



Molded case and Low voltage Power circuit breakers

1SDC001006B0202



ABB

ABB SACE.

At the forefront in Low Voltage.



ABB SACE is a synonym for quality and innovation in the Low Voltage sector, offering products which, by integrating perfectly, adapt to the various service and installation requirements thus satisfying all plant needs, from the small user up to large industrial electric power distributors.

ABB SACE's offer of low voltage circuit breakers makes high quality, reliable and precise products available, which guarantee high performances under any conditions, products safe during use and, when necessary, with easy replacement of faulty parts.

The SACE Emax series of power circuit breakers, now enriched with the new X1 size, cover all user needs from 800 up to 5000 A. X1 of Emax is proposed as the best solution for all those applications where dimensions

are an important and determining factor in selecting the circuit breaker, without however necessarily having to give up high performance. The SACE Tmax family of molded case circuit breakers is divided into

eight sizes (T1-T7) with rated uninterrupted currents from 100 to 1200 A. Perfect integration between the sizes, higher performances in circuit breakers of even more limited dimensions, a range of standardized accesso-



ries which considerably simplifies selection of the apparatus ... today all this is possible thanks to the eight sizes of the new Tmax molded case circuit breaker.

The Tmax family is completed by the new Tmax T7, available in two versions with manual and motorizable operating mechanism, to fulfill all installation and protection requirements – even the most specific ones. The Tmax circuit breakers and their accessories are conformed to the UL489 and CSA C22.2 No.5.1 North American Standard and to the International IEC60947-2 Standards.

The Emax power circuit breakers are conformed to the ANSI C37.13, C37.16, C37.17 and C37.50 Standards and they are UL1066 certified. The UL1066 certification allows Emax to be used in UL1558 switchgears, gear UL891 Low Voltage switchboards and CSA C22.2 No.31 Switchgear Assemblies.

In conformity with the commitment and awareness of the group towards the environment, ABB SACE has always paid great attention to achieving the objectives of sustainable development and environmental protection. All the company production sites have obtained ISO 9001 quality certification, and

Ethic and social accountability

The **SA8000** international Standard (Social Accountability 8000) or **Social Accountability System** is the mostly widespread and well-known international Standard, which guarantees that the company is socially accountable and mainly involved **in respecting the principles of the work ethic and of the working condition.**

Based on the so-called “social accountability requirements”, the SA8000 Standard confirms the **ethics of the whole production cycle** of a company with regard to child labor, freedom of employment, safeguarding personnel health and safety, freedom of association and the right to collective bargaining, equal opportunities, disciplinary procedures, wages and working hours, relationships with suppliers and integration with the communities where the company carries out its activities.

Also on the basis of the previous certification obtained by ABB Group Services Center in 2003, in 2004 ABB SACE S.p.A. decided to implement the management system for Social Accountability according to the SA8000 Standard at its sites in Frosinone and Patrica, which had already had their integrated QAS (Quality, Environment, Safety) management system certified in accordance with the ISO 9001:2000, ISO 14001:2004, and OHSAS 18001:99 Standards.

The initiative is part of the more general framework for the Group Function Sustainability Affairs activities of ABB, committed to implementation and pursuit of the objectives of ABB sustainability worldwide.

During the process for implementing the SA8000 Standard, all the personnel at Frosinone and Patrica took part in a series of confrontation and training meetings. **Suppliers and sub-suppliers were also involved**, called on to recognize and support the principles confirmed by the SA8000 Standard and the policy of ABB SACE S.p.A. for Social Accountability.

Among the multinationals in the electro-technical sector, ABB is, to date, the only certified SA8000 company. Yet again, ABB SACE is ahead of the field in offering a better and better customer service.



most of them also have ISO 14001 certification of their environmental management system. The ABB SACE factories have also obtained certification for integrated management of their Quality, Environment and Safety systems in conformity

with ISO 9001-2000, ISO 14001-96 and OHSAS 18001 Standards. From the safety viewpoint, ABB SACE is, once again, a guarantee of conformity with the electrical safety standards, in respect of the international Standards. Our products

undergo the most severe tests for conformity with standards as well as the necessary type tests in the ABB laboratories, accredited by the most important national and international Organizations (SINAL, ACAE and LOVAG).

Molded case circuit breakers for power distribution



Type		Tmax T1 1p	Tmax T1	Tmax T2	Tmax T3	Tmax Ts3					
Frame size	[A]	100	100	100	225	150			225		
Number of poles	[No.]	1	3-4	3 ⁽³⁾ -4	3-4	2-3-4			2-3-4		
Rated voltage	AC (50-60 Hz)	347	600Y/347	480	600Y/347	600			480		
	DC		500		500	600			500		
Interrupting ratings		B	N	S H	N S	N H L	N H L	N H L	N H L	N H L	
	240 V AC [kA rms]		50 ⁽²⁾	65 150	50 65	65 100 150	65 100 150	65 100 150	65 100 150	65 100 150	
	277 V AC [kA rms]	18 ⁽¹⁾									
	347 V AC [kA rms]	14 ⁽¹⁾									
	480 V AC [kA rms]		22 ⁽²⁾	35 65	25 35	25 50 85 ⁽⁶⁾	25 50 65	25 50 65	25 50 65	25 50 65	
	600Y/347 V AC [kA rms]		10		10 10						
	600 V AC [kA rms]					14 14 25					
	250 V DC (2 poles in series) [kA rms]		25		25 35						
	500 V DC (3 poles in series) [kA rms]		25		25 35						
	500 V DC (2 poles in series) [kA rms]					35 50 65	20 35 50	20 35 50	20 35 50	20 35 50	
	600 V DC (3 poles in series) [kA rms]					20 35 50					
Execution		F	F	F-P	F-P	F-P-W			F-P-W		
Trip units	TMF	■	■	■	■	■	■	■	■	■	
	TMD/TMA										
	MA			■	■	■	■	■	■	■	
	Electronic			■							
	PR212/P										
	PR221 DS			■							
	PR222DS/P										
	PR222DS/PD-A										
	PR231/P										
	PR232/P										
PR331/P											
PR332/P											
Dimensions	H [in/mm]	5.12/130	5.12/130	5.12/130	5.9/150	6.7/170			6.7/170		
	W 3p [in/mm]	1/25.4	3/76	3.54/90	4.13/105	4.13/105			4.13/105		
	D [in/mm]	2.76/70	2.76/70	2.76/70	2.76/70	4.07/103.5			4.07/103.5		
Mechanical life	[No. operations]	25000	25000	25000	25000	25000			25000		

⁽¹⁾ In 15 A = 10 kA @ 277 V AC - 10 kA @ 347 V AC

⁽²⁾ In 15 A = 35 kA @ 240 V AC - 14 kA @ 480Y/277 V AC

⁽³⁾ T5 600 with electronic trip units only and in three pole version

⁽⁴⁾ 2p T4N 250 and T5N 400: available only in N interrupting rating

⁽⁵⁾ In from 15 A up to 30 A = 65 kA @ 480 V AC

⁽⁶⁾ T2H 100 3p, T4H 250 3p, T4V 250 3p, T5H 400 3p, T5V 400 3p are Current Limiting CB

F = Fixed
P = Plug in
W = Draw out

Molded case circuit breakers for specific applications

MCP: Motor Control Protection circuit breaker

Type	Tmax T2	Tmax T3	Tmax Ts3			Tmax T4				
Frame size	100	225	150-225			250				
Poles	3	3	3			3				
Ratings	20...100	100...200	3...25	50...150	175...200	100-150-250				
Icu	S	H	S	L	L	L	N	S	H	L
240 V AC	65	150	65	50	150	150	65	100	150	200
480 V AC	35	65	35	25	85	65	25	35	65	100
600Y/347 V AC			10							
600 V AC				10	25		18	25	35	65
500 V DC			35	65 ⁽¹⁾	65	50				
600 V DC				50	50					
Trip unit	Adjustable magnetic only (6...12xIn)	■	■	■						
	Adjustable magnetic only (4...12xIn)				■	■	■			
	PR221DS-I	■	■				■	■	■	■
	PR231/P-I									
	PR211/P-I									

⁽¹⁾ Only for 25A rating

MCS: Molded Case Switches

Type	Tmax T1N-D	Tmax T3S-D	Tmax T3S-D	Tmax Ts3H-D 150
Rating [A]	100	150	225	150
Poles [No.]	3-4	3-4	3-4	3-4
Magnetic override [A]	1000	1500	2250	1500
Rated Voltage AC (50-60 Hz) [V]	600Y/347	600Y/347	600Y/347	600
DC [V]	500	500	500	600

Tmax Current Limiting

Type	Tmax T2	Tmax T4		Tmax T5	
Frame size [A]	100	250		400	
Number of poles [No.]	3	3		3	
Rated voltage AC (50-60 Hz) [V]	480	600		600	
DC [V]		600		600	
Interrupting ratings	H	H	V	H	V
240 V AC [kA rms]	150	150	200	150	200
277 V AC [kA rms]					
347 V AC [kA rms]					
480 V AC [kA rms]	65	65	150	65	150
600Y/347 V AC [kA rms]					
600 V AC [kA rms]		35	100	35	100
250 V DC (2 poles in series) [kA rms]					
500 V DC (3 poles in series) [kA rms]					
500 V DC (2 poles in series) [kA rms]		50	100	50	100
600 V DC (3 poles in series) [kA rms]		35	65	35	65
Trip units	TMF	■	■		
	TMD/TMA		■	■	
	Electronic	■	■	■	
Dimensions	H [in/mm]	5.12/130	8.07/205	8.07/205	
	W 3p [in/mm]	3.54/90	4.13/105	5.51/140	
	D [in/mm]	2.76/70	4.07/103.5	4.07/103.5	
Mechanical life [No. operations]		25000	20000	20000	

Emax power circuit breakers for distribution

Common data

Voltages			
Rated maximum voltage	[V]	635	
Rated voltage	[V]	600	
Test voltage (1 min. 50/60 Hz)	[kV]	2.2	
Frequency	[Hz]	50 - 60	
Number of poles		3 - 4	
Version		Fixed (F) - Draw out (W)	



Level of performance

Currents

Frame size

	[A]						
	[A]						
	[A]						
	[A]						
	[A]						
	[A]						

Capacity of neutral pole for four-pole circuit breakers [%I_u]

Rated short circuit current

240 V	[kA]	42	42	50	42	65	65	85
480 V	[kA]	42	42	50	42	50	65	85
600 V	[kA]	-	42	50	42	50	65	65

Rated short time current [kA]

42	[kA]	42	42	50	42	50	65	65
42	[kA]	42	42	50	42	50	65	65
-	[kA]	42	42	50	42	50	65	65

Trip units

PR121/P		-	■	■	■	■	■	■
PR122/P		-	■	■	■	■	■	■
PR123/P		-	■	■	■	■	■	■
PR331/P		■	-	-	-	-	-	-
PR332/P		■	-	-	-	-	-	-
PR333/P		■	-	-	-	-	-	-

Trip times

Make time (max)	[ms]	80	80	80	80	80	80	80
Break time (I<ST current) (max)	[ms]	70	70	70	70	70	70	70
Break time (I>ST current) (max)	[ms]	30	30	30	30	30	30	12

Overall dimensions

Fixed: H = 418 mm/16.46 in - D = 302 mm/11.89 in⁽¹⁾

W (3 poles/4 poles)	[mm]	210/280	296/386	296/386
W (3 poles/4 poles)	[in]	8.27/11.02	11.65/15.20	11.65/15.20

Draw out: H = 461 mm/18.15 in - D = 396.5 mm/15.61 in⁽²⁾

W (3 poles/4 poles)	[mm]	284/354	324/414	324/414
W (3 poles/4 poles)	[in]	11.18/13.94	12.76/16.30	12.76/16.30

Weights

(circuit breaker complete with trip unit, RH terminals, CS, excluding accessories)

Fixed	3 poles/4 poles	[kg]	11/14	45/54	50/61
	3 poles/4 poles	[lbs]	24.26/30.87	99.23/119.07	110.25/134.51
Draw out	3 poles/4 poles	[kg]	32/42.6	70/82	78/93
	3 poles/4 poles	[lbs]	70.56/93.93	154.35/180.81	171.99/205.07

Continuous current rating I _u	[A]				
Mechanical life with regular ordinary maintenance	[No. Operations x 1000]				
Operation frequency	[Operations/hour]				
Electrical life	[No. Operations x 1000]				
Operation frequency	[Operations/hour]				

⁽¹⁾ 10 for E3X-A

⁽²⁾ 1.5 for E3X-A

X1	E1		E2			
	B-A	B-A N-A	B-A	N-A	S-A	H-A
800	800	800	1600	800	800	800
	1200	1200		1200	1200	1200
				1600	1600	1600
100	100	100	100	100	100	100
42	42	50	42	65	65	85
42	42	50	42	50	65	85
-	42	50	42	50	65	65
42	42	50	42	50	65	65
-	■	■	■	■	■	■
-	■	■	■	■	■	■
-	■	■	■	■	■	■
-	-	-	-	-	-	-
-	-	-	-	-	-	-
80	80	80	80	80	80	80
70	70	70	70	70	70	70
30	30	30	30	30	30	12
210/280	296/386		296/386			
8.27/11.02	11.65/15.20		11.65/15.20			
284/354	324/414		324/414			
11.18/13.94	12.76/16.30		12.76/16.30			
11/14	45/54		50/61			
24.26/30.87	99.23/119.07		110.25/134.51			
32/42.6	70/82		78/93			
70.56/93.93	154.35/180.81		171.99/205.07			

X1 B-A	E1 B-A / N-A		E2 B-A / N-A / S-A / H-A		
800	800	1200	800	1200	1600
12.5	20	20	20	20	20
60	30	30	30	30	30
6	10	10	10	10	10
30	30	30	30	30	30



E3						E4					E6						
N-A	S-A	H-A	V-A	X-A		S-A	H-A	V-A	L-A	H-A/f ⁽¹⁾		H-A	V-A	L-A	X-A	H-A/f ⁽¹⁾	X-A/f ⁽¹⁾
2000	800	800	800	800	800	3200	3200	3200	3200	3200		4000	4000	4000	4000	4000	4000
2500	1200	1200	1200	1200	1200	3600	3600	3600	3600	3600		5000	5000	5000	5000	5000	5000
	1600	1600	1600	1600													
	2000	2000	2000	2000	2000												
	2500	2500	2500														
	3200	3200	3200														
100	100	100	100	100	100	50	50	50	50	100		50	50	50	50	100	100
65	85	85	125	200		85	100	100	125	100		125	125	150	200	125	200
50	65	85	125	200		65	85	100	125	85		85	125	150	200	85	200
50	65	85	100	14		65	85	100	100	85		85	100	100	100	85	100
50	65	65	85	14		65	85	100	100	85		100	100	100	100	100	100
■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■
■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■
■	■	■	■	■	■	■	■	■	■	■		■	■	■	■	■	■
-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-	-
80	80	80	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	70	70	70
30	30	30	30	30	30	30	30	30	30	30		30	30	30	30	30	30
		404/530						566/656		746				782/908			1034
		15.91/20.87						22.28/25.83		29.37				30.79/35.75			40.71
		432/558						594/684		774				810/936			1062
		17.01/21.97						23.39/26.93		30.47				31.89/36.85			41.81
		66/80		70/84				97/117		125				140/160			185
		145.53/176.40		154.35/185.22				213.89/257.99		275.63				308.70/352.80			407.93
		104/125		106/128				147/165		200				210/240			275
		229.32/275.63		233.73/282.24				324.14/363.83		441.00				463.05/529.20			606.38

E3 N-A / S-A / H-A / V-A / X-A						E4 S-A / H-A / V-A / L-A / H-A/f				E6 H-A / V-A / L-A / X-A / H-A/f / X-A/f			
800	1200	1600	2000	2500	3200	3200	3600	4000	5000				
15 ⁽²⁾	15 ⁽²⁾	15 ⁽²⁾	15 ⁽²⁾	15	15	8	8	8	8				
30	30	30	30	30	30	30	30	30	30				
10 ⁽³⁾	10 ⁽³⁾	10 ⁽³⁾	8 ⁽³⁾	8	8	5	5	5	3				
30	30	30	30	30	30	30	30	30	30				

Emax power circuit breakers for specific applications

Emax UL switches

Type		X1B-A/MS	E1B-A/MS	E1N-A/MS	E2B-A/MS	E2N-A/MS	E2S-A/MS
Frame size	[A]	800	800	800	1600	800	800
	[A]		1200	1200		1200	1200
	[A]					1600	1600
	[A]						
	[A]						
Number of poles		3/4	3/4	3/4	3/4	3/4	3/4
Capacity of neutral pole for four-pole circuit breakers	[%I _n]	100	100	100	100	100	100
Rated voltage	[V]	480	600	600	600	600	600
Rated maximum voltage	[V]	508	635	635	635	635	635
Test voltage (1 min. 50/60 Hz)	[kV]	2.2	2.2	2.2	2.2	2.2	2.2
Frequency	[Hz]	50-60	50-60	50-60	50-60	50-60	50-60
Rated short time current	[kA]	42	42	50	42	50	65
Version		F - W	F - W	F - W	F - W	F - W	F - W

IEC 60947-2

Type		X1			E1		E2				
		B	N	L	B	N	B	N	S	L	
Levels of performance	Currents: rated uninterrupted current (at 40°C) I _n	[A]	630	630	630	800	800	1600	1000	800	1250
		[A]	800	800	800	1000	1000	2000	1250	1000	1600
		[A]	1000	1000	1000	1250	1250		1600	1250	
		[A]	1250	1250	1250	1600	1600		2000	1600	
		[A]	1600	1600						2000	
		[A]									
Capacity of neutral pole for four-pole circuit breakers	[%I _n]	100	100	100	100	100	100	100	100	100	
Rated ultimate breaking capacity under short circuit I _{cu}	220/230/380/400/415 V	[kA]	42	65	150	42	50	42	65	85	130
	440 V	[kA]	42	65	130	42	50	42	65	85	110
	500/525 V	[kA]	42	50	100	42	50	42	55	65	85
	660/690 V	[kA]	42	50	60	42	50	42	55	65	85
Rated service breaking capacity under short circuit I _{cs}	220/230/380/400/415 V	[kA]	42	50	150	42	50	42	65	85	130
	440 V	[kA]	42	50	130	42	50	42	65	85	110
	500/525 V	[kA]	42	42	100	42	50	42	55	65	65
	660/690 V	[kA]	42	42	45	42	50	42	55	65	65
Rated short time withstand current I _{cw} (1s)	[kA]	42	42	15	42	50	42	55	65	10	

UL 1066 and IEC 60947-2

Type		X1		E1		E2		
		W (3 poles/4 poles)	[mm]	W (3 poles/4 poles)	[in]	W (3 poles/4 poles)	[mm]	W (3 poles/4 poles)
Overall dimensions	Fixed: H = 418 mm/16.46 in; D = 302 mm/11.89 in ⁽¹⁾							
		210/280		296/386		296/386		
		8.27/11.02		11.65/15.2		11.65/15.2		
Draw out: H = 461 mm/18.15 in; D = 396.5 mm/15.61 in ⁽²⁾		284/354		324/414		324/414		
		11.18/13.94		12.76/16.3		12.76/16.3		
Weights (circuit breaker complete with trip unit, RH terminals, CS, excluding accessories)	Fixed	3 poles/4 poles	[Kg]	11/14		45/54		50/61
		3 poles/4 poles	[lbs]	24.26/30.87		99.23/119.07		110.25/134.51
Draw out		3 poles/4 poles	[Kg]	32/42.6		70/82		78/93
		3 poles/4 poles	[lbs]	70.56/93.93		154.35/180.81		171.99/205.07

⁽¹⁾ four poles only

⁽²⁾ 100% neutral protection

⁽³⁾ for E3X-A only

⁽⁴⁾ the performance at 600 V is 100 kA

⁽¹⁾ for X1: H = 268 mm/10.55 in – D = 181 mm/7.13 in; for E3X-A: H = 438 mm/17.24 in – D = 302 mm/11.89 in

⁽²⁾ for X1: H = 343 mm/13.5 in – D = 254 mm/10 in; for E3X-A: H = 481 mm/18.94 in – D = 396.5 mm/15.61 in

E3N-A/MS	E3S-A/MS	E3V-A/MS	E4S-A/MS	E4H-A/MS	E4V-A/MS	E4H-Af/MS	E6H-A/MS	E6H-Af/MS
2000	800	800	3200	3200	3200	3200	4000	4000
2500	1200	1200	3600	3600	3600	3600	5000	5000
	1600	1600						
	2000	2000						
	2500	2500						
	3200	3200						
3/4	3/4	3/4	3/4	3/4	3/4	4	3/4	4
100	100	100	50	50	50	100	50	100
600	600	600	600	600	600	600	600	600
635	635	635	635	635	635	635	635	635
2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
50-60	50-60	50-60	50-60	50-60	50-60	50-60	50-60	50-60
50	65	85	65	85	100	85	100	100
F - W	F - W	F - W	F - W	F - W	F - W	F - W	F - W	F - W

E3					E4					E6		
N	S	H	V	L	S	H	V	S/f ⁽¹⁾	H/f ⁽¹⁾	H	V	H/f ⁽¹⁾
2500	1000	800	800	2000	4000	3200	3200	4000	3200	4000	3200	4000
3200	1250	1000	1250	2500		4000	4000		4000	5000	4000	5000
	1600	1250	1600							6300	5000	6300
	2000	1600	2000								6300	
	2500	2000	2500									
	3200	2500	3200									
	3200											
100	100	100	100	100	50	50	50	100	100	50	50	100
65	75	100	130	130	75	100	150	80	100	100	150	100
65	75	100	130	110	75	100	150	80	100	100	150	100
65	75	100	100	85	75	100	130	75	100	100	130	100
65	75	85 ⁽⁴⁾	100	85	75	85 ⁽⁴⁾	100	75	100	100	100	100
65	75	85	100	130	75	100	150	80	100	100	125	100
65	75	85	100	110	75	100	150	80	100	100	125	100
65	75	85	85	65	75	100	130	75	100	100	100	100
65	75	85	85	65	75	85	100	75	100	100	100	100
65	75	75	85	15	75	100	100	80	85	85	85	100

E3		E4		E6	
404/530		566/656	746 ⁽²⁾	782/908	1034 ⁽²⁾
15.91/20.87		22.28/25.83	29.37	30.79/35.75	40.71
432/558		594/684	774 ⁽²⁾	810/936	1062 ⁽²⁾
17.01/21.97		23.39/26.93	30.47	31.89/36.85	41.81
66/80	70/84 ⁽³⁾	97/117	125 ⁽²⁾	140/160	185 ⁽²⁾
145.53/176.40	154.35/185.22 ⁽³⁾	213.89/257.99	275.63	308.70/352.80	407.93
104/125	106/128 ⁽³⁾	147/165	200 ⁽²⁾	210/240	275 ⁽²⁾
229.32/275.63	233.73/282.24 ⁽³⁾	324.14/363.83	441	463.05/529.2	606.38



Due to possible developments of standards as well as of materials, the characteristics and dimensions specified in the present catalogue may only be considered binding after confirmation by ABB SACE.

1SDC001006B0201 - 11/2005
Printed in Italy
2,000 - CAL

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