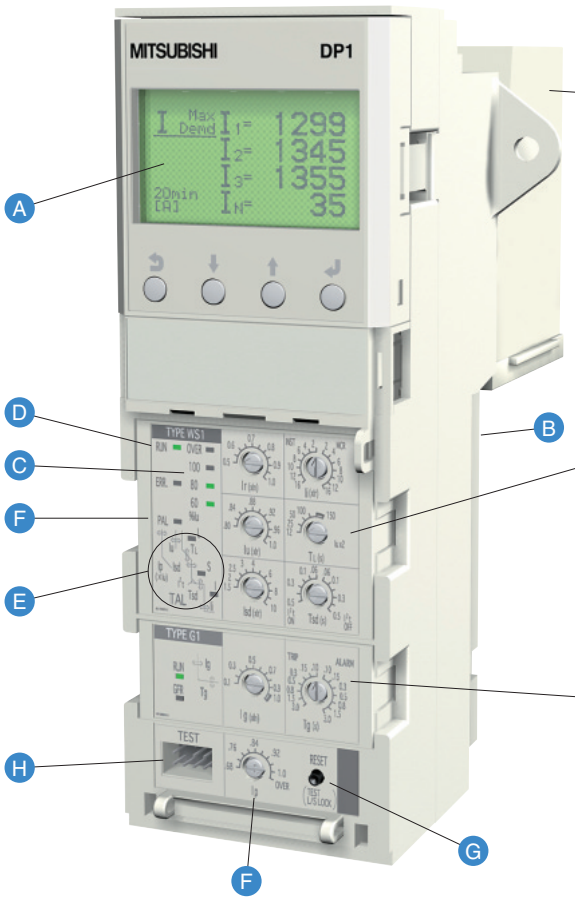
Electronic trip relay(Feature)



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.

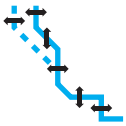
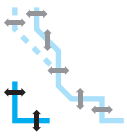
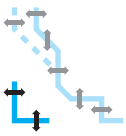
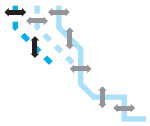
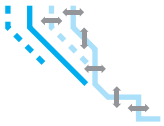
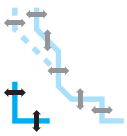
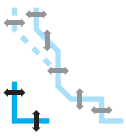
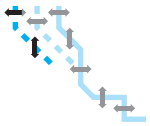
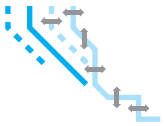
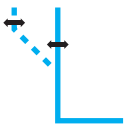
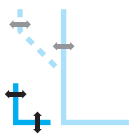
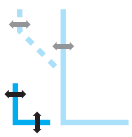
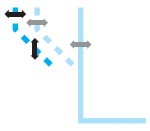
MCR:Making current release (option)
Just under the breaker closing operation (from open to close), Instantaneous characteristic become effective, but after closing the breaker, instantaneous characteristic become ineffective.
When you order the MCR switch, MCR switch is built in the main body.
If MCR 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.

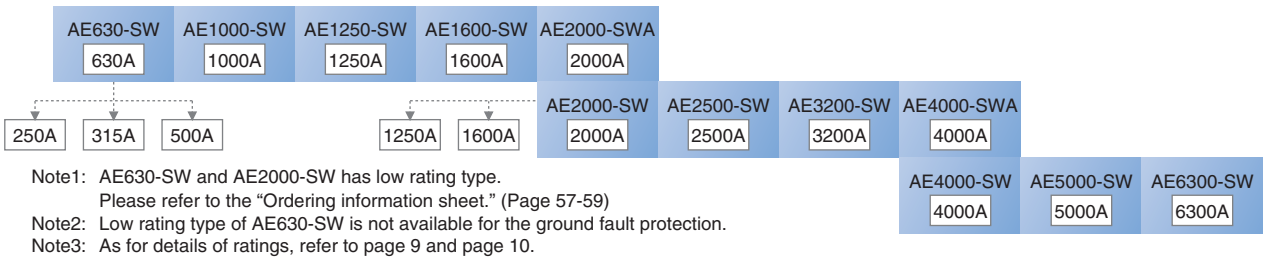
Contact capacity(Type code P3, P4)

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)

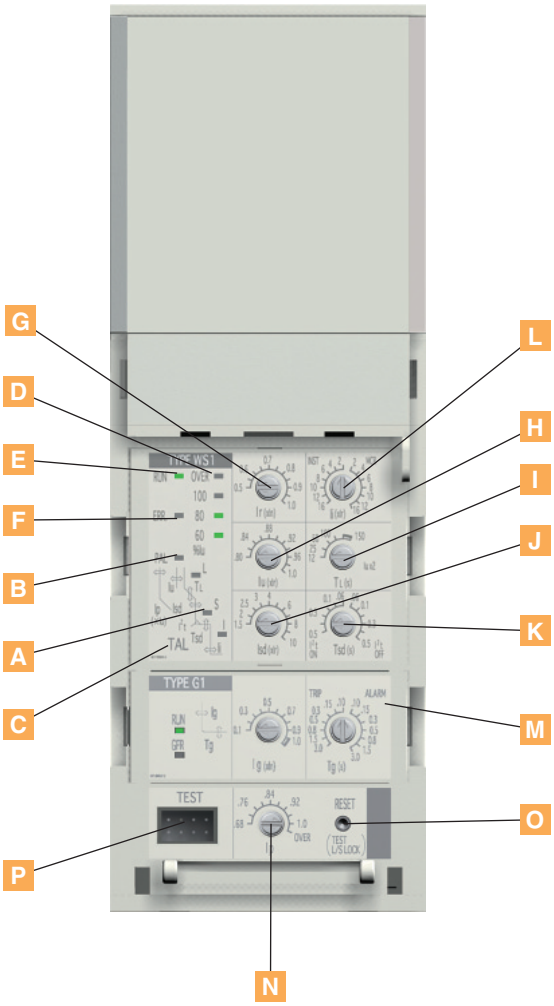
Additional function

- ☐ 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

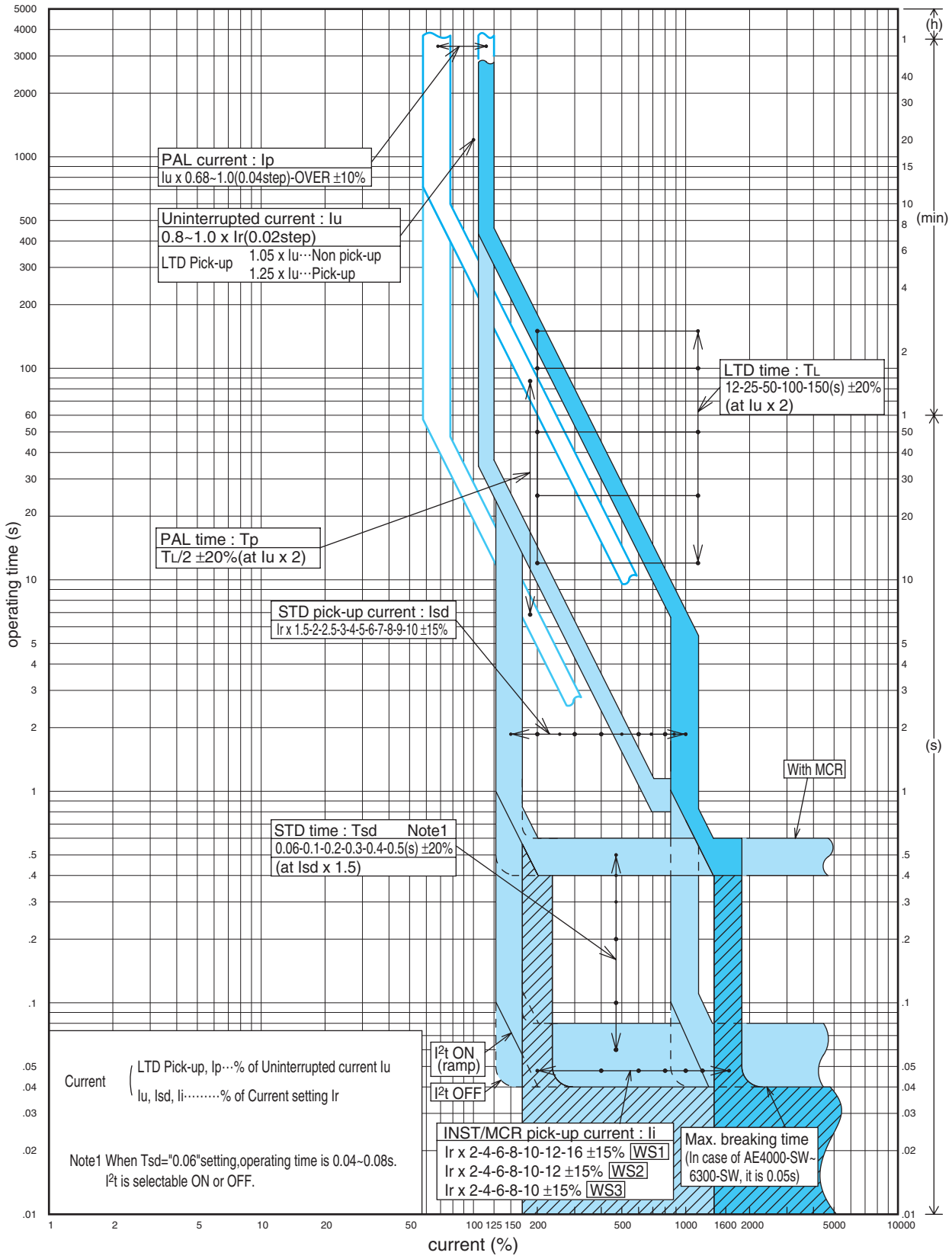
In (CT rating) — Ir — Ig (P.27)
Ir — Iu — Isd
Iu — Ii
Iu — Ip
Ip — Ip2 (P.29)
Ii — Load current LED (60, 80, 100%, OVER)

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%	—

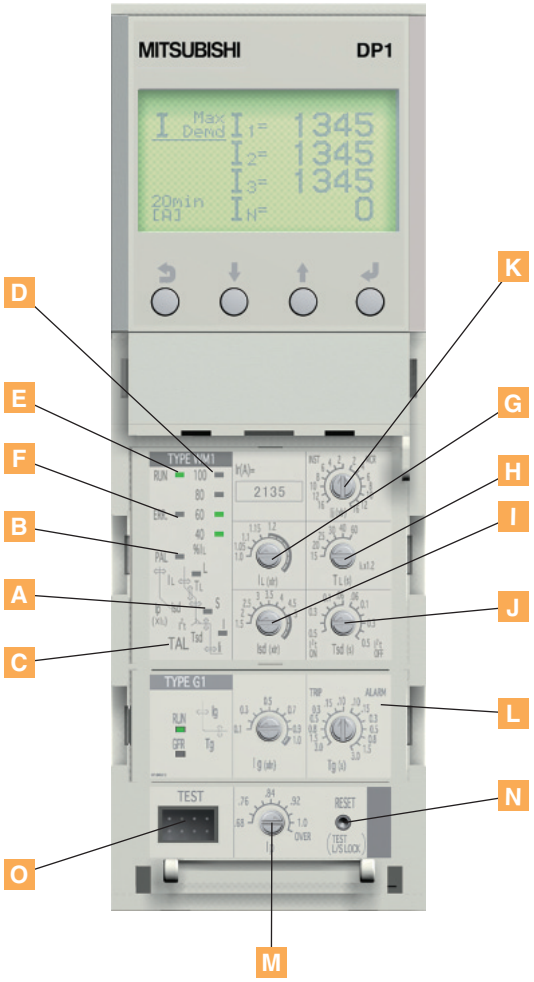
Upper figure and table denote the case optional MCR function is included.

■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

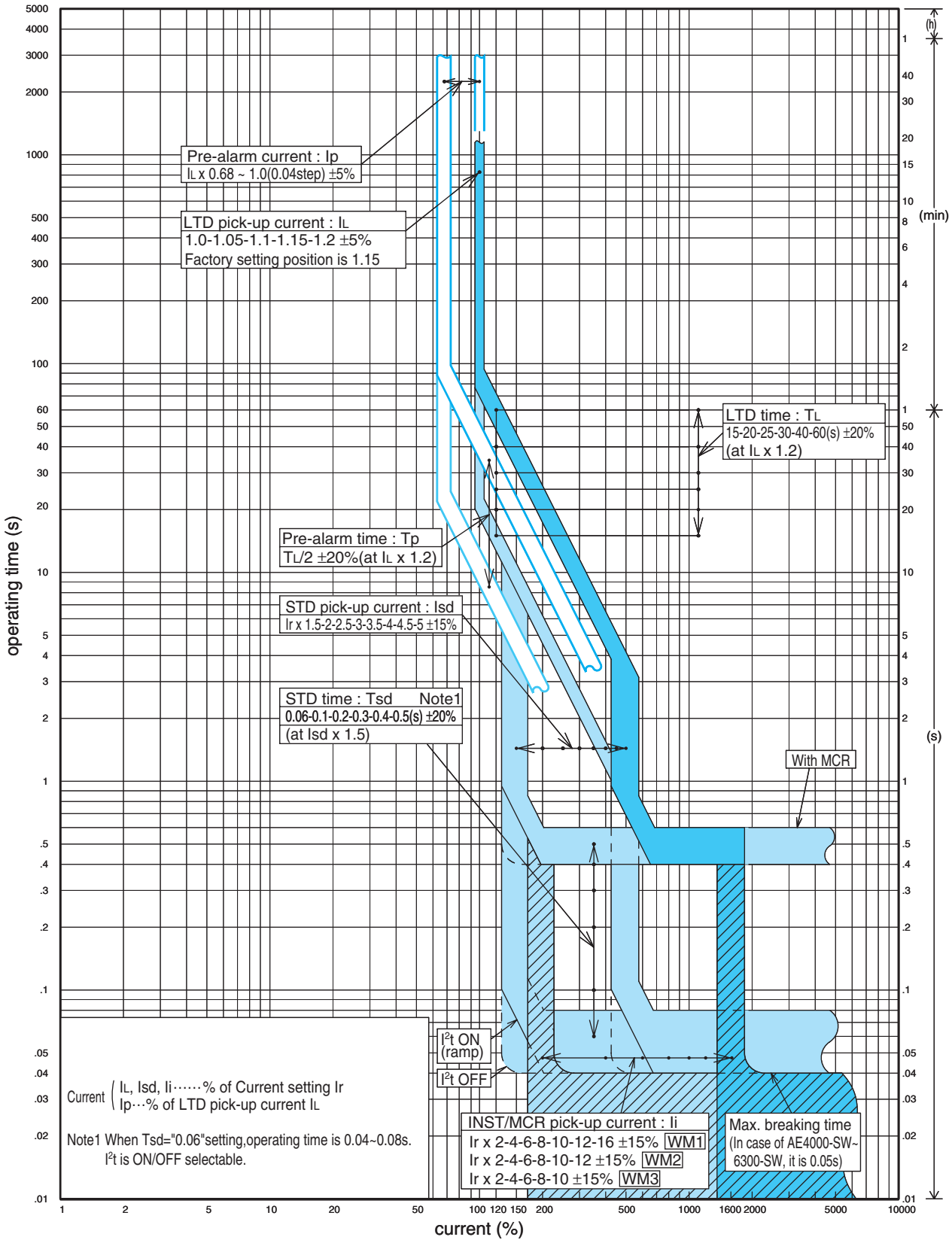
In (CT rating) — Ir (Fixed) — IL — Ip
Ir (Fixed) — Ig (P.27)
IL — Isd — Ip2 (P.29)
Isd — Ii — Load current LED (40, 60, 80, 100%)

Adjustable setting range

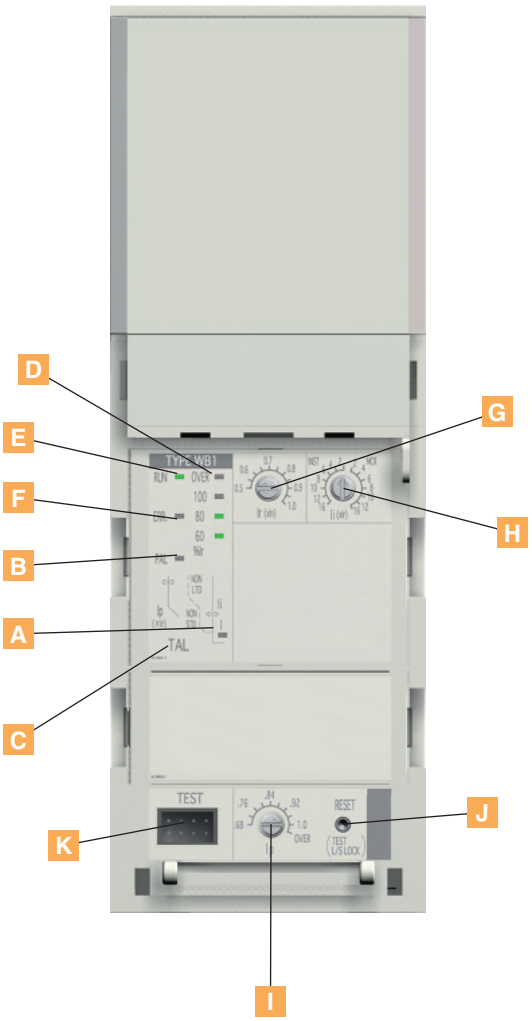
No.	Setting item	Mark	Adjustable setting range	Accuracy	Factory default value
—	Current setting	Ir	0.63 ~ 1.0 x In (Adjust by factory : Fixed)	—	Comply with ordering sheet
G	LTD pick-up current	IL	1.0–1.05–1.1–1.15–1.2 x Ir	± 5%	1.15
H	LTD time	TL	15–20–25–30–40–60s at IL x 1.2	± 20%	20
I	STD pick-up 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

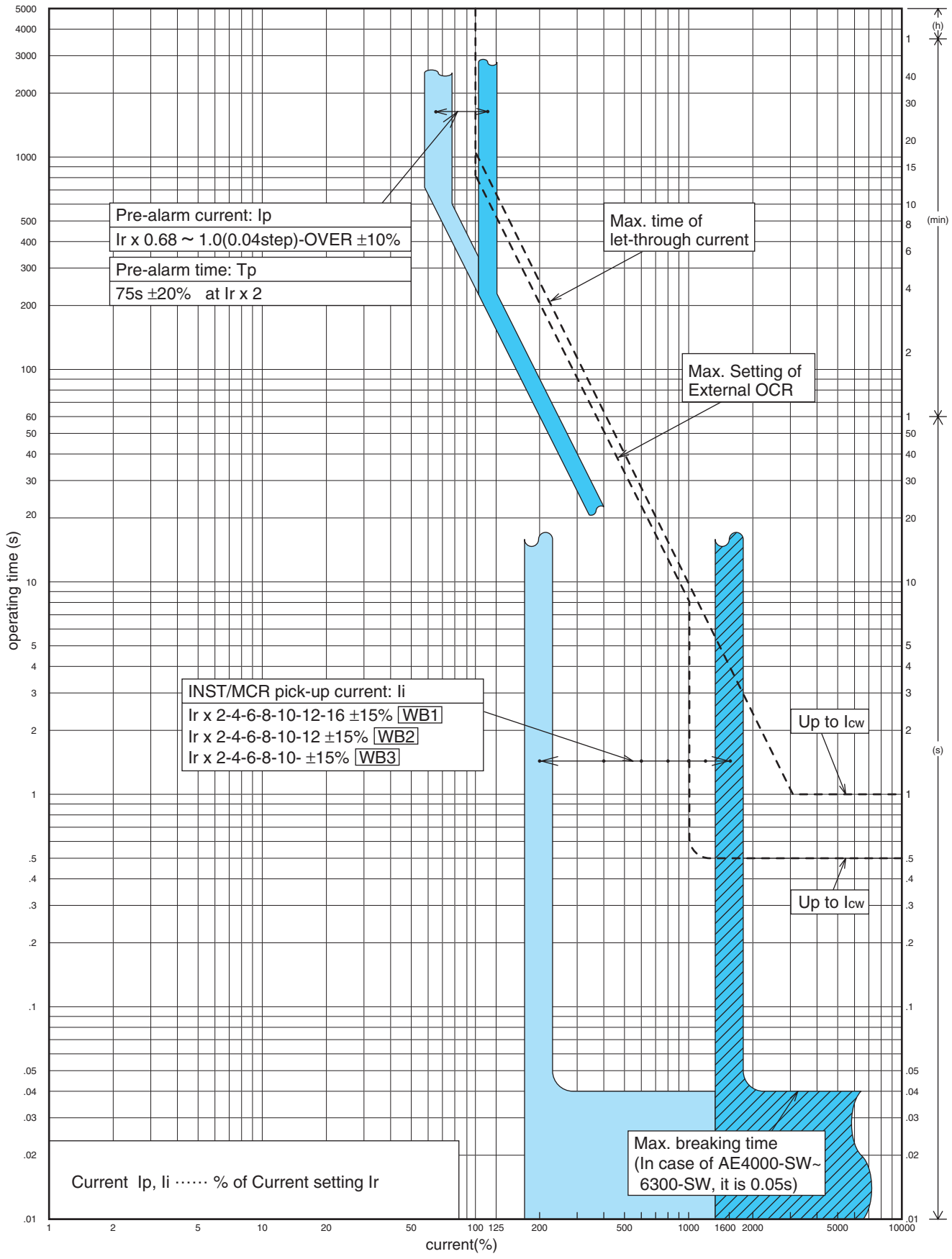
In (CT rating) — Ir — Ig (P.27)
Ir — Ii
Ir — Ip
Ir — Ip2 (P.29)
Ir — Load current LED (60, 80, 100%, OVER)

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.

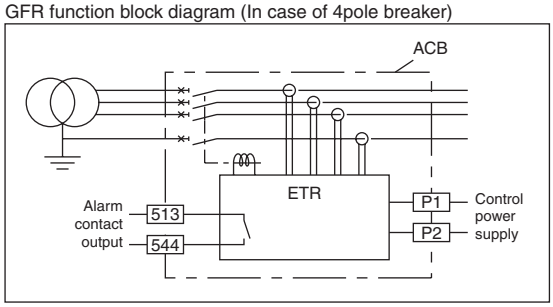
Setting item	Mark	Adjustable setting range	Accuracy	Factory default value
GFR pick-up current	Ig	0.1-0.2-0.3-0.4-0.5-0.6-0.7-0.8-0.9-1.0 x In	±20%	1.0
GFR time	Tg	3-1.5-0.8-0.5-0.3-0.15-<0.1 (TRIP) - <0.1-0.15-0.3-0.5-0.8-1.5-3s (ALARM (at 1.5 x Ig))	±20%	3s (TRIP)
alarm output	—	TRIP side : Self-holding/ALARM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

Neutral CT(NCT) ※Only use for AE-SW

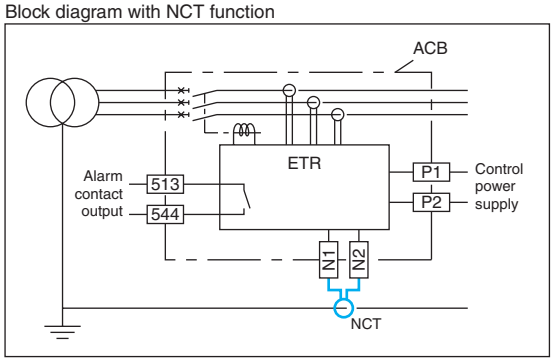
Option

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

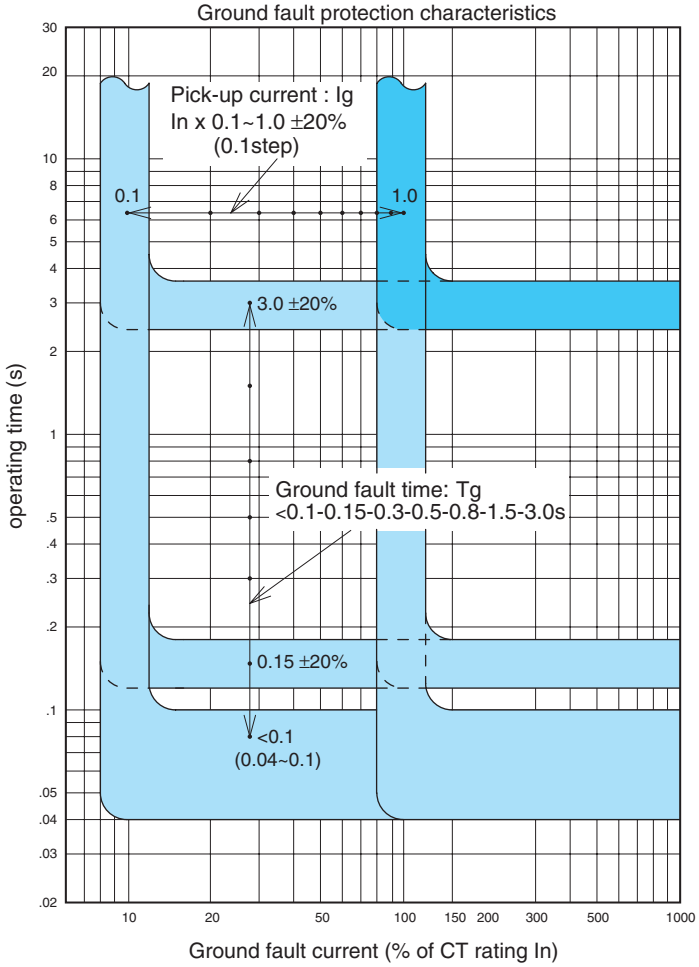


NCT type name

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)

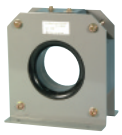
Option

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

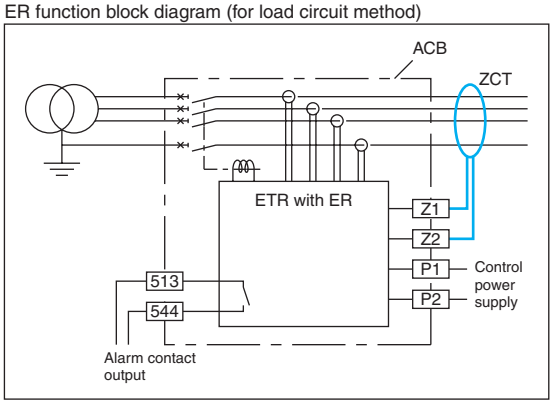
ZCT type name	ACB type name
ZCT163	AE630-SW ~ AE1600-SW 3-pole
ZCT323	AE630-SW ~ AE1600-SW 4-pole AE2000-SW ~ AE3200-SW 3-pole
ZCT324	AE2000-SW ~ AE3200-SW 4-pole

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

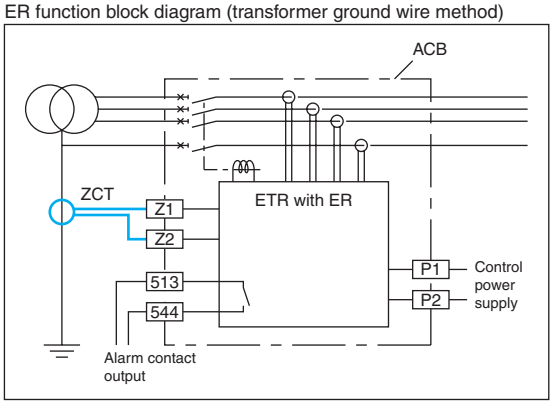
ZCT for transformer ground wire

ZT15B	ZT30B	ZT40B	ZT60B	ZT80B	ZT100B

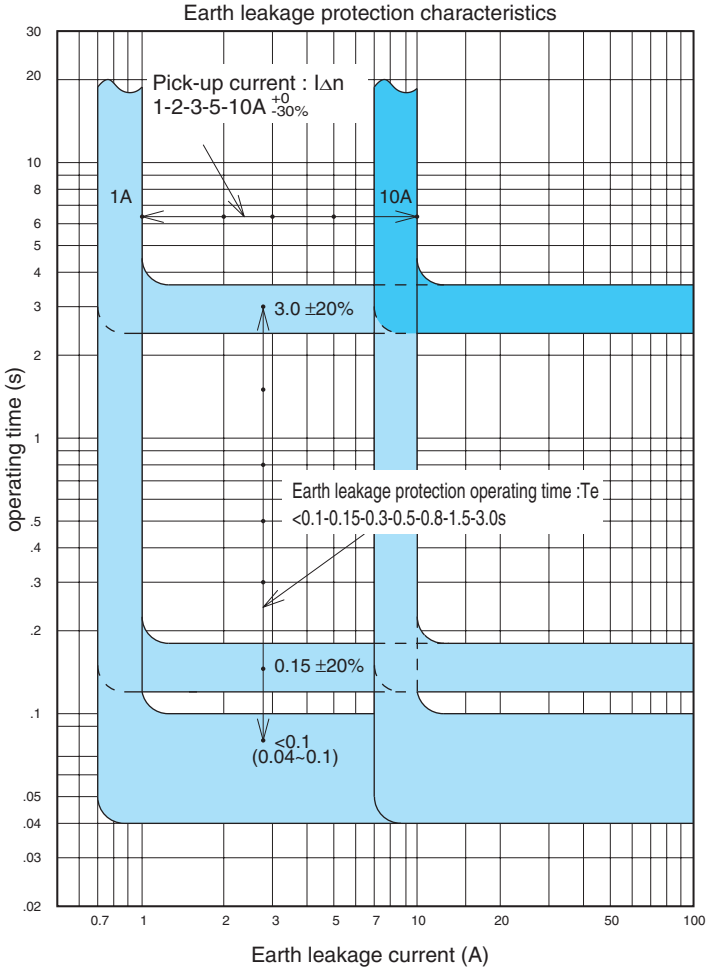
ER function block diagram (for load circuit method)



ER function block diagram (transformer ground wire method)



Earth leakage protection characteristics



Accessories

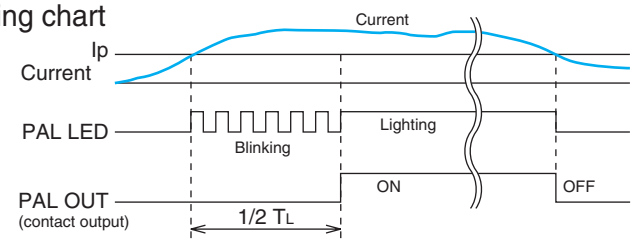
2nd Additional Pre-alarm (AP)

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®	○	○	○			○

DP1 EX1(inside breaker)

DP2 (on the Panel)

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))

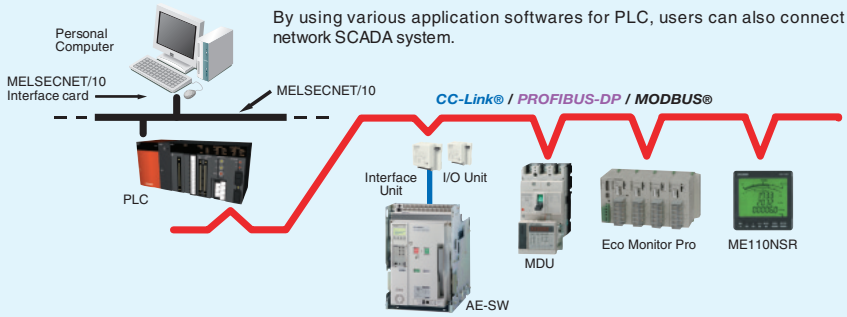
These Interface units can expand the future possibility in various communication and Intelligent control.

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

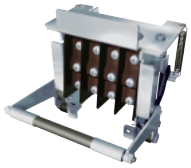
BIF-CON

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

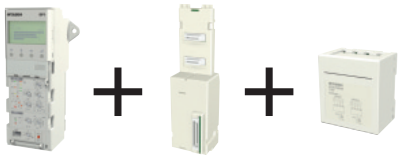


BIF-CL

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.

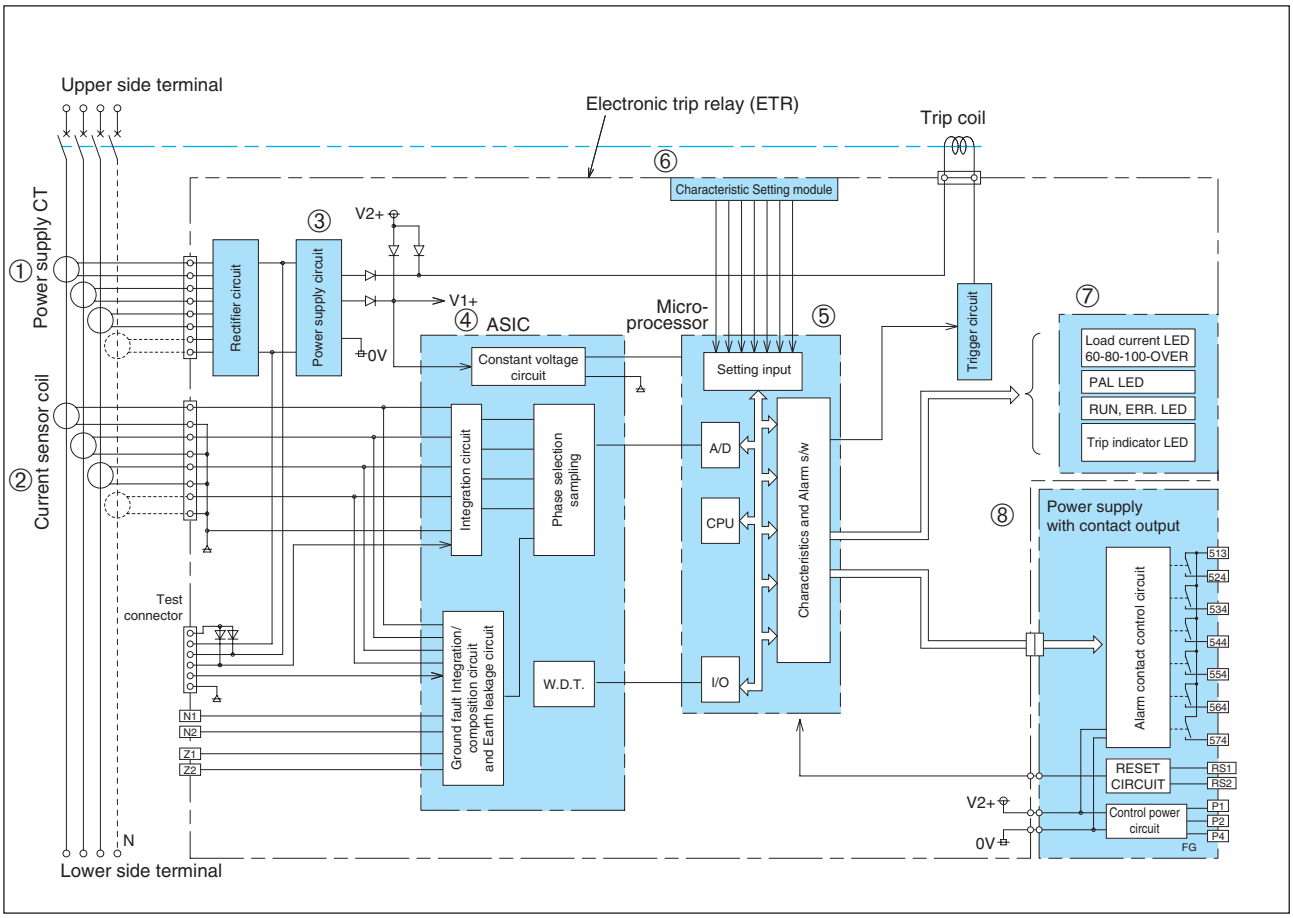
Function	Description	Note
Monitor	Breaker Drawout position	Position : Connect or Test or Disconnect

○ : 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.

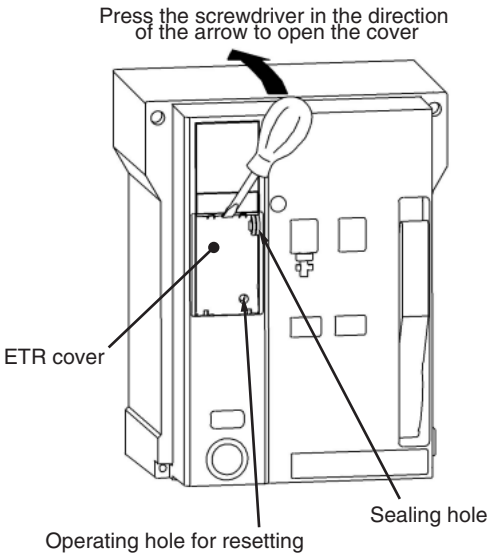
⑤ **Microprocessor**
The microprocessor integrates each phase current waveforms from the ASIC and performs processing for overcurrent protection and others.

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

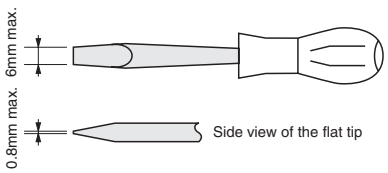
⑦ **Several LEDs**
The load current LED give a figure of current in percent by CT energy.
Trip indicator and pre-alarm are indicated by control power supply.
RUN and ERR. LED indicate breaker's condition by control power supply or ten-odd percent of CT energy.

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

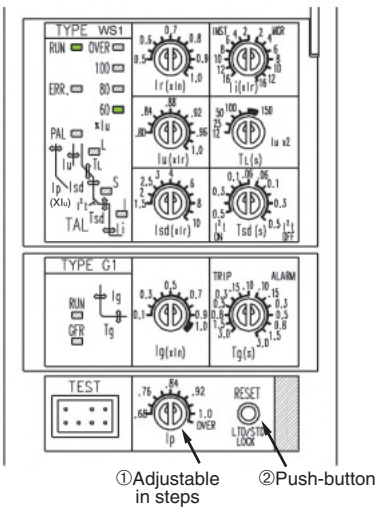


1 Prepare a small flat tipped screwdriver.



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.



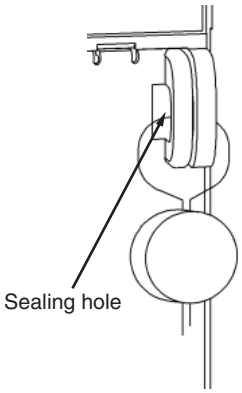
① Adjustable in steps

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.