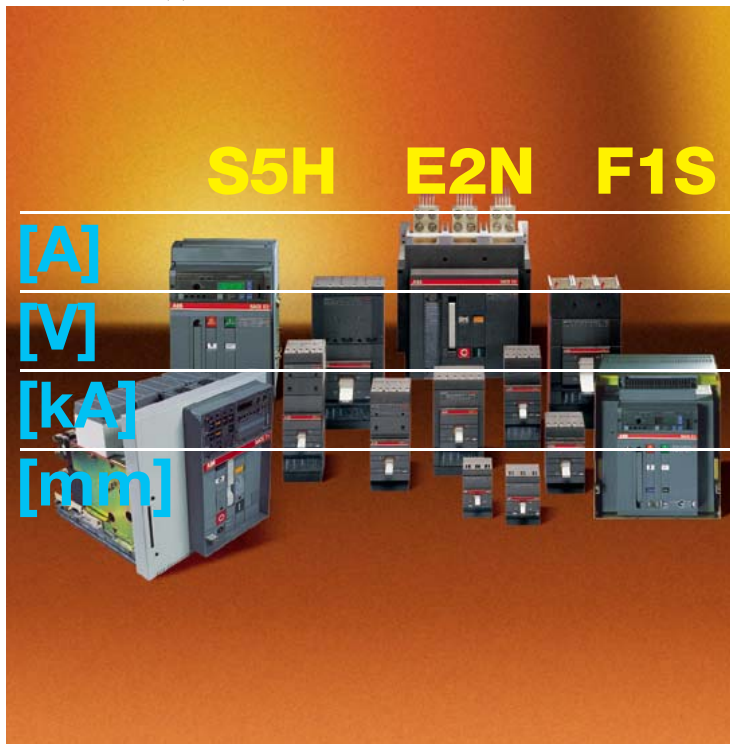


CNABB / ITSLV / 604040 / 011(R3) en 06-2003



适合所有应用的领域

A range for all applications

	直流保护 Direct current protection	发电机保护 Generator protection	变压器保护 Transformer protection
SACE Isomax	S1, S2, S3, S5, S6 配热磁脱扣器 with thermomagnetic releases	S3 (3xIth) 配热磁脱扣器 由 S4 至 S8 配 PR211 和 PR212 电子脱扣器 S3 with thermomagnetic release (3xIth), from S4 to S8 with PR211 and PR212 releases	S1 至 S8 配 PR211 和 PR212 电子脱扣器或热磁脱扣器 from S1 to S8 with PR211 and PR212 releases
SACE Emax		E1, E2, E3, E4, E6 配 PR111, PR112 和 PR113 电子脱扣器 with PR111, PR112 and PR113 releases	E1, E2, E3, E4, E6 配 PR111, PR112 和 PR113 电子脱扣器 with PR111, PR112 and PR113 releases
SACE Megamax	F1, F3, F4 配瞬时或延时电磁脱扣器 with electromagnetic releases with instantaneous or delayed trip	F1, F2, F3, F4, F5, F6 配 AR1 和 PR1 电子脱扣器 with AR1 and PR1 releases	F1 至 F6 配 AR1 和 PR1 电子脱扣器 with AR1 and PR1 releases



馈电保护 Feeder protection	马达保护 Motor protection	剩余电流保护 Residual-current protection	线路控制及隔离 Circuit control and isolation
S1 至 S8 配 PR211 和 PR212 电子脱扣器或热磁脱扣器 from S1 to S8 with PR211 and PR212 releases	S2 至 S7 配短路保护或 S4-S7 配过载和短路保护 (PR212/MP) from S2 to S7 with short-circuit only protection or from S4 to S7 with overload and short-circuit protection (PR212/MP)	S1-S3 配 RC211 和 RC212 剩余电流脱扣器 S4-S8 配 RCQ 漏电继电器 from S1 to S3 with RC211 and RC212 residual-current release, from S4 to S8 with RCQ switchboard residual-current relay	S2D, S3D, S6D, S7D 及 S8D SACE Isomax
E1 至 E6 配 PR111, PR112 和 PR113 电子脱扣器 from E1 to E6 with PR111, PR112 and PR113 releases	E1 至 E6 配 PR112 和 PR113 电子脱扣器 from E1 to E6 with PR112 and PR113 release	配 RCQ 漏电继电器 RCQ switchboard residual-current relay	由 from E1/MS 至 to E6/MS SACE Emox
F1 至 F6 配 AR1 和 PR1 电子脱扣器 with AR1 and PR1 releases		配 RCQ 漏电继电器 RCQ switchboard residual-current relay	由 from F1/MS 至 to F6/MS SACE Megamax



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SACE Emax 空气断路器

SACE Emax Air Circuit Breakers

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SACE Megamax 空气断路器

SACE Megamax Air Circuit Breakers

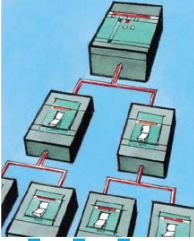
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Distribution



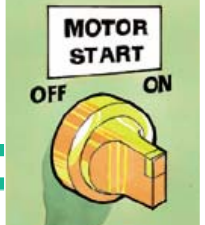
Distribution 1000V



Current-limiting



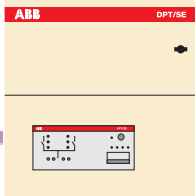
Motor protection



Switch-disconnectors



DPT/SE & DPT/TE



ESD 2000



RCQ



Residual-current releases A coordinated combination



Residual-current circuit-breakers combine overcurrent protection and residual-current protection in a single device. They are tripped both by overloads / short circuits and earth leakage currents. "Pure" residual-current circuit-breakers, obtained using switch-disconnectors, are only tripped by earth fault currents.

They also enable the installation's insulation status to be monitored continuously, ensuring effective protection against fire and explosion hazards and, in the case of devices with $I_{\Delta n} \leq 30$ mA, ensure protection (personal safety) against direct and indirect contacts, in addition to the compulsory measures specified in the relevant standards and safety prescriptions.

RC212 residual-current releases

RC212 residual-current releases can be installed in horizontal or vertical layouts with SACE Isomax S2 and S3 circuit-breakers or SACE S3D switch-disconnectors. These releases feature analogue electronic technology. They do not require an auxiliary power supply because they are powered directly from the mains through the circuit-breaker and operation is guaranteed even with only one phase live and unidirectional pulsating currents with continuous current components. A test pushbutton enables operation to be tested.

The residual-current releases are manufactured in conformity with the following standards: IEC 60947-2 Appendix B (idt GB14148.2-200 Appendix B), IEC 255-4 and IEC 1000 for protection against slow tripping, as well as IEC 755 for insensitiveness to continuous current components.

SACE RC212 releases act on the circuit-breaker through an opening solenoid supplied with the release to be fitted in the special slot in the zone of the third pole.

RCQ residual-current switchboard release

Suitable for use with solely alternating earth currents and for alternating and/or pulsating currents with continuous components, while also being suitable for implementing residual-current selectivity. It can be used in conjunction with all SACE Isomax S circuit-breakers and is installed in the switchboard with a separate toroid for external installation on the line conductors.

Particularly suitable for applications requiring a residual-current protection system that is coordinated with the various different distribution levels, from the main switchboard to the end user.

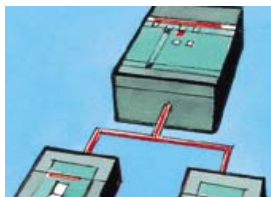
剩余电流脱扣器	RC212
采用技术	电子式
符合标准	IEC 60947-2 附录 B GB 14048.2 附录 B IEC 255-3 和 IEC 1000 : 故障脱扣保护
动作	分励线圈
工作电压 [V]	50 ... 500
工作频率 [Hz]	50 - 60 Hz $\pm 10\%$
测试电压范围 [V]	50 ... 500
额定工作电流 [A]	高达 250
脱扣门限值 $I_{\Delta n}$ [A]	0.03 - 0.1 - 0.3 - 0.5 - 3
允差 $I_{\Delta n}$ [%]	$\pm 0, -20$
脱扣时间 [s]	0 - 0.1 - 0.25 - 0.5 - 1 - 1.5
脱扣时间允差 [%]	± 20
脱扣信号	■
自供电	■
遥控断开输入	■
50% 时报警	■
AC 型	■
A 型	■
高敏感性	■
装在断路器下	■
装在断路器侧	■
尺寸 (L x H x P) [mm]	120 x 120 x 70 (RC212/2) 140 x 170 x 108 (RC212/3)

剩余电流继电器	RCQ
电源电压 AC [V]	80 ... 500
DC [V]	48 ... 125
工作频率 [Hz]	50 + 60 Hz $\pm 10\%$
脱扣门限值调整 $I_{\Delta n}$	
-1° 调整范围 [A]	0.03 - 0.05 - 0.1 - 0.3 - 0.5
-2° 调整范围 [A]	1 - 3 - 5 - 10 - 30
脱扣时间调整 [s]	0 - 0.1 - 0.2 - 0.3 - 0.5 - 0.7 - 1 - 2 - 3 - 5
报警门限值调整值 [%] x $I_{\Delta n}$	25 ... 75% x $I_{\Delta n}$
闭合式互感器应用范围 $I_{\Delta n}$	
环形互感器直径 $\phi 110$ [mm]	0.03 ... 30
报警信号	LED 黄色闪烁 一对常开转换触点 6A - 250 V AC 50/60 Hz
漏电器脱扣信号	LED 黄色闪烁 二对常开转换触点 (N.O.N.C.; N.O.) 6A - 250 V AC 50/60 Hz
遥控断开指令	N.O. 触点 脱扣时间 15 ms
环形互感器连接	4 根导线串接 最长 5 m
尺寸 (L x H x P) [mm]	96 x 96 x 131.5
安装钻孔图 [mm]	92 x 92



用于配电的 SACE Emax 空气断路器

SACE Emax air circuit-breakers for distribution



系列产品的共同规格 Specifications common to the entire range

电压 Voltages			
额定操作电压 Rated service voltage	U _e	690 - / 250 -	[V]
额定绝缘电压 Rated insulation voltage	U _i	1000	[V]
额定脉冲耐受电压 Rated impulse withstand voltage	U _{imp}	12	[kV]
运行温度 Service temperature		-5 ... +70	[°C]
储存温度 Storage temperature		-40 ... +70	[°C]
频率 Frequency	f	50-60	[Hz]
极数 Numbers of poles		3-4	
型式 Versions		固定式, 抽出式, Fixed- / Withdrawable	



每一系列的特性 Specification of the single series

		E1	
性能水平 Performance level		B	N
额定持续电流 Rated uninterrupted current	lu	800	800
		[A]	[A]
		1250	1250
		[A]	[A]
		[A]	[A]
		[A]	[A]
四极断路器的中性极容量 Capacity of neutral pole on four-pole circuit-breakers	(%lu)	100	100
额定极限短路分断容量 Rated ultimate short-circuit breaking capacity	I _{cu}	220/230/380/400/415 V - 440 V - 500/660/690 V -	[kA]
		42	50
		[kA]	[kA]
		42	50
		[kA]	[kA]
		36	36
额定工作短路分断容量 Rated service short-circuit breaking capacity	I _{cs}	220/230/380/400/415 V - 440 V - 500/660/690 V -	[kA]
		42	50
		[kA]	[kA]
		42	50
		[kA]	[kA]
		36	36
额定短路耐受电流 Rated short-time withstand current	I _{cw} (1 s) / I _{cw} (3 s)	[kA]	[kA]
		36	50
		[kA]	[kA]
		36	36
额定短路合闸容量 (峰值) Rated short-circuit making capacity (peak value)	I _{cm}	220/230/380/400/415 V - 440 V - 500/660/690 V -	[kA]
		88.2	105
		[kA]	[kA]
		88.2	105
		[kA]	[kA]
		75.6	75.6
使用类别 Utilization category	(根据 in accordance with CEI EN 60947-2)	B	B
隔离功能 Isolation behaviour	(根据 in accordance with CEI EN 60947-2)	■	■
过电流保护 Overcurrent protection	Microprocessor-based releases for a.c. applications	■	■
用于交流电的微处理器断路器			
操作时间 Operating times			
合闸时间 (最大) Closing time (max)	[ms]	80	80
分闸时间 I_{clow} (最大) ⁽¹⁾ Break time for I_{clow} (max) ⁽¹⁾	[ms]	70	70
分闸时间 I>sub>clow</sub> (最大) Break time for I>sub>clow</sub> (max)	[ms]	30	30
尺寸 Overall dimensions			
固定式 3/4 极 Fixed:	H = 418 mm - P = 302 mm L (3/4 poles)	[mm]	296 / 386
抽出式 3/4 极 Withdrawable:	H = 461 mm - P = 396.5 mm L (3/4 poles)	[mm]	324 / 414
重量 (断路器包括脱扣器和电流互感器, 不包括附件) Weights (circuit-breaker complete with release and CT, excluding accessories)			
固定式 3/4 极 Fixed 3/4 Poles		[kg]	45 / 54 45 / 54
抽出式 3/4 极 (包括固定部份) Withdrawable 3/4 Poles (including fixed part)		[kg]	70 / 82 70 / 82

⁽¹⁾ 无时间延迟

⁽²⁾ 在 600V 时, 分断容量为 100kA

⁽³⁾ 在 500V 时, 分断容量为 100kA

⁽¹⁾ without intentional delay

⁽²⁾ the performance at 600V is 100kA

⁽³⁾ the performance at 500V is 100kA

		E1 B			E2 B-N		
额定持续电流 I _u (40 °C), lu	Rated uninterrupted current (40 °C), lu	[A]	800	1250	1250	1600	2000
机械寿命 (正常维护作业下) [操作次数 X1000]	Mechanical life with regular routine maintenance	[No. operations x 1000]	25	25	25	25	25
频率 (每小时操作次数)	Frequency	[Operations per hour]	60	60	60	60	60
电气寿命 (操作次数 X1000)	Electrical life (440 V -)	[No. operations x 1000]	10	10	15	12	10
	Electrical life (690 V -)	[No. operations x 1000]	10	8	15	10	8
频率 (每小时操作次数)	Frequency	[Operations per hour]	30	30	30	30	30



E2			E3				E4		E6			
B	N	L	N	S	H	L	S	H	H	V		
1600	1250	1250	2500	1250	1250	2000	4000	3200	5000	3200		
2000	1600	1600	3200	1600	1600	2500		4000	6300	4000		
2000				2000	2000					5000		
				2500	2500					6300		
				3200	3200							
100	100	100	100	100	100	100	50	50	50	50		
42	65	130	65	75	100	130	75	100	100	150		
42	65	110	65	75	100	110	75	100	100	150		
42	55	85	65	75	85	85	75	85 ⁽²⁾	100	100		
42	65	130	65	75	85	130	75	100	100	125		
42	65	110	65	75	85	110	75	100	100	125		
42	55	65	65	75	85	65	75	85 ⁽³⁾	100	100		
40	55	10	65	75	75	15	75	100	100	100		
40	40	-	65	65	65	-	65	65	-	-		
88.2	143	286	143	165	220	286	165	220	220	330		
88.2	143	242	143	165	220	242	165	220	220	330		
88.2	121	187	143	165	187	187	165	187	220	220		
B	B	A	B	B	B	A	B	B	B	B		
■	■	■	■	■	■	■	■	■	■	■		
■	■	■	■	■	■	■	■	■	■	■		
80	80	80	80	80	80	80	80	80	80	80		
70	70	70	70	70	70	70	70	70	70	70		
30	30	12	30	30	30	12	30	30	30	30		
	296 / 386			404 / 530			566 / 656		782 / 908			
	324 / 414			432 / 558			594 / 684		810 / 936			
50 / 61	50 / 61	52 / 63	66 / 80	66 / 80	66 / 80	72 / 83	97 / 117	97 / 117	140 / 160	140 / 160		
78 / 93	78 / 93	80 / 95	104 / 125	104 / 125	104 / 125	110 / 127	147 / 165	147 / 165	210 / 240	210 / 240		

E2 L		E3 N-S-H				E3 L		E4 S-H		E6 H-V				
1250	1600	1250	1600	2000	2500	3200	2000	2500	3200	4000	3200	4000	5000	6300
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
4	3	12	10	9	8	6	2	1.8	7	5	5	4	3	2
3	2	12	10	9	7	5	15	1.3	7	4	5	4	2	15
20	20	20	20	20	20	20	20	20	10	10	10	10	10	10

隔离开关

Switch-disconnector

这类型的开关与其原型断路器唯一不同的是未加装过流保护装置，隔离开关亦可为固定式或抽出式，兼有3极4极，并以“MS”符号作识别，可应用于AC-23A的使用类别（接通电机或高电感的负载），其电气特性如下表（根据IEC 60947-3标准）

The switch-disconnectors are derived from the corresponding automatic circuit-breakers, of which they maintain the overall dimensions and the possibility of mounting accessories. This version differs from the automatic circuit-breakers only in the absence of overcurrent releases.

The circuit-breaker is available in both fixed and withdrawable versions, three-pole and four-pole. The switch-disconnectors, identified by the label “MS”, may be used according to the category of use AC-23A (switching motor loads or other highly inductive loads) in accordance with the standard IEC 60947-3. The electrical specifications of the switch-disconnectors are listed in the table below.



			E1 B/MS	E1 N/MS	E2 B/MS	E2 N/MS	E3 N/MS	E3 S/MS	E4 S/MS	E4 S1/MS	E4 H/MS	E6 H/MS	E6 H1/MS			
额定电流 Rated current	I _n (40 °C)	[A]	800	800	1600	1250	2500	1250	4000	4000	3200	5000	5000			
			1250	1250	200	1600	3200	1600				4000	6300	6300		
						2000		2000								
								2500								
									3200							
额定操作电压 Rated service voltage	U _e 50-60 Hz	[V-]	690	690	690	690	690	690	690	690	690	690	690			
			250	250	250	250	250	250	250	250	250	250	250	250		
额定绝缘电压 Rated insulation voltage	U _i	[V-]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000			
额定脉冲耐受电压 Rated impulse withstand voltage	U _{imp}	[V-]	12	12	12	12	12	12	12	12	12	12	12			
额定短时耐受电流 Rated short-time withstand current	I _{cw} (1 s) (3 s)	[kA]	36	50	42	55	65	75	75	80	100	100	100			
		[kA]	36	36	42	42	65	65	75	75	85	85	85			
额定合闸容量 Rated making capacity	I _{cm}															
		220/230/380/400/415/440 V- 220/230/380/400/415/440 V-	[kA]	75.6	105	88.2	121	143	165	165	176	220	220	220		
		[kA]	75.6	75.6	88.2	121	143	165	165	165	187	220	220			

高达 1000V 交流电压的 SACE Emax 空气断路器

SACE Emax circuit-breakers for voltages up to 1000V AC in alternating current

SACE E2B/E 20			
额定频率	50-60 Hz	额定电压	U _n = 2000V U _e = 1000V
额定电压	1000V	符合标准	CE EN 60898-2 IEC 947-2
额定电流	20 A	额定短路分断能力	I _{cn} = 20kA _{As} 1s
额定短路分断能力	20		

SACE Emax 断路器有个特殊型号，专用于电压高达 1000V 的交流线路，这种型号的断路器通过在标准系列（额定电压最高为 690V AC）的缩写后加上“-E”来进行命名，并且是从相应的 SACE Emax 标准断路器演变而来的。它们具有相同的形式和附件。

用于 1000V 交流的 SACE Emax 断路器有 3 极和 4 极的固定式和抽出式可供选择。

SACE Emax/E 断路器特别适用于矿井、石油化工厂和动力牵引等场合。下表所示为该系列的电气属性。

SACE Emax circuit-breakers can be supplied, in the special version, for rated service voltages up to 1000V in alternating current.

The circuit-breakers in this version are defined with the abbreviation of the standard range (rated service voltage up to 690V a.c.) plus “-E” and are derived from the corresponding standard SACE Emax circuit-breakers of which they keep the versions and accessories.

The range of SACE Emax circuit-breakers for

applications up to 1000V in alternating current is available in the fixed and withdrawable version, both in the three-pole and four-pole version.

SACE Emax/E circuit-breakers are particularly suitable for installation in mines, petrochemical plants and for traction.

The table below shows the electrical characteristics of the range.



详细说明	Specifications 1000 V AC	E2B/E	E2N/E	E3H/E	E4H/E
型式	Version	固定式/抽出式 fixed/withdr.	固定式/抽出式 fixed/withdr.	固定式/抽出式 fixed/withdrawable	固定式/抽出式 fixed/withdrawable
极数	Number of poles	3 - 4	3 - 4	3 - 4	3 - 4
频率	Frequency	50 - 60	50 - 60	50 - 60	50 - 60
额定操作电压	Rated service voltage	[V] 1000	1000	1000	1000
额定持续电流	Rated uninterrupted current I_u	[A] 1600	1250	1250	3200
		[A] 2000	1600	1600	4000
		[A]	2000	2000	
		[A]		2500	
		[A]		3200	
四级断路器的中性极容量	Capacity of neutral pole on four-pole circuit-breakers	[% I _u] 100	100	100	50
额定极限短路分断容量	Rated ultimate short-circuit breaking capacity I_{cu}	[kA] 20	30	50	65
额定工作短路分断容量	Rated service short-circuit breaking capacity I_{cs}	[kA] 20	30	50	65
额定短时耐受电流	Rated short-time withstand current I_{sw}	[kA] 20	30	50	65
使用类别	Utilization category	B	B	B	B
过电流保护 - 微处理器脱扣器	Overcurrent protection - Microprocessor-based releases for a.c. applic.	■	■	■	■
尺寸					
固定式 3/4 极	Fixed: H = 418 mm - P = 302 mm L (3/4 poles)	[mm] 296 / 396	296 / 386	404 / 530	566 / 656
抽出式 3/4 极	Withdrawable: H = 461 mm - P = 396.5 mm L (3/4 poles)	[mm] 324 / 414	324 / 414	432 / 558	594 / 684
重量 (断路器包括脱扣器和互感器 - 不包括附件)					
固定式 3/4 极	Fixed 3/4 poles	[kg] 46 / 55	46 / 55	68 / 80	95 / 115
抽出式 3/4 极 (包括固定部分)	Withdrawable 3/4 poles (including fixed part)	[kg] 72 / 89	72 / 89	100 / 125	147 / 190



应用于直流高达 1000V DC 的隔离开关

Switch-disconnectors for applications up to 1000V DC

ABB SACE 成功开发出的 SACE Emax/E MS 系列应用于直流 1000V 的直流隔离开关。符合 IEC 60947-3 标准。这类产品的产品主要应用于直流系统中母排的连接或主隔离，如直流电力机车：

这类产品的应用可达 1000V DC / 3200A 高达 750V DC / 4000A。有固定式和抽出式，三极和四极。

如将三极串联，可应用于 750V DC 的系统中，如将四极串联，可应用于 1000V DC 的系统中。

SACE Emax/E MS 不但拥有与标准断路器相同的尺寸和优点，还可安装与标准断路器通用的端子单元。但是，它们不可以安装交流电子脱扣器、电流互感器和电流探测及保护附件。

ABB SACE has developed the SACE Emax/E MS range of switch-disconnectors for applications in direct current up to 1000V in compliance with international standard IEC 60947-3. These non-automatic circuit-breakers are especially suitable for use as busbar links or main isolators in direct current systems, such as for applications involving electric traction. The range covers all installation needs up to 1000V DC / 3200A or up to 750V DC / 4000A. They are available in fixed and withdrawable versions, three-pole and four-pole.

By connecting three breaking poles in series, it is possible to achieve a rated insulation voltage of 750V DC, while with four poles in series the limit rises to 1000V DC.

The switch-disconnectors of the SACE Emax/E MS range maintain the overall dimensions and fastening points of the standard range circuit-breakers. They may be fitted with the various terminal kits and all accessories common to the SACE Emax range. They may obviously not be associated with the electronic release, CT and with the current detection and protection accessories for AC applications.

The withdrawable circuit-breakers should be used together with the special version fixed parts for applications at 750 / 1000V DC.



详细说明 Specifications 1000 V DC				E1B/E MS		E2N/E MS		E3H/E MS		E4H/E MS	
额定电流	Rated current	I _n (40 °C)	[A]	800	1250	1250	1250	3200			
				1250	1600	1600	1600	4000			
					2000	2000	2500				
							3200				
极数	Poles (to be connected in series)			3	4	3	4	3	4	3	
额定操作电压	Rated service voltage	U _e	[V-]	750	1000	750	1000	750	1000	750	
额定绝缘电压	Rated insulation voltage	U _i	[V-]	1000	1000	1000	1000	1000	1000	1000	
额定脉冲耐受电压	Rated impulse withstand voltage	U _{imp}	[kV]	12	12	12	12	12	12	12	
额定短时耐受电流	Rated short-time withstand current	I _{cw} (1 s)	[kA]	20	20	25	25	40	40	65	
额定合闸容量	Rated making capacity	I _{cm} 750Vdc	[kA]	42	42	52.5	52.5	105	105	143	
		I _{cm} 1000Vdc	[kA]	—	42	—	52.5	—	105	—	

SACE Emax 空气断路器附件

Accessories for SACE Emax air circuit-breakers

E1 ... E6

E1 ... E6

断路器/Circuit-breaker

隔离开关/Switch-disconnector



类型	Version	固定式/Fixed	抽出式/Withdrawable	固定式/Fixed	抽出式/Withdrawable
分励/合闸脱扣器	Shunt opening/closing release	■	■	■	■
SDR 测试单元	SDR Test Unit	■	■	■	■
欠压脱扣器	Undervoltage release	■	■	■	■
欠压脱扣器的延迟装置	Delay device for undervoltage release	■	■	■	■
合闸弹簧储能电动机	Geared motor for automatic charging of closing springs	■	■	■	■
由过电流脱扣器发出的机械指示	Mechanical signal of overcurrent releases	■	■	■	■
由过电流脱扣器跳闸时发出的机械及电气指示	Mechanical and electrical signal of overcurrent releases tripped	■	■	■	■
断路器打开/闭合的电气指示	Electrical signal for circuit-breaker open/closed	■	■	■	■
与试验位置连接或隔离的断路器电气指示	Electrical signal for circuit-breaker connected/isolated for test/isolated	■	■	■	■
闭合弹簧被加载的电气指示用触点	Contact for signalling closing spring charged	■	■	■	■
欠电压释放机构被接上电压的电气指示用触点	Contact for signalling undervoltage release energised	■	■	■	■
位于断路器外部中性线上电流互感器	Current transformer for the circuit-breaker external neutral conductor	■	■	■	■
主要电源的接地导线的单极环	Homopolar toroid for the earthing conductor of the main power supply	■	■	■	■
固定式断路器的端子盒	Terminal box for fixed version circuit-breaker	▲		▲	
抽出式断路器的滑动触点	Sliding contacts for withdrawable version circuit-breaker		▲		▲
机械操作计数器	Mechanical operation counter	■	■	■	■
分闸位置挂锁/锁扣	Key lock or padlock devices in open position	■	■	■	■
断路器在为试验而连接和隔离的位置上或在为试验而隔离位置上的锁定	Circuit-breaker lock in connected/isolated for test/isolated position	■	■	■	■
不同型号的断路器的防插入锁	Anti-insertion lock for circuit-breakers of different models		▲		▲
闸板固定部份的挂锁	Padlock devices for fixed part shutters	■	■	■	■
小室门的机械锁	Compartment door mechanical lock	■	■	■	■
按钮保护罩	Protection for opening and closing pushbuttons	■	■	■	■
开关柜门保护 (防护等级IP54)	IP54 door protection	■	■	■	■
断路器间的联锁	Interlock between circuit-breakers	■	■	■	■
提升板	Lifting plate	▲	▲	▲	▲
抽出铰	Racking out crank handle	▲	▲	▲	▲
小室门的法兰	Flange for compartment door	▲	▲	▲	▲

■ = 选择性 optional ▲ = 附件根据标准供应 accessory supplied as standard

注 : 所有附件在图表上显示的均在配电, UL 名单及 1000V 里十分常用

Note : all accessories shown in the table are common to the distribution, UL Listed and 1000V ranges

为您的保护要求给予一个富智慧和灵活的答案

An intelligent and flexible answer to all your protection requirements

主要特性 Main characteristics

可自备操作电源 Possibility of self-powered operation

操作精确度高 High operating precision

对真实电流有效值的灵敏度 Sensitivity to true root-mean-square value of the current

中性线设定可达100%的相电流，额定电流高达6300A Possibility of setting neutral to 100% of the phases with rated currents up to 6300A (E4 and E6 will be available)

先进微处理器技术 Advanced microprocessor technology

综合对话单元 Integrated dialogue unit (for I12PR / I13PR Modbus or LON)

SACE PR111, SACE PR112 及 SACE PR113 微处理器脱扣器

随着空气断路器的新型系列，ABB SACE LV 开发了另一完整及革新的微处理器电子过电流脱扣器：SACE PR111, PR112 和 PR113。任何人安装 SACE Emax 断路器，也可根据安装场合及设计者基于安全和可靠的要求，选择最适合的脱扣器。随着配备了分布智能系统的电力装置的进步，导致脱扣器所扮演的角色也越来越重要。

脱扣器应满足以下要求：

- 操作精确度高
- 设定范围广
- 对任何故障可作出保护
- 量度及监察各主要电力参数
- 与监控系统对话

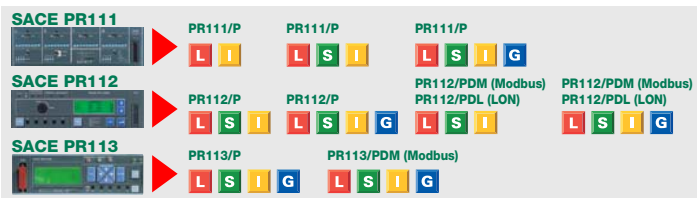
带 SACE PR111 和 PR112 的 SACE Emax 断路器能提供以上功能，同时该脱扣器会执行过载、短路（瞬时 I 和选择性 S）及接地保护。PR113 同样能为低压应用提供最完备的保护（同样基于电压测量）。

SACE PR111, SACE PR112 和 SACE PR113 microprocessor-based overcurrent releases

Alongside its modern series of air circuit-breakers, ABB SACE LV presents a complete and innovative range of microprocessor-based electronic overcurrent releases, the SACE PR111, PR112 and PR113. Anyone installing SACE Emax circuit-breakers has the option of choosing the release that is best suited to their installation needs in any given situation, together with the designer's requirements regarding safety and reliability. The advances made by electrical installations implementing distributed intelligence systems has made the role played by releases increasingly important, demanding that they offer:

- high operating precision;
- a wide range of settings;
- complete protection against all types of faults;
- measurement and monitoring of the main electrical parameters;
- dialogue with supervision and control systems.

These functions are provided on SACE Emax circuit-breakers using the SACE PR111 and PR112 microprocessor-based releases, which provide protection functions against overloads (L), short-circuit's (instantaneous I and selective S) and earth faults (G) and using PR113 which provide also the most sophisticated protection function for low voltage applications (based also on voltage measurements).



图例

- 1 微处理器故障显示 (LED)
- 2 辅助电源显示 (LED)
- 3 预报警显示 (LED)
- 4 报警显示 (LED)
- 5 [布雷特] 图显示
- 6 [UP] 按钮
- 7 [DOWN] 按钮
- 8 SACE PR10/T 及 SACE PR120/B 测试接口 (TEST)
- 9 确认数值及改变编辑页面按钮 (ENTER)
- 10 退出次级菜单及取消操作按钮 (ESC)
- 11 测试按钮 (TEST)
- 12 保护功能的脱扣显示 (L · S · I · G)
- 13 脱扣器超限显示
- 14 重置按钮 (RESET)
- 15 参数板显示电流互感器的中性线额定电流及脱扣器的编号

Legend

- 1 Microprocessor fault indicator LED
- 2 Auxiliary power supply indicator LED
- 3 Pre-alarm indicator LED
- 4 Alarm indicator LED
- 5 Backlit alphanumeric display
- 6 Cursor UP button
- 7 Cursor DOWN button
- 8 TEST connector to link to SACE PR10/T and SACE PR120/B external accessory units
- 9 ENTER button to confirm data or change pages
- 10 Button to exit submenus or cancel operations (ESC)
- 11 TEST button
- 12 Magnetic devices to signal protection functions L, S, I, G tripped
- 13 Magnetic device to signal excessive release case temperature rise
- 14 Key for resetting the magnetic signalling devices and protection device tripped signalling contact (RESET)
- 15 Rating plate indicating the rated current of the CTs and neutral plus the release serial number

脱扣器的主要特性

Main characteristics of the releases

保护功能	Protection functions	SACE PR111	SACE PR112	SACE PR113
L 过载保护 - 反时限长延时跳闸	Overload protection with inverse long time-delay trip	•	•	•
S 选择性短路保护 - 反时限短延时跳闸	Selective short-circuit protection with inverse short time-delay trip	•	•	•
I 瞬时短路保护 - 可调脱闸电流门限	Instantaneous short-circuit protection with adjustable trip current threshold	•	•	•
G 接地故障保护 - 电源接地回路	Earth fault protection Source ground return	•	•	•
T: 过热保护		•	•	•
V: 欠电压保护		•	•	•
F: 相不平衡保护		•	•	•
P: 反向能量流动保护		•	•	•
D: 定向保护		•	•	•
L和S的热记忆	Thermal memory for functions L and S	•	•	•
量度	Measurements			
电流 (相、中性及接地故障)	Currents (phases, neutral and earth fault)	•	•	•
触头损耗		•	•	•
操作次数		•	•	•
剩余电压		•	•	•
电网频率		•	•	•
有效功率、无效功率、实在功率		•	•	•
功率因数		•	•	•
有效能量、无效能量、实在能量		•	•	•
谐波失真		•	•	•
事件及维护记录	Event and maintenance data marking			
事件发生时间记录	Event marking with time event occurred	•	•	•
把事件顺序储存	Events stored in chronological order	•	•	•
计算操作及触点损耗次数	Counting of number of operations and contact wear	•	•	•
与中央监控系统联结 (使用对话单元)	Communication with centralised supervision and control system (using dialogue unit)			
遥距参数设定	Remote setting of parameters, protection functions, unit configuration and communication	•	•	•
由断路器把量度数据、状态及报警传送到系统	Transmission of measurements, statuses and alarms from circuit-breaker to system	•	•	•
由断路器把事件及维护数据传送到系统	Transmission of events and maintenance data from circuit-breaker to system	•	•	•
自我测试	Self-test			
报警及脱扣器超温跳闸	Alarm and tripping for release overtemperature	•	•	•
微处理器故障报警	Alarm for microprocessor fault	•	•	•
用户介面	User interface			
使用 DIP 开关作参数设定	Parameter setting using DIP switches	•	•	•
使用按键及液晶显示屏作参数设定	Parameter setting using keys and liquid crystal display	•	•	•
对所有保护的预报警及自我对监察功能完全管理	Complete management of prealarms and alarms for all protection and self-monitoring functions	•	•	•
锁孔开关允许调节至“唯读”模式作咨询用途或“编辑”模式作设置及设定用途	Key for enabling use with “READ” mode for consultation only or “EDIT” mode for consultation and setting	•	•	•
负载控制 (带辅助单元)	Load control (with auxiliary unit)			
通过电流值来确定断路器对负载连接或不连接	Connection-disconnection of loads in relation to the value of the current passing through the circuit-breaker	•	•	•
区域选择性	Zone selectivity			
通过功能 S 和 G 被激活该而实现	Can be activated for protection functions S and G	•	•	•
通过功能 D 被激活该而实现 (方向式保护)	Can be activated for protection functions D	•	•	•

接地故障保护

以下提供不同种类的接地故障保护：

- 利用脱扣器的保护功能“G”：接地电流是由脱扣器把相电流及中性线电流的向量总值和计算出来(漏电方法)。
- 利用安装在 MV/LV 变压器的磁 P 纳 I 及地面之间的特制环形线圈，可直接量度出泄漏接地电流(电源接地回路)。
- 利用在 SACE RCQ 开关柜中的带分开环形线圈的电子漏电继电器。

不同系列足以满足每种接地保护及选择性要求。

Earth fault protection

A number of different options are available for earth fault protection:

- using protection function “G” of the release: in this case the earth current is calculated by the release itself using the vector sum of the phase and neutral currents (“residual” method)
- using a special toroid coil that is installed on the connection between the star centre and earth of the MV/LV transformer, with direct reading of the earth leakage current (“Source ground return”)
- using electronic residual-current relays from a SACE RCQ switchboard with separate toroid coil.

This range of different options makes it possible to cover every earth fault protection and selectivity requirement.

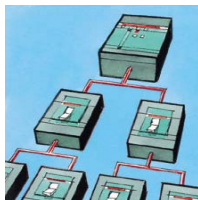


保护脱扣器可为断路器提供智能化的电流及用户管理。

Protection releases give circuit-breakers the intelligence to manage the protection of circuits and users.

用于配电的 SACE Megamax F 系列空气断路器

SACE Megamax F air circuit-breakers for distribution



系列产品的共同规格	Specifications common to the entire range		
额定操作电压	Rated service voltage	Ue	50/60 Hz V- 690 V- 250
额定绝缘电压	Rated insulation voltage	Ui	50/60 Hz V- 1000
测试电压 1 分钟	Test voltage 1 min		50 Hz V- 3500
额定脉冲耐受电压	Rated impulse withstand voltage	Uimp	kv 12



每一系列的特性	Specifications of the single series		F1			
性能水平	Performance level		S	H		
极数	Number of poles		3 - 4	3 - 4		
额定持续电流 ⁽¹⁾	Rated uninterrupted current ⁽¹⁾ (45 °C) ⁽²⁾		[A]			
			1250	1250		
			1600	1600		
			2000			
标识号	Identification code		F1S	F1H ⁽³⁾		
额定极限短路分断容量 ⁽³⁾	Rated ultimate short-circuit breaking capacity ⁽³⁾	Icu				
		220/230 ⁽⁴⁾ V-	[kA]	55	120	
		380/400 ⁽⁴⁾ /415 V-	[kA]	55	85	
		440 V-	[kA]	50	70	
		500 V-	[kA]	50	70	
		660/690 ⁽⁴⁾ V-	[kA]	45	55	
		250 ⁽⁷⁾ V-	[kA]	55	85	
额定短路合闸容量 (峰值)	Rated short-circuit making capacity (peak value)		Icm	[kA]	120	265
额定运行短路分断容量	Rated service short-circuit breaking capacity	Ics				
		220/230 ⁽⁴⁾ V-	[kA]	55	120	
		380/400 ⁽⁴⁾ /415 V-	[kA]	55	85	
		440 V-	[kA]	50	70	
		500 V-	[kA]	50	70	
		660/690 ⁽⁴⁾ V-	[kA]	45	55	
		250 ⁽⁷⁾ V-	[kA]	55	85	
使用类别	Utilization category		(根据 EN 60947-2)		B	B
额定短路耐受电流	Rated short-circuit withstand current		1 s	[kA]	50	20
			3 s ⁽⁸⁾	[kA]	50	—
分闸时间	Opening time		max.	[ms]	30	—
合闸时间	Make time			[ms]	45-60	45-60
燃弧时间	Arcing time			[ms]	10-15	—
分断时间	Break time		max.	[ms]	45	10
尺寸	Overall dimensions		H x L x P		[mm]	
固定式断路器 3/4极			fixed circuit-breaker 3/4 POL		410 x 334 / 429 x 394	410 x 334 / 429 x 394
抽出式断路器 3/4极			withdrawable circuit-breaker 3/4 POL		410 x 334 / 429 x 452	410 x 334 / 429 x 452

⁽¹⁾ 额定持续电流同时代表断路器的型号。(例: F1B 1250) ⁽¹⁾ The rated uninterrupted currents identifies also the type of circuit-breaker (e.g. F1B 1250).

⁽²⁾ 参考温度 (根据标准要求, 定为高于 40°C) ⁽²⁾ Reference temperature (higher than 40°C as required by standards).

⁽³⁾ 根据 IEC 947-2 标准, 功能因数 (cosφ) 如下: ⁽³⁾ With power factor (cosφ) according to IEC 947-2 standards as follows:
 cosφ = 0.25 for 20 kA < Icu ≤ 50 kA
 cosφ = 0.2 for Icu > 50 kA

⁽⁴⁾ 电压是根据 IEC 38 标准 ⁽⁴⁾ Voltages according to IEC 38 standards.

⁽⁵⁾ 对于额定持续电流为 2000 A. ⁽⁵⁾ For rated uninterrupted current of 2000 A.

⁽⁶⁾ 对于额定持续电流为 2500 A. ⁽⁶⁾ For rated uninterrupted current of 2500 A.

⁽⁷⁾ T = 10-15 ms. ⁽⁷⁾ T = 10-15 ms.

⁽⁸⁾ 限流型断路器 ⁽⁸⁾ Current-limiting circuit-breaker.

⁽⁹⁾ 请向 ABB 查询 ⁽⁹⁾ Ask ABB.



F2		F3	F4		F5	F6
H	S	S	S	S	S	S
3 - 4	3 - 4	3 - 4	3 - 4	3 - 4	3 - 4	3
2000	2500	2000	3200	3600	3200	6300
2500	3000	2500			4000	
		3000			5000	
F2H[®]	F2S	F3S	F4S	F4S	F5S	F6S
120	65	75	75	80	100	100
85	65	75	75	80	100	100
70	60	75	75	75	100	100
70	60	75	75	75	100	100
55	55	65	65	65	75	75
85	65	75	75	80	100	100
265	143	165	165	176	220	220
120	65	75	75	80	100	100
85	65	75	75	80	100	100
70	60	75	75	75	100	100
70	60	75	75	75	100	100
55	55	65	65	65	75	75
85	65	75	75	80	100	100
B	B	B	B	B	B	B
25 [®]	65	75	75	80	100	100
30 [®]						
—	50	50	50	55	60	80
—	30	30	30	30	45	45
45-60	45-60	45-60	45-60	45-60	45-60	45-60
—	10-15	10-15	10-15	10-15	10-15	10-15
10	45	45	45	45	60	60
410 x 416 / 511 x 394		480 x 416 / 531 x 467	480 x 536 / 651 x 467	480 x 761 / 876 x 467		—
410 x 416 / 511 x 452		480 x 416 / 531 x 515	480 x 536 / 651 x 515	480 x 761 / 876 x 515		480 x 1001 x 515

双电源自动切换装置 — 供电系列持续可靠性的保证

Automatic Transfer Switch Device

— Guarantee the continuous reliability of power supply



DPT/SE 和 DPT/TE 装置是一个四位置的转换开关，主要用于控制和自动均换两路带有机械和电气联锁的低压断路器，从而达到自动切换两路供电电源的目的。

DPT/SE & DPT/TE is a four modes transfer switch, which is mainly applied to control and transfer two electrical and mechanical interlocked circuit breakers for realizing the automatic transformation between two power supplies.

技术参数

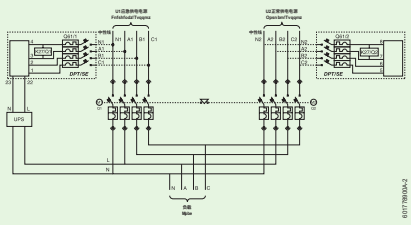
Technical Specification

符合标准	Compliance with standard	IEC 60947-6-1 / GB / T14048.11
电器级别	Category	CB 级
工作电压	Power supply	
控制回路	Control unit	220V - 50Hz
主回路	Main circuit	380V - 50Hz / 60Hz
输出接口 (控制回路) 的分断能力	Breaking capacity of output contacts	
欧姆负载	Ohmic load	5A / 220V - 50Hz
感性负载 (COS φ = 0.4)	Inductive load (COS φ = 0.4)	2A / 220V - 50Hz

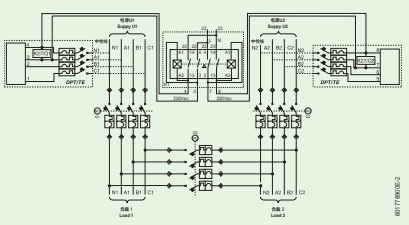
断路器及配件 (不包括在双电源自动切换装置, 客户需另购)

配件	选用型号	DPT / SE				DPT / TE		
		160	630	1600	6300	630	1600	6300
1. 断路器	类别	S2	S3 - 5	S6 - 7	F、E	S3 - 5	S6 - 7	F、E
	数量	2	2	2	2	3	3	3
2. 辅助触点 (1+1)	类别	S2	S3 - 5	S6 - 7	标准配置	S3 - 5	S6 - 7	标准配置
	数量	2	2	2	-	3	3	-
3. 电源线连接器	类别	-	S3 - 5	S6 - 7	客户自备	S3 - 5	S6 - 7	客户自备
	数量	-	2	2	-	3	3	-
4. 电动操作机构	类别	S2	S3 - 5	S6 - 7	标准配置	S3 - 5	S6 - 7	标准配置
	数量	2	2	2	-	3	3	-
5. 机械联锁	类别	S2	S3 - 5	S6 - 7	A 型	-*	-*	C 型
	数量	1	1	1	2	-*	-*	3
6. UPS	类别	3kVA	1kVA	1kVA	1kVA	-	-	-

DPT/SE 主回路接线图



DPT/TE 主回路接线图



New communication devices for Isomax and Emax's LON and Modbus RTU networks — Communication becomes standard

Neueit
New
Nouveau
Novità
Novedad

ABB SACE 开发的新型设备是：

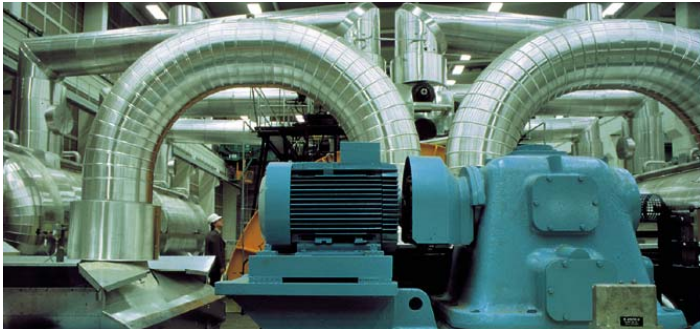
SACE PR112/PDL 脱扣器 (用于 SACE Emax 空气断路器系列) 和 **SACE PR212/DL** 通信装置 (用于 SACE Isomax S 系列塑壳断路器)，它们基于 LonWork 技术，使用 **LonTalk** 协议。

SACE PR112/PDM 和 **PR113/PDM** 脱扣器 (用于 SACE Emax 空气断路器系列) 和 **SACE PR212/DM** 通信装置 (用于 SACE Isomax S 系列塑壳断路器)，它们基于 **Modbus RTU** 协议。

In particular, the new devices developed by ABB SACE are :

The **SACE PR112/PDL** releases (for the SACE Emax range of air circuit-breakers) and **SACE PR212/DL** communication device (for the SACE Isomax S range of moulded-case circuit-breakers) based on LonWorks technology with **LonTalk** protocol.

The **SACE PR112/PDM** and **PR113/PDM** (for the SACE Emax range of air circuit-breakers) and the **SACE PR212/DM** communication device (for the SACE Isomax S range of moulded-case circuit-breakers) based on **Modbus RTU** protocol.



具有的功能

集成有通信和控制功能的脱扣器 (SACE PR112/PDL 和 SACE PR112/PDM) 和通信装置 (SACE PR212/DL 和 SACE PR212/DM) 可以实现远程获取和传送大量的信息。

Functions available

The releases with integrated communication and control functions (SACE PR112/PDL and SACE PR112/PDM) and the communication device (SACE PR212/DL and SACE PR212/DM) allow a wide range of information to be acquired and transmitted remotely.

状态	States
断路器的状态和位置	State and position of the circuit-breaker
警报	Alarms
过载和过热的预警	Pre-alarm due to overload and excessive temperature
各种保护计时 (L, S, G) 的不同警报	Differentiated alarms for protection function timing (L, S and G)
各种保护脱扣 (L, S, I, G, 过热) 的不同警报	Differentiated alarms for protection function trip (L, S, I, G overtemperature)
触头磨损警报	Alarm for contact wear
PR113 的整套保护警报	Complete set of alarms for protection with PR113
测量	Measurements
相、中性及接地电流 (PR113 还有电压以及相关的测量)	Phase, neutral and earth currents (Plus voltage and related measurement with PR113)
触头的磨损	Contact wear
手动操作的总数	Number of total and manual operations
各保护 (L, S, I, G 和 T) 的脱扣总数	Number of total and differentiated trips for protection functions (L, S, I, G and T)
故障电流的记忆功能	Memorisation of fault currents
脱扣曲线和门值的数值设定	Values set for trip curves and thresholds
命令	Commands
断路器、分断、闭合与复位	Circuit-breaker Opening, Closing and Reset
警报的复位	Alarm Reset
脱扣曲线和门值的数值设定	Trip curve and threshold setting
自动后备分断	Automatic Back-up opening
负载控制 (通过 PR010/K)	Load control (by means of PR010/K)
同步 (使用 LonTalk 协议)	Synchronization (with LonTalk protocol)

Appendix - LON & Modbus RTU

ESD2000 变配电智能监控系统

ESD2000 System



当今, 计算机网络技术已经深入到各行各业, 监控功能的集成在广阔的技术领域和服务部门中的应用也日益增多。事实上, 完善的管理已经离不开状态监控和处理系统。作为变配电能管理的各类变电站, 其中枢管理系统早已纳入智能化监控管理范畴。

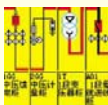
ABB 的 ESD2000 系统在变配能的监控领域里处于领先地位。它可与现场开关柜内的智能型中、低压开关设备进行交换信息并实施监控, 也可对非智能型中、低压开关设备读取状态和实施电操控制, 既可用于 FCS 系统, 亦可用于 DCS 系统, ABB ESD2000 系统在通讯方面具有开放性, 它往上可联接 BA、DCS 系统或工厂上层管理系统的高速以太网, 并提供开放的协议, 它往下可联接各种开关器件和各型多功能电参量采集器。ABB ESD2000 系统还能为用户提供变电站内的各种电气图纸和全部元器件的清单, 极大方便用户进行技术管理和物料管理。

Nowadays, computer network technology has been applied widely in all industries, the application of computer control and supervision has also been increasing progressively. In fact, good management requires both state supervision and accurate measurement system. Being the energy distribution management of all kinds of substations, the central management system has already grouped into the scope of intelligent supervision management.

ABB ESD2000 keeps ahead in the field of substation supervision. It can supervise and exchange information with intelligent medium & low voltage switchgear. It can also read the state of non-intelligent medium & low voltage switchgear and control them electrically. It can be used in FCS systems, but also in DCS systems. With flexible communication capabilities, ABB ESD2000 can be connected with BA, DCS systems or top management systems by using high-speed Ethernet Network. ABB ESD2000 provides different kinds of electrical graphics and detailed checklist of all components to ensure the convenience application of technical and material management.

ABB ESD2000 系统界面信息

ABB ESD2000 System Interface



- 可读取变电站中压系统图
- 可显示中压断路器工作状态、手车位置、接地刀状态以及保护参数
- 可显示中压电参数的直接、平均及峰值曲线和变化趋势图
- 可过滤、筛选和打印中压系统各种统计报表
- 可过滤、筛选和打印中压系统故障状态和事故报表
- 可显示电力变压器的温度参数和工作状态

- Provides medium voltage system diagrams of substation
- Displays switch status, trolley position, grounding blade status and protection parameters
- Displays diversified electrical parameters: direct, average, peak and trend curve of medium voltage system
- Filters, selects and prints medium voltage system statistic report form
- Filters, selects and prints medium voltage system fault and accident report form
- Displays temperature and status of power system transformer



- 可读取变电站低压系统图
- 可显示低压系统开关设备的状态以及保护参数
- 可显示低压电参数的直接、平均及峰值曲线和变化趋势图
- 可过滤、筛选和打印低压系统各种统计报表
- 可过滤、筛选和打印低压系统故障状态和事故报表

- Provides low voltage system diagrams of substation
- Displays the equipment state and protection parameters of low voltage system
- Displays diversified electrical parameters: direct, average, peak and trend curve of low voltage system
- Filters, selects and prints low voltage system statistic report form
- Filters, selects and prints low voltage system fault and accident report form



- 系统数据连可保存 2 年的全部运行和事故记录
- 可提供系统内中压与低压各回路控制原理图及主要元器件表
- 可提供系统内中低压各回路的技术参数
- 可提供系统软件、系统操作说明书及技术文档

- Saves 2-year continuous historical records of the system operation and accident
- Provides medium voltage and low voltage circuit control diagrams, main components lists
- Provides medium & low voltage system technical parameters of all circuits
- Provides system software, operation manual and technical document



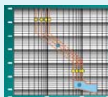
- 显示电动机的工作电参数
- 显示和设置电动机的保护参数
- 显示、分析和提示电动机的绝缘程度、接地状态以及热保护参数
- 显示和设置电动机启动方式和工作方式
- 记录并打印电动机工作曲线
- 记录、分析和提示交流接触器更换预期

- Displays working parameters of motor
- Displays and sets protection parameters
- Displays, analyses and denotes the isolation degree, earthing status and heating protection parameters of motors
- Displays starting and working modes of motors
- Records and prints working curve of motors
- Records, analyses and anticipates the replacement of alternating contactors



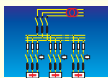
- 各类故障与事故语音报警, 同时打印记录
- 筛选对象功能
- 故障分析和预测功能

- Gives and alarms on all kinds of faults and accidents with a vocal warning, and prints the records simultaneously
- Screens out object
- Analyses and predicts fault



- 可读取和设置中低压开关设备的保护参数

- Reads and sets switch protection parameters of medium & low voltage system



- 可读取各种电参数 I、U、P、Q、W、PF、WP、WO、F、S 等等

- Reads all kinds of electrical parameters: I, U, P, Q, W, PF, WP, WO, F, S etc



ABB (Hong Kong) Ltd.

低压器:
香港新界大埔
大埔工业邨大菁街3号
电话: (852) 2929 3838
传真: (852) 2929 3505

ABB SACE L.V. SPA

Head Office: Via Baloni, 35
24123 Bergamo-Italy
Tel: +39 (0) 35 395 111
Fax: +39 (0) 35 395 306

ABB 新金低压开关有限公司

中国广东省新会县 529100
今古洲工业开发区
电话: (0750) 6322 200
传真: (0750) 6677 526

厦门 ABB 低压电器设备有限公司

中国福建省厦门市 361006
厦门市火炬高技术产业开发区
怡和路 12-20 号 5 楼
电话: (0592) 5715 625
传真: (0592) 5627 374

阿西亚·布朗·勃法瑞 (中国) 投资有限公司

北京分部:
中国北京市 100016
朝阳区蓝山桥路 10 号
雷通大厦
电话: (010) 8456 6688
传真: (010) 8456 9907

天津分公司:
中国天津市 300141
中山路 290 号
万科中心办公大楼 2505 室
电话: (022) 2621 6488
传真: (022) 2621 6485

大连分公司:
中国辽宁省大连市 116011
西岗区中山路 147 号
森茂大厦 12 楼
电话: (0411) 3696 021 / 3696 632
传真: (0411) 3603 380

西安分公司:
中国陕西省西安市 710054
文艺路北口甲 1 号
鹏源大厦 801-2 室
电话: (029) 7857 422 / 7861 766
传真: (029) 7857 423

沈阳分公司:
中国辽宁省沈阳市 110001
和平区南京北街 206 号
沈阳假日大厦城市广场二座 3-166 室
电话: (024) 2334 1818
传真: (024) 2334 1306

长春分公司:
中国吉林省长春市 130061
西安大路 16 号
国际大厦 A 座 7 层 709 室
电话: (0431) 8926 821 / 23 / 25
传真: (0431) 8926 835

哈尔滨分公司:
中国黑龙江省哈尔滨市 150001
红军街 26 号
北亚大厦 1001-2 室
电话: (0451) 3605 460 / 465-66
传真: (0451) 3602 731

上海分公司:
中国上海市 200002
延安路 100 号
联进大厦 7 楼
电话: (021) 6320 3333 / 6323 2032
传真: (021) 6320 1132 / 6323 2697

武汉分公司:
中国湖北省武汉市 430071
武昌中南路 7 号
中商广场写字楼 34 楼 B3408
电话: (027) 8725 9222
传真: (027) 8725 9233

青岛分公司:
中国山东省青岛市 266071
香港中路 12 号
半合广场 B 区钻石楼 310 室
电话: (0532) 5026 396 / 97 / 98
传真: (0532) 5026 395

杭州分公司:
中国浙江省杭州市 310007
杭大路 18 号
黄龙世纪广场 C 区 6 楼 0606, 0608 室
电话: (0571) 8790 1355
传真: (0571) 8790 1151

南京分公司:
中国江苏省南京市 210002
中山南路 90 号
华泰大厦 18 楼
电话: (025) 6645 645
传真: (025) 6645 338

济南分公司:
中国山东省济南市 250011
经一路 17 号
华能大厦 8 楼
电话: (0531) 6092 726
传真: (0531) 6092 724

郑州分公司:
中国河南省郑州市 450007
中国西路 220 号
福达国际商贸中心 A 座 2207 室
电话: (0371) 7713 588
传真: (0371) 7713 873

长沙分公司:
中国湖南省长沙市 410005
黄兴中路 88 号
平高商务楼 12B01
电话: (0731) 2562 898
传真: (0731) 4445 519

成都分公司:
中国四川省成都市 610072
蜀都大道西段
瑞华广场 28 层 C, D, E 座
电话: (028) 8778 6688
传真: (028) 8774 4101 / 8779 5399

重庆分公司:
中国重庆市 400060
南坪北路 15 号
重庆桔子 J 假日酒店 2 楼
电话: (023) 6262 6686
传真: (023) 6280 5369

昆明分公司:
中国云南省昆明市 650011
青年路 399 号
邦克酒店 6 楼 801 室
电话: (0871) 3158 188
传真: (0871) 3158 186

福州分公司:
中国福建省福州市 350003
五四路 158 号
环塔广场 30 层 B 区
电话: (0591) 7858 224
传真: (0591) 7814 889

南宁分公司:
中国广西省南宁市 530012
新民路 34-18 号
中明大厦 10 楼 D 座
电话: (0771) 2827 123
传真: (0771) 2827 110

广州分公司:
中国广东省广州市 510075
天河北路 183 号
大都会广场 21 楼 1-8 及 16 室
电话: (020) 8755 8080
传真: (020) 8755 0172

深圳分公司:
中国深圳市 518033
福田区·福虹路
世贸广场 A 座 23 楼 2302-2304 室
电话: (0755) 8367 9990
传真: (0755) 8367 6437

<http://www.abb.com>