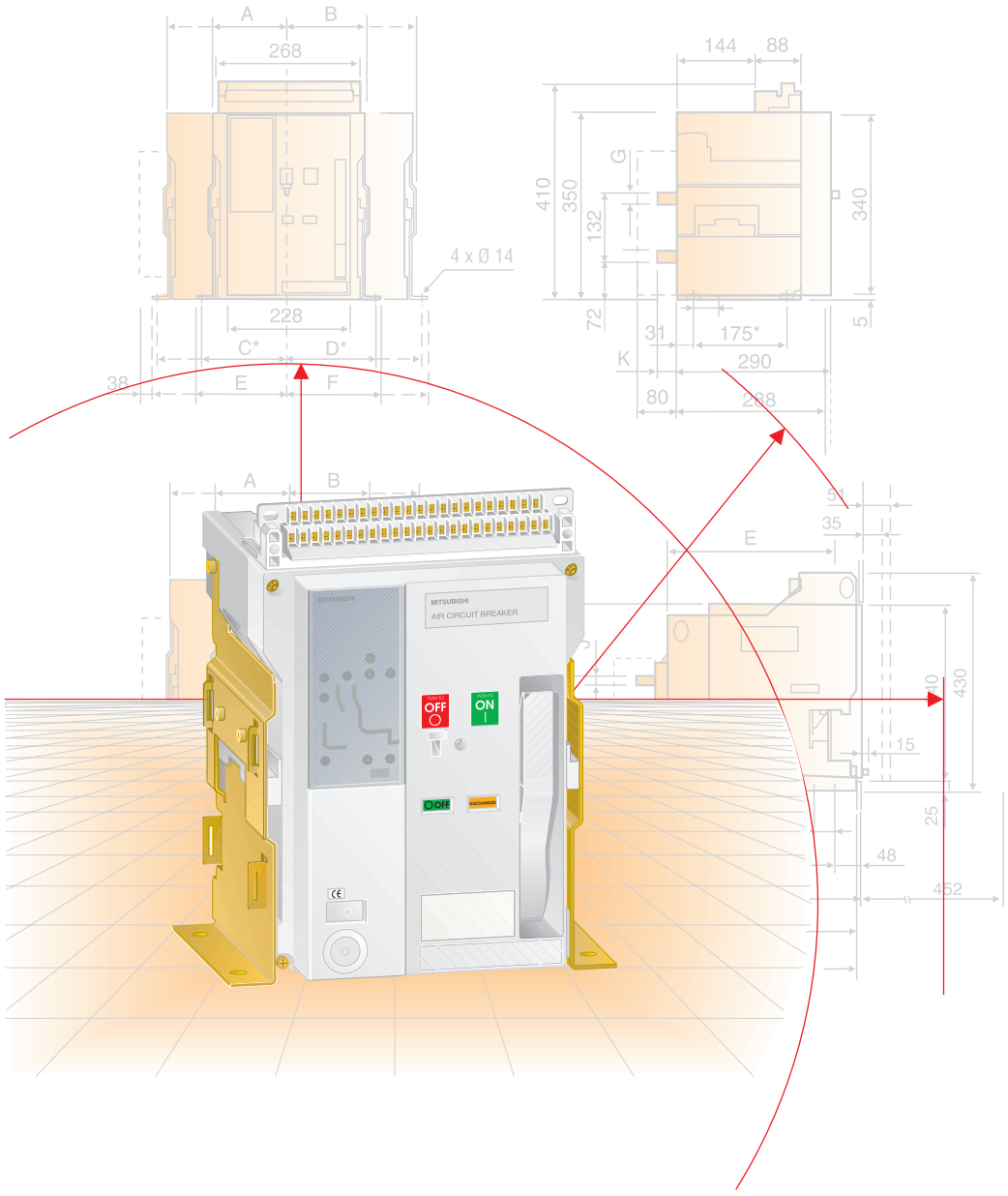
MITSUBISHI ELECTRIC

Low Voltage Switchgears

Air Circuit Breakers

Air Circuit Disconnectors



SUPER AE
AE 1000 – AE 6300

Technical Catalogue

2004

New Items in this Catalogue

01/2004

The air circuit breaker program from MITSUBISHI ELECTRIC:

- ***Complete breaker program***
  Frame size from 1000 A to 6300 A
- ***Wide performance range***
  Standard version "SS" from 65 to 130 kA
  High performance version "SH" with 130 kA
- ***High interrupting capacity***
  Growing power demands
- ***Optimum overload tripping system***
  Safer and more selectivity

Further Publications within the LVS, PLC and inverter range

Technical Catalogues

WSS, PSS & Super Series Technical Catalogue
Product catalogue for circuit breakers and disconnectors from 3 A to 1600 A rated current (art no. 133207)

MS-N Technical Catalogue
Product catalogue for low voltage contactors and relays from 20 A to 1000 A rated current (art no. 62306)

PLC and Inverter Technical Catalogues
Product catalogues for programmable logic controllers and frequency inverters (more details on request)

Additional Services

Current information on updates, alterations, new items, and technical support you will find on MITSUBISHI ELECTRIC's web pages (www.mitsubishi-automation.com).
In the products section of the MITSUBISHI home site various documentations of the whole product range by MITSUBISHI ELECTRIC as well as the current version of this catalogue on hand are available as download. The content is updated daily and to date is provided in German and English.

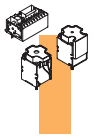
About this product catalogue

Due to the constantly growing product range, technical alteration, and new or changed characteristical features, this catalogue is updated frequently.

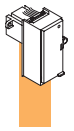
Texts, figures and diagrams shown in this product catalogue are intended exclusively for explanation and assistance in planning and ordering the electronic air circuit breakers of the SUPER AE series and the associated accessories. Only the manuals supplied with the breakers are relevant for installation, commissioning and handling of the air circuit breakers and the accessories. The information given in this documentation must be read before installation and commissioning of the modules.
Should questions arise with regard to the planning of modules described in this product catalogue, do not hesitate to contact the german branch of the MITSUBISHI ELECTRIC EUROPE B.V. in Ratingen or one of its distributors (see cover page).

SUPER AE SERIES

BASE UNITS



ACCESSORIES

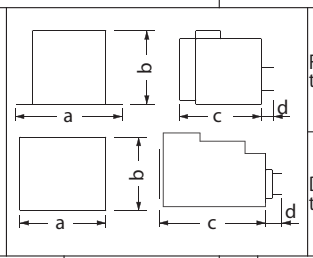


ELECTRONIC TRIP RELAY

SPECIFICATIONS

APPENDIX

Program Overview – Specifications

SUPER AE				Series	Standard series "SS"											
				Breaker type	AE 1000 - SS		AE 1250 - SS		AE 1600 - SS		AE 2000 - SS		AE 2500 - SS		AE 3200 - SS	
Rated current (A) at 40 °C ①				$I_{N\,max}$	1000		1250		1600		2000		2500		3200	
Rated insulation voltage (V) 50/60 Hz				Ui	1000		1000		1000		1000		1000		1000	
Rated operating voltage (V) 50/60 Hz				Ue	690		690		690		690		690		690	
Number of poles					3	4	3	4	3	4	3	4	3	4	3	4
Adjustment range Rated current (A)	Ir	General protection (current rating adjustable)			500-600-700-800-900-1000		625-750-875-1000-1125-1250		800-960-1120-1280-1440-1600		1000-1200-1400-1600-1800-2000		1250-1500-1750-2000-2250-2500		1600-1920-2240-2560-2880-3200	
					315-378-441-504-567-630						800-960-1120-1280-1440-1600					
					157-189-220-252-284-315 ⑤						625-750-875-1000-1125-1250					
		Generator protection (current rating fixed)			500≤In≤1000 200≤In≤630 ⑤		625≤In≤1250		800≤In≤1600		1000≤In≤2000 625≤In≤1000		1250≤In≤2500		1600≤In≤3200	
Rated current for neutral pole N				(A)	1000		1250		1600		2000		2500		3200	
Rated service short-circuit breaking capacity I_{CS} (kA, eff, sym.) Breaking duty: O-t-CO-t-CO $I_{CS} = I_{CU}$	IEC 947-2, EN 60947-2, VDE 0660,	With instantaneous trip		AC690V	50		50		50		50		50		50	
				AC600V	50		50		50		65		65		65	
				AC500V	65		65		65		85		85		85	
		Without instantaneous trip (with MCR)		AC690V	42		42		42		50		50		50	
				AC600V	50		50		50		65		65		65	
				AC500V	65		65		65		65		65		65	
		Without inst. trip ②		AC690V	25		25		25		45		45		45	
Rated short-circuit making capacity I_{CM} (kA, peak value)		With instantaneous trip		AC690V	105		105		105		105		105		105	
				AC600V	105		105		105		143		143		143	
				AC500V	143		143		143		187		187		187	
		Without instantaneous trip (with MCR)		AC690V	88.2		88.2		88.2		105		105		105	
				AC600V	105		105		105		143		143		143	
				AC500V	143		143		143		143		143		143	
		Without inst. trip ②		AC690V	52.5		52.5		52.5		94.5		94.5		94.5	
Rated short time current (kA eff.) I_{CW}				1s	65		65		65		65		65		65	
				2s	40		40		60		65		65		65	
				3s	30		30		50		65		65		65	
Maximum total breaking time				(sec)	0.04		0.04		0.04		0.04		0.04		0.04	
Closing time				(sec)	0.08		0.08		0.08		0.08		0.08		0.08	
Number of operating cycles ③ (ON/OFF)		With rated current			5000		5000		5000		1500		1500		1000	
		Without rated current			10000		10000		10000		10000		10000		10000	
Dimensions (mm) ④ 			Fixed type	a	340	425	340	425	340	425	475	605	475	605	475	605
				b	410	410	410	410	410	410	410	410	410	410	410	410
				c	290	290	290	290	290	290	290	290	290	290	290	290
				d	40	40	40	40	40	40	40	40	40	40	40	40
			Drawout type	a	298	385	298	385	298	385	433	565	433	565	433	565
				b	430	430	430	430	430	430	430	430	430	430	430	430
				c	368	368	368	368	368	368	368	368	368	368	368	368
				d	61	61	61	61	61	61	61	61	61	61	61	61
Weight ④ (kg)	Fixed type	Charging type	Manual charging		41	51	41	51	42	52	60	72	61	73	63	75
			Motor charging		44	54	44	54	45	55	63	75	64	76	66	78
	Drawout type (with cradle)		Manual charging		64	78	64	78	65	79	92	113	93	114	95	116
			Motor charging		67	81	67	81	68	82	95	116	96	117	98	119
	Cradle only				26	30	26	30	26	30	35	43	35	43	36	44

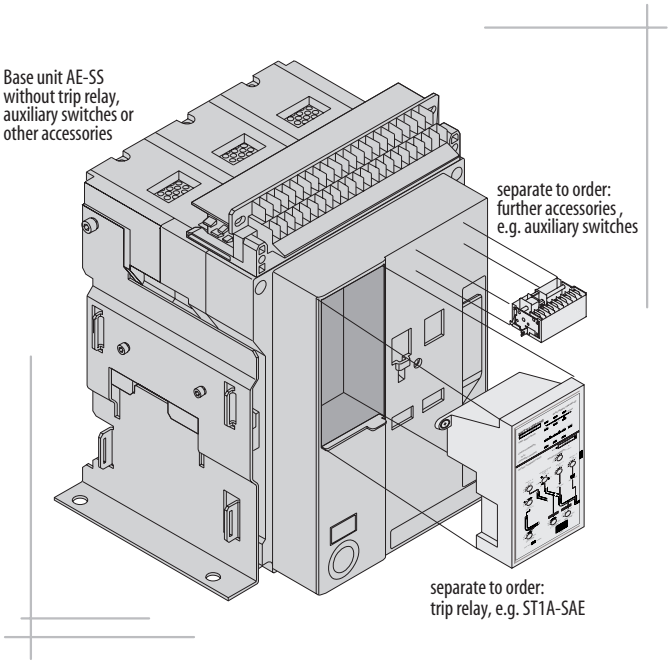
① For further temperatures refer to technical information on page 48.
② The figures for "without instantaneous tripping" are the values when the bare main body and the **external** relay are combined.
③ The number of operating cycles with rated current also include the number of operating cycles without rated current.
④ All specifications without peripheral accessories (e.g. UVT control unit).
⑤ Further current ratings on request.
More details on request.

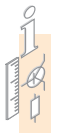
Standard series "SS"									High performance series "SH"											
AE 4000 - SSA		AE 4000 - SSC	AE 4000 - SS		AE 5000 - SS		AE 6300 - SS		AE 1000 - SH		AE 1250 - SH		AE 1600 - SH		AE 2000 - SH		AE 2500 - SH		AE 3200 - SH	
4000		4000	4000		5000		6300		1000		1250		1600		2000		2500		3200	
1000		1000	1000		1000		1000		1000		1000		1000		1000		1000		1000	
690		690	690		690		690		690		690		690		690		690		690	
3	4	3	3	4	3	4	3	4	3	4	3	4	3	4	3	4	3	4	3	4
3200-3600-4000		3200-3600-4000	2000-2400-2800-3200-3600-4000		2500-3000-3500-4000-4500-5000		3150-3780-4410-5040-5670-6300		500-600-700-800-900-1000 315-378-441-504-567-630 —		625-750-875-1000-1125-1250		800-960-1120-1280-1440-1600		1000-1200-1400-1600-1800-2000		1250-1500-1750-2000-2250-2500		1600-1920-2240-2560-2880-3200	
3200≤In≤4000		3200≤In≤4000	2000≤In≤4000		2500≤In≤5000		3150≤In≤6300		500≤In≤1000		625≤In≤1250		800≤In≤1600		1000≤In≤2000		1250≤In≤2500		1600≤In≤3200	
4000		—	3200		3200		3200		1000		1250		1600		2000		2500		3200	
50		50	50		50		50		65		65		65		65		65		65	
65		65	85		85		85		85		85		85		85		85		85	
85		85	130		130		130		130		130		130		130		130		130	
50		50	50		50		50		—		—		—		—		—		—	
65		65	85		85		85		—		—		—		—		—		—	
75		75	85		85		85		—		—		—		—		—		—	
45		45	50		50		50		—		—		—		—		—		—	
105		105	105		105		105		65		65		65		65		65		65	
143		143	187		187		187		85		85		85		85		85		85	
187		187	286		286		286		130		130		130		130		130		130	
105		105	105		105		105		—		—		—		—		—		—	
143		143	187		187		187		—		—		—		—		—		—	
165		165	187		187		187		—		—		—		—		—		—	
94.5		94.5	105		105		105		—		—		—		—		—		—	
75		75	85		85		85		—		—		—		—		—		—	
65		65	70		70		70		—		—		—		—		—		—	
65		65	70		70		70		—		—		—		—		—		—	
0.04		0.04	0.05		0.05		0.05		0.04		0.04		0.04		0.04		0.04		0.04	
0.08		0.08	0.08		0.08		0.08		0.08		0.08		0.08		0.08		0.08		0.08	
500		500	500		500		500		3000		3000		2000		1500		1500		1000	
5000	4000	5000	2000		2000		2000		10000		10000		10000		10000		10000		10000	
475	605	605	—	—	—	—	—	—	475	605	475	605	475	605	475	605	475	605	475	605
410	410	414	—	—	—	—	—	—	410	410	410	410	410	410	410	410	410	410	410	410
290	290	290	—	—	—	—	—	—	290	290	290	290	290	290	290	290	290	290	290	290
117	117	136	—	—	—	—	—	—	70	70	70	70	70	70	70	70	70	70	70	70
439	569	565	875	1005	875	1005	875	1005	485	615	485	615	485	615	485	615	485	615	485	615
430	430	430	480	480	480	480	480	480	430	430	430	430	430	430	430	430	430	430	430	430
368	368	368	368	368	368	368	368	368	398	398	398	398	398	398	398	398	398	398	398	398
109	109	151	123	123	123	123	123	123	61	61	61	61	61	61	61	61	61	61	61	61
81	99	109	—	—	—	—	—	—	66	79	66	79	66	79	66	79	66	79	68	81
85	103	112	—	—	—	—	—	—	69	82	69	82	69	82	69	82	69	82	71	84
107	136	145	240	263	240	263	240	263	105	127	105	127	105	127	105	127	105	127	107	129
111	140	148	244	267	244	267	244	267	108	130	108	130	108	130	108	130	108	130	110	132
49	61	75	125	140	125	140	125	140	42	50	42	50	42	50	42	50	42	50	43	51

Declaration of conformity:

Standards	IEC947-2, EN60947-2, VDE0660
Certificates	ASTA, SEV (types on request)
Marine approvals	LRS, GL, BV, ABS, DNK, NK
	(other approvals on request)

☐ Program Overview – Order Information





SUPER AE Air Circuit Breaker – Order Information

The circuit breakers of the frame sizes AE1000-SS to AE3200-SS are offered without trip relay and auxiliary switch included as standard equipment. The circuit breakers of the frame sizes AE4000-SSA/SSC/SS to AE6300-SS are available including the trip relay ST1A and auxiliary relay. The circuit breakers of the frame sizes AE4000-SS, AE5000-SS, and AE6300-SS for handling and weight reasons are available as drawout types. The circuit breakers of the high-performance series AE-SH as well are available including the trip relay ST1A and auxiliary relay. They are available as fixed and drawout types.

To purchase a fully functional 3-pole or 4-pole **fixed type** circuit breaker please select the following:

- base unit: fixed type, 3 or 4 pole with 3 current sensors (CT),
- electronic trip relay,
- auxiliary switches,
- and the required accessory.

Please refer to order example 1.

To purchase a fully functional 3-pole or 4-pole **drawout type** circuit breaker please select the following:

- the corresponding circuit breaker – fixed type,
- the corresponding cradle
- and the drawout mechanism.

Please refer to order example 2.

To purchase a fully functional 3-pole or 4-pole **drawout type** disconnector please select the following:

- the corresponding disconnector – fixed type,
- the corresponding cradle
- and the drawout mechanism.

Please refer to order example 3.

Order example 1:

- Base unit – fixed type, 3 pole with 3 current sensors: AE1000-SS 3P Fix, Bare, CT, TC (art. no. 129215)
- Electronic trip relay (for general use - S type): ST1A-SAE (art. no. 135976)
- Auxiliary switches: AX-SAE2A2BA (art. no. 28786)

Order example 2:

- Base unit – fixed type, 3 pole with 3 current sensors: AE1000-SS 3P Fix, Bare, CT, TC (art. no. 129215)
- Electronic trip relay (for general use - S type): ST1A-SAE (art. no. 135976)
- Auxiliary switches: AX-SAE2A2BA (art. no. 28786)
- Cradle with horizontal terminals: CRADLE-02SEA3 (art. no. 25897)
- Drawout mechanism: REC-SAEFD (art. no. 34666)

Order example 3:

- Base unit (Disconnector *) – fixed type, 3 pole: AE1000-SS 3P Fix, Bare (art. no. 129228)
- Cradle with horizontal terminals: CRADLE-02SEA3 (art. no. 25897)
- Drawout mechanism: REC-SAEFD (art. no. 34666)

* Air circuit breaker without overcurrent short-circuit release and without current transformer

Standard series AE-SS – Fixed type

Base unit equipment	Breaker ③	3-pole type	Art. no.		4-pole type	Art. no.
Shipping contents: ● Base unit ● Charging handle (for manual operation) ● without electronic trip relay ● 4 auxiliary contacts (2 NO, 2 NC contacts) Further elements that must be ordered: ○ Electronic trip relay e.g. ST1A ① ○ Accessories as required ②	AE 1000 - SS	AE1000-SS 3P Fix, Bare, CT, TC	129215		AE1000-SS 4P Fix, Bare, CT, TC	129216
	AE 1250 - SS	AE1250-SS 3P Fix, Bare, CT, TC	129217		AE1250-SS 4P Fix, Bare, CT, TC	129218
	AE 1600 - SS	AE1600-SS 3P Fix, Bare, CT, TC	129220		AE1600-SS 4P Fix, Bare, CT, TC	129222
	AE 2000 - SS	AE2000-SS 3P Fix, Bare, CT, TC	129224		AE2000-SS 4P Fix, Bare, CT, TC	129225
	AE 2500 - SS	AE2500-SS 3P Fix, Bare, CT, TC	129226		AE2500-SS 4P Fix, Bare, CT, TC	129227
	AE 3200 - SS	AE3200-SS 3P Fix, Bare, CT, TC	129246		AE3200-SS 4P Fix, Bare, CT, TC	129247

Standard series AE-SS – Drawout type

Please refer to order information above.

① For specification and order information about electronic trip relays refer to page 20 ff. ② For breaker accessories refer to page 8 ff.
③ Further breaker types with other rated current on request.

Air circuit breaker series AE-SSA/SSC 4000 A

Base unit equipment	Breaker ③	Fixed type	Art. no.	Draw-out type	Art. no.
Shipping contents:	AE 4000 - SSA	AE4000-SSA 3P Fix, ST1A, AX2A2B	142593	AE4000-SSA 3P D/O, ST1A, AX2A2B, SST	142596
● Base unit ● Charging handle (for manual operation) ● Electronic trip relay ST1A ● 4 auxiliary contacts (2 NO, 2 NC contacts) ● Safety shutters	AE 4000 - SSA	AE4000-SSA 4P Fix, ST1A, AX2A2B	142594	AE4000-SSA 4P D/O, ST1A, AX2A2B, SST	142599
	AE 4000 - SSC	AE4000-SSC 3P Fix, ST1A, AX2A2B	69984	AE4000-SSC 3P D/O, ST1A, AX2A2B, SST	69985
Further elements that must be ordered: ○ Different trip relay if you do not want ST1A ① ○ Accessories as required ②					

Air circuit breaker series AE-SS 4000–6300 A – Draw-out type

Base unit equipment	Breaker	3-pole type	Art. no.	4-pole type	Art. no.
Shipping contents:	AE 4000 - SS	AE4000-SS 3P D/O, ST1A, AX2A2B, SST	56977	AE4000-SS 4P D/O, ST1A, AX2A2B, SST	56978
● Base unit ● Charging handle (for manual operation) ● Electronic trip relay ST1A ● 4 auxiliary contacts (2 NO, 2 NC contacts) ● Safety shutters	AE 5000 - SS	AE5000-SS 3P D/O, ST1A, AX2A2B, SST	56976	AE5000-SS 4P D/O, ST1A, AX2A2B, SST	56975
	AE 6300 - SS	AE6300-SS 3P D/O, ST1A, AX2A2B, SST	56974	AE6300-SS 4P D/O, ST1A, AX2A2B, SST	56973
Further elements that must be ordered: ○ Different trip relay if you do not want ST1A ① ○ Accessories as required ②					

High performance series AE-SH – Fixed type

Base unit equipment	Breaker ③	3-pole type	Art. no.	4-pole type	Art. no.
Shipping contents:	AE 1000 - SH	AE1000-SH 3P FIX, ST1A, AX2A2B	43713	AE1000-SH 4P FIX, ST1A, AX2A2B	139891
● Base unit ● Charging handle (for manual operation) ● Electronic trip relay ST1A ● 4 auxiliary contacts (2 NO, 2 NC contacts)	AE 1250 - SH	AE1250-SH 3P FIX, ST1A, AX2A2B	139887	AE1250-SH 4P FIX, ST1A, AX2A2B	139902
	AE 1600 - SH	AE1600-SH 3P FIX, ST1A, AX2A2B	43711	AE1600-SH 4P FIX, ST1A, AX2A2B	139903
	AE 2000 - SH	AE2000-SH 3P FIX, ST1A, AX2A2B	139888	AE2000-SH 4P FIX, ST1A, AX2A2B	139904
Further elements that must be ordered: ○ Different trip relay if you do not want ST1A ① ○ Accessories as required ②	AE 2500 - SH	AE2500-SH 3P FIX, ST1A, AX2A2B	139889	AE2500-SH 4P FIX, ST1A, AX2A2B	43703
	AE 3200 - SH	AE3200-SH 3P FIX, ST1A, AX2A2B	139890	AE3200-SH 4P FIX, ST1A, AX2A2B	43702

High performance series AE-SH – Draw-out type

Base unit equipment	Breaker ③	3-pole type	Art. no.	4-pole type	Art. no.
Shipping contents:	AE 1000 - SH	AE1000-SH 3P D/O, ST1A, AX2A2B	43701	AE1000-SH 4P D/O, ST1A, AX2A2B	43695
● Base unit ● Drawout mechanism ● Cradle ● Charging handle (for manual operation) ● Electronic trip relay ST1A ● 4 auxiliary contacts (2 NO, 2 NC contactsr)	AE 1250 - SH	AE1250-SH 3P D/O, ST1A, AX2A2B	139905	AE1250-SH 4P D/O, ST1A, AX2A2B	139908
	AE 1600 - SH	AE1600-SH 3P D/O, ST1A, AX2A2B	139906	AE1600-SH 4P D/O, ST1A, AX2A2B	139909
	AE 2000 - SH	AE2000-SH 3P D/O, ST1A, AX2A2B	43698	AE2000-SH 4P D/O, ST1A, AX2A2B	139910
	AE 2500 - SH	AE2500-SH 3P D/O, ST1A, AX2A2B	139907	AE2500-SH 4P D/O, ST1A, AX2A2B	139911
Further elements that must be ordered: ○ Different trip relay if you do not want ST1A ① ○ Accessories as required ②	AE 3200 - SH	AE3200-SH 3P D/O, ST1A, AX2A2B	43696	AE3200-SH 4P D/O, ST1A, AX2A2B	43690

Switch-disconnector* AE-SS – Fixed type

Base unit equipment	Breaker	3-pole type	Art. no.	4-pole type	Art. no.
Shipping contents:	AE 1000 - SS	AE1000-SS 3P SS Fix, Bare	129228	AE1000-SS 4P SS Fix, Bare	129229
● Base unit ● Charging handle (for manual operation) ● without auxiliary contacts	AE 1250 - SS	AE1250-SS 3P SS Fix, Bare	129232	AE1250-SS 4P SS Fix, Bare	129234
	AE 1600 - SS	AE1600-SS 3P SS Fix, Bare	129236	AE1600-SS 4P SS Fix, Bare	129238
Further elements that must be ordered: ○ Electronic trip relay type B if you do not want without trip relay ○ Accessories as required ②	AE 2000 - SS	AE2000-SS 3P SS Fix, Bare	129240	AE2000-SS 4P SS Fix, Bare	129241
	AE 2500 - SS	AE2500-SS 3P SS Fix, Bare	129242	AE2500-SS 4P SS Fix, Bare	129244
	AE 3200 - SS	AE3200-SS 3P SS Fix, Bare	129248	AE3200-SS 4P SS Fix, Bare	129249

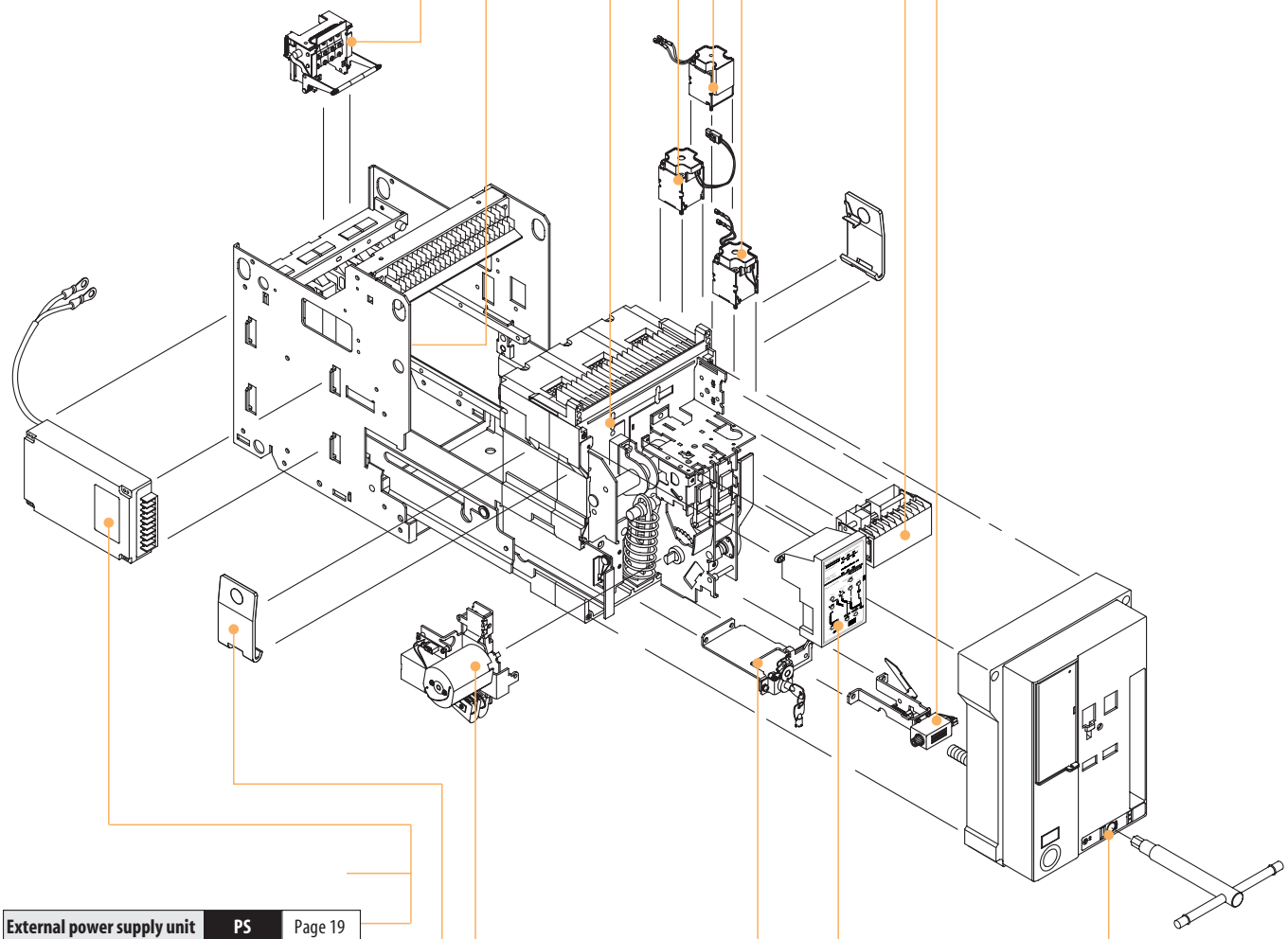
Switch-disconnector* AE-SS – Draw-out type

Please refer to order information on the top left side.

① For specification and order information about electronic trip relays refer to page 20 ff. ② For breaker accessories refer to page 8 ff.
③ Further breaker types with other rated current on request. * Air circuit breaker without overcurrent short-circuit release and without current transformer

Overview and mounting positions of the main accessories

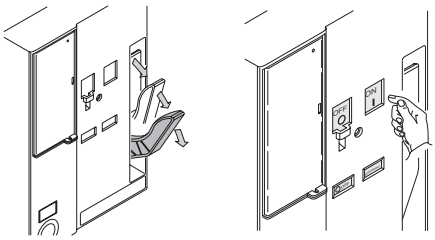
Counter	CNT	Page 13
Auxiliary switch	AX	Page 12
Under voltage trip device	UVT	Page 11
Closing coil	CC	Page 12
Shunt trip device	SHT	Page 12
Mis insertion preventer	MIP	Page 15
Safety shutters	SST	Page 14
Cell switch	CL	Page 14



External power supply unit	PS	Page 19
Lifting hooks	HP	Page 15
Motor charging device	MD	Page 10
Cylinder lock	CYL	Page 13
Castell lock	CAL	Page 13
Electronic trip relay		Page 20
Drawout mechanism with drawout handle		Page 6

Overview and description of the standard equipment

■ Manual charging



The spring is charged by the manual charging handle. The breaker is closed when the ON button is pressed, and opened when the OFF button is pressed.

When the closing spring charging is completed, the charging indicator displays CHARGED.

The indicator displays ON or OFF state of the main contacts.

The breaker cannot be closed while the OFF button is being pressed (safety feature).

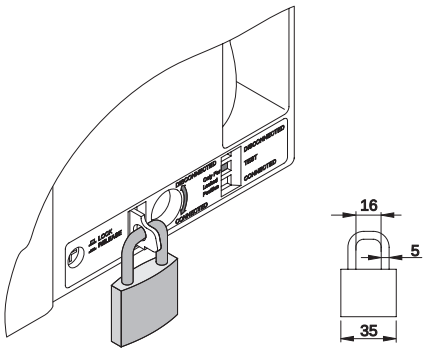
The manual charging process is one of the standard features of the breaker and part of the standard equipment.

■ Drawout interlock

A safety device prevents the circuit breaker from being pushed in or drawn out while the breaker is on.

The drawout handle cannot be inserted unless the OFF button is pressed.

■ Position lock



The device is for locking the drawout mechanism at the TEST position. This then indicates the TEST position.

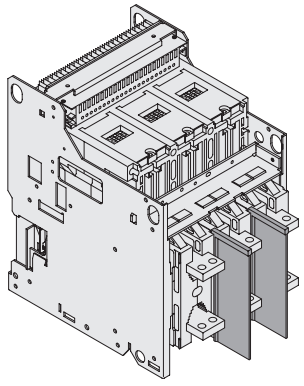
The lock can be used during either the drawing out or pushing-in operation.

The lock is released when the lock plate is pushed in, and the next operation becomes possible.

Padlocking is possible at the CONNECTED, TEST, and DISCONNECTED positions. Use this lock to prevent unauthorised changing of positions.

(The padlock should be supplied by the customer)

■ Interphase barrier



The interphase barrier of the circuit breaker prevent the short-circuit due to conductive matters or dust.

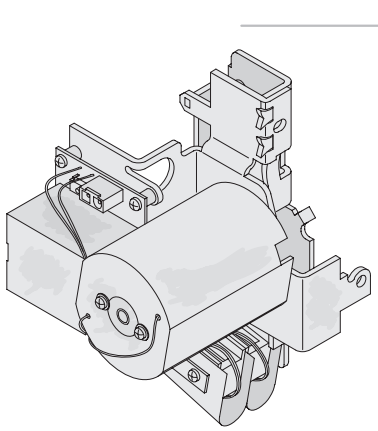
The interphase barrier are simple to add and have been designed as fixed types and drawout types, to suit your requirements. The table on the right shows you which circuit breakers are supplied with pre-mounted barriers.

Breaker	Fixed type	Drawout type
AE1000-SS – AE1600-SS	●	●
AE2000-SS – AE3200-SS	●	●
AE4000-SSA/SSC AE4000-SS – AE6300-SS	—	—
AE1000-SH – AE3200-SH	—	●

● =Standard equipment by horizontal connection

Overview and description on the optional accessories

Motor charging device (MD)



In addition to manual operation, the closing spring can be charged automatically by an electric motor every time the breaker is closed (ON charging method).

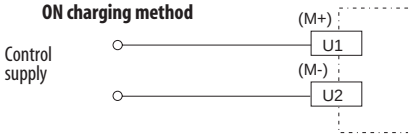
If the closing spring is to be charged automatically whenever the breaker is opened, then this can be done through an additional auxiliary contact (AXb) (OFF charging method). As soon as charging is completed, a visual display on the front says "CHARGED".

The "CHARGED" signal is also available via the 413 (TS+) and 414 (TS-) terminals (included in the standard MD configuration).

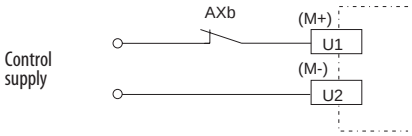
There is always the option of manual operation in an emergency. A closing coil (CC) is required for closing the breaker by remote control, and a shunt trip device (SHT) is required for opening it in this way.

This warrants the prevention of pumping, both electronically and mechanically. The circuit of the motor is separate from the ON/OFF circuit (CC, SHT).

ON charging method



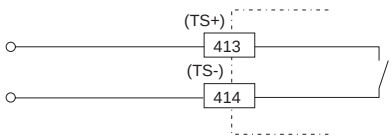
OFF charging method



Specifications		MD-SAED24	MD-SAED48	MD-SAED60	MD-SAEAD013	MD-SAWAD013	MD-SAEAD025C	MD-SAWAD025C
Application		AE1000-SS/-SH – AE3200-SS/-SH, AE4000-SSA② AE4000-SSC	AE1000-SS/-SH – AE3200-SS/-SH, AE4000-SSA② AE4000-SSC	AE1000-SS/-SH – AE3200-SS/-SH, AE4000-SSA② AE4000-SSC	AE1000-SS/-SH – AE3200-SS/-SH, AE4000-SSA② AE4000-SSC	AE4000-SSA③, AE4000-SS– AE6300-SS	AE1000-SS/-SH – AE3200-SS/-SH, AE4000-SSA② AE4000-SSC	AE4000-SSA③, AE4000-SS– AE6300-SS
Rated voltage *	(V)	24 (DC) ①	48 (DC)	60 (DC)	100–125 (AC/DC)	100–125 (AC/DC)	200–250 (AC/DC)	200–250 (AC/DC)
Applicable voltage range	(V)	20.4–26.4	40.8–52.8	51–60	85–137.5	85–137.5	170–275	170–275
Applied voltage	(V)	24	48	60	100 / 125	100 / 125	200 / 250	200 / 250
Inrush current (peak value)	(A)	22	14	9	10 / 12	10 / 12	5 / 6	7 / 8
Steady current	(A)	6	3	3	3	4	1	2
Charging time	(sec)	≤5	≤5	≤5	≤5	≤5	≤5	≤5
Order information	Art. no.	29453	34352	34368	32843	58320	25830	58321

* Rated frequency at AC = 50/60 Hz
① Not available for AE4000-SS – AE6300-SS.
② for 3-pole type
③ for 4-pole type

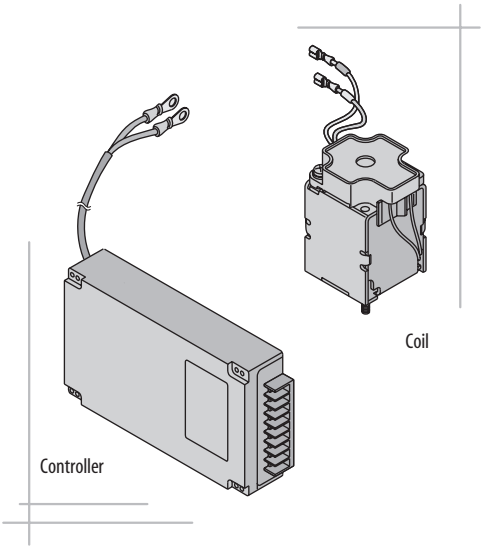
Charging completion switch (TS)



As soon as charging has been completed, this status is reported by the 413 (TS+) and 414 (TS-) terminals (signal display of charged status). This function is available during the charging process both manually and automatically.

Specifications		TS-SAE1A
Contact capacity		refer to auxiliary switch
Order information	Art. no.	30439

Undervoltage trip device (UVT)



Two trip types are available:

- instantaneous (for immediate tripping)
- with a time delay of 0.5 or 3 seconds

All UVT controllers are fitted with additional terminals for the connection of an emergency OFF switch. The UVT controller can be mounted to the left of the the unit.

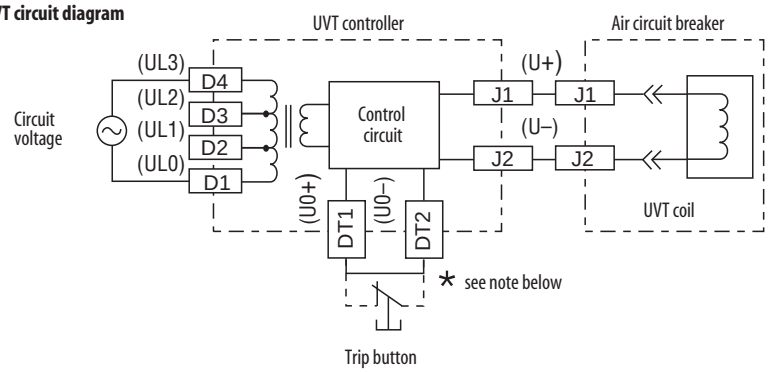
If two rated voltages are used, the lowest value is applied.

If an emergency OFF trip function is required, remove the shorting wire across terminals DT1 (UO+) and DT2 (UO-) and replace with an emergency OFF switch.

This device is used for tripping the breaker when the supply voltage drops below the rated value.

The undervoltage trip device consists of a UVT coil and a UVT controller. **Both parts must be ordered separately.**

UVT circuit diagram



Notes on the circuit diagram:

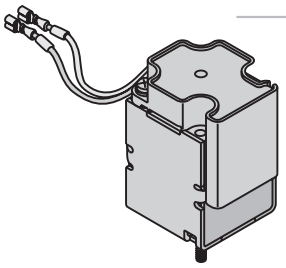
The UVT, as delivered, has a shorting wire between the DT1 (U0+) and DT2 (U0-) terminals. If an emergency OFF switch is used, this contact bridge must be removed. The emergency OFF switch is not included in the package. The maximum length of the wire between DT1 (U0+) and DT2 (U0-) and the trip button should be 5 m. If longer distances are required please contact your nearest Mitsubishi distributor.

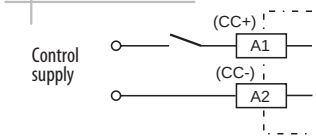
Specifications		UCON-SAED24-B	UCON-SAED011-B	UCON-SAEA123T-B	UCON-SAED24-05B	UCON-SAED011-05B	UCON-SAEA123T-05B	UCON-SAED24-30B	UCON-SAED011-30B	UCON-SAEA123T-30B	UVT-SAEUC
Rated voltage (+10%/-15%) *	(V)	24 (DC)	100–125 (DC)	100–460 (AC)	24 (DC)	100–110 (DC)	100–460 (AC)	24 (DC)	100–110 (DC)	100–460 (AC)	UVT coil
Operation		Instantaneous			With time delay						Trip coil for the beside mentioned controllers
Operating time	(sec)	0.1 or less	0.1 or less	0.1 or less	0.5 or more	0.5 or more	0.5 or more	3 or more	3 or more	3 or more	
Closing delay **	(sec)	Approx. 1.5	Approx. 1.5	Approx. 1.5	Approx. 1.5	Approx. 1.5	Approx. 1.5	Approx. 3	Approx. 3	Approx. 3	
Pick-up/drop-out voltage	(V)	Pick-up voltage 65–85 %, drop-out voltage 45–70 %									
Trip function		With open circuit (terminals DT1 (U0+), DT2 (U0–); rated 0.5 A at DC 250 V)									
Power consumption	(VA)	20									
Order information	Art. no.	30440	30441	30209	30442	30443	30206	30444	30445	30208	25912

* Rated frequency at AC= 50/60 Hz

** Delay which must be taken into account between the charging of the UVT controller and the closing of the breaker.

Closing coil (CC)





The closing coil is a device to close the breaker by remote control. Only one closing signal (about 100 msec.) is sent even when the closing coil supply is maintained ON.

The closing coil is seperate from the motor charging power supply.

Steady current is the value at maximum rated voltage.

An interlock to prevent pumping is provided electrically. The pumping prevention is not performed, when the supply voltage is 50 % or less the minimum rated voltage.

Closing time is from the initial energization of the closing coil to the completion of the closing of the main contacts.

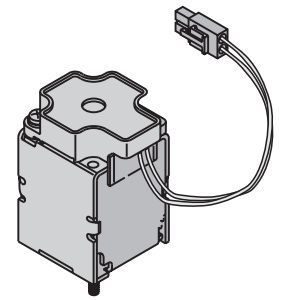
No pumping prevention takes place if an integrated auxiliary switch (AXb) is used as a cut-off switch.

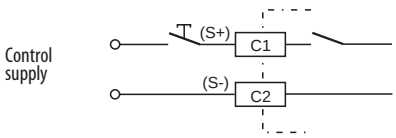
An auxiliary contact with high switching capacity should be used with DC supply voltage (HAX).

Specifications		CC-SAED004A	CC-SAED60	CC-SAEAD025A
Rated voltage *	(V)	24–48 (DC)	60 (DC)	100–250 (AC/DC)
Applicable voltage range	(V)	18–52,8	45–60	75–275
Operating voltage	(V)	24 / 48	60	100 / 250
Inrush current	DC (A)	3.5 / 7.0 (DC24 V 100 W, DC48 V 200 W)	1.1	0.6 / 1.3 (DC100 V 100 W, DC250 V 200 W)
	AC (A)	—	—	0.5 / 1.0 (AC 100 V 100 VA, AC 250 V 200 VA)
Closing time	(sec)	max. 0.08	max. 0.08	max. 0.08
Order information	Art. no.	30399	40310	25909

* Rated frequency at AC = 50/60 Hz

Shunt trip device (SHT)



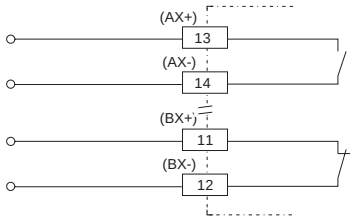


The shunt trip device is used to open the breaker by remote control.
A cut-off switch is included.

Specifications		SHT-SAED004A	SHT-SAED60	SHT-SAED025A	SHT-SAEA046A
Rated voltage *	(V)	24–48 (DC)	60 (DC)	100–250 (AC/DC)	380–500 (AC)
Applicable voltage range	(V)	16.8–52.8	42–66	70–275	266–550
Operating voltage	(V)	24 / 48	60	100 / 250	460
Inrush current (peak value)	DC (A)	3.5 / 7.0 (DC24 V 100 W, DC48 V 200 W)	1	0.8 / 2.0 (DC100 V 100 W, DC250 V 200 W)	—
	AC (A)	—	—	0.6 / 1.7 (AC 100 V 100 VA, AC 250 V 150 VA)	0.6 (AC 460 V 200 VA)
Closing time	(sec)	max. 0.04 (AE 4000-SS – AE 6300-SS = max. 0.05)			
Order information	Art. no.	27215	40309	25831	27614

* Rated frequency at AC = 50/60 Hz

Auxiliary switch (AX, HAX)



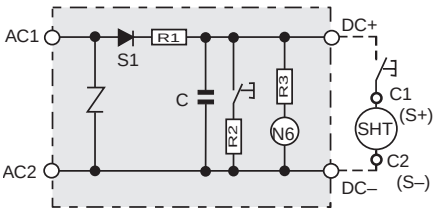
These auxiliary contacts are used to remotely indicate the ON or OFF status of the breaker.

Specifications			AX-SAE2A2BA		AX-SAE5A5BA		AX-SAE5A5BAD	
Type			Standard capacity (AX)				High capacity (HAX)	
Contact capacity			Resistance load	Inductive load	Resistance load	Inductive load	Resistance load	Inductive load
(A)	AC	460 V	5	2	5	2	5	2.5
		250 V	10	10	10	10	10	10
		125 V	10	10	10	10	10	10
	DC	250 V	0.3	0.3	0.3	0.3	3	1.5
		125 V	0.6	0.6	0.6	0.6	10	6
		30 V	10	6	10	6	10	10
Maximum number of contacts			2 NO, 2 NC		5 NO, 5 NC		5 NO, 5 NC	
Order information		Art. no.	28786		25835		38468	

Note: The chattering time at the time of contact ON - OFF is below 0.025 sec.

Condensor trip device (COT)

Circuit diagram



This device allows the electrically actuated opening of the breaker by remote control within a given period of time, despite a power cut. The COT is used in conjunction with the shunt trip device (SHT).

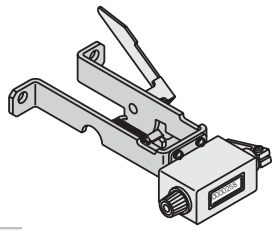
For dimensions refer to page 41.

Further details on request.

Specifications		KF-100	KF-200
Rated input voltage *	V AC	100/110	200/220
Rated charging voltage	V	140/155	280/310
Power supply capacity	VA	1	1
Capacitor capacity	µF	660	150
Voltage range	%	60–125	60–125
Charging time (capacitor)	s	max. 0.5	max. 0.5
Trip limit time	s	min. 900	min. 300
Order information	Art. no.	On request	On request

* Rated frequency at AC = 50/60 Hz

Counter (CNT)

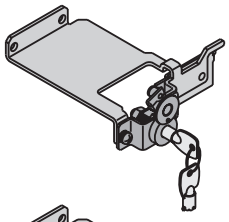


This is a mechanical counter which registers the total number of operating cycles (with 1 ON/OFF switching operation = 1 operating cycle).

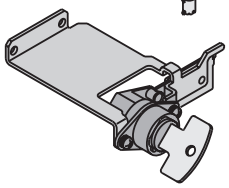
The number of operating cycles is displayed on the front of the unit.

Specifications	CNT-SAE
Counter type	Mechanical
Display	5 digits
Order information Art. no.	25914

Interlock device (CYL, CAL)



CYL



CAL

The interlock device locks the circuit breaker into the OFF position.

The relevant key can only be taken out in the OFF position of the circuit breaker, so that it can also be used for unlocking other breakers.

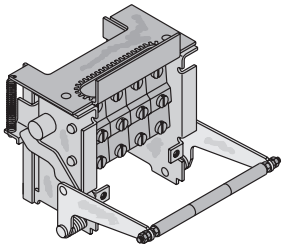
There are two locking options available:

- Cylinder lock (CYL)
- Castell lock (CAL) *

Specifications		CYL-SAEWK	CYL-SAEWK 1	CYL-SAEWK 2	CYL-SAEWK 3	CYL-SAEWK 4	CAL-SAEWK
Interlock		Cylinder	Cylinder	Cylinder	Cylinder	Cylinder	Castell
Closing		Basic	1	2	3	4	Basic
Order information	Art. no.	25838	39485	39486	39488	39489	On request

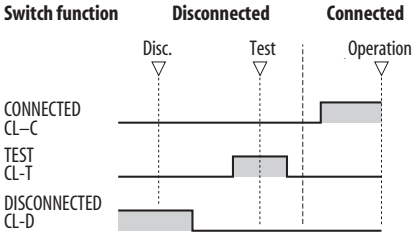
* The closing basis for the Castell lock can be designed individually. Further details on request.

Cell switch (CL)



The cell switches can be set for all the relevant positions, i.e. connected, test and disconnected.

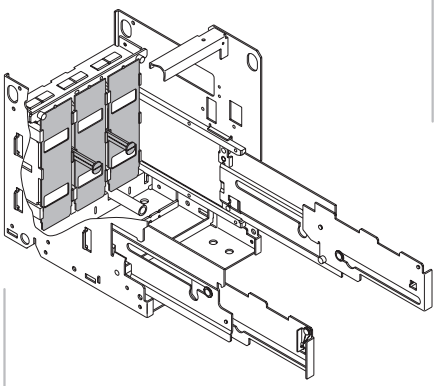
Each cell switch consists of 4 individual switches.



In addition to the mechanical position indicator on the front panel, it is also possible to mount these cell switches onto the cradle.

Specifications		CL-SAE211		CL-SAH211	
Load		Resistive	Inductive	Resistive	Inductive
Contact capacity (A)	AC 460 AC 250 AC 125	5 10 10	2.5 10 10	5 10 10	2.5 10 10
	DC 250 DC 125 DC 30	3 10 10	1.5 6 10	3 10 10	1.5 6 10
Number and type of switches		4 interchange switches		4 interchange switches	
Application (breaker)		AE1000-SS – AE6300-SS		AE1000-SH – AE3200-SH	
Order information	Art. no.	25840		45578	

Safety shutters (SST)



The safety shutters cover the main conductors of the cradle side (supply and load side) automatically when the circuit breaker is drawn out.

When checking the main circuit, the safety shutters on the supply and load sides can be opened independently of one another.

The safety shutters can also be locked with a mechanical locking device (SST LOCK). The padlocks have to be supplied by customer.

Specifications		SST-02SAE3	SST-02SAE4	SST-05SAE3	SST-05SAE4	SST-SAELOCK
Application (breaker) *		AE1000–1600-SS		AE2000–3200-SS / AE1000–3200-SH		Safety shutter lock
Breaker type		Drawout				
Number of poles		3	4	3	4	
Order information	Art. no.	25836	25837	25907	25908	30458

* On breaker types AE 4000-SSA/SSC–SS to AE 6300-SS the safety shutters are already part of the standard version.

Shorting b-contact (SBC)

When moving the breaker from the connected to the test positions, this contact is used to short circuit auxiliary switch (Axb) thus maintaining the correct sequence of operation of the external control circuit.

When ordering, the same number of shorting b-contacts as auxiliary switches (AXb) will be provided.

Specifications	SBC-SAE
Application (breaker)	All breaker
Order information Art. no.	30456

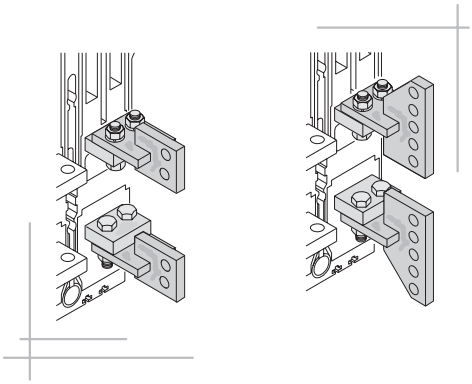
Mis-insertion preventor (MIP)

To obtain the right drawout configuration, it is extremely important that the breaker unit specifications (type, current rating, optional accessories, etc.) should match the cradle.

Mis-insertion is prevented by a combination of matching components (on the breaker and the cradle).

Specifications	MIP-SAE
Application (breaker)	AE1000–AE3200-SS/SH AE4000-SSA/SSC
Material	Metal
Order information Art. no.	30455

Vertical terminal adapter (VTA)

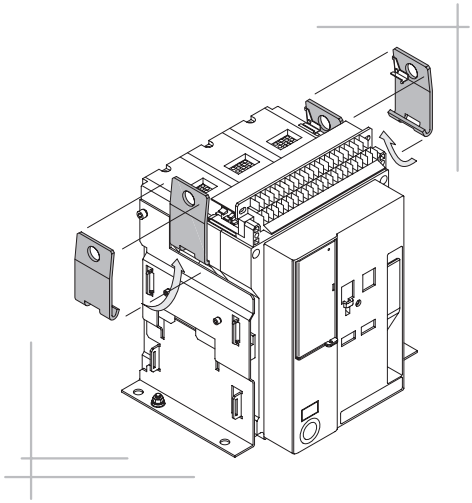


Vertical terminal adapters allow you to turn power connection by 90°.

Other forms of terminal adapters on request. Dimensions see page 37 ff.

Specifications	VTA-02SAE	VTA-03SAE	VTA-32SAE
Application (breaker)	AE1000–AE1600-SS	AE2000–2500-SS/ AE1000–2500-SH	AE3200-SS/SH
Shipping contents pieces	1	1	1
Order information Art. no.	34193	34192	34191

Lifting hooks (HP)



These hooks are used to remove the drawout breaker from the cradle.

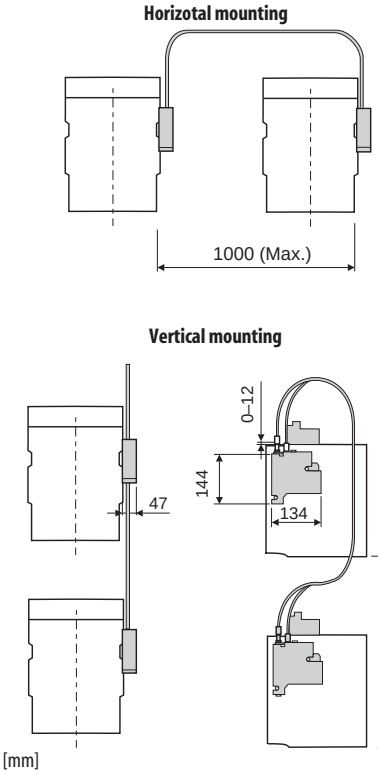
The option is not necessary, when a special lifter (bucket type) for AE-SS is used.

The fixed type breaker is equipped with the lifting hooks as standard.

The lifting hooks can not be used for AE4000-SS to AE6300-SS.

Specifications	HP-SAE
Material	Metal
Order information Art. no.	30485

Mechanical interlock (MI)



The mechanical interlock is a secure interlock prohibiting the parallel closing of two or three breakers.

Any combination between AE1000-SS/SH up to AE3200-SS/SH and AE4000-SSA/SSC is possible.

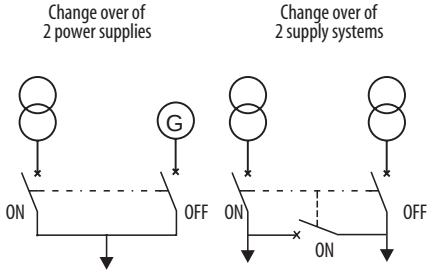
The interlock can be simply installed on either fixed or drawout type breakers.

With the drawout type, the interlock operates at the connecting point and can be released at other positions, providing secure maintenance and inspection of the breaker.

For AE4000-SS up to AE6300-SS a combination is possible only between two breakers.

Note:

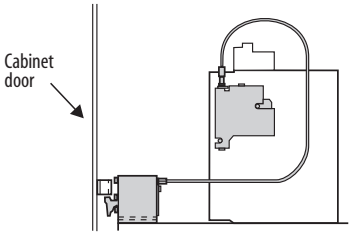
When using the mechanical interlock, the application of the door interlock (DI) is not possible.



Specifications	MI-SAE 163F	MI-SAE 164F	MI-SAE 323F	MI-SAE 324F	MI-SAE 163D	MI-SAE 164D	MI-SAE 323D	MI-SAE 324D	MI-SAW 633D	MI-SAW 634D	MI-SAEIW
Application (breaker)	AE1000–1600SS		AE2000–3200SS AE1000–3200SH AE4000-SSA		AE1000–1600SS		AE2000–3200SS AE1000–3200SH AE4000-SSA		AE4000–6300SS		Bowden cable set
Breaker type	Fixed				Drawout						
Number of poles	3	4	3	4	3	4	3	4	3	4	
Order information Art. no.	30450	30451	30452	30453	30446	30447	30448	30449	62327	62326	30454

Interlocking requires a separate unit for each breaker. If you have 3 breakers, you need a separate set of bowden cables MI-SAEIW.

Door interlock (DI)



The device has been designed for panel doors with the groove on the left (standard). Locks for grooves on the right are available on request.

A wire-type mechanical interlock is used to allow flexibility in positioning breakers in the panel.

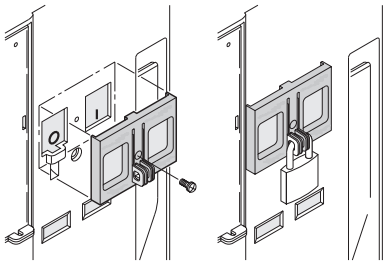
Note:

When using the door interlock (DI) the application of the mechanical interlock (MI) is not possible.

This mechanical interlock device makes it impossible to open the panel door unless the circuit breaker is not switched off.

Specifications	DI-SAEF	DI-SAED
Application (breaker)	For all breakers	For all breakers
Breaker type	Fixed	Drawout
Order information Art. no.	31538	31537

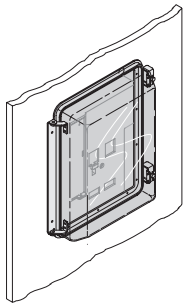
Push button cover (BC-L)



This mechanical device can be locked with a padlock or a seal (not included in the package) to protect the push buttons of the breaker unit against inadvertent ON/OFF operation.
The padlock has to be supplied by the customer.

Specifications		BCL-SAE
Material		Acrylic plate
Order information	Art. no.	27727

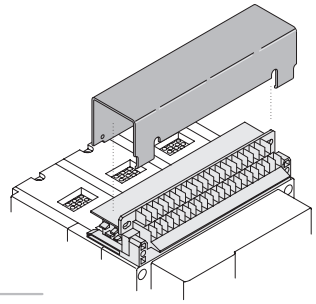
Dust cover (DUC)



The transparent dust cover is hinged onto the panel door. It has a screw lock and prevents dust and water entering into the circuit breaker.

Specifications		DUC-SAE
Protection		IP 54
Order information	Art. no.	42618

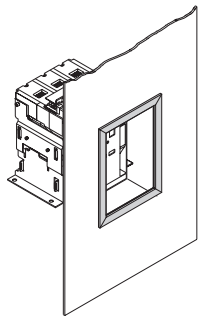
Terminal cover (TTC)



The terminal cover is a transparent cover for safety finger protection of control terminals.
The terminal cover prevents from careless touching to the live control terminals.

Specifications		TTC-SAEF	TTC-SAED
Application (breaker)		Fixed type	Draw-out
Protection		IP 20	IP 20
Order information	Art. no.	62482	62481

Door frame (DF)



The door frame improves the appearance, after cutting out the panel door to install the breaker.
Refer to the overall dimension drawings on page 36 ff for the installation method.

Specifications		DF-SAE
Application (breaker)		For all breakers
Material		Plastic
Protection		IP 20
Order information	Art. no.	28319

Current transformer (CT)

These current transformers (CT and sensor coil) are suitable for the main conductor and the N conductor.

Current transformers of type CT-06□□□ serve the reduction of $I_{n\,max}$. on an AE 1000.

Specifications		CT-06 SAE031	CT-06 SAE050	CT-06 SAE063	CT-10 SAE100	CT-12 SAE125	CT-16 SAE160	CT-20 SAE125	CT-20 SAE160	CT-20 SAE200	CT-25 SAE250	CT-32 SAE320
Application (breaker) *		AE1000 -SS	AE1000 -SS	AE1000 -SS	AE1000 -SS	AE1250 -SS	AE1600 -SS	AE2000-SS AE1250-SH	AE2000-SS/-SH AE1600-SH	AE2000 -SS/-SH	AE2500 -SS/-SH	AE3200 -SS/-SH
Rated current $I_{n\,max}$ **	(A)	315	500	630	1000	1250	1600	1250	1600	2000	2500	3200
Order information	Art. no.	30476	30477	30478	33437	30479	30480	43387	62748	39539	39540	39541

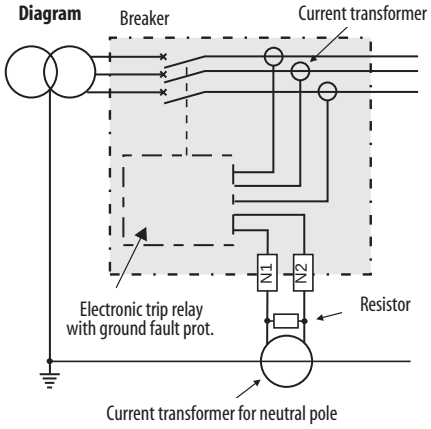
More CTs on request.

* Shipping contents includs CT and sensor coil for 1 pole. Other transformers on request.

** At 40°C and 50/60 Hz (other temperatures see Technical Information on page 48)

Neutral current transformer (NCT)

Diagram



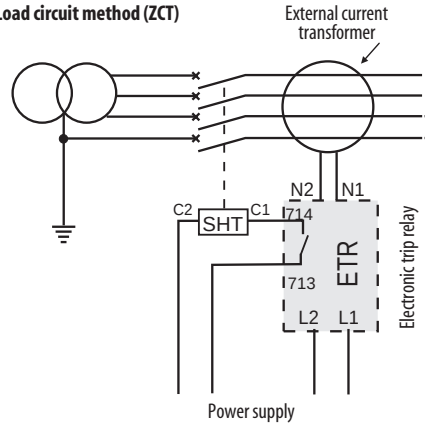
The neutral CT is used for ground fault protection when a 3 pole breaker is used on a 3 phase 4 wire system. It should be used together with a electronic trip relay that has the ground fault protection (GFR) option.

Specifications		NCT-06SAE	NCT-10SAE	NCT-12SAE	NCT-16SAE	NCT-20SAE	NCT-25SAE	NCT-32SAE	NCT-40SAW	NCT-50SAW	NCT-63SAW
Application (breaker) *		AE1000	AE1000	AE1250	AE1600	AE2000	AE2500	AE3200	AE4000	AE5000	AE6300
Current range	(A)	630	1000	1250	1600	2000	2500	3200	4000	5000	6300
Order information	Art. no.	39038	39026	33853	37323	39037	39036	39035	62330	62329	62328

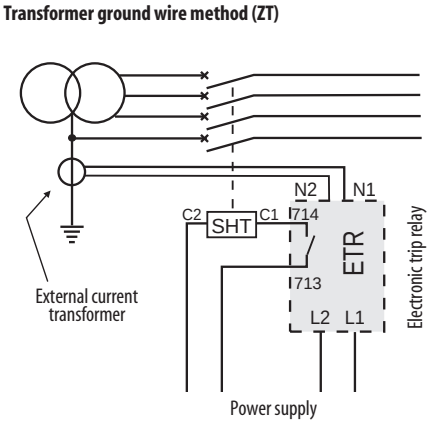
* A suitable resistor (0.1 Ω / 10 W) is attached to the product. Further technical details on request.
For AE4000-SSC on request.

External current transformer (ZCT)

Load circuit method (ZCT)



Transformer ground wire method (ZT)



This option is used to detect several amperes of earth leakage when used in combination with an electronic trip relay that has the earth leakage tripping (ER) option.

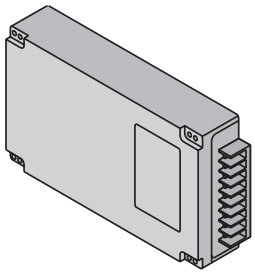
Two methods are available:

- **ZCT:** three-load phase conductors (and the neutral conductor in a 4-wire system) are passed through the ZCT
- **ZT:** The supply transformer's ground wire passes through to earth.

Specifications		ZCT-163	ZCT-323	ZCT-324	ZT-15A	ZT-30A	ZT-40A	ZT-60A	ZT-80A	ZT-100A
Application		Load circuits			Transformer ground wire					
Hole diameter for wire *	(mm)	230x60 (oval)	370x108 (oval)	500x108 (oval)	∅ 15	∅ 30	∅ 40	∅ 60	∅ 80	∅ 100
Order information	Art. no.	On request								

* For detailed dimensions refer to page 46. Further specifications on request.

External power supply unit (PS)



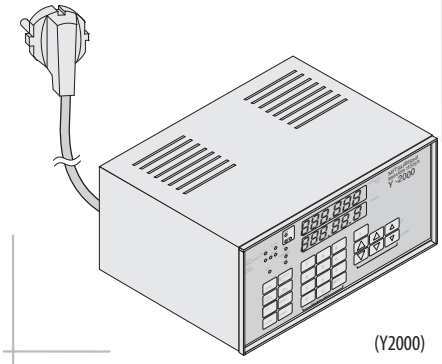
This unit is used when a DC 24 V control supply is needed for the trip indicator on the electronic trip relay.

The unit can be installed from the front to the left side of the breaker (for dimensions please refer to page 46).

Specifications		PS-A200	PS-D200	PS-A400
Rated voltage *	(V)	100–110 / 200–220 (AC)	200 (DC)	380–415 (AC)
Input voltage range	(%)	+10 / -15 %	+10 / -15 %	+10 / -15 %
Input capacity		30 VA or less	30 W or less	30 VA or less
Output voltage	(V)	24 (DC) ± 10 %	24 (DC) ±10 %	24 (DC) ±10 %
Output current	(A)	0.42 or less	0.42 or less	0.3 or less
Order information	Art. no.	On request	On request	On request

* Rated frequency at AC = 50/60 Hz

Field test devices



(Y2000)

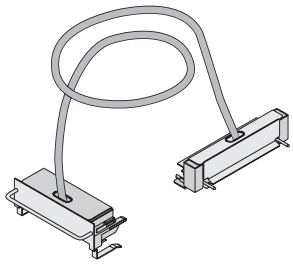
The test devices are for testing the functioning of the electronic trip relay.

It allows you to test the trip relay without the breaker being connected to the main supply. The breaker will trip when tested.

Specifications		Y-160	Y-2000
Test functions		LTD, STD, INST, Groundfault	LTD, INST, STD, Groundfault, pre-alarm
Power supply *		100–120 V, 200–240 V (AC) or battery	100–240 V (AC)
Test current signal setting		6-point setting possible (20, 40, 125, 200, 500 and 2000 %)	Continuously variable (10 – 2000 %)
Others		Time counter	Ammeter, time counter
Order information	Art. no.	27497	27496

* Rated frequency at AC = 50/60 Hz

Test jumper (TJ)



The test jumper cable is for testing the functioning of the circuit breaker when the unit is removed from its cradle.
Take the breaker out of its cradle and use this cable to switch the breaker on and off electrically, so that you can check all its functions.

Specifications		TJ-SAE
Cable length	(m)	3 *
Order information	Art. no.	30457

* Other lengths on request

Introduction and selection

Functions			Code	Applicable types B type —	General use S type ST	SPT	SPGT	SPET	Generator protection M type MT	MPT	MPGT	Power supply	Remarks	Reference
Standardfunctions		Long-time-delay	L	—	●	●	●	●	●	●	●	—	The basic L, S and I protection functions are also available when the control power supply fails.	Page 23, 25
		+ Short-time-delay	S											
		+ Instantaneuous	I											
		Trip indicator	TRIP	—	●	●	●	●	●	●	●	required *)	Both LED display and relay output terminals are available.	Page 22, 24
		Load current indicator	LCI	—	●	●	●	●	●	●	●	—	The load state is indicate by the color of the LED.	Page 22, 24
		STD lock button		—	●	●	●	●	●	●	●	—	Convenient for checking instantaneous operation	Page 23, 25
		OCR alarm	AL	●	●	●	●	●	●	●	●	—	Since the output signal is a short pulse, an external self-holding circuit is required.	Page 29
	4-pole	Neutral pole overcurrent protection		—	●	●	●	●	—	—	—	—	100 % Neutral pole protection is provided for all 4-pole breakers, if the N-pole is equipped with CT.	Page 29
		Test terminal	TEST	—	●	●	●	●	●	●	●	—	For characteristics check	Page 23, 25
Special functions		Pre-alarm	PAL	—	—	●	●	●	—	●	●	required *)	Both LED display and relay output terminals are available.	Page 22, 24
		Ground fault	GFR	—	—	—	●	—	—	—	●	—	1. With ground fault alarm switch 2. If a 3-pole breaker is used in a 4-wire circuit, a neutral-pole CT (NCT) has to be ordered. 3. The ground fault protection (GFR) is not available when the maximum rated current is less than 315 / 500 A or 630 A for AE1000-SH.	Page 28
		Earth leakage	ER	—	—	—	—	●	—	—	—	required	An external ZCT and a shunt trip device (SHT) are required (not available for AE 4000–6300)	Page 28
Accessory		Load current measurement	LM	—	○	○	○	○	○	○	○	required *)	The maximum phase current flowing through the braker can be measured.	Page 29
		Unusual temperature indicator	TAL	—	○	○	○	○	○	○	○	required *)	The sensor is integrated in the breaker.	Page 29
		Instantaneous / MCR		●	—	—	—	—	—	—	—	—	1. The long-time and short-time delay function (L) is not available. 2. A changeover between instantaneous and MCR characteristics is possible.	—
	3- and 4-pole	Short-time delay +instantaneous / MCR (I)	MCR (I)	—	①	①	①	①	—	—	—	—	1. The long-time delay function (L) is not available. 2. A change-over between instantaneous and MCR characteristics is not possible.	—
		Long-time delay +short-time delay +instantaneous / MCR (C)	MCR (C)	—	①	①	①	①	—	—	—	—	A change-over between instantaneous and MCR characteristics is possible (not available for AE 4000–6300).	Page 22, 23
Relay power supply		Applicable voltage range ** AC 100–120/200–240 V DC 100–125 V DC 24–60 V	1 2 4	—	An external power supply for trip indication (TRIP) and relay control is required for all type of relays. The relay types are available in the 3 shown voltage ranges (standard = AC100–120/200–240 V). Please remark when ordering.							—	When the control power supply fails the function of the LED displays and output terminals are disabled. All standard protection functions are still available.	—

● Equipped with function as standard.
— Function not available.
○ Function available as an option.
① Only one of the special versions (MCR-I, or MCR-C) is available as an option.

* No additional power supply is required as long as control power is available.
** Other voltages on request. Rated frequency at AC = 50/60 Hz.

Special notes:

The circuit breakers are equipped with the S type relay in ST1A version (applicable voltage range AC 100–120/200–240 V) as **standard** (refer to page 6).

All other model types and accessories can be configured and ordered individually.

In the table on page 30 and 31 the most common configurations are listed with order informations.

The trip relay type B is suitable for switch disconnectors with instantaneous MCR characteristics only.

Characteristics setting table

Function		Applicable type	Application	Standard protection S type				Generator protection M type		
				ST	SPT	SPGT	SPET	MT	MPT	MPGT
Max. rated current ($I_{n\,max}$)		All types	Maximum rated current ($I_{n\,max.}$)	Conforms to CT ratings (see table below)						
Rated current (I_n)		All types	Maximum rated current ($I_{n\,max}$) × setting	0.5–0.6–0.7–0.8–0.9–**1.0** AE4000 SSA/SSC: 0.8–0.9–**1.0** (adjustable in steps)				0.5 – 1.0 (continuously adjustable) AE4000-SSA/SSC: 0.8 – 1.0 (Setting only by authorizide persons)		
Uninterrupted current (I_U)		S type	Rated current (I_n) × setting	0.80–0.82–0.84–0.86–0.88–0.90–0.92–0.94–0.96–0.98–**1.0** (adjustable in steps)				—	—	—
Long-time delay (L)	Current (I_l)	S type	Uninterrupted current (I_U) × setting	1.15 ± 10 % ② (fixed)				1–1.05–1.1–**1.15**–1.2 ± 5 % (adjustable in steps)		
		M type	Rated current (I_n) × setting							
	Time (T_L)	S type	At uninterrupted current (I_U) × 2	12–25–50–100–**150** sec ±20 % (adjustable in steps)				12–**20**–25–30–40–60 s ± 20 % (adjustable in steps)		
		M type	At current (I_L) ×1.2							
	Time fine adjustment	M type	Long-time delay time (T_l) ×setting	—	—	—	—	Details on request		
Short-time delay (S)	Current (I_{sd})	All types	Rated current (I_n) × setting	2–3–4–6–8–**10** ± 15 % (adjustable in steps)				2–2.5–3–3.5–4–**4.5** ± 15 % (adjustable in steps)		
	Time (T_{sd})		At short-time delay current (I_{sd}) ×1.5	0–0.1–0.2–0.3–0.4–**0.5** s ± 20 % (adjustable in steps) Remark: the operating time for "0" is 0.05 sec. (only for M type)						
Instantaneous (I)	Current (I_i)	All types	Rated current (I_n) × setting	4–6–8–10–12–**16** ± 15 % AE5000-SS: 4–6–8–10–**12** ± 15 %, AE6300-SS: 4–6–8–**10** ± 15 % (adjustable in steps each)						
Pre-alarm (PAL)	Current (I_p)	S type	Uninterrupted current (I_U) × setting	—	0.7–0.8–0.9–1.0–**OVER** ± 10 % (adjustable in steps)			—	0.84–0.88–0.92–0.96–**1.0** ± 5 % (adjustable in steps)	
		M type	Long-time delay current (I_L) × setting							
	Time (T_p)	All types	At long-time delay time (T_L) × setting	—	0.5 times ± 20 %			—	0.5 times ± 20 %	
	Reset system		—	—	Self holding			—	Automatic reset	
Ground fault (GFR) ①	Current (I_g)	All types	Maximum rated current ($I_{n\,max}$) × setting	—	—	0.1–0.2–0.3–**0.5** ±20 % AE4000-SSA/SSC, AE4000 – AE6300-SS: 0.2–0.3–**0.5** ±20 % (adjustable in steps each)	—	—	—	0.1–0.2–0.3–**0.5** ±20 % AE4000-SSA/SSC, AE4000 – AE6300-SS: 0.2–0.3–**0.5** ± 20 % (adjustable in steps each)
	Time (T_g)		At ground fault current (I_g) ×1.5	—	—	0.3–0.8–1.5–**3** s ± 20 % (adjustable in steps)	—	—	—	0.3–0.8–1.5–**3** s ± 20 % (adjustable in steps)
Earth leakage (ER)	Current (I_e)	S type	Earth leakage current (I_e) = setting	—	—	—	1–2–3–**5** A ±20 % (adjustable in steps)	—	—	—
	Time (T_e)		At earth leakage current (I_e) ×1.5	—	—	—	0.3–0.8–1.5–**3** s ±20 % (adjustable in steps)	—	—	—

① Not available at $I_{n\,max}$ ≤315 A, 500 A and AE 1000-SH, 630 A.
② At 105 % non trip, at 125 % pick up.

Note: The electronic trip relay will be delivered set to the values shown in **bold** type.

Overview of rated currents ($I_{n\,max}$) – CT ratings

"SS" type	AE1000-SS	AE1250-SS	AE1600-SS	AE2000-SS	AE2500-SS	AE3200-SS	AE4000-SSA/SSC	AE4000-SS	AE5000-SS	AE6300-SS
Rated current ($I_{n\,max}$)	315, 500 630,1000	1250	1600	1250 1600 2000	2500	3200	4000	4000	5000	6300

"SH" type	AE1000-SH	AE1250-SH	AE16000-SH	AE2000-SH	AE2500-SH	AE3200-SH
Rated current ($I_{n\,max}$)	630 1000	1250	1600	2000	2500	3200

S Types – General Protection

① TRIP — Trip Indicator

Display of tripping condition:

- L for Long-time delay
- S/I for short-time delay (S) / instantaneous (I)
- G for ground fault (GFR)
- E for earth leakage (ER)

Both an LED display (red) and a relay output are provided.

Remarks: ❶, ❷, ❹

② PAL — Pre-Alarm Display

Pre-alarm display when a pre-determined load current is reached.

Display method: Both an LED display (yellow) and a relay output are available.

- The "PAL" LED lights up when the pre-set value is exceeded (the relay is not activated when this happens).
- The relay output is activated when the "PAL OUT" LED lights up.
- The "PAL OUT" is self-holding and keeps lightning, even if the load value is again smaller than the set value.

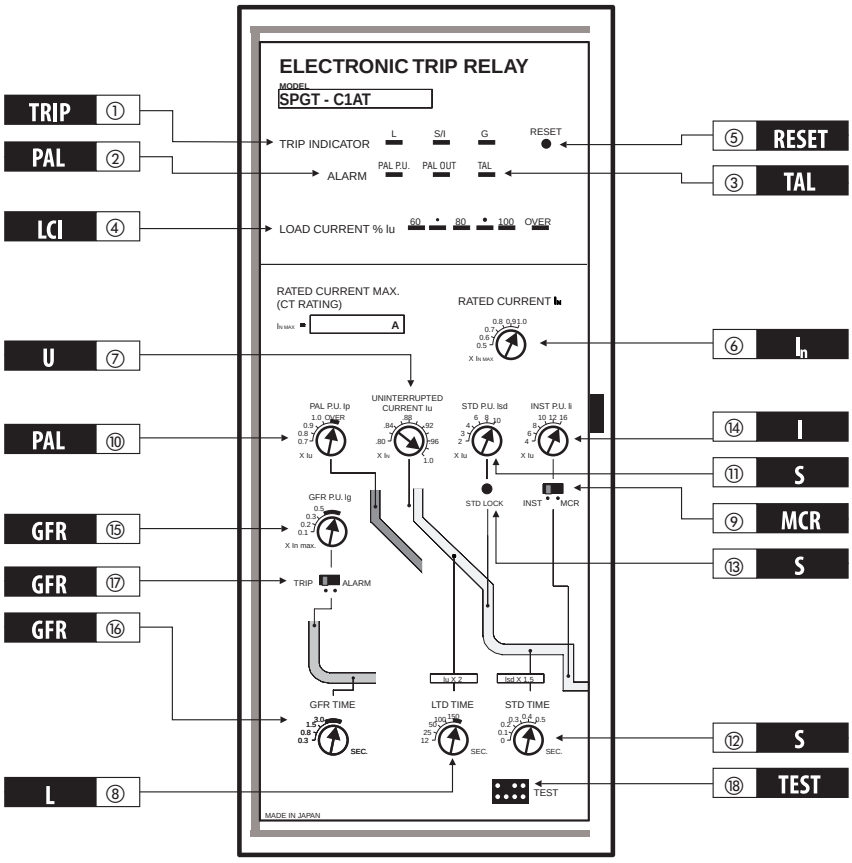
Remarks: ❶, ❷, ❹

③ TAL — Temperature Alarm

An alarm signal is generated when the temperature of the main contacts rises above the threshold level (approx. 170 °C or more).

Display methods: Both an LED indicator (red) and a relay output are provided.

Remarks: ❶, ❷, ❹



④ LCI — Load Current Indicator

Indicates the percentage of uninterrupted current (I_u) in the following steps 60-70-80-90-100-OVER.

LED indication in different colours:

- 60 – 80 % = green
- 90 – 100 % = yellow
- OVER = red

The LEDs goes out when the breaker trips.

AL — OCR Alarm Contact

An alarm signal is output to the contact when the breaker is tripped by one of the following causes:

- L Long-time delay
- S Short-time delay
- I Instananeous trip (I) or MCR
- G Ground fault or
- E Earth leakage

Remarks: ❸, ❹

⑤ RESET — Indicator Reset Button

Pressing this button resets the displays and the relay output.

- Trip indicator (TRIP)
- Unusual temperature indicator (TAL)
- Pre-alarm (PAL)

Remarks:

All functions marked in gray are included as standard equipment (standard relay ST1A).

This overview lists the maximum possible functionality of the units.

Trip relays with special functions (functions wich are not marked in gray) have to be ordered seperately (please refer to order information on page 30 and 31).

Page 28 and following contain a detailled description of all special functions.

❶ An external power supply for trip indication and relay control is required for all type of relays. The voltage range for the power supply must be within one of the following ranges:
- 1: AC 100–120 / 200–240 V (standard)
- 2: DC 100–125 V
- 4: DC 24–60 V
(other voltages on request)

❷ The LED will go out when the control power supply is interrupted or when the RESET button is pushed.

❸ An external self-hold circuit is required, as the alarm signal pulse has a duration of only 0.03 sec.

❹ The contact rating (A) for the signal relays are listed in the table below.

Voltage (V)		Resistive load	Inductive load*
AC	120	2	2
	250		
DC	30	0.2	0.1
	125		

* cos φ = 0,4 , L/R = 7 msec

Basic Setting

⑥ **I_n** **Rated Current**

▶ *RATED CURRENT*

The maximum rated current can be selected as follows:

Max. rated current ($I_{n\,max}$) x setting (A)

0.5-0.6-0.7-0.8-0.9-**1.0**

AE4000-SSA/SSC: 0.8–0.9–**1.0**

Changing this setting changes the following values proportionally:

- Uninterrupted current (I_u)
- Short-time delay current (I_{sd})
- Instantaneous current (I_i)
- Pre-alarm (I_p)

Overload Protection

⑦ **U** **Uninterrupted Current (I_u)**

▶ *UNINTERRUPTED CURRENT*

Rated current (I_n) x setting (A)

0.80-0.84-0.88-0.92-0.96-**1.0**

Used for setting the continuous uninterrupted current value. The actual tripping range is I_u x 1.05 – 1.25.

The load current is displayed as a percentage of the uninterrupted current and thus changes proportionally when the uninterrupted current setting is changed.

⑧ **L** **Long-Time Delay Time (T_L)**

▶ *LTD TIME*

Time setting (in seconds)

12-25-50-100-**150**

This value specifies the operating time when the current flowing is the uninterrupted current set value × 2.

The pre-alarm operating time is half of the long-time-delay time setting.

⑨ **MCR** **INST/MCR Switch**

▶ *INST/MCR*

This switch makes it possible to select between instantaneous operation characteristic (INST) and MCR characteristic.

The MCR characteristics the abbreviation for Making Current Release. With this characteristic, instantaneous tripping is only possible if a short circuit occurs during switch-ON. After the initial switch-ON, the time delay tripping characteristic is active but the instantaneous tripping is not possible.

⑩ **PAL** **Pre-Alarm Current (I_p)**

▶ *PAL P.U.*

Rated current (I_u) x setting (A)

0.7-0.8-0.9-1.0-**OVER**

Current setting for pre-alarm activation.

Short-Circuit Protection (STD)

⑪ **S** **Short-Time Delay P.U. Current (I_{sd})**

▶ *STD P.U.*

Rated current (I_n) x setting (A)

2-3-4-6-8-**10**

Current threshold value setting for short-time delay tripping.

⑫ **S** **Short-Time Delay Time (T_{sd})**

▶ *STD TIME*

Time-delay setting (in seconds)

0-0.1-0.2-0.3-0.4-**0.5**

The setting value is the operating time when the current flowing is the short-time delay current setting (I_{sd}) × 1,5.

If the dial is set to 0 seconds the breaker will trip in 0.05 seconds.

⑬ **S** **Short-Time Delay Lock Button**

▶ *STD LOCK*

When measuring the instantaneous tripping current, press the short time delay operation inhibit button (STD LOCK) in order to disable the short-time-delay tripping function.

Short-Circuit Protection (instantaneous)

⑭ **I** **Instantaneous P.U. Current (I_i)**

Rated current (I_n) x setting (A)

4-6-8-10-12-**16**

AE5000: 4-6-8-10-**12**
AE6300: 4-6-8-**10**

Sets the threshold current value for instantaneous tripping.

ER **Earth Leakage Protection (I_e)**

▶ *ER P.U.*

Current setting 1–2–3–**5**

Both external ZCT and SHT are required (see page 18 and 26 for further details).

ER **Earth Leakage Protection (T_e)**

▶ *(TE) ER TIME*

Time setting (in seconds)

0.3–0.8–1.5–**3**

The setting represents the operating time when the current flowing is the earth leakage current value setting × 1,5.

The earth leakage protection facility is not illustrated because it is only possible to have either earth leakage **or** ground fault protection.

Ground Fault Protection (GFR)

⑮ **GFR** **Ground Fault P.U. Current (I_g)**

▶ *GFR P.U.*

Max. rated current ($I_{n\,max}$) x setting (A)

0.1-0.2-0.3-**0.5**

AE4000-SSA/SSC; AE4000–6300: 0.2-0.3-**0.5**

The function is not available when $I_{n\,max.}$ is less than 630 A and for AE1000-SH $I_{n\,max}$ 630 A.

⑯ **GFR** **Ground Fault Time (T_g)**

▶ *GFR TIME*

GFR time setting (in seconds)

0.3-0.8-1.5-**3**

The setting specifies the operating time when the current flowing is the ground fault current value setting (I_g) x 1.5.

⑰ **GFR** **Ground Fault Trip Switch**

▶ *GFR TRIP / ALARM*

The breaker will trip when the switch is set to the "TRIP" position.

When the switch is set to the "ALARM" position a red trip indicator LED will light up and the relay output will be activated when a ground fault occurs; the breaker will not trip, however.

The switch must be set to the "TRIP" position when the overcurrent tripping characteristic is activated (refer to p. 28).

Others

⑱ **TEST** **Test Terminal**

Test functions:

Tripping characteristics

- Long-time-delay (L)
- Short-time-delay (S)
- Instantaneous (I)
- Pre-alarm (P)
- Ground fault (GFR)

A special testing device is required (see page 19).

The **bold** marked values show the setting at time of shipment.

M Types – General Protection

① TRIP — Trip Indicator

Display of tripping condition:

- L for Long-time delay
- S/I for short-time delay (S) / instantaneous (I)
- G for ground fault (GFR)

Both an LED display (red) and a relay output are provided.

Remarks: ❶, ❷, ❹

② PAL — Pre-Alarm Display

Pre-alarm display when a pre-determined load current is reached.

Display method: Both an LED display (yellow) and a relay output are available.

- The "PAL" LED lights up when the preset value is exceeded (the relay is not activated when this happens).
- The relay output is activated when the "PAL OUT" LED lights up.
- The "PAL OUT" is self-holding and keeps lightning, even if the load value is again smaller than the set value.

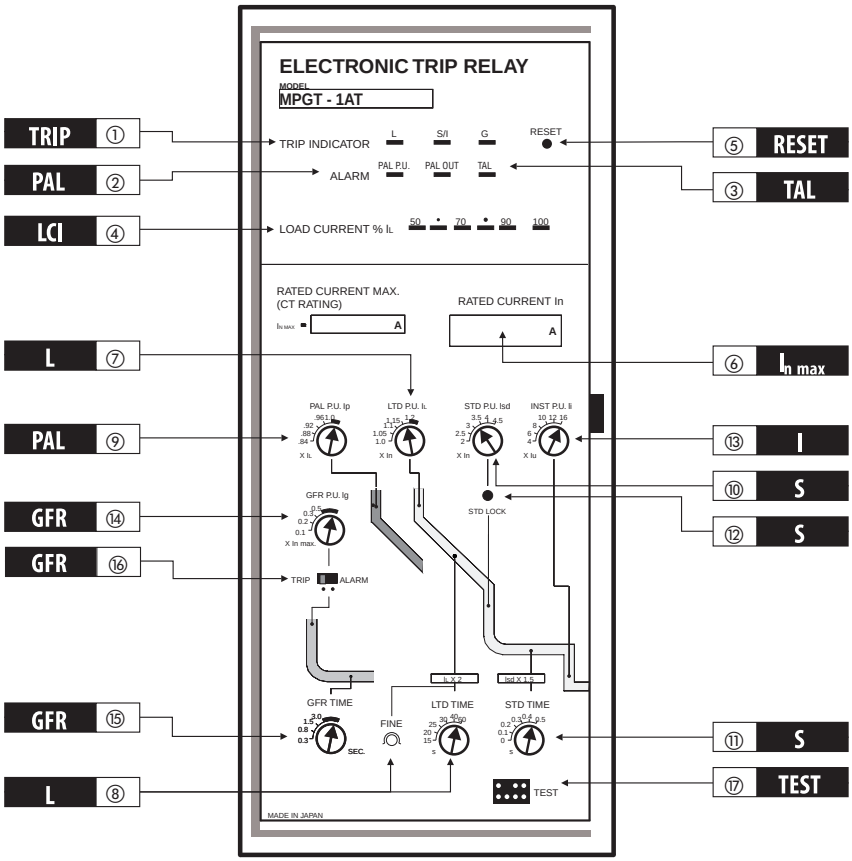
Remarks: ❶, ❷, ❹

③ TAL — Temperature Alarm

An alarm signal is generated when the temperature of the main contacts rises above the threshold level (approx. 170 °C or more).

Display methods: Both an LED indicator (red) and a relay output are provided.

Remarks: ❶, ❷, ❹



④ LCI — Load Current Indicator

Indicates the percentage of uninterrupted current (I_L) in the following steps 50-60-70-80-90-100-OVER.

LED indication in different colours:

- 50 – 70 % = green
- 80 – 90 % = yellow
- 100 % = red

The LEDs goes out when the breaker trips.

AL — OCR Alarm Contact

An alarm signal is output to the contact when the breaker is tripped by one of the following causes:

- L Long-time delay
- S Short-time delay
- I Instananeous trip (I)
- G Ground fault

Remarks: ❸, ❹

⑤ RESET — Indicator Reset Button

Pressing this button resets the displays and the relay output.

- Trip indicator (TRIP)
- Unusual temperature indicator (TAL)
- Pre-alarm (PAL)

Remarks:

All functions marked in gray are included as standard equipment (standard relay MT1A).

This overview lists the maximum possible functionality of the units.

Trip relays with special functions (functions wich are not marked in gray) have to be ordered seperately (please refer to order information on page 30 and 31).

Page 28 and following contain a detailled description of all special functions.

❶ An external power supply for trip indication and relay control is required for all type of relays. The voltage range for the power supply must be within one of the following ranges:

- 1: AC 100–120 / 200–240 V (standard)
- 4: DC 24–60 V

(other voltages on request)

❷ The LED will go out when the control power supply is interrupted or when the RESET button is pushed.

❸ An external self-hold circuit is required, as the alarm signal pulse has a duration of only 0.03 sec.

❹ The contact rating (A) for the signal relays are listed in the table below.

Voltage (V)		Resistive load	Inductive load*
AC	120	2	2
	250		
DC	30		
	125	0.2	0.1

* cos φ = 0,4 , L/R = 7 msec

Basic Setting

⑥ $I_{n\,max}$ **Rated Current**

▶ *RATED CURRENT*

The rated current will be preset to a fixed value at time of shipment (select a value between 0.5 and 10 (AE4000-SSA/SSC: 0.8 and 1.0) of the maximum rated current).

The value is stamped on the relay.

Note:
Specify the preset rated current in written form when ordering.

Overload Protection

⑦ L **Long-Time Delay Current (I_L)**

▶ *LTD P.U.*

Rated current (I_n) x setting (A)

1-1.05-1.1-**1.15**-1.2

The breaker trips within a range from (I_L) x 0.95 to 1.05.

The load current is displayed as a percentage of the long-time delay current (I_L).

The pre-alarm set value varies proportionally to the long-time delay current setting.

⑧ L **Long-Time Delay Time (T_L)**

▶ *LTD TIME*

Time setting (in seconds)

15-**20**-25-30-40-60

This value specifies the operating time when the current flowing is the long-time delay current set value (I_L) x 1.2.

The pre-alarm operating time is half of the long-time delay setting.

⑧ L **Long-Time Delay Time FINE (T_L)**

▶ *FINE*

Fine adjustment of long-time delay time.

Detailled information on request.

This setting has no influence on the pre-alarm time.

⑨ PAL **Pre-Alarm (I_p)**

▶ *PAL P.U.*

Long-time-delay current value (I_L) x setting

0.84-0.88-0.92-0.96-**1.0**

Threshold value for pre-alarm operation.

Short-Circuit Protection (STD)

⑩ S **Short-Time Delay P.U. Current (I_{sd})**

▶ *STD P.U.*

Rated current (I_n) x setting (A)

2-2.5-3-3.5-4-**4.5**

Current threshold value setting for short-time delay tripping.

⑪ S **Short-Time Delay Time (T_{sd})**

▶ *STD TIME*

Time delay setting (in seconds)

0-0.1-0.2-0.3-0.4-**0.5**

The setting value is the operating time when the current flowing is the short-time delay current setting (I_{sd}) x 1.5.

If the dial is set to 0 seconds the breaker will trip in 0.05 seconds.

⑫ S **Short-Time Delay Lock Button**

▶ *STD LOCK*

When measuring the instantaneous tripping current, press the short time delay operation inhibit button (STD LOCK) in order to disable the short-time-delay tripping function.

Short-Circuit Protection (instantaneous)

⑬ I **Instantaneous P.U. Current (I_i)**

▶ *INST P.U.*

Rated current (I_n) x setting (A)

4-6-8-10-12-**16**

AE5000: 4-6-8-10-**12**
AE6300: 4-6-8-**10**

Sets the threshold current value for instantaneous tripping.

Ground Fault Protection

⑭ GFR **Ground Fault P.U. Current (I_g)**

▶ *GFR P.U.*

Max. rated current ($I_{n\,max}$) x setting (A)

0.1-0.2-0.3-**0.5**

AE4000-SSA/SSC, AE4000–6300:
0.2-0.3-**0.5**

This function is not available if max. rated current values $I_{n\,max}$ is less than 630 A and for AE1000-SH, $I_{n\,max}$ 630 A.

⑮ GFR **Ground Fault Time (T_g)**

▶ *GFR TIME*

Time setting (in seconds)

0.3-0.8-1.5-**3**

The setting specifies the operating time when the current flowing is the ground fault current value setting (I_g) x 1.5.

⑯ GFR **Ground Fault Trip Switch**

▶ *GFR TRIP / ALARM*

The breaker will trip when the switch is set to the "TRIP" position.

When the switch is set to the "ALARM" position a red trip indicator LED will light up and the relay output will be activated when a ground fault occurs; the breaker will not trip, however.

The switch must be set to the "TRIP" position when the overcurrent tripping characteristic is activated (refer to p. 28).

Others

⑰ TEST **Test Terminal**

Test functions:

Tripping characteristics

- Long-time-delay (L)
- Short-time-delay (S)
- Instantaneous (I)
- Pre-alarm (P)
- Ground fault (GFR)

A special testing device is required (see page 19).

The **bold** marked values show the setting at time of shipment.

How to Adjust the Electronic Trip Relay

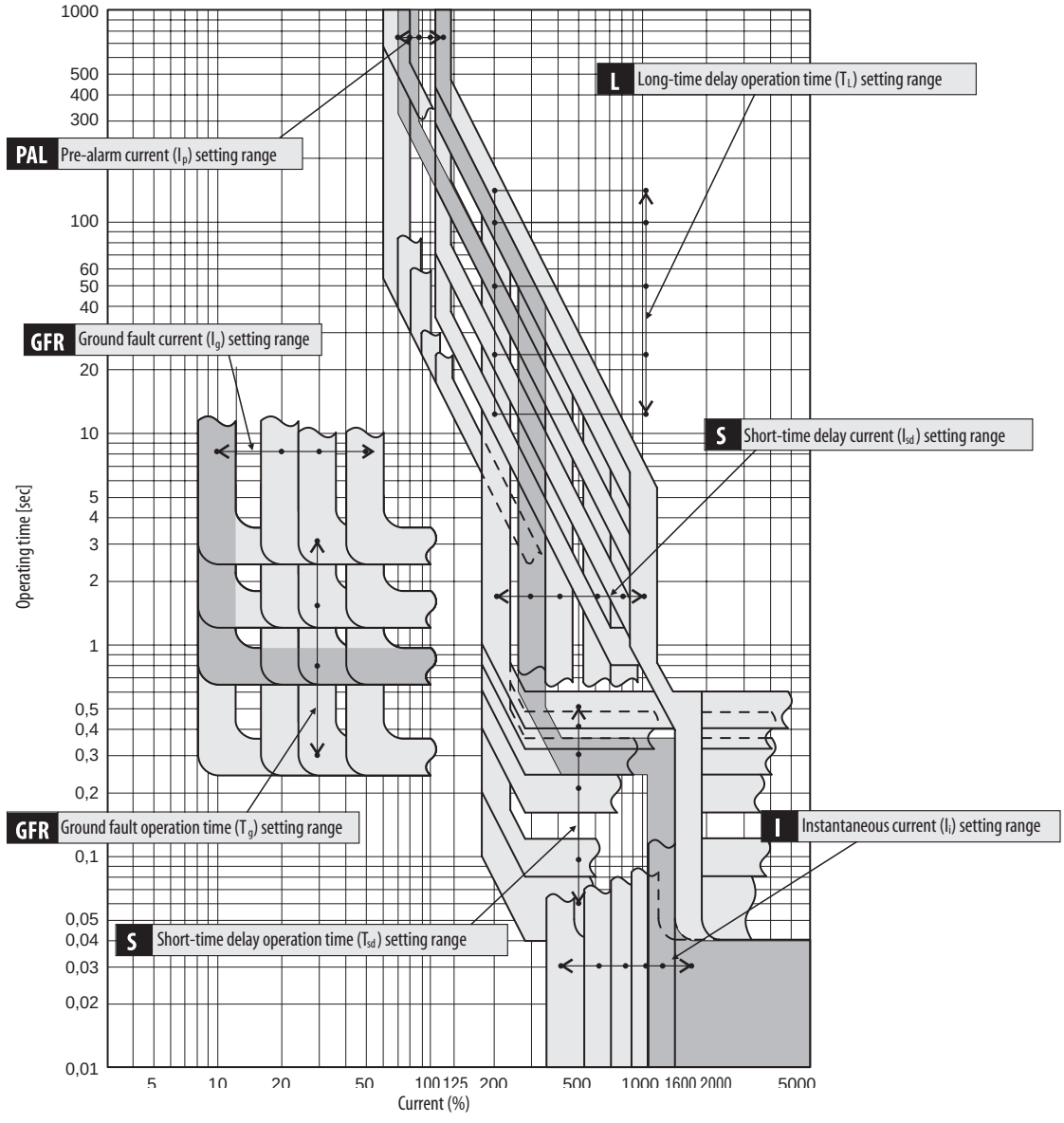
S type setting dial operation schematic – General use

- Max. rated current In max
  - Rated Current In
    - INST Instantaneous P.U. Current Ii
    - STD Short-Time Delay P.U. Current Isd
    - Uninterrupted Current Iu
      - Pre-Alarm Current Ip
      - Load Current Indicator LEDs
  - GFR Ground Fault P.U. Current Ig or ER Earth Leackage Fault Current IΔn

M type setting dial operation schematic – Generator protector use

- Max. rated current In max
  - Rated Current In
    - INST Instantaneous P.U. Current Ii
    - STD Short-Time Delay P.U. Current Isd
    - LTD Long-Time Delay Current I_L
      - Pre-Alarm Current Ip
      - Load Current Indicator LEDs
  - GFR Ground Fault P.U. Current Ig

Characteristic curve for the example next page



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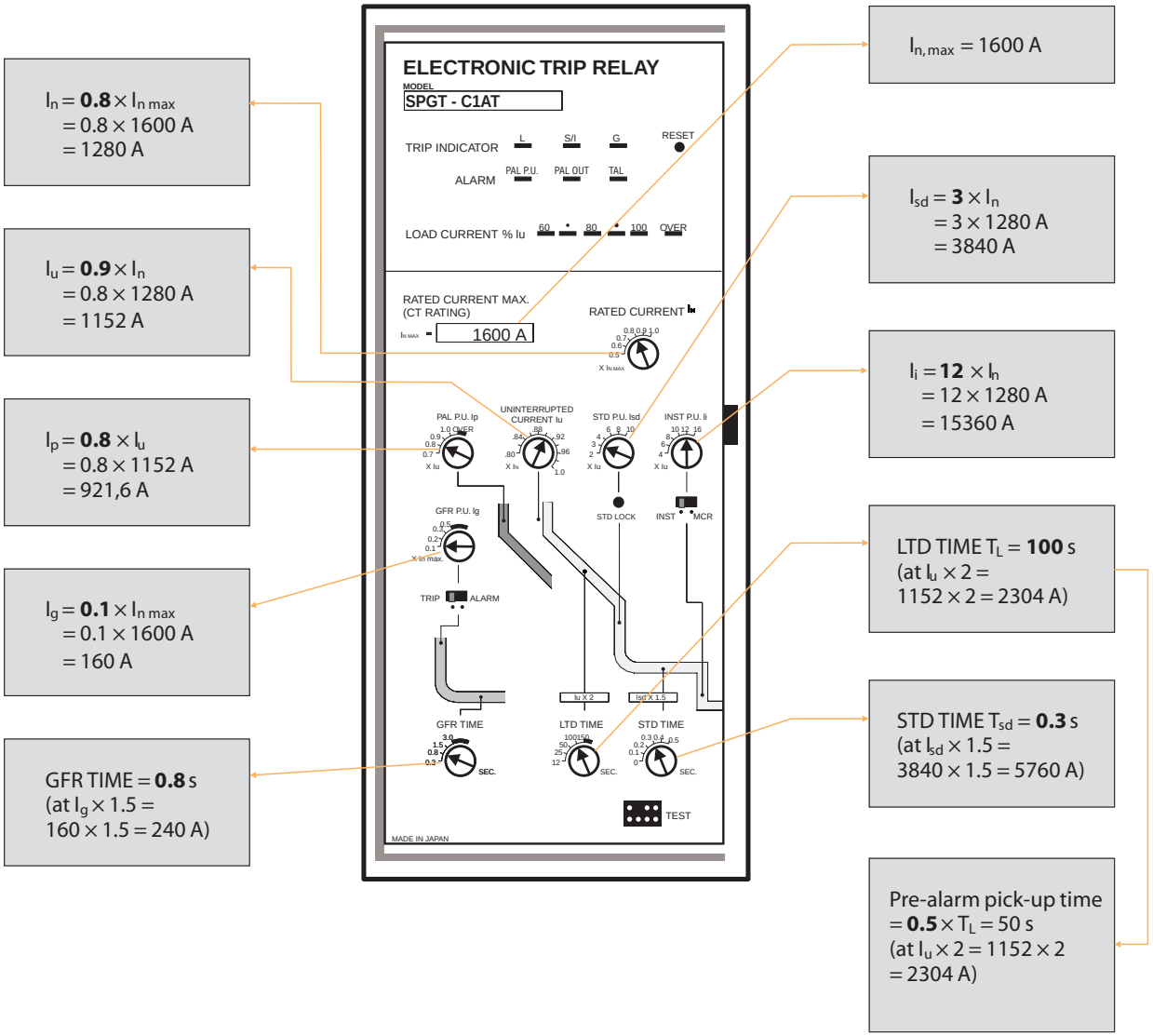
Setting example for S Type – General use

The following example shows in a simple way how you can set your required values on the S type trip relay.

Additional all current settings and operation times are calculated and shown.



Actual settings are as in the following table

Functions	Description	Setting value
Max. Rated Current	$I_{n\,max}$	1600 A
Set rated value	I_n	1280 A
Uniterrupted Current	I_u	1152 A
Long-Time Delay Time	LTD TIME	100 s ± 20 % (at 2304 A)
Short-Time Delay P.U. Current	I_{sd}	3840 A ± 15 %
Short-Time Delay Time	STD TIME	0.3 s ± 20 % (at 5760 A)

Functions	Description	Setting value
Instantaneous P.U. Current	I_i	15360 A ± 15 %
Pre-Alarm Current	I_p	921,6 A ± 10 %
Pre-alarm pick-up time	PAL pick-up time	50 s ± 20 % (at2304 A)
Ground Fault P.U. Current	I_g	160 A ± 20 %
Ground Fault Time	GFR TIME	0.8 s ± 20 % (at 240 A)

Special Functions – Accessories

■ Earth leakage protection (ER)

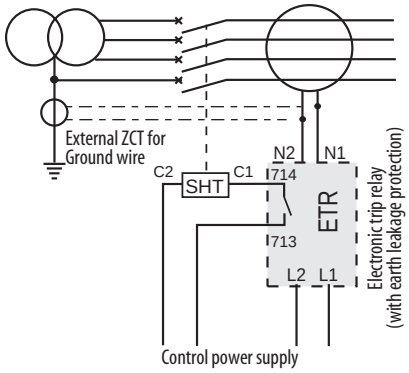
The earth leakage alarm facility is realised with an electronic trip relay with earth leakage protection (ER characteristics) and an external ZCT (refer to page 18 and 20).

When earth leakage current flows an alarm is activated but the breaker does not trip (see the earth leakage alarm system wiring diagram).

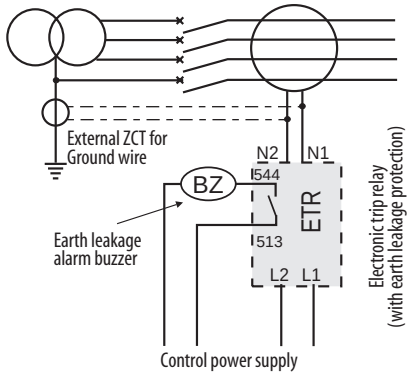
If you require the breaker to trip upon earth leakage you must also install an SHT device (see the earth leakage tripping system wiring diagram). Observe the voltage range specifications for the voltage tripping device SHT; the voltage tripping device (SHT) is suitable for 250 V AC/DC or less.

The earth leakage protection is not available for AE4000 to AE6300-SS breakers.

Earth leakage tripping system



Earth leakage tripping system



■ Pre-alarm (PAL)

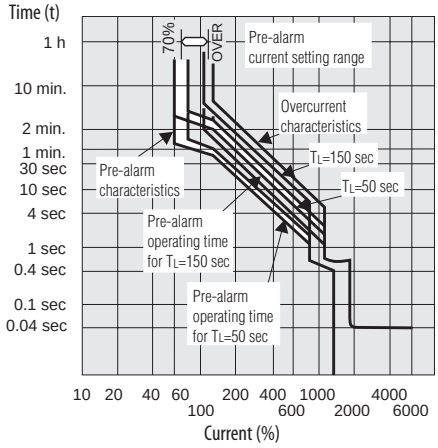
If the load current flowing through the breaker exceeds the preset value the "PAL" LED lights up and a relay output is activated. This is a useful option for ensuring a continuous power supply to an important circuit.

The operating characteristic shown in the graph is proportional to half of the long-time-delay tripping characteristic. It has been designed to prevent unnecessary alarms from inrush currents to the load.

T_L represents the long-time delay time.

The general use relay output is of a self-hold type; the relay type for generator protection features auto reset. (The control power supply and reset button required for the LED display is also used internally for the pre-alarm).

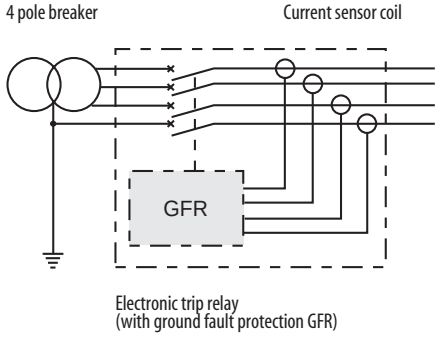
Characteristics (type S)



■ Ground fault protection (GFR)

When ground fault currents of several hundred amperes flow, it is possible that the long-time-delay or short-time-delay functions may not be able to protect the circuit. The ground fault function (GFR) can provide the necessary protection in these situations. Response sensitivity can be set in the range 0.1–0.2–0.3–0.5, multiplied by the maximum rated current ($I_{N\,max.}$); operating time can be set in the range 0.3–0.8–1.5–3 seconds.
No control power supply is required for this function.

- Similary with a 3 pole breaker, ground fault protection is also possible for a 3-phase, 3-wire circuit.
- In a 3-phase, 4-wire circuit ground fault protection is also possible if the 3-pole breaker is combined with a neutral pole CT (NCT). See page 18 for details.
- The ground fault protection is not available if the max. rated current (I_N max.) is less than 315 A or 500 A and less than 630 A for AE1000SH.



Temperature alarm (TAL)

When the temperature of the main contacts exceeds a pre-determind (approx. 170° C), a LED lights up and a relay contact (NO contact) is activated.

This helps to prevent malfunctions and increase the service life of the contacts as it makes it possible to detect even temporary temperature increases. Since the relay output is self holding a temporary rise in temperature more than 6 hours can also be detected (the control supply and the reset button are used in common with the trip indicator).

Note:

The power supply which is required for the LED indicators, is additionally used for the internal temperature measurement.

Load current measurement (LM)

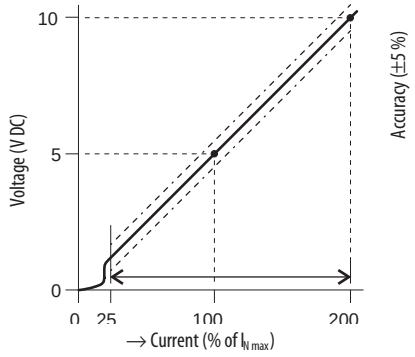
A direct current voltage signal which is converted from the effective value current in the electronic trip relay is taken out externally by using an isolation amplifier. Use the receiving indicator that can be operated by an input of 0–5 V DC since the voltage signal proportional to the largest phase current is transmitted. Moreover the voltage signal which is proportional to the largest phase current is then used to light the appropiate phase LED (the control supply is that used for the trip indicator).

Note:

Please consider that the wiring is within 3 m of the breaker control circuit terminal by using a twisted pair wire (with over 40 turns/meter).

The required control power supply for the LED indicator is common to the trip indicator

Output characteristics



Standard functions

The following functions are provided as standard for the electronic trip relays listed in this Catalogue.

OCR alarm (AL)

The OCR alarm is a short-time operating contact (NO contact) that indicates when the breaker has tripped as a result of an overcurrent situation. The AL unit is integrated in the electronic trip relay.

It operates when the breaker trips due to long-time-delay, short-time-delay, instantaneous/MCR and ground fault (GFR).
It is not activated when the breaker is tripped by the earth leakage (ER) protection facility

Note:

Though control power supply is not required for the operation of the overcurrent alarm (AL), an external self-hold circuit is required since the relay output is only activated for 0.03 seconds.

When a continuous output signal from the OCR alarm (AL) is required, please use the output signal from the trip indicators L, S/I and G, which is operated by the same causes as the OCR alarm.

Neutral pole overcurrent protection (NP) in a 4-pole circuit

All electronic trip relays listed in this Catalogue are provided with 100 % Neutral pole protection for 4-pole breakers, if the fourth pole (neutral pole) is equipped with a CT.

More details on request.

Special Functions – Accessories

Unless otherwise indicated, all circuit brea- kers in the standard package are delivered with the electronic trip relay ST1A (see overview on pages 6 and 7).

If you require a different relay for a given circuit breaker, simply specify the relevant electronic trip relay separately when ordering the breaker.

The table on the right gives you an overview of different trip relays. For detailed information please refer to page 20.

The table below gives you a selection of the most common elec- tronic trip relays with the relevant ordering details. To order a certain relay, make sure you state the relevant order code.

Ordering procedure

Type (code)	Voltage code	Accessory
SPT	1	A

A = AL (OCR alarm)
C = LM (Load current meas.)
T = TAL (Temperature alarm)
– = no accessory wanted

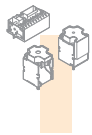
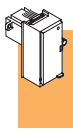
Trip relay		Operating functions								Voltage code			Accessory	
Type	Version	PAL	GFR	ER	MCR/C	MCR/I	NP	MCR/ INST	AL	1	2	4	LM	TAL
S	ST	—	—	—	—	—	—	—	●	AC 100–120, 200–240 V	DC 100–125 V	DC 24–60 V	○	○
	ST-C	—	—	—	●	—	—	—	●				○	○
	ST-I	—	—	—	—	●	—	—	●				○	○
	SPT	●	—	—	—	—	—	—	●				○	○
	SPT-C	●	—	—	●	—	—	—	●				○	○
	SPT-I	●	—	—	—	●	—	—	●				○	○
	SPGT	●	●	—	—	—	—	—	●				○	○
	SPGT-C	●	●	—	●	—	—	—	●				○	○
	SPGT-I	●	●	—	—	●	—	—	●				○	○
	SPET	●	—	●	—	—	—	—	●				○	○
	SPET-C	●	—	●	●	—	—	—	●				○	○
	SPET-I	●	—	●	—	●	—	—	●				○	○
M	MT	—	—	—	—	—	—	—	●		—		○	○
	MPT	●	—	—	—	—	—	—	●		—		○	○
	MPGT	●	●	—	—	—	—	—	●		—		○	○
B	B-C	—	—	—	—	—	—	●	●	—	—	—	—	—

● Function included in the relevant trip relay.
○ Function available as an option.
— Function either not included or not available.

Important:
The MCR function is not available for high performance breakers (i.e. the AE-SH series) and breaker types AE4000-SS up to AE6300-SS.

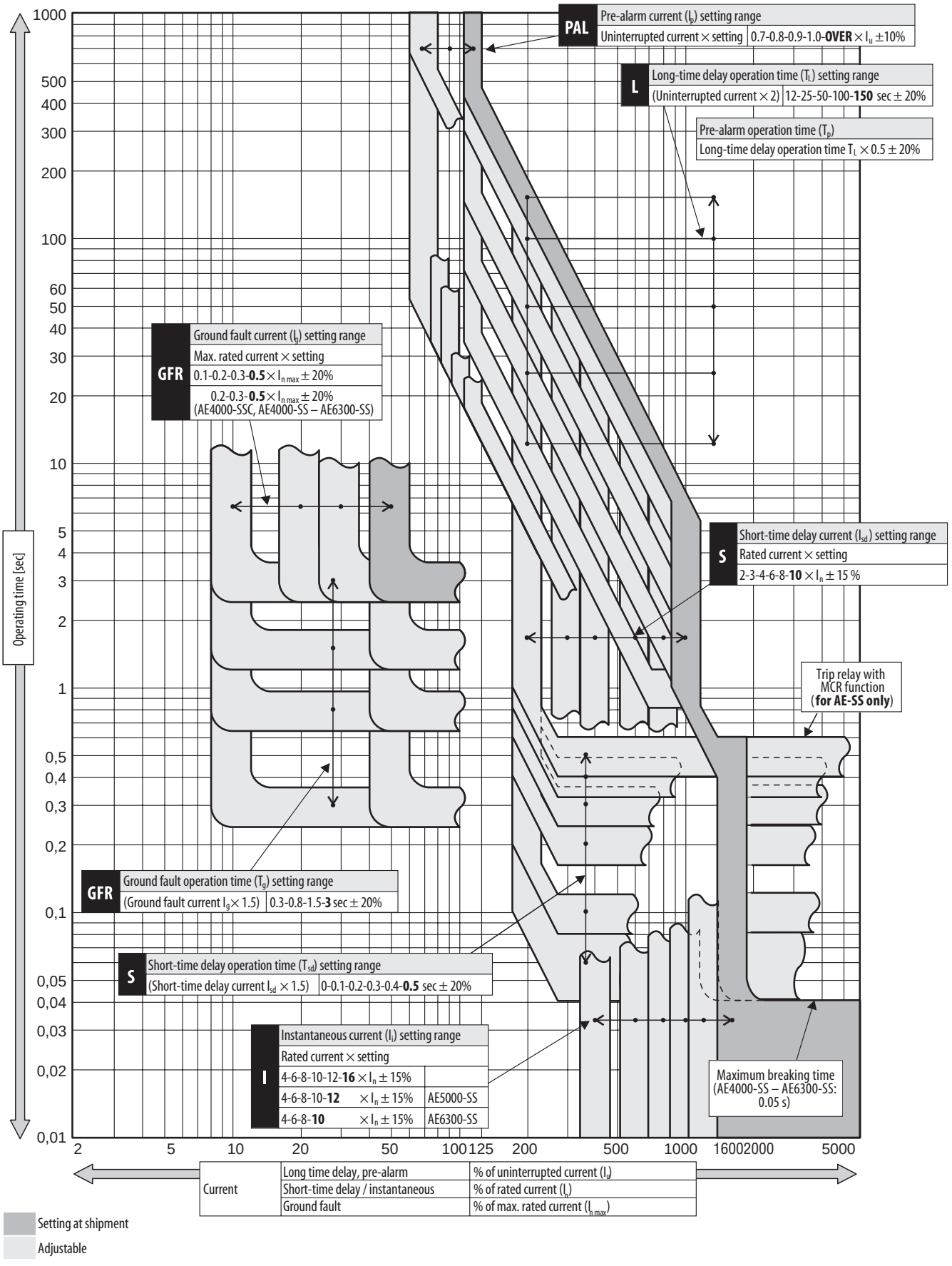
Type	Code	Description	Application	Ordering information	Art. no.
S	ST1A	Standard trip relay with OCR alarm (AL) without optional functions, AC 100–120 V and AC 200–240 V	AE1000–AE3200-SS/SH, AE4000-SS	ST1A-SAE	135976
			AE4000-SSA/SSC	ST1A-SAE-45	On request
	ST2A	Standard trip relay with OCR alarm (AL) without optional functions, DC 100–125 V	AE1000–AE3200-SS/SH, AE4000-SS	ST2A-SAE	135977
			AE4000-SSA/SSC	ST2A-SAE-45	On request
	ST4A	Standard trip relay with OCR alarm (AL) without optional functions, DC 24–60 V	AE1000–AE3200-SS/SH, AE4000-SS	ST4A-SAE	135978
			AE4000-SSA/SSC	ST4A-SAE-45	On request
	STC1A	Trip relay with MCR characteristics and OCR alarm (AL), AC 100–120 V and AC 200–240 V	AE1000–AE3200-SS/SH, AE4000-SS	STC1A-SAE	135979
			AE4000-SSA/SSC	STC1A-SAE-45	On request
	STC2A	Trip relay with MCR characteristics and OCR alarm (AL), DC 100–125 V	AE1000–AE3200-SS/SH, AE4000-SS	STC2A-SAE	135980
			AE4000-SSA/SSC	STC2A-SAE-45	On request
	STC4A	Trip relay with MCR characteristics and OCR alarm (AL), DC 24–60 V	AE1000–AE3200-SS/SH, AE4000-SS	STC4A-SAE	135981
			AE4000-SSA/SSC	STC4A-SAE-45	On request
	SPT1A	Trip relay with pre-alarm function (PAL) and OCR alarm (AL), AC 100–120 V and AC 200–240 V	AE1000–AE3200-SS/SH, AE4000-SS	SPT1A-SAE	135992
			AE4000-SSA/SSC	SPT1A-SAE-45	On request
	SPT2A	Trip relay with pre-alarm function (PAL) and OCR alarm (AL), DC 100–125 V	AE1000–AE3200-SS/SH, AE4000-SS	SPT2A-SAE	135993
			AE4000-SSA/SSC	SPT2A-SAE-45	On request
	SPT4A	Trip relay with pre-alarm function (PAL) and OCR alarm (AL), DC 24–60 V	AE1000–AE3200-SS/SH, AE4000-SS	SPT4A-SAE	135994
			AE4000-SSA/SSC	SPT4A-SAE-45	On request
	SPGT1A	Trip relay with pre-alarm function (PAL), ground fault protection (GFR) and OCR alarm (AL), AC 100-120 V and AC 200–240 V	AE1000–AE3200-SS/SH, AE4000-SS	SPGT1A-SAE	135995
			AE4000-SSA/SSC	SPGT1A-SAE-45	On request
	SPGT2A	Trip relay with pre-alarm function (PAL), ground fault protection (GFR) and OCR alarm (AL), DC 100–125 V	AE1000–AE3200-SS/SH, AE4000-SS	SPGT2A-SAE	135996
			AE4000-SSA/SSC	SPGT2A-SAE-45	On request
	SPGT4A	Trip relay with pre-alarm function (PAL), ground fault protection (GFR) and OCR alarm (AL), DC 24–60 V	AE1000–AE3200-SS/SH, AE4000-SS	SPGT4A-SAE	135997
			AE4000-SSA/SSC	SPGT4A-SAE-45	On request
	SPGTC1A	Trip relay with pre-alarm function (PAL), ground fault protection (GFR), MCR characteristics and OCR alarm (AL), AC 100-120 V and AC 200–240 V	AE1000–AE3200-SS/SH, AE4000-SS	SPGTC1A-SAE	135998
			AE4000-SSA/SSC	SPGTC1A-SAE-45	On request
	SPGTC2A	Trip relay with pre-alarm function (PAL), ground fault protection (GFR), MCR characteristics and OCR alarm (AL), DC 100–125 V	AE1000–AE3200-SS/SH, AE4000-SS	SPGTC2A-SAE	135999
			AE4000-SSA/SSC	SPGTC2A-SAE-45	On request
	SPGTC4A	Trip relay with pre-alarm function (PAL), ground fault protection (GFR), MCR characteristics and OCR alarm (AL), DC 24–60 V	AE1000–AE3200-SS/SH, AE4000-SS	SPGTC4A-SAE	136000
			AE4000-SSA/SSC	SPGTC4A-SAE-45	On request
M	MT1A	Trip relay for generator protection with OCR alarm (AL), AC 100-120 V and AC 200–240 V	AE1000–AE3200-SS/SH, AE4000-SS	MT1A-SAE	136001
			AE4000-SSA/SSC	MT1A-SAE-45	On request
	MT4A	Trip relay for generator protection with OCR alarm (AL), DC 24–60 V	AE1000–AE3200-SS/SH, AE4000-SS	MT4A-SAE	136002
			AE4000-SSA/SSC	MT4A-SAE-45	On request
	MPT1A	Trip relay for generator protection with pre-alarm function (PAL) and OCR alarm (AL), AC 100-120 V and AC 200–240 V	AE1000–AE3200-SS/SH, AE4000-SS	MPT1A-SAE	136003
			AE4000-SSA/SSC	MPT1A-SAE-45	On request
	MPT4A	Trip relay for generator protection with pre-alarm function (PAL) and OCR alarm (AL), DC 24–60 V	AE1000–AE3200-SS/SH, AE4000-SS	MPT4A-SAE	136004
			AE4000-SSA/SSC	MPT4A-SAE-45	On request
	MPGT1A	Trip relay for generator protection with pre-alarm function (PAL), ground fault protection (GFR) and OCR alarm (AL), AC 100-120 V und AC 200–240 V	AE1000–AE3200-SS/SH, AE4000-SS	MPGT1A-SAE	136005
			AE4000-SSA/SSC	MPGT1A-SAE-45	On request
	MPGT4A	Trip relay for generator protection with pre-alarm function (PAL), ground fault protection (GFR) and OCR alarm (AL), DC 24–60 V	AE1000–AE3200-SS/SH, AE4000-SS	MPGT4A-SAE	136006
			AE4000-SSA/SSC	MPGT4A-SAE-45	On request
B	BC0A	Closing short-circuit current actuator with MCR characteristics and OCR alarm (AL)	AE1000–AE3200-SS	BC0A-SAE	136011

Relay for frame sizes AE5000-SS and AE6300-SS on request.

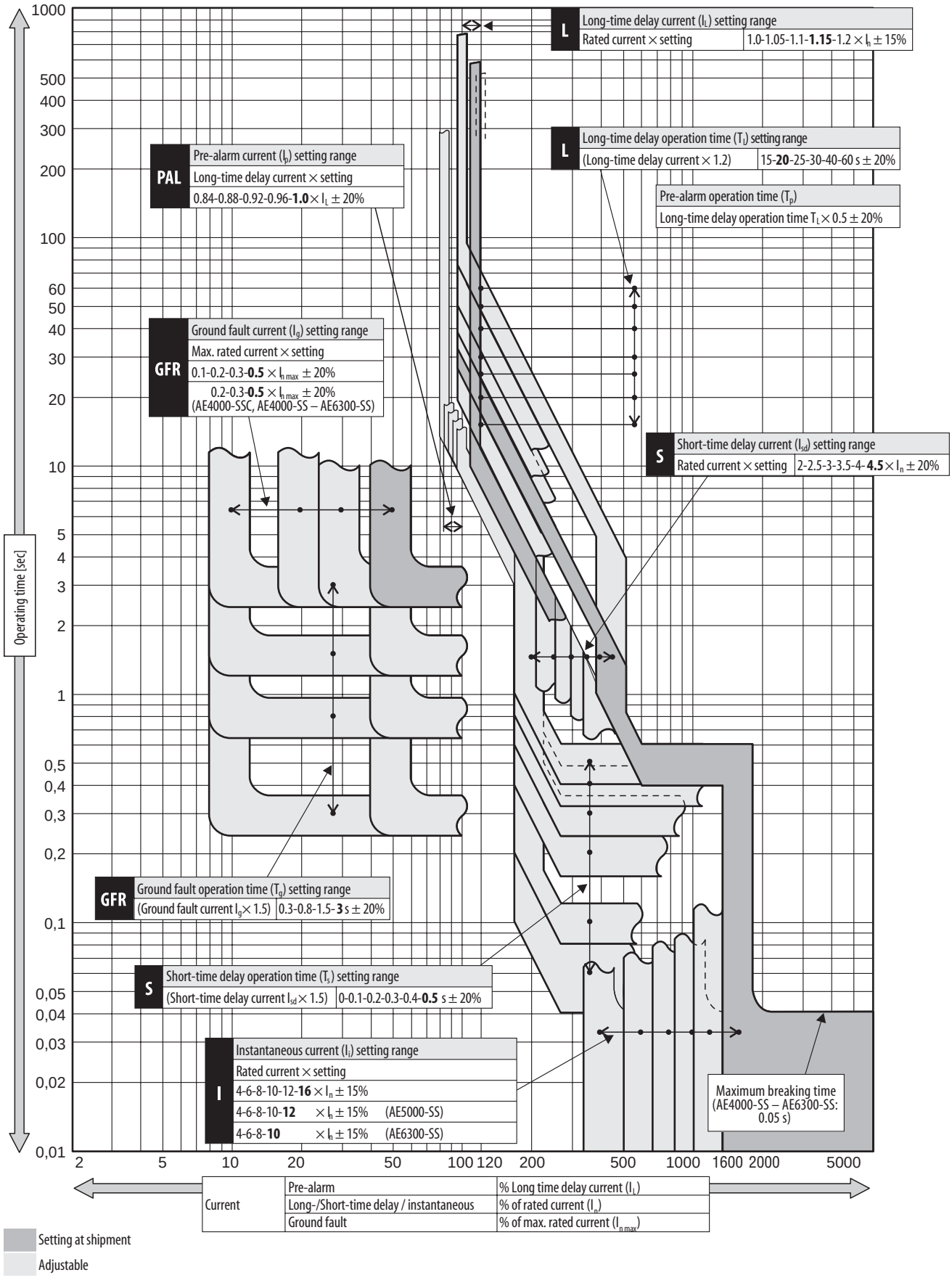

Operating Characteristics Type S

Braker types AE1000-SS/SH to AE3200-SS/SH, AE4000-SSA/SSC, AE4000-SS to AE6300-SS



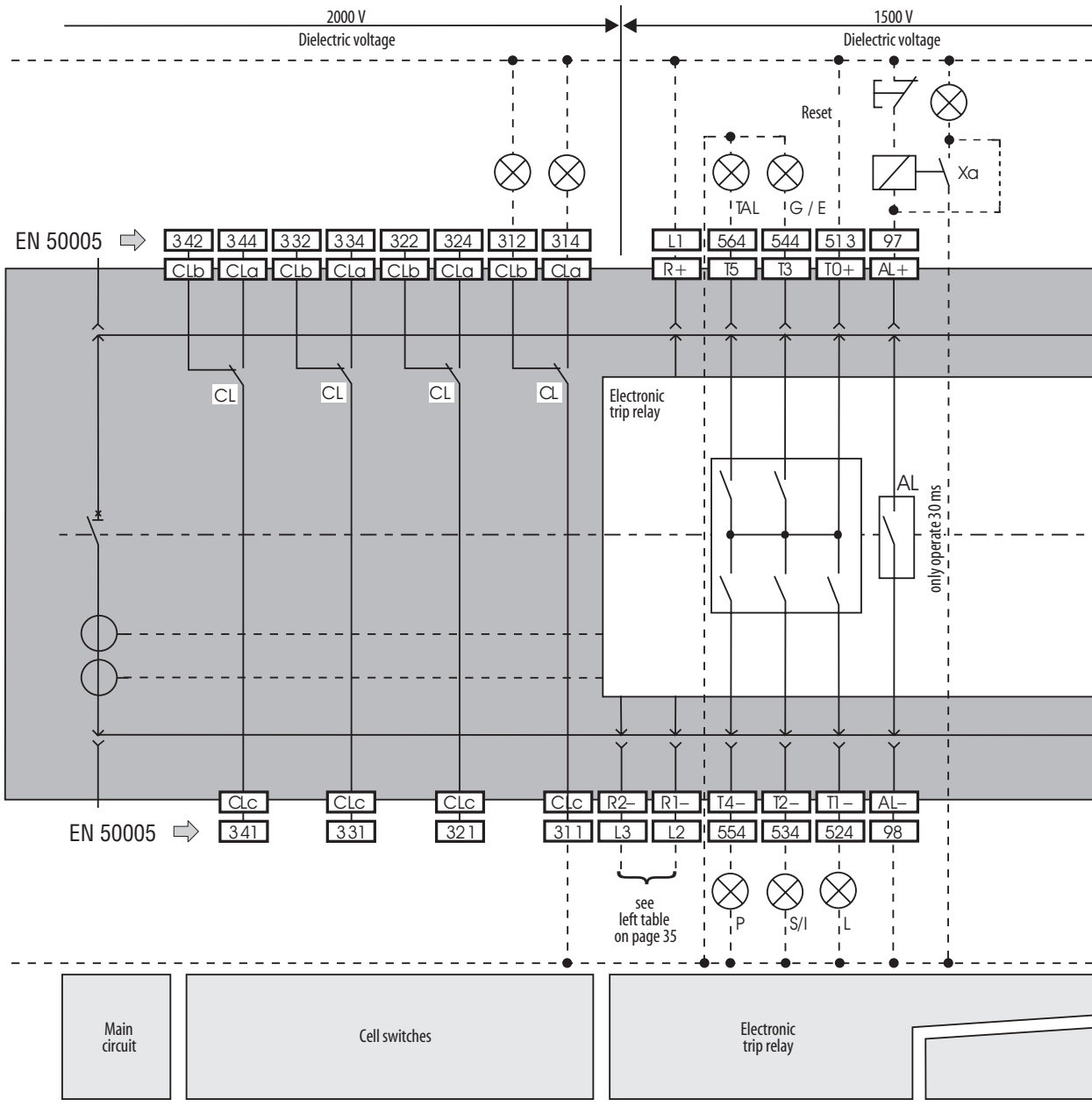
Operating Characteristics Type M

Breaker types AE1000-SS/SH to AE3200-SS/SH, AE4000-SSA/SSC, AE4000-SS to AE6300-SS



Wiring diagram – Super AE air circuit breakers with electronic trip relay type S or M

The following circuit diagram shows the breaker with fully equipped accessories.

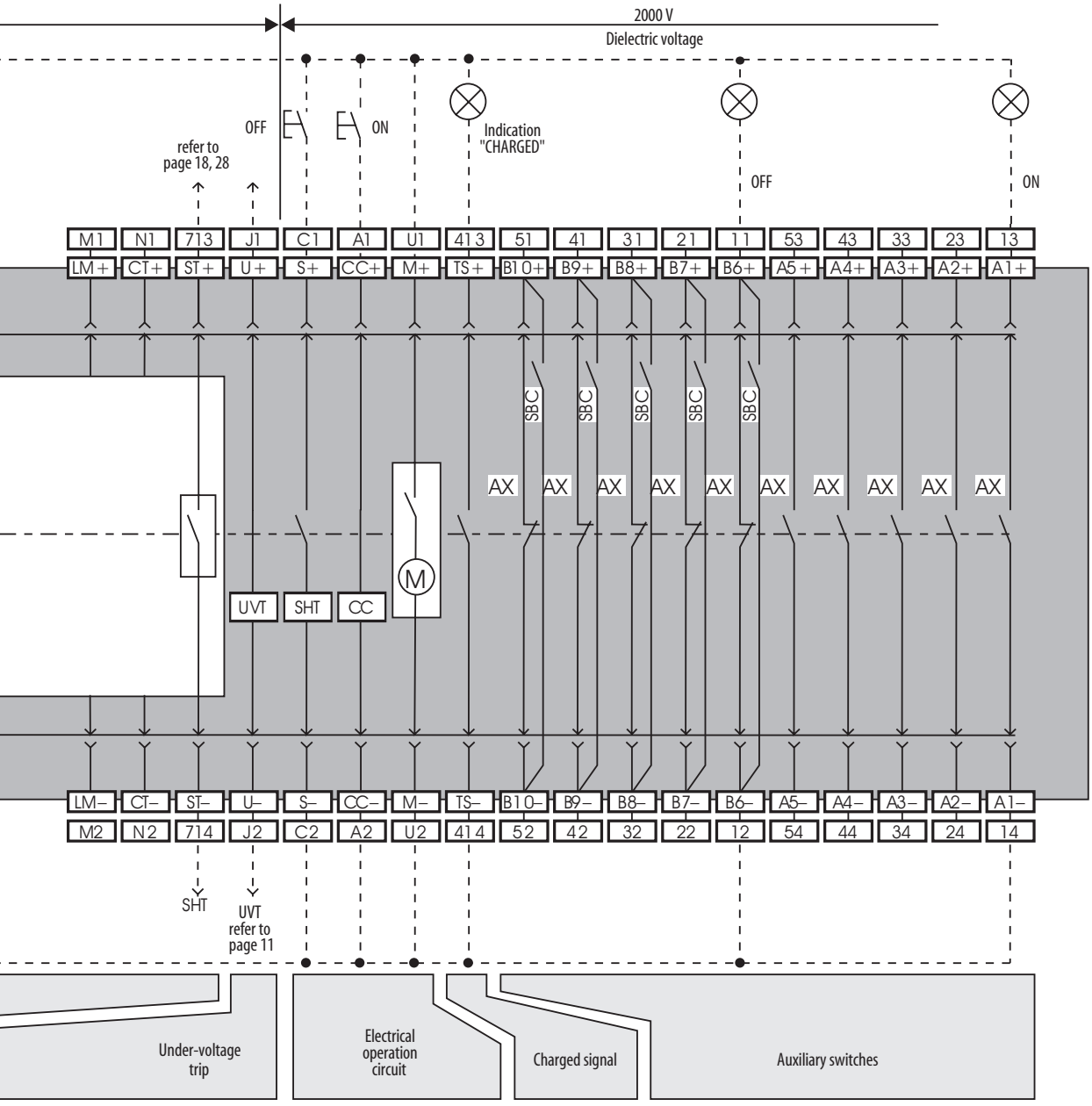


Description of terminal layout

Terminal	Code	Function	Remark
13/14, 23/24, 33/34, 43/44, 53/54	AXa	Auxiliary switch contact a	NO contact
11/12, 21/22, 31/32, 41/42, 51/52	AXb	Auxiliary switch contact b	NC contact
413 / 414	TS	Charged signal	NO contact
U1 / U2	MD	Motor charging	
A1 / A2	CC	Closing coil	
C1 / C2	SHT	Shunt trip	
J1 / J2	UVT	Under-voltage trip	
713 / 714	ER	Earth leakage trip	e.g. for SHT trip

Terminal	Code	Function	Remark
N1 / N2	NP	Neutral pole CT or ext. ZCT	
M1 / M2	LM	Load current measurement	
97 / 98	AL	OCR alarm contact	
513/524/534/544	TRIP	Trip indication contact L, S/I, G or E	Signal
513 / 554	PAL	Pre-alarm indication contact	Signal
513 / 564	TAL	Temperature alarm indication contact	Signal
L1 / L2 / L3	—	Electronic trip relay unit control power supply	See table on p. 35
311 – 344	—	Cell switches (drawout type breakers only)	

When using coil loads such as DC magnetic switches, etc. as operating voltage in the peripheral circuits, install diodes, surge absorbers, etc. as a countermeasure against surge (counter electromotive force) at the time of switching. On the drawout type, the control circuit terminal block should be moved to the left or right by 5 mm after the cables are connected.



Power supply for electronic trip relay

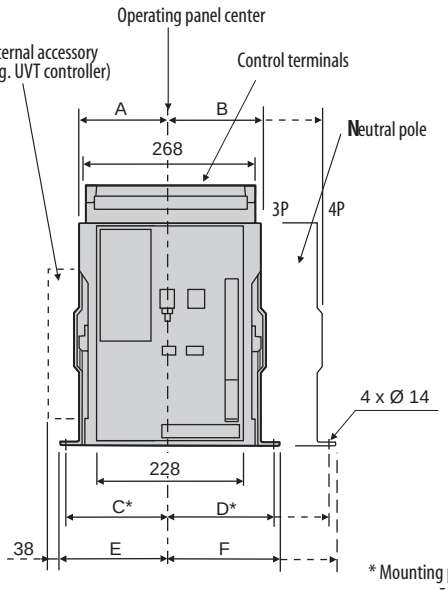
Electrical connection			Terminals		
Voltage			L1	L2	L3
AC	100–120 V	—	●	●	
	200–240 V	—	●		●
DC	100–125 V	+	●		
		–		●	
DC	24–60 V	+	●		
		–		●	

Description of symbols for the accessory

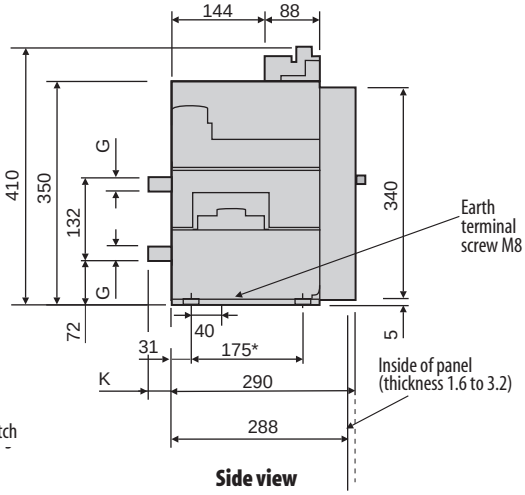
Description			
Symbol	Function	Symbol	Function
M	Motor	G or E	Ground fault trip or earth leakage indication lamp
CC	Closing coil	P	Pre-alarm indication lamp
SHT	Shunt trip device	TAL	Unusual temperatur indication lamp
UVT	Undervoltage trip device	⧄	Self-holding relay
S/I	Short-time delay trip indication lamp	———	Wiring by factory
		- - - -	Wiring by customer

Dimensions – Fixed Type Breaker

Breaker types AE1000 to AE3200-SS/SH with standard connection (horizontal terminals)

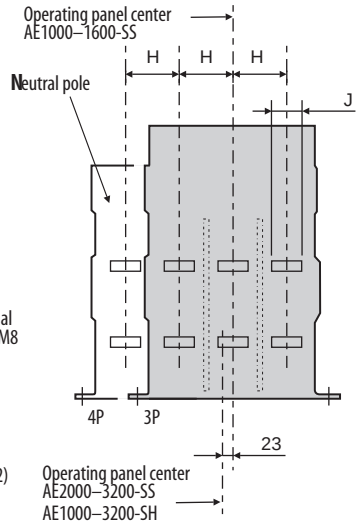


Front view



Side view

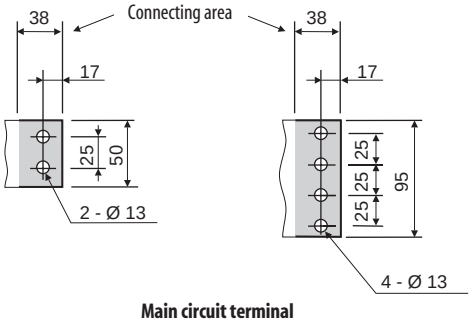
AE1000–1600-SS



Rear view

AE2000–3200-SS
AE1000–3200-SH

Breaker type	Pole	A	B	C	D	E	F	G	H	J	K
AE1000 – 1600-SS	3	142	142	156	156	170	170	15	85	50	40
	4	142	227	156	241	170	255	15	85	50	40
AE2000 – 3200-SS	3	232	187	246	201	260	215	20	130	95	40
	4	232	317	246	331	260	345	20	130	95	40
AE1000 – 3200-SH	3	232	187	246	201	260	215	20	130	95	70
	4	232	317	246	331	260	345	20	130	95	70

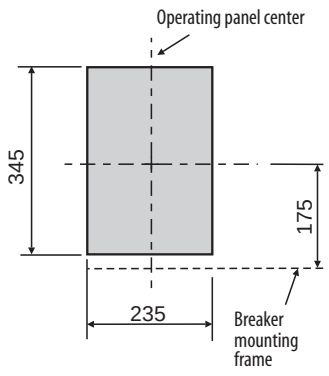


Main circuit terminal

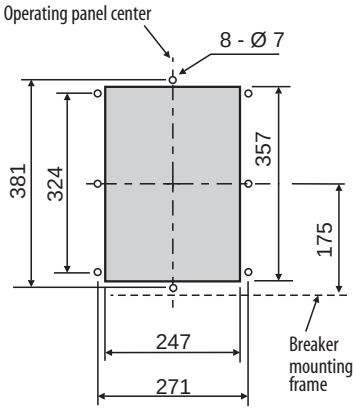
[mm]

Door frame and panel-cut

Panel-cut



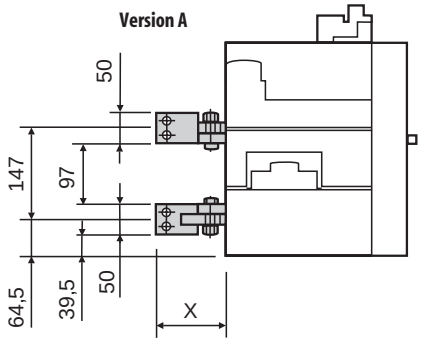
Door frame panel-cut

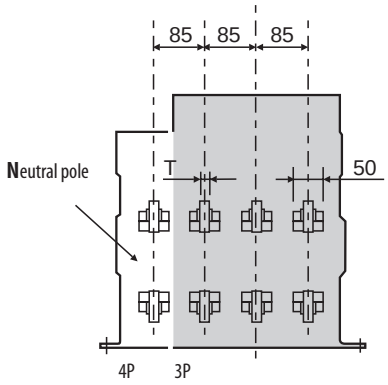


[mm]

Breaker types AE1000 to AE3200-SS/SH with Vertical terminal adapter (VAT)

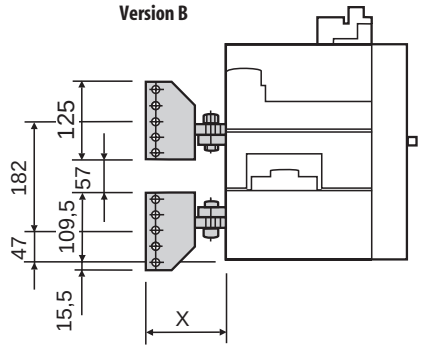
AE1000–1600-SS

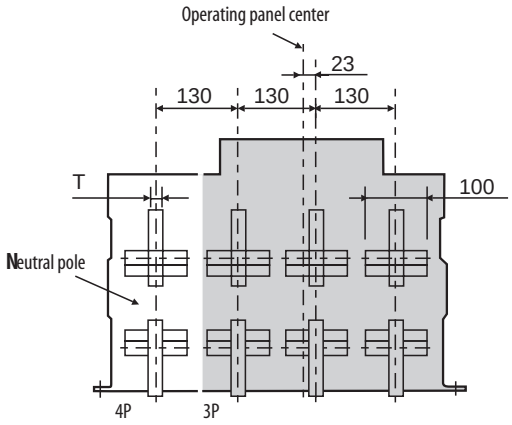




Breaker	X	T
AE1000–1600-SS	108	15
AE2000–2500-SS	123	20
AE3200-SS	123	25
AE1000–2500-SH	153	20
AE3200-SH	153	25

AE2000–3200-SS
AE1000–3200-SH

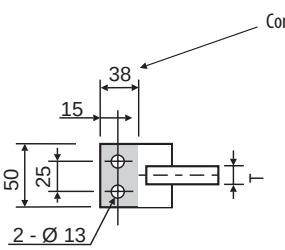


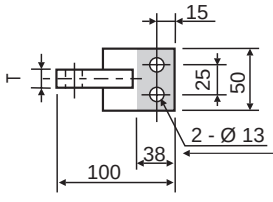


[mm]

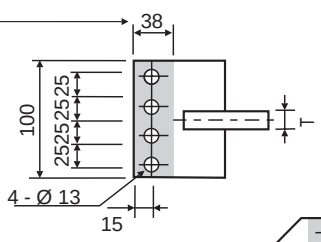
Vertical terminal adapter (VTA)

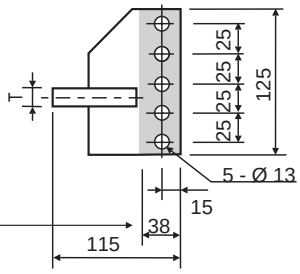
Version A





Version B





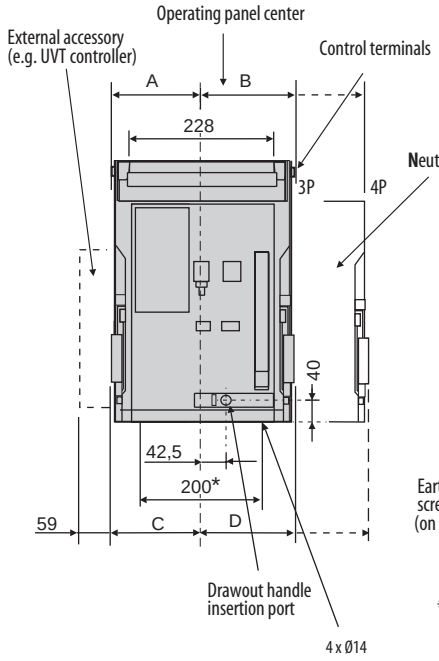
Connecting area

Breaker	Version	T
AE1000–1600-SS	A	15
AE2000–2500-SS	B	20
AE3200-SS	B	25
AE1000–2500-SH	B	20
AE3200-SH	B	25

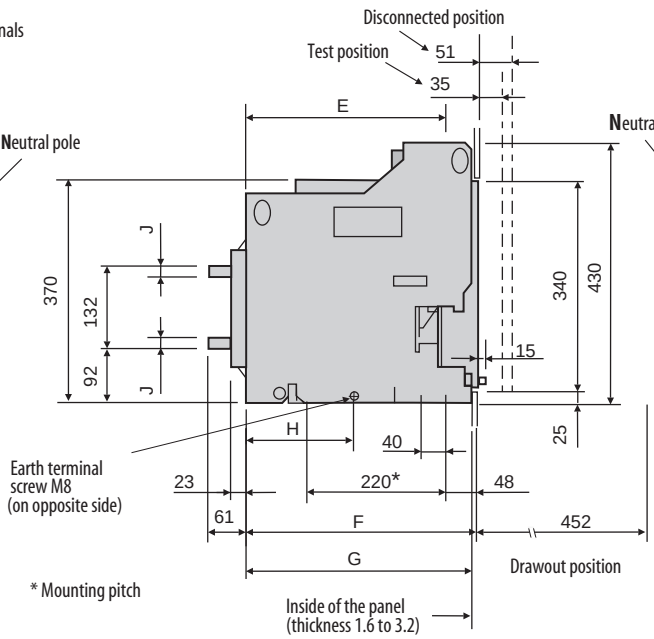
[mm]

Dimensions – Drawout Type Breaker

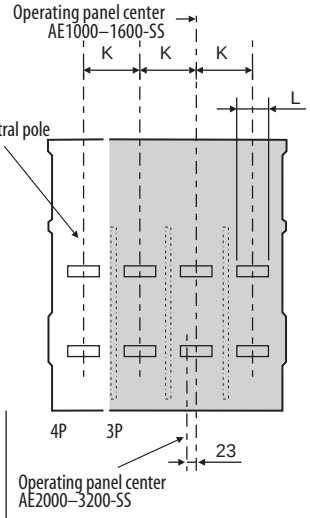
Breaker types AE1000 to AE3200-SS with standard connection (horizontal terminals)



Front view

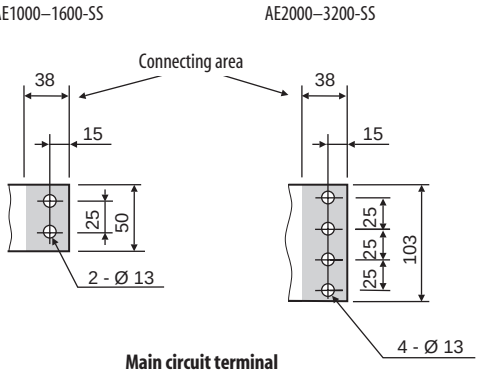


Side view



Rear view

Breaker	Pole	A	B	C	D	E	F	G	H	J	K	L
AE1000–1600-SS	3	150	150	149	149	311	368	366	172	15	85	50
	4	150	235	149	234	311	368	366	172	15	85	50
AE2000–3200-SS	3	243	195	239	194	311	368	366	172	25	130	103
	4	243	325	239	324	311	368	366	172	25	130	103

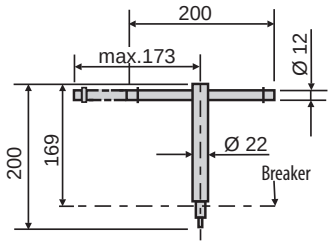


Main circuit terminal

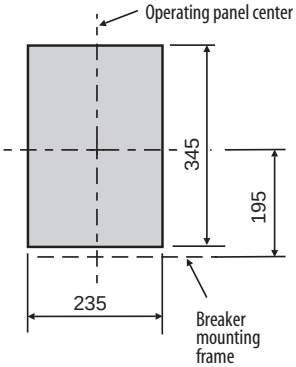
[mm]

Drawout handle, door frame and panel-cut

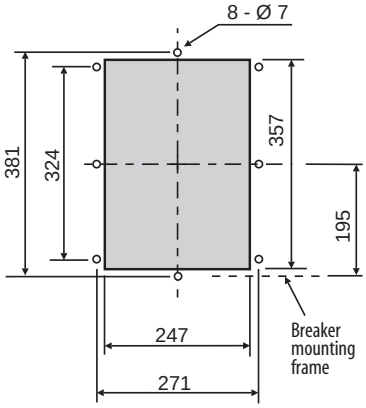
Drawout handle



Panel-cut



Door frame panel-cut

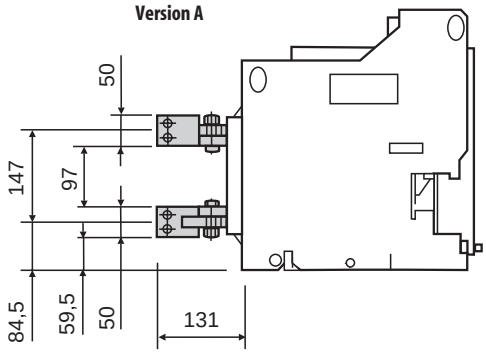


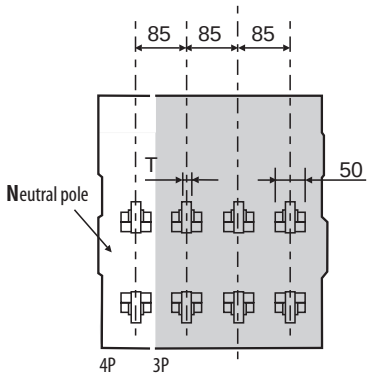
[mm]

Breaker types AE1000 to AE3200-SS with vertical terminal adapter

AE1000–1600-SS

Version A

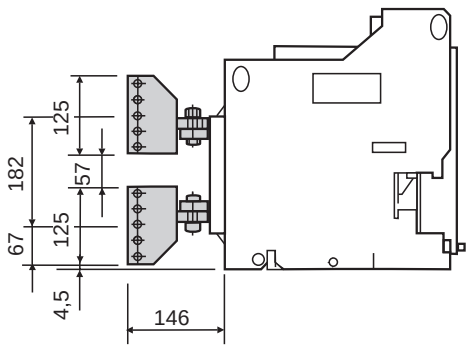


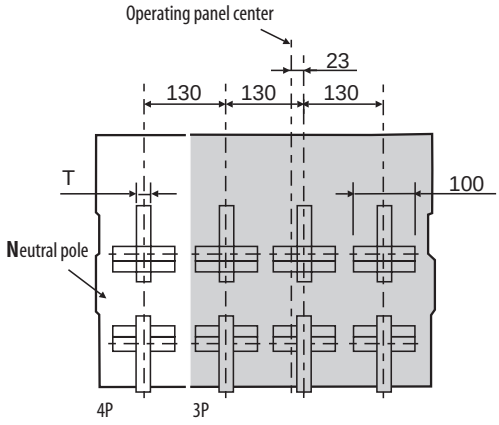


Breaker	T
AE1000–1600-SS	15
AE2000–2500-SS	20
AE3200-SS	25

AE2000–3200-SS

Version B

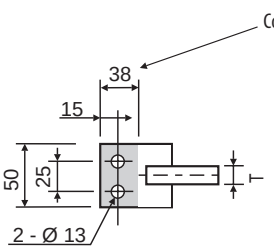


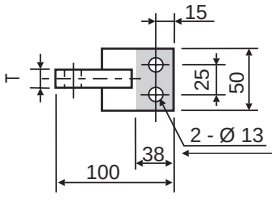


[mm]

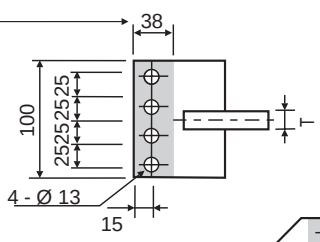
Vertical terminal adapter (VTA)

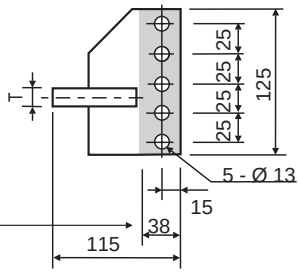
Version A





Version B





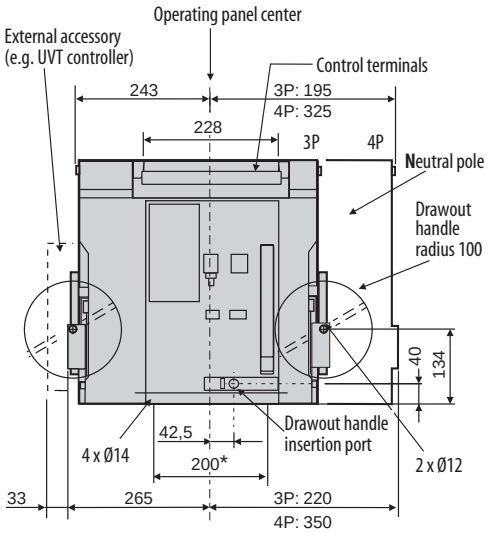
Connecting area

Breaker	Version	T
AE1000–1600-SS	A	15
AE2000–2500-SS	B	20
AE3200-SS	B	25

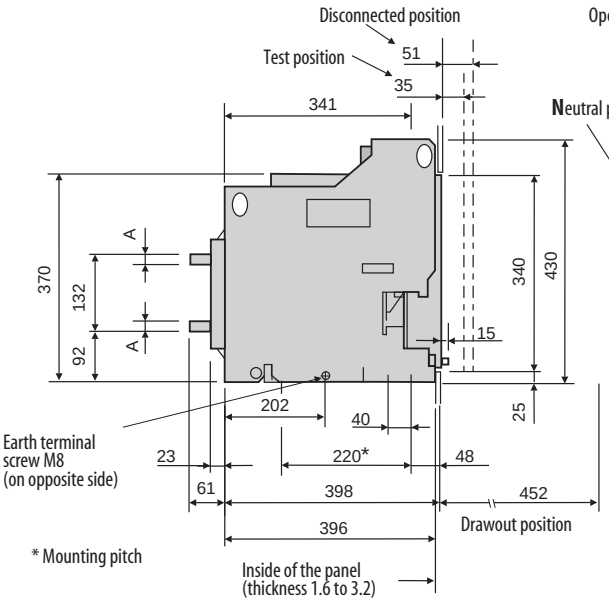
[mm]

Dimensions – Drawout Type Breaker

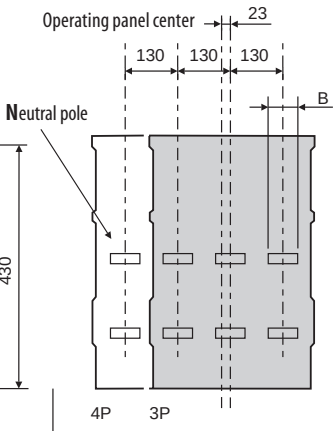
Breaker types AE1000 to AE3200-SH with standard connection (horizontal terminals)



Front view

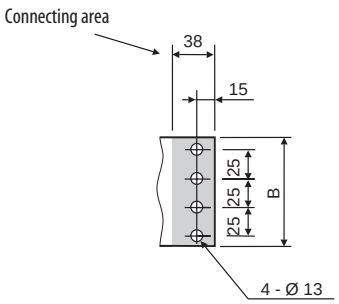


Side view



Rear view

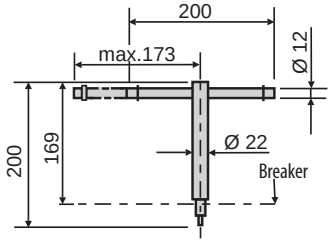
Breaker	A	B
AE1000–2500-SH	20	95
AE3200-SH	25	103



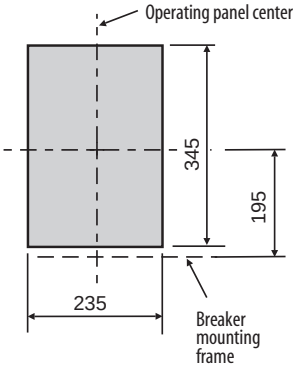
[mm]

Drawout handle, door frame and panel-cut

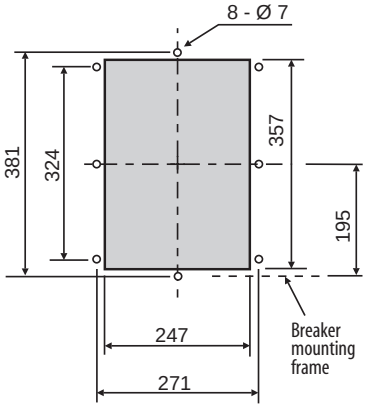
Drawout handle



Panel-cut

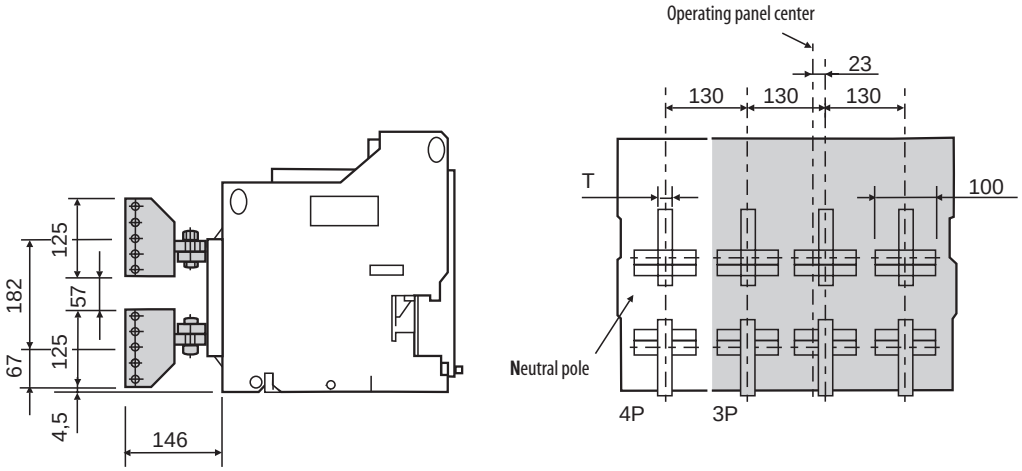


Door frame panel-cut



[mm]

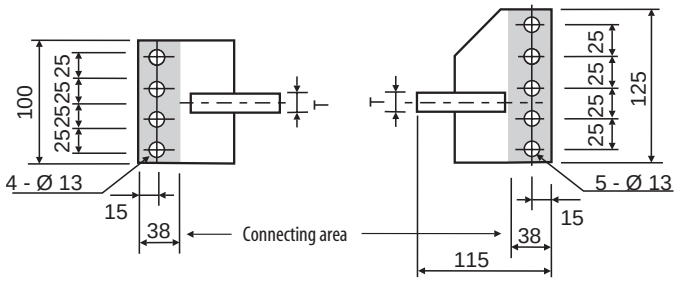
Breaker types AE1000 to AE3200-SH with vertical terminal adapter



Breaker	T
AE1000–2500-SH	20
AE3200-SH	25

[mm]

Vertical terminal adapter (VTA)

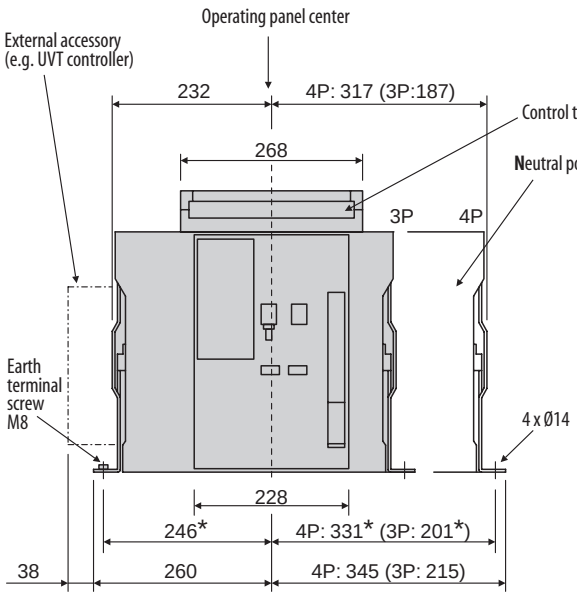


Breaker	Vers.	T
AE1000–2500-SH	B	20
AE3200-SH	B	25

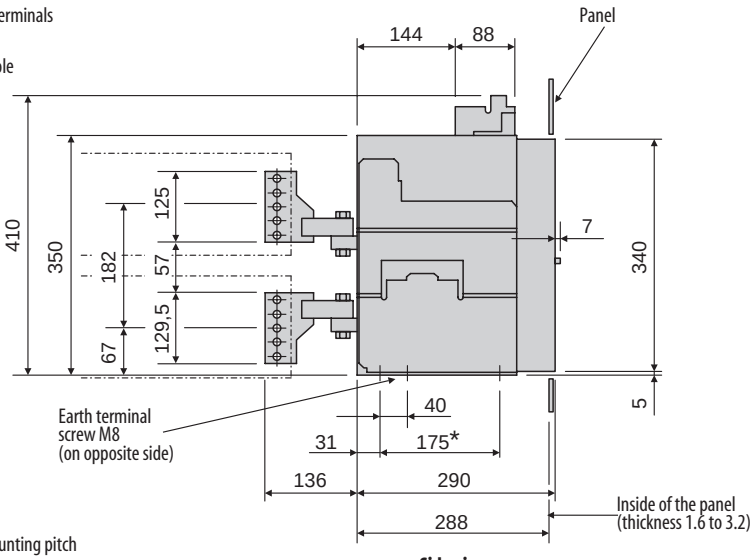
[mm]

Dimensions – Fixed Type Breaker

Breaker typ AE4000-SSA (Fixed with vertical terminal)

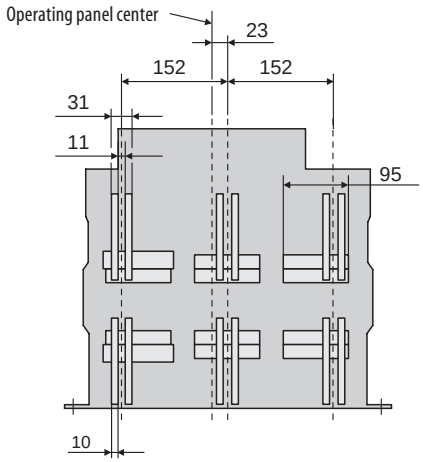


Front view

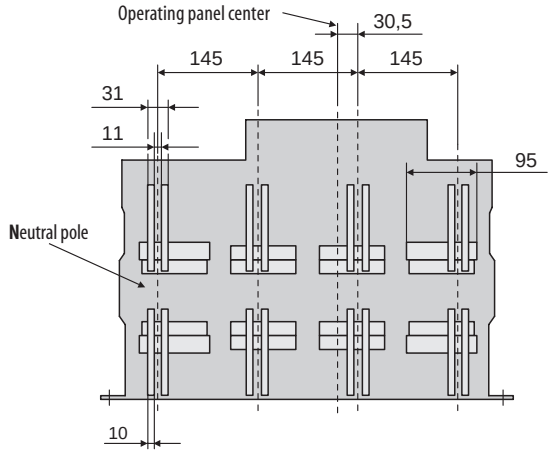


Side view

* Mounting pitch



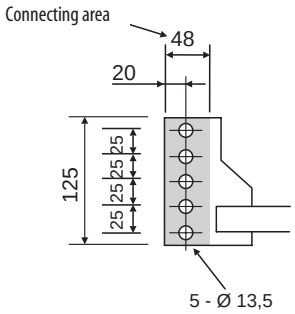
Rear view 3-poles



Rear view 4-poles

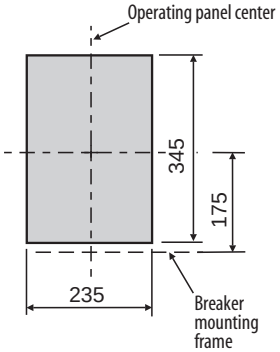
[mm]

Main circuit terminals

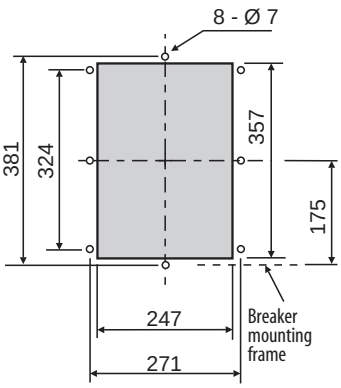


Door frame and panel-cut

Panel-cut



Door frame panel-cut

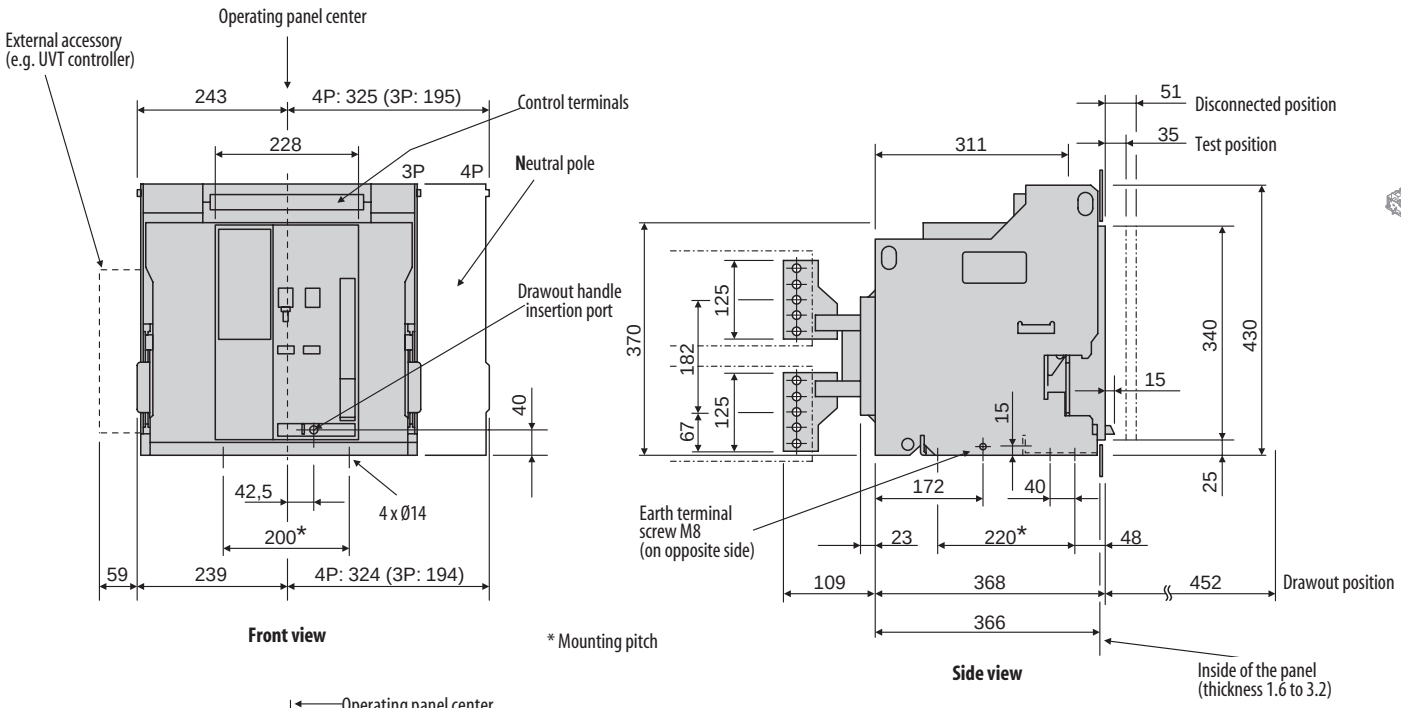


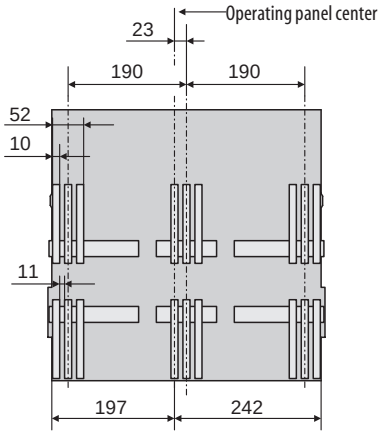
[mm]

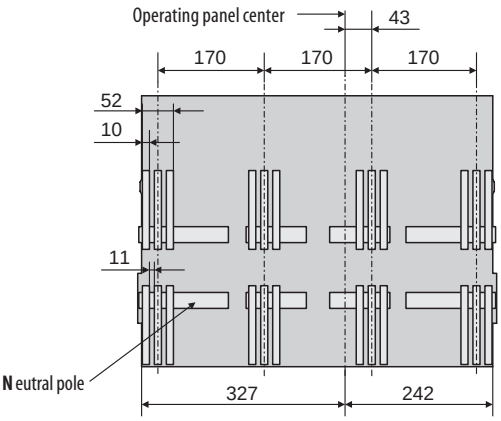
MITSUBISHI ELECTRIC

Dimensions – Drawout Type Breaker

Breaker typ AE4000-SSA (Drawout with vertical terminal)

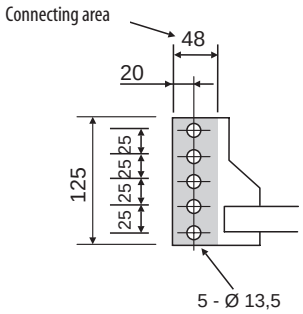




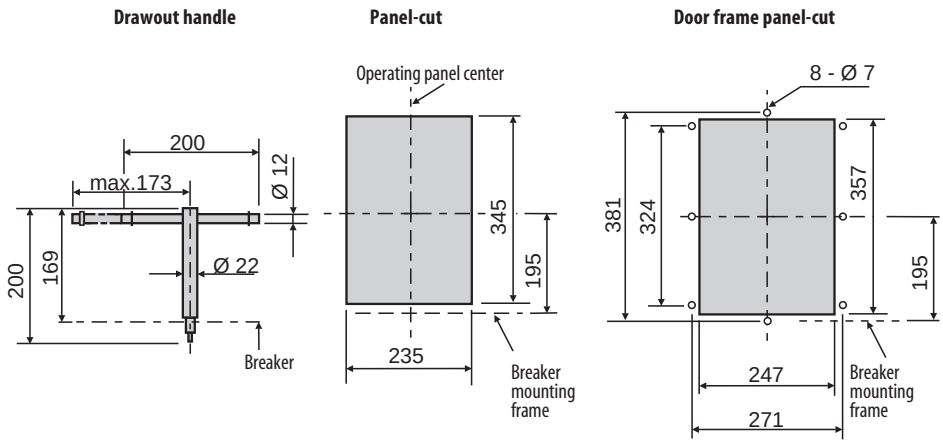


[mm]

Main circuit terminals



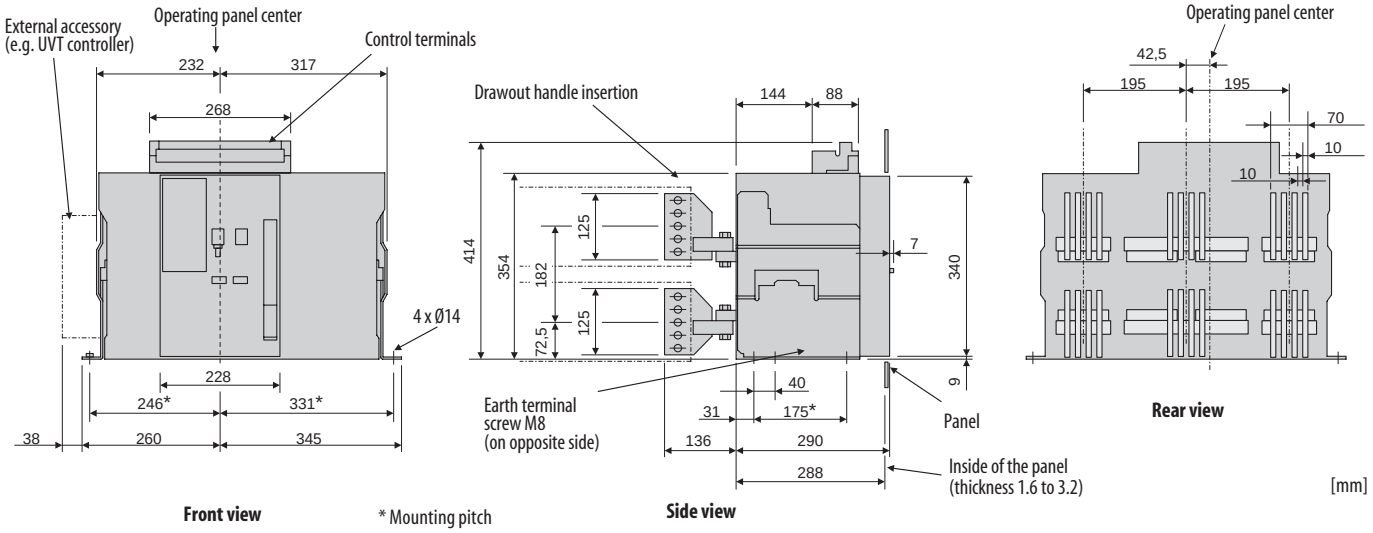
Drawout handle, door frame and panel-cut



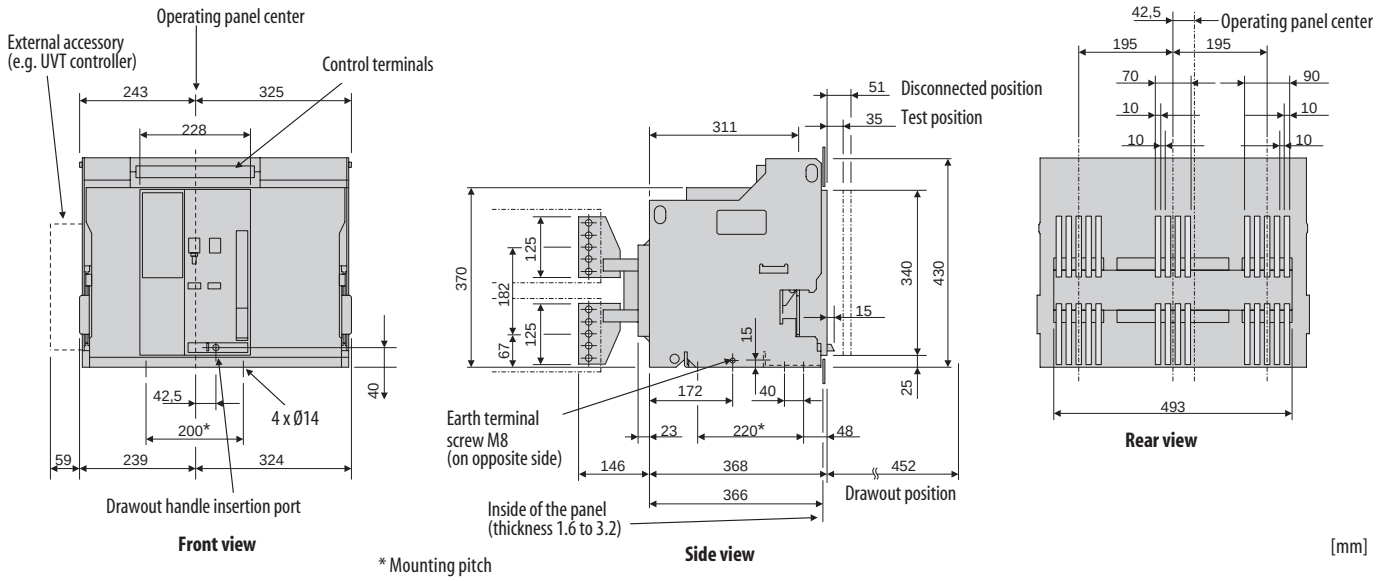
[mm]

Dimensions – Fixed/Drawout Type Breaker

Breaker typ AE4000-SSC (Fixed with vertical terminal)

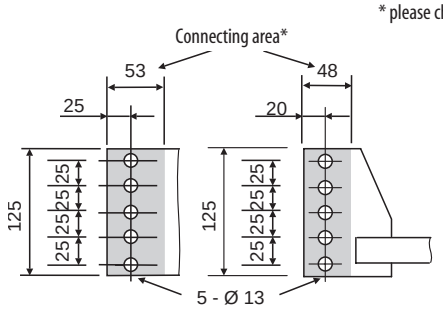


Breaker typ AE4000-SSC (Drawout with vertical terminal)



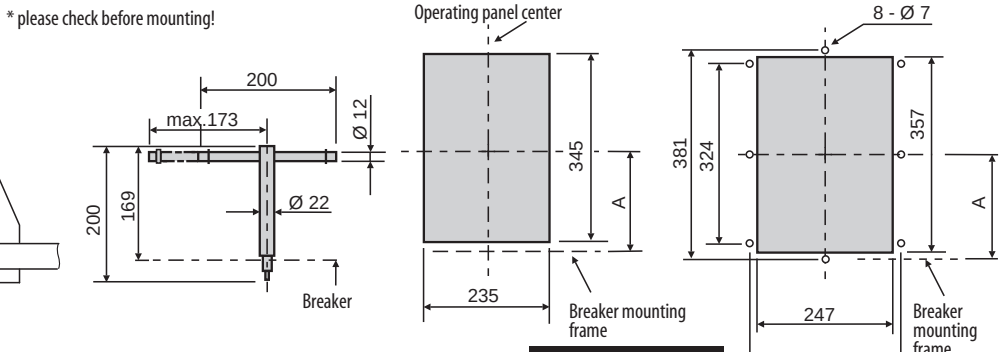
Main circuit terminals

Fixed type **Drawout type**



Drawout handle, door frame and panel-cut

Drawout handle **Panel-cut** **Door frame panel-cut**



Recommendation:

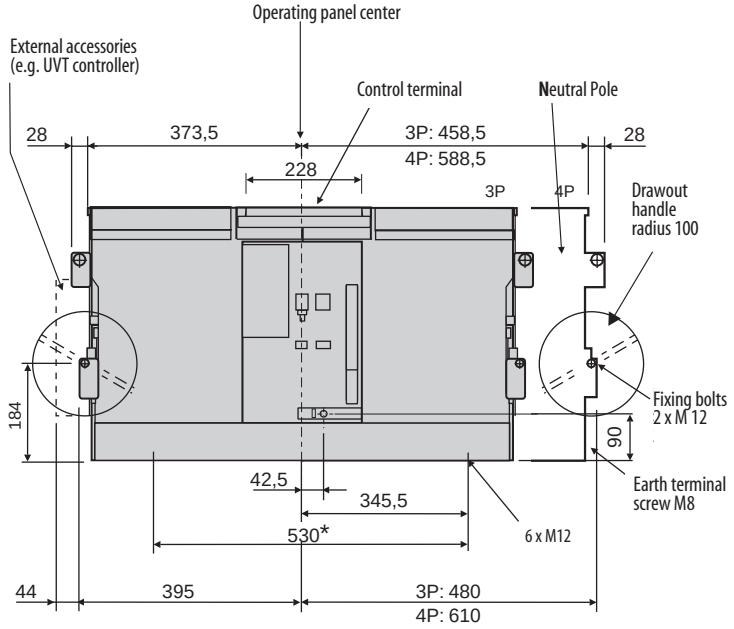
Fixed type:	Main circuit terminals per pole:	3 × connection bus bar T × B: 10 × 150 mm
Drawout type:	Main circuit terminals for pole L1, L3:	4 × connection bus bar T × B: 10 × 150 mm
	L2	T × B: 10 × 150 mm

Type	A
Fixed type	179
Drawout type	195

[mm]

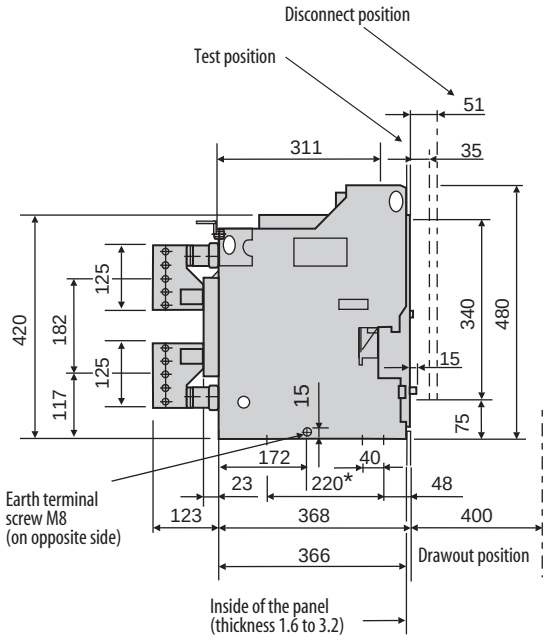
Dimensions – Breaker

Breaker types AE4000 to AE6300-SS with standard connection (vertical)

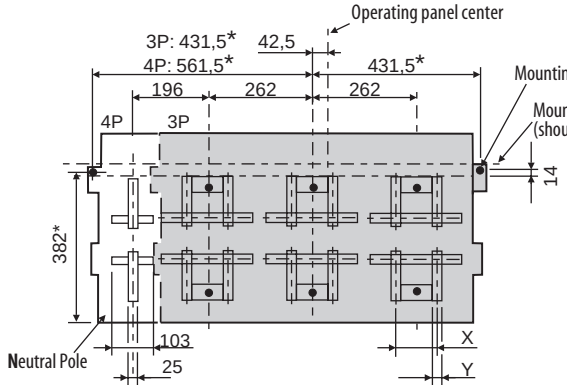


* Mounting pitch

Front view



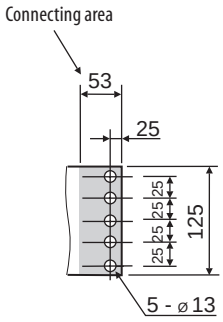
Side view



Rear view

Type	Dimensions**	
	X	Y
AE4000-SS AE5000-SS	100	20
AE6300-SS	105	25

** please check before mounting!

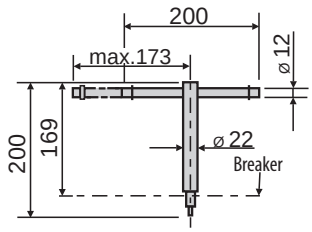


Main circuit terminals

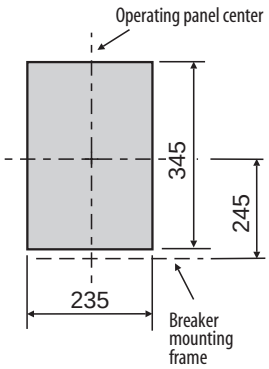
[mm]

Drawout handle, door frame and panel-cut

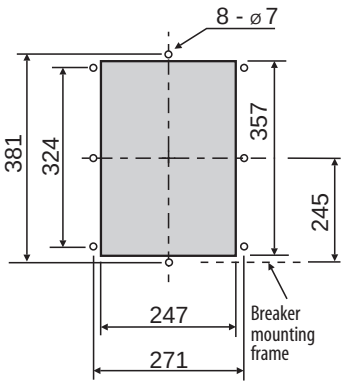
Drawout handle



Panel-cut



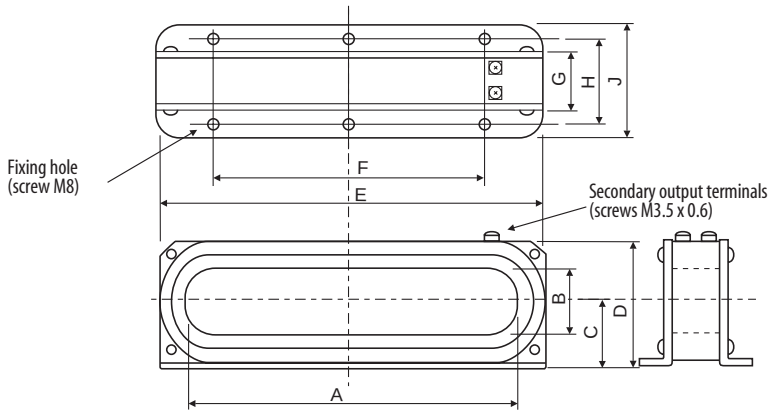
Door frame panel-cut



[mm]

Dimensions – Accessory

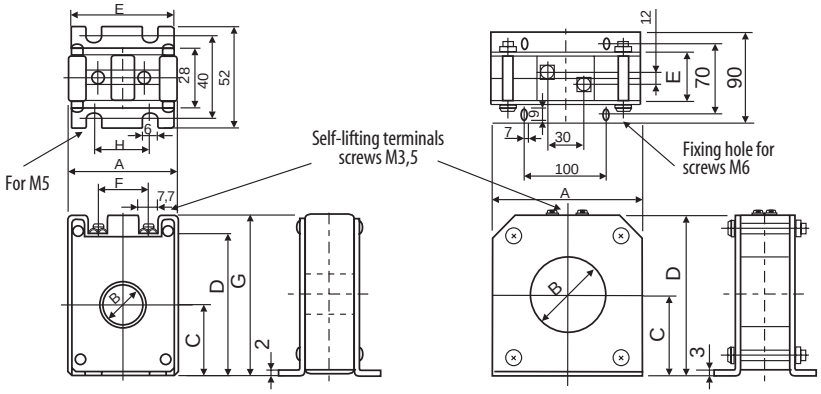
External ZCT for load circuits



Type	ZCT 163	ZCT 323	ZCT 324
A	230	370	500
B	60	108	108
C	104	104	104
D	200	200	200
E	323	460	600
F	250	400	550
G	47	47	48
H	72	72	72
J	92	92	92

[mm]

External ZCT for transformer ground wire



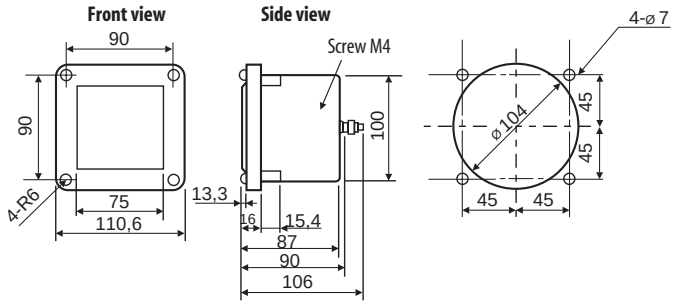
ZT15A – 40 A

ZT60A – 100 A

Type	ZT 15A	ZT 30A	ZT 40A	ZT 60A	ZT 80A	ZT 100A
A	48	68	85	140	160	185
B	15	30	40	60	80	100
C	29	37	43	73	82	93
D	62	82	92	150	169	190
E	46	66	81	46	48	50
F	15	30	40			
G	70	90	100			
H	25	50	50			

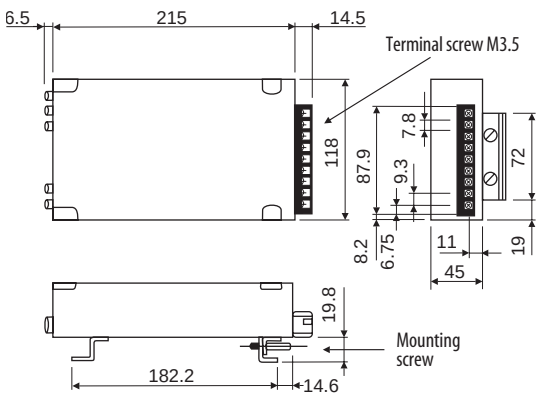
[mm]

Condenser trip device (COT)



[mm]

UVT controller, external power supply (PS)



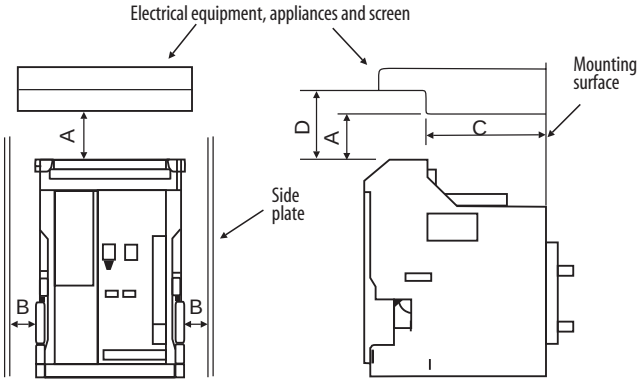
[mm]

Operating Conditions, Technical Information

Insulation clearances at the supply side

When a short-circuit current is interrupted by the breaker, ionised gases flow out of the exhaust openings of the arc extinguishing chamber. This makes it necessary to observe the insulation clearance shown in the table on the right.

The clearances required for maintenance work have also been taken into consideration in the table.



Breaker type		AE1000–3200-SS AE4000-SSA/SSC		AE1000–3200-SH AE4000–6300-SS
Applicable voltage		≤ AC 600 V	AC 660, 690 V	≤ AC 690 V
Fixed type	A ①	0	100	200
	B ③	50	50	50
	C	162	162	—
	D ②	50	50	200
Drawout type	A ①	0	100	200
	B ③	50	50	50
	C	240	240	—
	D ②	50	50	200

[mm]

① A clearance of 300 mm or more is necessary for inspection of the arc extinguishing chambers and main contacts.

② The dimension D represents the wiring space required for the control terminal block.

③ Dimension B becomes larger when the breaker is fitted with the UVT controller, mechanical interlock, door interlock, etc. Further details available on request.

Normal service conditions

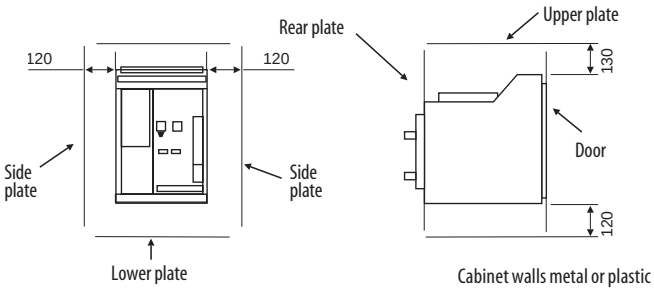
If all the following normal working conditions are satisfied (and not specified otherwise) the AE series air circuit breakers may be used:

- Ambient air temperature
  Range min. –5 °C to max. +40 °C (the average value however should not exceed +35 °C in any 24-hour period).
- Altitude
  2000 m (6600 feet) or less
- Environmental conditions
  The air must be free of dust and corrosive gases. Do not use and store in atmospheres with sulfide gas, ammonia gas etc. ($H_2S \leq$ 0,01 ppm, $SO_2 \leq$ 0,1 ppm, NH_3 not measurable).
  The relative humidity should be of 85% or less at a max. of +40 °C.
- Installation conditions
  When installing AE series circuit breakers always follow the instructions provided in the catalogue **and** in the instruction manual.
- Storage temperature
  A range of max. +60 °C to min. -20 °C is recommended to store. However, the average over 24 hours must not exceed +35 °C.
- Replacement
  Lifetime is approx. 15 years. For detailed information please refer to the instruction manual.

Special service conditions

In case of special service conditions, modified circuit breakers are available (please specifiy when ordering). Service life may be shorter dependend on service conditions.

- Special environmental conditions
  Using breakers in a high temperature and/or humidity environment can result in deterioration of insulation durability and other electrical or mechanical features. Breakers used in such environments should be specially treated to a higher corrosion proof specification and against moistural fungus. Where corrosive gases are present in the environment it is recommended that breakers to a higher corrosion proof specification are ordered (further details on request).
- Special ambient temperature
  If the ambient temperature exceeds +40 °C, the continuous current rating must be reduced. The reduction value depends on the applicable standard (please refer to the following page).
- Special altitude
  When breakers are used at altitudes above 2,000 m the heat radiation rate is reduced, decreasing the operation voltage, uninterrupted current and breaking capacity. Reduced atmospheric pressure can also reduce insulation durability.
  Further details available on request.
- Installation in a separate cabinet
  If the breaker is installed in a special cabinet, the following clearances have to be taken into consideration.



Example:
The smallest possible cabinet dimensions for 3-pole Super AE breakers with up to 1600 A are: Hight=680 mm, Width=540 mm, Depth=368 mm.

Internal resistance, reactance and power consumption (per pole)

Standard series "SS"				
Breaker type		Resistance (mΩ)	Reactance (mΩ)	Power consumption(W)
AE1000-SS	Fixed	0.026	0.060	26
	Drawout	0.040	0.091	40
AE1250-SS	Fixed	0.024	0.060	38
	Drawout	0.038	0.091	60
AE1600-SS	Fixed	0.016	0.063	41
	Drawout	0.030	0.095	77
AE2000-SS	Fixed	0.010	0.047	40
	Drawout	0.020	0.071	80
AE2500-SS	Fixed	0.008	0.047	50
	Drawout	0.018	0.071	113
AE3200-SS	Fixed	0.007	0.048	72
	Drawout	0.014	0.072	143
AE4000-SSA	Fixed	0.009	0.048	144
	Drawout	0.015	0.072	240
AE4000-SSC	Fixed	0.008	0.048	128
	Drawout	0.014	0.072	224
AE4000-SS	Drawout	0.013	0.062	210
AE5000-SS	Drawout	0.011	0.062	275
AE6300-SS	Drawout	0.0085	0.062	340

High performance series "SH"				
Breaker type		Resistance (mΩ)	Reactance (mΩ)	Power consumption (W)
AE1000-SH	Fixed	0.018	0.047	18
	Drawout	0.028	0.071	28
AE1250-SH	Fixed	0.016	0.047	25
	Drawout	0.026	0.071	41
AE1600-SH	Fixed	0.014	0.047	36
	Drawout	0.024	0.071	61
AE2000-SH	Fixed	0.012	0.047	48
	Drawout	0.022	0.071	88
AE2500-SH	Fixed	0.010	0.047	63
	Drawout	0.020	0.071	125
AE3200-SH	Fixed	0.009	0.048	92
	Drawout	0.016	0.072	164

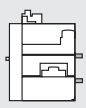
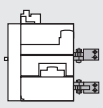
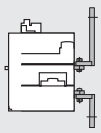
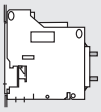
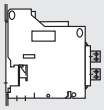
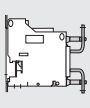
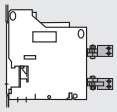
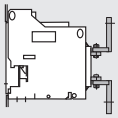
Deratings (A) by ambient temperature

Standard	Ambient temperature	AE1000-SS AE1000-SH	AE1250-SS AE1250-SH	AE1600-SS AE1600-SH	AE2000-SS AE2000-SH	AE2500-SS AE2500-SH	AE3200-SS AE3200-SH	AE4000-SSA	AE4000-SSC	AE4000-SS	AE5000-SS	AE6300-SS
IEC 947-2, EN 60947-2, VDE 0660, BS 4752 (Reference temperature= 40 °C)	**40 °C**	**1000**	**1250**	**1600**	**2000**	**2500**	**3200**	**4000**	**4000**	**4000**	**5000**	**6300**
	45 °C	1000	1250	1600	2000	2500	3200	—	3800	4000	5000	6000
	50 °C	1000	1250	1600	2000	2500	3200	3650	3650	4000	5000	5750
	55 °C	1000	1250	1550 (1600)	2000	2450	3000	3300	3500	3900	5000	5500
	60 °C	1000	1200 (1250)	1500 (1600)	2000	2350	2900	—	3300	3750	4750	5200
LR, AB, GL DNV, BV (Reference temperature= 45 °C)	**45 °C**	**1000**	**1250**	**1600**	**2000**	**2500**	**3200**	**—**	**—**	**4000**	**5000**	**6000**
	50 °C	1000	1250	1600	2000	2500	3200	—	—	4000	5000	5750
	55 °C	1000	1250	1550 (1600)	2000	2450	3050	—	—	3900	5000	5500
	60 °C	1000	1200	1500 (1600)	2000	2350	2900	—	—	3750	4750	5200

All data in the above table are based on test conditions, connecting methods and size of the mounting rails conforming to IEC947-2, EN60947-2, VDE0660 etc.
The figures in brackets ( ) in the table above indicate the reduced current values exclusive to AE-SH series.

Connection arrangements

The following connecting methods are available for the AE type air circuit breaker.

Connection / Mounting method	Horizontal connection Standard	Vertical connection Optional	Front connection Optional	Vertical terminal adapter Accessory	Front terminal adapter Optional
Fixed type	 (Standard)	———	———	 (FIX-VTA)	 (FIX-FTA)
Drawout type	 (Standard)	 (DR-VT)	 (DR-FT)	 (DR-VTA)	 (DR-FTA)
Remark	Standard equipment (shipping version)	Special equipment (on request)	Special equipment (on request)	Available as accessory (refer to page 15)	Optional accessory (on request)

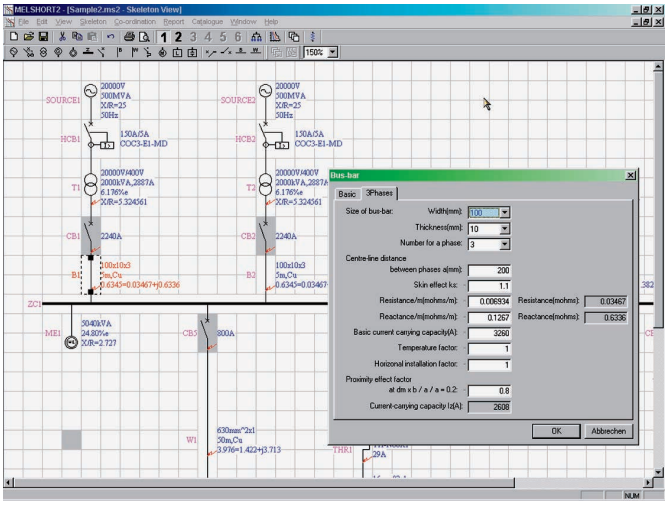
Specifications for marinal standards

SUPER AE			Series	Standard series "SS"									
			Breaker type	AE1000-SS	AE1250-SS	AE1600-SS	AE2000-SS	AE2500-SS	AE3200-SS	AE4000-SSC	AE4000-SS	AE5000-SS	AE6300-SS
Rated current (A)			$I_{N\,max}$	1000	1250	1600	2000	2500	3200	4000	4000	5000	6300
Rated insulation voltage (V) 50/60 Hz			Ui	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Rated operating voltage (V) 50/60 Hz			Ue	690	690	690	690	690	690		690	690	690
Number of poles				3	3	3	3	3	3	3	3	3	3
Adjustment range (A)	General protection I_r (current rating adjustable)			500≤In≤1000 315≤In≤630	625≤In≤1250	800≤In≤1600	1000≤In≤2000 625≤In≤1000	1250≤In≤2500	1600≤In≤3200	3200≤In≤3800 3200≤In≤3500 (für LR)	2000≤In≤4000	2500≤In≤5000	3150≤In≤6300
Rated service short-circuit breaking capacity Ics (kA, eff, sym.) Breaking duty: O-t-CO-t-CO $I_{cu} = I_{cs}$	LR	with instantaneous trip	AC690V	50	50	50	50	50	50	51,1	—	—	—
			AC600V	—	—	—	65	65	65	67	87	87	87
			AC500V	65	65	65	85	85	85	86.6	133	133	133
	DNV	with instantaneous trip	AC690V	50	50	50	50	50	50	—	—	—	—
			AC600V	—	—	—	65	65	65	—	—	—	—
			AC500V	65	65	65	85	85	85	—	—	—	—
	GL	with instantaneous trip	AC690V	50	50	50	50	50	50	—	—	—	—
			AC600V	—	—	—	65	65	65	—	—	—	—
			AC500V	65	65	65	85	85	85	—	—	—	—
	BV	with instantaneous trip	AC690V	50	50	50	50	50	50	—	—	—	—
			AC600V	—	—	—	65	65	65	—	—	—	—
			AC500V	65	65	65	85	85	85	—	—	—	—
	NK	with instantaneous trip	AC600V	50	50	50	65	65	65	65	87	87	87
			AC500V	65	65	65	85	85	85	85	133	133	133
Rated service short-circuit making capacity Icm (kA, peak value)	LR	with instantaneous trip	AC690V	106	106	106	106	106	106	113	—	—	—
			AC600V	—	—	—	143	143	143	147	211	211	211
			AC500V	151	151	151	196	196	196	199	330	330	330
	DNV	with instantaneous trip	AC690V	106	106	106	106	106	106	—	—	—	—
			AC600V	—	—	—	143	143	143	—	—	—	—
			AC500V	151	151	151	196	196	196	—	—	—	—
	GL	with instantaneous trip	AC690V	106	106	106	106	106	106	—	—	—	—
			AC600V	—	—	—	143	143	143	—	—	—	—
			AC500V	151	151	151	196	196	196	—	—	—	—
	BV	with instantaneous trip	AC690V	105	105	105	105	105	105	—	—	—	—
			AC600V	—	—	—	143	143	143	—	—	—	—
			AC500V	143	143	143	187	187	187	—	—	—	—
	NK	with instantaneous trip	AC600V	112	112	112	143	143	143	143	211	211	211
			AC500V	147	147	147	196	196	196	196	330	330	330

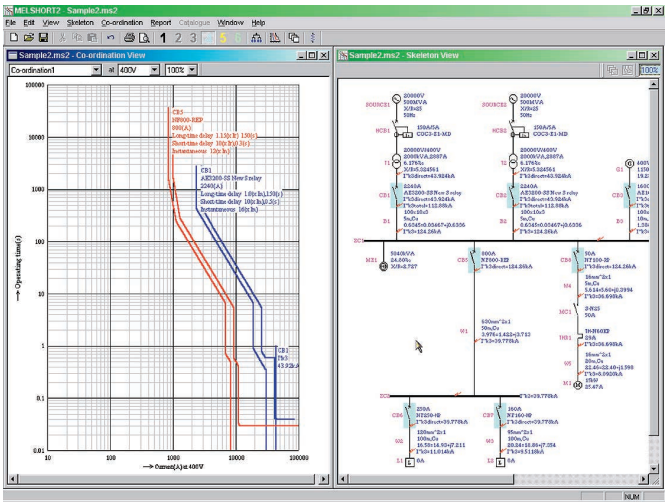
* Further current ratings on request.

SUPER AE			Series	High performance series "SH"					
			Breaker type	AE1000-SH	AE1250-SH	AE1600-SH	AE2000-SH	AE2500-SH	AE3200-SH
Rated current (A)			$I_{N\,max}$	1000	1250	1600	2000	2500	3200
Rated insulation voltage (V) 50/60 Hz			Ui	1000	1000	1000	1000	1000	1000
Rated operating voltage (V) 50/60 Hz			Ue	690	690	690	690	690	690
Number of poles				3	3	3	3	3	3
Adjustment range (A)	General protection I_r (current rating adjustable)			500≤In≤1000 315≤In≤630	625≤In≤1250	800≤In≤1600	1000≤In≤2000	1250≤In≤2500	1600≤In≤3200
Rated service short-circuit breaking capacity Ics (kA, eff, sym.) Br. duty: O-t-CO-t-CO $I_{cu} = I_{cs}$	LR	with instantaneous trip	AC690V	68	68	68	68	68	68
			AC600V	87	87	87	87	87	87
			AC500V	133	133	133	133	133	133
	NK	with instantaneous trip	AC600V	—	—	—	—	—	—
			AC500V	130	130	130	130	130	130
Rated service short-circuit making capacity Icm (kA, peak value)	LR	with instantaneous trip	AC690V	173	173	173	173	173	173
			AC600V	211	211	211	211	211	211
			AC500V	330	330	330	330	330	330
	NK	with instantaneous trip	AC600V	—	—	—	—	—	—
			AC500V	317	317	317	317	317	317

Calculation and Selection Software MELSHORT2



Circuit diagram of the network to be calculated, with input field



Display of the trip curves of a circuit breaker in the network

MELSHORT2 – The New Calculation Software for Low-Voltage Switchgear

MELSHORT2 is a software package that provides all the functions needed for planning and dimensioning switchgear systems.

Increasingly demanding technical specifications and accountability regulations are making switchgear configuration much more critical than it used to be. In the past, software for calculating and dimensioning switchgear was helpful – nowadays it's absolutely essential.

Mitsubishi Electric's MELSHORT2 is a complete software package that provides all the functions needed for successful switchgear system configuration and layout. It supports all modern international electrical engineering standards and shines with simple and reliable operation.

The program calculates the short-circuit levels and currents at all necessary points for all switchgear components, including the power supply transformer and circuit breakers, the emergency generators, the individual motor and capacitor group branch circuits and all the other power distribution circuits, down to the last circuit breaker. This makes it possible to select the ideal breaker for every task, for optimum performance and cost-efficiency.

MELSHORT2 has a comprehensive range of powerful, easy-to-use functions, including:

- Selective shutdown
- Backup protection
- Coordination with the main power supply systems
- Allowance for the start-up currents of electric motors

These functions make it possible to optimise the configuration of your switchgear equipment for the specific requirements of your applications.

The calculated results, the hardware model suggestions and the wiring diagram with all the relevant values can be processed and used as documentation for the switchgear installation. Another welcome extra is the free Internet update service.

Specifications	MELSHORT2
Operating system	MS Windows 95/98/NT4.0/2000
Disk type	CD-ROM

Order information	Art. no.	129115

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