



Numerical Protection Relay

*MELPRO*™-D Series  
DIRECTIONAL EARTH FAULT RELAY

MODEL

**CDG1-A01D1**

INSTRUCTION MANUAL

**Request**

Ensure that this Instruction Manual is delivered to  
the end users and the maintenance manager.

— Safety section —

This Safety section should be read before starting any work on the relay. Be sure to read the instruction manuals and other related documents prior to commencing any work on the relay in order to maintain them in a safe condition. Be sure to be familiar with the knowledge, safety information and all caution items of the product prior to use.



**CAUTION**

Caution means that failure to un-observe safety information, incorrect use, or improper use may endanger personnel and equipment and cause personnel injury or physical damage.

Items as classified to the caution may become to occur more sever results according to the circumstance. Therefore, all items described in the safety section are important and to be respected without fail.



**CAUTION**

1. Items concerning transportation
  - (1) Be sure the equipment to be kept in normal direction
  - (2) Avoid the bumps, shock, and vibration, otherwise the product performance /life might be unfavorably affected.
2. Items concerning storage
  - (1) Environment shall be as below, otherwise the product performance/life might be unfavorably affected.
    - Ambient temperature:  $-20^{\circ}\text{C}\sim+60^{\circ}\text{C}$  (with no condensation nor freezing)
    - Relative humidity: 30~80% average of a day
    - Altitude: Less than 2000m
    - Avoid applying unusual shock, vibration or leaning or magnetic field
    - Not expose to harmful smoke, gas, salty air, water, vapor, dust, powder, explosive material or wind, rain.
3. Items concerning mounting/wiring work
  - (1) Mounting and wiring work should be done correctly.  
Otherwise, damage, burning or erroneous operation might occur.
  - (2) Screw terminal should be tightened securely.  
Otherwise, damage and burning might occur.
  - (3) Grounding should be done correctly in case it is required.  
Otherwise, electric shock, damage, burning or erroneous operation might occur.
  - (4) Wiring should be done without mistake especially observing the correct polarity.  
Otherwise, damage, burning or erroneous operation might occur.
  - (5) Wiring should be done without mistake especially observing the phase ordering.  
Otherwise, damage, or erroneous operation might occur.
  - (6) Auxiliary power source, measuring transformer and power source which have enough capacity for correct operation of product should be used.  
Otherwise, an erroneous operation might occur.
  - (7) Be sure to restore the front cover, terminal cover, protection cover, etc to the original position, which have been removed during the mounting/ wiring work.  
Otherwise, electrical shock might occur at the time of checking.
  - (8) Connection should be done correctly using designated and right connectors.  
Otherwise, damage or burning might occur.
  - (9) Fully insert the sub unit into the case until you can hear a click while pressing the handles located on both sides of the sub unit front face.  
Otherwise, incomplete inserting the sub unit might only establish a poor contact with the terminals located on the back side of unit, which might cause erroneous operation or heating.
4. Concerning equipment operation and settings
  - (1) Operational condition should be as below.  
Otherwise, the product performance/life might be unfavorably affected.
    - Deviation of auxiliary power: within  $+10\%\sim-15\%$  of rated voltage
    - Deviation of frequency: within  $\pm 5\%$  of rated frequency
    - Ambient temperature:  $0^{\circ}\text{C}\sim+40^{\circ}\text{C}$  ( $-10^{\circ}\text{C}\sim+50^{\circ}\text{C}$  is permissible during couples of hour per day, with no condensation nor freezing)
    - Relative humidity: 30~80% average of a day
    - Altitude: Less than 2000m
    - Avoid to be exposed to unusual shock, vibration, leaning or magnetic field
    - Not expose to harmful smoke, gas, salty air, water, vapor, dust, powder, explosive material, wind or rain.
  - (2) Qualified personnel may work on or operate this product, otherwise, the product performance/life might

be unfavorably affected and/or burning or erroneous operation might occur.

- (3) Be sure to read and understand the instruction manuals and other related documents prior to commencing operation and maintenance work on the product. Otherwise, electrical shock, injury, damage, or erroneous operation might occur.
- (4) While energizing product, be sure not to remove any unit or parts without permissible one. Otherwise, damage, or erroneous operation might occur.
- (5) While energizing product, be sure to make short circuit of current transformer secondary circuits before setting change or drawing out the sub unit. Otherwise, secondary circuit of live current transformer might be opened and damage or burning might occur due to the high level voltage.
- (6) While energizing product, be sure to open trip lock terminal before setting change or drawing out the internal unit of product. Otherwise, erroneous operation might occur.
- (7) Be sure to use the product within rated voltage and current.  
Otherwise, damage or mal-operation might be occurred.
- (8) While energizing product, be sure not to clean up the product.  
Only wiping a stain on the front cover of product with a damp waste might be allowable. (Be sure to wring hardly the water out of the waste.)

5. Items concerning maintenance and checking

- (1) Be sure that only qualified personnel might work on or operate this product.  
Otherwise, electrical shock, injury, damage, or erroneous operation might occur.
- (2) Be sure to read and understand the instruction manuals and other related documents prior to commencing operation and maintenance work on the product. Otherwise, electrical shock, injury, damage, or erroneous operation might occur.
- (3) In case of replacing the parts, be sure to use the ones of same type, rating and specifications, etc.  
If impossible to use above parts, be sure to contact the sales office or distributor nearest you.  
Otherwise, damage or burning might occur.
- (4) Testing shall be done with the following conditions.
  - Ambient temperature:  $20^{\circ}\text{C}\pm 10^{\circ}\text{C}$
  - Relative humidity: Less than 90%
  - Magnetic field: Less than 80A/m
  - Atmospheric pressure:  $86\sim 106\times 10^3\text{ Pa}$
  - Installation angle: Normal direction $\pm 2^{\circ}$
  - Deviation of frequency: within  $\pm 1\%$  of nominal frequency
  - Wave form(in case of AC): Distortion factor less than 2%  
(Distortion factor= $100\%\times$ effective value of harmonics/effective value of fundamental)
  - Ripple (in case of DC): Ripple factor less than 3%  
(Ripple factor= $100\%\times$ (max-min)/average of DC)
  - Deviation of auxiliary power: within  $\pm 2\%$  of nominal voltage
  - Be sure not to inject the voltage or current beyond the overload immunity.  
Otherwise, damage or burning might occur.
  - Be careful not to touch the energized parts.  
Otherwise, the electric shock might occur.

6. Items concerning modification and/or repair work

Be sure to ask any modification and/ or repair work for product to the sales office or distributor nearest you.  
Unless otherwise, any incidents occurred with modification or repair works (including software) done by any other entity than MITSUBIHI ELECTRIC CORPORATION shall be out of scope on warranty covered by MITSUBISHI ELECTRIC CORPORATION.

7. Items concerning disposal

Particular regulations within the country of operation shall be applied to the disposal.

**- Introduction -**

Thank for your purchasing MITSUBISHI ELECTRIC **MELPRO**™ – D Series Digital Protection Relay.

Please read this manual carefully to be familiar with the functions and performances enough to use the product properly.

Please note end users are required to be provided with this instruction manual.

For operation of the product, this manual should be used in conjunction with the following materials:

Title of document	Document No.
MELPRO – D Series Protection Relay General Operation Manual	JEP0-IL9416

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# 1 Features

## 1.1 General description

Mitsubishi Electric MELPRO-D Series is a digital protection relay product with a microprocessor for protecting high/extra-high-voltage electric power system.

With its improved functions, including operation support using the advanced communication networks, data saving at the power system faults and power system voltage/current measurement, this series of protection relay will allow stable and effective control and monitoring of electric power systems as well as provide high-reliable protection.

## 1.2 Features

### (1) High-reliable protection

CDG1-A01D1 relay contains an earth fault directional element.

### (2) Diverse operation and reset characteristics

The product is provided with diversified operation and reset characteristics that meet the requirements of IEC 60255-3, and can be used for protecting various types of electric systems.

### (3) Measurement & Recording Functions

#### - Real time monitoring of relay input data

The relay can measure steady state relay input values, supporting energy management.

#### - Fault Data Monitoring

When a fault occurs, the relay saves the past 5 effective input values to assist with fault analysis.

### (4) Programmable Output Configuration

The operating output contacts (DO) can be set by combining the outputs of the protection relay element using 'OR' logic, thereby simplifying sequence design.

### (5) High Accurate Digital Computation

The digital computation using high-speed sampling minimizes the effect of high harmonics, etc., and results in highly accurate protection.

### (6) Self-diagnosis

The relay continuously monitors electronic circuits from input to output so that it can detect internal failure before that failure causes damage on the power system, thereby improving reliability.

### (7) Easy Replacement

The dimensions of the panel cutout are the same as the prior MULTICAP series. Changing from an existing relay type to this new type is easy.

### (8) Easy Maintenance

The relays are adopted as draw-out unit mechanisms with automatic CT shorting at drawing, thereby making maintenance easy.

### (9) Easy wiring check

It is possible to carry out forced operation of the output contacts individually. This will allow an easy wiring check.

## 2 Rating and specifications

### 2.1 General information

Type name		CDG1-A01D1		
Style		318PQB	319PQB	
Composite transformers	Zero-phase voltage	Commercial EVT with standard JEC-1201		
Elements	Protection	Earth fault directional element × 1		
	Measurement	zero-phase current, Zero-phase voltage, Phase (zero-phase voltage standard, lead °)		
Ratings	Frequency	50 Hz	60 Hz	
	Zero-phase current	1 A		
	Zero-phase voltage	100~ 208V		
	Auxiliary Power supply *21	Voltage	Common use for 100 ~ 220VDC / 100 ~ 220VAC	
		Operative range	DC : 85 ~ 242 V (Range of 80 ~ 286VDC is allowable temporarily.) AC : 85 ~ 242 V (Range of 80 ~ 253VAC is allowable temporarily.)	
Display	RUN	Indicate the result of automatic self-check. The lamp is lit for normal conditions and off for abnormal.		
	Unit	Indicate the unit symbol for measurements.		
	Item No., Item data	Display measurement, status, setting and option data selected with an item number.		
	Communication	The lamp is off.		
Self-diagnosis		Monitor the electronic circuit and internal power supply to output signal to the RUN LED and self-diagnosis output (ALARM).		
Output contacts	Configurations	For trip	2 make contacts: X <sub>4</sub> and X <sub>5</sub> (programmable output)	
		For signaling	4 make contacts: X <sub>0</sub> to X <sub>3</sub> (programmable output)	
		For self-diagnosis output	1 break contact: Y (open for normal result of self-diagnosis with power on)	
	Capacity	For trip	Make	110VDC, 15A, 0.5 s (L/R = 0 s) 220VDC, 10A, 0.5 s (L/R = 0 s)
			Break	110VDC, 0.3A (L/R≤40 ms) 220VDC, 0.15A (L/R≤40 ms)
			Carry	1.5 A, continuously
		For signaling and self-diagnosis output	Make and Break	500 VA (cosφ= 0.4), 60W (L/R = 0.007 s)
			Max. current	5 A
Max. voltage	380VAC, 125VDC			
Burden	Zero-phase current circuit	0.1 VA or less (with rated current)		
	Zero-phase voltage circuit	0.15 VA or less (with rated voltage)		
	Auxiliary power supply circuit	For 100VDC: approx. 5 W For 100VAC: approx. 7 VA For 220VDC: approx. 6 W For 220VAC: approx. 12 VA		
Mass		Net weight of relay unit : approx. 2.3 kg Including case : approx. 3.0 kg		
Case/cover		Size : D1 type	Color : N1.5	

\*21 When an uninterruptible AC power source is not provided in your system for the auxiliary supply voltage, use the type B-T1 back up power supply or commercially available uninterruptible power supply (UPS).

Type B-T1 back up power supply unit can be applied for DASH series protection relay with 100V~200V auxiliary power supply voltage rating only.

In addition, the power supply duration of the type B-T1 back up power supply is confirmed about 2 seconds in combination with one MELPRO-D series relay. Therefore, in the case that the required power supply duration after power source loss exceeds 2 seconds, please use a suitable commercial uninterruptible power supply.

When the power supply back up for the control power supply of a circuit breaker is required, it is necessary to prepare the backup power supply different from the type B-T1 back up power supply.

2.2 Protective elements

Style		318PQB	319PQB
Settings * 23	Earth fault direction	$I_0$ Operation current	0.05~1.0A (0.05A step)
		$V_0$ Operation voltage	LOCK-5~60V (1V step)
		Operation time	0.1~10s (0.1s step)
		Max. sensitivity angle	<p>Lead angle <math>0^\circ \sim 30^\circ</math> (<math>5^\circ</math> step)</p>
Forced operation		Forced operation is available for any trip or signaling contact individually.	
Operation indication		Operation indicator LED (red) comes on when the relay operates.	



2.3 Measurement elements

Style		318PQB	319PQB	
Option *24	CT primary	Zero-phase current 5-10-12-12.5-15-20-25-30-40-50-60-75-80-100-120-125-150-200-250-300-400-500-600-750-800-1000-1200-1250-1500-2000-2500-3000-4000-5000-6000-7500-8000[A]		
	EVT primary voltage	100~ 999[V] (1V step) 1000~ 9990[V] (10V step) 10.0~ 99.9[KV] (0.1KV step) 100~ 300[KV] (1KV step)		
	EVT tertiary voltage	100-110-115-120-100√3-110√3-115√3-120√3 [V] (173) (190) (200) (208)		
Display	Zero-phase current	Real time	Conversion	Indication value = Relay input value×CT primary setting / 5
			Range *22	0.00~CT primary setting × 0.4[A]
			Update	Approx. 200 ms
		Max. records	Conversion	Indication value = Relay input value×CT primary setting / 5
			Range *22	0.00~CT primary setting × 0.4[A]
		Fault records	Conversion	Indication value = Relay input value×CT primary setting / 5
	Range *22		0.00~CT primary setting × 1.6[A]	
	Zero-phase voltage	Real time	Conversion	Indication value = Relay input value ×(EVT primary setting / EVT tertiary setting) ×(1/ √3)
			Range *22	0.00 ~ (EVT primary setting / EVT tertiary setting)×(1/ √3) ×210 [V]
			Update	Approx. 200 ms
		Max. records	Conversion	Indication value = Relay input value ×(EVT primary setting / EVT tertiary setting) ×(1/ √3)
			Range *22	0.00 ~ (EVT primary setting / EVT tertiary setting)×(1/ √3) ×210 [V]
		Fault records	Conversion	Indication value = Relay input value ×(EVT primary setting / EVT tertiary setting) ×(1/ √3)
			Range *22	0.00 ~ (EVT primary setting / EVT tertiary setting)×(1/ √3) ×210 [V]
		Phase	Real time	Range *22
Update				Approx. 200 ms
Fault records	Range *22		-179~0~180[° ]	

\*22 The form of display depends on value range as shown in the tables below:  
 CT primary setting value and EVT primary setting value determine the minimum number of digits to be displayed on each measurement display.  
 When a value to be displayed exceeds the max. value of the display range, the max. value will blink

(1) Display of current

CT primary setting		5 ~ 40[A]	50 ~ 400[A]	500 ~ 4000[A]	5000 ~ 8000[A]
Form of display	0.00 ~ 9.99[A]	□.□[A]	□[A]	-	-
	10.0 ~ 99.9[A]	□□.□[A]	□□[A]	□.□□[kA]	-
	100 ~ 999[A]	□□□[A]	□□□[A]	□.□□[kA]	□.□[kA]
	1.00 ~ 9.99[kA]	□.□□[kA]	□.□□[kA]	□.□□[kA]	□.□[kA]
	10.0 ~ 99.9[kA]	□□.□[kA]	□□.□[kA]	□□.□[kA]	□□.□[kA]
	100 ~ 999[kA]	□□□[kA]	□□□[kA]	□□□[kA]	□□□[kA]

(2) Display of voltage

EVT primary setting		100 ~ 500[V]	501 ~ 10000[V]	11 ~ 300[kV]
Form of display	0.00 ~ 999[V]	□□□[V]	□.□□[KV]	□.□[kV]
	1.00 ~ 9.99[kV]	□.□□[kV]	□.□□[kV]	□.□[kV]
	10.0 ~ 99.9[kV]	□□.□[kV]	□□.□[kV]	□□.□[kV]
	100 ~ 999[kV]	□□□[kV]	□□□[kV]	□□□[kV]

(3) Display of phase

Range of display	Form of display
-179 ~ -1[°]	-□□□[°]
0 ~ 180[°]	□□□[°]

\*23 When the product is shipped from the factory, each setting value is "Lock" (With lock setting element) or "minimum setting value" (Without lock setting element).

### 3 Characteristics

Common conditions	(1) Rated frequency: $\pm 1\%$ (2) Ambient temperature: $20^{\circ}\text{C} \pm 10^{\circ}\text{C}$ (3) Aux. supply voltage: Rated voltage $\pm 2\%$	The conditions shown on the left should be applied unless otherwise specified.
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#### 3.1 Protective elements

Items		Conditions	Guaranteed performance
Operation value	Earth fault directional elements	Setting: Operation time = Minimum Input: Zero-phase voltage = Rating voltage Phase(zero-phase current)=Max sensitivity angle	- For setting of 0.05A Setting value $\pm 10\%$ - For setting of other range Setting value $\pm 5\%$
		Setting: Operation time=Minimum Input: Zero-phase current=setting current value $\times 200\%$ Phase(zero-phase current)=Max sensitivity angle	Setting value $\pm 5\%$
Reset value	Earth fault directional elements	Setting: Operation time:Minimum Input: Zero-phase voltage=Rating voltage Phase(zero-phase current)=Max sensitivity angle	- For setting of 0.05A Operation value $\times 90\%$ or more - For setting of all range Operation value $\times 95\%$ or more
		Setting: Operation time=Minimum Input: Zero-phase current=setting current value $\times 200\%$ Phase(zero-phase current)=Max sensitivity angle	- For setting of all range Operation value $\times 95\%$ or more
Voltage vs. current characteristics		Setting: Operation time=Minimum Zero-phase voltage=Minimum Input: Zero-phase voltage=30V Phase(zero-phase current)=Max sensitivity angle	- For setting of 0.05A Setting value $\pm 10\%$ - For setting of other range Setting value $\pm 5\%$
Operation time		Input: Zero-phase current=0A $\rightarrow$ Setting value $\times 300\%$ Zero-phase voltage=0V $\rightarrow$ Rating voltage Phase(zero-phase current)=Max sensitivity angle	- For setting of 0.1~0.4sec Setting value $\pm 25\text{ms}$ - For setting of other range Setting value $\pm 5\%$
Reset time		Input: Zero-phase current=Setting value $\times 300\% \rightarrow 0\text{A}$ Zero-phase voltage=Rating voltage $\rightarrow 0\text{V}$ Phase(zero-phase current)=Max sensitivity angle	- For setting of all range 200ms $\pm 25\text{ms}$
Phase characteristics in operation		Setting: Operation time=Minimum Input: Zero-phase current=Setting value $\times 1000\%$ Zero-phase voltage=30V	- For setting of all range Setting value $\pm 5^{\circ}$
Phase characteristics in reset		Setting: Operation time=Minimum Input: Zero-phase current=Setting value $\times 1000\%$ Zero-phase voltage=30V	- For setting of all range Operation phase value $\pm 3^{\circ}$

Items	Conditions	Guaranteed performance
Overload characteristics	Setting: Operation time=Minimum Zero-phase voltage=Minimum Zero-phase current=Minimum Max sensitivity angle=0° Input: Zero-phase current=Setting value×4000% Zero-phase voltage= Rated voltage×150% (1) Phase(zero-phase current)= 0° (2) Phase(zero-phase current)=180°	<ul style="list-style-type: none"> <li>- In case of (1) Repeating operation and reset when input on and off</li> <li>- In case of (2) No operation when input on and off</li> </ul>
Creeping characteristics	Setting: Operation time=Minimum Zero-phase voltage=Minimum Zero-phase current=Minimum Max sensitivity angle=0° Input: Zero-phase voltage=Rated voltage×150% Input terminals of zero-phase current=Open	No operation when input on

### 3.2 Measurement elements

Items		Condition	Guaranteed performance
Real time and max.records	Zero-phase current	CT primary setting×0.4	±1%
	Zero-phase voltage	(EVT primary setting / EVT tertiary setting) × (1/ √3) × 210	±5%
	Phase	I <sub>0</sub> =0.5A V <sub>0</sub> =30V	±5°

### 3.3 Common technical data

ITEM		DESCRIPTION	CONDITION	STANDARD
Environment	Ambient operating temperature	-10°C to +55°C		IEC60255-6
	Ambient storage and transport temperature	-25°C to +70°C		IEC60255-6
	Damp heat	+40°C, 95%RH, 4 days		IEC60068-2-3
Thermal withstand	VT	1.15Vn, 3h		
	CT	40In, 1s		
Dielectric test	Circuit of 60V or below	500VAC, 1min.	1) Between each circuit and the exposed conductive parts, the terminals of each independent circuit being connected together 2) Between independent circuits, the terminals of each independent circuit being connected together	IEC60255-5
	Circuit of more than 60V and 500v or below	2000VAC 1min.		
	Open contact	1000VAC, 1min.	Between open contact poles	
Impulse voltage test		5kV, 1.2µs/50µs	1) Between each circuit and the exposed conductive parts, the terminals of each independent circuit being connected together 2) Between independent circuits, the terminals of each independent circuit being connected together	IEC60255-5
High-frequency disturbance test	Common mode	2.5kV peak, 1MHz with 200Ω source impedance for 2s	Between independent circuits, and between independent circuit and earth	IEC60255-22-1 class 3
	Differential mode	1.0kV peak, 1MHz with 200Ω source impedance for 2s	Across terminals of the same circuit	
Electrostatic discharge test		8kV	Contact discharge	IEC60255-22-2
		15kV	Air discharge	Class 4
Radiated electromagnetic field disturbance test		68 to 87Mhz 146 to 174MHz 420 to 470MHz		IEC60255-22-3 class 3
Fast transient disturbance test		2.0kV, 5ns/50ns, 1min		IEC60255-22-4
Vibration test		Refer to class 1		IEC60255-21-1 Class 1
Shock response		Refer to class 2		IEC60255-21-2 Class 2
Shock withstand		Refer to class 1		IEC60255-21-2 Class 1
Bump		Refer to class 1		IEC60255-21-2 Class 1
Enclosure protection		IP51		IEC60529

Vn: Rated voltage, In: Rated current

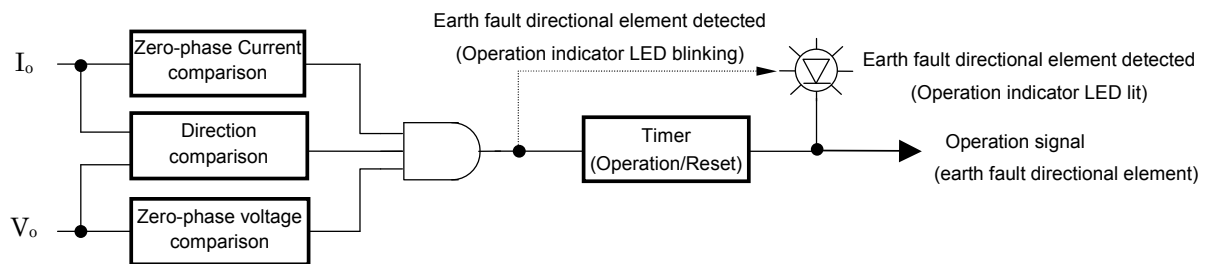
## 4 Functions

### 4.1 Protection

#### 4.1.1 Earth fault directional elements

Fig. 4.1 “Earth fault directional element internal function block diagram” shows operation principle of the earth fault directional elements.

The levels of zero-phase current and zero-phase voltage are detected through comparing input current and voltage with the operation setting values. In addition, from the phase relation between zero-phase current and zero-phase voltage the fault direction is distinguished. (see the Fig. 4.2 phase characteristics). When all of these three inputs of AND gate are enable, the element outputs an operation signal after the time-delayed timer expires.



**Figure 4.1 Earth fault directional element internal function diagram**

(1) Setting of  $I_0$  Operation current

The  $I_0$  operation current settings are indicated with current values [mA].

When the setting “Lock”, the elements selected are locked for operation.

(2) Setting of  $V_0$  Operation voltage

The  $V_0$  operation voltage settings are indicated with voltage values [V].

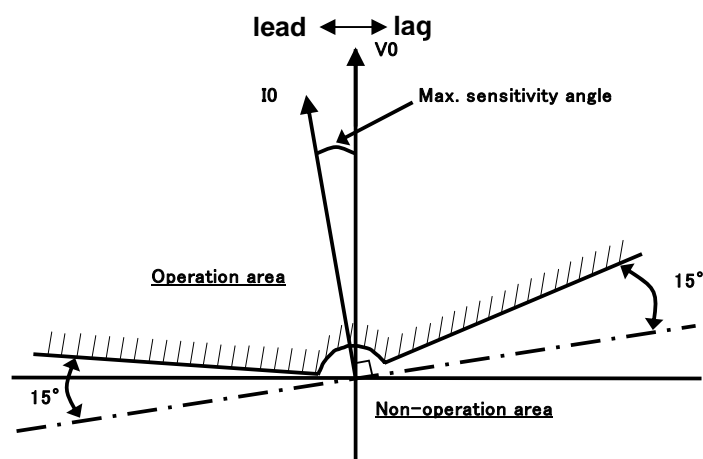
When the setting “Lock”, the elements selected are locked for operation.

(3) Setting of operation time

The operation time settings are indicated with time value [s].

(4) Setting of characteristic angle

The characteristic angle settings are indicated with angle value [°]



**Figure 4.2 Phase characteristic of earth fault directional element**

#### 4.1.2 General functions

##### (1) Operation display

The operation indicator LED has been set to “self-hold” in the factory. This setting can be freely changed to “auto reset”.

With the “self-hold” setting, data of the latest operation indication will be stored in the internal memory even if the auxiliary power supply runs down.

The data stored will be cleared when the “indicator reset” switch is pressed.

Up to latest five phenomena can be stored and displayed as a history record. (Older data than the latest five phenomena will automatically be cleared).

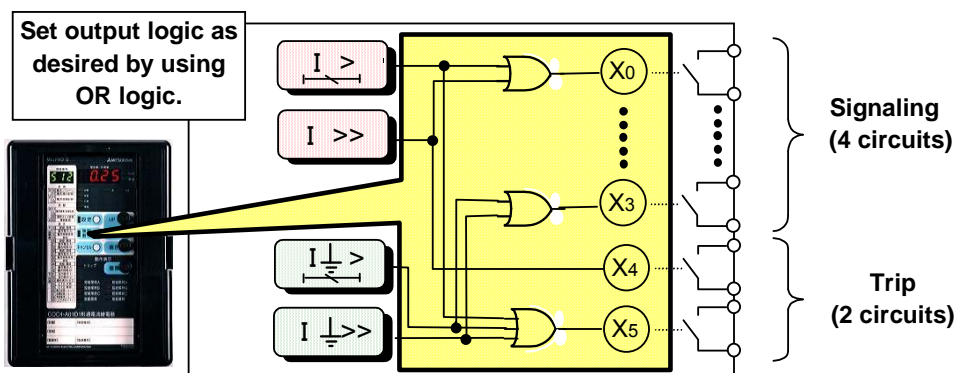
Item No.	History	Sequence of recording
311	1 <sup>st</sup> phenomena	Latest fault record data ↓ ↓ ↓ Oldest fault record data
312	2 <sup>nd</sup> phenomena	
313	3 <sup>rd</sup> phenomena	
314	4 <sup>th</sup> phenomena	
315	5 <sup>th</sup> phenomena	

##### (2) Output contacts

The signaling outputs  $X_0$  to  $X_3$  and trip outputs  $X_4$  and  $X_5$  are all programmable type.

The factory default setting of the arrangement of these outputs is as shown in the internal function block diagram of Figure 5.2. This setting can be freely changed by specifying outputs of the internal elements based on the OR logic.

All the outputs have been set to “auto reset” in the factory. Any of them can be changed to “self hold”.



**Figure 4.2 Schematic image of Programmable Outputs (example: COC4-A01)**

##### (3) Forced operation

It is possible to carry out forced operation of any of the signaling outputs  $X_0$  to  $X_3$  and trip outputs  $X_4$  and  $X_5$  independently. Forced operation is useful for checking the wiring.

When forced operation is carried out, the corresponding LED lamps will come on to show the current status of the programmable outputs. Checking the lamp status will be useful not only for wiring check but also to check the programmable outputs arrangement.

## 4.2 Measurement

Currents and voltage input to the relay are measured and converted into freely set CT primary currents and EVT primary/tertiary voltage, then indicated on the display.

### (1) Real time measurement

The effective zero-phase current and zero-phase voltage , and phase(zero-phase current) in steady state is showed

### (2) Max. record

The maximum effective current is recorded and stored for each phase.

The max. record will be all cleared when “aux. power supply OFF” or “max. record reset” operation is made.

### (3) Fault record

In the event of system fault, the effective current and voltage, and phase data that have been measured at the time when one of the protection elements operates to issue an output signal are stored. Data of up to five phenomena can be stored and displayed for each phase.

With “fault record reset” operation, these input data items will be all cleared.

(Records older than the 5<sup>th</sup> phenomenon will automatically be cleared.)

Item No.	History	Sequence of recording
211	1 <sup>st</sup> phenomena	Latest fault record data ↓ ↓ ↓ Oldest fault record data
212	2 <sup>nd</sup> phenomena	
213	3 <sup>rd</sup> phenomena	
214	4 <sup>th</sup> phenomena	
215	5 <sup>th</sup> phenomena	



### 4.3 Self-diagnosis

The self-diagnosis function monitors the electronic circuit and built-in power source continuously. If an abnormal condition occurs, the protection elements will be locked for operation. Also, the RUN LED lamp will go off and the self-diagnosis output contact (break contact) will be closed.

(1) Checking defect code at failure detection

When a failure is detected, the defect code will be recorded. This defect code can be checked through the self-diagnosis (ALARM) status indication.

(2) Resetting self-diagnosis output

If a failure is detected, **the failure status may be reset by turning off/on the power.**

In this case, **be sure to lock the trip circuit on the external wiring of the relay** before resetting. (If the failure persists, an erroneous output may be caused).

(3) Clearing the defect code

The defect code data stored at failure detection can not be cleared only by carrying out the power on/off procedure in the item (2) above. All the defect code numbers that have been detected since the previous “self-diagnosis reset” (RESET ALARM) operation was made are accumulated in the memory.

**To clear the record data, carry out “self-diagnosis reset” (RESET ALARM) operation.**

**Table 4.1 Output for protection relay failures**

Status	Detected items	Output				
		Display		ALARM (break contact)	Operation output lock	
		RUN	Defect code			
Normal	—	On		Open	Not locked	
Power circuit failure	—	Off	No display	Closed	Locked	
CPU failure	—				* 44	
Monitor error	ROM check				0001	Locked
	RAM check				0002	
	A/D accuracy check				0003	
	A/I check				0004	
	A/D check				0005	
	SRAM check				0006	
	D/O status check				0008	
	D/O operation check				0009	
	Analog filter check				0010	
	A/I double check				0011	
	D/I check * 41				0012	
	E <sup>2</sup> PROM check				0013	
	Computing function check				0014	
	WDT check				0015	
	Data transfer check * 42				0016	
Differential current check * 43	0017					

\* 41 Monitored only in the models with built-in D/I function.

\* 42 Monitored only in the models with D2 unit.

\* 43 Monitored only the biased differential relay.

\* 44 No necessary to lock the operation output as any signals can't be output in case of CPU stop.

## 5 Configuration

### 5.1 Internal configuration

#### (1) I/O and CPU circuits

Fig. 5.1 shows the internal block diagram of the model CDG1-A01D1.

Current input is converted into AC signals at the electronic circuit level via the auxiliary transformer and filter circuits. These signals are retained as a form of DC signal in the sample hold circuit on each channel sharing a same time. The multiplexer selects a channel to take the signal and sends it to an A/D converter. The signals are converted to digital signals sequentially in the converter to be sent to the CPU.

The setting circuit is used to input setting data into the CPU.

These inputs will be used to carry out the functions shown in Fig. 5.2 “Internal function block diagram”, and then issue output signals to the display and output relay.

#### (2) Self-diagnosis circuit

When the self-diagnosis function detects that the electronic and power circuits are normal, the output relay will be energized to open the self-diagnosis output contact (break contact).

The self-diagnosis output contact (break contact) will be closed when a failure occurs in the circuits above or when the built-in power fuse burns.

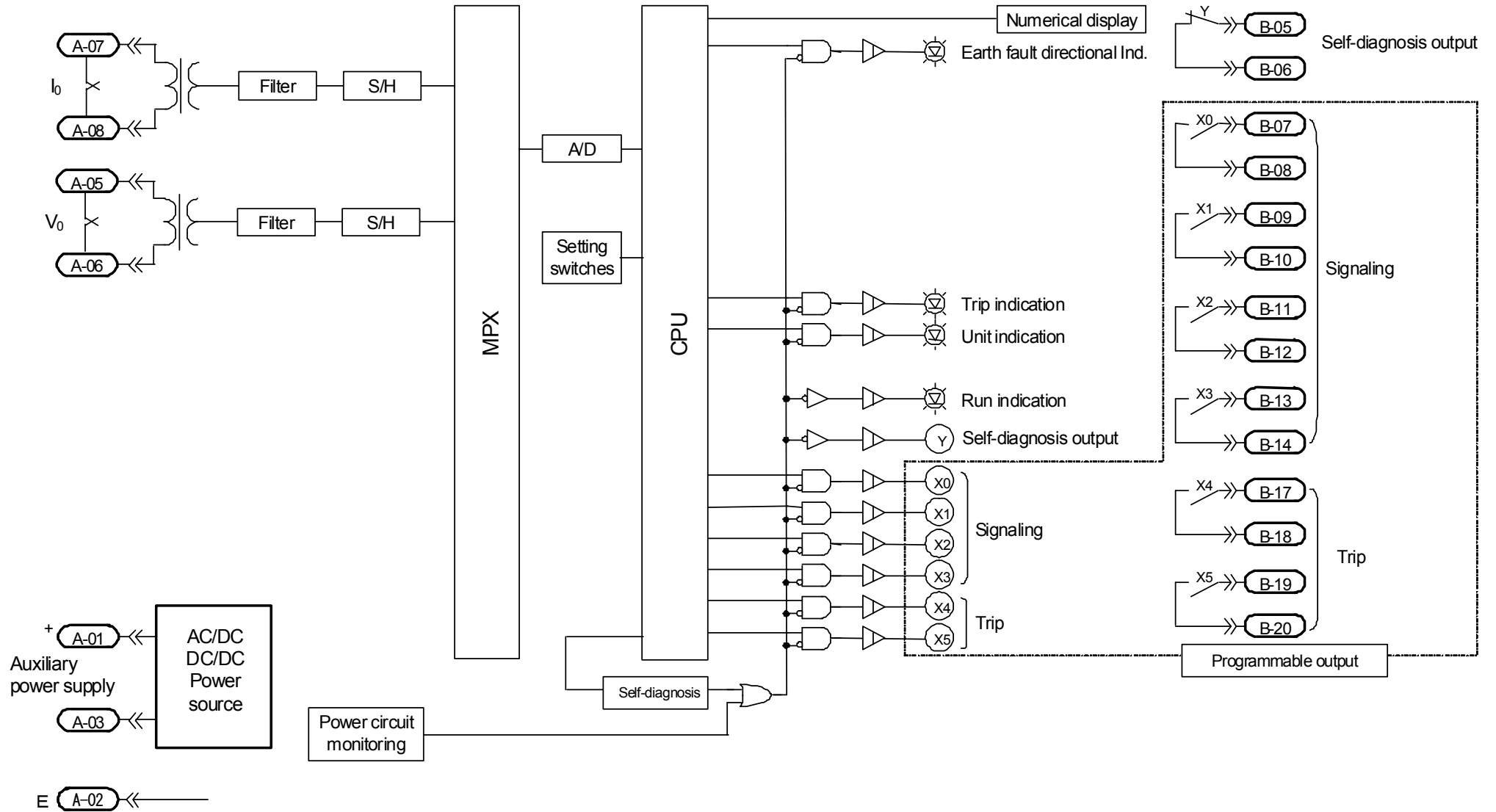


Figure 5.1 Internal block diagram of Type CDG1-A01D1 relay

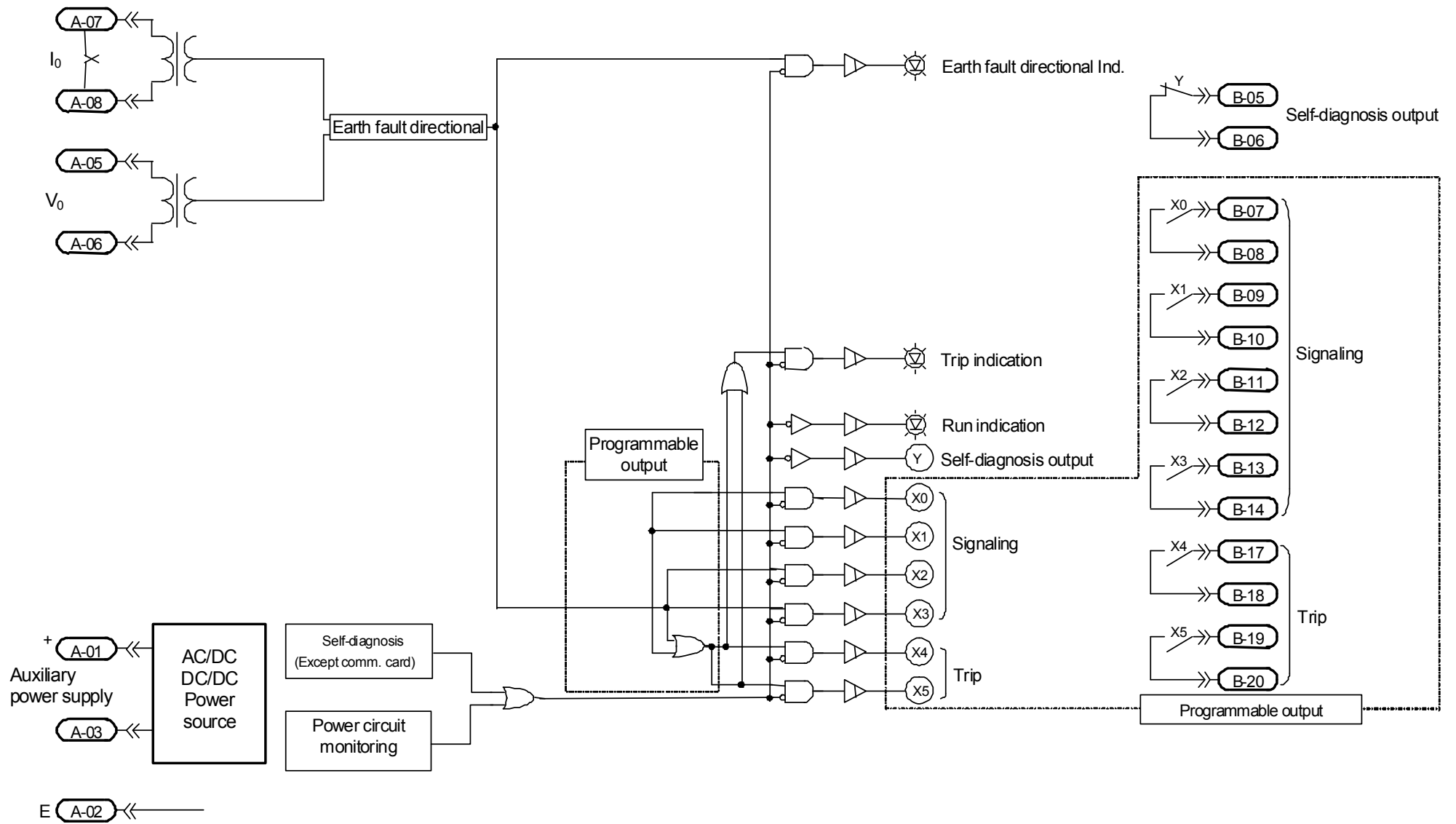


Figure 5.2 Internal function block diagram of Type CDG1-A01D1 relay

## 5.2 External connection

### (1) Connection diagram

Figure 5.4 and 5.5 show examples of input circuit (AC circuit) connection, Figure 5.6 an example of control circuit (DC circuit) connection and Figure 5.7 a terminal arrangement.

In the terminals, M3.5 screws and wires of 2 mm<sup>2</sup> or less are recommended to be used.

### (2) Precautions for wiring work

a. Important facilities should be provided with fail safe measures such as dual system to improve reliability of the facilities.

b. Effects of external surge

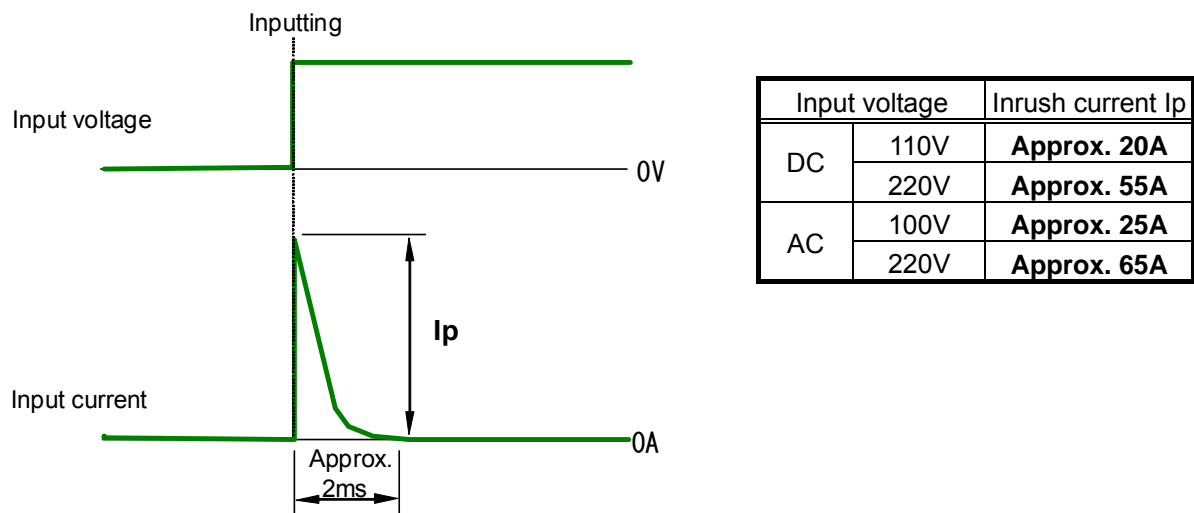
Some type of surge with a certain condition may inversely affect the relay. If so, take it into account to install MF type surge absorbers made by Mitsubishi Electric.

c. Guarantee of AC auxiliary power supply against power interruption

The AC auxiliary power supply of the relay is not guaranteed against power interruption. When you do not have an uninterruptible AC power source, use an type B-T1 back up power supply manufactured by Mitsubishi Electric or uninterruptible power source (UPS) that is commercially available.

d. Inrush current of auxiliary supply

Since inrush current may flow in the relay when the auxiliary power supply is turned on as shown in figure 5.3, make consideration of this point when selecting the breaker for the auxiliary power supply circuit.



**Figure 5.3 Inrush current of auxiliary power supply**

e. Trip circuit

Only the contacts X<sub>4</sub> and X<sub>5</sub> can be used for the trip circuit. Please keep in mind that the contacts X<sub>0</sub> to X<sub>3</sub> can not be used for the trip circuit. (If used, the contact may burn).

Connect the pallet contact (52a) of the circuit breaker to the trip circuit.

f. Self-diagnosis output circuit

The self-diagnosis output contact is so configured that the auxiliary relay can be energized (break contact) with normal result of monitoring, in order to be able to continue monitoring even if the built-in

power fuse burns. Therefore, connect the timer to the external wiring. (See Fig. 5.6 “DC circuit connection diagram”)

g. Earth circuit

Be sure to earth the earth terminal located on the back of the relay according to the Class D earth wiring method.

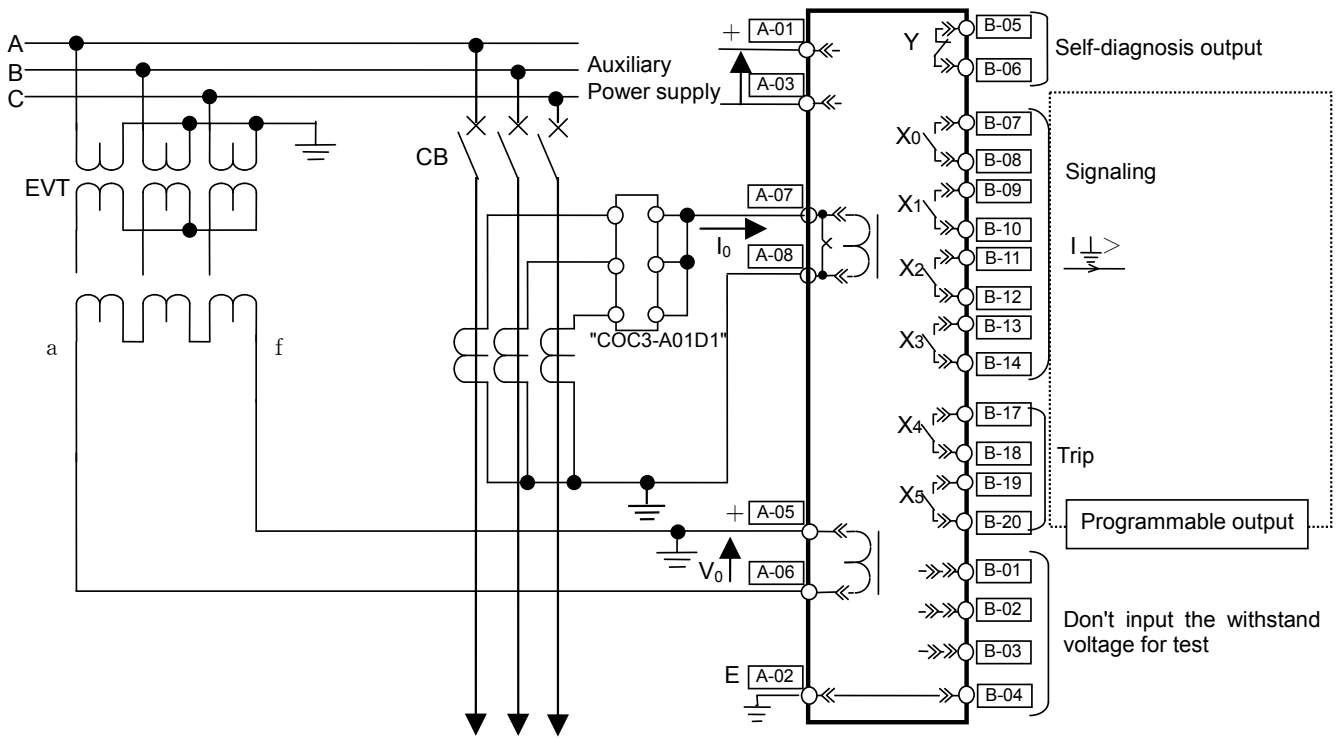


Figure 5.4 External connection diagram for CDG1-A01D1 relay(1)

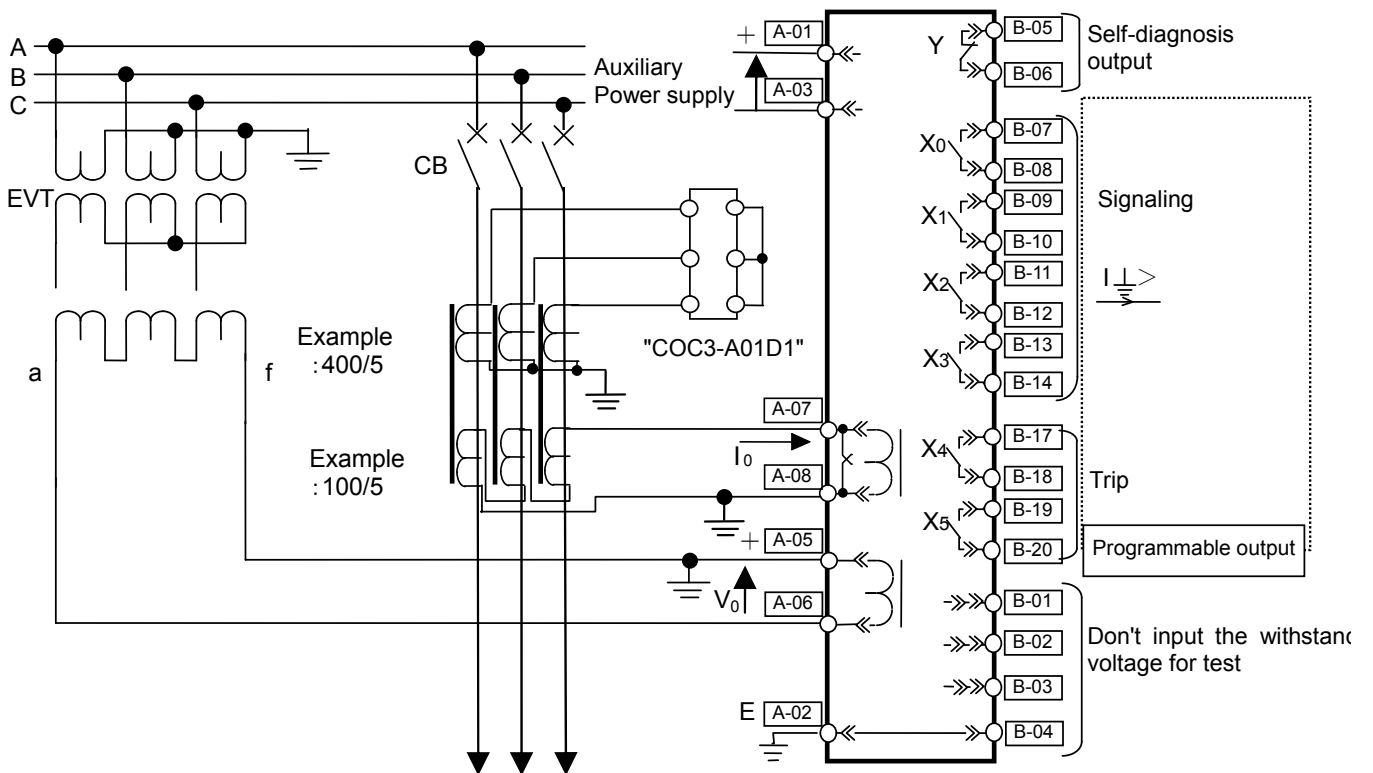
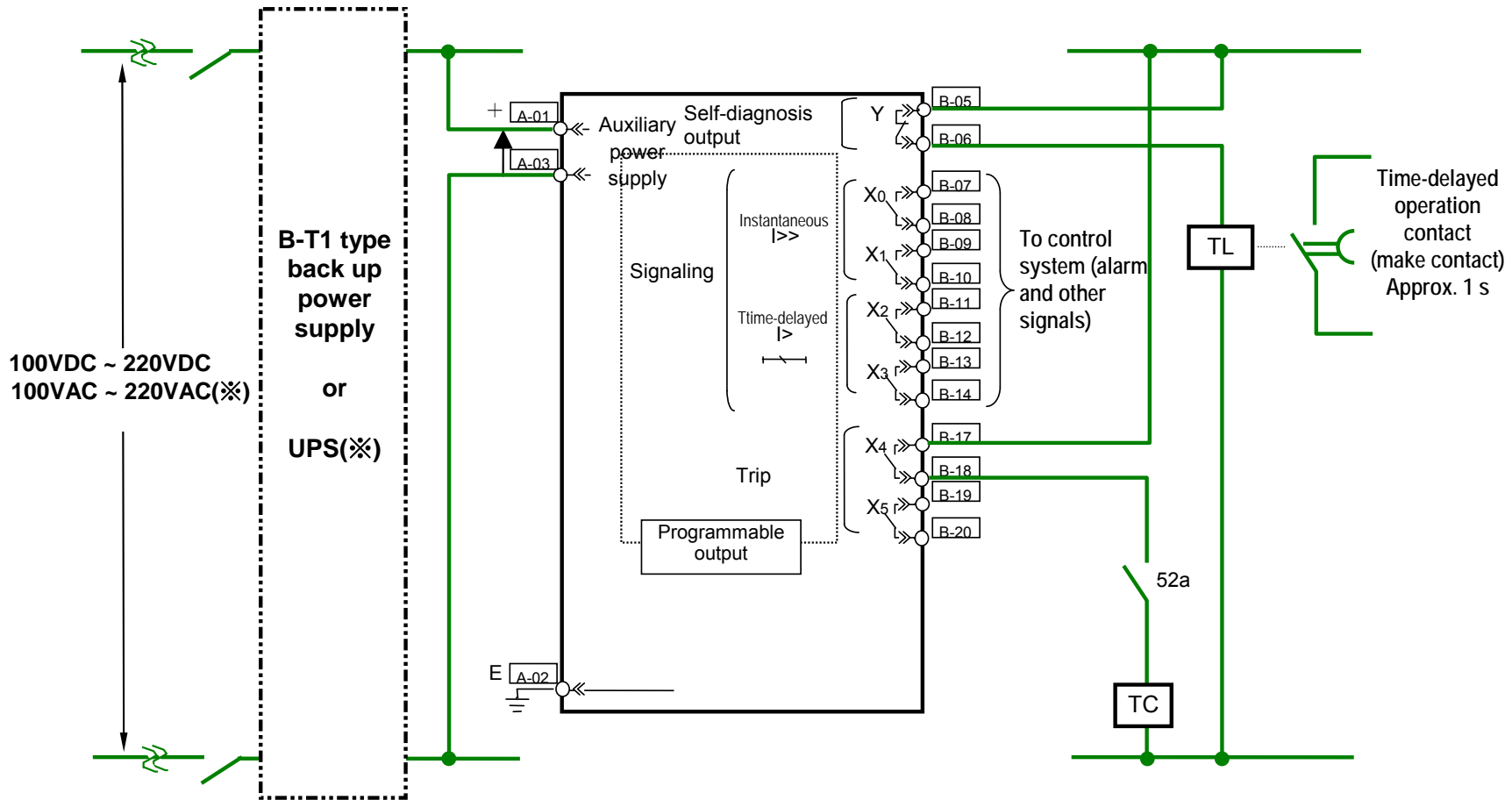


Figure 5.5 External connection diagram for CDG1-A01D1 relay(2)



Note 1) The self-diagnosis output contact is so configured as below mentioned that alarm can be issued even after the built-in power fuse burns. This type of auxiliary relay circuit configured such that relay will be energized (“break contact” opened) when normal result of self-diagnosis is received. Therefore, the “break contact” is closed when the power is applied and will be opened after about 50ms. If the auxiliary power supply of the relay and the self-diagnosis output contact shares a same power source, **the “break contact” will be closed temporarily after the auxiliary power supply is turned on.** In the case where the phenomenon stated in the above would conflict with your system requirement, it is recommended that the self-diagnosis output contact should be **connected via the time-delayed timer** as shown in the left of the figure.

Note 2) Regarding to the type CPS1 AC/DC converter or commercially available uninterruptible power supply (UPS), refer to the note \*21 in the section 2.1 General information.

(\*) Refer to the page 21, 5.2 External connection (2) Precautions for wiring work c. Guarantee of AC auxiliary power supply against power interruption.

Figure 5.6 Auxiliary power supply circuit connection example of type CDG1-A01D1 relay



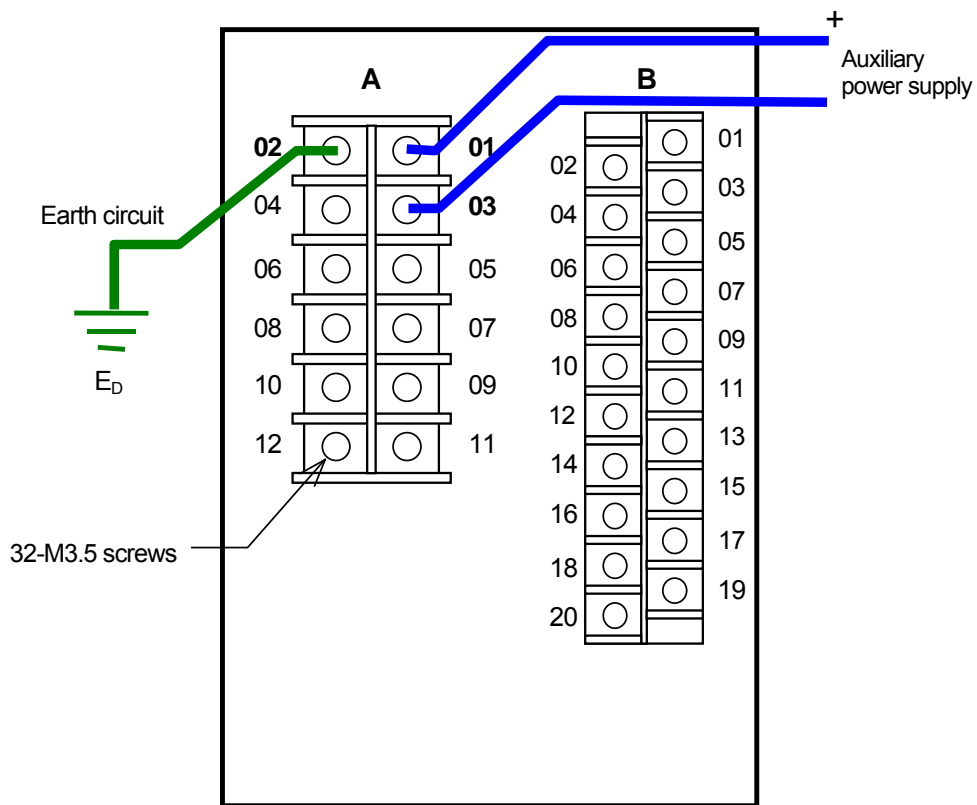


Figure 5.7 Rear view of type CDG1-A01D1 relay

## 6 Handling

### 6.1 Unpacking

Usually this relay is packed in a D1 case for transportation. However, it may occur that only the sub unit is transported independently for the convenience at repair. In such a case, fully brush off the dust, dirt, etc. adhered to the sub unit after completion of unpacking, and further visually check that the parts mounted on the front panel or built in the sub unit are not damaged.

### 6.2 Transportation and storage

To carry the equipment within the place of use, handle it carefully so that the parts installed on the front panel of the sub unit or built-in parts cannot be deformed or broken.

### 6.3 Appearance and how to pull sub unit out

The relay is so constructed that the sub unit can be drawn out, in order to facilitate inspection or test. It is possible to pull the sub unit out without disconnecting the external wiring.

Note that the sub unit should not be drawn out with the line hot. Before drawing out, be sure to take the following actions.

- Lock the tripping circuit including breakers.
- Stop the main circuit.
- Shorten and isolate the CT circuit.
- Open the auxiliary power supply circuit.

Bear in mind that careless opening of circuits may result in opening the other control circuits too to impair the protective function. Be sure to only shut off the concerned circuit.

The CT circuit is provided with an automatic short circuit mechanism. In case that you have pulled the sub unit out without isolating the CT circuit by mistake, the automatic short circuit mechanism will work to prevent the CT secondary circuit from opening.

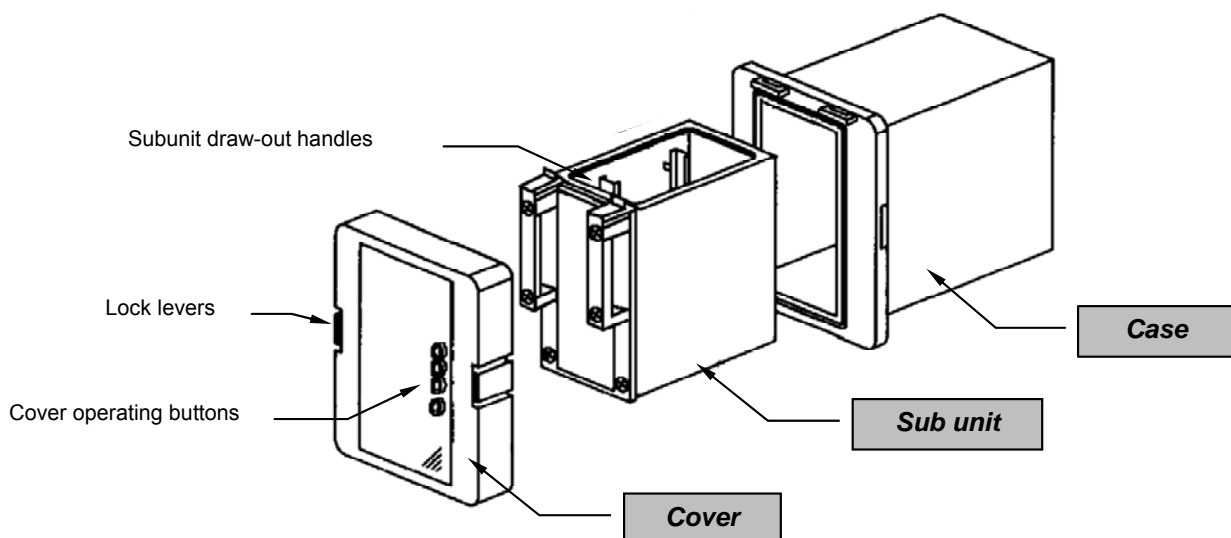
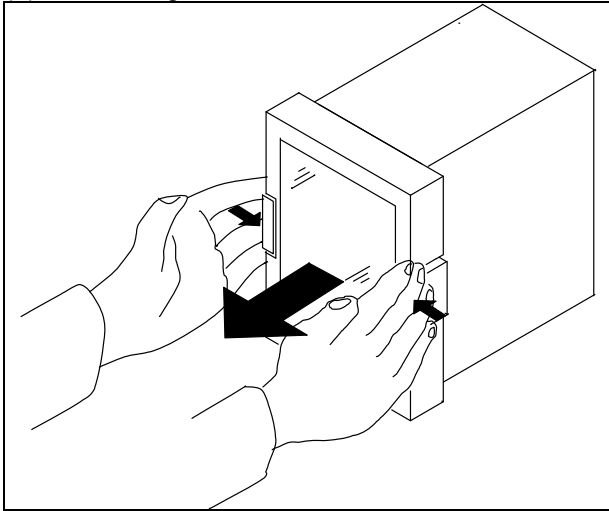


Figure 6.1 Outside view of type CDG1-A01D1 relay

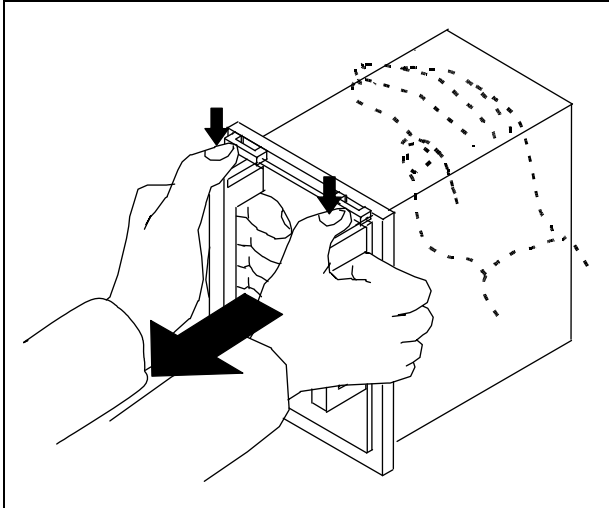
### 6.3.1 How to draw sub unit out

#### (1) Removing the cover



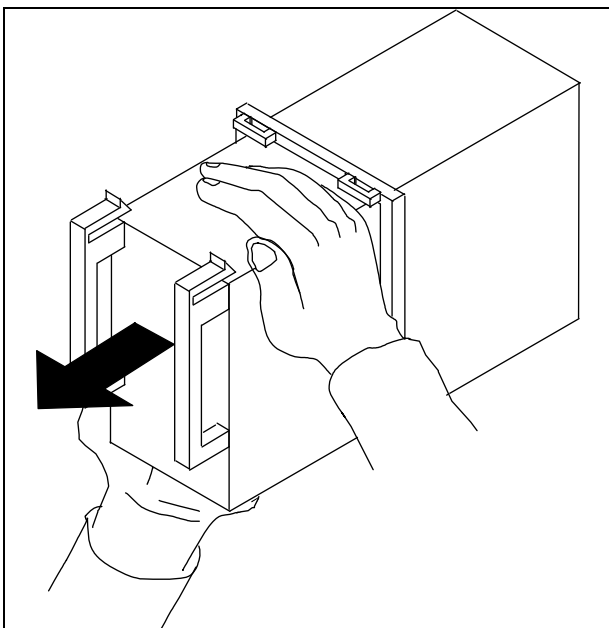
Hold the **lock levers**, which are located at both sides of the cover, on their front sections. Take off the cover **straight toward you** while pushing the levers **inwards**.

#### (2) Drawing the sub unit



Grip the draw-out handles (located at both sides of the front of the sub unit). **Press the locking pieces installed in the upper portion of the draw-out handles with your thumbs to pull the sub unit towards you.**

Note) The sub unit is so designed that it can not be removed unless it is pulled out with a relatively strong force, in consideration of quake-proof measures. When the relay unit is to be removed independently, it is recommended to draw it out with the case held by other operator.

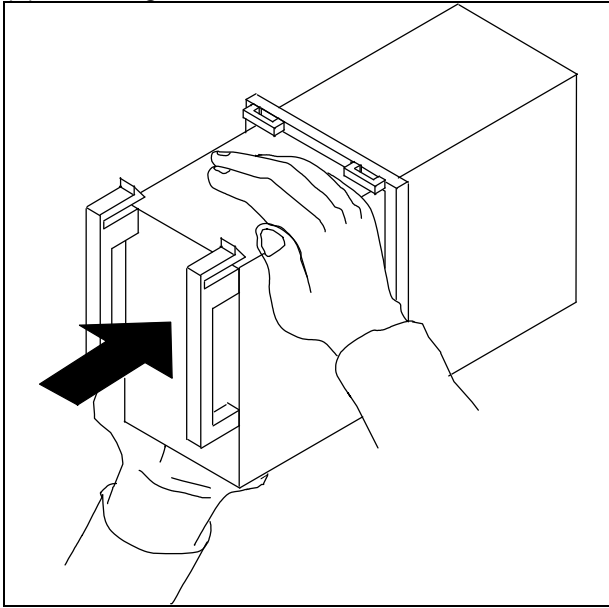


When about a half portion of the sub unit is pulled out of the case, just stop the drawing motion. Then, **hold the top and bottom of the sub unit to pull it out completely**, in order to prevent the unit from falling.

Note) Be careful not to touch the printed circuit board and parts inside the sub unit.

## 6.3.2 Housing the sub unit

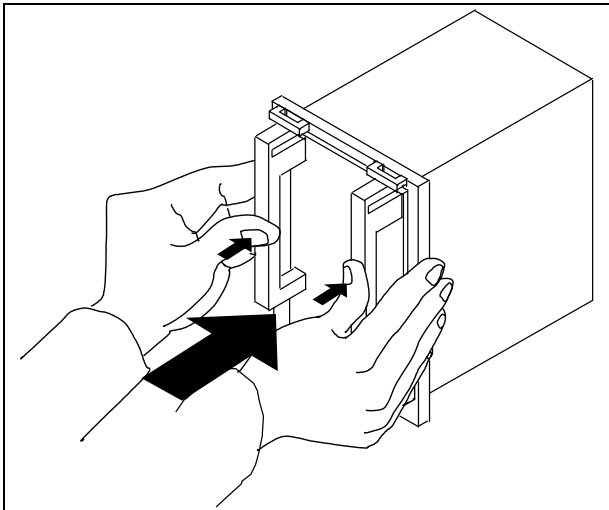
### (1) Housing the sub unit



Hold the sub unit on the top and bottom to push the unit into the case approx. a half of the unit.

Note)

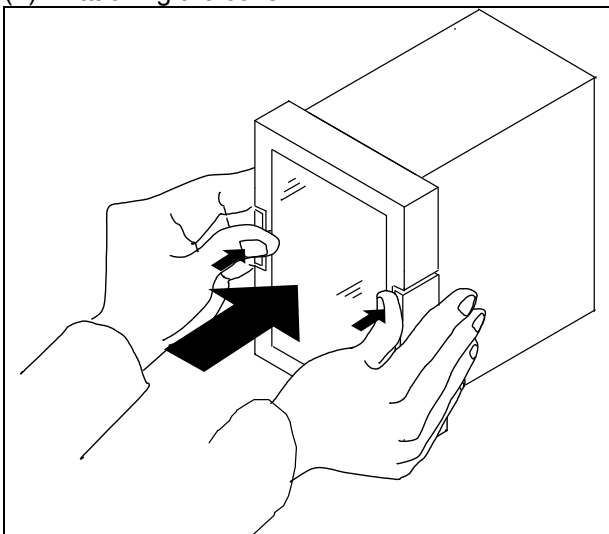
- Be careful not to touch the PCB and parts inside the sub unit.
- The sub unit is so constructed that it can not be housed in the case upside down.



**Fully insert the sub unit into the case until you hear a click** while pressing the handles located on both sides of the front of the sub unit, **and also the front face of subunit (ie, 4 corners of front face) is becoming flush with the vertical surface of the case.**

Note) Please note that inserting the sub-unit incompletely may only establish a poor contact of the terminals located on the back of the unit, which may cause operational failure or heating.

### (2) Attaching the cover



**Fit the cover straight** to the case. Hold the cover frame to **fully push the lock levers, located both side of the cover, to case side until it is clicked and locked.**

Note) After setting the cover, check if the buttons can be smoothly pressed from over the cover.

## 6.4 How to use front control panel

### 6.4.1 Front control panel layout

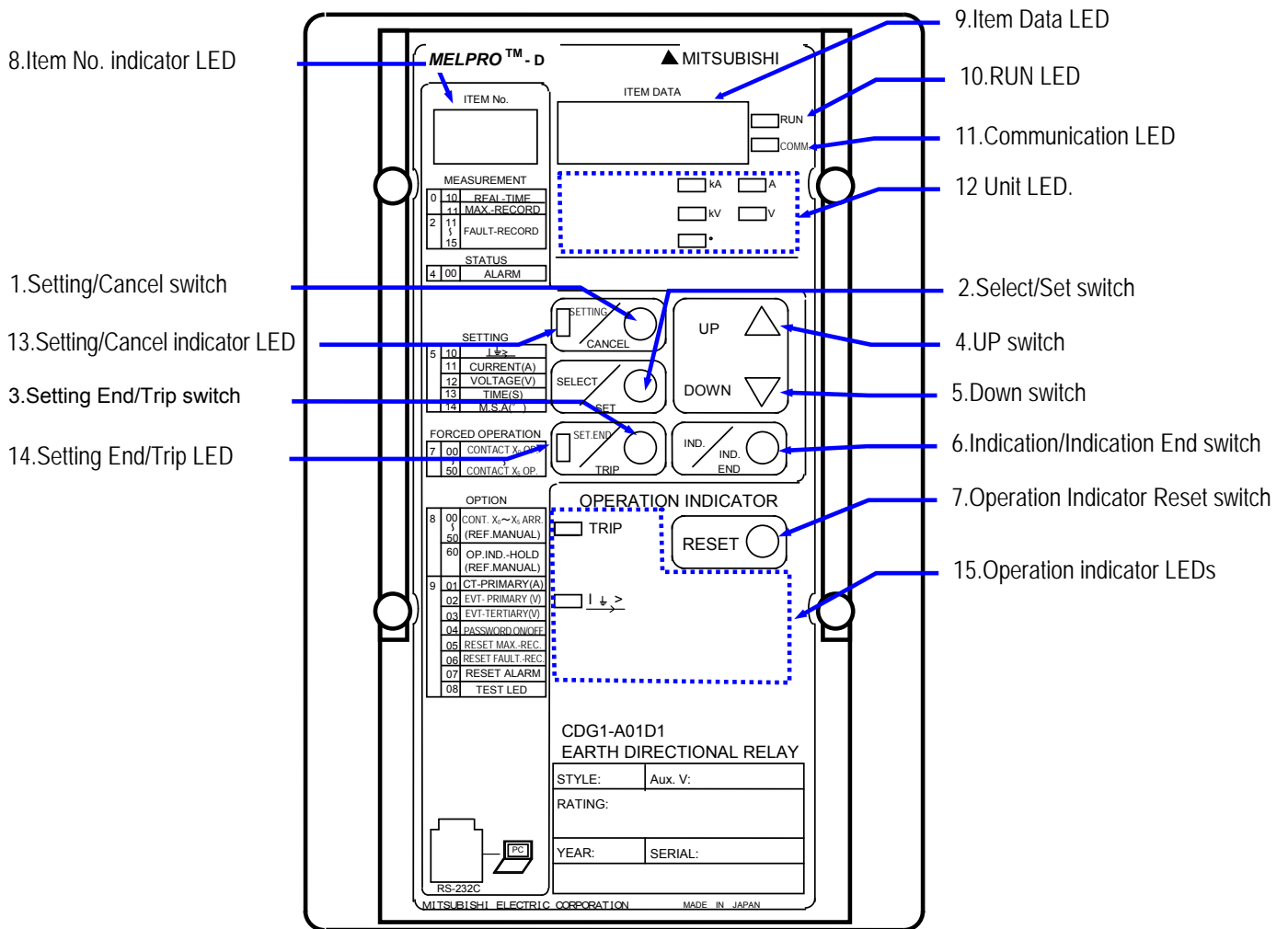








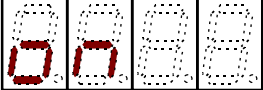
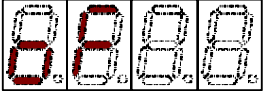
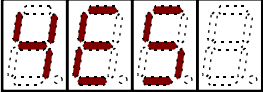




Figure 6.2 Front view of type CDG1-A01D1 relay

**Table 6.1 Front control panel guide**

No.	Designation		Symbol	Description
1	Setting / Cancel			Pressing this switch will start the procedure for setting, forced operation or option. When this switch is pressed again instead of the  switch, data that has been programmed will be all cleared to terminate the selected procedure. The SETTING/CANCEL indicator LED is lit during the procedure.
2	Select / Set			This switch is used to select an item number and to program item data during setting, forced operation or option procedure. When data is programmed to be ready for replacing the currently used setting, the SET.END/TRIP LED will blink.
3	Setting End / Trip			When the SET.END/TRIP switch is pressed with its LED blinking during setting, forced operation or option procedure, the currently enabled setting will be replaced by data given by programming. The new setting will be thus enabled.
4	UP select			These switches are used for selecting data elements. Pressing these switches for a while will allow fast forwarding. With the cover operating buttons, you can use the switches without removing the cover.
5	DOWN select			
6	Indication / Indication End			Pressing this switch will start or end the display of settings and measurements. With the cover operating button, you can use the switch without removing the cover.
7	Reset			Pressing this switch will reset output contacts after the relay operated and extinguish the operation indicator LEDs. With the cover operating button, you can use the switch without removing the cover.
8	Item No.	Green	-	A number allocated to the selected setting, forced operation or option item is indicated here.
9	Item Data	Red	-	Data that corresponds to the item number selected is displayed here. For the indication of individual letters, see the Table 6.2.
10	RUN	Green	-	Indicate the result of the automatic self-check. The lamp will be lit for normal results while off for abnormal.
11	Communication	Green	-	Indicate the operational status of the communication card. - With a communication card installed: the lamp will be lit for normal conditions, blinking during communication and off for abnormal conditions. - With a communication card not installed: the lamp will be off.
12	Unit	Yellow	-	Indicate the unit used for the item data.
13	Setting / Cancel	Yellow	-	This lamp will be lit during setting, forced operation or option procedure.
14	Setting End / Trip	Yellow	-	This lamp will blink when new data is programmed to be ready for replacing the currently enabled setting.
15	Operation	Red	-	Indicate the corresponding operation elements and phases of the relay.

**Table 6.2 Letter representation of item data indicator LEDs**

Item		Display in item data box
Designation	Letters	
On	ON	
Off	OFF	
Yes	YES	
No	NO	
Operation lock	LOCK	

### 6.4.2 Operational procedure

For more information about the operational procedure shown below, see the MELPRO-D Series General Operation Manual (JEP0-IL9416).

#### 6.4.2.1 Relay I/F communication without RS232C

**Table 6.3 Operational procedure**

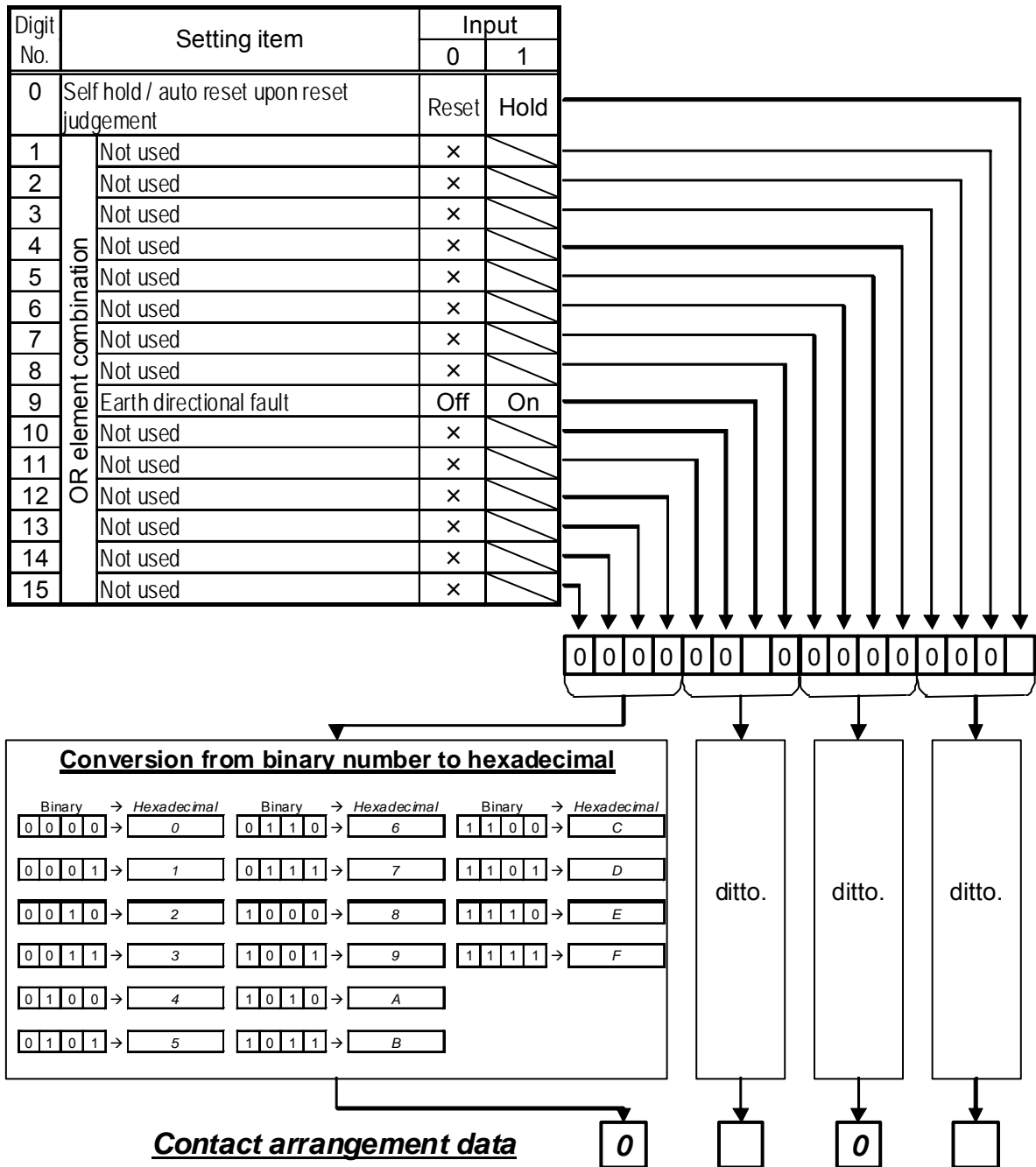
Item				Corresponding section of general operation manual		
No.	Designation		Description	Indication mode	Setting / forced operation / option mode	
010	Measurement	Real time	Measure and display effective value currents input to the relay all the time.	A-1		
011		Max. record	Display the max. effective value current.	A-2		
211		Fault record	1 <sup>st</sup> phenomena	Keep in record and display effective value currents for up to five latest phenomena of relay trip caused by system fault. The 1 <sup>st</sup> phenomena is the latest trip and the 5 <sup>th</sup> the oldest.		A-3
212			2 <sup>nd</sup> phenomena			
213			3 <sup>rd</sup> phenomena			
214			4 <sup>th</sup> phenomena			
215			5 <sup>th</sup> phenomena			
400	Status	Self-diagnosis (ALARM)	Keep in record and display defect codes in the case where an abnormal condition is detected by the self-diagnosis.	A-6		
511	Setting	Phase fault	Operation current [A]	Set and display settings.	A-7	
512			Time-delayed			Operation time multiplier
513						Operation characteristic
514						Reset characteristic
521						Instantaneous
522			Operation time [s]			
700	Forced operation	Contact X <sub>0</sub> operation	Carry out forced operation of output contacts individually. The setting of the programmable contacts can be checked through the operation indicator LEDs.	C-1		
710		Contact X <sub>1</sub> operation				
720		Contact X <sub>2</sub> operation				
730		Contact X <sub>3</sub> operation				
740		Contact X <sub>4</sub> operation				
750		Contact X <sub>5</sub> operation				
800	Option	Contact arrangement	Contact X <sub>0</sub>	Configure the programmable outputs. Also, set and display self-hold/reset setting of the programmable outputs. For the guide for setting, see the section 6.4.2.3 (1) below.	A-7	
810			Contact X <sub>1</sub>			
820			Contact X <sub>2</sub>			
830			Contact X <sub>3</sub>			
840			Contact X <sub>4</sub>			
850			Contact X <sub>5</sub>			
860		Operation indicator LED hold	Set and display self-hold/auto reset setting of the operation indicator LEDs. For the guide for setting, see the section 6.4.2.3 (2) below.	D-2		
901		CT primary side [A]	Set the CT primary current of the phase circuit.	D-3		
902		EVT primary side [V]	Set the EVT primary voltage of the zero-phase.			
903		EVT tertiary side [V]	Set the EVT tertiary voltage of the zero-phase.			
904		Relay password enable/disable option	Set relay password enable or disable for setting.			
905	Max. record reset	Clear data of the max. record.	D-4			
906	Fault record reset	Clear data of the fault record.				
907	Self-diagnosis (ALARM) reset	Clear data of the self-diagnosis record.				
908	LED lamp test	Carry out forced illumination of all the LED lamps on the front of the relay unit.	D-5			



### 6.4.2.2 Guide for option function

#### (1) Specifying contact arrangement data of output contacts

The table below shows the setting guide table. See the section **D-1** of the general operation manual for the detailed procedure.



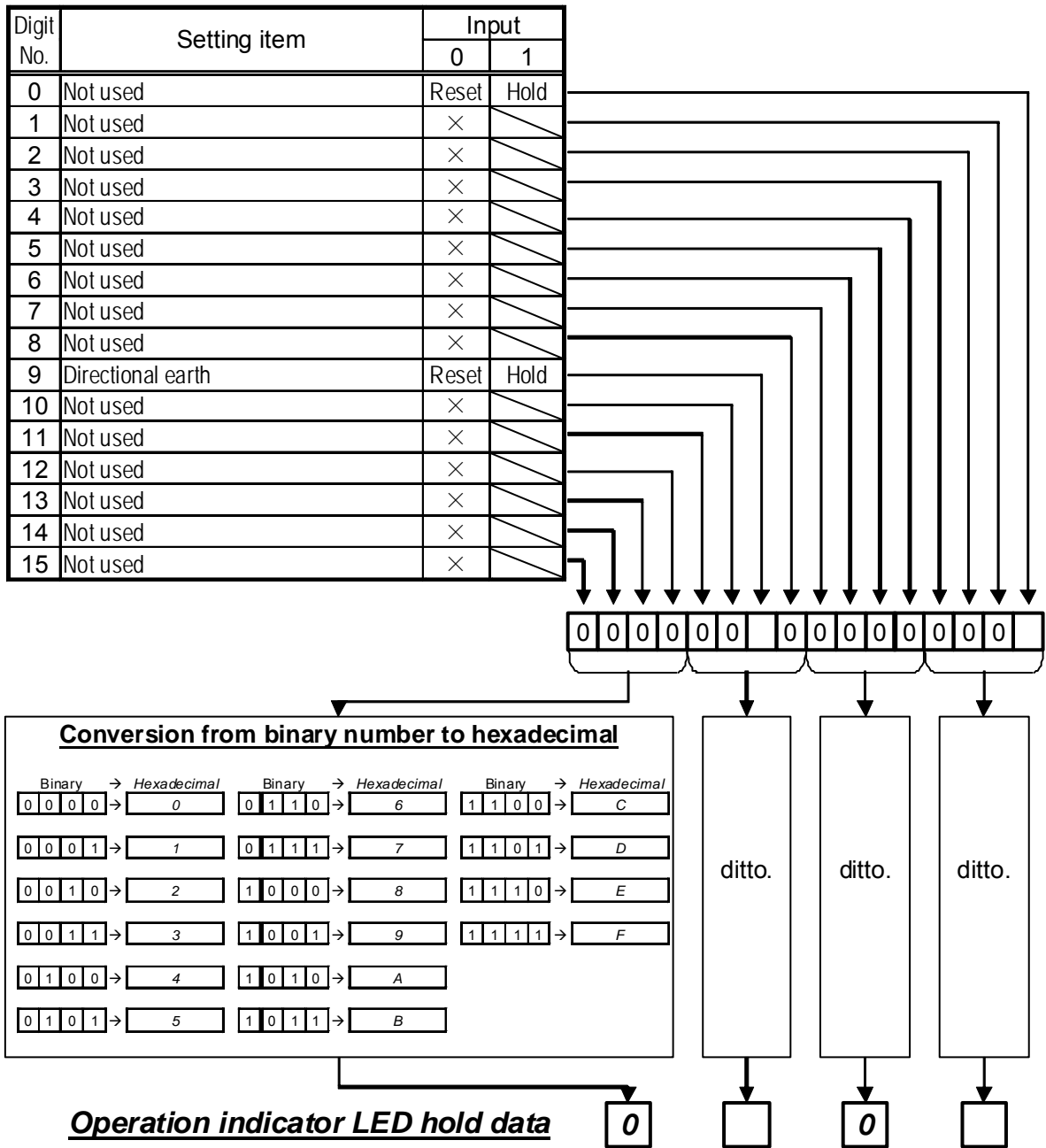
When the product is shipped from the factory, contact arrangement data are set as follows.

Contact	Item number	Contact arrangement data	Setting of the element	Contact	Item number	Contact arrangement data	Setting of the element
X0	800	0200	Earth directional fault	X3	830	0200	Earth directional fault
X1	810	0200	Earth directional fault	X4	840	0200	Earth directional fault
X2	820	0200	Earth directional fault	X5	850	0200	Earth directional fault

\*The "Self hold/auto reset" setting are "Reset" (auto reset) for all contacts.

(2) Specifying operation indicator LED hold data

The table below shows the setting guide table. See the section **D-2** in the general operation manual for the detailed procedure.



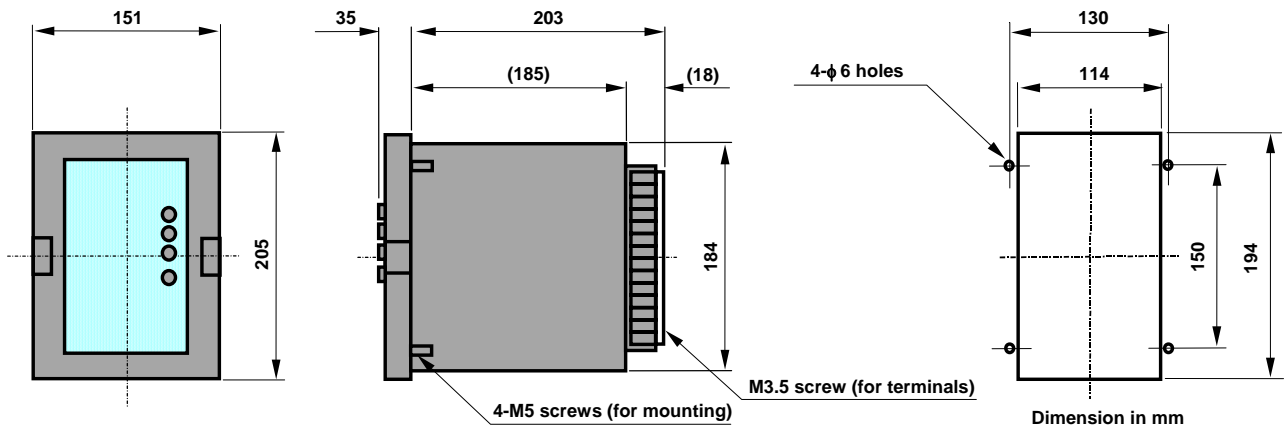
When the product is shipped from the factory, all LEDs are set to self-hold.

Item number	Operation indicator LED hold data
860	0201

## 7 Mounting

### 7.1 Mounting dimension

Mount the case to the panel according to Fig. 7.1 "Mounting dimension".



**Figure 7.1 Outside dimension /drilling drawing**

### 7.2 Standard operating environment

Install the relay in the environment described in section 3.3 Common technical data. In addition, the following conditions should be kept:

- Abnormal vibration, shock, inclination or magnetic field should be avoided.
- Harmful smoke or gas, salt gas, excessive humidity, water drop or vapor, excessive dust or fine powder, rain and wind should be avoided.

## 8 Test

The relay has been fully tested prior to shipment. However, it is recommended to carry out a test again by referring to the following test guide before use.

### 8.1 Appearance inspection

Check the relay for appearance according to the following procedure:

Objects		Check points
Unit	Coil/conductor	(1) Discoloring and burning due to overheat. (2) Abnormal conditions including loosened screws.
	Printed card	(1) Discoloring of the printed card due to overheated parts. (2) Contact between the printed card and connector
	Mechanism	(1) Deformation (2) Operation of the operating key switches. (3) Damage of the draw-out lever of the sub unit. (4) Discoloring and deformation of the name plate on the front panel. (5) Damage of the terminal section.
Case/cover		(1) Damage of the cover. (2) Stain of the cover. (3) Clouding of the cover. (4) Damage of the lock lever of the cover. (5) Damage of the operating buttons of the cover. (6) Operation of the operating buttons of the cover. (7) Damage of the terminal section.
Others		Invasion of foreign matters including dust and iron chips.

## 8.2 Characteristic test

### 8.2.1 Precautions in testing

#### (1) Standard test conditions

Ensure the following test conditions whenever possible:

Note that carrying out a test under an environment that significantly differs from the following conditions may produce an incorrect result.

- Ambient temperature :  $20^{\circ}\text{C}\pm 10^{\circ}\text{C}$
- Rated frequency :  $\pm 5\%$
- Waveform (AC) : 2% (distortion ratio)
- Auxiliary power supply voltage : rated voltage  $\pm 2\%$

#### (2) Characteristic control point

See the section 3 “Characteristics”.

The characteristic control point refers to the characteristic of a relay unit only. Note that, when a characteristic test is carried out on a relay system connected with external equipment such as CT and ZCT, the result obtained would be a combined characteristic added with the fluctuation of the external equipment.

For special control in terms of a specific control point (for instance, using the operation setting), first carry out a test at “Characteristic control point” at the time when the relay is received or put in service to determine the acceptance/rejection. Thereafter, perform another test at each control point, so that the data obtained can be used for future reference.

#### (3) Changing setting

Change the setting according to the section 6 “Handling”.

#### (4) Operation judgment

Determine the operation currents and time and other values of the relay unit basically by turning on and off the corresponding output relay contact of each element.

To determine the starting value of the time-delayed elements of overcurrent relay, which cannot be checked through the output contact, read the display of “elapsed time of time-delayed timer”.

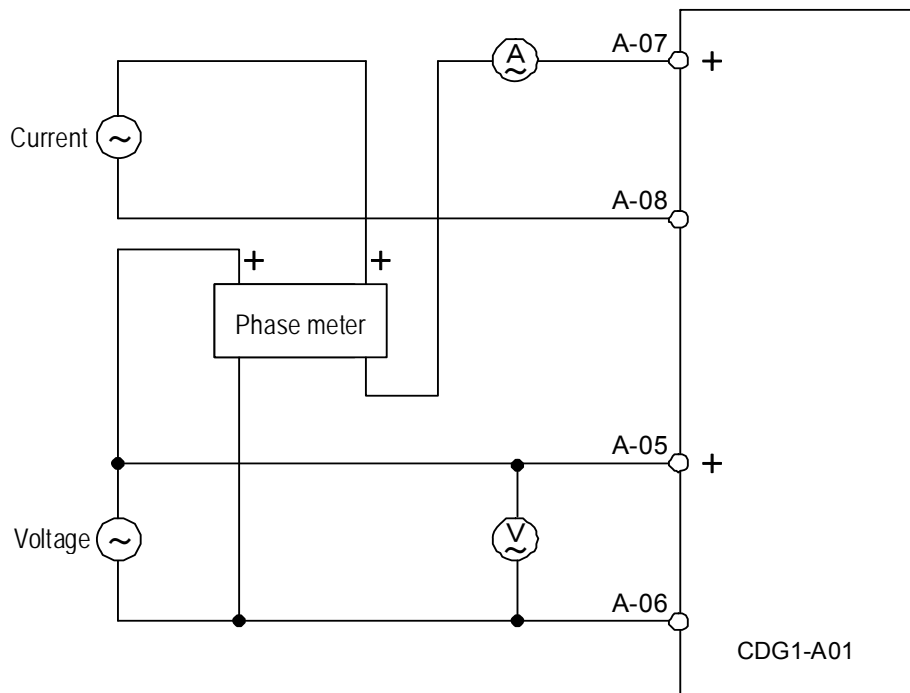
#### (5) Caution in withstand voltage test

For the test of withstand voltage and lightning impulse withstand voltage, please avoid inputting test voltage to the serial communication network circuit (B-01 , B-02 , B-03 , B-04 terminals).

## 8.2.2 Characteristic test

### (1) Test circuit

Connect the external wiring referring to the AC input circuit diagram shown below:



### (2) Test items and characteristic control point

#### a. Forced operation test

See "Front control panel operational procedure" in the section 6 "Handling".

#### b. Operation value test

See the item "Operation and reset values" in the section 3 "Characteristics".

#### c. Operation time test

See the item "Operation time" in the section 3 "Characteristics".

#### d. Reset time test

See the item "Reset time" in the section 3 "Characteristics".

#### e. Phase test

See the item "Reset time" in the section 3 "Characteristics".

## 9 Maintenance

### 9.1 Daily inspection

Take every opportunity to carry out the following inspection:

- Check that the cover is not damaged and is attached properly.
- Check that no dust or iron chips have invaded into the unit.
- Check that the cover is not clouded notably.
- Check that abnormal noise is not generated.
- Check that the RUN LED lamp is lit.

### 9.2 Periodical inspection

It is recommended to carry out periodic inspections to check the relay for proper function.

For periodical inspections, perform the appearance inspection and characteristic test in accordance with the section 8 "Test".

## 10 Ordering

The product and specification shown in this manual may subject to changes (including specification change and production suspend) without notice. It is advisory to inquire the nearest Mitsubishi Electric's branch or sales office, if required, to confirm that the latest information is given in the manual, prior to placing an order.

Notify the following items when placing an order.

Item	Example of order	Remarks
Model	CDG1-A01D1	For more information, see the section 2 "Rating and specification".
Frequency	50 Hz	Select 50Hz or 60Hz.
Rating	Zero-phase current: 1A Zero-phase voltage: 100 ~ 208V	For more information, see the section 2 "Rating and specification".
Setting range	Earth fault directional element (67N) : $I_0=0.05 \sim 1.0A$ $V_0=5 \sim 60V$	For more information, see the section 2 "Rating and specification".

## 11 Guarantee

### 11.1 Guarantee period

The guarantee period of this product should be one year after delivery, unless otherwise specified by both parties.

### 11.2 Scope of guarantee

When any fault or defect is detected during the period of guarantee and such fault or defect is proved to be caused apparently at the responsibility of MITSUBISHI ELECTRIC CORPORATION, the defective unit concerned will be repaired or replaced with substitute with free of charge.

However, the fee for our engineer dispatching to site has to be covered by the user.

Also, site retesting or trial operation caused along with replacing the defect units should be out of scope of our responsibilities.

It is to be acknowledged that the following faults and defects should be out of this guarantee.

- ①When the faults or defects are resulted from the use of the equipment at the range exceeding the condition/environment requirements stated in the catalogue and manual.
- ②When the faults or defects are resulted from the reason concerning without our products.
- ③When the faults or defects are resulted from the modification or repair carried out by any other entity than MITSUBISHI ELECTRIC CORPORATION.
- ④When the faults or defects are resulted from a phenomenon which can not be predicted with the science and technology put into practical use at the time of purchase or contract
- ⑤In case of integrating our products into your equipment, when damages can be hedged by the proper function or structure in the possession of your equipment which should be completed according to the concept of the de facto standard of industry.
- ⑥In case of that the faults or defects are resulted from un-proper application being out of instruction of MITSUBISHI ELECTRIC CORPORATION.
- ⑦In case that the faults or defects are resulted from force majeure such a fire or abnormal voltage and as an act of God such as natural calamity or disaster.



### 11.3 Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, MITSUBISHI ELECTRIC CORPORATION shall not be liable for compensation of damages caused by any cause found not be the responsibility of MITSUBISHI ELECTRIC CORPORATION, loss in opportunity, lost profits incurred to the user by failures of MITSUBISHI ELECTRIC CORPORATION products, special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than MITSUBISHI ELECTRIC CORPORATION products and other tasks

### 11.4 Applications of products

①The user is requested to confirm the standards, the regulations and the restrictions which should be applied, in case of utilizing products described in this catalogue and another one in combination.

Also, the user is requested to confirm the suitability of our products to your applied system or equipment or apparatus by yourself.

MITSUBISHI ELECTRIC CORPORATION shall not be liable for any suitability of our products to your utilization.

②This MITSUBISHI ELECTRIC CORPORATION products described in the catalogue have been designed and manufactured for application in general industries, etc. Thus, application in which the life or an asset could be affected by special application such as medical system for life-sustaining, in nuclear power plants, power plants, aerospace, transportation devices(automobile, train, ship, etc )shall be excluded from the application. In addition to above, application in which the life or an asset could be affected by potentially chemical contamination or electrical interference and also in which the circumstances and condition are not mentioned in this catalogue shall be excluded from the application. Note even if the user wants to use for these applications with user's responsibility, the user to be requested to approve the specification of MITSUBISHI ELECTRIC CORPORATION products and to contact to the technical section of MITSUBISHI ELECTRIC CORPORATION prior to such applications. If the user applies MITSUBISHI ELECTRIC CORPORATION products to such applications without any contact to our technical section, MITSUBISHI ELECTRIC CORPORATION shall not be liable for any items and not be insured, independently from mentioned in this clause.

③In using MITSUBISHI ELECTRIC CORPORATION product, the working conditions shall be that the application will not lead to a major accident even if any problem or fault occur, and that backup or duplicate system built in externally which should be decided depend on the importance of facility, is recommended.

④The application examples given in this catalogue are reference only and you are requested to confirm function and precaution for equipment and apparatus and then, use our products

⑤The user is requested to understand and to respect completely all warning and caution items so that unexpected damages of the user or the third party arising out of un-correct application of our products would not be resulted.

### 11.5 Onerous repair term after discontinuation of product

①MITSUBISHI ELECTRIC CORPORATION shall accept onerous product repairs for 7(seven) years after production of the product is discontinued. (However, please consider the replacement of products after 15 years have been passed from ex-work of products.)

②Product supply (including repair parts) is not available after production is discontinued.

#### 11.6 Changes in product specification

The specification given in the catalogue, manuals or technical documents are subject to change without prior to notice.

#### 11.7 Scope of service

The technical service fee such as engineer dispatching fee is excluded in the price of our products. Please contact to our agents if you have such a requirement.

### 12 Improvement on the reliability of protection function

Any parts and materials applied to the protection relay have limited life time which will bring the degradation to the relay.

The degree of degradation will be variable and depend on the purpose, period in use, applied circumstance and unevenness on the performance of each part.

MITSUBISHI ELECTRIC CORPORATION design the relay so as to realize that the recommended replaced duration is more them 15 years.

However, there may be some possibilities to occur some defects before reaching 15 years due to above mentioned the degree of degradation of parts and materials being depended on the condition in use.

To prevent unwanted operation or no operation of relay due to above reasons, it is recommended to apply the relay with self-diagnosis function and/or multiplexing relay system such as dual or duplex scheme.

# **mitsubishi electric corporation**

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

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