



for a greener tomorrow



**MITSUBISHI
ELECTRIC**

Changes for the Better

FACTORY AUTOMATION

Low Voltage Air Circuit Breakers

World Super **AE**

630AF~6300AF

World Super

WS

Series



Mitsubishi Presents the WS Series, Satisfied with the High Demands of the 21st Century Global Market.

World Super

WS Series

Best-Solution

Various line-up and high flexibility

High-Performance

One-rank higher breaking performance

High-Reliability

Safety and reliability provided

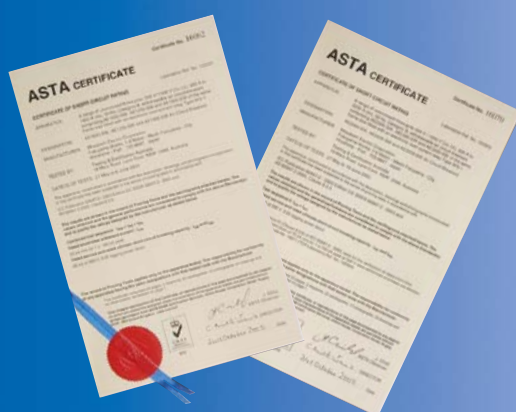
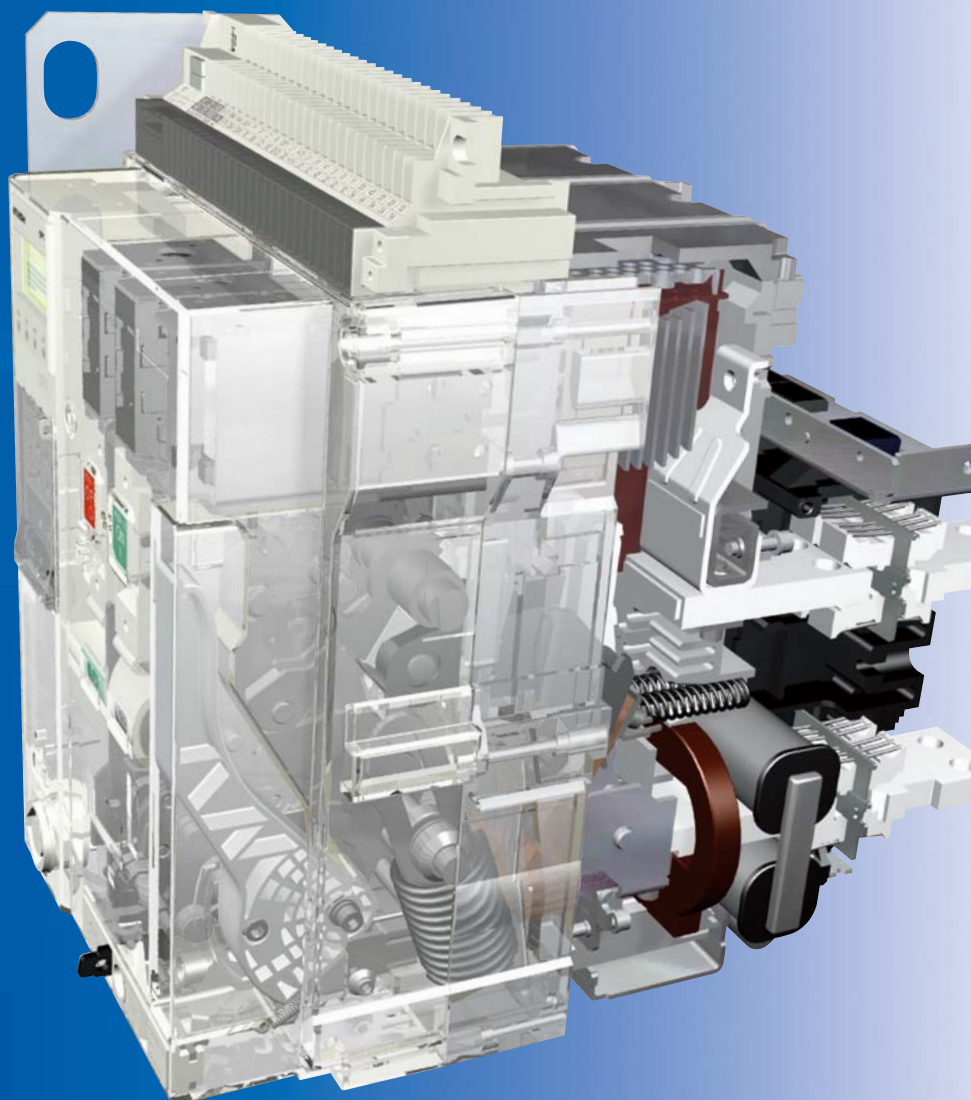
Customer Friendly

Easy handling and retrofitted solution



Global...





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Line up (630 to 6300A)

Rated current (A)	630	1000	1250	1600	2000	2500	3200	4000	5000	6300
SW series	AE630-SW	AE1000-SW	AE1250-SW	AE1600-SW	AE2000-SWA	—				
	—				AE2000-SW	AE2500-SW	AE3200-SW	AE4000-SWA	—	
	—							AE4000-SW	AE5000-SW	AE6300-SW

Product Features

Best Solution

Through Flexible and Various Options, To be Built up the Suitable Functions.

Electronic Trip Relay

Main setting module ①

With interchangeable & add-on modules, flexible functions built up.

WS1 WS2 WS3	General use	WM1 WM2 WM3	Generator protection use	WB1 WB2 WB3	Special use	WF1 WF2 WF3	Protective coordination use
LTD+STD+INST / MCR		LTD+STD+INST / MCR		INST / MCR		LTD+STD+INST / MCR	

Optional setting module ②

With optional setting modules, GFR, ER etc are added easily.

G1	E1	AP	N5
Ground fault protection (GFR)	Earth leakage (ER) ⁽¹⁾	2nd Additional Pre-alarm	Neutral pole ⁽²⁾ 50% protection

Note (1) : Combination with ZCT

(2) : With "N5" optional module, Neutral pole protection will be changed from 100% (standard) to 50%.

Power supply ③

It is necessary for Display and LEDs. (see page 19, 20.)

P1	100-240V AC•DC
P2	24-60V DC
P3	100-240V AC / 100-125V DC with output contact
P4	24-60V DC with output contact
P5	100-240V DC with output contact (SSR) ⁽¹⁾

Note (1) : Solid State Relay

Additional function

EX1 Extension module		DP1 Display		TAL Temperature alarm	The TAL is operated by an unusual temperature of the breaker contacts. (see page 34)
Module for display and communication		Current, Voltage, Power, Harmonics, Trip current, etc. Note : The VT unit is required to display the measured data except the load current.		MCR-SW MCR switch	Making current release is possible with MCR switch. (see page 34)

WS relay with ampere meter and fault memory (DP3)

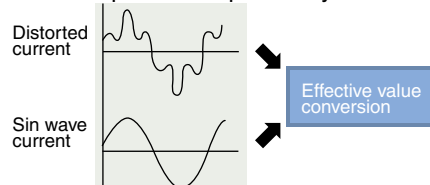
DP3 Display	
Displays Current, Harmonic, Trip current, Trip cause, etc. Note : Refer to page 23 on details.	

Protection with power from Internal CT

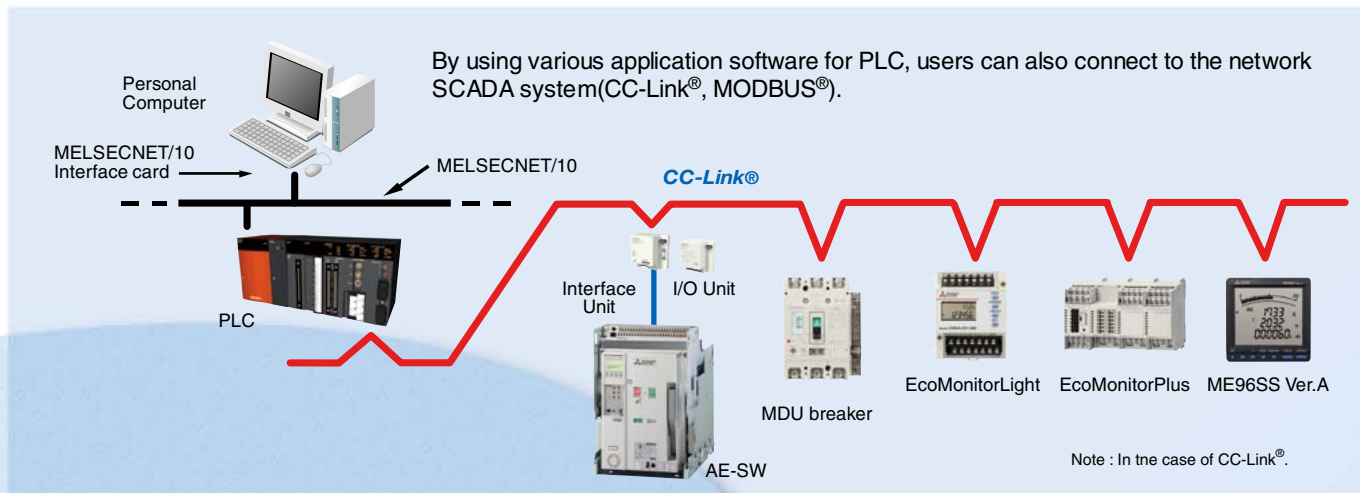
The Over current protection and Ground fault protection can work with power from Internal CT, even if the control power source is off. For the Trip indicator LED and the additional functions like EX1, DP1/DP2, TAL and Network, the control power source is required.

Secure protection by actual effective value detection

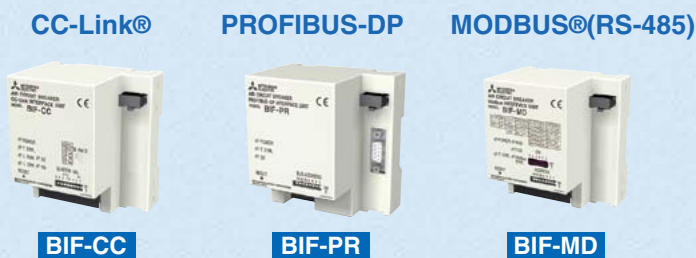
For spread of electronic devices such as inverter, the actual effective value detection method is adopted, which is strong against deformed waveform and is detected from each phase independently .



Network



Interface unit



Communication items

Measurement / Alarm	Current, Voltage*, Power*, Harmonics*, etc.
	Tripping cause, Tripping current
	Alarm (PAL, TAL, Self diagnosis, etc.)
Breaker remote control	ON and OFF by CC and SHT
	Spring charge by MD
Breaker status	ON or OFF or Charge state
	Drawout position
	ETR Setting value

Note*: The VT unit is required to display the measured data except for the load current.

I/O unit

BIF-CON

ON, OFF, Spring charge, Digital input



Option to interface unit I/O unit enables to turn ON/OFF the breaker and the spring charge via network. And by addition of the drawout position switch, it is possible to transmit the breaker drawout position.

Display unit for Panel board

DP2



It has the same function as the breaker display unit (DP1). In the case where the breaker is installed in the panel, it becomes possible to view the measurement information from the outside of the panel board.

Note : The VT unit is required to display the measured data except for the load current.

VT unit

VT



VT unit enables to measure voltages, electric powers, harmonics and etc.

Electronic Trip Relay type code

<p>● Main setting module</p> <table border="1"> <tr> <td>WS1, WB1, WM1, WF1</td> <td>AE630-1600-SW, AE2000-3200-SW, AE4000-SW</td> </tr> <tr> <td>WS2, WB2, WM2, WF2</td> <td>AE2000-SWA, AE4000-SWA, AE5000-SW</td> </tr> <tr> <td>WS3, WB3, WM3, WF3</td> <td>AE6300-SW</td> </tr> </table> <p>WS : General use WM : Generator protection use WB : INST only WF : Protective coordination use</p>	WS1, WB1, WM1, WF1	AE630-1600-SW, AE2000-3200-SW, AE4000-SW	WS2, WB2, WM2, WF2	AE2000-SWA, AE4000-SWA, AE5000-SW	WS3, WB3, WM3, WF3	AE6300-SW	<p>● Optional setting module</p> <p>G1: Ground fault protection N5: Neutral pole 50% protection E1: Earth leakage protection AP: 2nd Additional Pre-alarm NA: Without optional setting</p> <p>● ETR Auxiliary Equipment</p> <p><input type="checkbox"/> Temperature alarm(TAL) <input type="checkbox"/> MCR switch(MCR-SW)</p>	<p>● Power supply</p> <p>P1: 100-240V AC-DC P2: 24-60V DC P3: 100-240V AC / 100-125V DC with output contact P4: 24-60V DC with output contact P5: 100-240V DC with output contact (SSR : Solid State Relay)</p>	<p>Additional function</p> <p><input type="checkbox"/> Extension module(EX1)</p> <p>Network</p> <p><input type="checkbox"/> BIF-CC <input type="checkbox"/> BIF-PR <input type="checkbox"/> BIF-MD</p> <p><input type="checkbox"/> Display(DP1) <input type="checkbox"/> Display onto panel board(DP2) <input type="checkbox"/> VT unit(VT)</p> <p>Wire system (when EX1 is specified)</p> <p>EX1 <input type="checkbox"/> 3φ3W <input type="checkbox"/> 3φ4W <input type="checkbox"/> Normal connection <input type="checkbox"/> Reverse connection</p>
WS1, WB1, WM1, WF1	AE630-1600-SW, AE2000-3200-SW, AE4000-SW								
WS2, WB2, WM2, WF2	AE2000-SWA, AE4000-SWA, AE5000-SW								
WS3, WB3, WM3, WF3	AE6300-SW								

Note : For DP3, refer to page 23 on details.

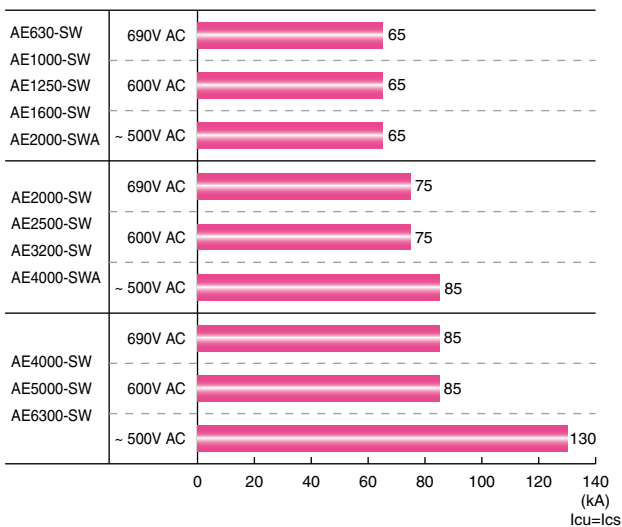
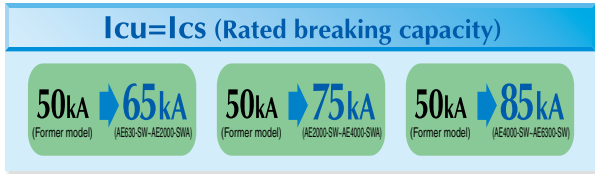
Product Features

High-Performance High-Reliability

The safety of valuable circuits can be securely maintained.

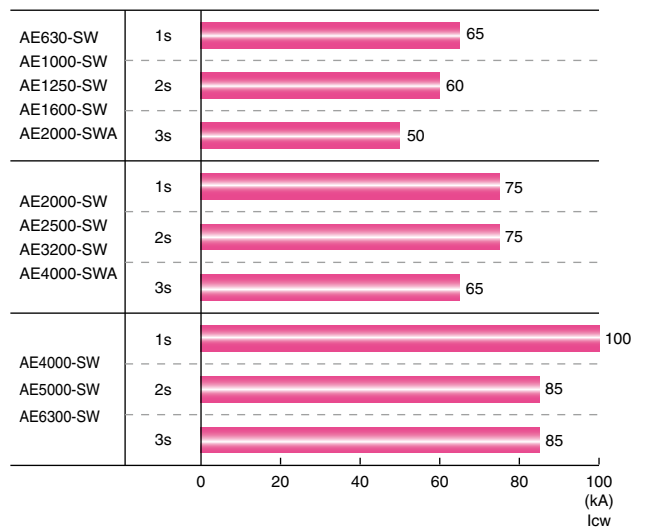
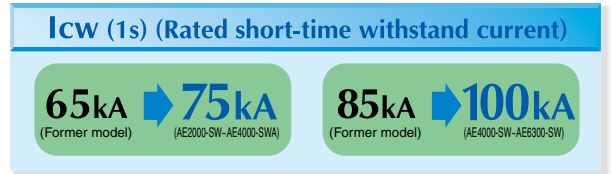
Higher short circuit protection performance by improving breaking capacity

In case of 690V AC, Icu = Ics improved
 from 50 kA to 65 kA for AE630-SW~AE2000-SWA
 from 50 kA to 75 kA for AE2000-SW~AE4000-SWA
 from 50 kA to 85 kA for AE4000-SW~AE6300-SW



Wide coordination range by improving rated short-time withstand current

Icw (1s) improved
 from 65 kA to 75 kA for AE2000-SW~AE4000-SWA
 from 85 kA to 100 kA for AE4000-SW~AE6300-SW



Higher safety by improving insulation performance

Rated impulse withstand voltage (Uimp) for the main circuit is improved from 8 kV to 12 kV.

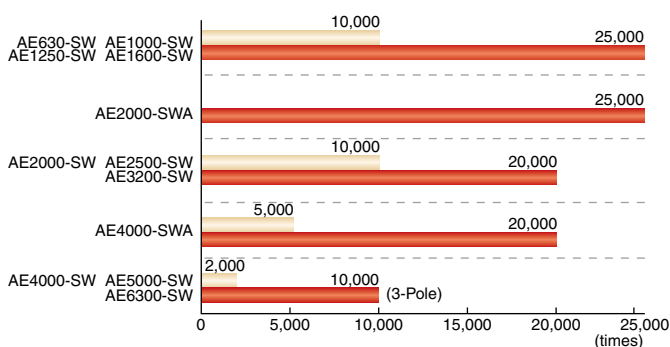
Uimp (Rated impulse withstand voltage)



Higher reliability by High operating durability

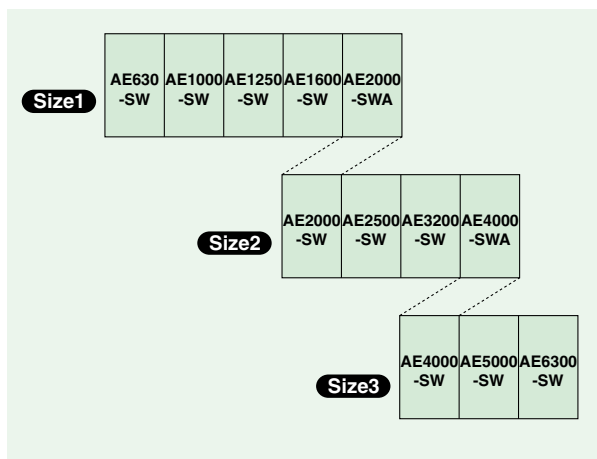
Mechanical

AE-SW series are sharply improved in mechanical durability compared to the former model.



Customer Friendly Convenience for Customer

3 sizes



Compact size AE2000-SWA!

- The compact AE2000-SWA can reduce the panel size.



Replacement from the former model (AE-SS)

- Due to the same installation dimension and outline dimension, the former model (AE-SS) can be replaced with AE-SW series.
- For the replacement of Drawout type, the Drawout frames (Cradle) for AE-SS have to be replaced with one for AE-SW.
- AE-SW can be installed to the existing connection bus bar without any special connection kit. (Except for AE2000-SWA and AE4000-SWA)



Replacement from the old model (AE-S)

For the replacement from the old model (AE-S), the special adapter for AE-SW is prepared. (It is available for Drawout type only.) For details, please contact us.

Reverse connection available

Line and Load are not defined on the Main circuit terminals. Therefore, reverse connection is available without any limitation.

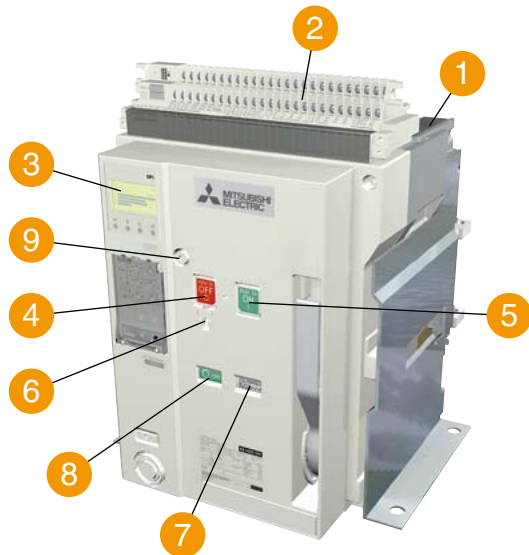
Zero arc space

Arc exhaust to the outside of the breaker is drastically reduced for safer operation. (For AE630-SW~AE4000-SWA models, 600V AC or less) (Refer to page 58 : Insulation distance)

Appearance and Product structure

Fixed type

AE-SW Series



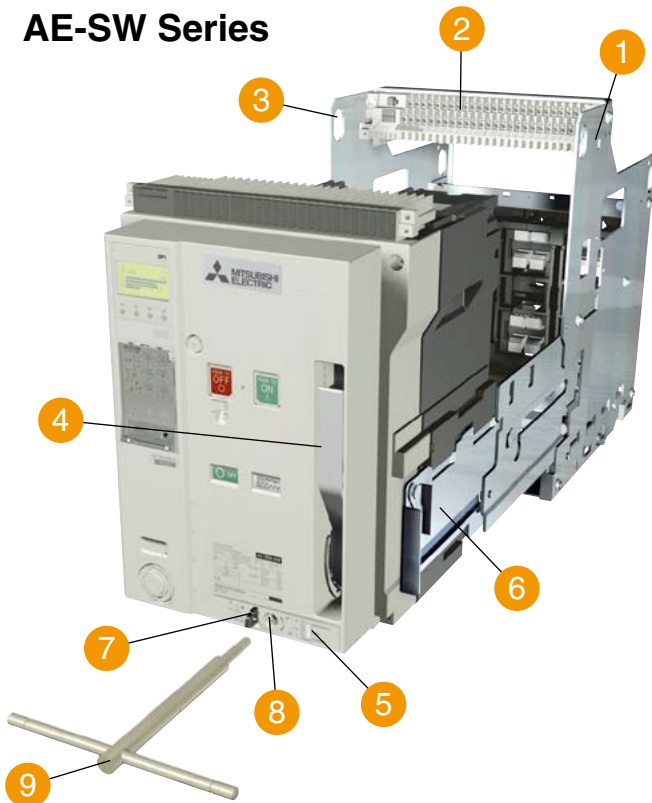
AE1600-SW 3P

- 1 Arc extinguishing chamber
- 2 Control circuit terminal block
- 3 Electronic trip relay
- 4 OFF button
- 5 ON button
- 6 Padlock hook
- 7 Charging indicator
- 8 ON/OFF indicator
- 9 Manual reset button(Optional)

For the fixed type, Lifting hooks (HP) are attached.

Drawout type

AE-SW Series

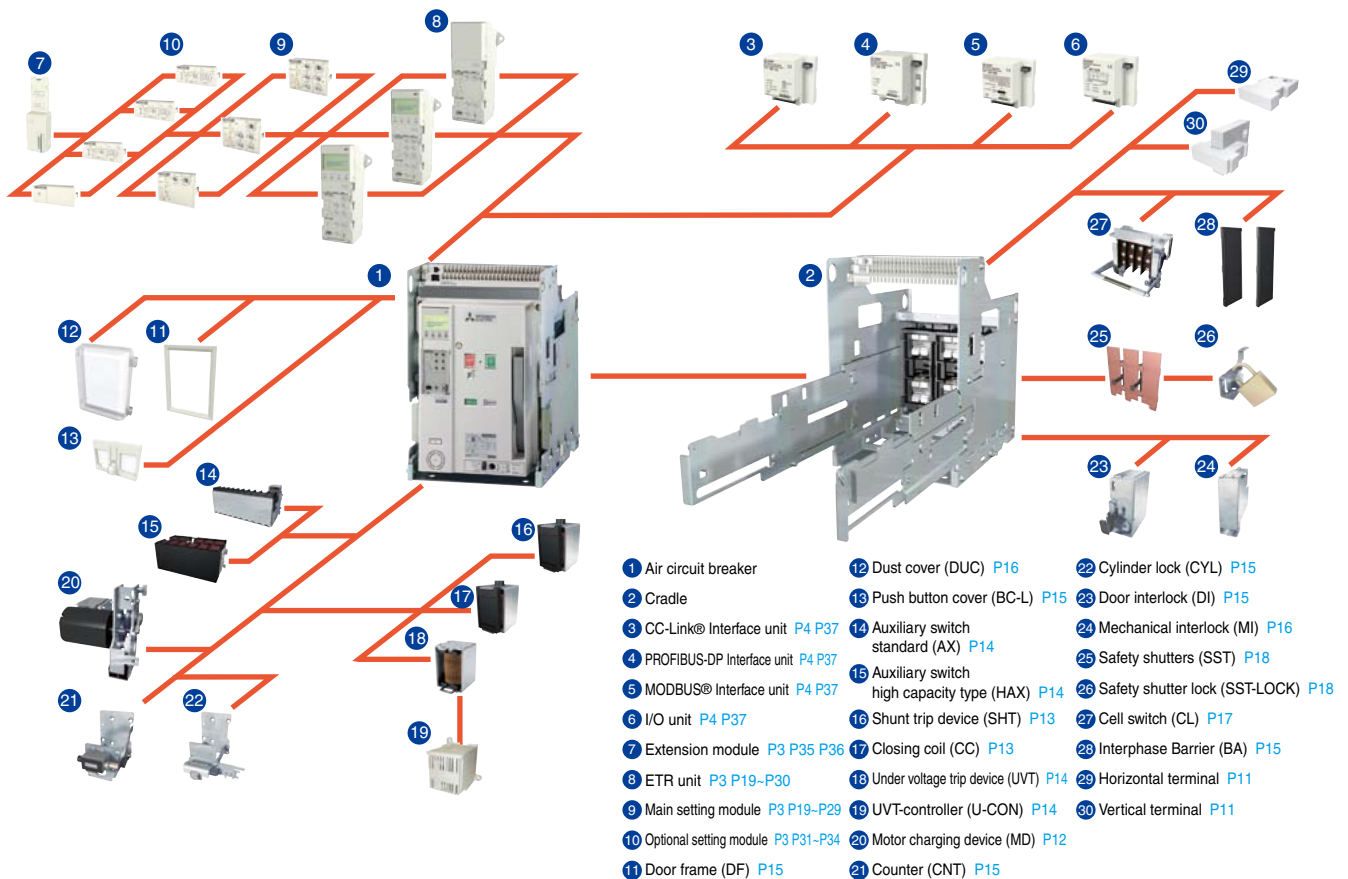


AE1600-SW 3P

- 1 Cradle
- 2 Control circuit terminal block
- 3 Lifting hole
- 4 Charging handle
- 5 Drawout position indicator
- 6 Extension rail
- 7 Position lock
- 8 Aperture for the drawout handle
- 9 Drawout handle

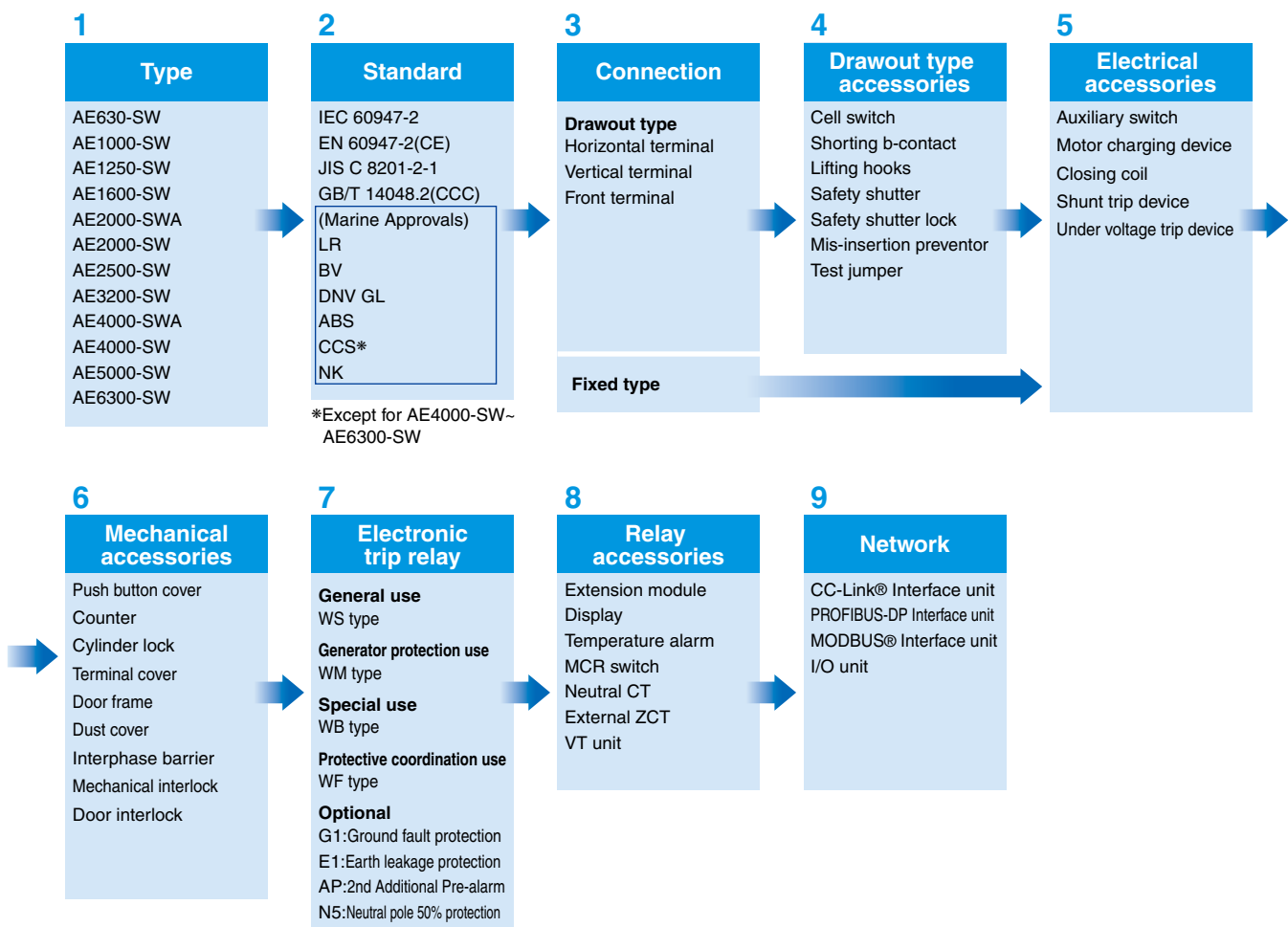
For the drawout type, Drawout handle is attached.

Skeleton



- 1 Air circuit breaker
- 2 Cradle
- 3 CC-Link® Interface unit P4 P37
- 4 PROFIBUS-DP Interface unit P4 P37
- 5 MODBUS® Interface unit P4 P37
- 6 I/O unit P4 P37
- 7 Extension module P3 P35 P36
- 8 ETR unit P3 P19-P30
- 9 Main setting module P3 P19-P29
- 10 Optional setting module P3 P31-P34
- 11 Door frame (DF) P15
- 12 Dust cover (DUC) P16
- 13 Push button cover (BC-L) P15
- 14 Auxiliary switch standard (AX) P14
- 15 Auxiliary switch high capacity type (HAX) P14
- 16 Shunt trip device (SHT) P13
- 17 Closing coil (CC) P13
- 18 Under voltage trip device (UVT) P14
- 19 UVT-controller (U-CON) P14
- 20 Motor charging device (MD) P12
- 21 Counter (CNT) P15
- 22 Cylinder lock (CYL) P15
- 23 Door interlock (DI) P15
- 24 Mechanical interlock (MI) P16
- 25 Safety shutters (SST) P18
- 26 Safety shutter lock (SST-LOCK) P18
- 27 Cell switch (CL) P17
- 28 Interphase Barrier (BA) P15
- 29 Horizontal terminal P11
- 30 Vertical terminal P11

Product configuration



Product Specification

● Specification

Type		AE630-SW	AE1000-SW	AE1250-SW	AE1600-SW	
Frame size	(A)	630	1000	1250	1600	
Rated insulation voltage (Ui)	(50/60Hz)(AC.V)	1000				
Rated operational voltage (Ue)	(50/60Hz)(AC.V)	690				
Rated impulse withstand voltage (Uimp)	(kV)	12				
Pollution degree		3				
Number of poles		3, 4				
Rated current In (CT rating)		630 (Note 5)	1000	1250	1600	
Current setting Ir (A) (40°C)	<div style="border: 1px solid black; padding: 2px; display: inline-block;">WS</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-left: 5px;">WB</div> General use (Current rating adjustable) (0.5 to 1.0 × In 0.05 step)	315-346.5-378-409.5-441-472.5-504-535.5-567-598.5-630 (Note 5)	500-550-600-650-700-750-800-850-900-950-1000	625-687.5-750-812.5-875-937.5-1000-1062.5-1125-1187.5-1250	800-880-960-1040-1120-1200-1280-1360-1440-1520-1600	
	<div style="border: 1px solid black; padding: 2px; display: inline-block;">WM</div> Generator protection use (Current rating fixed) (Note 10)	160 ≤ Ir ≤ 630	400 ≤ Ir ≤ 1000	800 ≤ Ir ≤ 1250	1000 ≤ Ir ≤ 1600	
Rated current of neutral pole	(A)	630	1000	1250	1600	
IEC60947-2 EN60947-2 JIS C 8201-2-1	Ultimate breaking capacity Icu (kA rms)	690V AC	65			
		600V AC	65			
		240-500V AC	65			
		with MCR	690V AC	65		
			600V AC	65		
			240-500V AC	65		
	Bare + External relay	690V AC	25 (Note 1)			
		500V AC	25 (Note 1)			
	Rated service breaking capacity Ics (kA rms) %Icu		100%			
	Rated making capacity Icm (kA peak)	690V AC	143			
			600V AC	143		
				240-500V AC	143	
		with MCR	690V AC	143		
			600V AC	143		
240-500V AC			143			
Bare or Bare + External relay	690V AC	52.5				
	500V AC	52.5				
Rated short time withstand current Icw (kA rms)	1s	65				
	2s	60				
	3s	50				
Maximum total breaking time		(ms)	40 (Note 6)			
Maximum closing time		(ms)	80			
Number of operating cycles	With rated current	500V AC In	5,000			
		690V AC In	5,000			
(Note 2)	Without rated current		25,000 (Note 4)			
Connecting terminal	Horizontal terminal		○			
	Vertical terminal		○			
	Front terminal		○			
Outline dimension (mm) H×W×D	Fixed type	3-pole	410×340×290			
		4-pole	410×425×290			
	Drawout type	3-pole	430×300×375			
		4-pole	430×385×375			
Weight (kg) (without Accessory)	Fixed type	3-pole	40	41	42	
		4-pole	50	51	52	
	Drawout type (including cradle)	3-pole	63	64	65	
		4-pole	77	78	79	
	Cradle only	3-pole	26			
		4-pole	30			
Marine approval	3-pole	○ (LR, BV, DNV GL, ABS, NK, CCS)				

(Note 1) This is the Icu value when the bare main body and the external relay are combined.

(Note 2) The number of operating cycles without rated current also includes the number of operating cycles with rated current.

(Note 3) AE2000-SWA, AE4000-SWA and AE4000-SW-AE6300-SW apply for only vertical terminal of connecting terminal.

(Note 4) This value is max. operating cycle for just ACB body without any accessories.

(The max. operating cycles for the accessories like AX, MD,CC, SHT and UVT are half of this value.)

(Note 5) Products with low rating types are available. For AE630-SW low rating types (250A, 315A, 500A), DP3 is not available.

AE 630-SW 3 kinds of products with low rating types are available.

- 250-275-300-325-350-375-400-425-450-475-500(CT 500A)
- 157.5-173.3-189-204.8-220.5-236.3-252-267.8-283.5-299.3-315(CT 315A)
- 125-137.5-150-162.5-175-187.5-200-212.5-225-237.5-250(CT 250A)

AE 2000-SW 2 kinds of products with low rating types are available.

- 800-880-960-1040-1120-1200-1280-1360-1440-1520-1600(CT 1600A)
- 625-687.5-750-812.5-875-937.5-1000-1062.5-1125-1187.5-1250(CT 1250A)

	AE2000-SWA	AE2000-SW	AE2500-SW	AE3200-SW	AE4000-SWA	AE4000-SW	AE5000-SW	AE6300-SW
	2000	2000	2500	3200	4000	4000	5000	6300
		1000			1000			
		690			690			
		12			12			
		3			3			
		3, 4			3, 4 (HN, FN) (Note 7)			
	2000	2000 (Note 5)	2500	3200	4000	4000	5000	6300
	1000-1100-1200-1300-1400-1500-1600-1700-1800-1900-2000	1000-1100-1200-1300-1400-1500-1600-1700-1800-1900-2000 (Note 5)	1250-1375-1500-1625-1750-1875-2000-2125-2250-2375-2500	1600-1760-1920-2080-2240-2400-2560-2720-2880-3040-3200	2000-2200-2400-2600-2800-3000-3200-3400-3600-3800-4000	2000-2200-2400-2600-2800-3000-3200-3400-3600-3800-4000	2500-2750-3000-3250-3500-3750-4000-4250-4500-4750-5000	3150-3465-3780-4095-4410-4725-5040-5355-5670-5985-6300
	$1250 \leq I_r \leq 2000$	$800 \leq I_r \leq 2000$	$1600 \leq I_r \leq 2500$	$2000 \leq I_r \leq 3200$	$2500 \leq I_r \leq 4000$	$2500 \leq I_r \leq 4000$	$3150 \leq I_r \leq 5000$	$4000 \leq I_r \leq 6300$
	2000	2000	2500	3200	4000	2000 (4000) (Note 8)	2500 (5000) (Note 8)	3150 (6300) (Note 8)
		75			85			
		75			85			
		85			130 (Note 9)			
		75			85			
		75			85			
		75			100			
		45 (Note 1)			65 (Note 1)			
		45 (Note 1)			65 (Note 1)			
		100%			100%			
		165			187			
		165			187			
		187			286			
		165			187			
		165			187			
		165			220			
		94.5			143			
		94.5			143			
		75			100			
		75			85			
		65			85			
		40 (Note 6)			50 (Note 6)			
		80			80			
	1,500	1,500	1,000	500		1,000		
	1,500	1,500	1,000	500		1,000		
		20,000 (Note 4)			10,000 (3P) / 5,000 (4P)			
	-	○			-			
	○ (Note 3)	○			○ (Note 3)			
	-	○			-			
		410×475×290			414×874×290			
		410×605×290			414×1004(1134)×290 (Note 8)			
		430×435×375		430×439×375	480×889×375			
		430×565×375		430×569×375	480×1019(1149)×375 (Note 8)			
	47	60	61	63	81	160	160	160
	57	72	73	75	99	180 (200) (Note 8)	180 (200) (Note 8)	180 (200) (Note 8)
	70	92	93	95	108	233	233	240
	84	113	114	116	136	256 (279) (Note 8)	256 (279) (Note 8)	263 (286) (Note 8)
	31	35		36	49	118	118	125
	35	43		44	61	133 (148) (Note 8)	133 (148) (Note 8)	140 (155) (Note 8)
		○ (LR, BV, DNV GL, ABS, NK, CCS)			○ (NK, LR, DNV GL, BV, ABS)			

(Note 6) This value means the instantaneous breaking time at shortcircuit interruption.
As for accessories (SHT, UVT), refer to page 13 and 14.

(Note 7) 4(HN) means the neutral poles current capacity is 50% of the rated current, for 4 poles.
4(FN) means the neutral poles current capacity is 100% of the rated current, for 4 poles.

(Note 8) () shows the value for 4P FN type.

(Note 9) Marine approval value is 138kA.

(Note 10) For WM relay, the current setting I_r can be set by 1A except AE630-SW low rating types "CT315A" and "CT250A". For AE630-SW with "CT315A" and "CT250A", it can be set by 0.1A.

(Remark) All models conform the isolating function according to IEC 60947-2.
Reverse connection is possible.

Connections

Over view (AE630~1600-SW, AE2000~3200-SW)

Connections Type	Horizontal	Vertical (VT)	Front (FT)	Vertical terminal adapter (VTA)	Front terminal adapter (FTA)
Fixed type (FIX)		—	—	 FIX-VTA	 FIX-FTA
Drawout type (DR)		 DR-VT	 DR-FT	 DR-VTA	 DR-FTA

● Connection image : AE630~1600-SW, 3-pole type

Over view (AE2000-SWA, AE4000-SWA, AE4000~6300-SW)

Connections Type	Vertical (VT) Standard
Fixed type (FIX)	 FIX-VT
Drawout type (DR)	 DR-VT

● Connection image : AE2000-SWA, 3-pole type
● For AE2000-SWA, AE4000-SWA, AE4000-SW, AE5000-SW and AE6300-SW models, vertical terminal only is available.

Available connections

Connections		Breakers											
		AE630-SW	AE1000-SW	AE1250-SW	AE1600-SW	AE2000-SWA	AE2000-SW	AE2500-SW	AE3200-SW	AE4000-SWA	AE4000-SW	AE5000-SW	AE6300-SW
Fixed type (FIX)	Horizontal	○	○	○	○	—	○	○	○	—	—	—	—
	FIX-VT	—	—	—	—	○	—	—	—	○	○	○	○
	FIX-VTA	○	○	○	○	—	○	○	○	—	—	—	—
	FIX-FTA	○	○	○	○	—	○	○	○	—	—	—	—
Drawout type (DR)	Horizontal	○	○	○	○	—	○	○	○	—	—	—	—
	DR-VT	○	○	○	○	○	○	○	○	○	○	○	○
	DR-FT	○	○	○	○	—	○	○	○	—	—	—	—
	DR-VTA	○	○	○	○	—	○	○	○	—	—	—	—
	DR-FTA	○	○	○	○	—	○	○	○	—	—	—	—

○ Available

Manual charging



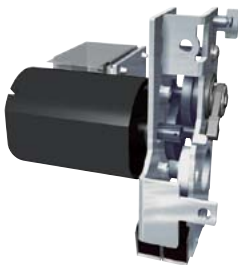
The closing spring is charged by the manual charging handle. The breaker is closed when the ON button is pressed, and opened when the OFF button is pressed.

- When the closing spring is completely charged, the charging indicator will show "CHARGED".
- The indicator shows the ON or OFF state of the main contacts.
- The breaker cannot be closed while the OFF button is being pressed. (Safety design)
- OFF lock is enabled by padlock (See P7, P17) as standard.

Motor charging device (MD)

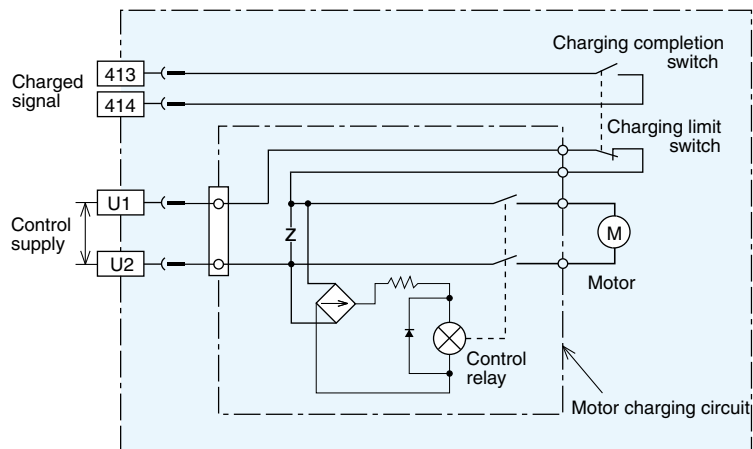
Option

1



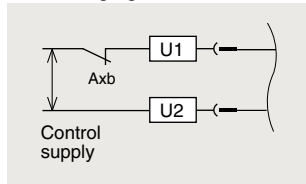
The closing spring is charged by an electric motor. When the breaker is closed, the spring is charged automatically (ON-charge method). The closing coil (CC) is required to remotely close the breaker, and the shunt trip device is required to remotely open the breaker.

- Manual charging operation is also possible.
- Pumping prevention is assured both electrically and mechanically.
- As the charging completion contact is separate from the electrical charging circuit, its function in the control scheme can be arranged as desired.



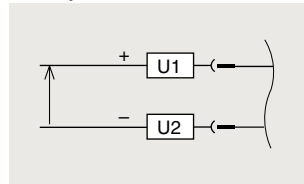
For 24V DC and 48V DC, the Diode rectifier is not included.

OFF charging method



OFF charging method is also available. The closing spring is charged automatically when the breaker is opened. This is available only by externally connecting b contact (AXb) of the auxiliary switch to the motor charging circuit in series. In case of DC power supply, please use high capacity auxiliary switch (HAX).

Polarity of DC circuit use



Motor charging rating

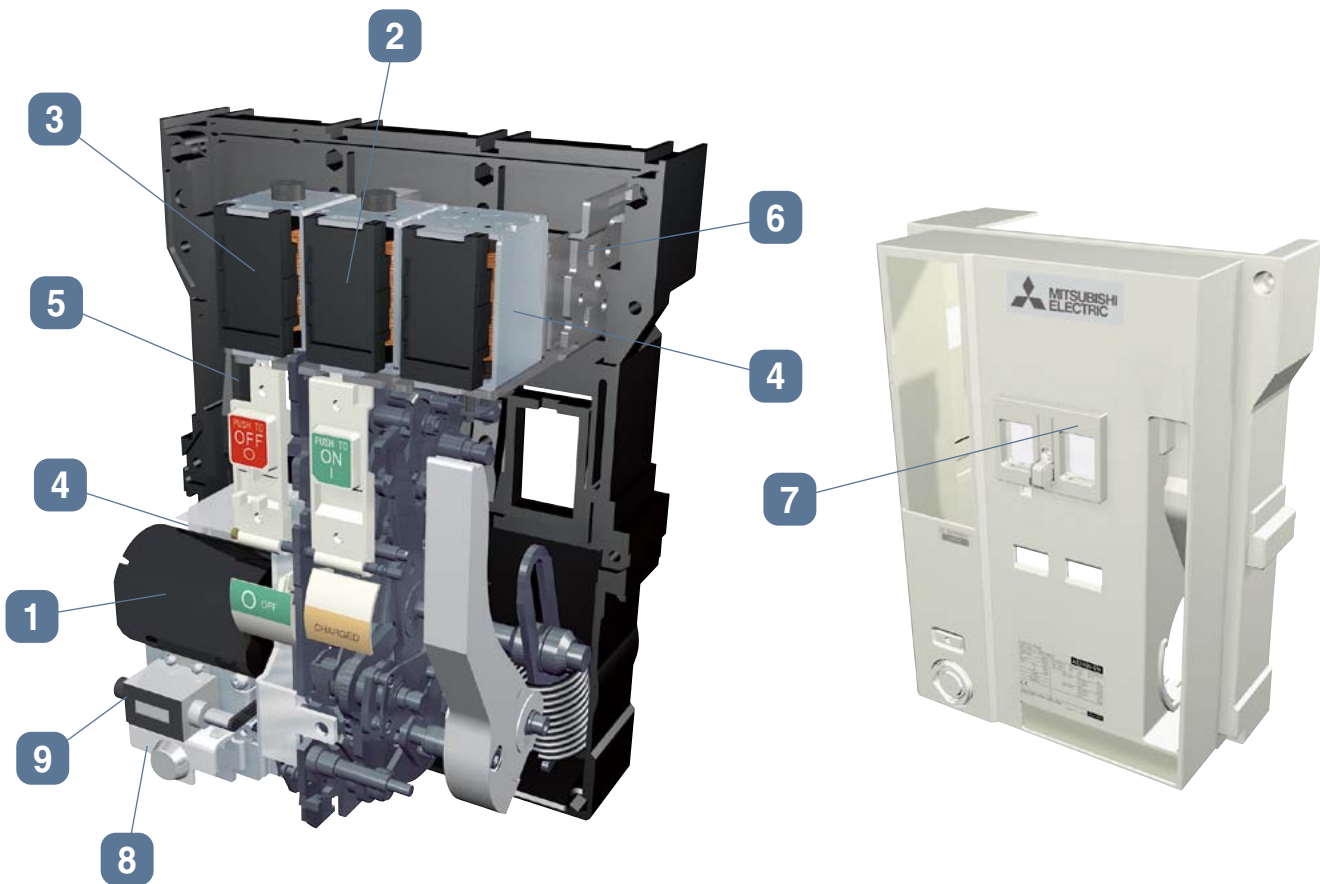
Rated voltage (V)	Applicable voltage range (V)	Applied voltage (V)	Inrush		Steady current (A)	Charging time (s)	Criterion for power requirement (VA)
			Current (Peak value) (A)	time (s)			
24DC	18 ~ 26.4	24	22	< 0.4	6	≤5	500
48DC	36 ~ 52.8	48	14	< 0.4	3		700
AC/DC	85 ~ 137.5	100	10(10)	AC: < 0.45	3(4)		1000
100-125		125	12(12)	DC: < 0.25	3(4)		700
AC/DC	170 ~ 275	200	5(7)	AC: < 0.45	1(2)		1000
200-250		250	6(8)	DC: < 0.25	1(2)		

Values in parentheses show values for AE4000-SWA 4 pole and AE4000-SW - AE6300-SW. We cannot manufacture AE4000-SWA 4 pole and AE4000-SW - AE6300-SW in 24V DC and 48V DC rating.

Charging completion contact rating

Voltage (V)	Current (A)	
	Resistance load	Inductive load
AC	460	5
	250	10
	125	10
DC	250	3
	125	10
	30	10

Accessories (for breaker unit)



Closing coil (CC)

Option

2



The closing coil is a device to close the breaker by remote control.

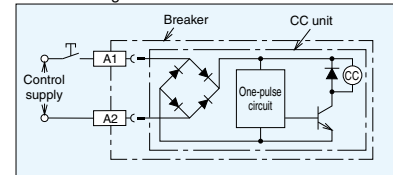
- An interlock to prevent pumping is provided electrically.

Rated voltage (Applicable voltage range)	Operating voltage · Operating inrush current (VA)		Closing time (Note 1)
	AC	DC	
24-48V DC (16.8-52.8)	-	24V DC 3.0A (100W)	0.08 s or less
	-	48V DC 6.0A (200W)	
100-250V AC · DC common (75-275)	100V AC 0.7A (100VA)	100V DC 0.8A (100W)	
	250V AC 1.7A (200VA)	250V DC 1.8A (250W)	

Note 1) In case of double rating of rated voltage, it is the value for the lower rating.
(Example) In case of 24-48V DC, it is operating time for 24V DC.

- Closing time means time from the initial energization of the closing coil up to the complete closing of the main contacts.
- As CC is one-pulse driven, it is not necessary to insert AXb for burning prevention purposes. Inserting AXb will cause anti-pumping function to be ineffective.

CC circuit diagram



Diode rectifier is not used for control source 24-48V DC.

Shunt trip device (SHT)

Option

3



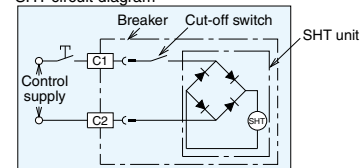
The shunt trip device is a device to open the breaker by remote control. A cut-off switch is included.

Rated voltage (Applicable voltage range)	Operating voltage · Operating inrush current (VA)		Operating time (Note 1)
	AC	DC	
24-48V DC (16.8-52.8)	-	24V DC 2.5A (100W)	0.04 s or less
	-	48V DC 6.0A (200W)	
100-250V AC · DC common (70-275)	100V AC 0.4A (100VA)	100V DC 0.6A (100W)	
	250V AC 1.4A (150VA)	250V DC 1.6A (200W)	
380-500V AC (266-550)	380V AC 0.5A (250VA)	-	
	500V AC 0.7A (300VA)	-	

Note 1) In case of double rating of rated voltage, it is the value for the lower rating.
(Example) In case of 24-48V DC, it is operating time for 24V DC.

Note 2) Operating time for AE4000-SW-AE6300-SW is 0.05s or less.

SHT circuit diagram



Diode rectifier is not used for control source 24-48V DC.

Under voltage trip device (UVT)

Option

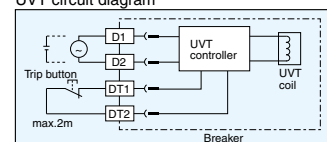
4



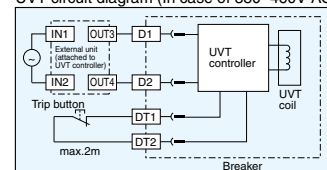
This is the device that automatically trips the breaker when the circuit voltage drops below the nominal voltage, and comprises UVT coil and UVT controller. There are 3 kinds of tripping time, INST, 0.5s and 3.0s. A trip terminal for forced OFF function is included as standard equipment.

Rated voltage	Frequency	operating time (time delay)	Pick-up voltage	Drop-out voltage	Trip function	Power consumption
100-120V AC	50/60Hz	<input type="checkbox"/> Inst(0.2s) <input type="checkbox"/> 0.5s(Min.) <input type="checkbox"/> 3.0s(Min.)	65-85V	45-70V	With open circuit of DT1,DT2 terminals.	Steady: 20VA Inrush: 200VA ≤ 0.4S (100-120V AC) 24V DC (Inrush:100VA ≤ 1S)
200-240V AC			130-170V	90-140V		
380-460V AC			247-323V	171-266V		
24V DC			15.6-20.4V	10.8-16.8V		
48V DC			31.2-40.8V	21.6-33.6V		
100-110V DC			65-85V	45-70V		
120-125V DC			78-102V	54-84V		

UVT circuit diagram



UVT circuit diagram (In case of 380-460V AC)



- Note1) In case of 380-460V AC, the external unit is attached additionally.
 Note2) The operating time is a guarantee value when it drops from 85% or more of rated voltage.
 Note3) Time delay should be allowed for 1.5s between applying the voltage to the UVT and closing the breaker.
 Note4) If a remote trip function is required, remove the shorting bar (DT1 DT2) and connect a normally closed switch, rated 0.5A at 150V DC across them.
 Note5) If a forced OFF function is used, the shorting (signal input to DT1 and DT2) should be held for 0.2 sec. and more.
 Note6) When an ambient temperature is at 60° C, this device is installed outside of the ACB body.
 Note7) The operating time in the above table does not include the operating time of the ACB.

OCR alarm (AL) [Automatic reset type Short-time operation (30ms)]

Standard if ETR is equipped

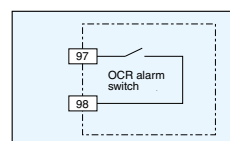
5



OCR alarm (AL) is provided as standard if ETR is equipped. OCR alarm (AL) is the contact (1a) of short-time operation (30ms), being output when the breaker is tripped by the electronic trip relay. Two types of automatic reset type (standard) and manual reset type (optional) are available. When ordering, specify either automatic reset or Manual reset.

Switch rating

Voltage (V)	Current (A)		
		Resistive load	Inductive load
AC	240	3	2
	125	5	3
DC	240	0.2	0.2
	125	0.4	0.4
	30	4	3



- Note1) Though the control power supply is unnecessary to activate OCR alarm (AL), the self-holding circuit is necessary since the contact output is activated for the short time (30ms).
 Note2) This works when tripping occurs in LTD, STD, INST, GFR or ER.
 Note3) If any continuous output of OCR alarm (AL) is necessary, use the trip indicator (TI) output contact of the electronic trip relay. Choose P3, P4 or P5 for power supply type.

OCR alarm (AL) [MRE : Manual reset type]

Option



On the manual reset type (optional), the gray manual reset button on the front side of the breaker will stick out to continuously output OCR alarm (AL) if the breaker is tripped by the electronic trip relay. After tripping, the breaker can not be turned on unless the manual reset button is pressed for resetting.

Auxiliary switch Standard (AX) • High capacity type (HAX)

Option

6

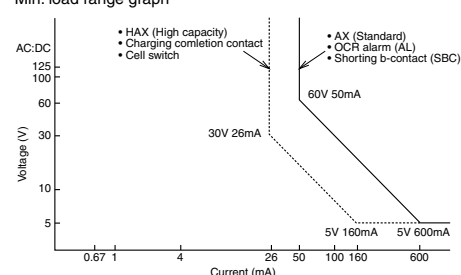


This is the contact that remotely indicates the ON or OFF status of the breaker.

Switch rating

Voltage (V)	Current (A)			
	Standard (AX)		High capacity type (HAX)	
	Resistive load	Inductive load	Resistive load	Inductive load
AC	250	10	10	10
	125	10	10	10
DC	250	0.3	0.3	1.5
	125	0.6	0.6	6
	30	10	6	10
Maximum contacts		5a5b		5a5b
Change-over sequence	Breaker state	a-contact (NO)	b-contact (NC)	
	ON	ON	OFF	
	OFF	OFF	ON	

Min. load range graph



- The a and b contacts may turn simultaneously to ON instantaneously at the time of changing the contact; Pay attention to the contact state when designing circuits.
- The chattering time at the time of contact ON-OFF is below 0.025 s.

Accessories (for breaker unit)

Push button cover (BC-L)

Option

7



The cover prevents careless manual operation (ON,OFF) of the push buttons.
BC-L can be locked by a padlock (The padlock should be supplied by the customer.)
For the suitable size of a padlock, refer to Page 17.

Cylinder lock (CYL)

Option

8



The breaker is locked OFF with the cylinder lock.
● Since it is an interlock which only allows the key to be removed when the breaker is locked off, it can be used for interlocking two or more breakers.

Counter (CNT)

Option

9



The number of open/close operations of the breaker are shown by a 5 digit counter.

Door frame (DF)

Option



The door frame improves the appearance, after cutting out the panel door to install the breaker.
As for panel cut-out dimensions, refer to page 53.

Door interlock (DI)

Option



The panel door cannot be opened unless the breaker is open position.
● A wire type mechanical interlock allows flexibility in positioning breakers in the switchboard.
● The parts of the Door panel should be supplied by the customer.
● DI can not be installed with "Mechanical interlock(MI)for 3 breakers."

Interphase Barrier (BA)

Option



This enhances the interphase insulation between the terminal portions of the breaker, and prevents short-circuit due to conductive inclusion or dust. It can be attached and detached easily. As for its availability, refer to the following table.

Type	Connections	AE630-SW~ AE1600-SW	AE2000-SWA	AE2000-SW~ AE3200-SW	AE4000-SWA	AE4000-SW~ AE6300-SW
Fixed type (FIX)	Horizontal (FIX)	●		●		
	Vertical terminal (FIX-VT)		▲		▲	-
	Vertical terminal adaptor (VTA)	▲		▲		
	Front terminal adaptor (FIX-FTA)	▲		▲		
Drawout type (DR)	Horizontal (DR)	●		●		
	Vertical terminal (DR-VT)	●	▲	▲	▲	▲
	Front terminal (DR-FT)	-		▲		
	Vertical terminal adaptor (VTA)	▲		▲		
	Front terminal adaptor (DR-FTA)	▲		▲		

● Available for the insulation ▲ Available for separating terminals ■ Not existing type - Attachment is impossible

Terminal Cover (TTC)

Option



The transparent terminal cover prevents from careless touching to the live control terminals.
Protection degree is IP20.

Mechanical interlock (MI)

Option



This is the device to prevent parallel charge of 2 or 3 units of breakers, and it can interlock the breakers mechanically without fail.

All combinations are available among any models from AE630-SW to AE6300-SW.

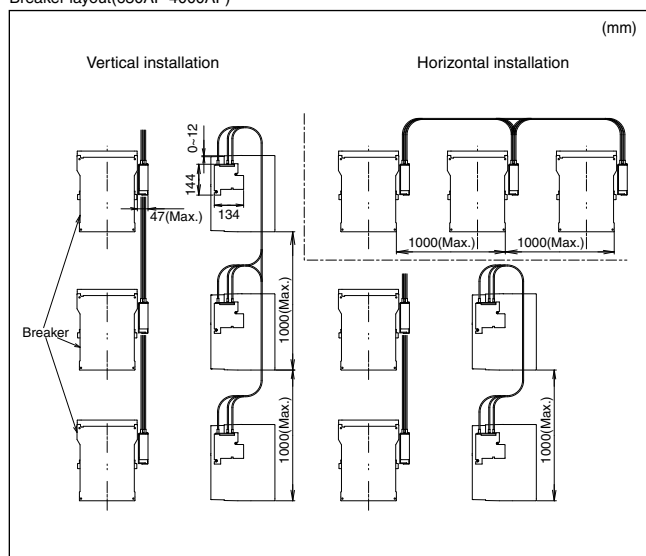
Please make inquiries about installation to AE4000-SW~AE6300-SW.

Further the interlock is possible among the different connection types or poles, such as fixed type or drawout type, 3 pole or 4 pole.

In combination with electric interlock, the higher safety interlock system can be secured.

- For drawout type, the interlock works at "CONNECTED" position, and in another position the interlock is released, which assures easy maintenance and inspection of the breaker.
- When turning OFF one breaker and then turning ON another breakers, please take an interval 0.5 seconds or more.
- MI for 3 breakers can not be installed by combining with Door Interlock (DI).

Breaker layout(630AF-4000AF)



Interlock combinations

Switching states (for 2 ACBs)				○ : ACB open : ACB closed	Case circuit				
Type	①	②	③						
ACB1	○		○	2 devices : 1 normal power supply and 1 emergency power supply					
ACB2	○	○							
Switching states (for 3 ACBs)									
Type	①	②	③	④	⑤	⑥	⑦	3 devices : 2 sources and 1 coupling	
ACB1	○		○				○		
ACB2	○	○		○		○			
ACB3	○	○	○		○				
Switching states (for 3 ACBs)									
Type	①	②	③	④				3 devices : 3 sources, only 1 device closed	
ACB1	○		○	○					
ACB2	○	○		○					
ACB3	○	○	○						
Switching states (for 3 ACBs)									
Type	①	②	③	④	⑤			3 devices : 2 normal power supplies and 1 emergency power supply	
ACB1	○		○		○				
ACB2	○	○		○	○				
ACB3	○	○	○						

Condenser trip device (COT)

Please prepare by the customer. Refer to Page 13 for the specifications of combined SHT.

Dust cover (DUC)

Option



Dust cover prevents the dust or water entering into the panel board from the breaker panel cut. Protection degree is IP54.

Accessories(for drawout type)

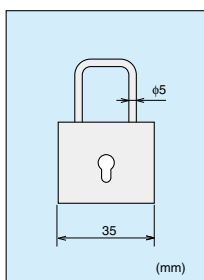
Drawout interlock (standard equipment)

This is the safety device that prevents insertion and drawout operation. When the breaker is ON, the drawout handle cannot be inserted, and insertion and drawout operation cannot be done unless the OFF button is pressed.



Position lock (standard equipment)

This is the device that locks automatically the drawout mechanism at "TEST" or "CONNECTED" positions during insertion and drawout operation. When the lock plate is pushed in, lock is released and operation can be continued.



Outline dimensions (reference)

Padlock

* This padlock should be supplied by customer.

A padlock can be arranged at the lock plate. Thereby, it is possible to prevent the connection position from being changed unnecessarily. As for outline dimensions of the padlock, please refer to the left figure.

Operating position of drawout type

CONNECTED position

- Both main and control circuits are connected.
- Normal in use condition.
- Lock plate is protruding

TEST position

- Main circuit is disconnected, but the control circuit is connected.
- The breaker operation can be tested with the door closed.
- Lock plate is protruding

DISCONNECTED position

- Both main and control circuits are disconnected.
- The door can be closed.

DRAWOUT position

- This is the position for removing the breaker.
- The breaker is drawn out of the cradle on the extension rails.

Ground terminal is on right side of the cradle.

Cell switch (CL)



This is the switch to show the drawout position (CONNECTED, TEST, and DISCONNECTED) of the breaker. An arbitrary combination up to 4 pieces is available.



Operating sequence

Switch function	Drawout position of breaker	Disconnected			Connected
		DISCON	TEST	CONNECT	ON
CL-C (CONNECTED)	Change-over sequence (recontact)	OFF	OFF	OFF	ON
CL-T (TEST)		OFF	ON	OFF	OFF
CL-D (DISCONNECTED)		ON	OFF	OFF	OFF

Note 1: The setting can be changed by customer later.
A preliminary setting of CL at factory shipment is as follows.
CL1:1C CL2:1C1D CL3:1C1T1D CL4:2C1T1D

Switch rating

Voltage (V)		Current (A)	
		Resistive load	Inductive load
AC	250	10	10
	125		
DC	250	3	1.5
	125	10	6
	30	10	10
Maximum contacts		Total 4c max.	

Standard pattern

	CL-C	CL-T	CL-D
CL1	1	-	-
CL2	1	-	1
CL3	1	1	1
CL4	2	1	1

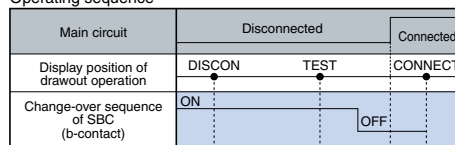
Shorting b-contact (SBC)

Option



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, SBC with the same number of contacts as auxiliary switches (AXb) will be provided.

Operating sequence



Switch rating

Voltage (V)		Current (A)	
		Resistive load	Inductive load
AC	250	10	2
	125	10	3
DC	250	0.2	0.2
	125	0.4	0.4
	30	4	3

Refer to the Min. load range graph in Page 14.

Lifting hook (HP)

Option



This is the metal fitting to suspend the main body when the breaker is removed from the drawout cradle. The fixed type breaker is equipped with HP as standard.

Safety shutter (SST)

Option



The safety shutters cover the conductors (cradle side) and prevent contact with them when the breaker is drawn out.

Safety shutter lock (SST-Lock)

Option



This kit is used to lock the safety shutters using 2 padlocks (the padlocks to be customer's supply). The safety shutters close when the breakers are drawn out to prevent accidental contact with the main contacts.

Mis-insertion preventor (MIP)

Option



This prevents other breakers unspecified from inserting into the cradle, and 5 patterns in maximum are available.

Not available for AE4000-SW~AE6300-SW

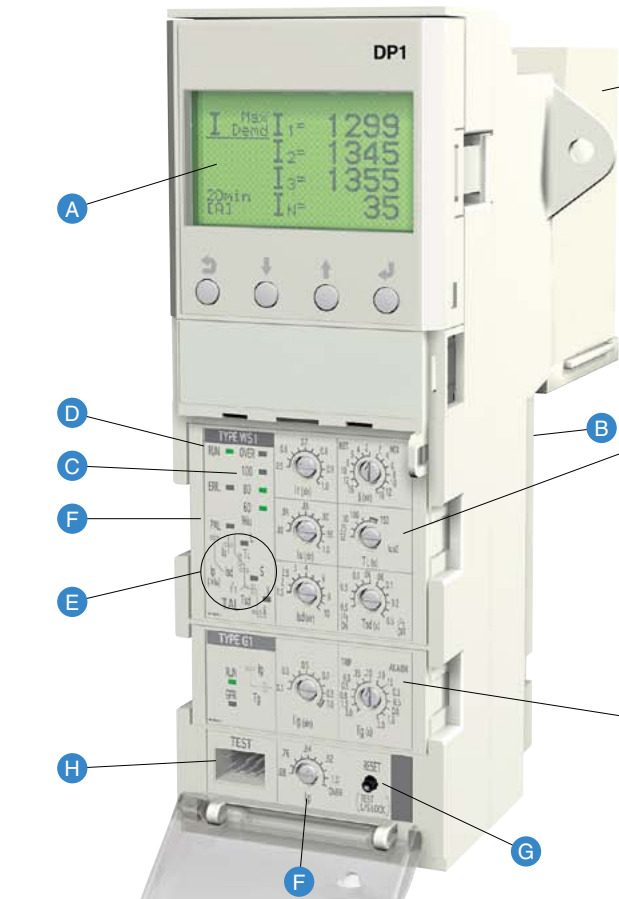
Test jumper (TJ)

Option



With the breaker taken out of its cradle, this device enables the breaker to be electrically opened and closed, and the operating sequence to be checked. 3m cable is equipped as standard shipment.

Electronic trip relay (Feature)



- A Display (option)**
Several measuring data (current, voltage, power etc) and alarms can be displayed with this module.
- B Extension module (option)**
This module is required to install VT unit, display module and each interface unit.
- C Load current LED (standard)**
This indicator shows the actual current-carrying level.
- D RUN and ERR. LED (standard)**
This indicator displays the ETR situation (Run or Error)
- E Trip indicator LED (standard)**
This indicator displays the trip cause. (Self-holding type)
If output contact for this Trip indicator is required, Power supply module should be selected from P3, P4 or P5.

3 Power supply module
This module provides the control power source for Trip indicator LED and Additional function modules like EX1, DP1, etc..
Please select a Power supply type from P1 to P5, which include Power supplies with output contact or with SSR output contact for 200V DC.
(The Over current protection and Ground fault protection (GFR)* can work with power from Internal CT, even if Control power source is off.)
Note*) For Ground fault protection, it works under the rated current (In) setting of 0.2-1.0 without Control power source.

1 Main setting module
This module provides the characteristic setting function of Over current protection according to application. The modules for general use (WS) and for generator protection use (WM) have the setting dials for LTD, STD and INST operating characteristics. And the module for special use (WB) has setting dials for INST only.
4 pole breaker provides Neutral 100% protection as standard, which becomes 50% protection when Optional setting module "N5" is installed.

2 Optional setting module (option)
With each optional setting modules, the following functions can be added respectively.
G1: Ground fault protection
N5: Neutral pole 50% protection
E1: Earth leakage protection in combination with ZCT
AP: 2nd Additional Pre-alarm

- F Pre-alarm (PAL LED and Current setting dial) (standard)**
This indicator displays the Pre-Alarm situation when the setting current is exceeded. If output contact for this Pre-alarm is required, Power supply module should be selected from P3, P4 or P5. And by adding the Optional setting module "AP", 2nd Pre-alarm can be added.
- G RESET button (standard)**
With this Reset button, Trip indicator, Display data like fault cause and fault current and Pre-alarm are reseted. When Power supply module P3, P4 or P5 is equipped, the resetting from Control circuit terminal becomes possible. Additionally, this Reset button provides a lock function of LTD and STD characteristics on the INST testing with Mitsubishi Tester "Y-2005".
- H TEST terminal (standard)**
This Test terminal is used for the field testing of characteristics with Mitsubishi Tester "Y-2005" (refer to Page 34).

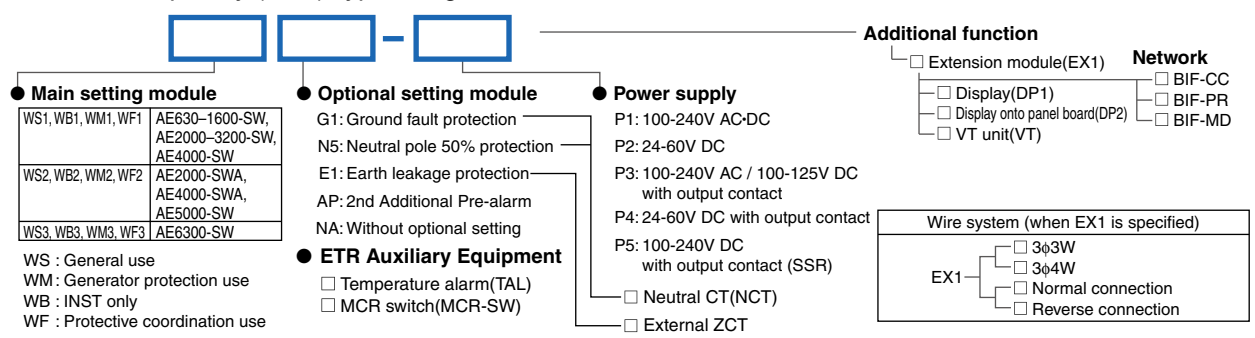
OCR alarm (AL) (standard)

When tripped by Over current, Ground fault (GFR) and Earth leakage (ER), this device outputs alarm signal. There are two types of OCR alarms. One is Automatic reset type with 30ms one pulse output (standard) and the other is Manual reset type with self-holding (optional). For details, refer to Page 14.

Neutral pole overcurrent protection (NP) (standard)

When Harmonics in load current become higher, the current on Neutral pole may exceed the rated current. This Neutral pole overcurrent protection prevents the troubles caused by higher Harmonics.

Electronic trip relay (ETR) Type designation breakdown



Characteristic table

①	②	NA Nothing	G1 Ground fault	E1 Earth leakage	AP 2nd additional Pre-alarm	N5 Neutral pole 50% protection
WS General use LTD+STD+ INST/MCR						
WM Generator protection use LTD+STD+ INST/MCR						
WB Special use INST/MCR						
WF Protective coordination use LTD+STD+ INST/MCR						

Power supply module ③

Type	Rated Voltage (V)	Applicable Voltage range (V)	Criterion for Power requirement (VA)	Alarm output
P1	100-240 AC-DC	85-264 AC-DC	15	—
P2	24-60 DC	18-72 DC	10	—
P3	100-240 AC 100-125 DC	85-264 AC 85-138 DC	15	6 output contacts
P4	24-60 DC	18-72 DC	10	6 output contacts
P5	100-240 DC	85-264 DC	15	6 output contacts (SSR)

Contact capacity (Type P3 and P4)

Voltage (V)	Current (A)	
	Resistive load	Inductive load
	cosφ=0.4 L/R=0.7	
AC	240	1
	120	1
DC	125	0.1
	30	1

Current capacity (Type P5)

Voltage (V)	Normal current (A)	Peak inrush current (A)	ON resistance (Ω) (max.)
AC	240	0.1	0.3
	120	0.1	0.3
DC	240	0.1	0.3
	30	0.1	0.3

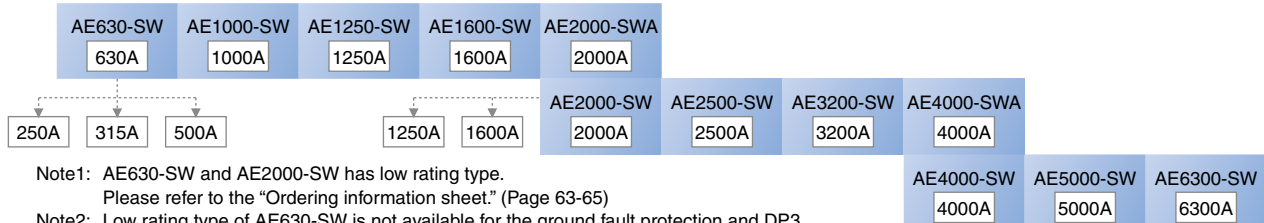
Note1: Over current protection and ground fault protection operates without control power source.
 Note2: Factory setting of 6 output contacts is as follows.

①	②	③	④	⑤	⑥
LTD	STD/INST	G1/E1/AP	PAL	TAL	ERR
Self-holding	Self-holding	Refer to lower table	Automatic reset	Automatic reset	Automatic reset

ETR dial set	G1	E1	AP
TRIP side	Self-holding	Self-holding	—
ALARM side	Automatic reset	Automatic reset	Automatic reset

Self-holding:
The output is maintained until it resets.
 Automatic reset:
The output will be reset if it backs to normal condition.

CT rating table



Note1: AE630-SW and AE2000-SW has low rating type. Please refer to the "Ordering information sheet." (Page 63-65)
 Note2: Low rating type of AE630-SW is not available for the ground fault protection and DP3.
 Note3: As for details of ratings, refer to page 9 and page 10.

Electronic trip relay (ETR) for WS relay with Ampere Meter and Fault Memory (DP3)

With ETR

Type - ; DP3



Main setting

WS1	AE630-1600-SW, AE2000-3200-SW, AE4000-SW
WS2	AE2000-SWA, AE4000-SWA, AE5000-SW
WS3	AE6300-SW

WS : General use

Optional setting

G1: Ground fault protection
 NA: Without optional setting

ETR Auxiliary Equipment

MCR switch (MCR-SW)

Power supply

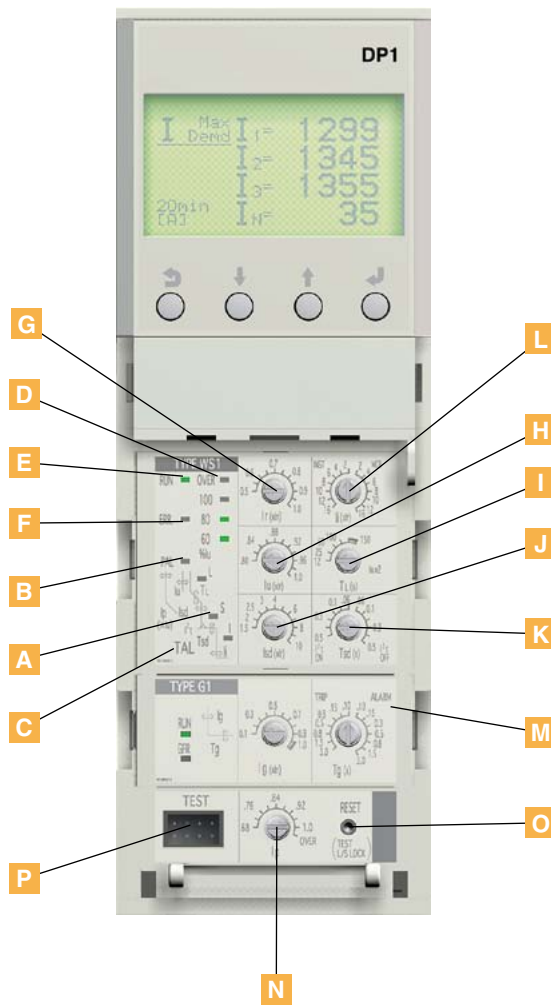
P1: 100-240V AC-DC
 P2: 24-60V DC
 P3: 100-240V AC / 100-125V DC with output contact
 P4: 24-60V DC with output contact
 P5: 100-240V DC with output contact (SSR)

Connection
 3φ3W
 3φ4W

Neutral CT (NCT)

Note : For DP3, refer to page 23 on details.

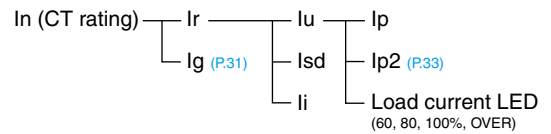
Electronic trip relay (for general use : WS)



- A** Trip indicator LED
- B** Pre-alarm LED
- C** Temperature alarm LED
- D** Load current LED
- E** RUN LED
- F** ERR. LED
- G** Current setting dial
- H** Uninterrupted current setting dial
- I** LTD time setting dial
- J** STD pick-up setting dial
- K** STD time setting dial
- L** INST/MCR pick-up current setting dial
- M** Optional setting module (P.31~33)
- N** Pre-alarm current setting dial
- O** RESET button (TEST L/S LOCK button)
- P** TEST terminal

Note: The figure shows WS1 type with G1 module, Display (DP1) and MCR switch. G1, DP1 and MCR are optional equipments.

Relation of setting dial



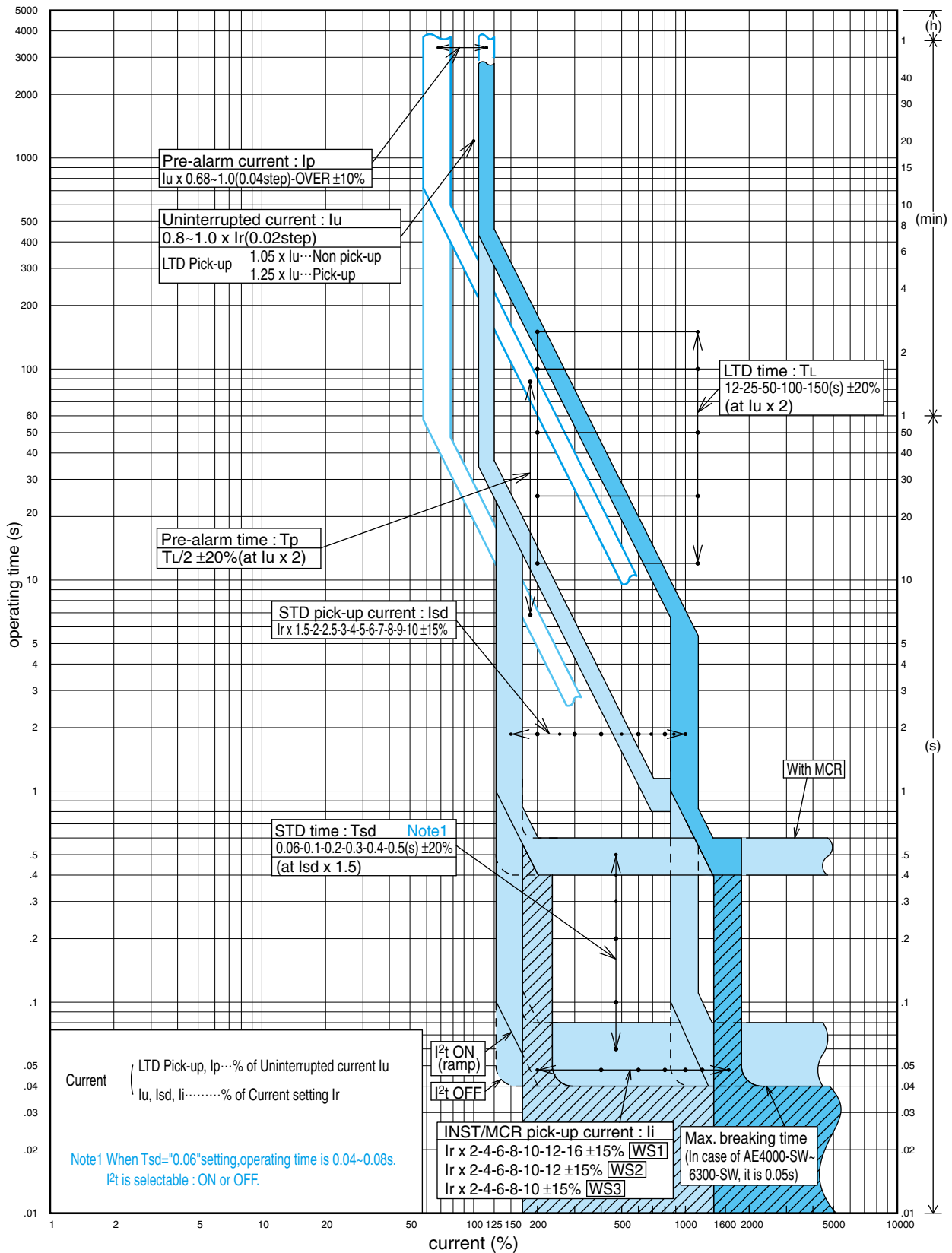
Adjustable setting range

No.	Setting item	Mark	Adjustable setting range	Accuracy	Factory default value
G	Current setting	Ir	0.5 ~ 1.0 (0.05step) x In (CT rating)	—	1.0
H	Uninterrupted current	lu	0.8 ~ 1.0 x Ir (0.02step), Pick-up current : 1.15 x lu	1.05 x lu--Non Pick-up 1.25 x lu--Pick-up	1.0
I	LTD time	T _L	12-25-50-100-150s at lu x 2	± 20%	150
J	STD pick-up current	Isd	1.5-2-2.5-3-4-5-6-7-8-9-10 x Ir	± 15%	10
K	STD time	T _{sd}	<u>0.5-0.4-0.3-0.2-0.1-0.06-0.06-0.1-0.2-0.3-0.4-0.5s</u> (I ₁ t ON) (I ₁ t OFF) at Isd x 1.5	± 20% It operates in the range between 0.04 and 0.08s when the time set at 0.06s.	0.5 (I ₁ t ON)
L	INST/MCR pick-up current	li	AE630-SW~AE1600-SW AE2000-SW~AE3200-SW AE4000-SW <u>16-12-10-8-6-4-2-2-4-6-8-10-12-16</u> x Ir (INST) (MCR) WS1	± 15%	WS1...16 (INST)
			AE2000-SWA, AE4000-SWA AE5000-SW <u>12-10-8-6-4-2-2-4-6-8-10-12</u> x Ir (INST) (MCR) WS2		WS2...12 (INST)
			AE6300-SW <u>10-8-6-4-2-2-4-6-8-10</u> x Ir (INST) (MCR) WS3		WS3...10 (INST)
N	Pre-alarm current	Ip	lu x 0.68 ~ 1.0 (0.04step) -OVER	± 10%	OVER
—	Pre-alarm time	T _p	1/2 T _L at lu x 2 (after 1/2 T _L , PAL contact output turns on.)	± 20%	—

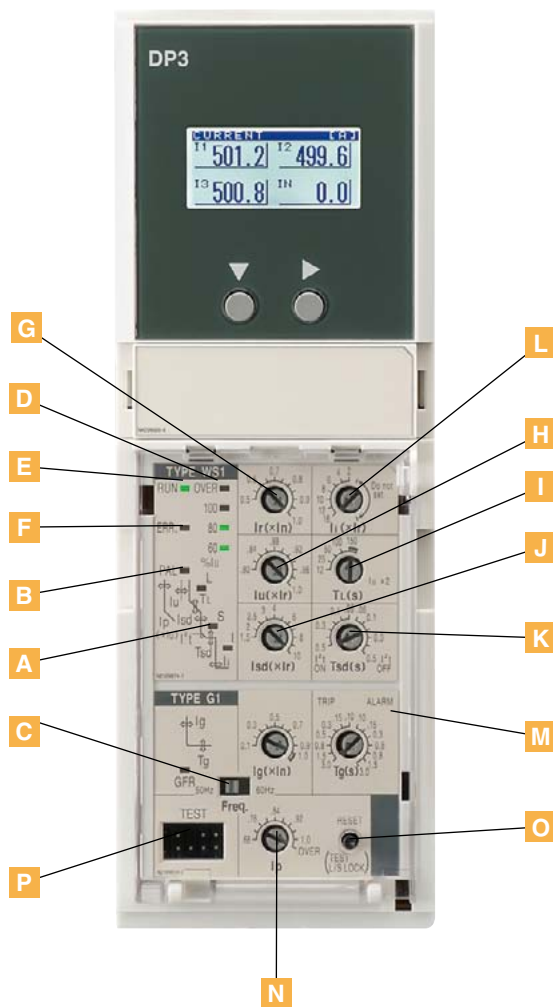
The table and the figure include both optional display and MCR.

For WS relay, Pre-alarm current "OVER" setting is lu x 1.15.

■ Operating characteristic curve (for general use : WS)



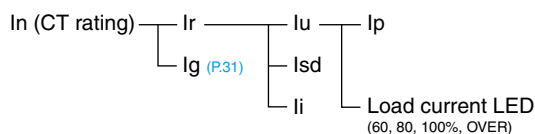
Electronic trip relay (for general use : WS relay with Ampere Meter) and Fault Memory "DP3"



- A** Trip indicator LED
- B** Pre-alarm LED
- C** Frequency selector switch
- D** Load current LED
- E** RUN LED
- F** ERR. LED
- G** Current setting dial
- H** Uninterrupted current setting dial
- I** LTD time setting dial
- J** STD pick-up setting dial
- K** STD time setting dial
- L** INST/MCR pick-up current setting dial
- M** Optional setting (P31)
- N** Pre-alarm current setting dial
- O** RESET button (TEST L/S LOCK button)
- P** TEST terminal

Note: The figure shows WS1 type with DP3 that equipped with G1.
For optional setting, only G1 and MCR are available for WS relay with DP3.

Relation of setting dial



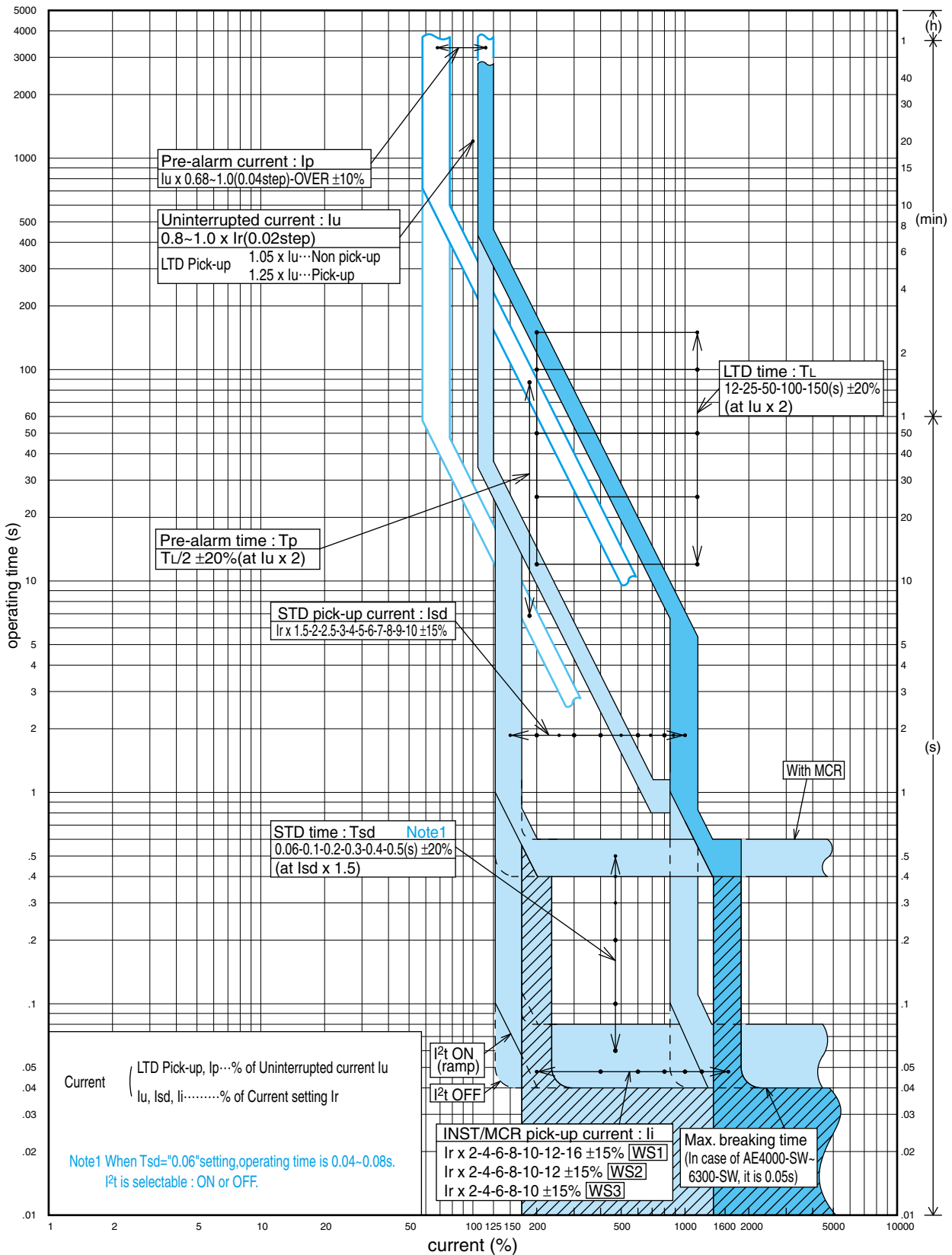
Adjustable setting range

No.	Setting item	Mark	Adjustable setting range	Accuracy	Factory default value
G	Current setting	Ir	0.5 ~ 1.0 (0.05step) x In (CT rating)	—	1.0
H	Uninterrupted current	lu	0.8 ~ 1.0 x Ir (0.02step), Pick-up current : 1.15 x lu	1.05 x lu--Non Pick-up 1.25 x lu--Pick-up	1.0
I	LTD time	T _L	12-25-50-100-150s at lu x 2	± 20%	150
J	STD pick-up current	Isd	1.5-2-2.5-3-4-5-6-7-8-9-10 x Ir	± 15%	10
K	STD time	T _{sd}	<u>0.5</u> -0.4-0.3-0.2-0.1-0.06-0.06-0.1-0.2-0.3-0.4-0.5s (I ² t ON) (I ² t OFF) at Isd x 1.5	± 20% It operates in the range between 0.04 and 0.08s when the time set at 0.06s.	0.5 (I ² t ON)
L	INST/MCR pick-up current	li	AE630-SW~AE1600-SW AE2000-SW~AE3200-SW AE4000-SW <u>16-12-10-8-6-4-2-2-4-6-8-10-12-16</u> x Ir (INST) (MCR) WS1	± 15%	WS1...16 (INST)
			AE2000-SWA, AE4000-SWA AE5000-SW <u>12-10-8-6-4-2-2-4-6-8-10-12</u> x Ir (INST) (MCR) WS2		WS2...12 (INST)
			AE6300-SW <u>10-8-6-4-2-2-4-6-8-10</u> x Ir (INST) (MCR) WS3		WS3...10 (INST)
N	Pre-alarm current	Ip	lu x 0.68 ~ 1.0 (0.04step) -OVER	± 10%	OVER
—	Pre-alarm time	T _p	1/2 T _L at lu x 2 (after 1/2 T _L , PAL contact output turns on.)	± 20%	—

The table and the figure include both optional display and MCR.

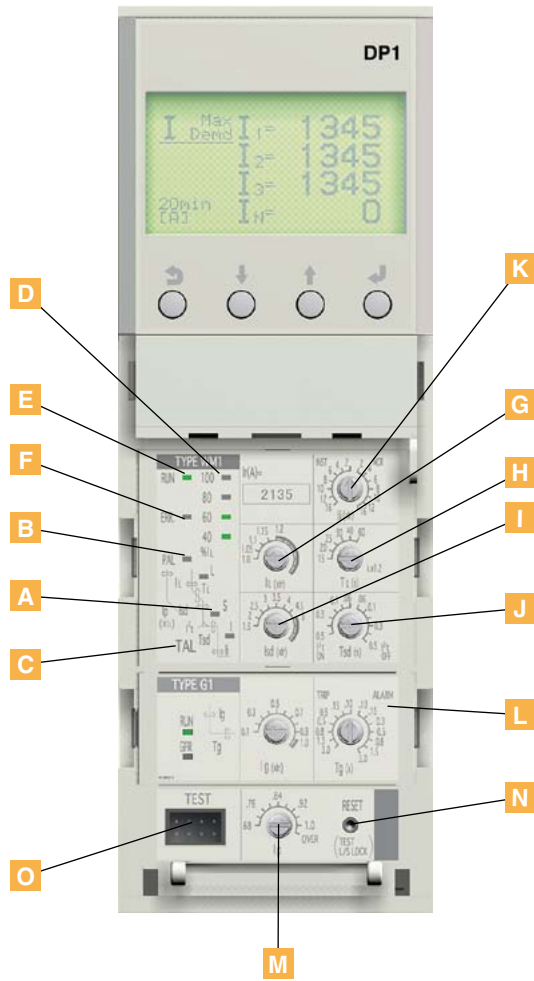
For WS relay, Pre-alarm current "OVER" setting is lu x 1.15.

Operating characteristic curve (for general use : WS relay with Ampere Meter and Fault Memory "DP3")



Electronic trip relay (for generator protection use : WM)

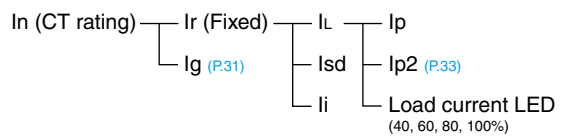
This WM relay is mainly used for the protection of generator on ship.
Current setting I_r (default value) is fixed at the value complying with the rating of generator, which should be indicated when placing an order.



- A** Trip indicator LED
- B** Pre-alarm LED
- C** Temperature alarm LED
- D** Load current LED
- E** RUN LED
- F** ERR. LED
- G** LTD pick-up current
- H** LTD time setting dial
- I** STD pick-up setting dial
- J** STD time setting dial
- K** INST/MCR pick-up current setting dial
- L** Optional setting module (P.31-33)
- M** Pre-alarm current setting dial
- N** RESET button (TEST L/S LOCK button)
- O** TEST terminal

Note: The figure shows WM1 type with G1 module, Display (DP1) and MCR switch.
G1, DP1 and MCR are optional equipments.

Relation of setting dial

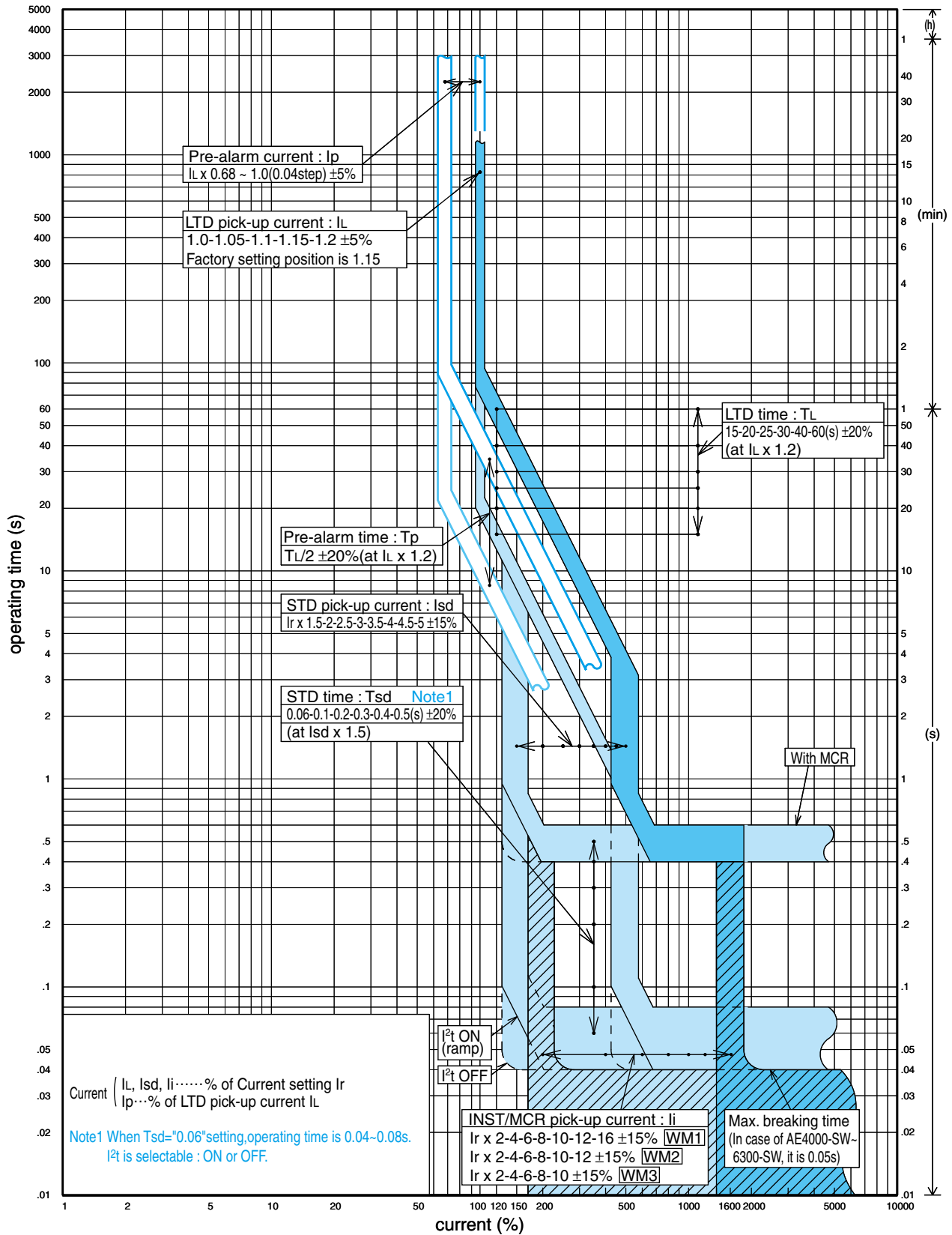


Adjustable setting range

No.	Setting item	Mark	Adjustable setting range	Accuracy	Factory default value
—	Current setting	I_r	To be fixed at Factory default value in the available range, which shows in Page 9 and 10.	—	To be complied with ordering indication
G	LTD pick-up current	I_L	1.0-1.05-1.1-1.15-1.2 x I_r	± 5%	1.15
H	LTD time	T_L	15-20-25-30-40-60s at $I_L \times 1.2$	± 20%	20
I	STD pick-up current	I_{sd}	1.5-2-2.5-3-3.5-4-4.5-5 x I_r	± 15%	5
J	STD time	T_{sd}	0.5-0.4-0.3-0.2-0.1-0.06-0.06-0.1-0.2-0.3-0.4-0.5s (I ² t ON) (I ² t OFF) at $I_{sd} \times 1.5$	± 20% It operates in the range between 0.04 and 0.08s when the time set at 0.06s.	0.5 (I ² t ON)
K	INST/MCR pick-up current	I_i	AE630-SW~AE1600-SW AE2000-SW~AE3200-SW AE4000-SW 16-12-10-8-6-4-2-2-4-6-8-10-12-16 x I_r (INST) (MCR) WM1 AE2000-SWA, AE4000-SWA AE5000-SW 12-10-8-6-4-2-2-4-6-8-10-12 x I_r (INST) (MCR) WM2 AE6300-SW 10-8-6-4-2-2-4-6-8-10 x I_r (INST) (MCR) WM3	± 15%	WM1...16 (INST) WM2...12 (INST) WM3...10 (INST)
M	Pre-alarm current	I_p	$I_L \times 0.68 \sim 1.0$ (0.04step) -OVER	± 5%	OVER
—	Pre-alarm time	T_p	1/2 T_L at $I_L \times 1.2$ (after 1/2 T_L , PAL contact output turns on.)	± 20%	—

The table and the figure include both optional display and MCR.
For WM relay only, when Pre-alarm current I_p is set at "OVER", the I_p value becomes equal to " $I_L \times 1.0$ ".

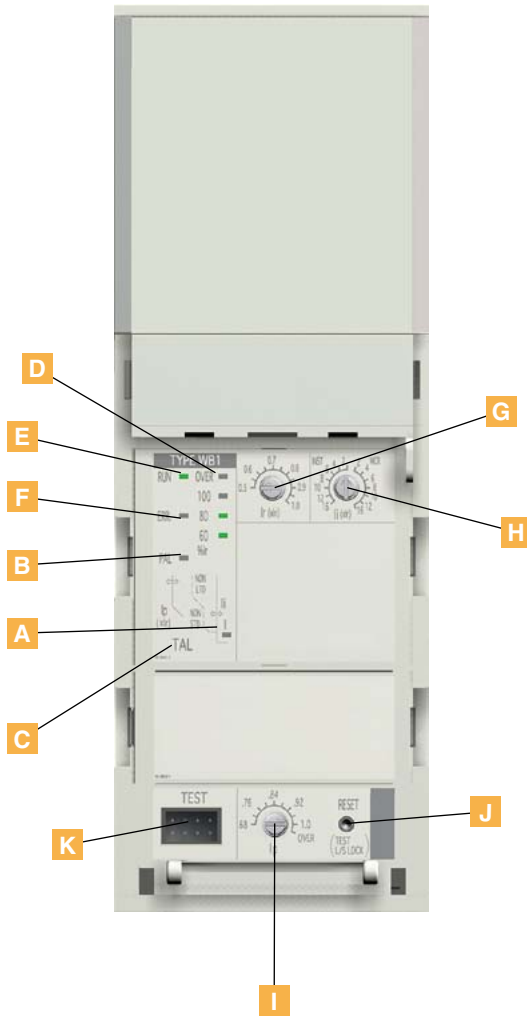
■ Operating characteristic curve (for generator protection use : WM)



Electronic trip relay (for special use : WB)

This WB relay is effective for the combination with the external OCR without severely decreasing the breaking capacity.

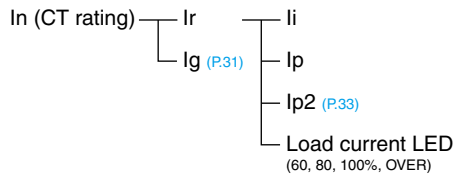
Actually, if ACB is combined with the external OCR only without WB relay, its breaking capacity comes to be reduced drastically. (e.g. For AE1600-SW, it's reduced to 25kA.)



- A** Trip indicator LED
- B** Pre-alarm LED
- C** Temperature alarm LED
- D** Load current LED
- E** RUN LED
- F** ERR. LED
- G** Current setting dial
- H** INST/MCR pick-up current setting dial
- I** Pre-alarm current setting dial
- J** RESET button
- K** TEST terminal

Note: The figure shows WB1 type with MCR switch.
MCR is optional equipment.

Relation of setting dial

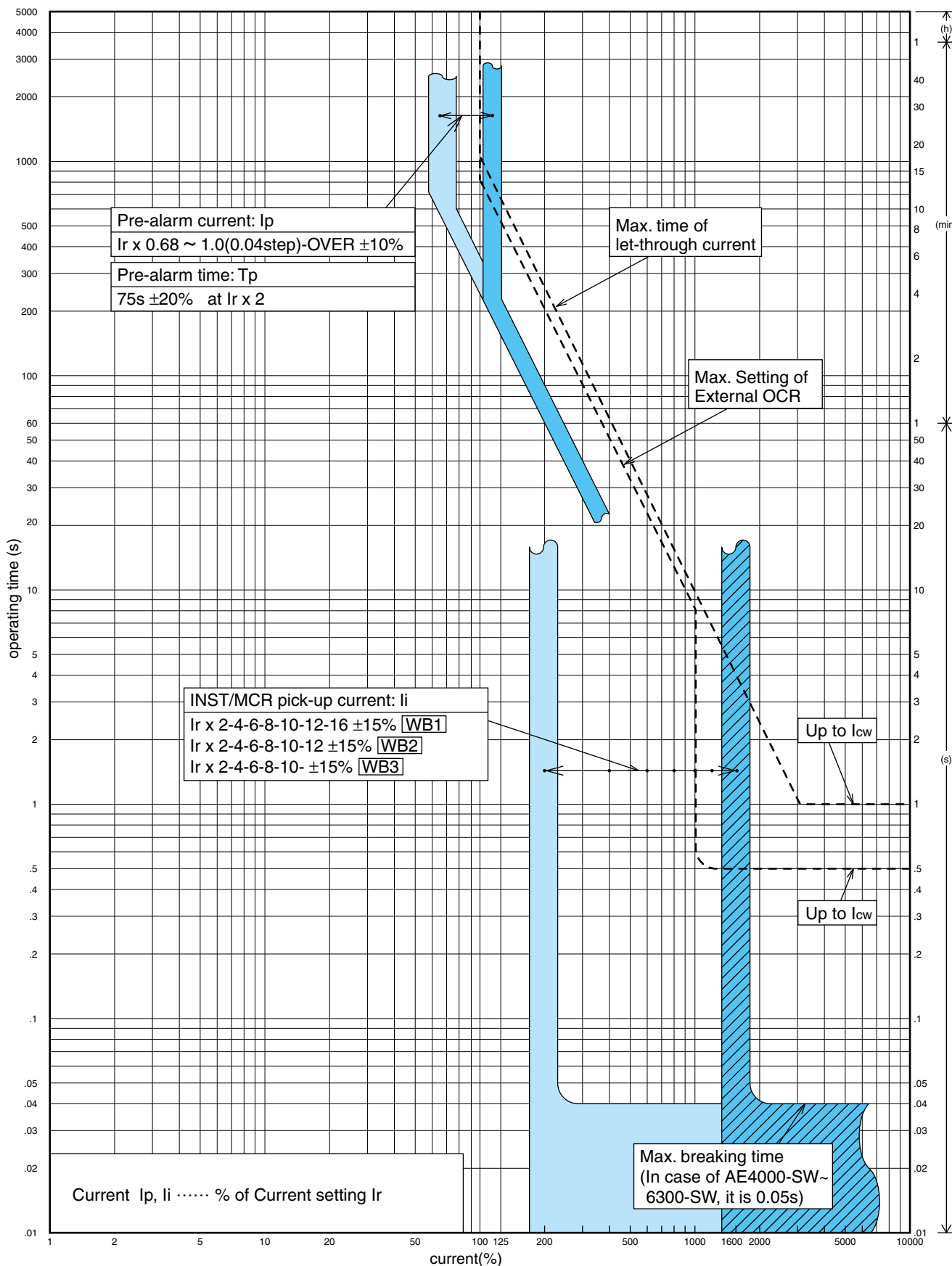


Adjustable setting range

No.	Setting item	Mark	Adjustable setting range	Accuracy	Factory default value	
G	Current setting	Ir	0.5 ~ 1.0 (0.05step) x In (CT rating)	—	1.0	
H	INST/MCR pick-up current	li	AE630-SW~AE1600-SW AE2000-SW~AE3200-SW AE4000-SW	± 15%	WB1...16 (INST)	
			AE2000-SWA, AE4000-SWA AE5000-SW			WB2...12 (INST)
			AE6300-SW			WB3...10 (INST)
I	Pre-alarm current	Ip	Ir x 0.68 ~ 1.0 (0.04step) —OVER	± 10%	OVER	
—	Pre-alarm time	Tp	75s at Ir x 2 (after 75s, PAL contact output turns on.)	± 20%	—	

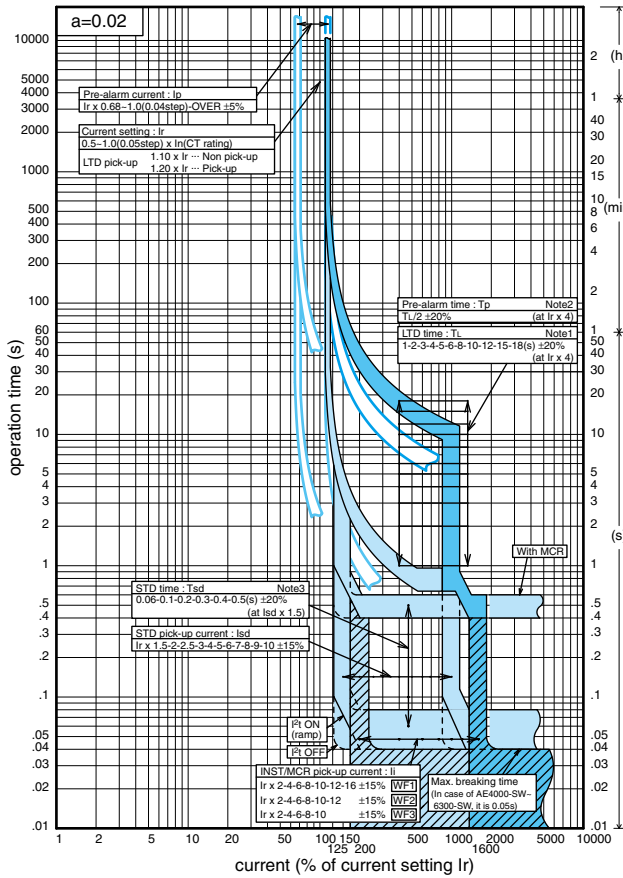
The table and the figure include both optional display and MCR.
For WB relay, when Pre-alarm current Ip is set at "OVER", the Ip value is "Ir x 1.15".

■ Operating characteristic curve (for special use : WB)

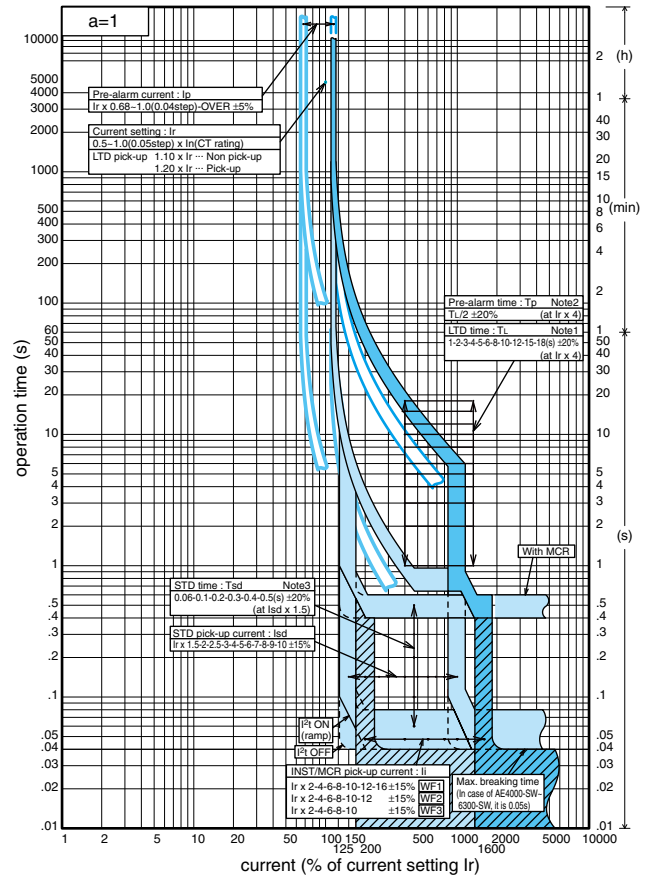


■ Operating characteristic curve (for protective coordination use : WF)

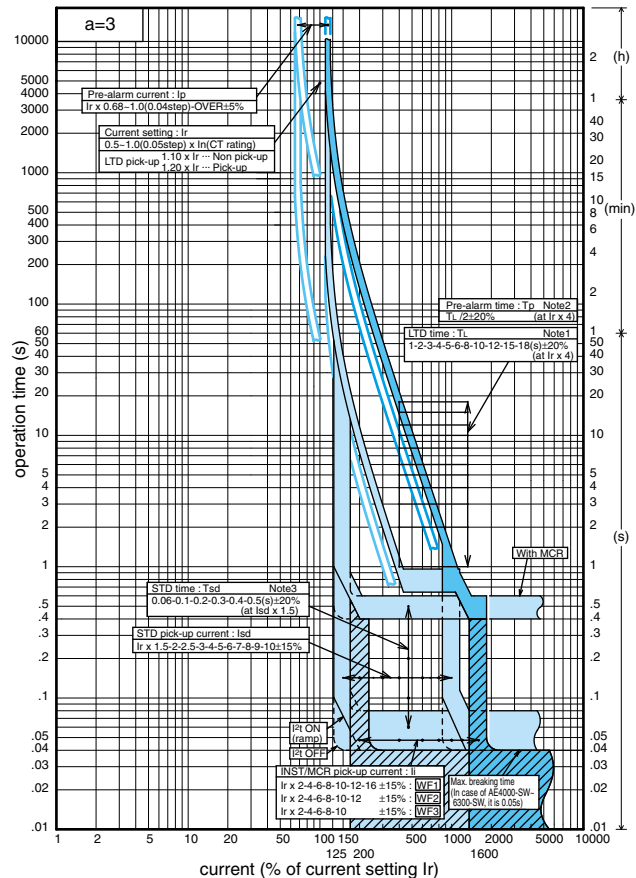
[LTD curve setting "a=0.02"]



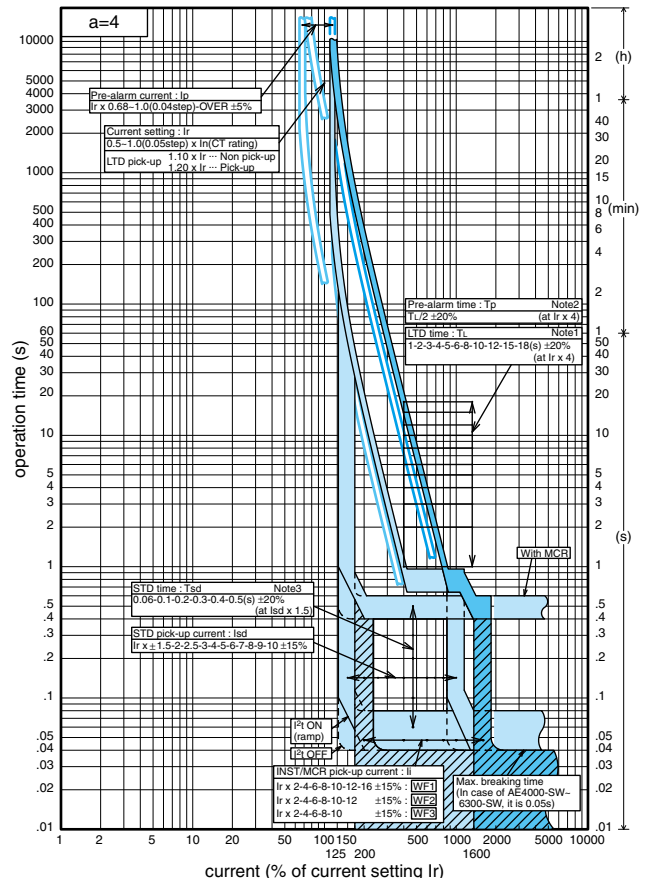
[LTD curve setting "a=1"]



[LTD curve setting "a=3"]



[LTD curve setting "a=4"]



Note 1: LTD operating time t_{LTD} is calculated by the following equations.

$$t_{LTD} = \frac{(4/1.1155)^a - 1}{(1/1.1155)^a - 1} \times T_L \quad \begin{cases} a = \text{LTD curve setting} \\ I = \text{load current (A)} \\ I_r = 0.5 - 1.0 \times \ln(A) \\ T_L = 1 - 18 \text{ (s)} \end{cases}$$

The accuracy of operating time is $\pm 30\%$ ($1.5I_r = \text{load current} < 4I_r$) or $\pm 20\%$ ($4I_r = \text{load current}$). LTD operating time is 0.8s (FLAT) when the operating time becomes 0.8s or less.

Note 3: When $T_{sd} = "0.06"$ setting, operating time is 0.04-0.08s. I_i is selectable : ON or OFF.

Note 2: PAL operating time t_{PAL} is calculated by the following equations.

$$t_{PAL} = \frac{(4/1.097)^a - 1}{(1/1.097)^a - 1} \times \frac{T_L}{2} \quad \begin{cases} a = \text{LTD curve setting} \\ I = \text{load current (A)} \\ I_p = 0.68 - 1.15 \times I_r \text{ (A)} \\ T_L = 1 - 18 \text{ (s)} \end{cases}$$

The accuracy of operating time is $\pm 30\%$ ($1.5I_r = \text{load current} < 4I_r$) or $\pm 20\%$ ($4I_r = \text{load current}$). PAL operating time is 0.5s (FLAT) when the operating time becomes 0.5s or less.

Electronic trip relay

Accessories

Ground fault protection (GFR)

Option



The ground fault protection (GFR) of several hundred amperes is possible. This function can be selected for trip and alarm (no trip). Power supply is necessary for this function, even if there is not power supply, it can function at $0.2 \times I_n$ or higher.

Setting item	Mark	Adjustable setting range	Accuracy	Factory default value				
GFR pick-up current	I _g	0.1-0.2-0.3-0.4-0.5-0.6-0.7-0.8-0.9-1.0 x I _n	±20%	1.0				
GFR time	T _g	<table border="1"> <tr> <td>TRIP</td> <td>3-1.5-0.8-0.5-0.3-0.15-<0.1</td> </tr> <tr> <td>ALARM</td> <td><0.1-0.15-0.3-0.5-0.8-1.5-3s</td> </tr> </table> (at 1.5 x I _g)	TRIP	3-1.5-0.8-0.5-0.3-0.15-<0.1	ALARM	<0.1-0.15-0.3-0.5-0.8-1.5-3s	±20%	3s (TRIP)
TRIP	3-1.5-0.8-0.5-0.3-0.15-<0.1							
ALARM	<0.1-0.15-0.3-0.5-0.8-1.5-3s							
alarm output	—	TRIP side : Self-holding/ALARM side : Automatic reset	—	TRIP side (Self-holding)				

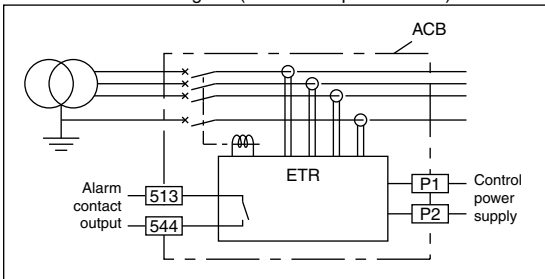
Neutral CT (NCT) ※Only use for AE-SW

Option

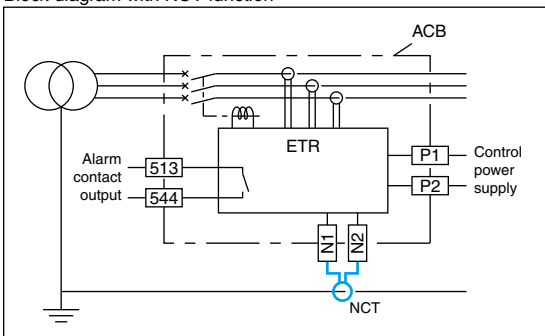


The Neutral CT is used for ground fault protection when the 3 pole breaker is used on a 3 phase 4 wires system and for over current protection on N phase. Please use this CT in combination with ground fault protection (GFR). As for outline dimensions, refer to page 54. The length of the cable (attached) for NCT is 2m.

GFR function block diagram (In case of 4pole breaker)



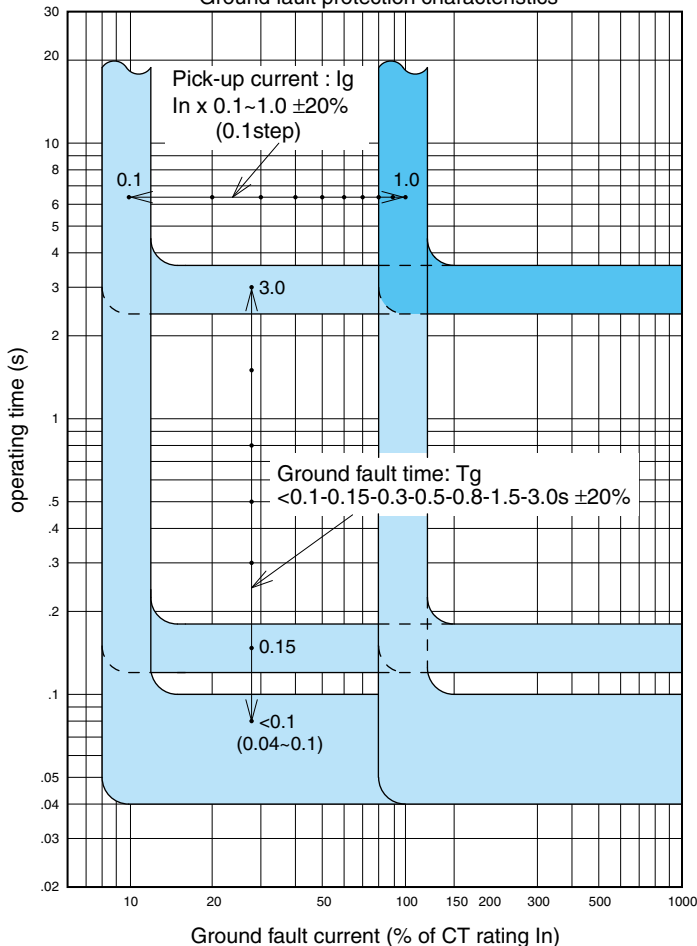
Block diagram with NCT function



NCT type name

NCT type name	ACB type name / CT rating
NCT06	AE630-SW 630A
NCT10	AE1000-SW 1000A
NCT12	AE1250-SW 1250A AE2000-SW 1250A
NCT16	AE1600-SW 1600A AE2000-SW 1600A
NCT20	AE2000-SWA 2000A AE2000-SW 2000A
NCT25	AE2500-SW 2500A
NCT32	AE3200-SW 3200A
NCT40	AE4000-SWA 4000A AE4000-SW 4000A
NCT50	AE5000-SW 5000A
NCT63	AE6300-SW 6300A

Ground fault protection characteristics



Earth leakage protection (ER)

Option

By combining the ETR with earth leakage protection (ER) and External ZCT, earth leakage protection is possible. Earth leakage protection, earth leakage tripping and earth leakage alarm can be selected. Control supply is necessary for this function.

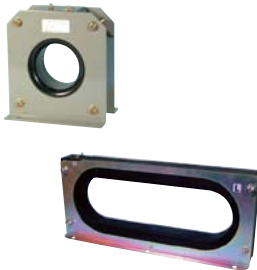


Setting item	Mark	Adjustable setting range	Accuracy	Factory default value
ER pick-up current	$I_{\Delta n}$	1A-2A-3A-5A-10A	0 -30%	10A
ER time	T_e	3-1.5-0.8-0.5-0.3-0.15-<0.1 - <0.1-0.15-0.3-0.5-0.8-1.5-3s TRIP ALARM (at 1.5 x $I_{\Delta n}$)	$\pm 20\%$	3s (TRIP)
alarm output	—	TRIP side : Self-holding/ALARM side : Automatic reset	—	TRIP side (Self-holding)

External ZCT

Option

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. The first is where the all load conductors pass through the ZCT. The other method uses a smaller ZCT through which the supply transformer's ground wire passes through to the earth.



ZCT for load circuit

ZCT type name	ACB type name
ZCT163	AE630-SW ~ AE1600-SW 3-pole
ZCT323	AE630-SW ~ AE1600-SW 4-pole AE2000-SW ~ AE3200-SW 3-pole
ZCT324	AE2000-SW ~ AE3200-SW 4-pole

As for outline dimensions refer to page 54. Make a choice of suitable ZCT in conformity to the BUSBAR size.

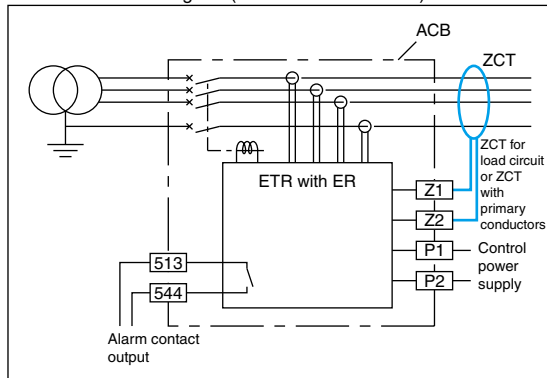
ZCT for transformer ground wire

ZT15B	ZT30B	ZT40B	ZT60B	ZT80B	ZT100B
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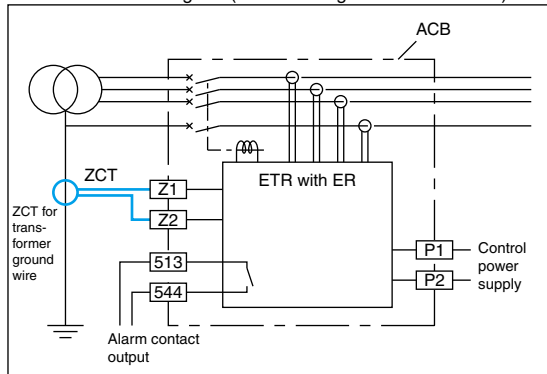
ZCT with primary conductors

ZCT type name	ACB type name / Pole
ZTA1200A	AE630-SW / 3P, AE1000-SW / 3P
ZTA2000A	AE1250-SW / 3P, AE1600-SW / 3P AE2000-SWA / 3P, AE2000-SW / 3P

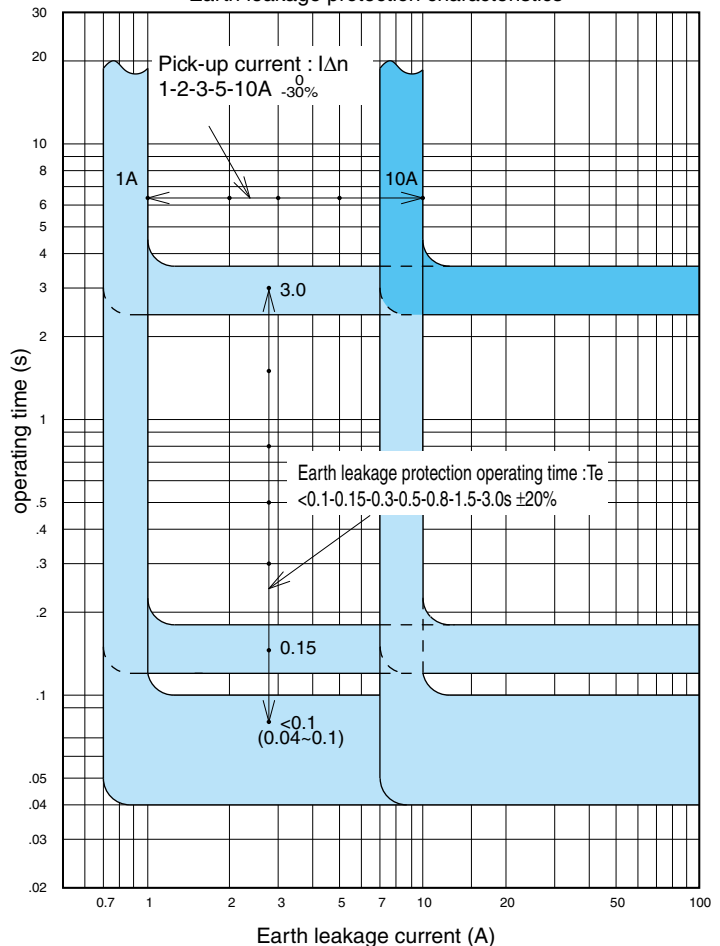
ER function block diagram (for load circuit method)



ER function block diagram (transformer ground wire method)



Earth leakage protection characteristics



Electronic trip relay

Accessories

2nd Additional Pre-alarm (AP)

Option

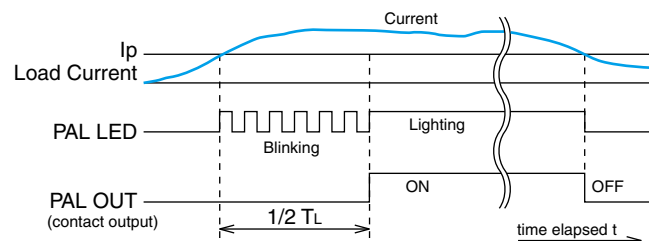


The Pre-Alarm (1st) function is already installed in standard breaker, the 2nd additional Pre-Alarm function can be installed as option, thereby it is possible to monitor (observer) electric circuit in more detail by 2nd additional Pre-Alarm function.

Setting item	Mark	Adjustable setting range	Accuracy	Factory default value
2nd Additional Pre-alarm pick-up current	Ip2	0.5-0.6-0.7-0.8-0.84-0.88-0.92-0.96-1.0 x Iu WS	±10% WS	1.0
		0.5-0.6-0.7-0.8-0.84-0.88-0.92-0.96-1.0 x I _L WM	±5% WM	
2nd Additional Pre-alarm time	Tp2	$\frac{0.9-0.8-0.7-0.6-0.5-0.4-0.3 \times T_L}{(x T_L)} - \frac{5-10-15-20-30-40-60s}{(FLAT)}$	±20%	0.9 (x T _L)

<Pre-alarm timing chart>

PAL LED starts to blink at time when the actual current exceeds the setting current. Then after it passes a half of LTD time (TL), it starts to light and simultaneously the contact output starts. As for its operating time, refer to the Operating characteristic curves in Page 22, 24, 26 and 28.



Neutral pole 50% protection (N5)

Option



When used OA equipment or DC power source that brings the third higher harmonic in 3 phases 4 wires circuit, is sometimes it electrically damages the other peripheral equipments due to the superposition of the third higher harmonic on Neutral pole.

This Neutral Pole 50% Protection (N5) is useful to protect the other peripheral equipments from such an electrical damage and also to prevent some troubles with the Pre-Alarm function (AP). Neutral pole overcurrent protection (operating at 100% of rated current) is already equipped with ETR as standard features.

But, if the operation at 50% of rated current is required on Neutral pole, it becomes available with this optional module unit.

MCR switch (MCR-SW)

Option



With this MCR switch, at the time of breaker closing from OFF to ON the INST (Instantaneous) characteristic works, and then after breaker is in closed (ON) position the INST characteristic becomes ineffective. This controlling function of INST characteristic is useful for the protection on the short-circuit fault at the time of closing and also for expanding the selective combination with branch breakers after closed.

The factory default setting of "INST/MCR pick-up current setting dial" is usually at "INST", so if the function of this MCR switch is required, the dial should be changed to "MCR".

Temperature alarm (TAL)

Option



When TAL sensor is installed in the breaker, temperature alarm is operative. When the temperature of main contact exceeds normal level, temperature alarm is indicated by LED on main setting module and also the output contact is made energize if power supply with output contact is installed. It is possible to know temperature rising which is caused by wear of main contact because TAL sensor is installed near main contact. When the temperature of main contact goes down to the normal level, temperature alarm turns off automatically.

Field test device (Y-2005)



The electronic trip relay can be checked by this field test device when the breaker is at the test position or the disconnect position. The breaker will trip when tested with this device.

Y-2005 specification

Test items	LTD, STD, INST, GFR, PAL
Range of signal output	Voltage signal equivalent to 1%~2500% of Rated current I_n (CT rating)
Dimensions	220mm(W) x 150mm(H) x 340mm(D)
Time counter	0.000 ~ 999.999s
Input voltage	100-240V AC 50/60Hz
Weight	4.5kg

Electronic trip relay

Additional functions

By adding the extension module unit in ETR, additional functions like measuring, display and communication become available.

List of extension unit (Option)

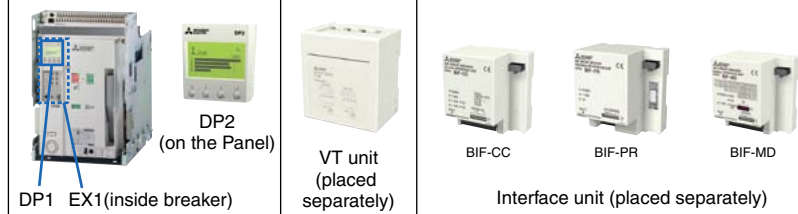
Name	Type	Description
Extension module	EX1	Base module for display and interface function (indispensable)
Display module (relay attachment)	DP1	Display module for ETR
Display module (panel attachment)	DP2	Display module for panel board
VT unit	VT	Module for measuring voltage, active power and active energy
CC-Link® interface unit	BIF-CC	Interface unit for CC-Link®
PROFIBUS-DP interface unit	BIF-PR	Interface unit for PROFIBUS-DP
MODBUS® (RS-485) interface unit	BIF-MD	Interface unit for MODBUS® (RS-485)
I/O unit	BIF-CON	Module for breaker remote control (Interface unit is required)
Drawout position switch	BIF-CL	Switch for detecting the drawout position of the breaker (Interface unit and I/O unit are required.)

Note: The above extension units are not available for WS relay with DP3.

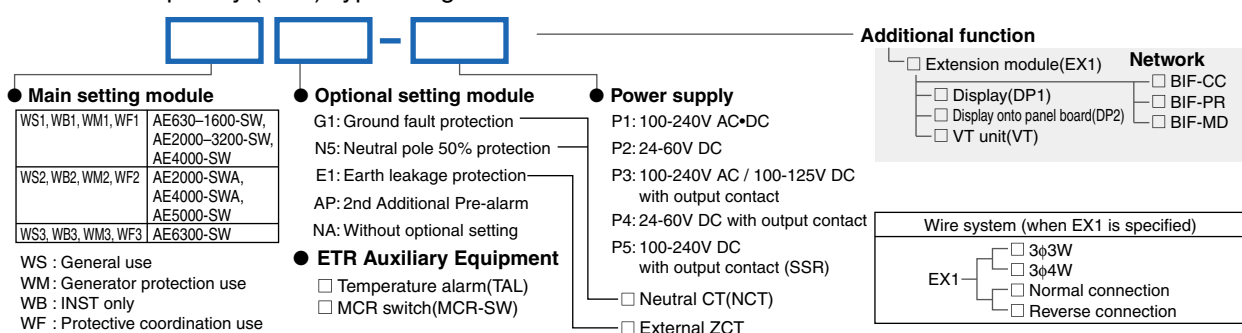
Selection samples of additional function modules

(○:required optional modules)

Additional function	Name	Type	Extension module	Display	VT unit	Interface unit		
			EX1	DP1 or/and DP2	VT	BIF-CC	BIF-PR	BIF-MD
Load current	Display		○	○				
	Communication	CC-Link®	○			○		
		PROFIBUS-DP	○				○	
		MODBUS®	○					○
	Display & Communication	CC-Link®	○	○		○		
		PROFIBUS-DP	○	○			○	
MODBUS®		○	○				○	
Voltage Power Energy Harmonics current etc.	Display		○	○	○			
	Communication	CC-Link®	○		○	○		
		PROFIBUS-DP	○		○		○	
		MODBUS®	○		○			○
	Display & Communication	CC-Link®	○	○	○	○		
		PROFIBUS-DP	○	○	○		○	
MODBUS®		○	○	○			○	



Electronic trip relay (ETR) Type designation breakdown



Extension module (EX1)

Option



This is the base module that provides various additional functions when combined with Display module (DP1 / DP2), Interface unit (BIF-CC / BIF-PR / BIF-MD) and VT unit (VT).

1 Various measuring elements, high measuring accuracy

By adopting high-performance ASIC, various measuring elements (load current, voltage, energy, harmonics, etc.) and high measuring accuracy are attained. Refer to page 38 for more details.

2 Communication function

With the advanced internal communication function of this EX1 module, it is achieved rapid transmission of data between ETR and Displays or Interface units. Besides, it can be extended the function by connecting with Max. 2 display modules and 1 interface unit in parallel.

Display module (DP1/DP2)

Option



This is the module for display and setting of the various information like measured value, trip and alarm status, ETR status for display and output contacts setting etc...

1 Multi display of measuring element

It enables to easily monitor the comparison of each measuring element with its multi display (4 phases multi display of load current and voltage) on one screen.

2 Two-color back light

Under trip or alarm, back light color changes from green to red automatically, which visually shows an abnormal situation.



3 Graphical display

By adopting dot matrix type LCD, graphical display such as bar graph display of load current, harmonic currents and characteristic curve are available.



There are 2 types of display module. One is the ETR attachment type (DP1). The other is the panel attachment type (DP2), which can be connected to extension terminals of control circuit with 2m cable. 2 units of display modules (DP1 and DP2) can be attached on one breaker. (As for outline dimensions of DP2, refer to page 55.)

Note;

- Extension module (EX1) is required.
- VT unit (VT) is required to display the measured data except load current.

VT unit (VT)

Option



VT unit enables to measure voltages, powers, energies, harmonic currents and etc. by connecting the ETR with Extension module (EX1). (outline dimensions are shown in page 56.)

Note;

- The length of the cable attached for VT unit is 2m.

Electronic trip relay

Network

Interface unit (BIF-CC/BIF-PR/BIF-MD)

Option

These Interface units can expand the future possibility in various communication and Intelligent control.

1 Applicable to various open networks.

These units are applicable to various open network systems such as CC-Link®, PROFIBUS-DP and MODBUS® (RS-485), which can be built in easily.

2 Intelligent control by Multi-data communication

It can be the Intelligent control by Multi-data communication from PLC/SCADA to these interface units. These interface units receive the measurement information, setting values, error information and trip and alarm information from PLC/SCADA.



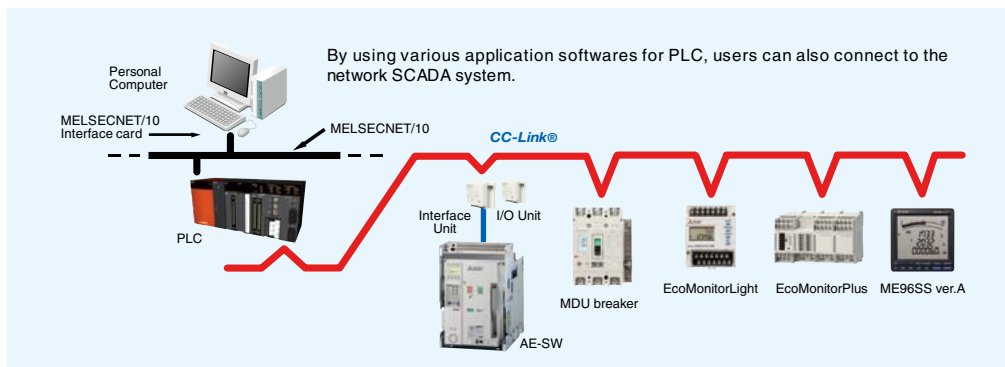
BIF-CC (CC-Link®)



BIF-PR (PROFIBUS-DP)



BIF-MD (MODBUS®(RS-485))



The length of the cable for interface unit is 2m.

Note: In the case of CC-Link®.

Note:

- Extension module (EX1) is required.
- VT unit (VT) is required to transmit the measured data except load current.

I/O unit (BIF-CON)

Option

The Input & Output Controlling Unit (BIF-CON) is available for the remote controlling and the remote monitoring of the breaker condition through the various network systems.

With this BIF-CON unit in addition to the Interface Unit, it becomes possible to control the breaker remotely, like a ON or OFF operations or Spring-charging.



BIF-CON

Function	Description	Note
Control	Breaker ON operation	1a contact for Closing coil (CC)
	Breaker OFF operation	1a contact for Shunt trip device (SHT) (not applicable for 380-500V AC rating)
	Spring charge	1a contact for Motor charging (MD)
Monitor	Digital Input (DI) monitoring	For BIF-CC and BIF-MD, Max. 3 contacts monitoring are available. For BIF-PR, 1 contact monitoring is available.

Drawout position switch (BIF-CL)

Option

With this Drawout position switch (BIF-CL) in addition to Interface unit and I/O unit (BIF-CON), the remote monitoring of draw-out position becomes available for the breaker draw-out type.



BIF-CL

Function	Description	Note
Monitor	Breaker Drawout position	Position : Connect or Test or Disconnect

○ : can be displayed by DP1/DP2/DP3 ● : can be displayed and set by DP1/DP2

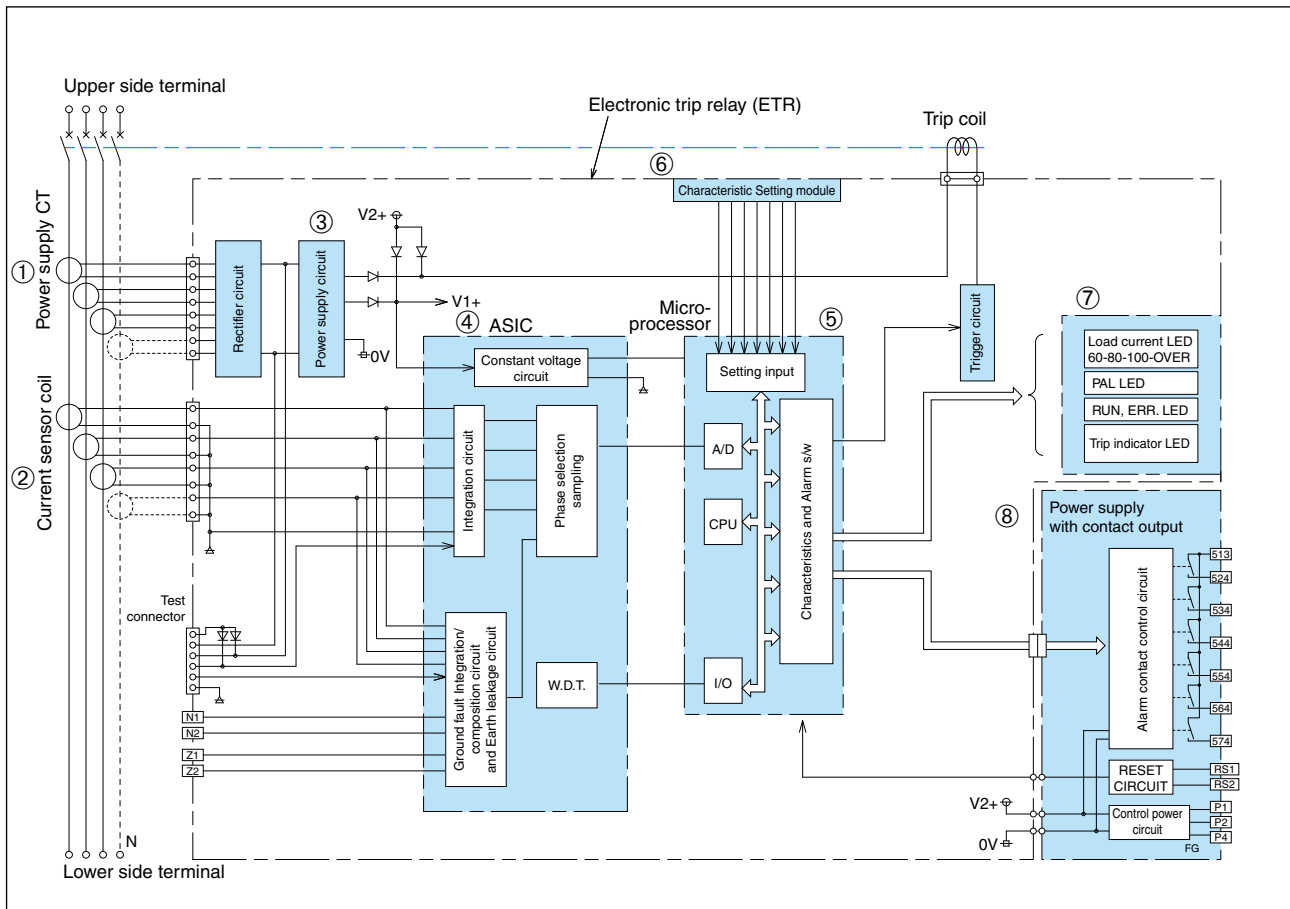
Combination sample						
Type	① ② - ③ ;EX1;DP1(;DP2) ^{Note 1)}		① ② - ③ ;EX1;DP1(;DP2),VT ^{Note 1)}		① ② - ③ ;DP3	
①Main setting	WS / WF	WM	WB	WS / WF	WM	WB
②Optional setting	NA AP G1 E1	NA AP G1 E1	NA AP G1 E1	NA AP G1 E1	NA AP G1 E1	NA AP G1 E1
③Power supply	P1~P5			P1~P5		
Measurement						
Load current (Accuracy)	○ (±2.5%)		○ (±2.5%)		○ (±1.5%) ^{Note 5)}	
Leakage current (±15%) ^{Note 4)}	-	-	○	-	-	○
Voltage (±2.5%)	-		○		-	
Power (active,reactive,apparent) (±2.5%)	-		○		-	
Power factor (±5%)	-		○		-	
Energy (active,reactive) (±2.5%)	-		○		-	
Harmonics current (Accuracy)	-		○ (±2.5%, 3.5...19th)		○ (±3.5%, 3.5,7th) ^{Note 5)}	
Frequency (±2.5%)	-		○		-	
Trip history						
LTD	○	○	-	○	○	-
STD	○	○	-	○	○	-
INST	○		○		○	
GFR	-	-	○	-	-	○
ER	-	-	○	-	-	○
UVT	○ ^{Note 2)}		○ ^{Note 2)}		-	
Alarm history						
PAL1	○		○		○	
PAL2	-	○	-	-	○	-
OVER	○		○		○	
GFR	-	-	○	-	-	○
EPAL	-	-	○	-	-	○
ER	-	-	○	-	-	○
TAL	○ ^{Note 3)}		○ ^{Note 3)}		-	
Characteristic setting (panel attachment product [DP2] only)						
LTD	○	○	-	○	○	-
STD	○	○	-	○	○	-
INST	○		○		○	
PAL1	○		○		○	
PAL2	-	○	-	-	○	-
GFR	-	-	○	-	-	○
EPAL	-	-	●	-	-	●
ER	-	-	○	-	-	○
Setting						
Contact outputs setting change	●		●		-	
Date & Time	●		●		-	
Demand time	●		●		-	
Alarm holding method	●		●		-	
Reset						
Trip and alarm information	●		●		-	
Measurement information (min. and max. values)	●		●		-	
ETR information						
Main / Optional setting module information	○		○		-	
Error information	○		○		-	
CT rating (In)	○		○		-	
Phase line method	○		○		-	
Normal connection or reverse connection	○		○		-	
Transmission						
Communication ^{Note 6)}	CC-Link® PROFIBUS-DP MODBUS®		CC-Link® PROFIBUS-DP MODBUS®		-	

Note 1) 2 units of display modules can be attached.
 Note 2) Display is available only when UVT module is attached.
 Note 3) Display is available only when TAL sensor is attached.

Note 4) Include the accuracy of ZCT.
 Note 5) This is the accuracy value when WS relay with DP3 is assembled to ACB before factory shipment.
 Note 6) Interface unit is required for communication function.

Electronic trip relay

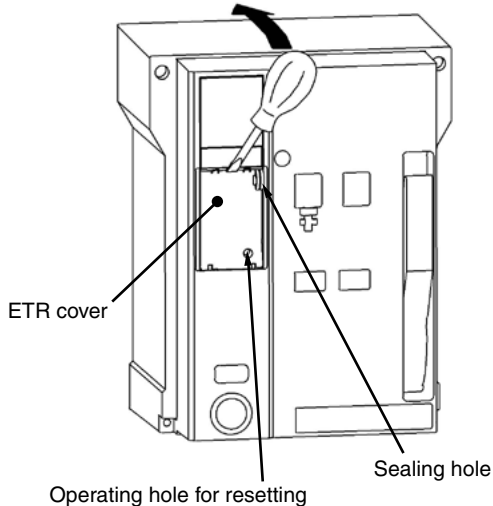
Electronic trip relay circuit diagram



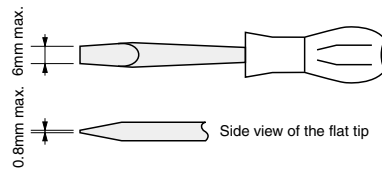
- ① **Power supply CT**
Energy is supplied for the operation of the overcurrent tripping and ground fault tripping (GFR) function of the electronic trip relay.
- ② **Current sensor coil**
The current in each phase flowing through the breaker is detected. An air core coil which has good linearity is adopted.
- ③ **Power supply circuit**
This part converts power supply CT energy to constant voltage for respective circuits in the ETR.
- ④ **ASIC**
This ASIC amplifies the signal detected by the current sensor coil and the detected signal of ground fault current which is vector composed of the detected signals of each phase.
- ⑤ **Microprocessor**
The microprocessor integrates each phase current waveform from the ASIC and performs processing for overcurrent protection and others.
- ⑥ **Characteristic setting module**
The module for the characteristic setting of the ETR.
- ⑦ **Several LEDs**
The load current LED gives a figure of current in percent by CT energy.
Trip indicator and pre-alarm are indicated by control power supply.
RUN and ERR. LED indicate breaker's condition by control power supply or ten-odd percent of CT energy.
- ⑧ **Power supply with contact output**
This outputs contact signals of fault cause (including pre-alarm) and other alarms.
A control supply is necessary for this function.

Setting procedure

Press the screwdriver in the direction of the arrow to open the cover



1 Prepare a small flat tipped screwdriver.



2 Insert the flat tipped screwdriver into the opening of the ETR cover. Then, lightly turn the screwdriver to the upside as shown in the left figure, and the ETR cover will open.

3 There are two kinds of switches for characteristics setting and for trip indicator reset. They should be used as follows.

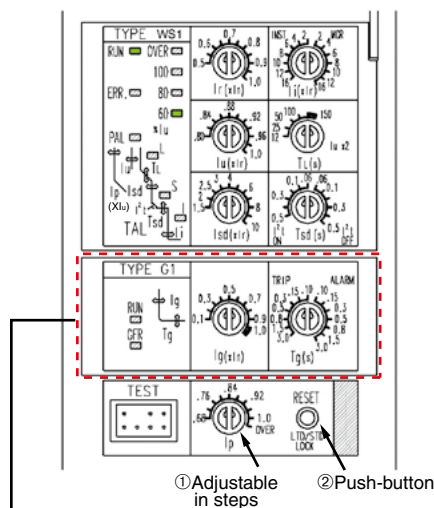
① Adjustable in steps

Rotary code switch is used. Do not set the switch at points between steps. The setting value is the same when the switch is positioned at the thick line. (Set the switch with a torque of 0.02N·m or below.)

Note) If the switch is set at points between steps, the characteristics setting value will be decided at either end of steps.

② Push-button

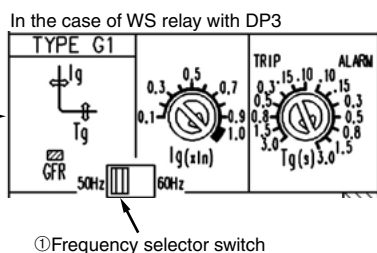
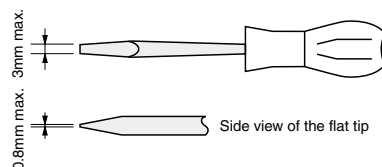
This is for temporary operation, and press it with force of 3N or less.



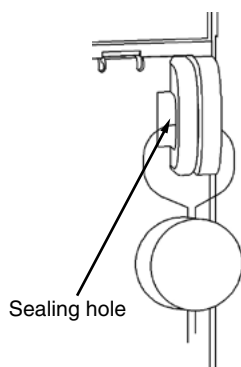
4 For WS relay with DP3, there is a slide type switch (Frequency selector switch) as the left side picture shows.

① Frequency selector switch

Do not set the switch at points between the slide. When operating the switch, use a flat tipped screwdriver of the following size.



① Frequency selector switch

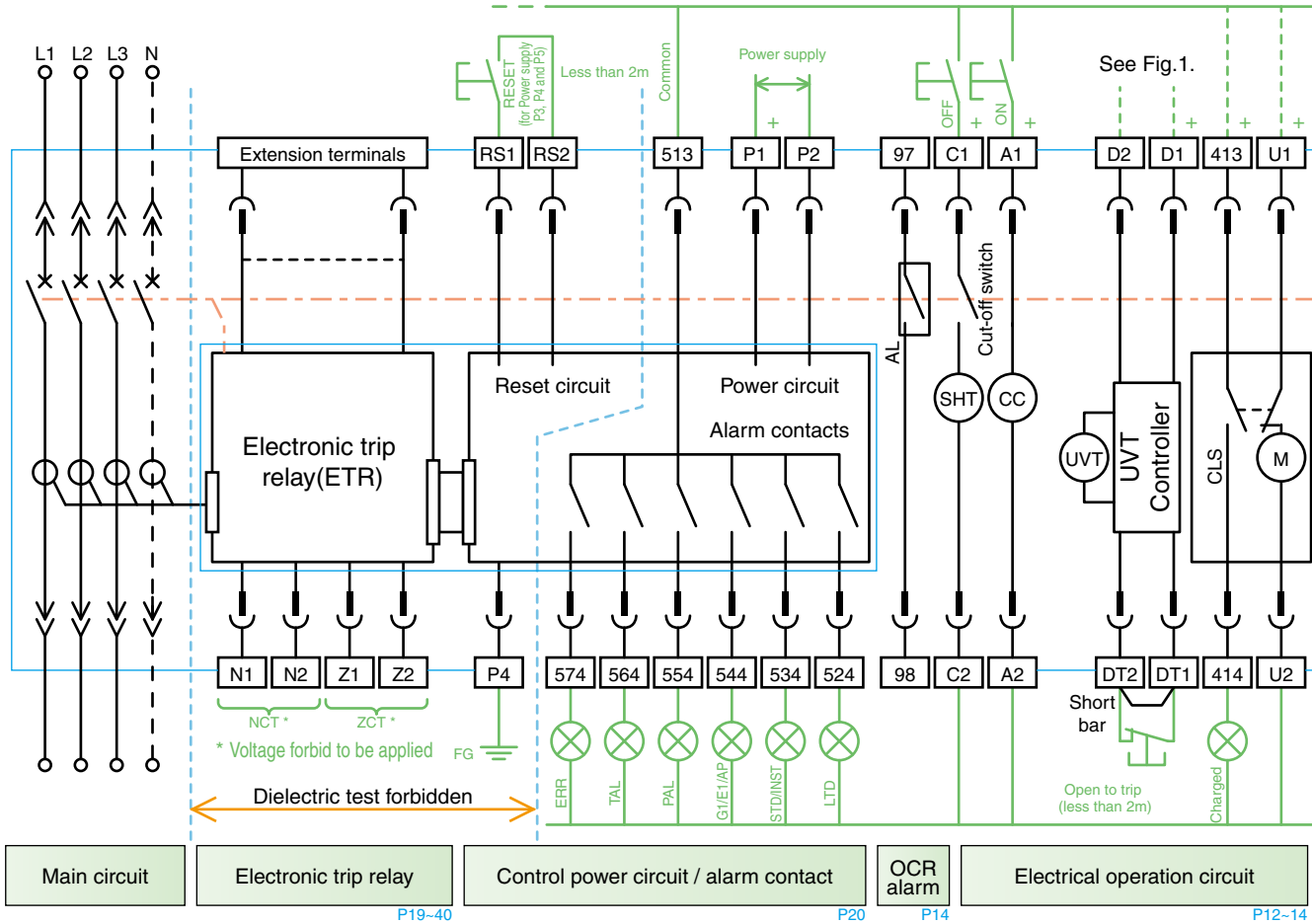


5 When the characteristic is set up, use a device like a field tester, etc to make sure that the required characteristic has been set.

6 At sealing, seal the ETR cover by using the sealing hole at the top of the ETR cover.

Wiring diagram

● The following diagram shows the case that accessories are fully equipped.



Terminal description

13	14	~	53	54	Auxiliary switch "a"
11	12	~	51	52	Auxiliary switch "b"
U1	U2				Motor charging
413	414				Charged signal (Normal open)
D1	D2				Voltage Input terminal of UVT
DT1	DT2				Trip terminal of UVT (Remote trip)
A1	A2				Closing coil
C1	C2				Shunt trip
97	98				OCR alarm
P1	P2				Power supply for ETR
P4					FG of power supply (FG:Frame Ground)
RS1	RS2				Alarm reset (Trip cause LED, alarm contact)
513	524				Alarm contact for LTD Trip
513	534				Alarm contact for STD or INST Trips
513	544				Alarm contact for Ground fault, Earth leakage trips or 2nd Pre-alarm contact
513	554				Pre-alarm contact
513	564				Temperature alarm contact
513	574				Error alarm contact
Z1	Z2				For external ZCT
N1	N2				For Neutral CT (Note)
Extension terminals					For external display DP2
					For Interface unit
					For VT unit

Accessory Symbols

	SHT	Shunt tripping device
	CC	Closing coil
	M	Motor(Motor charging device)
	UVT	UVT coil
	AX	Auxiliary switch
	AL	OCR alarm switch
	CLS	Charge limit switch
	SBC	Shorting b-contact
	CL	Cell switch

— Internal wiring

— External wiring (user's wiring)

— Control circuit connector (drawout type)

Control circuit terminal block Terminal placement

VT	N1	Z1	RS1	513	564	544	524	P1	97	C1	A1	DT1	D1	413	U1	51	41	31	21	11	53	43	33	23	13
I/F-1	N2	Z2	RS2	P4	574	554	534	P2	98	C2	A2	DT2	D2	414	U2	52	42	32	22	12	54	44	34	24	14

Extended terminal

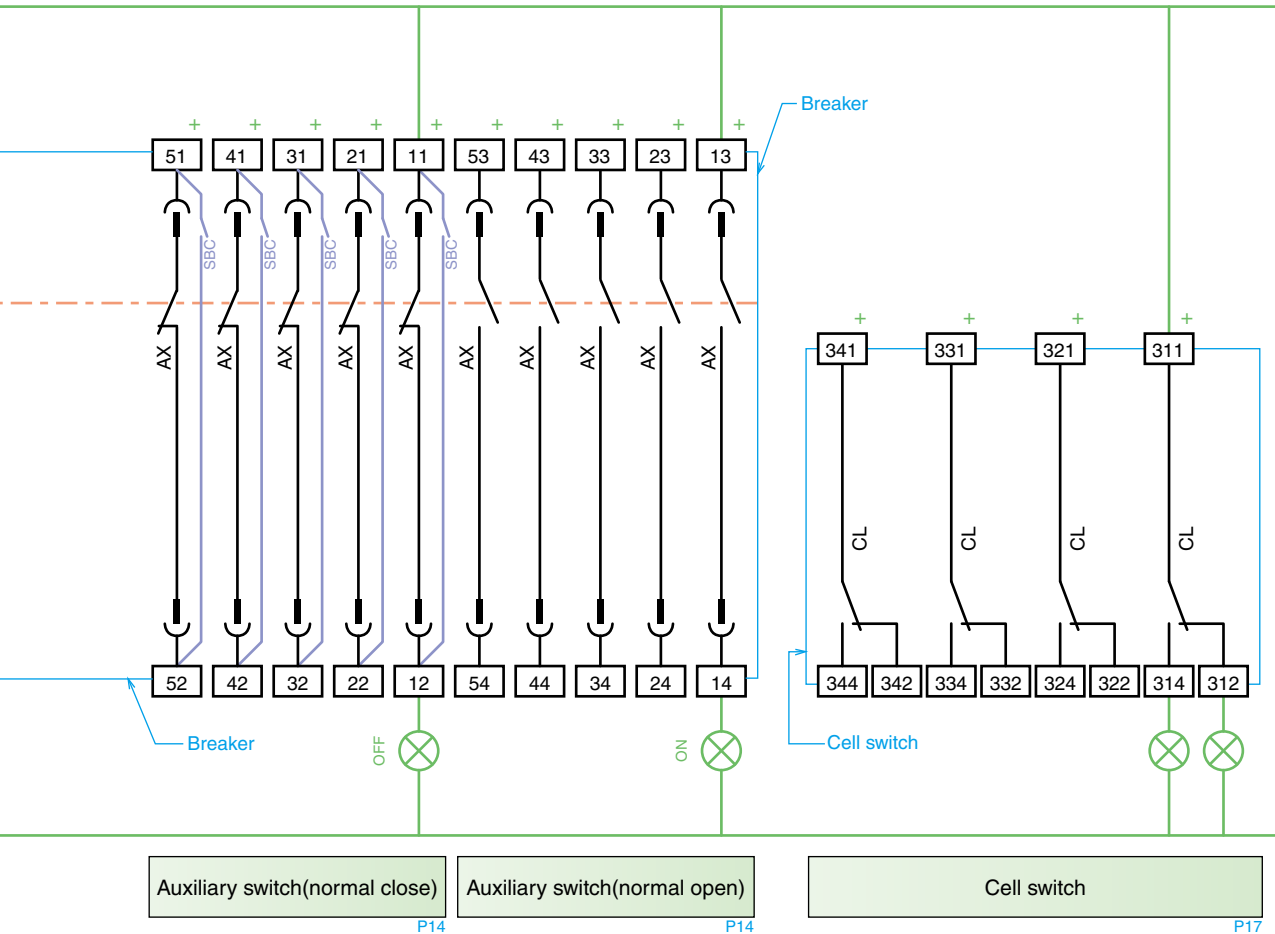
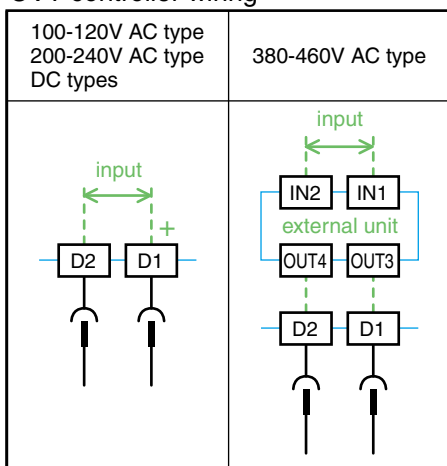


Fig.1
UVT controller wiring



Note:

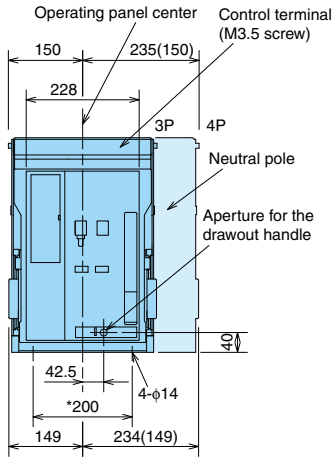
- For the drawout type, the cables should have the length which allow the control circuit terminal block to be moved to the left or right by 5mm.
- When a coil load is connected in the same control circuit as the ETR, surge absorbers are required to absorb the surge voltage.
- OCR alarm (AL)
The contact output of the OCR alarm (Standard type AL) is the one-pulse output and the output time is 30~50ms.
For this reason, this output needs self-holding circuit.
- For Power supply type P3 and P4, the high sensitive relay used in contact output may cause the chattering noise (wrong output of 1ms level) during ON and OFF operation, depending on the Panel placing condition. When it is used in the quick responsive sequence, the filter circuit of a few milli-second (ms) should be provided or the double reading sampling should be implemented.
- Closing coil (CC)
As CC is one-pulse driven, it is not necessary to insert AXb for burning prevention purposes. Inserting AXb will cause anti-pumping function to be ineffective.
- Under voltage trip device (UVT)
Use the switch that can open and close 150V DC, 0.5A for remote trip.
Remote trip terminal has short bar at shipment, so remove it before using this function.
Disconnect the voltage input wires during dielectric testing of main circuit.
- Since some terminals are polarized, the wiring should be done correctly as the polarity shown in the wiring diagram when the control voltage is DC. Auxiliary switch (AX) Standard type has no polarity.
- Alarm reset (Terminal: RS1 and RS2) is available only for Power supply type P3, P4 and P5. For Power supply type P1 and P2, it can not be reset from the Control circuit terminal block (RS1 and RS2).
- Alarm contacts (Terminal : 513~574) are available only for power supply type P3, P4 and P5. For output contacts, refer to page 20 Note2.

Outline dimensions

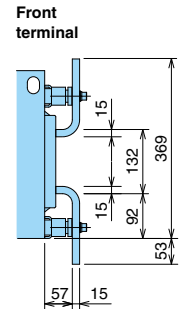
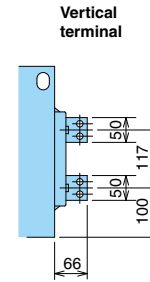
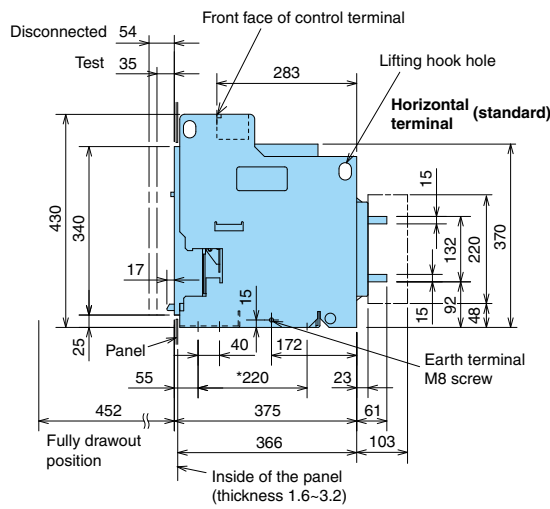
Drawout type AE630-SW, AE1000-SW, AE1250-SW, AE1600-SW

(mm)

Front view



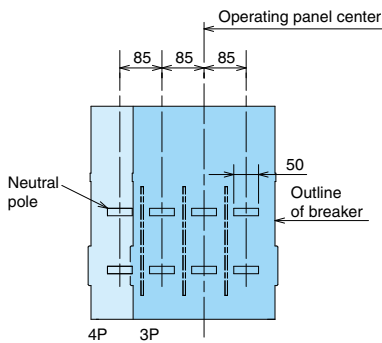
Side view



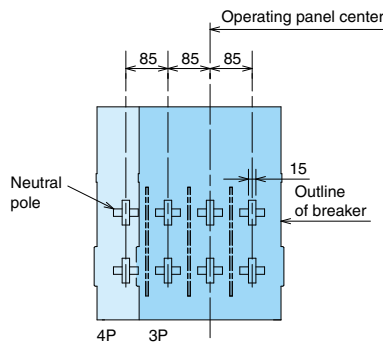
* : Mounting pitch
The numerals shown in parentheses are for 3 poles.

Rear view

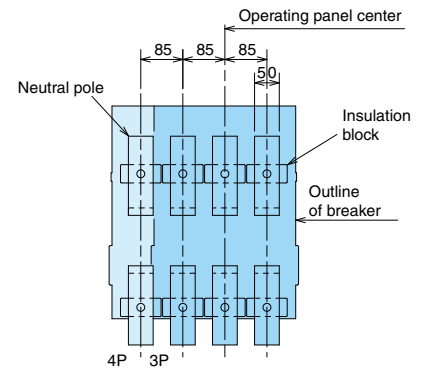
Horizontal terminal



Vertical terminal

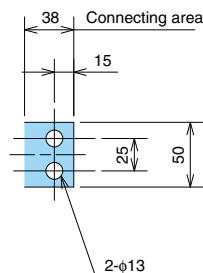


Front terminal



Main circuit terminal dimension

Horizontal terminal(standard) Vertical terminal Front terminal

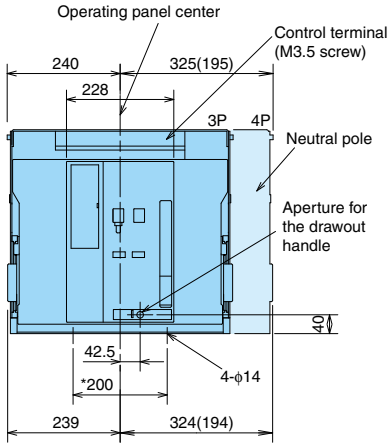


Outline dimensions

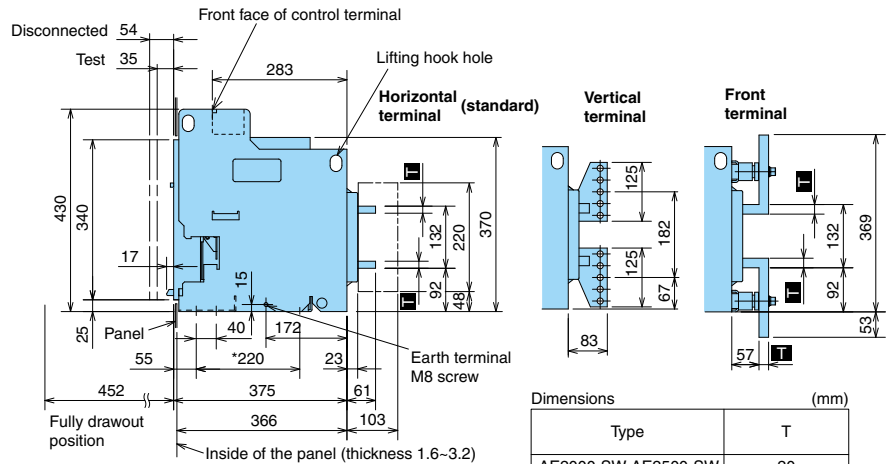
Drawout type AE2000-SW, AE2500-SW, AE3200-SW

(mm)

Front view

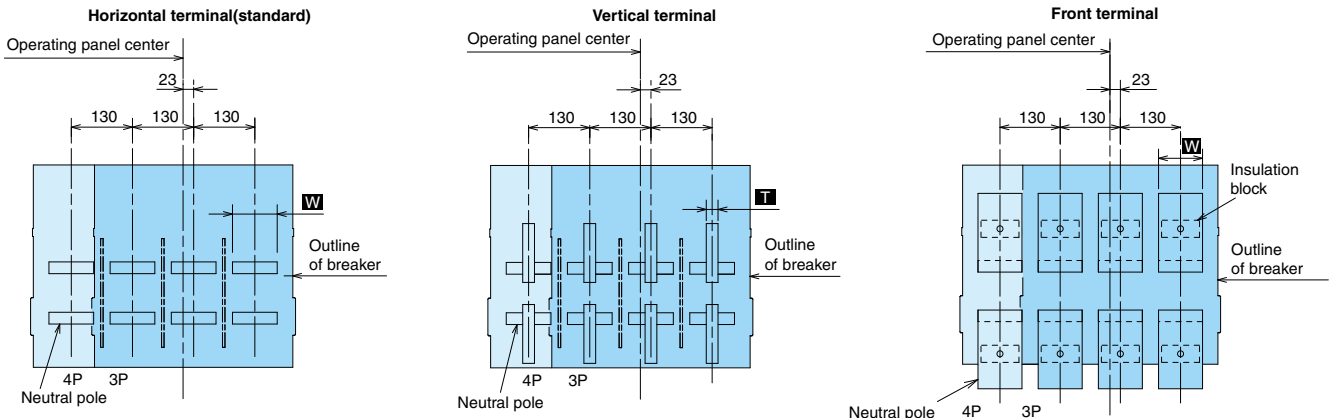


Side view

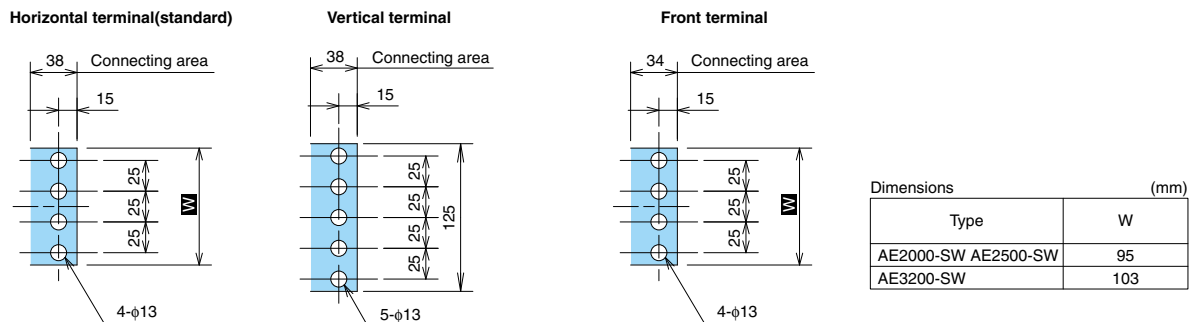


* : Mounting pitch
The numerals shown in parentheses are for 3 poles.

Rear view



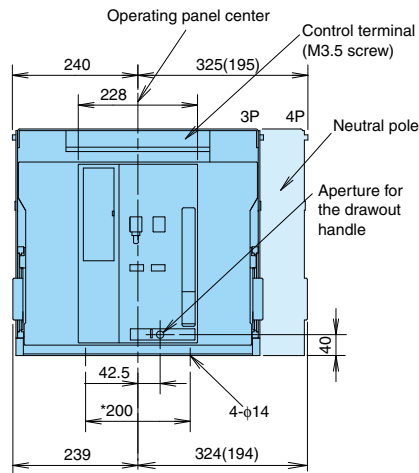
Main circuit terminal dimensions



Drawout type AE4000-SWA

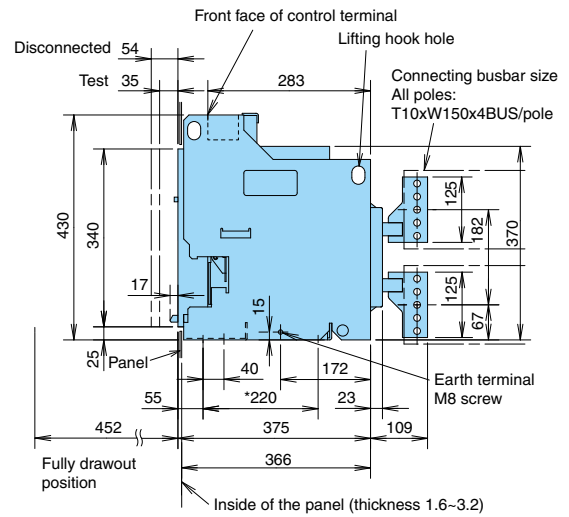
(mm)

Front view

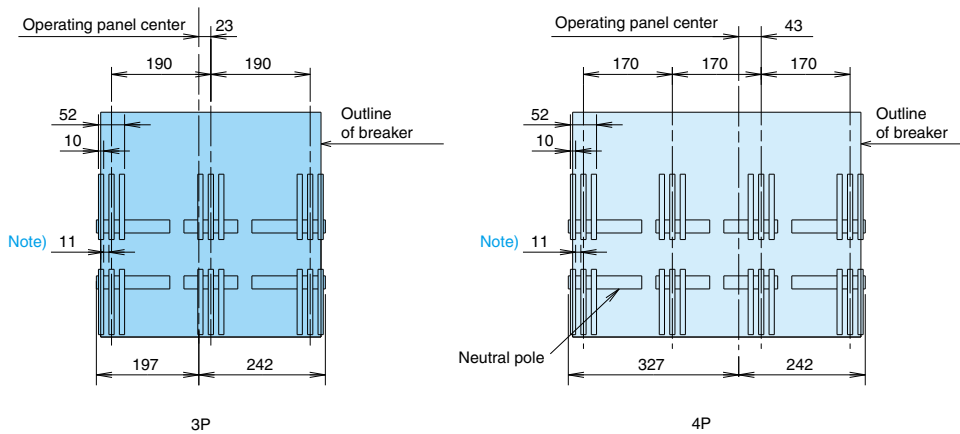


* : Mounting pitch
The numerals shown in parentheses are for 3 poles.

Side view

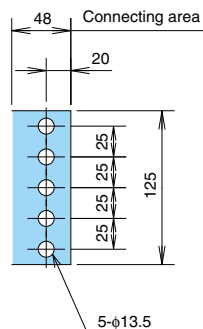


Rear view



Note) Spacers are not required when fastening connecting conductors (T10). The necessary contact area can be obtained with ACB terminal bent by tightening the screw.

Main circuit terminal dimension

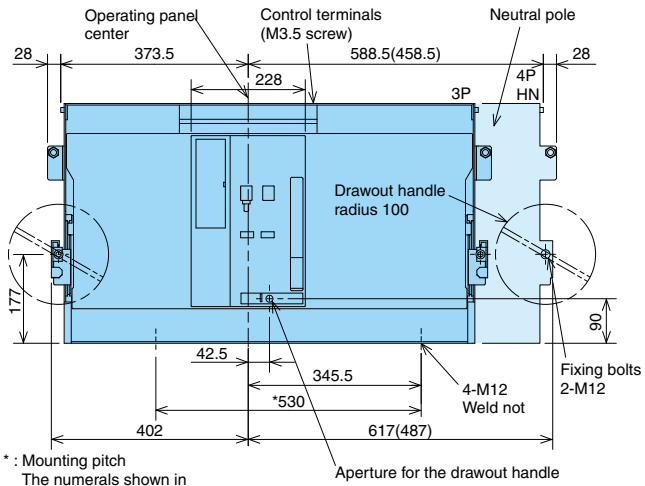


Outline dimensions

Drawout type AE4000-SW, AE5000-SW, AE6300-SW

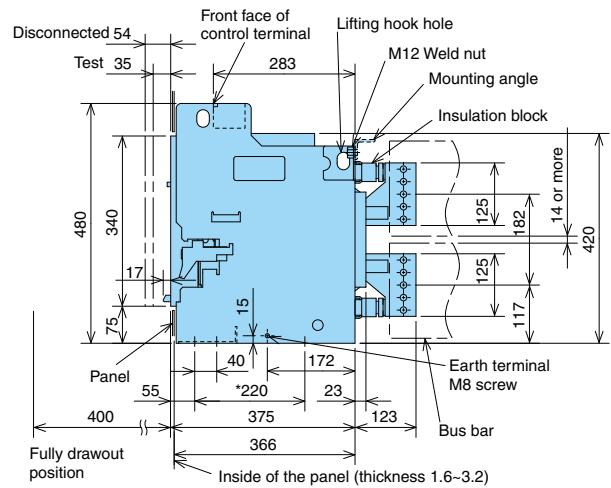
(mm)

Front view

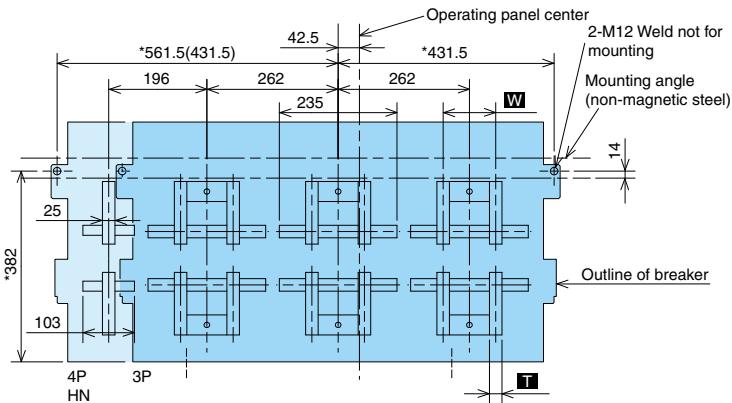


* : Mounting pitch
The numerals shown in parentheses are for 3 poles.

Side view

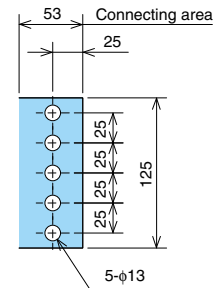


Rear view



The mounting angle should be prepared by the customer.

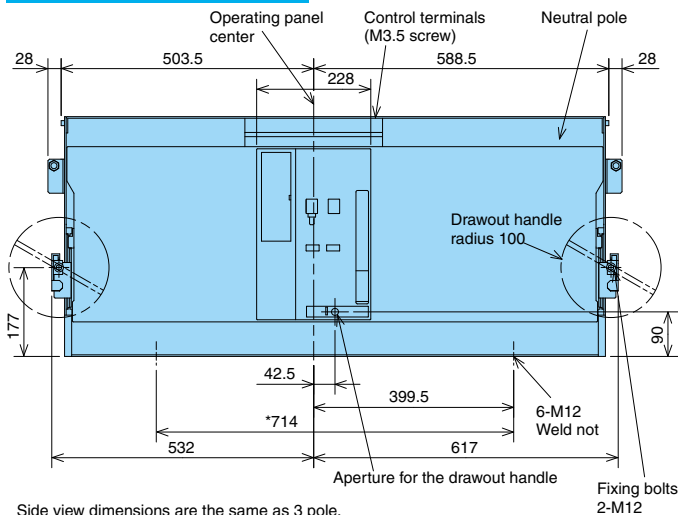
Main circuit terminal dimension



Dimensions		(mm)	
Type		W	T
AE4000-SW	AE5000-SW	100	20
AE6300-SW		105	25

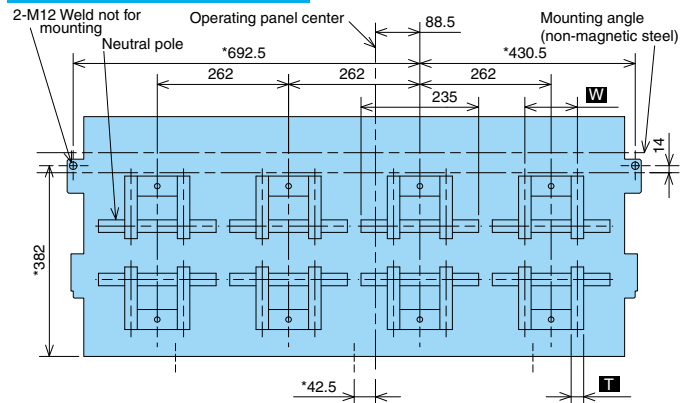
4P FN type

Front view



Side view dimensions are the same as 3 pole.

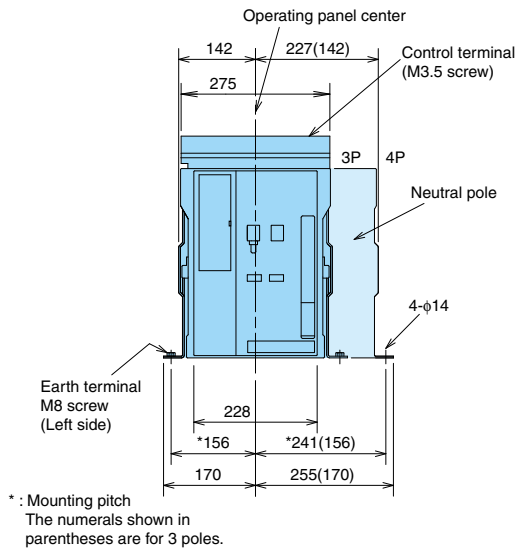
Rear view



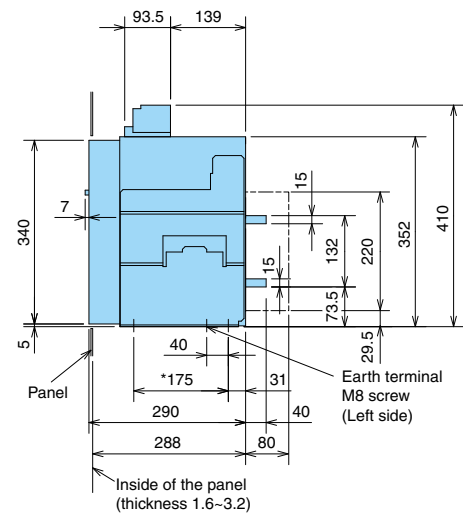
Fixed type AE630-SW, AE1000-SW, AE1250-SW, AE1600-SW

(mm)

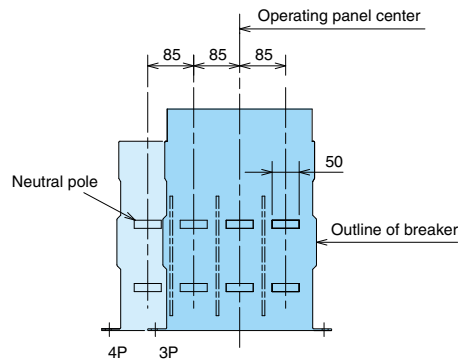
Front view



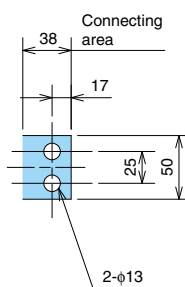
Side view



Rear view

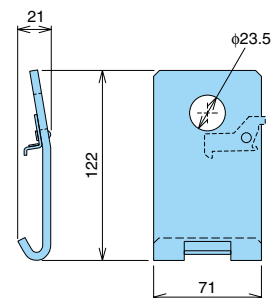


Main circuit terminal dimension



Lifting hooks (HP)

HP is supplied with ACB Fixed type.

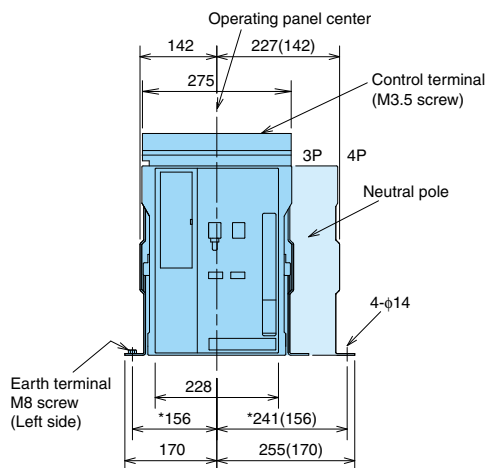


Outline dimensions

Fixed type AE2000-SWA

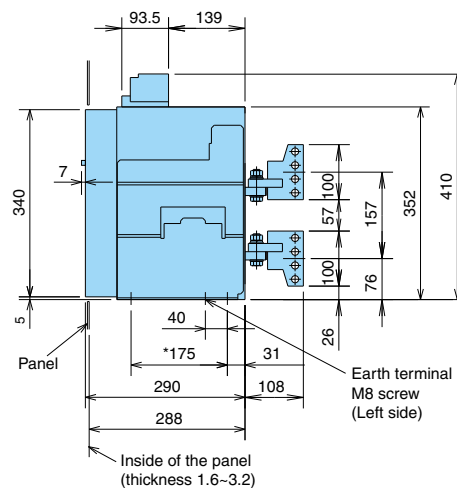
(mm)

Front view

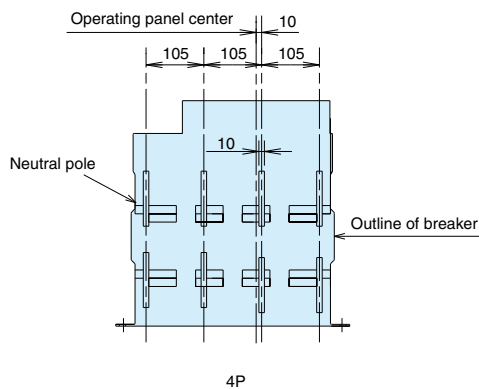
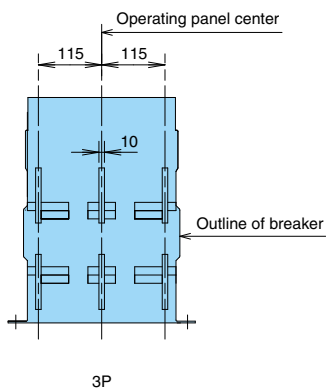


* : Mounting pitch
The numerals shown in parentheses are for 3 poles.

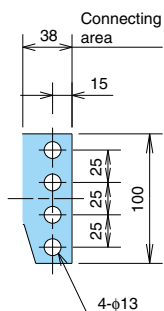
Side view



Rear view

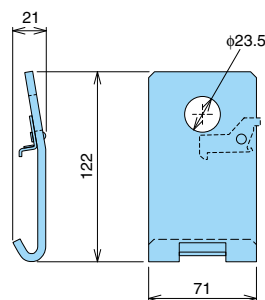


Main circuit terminal dimension



Lifting hooks (HP)

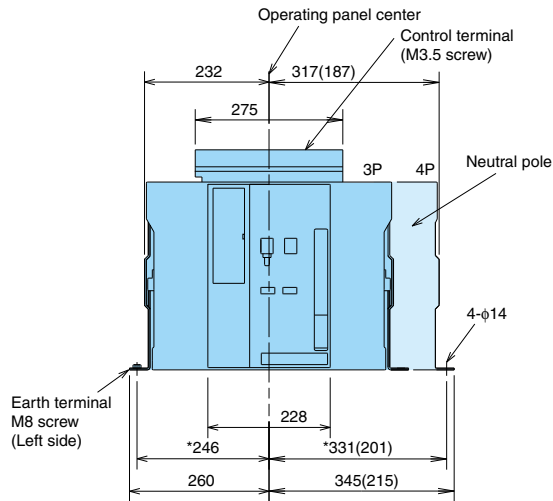
HP is supplied with ACB Fixed type.



Fixed type AE200-SW, AE250-SW, AE3200-SW

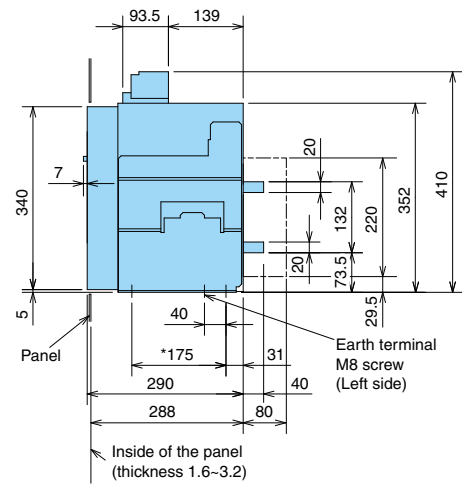
(mm)

Front view

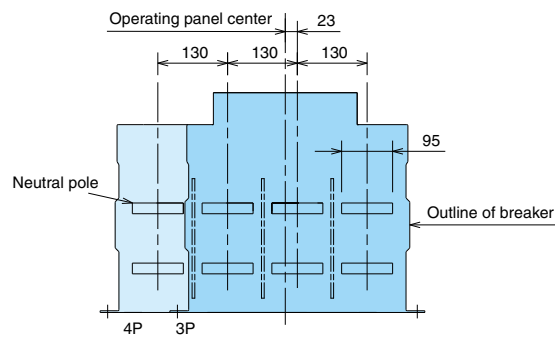


* : Mounting pitch
The numerals shown in parentheses are for 3 poles.

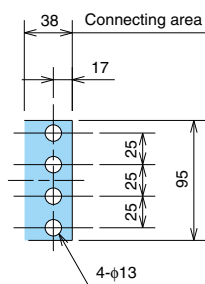
Side view



Rear view

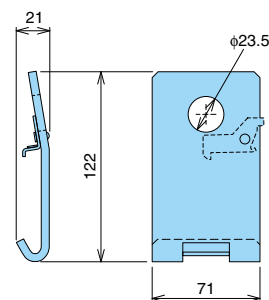


Main circuit terminal dimension



Lifting hooks (HP)

HP is supplied with ACB Fixed type.

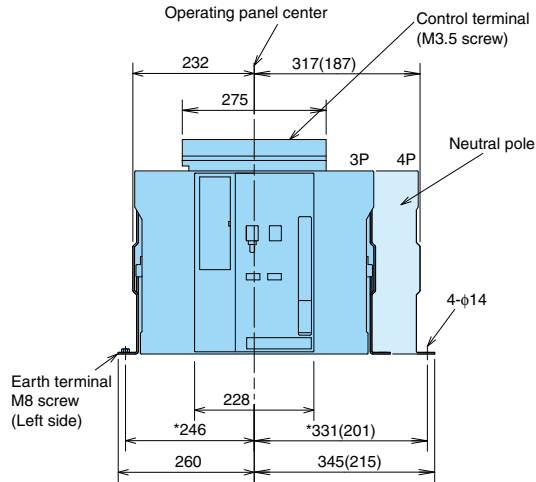


Outline dimensions

Fixed type AE400-SWA

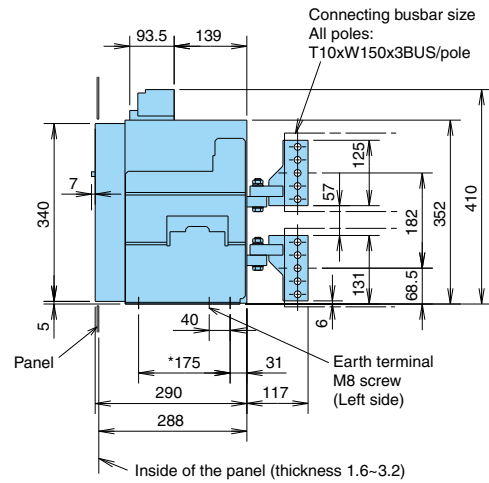
(mm)

Front view

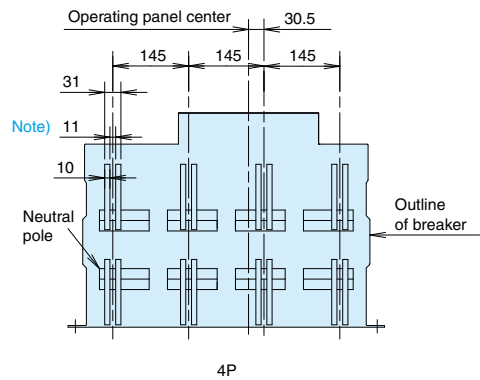
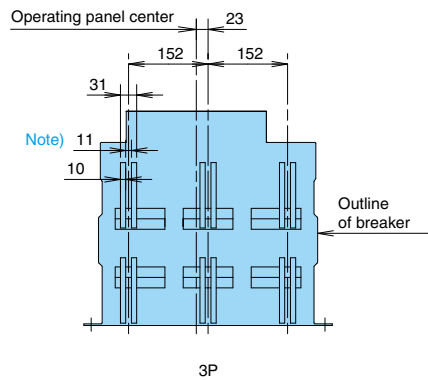


* : Mounting pitch
The numerals shown in parentheses are for 3 poles.

Side view

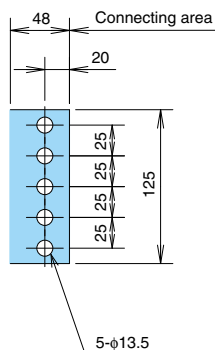


Rear view



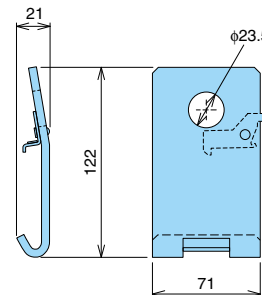
Note) Spacers are not required when fastening connecting conductors (T10). The necessary contact area can be obtained with ACB terminal bent by tightening the screw.

Main circuit terminal dimension



Lifting hooks (HP)

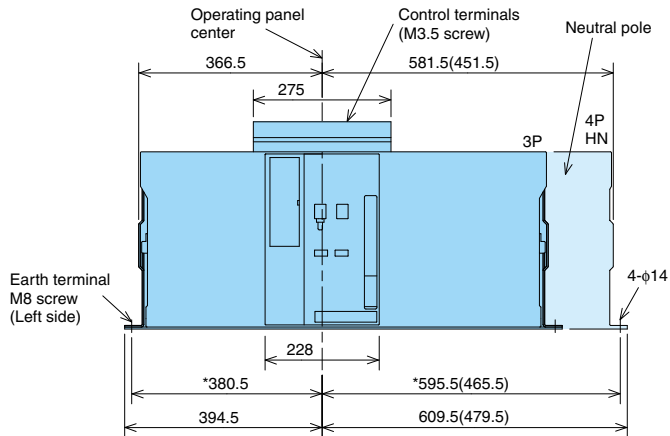
HP is supplied with ACB Fixed type.



Fixed type AE400-SW, AE500-SW, AE630-SW

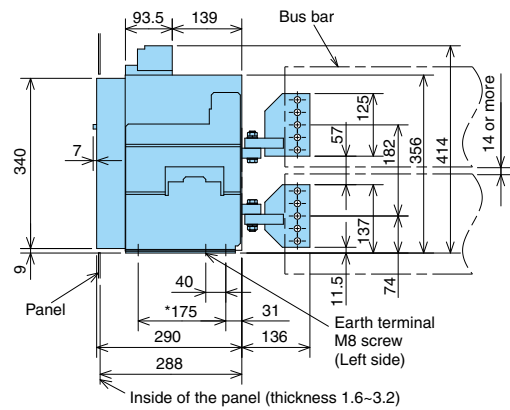
(mm)

Front view

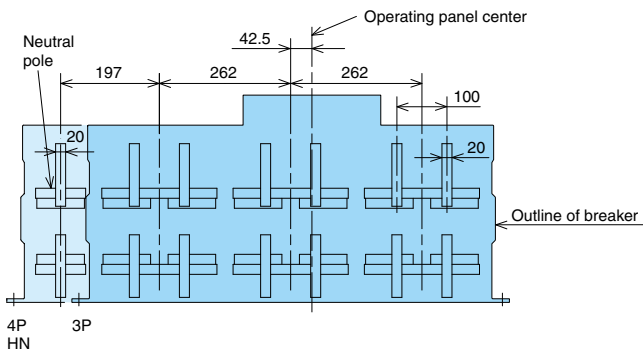


*: Mounting pitch
The numerals shown in parentheses are for 3 poles.

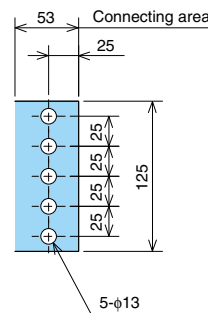
Side view



Rear view

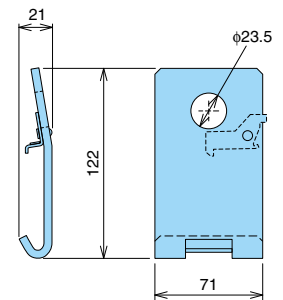


Main circuit terminal dimension



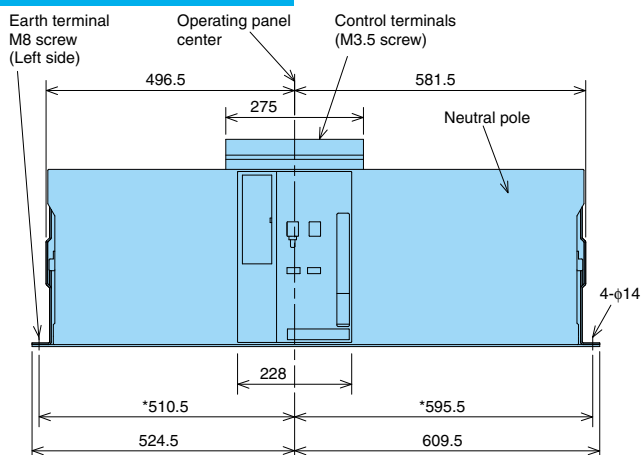
Lifting hooks (HP)

HP is supplied with ACB Fixed type.

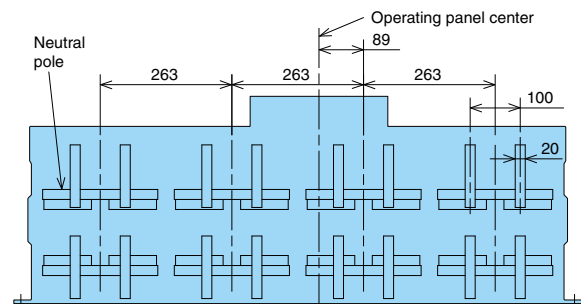


4P FN type

Front view



Rear view



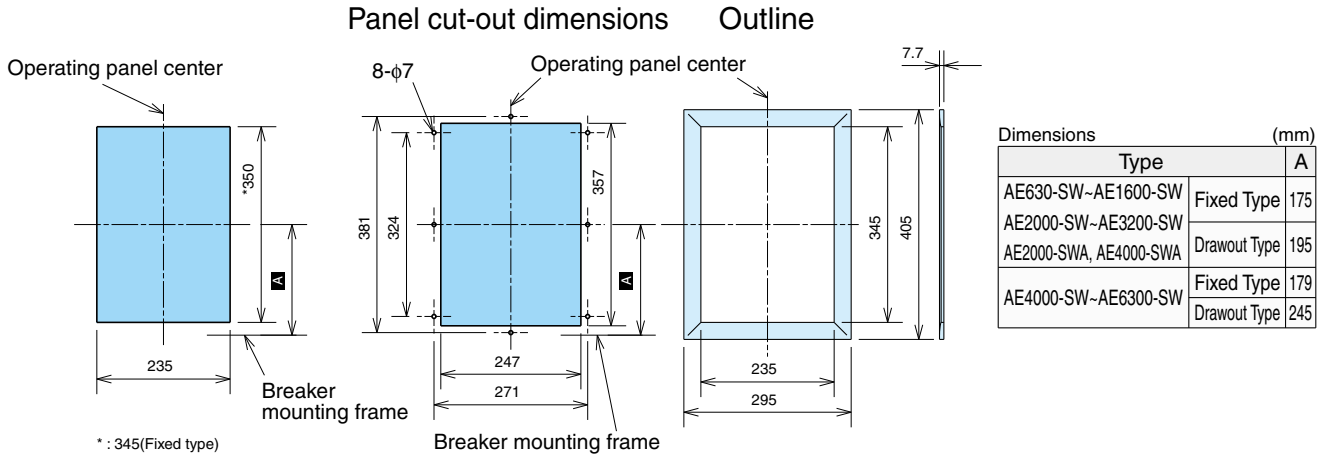
Side view dimensions are the same as 3 pole.

Outline dimensions

Panel cut-out, Terminal adapter, Drawout handle, Terminal cover

Panel cut-out dimensions

Door frame panel cut-out dimensions

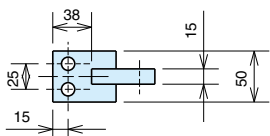


Vertical terminal adapter

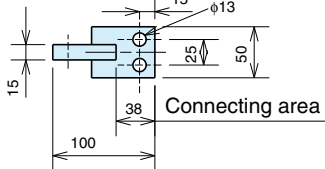
Front terminal adapter

AE630~1600-SW

Top view



Side view

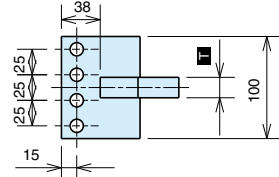


Dimensions (mm)

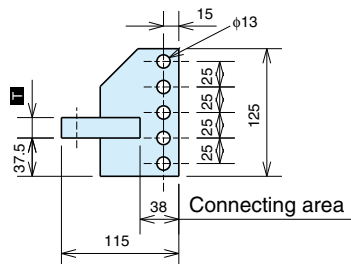
Type	T
AE2000-SW,2500-SW	20
AE3200-SW	25

AE2000~3200-SW

Top view

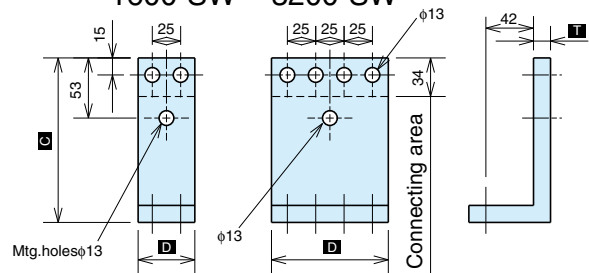


Side view



AE630~1600-SW

AE2000~3200-SW

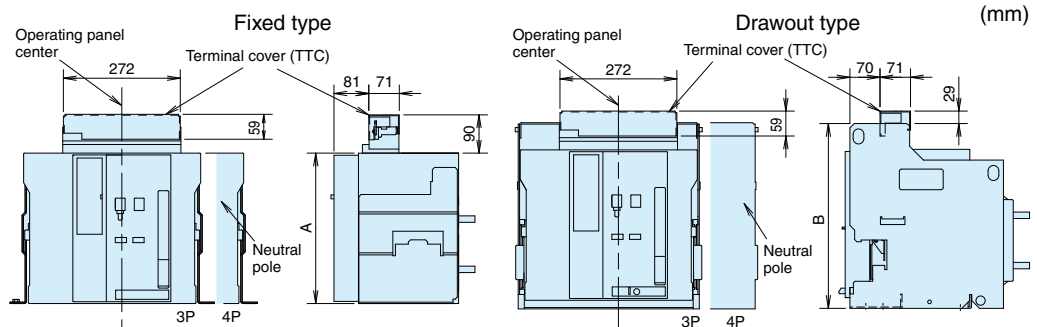
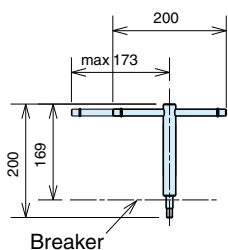


Dimensions (mm)

Type			C	D	T
AE630-SW-1600-SW	Fixed type	Up side	258.5	50	15
		Down side	145	50	15
	Drawout type		145	50	15
AE2000-SW,2500-SW	Fixed type	Up side	258.5	95	20
		Down side	145	95	20
	Drawout type		145	95	20
AE3200-SW	Fixed type	Up side	258.5	95	25
		Down side	145	95	25
	Drawout type		145	103	25

Drawout handle dimensions

Terminal cover (TTC)



Dimensions (mm)

Type	A	B
AE630-SW-AE3200-SW, AE2000-SWA, AE4000-SWA	350	430
AE4000-SW-AE6300-SW	354	480

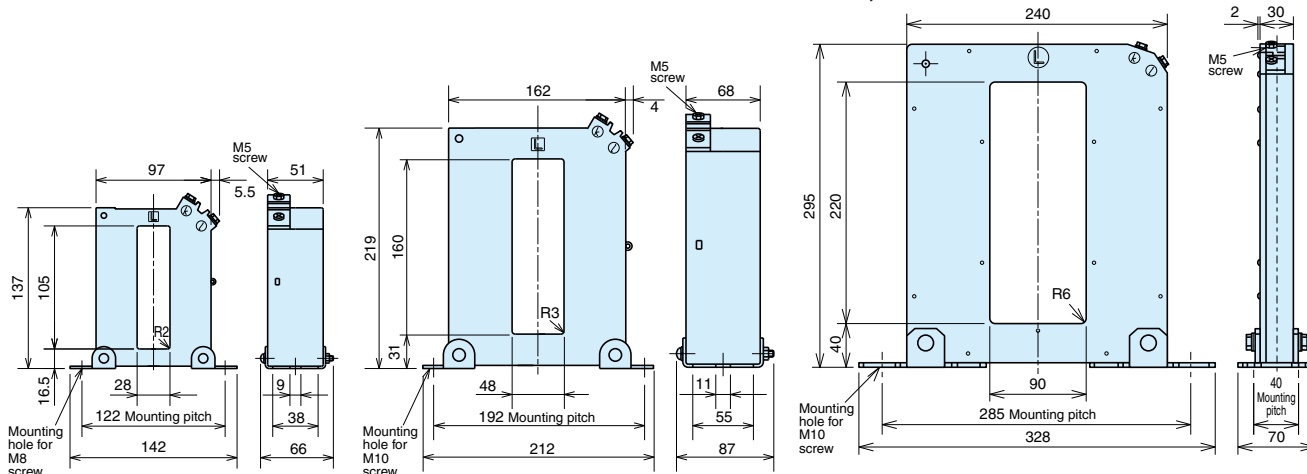
Neutral CT (NCT), External ZCT

Neutral CT (NCT)

630~2000A

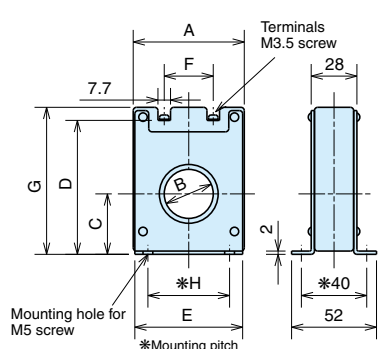
2500~4000A

5000, 6300A

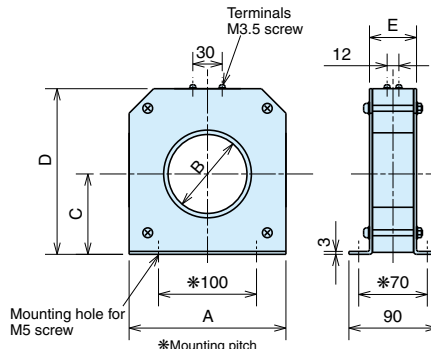


External ZCT for transformer ground wire

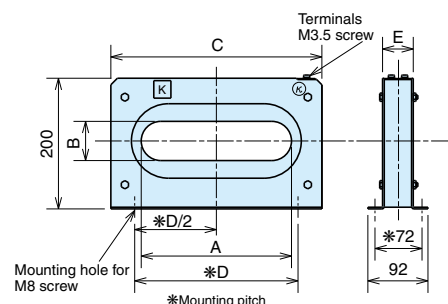
External ZCT for load circuits



Dimensions	(mm)							
	A	B	C	D	E	F	G	H
ZT15B	48	15	29	62	46	15	70	25
ZT30B	68	30	37	82	66	30	90	50
ZT40B	85	40	43	92	81	40	100	50



Dimensions	(mm)				
	A	B	C	D	E
ZT60B	140	60	73	150	46
ZT80B	160	80	82	169	48
ZT100B	185	100	93	190	50

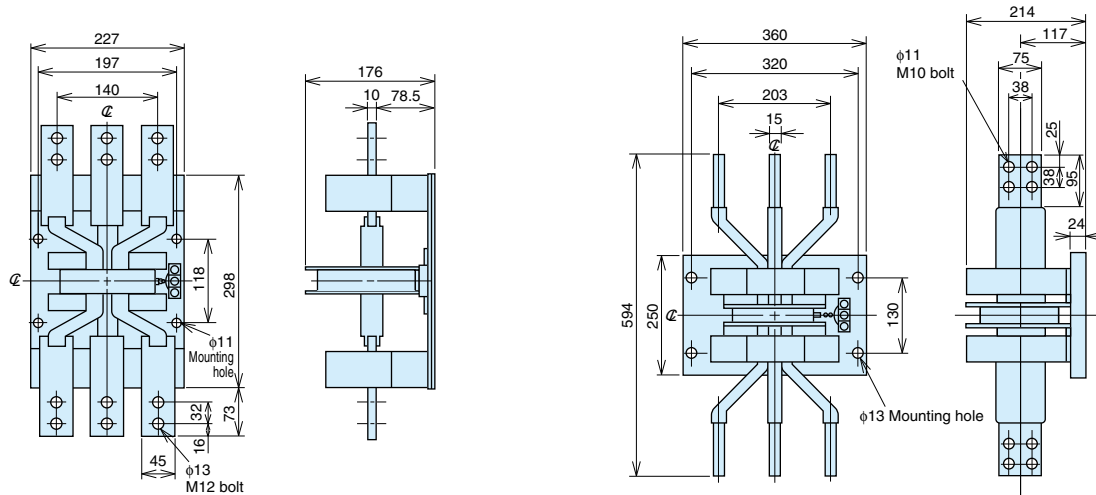


Dimensions	(mm)				
	A	B	C	D	E
ZCT163	230	60	323	250	47
ZCT323	370	108	460	400	47
ZCT324	500	108	600	550	48

ZCT with primary conductors

ZTA1200A (1200A)

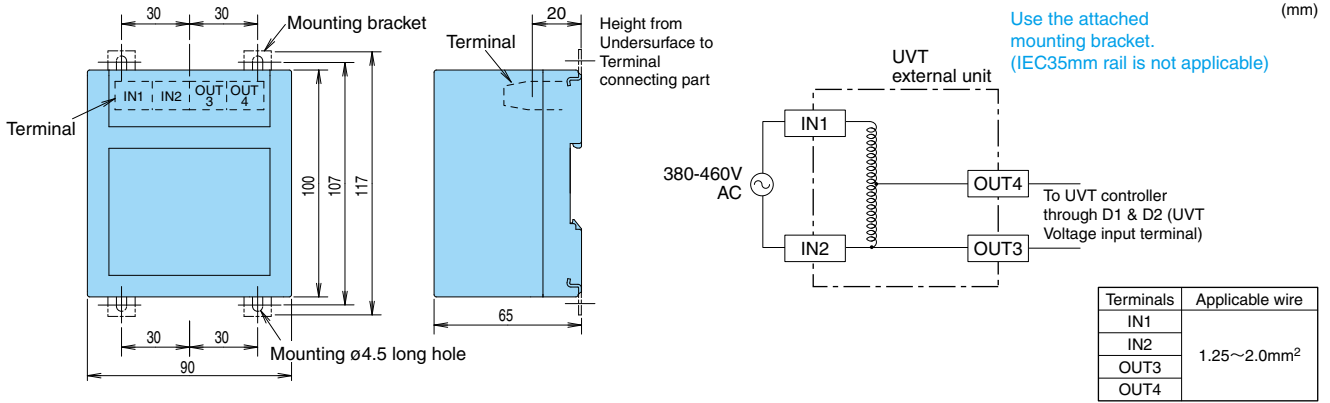
ZTA2000A (2000A)



Outline dimensions

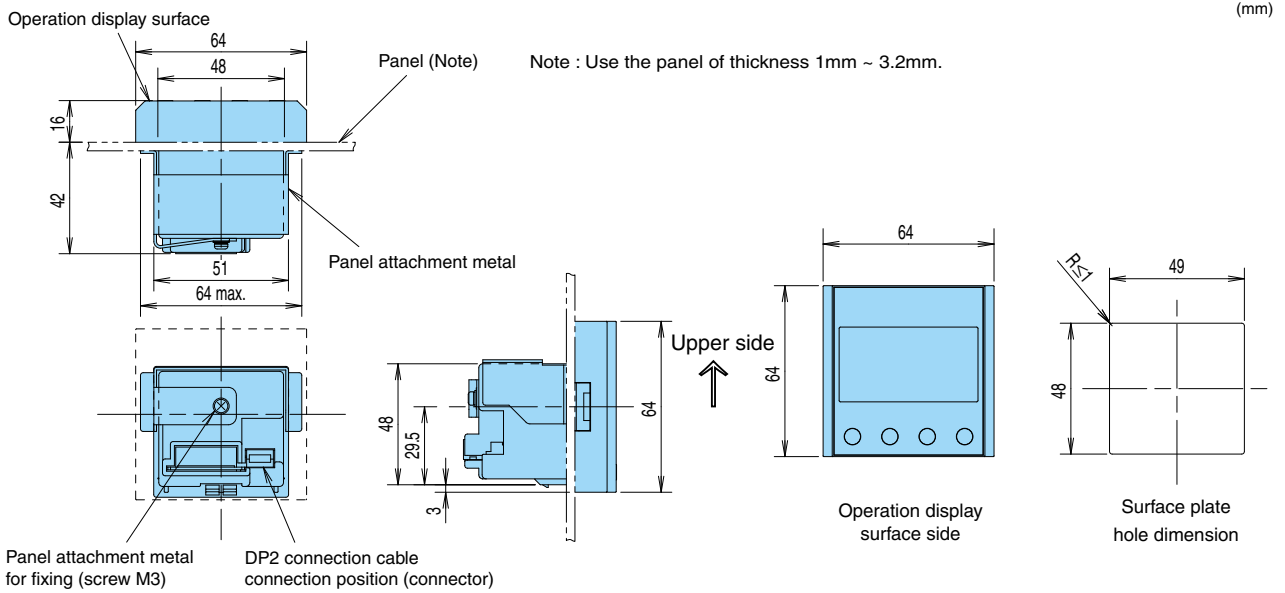
UVT external unit

UVT external unit (380 ~ 460V AC)



ETR external units

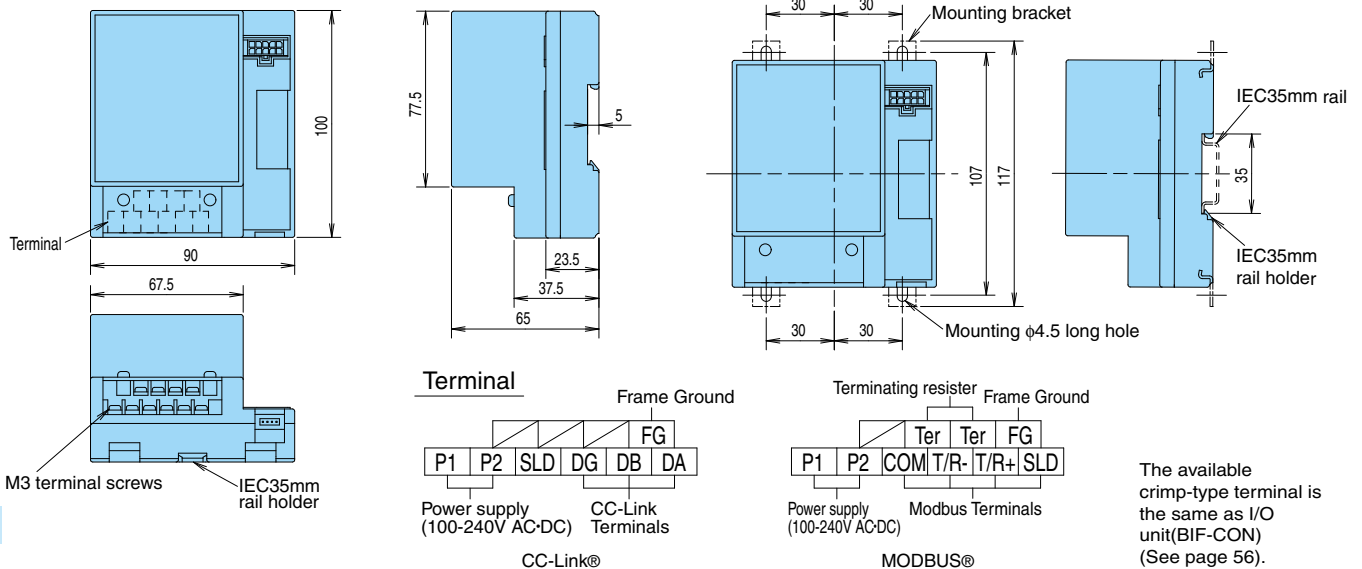
Display onto panel board (DP2)



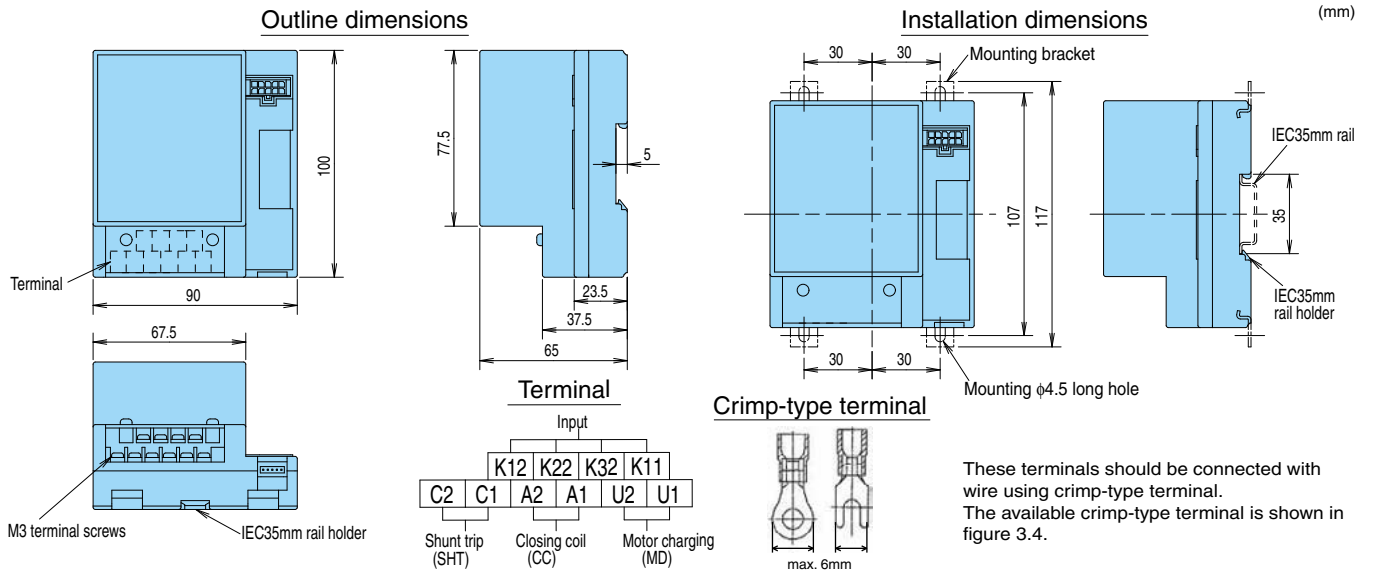
CC-Link®, MODBUS® interface unit (BIF-CC, BIF-MD)

Outline dimensions

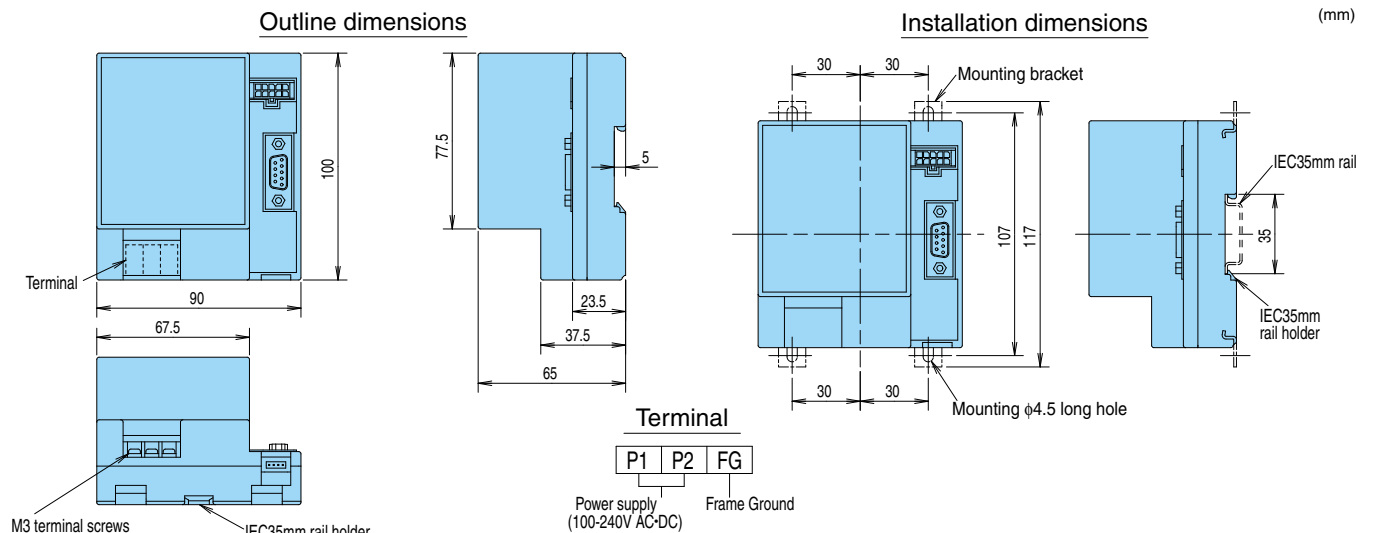
Installation dimensions



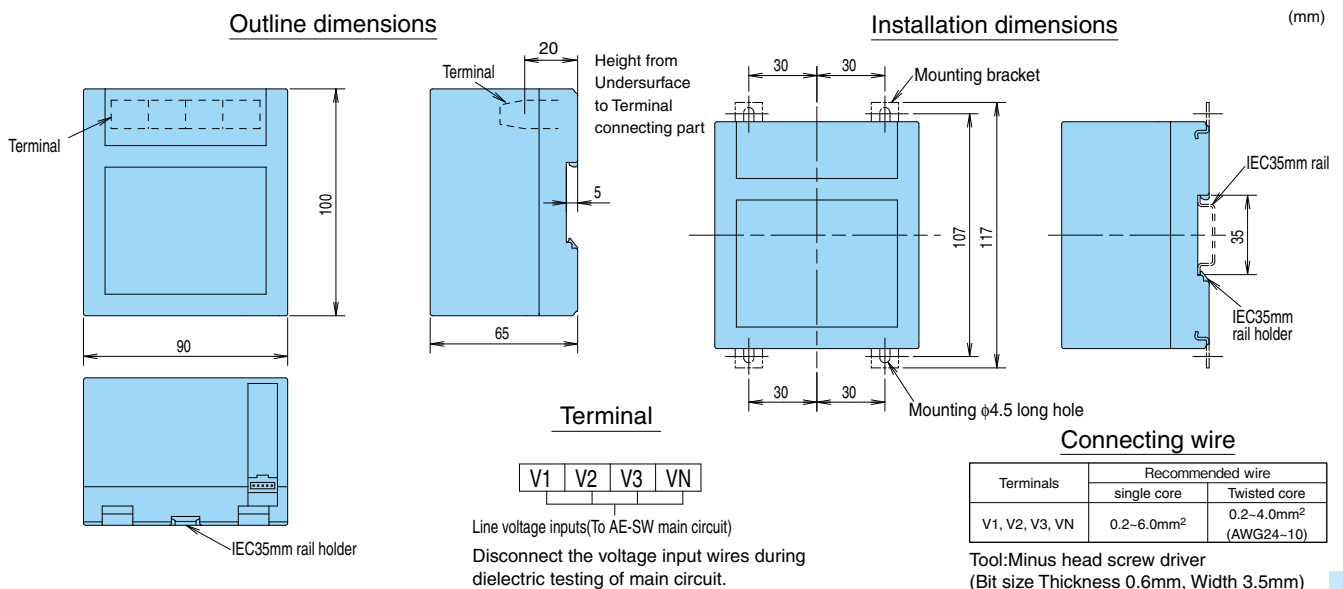
I/O unit (BIF-CON)



PROFIBUS-DP interface unit (BIF-PR)



VT unit (VT)



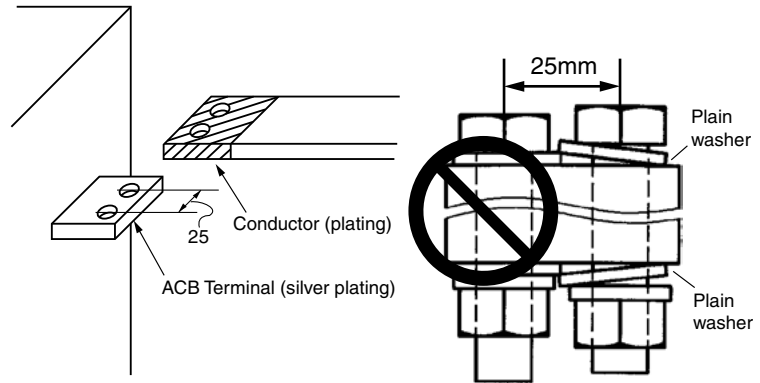
Technical information

Pre-cautions when making connections

Use M12 bolts, plain washers, and spring lock washers to connect the conductor. There are various sizes in plain washers, but use 24mm or smaller outer diameter washers. The washers may overlap if larger sized washers are used. It is recommended to apply silver plating on the contact surface of the conductor which is used to connect with the terminal of circuit breakers in order to prevent the increase of contact resistance due to moisture, etc. Tin plating or nickel plating may be applied, but quickly connect with the circuit breaker terminal if nickel plating is applied because nickel plating is less resistant to sulfur dioxide gas.

Clean the contact surface and securely tighten the bolts with a correct torque (M12: 40 to 50 N·m).

The terminal which is applicable to connect the conductor is different depending on the shape of the terminal. Refer to the outline dimensions of P.43 to P.52.



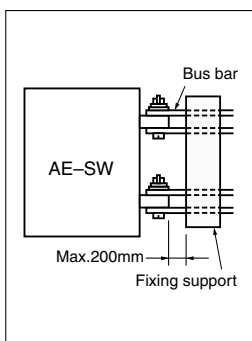
Standard tightening torque

Screw size	Tightening torque(N·m)
M12	45±5

Since fault current flowing through the conductors causes large electromagnetic forces, the conductors should be secured firmly, using the values in the below table as a reference. Max. distance between fixing support and ACB bus bar should be less than 200mm.

Electromagnetic force in N per 1m conductor
(in the case of three phase short circuit)

(N)



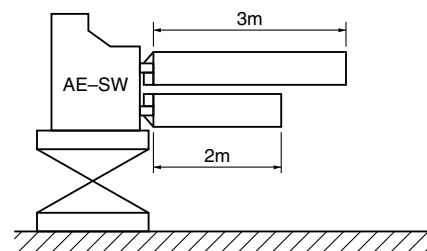
Type	AE630-SW- AE1600-SW	AE2000-SWA		AE2000-SW- AE3200-SW	AE4000-SWA				AE4000-SW- AE6300-SW
		3-Pole	4-Pole		Drawout type		Fixed type		
					3-Pole	4-Pole	3-Pole	4-Pole	
Conductor distance(mm)	85	115	105	130	190	170	152	145	262
Prospective fault current kA(pi)									
30(0.2)	7700	5700	6300	5100	3500	3900	4300	4500	2500
42(0.2)	15100	11200	12200	9900	6800	7600	8500	8900	5000
50(0.2)	21400	15800	17300	14000	9600	10700	12000	12600	7000
65(0.2)	36100	26700	29300	23600	16200	18100	20200	21200	11800
75(0.2)	-	-	-	31500	21500	24100	26900	28200	15800
85(0.2)	-	-	-	40400	27600	30900	34500	36200	20000
100(0.2)	-	-	-	55800	38200	42700	47800	50100	27800
130(0.2)	-	-	-	-	-	-	-	-	47000

When selecting conductors to be connected to AE breakers, ensure that they have a sufficient current capacity. Refer to the right table.

Conductor Size(IEC 60947-1; Ambient Temp. 40°C , Open air)

Rated current Max.(A)	Connecting conductors(copper bus bar)		
	Arrangement	Quantity	Conductor size(mm)
630	With long surface vertical	2	40 x 5
1000		2	60 x 5
1250		2	80 x 5
1600		2	100 x 5
2000		3	100 x 5
2500		4	100 x 5
3150(3200)*1		3	100 x 10
4000 (AE4000-SWA Drawout type)		4	150 x 10
4000 (AE4000-SWA Fixed type)		3	150 x 10
4000 (AE4000-SW)		4	100 x 10
5000		4	150 x 10
6300		4	200 x 10

The left table shows the suitable connecting conductor size based on IEC 60947-1, which is assured from the test under Ambient temp. 40°C, Open air and testing configuration as shown in the following drawing.

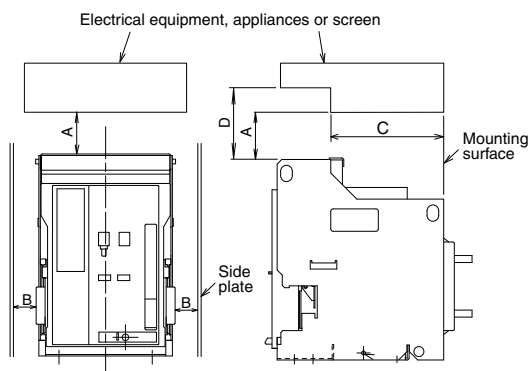


*1 The temperature rise of rated current 3200A conforms to the requirement of IEC 60947-1 for the connecting conductor size of a rated current 3150A. In case of more than 3200A, conductor sizes are not defined in IEC 60947-1.

Insulation distance

When a short-circuit current is interrupted, discharged hot gas blows out from the exhaust port of the arc extinguishing chamber, so provide a clearance as shown in the following table.

Note1: On the fixed type, maintenance is possible with following clearance.



Dimensions

				(mm)
Type		AE630-SW-AE3200-SW AE2000-SWA AE4000-SWA	AE4000-SW- AE6300-SW	
Applicable voltage		600V AC or less	660V AC, 690V AC	690V AC or less
Fixed type	A	(Note 1) 0	(Note 1) 100	(Note 1) 200
	B	(Note 3) 50	(Note 3) 50	(Note 3) 50
	C	162	162	-
	D	(Note 2) 50	(Note 2) 50	200
Drawout type	A	0	100	200
	B	(Note 3) 50	(Note 3) 50	(Note 3) 50
	C	240	240	-
	D	(Note 2) 50	(Note 2) 50	(Note 2) 200

Note1 : 300mm or more clearance is necessary to inspect the arc-extinguishing chamber and contacts.
 Note2 : The wiring space required for the control terminal block.
 Note3 : When using mechanical interlock, door interlock, etc., dimension B becomes larger.

Service conditions

1. Normal service condition

Under ordinary conditions the following normal working conditions are all satisfied, the AE Series air circuit breaker may be used unless otherwise specified.

1. Ambient temperature
A range of max. +40°C to min. -5°C is recommended. And the average over 24 hours must not exceed +35°C.
2. Altitude
2,000m (6,600 feet) or less
3. Environmental conditions
The air must be clean, and the relative humidity must be 85% or less at max. temp. +40°C. Do not use and store in atmospheres with sulfide gas and ammonia gas etc. (H₂S ≤ 0.01ppm, SO₂ ≤ 0.1ppm, NH₃ < a few ppm.)
4. Installation conditions
When installing the AE Series air circuit breaker, refer to the installation instructions in the catalogue and instruction manual.
5. Storage temperature
A range of max. +60°C to min. -20°C is recommended to be stored. And the average over 24 hours must not exceed +35°C.

6. Guideline for replacement

Within approx. 15 years. Please refer to the instruction manual.

2. Special service conditions

In case of special service condition, service life may become shorter in some cases.

1. Special environmental conditions
High temperature and/or high humidity
corrosive gas
2. High ambient temperature
If the ambient temperature exceeds +40°C, the uninterrupted current rating will be reduced. Since the derating value is different depending on the applicable standard, refer to P60.
3. High altitude
Since the heat radiation rate is reduced for use at the 2,000m or higher, accordingly the operating voltage, continuous current capacity and breaking capacity are derated. Moreover the insulation durability is also decreased owing to the atmospheric pressure. Please inquire us for further detail.

Guarantee

1. Free guarantee period

The free guarantee period of the product is one year from the day of purchase.

2. Scope of guarantee

- (1) We will repair the product free of charge within the guarantee period on condition that it has been used under the standard working conditions in conformity with the operating conditions, operating procedures, environmental conditions and instructions specified in the catalogs, manuals and caution labels on the product body.
- (2) In the following cases, the product will be repaired at your expense even within the free guarantee period.
 - Failure caused by your improper storage or handling, carelessness or negligence

- Failure caused by inadequacies of installation
- Failure caused by mis-operation or improper modification
- Failure caused by external factors due to acts of God, such as fire and abnormal voltage, and natural disasters, such as earthquake, windstorm and flood
- Failure caused by reasons that could not be foreseen on the level of science and technology at the time of delivery

The term "guarantee" used in this section refers to the guarantee only of the delivered product. We are not liable to compensate for any damage induced by the failure of the delivered product.

3. Repair parts supplying period

The supply of the repair parts is warranted for 5 years after discontinuation of the production. The supply is terminated as soon as the repair parts run out after the 5 years.

Technical information

Internal resistance, reactance and power consumption (per pole)

Type	Connection	Internal resistance (mΩ)	Reactance (mΩ)	Power consumption (W)
AE630-SW	Fixed type	0.020	0.099	8
	Drawout type	0.031	0.147	12
AE1000-SW	Fixed type	0.020	0.095	20
	Drawout type	0.031	0.136	31
AE1250-SW	Fixed type	0.020	0.088	31
	Drawout type	0.031	0.135	48
AE1600-SW	Fixed type	0.020	0.099	51
	Drawout type	0.031	0.129	79
AE2000-SWA	Fixed type	0.020	0.120	80
	Drawout type	0.030	0.161	120
AE2000-SW	Fixed type	0.010	0.076	40
	Drawout type	0.018	0.122	72
AE2500-SW	Fixed type	0.010	0.084	63
	Drawout type	0.018	0.128	113
AE3200-SW	Fixed type	0.009	0.068	92
	Drawout type	0.015	0.096	154
AE4000-SWA	Fixed type	0.011	0.111	176
	Drawout type	0.015	0.106	240
AE4000-SW	Fixed type	0.009	0.070	144
	Drawout type	0.011	0.084	176
AE5000-SW	Fixed type	0.009	0.061	225
	Drawout type	0.011	0.081	275
AE6300-SW	Fixed type	0.008	0.059	318
	Drawout type	0.009	0.080	357

(Note) The above values are applicable for one pole.

The above values are measured values and can be used only for reference.

Deratings by ambient temperature

(Table 1) Deratings of Max. rated current by ambient temperature

(A)

Standard	IEC60947-2, JIS C 8201-2-1 (Standard:40°C)				
	LR, BV, DNV GL, ABS, NK, CCS (Standard:45°C)				
Ambient Temperature	40°C	45°C	50°C	55°C	60°C
AE630-SW	630	630	630	630	630
AE1000-SW	1000	1000	1000	1000	1000
AE1250-SW	1250	1250	1250	1250	1200
AE1600-SW	1600	1600	1600	1550	1500
AE2000-SWA	2000	2000	1900	1800	1700
AE2000-SW	2000	2000	2000	2000	2000
AE2500-SW	2500	2500	2500	2450	2350
AE3200-SW	3200	3200	3200	3000	2900
AE4000-SWA	4000	4000	4000	3800	3600
AE4000-SW	4000	4000	4000	3900	3750
AE5000-SW	5000	5000	5000	5000	4750
AE6300-SW	6300	6300	5750	5500	5200

(Table 2) Deratings of Max. rated current by ambient temperature with Extension module, Display and Network

In case extension module (EX1), display (DP1) and network are attached, the following derating values shown in this table are applied.

(A)

Standard	IEC60947-2, JIS C 8201-2-1 (Standard:40°C)		
	LR, BV, DNV GL, ABS, NK, CCS (Standard:45°C)		
Ambient Temperature	40°C	45°C	50°C
AE630-SW	630	630	630
AE1000-SW	1000	1000	1000
AE1250-SW	1250	1250	1250
AE1600-SW	1600	1600	1440
AE2000-SWA	2000	1900	1700
AE2000-SW	2000	2000	2000
AE2500-SW	2500	2500	2500
AE3200-SW	3200	3200	2880
AE4000-SWA	4000	3800	3600
AE4000-SW	4000	4000	3750
AE5000-SW	5000	5000	4750
AE6300-SW	6300	5750	5200

The above table shows the maximum rated current per each ambient temperature for drawout type breaker with vertical connection (at brandnew product), when breaker and bus bar are installed in open air.

Connection bus bar is according to IEC60947-1. For AE3200-SW, AE4000-SWA, AE4000-SW, AE5000-SW and AE6300-SW, it is required to follow the manufacturer recommended size shown in Page 57.

As for ambient temperature exceeding 60°C, please inquire us.

Technical information

Discrimination table

AE-SW Series air circuit breakers provide easy selective co-ordination with branch circuit breakers. For selective co-ordinations, refer to the following table.

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Main circuit breaker Unit breaking capacity	AE-SW											
	AE630-SW	AE1000-SW	AE1250-SW	AE1600-SW	AE2000-SWA	AE2000-SW	AE2500-SW	AE3200-SW	AE4000-SWA	AE4000-SW	AE5000-SW	AE6300-SW
Branch circuit breaker	65	65	65	65	65	85	85	85	85	130	130	130
NF NV NF NV NF NV NF NV NF NV NF NV NF NV NF NV	NF32-SV	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
	NV32-SV	10	9(10)	10	10	10	10	10	10	10	10	10
	NF63-SV	15	9(10)	15	15	15	15	15	15	15	15	15
	NV63-SV											
	NF63-HV	25	9(25)	25	25	25	25	25	25	25	25	25
	NV63-HV											
	NF125-SV	50	9(50)	45(50)	50	50	50	50	50	50	50	50
	NV125-SV											
	NF125-SEV	85	9(65)	45(65)	50(65)	50(65)	50(65)	85	85	85	85	85
	NV125-SEV											
	NF125-SGV	85	16(65)	45(65)	65	65	65	85	85	85	85	85
	NV125-SGV	90	16(65)	45(65)	65	65	65	85	85	85	90	90
	NF125-LGV	90	16(65)	45(65)	65	65	65	85	85	85	90	90
	NV125-LGV											
	NF125-HV	100	9(65)	50(65)	65	65	65	100	100	100	100	100
NV125-HV												
NF125-HGV	100	16(65)	45(65)	65	65	65	85	85	85	100	100	
NV125-HGV												
NF160-SGV	85	9.4(65)	25(65)	40(65)	65	65	85	85	85	85	85	
NV160-SGV	90	9.4(65)	25(65)	40(65)	65	65	85	85	85	90	90	
NF160-LGV	90	9.4(65)	25(65)	40(65)	65	65	85	85	85	90	90	
NV160-LGV												
NF160-HGV	100	9.4(65)	25(65)	40(65)	65	65	85	85	85	100	100	
NV160-HGV												
NF250-SV	85	9(65)	20(65)	22(65)	42(65)	42(65)	50(85)	85	85	85	85	
NV250-SV												
NF250-SEV	85	9.4(65)	25(65)	40(65)	65	65	85	85	85	85	85	
NV250-SEV	90	9.4(65)	25(65)	40(65)	65	65	85	85	85	90	90	
NF250-SGV	90	9.4(65)	25(65)	40(65)	65	65	85	85	85	90	90	
NV250-SGV												
NF250-LGV	100	9(65)	25(65)	40(65)	65	65	85	85	85	100	100	
NV250-LGV												
NF250-HV	100	9(65)	25(65)	40(65)	65	65	85	85	85	100	100	
NV250-HV												
NF250-HEV	100	9(65)	25(65)	40(65)	65	65	85	85	85	100	100	
NV250-HEV												
NF400-SW	85	—	—	20(65)	30(65)	30(65)	48(75)	70(75)	85	85	85	
NV400-SW												
NF400-SEW	85	9(65)	15(65)	20(65)	30(65)	30(65)	48(75)	70(75)	85	85	85	
NV400-SEW												
NF400-HEW	100	9(65)	15(65)	20(65)	30(65)	30(65)	48(75)	70(75)	85	100	100	
NV400-HEW												
NF400-REW	150	9(65)	15(65)	20(65)	30(65)	30(65)	48(75)	70(75)	85	85	130	
NV400-REW												
NF630-SW	85	—	—	—	24(65)	24(65)	30(75)	40(75)	60(75)	60(75)	75(85)	
NV630-SW												
NF630-SEW	85	—	15(65)	18(65)	24(65)	24(65)	30(75)	40(75)	60(75)	60(75)	75(85)	
NV630-SEW												
NF630-HEW	100	—	15(65)	18(65)	24(65)	24(65)	30(75)	40(75)	60(75)	60(75)	75(100)	
NV630-HEW												
NF630-REW	150	—	15(65)	18(65)	24(65)	24(65)	30(75)	40(75)	60(75)	60(75)	75(100)	
NV630-REW												
NF800-SEW	85	—	—	18(65)	24(65)	24(65)	30(75)	40(75)	60(75)	60(75)	75(85)	
NV800-SEW												
NF800-HEW	100	—	—	18(65)	24(65)	24(65)	30(75)	40(75)	60(75)	60(75)	75(100)	
NV800-HEW												
NF800-REW	150	—	—	18(65)	24(65)	24(65)	30(75)	40(75)	60(75)	60(75)	75(100)	
NV800-REW												
NF63-CV	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
NV63-CV												
NF125-CV	30	9(30)	15(30)	18(30)	24(30)	24(30)	30	30	30	30	30	
NV125-CV												
NF250-CV	36	9(36)	15(36)	18(36)	24(36)	24(36)	36	36	36	36	36	
NV250-CV												
NF400-CW	50	—	15(50)	20(50)	27(50)	27(50)	42(50)	50	50	50	50	
NV400-CW												
NF630-CW	50	—	—	—	24(50)	24(50)	30(50)	40(50)	50	50	50	
NV630-CW												
NF800-CEW	50	—	—	18(50)	24(50)	24(50)	30(50)	40(50)	50	50	50	
NV800-CEW												
NF125-RGV	150	65	65	65	65	65	85	85	85	130	130	
NV125-RGV												
NF250-RGV	150	9(65)	65	65	65	65	85	85	85	130	130	
NV250-RGV												
NF250-UV	200	9(65)	65	65	65	65	85	85	85	130	130	
NV250-UV												
NF400-UEW	200	9(65)	15(65)	18(65)	29(65)	29(65)	48(75)	85	85	85	130	
NV400-UEW												
NF800-UEW	200	—	—	18(65)	24(65)	24(65)	30(75)	37(75)	68(75)	68(75)	85(100)	
NV800-UEW												

• The values in the table represent the max. rated current for both Series AE-SW air circuit breakers and branch breakers, and the selective co-ordination applies when the AE-SW series air circuit breakers instantaneous pick up is set to maximum.
 • The numerals shown in parentheses are for AE-SW with MCR. (When set MCR).

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Main circuit breaker Unit breaking capacity		AE-SW												
		AE630-SW	AE1000-SW	AE1250-SW	AE1600-SW	AE2000-SWA	AE2000-SW	AE2500-SW	AE3200-SW	AE4000-SWA	AE4000-SW	AE5000-SW	AE6300-SW	
Branch circuit breaker		65	65	65	65	65	85	85	85	85	130	130	130	
NFI	NF32-SV	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	NV32-SV	5	5	5	5	5	5	5	5	5	5	5	5	5
NF	NF63-SV	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
	NV63-SV													
NF	NF63-HV	10	9(10)	10	10	10	10	10	10	10	10	10	10	10
	NV63-HV													
NF	NF63-HRV	30	9(30)	30	30	30	30	30	30	30	30	30	30	30
	NV63-HRV													
NF	NF125-SV	30	7(30)	20(30)	25(30)	30	30	30	30	30	30	30	30	30
	NV125-SV													
NF	NF125-SEV	36	7(36)	20(36)	25(36)	30(36)	36	36	36	36	36	36	36	36
	NV125-SEV													
NF	NF125-SGV	36	9(36)	20(36)	36	36	36	36	36	36	36	36	36	36
	NV125-SGV													
NF	NF125-LGV	50	9(50)	20(50)	36(50)	50	50	50	50	50	50	50	50	50
	NV125-LGV													
NF	NF125-HV	50	9(50)	30(50)	50	50	50	50	50	50	50	50	50	50
	NV125-HV													
NF	NF125-HGV	65	9(65)	20(65)	36(65)	65	65	65	65	65	65	65	65	65
	NV125-HGV													
NF	NF160-SGV	36	9(36)	15(36)	25(36)	36	36	36	36	36	36	36	36	36
	NV160-SGV													
NF	NF160-LGV	50	9(50)	15(50)	25(50)	42(50)	42(50)	50	50	50	50	50	50	50
	NV160-LGV													
NF	NF160-HGV	65	9(65)	15(65)	25(65)	42(65)	42(65)	65	65	65	65	65	65	65
	NV160-HGV													
NF	NF250-SV	36	7(36)	14(36)	19(36)	25(36)	25(36)	36	36	36	36	36	36	36
	NV250-SV													
NF	NF250-SGV	36	7(36)	15(36)	25(36)	36	36	36	36	36	36	36	36	36
	NV250-SGV													
NF	NF250-LGV	50	7(50)	15(50)	25(50)	42(50)	42(50)	50	50	50	50	50	50	50
	NV250-LGV													
NF	NF250-HV	70	7(65)	15(65)	25(65)	42(65)	42(65)	70	70	70	70	70	70	70
	NV250-HV													
NF	NF250-HEV	65	7(65)	15(65)	25(65)	42(65)	42(65)	65	65	65	65	65	65	65
	NV250-HEV													
NF	NF250-HGV	65	7(65)	15(65)	25(65)	42(65)	42(65)	65	65	65	65	65	65	65
	NV250-HGV													
NF	NF400-SW	45	—	—	18(45)	24(45)	24(45)	33(45)	45(45)	45	45	45	45	45
	NV400-SW													
NF	NF400-SEW	50	9(50)	15(50)	18(50)	24(50)	24(50)	30(50)	39(50)	50	50	50	50	50
	NV400-SEW													
NF	NF400-HEW	70	9(65)	15(65)	18(65)	24(65)	24(65)	30(70)	39(70)	70	70	70	70	70
	NV400-HEW													
NF	NF400-REW	125	9(65)	15(65)	18(65)	24(65)	24(65)	30(75)	39(75)	80	80	100	100	100
	NV400-REW													
NF	NF630-SW	50	—	—	—	24(50)	24(50)	30(50)	37(50)	50	50	50	50	50
	NV630-SW													
NF	NF630-SEW	50	—	15(50)	18(50)	24(50)	24(50)	30(50)	37(50)	50	50	50	50	50
	NV630-SEW													
NF	NF630-HEW	70	—	15(65)	18(65)	24(65)	24(65)	30(70)	37(70)	48(70)	48(70)	70	70	70
	NV630-HEW													
NF	NF630-REW	125	—	15(65)	18(65)	24(65)	24(65)	30(75)	37(75)	48(75)	48(75)	75(100)	75(100)	75(100)
	NV630-REW													
NF	NF800-SEW	50	—	—	18(50)	24(50)	24(50)	30(50)	37(50)	48(50)	48(50)	50	50	50
	NV800-SEW													
NF	NF800-HEW	70	—	—	18(65)	24(65)	24(65)	30(70)	37(70)	48(70)	48(70)	70	70	70
	NV800-HEW													
NF	NF800-REW	125	—	—	18(65)	24(65)	24(65)	30(75)	37(75)	48(75)	48(75)	75(100)	75(100)	75(100)
	NV800-REW													
NF	NF63-CV	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	NV63-CV													
NF	NF125-CV	10	9(10)	10	10	10	10	10	10	10	10	10	10	10
	NV125-CV													
NF	NF250-CV	25	9(25)	15(25)	18(25)	25	25	25	25	25	25	25	25	25
	NV250-CV													
NF	NF400-CW	36	—	15(36)	18(36)	24(36)	24(36)	25(36)	36	36	36	36	36	36
	NV400-CW													
NF	NF630-CW	36	—	—	—	24(36)	24(36)	30(36)	36	36	36	36	36	36
	NV630-CW													
NF	NF800-CW	36	—	—	18(36)	24(36)	24(36)	30(36)	36	36	36	36	36	36
	NV800-CW													
NF	NF125-RGV	125	35(65)	65	65	65	65	85	85	85	85	125	125	125
	NV125-RGV													
NF	NF125-UV	200	50(65)	65	65	65	65	85	85	85	85	130	130	130
	NV125-UV													
NF	NF250-RGV	125	9(65)	50(65)	65	65	65	85	85	85	85	125	125	125
	NV250-RGV													
NF	NF250-UV	200	9(65)	65	65	65	65	85	85	85	85	130	130	130
	NV250-UV													
NF	NF400-UW	200	9(65)	15(65)	18(65)	29(65)	29(65)	48(75)	85	85	85	130	130	130
	NV400-UW													
NF	NF800-UW	200	—	—	18(65)	24(65)	24(65)	30(75)	37(75)	68(75)	68(75)	85(100)	85(100)	85(100)
	NV800-UW													

• The values in the table represent the max.rated current for both Series AE-SW air circuit breakers and branch breakers, and the selective co-ordination applies when the AE-SW series air circuit breakers instantaneous pick up is set to maximum.
 • The numerals shown in parentheses are for AE-SW with MCR.(When set MCR).

Ordering information

Ordering information for Mitsubishi AE-SW series air circuit breaker (General use---WS Type, Special use---WB Type, Protective coordination use---WF Type)

Customer(name)		Order No.		Number of units		units
Type	P9-10 AE <u>1600</u> -SW	AE _____ -SWA				
Number of poles	<input checked="" type="checkbox"/> 3P <input type="checkbox"/> 4P <small>AE630-SW- AE4000-SWA</small>	<input type="checkbox"/> 3P <input type="checkbox"/> 4P HN <small>Note15</small>	<input type="checkbox"/> 3P <input type="checkbox"/> 4P FN <small>Note15</small>			
Current setting Ir	<u>1600</u> A	CT rating _____ A <small>Note1 P9,P20</small>				
Applicable standard	<input checked="" type="checkbox"/> IEC 60947-2	<input type="checkbox"/> CCC				
Ambient temperature	<input checked="" type="checkbox"/> 40°C(Standard)	<input type="checkbox"/> Others _____ °C <small>Note2</small>				
Connection	<input type="checkbox"/> Fixed type <small>Note3</small>	<input checked="" type="checkbox"/> Drawout type <small>Note3</small>				
Main circuit terminal	<input type="checkbox"/> Horizontal terminal(FIX) <small>(AE630-1600-SW / AE2000-3200-SW)</small>	<input checked="" type="checkbox"/> Horizontal terminal(DR)	<input type="checkbox"/> Vertical terminal(DR-VT) <small>AE2000-SWA / AE4000-SWA AE4000-6300-SW</small>	<input type="checkbox"/> Front terminal(DR-FT) <small>Note4</small>		
			Drawout type accessories P17-18 <input checked="" type="checkbox"/> Cell switch(CL- <input checked="" type="checkbox"/> : 1 or 2 or 3 or 4) <small>Note5</small> <input type="checkbox"/> Shorting b-contact(SBC- <input type="checkbox"/> : 1 or 2 or 3 or 4 or 5) <input type="checkbox"/> Lifting hooks(HP) <input checked="" type="checkbox"/> Safety shutter(SST) <input checked="" type="checkbox"/> Shutter lock(SST-LOCK) <input type="checkbox"/> Mis-insertion preventor(MIP) <input type="checkbox"/> Test jumper(TJ) <input type="checkbox"/> Vertical terminal adapter(VTA) <small>Can be connected to the Horizontal terminals.</small> <input type="checkbox"/> Front terminal adapter(FTA)			

Electronic trip relay(ETR)		Reset type <input checked="" type="checkbox"/> Automatic Reset (Standard) <input type="checkbox"/> Manual Reset (MRE)	
<input checked="" type="checkbox"/> With ETR			
Type	<u>WS1</u> <u>G1</u> - <u>P1</u>	Additional function P36	
Main setting module WS1, WB1, WF1 AE630-1600-SW, AE2000-3200-SW, AE4000-SW WS2, WB2, WF2 AE2000-SWA, AE4000-SWA, AE5000-SW, AE6300-SW WS3, WB3, WF3 AE6300-SW <small>WS: General use WB: INST only WF: Protective coordination use</small>		Optional setting module G1: Ground fault protection <small>Note6</small> N5: Neutral pole 50% protection <small>Note7</small> E1: Earth leakage protection AP: 2nd Additional Pre-alarm NA: Without optional setting ETR Auxiliary Equipment <input type="checkbox"/> Temperature alarm(TAL) <input type="checkbox"/> MCR switch(MCR-SW) P34	
<input type="checkbox"/> BARE without ETR		Power supply P1: 100-240V AC·DC P2: 24-60V DC P3: 100-240V AC / 100-125V DC with output contact P4: 24-60V DC with output contact P5: 100-240V DC with output contact (SSR) <input type="checkbox"/> Neutral CT(NCT) <small>Note8</small> External ZCT <small>Note9</small> ZCT <input type="checkbox"/> ZT <input type="checkbox"/> B ZTA <input type="checkbox"/>	
		Network P37 <input type="checkbox"/> BIF-CC <input type="checkbox"/> BIF-PR <input type="checkbox"/> BIF-MD <input type="checkbox"/> BIF-CON <input type="checkbox"/> BIF-CL <input checked="" type="checkbox"/> Extension module(EX1) P36 <input checked="" type="checkbox"/> Display(DP1) <input type="checkbox"/> Display onto panel board(DP2) <input checked="" type="checkbox"/> VT unit(VT)	
		Wire system (when EX1 is specified) EX1 <input checked="" type="checkbox"/> 3φ3W <input type="checkbox"/> 3φ4W <input checked="" type="checkbox"/> Normal connection : <small>Note13</small> <input type="checkbox"/> Reverse connection : <small>Note14</small>	

Electrical accessories P12-14	<input checked="" type="checkbox"/> Auxiliary switch <small>A and B contacts in the same quantity are used. Max. quantity: 5 each for A and B contacts</small>	<input type="checkbox"/> Standard (AX <input checked="" type="checkbox"/> : 2 or 4 or 6 or 8 or 10)	<input type="checkbox"/> High capacity (HAX <input type="checkbox"/> : 2 or 4 or 6 or 8 or 10)
	<input checked="" type="checkbox"/> Motor charging (MD)	<input checked="" type="checkbox"/> 100-125V AC · DC	<input type="checkbox"/> 200-250V AC · DC <input type="checkbox"/> 24V DC <small>Note10</small> <input type="checkbox"/> 48V DC
	<input checked="" type="checkbox"/> Closing coil (CC)	<input checked="" type="checkbox"/> 100-250V AC · DC	<input type="checkbox"/> 24-48V DC
	<input checked="" type="checkbox"/> Shunt trip device (SHT)	<input checked="" type="checkbox"/> 100-250V AC · DC	<input type="checkbox"/> 380-500V AC <input type="checkbox"/> 24-48V DC
<input checked="" type="checkbox"/> Under voltage trip device (UVT)	<input checked="" type="checkbox"/> 100-120V AC	Time delay <input checked="" type="checkbox"/> Inst (INST) <input type="checkbox"/> 0.5s (05) <input type="checkbox"/> 3.0s (30) <small>Note: In case of 380-460V AC, the external transformer is attached</small>	<input type="checkbox"/> 200-240V AC
	<input type="checkbox"/> 380-460V AC		<input type="checkbox"/> 24V DC
	<input type="checkbox"/> 48V DC		<input type="checkbox"/> 100-110V DC
	<input type="checkbox"/> 100-110V DC		<input type="checkbox"/> 120-125V DC
	<input type="checkbox"/> 120-125V DC		

Mechanical accessories P15-16	<input checked="" type="checkbox"/> Push button cover (BC-L)
	<input checked="" type="checkbox"/> Counter (CNT)
	<input type="checkbox"/> Cylinder lock (CYL)
	<input type="checkbox"/> Door interlock (DI) <small>Note11</small>
	<input type="checkbox"/> Terminal cover (TTC)
	<input checked="" type="checkbox"/> Door frame (DF)
	<input type="checkbox"/> Dust cover (DUC)
	<input checked="" type="checkbox"/> Interphase barrier (BA) <small>Note12</small> <input type="checkbox"/> for 2units (MI2) <input type="checkbox"/> Mechanical interlock (MI) <input type="checkbox"/> for 3units (MI3) <small>Note11</small>

- Note 1: For AE630-SW and AE2000-SW Low rating type, please specify CT rating. Refer to Page 9 and Page 20.
- Note 2: There is a case to be derated by ambient temperature. Refer to Page 60.
- Note 3: As for the terminal for AE2000-SWA, AE4000-SWA and AE4000-SW-AE6300-SW, Vertical terminal type only is available. (FIX-VT or DR-VT)
- Note 4: Refer to Page 11 and Page 43-45.
- Note 5: This setting is available for change by customer later. A preliminary setting of CL at factory shipment is as follows.
CL1: 1C CL2: 1C1D CL3: 1C1T1D CL4: 2C1T1D
- Note 6: Not available for AE630-SW with CT rating : 250A or 315A or 500A.
- Note 7: Not available for WB1, WB2 and WB3 Main setting module.
N5 optional setting module is used for 3phase 4wires system.(4Pole breaker or 3pole breaker with Neutral CT)
- Note 8: Neutral CT is required for Ground fault or Neutral pole protection, when 3 Pole breaker is used for 3 phase 4 wires system.
- Note 9: For Earth leakage protection, it is required External ZCT.
- Note 10: 24V DC and 48V DC are not available for AE4000-SWA 4P and AE4000-SW-AE6300-SW.
- Note 11: The combined installation of DI and MI3 is not available.
- Note 12: Some module types are not provided BA. Refer to Page15.
- Note 13: Power Supply comes from the top terminals.
- Note 14: Power Supply comes from the bottom terminals.
- Note 15: Current capacity of the neutral poles
HN: 50% of the rated current
FN: 100% of the rated current (See page 47, 52 for the outline and dimensions.)

Remark
Order Issuer

Ordering information for Mitsubishi AE-SW series air circuit breaker (General use---WS Type, Special use---WB Type, Protective coordination use---WF Type)

Customer(name)	Order No.	Number of units	units
Type P.9-10 AE _____ -SW AE _____ -SWA			
Number of poles <input type="checkbox"/> 3P <input type="checkbox"/> 4P AE4000-SW- AE6300-SW <input type="checkbox"/> 3P <input type="checkbox"/> 4P HN <small>Note15</small> <input type="checkbox"/> 4P FN <small>Note15</small>			
Current setting Ir _____ A CT rating _____ A <small>Note1 P.9,P.20</small>			
Applicable standard <input type="checkbox"/> IEC 60947-2 <input type="checkbox"/> CCC			
Ambient temperature <input type="checkbox"/> 40°C (Standard) <input type="checkbox"/> Others _____ °C <small>Note2</small>			
Connection <input type="checkbox"/> Fixed type <small>Note3</small> <input type="checkbox"/> Drawout type <small>Note3</small>			
Main circuit terminal <small>P.11</small>			
<input type="checkbox"/> Horizontal terminal(FIX) <small>(AE630-1600-SW / AE2000-3200-SW)</small> <input type="checkbox"/> Vertical terminal(FIX-VT) <small>(AE2000-SWA / AE4000-SWA / AE4000-6300-SW)</small>		<input type="checkbox"/> Horizontal terminal(DR) <small>Note3</small> <input type="checkbox"/> Vertical terminal(DR-VT) <small>(AE2000-SWA / AE4000-SWA / AE4000-6300-SW)</small> <input type="checkbox"/> Front terminal(DR-FT) <small>Note4</small>	

Drawout type accessories P.17-18

Cell switch(CL- : 1 or 2 or 3 or 4) Note5

Shorting b-contact(SBC- : 1 or 2 or 3 or 4 or 5)

Lifting hooks(HP)

Safety shutter(SST)

Shutter lock(SST-LOCK)

Mis-insertion preventor(MIP)

Test jumper(TJ)

Vertical terminal adapter(VTA) Can be connected to the Horizontal terminals.

Front terminal adapter(FTA)

Electronic trip relay(ETR)		Reset type <input type="checkbox"/> Automatic Reset (Standard) <input type="checkbox"/> Manual Reset (MRE)	
<input type="checkbox"/> With ETR		Additional function <small>P.36</small>	
Type <input type="checkbox"/> - <input type="checkbox"/> - <input type="checkbox"/>		<input type="checkbox"/> Extension module(EX1) <small>P.37</small> <input type="checkbox"/> Display(DP1) <input type="checkbox"/> BIF-CC <input type="checkbox"/> BIF-CON <input type="checkbox"/> Display onto panel board(DP2) <input type="checkbox"/> BIF-PR <input type="checkbox"/> BIF-MD <input type="checkbox"/> VT unit(VT) <input type="checkbox"/> BIF-CL	
Main setting module WS1, WB1, WF1 AE630-1600-SW, AE2000-3200-SW, AE4000-SW WS2, WB2, WF2 AE2000-SWA, AE4000-SWA, AE5000-SW WS3, WB3, WF3 AE6300-SW <small>WS: General use WB: INST only WF: Protective coordination use</small>		Optional setting module G1: Ground fault protection <small>Note6</small> N5: Neutral pole 50% protection <small>Note7</small> E1: Earth leakage protection AP: 2nd Additional Pre-alarm NA: Without optional setting ETR Auxiliary Equipment <input type="checkbox"/> Temperature alarm(TAL) <input type="checkbox"/> MCR switch(MCR-SW) <small>P.34</small>	
<input type="checkbox"/> BARE without ETR		Power supply P1: 100-240V AC+DC P2: 24-60V DC P3: 100-240V AC / 100-125V DC with output contact P4: 24-60V DC with output contact P5: 100-240V DC with output contact (SSR) <input type="checkbox"/> Neutral CT(NCT) <small>Note8</small> <input type="checkbox"/> External ZCT <small>Note9</small> P.32 ZCT <input type="checkbox"/> ZT <input type="checkbox"/> B ZTA <input type="checkbox"/>	

Wire system (when EX1 is specified)

3φ3W
 3φ4W
 Normal connection : Note13
 Reverse connection : Note14

Electrical accessories <small>P.12-14</small>	<input type="checkbox"/> Auxiliary switch <small>A and B contacts in the same quantity are used. Max. quantity: 5 each for A and B contacts</small>
	<input type="checkbox"/> Standard (AX <input type="checkbox"/> : 2 or 4 or 6 or 8 or 10) <input type="checkbox"/> High capacity (HAX <input type="checkbox"/> : 2 or 4 or 6 or 8 or 10)
	<input type="checkbox"/> Motor charging (MD) <input type="checkbox"/> 100-125V AC · DC <input type="checkbox"/> 200-250V AC · DC <input type="checkbox"/> 24V DC <small>Note10</small> <input type="checkbox"/> 48V DC
	<input type="checkbox"/> Closing coil (CC) <input type="checkbox"/> 100-250V AC · DC <input type="checkbox"/> 24-48V DC
<input type="checkbox"/> Shunt trip device (SHT) <input type="checkbox"/> 100-250V AC · DC <input type="checkbox"/> 380-500V AC <input type="checkbox"/> 24-48V DC	
<input type="checkbox"/> Under voltage trip device (LVT)	
<input type="checkbox"/> 100-120V AC <input type="checkbox"/> 200-240V AC <input type="checkbox"/> 380-460V AC <input type="checkbox"/> 24V DC <input type="checkbox"/> 48V DC <input type="checkbox"/> 100-110V DC <input type="checkbox"/> 120-125V DC	Time delay <input type="checkbox"/> Inst (INST) <input type="checkbox"/> 0.5s (05) <input type="checkbox"/> 3.0s (30) <small>Note: In case of 380-460V AC, the external transformer is attached</small>

Mechanical accessories <small>P.15-16</small>	<input type="checkbox"/> Push button cover (BC-L)
	<input type="checkbox"/> Counter (CNT)
	<input type="checkbox"/> Cylinder lock (CYL)
	<input type="checkbox"/> Door interlock (DI) <small>Note11</small>
	<input type="checkbox"/> Terminal cover (TTC)
	<input type="checkbox"/> Door frame (DF)
	<input type="checkbox"/> Dust cover (DUC)
	<input type="checkbox"/> Interphase barrier (BA) <small>Note12</small> <input type="checkbox"/> for 2units (MI2) <input type="checkbox"/> Mechanical interlock (MI) <input type="checkbox"/> for 3units (MI3) <small>Note11</small>

- Note 1:** For AE630-SW and AE2000-SW Low rating type, please specify CT rating. Refer to Page 9 and Page 20.
- Note 2:** There is a case to be derated by ambient temperature. Refer to Page 60.
- Note 3:** As for the terminal for AE2000-SWA, AE4000-SWA and AE4000-SW-AE6300-SW, Vertical terminal type only is available. (FIX-VT or DR-VT)
- Note 4:** Refer to Page 11 and Page 43-45.
- Note 5:** This setting is available for change by customer later. A preliminary setting of CL at factory shipment is as follows.
CL1: 1C CL2: 1C1D CL3: 1C1T1D CL4: 2C1T1D
- Note 6:** Not available for AE630-SW with CT rating : 250A or 315A or 500A.
- Note 7:** Not available for WB1, WB2 and WB3 Main setting module.
N5 optional setting module is used for 3phase 4wires system.(4Pole breaker or 3pole breaker with Neutral CT)
- Note 8:** Neutral CT is required for Ground fault or Neutral pole protection, when 3 Pole breaker is used for 3 phase 4 wires system.
- Note 9:** For Earth leakage protection, it is required External ZCT.
- Note 10:** 24V DC and 48V DC are not available for AE4000-SWA 4P and AE4000-SW-AE6300-SW.
- Note 11:** The combined installation of DI and MI3 is not available.
- Note 12:** Some module types are not provided BA. Refer to Page15.
- Note 13:** Power Supply comes from the top terminals.
- Note 14:** Power Supply comes from the bottom terminals.
- Note 15:** Current capacity of the neutral poles
HN: 50% of the rated current
FN: 100% of the rated current (See page 47, 52 for the outline and dimensions.)

Remark
Order Issuer

Ordering information

Ordering information for Mitsubishi AE-SW series air circuit breaker (Generator protection use---WM Type)

Customer(name) _____	Order No. _____	Number of units _____	units _____
Type P.9-10 AE _____-SW AE _____-SWA			
Number of poles <input type="checkbox"/> 3P <input type="checkbox"/> 4P AE4000-SW- AE6300-SW <input type="checkbox"/> 3P <input type="checkbox"/> 4P HN <small>Note15</small> <input type="checkbox"/> 4P FN <small>Note15</small>			
Current setting Ir _____ A <small>Note1</small>			
Applicable standard <input type="checkbox"/> LR <input type="checkbox"/> BV <input type="checkbox"/> DNV GL <input type="checkbox"/> ABS <input type="checkbox"/> CCS <input type="checkbox"/> IEC 60947-2			
Ambient temperature <input type="checkbox"/> 40°C (Standard) <input type="checkbox"/> Others _____ °C <small>Note2</small>			
Connection <input type="checkbox"/> Fixed type <small>Note3</small> <input type="checkbox"/> Drawout type <small>Note3</small>			
Main circuit terminal P.11			
<input type="checkbox"/> Horizontal terminal(FIX) (AE630-1600-SW / AE2000-3200-SW) <input type="checkbox"/> Vertical terminal(FIX-VT) (AE2000-SWA / AE4000-SWA / AE4000-6300-SW)		<input type="checkbox"/> Horizontal terminal(DR) _____ <input type="checkbox"/> Vertical terminal(DR-VT) (AE2000-SWA / AE4000-SWA / AE4000-6300-SW) <input type="checkbox"/> Front terminal(DR-FT) <small>Note4</small>	

Drawout type accessories P.17-18

Cell switch(CL- : 1 or 2 or 3 or 4) Note5

Shorting b-contact(SBC- : 1 or 2 or 3 or 4 or 5)

Lifting hooks(HP)

Safety shutter(SST)

Shutter lock(SST-LOCK)

Mis-insertion preventor(MIP)

Test jumper(TJ)

Vertical terminal adapter(VTA) Can be connected to the Horizontal terminals.

Front terminal adapter(FTA)

Electronic trip relay(ETR)		Reset type <input type="checkbox"/> Automatic Reset (Standard) <input type="checkbox"/> Manual Reset (MRE)	
<input type="checkbox"/> With ETR		Additional function P.36	
Type <input type="checkbox"/> <input type="checkbox"/> - <input type="checkbox"/>		<input type="checkbox"/> Extension module(EX1) Network P.37 <input type="checkbox"/> Display(DP1) <input type="checkbox"/> BIF-CC <input type="checkbox"/> BIF-CON <input type="checkbox"/> Display onto panel board(DP2) <input type="checkbox"/> BIF-PR <input type="checkbox"/> BIF-MD <input type="checkbox"/> VT unit(VT) <input type="checkbox"/> BIF-CL	
Main setting module WM1 AE630-1600-SW, AE2000-3200-SW, AE4000-SW WM2 AE2000-SWA, AE4000-SWA, AE5000-SW WM3 AE6300-SW WM: Generator protection use		Optional setting module G1: Ground fault protection <small>Note6</small> N5: Neutral pole 50% protection <small>Note7</small> E1: Earth leakage protection AP: 2nd Additional Pre-alarm NA: Without optional setting	
Power supply P1: 100-240V AC-DC P2: 24-60V DC P3: 100-240V AC / 100-125V DC with output contact P4: 24-60V DC with output contact P5: 100-240V DC with output contact (SSR) <input type="checkbox"/> Neutral CT(NCT) <small>Note8</small> <input type="checkbox"/> External ZCT <small>Note9</small> P.32 ZCT <input type="checkbox"/> ZT <input type="checkbox"/> B ZTA <input type="checkbox"/>		Wire system (when EX1 is specified) EX1 <input type="checkbox"/> 3φ3W <input type="checkbox"/> 3φ4W <input type="checkbox"/> Normal connection : <small>Note13</small> <input type="checkbox"/> Reverse connection : <small>Note14</small>	
Specify a setting value, if required. <small>P.25, 26, 29-31</small> LTD pick-up current : IL <input type="text"/> LTD time : TL <input type="text"/> STD pick-up current : Istd <input type="text"/> STD time : Tsd <input type="text"/> INST pick-up current: Ii <input type="text"/> Pre-alarm current: Ip <input type="text"/> Others (<input type="text"/>)		ETR Auxiliary Equipment <input type="checkbox"/> Temperature alarm(TAL) <input type="checkbox"/> MCR switch(MCR-SW) P.34	

Electrical accessories P.12-14	
<input type="checkbox"/> Auxiliary switch <small>A and B contacts in the same quantity are used. Max. quantity: 5 each for A and B contacts.</small> <input type="checkbox"/> Standard (AX <input type="checkbox"/> : 2 or 4 or 6 or 8 or 10) <input type="checkbox"/> High capacity (HAX <input type="checkbox"/> : 2 or 4 or 6 or 8 or 10)	
<input type="checkbox"/> Motor charging (MD) <input type="checkbox"/> 100-125V AC · DC <input type="checkbox"/> 200-250V AC · DC <input type="checkbox"/> 24V DC <small>Note10</small> <input type="checkbox"/> 48V DC	
<input type="checkbox"/> Closing coil (CC) <input type="checkbox"/> 100-250V AC · DC <input type="checkbox"/> 24-48V DC	
<input type="checkbox"/> Shunt trip device (SHT) <input type="checkbox"/> 100-250V AC · DC <input type="checkbox"/> 380-500V AC <input type="checkbox"/> 24-48V DC	
<input type="checkbox"/> Under voltage trip device (UVT) <input type="checkbox"/> 100-120V AC <input type="checkbox"/> 200-240V AC <input type="checkbox"/> 380-460V AC <input type="checkbox"/> 24V DC <input type="checkbox"/> 48V DC <input type="checkbox"/> 100-110V DC <input type="checkbox"/> 120-125V DC Time delay <input type="checkbox"/> Inst (INST) <input type="checkbox"/> 0.5s (05) <input type="checkbox"/> 3.0s (30) <small>Note: In case of 380-460V AC, the external transformer is attached.</small>	

Mechanical accessories P.15-16	
<input type="checkbox"/> Push button cover (BC-L) <input type="checkbox"/> Counter (CNT) <input type="checkbox"/> Cylinder lock (CYL) <input type="checkbox"/> Door interlock (DI) <small>Note11</small> <input type="checkbox"/> Terminal cover (TTC) <input type="checkbox"/> Door frame (DF) <input type="checkbox"/> Dust cover (DUC) <input type="checkbox"/> Interphase barrier (BA) <small>Note12</small> <input type="checkbox"/> for 2 units (MI2) <input type="checkbox"/> Mechanical interlock (MI) <input type="checkbox"/> for 3 units (MI3) <small>Note11</small>	

Note 1: Please specify current setting (Ir) from the specification table. Refer to Page 9 and 10.

Note 2: There is a case to be derated by ambient temperature. Refer to Page 60.

Note 3: As for the terminal for AE2000-SWA, AE4000-SWA and AE4000-SW-AE6300-SW, Vertical terminal type only is available. (FIX-VT or DR-VT)

Note 4: Refer to Page 11 and Page 43-45.

Note 5: This setting is available for change by customer later. A preliminary setting of CL at factory shipment is as follows.
 CL1: 1C CL2: 1C1D CL3: 1C1T1D CL4: 2C1T1D

Note 6: Not available for AE630-SW with CT rating : 250A or 315A or 500A.

Note 7: N5 optional setting module is used for 3 phase 4 wires system. (4 Pole breaker or 3 pole breaker with Neutral CT)

Note 8: Neutral CT is required for Ground fault or Neutral pole protection, when 3 Pole breaker is used for 3 phase 4 wires system.

Note 9: For Earth leakage protection, it is required External ZCT.

Note 10: 24V DC and 48V DC are not available for AE4000-SWA 4P and AE4000-SW-AE6300-SW.

Note 11: The combined installation of DI and MI3 is not available.

Note 12: Some module types are not provided BA. Refer to Page 15.

Note 13: Power Supply comes from the top terminals.

Note 14: Power Supply comes from the bottom terminals.

Note 15: Current capacity of the neutral poles
 HN: 50% of the rated current
 FN: 100% of the rated current (See page 47, 52 for the outline and dimensions.)

Remark
Order Issuer

Ordering information for MITSUBISHI AE-SW series air circuit breaker (General use---WS relay with Ampere Meter and Fault Memory "DP3")

Customer(name) _____		Order No. _____		Number of units _____	units _____
Type AE _____ -SW		AE _____ -SWA			
Number of poles					
<input type="checkbox"/> 3P <small>AE630-SW- AE4000-SWA</small>		<input type="checkbox"/> 4P <small>AE4000-SW- AE6300-SW</small>		<input type="checkbox"/> 3P <input type="checkbox"/> 4P HN <small>Note9</small> <input type="checkbox"/> 4P FN <small>Note9</small>	
Current setting I_r _____ A		CT rating _____ A		<small>Note1</small>	
Applicable standard		<input type="checkbox"/> IEC60947-2 <input type="checkbox"/> CCC			
Ambient temperature		<input type="checkbox"/> 40°C (Standard) <input type="checkbox"/> Others _____ °C <small>Note2</small>			
Connection		<input type="checkbox"/> Fixed type <small>Note3</small> <input type="checkbox"/> Drawout type <small>Note3</small>			
Main circuit terminal		<input type="checkbox"/> Horizontal terminal(FIX) <small>(AE630-1600-SW / AE2000-3200-SW)</small> <input type="checkbox"/> Vertical terminal(FIX-VT) <small>(AE2000-SWA / AE4000-SWA AE4000-6300-SW)</small>		<input type="checkbox"/> Horizontal terminal(DR) <input type="checkbox"/> Vertical terminal(DR-VT) <small>(AE2000-SWA / AE4000-SWA AE4000 to 6300-SW)</small> <input type="checkbox"/> Front terminal(DR-FT)	

Drawout type accessories

Cell switch(CL- : 1 or 2 or 3 or 4) Note4

Shorting b-contact(SBC- : 1 or 2 or 3 or 4 or 5)

Lifting hooks(HP)

Safety shutter(SST)

Shutter lock(SST-LOCK)

Mis-insertion preventer(MIP)

Test jumper(TJ)

Vertical terminal adapter(VTA) Can be connected to the Horizontal terminals.

Front terminal adapter(FTA)

Electronic trip relay(ETR) <small>Note11</small>		Reset type							
<input checked="" type="checkbox"/> With ETR Type <input type="text"/> - <input type="text"/> ; DP3		<input type="checkbox"/> Automatic Reset (Standard) <input type="checkbox"/> Manual Reset (MRE)							
<p>Main setting <small>Note10</small></p> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td>WS1</td> <td>AE630-1600-SW, AE2000-3200-SW, AE4000-SW</td> </tr> <tr> <td>WS2</td> <td>AE2000-SWA, AE4000-SWA, AE5000-SW</td> </tr> <tr> <td>WS3</td> <td>AE6300-SW</td> </tr> </table> <p>WS: General use</p>		WS1	AE630-1600-SW, AE2000-3200-SW, AE4000-SW	WS2	AE2000-SWA, AE4000-SWA, AE5000-SW	WS3	AE6300-SW	<p>Optional setting</p> <p>G1: Ground fault protection NA: Without optional setting</p> <p>ETR Auxiliary Equipment <small>Note10</small></p> <p><input type="checkbox"/> MCR switch(MCR-SW)</p>	
WS1	AE630-1600-SW, AE2000-3200-SW, AE4000-SW								
WS2	AE2000-SWA, AE4000-SWA, AE5000-SW								
WS3	AE6300-SW								
<p>Power supply</p> <p>P1: 100-240V AC-DC P2: 24-60V DC P3: 100-240V AC / 100-125V DC with output contact P4: 24-60V DC with output contact P5: 100-240V DC with output contact (SSR)</p>		<p>Connection</p> <p><input type="checkbox"/> 3φ3W <input type="checkbox"/> 3φ4W</p> <p><input type="checkbox"/> Neutral CT(NCT) <small>Note5</small></p>							

Electrical accessories																		
<input type="checkbox"/> Auxiliary switch <small>A and B contacts in the same quantity are used. Max. quantity: 5 each for A and B contacts.</small> <input type="checkbox"/> Standard (AX <input type="checkbox"/> : 2 or 4 or 6 or 8 or 10) <input type="checkbox"/> High capacity (HAX <input type="checkbox"/> : 2 or 4 or 6 or 8 or 10)																		
<input type="checkbox"/> Motor charging (MD)																		
<input type="checkbox"/> Closing coil (CC)																		
<input type="checkbox"/> Shunt trip device (SHT)																		
<input type="checkbox"/> Under voltage trip device (UVT)																		
<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td>100-120V AC</td> <td rowspan="2">Time delay</td> <td rowspan="2">Inst (INST)</td> </tr> <tr> <td>200-240V AC</td> </tr> <tr> <td>380-460V AC</td> <td rowspan="2">0.5s(05)</td> <td rowspan="2">3.0s(30)</td> </tr> <tr> <td>24V DC</td> </tr> <tr> <td>48V DC</td> <td colspan="2"></td> </tr> <tr> <td>100-110V DC</td> <td colspan="2"></td> </tr> <tr> <td>120-125V DC</td> <td colspan="2"></td> </tr> </table> <p><small>Note: In the case of 380-460V AC, the external transformer is attached.</small></p>		100-120V AC	Time delay	Inst (INST)	200-240V AC	380-460V AC	0.5s(05)	3.0s(30)	24V DC	48V DC			100-110V DC			120-125V DC		
100-120V AC	Time delay	Inst (INST)																
200-240V AC																		
380-460V AC	0.5s(05)	3.0s(30)																
24V DC																		
48V DC																		
100-110V DC																		
120-125V DC																		

Mechanical accessories	
<input type="checkbox"/> Push button cover(BC-L) <input type="checkbox"/> Counter(CNT) <input type="checkbox"/> Cylinder lock(CYL) <input type="checkbox"/> Door interlock(DI) <small>Note7</small> <input type="checkbox"/> Terminal cover(TTC) <input type="checkbox"/> Door frame(DF) <input type="checkbox"/> Dust cover(DUC) <input type="checkbox"/> Interphase barrier(BA) <small>Note8</small> <input type="checkbox"/> for 2units(MI2) <input type="checkbox"/> Mechanical interlock(MI) <input type="checkbox"/> for 3units(MI3) <small>Note7</small>	

Note 1: For AE2000-SW, low rating current types are available. Low rating types (250A, 315A, 500A) are not available for AE630-SW.

Note 2: There is a case to be derated by ambient temperature. Refer to Page 60.

Note 3: As for the terminal for AE2000-SWA, AE4000-SWA and AE4000-SW-AE6300-SW, Vertical terminal type only is available. (FIX-VT or DR-VT)

Note 4: This setting is available for change by customer later. A preliminary setting of CL at factory shipment is as follows.
 CL1:1C CL2:1C1D CL3:1C1T1D CL4:2C1T1D

Note 5: Neutral CT is required for Ground fault or Neutral pole protection, when 3-pole breaker is used for 3phase 4wire system.

Note 6: 24V DC and 48V DC are not available for AE4000-SWA 4P or AE4000 to 6300-SW.

Note 7: The combined installation of DI and MI3 is not available.

Note 8: Some module types are not provided BA. Refer to Page15.

Note 9: Current capacity of the neutral poles
 HN: 50% of the rated current
 FN: 100% of the rated current (See page 47, 52 for the outline and dimensions.)

Note 10: If MCR switch is ordered, INST/MCR characteristic will be installed. INST/MCR characteristics can be switched using a setting dial.

Note 11: For WS relay with ampere meter and fault memory (DP3), ETR including optional setting such as "G1" has integrated structure. So, optimal setting such as G1 for WS relay with DP3 should be specified before ordering as those parts cannot be installed with ETR after factory shipment.

Remark

Order Issuer

Country/Region	Corporation Name	Address	Telephone
Australia	Mitsubishi Electric Australia Pty. Ltd.	348 Victoria Road, Rydalmere, N.S.W. 2116, Australia	+61-2-9684-7777
Algeria	Mec Casa	Cité Alghazel N° 01 DZ-02000 Chief	+21327798069
Bangladesh	PROGRESSIVE TRADING CORPORATION	HAQUE TOWER,2ND FLOOR,610/11,JUBILEE ROAD, CHITTAGONG, BANGLADESH	+880-31-624307
	ELECTRO MECH AUTOMATION& ENGINEERING LTD.	SHATABDI CENTER, 12TH FLOOR, SUITES : 12-B, 292, INNER CIRCULAR ROAD, FAKIRA POOL, MOTIJIHEEL, DHAKA-1000, BANGLADESH	+88-02-7192826
Belarus	Tehnikon	Oktyabrskaya 19, Of. 705, BY-220030 Minsk, Belarus	+375 (0)17 / 210 46 26
Belgium	EL-CON, Powergrid Solutions B.V.	Wattstraat 8, 2691GZ 's-Gravenzande, Netherlands	+31 (0)174 286 900
Brasil	Mitsubishi Electric do Brasil Comércio e Serviços Ltda.	Avenida Adelino Cardana, 293 21 andar Bethaville, Barueri SP, Brasil	+55-11-4689-3000
Cambodia	DHINIMEX CO.,LTD	#245, St. Tep Phan, Phnom Penh, Cambodia	+855-23-997-725
Central America	Automation International LLC	7050 W. Palmetto Park Road Suite #15 PMB #555, Boca Raton, FL 33433	+1-561-237-5228
Chile	Rhona S.A. (Main office)	Vte. Agua Santa 4211 Casilla 30-D (P.O. Box) Vina del Mar, Chile	+56-32-2-320-600
China	Mitsubishi Electric Automation (China) Ltd.	Mitsubishi Electric Automation Building, No.1386 Hongqiao Road, Shanghai, China 200336	+86-21-2322-3030
	Mitsubishi Electric Automation (China) Ltd. BeiJing Branch	5/F,ONE INDIGO,20 Jiuxianqiao Road Chaoyang District,Beijing, China 100016	+86-10-6518-8830
	Mitsubishi Electric Automation (China) Ltd. ShenZhen Branch	Level 8, Galaxy World Tower B, 1 Yabao Road, Longgang District, Shenzhen, China 518129	+86-755-2399-8272
	Mitsubishi Electric Automation (China) Ltd. GuangZhou Branch	Rm.1006, A1 Times E-Park, No.276-282, Hanxi Road East, Zhongcun Street, Panyu Distric, Guangzhou, China 510030	+86-20-8923-6730
	Mitsubishi Electric Automation (China) Ltd. ChengDu Branch	1501-1503,15F, Guang-hua Centre Building-C, No.98 North Guang Hua 3th Rd Chengdu, China 610000	+86-28-8446-8030
Mitsubishi Electric Automation (Hong Kong) Ltd.	20/F., Cityplaza One, 1111 King's Road, Taikoo shing, Hong Kong	+852-2510-0555	
Colombia	Proelectrico Representaciones S.A.	Carrera 42 N° 75 – 367 Bodega 109, Itagüi, Medellín, Antioquia, Colombia	+57-4-4441284
	Mavicontrol Ltda	Calle 78 No. 70 A – 03 BRR BONANZA, Bogotá-Colombia	+57-1-4303803
Czech Republic	AUTOCONT CONTROL SYSTEMS S.R.O	Technologická 374/6, CZ-708 00 Ostrava - Pustkovec	+420 595 691 150
Denmark	HANS FOLSGAARD A/S	THEILGAARDS ALLE 11 / 4600 KOGE / DK	+45 43 20 86 00
Egypt	Cairo Electrical Group	9, Rostoum St. Garden City P.O. Box 165-11516 Maglis El-Shaab,Cairo - Egypt	+20-2-27961337
Estonia	ELECTROBIT OU	PÄRNU MNT. 160 IJ / 11317 TALLINN / EE	+372 651 8140
Finland	UTU AUTOMATION OY	PELTOTIE 37 / 28400 ULVILA / FI	+358 20 7463540
France	Mitsubishi Electric Europe B.V. French Branch	FR-92741 Nanterre Cedex	+33 (0)1 55 68 57 01
Germany	Mitsubishi Electric Europe B.V.	Mitsubishi-Electric-Platz 1, 40882 Ratingen, Germany	+49 (0) 2102 4860
	UTECO	5, MAVROGENOUS STR., 18542 PIRAEUS, Greece	+30-211-1206-900
Hungary	Meltrade Ltd.	Fertő utca 14. HU-1107 Budapest, Hungary	+36 (0)1-431-9726
India	Mitsubishi Electric India Private Limited	2nd Floor, Tower A&B, Cyber Greens, DLF Cyber City, DLF Phase-III, Gurgaon - 122 022 Haryana, India	+91-124-4630300
	Mitsubishi Electric India Private Limited Pune Sales Office	ICC-Devi Gaurav Technology Park, Unit no. 402, Fourth Floor, Survey no. 191-192 (P), Opp. Vallabh Nagar Bus Depot, Pune – 411018, Maharashtra, India	+91-(20)68192100
Indonesia	P.T. Sahabat Indonesia	P.O.Box 5045 Kawasan Industri Pergudangan, Jakarta, Indonesia	+62-(0)21-6610651-9
Ireland	Mitsubishi Electric Europe B.V.	Westgate Business Park, Ballymount, IRL-Dublin 24, Ireland	+353 (0)1-4198800
Israel	Sherf Motion Technology Ltd	Rehov Hamerkava 19 IL-58851 Holon	+972 (0)3 / 559 54 62
	Ilan & Gavish Ltd	24 Shenkar St., Kiryat Arie IL-49001 Petah-Tikva	+972 (0)3 / 922 18 24
Italy	Mitsubishi Electric Europe B.V.	Viale Colleoni 7, I-20041 Agrate Brianza (MI), Italy	+39 039-60531
Kazakhstan	Kazpromavtomatika	Ul. Zhambyla 28, KAZ - 100017 Karaganda	+7-7212-501000
Korea	Mitsubishi Electric Automation Korea Co., Ltd	9F Gangseo Hangang xi-tower, 401 Yangcheon-ro, Gangseo-gu, Seoul 07528 Korea	+82-2-3660-9572
Laos	AROUNKIT CORPORATION IMPORT-EXPORT SOLE CO.,LTD	SAPHANMO VILLAGE. SAYSETHA DISTRICT, VIENTIANE CAPITAL, LAOS	+856-20-415899
Lebanon	Comptoir d'Electricite Generale-Liban	Cebaco Center - Block A Autostrade Dora, P.O. Box 11-2597 Beirut - Lebanon	+961-1-240445
Latvia	SIA OAK INTEGRATOR PRODUCTS	VIENIBAS GATVE 200 / 1058 RIGA / LV	+371 0-67842280
Lithuania	AUTOMATIKOS CENTRAS UAB	PRAMONES PR. 17H / 51327 KAUNAS / LT	+370 37 262707
Malaysia	Mitric Sdn Bhd	No. 5 Jalan Pemberita U1/49, Temasya Industrial Park, Glenmarie 40150 Shah Alam, Selangor, Malaysia	+603-5569-3748
Malta	ALFATRADE LTD	99 PAOLA HILL, PAOLA PLA 1702, Malta	+356 (0)21-697-816
Marocco	SCHIELE MAROC	KM 7,2 NOUVELLE ROUTE DE RABAT AIN SEBAA, 20600 Casablanca, Marocco	+212 661 45 15 96
Myanmar	Peace Myanmar Electric Co.,Ltd.	NO137/139 Botahtaung Pagoda Road, Botahtaung Town Ship 11161, Yangon, Myanmar	+95-(0)1-202589
Nepal	Watt&Volt House	KHA 2-65, Volt House Dillibazar Post Box:2108,Kathmandu,Nepal	+977-1-4411330
Netherlands	EL-CON, Powergrid Solutions B.V.	Wattstraat 8, 2691GZ 's-Gravenzande, Netherlands	+31 (0)174 286 900
North America	Mitsubishi Electric Automation, Inc.	500 Corporate Woods Parkway, Vernon Hills, IL 60061 USA	+847-478-2100
Norway	Mitsubishi Electric Europe B.V. Norwegian Branch	Dronninggata 15, 3019 Drammen, Norway	+47 915 02650
Norway	Scanelec AS	Leivrikasen 43B, NO-5179 Godvik, Norway	+47 (0)55-506000
Mexico	Mitsubishi Electric Automation, Inc. Mexico Branch	Blvd. Miguel de Cervantes Saavedra 301, Torre Norte Piso 5, Col. Ampliación Granada, Miguel Hidalgo, Ciudad de México, CP 11520, México	+52-55-3067-7511
Middle East Arab Countries & Cyprus	Comptoir d'Electricite Generale-International-S.A.L.	Cebaco Center - Block A Autostrade Dora P.O. Box 11-1314 Beirut - Lebanon	+961-1-240430
Pakistan	Prince Electric Co.	2-P GULBERG II, LAHORE, 54600, PAKISTAN	+92-42-575232, 5753373
Peru	Rhona S.A. (Branch office)	Avenida Argentina 2201, Cercado de Lima	+51-1-464-4459
Philippines	Edison Electric Integrated, Inc.	24th Fl. Galleria Corporate Center, Edsa Cr. Ortigas Ave., Quezon City Metro Manila, Philippines	+63-(0)2-634-8691
Poland	Mitsubishi Electric Europe B.V. Polish Branch	Krakowska 48, 32-083 Balice, Poland	+48 12 347 65 00
Republic of Moldova	Intehsis SRL	bld. Traian 23/1, MD-2060 Kishinev, Moldova	+373 (0)22-66-4242
Romania	Sirius Trading & Services SRL	RO-060841 Bucuresti, Sector 6 Aleea Lacul Morii Nr. 3	+40-(0)21-430-40-06
Russia	Mitsubishi Electric (Russia) LLC	2 bld.1, Letnikovskaya street, Moscow, 115114, Russia	+7 495 721-2070
Saudi Arabia	Center of Electrical Goods	Al-Shuwayer St. Side way of Salahuddin Al-Ayoubi St. P.O. Box 15955 Riyadh 11454 - Saudi Arabia	+966-1-4770149
Singapore	Mitsubishi Electric Asia Pte. Ltd.	307 Alexandra Road, Mitsubishi Electric Building, Singapore 159943	+65-6473-2308
Slovakia	PROCONT, Presov	Kupelna 1/, SK - 08001 Presov, Slovakia	+421 (0)51 - 7580 611
	SIMAP	Jana Derku 1671, SK - 91101 Trenčin, Slovakia	+421 (0)32 743 04 72
Slovenia	Inea RBT d.o.o.	Stegne 11, SI-1000 Ljubljana, Slovenia	+386 (0)1-513-8116
South Africa	CBI-electric: low voltage	Private Bag 2016, ZA-1600 Isando Gauteng, South Africa	+27-(0)11-9282000
Spain	Mitsubishi Electric Europe B.V. Spanish Branch	Carretera de Rubí 76-80, E-08190 Sant Cugat del Vallés (Barcelona), Spain	+34 (0)93-565-3131
Sweden	Mitsubishi Electric Europe B.V. (Scandinavia)	Hedvig Möllers gata 6, 223 55 Lund, Sweden	+46 (0)8-625-10-00
Sweden	Euro Energy Components AB	Järnvägsatan 36, S-434 24 Kungälv, Sweden	+46 (0)300-690040
Switzerland	Widap AG	Muehlentalstrasse 136, CH-8201 Schaffhausen	+41 (0)52 632 10 20
Taiwan	Setsuyo Enterprise Co., Ltd	5th Fl., No.105, Wu Kung 3rd, Wu-Ku Hsiang, Taipei, Taiwan, R.O.C.	+886-(0)2-2298-8889
Thailand	United Trading & Import Co., Ltd.	77/12 Bamrungmuang Road,Klong Mahanak Pomrab Bangkok Thailand	+66-223-4220-3
Tunisia	MOTRA Electric	3, Résidence Imen, Avenue des Martyrs Mourouj III, 2074 - El Mourouj III Ben Arous, Tunisia	+216-71 474 599
Turkey	Mitsubishi Electric Turkey A.Ş.	Şerifali Mahallesi Kale Sokak No: 41, 34775 Ümraniye, Istanbul, Turkey	+90-216-969-2666
United Kingdom	Mitsubishi Electric Europe B.V.	Travellers Lane, UK-Hatfield, Herts. AL10 8XB, United Kingdom	+44 (0)1707-276100
Uruguay	Fierro Vignoli S.A.	Avda. Uruguay 1274 Montevideo Uruguay	+598-2-902-0808
Vietnam	Mitsubishi Electric Vietnam Co.,Ltd. Head Office	Unit01-04, 10th Floor, Vincom Center, 72 Le Thanh Ton Street, District 1, Ho Chi Minh City, Vietnam	+84-28-3910-5945
	Mitsubishi Electric Vietnam Co.,Ltd. Hanoi Branch	24th Floor, Handico Tower, Pham Hung Road, khu do thi moi Me Tri Ha, Nam Tu Liem District, Hanoi City, Vietnam	+84-24-3937-8075

MITSUBISHI Low Voltage Air Circuit Breakers

For Safety : Please read the instruction manual carefully before using the products in this catalog.
Wiring and connection must be done by the person has a specialized knowledge of electric construction and wiring.

FA Global Site

<http://www.mitsubishielectric.com/fa/products/lvd/lvcb/index.html>



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MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE: TOKYO BUILDING, 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN