MITSUBISHI ELECTRIC

Changes for the Better

LOW VOLTAGE AIR CIRCUIT BREAKERS

World Super WS Series

World Super AE

630AF~6300AF

07A

Empowering Industries

ISO 14001 JACO EC97J1128 UKAS ENVIRONMENTAL MANAGEMENT 051

Certified ISO 9001 by BVQI UKAS QUALITY MANAGEMENT 008

Mitsubishi Electric Corporation's Fukuyama Works, which produces these products, is certified as meeting the ISO 14001:2004 environmental management system standard.

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

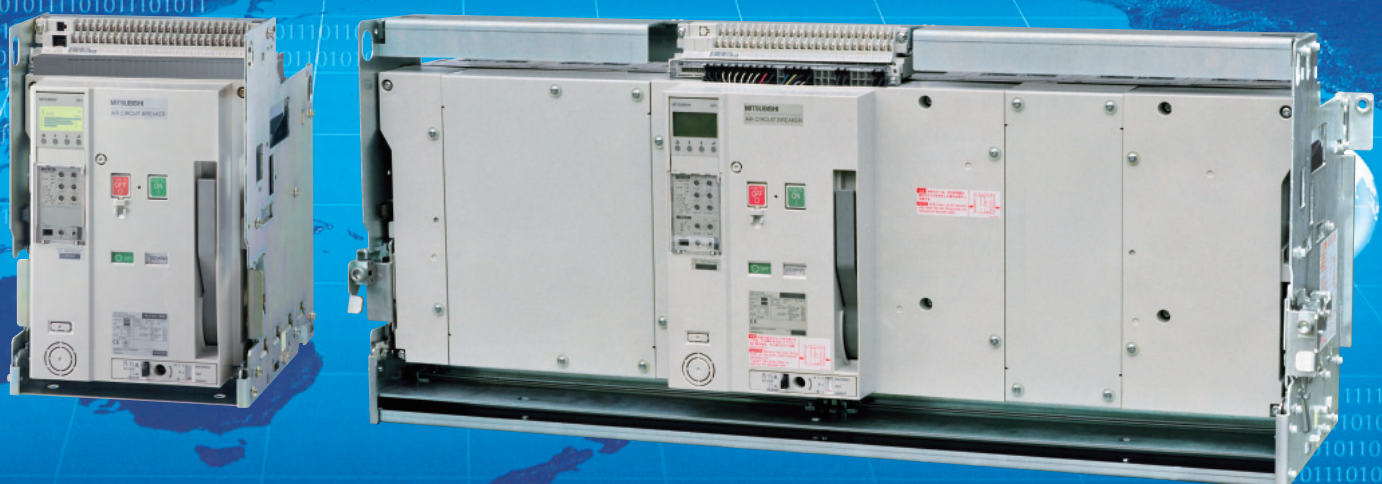
High-Reliability

Safety and reliability provided

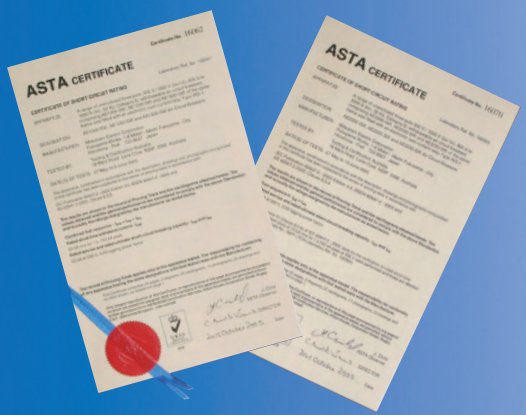
Customer Friendly

Easy handling and retrofitted solution

Global...



Contents



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
SH series	AE630-SH	AE1000-SH	AE1250-SH	AE1600-SH	AE2000-SH	AE2500-SH	AE3200-SH	—		

Note : Please contact us for the details of AE-SH series.

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
		
LTD+STD+INST / MCR	LTD+STD+INST / MCR	INST / MCR only

Note : *For optimum protective coordination with upstream and/or downstream protective devices such as fuses and OCRs, WF relay (WF1/WF2/WF3) are provided.
As for the details about WF relay, please make inquiries.

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 neccessary for Display and LEDs. (see page 19, 20.)

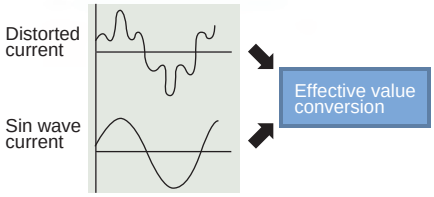
P1	100-240V AC•DC
P2	24-60V DC
P3	100-240V AC / 100-125V DC with output contact
P4	24-60V DC with output contact
P5	100-240V DC with output contact (SSR)

Additional function

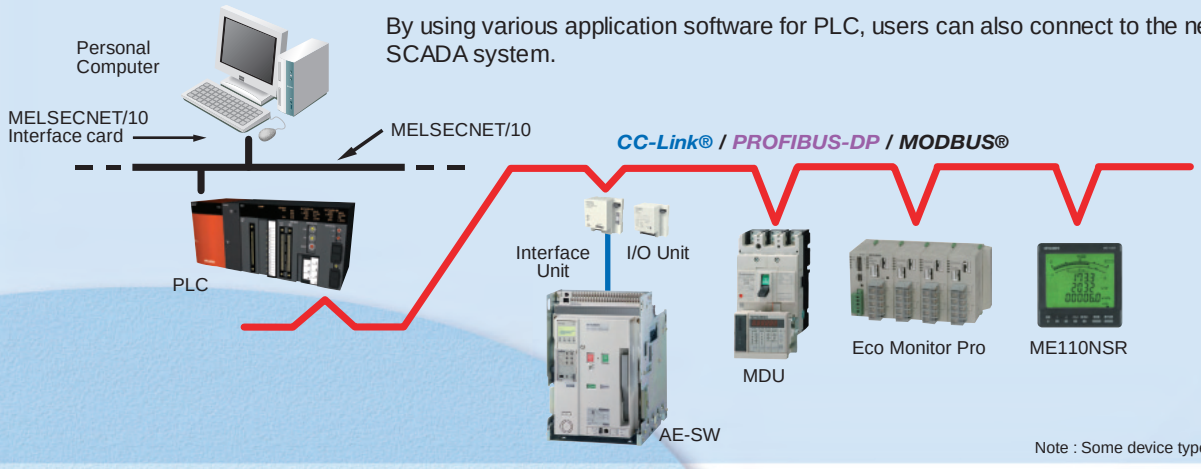
EX1 Extension module	DP1 Display	TAL Temperature alarm
		The TAL is operated by an unusual temperature of the breaker contacts.
Module for display and communication	Current,Voltage,Power, Harmonics,Trip current,etc.	**MCR-SW MCR switch**
	Note : The VT unit is required to display the measured data except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

■ **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



By using various application software for PLC, users can also connect to the network SCADA system.

Note : Some device types are excluded.

Interface unit

CC-Link® **PROFIBUS-DP** **MODBUS®(RS-485)**



BIF-CC **BIF-PR** **BIF-MD**

Communication items

Measurement / alarm	Current, Voltage, Power, Harmonics, etc
	Tripping cause/current
	Alarm (PAL,TAL,Self diagnosis)
Breaker control	Breaker ON,OFF
	Spring charge
Breaker status	ON/OFF
	Drawout position

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

VT unit VT

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

Electronic Trip Relay type code

□□□-□

Main setting module

WS1, WB1, WM1	AE630–1600-SW, AE2000–3200-SW, AE4000-SW
WS2, WB2, WM2	AE2000-SWA, AE4000-SWA, AE5000-SW
WS3,WB3,WM3	AE6300-SW

WS : General use
WM: Generator protection use
WB : INST/MCR only

Optional setting module

G1: Ground fault protection
N5: Neutral pole 50% protection
E1: Earth leakage protection
AP: 2nd Additional Pre-alarm
NA: Without optional setting

Power supply

P1: AC·DC100-240V
P2: DC24-60V
P3: AC100-240V / DC100-125V with output contact
P4: DC24-60V with output contact
P5: DC100-240V with output contact (SSR)

Additional function

- ☐ Extension module(EX1)
  - ☐ Display(DP1)
  - ☐ Display onto panel board(DP2)
  - ☐ VT unit(VT)
- ☐ Temperature alarm(TAL)
- ☐ MCR switch(MCR-SW)

Network

- ☐ BIF-CC
- ☐ BIF-PR
- ☐ BIF-MD

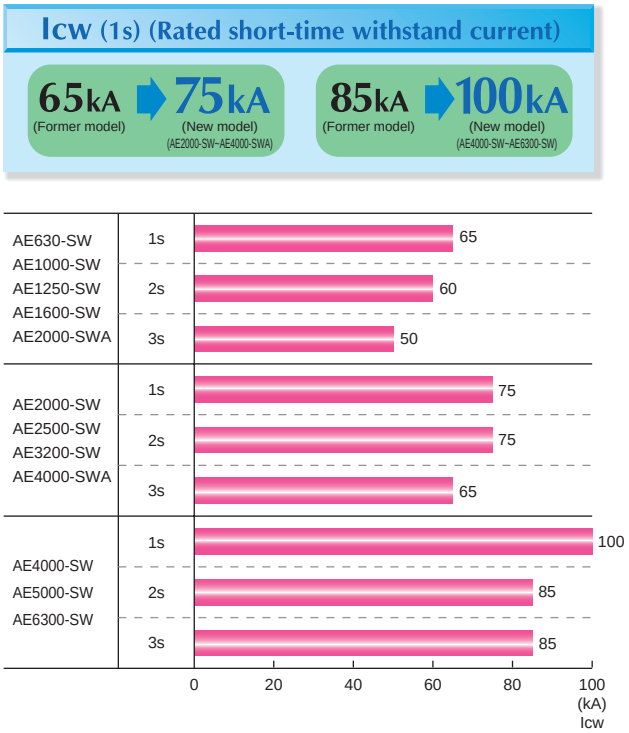
The safety of valuable circuits can be securely maintained.

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

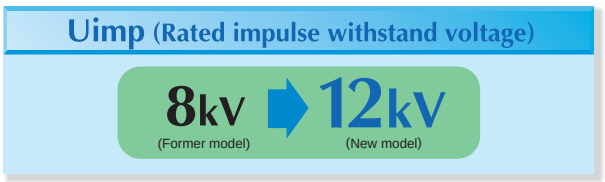
Wider choice coordination range by improving rated short-time withstand current

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

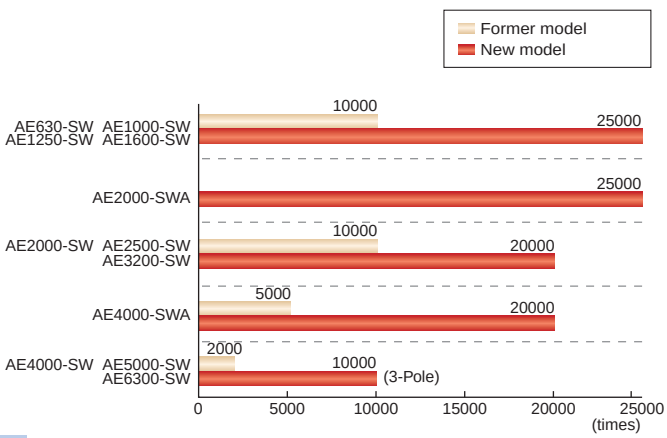
Rated impulse withstand voltage (Uimp) for the main circuit is improved from 8 kV to 12 kV.



Higher reliability by High operating durability

■ Mechanical

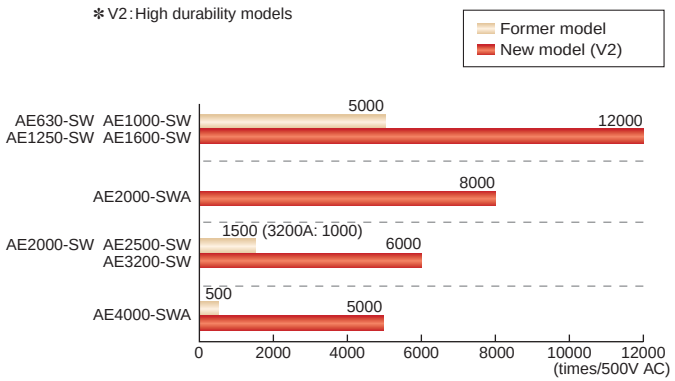
The new models are sharply improved in mechanical durability compared to the former model.



■ Electrical

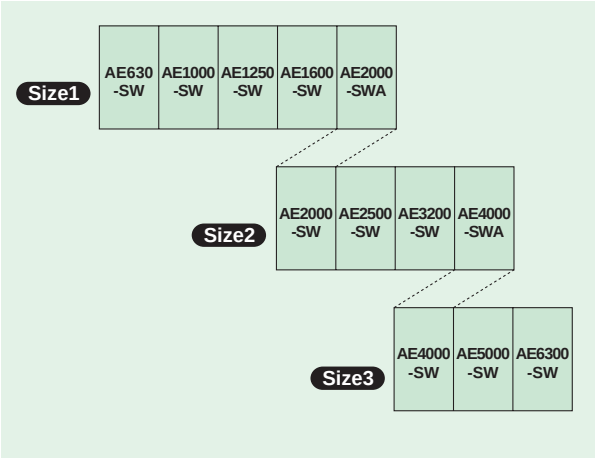
The new models (V2*) are sharply improved in electrical durability compared to the former model.

*V2: High durability models



For convenience

3 sizes



Compact size AE2000-SWA!

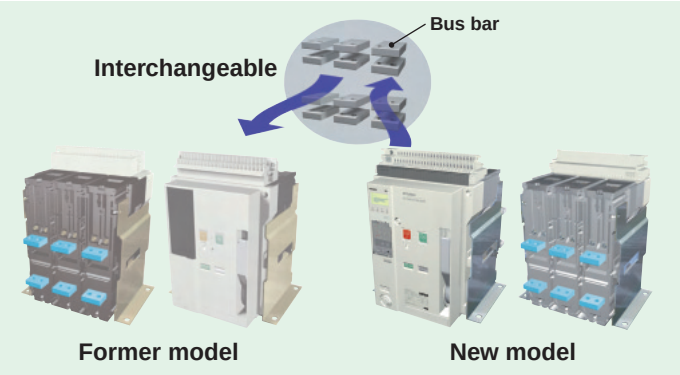
■ The compact AE2000-SWA can reduce the panel size.

The former model (AE-SS) can be retrofitted.

■ It is same as the former model (AE-SS) in installation dimension and outline dimension, and the former model can be replaced with the new one.

■ ACB main body with drawout frame can be replaced.

■ It can be installed to the existing connection bus bar without any special connection kit.
(Except AE2000-SWA, AE4000-SWA)



Zero arc space

Arc exhaust to the outside of the breaker is drastically reduced for safer operation.
(AE630-SW~AE4000-SWA models ≤ 600V AC)
(refer to page 54 : Insulation distance)

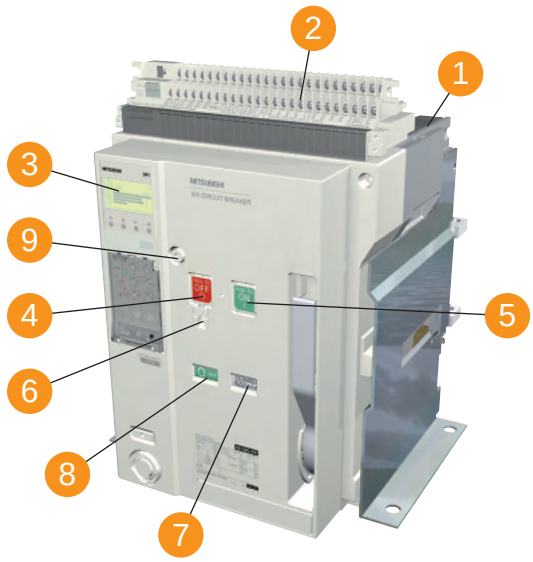
Reverse connection available

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

External appearance and skeleton

Fixed type

AE-SW Series



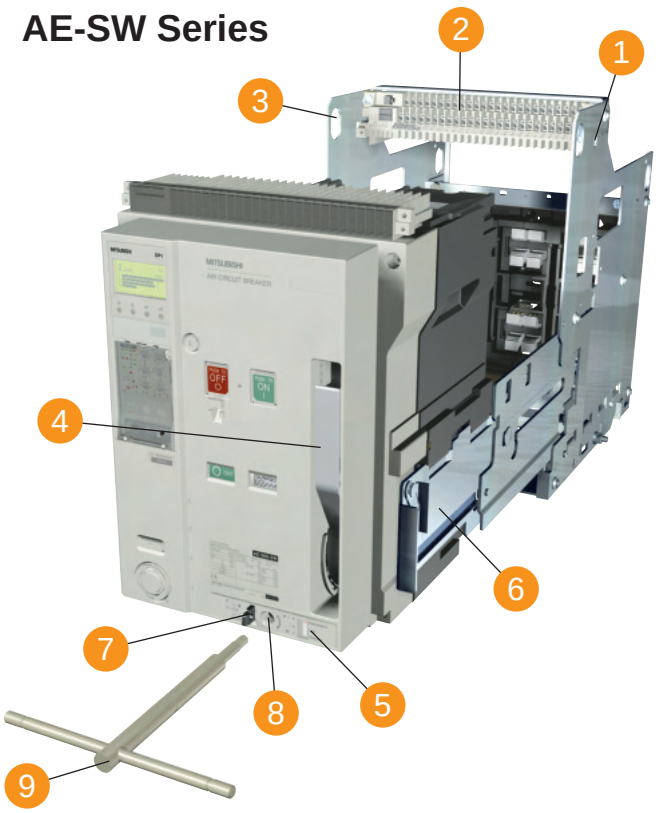
AE1600-SW 3P

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)

In case of the fixed type,Lifting hooks (HP) are attached.

Drawout type

AE-SW Series

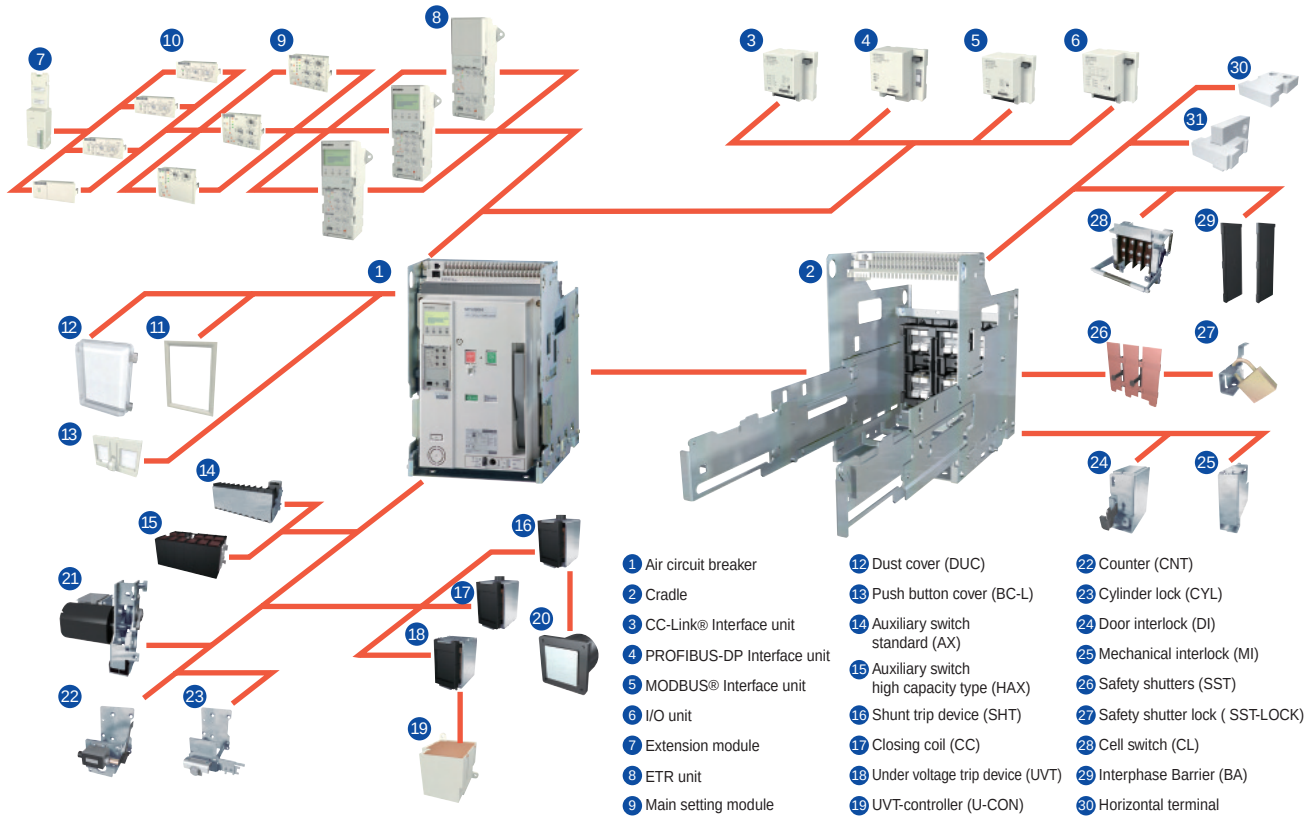


AE1600-SW 3P

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

In case of the drawout type, Drawout handle is attached.

Skeleton



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

Product introduction

1 Type

AE630-SW
AE1000-SW
AE1250-SW
AE1600-SW
AE2000-SWA
AE2000-SW
AE2500-SW
AE3200-SW
AE4000-SWA
AE4000-SW
AE5000-SW
AE6300-SW

2 Standard

IEC 60947-2
EN 60947-2(CE)
VDE
JIS C 8201-2-1
GB 14048.2(CCC)
(Shipping Approvals)
LR
GL
BV
DNV
ABS
CCS
NK

3 Connection

Drawout type
Horizontal terminal
Vertical terminal
Front terminal

Fixed type

4 Drawout type accessories

Cell switch
Shorting b-contact
Lifting hooks
Safety shutter
Safety shutter lock
Mis-insertion preventor
Test jumper

5 Electrical accessories

Auxiliary switch
Motor charging device
Closing coil
Shunt trip device
Under voltage trip device
Condenser trip device

6 Mechanical accessories

Push button cover
Counter
Cylinder lock
Terminal cover
Door frame
Dust cover
Interphase barrier
Mechanical interlock
Door interlock

7 Electronic trip relay

General use
WS type

Generator protection use
WM type

Special use
WB type

Optional
G1:Ground fault protection
E1:Earth leakage protection
AP:2nd Additional Pre-alarm
N5:Neutral pole 50% protection

8 Relay accessories

Extension module
Display
Temperature alarm
MCR switch
Neutral CT
External ZCT
VT unit

9 Network

CC-Link® Interface unit
PROFIBUS-DP Interface unit
MODBUS® Interface unit
I/O unit

Product Specification

● Specification

Type				AE630-SW	AE1000-SW	AE1250-SW	AE1600-SW	
Frame size (A)				630	1000	1250	1600	
Rated insulation voltage (Ui) (AC.V)				1000				
Rated operational voltage (Ue) (AC.V)				690				
Rated impulse withstand voltage (Uimp) (kV)				12				
Pollution degree				3				
Number of poles				3, 4				
Rated current In (CT rating)				630	1000	1250	1600	
Current setting Ir (A) (40˚C)	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	
	Generator protection use (Current rating fixed)			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 BS VDE 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				
		without Instantaneous	690V AC	25 (Note1)				
			500V AC	25 (Note1)				
	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				
		without Instantaneous	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 (Note 2)	With rated current		AC500V In	5000				
			AC690V In	5000				
	Without rated current			25000 (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		430×300×368				
		4-pole		430×385×368				
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, GL, BV, DNV, ABS, NK, CCS)				

(Note 1) The columns for "without instantaneous" are the values when the bare main body and the external relay is combined.
(Note 2) The number of operating cycles without rated current also include 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 not including 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 is available.

AE 630-SW 3 kinds of products with low rating types is 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 is 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) (Note7)		
	2000	2000	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 ≤ Ir ≤ 2000	800 ≤ Ir ≤ 2000	1600 ≤ Ir ≤ 2500	2000 ≤ Ir ≤ 3200	2500 ≤ Ir ≤ 4000	2500 ≤ Ir ≤ 4000	3150 ≤ Ir ≤ 5000	4000 ≤ Ir ≤ 6300
	2000	2000	2500	3200	4000	2000 (4000) (Note8)	2500 (5000) (Note8)	3150 (6300) (Note8)
		75				85		
		75				85		
		85				130 (Note9)		
		75				85		
		75				85		
		75				100		
		45 (Note1)				65 (Note1)		
		45 (Note1)				65 (Note1)		
		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		
	1500	1500		1000	500	1000		
	1500	1500		1000	500	1000		
		20000 (Note 4)				10000 (3P) / 5000 (4P)		
	-	○			-	-		
	○ (Note 3)	○			○ (Note 3)	○ (Note 3)		
	-	○			-	-		
		410×475×290				414×873×290		
		410×605×290				414×1003(1133)×290 (Note 8)		
		430×435×368			430×439×368	480×875×368		
		430×565×368			430×569×368	480×1005(1135)×368 (Note 8)		
	47	60	61	63	81	160	160	160
	57	72	73	75	99	180 (200) (Note8)	180 (200) (Note8)	180 (200) (Note8)
	70	92	93	95	108	233	233	240
	84	113	114	116	136	256 (279) (Note8)	256 (279) (Note8)	263 (286) (Note8)
	31	35		36	49	118	118	125
	35	43		44	61	133 (148) (Note8)	133 (148) (Note8)	140 (155) (Note8)
		○ (LR, GL, BV, DNV, ABS, NK, CCS)				○ (NK), available soon (LR, 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.

(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)

Type \ Connections	Horizontal Standard	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)

Type \ Connections	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	○	○	○	○	–	○	○	○	–	–	–	–

● Standard ○ Optional

Manual charging

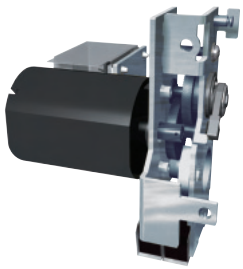
The closing spring is charged by the manual charging handle. The breaker is closed when the ON button is pressed, and opened when the OFF button is pressed.

- 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 feature)
- OFF lock is available by padlock (See P7, P17) as standard.

Motor charging device (MD)

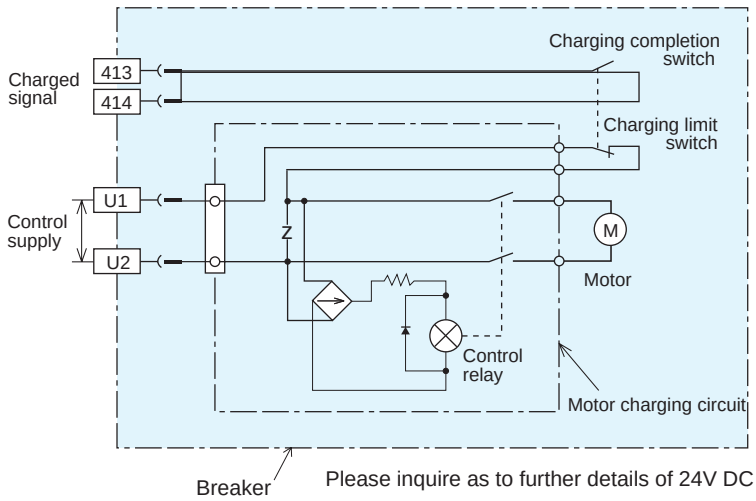
Option

1



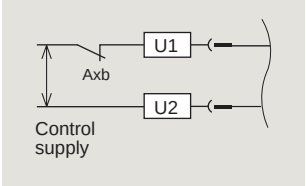
The closing spring is charged by an electric motor. When the breaker is closed, the spring is charged automatically (ON-charge method.) The closing coil (CC) is required to remotely close, and the shunt trip device is required to remotely open the breaker.

- 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.



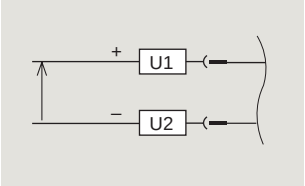
Please inquire as to further details of 24V DC and 48V DC.

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

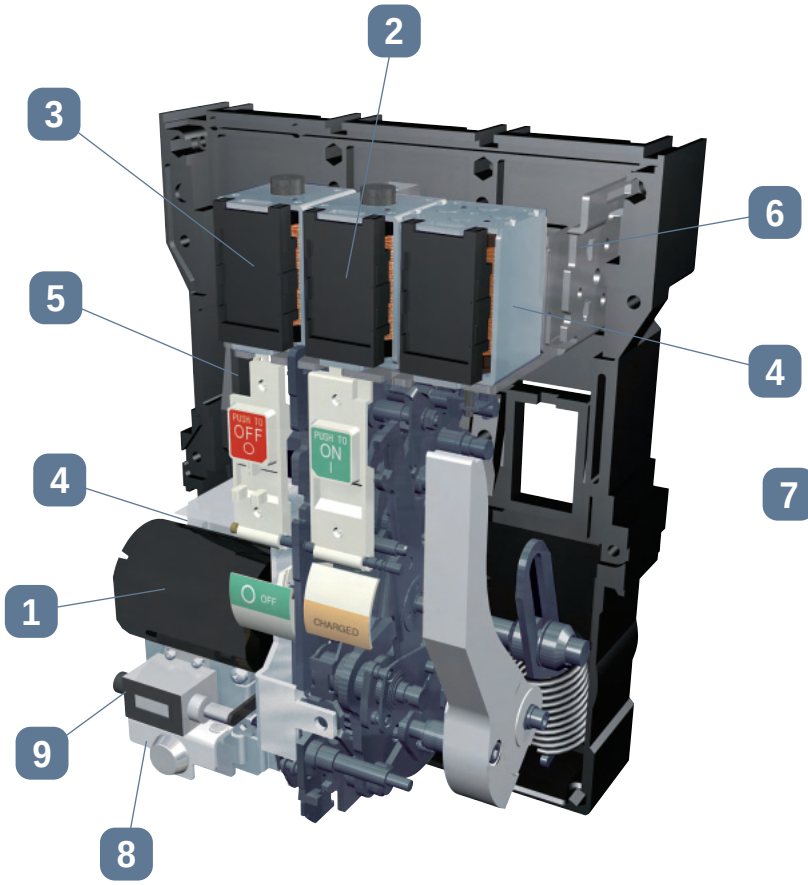


Motor charging rating

Rated voltage (V)	Applicable voltage range (V)	Applied voltage (V)	Inrush current(Peak value) (A)	Steady current (A)	Charging time (s)	Criterion for power requirement (VA)
DC24	18 ~ 26.4	24	22	6	≤ 5	500
DC48	36 ~ 52.8	48	14	3		
AC/DC 100-125	85 ~ 137.5	100	10(10)	3(4)		700
		125	12(12)	3(4)		1000
AC/DC 200-250	170 ~ 275	200	5(7)	1(2)		700
		250	6(8)	1(2)		1000

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 DC 24V and DC 48V rating.

Accessories (for breaker unit)



Closing coil (CC)

Option

2

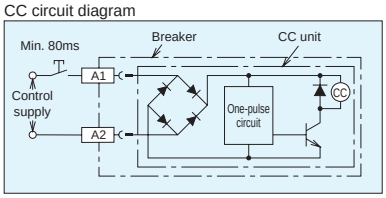
The closing coil is a device to close the breaker by remote control.

- An interlock to prevent pumping is provided electrically.

Rated voltage (Applicable voltage range)	Operating voltage · Operating inrush current (VA)		Closing time (Note1)
	AC	DC	
DC24-48V (18~52.8)	–	DC24V 3.0A (100W)	0.08 s or less
	–	DC48V 6.0A (200W)	
AC · DC common 100-250V (75-275)	AC100V 0.7A (100VA)	DC100V 0.8A (100W)	
	AC250V 1.7A (200VA)	DC250V 1.8A (250W)	

N o t e 1) In case of double rating of rated voltage, it is the value for the lower rating.
(Example) In case of DC24 to 48, it is operating time for DC24V.

CC circuit diagram



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

Shunt trip device (SHT)

Option

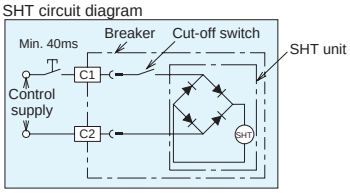
3

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 (Note1)
	AC	DC	
DC24-48V (16.8~52.8)	–	DC24V 2.5A (100W)	0.04 s or less
	–	DC48V 6.0A (200W)	
AC · DC common 100-250V(70-275)	AC100V 0.4A (100VA)	DC100V 0.6A (100W)	
	AC250V 1.4A (150VA)	DC250V 1.6A (200W)	
AC380~500V (266~550)	AC380V 0.5A (250VA) AC500V 0.7A (300VA)	-	

N o t e 1) In case of double rating of rated voltage, it is the value for the lower rating.
(Example) In case of DC24 to 48V, it is operating time for DC24V.
N o t e 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.

4 Under voltage trip device (UVT)

Option

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.

Rated voltage	Frequency	operating time (time delay)	Pick-up voltage	Drop-out voltage	Trip function	Power consumption
AC100-120V	50/60Hz	☐ Inst(0.2s) ☐ 0.5s(Min.) ☐ 3.0s(Min.)	65~85V	45~70V	With open circuit of DT1,DT2 terminals.	20VA
AC200-240V			130~170V	90~140V		
AC380-460V			247~323V	171~266V		
DC24V	-		15.6~20.4V	10.8~16.8V		
DC48V			31.2~40.8V	21.6~33.6V		
DC100-110V			65~85V	45~70V		
DC120-125V			78~102V	54~84V		

Note1) In case of 380-460V AC, the external unit is attached additionally.

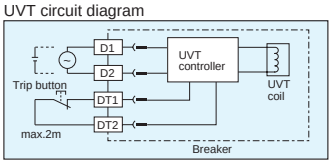
Note2) The operating time is a guarantee value when it drops from 85% or more of rated voltage.

Note3) Time delay should be allowed for 1.5s between applying the voltage to the UVT and closing the breaker.

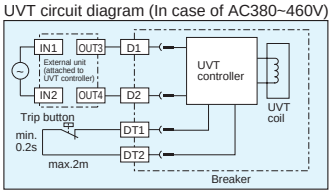
Note4) If a remote trip function is required, remove the shorting bar (DT1 DT2) and connect a normally closed switch, rated 0.5A at 150VDC across them.

Note5) Usage ambient temperature should be in the range from max. 40°C to min. -5°C.

UVT circuit diagram



UVT circuit diagram (In case of AC380~460V)



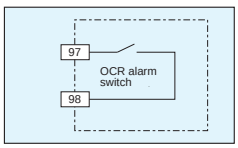
5 OCR alarm (AL) [Automatic reset type Short-time operation (30ms)]

Standard if ETR is equipped

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.

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.

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

Option

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	460	5	2	5	2.5
	250	10	10	10	10
	125	10	10	10	10
DC	250	0.3	0.3	3	1.5
	125	0.6	0.6	10	6
	30	10	6	10	10
Maximum contacts		5a5b		5a5b	

Change-over sequence	Breaker state	a-contact (NO)	b-contact (NC)
	ON	ON	OFF
	OFF	OFF	ON

- The a and b conacts 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.
- For special environment specification, the contact capacity gets deteriorated. Make inquiries for more details.

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 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 49.

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 by combining 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.

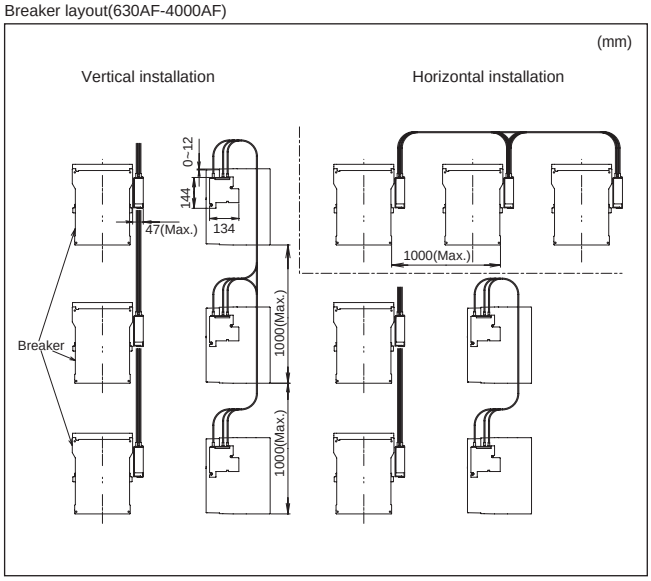
Mechanical interlock (MI)

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 AE4000-SWA.
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.

- In case of 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)



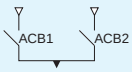
Interlock combinations

Switching states (for 2 ACBs)

Type	①	②	③
ACB1	○	|	○
ACB2	○	○	|

○ : ACB open
\| : ACB closed

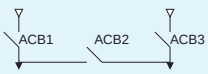
2 devices : 1 normal power supply and 1 emergency power supply



Switching states (for 3 ACBs)

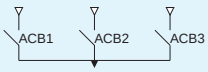
Type	①	②	③	④	⑤	⑥	⑦
ACB1	○	|	○	○	|	|	○
ACB2	○	○	|	○	|	○	|
ACB3	○	○	○	|	○	|	|

3 devices : 2 sources and 1 coupling



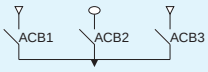
Type	①	②	③	④
ACB1	○	|	○	○
ACB2	○	○	|	○
ACB3	○	○	○	|

3 devices : 3 sources,only 1 device closed



Type	①	②	③	④	⑤
ACB1	○	|	○	|	○
ACB2	○	○	|	○	○
ACB3	○	○	○	|	|

3 devices : 2 normal power supplies and 1 emergency power supply



Case circuit

Condenser trip device (COT)

Option

Even if the power supply fails, the breaker can be electrically opened by remote operation within a definite time. This device is used in combination with the shunt trip device (SHT).

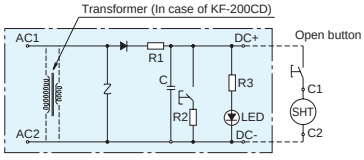
Type	KF-100CD	KF-200CD
Rated input voltage (V)	AC100/110	AC200/220
Rated frequency (Hz)	50-60	
Rated charging voltage (V) Note1	140/155	
Condenser capacity (μF)	820	
Voltage range	70~125%	
Power supply capacity (VA)	1 VA max	
Charging time (s)	1sec. max	
Trip limit time Note2	30 sec.	
Paint color	Black	
Withstand voltage (1minute)	AC 2000V	
Applicable SHT type (Rated voltage)	AC·DC 100-250V	

As for outline dimensions, refer to page 49.

Note 1: The rated charging voltage is the voltage stored during condenser saturation. It is continuously supplied by the rectified voltage of the rated AC input voltage.

Note 2: The trip limit time means the time period in which the shunt trip device (SHT) can make a tripping operation once, even after the charged condenser with 100% supply voltage would be stopped to charge. It can be tripped up to 30 seconds.

Note 3: Usage ambient temperature is in a range of max. 40°C to min. -20°C.



Circuit diagram

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.

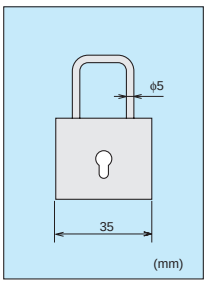
Accessories(for drawout type)

Drawout interlock (standard)

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)

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)

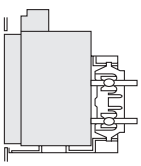
Padlock

Option

A padlock can be arranged at the lock plate. Thereby, it is possible to prevent the connection position from being changed unnecessarily. A padlock of ϕ5 should to be supplied by customer. As for outline dimensions of the padlock, please refer to the left figure.

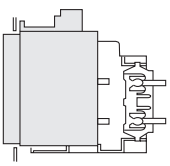
Operating position of drawout type

CONNECTED position



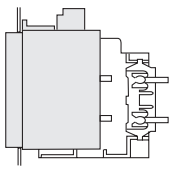
- Both main and control circuits are connected.
- Normal in use condition.
- Lock plate is protruding

TEST position



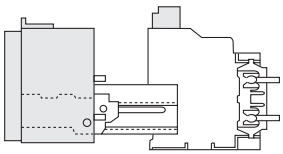
- Main circuit is disconnected, but the control circuit is connected.
- The breaker operation can be tested with the door closed.
- Lock plate is protruding

DISCONNECTED position



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

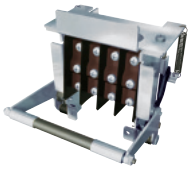
DRAWOUT position



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

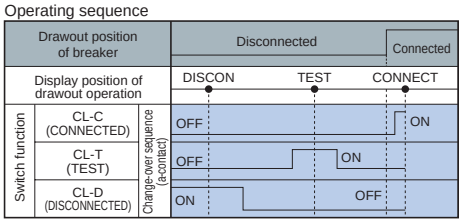
Cell switch (CL)

Option



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



Note 1: The 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

Switch rating

Voltage (V)		Current (A)	
		Resistive load	Inductive load
AC	460	5	2.5
	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.

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

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 drawn out to prevent accidental contact with the main contacts.

Mis-insertion preventor(MIP)

Option

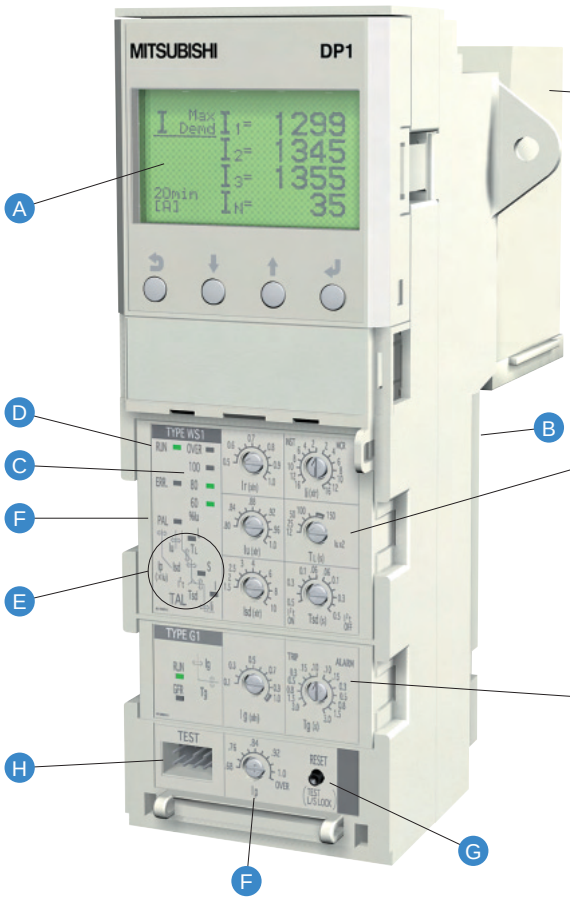
This prevents other breakers than specified from inserting into the cradle, and max.5 patterns are available.
Not available for AE4000-SW~AE6300-SW

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 length of cable is equipped as standard shipment.

Electronic trip relay(Feature)



3 Power supply module
This module provides control source for DISPLAY module,Trip indicator and several indicators (LEDs).
(Even when the control power source is off, the function of over current protection and ground fault protection are effective.)
There are two types of power supply modules, one is only of power supply function, the other is power supply function with output contact (6 contacts).

1 Main setting module
This module provides the function of over current protection.
It is possible to select the three setting module according to application. (see page 21-26)
Neutral protection of rated current (100%) function is standard at 4 pole breaker.

2 Optional setting module (option)
Additional functions and characteristics can be selected by optional setting modules.

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 when installed VT unit, display module and each interface unit.

C Load current LED (standard)
This indicator displays the maximum current of phase.

D RUN LED, ERR. LED (standard)
This indicator displays the ETR situation (Run or Error)

E Trip indicator LED (standard)
This indicator displays the trip cause.

F Pre-alarm(PAL) (standard)
This indicator displays the Pre-Alarm situation when exceed the setting current. When it installed power supply module with contact, the output contact of Pre Alarm is available.

* The output is reset when the electric current goes below the set level after an alarm is set off.

G RESET button (standard)
When push this reset button, trip indicator, and Pre-Alarm will be reseted. And when the instantaneous test by MITSUBISHI special tester and push this reset button, as a result of LTD and STD function become ineffective.

H TEST terminal (standard)
This terminal already installed as standard. This terminal is used for testing by the field test device (Y-2000). (see page 30)

OCR alarm (AL) (standard)
When it happen to trip by over current, ground fault (GFR) and Earth leakage (ER), it issue a warning alarm.

Neutral pole overcurrent protection (NP) (standard)
When harmonics in load current are large, the current on neutral pole exceeding rated current may flow. Harmonics may cause some troubles. Neutral pole overcurrent protection prevents them by operating at 100% of rated current on neutral pole.

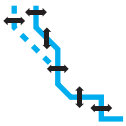
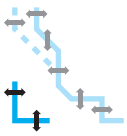
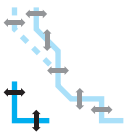
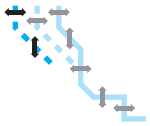
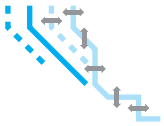
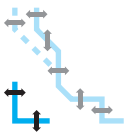
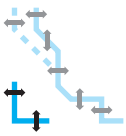
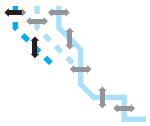
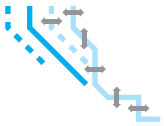
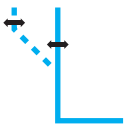
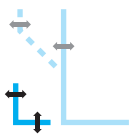
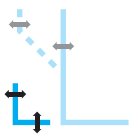
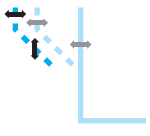
MCR:Making current release (option)
Just under the breaker closing operation (from open to close), Instantaneous characteristic become effective, but after closing the breaker, instantaneous characteristic become ineffective.
When you order the MCR switch, MCR switch is built in the main body.
If MCR switch is built in the main body and the adjust dial of INST/MCR on main setting module is set the MCR position,MCR function become effective.

TAL (option)
When the temperature of main contacts exceed normal temperature level, temperature alarm is indicated at LED (on main setting module) and output by contact (only installed power supply with output contact).
If TAL is installed in the breaker according your order, Temperature alarm (LED) function become effective.
When the temperature goes down within normal tempter level, the temperature alarm will be reset.

NCT (option)
Neutral CT is required for Ground fault or Neutral pole protection, when 3 pole breaker is used for 3 phase 4 wires system.

ZCT (option)
ZCT is required for a few amperes earth leakage protection, and is combining ER plug. (see page 28)

Characteristic table

② / ①	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					

Power supply module ③

Type	Rating	alarm output
P1	100-240V AC•DC	Nothing
P2	24-60V DC	Nothing
P3	100-240V AC 100-125V DC	6 output contacts
P4	24-60V DC	6 output contacts
P5	100-240V DC	6 output contacts (SSR)

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

① LTD	② STD/INST	③ G1/E1/AP	④ PAL	⑤ TAL	⑥ 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.

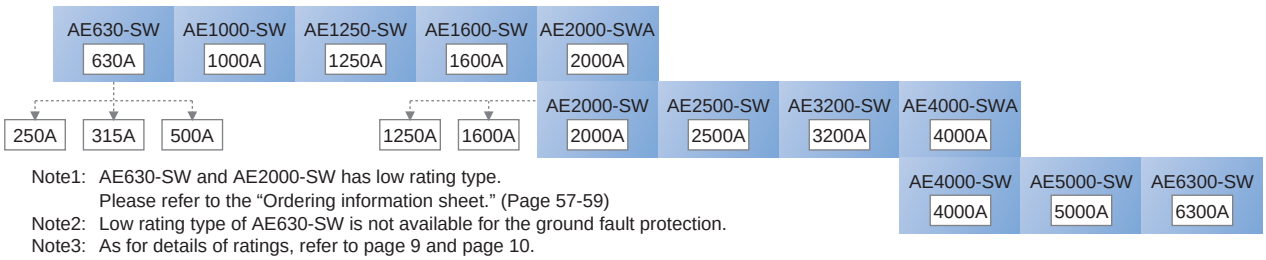
Contact capacity(Type code P3, P4)

Voltage(V)		Current (A)	
		Resistive load	Inductive load
		cosϕ=1.0	cosϕ=0.4 L/R=7ms
AC	240	1	0.5
	120	1	1
DC	125	0.1	0.05
	30	1	1

Current capacity(Type code P5)

Voltage(V)		Normal current	Peak inrush current	ON resistance (max.)
AC	240	0.1A	0.3A	5Ω
	120	0.1A	0.3A	5Ω
DC	240	0.1A	0.3A	5Ω
	30	0.1A	0.3A	5Ω

CT rating table



Note1: AE630-SW and AE2000-SW has low rating type.
Please refer to the “Ordering information sheet.” (Page 57-59)
Note2: Low rating type of AE630-SW is not available for the ground fault protection.
Note3: As for details of ratings, refer to page 9 and page 10.

Electronic trip relay(ETR) type code

□□□-□

Main setting module

WS1, WB1, WM1	AE630–1600-SW, AE2000–3200-SW, AE4000-SW
WS2, WB2, WM2	AE2000-SWA, AE4000-SWA, AE5000-SW
WS3,WB3,WM3	AE6300-SW

WS : General use
WM : Generator protection use
WB : INST/MCR only

Optional setting module

G1: Ground fault protection
N5: Neutral pole 50% protection
E1: Earth leakage protection
AP: 2nd Additional Pre-alarm
NA: Without optional setting

Power supply

P1: AC·DC100-240V
P2: DC24-60V
P3: AC100-240V / DC100-125V
with output contact
P4: DC24-60V with output contact
P5: DC100-240V
with output contact (SSR)

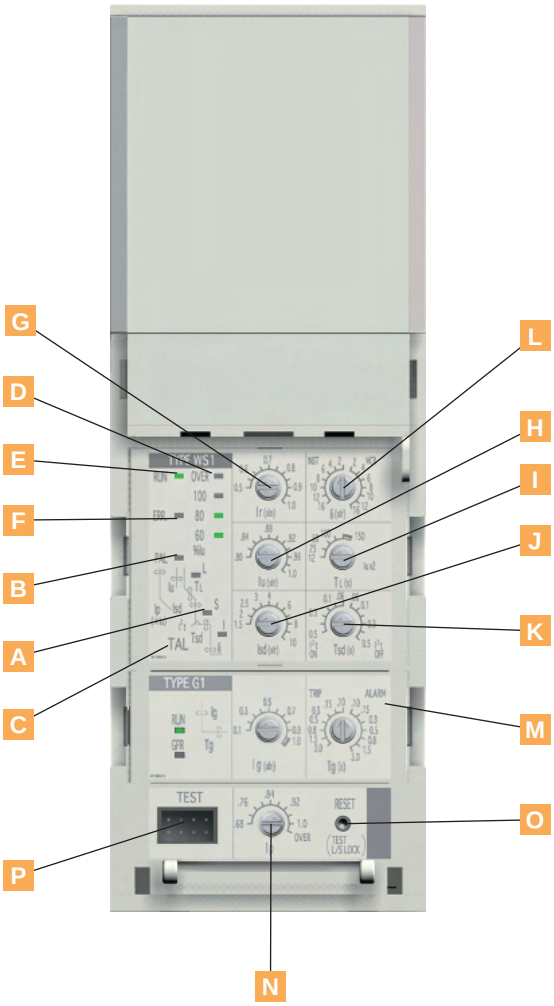
Additional function

- ☐ Extension module(EX1)
  - ☐ Display(DP1)
  - ☐ Display onto panel board(DP2)
  - ☐ VT unit(VT)
- ☐ Temperature alarm(TAL)
- ☐ MCR switch(MCR-SW)

Network

- ☐ BIF-CC
- ☐ BIF-PR
- ☐ BIF-MD

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.27~29)
- N Pre-alarm current setting dial
- O RESET button (TEST L/S LOCK button)
- P TEST terminal

Note: The figure shown WS type with G1 plug.
G1 is option.

Relation of setting dial

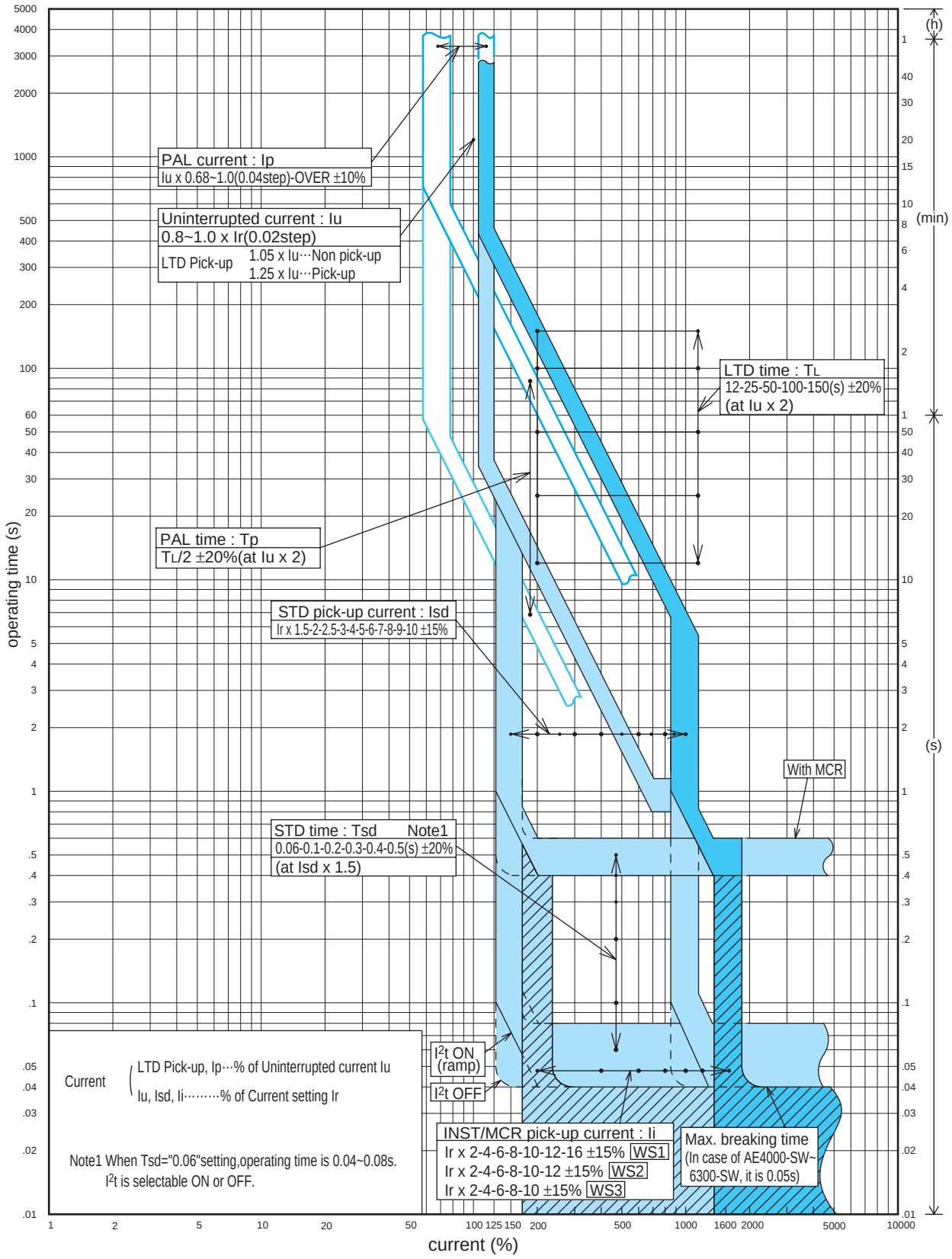
In (CT rating) — Ir — Ig (P.27)
Ir — Iu — Isd
Iu — Ii
Iu — Ip
Ip — Ip2 (P.29)
Ip — Load current LED (60, 80, 100%, OVER)

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	Iu	0.8 ~ 1.0 x Ir (0.02step), Pick-up current : 1.15 x Iu	1.05 x Iu···Non Pick-up 1.25 x Iu···Pick-up	1.0
I	LTD time	T_L	12–25–50–100–150s at Iu 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	Tsd	0.5–0.4–0.3–0.2–0.1–0.06 (I^2t ON) – 0.06–0.1–0.2–0.3–0.4–0.5s (I^2t 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^2t ON)
L	INST/MCR pick-up current	Ii	AE630-SW~AE1600-SW AE2000-SW~AE3200-SW AE4000-SW 16-12-10-8-6-4-2 (INST) – 2-4-6-8-10-12-16 (MCR) x Ir WS1	± 15%	WS1···16 (INST)
			AE2000-SWA, AE4000-SWA AE5000-SW 12-10-8-6-4-2 (INST) – 2-4-6-8-10-12 (MCR) x Ir WS2		WS2···12 (INST)
			AE6300-SW 10-8-6-4-2 (INST) – 2-4-6-8-10 (MCR) x Ir WS3		WS3···10 (INST)
N	Pre-alarm current	Ip	Iu x 0.68 ~ 1.0 (0.04step) –OVER	± 10%	OVER
—	Pre-alarm time	Tp	1/2 T_L at Iu x 2 (after 1/2 T_L, PAL contact output turns on.)	± 20%	—

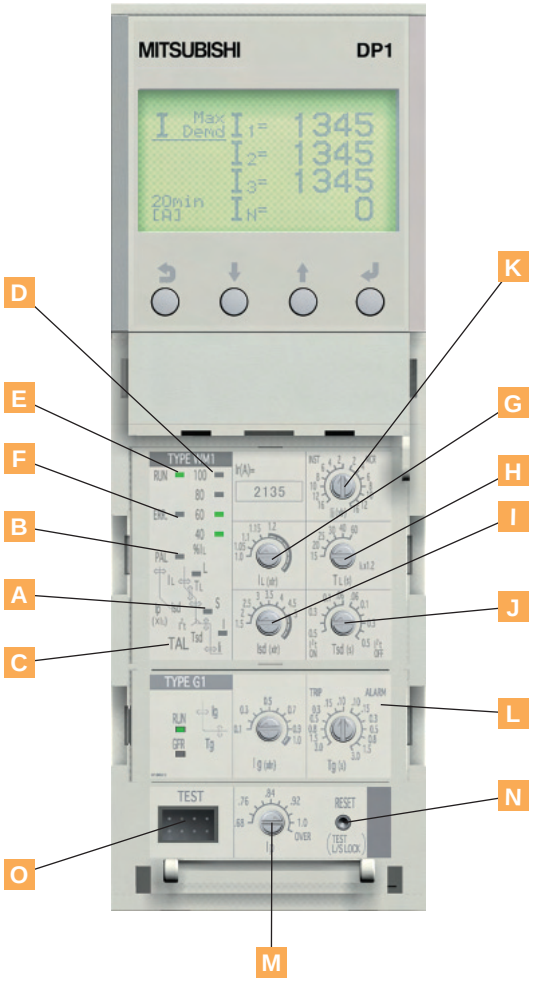
Upper figure and table denote the case optional MCR function is included.

■Operating characteristic curve (for general use : WS)



Note :
The slope of LTD curve can be changed easily in case a relay for protective coordination (WF relay) is used instead of WS relay.
As for the details about WF relay, please make inquiries.

Electronic trip relay(for generator protection use:WM)



- 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.27~29)
- M Pre-alarm current setting dial
- N RESET button (TEST L/S LOCK button)
- O TEST terminal

Note: The figure shown WM1 type with G1 plug and Display (DP1). G1 and DP1 are options.

Relation of setting dial

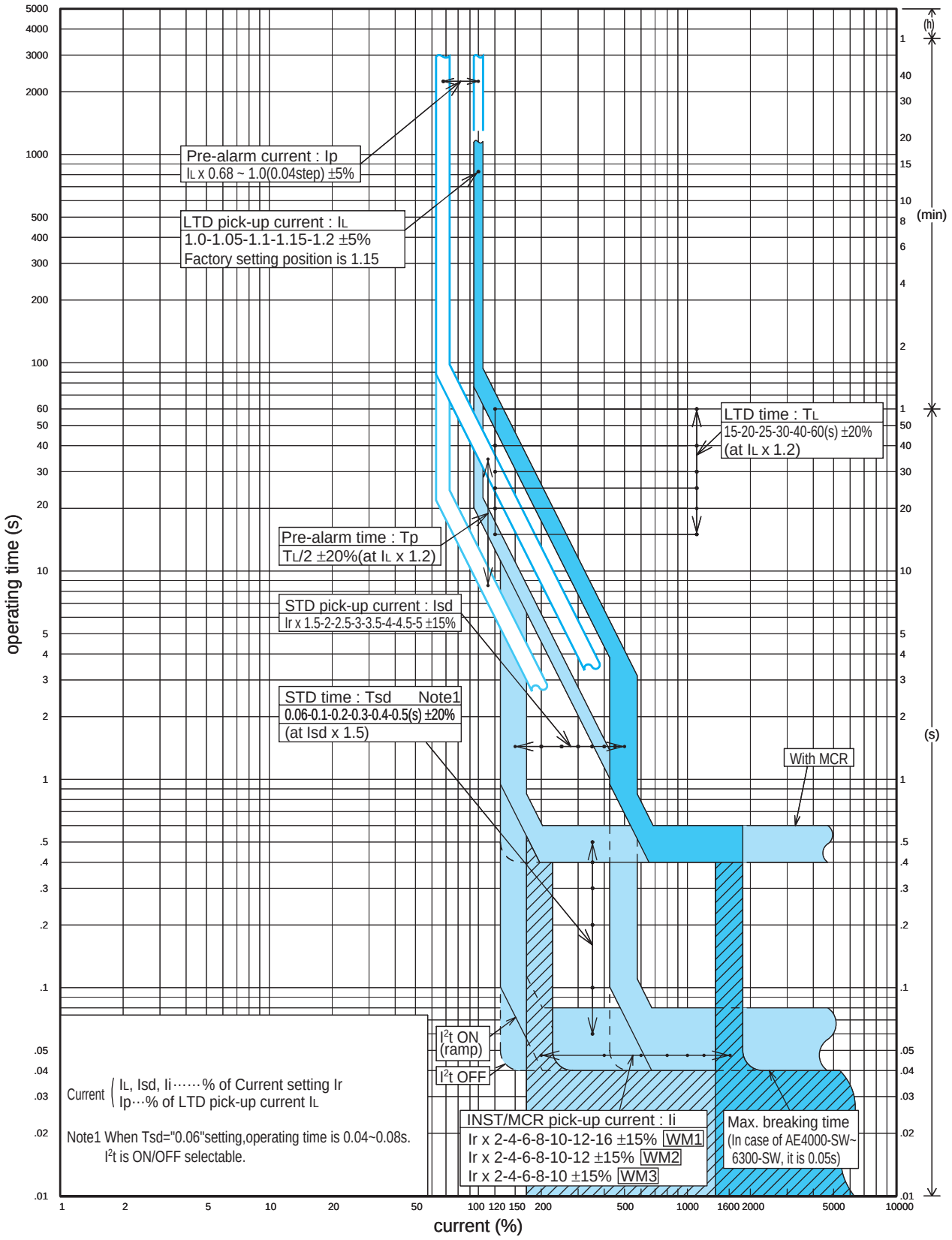
In (CT rating) — Ir (Fixed) — IL — Ip
Ir (Fixed) — IL — Ip2 (P.29)
Ir (Fixed) — IL — Load current LED (40, 60, 80, 100%)
Ir (Fixed) — Ig (P.27)
Ir (Fixed) — Isd
Ir (Fixed) — Ii

Adjustable setting range

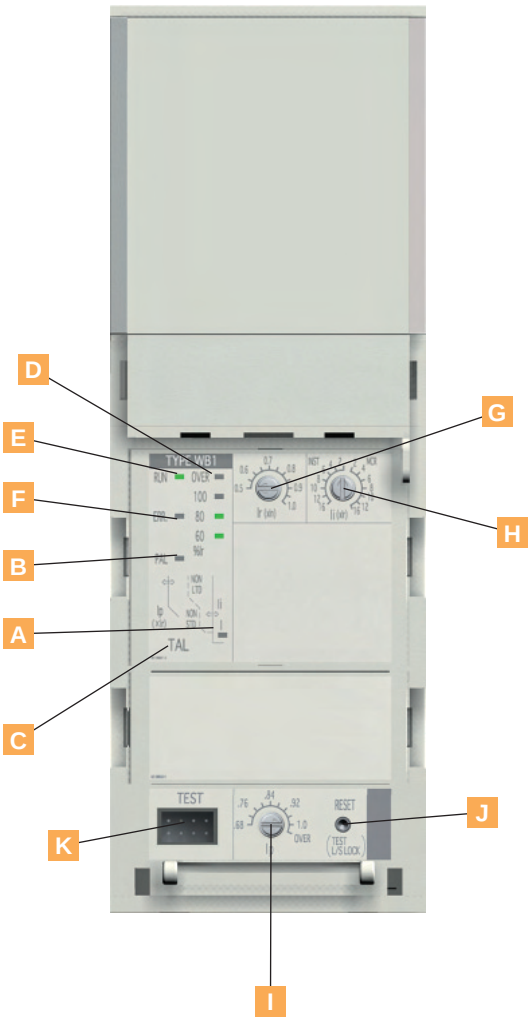
No.	Setting item	Mark	Adjustable setting range	Accuracy	Factory default value
—	Current setting	Ir	0.63 ~ 1.0 x In (Adjust by factory : Fixed)	—	Comply with ordering sheet
G	LTD pick-up current	IL	1.0–1.05–1.1–1.15–1.2 x Ir	± 5%	1.15
H	LTD time	TL	15–20–25–30–40–60s at IL x 1.2	± 20%	20
I	STD pick-up current	Isd	1.5–2–2.5–3–3.5–4–4.5–5 x Ir	± 15%	5
J	STD time	Tsd	0.5–0.4–0.3–0.2–0.1–0.06 (I²t ON) – 0.06–0.1–0.2–0.3–0.4–0.5s (I²t 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 (I²t ON)
K	INST/MCR pick-up current	Ii	AE630-SW~AE1600-SW / AE2000-SW~AE3200-SW / AE4000-SW: 16-12-10-8-6-4-2 (INST) – 2-4-6-8-10-12-16 (MCR) x Ir — WM1	± 15%	WM1···16 (INST)
			AE2000-SWA, AE4000-SWA / AE5000-SW: 12-10-8-6-4-2 (INST) – 2-4-6-8-10-12 (MCR) x Ir — WM2		WM2···12 (INST)
			AE6300-SW: 10-8-6-4-2 (INST) – 2-4-6-8-10 (MCR) x Ir — WM3		WM3···10 (INST)
M	Pre-alarm current	Ip	IL x 0.68 ~ 1.0 (0.04step) –OVER	± 5%	OVER
—	Pre-alarm time	Tp	1/2 TL at IL x 1.2 (after 1/2 TL, PAL contact output turns on.)	± 20%	—

Upper figure and table denote the case optional MCR function is included.
Pre-alarm current "OVER" setting is equal to 1.0.

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



Electronic trip relay(for special use : WB)



- 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

Relation of setting dial

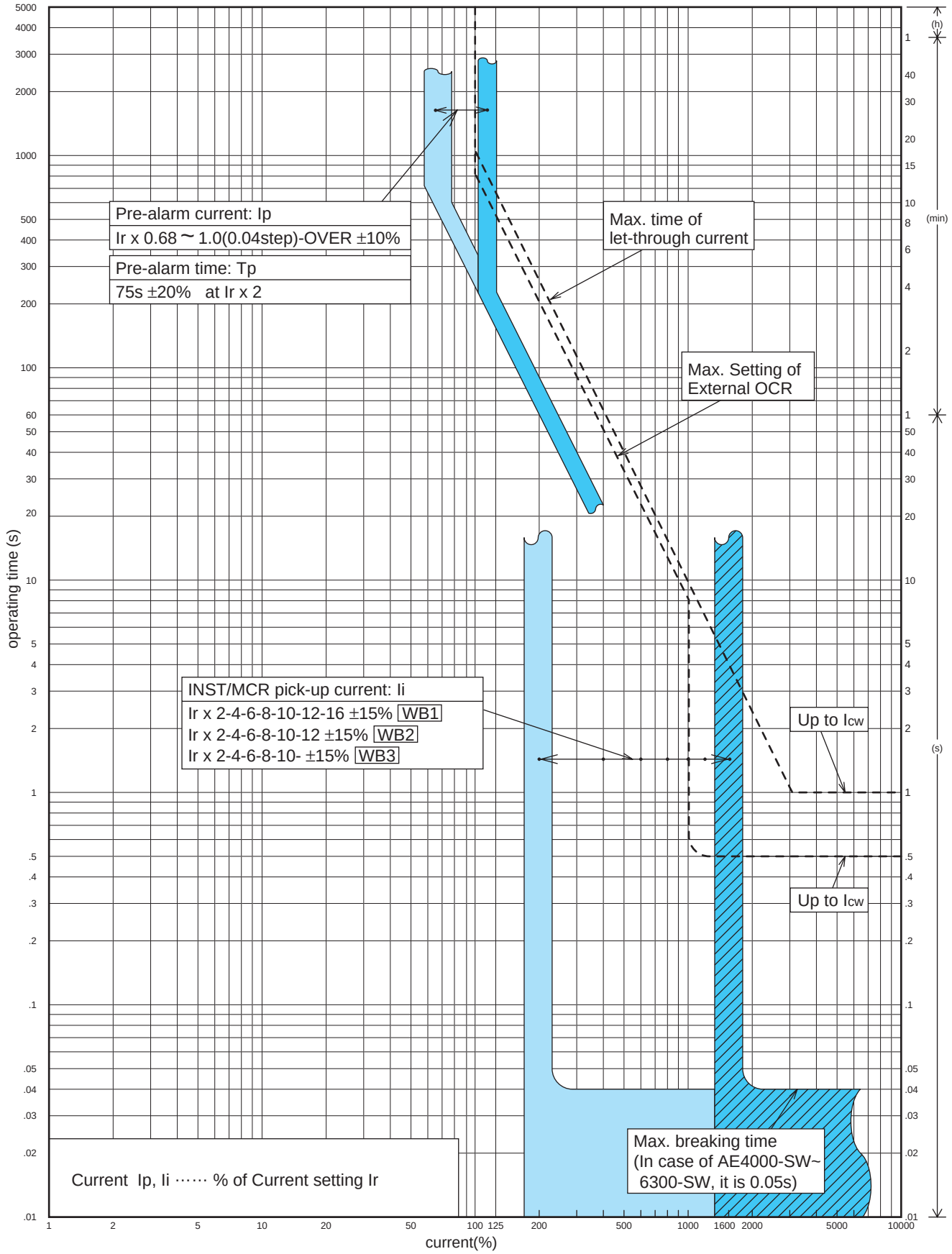
In (CT rating) — Ir — Ig (P.27)
Ir — Ii
Ir — Ip
Ir — Ip2 (P.29)
Ir — Load current LED (60, 80, 100%, OVER)

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	Ii	AE630-SW~AE1600-SW AE2000-SW~AE3200-SW AE4000-SW 16-12-10-8-6-4-2 (INST) / 2-4-6-8-10-12-16 (MCR) x Ir WB1	± 15%	WB1···16 (INST)
			AE2000-SWA, AE4000-SWA AE5000-SW 12-10-8-6-4-2 (INST) / 2-4-6-8-10-12 (MCR) x Ir WB2		WB2···12 (INST)
			AE6300-SW 10-8-6-4-2 (INST) / 2-4-6-8-10 (MCR) x Ir WB3		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%	—

Upper figure and table denote the case optional MCR function is included.

■Operating characteristic curve (for special use : WB)



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 0.2xIn or higher.

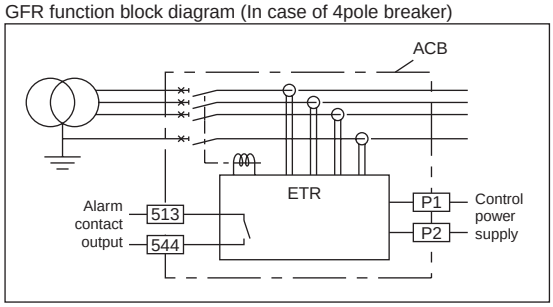
Setting item	Mark	Adjustable setting range	Accuracy	Factory default value
GFR pick-up current	Ig	0.1-0.2-0.3-0.4-0.5-0.6-0.7-0.8-0.9-1.0 x In	±20%	1.0
GFR time	Tg	3-1.5-0.8-0.5-0.3-0.15-<0.1 (TRIP) - <0.1-0.15-0.3-0.5-0.8-1.5-3s (ALARM) (at 1.5 x Ig)	±20%	3s (TRIP)
alarm output	—	TRIP side : Self-holding/ALARM side : Automatic reset	—	TRIP side (Self-holding)

Neutral CT(NCT) ※Only use for AE-SW

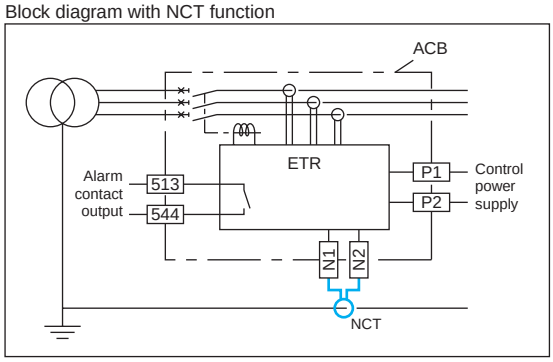
Option

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 50.
The length of the cable (attached) for NCT is 2m.

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



Block diagram with NCT function

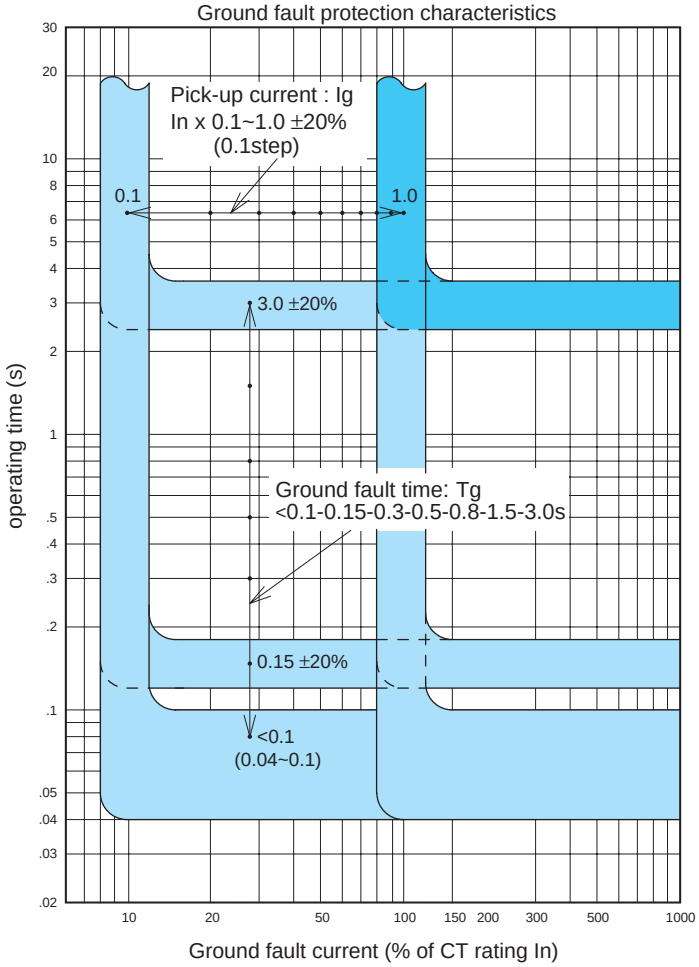


NCT type name

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

As for outline dimensional drawing, refer to page 50.

Ground fault protection characteristics



Earth leakage protection(ER)

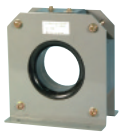
Option

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∆n	1A-2A-3A-5A-10A	+0% –30%	10A
ER time	Te	3-1.5-0.8-0.5-0.3-0.15-<0.1 (TRIP) - <0.1-0.15-0.3-0.5-0.8-1.5-3s (ALARM) (at 1.5 x I∆n)	±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 use in combination with a 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 earth.

ZCT for load circuit

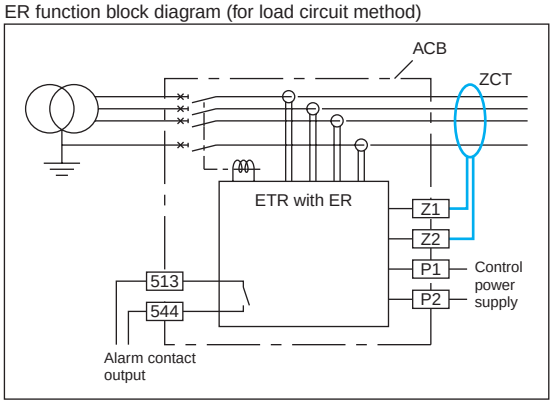
ZCT type name	ACB type name
ZCT163	AE630-SW ~ AE1600-SW 3-pole
ZCT323	AE630-SW ~ AE1600-SW 4-pole AE2000-SW ~ AE3200-SW 3-pole
ZCT324	AE2000-SW ~ AE3200-SW 4-pole

As for outline dimensions refer to page 50. Make choice of suitable ZCT in comformity to the BUSBAR size.

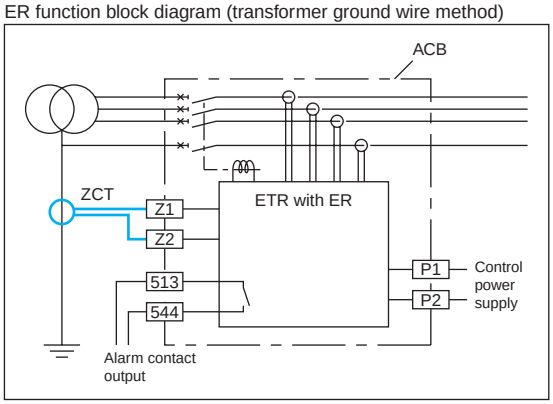
ZCT for transformer ground wire

ZT15B	ZT30B	ZT40B	ZT60B	ZT80B	ZT100B

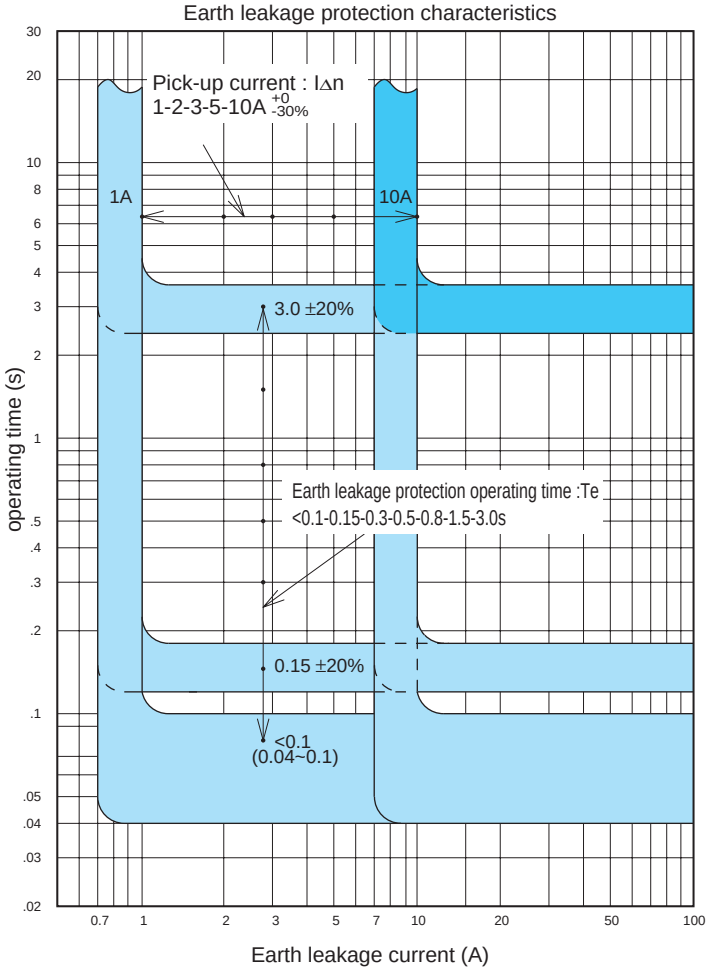
ER function block diagram (for load circuit method)



ER function block diagram (transformer ground wire method)



Earth leakage protection characteristics



Accessories

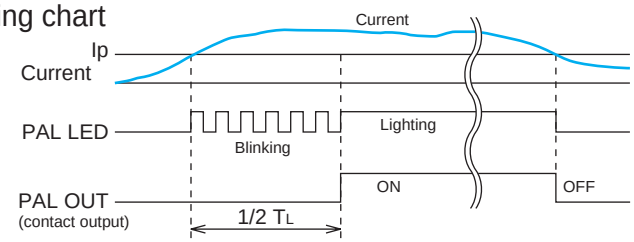
2nd Additional Pre-alarm (AP)

Option

The Pre-Alarm (1st) function 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	0.9-0.8-0.7-0.6-0.5-0.4-0.3 x T_L (x T_L) - 5-10-15-20-30-40-60s (FLAT)	±20%	0.9 (x T_L)

Pre-alarm timing chart



Neutral pole 50% protection(N5)

Option

Neutral pole overcurrent protection (operating at 100% of rated current) come already eqipped with ETR as standard features.
But if you would like to operate at 50% of rated current on neutral pole, neutral pole 50% protection is availabe with this optional module unit.

MCR switch (MCR-SW)

Option

If MCR switch is built in the breaker and the dial for INST/MCR on Main setting module is set to the range of MCR position, MCR function is operative.

MCR function:
During a closing operation of the breaker, Instantaneous characteristics is operative.
And it becomes inoperative when the breaker is in the closed position.

Temperature alarm (TAL)

Option

If TAL sensor is built 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-2000)

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

Y-2000 specification

TEST ITEM	LTD,STD,INST,GFR,PAL
TEST SIGNAL RANGE	1% ~ 2500%
OUTLINE DIMENSION	230(W) x 120(H) x 290(D)
TIMER	0.000 ~ 999.999s
POWER SUPPLY	100 – 240V AC 50 / 60Hz

Additional functions

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

List of extension unit

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 of 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.)

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®	○	○	○			○

DP2 (on the Panel)

DP1 EX1(inside breaker)

VT unit (placed separately)

BIF-CC BIF-PR BIF-MD

Interface unit (placed separately)

Electronic trip relay(ETR) type code

Main setting module

WS1, WB1, WM1	AE630–1600-SW, AE2000–3200-SW, AE4000-SW
WS2, WB2, WM2	AE2000-SWA, AE4000-SWA, AE5000-SW
WS3,WB3,WM3	AE6300-SW

WS : General use
WM : Generator protection use
WB : INST/MCR only

Optional setting module

G1: Ground fault protection
N5: Neutral pole 50% protection
E1: Earth leakage protection
AP: 2nd Additional Pre-alarm
NA: Without optional setting

Power supply

P1: AC•DC100-240V
P2: DC24-60V
P3: AC100-240V / DC100-125V with output contact
P4: DC24-60V with output contact
P5: DC100-240V with output contact (SSR)

Additional function

- ☐ Extension module(EX1) — Network: ☐ BIF-CC ☐ BIF-PR ☐ BIF-MD
  - ☐ Display(DP1)
  - ☐ Display onto panel board(DP2)
  - ☐ VT unit(VT)
- ☐ Temperature alarm(TAL)
- ☐ MCR switch(MCR-SW)

Wire system (when EX1 is specified)

EX1 — ☐ 3ϕ3W ☐ 3ϕ4W ☐ Normal connection ☐ Inverse connection

Extension module (EX1)

Option

This is the base module that provides various additional functions with combining 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 elememts (load current, voltage, energy, harmonics, etc.) and high measuring accuracy are attained. Refer to page 34 for more details.

2 Communication function

2 display modules and 1 interface unit can be connected simultaneously with its advanced internal communication.

Display module (DP1/DP2)

Option

This is the module that displays and sets various information, for example, displays of measurement, trip and alarm, setting of output contacts and so on.

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 is available.

There are 2 types of display module. One is the ETR attachment type (DP1). Another 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 51.)

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 52.)

Note;

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

Network

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

Option

BIF-CC (CC-Link®)

BIF-PR (PROFIBUS-DP)

BIF-MD (MODBUS®(RS-485))

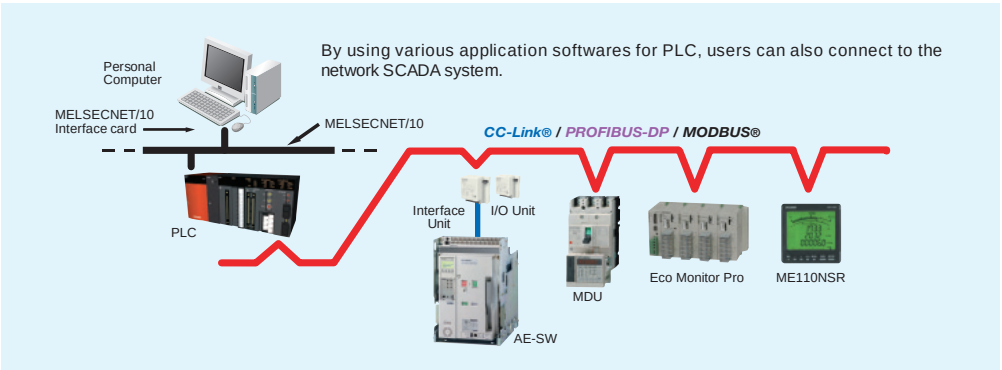
These Interface units can expand the future possibility in various communication and Intelligent control.

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 comes into being the Intelligent control by Multi-data communication through these interface units to PLC/SCADA, which transfer the measurement Information, setting values, error information and trip and alarm informations.



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

Note: Some device types are excluded.

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

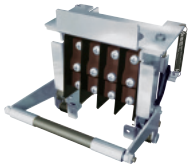
BIF-CON

The Input & Output Controlling Unit (BIF-CON) is available for the remote controlling and remote monitoring of the breaker condition through the various network systems.
With this BIF-CON unit in addition to the Interface Unit, it become possible to control the breaker remotely, like a ON or OFF operations or Spring-charging.

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 AC380-500V 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

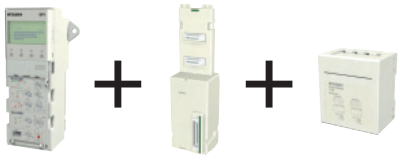


BIF-CL

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 become available in case of the breaker draw-out type.

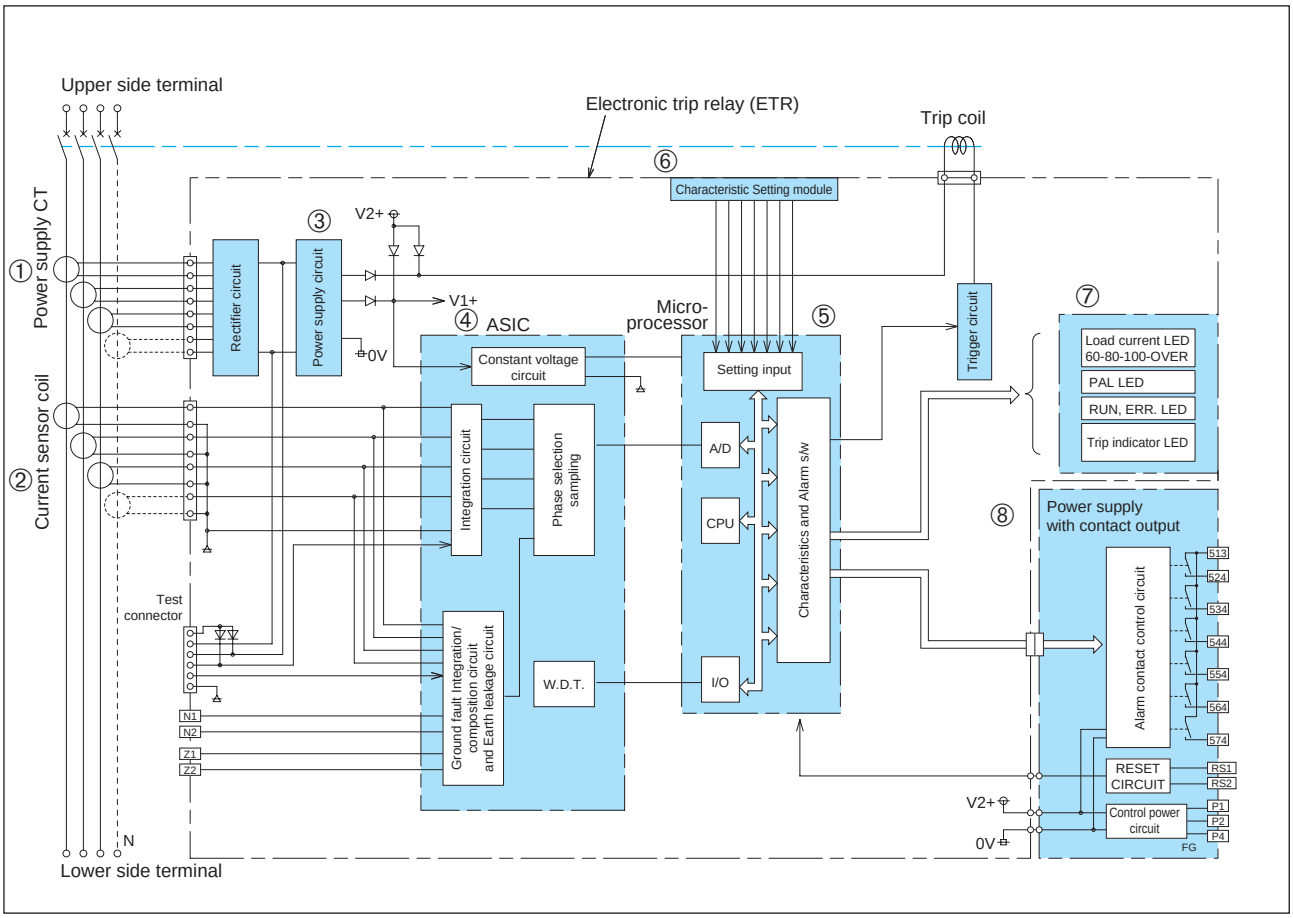
Function	Description	Note
Monitor	Breaker Drawout position	Position : Connect or Test or Disconnect

○ : can be displayed by DP1/DP2　　● : 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)											
①Main setting module	WS				WM				WB				WS				WM				WB			
②Optional setting module	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 (±2.5%)	○												○											
Leakage current (±15%) Note 4)	-	-	-	○	-	-	-	○	-	-	-	○	-	-	-	○	-	-	-	○	-	-	-	○
Voltage (±2.5%)	-												○											
Power (active,reactive,apparent) (±2.5%)	-												○											
Power factor (±5%)	-												○											
Energy (active,reactive) (±2.5%)	-												○											
Harmonics current (±2.5%)	-												○ (3.5...19th)											
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	○												○											

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)　Included the accuracy of ZCT.

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 in the breaker is detected. A air core coil which has good linearity is achieved.

③ **Power supply circuit**
This part convert power supply CT energy to constant voltage for respective circuits in the ETR.

④ **ASIC**
This amplifies signal detected by the current sensor coil, and detects ground fault current by vector composition.

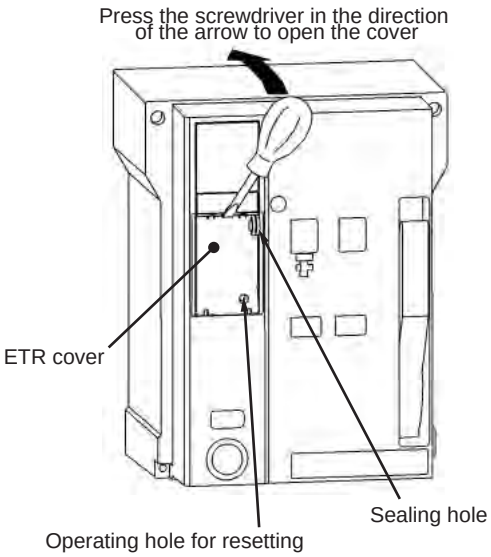
⑤ **Microprocessor**
The microprocessor integrates each phase current waveforms from the ASIC and performs processing for overcurrent protection and others.

⑥ **Characteristic setting module**
The module for the characteristic setting of the ETR.

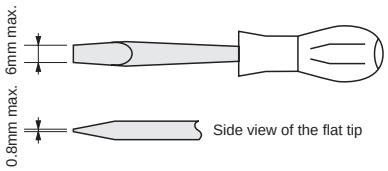
⑦ **Several LEDs**
The load current LED give a figure of current in percent by CT energy.
Trip indicator and pre-alarm are indicated by control power supply.
RUN and ERR. LED indicate breaker's condition by control power supply or ten-odd percent of CT energy.

⑧ **Power supply with contact output**
This outputs contact signal at fault cause (including pre-alarm) and at other alarms.
A control supply is necessary for this function.

Setting procedure

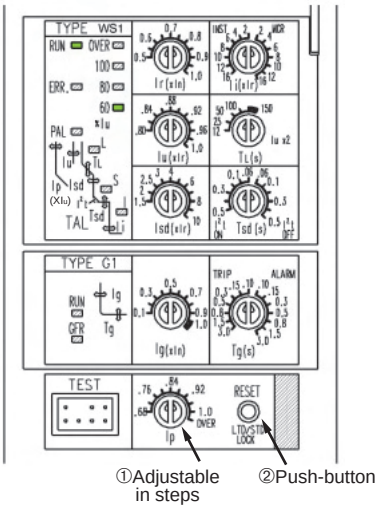


1 Prepare a small flat tipped screwdriver.



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

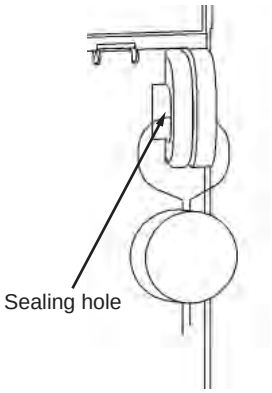
Rotary code switch is used. Do not set the switch at points between steps. The setting value is same when the switch is positioned at the thick line. (Set the switch with a torque of 0.02N·m or below.)

② Push-button

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

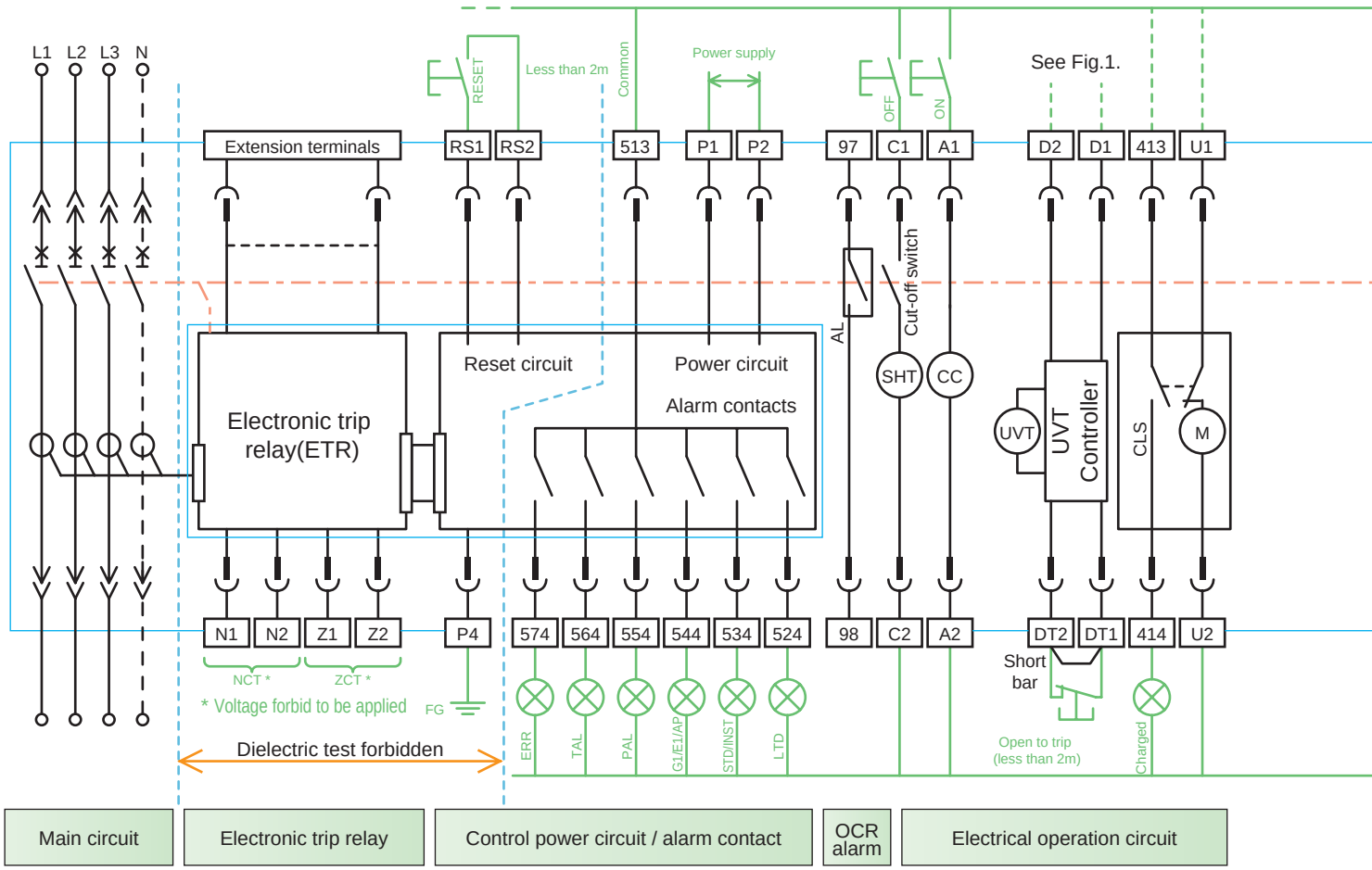
4 When the characteristic is set up, use a device like a field tester, etc to make sure that the required characteristic has been set.

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



Wiring diagram

● The following diagram shown accessories fully equiped.



Terminal description

13 14 ~ 53 54	Auxiliary switch "a"
11 12 ~ 51 52	Auxiliary switch "b"
U1 U2	Motor charging
413 414	Charged signal
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 ~ 574	Alarm contacts
Z1 Z2	For external ZCT
N1 N2	For Neutral CT (Note)
Extension terminals	For external display DP2
	For Interface unit
	For VT unit

Note; Do not connect the NCT type CW-40LM (for AE-SS series).

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 connecter (drawout type)

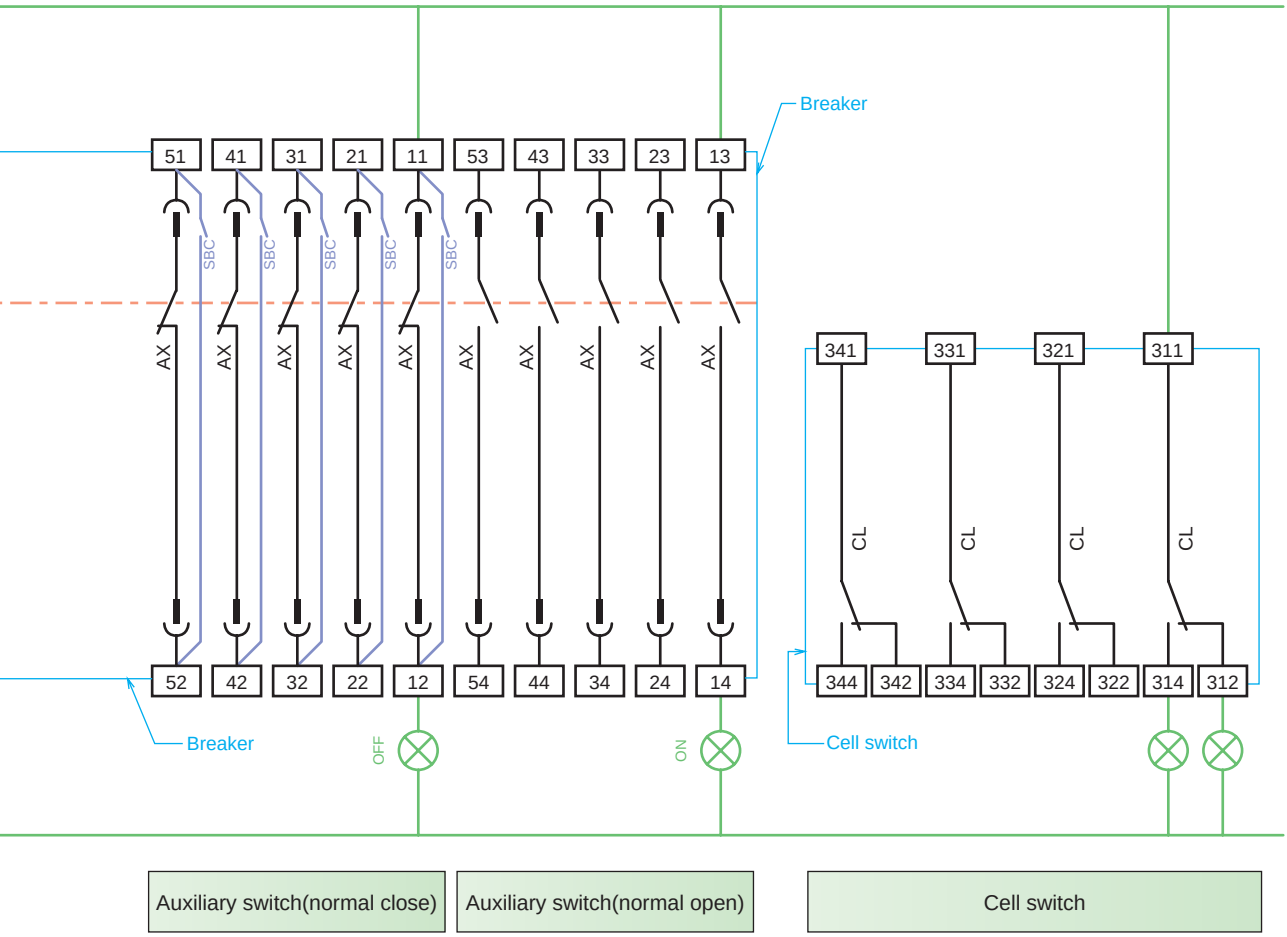
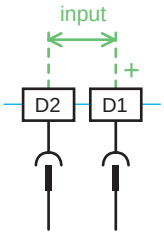
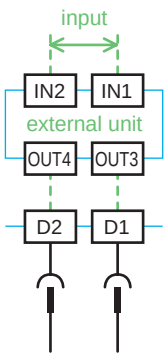


Fig.1
UVT controller wiring

100-120V AC type 200-240V AC type DC types	380-460V AC type
	

Note;

- On 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.
- 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)

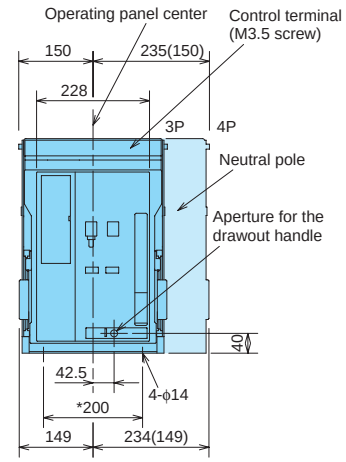
  Use the switch that can open and close DC150V, 0.5A to remote trip.
  Remote trip terminal has short bar at shipment, so remove it before using this function.
  Disconnect the voltage input wires during dielectric testing of main circuit.
- Alarm contacts 513, 524~574 are also reset by removing P1, P2 power supply voltage. (longer than 1sec.)

Outline dimensions

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

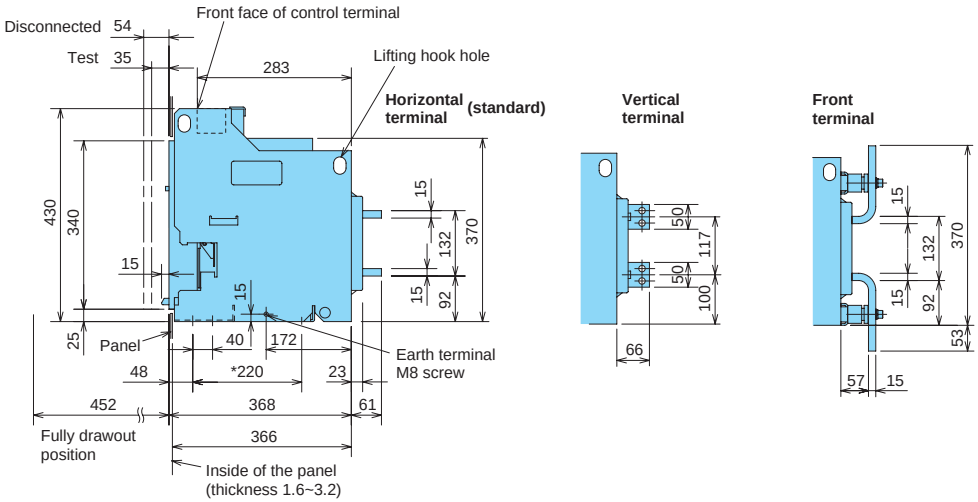
(mm)

Front view

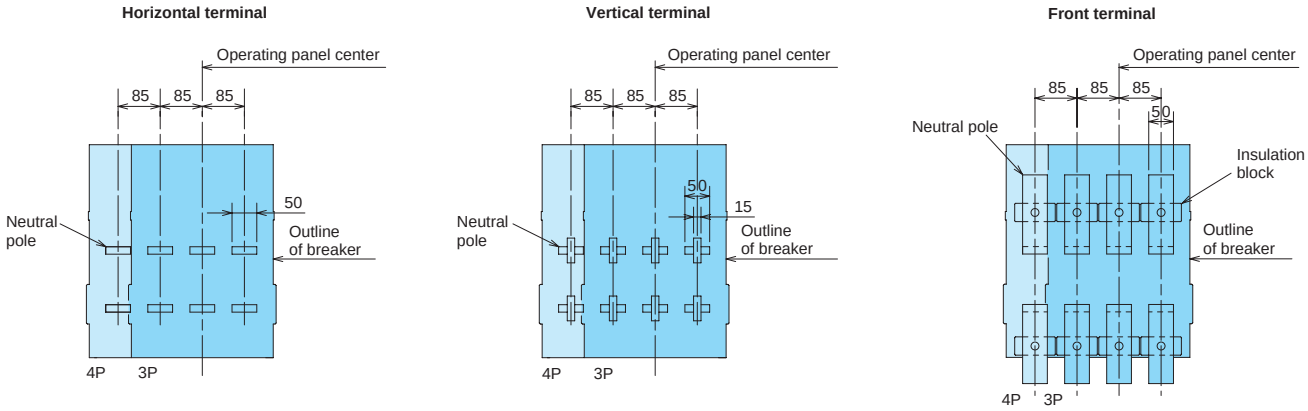


* : Mounting pitch
The numerals shown in parentheses are for 3 poles.

Side view

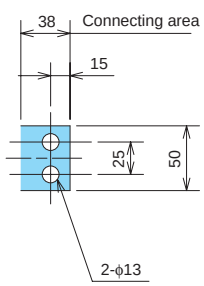


Rear view



Main circuit terminal dimension

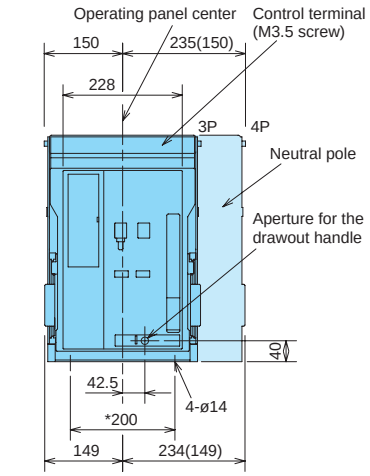
Horizontal terminal(standard)
Vertical terminal
Front terminal



Drawout type AE2000-SWA

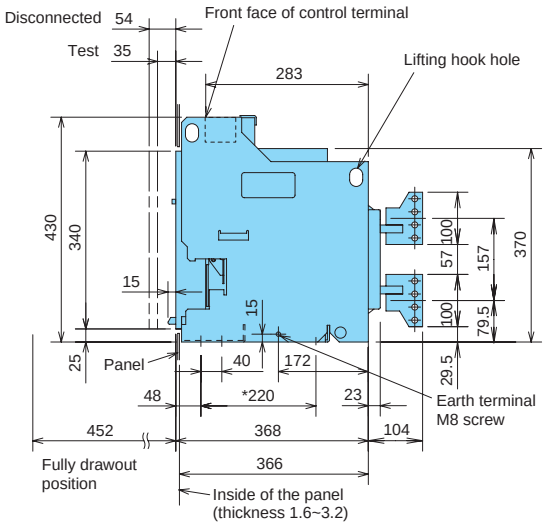
(mm)

Front view

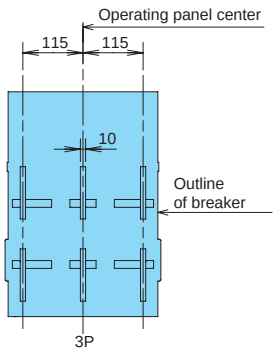


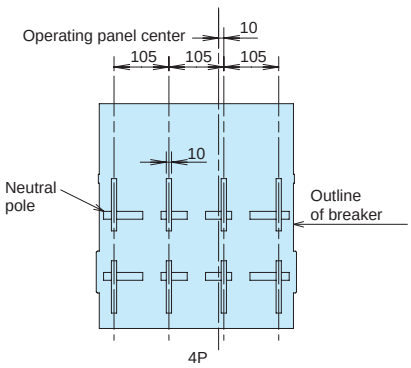
* : Mounting pitch
The numerals shown in parentheses are for 3 poles.

Side view

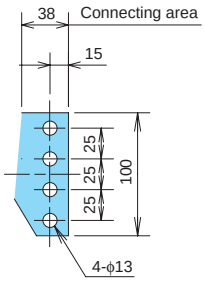


Rear view





Main circuit terminal dimension

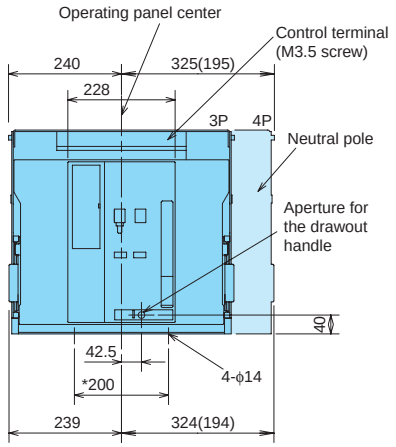


Outline dimensions

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

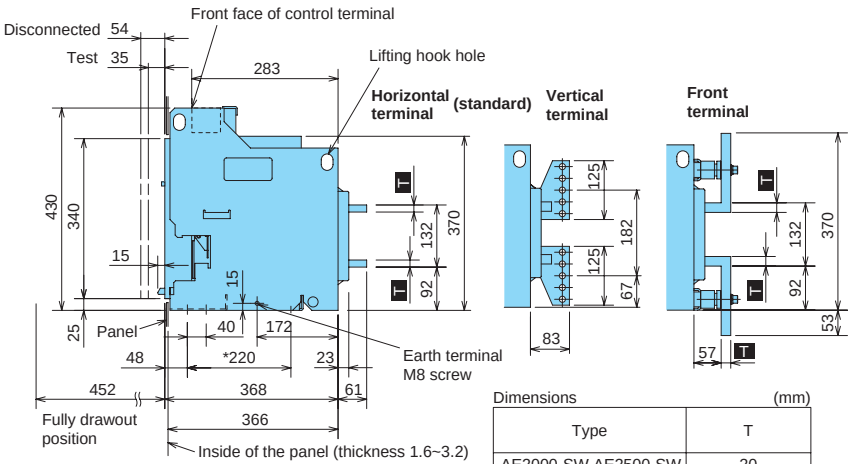
(mm)

Front view



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

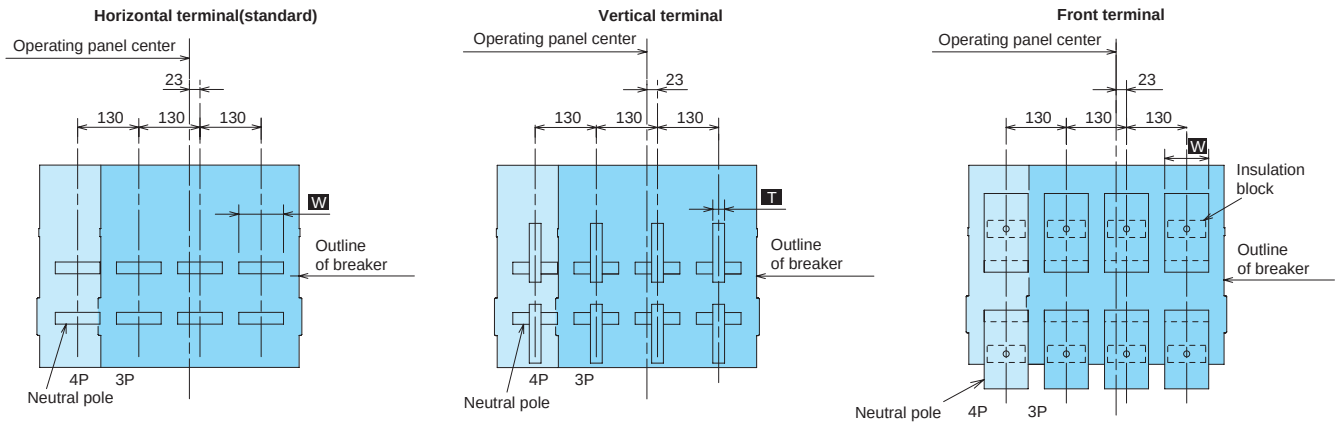
Side view



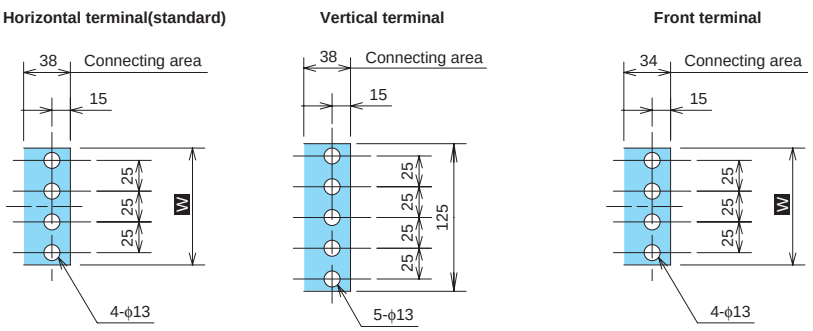
Dimensions (mm)

Type	T
AE2000-SW AE2500-SW	20
AE3200-SW	25

Rear view



Main circuit terminal dimensions



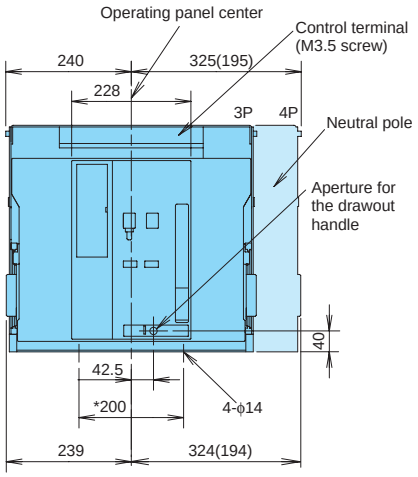
Dimensions (mm)

Type	W
AE2000-SW AE2500-SW	95
AE3200-SW	103

Drawout type AE4000-SWA

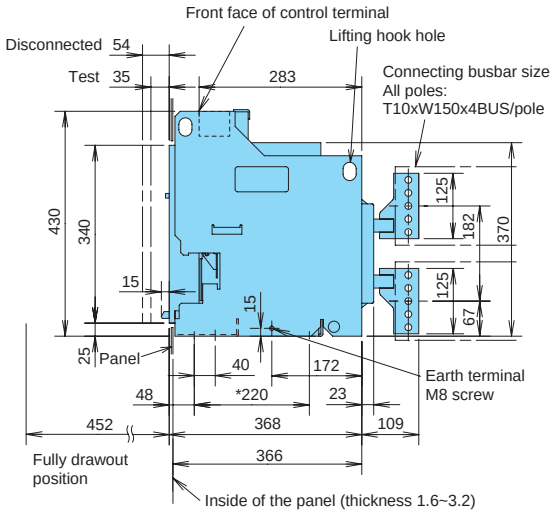
(mm)

Front view

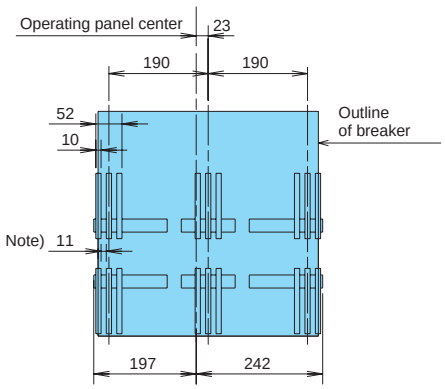


* : Mounting pitch
The numerals shown in parentheses are for 3 poles.

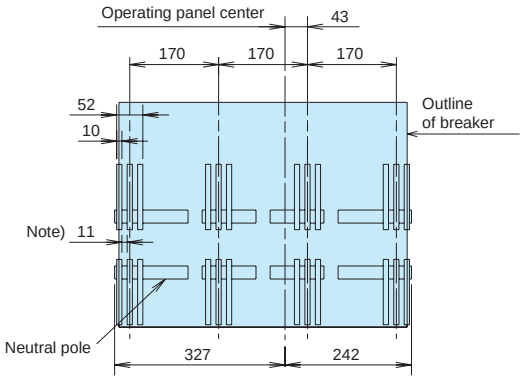
Side view



Rear view



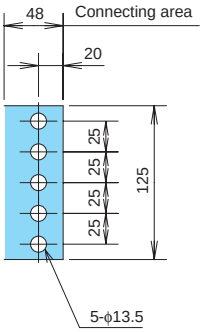
3P



4P

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

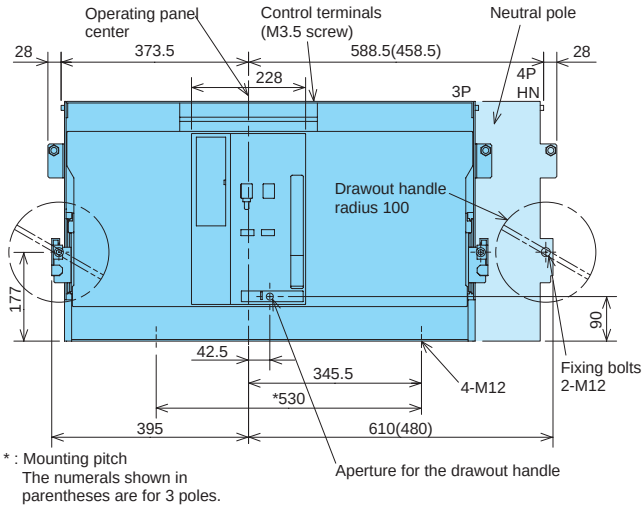


Outline dimensions

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

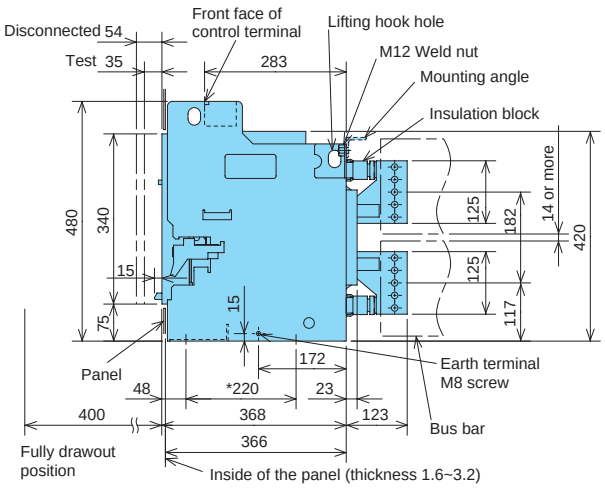
(mm)

Front view

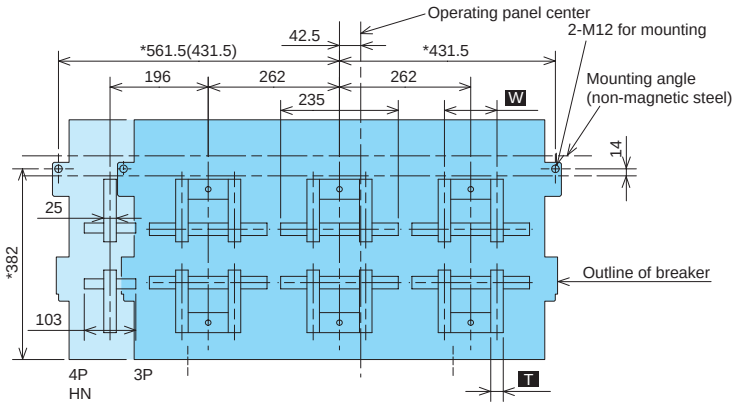


* : Mounting pitch
The numerals shown in parentheses are for 3 poles.

Side view

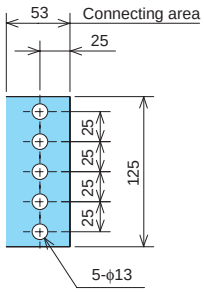


Rear view



The mounting angle should be prepared by the customer.

Main circuit terminal dimension

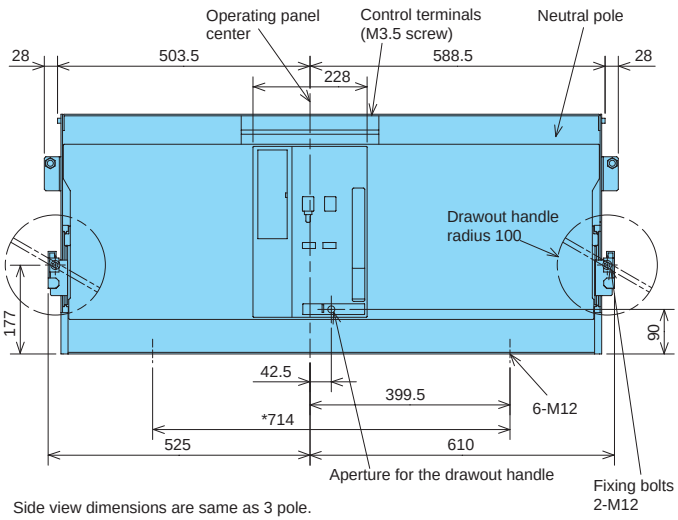


Dimensions (mm)

Type	W	T
AE4000-SW AE5000-SW	100	20
AE6300-SW	105	25

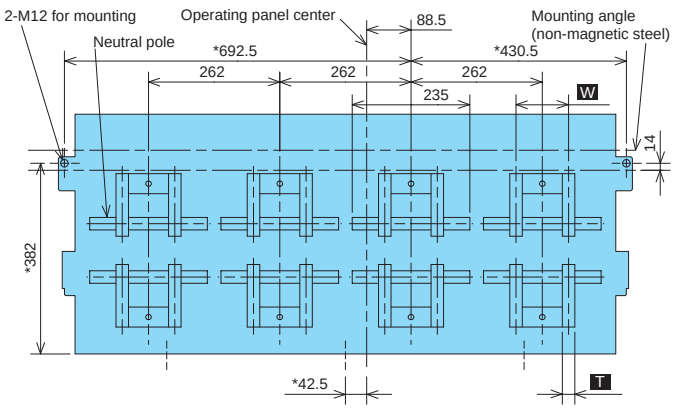
4P FN type

Front view



Side view dimensions are same as 3 pole.

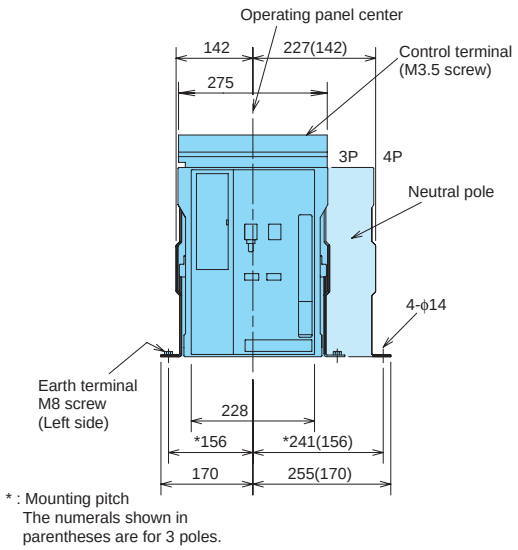
Rear view



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

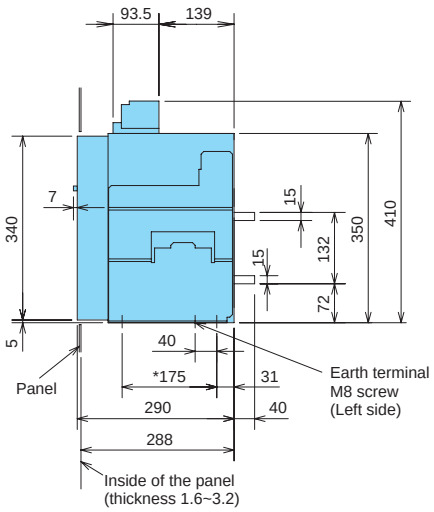
(mm)

Front view

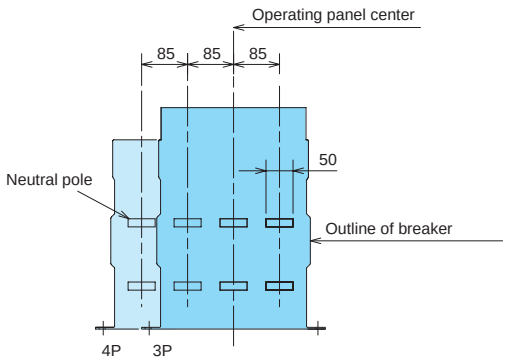


* : Mounting pitch
The numerals shown in parentheses are for 3 poles.

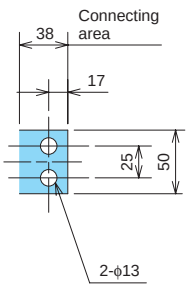
Side view



Rear view



Main circuit terminal dimension

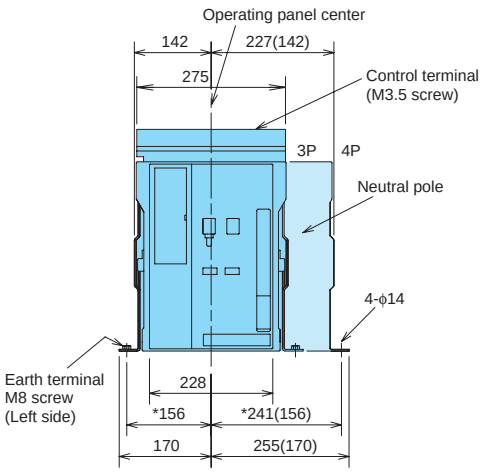


Outline dimensions

Fixed type AE2000-SWA

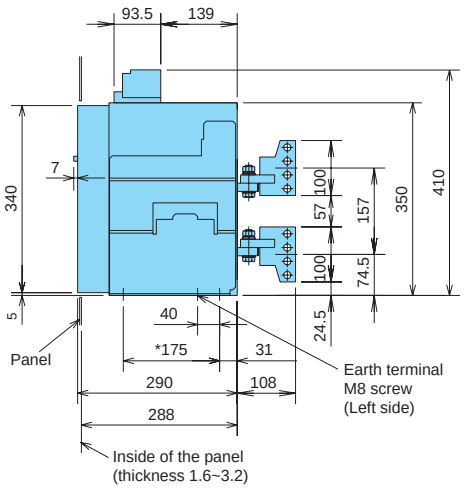
(mm)

Front view

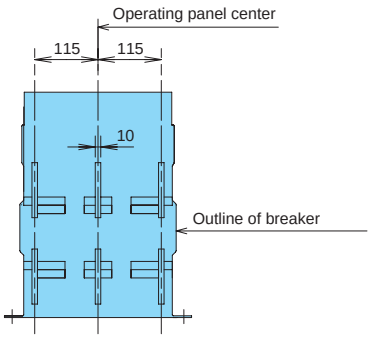


* : Mounting pitch
The numerals shown in parentheses are for 3 poles.

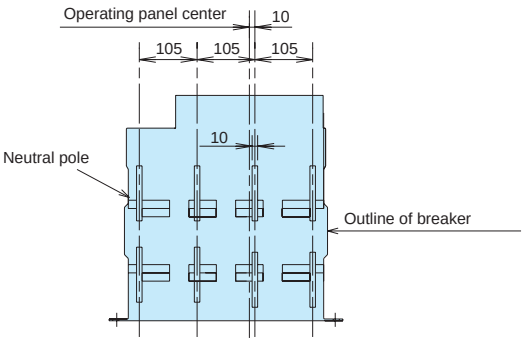
Side view



Rear view

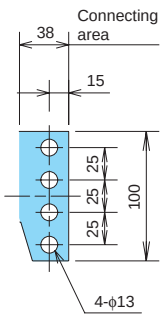


3P



4P

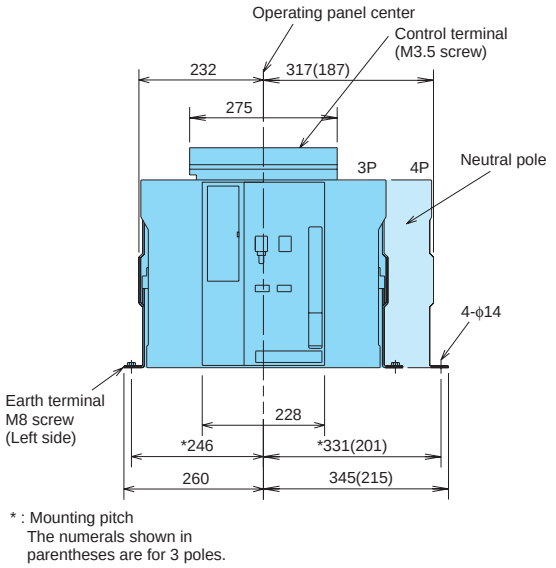
Main circuit terminal dimension



Fixed type AE2000-SW, AE2500-SW, AE3200-SW

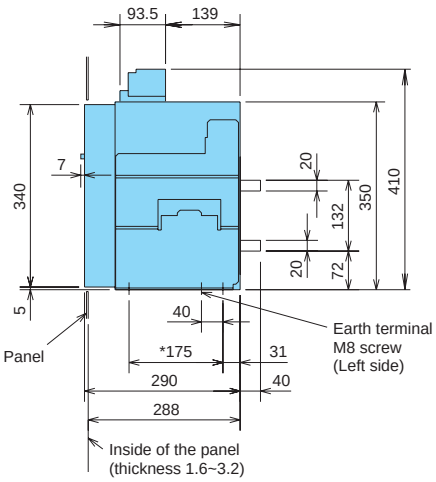
(mm)

Front view

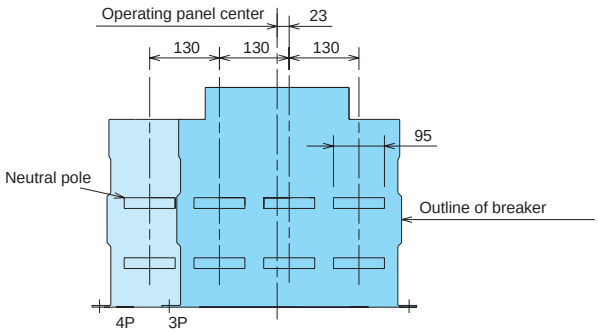


* : Mounting pitch
The numerals shown in parentheses are for 3 poles.

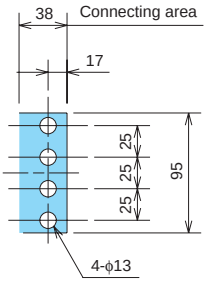
Side view



Rear view



Main circuit terminal dimension

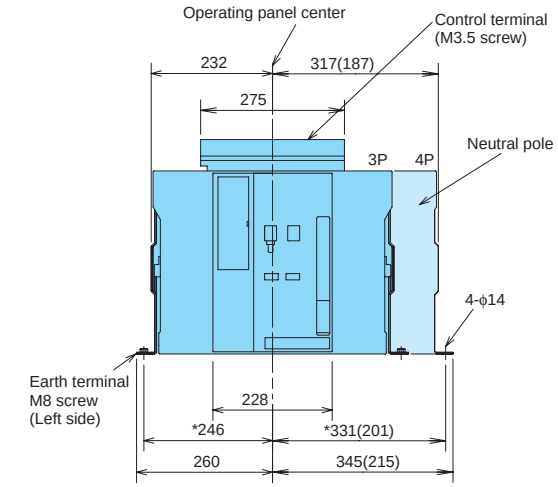


Outline dimensions

Fixed type AE4000-SWA

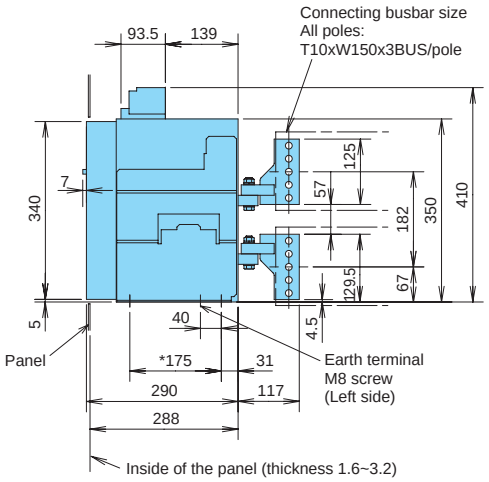
(mm)

Front view

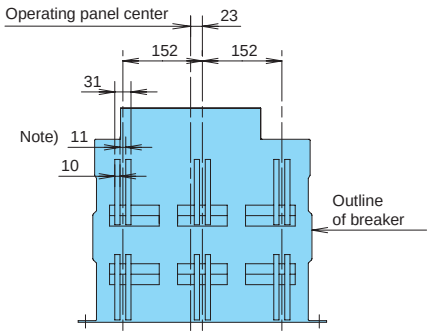


* : Mounting pitch
The numerals shown in parentheses are for 3 poles.

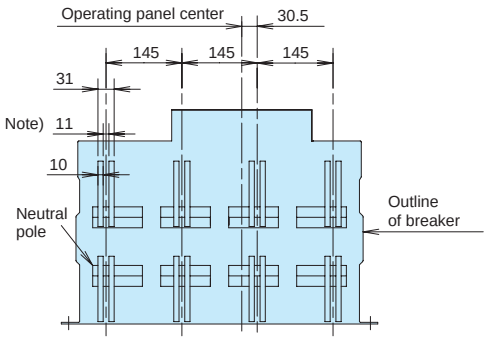
Side view



Rear view



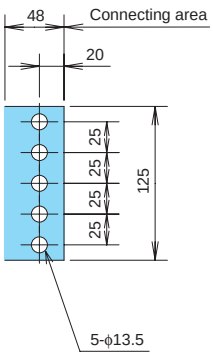
3P



4P

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.

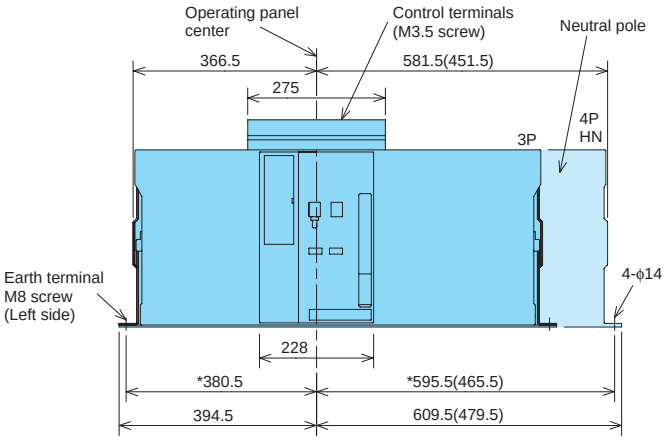
Main circuit terminal dimension



Fixed type AE4000-SW, AE5000-SW, AE6300-SW

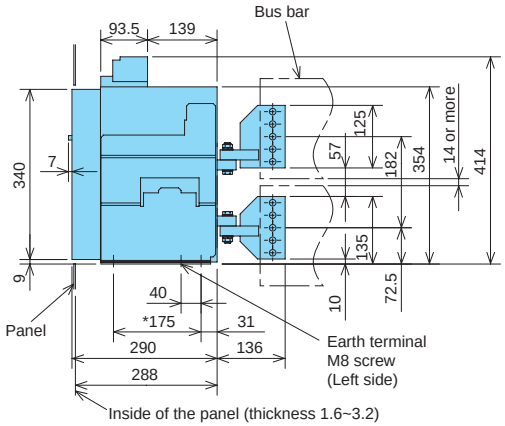
(mm)

Front view

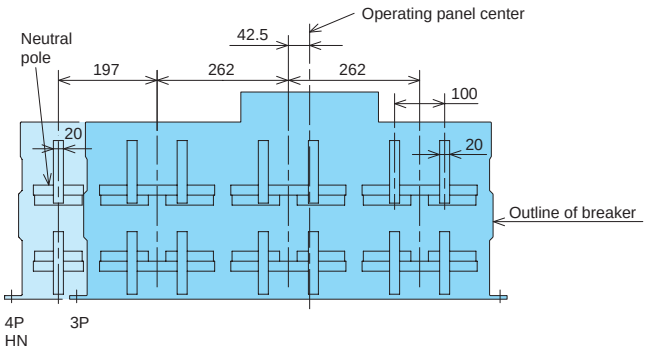


* : Mounting pitch
The numerals shown in parentheses are for 3 poles.

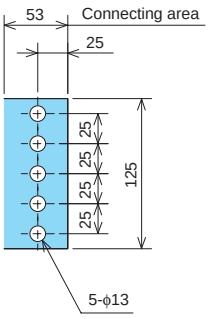
Side view



Rear view

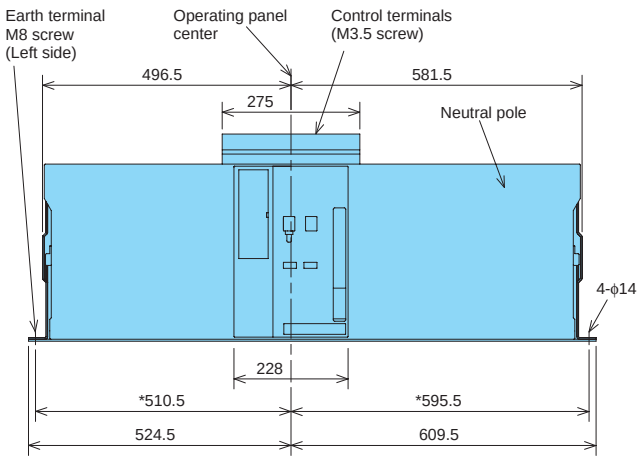


Main circuit terminal dimension

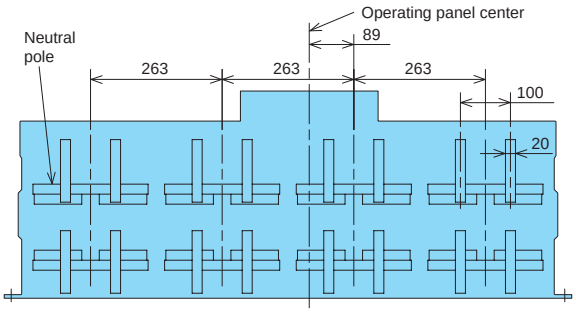


4P FN type

Front view



Rear view



Side view dimensions are same as 3 pole.

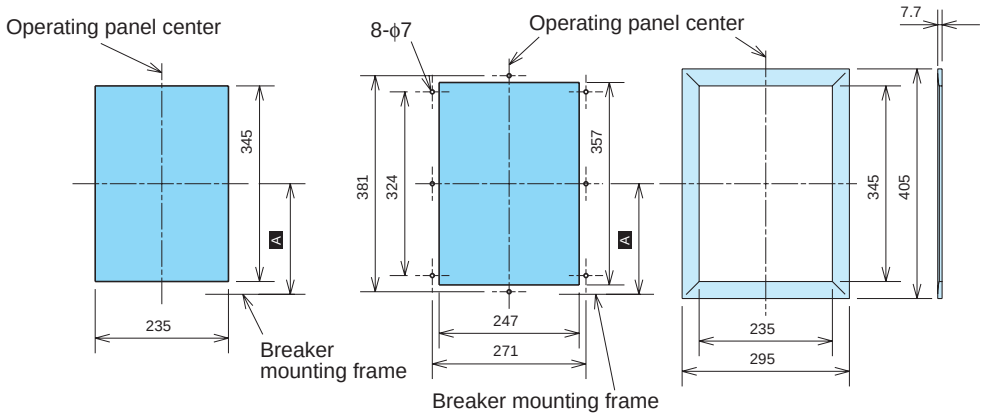
Outline dimensions

Panel cut-out, Drawout handle, Terminal adapter

Panel cut-out dimensions

Door frame panel cut-out dimensions

Panel cut-out dimensions Outline

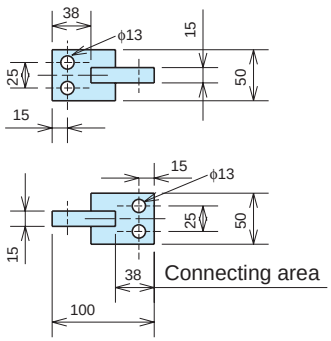


Dimensions (mm)

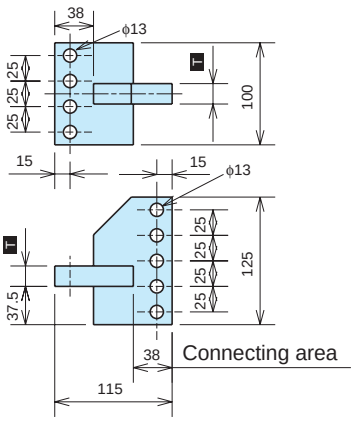
Type		A
AE630-SW~AE1600-SW	Fixed Type	175
AE2000-SW~AE3200-SW		
AE2000-SWA, AE4000-SWA	Drawout Type	195
AE4000-SW~AE6300-SW	Fixed Type	179
	Drawout Type	245

Vertical terminal adapter

AE630~1600-SW



AE2000~3200-SW

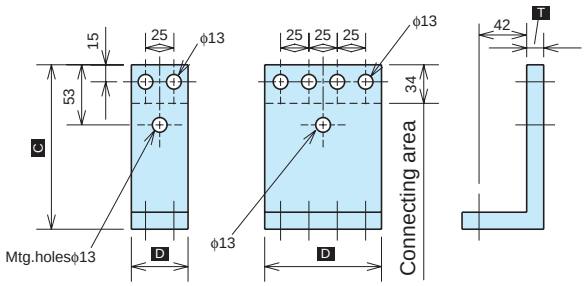


Dimensions (mm)

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

Front terminal adapter

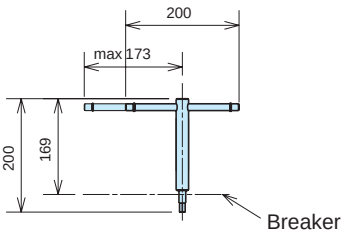
AE630~1600-SW AE2000~3200-SW



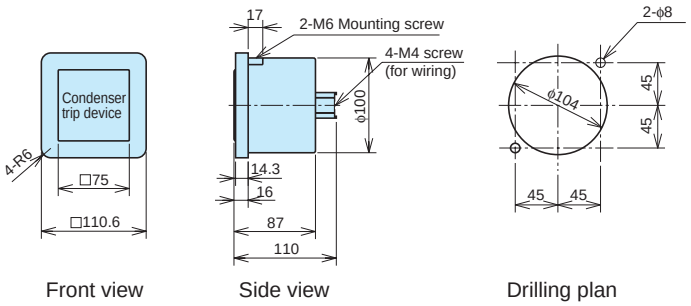
Dimensions (mm)

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

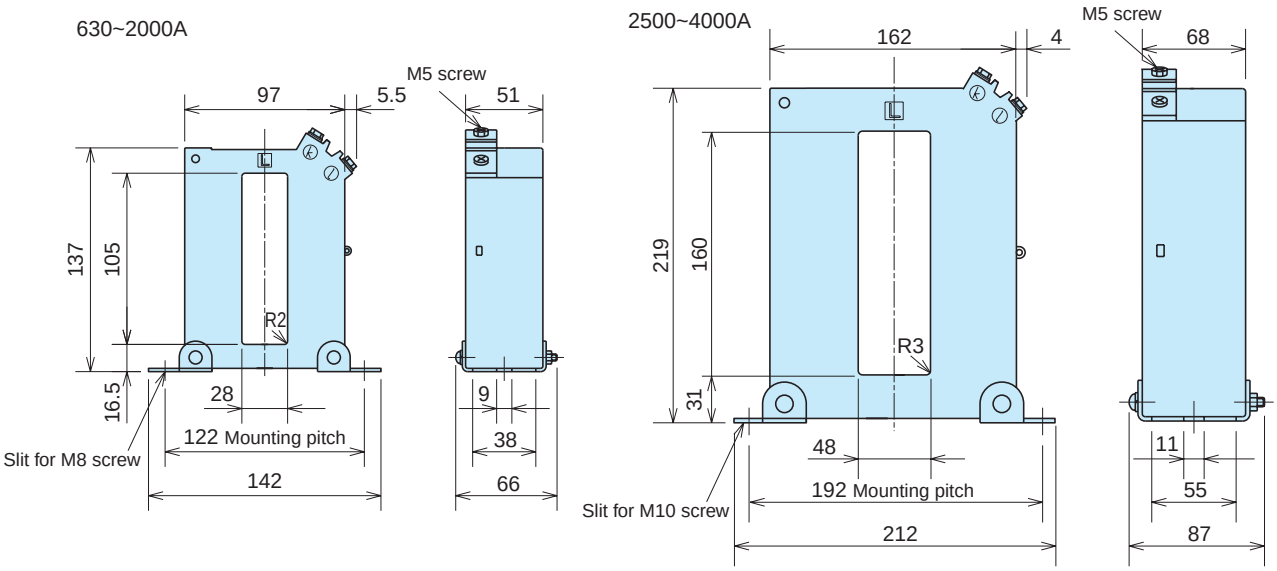


Condenser trip device (COT)

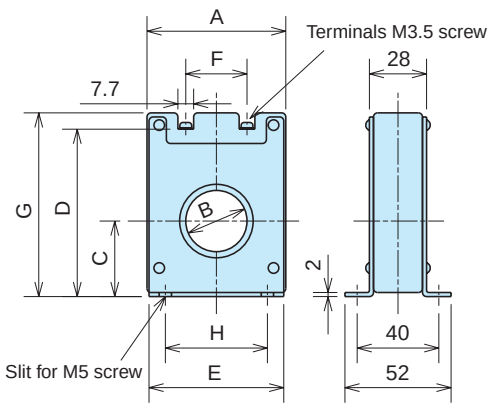


Neutral CT (NCT), External ZCT

Neutral CT (NCT)

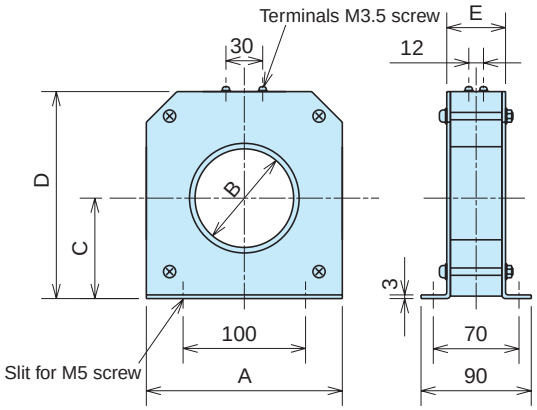


External ZCT for transformer ground wire



Dimensions (mm)

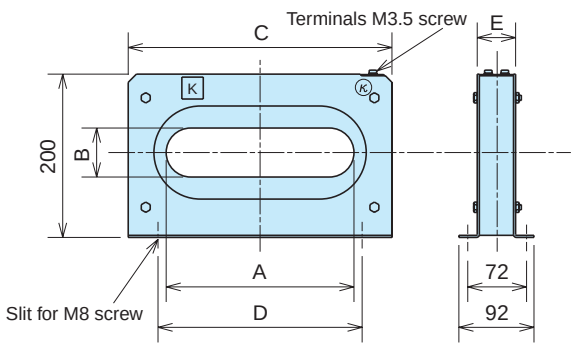
	A	B	C	D	E	F	G	H
ZT15B	48	15	29	62	46	15	70	25
ZT30B	68	30	37	82	66	30	90	50
ZT40B	85	40	43	92	81	40	100	50



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

External ZCT for load circuits



Dimensions (mm)

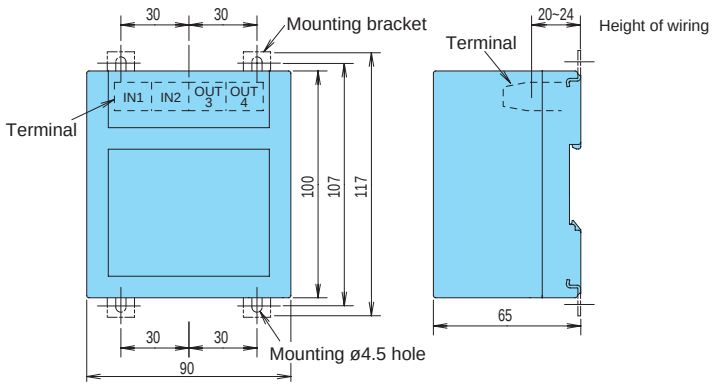
	A	B	C	D	E
ZCT163	230	60	323	250	47
ZCT323	370	108	460	400	47
ZCT324	500	108	600	550	48

Outline dimensions

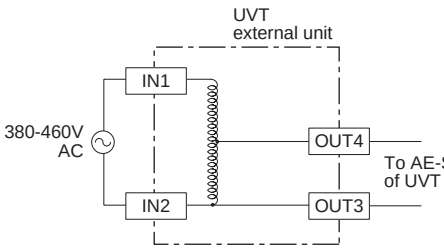
UVT external unit

UVT external unit (AC380 ~ 460V)

(mm)



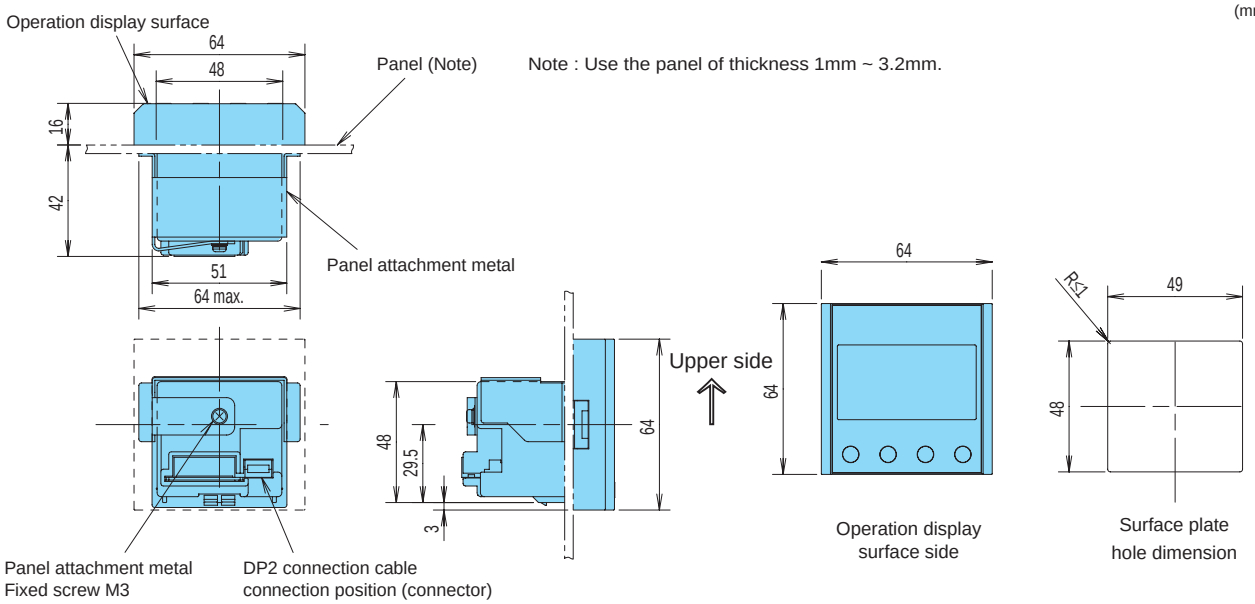
Use the attached mounting bracket. (Not applicable to 35mm IEC rail)



ETR external units

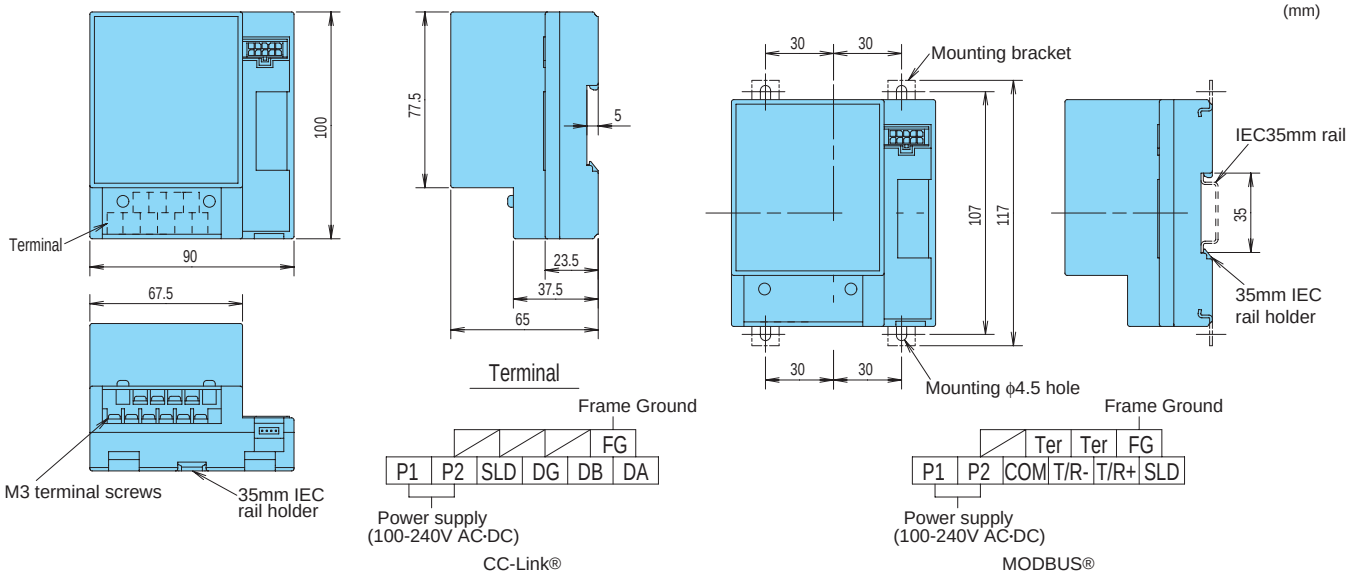
Display onto panel board (DP2)

(mm)

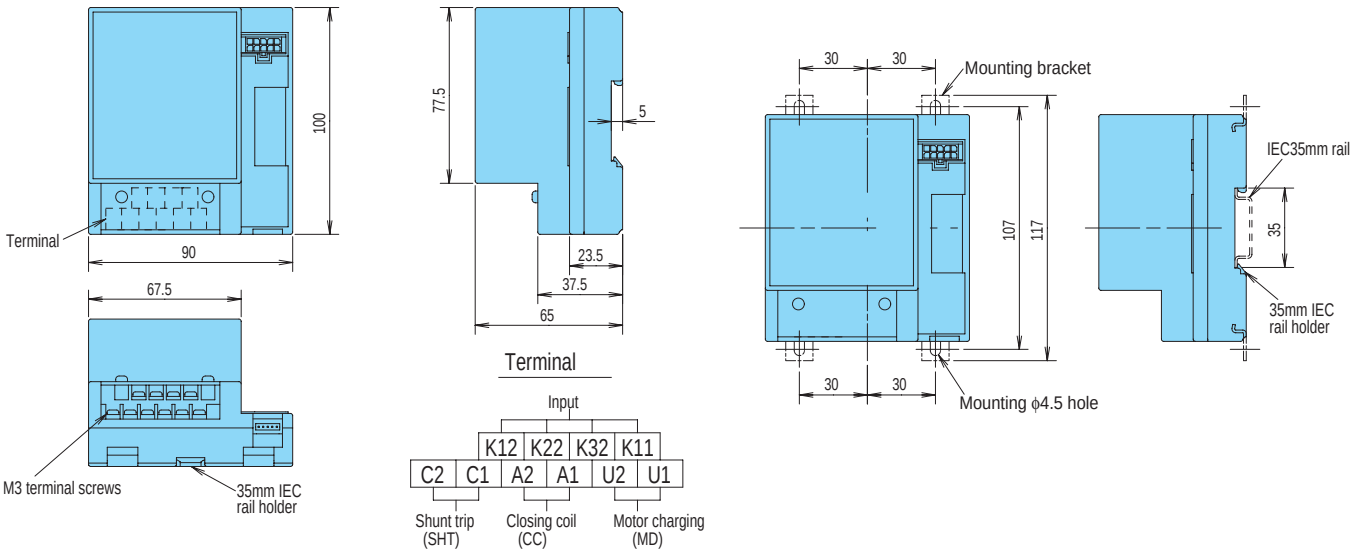


CC-Link®, MODBUS® interface unit (BIF-CC, BIF-MD)

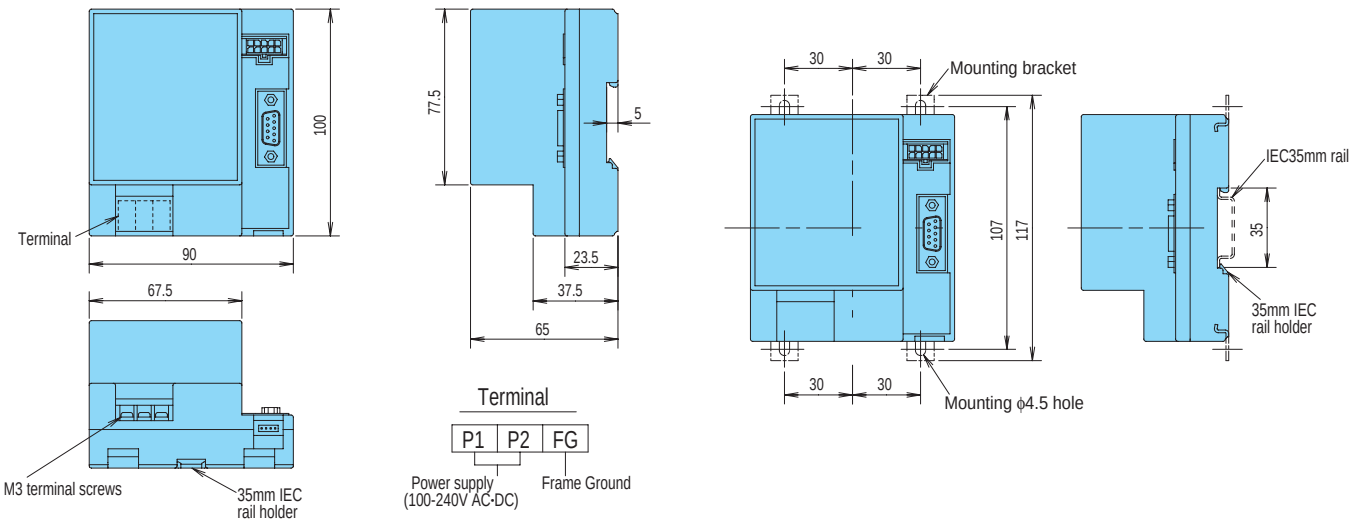
(mm)



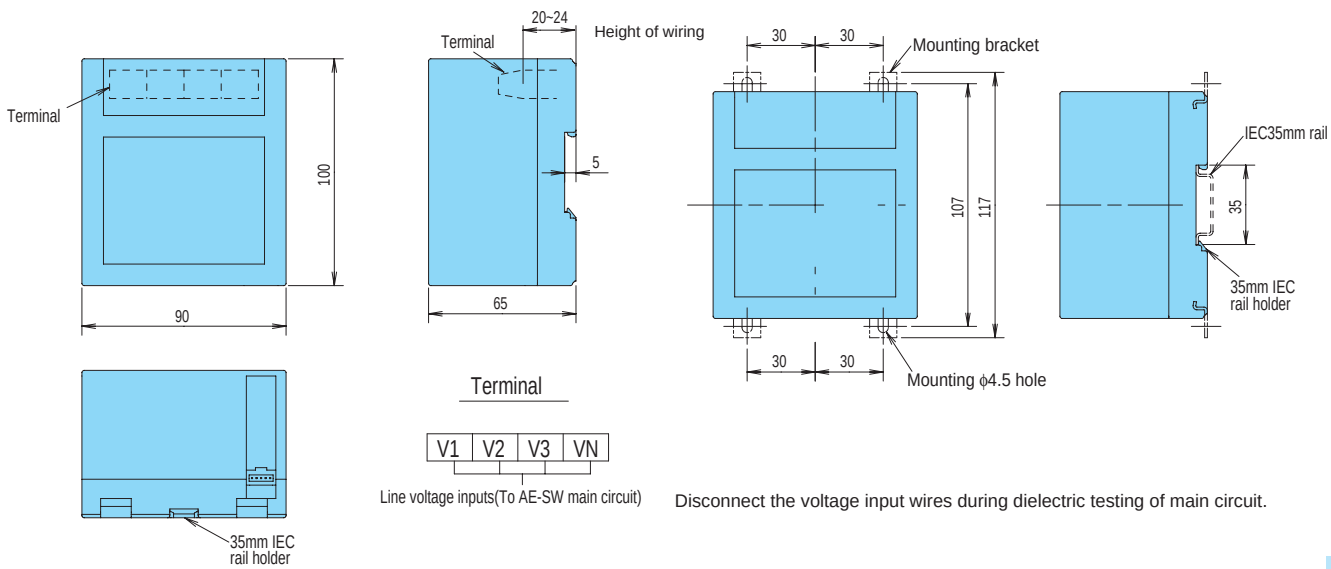
I/O unit (BIF-CON)



PROFIBUS-DP interface unit (BIF-PR)



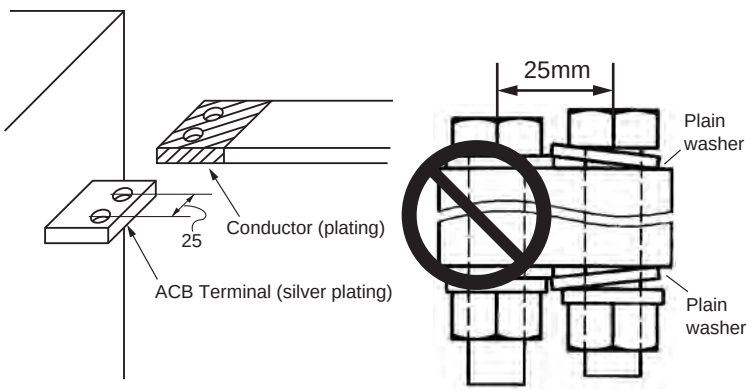
VT unit (VT)



Disconnect the voltage input wires during dielectric testing of main circuit.

Pre-cautions when making connections

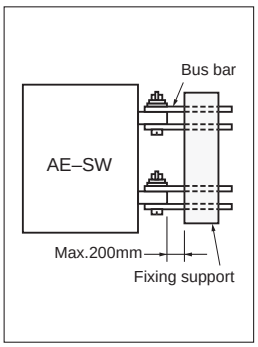
Use M12 bolts, plain washers, and spring lock washers to connect the conductor. There are various size plain washers, but use 24mm or smaller outside diameter washers. The washers may overlap if too large washers are used.
It is recommended to apply silver plating on the contact surface of the conductor 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.39 to P.46.



Standard tightening torque

Screw size	Tightening torque(N·m)
M12	40~50

Since fault current flowing through the conductors cause 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 / Conductor distance(mm) / Prospective fault current kA(pf)	AE630-SW~ AE1600-SW	AE2000-SWA		AE2000-SW~ AE3200-SW	AE4000-SWA				AE4000-SW~ AE6300-SW
					Drawout type		Fixed type		
		3-Pole	4-Pole		3-Pole	4-Pole	3-Pole	4-Pole	
	85	115	105	130	190	170	152	145	262
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)	-	-	-	-	-	-	-	-	27800
130(0.2)	-	-	-	-	-	-	-	-	47000

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

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

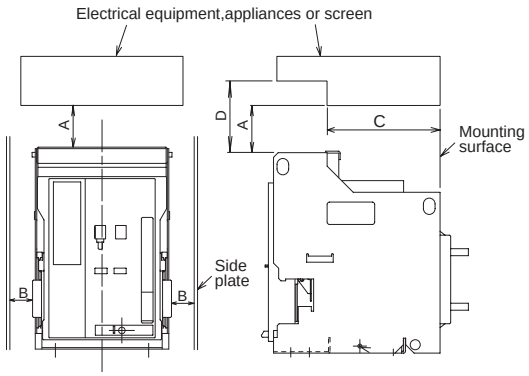
Rated current Max.(A)	Connecting conductors(copper bus bar)		
	Arrangement	Quantity	Conductor size(mm)
630	With long surface vertical	2	40 x 5
1000		2	60 x 5
1250		2	80 x 5
1600		2	100 x 5
2000		3	100 x 5
2500		4	100 x 5
3150(3200)*1		3	100 x 10
4000 (AE4000-SWA Drawout type)		4	150 x 10
4000 (AE4000-SWA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

*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		AC600V or less	AC660V, 690V	AC690V 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	(Note 1) 200
	B	(Note 3) 50	(Note 3) 50	(Note 3) 50
	C	240	240	-
	D	(Note 2) 50	(Note 2) 50	200

Note1:300mm or more clearance is necessary to inspect the arc-extinguishing chamber and contacts.
Note2:The wiring space reguired 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.($H_2S \leq 0.01$ppm, $SO_2 \leq 0.1$ppm, NH_3 < 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 P56.
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.

Internal resistance, reactance and power consumption (per pole)

Type	Connection	Internal resistance (mΩ)	Reactance (mΩ)	Power consumption (W)
AE630-SW	Fixed type	0.028	0.059	11
	Drawout type	0.042	0.089	17
AE1000-SW	Fixed type	0.026	0.060	26
	Drawout type	0.040	0.091	40
AE1250-SW	Fixed type	0.024	0.060	38
	Drawout type	0.038	0.091	60
AE1600-SW	Fixed type	0.016	0.063	41
	Drawout type	0.030	0.095	77
AE2000-SWA	Fixed type	0.016	0.063	64
	Drawout type	0.025	0.095	100
AE2000-SW	Fixed type	0.010	0.047	40
	Drawout type	0.020	0.071	80
AE2500-SW	Fixed type	0.008	0.047	50
	Drawout type	0.018	0.071	113
AE3200-SW	Fixed type	0.007	0.048	72
	Drawout type	0.014	0.072	143
AE4000-SWA	Fixed type	0.009	0.048	144
	Drawout type	0.015	0.072	240
AE4000-SW	Fixed type	0.010	0.038	160
	Drawout type	0.013	0.062	210
AE5000-SW	Fixed type	0.009	0.038	225
	Drawout type	0.011	0.062	275
AE6300-SW	Fixed type	0.008	0.038	318
	Drawout type	0.0085	0.062	340

The above values are applicable for one pole. (at brandnew product)

Deratings by ambient temperature

(A)

Standard	IEC60947-2, BS, JIS C 8201-2-1 (Standard:40°C)				
	LR, GL, BV, DNV, 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

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, BS, JIS C 8201-2-1 (Standard:40°C)		
	LR, GL, BV, DNV, 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

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 53.
As for ambient temperature exceeding 60°C, please inquire us.

Discrimination table

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

AC230V sym kA

Main circuit breaker / Unit breaking capacity / Branch circuit breaker			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
			65	65	65	65	65	85	85	85	85	130	130	130
NF|S·H·MB·NV|S·H	NF32-SW MB30-SW MB50-CW	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
	NV32-SW	10	9(10)	10	10	10	10	10	10	10	10	10	10	10
	NF63-SW MB50-SW NV63-SW	15	9(10)	10	10	10	10	10	10	10	10	10	10	10
	NF63-HW NV63-HW	25	9(25)	25	25	25	25	25	25	25	25	25	25	25
	NF125-SW MB100-SW NV125-SW	50	9(50)	45(50)	50	50	50	50	50	50	50	50	50	50
	NF125-HW NV125-HW	100	9(65)	50(65)	65	65	65	85	85	85	85	100	100	100
	NF250-SW MB225-SW NV250-SW NV250-SEW	50	9(50)	20(50)	22(50)	42(50)	42(50)	50	50	50	50	50	50	50
	NF250-HW NV250-HW	100	9(65)	25(65)	40(65)	65	65	85	85	85	85	100	100	100
	NF400-SW NV400-SW	85	-	-	20(65)	27(65)	27(65)	42(75)	70(75)	85	85	85	85	85
	NF400-SEW NV400-SEW	85	9(65)	15(65)	20(65)	27(65)	27(65)	42(75)	70(75)	85	85	85	85	85
	NF400-HEW NV400-HEW	100	9(65)	15(65)	20(65)	27(65)	27(65)	42(75)	70(75)	85	85	100	100	100
	NF400-REW NV400-REW	150	9(65)	15(65)	20(65)	27(65)	27(65)	42(75)	70(75)	85	85	130	130	130
	NF630-SW NV630-SW	85	-	-	-	24(65)	24(65)	30(75)	40(75)	60(75)	60(75)	85	85	85
	NF630-SEW NV630-SEW	85	-	15(65)	18(65)	24(65)	24(65)	30(75)	40(75)	60(75)	60(75)	85	85	85
	NF630-HEW NV630-HEW	100	-	15(65)	18(65)	24(65)	24(65)	30(75)	40(75)	60(75)	60(75)	85(100)	85(100)	85(100)
	NF630-REW	150	-	15(65)	18(65)	24(65)	24(65)	30(75)	40(75)	60(75)	60(75)	85(100)	85(100)	85(100)
	NF800-SEW NV800-SEW	85	-	-	18(65)	24(65)	24(65)	30(75)	40(75)	60(75)	60(75)	85	85	85
	NF800-HEW NV800-HEW	100	-	-	18(65)	24(65)	24(65)	30(75)	40(75)	60(75)	60(75)	85(100)	85(100)	85(100)
	NF800-REW	150	-	-	18(65)	24(65)	24(65)	30(75)	40(75)	60(75)	60(75)	85(100)	85(100)	85(100)
NF|C·NV|C	NF63-CW NV63-CW	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
	NF125-CW NV125-CW	30	9(30)	15(30)	18(30)	24(30)	24(30)	30	30	30	30	30	30	30
	NF250-CW NV250-CW	35	9(35)	15(35)	18(35)	24(35)	24(35)	35	35	35	35	35	35	35
	NF400-CW NV400-CW	50	-	15(50)	18(50)	24(50)	24(50)	30(50)	37(50)	48(50)	48(50)	50	50	50
	NF630-CW NV630-CW	50	-	-	-	24(50)	24(50)	30(50)	37(50)	48(50)	48(50)	50	50	50
	NF800-CEW	50	-	-	-	24(50)	24(50)	30(50)	37(50)	48(50)	48(50)	50	50	50
NF|U	NF125-RGW	125	65	65	65	65	65	85	85	85	85	125	125	125
	NF125-UGW	200	65	65	65	65	65	85	85	85	85	130	130	130
	NF250-RGW	125	9(65)	65	65	65	65	85	85	85	85	125	125	125
	NF250-UGW	200	9(65)	65	65	65	65	85	85	85	85	130	130	130
	NF400-UEW	200	9(65)	15(65)	18(65)	29(65)	29(65)	48(75)	85	85	85	130	130	130
	NF800-UEW	200	-	-	18(65)	24(65)	24(65)	30(75)	37(75)	68(75)	68(75)	85(100)	85(100)	85(100)

• 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).

AC440V sym kA

Main circuit breaker / Unit breaking capacity / Branch circuit breaker			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
			65	65	65	65	65	85	85	85	85	130	130	130
NF|S·H·MB·NV|S·H	NF32-SW MB30-SW MB50-CW	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-SW	5	5	5	5	5	5	5	5	5	5	5	5	5
	NF63-SW MB50-SW NV63-SW	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
	NF63-HW NV63-HW	10	9(10)	10	10	10	10	10	10	10	10	10	10	10
	NF125-SW MB100-SW NV125-SW	25	7(25)	20(25)	25	25	25	25	25	25	25	25	25	25
	NF125-HW NV125-HW	50	9(50)	30(50)	50	50	50	50	50	50	50	50	50	50
	NF250-SW MB225-SW NV250-SW NV250-SEW	25	7(25)	14(25)	19(25)	25	25	25	25	25	25	25	25	25
	NF250-HW NV250-HW	50	7(50)	15(50)	25(50)	42(50)	42(50)	50	50	50	50	50	50	50
	NF400-SW NV400-SW	42	-	-	18(42)	24(42)	24(42)	33(42)	42	42	42	42	42	42
	NF400-SEW NV400-SEW	42	9(42)	15(42)	18(42)	24(42)	24(42)	33(42)	42	42	42	42	42	42
	NF400-HEW NV400-HEW	65	9(65)	15(65)	18(65)	24(65)	24(65)	33(65)	45(65)	65	65	65	65	65
	NF400-REW NV400-REW	125	9(65)	15(65)	18(65)	24(65)	24(65)	33(75)	45(75)	80	80	100	100	100
	NF630-SW NV630-SW	42	-	-	-	24(42)	24(42)	33(42)	42	42	42	42	42	42
	NF630-SEW NV630-SEW	42	-	15(42)	18(42)	24(42)	24(42)	30(42)	40(42)	42	42	42	42	42
	NF630-HEW NV630-HEW	65	-	15(65)	18(65)	24(65)	24(65)	30(65)	40(65)	60(65)	60(65)	65	65	65
	NF630-REW	125	-	15(65)	18(65)	24(65)	24(65)	30(75)	40(75)	60(75)	60(75)	75(100)	75(100)	75(100)
	NF800-SEW NV800-SEW	42	-	-	18(42)	24(42)	24(42)	30(42)	40(42)	42	42	42	42	42
	NF800-HEW NV800-HEW	65	-	-	18(65)	24(65)	24(65)	30(65)	40(65)	60(65)	60(65)	65	65	65
	NF800-REW	125	-	-	18(65)	24(65)	24(65)	30(75)	40(75)	60(75)	60(75)	75(100)	75(100)	75(100)
NF|C·NV|C	NF63-CW NV63-CW	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
	NF125-CW NV125-CW	10	9(10)	10	10	10	10	10	10	10	10	10	10	10
	NF250-CW NV250-CW	15	9(15)	15	15	15	15	15	15	15	15	15	15	15
	NF400-CW NV400-CW	25	-	15(25)	18(25)	24(25)	24(25)	25	25	25	25	25	25	25
	NF630-CW NV630-CW	36	-	-	-	24(36)	24(36)	30(36)	36	36	36	36	36	36
	NF800-CEW	36	-	-	-	24(36)	24(36)	30(36)	36	36	36	36	36	36
NF|U	NF125-RGW	125	35(65)	65	65	65	65	85	85	85	85	125	125	125
	NF125-UGW	200	50(65)	65	65	65	65	85	85	85	85	130	130	130
	NF250-RGW	125	9(65)	50(65)	65	65	65	85	85	85	85	125	125	125
	NF250-UGW	200	9(65)	65	65	65	65	85	85	85	85	130	130	130
	NF400-UEW	200	9(65)	15(65)	18(65)	29(65)	29(65)	48(75)	85	85	85	130	130	130
	NF800-UEW	200	-	-	18(65)	24(65)	24(65)	30(75)	37(75)	68(75)	68(75)	85(100)	85(100)	85(100)

• 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)

Customer(name) _____ Order No. _____ Number of units _____ units

Type P9~10 AE 1600 -SW AE _____-SWA

Number of poles ☑ 3P ☐ 4P (AE630-SW~AE4000-SWA) ☐ 3P ☐ 4P HN Note15 ☐ 4P FN Note15 (AE4000-SW~AE6300-SW)

Current setting Ir 1600 A CT rating _____ A Note1 P9,P20

Applicable standard ☑ IEC 60947-2 ☐ CCC

Ambient temperature ☑ 40°C(Standard) ☐ Others _____°C Note2

Reset type ☑ Automatic Reset (Standard) ☐ Manual Reset (MRE)

Connection ☐ Fixed type Note3 ☑ Drawout type Note3

Main circuit terminal P.11
- ☐ Horizontal terminal(FIX) (AE630~1600-SW / AE2000~3200-SW)
- ☐ Vertical terminal(FIX-VT) (AE2000-SWA / AE4000-SWA AE4000~6300-SW)
- ☑ Horizontal terminals(DR)(standard)
- ☐ Vertical terminals(DR-VT) (AE2000-SWA / AE4000-SWA AE4000~6300-SW)
- ☐ Front terminals(DR-FT) Note4

Drawout type accessories P17~18
- ☑ Cell switch(CL- 4 : 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)
- ☐ Front terminal adapter(FTA)

Can be connected to the Horizontal terminals.

Electronic trip relay(ETR)

☑ With ETR

Type WS1 G1 – P1

Main setting module

WS1, WB1	AE630–1600-SW, AE2000–3200-SW, AE4000-SW
WS2, WB2	AE2000-SWA, AE4000-SWA, AE5000-SW
WS3, WB3	AE6300-SW

WS : General use
WB : INST/MCR only

Optional setting module
- G1: Ground fault protection Note6 Note7
- N5: Neutral pole 50% protection Note7
- E1: Earth leakage protection
- AP: 2nd Additional Pre-alarm
- NA: Without optional setting

Power supply
- P1: AC·DC100-240V
- P2: DC24-60V
- P3: AC100-240V / DC100-125V with output contact
- P4: DC24-60V with output contact
- P5: DC100-240V with output contact (SSR)

P28
- ☐ Neutral CT(NCT) Note8
- ☐ External ZCT Note9
  - ZCT ☐
  - ZT ☐ B
  - ZTA ☐

Additional function P32
- ☑ Extension module(EX1)
  - ☑ Display(DP1)
  - ☐ Display onto panel board(DP2)
  - ☑ VT unit(VT)
- ☐ Temperature alarm(TAL)
- ☐ MCR switch(MCR-SW)

Network P33
- ☐ BIF-CC
- ☐ BIF-PR
- ☐ BIF-MD
- ☐ BIF-CON
- ☐ BIF-CL

Wire system (when EX1 is specified)
- EX1
  - ☑ 3φ3W
  - ☐ 3φ4W
  - ☑ Normal connection : Note13
  - ☐ Inverse connection : Note14

☐ BARE(ETR not required)

Electrical accessories P12~14
- ☑ Auxiliary switch (A and B contacts in the same quantity are used. Max. quantity: 5 each for A and B contacts)
  - ☑ Standard(AX 6 : 2 or 4 or 6 or 8 or 10)
  - ☐ High capacity(HAX ☐ : 2 or 4 or 6 or 8 or 10)
- ☑ Motor charging(MD)
  - ☑ AC・DC100–125V
  - ☐ AC・DC200–250V
  - ☐ DC24V
  - ☐ DC48V Note10
- ☑ Closing coil(CC)
  - ☑ AC・DC100–250V
  - ☐ DC24–48V
- ☑ Shunt trip device (SHT)
  - ☑ AC・DC100–250V
  - ☐ AC380–500V
  - ☐ DC24–48V
- ☑ Under voltage trip device(UVT)
  - ☑ AC100–120V
  - ☐ AC200–240V
  - ☐ AC380–460V
  - ☐ DC24V
  - ☐ DC48V
  - ☐ DC100–110V
  - ☐ DC120–125V

  Time delay
  - ☑ Inst(INST)
  - ☐ 0.5s(05)
  - ☐ 3.0s(30)

  Note:In case of 380-460V AC, the external transformer is attached

P16 ☑ Condenser trip device (COT)
- ☑ AC100–110V
- ☐ AC200–220V

Mechanical accessories P15~16
- ☑ Push button cover(BC-L)
- ☑ Counter(CNT)
- ☐ Cylinder lock(CYL)
- ☐ Door interlock(DI) Note11
- ☐ Terminal cover(TTC)
- ☑ Door frame(DF)
- ☐ Dust cover(DUC)
- ☑ Interphase barrier(BA) Note12
- ☐ Mechanical interlock(MI)
  - ☐ for 2units(MI2)
  - ☐ for 3units(MI3) Note11

Note1: In case of AE630-SW and AE2000-SW Low rating type, please specify CT rating. Refer to Page 9 and Page 20.
Note2: There is a case to be derated by ambient temperature. Refer to Page 54.
Note3: 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)
Note4: Refer to Page 11 and Page 39~46.
Note5: 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
Note6: Not available for AE630-SW with CT rating : 250A or 315A or 500A.
Note7: 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)
Note8: Neutral CT is required for Ground fault or Neutral pole protection, when 3 Pole breaker is used for 3 phase 4 wires system.
Note9: In case of Earth leakage protection, it is required External ZCT.
Note10: DC24V and DC48V are not available for AE4000-SWA 4P and AE4000-SW~AE6300-SW.
Note11: The combined installation of DI and MI3 is not available.
Note12: Some module types are not provided BA. Refer to Page15.
Note13: Supply connect to the top terminals.
Note14: Supply connect to the bottom terminals.
Note15: Current capacity of the neutral poles
HN: 50% of the rated current
FN: 100% of the rated current (See page 43, 48 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)

Customer(name) _____ **Order No.** _____ **Number of units** _____ **units**

Type P.9~10 AE _____-SW AE _____-SWA

Number of poles ☐ 3P ☐ 4P (AE630-SW~AE4000-SWA) | (AE4000-SW~AE6300-SW) ☐ 3P ☐ 4P HN Note15 ☐ 4P FN Note15

Current setting Ir _____ A CT rating _____ A Note1 P.9,P.20

Applicable standard ☐ IEC 60947-2 ☐ CCC

Ambient temperature ☐ 40°C(Standard) ☐ Others _____ °C Note2

Reset type ☐ Automatic Reset (Standard) ☐ Manual Reset (MRE)

Connection ☐ Fixed type Note3 ☐ Drawout type Note3

Main circuit terminal P.11

- Horizontal terminal(FIX) (AE630~1600-SW / AE2000~3200-SW)
- Vertical terminal(FIX-VT) (AE2000-SWA / AE4000-SWA AE4000~6300-SW)
- ☐ Horizontal terminals(DR)(standard)
- ☐ Vertical terminals(DR-VT) AE2000-SWA / AE4000-SWA AE4000~6300-SW
- ☐ Front terminals(DR-FT) Note4

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)
☐ Front terminal adapter(FTA)
Can be connected to the Horizontal terminals.

Electronic trip relay(ETR)

☐ With ETR

Type ☐☐☐-☐

Main setting module

WS1, WB1	AE630–1600-SW, AE2000–3200-SW, AE4000-SW
WS2, WB2	AE2000-SWA, AE4000-SWA, AE5000-SW
WS3, WB3	AE6300-SW

WS : General use
WB : INST/MCR only

Optional setting module

- G1: Ground fault protection Note6
- N5: Neutral pole 50% protection Note7
- E1: Earth leakage protection
- AP: 2nd Additional Pre-alarm
- NA: Without optional setting

Power supply

- P1: AC•DC100-240V
- P2: DC24-60V
- P3: AC100-240V / DC100-125V with output contact
- P4: DC24-60V with output contact
- **P5:** DC100-240V with output contact (SSR)
  - ☐ Neutral CT(NCT) Note8
  - ☐ External ZCT Note9 P.28
    - ZCT ☐
    - ZT ☐ B
    - ZTA ☐

Additional function P.32

- ☐ Extension module(EX1)
  - ☐ Display(DP1)
  - ☐ Display onto panel board(DP2)
  - ☐ VT unit(VT)
- ☐ Temperature alarm(TAL)
- ☐ MCR switch(MCR-SW)

Network P.33

- ☐ BIF-CC
- ☐ BIF-PR
- ☐ BIF-MD
- ☐ BIF-CON
- ☐ BIF-CL

Wire system (when EX1 is specified)

EX1
- ☐ 3ϕ3W
- ☐ 3ϕ4W
- ☐ Normal connection : Note13
- ☐ Inverse connection : Note14

☐ BARE(ETR not required)

Electrical accessories P.12~14

- ☐ Auxiliary switch (A and B contacts in the same quantity are used. Max. quantity: 5 each for A and B contacts)
  - ☐ Standard(AX ☐: 2 or 4 or 6 or 8 or 10)
  - ☐ High capacity(HAX ☐: 2 or 4 or 6 or 8 or 10)
- ☐ Motor charging(MD)
  - ☐ AC • DC100–125V
  - ☐ AC • DC200–250V
  - ☐ DC24V
  - ☐ DC48V
  - Note10
- ☐ Closing coil(CC)
  - ☐ AC • DC100–250V
  - ☐ DC24–48V
- ☐ Shunt trip device (SHT)
  - ☐ AC • DC100–250V
  - ☐ AC380–500V
  - ☐ DC24–48V
- ☐ Under voltage trip device(UVT)
  - ☐ AC100–120V
  - ☐ AC200–240V
  - ☐ AC380–460V
  - ☐ DC24V
  - ☐ DC48V
  - ☐ DC100–110V
  - ☐ DC120–125V
  - Time delay
    - ☐ Inst(INST)
    - ☐ 0.5s(05)
    - ☐ 3.0s(30)
  - Note:In case of 380-460V AC, the external transformer is attached

P.16 ☐ Condenser trip device (COT)
- ☐ AC100–110V
- ☐ AC200–220V

Mechanical accessories P.15~16

- ☐ Push button cover(BC-L)
- ☐ Counter(CNT)
- ☐ Cylinder lock(CYL)
- ☐ Door interlock(DI) Note11
- ☐ Terminal cover(TTC)
- ☐ Door frame(DF)
- ☐ Dust cover(DUC)
- ☐ Interphase barrier(BA) Note12
- ☐ Mechanical interlock(MI)
  - ☐ for 2units(MI2)
  - ☐ for 3units(MI3) Note11

Note1: In case of AE630-SW and AE2000-SW Low rating type, please specify CT rating. Refer to Page 9 and Page 20.

Note2: There is a case to be derated by ambient temperature. Refer to Page 54.

Note3: 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)

Note4: Refer to Page 11 and Page 39~46.

Note5: 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

Note6: Not available for AE630-SW with CT rating : 250A or 315A or 500A.

Note7: 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)

Note8: Neutral CT is required for Ground fault or Neutral pole protection, when 3 Pole breaker is used for 3 phase 4 wires system.

Note9: In case of Earth leakage protection, it is required External ZCT.

Note10: DC24V and DC48V are not available for AE4000-SWA 4P and AE4000-SW~AE6300-SW.

Note11: The combined installation of DI and MI3 is not available.

Note12: Some module types are not provided BA. Refer to Page15.

Note13: Supply connect to the top terminals.

Note14: Supply connect to the bottom terminals.

Note15: Current capacity of the neutral poles
HN: 50% of the rated current
FN: 100% of the rated current (See page 43, 48 for the outline and dimensions.)

Remark

Order Issuer

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 ☐ 3P ☐ 4P (AE630-SW~AE4000-SWA) | (AE4000-SW~AE6300-SW) ☐ 3P ☐ 4P HN Note15 ☐ 4P FN Note15

Current setting Ir _____ A ☐

Applicable standard ☐ LR ☐ GL ☐ BV ☐ DNV ☐ ABS ☐ CCS ☐ IEC 60947-2

Ambient temperature ☐ 40°C(Standard) ☐ Others _____ °C Note2

Reset type ☐ Automatic Reset (Standard) ☐ Manual Reset (MRE)

Connection ☐ Fixed type Note3 ☐ Drawout type Note3

Main circuit terminal P.11
- Horizontal terminal(FIX) (AE630~1600-SW / AE2000~3200-SW)
- Vertical terminal(FIX-VT) (AE2000-SWA / AE4000-SWA AE4000~6300-SW)
- ☐ Horizontal terminals(DR)(standard)
- ☐ Vertical terminals(DR-VT) AE2000-SWA / AE4000-SWA AE4000~6300-SW
- ☐ Front terminals(DR-FT) Note4

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) ☐ Front terminal adapter(FTA) — Can be connected to the Horizontal terminals.

Electronic trip relay(ETR)

☐ With ETR

Type ☐☐–☐

● 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

Specify a setting value,if required. P.23,24,27~29
- LTD pick-up current : IL
- LTD time: TL
- STD pick-up current : Isd
- STD time: Tsd
- INST pick-up current:Ii
- Pre-alarm current:Ip
- Othters ( )

● Optional setting module
- G1: Ground fault protection Note6
- N5: Neutral pole 50% protection Note7
- E1: Earth leakage protection
- AP: 2nd Additional Pre-alarm
- NA: Without optional setting

● Power supply
- P1: AC·DC100-240V
- P2: DC24-60V
- P3: AC100-240V / DC100-125V with output contact
- P4: DC24-60V with output contact
- P5: DC100-240V with output contact (SSR)
- ☐ Neutral CT(NCT) Note8
- ☐ External ZCT Note9 P.28
  - ZCT ☐
  - ZT ☐ B
  - ZTA ☐

Additional function P.32
- ☐ Extension module(EX1)
  - ☐ Display(DP1)
  - ☐ Display onto panel board(DP2)
  - ☐ VT unit(VT)
  - **Network** P.33: ☐ BIF-CC, ☐ BIF-PR, ☐ BIF-MD → ☐ BIF-CON, ☐ BIF-CL
- ☐ Temperature alarm(TAL)
- ☐ MCR switch(MCR-SW)

Wire system (when EX1 is specified)
- EX1: ☐ 3φ3W, ☐ 3φ4W
- ☐ Normal connection : Note13
- ☐ Inverse connection : Note14

Electrical accessories P.12~14
- ☐ Auxiliary switch — A and B contacts in the same quantity are used. Max. quantity: 5 each for A and B contacts
  - ☐ Standard(AX ☐: 2 or 4 or 6 or 8 or 10)
  - ☐ High capacity(HAX ☐: 2 or 4 or 6 or 8 or 10)
- ☐ Motor charging(MD)
  - ☐ AC・DC100–125V
  - ☐ AC・DC200–250V
  - ☐ DC24V Note10
  - ☐ DC48V
- ☐ Closing coil(CC)
  - ☐ AC・DC100–250V
  - ☐ DC24–48V
- ☐ Shunt trip device (SHT)
  - ☐ AC・DC100–250V
  - ☐ AC380–500V
  - ☐ DC24–48V
- ☐ Under voltage trip device(UVT)
  - ☐ AC100–120V
  - ☐ AC200–240V
  - ☐ AC380–460V
  - ☐ DC24V
  - ☐ DC48V
  - ☐ DC100–110V
  - ☐ DC120–125V
  - Time delay: ☐ Inst(INST) ☐ 0.5s(05) ☐ 3.0s(30)
  - Note:In case of 380-460V AC, the external transformer is attached

P.16 ☐ Condenser trip device (COT)
- ☐ AC100–110V
- ☐ AC200–220V

Mechanical accessories P.15~16
- ☐ Push button cover(BC-L)
- ☐ Counter(CNT)
- ☐ Cylinder lock(CYL)
- ☐ Door interlock(DI) Note11
- ☐ Terminal cover(TTC)
- ☐ Door frame(DF)
- ☐ Dust cover(DUC)
- ☐ Interphase barrier(BA) Note12
- ☐ Mechanical interlock(MI)
  - ☐ for 2units(MI2)
  - ☐ for 3units(MI3) Note11

Note1: Please specify current setting (Ir) from the specification table. Refer to Page 9 and 10.
Note2: There is a case to be derated by ambient temperature. Refer to Page 54.
Note3: 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)
Note4: Refer to Page 11 and Page 39~46.
Note5: 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
Note6: Not available for AE630-SW with CT rating : 250A or 315A or 500A.
Note7: N5 optional setting module is used for 3 phase 4 wires system.(4 Pole breaker or 3 pole breaker with Neutral CT)
Note8: Neutral CT is required for Ground fault or Neutral pole protection, when 3 Pole breaker is used for 3 phase 4 wires system.
Note9: In case of Earth leakage protection, it is required External ZCT.
Note10: DC24V and DC48V are not available for AE4000-SWA 4P and AE4000-SW~AE6300-SW.
Note11: The combined installation of DI and MI3 is not available.
Note12: Some module types are not provided BA. Refer to Page15.
Note13: Supply connect to the top terminals.
Note14: Supply connect to the bottom terminals.
Note15: Current capacity of the neutral poles
HN: 50% of the rated current
FN: 100% of the rated current (See page 43, 48 for the outline and dimensions.)

Remark

Order Issuer

Service network

Country / Region	Company	Address	Telephone
Australia	Mitsubishi Electric Australia Pty. Ltd.	348 Victoria Road, Rydalmere, N.S.W. 2116, Australia	+61-2-9684-7777
Belgium	Koning & Hartman B.V.	Woluwelaan 31, BE-1800 Vilvoorde, Belgium	+32-(0)2-2570240
Chile	Rhona S.A.	Vte. Agua Santa 4211 Casilla 30-D (P.O. Box) Vina del Mar, Chile	+56-32-2-320-600
China	Mitsubishi Electric Automation (Shanghai) Limited	(Shanghai) 3F, Block 5, 103, Cao Bao Road, Shanghai, China	+86-(0)21-6475-3228
Colombia	Proelectrico Representaciones S.A.	Cra 53 No 29C-73 U.I.C. - Medellin, Colombia	+57-4-235-00-28
Czech Republic	Autocont Control Systems S.R.O.	Jelinkova 59/3, CZ-72100 Ostrava Svinov, Czech Republic	+420-(0)59-5691-150
Denmark	Lemvigh-Mueller	Geminivej 32, DK-2670 Greve, Denmark	+45-(0)43-959505
Egypt	Cairo Electrical Group	9, Rostoum St. Garden City P.O. Box 165-11516 Maglis El-Shaab, Cairo - Egypt	+20-2-7961337
France	Mitsubishi Electric Europe B.V.	25, Boulevard des Bouvets, F-92741 Nanterre Cedex, France	+33-(0)1-55 68 55 68
Germany	Mitsubishi Electric Europe B.V.	Gothaer Strasse 8, D-40880 Ratingen, Germany	+49-(0)2102-486-0
Greece	Elektrapothiki Attikis S.A.	15, Agiou Orous GR-10447 Athens, Greece	+30-(0)210-341-6650
Hungary	Meltrade Ltd.	Fertö utca 14. HU-1107 Budapest, Hungary	+36-(0)1-431-9726
Hong Kong	Mitsubishi Electric Automation (Hong Kong) Limited	10/F Manulife Tower 169 Electric Road North Point, Hong Kong	+852-28878870
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	Gino Industries Ltd.	26, Ophir Street IL-32235 Haifa, Israel	+972-(0)4-867 06 56
Italy	Mitsubishi Electric Europe B.V.	Viale Colleoni 7, I-20041 Agrate Brianza (MI), Italy	+39-(0)39-60-53 1
Kazakhstan	Kazpromautomatics Ltd.	2, Scladskaya str. KAZ-470046 Karaganda, Kazakhstan	+7-3212-50 11 50
Korea	Mitsubishi Electric Automation Korea Co., Ltd	1480-6, Gayang-Dong, Gangseo-Gu, Seoul, Korea	+82-2-3660-9572
Laos	Societe Lao Import Co., Ltd.	43-47 Lane Xang Road P.O BOX 2789 VT Vientiane Laos	+856-21-215043
Lebanon	Comptoir d'Electricite Generale-Liban	Cebaco Center - Block A Autostrade Dora, P.O. Box 11-2597 Beirut - Lebanon	+961-1-240445
Lithuania	Rifas UAB	Tinklu 29A, LT-5300 Panevezys, Lithuania	+370 (0)45 / 582 728
Malaysia	Mittric Sdn Bhd	No. 5 Jalan Pemberita U1/49, Temasya Industrial Park, Glenmarie 40150 Shah Alam, Selangor, Malaysia	+603-5569-3748
Myanmer	Peace Myanmar Electric Co.,Ltd.	NO137/139 Botataung Pagoda Road, Botataung Town Ship 11161,Yangon, Myanmar	+95-(0)1-202589
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
Nepal	Watt&Volt House	KHA 2-65,Volt House Dillibazar Post Box:2108, Kathmandu,Nepal	+977-1-4411330
New Zealand	Black Diamond Technologies Ltd.	1 Parliament Street, Lower Hutt, New Zealand	+64-4-560-9100
North America	Mitsubishi Electric Automation USA, Inc.	500 Corporate Woods Parkway, Vernon Hills, IL 60061 USA	+847-478-2100
Norway	Scanelec AS	Leirvikasen 43B, NO-5179 Godvik, Norway	+47-(0)55-50 60 00
Pakistan	Prince Electric Co.	1&16 Brandreth Road, Lahore-54000,Pakistan	+92-(0)42-7654342
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	MPL Technology Sp. z O.O.	Ul. Krakowska 50, PL-32-083 Balice, Poland	+48-(0)12-630 47 00
Republic of Moldova	Intehsis SRL	bld. Traian 23/1, MD-2060 Kishinev, Moldova	+373 (0)22 / 66 4242
Romania	Sirius Trading & Services SRL	Str. Biharia nr. 67-77, RO-013981 Bucuresti 1, Romania	+40 (0)21 / 201 1147
Russia	Consys	Promyshlennaya st. 42, RU-198099 St. Petersburg, Russia	+7-812-325 36 53
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
Serbia	Craft Consulting & Engineering D.O.O.	Toplicina str.4 lok 6, SER-1800 Nis, Serbia	+381 (0)18 / 292-24-4 / 5, 523 962
Singapore	Mitsubishi Electric Asia Pte. Ltd.	307 Alexandra Road #05-01/02 Mitsubishi Electric Building Singapore 159943	+65-6473-2308
Slovenia	Inea D.O.O.	Stegne 11, SI-1000 Ljubljana, Slovenia	+386-(0)1-513 8100
Slovakia	CS Mtrade Slovensko, S.R.O.	Vajanskeho 58, SK-92101 Piestany, Slovakia	+421 (0)33 / 7742 760
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.	Carretera de Rubí 76-80, E-08190 Sant Cugat del Vallés (Barcelona), Spain	+34-(0)93-565 3131
Sweden	Euro Energy Components AB	Järnvägsgatan 36, S-434 24 Kungsbacka, Sweden	+46-(0)300-69 00 40
Switzerland	TriElec AG	Muehlentalstrasse 136, CH-8201 Schaffhausen, Switzerland	+41 (0)52 / 6258425
Taiwan	Setsuyo Enterprise Co., Ltd	6th 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 Pomprab Bangkok Thailand	+66-223-4220-3
The Netherlands	Imtech Marine & Offshore B.V.	Sluisjesdijk 155, NL-3087 AG Rotterdam, Netherlands	+31-(0)10-487 19 11
Turkey	GTS	Darulaceze Cad. No. 43/A KAT. 2, TR-34384 Okmeydani-Istanbul, Turkey	+90-(0)212-320 1640
United Kingdom	Mitsubishi Electric Europe B.V.	Travellers Lane, UK-Hatfield, Herts. AL10 8XB, United Kingdom	+44-(0)1707-27 61 00
Uruguay	Fierro Vignoli S.A.	Avda. Uruguay 1274, 11.100 Montevideo, Uruguay	+598-2-902-0808
Venezuela	Adesco S.A.	Calle 7 La Urbina Edificio Los Robles Locales C y D Planta Baja, Caracas - Venezuela	+58-212-241-9952
Vetnam	CTY TNHH-TM SA GIANG	47-49 Hoang Sa, St., Dakao Ward, Dist 1, Ho Chi Minh City, Viet Nam	+84-8-9103633

Safety Tips : Be sure to read the instruction manual fully before using this product.

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