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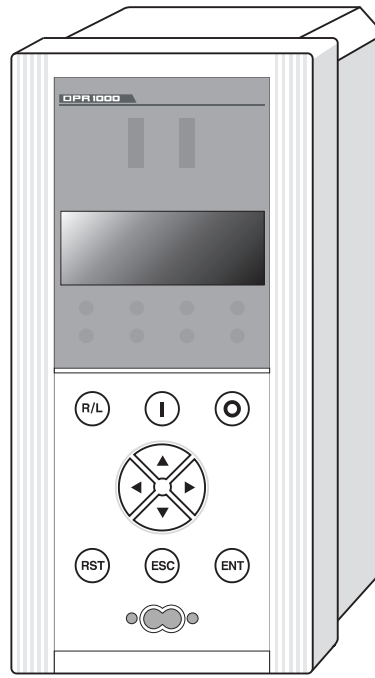
Digital **Protection** Relay

DPR-1000 MANUAL



⚠ Safety Instructions

- Read this manual carefully before installing, wiring, operating, serving or inspecting this equipment.
- Keep this manual within easy reach for quick reference.

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Safety caution

Please read carefully before product being taken into service to ensure safety and proper operation of DPR-1000.

- Please keep the safety caution to prevent any accident may happen by using the products incorrectly.
- Safety caution is classified with caution and danger and indication of them as follows.

⚠ Caution	Not following the instruction may result in serious injury or even death
⚠ Danger	Not following the instruction may result in serious injury or property damage

Symbols used in this manual indicate as follows.

⚠	This symbol is for warning the hazardousness under the specific condition.
⚡	This symbol is for warning the electric shocks or any accidents under the specific condition.

This instruction shall be kept in the nearest place of DPR-1000.

⚠ Caution

- Please do not wiring when applied with power or on the operation; it may result in electric shock.
- Please do not all the wiring operation with the live bus bar; it may result in electric shock or fire and property damage by charging voltage of current transformer.
- Please put to earth; it may result in electric shock.
- Please do not attempt to disassemble even when the power not applied; it may result in electric shock by charging current remained in the product.
- Please do not wire or operate with wet hands; it may result in electric shock.
- Please do not use any damaged cable; it may result in electric shock.
- Please use the ring terminal when wiring the cable; it may result in electric shock by bare wire.

• Please do not short-circuit the secondary of PT.
it may result in fire.
• Please do not open-circuit the secondary of CT.

⚠ Danger

■ Safety caution for installation & terminal wiring

• Apply the rated voltage to the power supply terminal; it may result in property damage or fire.
• Please keep away product from screws, metals, water, or oil; it may result in fire.
• Please keep the rated load and polarity of input & output terminals; it may result in property damage or fire.
• Please wire to the terminal block after checking the terminal number; it may result in property damage or fire.
• Please assemble the terminal cover after checking
• Specialist help shall be sought for the installation and maintenance of product; it may result in malfunction or accident.
• Please change the Comm. PCB board after Power is off.
All DO status are turned to initial status (DO is formatted) when the power is off.
• Please use relays when on-off the CB.
If user on-off CB without relays, the DPR-1000 can be damaged.

■ Inspection item before power supply being applied

• Check the voltage or polarity of control power supply.
• Check the wiring condition of input/output terminal.

■ Caution for storage & handling

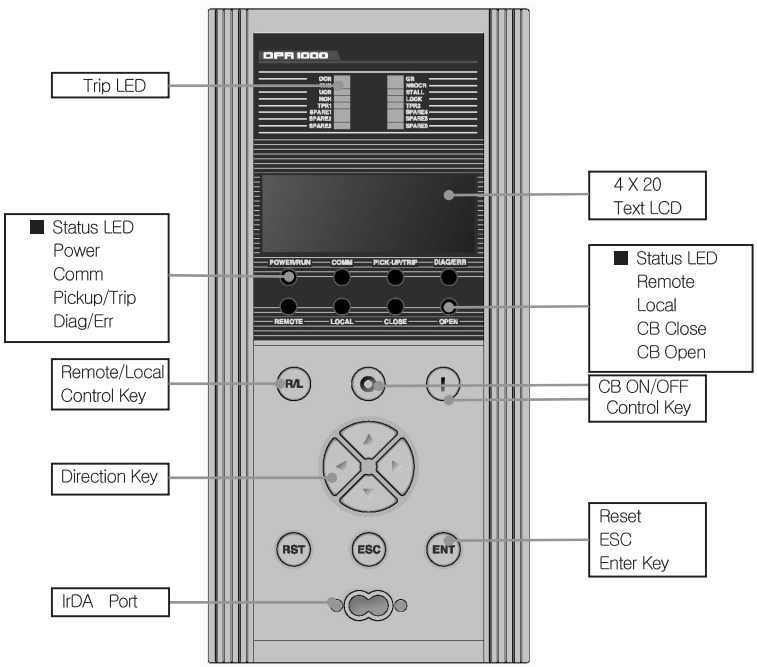
• Please store at dry & clean place.
• Please do not throw or put force on it during transport; It may result in malfunction or wrong operation

■ Caution for disposal

• Please dispose of it in accordance with industrial waste regulation.

1. The Layout of MMI

1.1 The External View



CB ON/OFF	CB Control key : OFF : ON
RST	The Restoration of Trip The indication of LED after faults, The restoration of LCD
ESC	The cancel of selected item & change of setting values
ENT	The selection of item, confirmation of setting
R/L	Remote/Local Switching (Green LED-, Red LED-)
Control Key	↕ The move of item & position ↔ The decrement / Increment of setting values & Item setting

1. The Layout of MMI

1.2 The configuration of DPR-1000

DPR-1000 has a 20 x 4 Character LCD to display various measurement data, event, and faults for the user's convenience. Furthermore, it provides the 18~24 of LEDs for the user's interface to inform the customers of current status more easily. Each LED has its own characteristics and indicates the condition of CB and faults, etc.
10 function keys are on the surface of DPR-1000 for the input of user's information and it can be entered much easier and faster via PC. DPR-1000 Manager, windows os-based program, enables to set & analyze the data of DPR-1000 as well as it can do high communication with the communication LED on the surface of DPR-1000.

a) The basic function & operation of Key on DPR-1000

The key on the surface of DPR-1000 has its own function according to each menu.

The type of key	Applicable menu	Basic function
Direction Key (Up & Down)	Menu tree	Move between menus with cursor
	Correcting & setting menu	Move to the data which will be set
	Password setting	The change of Password
Direction Key (Left & Right)	Correcting & setting menu	The change of data where cursor is on
	Password setting	The move of cursor
ENTER Key	Correcting & setting menu	The storage of changed data
	Menu tree	Move to the menu where cursor is on
	Saving confirmation menu	The storage of changed data
ESC Key	Correcting & setting menu	The cancel of changed data
	Menu tree	Move to upper menu
	Saving confirmation menu	The cancel of saving changed data
RESET Key	Trip of protection relay	Trip RESET of protection relay
	Alarming of Diag	Self-diagnostic of protection relay
CLOSE Key OPEN Key	All menus	The control of CB or CC Close Key is for the close of CB or CC Open Key is for the open of CB or CC
R/L Key	All menus	The switching of Remote and Local

1. The Layout of MMI

1.2 The configuration of DPR-1000

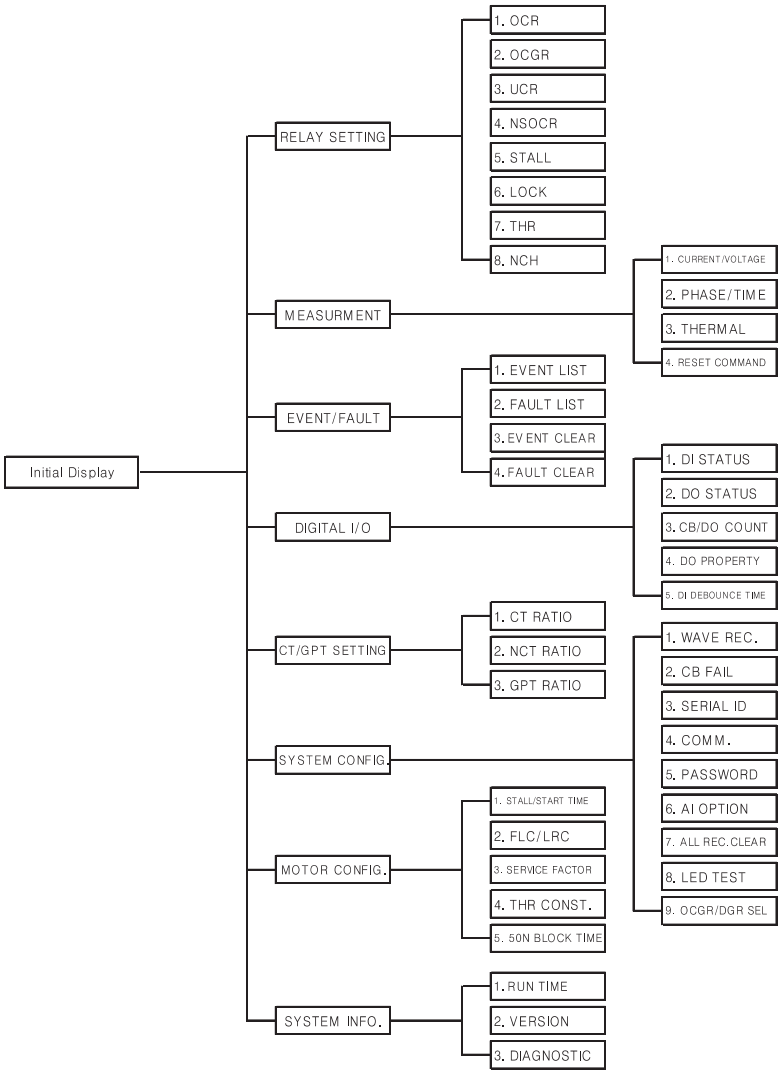
b) The basic function & operation of LED on DPR-1000

The LED embedded on DPR-1000 is different to the model. There are 24 LEDs for AI type(TPR1,2 LED are added) and 18 LEDs for Normal type. LEDs are divided according to function into Status indicating LED & Trip indicating LED. In case of Status indicating LED it has same function but for Trip indicating LED it has different function according to type.

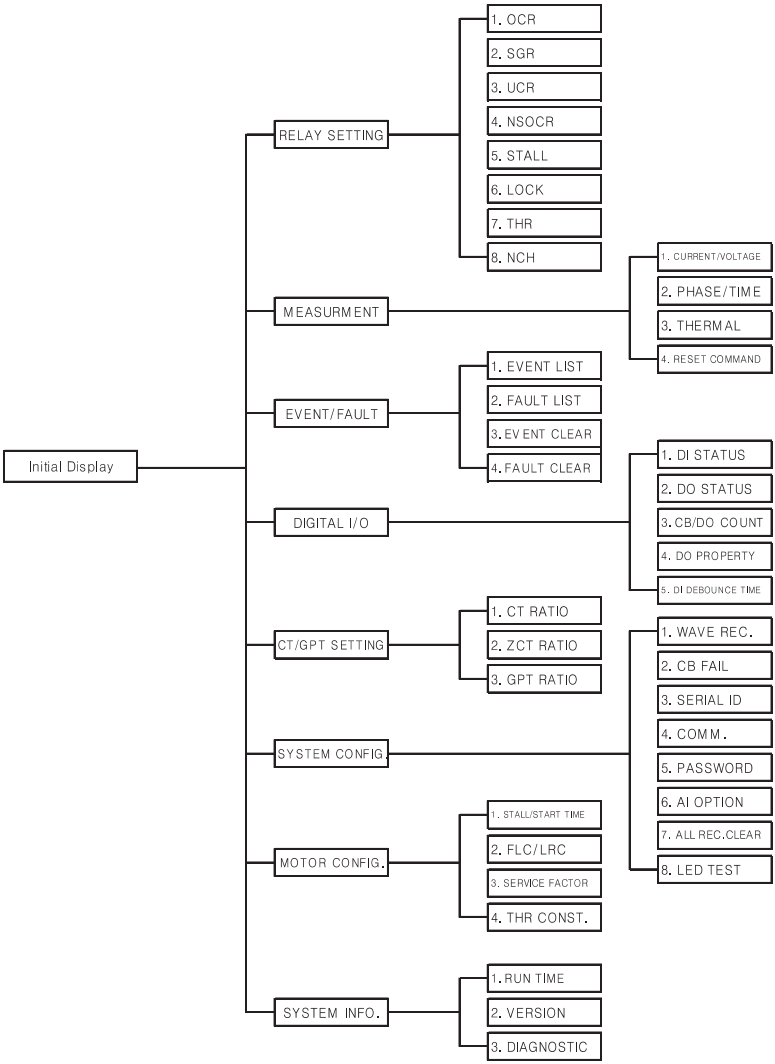
LED type	Basic function
Power supply LED	It is with green and indicates the status of power supply of DPR-1000. For normal operation it is kept with green light ON but for the abnormal operation it is blinking every second.
Communication LED	It is with orange and indicates the status of remote communication. The LED is blinking while transmitting or receiving data under normal correspondence of communication card.
DIAG/ERR	It is with yellow but it is blinking if problem has found with hardware or program while it is being under self-diagnosis. Under normal operation it is in OFF. Please contact the official A/S centre in case of blinking of LED.
PICK-UP/TRIP	It is with red and indicates the protection relay of DPR-1000. It is blinking every second if protection relay is in the condition of Pick-up by systematic faults. It is kept with red light ON if it is tripped by the operation of protection relay. This LED can be cancelled only by RESET KEY of protection relay or reset of it with remote communication.
TRIP indicating LED	The LED which corresponds to detected faults is ON when DPR-1000 is tripped due to systematic faults. However, In case of notching relay(NCH) LED is ON only when motor is unable to be started. The LED for protection relay can be cancelled only by RESET KEY like the PICK-UP/TRIP LED.
REMOTE/LOCAL	It is on the upper side of R/L KEY with green & red and indicates the present control status of DPR-1000. It is with GREEN light ON under REMOTE control and with RED light ON under LOCAL control. These two LEDs shall not be ON or OFF at the same time.
CB CLOSE/OPEN	It is on the upper side of CLOSE/OPEN KEY with green & red and indicates the present status of circuit breaker which is connected to DPR-1000. Open status – Green LED , Close status – Red LED

1. The Layout of MMI

1.3 Menu Tree of DPR-1000 FN



1.4 Menu Tree of DPR-1000 FZ



2. The ratings

2.1 The ratings of DPR-1000

The table as shown below is for the rating of DPR-1000

ITEM		SPEC
Wiring connection		3P3W, 3P4W
Input	Frequency	60Hz (50Hz)
	Voltage	GPT : 190, 190/√3
	Current	CT : 5A
		ZCT : 1.5mA
	Control power supply	AC/DC : 110V
	Power consumption	Normal : less than 30W, Operation : less than 70W
	Input burden	PT : 0.5VA
		CT : 1.0VA
	Input terminal	Digital Input : AC/DC 110V
Output terminal	POWER 2EA	AC 250V 16A / DC 30V 16A Resistive Load
		AC 2500VA, DC 300W
	ALARM 3EA	AC 250V 5A / DC 30V 5A Resistive Load
		AC 750 VA, DC 90W
Operating temperature range		-10℃ ~ 55℃
Storage temperature range		-25℃ ~ 70℃
Relative humidity		30% ~ 80% of the daily average RH
Altitude		Less than 1000m
Others		Shall be no abnormal vibration & impact
		Shall be no severe air pollution
Applicable standard		KEMC 1120, IEC 60255, IEC61000-4

※ If device is used out of the operating temperature range, LCD may not be displayed clearly.

2. The ratings

2.1 The ratings of DPR-1000

Measurement range

Elements	Display		remark
	Unit	range	
Voltage	V	Vo, Vopk:0, 2.2~200V	Vr,Vs,Vt ±0.5% (phase voltage) (0.8~1.2Vn, PF=1)
Current	A mA	Ir,Is,It :0,0.05~200A NCT(Io,Iopk):0,0.05~40A ZCT(Io,Iopk):0,0.15~30mA %I, Iavg, Ipeak:0, 5~1000%	Ir,Is,It ±0.5% (phase current) (only when 0.2~1.2In, PF=1)
Phase	°	Irs,Ist,Itr: 0 ~ 359.9°	±5
Start time	s	Tavg, Tpeak : Motor operating time It saves the values in 5 turns.	±5
Motor- value(Thermal)	%	%Q, Qpeak, Qavg: 0, 5~150%	±5
Analog Input(AI)1,2	mA	0, 4~20mA	±0.5

DPR-1000 RELAY SETTING

DPR-1000 RELAY SETTING

Protection relay	Operation type	Operating value setting / Increase & Decrease, Operating time	Remark
OCR(50/51)	INST High	Setting : OFF, 0.5~20.0/0.1In	Being operated less than 40ms
	INST Low	Setting : OFF, 0.5~20.0/0.1In Operating time : 0.05~60.00/0.01s	Definite time operating
	Time delay mode	Setting : OFF, 0.1~4.00/0.02In Operating time : 0.05~1.20/0.01 (Inverse time delay)	Time delay curve SI, VI, EI, LI
OCGR (50/51N)	Instantaneous	Setting : OFF, 0.1~8.0/0.02In Operating time : 0.05~60.00/0.01s	Definite time operating
	Time delay mode	Setting : OFF, 0.02~2.0/0.01In Operating time : 0.05~1.20/0.01s (Inverse time delay) 0.05~60.00/0.01s (Definite time operating)	Time delay curve DT, SI, VI, EI, LI
NSOCR (46)	Time delay High	Setting : OFF, 0.10~1.00 /0.02Vn Operating time : 0.08~60.00/0.01s	Definite time operating
	Time delay Low	Setting : OFF, 0.10~1.00/0.01Vn Operating time : 0.05~1.00/0.01s (Inverse time delay) 0.08~60.00/0.01s (Definite time operating)	Time delay curve DT, SI, VI, EI, LI
DGR (67N)	Time delay	Zero phase current setting: 0.02~2.0/0.01Ion Zero phase voltage setting: 11~80/1V Phase-sensitive standard angle : 0~90/1° Operating time : 0.05~10.00/0.01s	Ground connected type Definite time operating
SGR (67G)	Time delay	Zero phase current setting: 0.9~6.0/0.1mA Zero phase voltage setting: 11~80/1V Phase-sensitive standard angle : 0~90/1° Operating time : 0.05~10.00/0.01s	Non-Ground connected type Definite time operating
THERMAL (49)	Time delay	Setting : Off, 50~100/1%(Tl,Th) ※ Available setting value: FLC × SVC. × O/L	Refer to Motor Config.
STALL/LOCK (48/51LR)	Stall Time delay	Setting : 0.50~10.00/0.01FLC 0.05~300.00/0.01s (Definite time operating)	Refer to Motor Config. (Definite time operating)
	Lock Time delay	Setting : 0.50~10.00/0.01FLC 0.05~300.00/0.01s (Definite time operating) 0.05~1.20/0.01s (Inverse time delay)	Refer to Motor Config. Curve (DT,VI,EI)

3. Relay elements

DPR-1000 RELAY SETTING

UCR (37)	Time delay	Setting : 0.1~0.90/0.02In Operating time : 0.05~300.0/0.01s	Definite time operating
NCH (66)	-	Starting Number Sn: Off, 1~5/1Time Setting time Tb: 10~60/1 min Time interval between starting RS_B: 1~60/1min Residual heating value Tb-B: 10~80/1%	This relay element limits the motor-starting
TPR-1,2 (38)	Time delay	Setting Th(high) : Off, 20~180/1℃ Setting Tl(low) : Off, 20~180/1℃ Operating time : under 50ms	Definite time operating

DPR-1000 MOTOR CONFIG. SETTING

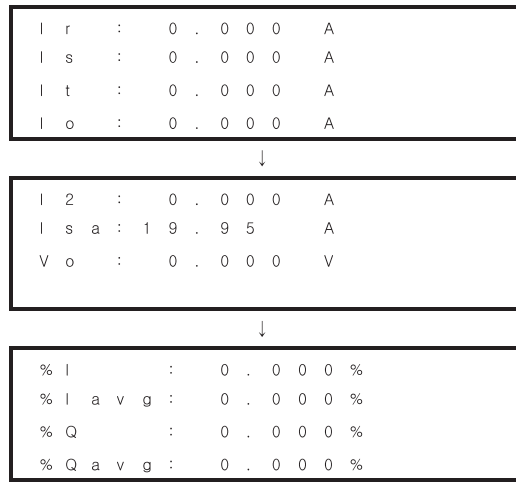
Setting menu	Operating value setting / Increase & Decrease, Operating time	Remark
STALL/START TIME	Tss(Stall operating time) : 0.05~300.00/0.01s Ts(Motor operating time) : 1.0~300.0/0.1s	
FLC/LRC	FLC : 0.20~2.00/0.01In LRC : 0.50~10.00/0.01FLC	FLC:STALL Setting LRC : LOCK Setting
SERVICE FACTOR	SVC. : 1.00~1.20/0.05	
THR CONST.	τ (Hot) : 2.0~60.0/0.5min τ (Cold) : 2.0~60.0/0.5mn Overload Constant (O/L)- k Factor : 0.80~1.20/0.05	THR(49) Setting
OCGR BLOCK TIME	B/T : 0.00~60.00/0.01s	Operating delay time for instantaneous OCGR. It applied at 50N. INST setting.

4. MENU setting

Handling manual of DPR-1000 displayed menu

1. Initial display

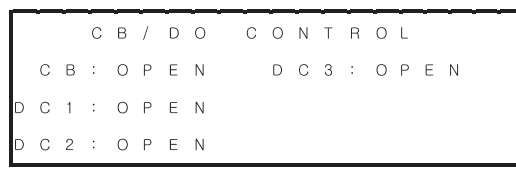
The initial window will be displayed as shown below after applying the power supply to the device. Different measured values are displayed on the initial window of DPR-1000.



1-1) CB ON, OFF MENU

User have to use these (◉ ▮) ON, OFF keys when controls CB.

Press the ON or OFF key.



Set the cursor on the 'CB' and press ON or OFF key.

4. MENU setting

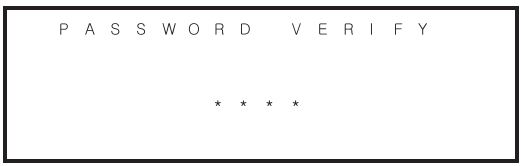
Handling manual of DPR-1000 displayed menu

↓

Confirm with ENT, ESC key.

1-2) Password verifying menu

User must input password when user operates the device for the first time. The default password is '0000'. If the password is default, user can input that by moving cursor to the end of the right with ▶ key and press the ENTER key. And also user can change the password in other menu. ▼ ▲ keys have function of selecting the number and ◀ ▶ keys have function of moving cursor. User can get out of this PASSWORD VERIFY menu by pressing ▶ Key(three times repetition)and pressing ENTER key.



User can get out of this 'password verify' menu by pressing ▶ key (three times repetition) and pressing ENTER key.

↓

Press 'ENT' key

1-3) Verifying the changing

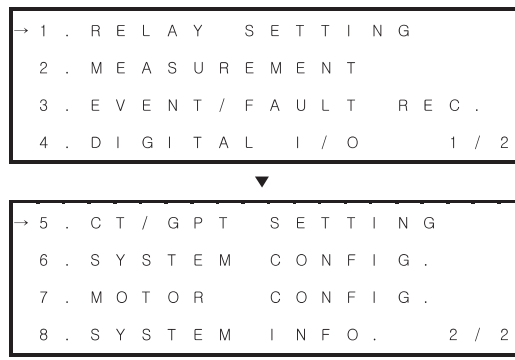
If user changes any values in some menu, user can see this Verifying menu when moves to other menu. Please select YES or NO.

4. MENU setting

Handling manual of DPR-1000 displayed menu

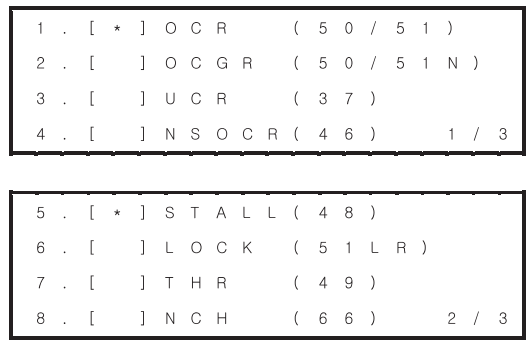
2. The display of Basic setting menu

If pressing ESC or ENTER KEY from initial window, move to basic menu window. It is the most fundamental window which displays the list of menu. For the move of different menu Up & Down KEY are used and the detailed menu is available by pressing ENTER KEY.



(User can move the cursor by pressing ▼ ▲ key. And can select the menu with 'ENT' key.)

2-1) RELAY SETING menu



Handling manual of DPR-1000 displayed menu

```
 9 . [ * ] T P R 1   ( 3 8 - 1 )
10 . [   ] T P R 2   ( 3 8 - 2 )

                                3 / 3
```

(Upward pictures show the examples of selecting OCR, STALL, TPR1.)

If user wants to use particular relay elements, move cursor to the elements you want with ◀ ▶ keys and set the '*' by press ◀ ▶ key.

The TPR1, TPR2 elements are available when user selects it on the AI OPTION in SYSTEM CONFIG.

And also user can select OCGR, DGR on the SYSTEM CONFIG menu. Upward picture shows the examples of Selecting OCGR

2-1-1) OCR setting menu

```
O C R       I N S T .     H I G H
O N / O F F   S E L .   [   O N   ]
I > > > :     2 0 . 0       I n
                              1 / 3
```

Select the use or unuse of relay element by press ◀ ▶ key

▼

Change the INST High setting values by pressing ◀ ▶ key (0.5~20.0/0.1UNIT)

▼

```
O C R       I N S T .     L O W
O N / O F F   S E L .   [   O N   ]
I > >   :     2 0 . 0       I n
T d     :     6 0 . 0 0     s   2 / 3
```

Select the use or unuse of relay element by press ◀ ▶ key

▼

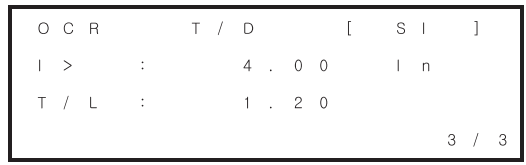
Change the INST Low setting values by pressing ◀ ▶ key (0.5~20.0/0.1UNIT)

▼

Change the operating time of OCR INST Low (0.05~60.0/0.01UNIT)

Handling manual of DPR-1000 displayed menu

▼



Select the curves (SI, EI, VI, LI, OFF) by pressing ◀ ▶ key

▼

Change the setting values by pressing ◀ ▶ key (0.10~4.00/0.02UNIT)

▼

Change the operating time (0.05~60.00/0.01UNIT)

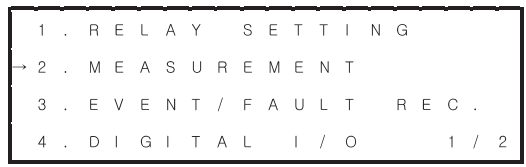
↓

Move to upper menu by pressing ESC key.

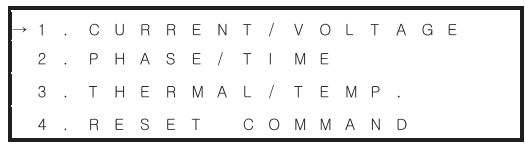
↓

Confirming of DATA change by pressing 'ENT'key.

2-2) MEASURMENT menu

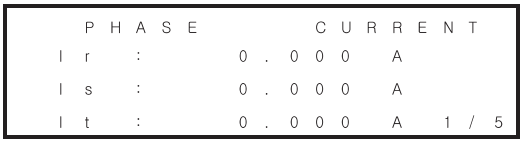


MEASURMENT menu has following child menu.



Handling manual of DPR-1000 displayed menu

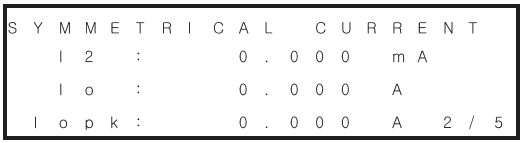
2-2-1) CURRENT/VOLTAGE mesurement



Line current (Ir, Is, It): 0, 0.05~200A

(* tolerance: under 2.0In: ±0.5% reading or ±1%In. over 2.0In: ±2.0%)

▼

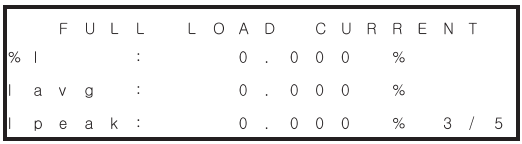


Negative phase current (I2): 0, 0.05~200A (* tolerance: ±5% reading or ±1% In)

Negative phase current (Io, Iopk): FN TYPE – NCT: 0, 0.05~40A, FZ TYPE – ZCT: 0, 0.15~30mA

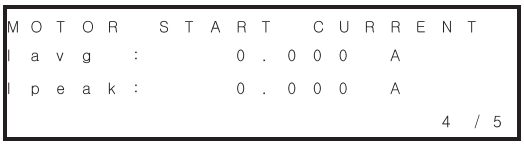
(* tolerance: ±5% reading or under ±1% In)

▼



%full load current(%I, Iavg, Ipeak):0, 5~1000% (* tolerance: ±1% reading or under ±1% In)

▼



Motor start current (Iavg, Ipeak)

▼

Handling manual of DPR-1000 displayed menu

```
   Z E R O   S E Q .   V O L T A G E
V o      :        0 . 0 0 0    V
V o p k  :        0 . 0 0 0    V
                                5 / 5
```

Zero sequence voltage (Vo, Vopk): 0, 2.2~200V (* tolerance: ±5% reading or ± under 1% Von)

2-2-2) PHASE/TIME measurement:

phase (Irs, Ist, Itr): 0 ~ 359.9°(±5° reading)

Motor start time (Tavg, Tpeak): average time and peak time(memory has 5 data)

2-2-3) THERMAL/AI measurement:

thermal (%Q, Qpeak, Qavg): 0, 5~150% (±5% reading)

ANALOG INPUT (AI): 0, 4~20mA (±0.5%)

ANALOG INPUT (AI): 0, 4~20mA (±0.5%)

2-2-1) RESET COMMAND menu

User can reset the accumulated values on RESET COMMAND menu.

```
→ 1 . I o      R E S E T
  2 . F L C    R E S E T
  3 . I s t    R E S E T
  4 . V o      R E S E T          1 / 3
```

▼

```
→ 5 . T s      R E S E T
  6 . Q        R E S E T
  7 . Q i      R E S E T
  8 . A I 1    R E S E T          2 / 3
```

▼

```
→ 9 . A I 2    R E S E T


                                  3 / 3
```

Handling manual of DPR-1000 displayed menu

Move the cursor by pressing ▲▼ key

↓

Press 'ENT' key

↓

Confirming of DATA reset by pressing 'ENT'key.

↓

Move to upper menu by pressing ESC key.

2-3) EVENT/FAULT REC.

```
→1. EVENT LIST          1
 2. FAULT LIST          0
 3. EVENT CLEAR
 4. FAULT CLEAR
```

The number of saved data(event and fault) is displayed on EVENT/FAULT REC menu.

The maximum number of savable event data is 128. and fault data is 32.

If the number of saved data exceeds the maximum, oldest data will be erased.

2-3-1) EVENT LIST menu

User can observe the detail information of FAULT or EVENT by pressing ◀ ▶ key, and move to the other FAULT or EVENT list by pressing ▲▼ key.

(month: 1~12, day: 1~31, hour: 0~23, min: 0~59, sec: 0~59, msec: 0~999)

```
   1     LOCAL TIME
       2004.07.30.
     14:39:18.001
PRESS LEFT/RIGHT KEY
```

Move to the detail information of FAULT or EVENT by pressing ◀ ▶ key

↓

4. MENU setting

Handling manual of DPR-1000 displayed menu

The displayed signs means like following information.

1) Pickup, Operation EVENT.

Displayed sign	Detail means
OCR50H-rst	50 high relay element operated.(it displays each phase elements.)
OCR50L-rst	50 relay element operated.(it displays each phase elements.)
OCR51-rst	51 relay element operated.(it displays each phase elements.)
OCGR50	50N relay element operated.(it displays each phase elements.)
OCGR51	51N relay element operated.(it displays each phase elements.)
OCGR50/51	50 and 51N are operated at the same moment.
SGR	67G relay element operated.
DGR	67N relay element operated.
UCR-rst	37 relay element operated.(it displays each phase elements.)
NSOCR-H	46 high relay element operated.(it displays each phase elements.)
NSOCR-L	46 low relay element operated.(it displays each phase elements.)
NSOCR-H/L	46 high and 46 low are operated at the same moment.
STALL	48 relay element operated.
LOCK	51LR relay element operated.
THR-H	49 high relay element operated.
THR-L	49 low 요 relay element operated.
THR-HL	49 high and 49 low are operated at the same moment.
NCH	66 relay element operated.
TPR1-H	38-1 high relay element operated.
TPR1-L	38-1 low relay element operated.

Handling manual of DPR-1000 displayed menu

TPR1-HL	38-1 high and 38-1 low are operated at the same moment.
TPR2-H	38-2 high relay element operated
TPR2-L	38-2 low relay element operated
TPR2-HL	38-2 high and low are operated at the same moment.

2)Fault.

Displayed sign	Detail means
OCR-rst	50/51 relay element operated.(it displays each phase elements.)
OCGR	50/51N high relay element operated.
DGR	67N relay element operated.
SGR	67G relay element operated.(it displays each phase elements.)
UCR -rst	37 relay element operated.
NSOCR	46 relay element operated.
LOCK	51LR relay element operated.
STALL	48 relay element operated.
THR	49 relay element operated.
NCH	66 relay element operated.
TPR1	38-1 relay element operated.
TPR2	38-2 relay element operated.

3) DI open/ close EVENT

Displayed sign	Detail means
DI 01	The status of DI 01 changed
DI 02	The status of DI 02 changed
DI 03	The status of DI 03 changed

4) DO open/ close EVENT

Displayed sign	Detail means
CB OPN	The status of CB open terminal DIDO changed
CB CLS	The status of CB close terminal DIDO changed

Handling manual of DPR-1000 displayed menu

DO 01	The status of DO 01 changed
DO 02	The status of DO 02 changed
DO 03	The status of DO 03 changed

5) EVENT of relay setting behavior

Displayed sign	Detail means
OCR	50/51 relay element setting was changed by user
OCGR	50/51N relay element setting was changed by user
DGR	67N relay element setting was changed by user
SGR	67G relay element setting was changed by user
UCR	37 relay element setting was changed by user
NSOCR	46 relay element setting was changed by user
LOCK	51LR relay element setting was changed by user
STALL	48 relay element setting was changed by user
THR	49 relay element setting was changed by user
NCH	66 relay element setting was changed by user
TPR1	38-1 relay element setting was changed by user
TPR2	38-2 relay element setting was changed by user

6) EVENT of config setting behavior

Displayed sign	Detail means
CT RATIO	User set the CT ratio setting was changed by user
NCT RATIO	NCT ratio setting was changed by user
GPT RATIO	GPT ratio setting was changed by user
WAVE	wave setting was changed by user
CBM	CBF setting was changed by user
PIO	programmable I/O setting was changed by user
COMM	COMM. setting was changed by user
PASSWORD	password was changed by user
MOTOR	Motor setting was changed by user

Handling manual of DPR-1000 displayed menu

R->L	'Remote' setting was changed to 'Local'
L->R	'Local' setting was changed to 'Remote'

7) Other EVENTs

Displayed sign	Detail means
MEA RST	User reset the accumulated measurement value.
MOT RST	User reset the Motor values
G1K R/T RST	User reset the start time
CNT RST	User reset the DIDO count
E/R RST	User reset the EVENT data
F/R RST	User reset the FAULT data
ALL RST	User reset the all data
DCP	Status of DO was changed
CB OPEN	CB opened
CB CLOSE	CB closed
DC1	DC1 control operated
DC2	DC2 control operated
DC3	DC3 control operated
FAULT RST	fault reset operated
PWR ON	Power on
PWR FAIL	Power fail
MOTOR R/T RST	User reset the Motor start time
CB R/T RST	User reset the number of CB operating

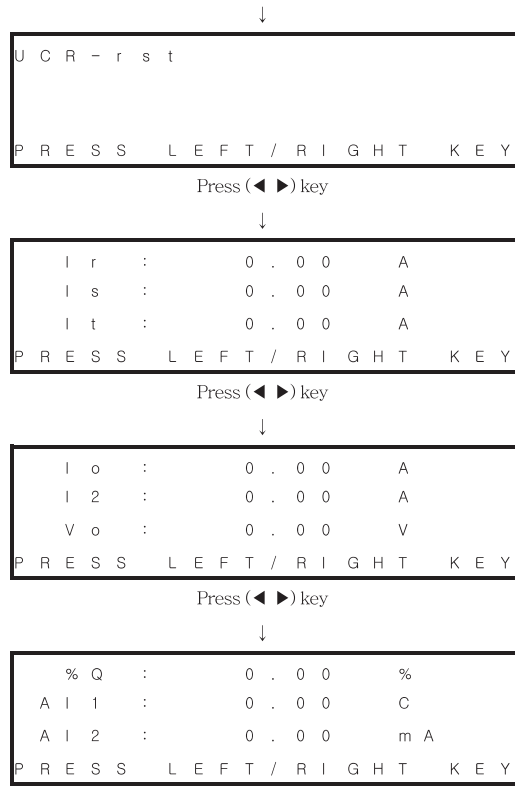
2-3-2) FAULT LIST menu

```
  1    F A U L T   L I S T
     2 0 0 4 . 0 7 . 3 0 .
   1 4 : 3 9 : 1 8 . 0 0 1
P R E S S  L E F T / R I G H T  K E Y
```

Move to the detail information of FAULT or EVENT by pressing ◀ ▶ key

(month: 1~12, day: 1~31, hour: 0~23, min: 0~59, sec: 0~59, msec: 0~999)

Handling manual of DPR-1000 displayed menu



The displayed sign means like following information.

Displayed sign	Detail means
OCR-rst	50/51 relay element operated
OCGR	50/51N relay element operated
DGR	67N relay element operated
SGR	67G relay element operated
UCR -rst	37 relay element operated
NSOCR	46 relay element operated

Handling manual of DPR-1000 displayed menu

LOCK	51LR relay element operated
STALL	48 relay element operated
THR	49 relay element operated
NCH	66 relay element operated
TPR1	38-1 relay element operated
TPR2	38-2 relay element operated

* The detail measurement saved values are displayed. (Ir, Is, It, Io, I2, Vo, %Q, AI1, AI2)

2-3-3) EVENT CLEAR

```
  1 . E V E N T    L I S T          1
  2 . F A U L T    L I S T          0
→ 3 . E V E N T    C L E A R
  4 . F A U L T    C L E A R
```

↓

Move cursor to 'EVENT CLEAR' and press 'ENT'key

2-3-4) FAULT CLEAR

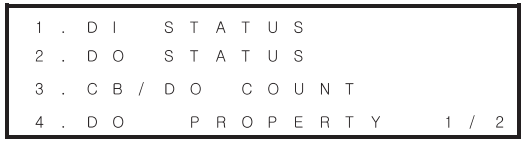
```
  1 . E V E N T    L I S T          1
  2 . F A U L T    L I S T          0
  3 . E V E N T    C L E A R
→ 4 . F A U L T    C L E A R
```

↓

Move cursor to 'FAULT CLEAR' and press 'ENT'key

Handling manual of DPR-1000 displayed menu

2-4) DIGITAL I/O menu



2-4-1) DI STATUS menu

CB open, close status is judged by DI 01 input. If '0' is entered in DI 01, DPR-1000 judges that CB status is OPEN.

2-4-2) DO STATUS menu

PO, PC terminal status mean CB OPEN, CB CLOSE. And 01, 02, 03 are programmable digital output terminal.
User can mapping several variable logics with DI terminal status, POWER FAIL, CBF.

Handling manual of DPR-1000 displayed menu

2-4-3) CB/DO COUNT menu

User can observe the number of CB ON and the number of terminal operations.

The accumulated numbers can be erased by user. If you press 'ENT' key during 3 seconds, the numbers will be erased.

2-4-4) DO PROPERTY

```
        DO  PROPERTY  SET
DO1 : PULSE
DO2 : LATCH
DO3 : LATCH
```

Move cursor ▼ ▲ key to the directory user wants to change

↓

Select PULSE or LATCH with ◀ ▶ key

2-4-5) DI DEBOUNCE TIME SET

User can set the DI signal input debounce delay time in this menu.

```
DI  DEBOUNCE  TIME  SET

 D.T. :    10.0      ms
```

Set the debounce delay time with ◀ ▶ key. (10.0~60.0/1.0UNIT)

2-5) CT/GPT RATIO setting menu

DPR-1000 FN TYPE uses OCGR or DGR relay elements so user has to set the 'NCT' ratio in this menu.

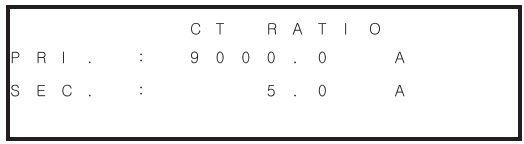
DPR-1000 FZ TYPE uses SGR relay elements so user has to set the 'ZCT' ratio in this menu.

```
→ 1. CT    RATIO
  2. NCT   RATIO
  3. GPT   RATIO
```

Handling manual of DPR-1000 displayed menu

2-5-1) CT RATIO setting menu

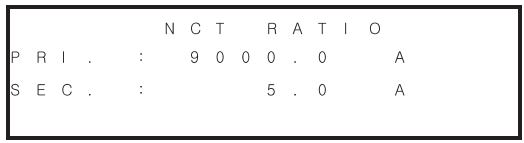
PRI(CT1-primary)is changeable value, and SEC(CT2-secondary)is unchangeable - 5A – value.



Set the value with ◀ ▶ key (5.0~9000.0/1.0UNIT)

5-2) NCT RATIO setting menu

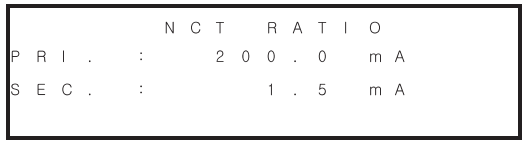
PRI(CT1-primary)is changeable value, and SEC(CT2-secondary)is unchangeable - 5A – value.



Set the value with ◀ ▶ key (CT PRI, 5.0~9000.0/1.0UNIT)

2-5-3) ZCT RATIO setting menu (*DPR-1000 FZ TYPE only)

ZCT 1 (primary), 2 (secondary) are all unchangeable.



2-5-4) GPT RATIO setting menu

GPT PRI (GPT1-primary)is changeable value, and GPT SEC(GPT2-secondary)is unchangeable – 110V – value.

Handling manual of DPR-1000 displayed menu

```
          GPT  RATIO
PRI.   :  154.00  kV
SEC.   :  110.00   V
```

2-6) SYSTEM CONFIG setting menu.

```
→1. WAVE REC. SET
 2. CB FAIL   SET
 3. SERIAL ID SET
 4. COMM.     SET   1 / 3
```

```
→5. PASSWORD
 6. AI OPTION
 7. ALL REC. CLEAR
 8. LED TEST          2 / 3
```

```
→9. OCGR/DGR SELECT


                      3 / 3
```

2-6-1) WAVE REC. setting menu:

User can set the wave PRD(PERIOD) with ◀ ▶ key. (16, 32, 64, 128 cycle)

User can set the wave PTRG(PRETIGGER) with ◀ ▶ key. (0~ PERIOD value/1UNIT)

User can set the number of savable SMP(SAMPLE) with ◀ ▶ key. (8, 16, 31)

(*PRETIGGER value can not exceed the PERIOD value and the number of sample (SMP)is limited by PERIOD value.)

8 Sample : 128cycle, 21trances, 4 times

64cycle, 21trances, 8 times

32cycle, 21trances, 16 times

16cycle, 21trances, 32 times

Handling manual of DPR-1000 displayed menu

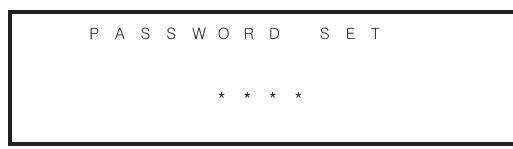
16Sample : 64cycle, 21trances, 4 times
32cycle, 21trances, 8 times
16cycle, 21trances, 16 times
32Sample : 32cycle, 21trances, 4 times
16cycle, 21trances, 8 times
traces : analog 7 channel, DI/DO 8 channel
(Ir, Is, It, Io, Vo, AI1, AI2, 3DI, 3DO, 2PO)
trigger source : Relay Pick-up/Operation, DI, DO, PO mulit-selectable
Trigger source is registerd in PC manager program

2-6-2) CB FAIL setting menu:
User can set the 'To' by pressing ◀ ▶ key (--, 30~250/5UNIT)
User can set the 'Tc' by pressing ◀ ▶ key (--, 30~250/5UNIT)

2-6-3) SERIAL ID setting menu: User can set the ID address by pressing ◀ ▶ key (1~255/1UNIT)

2-6-3) COMM. Setting menu:
(* This menu is available in case that DPR-1000 has COMM. board.)
Set the ADDR(ADDRESS) with ◀ ▶ key (1~247/1UNIT)
Set the B/R(BAUD RATE) with ◀ ▶ key (9600, 19200, 38400)
Set the SWAP with ◀ ▶ key (ON, OFF)

2-6-4) PASSWORD setting menu

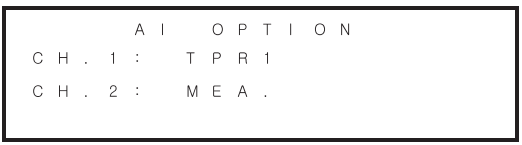


Move cursor with ◀ ▶ key
↓
Set the number which user wants by pressing ▼ ▲ key (0~9)

Handling manual of DPR-1000 displayed menu

2-6-6) AI OPTION setting

This is only available when DPR-1000 has AI board.



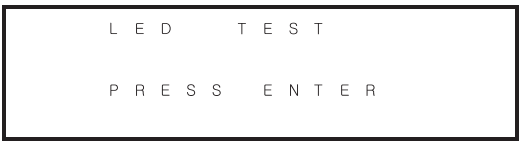
Move cursor with ▼ ▲ key

↓

Set the relay element (TPR1,2) or analog input terminal (MEA.)

2-6-7) ALL REC. CLEAR: this command can reset all accumulated values.

2-6-8) LED TEST menu



Press 'ENT' key

↓

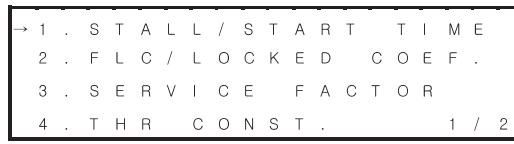
All LED light up for 2 sec.

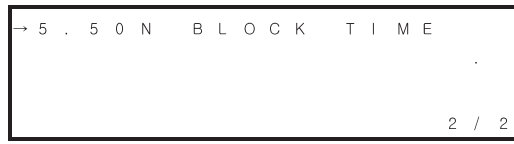
2-6-9) OCGR/DGR SEL. (*DPR-1000 FN TYPE only available.)

Select OCGR or DGR

Handling manual of DPR-1000 displayed menu

2-7) MOTOR CONFIG setting menu





2-7-1) STALL/START TIME setting menu:

Set the Tss(the application time for VI, EI curve) with ◀ ▶ key (0.05~300.00/0.01UNIT)

Set the Ts(the application time for DI curve) with ◀ ▶ key (0.05~300.00/0.01UNIT)

2-7-2) FLC/LRC setting menu:

Set the FLC(FULL LOAD CURRENT) with ◀ ▶ key (0.20~2.00/0.01UNIT)

Set the LRC with ◀ ▶ key (0.50~10.00/0.01UNIT)

2-7-3) SERVICE FACTOR setting menu:

Set the SVC (1.00~1.20/0.5UNIT) with ◀ ▶ key

2-7-4) THR CONSTANT setting menu:

Set the HEAT(the value of τ - HOT curve) with ◀ ▶ key (2.0~60.0/0.5UNIT)

Set the COOL(the value of τ - COLD curve) with ◀ ▶ key (2.0~60.0/0.5UNIT)

Set the O/L(OVER LOAD DONSTANT value) with ◀ ▶ key (0.8~1.20/0.05UNIT)

2-7-5) 50N BLOCK TIME setting menu: Set B/T with ◀ ▶ key (0.00~60.00/0.01UNIT)

Handling manual of DPR-1000 displayed menu

2-8) SYSTEN INFO setting menu

```
→1. RUN     TIME
 2. VERSION
 3. DIAGNOSTIC
 2004.07.30  09:43:00
```

2-8-1) RUN TIME: this menu displays the accumulated run time of DPR-1000.
The limit of run time is 4294967296 hour. If user want reset the time, press 'ENT' for 3 sec.

2-8-2) VERSION: this menu displays the version of program.

2-8-3) DIAGNOSIS: SVC LED turns on and off when the light errors occur. User can observe the detail error message on DIAGNOSIS menu. If the source of error is terminated, the LED will be turned off. And also the detail error message on DIAGNOSIS menu will be erased.

```
        DATA  EMPTY

      PRESS  ESC  KEY
```

(picture: the case of normality)

```
AUX. BAT
```

(picture: the case of abnormality)

The detail message on DIAGNOSIS menu means like the following list.

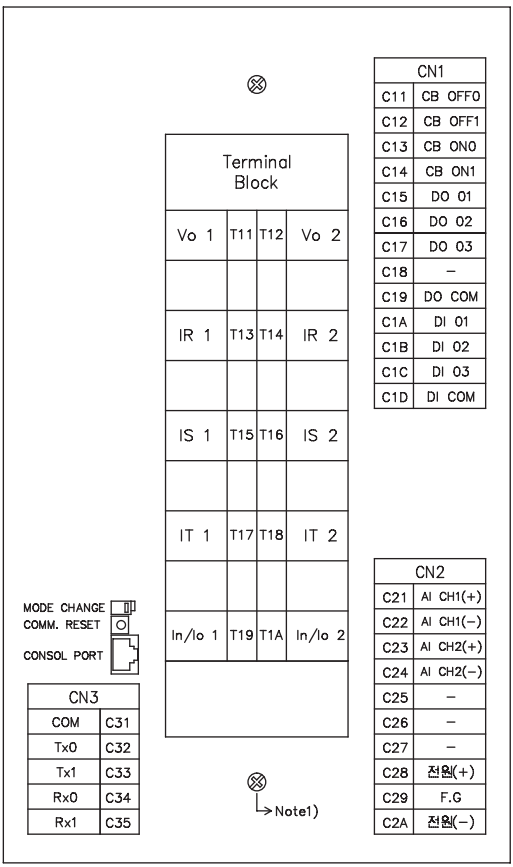
display	The source of error
AUX BAT	The backup power of RTC –supercap– is out of order.
F/S	The front serial communication error
R/S	The serial communication is error (the Comm Board operation is error)

Handling manual of DPR-1000 displayed menu

NO CT	C/PT calibration did not be operated
NO T/S	The RTC time setting did not be operated
NO AI	AI calibration did not be operated(only available when DPR-1000 has AI Board)
NO W/T	wave record setting did not be operated
WATCHDOG	The DPR-1000 did not normally turn on, off

5.1 DPR-1000 TERMINAL

A) DPR-1000 FN,FZ Model

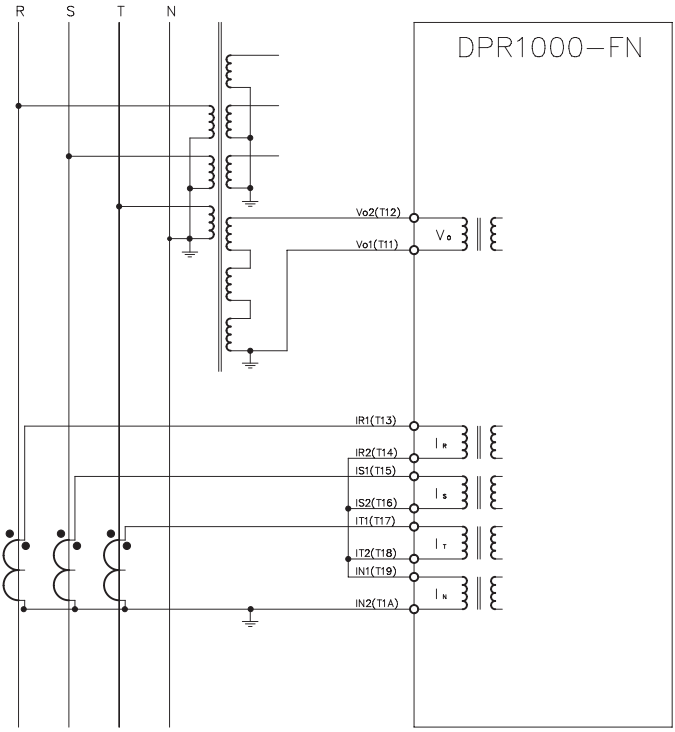


※ DI 01 is CB OPEN/CLOSE status input terminal. If DI 01 receives some signal, the status is 'CLOSE' and there is not signal, the status is 'OPEN'.

※ DO 01~03 is not useable for CB OPEN/CLOSE control command terminal.

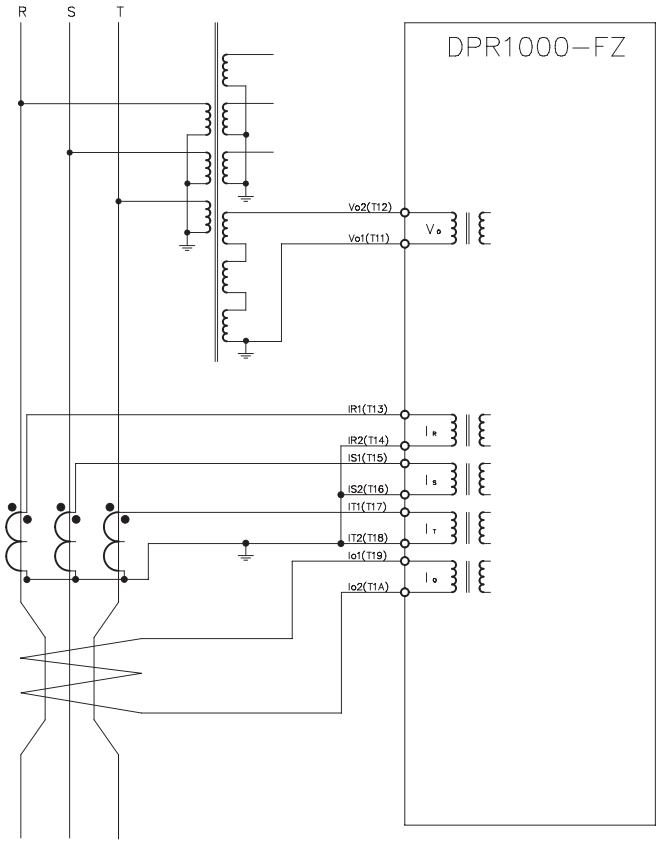
Note1) Please connect the lower screw to F.G.

5.2 DPR-1000 FN terminal



* Be careful about the (+) (-) of Io and Vo.(Vo is connected inversely)

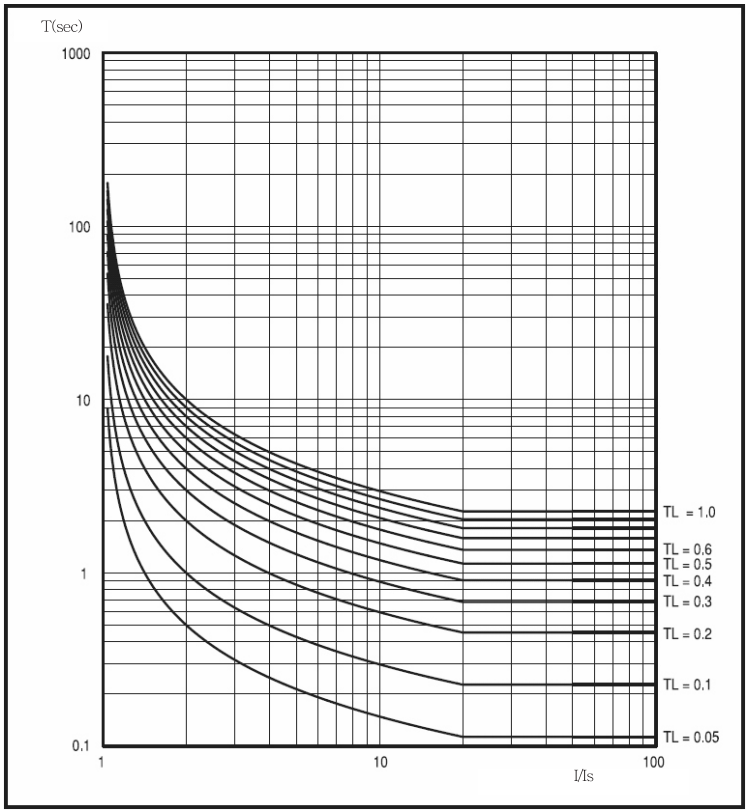
5.3 DPR-1000 FZ terminal



* Be careful about the (+) (–) of Io and Vo.(Vo is connected inversely)

6. Characteristic curves

Standard Inverse Time – SI(Standard Inverse) curve



<< SI characteristic curve >>

$$t = \frac{0.14}{(I/Is)^{0.02}-1} \times TD + C$$

t = operating time

I = fault value

Is = setting value

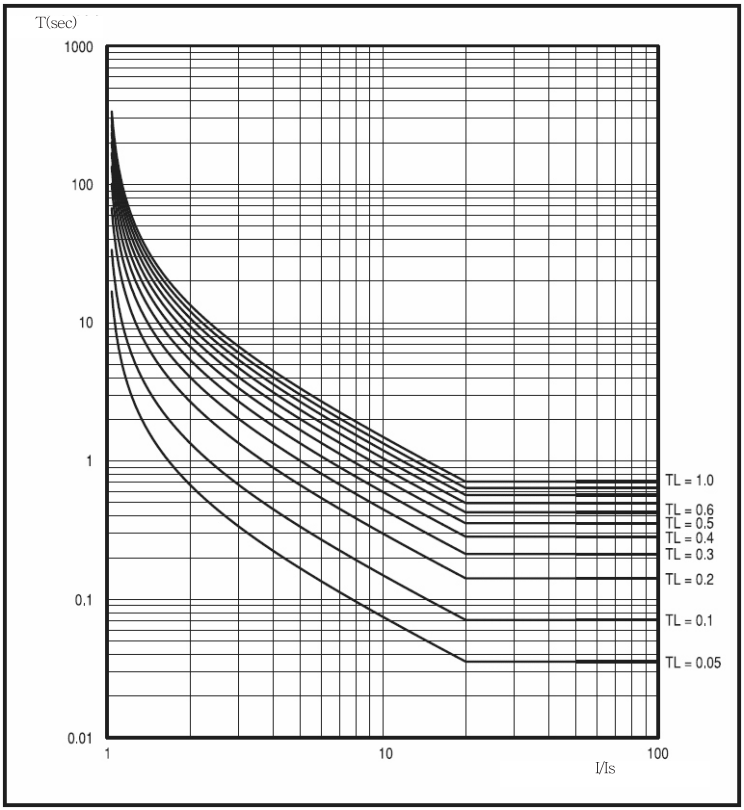
TD = Time Lever

C = delay time

※ Available relay elements: OCR(50/51), OCGR(50/51N), NSOCR(46)

6. Characteristic curves

Standard Inverse Time – VI(Very Inverse) curve



<< VI characteristic curve >>

$$t = \frac{13.5}{(I / Is) - 1} \times TD + C$$

t = operating time

I = fault value

Is = setting value

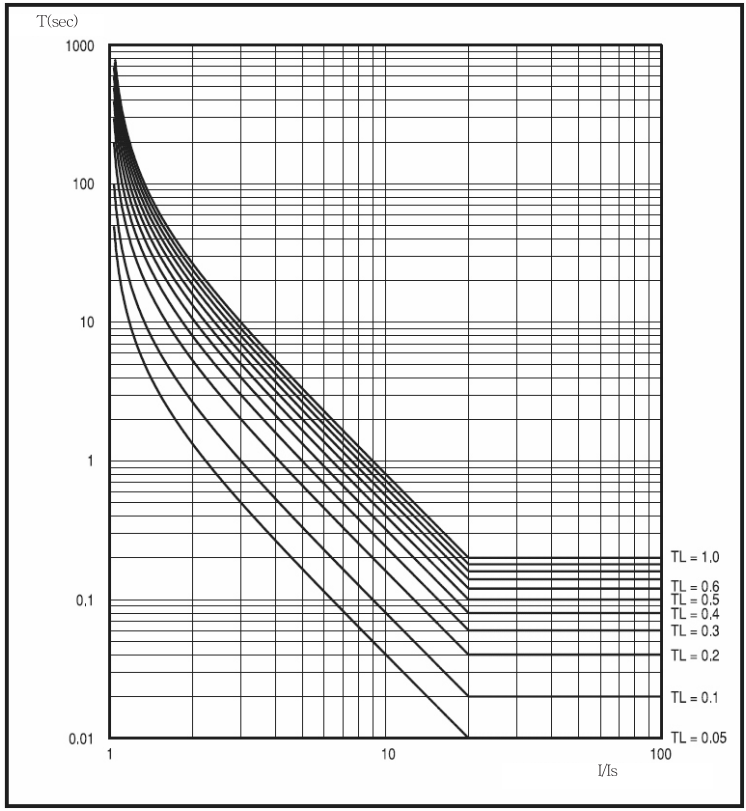
TD = Time Lever

C = delay time

※ Available relay elements: OCR(50/51), OCGR(50/51N), NSOCR(46), Locked Rotor

6. Characteristic curves

Standard Inverse Time – EI(Extremely Inverse) curve



<< EI characteristic curve >>

$$t = \frac{80}{(I / Is)^2 - 1} \times TD + C$$

t = operating time

I = fault value

Is = setting value

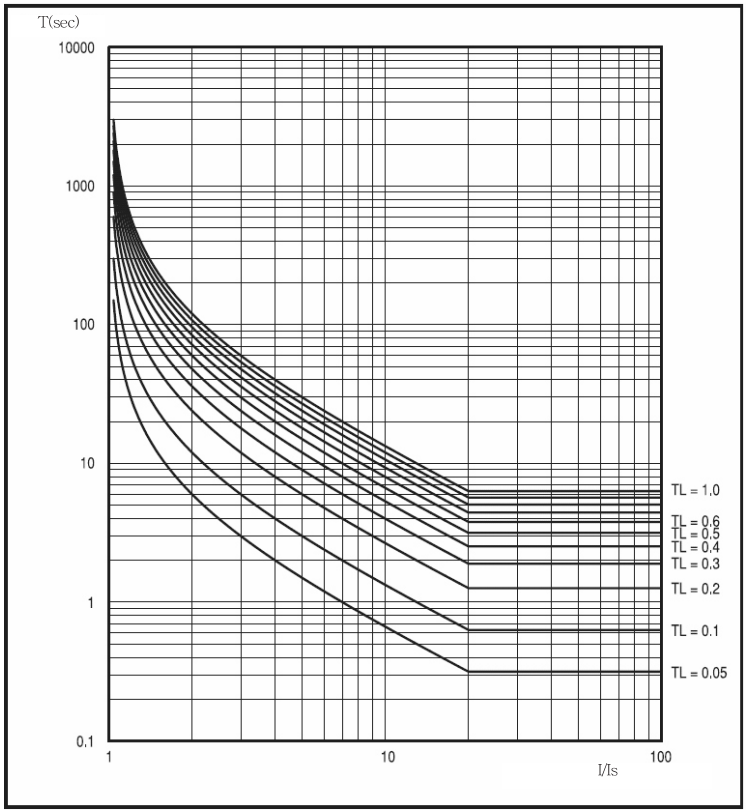
TD = Time Lever

C = delay time

※ Available relay elements: OCR(50/51), OCGR(50/51N), NSOCR(46), Locked Rotor(51LR)

6. Characteristic curves

Long Inverse Time – LI(Long Inverse) curve



<<LI characteristic curve >>

$$t = \frac{120}{(I / Is) - 1} \times TD + C$$

t = operating time

I = fault value

Is = setting value

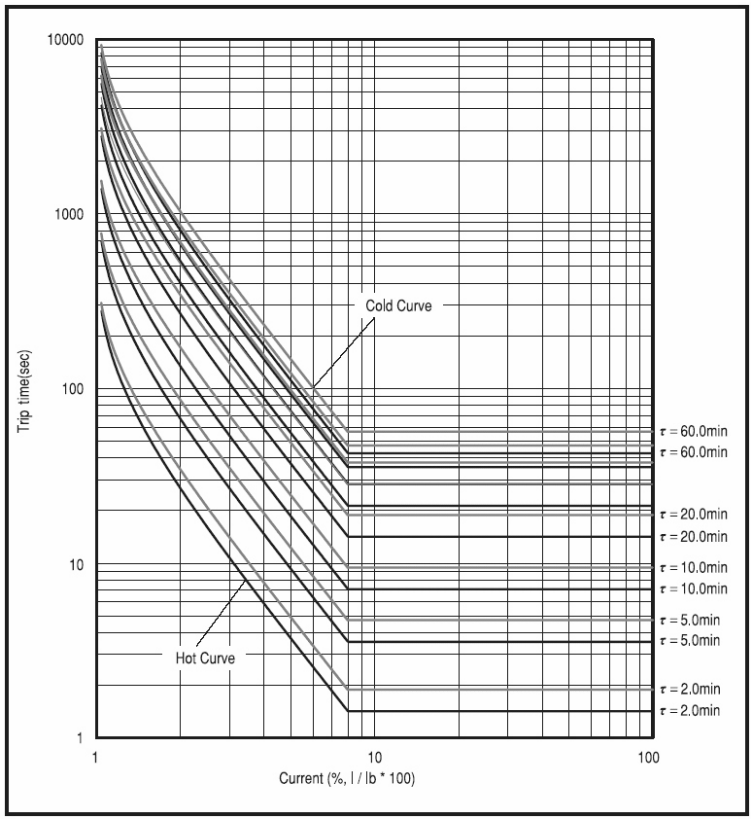
TD = Time Lever

C = delay time

※ Available relay elements: OCR(50/51), OCGR(50/51N), NSOCR(46), Locked Rotor(51LR)

6. Characteristic curves

Thermal Curve (COLD, HOT)



HOT $$t = \tau \ln \frac{I^2}{I^2 - (kI_B)^2}$$

COLD $$t = \tau \ln \frac{I^2 - I^2{}_P}{I^2 - (kI_B)^2}$$

Ip = the current before relay trip.
(in case of Cold, Ip=0)

I_B = rating current.

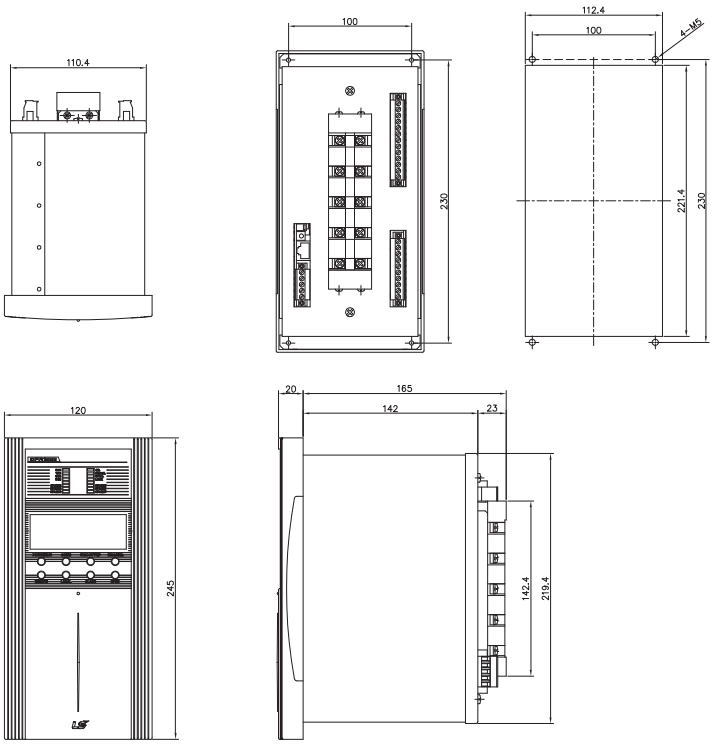
k =positive number of over current

I = relay trip current.

τ = thermal number

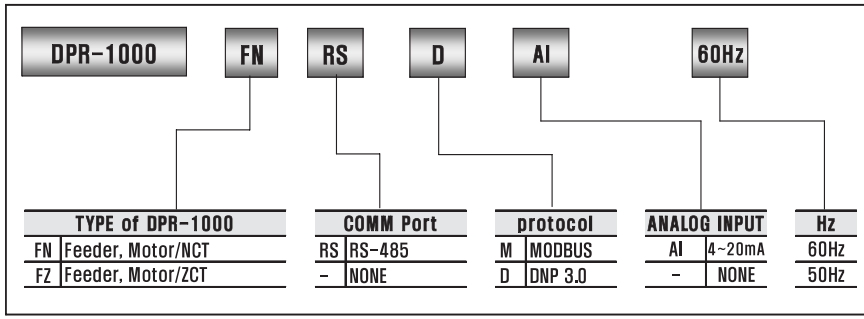
7. External dimension

DPR-1000 External dimension (mm)



8. Ordering information

Ordering information (variation)



* NCT: OCGR,DGR (ground type)
* ZCT: SGR (non-ground type)
* Analog Input option is used for the measurement of Motor temperature and TRE(Temperature Relay).

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