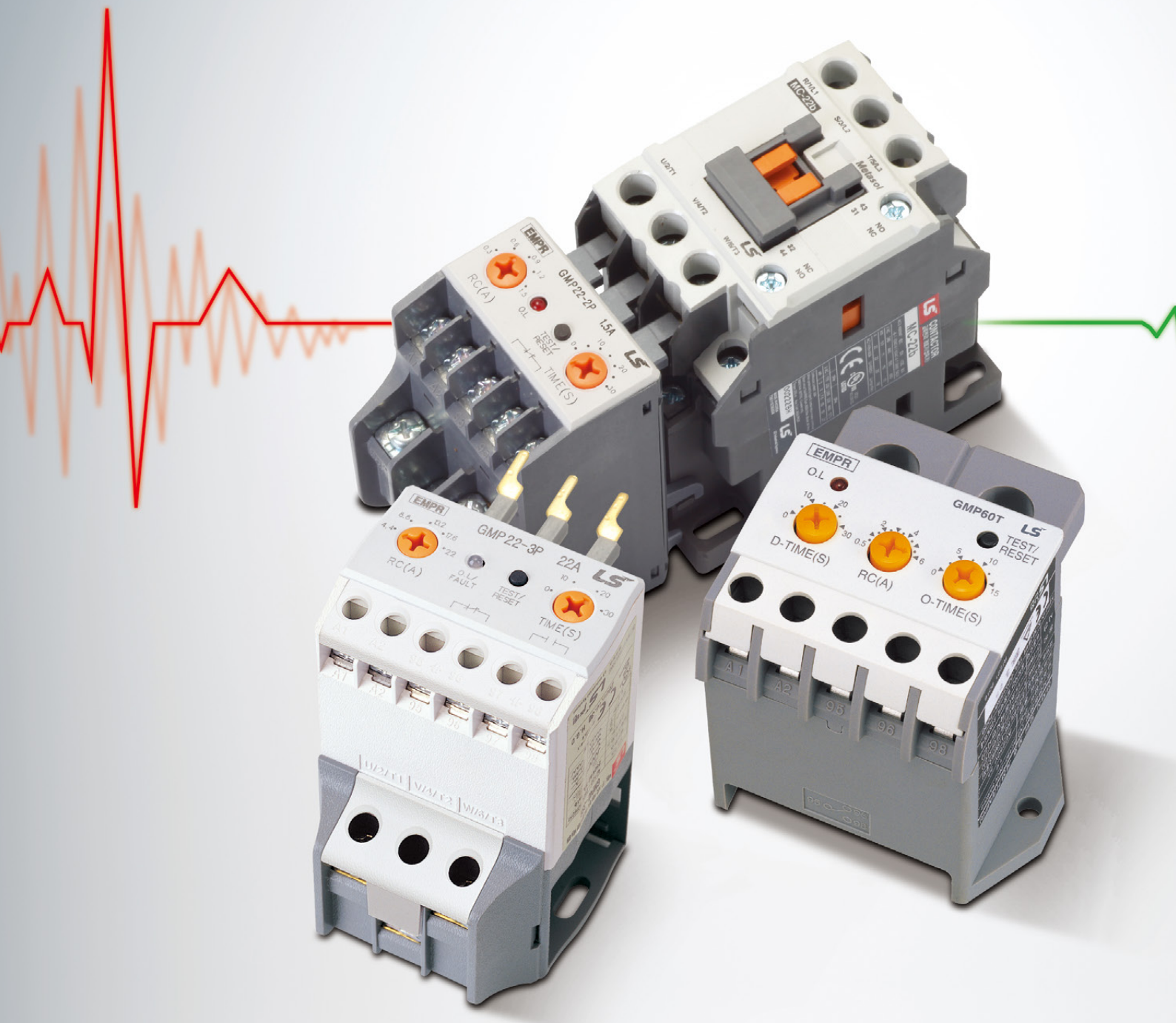
The new standard of next-generation motor protection relay!

With smart protection and safe control, we provide the cutting-edge digital total solution.



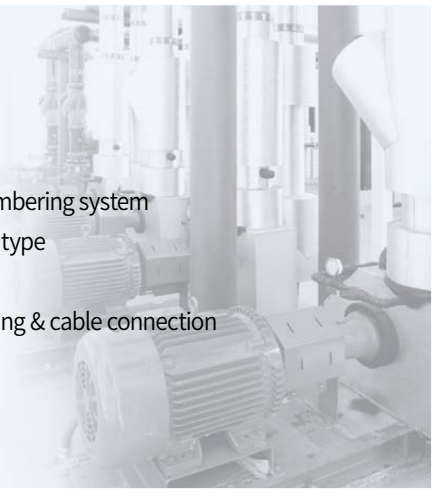
GMP Series

Electronic Motor Protection Relays

- Definite/inverse time protection of a variety of rating
- Ground fault protection model
- LED based display of failure cause
- MC direct coupling, penetration, and terminal types sharing

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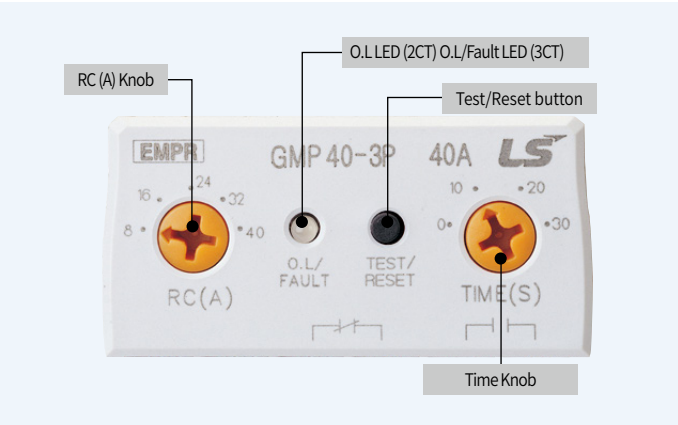


Operation & setting method

Inverse time characteristic

1. Check the rated voltage and apply the control power to A1 and A2 terminal

If 220V power is supplied to a model for AC110V, overvoltage occurs and thereby EMPR has a failure.



2. With Test/Reset button, check that output contact works normally.

1) If Test/Reset button is clicked once, O.L (display lamp) representing Trip is turned on. If EMPR is Tripped, output contact works.
2) If Test/Reset button is clicked again at the time of EMPR Trip, the display lamp is turned off and the equipment resets to its original state.
3) Auto reset function (Auto Reset)
• In case of overcurrent Trip, the equipment automatically returns after one minute (GMP22-2PA/GMP40-2PA),
• In case of overcurrent Trip, the equipment automatically returns after 0~120 seconds (variable setting) (GMP60T-A).

Note) To prevent a Trip accident, Test/Reset button is designed not to work while a motor is running.

3. Set the operating time

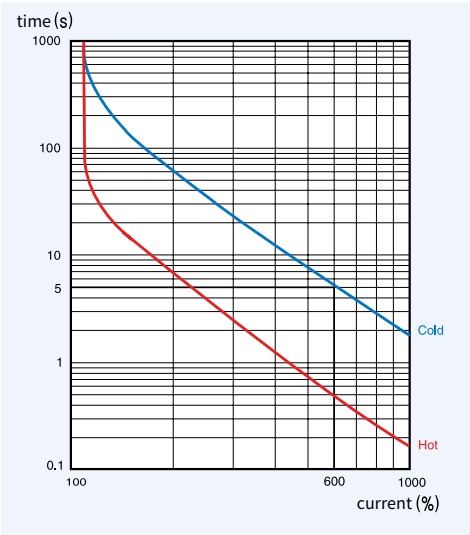
An operating time is based on 600% of rated current in the characteristic curve.

1) Set up the position of operating time control knob (Time Knob) in consideration of a staring time and starting current.
(E.g., on the assumption that a starting current accounts for 600%of normal operating current and a staring time is 10 seconds, set Time Knob to about 11~12 seconds with 10-20% margin.)
2) An available operating time ranges from 0 to 30 seconds.
3) In case that Time Knob is set to 10 seconds, if the starting current or 600% of rated current is supplied for 10 seconds, immediate Trip occurs.

Note) For a motor with frequent forward/reverse starting, such as a motor of crane or hoist, an EMPR with the characteristic of definite time is recommended

4. Set up a rated current.

Setting is based on the rated current of a motor (normal operating current).
1) Check that a motor's rated current is within the current control range of EMPR.
2) Set RC (Rating Current) Knob up to the maximum and run the motor.
3) In normal operation state, slowly turn RC Knob counter clockwise and stop at the point that overcurrent display lamp (O.L) flickers. At this point, the actual load current value (100%) of the motor is displayed.
4) From the point, turn RC Knob clockwise. Set up the knob at this point that O.L lamp is turned off (less than motor full load current).
(e.g., when overcurrent display lamp is turned off at 20A, set current = 20×1.1=22A)



5. Check status of operation by LED

2CT : Overcurrent, Phase failure, Lock/Stall
3CT : Overcurrent, Phase failure, Reverse phase, Phase unbalance, Lock/Stall

1) In case of overcurrent

- If there will be an overcurrent during motor operation, the red color of LED will flicker at 0.4 second intervals. After tripping because of overcurrent, the red color of LED will light up.

2) In case of phase failure (2CT EMPR can protect motor from R or T phase failure.)

- If a motor stops running due to phase failure, stall current flows. As a result, it is possible to protect the motor against overcurrent. If the motor keeps running in phase failure, it is necessary to protect against phase failure.
- If phase failure occurs in three-phase load (3CT), Trip occurs within three seconds. (O.L LED is turned on)
  R-phase phase failure - Fault LED flickers once (0.4 second) at an interval of three seconds.
  S-phase phase failure - Fault LED flickers twice at an interval of three seconds.
  T-phase phase failure - Fault LED flickers three times at an interval of three seconds

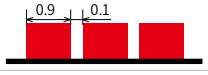
3) In case of phase unbalance

- If phase unbalance factor of three phase is about 50% or more after its calculation, Fault LED only flickers at an interval of 0.4 second and then trips after five seconds. (After Trip, the same display as phase failure appears.)

4) In case of Reverse phase

- Trip occurs within 1 second, and the lamp flickers red and green in turn (GMP22/40/60-□R type) or O.L LED and Fault LED flicker (GMP80-3SR). In this case, to detect reverse phase, a load current should be more than the minimum current setting range of EMPR.

5) LED operation status

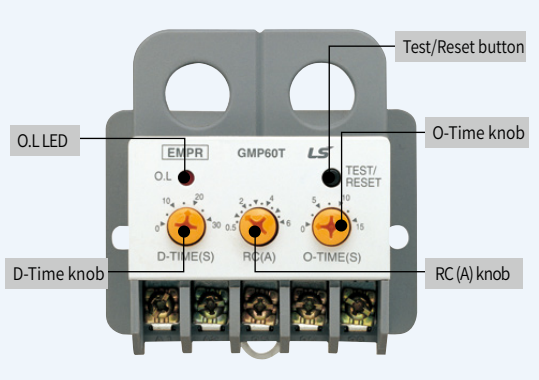
	Condition		LED Status	LED Diagram	Remark
Operating status	Normal		LED OFF		
	Over current		0.4 Second intervals		
	Phase unbalance (50%, 3CT)		0.4 Second intervals		GMP 80-3S/3SR model, only red color LED will flicker.
Tripped status	Over current		O.L LED light up		
	Phase failure (3CT)	R	1 time for 3 seconds		GMP 80-3S/3SR model, O.L LED will light up and also FAULT LED will flicker.
		S	2 time for 3 seconds		
		T	3 time for 3 seconds		
	Phase failure (2CT)		Red LED light up for 0.9 sec LED goes off for 0.1 sec		
	Reverse phase (3CT)		Red & Green color LED flicker alternately		GMP 80-3S/3SR model, Red/Green LED will flicker.

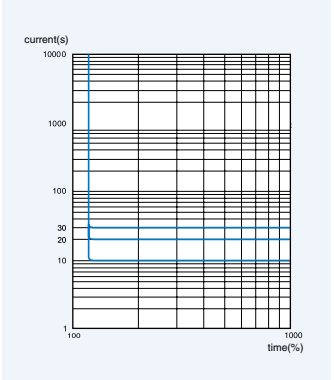
Note) There are two red color LEDs for O.L (Overload) & Fault in the model of GMP80-3S/SR

Definite time characteristic 1

1. Check the rated voltage and apply the control power to A1 and A2 terminal

If 220V power is supplied to a model for AC110V, overvoltage occurs and thereby EMPR has a failure.





2. Check the Test/Reset button operation

1) If Test/Reset button is clicked once, O.L (display lamp) is turned on, EMPR is Tripped, and output contact runs.

2) If Test/Reset Button is clicked once again when EMPR is Tripped, the display lamp is turned off and the equipment returns to its original state (Reset).

Note) 1. To prevent a Trip accident, Test/Reset button is designed not to work while a motor is running. 2. If Test/Reset button is clicked twice within 0.5 second, it is possible to check the final failure cause.

3. Set the operating time

D-Time (Delay Time) : 0~30 sec

It refers to the time of delaying EMPR operation in order to prevent Trip from a motor's staring current.

1) With the use of D-Time Knob, set up a delay time taken from motor starting to normal running current.
2) If you are unaware of a start delay time, set it to the maximum time and measure how long it takes to reach the normal starting current of the motor, and then set it up again. (Reference: in case of general load, set it to about 3~5 seconds.)

Note) If actual load current fails to detect during a set time, a motor can be damaged. Set up a delay time rightly.

O-Time (Operating Time) : 0~15 sec

It refers to the time taken from the start of overcurrent to EMPR Trip. After the set O-Time, EMPR is Tripped.

1) With the use of O-Time Knob, set up an operating time.
2) If O-Time is the minimum value, EMPR is immediately tripped as soon as overload occurs. (Reference: generally, set it to 4~6 seconds.)

A-Time (Auto Reset Time): 0~120 seconds; set up an automatic reset time in auto reset type.

4. Set the operating current

Setting is based on the rated current of a motor (normal operating current).

1) Check that a motor's rated current is within the current control range of EMPR.
2) Set RC (Rating Current) Knob up to the maximum and run the motor.
3) In normal operation state, slowly turn RC Knob counter clockwise and stop at the point that overcurrent display lamp (O.L) flickers. At this point, the actual load current value (100%) of the motor is displayed.
4) From the point, turn RC Knob clockwise. Set up the knob at this point that O.L lamp is turned off (less than motor full load current).

Generally, set it to 110~120% of actual load current (set to a value lower than a motor full load current).

5. Check the LED condition when operation

1) GMP60T

Condition		Red O.L LED	Remarks
Operation normal	Off		
Overcurrent	Flicker		Flicker during overcurrent
Trip over-current	On		The EMPR is tripped

2) GMP60-3T/3TR

The same as the LED operation state in operation.

Definite time characteristic 2 (GMP60-TD, TDa)

1. Function & setting menu

1) Set up “Slide S/W, Rated current, and Current transformer ratio” on the basis of a motor’s full load current.
To change Slide S/W, turn OFF control power. In the No. 1 menu (1.Cty), make sure to change to a relevant rated current.

Full Load Current	Wire penetration	Slide S/W	Rated current (1.Cty)	Current ratio (5.Ctr)
0.6A or less	4 times	6A	6A	0.25
0.7~1.5A	Twice	6A	6A	0.5
1.6~6A	Once	6A	6A	1
6~60A	Once	60A	60A	10
60~100A	Once	6A	6A	20
100A or more	Once	6A	6A	CT Ratio (Primary/Secondary)



2) In the ‘0000’ display state, click Test/Reset button to go to Setting Mode (‘Test’ is displayed on screen).
Click FUN button to search for items and set up various values with the use of SEL button.
3) Push FUN button until ‘Stor’ is displayed, and make sure to save a value with SEL button.
4) If saved completely, ‘0000’ is displayed on screen. If no button operation occurs in ten seconds in the value setting process, the current screen goes to initial screen.
5) If Test/Reset button is clicked in operation, it is possible to check “Set Current/D-T/O-T”.
In case of Trip, it is possible to check failure current/failure cause with the use of SEL button.
Note) While a motor is running, a set value is unable to be changed, but is able to be checked only.

2. Setting menu

FUNC	SEL	Description	Default Value	Remarks
1.Cty	6A/60A	Current type selection	6A	Set the same with rated current S/W
2.0-t	0.5/1~30(SEC)	Trip time setting	30	Set 0.5 to 30 sec
3.d-t	1~60/1(SEC)	Time delay setting	60	Set 1~60 sec
4.r-C	0.5~6.0/5~60	Rated current setting	6/60	-
5.Ctr	0.25/0.5/1~120	Current ratio setting	1	-
6.P-F	oFF/on	Phase loss enable	Off	Operation in less than 3 sec
7.U-C	oFF/30~70(%)	Undercurrent setting	Off	For TDa model only (Overcurrent operation)
8.A-r	oFF/1~20(MIN)	Automatic reset setting	Off	For TDa model only (Off, 1~20min)
9.Srt	oFF/10~8760	Operation hour setting	Off	For TDa model only
A.trt	-	Total running hour check	-	For TDa model only (Up to 10 years, 1 hour unit)
b.r-t	-	Running hour check	-	For TDa model only (Up to 10 years, 1 hour unit)
Sto	-	Store		-

Note) 1. Check final failure cause: push FUN+SEL (combination buttons) (if there is no failure cause, 'non' is displayed.)
2. Operating time setting: 'OrH' is displayed after a set operating time(Of, f10~8760 hours setting allowed)

3. Fault status configuration

Protection	FND	Description	Remarks
Over current	O-L	More than set current : Within the set time	
Undercurrent	U-C	Lower than the undercurrent set ratio : Within 3S	For TDa model only
Phase Loss	PF-r	Over 70% of the rate of unbalance : Within 3S	R Phase Loss
	PF-t	Over 70% of the rate of unbalance : Within 3S	T Phase Loss
LOCK	Loc	More than lock set current ratio : Within 1S	
Approaching Running Time	OrH	When Running time approaches at setting time	For TDa model only

Note) 1. If the set operating time in ‘9.Srt’ passes, ‘OrH’ is displayed and EMPR has no output.)
2. How to check ‘trt’ and ‘r-t’

FUNC	Description					
trt	Press the SEL button	Daily Display	Press the SEL button		Time Remaining, Display minutes	
r-t	Press the SEL button	Operation time indicator	Press the SEL button	Daily Display	Press the SEL button	Time Remaining, Display minutes

In case of ‘trt’, if power is Off, the minute unit based time is removed.
If ‘r-t’ is checked, an operating time represents a total running time taken until a motor is turned Off. It is displayed in the units of day, hour, and minute.

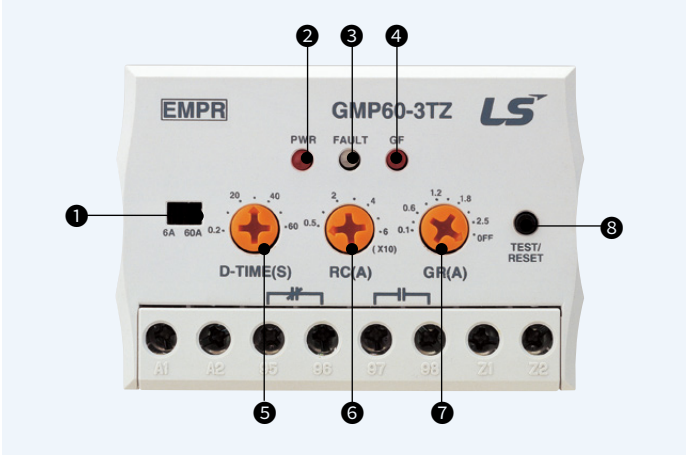
Definite time characteristic 3 (GMP60-3TZ, TZR / 3TN, TNR)

1. This product has the characteristic of definite time.

For setting, see pages 21 & 22.

2. Protective function: overcurrent, locked rotor, phase loss, phase unbalance, ground fault (and phase reverse)

1) Overcurrent : trip within 3 sec. after D-time at 105% or more
2) Locked rotor : trip within 1 sec. after D-time at 300% or more
3) Phase loss : trip within 3 sec. (phases unbalance rate over 70%)
4) Phase unbalance : trip within 5 sec. (phases unbalance rate over 50%)
5) Ground fault : trip within 0.5 sec. after D-time at over 110% or under 90% of set value
6) Reverse phase: if two out of R, S, and T phases are changed with each other and a current flows.
   Run in 1 second (no detection after TDim- e)



Note) 1. Make power off before changing the rated current with S/W ①
2. The setting range of RC (A) KNOB ⑥ is recognized as 0.5 ~ 6A or 5 ~ 60 According to the setting value of S/W ①. The value of the scale for RC (A) KNOB ⑥ is 0.5, 1, 2, 3, 4, 5, 6 or 5, 10, 20, 30, 40, 50, 60(A) from the left.
3. Last fault cause function indicates the LED status for the last TRIP.

3. Overcurrent trip time

1) Time delay(D-time) setting: between 0.2-60 sec.
2) Trip time(O-time) setting: fixed at 3 sec.

4. Other functions

1) Last fault cause data stored
   • to display it press Test/Reset button 2 times within 0.5 sec.
   • PWR LED flicking in case of no fault

Note) In case of load less than minimum rating of EMPR make the number of penetrating through CT more than 2 times. If not, error may happen to phase loss .

5. Status of LED configuration

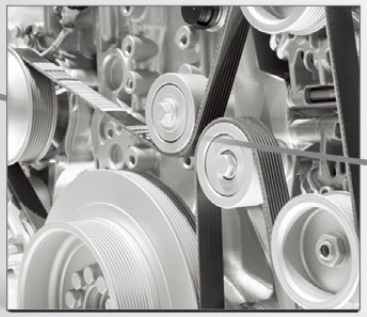
NO	Function	Setting	Description	Remark
❶	6A/60A	Slide switch	Maximum rated current (6A/60A) setting	-
❷	PWR.	Red LED	Lights up when power is ON Blinking in the failure mode	-
❸	Fault	Red / Green LED	Overcurrent / unbalance in progress : Overcurrent TRIP : Phase loss (unbalance) TRIP ·R-phase : ·S-phase : ·T-phase : ·Reverse phase :	Red LED Green LED
❹	GF	Red LED	Lights up after blinking in the event of ground fault	-
❺	D-Time (S)	KNOB	Delay time (0.2 to 60 sec.)	-
❻	RC (A)	KNOB	Rated current setting: 0.5~6A/5~60A	
❼	GR (A)	KNOB	Zero phase current detection type Sensitivity current setting (0.1~2.5A) Residual current detection type Sensitivity current setting (0.5~6A)	-
❽	Test/Reset	Button	TRIP / RESET alternately perform 1. Check relay contacts - displays fault cause 2. RESET	Pressing 2 times within 0.5 sec. the final failure cause is displayed



Revolutionary development of motor protection relays

Complete motor protection is realized with real time data processing and high precision.











DMPi Series

Intelligent Digital Motor Protection Relays

- Definite/Inverse time option and various protection methods
- Storage of failure causes
- Separated display part using cables
- MODBUS communication, 4~20mA DC output
- Operating time displayed for each model

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Operation & setting method

Display explanation



Type	Item		Description	Remarks
Display		R S T N	Display of R, S, T, or N phase	If fixed, flickering
		4 digit 7-segment	Display of a variety of information (numbers, text)	
		BAR GRAPH	Display of load factor (%) 50% ~ 120%	If 120% or more, flickering
		C	Display of communication status (C)	In communication, flickering
		%	Load factor (%) display unit	Depending on lighting status
		A	Current (A) display unit	Display of information
Button		TEST/RESET	Access TEST Mode and Release TRIP, Go to the top of menu	
		ENTER	Access Menu and Change & Save Setting Values	
		UP	Go to Items (Measurement Value, Group, Menu, Parameter Increase)	
		DOWN	Go to Items (Measurement Value, Group, Menu, Parameter Decrease)	

Operation & setting method

Before starting the motor, the following setting should be completed.

1. Check the test / Reset button.

1) First, check whether the connection method is appropriate. (Refer to the section on the connection method.)
2) Press the Test/Reset button once. 'Test' will be shown on the display and the device will be tripped.
3) When the Test/Reset button is pressed one more time during the device Trip, the display will be switched to the operating mode and the device will be reset for normal operation.

Note) To prevent trip failures, the system is designed to prevent operation of the Test/Reset button when the motor is running.
Note) Setup and setting values may change during the motor operation. Thus, please be cautious.

2. Setting method

1) Press Enter from the current display screen, and A-gr will appear on the screen. Use the Up or Down button to choose a group that you want and press Enter to display a menu on the chosen group. Press the Test/Reset button again to return to the current display screen.

2) The first menu will be displayed in relation to the selected group. Use the Up or Down button to choose a menu that you want and press Enter. The screen on setting values will be displayed. Press the Test/Reset button to display the group selection mode

Note) Start menu may vary according to the model specifications.

3) If you press the Up or Down button from the screen on setting values, P-99 will appear on the screen. Here, use the Up or Down button to change the value to P-00 and press Enter to return to the screen on setting values. The setting value will flicker and can be changed with the Up or Down button.
After setting the value, press Enter. The value will be saved and the flicking values will be switched off.

4) With it switched on, press Enter to proceed to the next menu or press the Test/Reset button to go back to the previous menu. Related menus can be set with the same procedure.

Note) Password insertion (P-00) is performed only once when changing the setting values. When no changes are made for 10 minutes, it can be re-inserted and changed.
Note) With it switched on, press Enter to proceed to the next menu or press the Test/Reset button to go back to the previous menu. Related menus can be set with the same procedure.
Note) When power is supplied for the first time or after power failure, the date information must be inserted at b-gr 4,S-d.

3. How to check the failure history

1) Press the "Down + Up" buttons at the same time and the latest cause of a failure will be displayed on the screen. 1- -

Note) When there is no failure history, it will be displayed as "non".

2) When saving more than 2 failure cases, use the Up or Down button to check any Event that you want. Then press Enter from the Event display to view the details on the failure causes.

Note) There may be differences in details displayed according to the failure cause.
Note) 5 causes of Trip in total are saved and when it exceeds 5 cases, the previous data are deleted for storage.

4. Operating time setting

1) B group 35rt is used for time setting (10~8,760). After the set operating time has elapsed, Trip state will be displayed with OrH.
When A group 22AL is set with OrH, 07-08 contact will be output.

5. Total operating time and operating time check

1) Total operating time can be checked from B group , ltrt which is displayed in the following order: day/hour/minute.
2) Operating time can be checked from B group, 2r-t which is displayed in the following order: hour/minute.

Note) When no current flows in the motor, the operating time will be displayed as 0.
Note) The total operating time is saved every 10 minutes. When turned off, any value less than 10 minutes will be reset.

6. Heat quantity reset (The motor's heat quantity is reset by force to switch to the cold mode.)

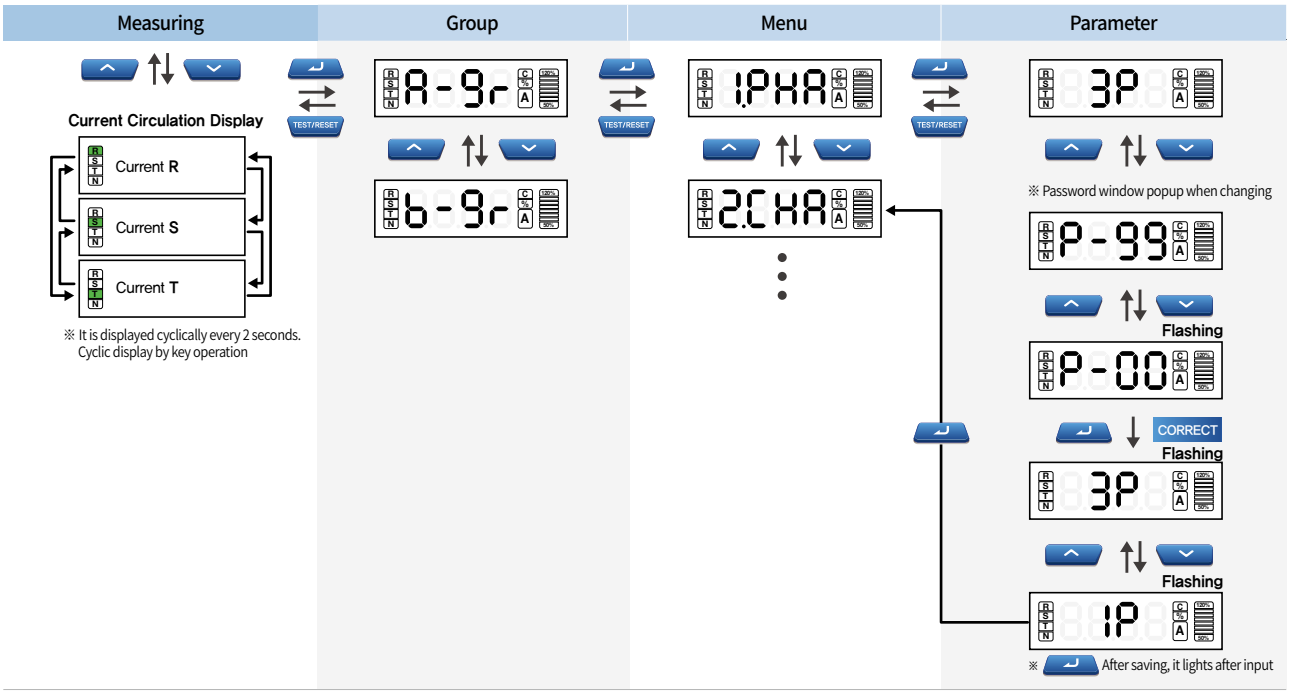
1) When the operating characteristics of A Group 2.CHA are set in the thermal heat build-up mode (th)
2) When the Test/Reset key is pressed under overload trip to return and then a motor is driven right away, the motor will be hot. Thus, trip is immediately performed.
3) On the other hand, when the Enter + Test / Reset keys are pressed simultaneously under overcurrent trip to return and then a motor is driven right away, the motor will be cold. Thus, trip will be executed after the set time.

Operation & setting method

7. Three-phase current circulation display

1) Three-phase operating current that automatically circulates is displayed at intervals of 2 seconds.
2) To view a specific phase on the circulation display, press Enter in relation to such phase for 2 seconds. The phase will flicker and be displayed.
3) If you want to display the circulating three-phase current again, use the Up or Down key to cancel the state for circulation display.

Menu configuration



Information display

Display information		Failure state	Additional display information	Remarks
Failure information	O-L	Overcurrent	Fault current (R-phase, S-phase and T-phase) Load factor, time	Operates at the set time
	Loc	Lock	Fault current (R-phase, S-phase and T-phase) Load factor, time	Operates within 0.5sec
	StL	Stall	Fault current (R-phase, S-phase and T-phase) Load factor, time	Operates in 3sec
	P-F	Phase fail	Fault current (R-phase, S-phase and T-phase) Load factor, time	Operates in 3sec (Delay time setting needed)
	P-U	Phase unbalance	R-phase, S-phase and T-phase, Unbalance factor, time	Ooperates in 5 sec (Delay time setting needed)
	r-P	Reverse phase	Time	Operates at the set time
	U-C	Under current	Fault current (R-phase, S-phase and T-phase) Load factor, time	Operates in 3sec
	g-F	Ground fault (ZCT)	Fault current (R-phase, S-phase and T-phase) N-phase, time	Operates at the set time (Delay time setting needed)
	Sho	Instance	Fault current (R-phase, S-phase and T-phase) Load factor, time	Operate within 50ms (Delay time setting needed)
Alarm information	OrH	Set operating time has elapsed	An alarm is displayed if a cumulative running time excesses a set running time	
Self-diagnosis information	L InE	Display communication error	When a communication error occurs between the display and body, please contact our office with the alarm maintained.	
	EErr	External memory error	When there is an error in the backup memory, please contact our office with the alarm maintained.	

A-Group

Group	Display	Setting item	Setting value(Display value)	Single phase	Default	Remarks Note4)
A	1.PHA	Single phase/Three-phase	1P/3P	1P Note1)	3P	
	2.CHA	Operating characteristic (Overcurrent protection)	dEF/n-th/th Note2)	O	n-th	
	3.0-t	Operating time	1~60sec	O	60	
	4.d-t	Delay time	1~200sec	O	200	Displayed upon 2.CHA dEFT setting
	5.r-C	Rated current(6, 65)	0.5~6A/5~65A	O	6/65	Maximum rated current display (06i: 6A, 65i: 65A)
	6.CTr	CT Ratio	0.25/0.5/1~200 Note3)	O	1	
	7.Loc	LOCK	Off/200~800%	O	Off	
	8.StL	STALL	Off/150~500%	O	Off	
	9.P-F	Phase fail(100%)	On/Off	-	On	
	10.Pd	Phase fail delay time	0~200	-	0	Displayed upon 9.P-F setting
	11.PU	Phase unbalance	Off/10~90%	-	Off	
	12.Ud	Phase unbalance delay time	0~200	-	0	Displayed upon 10.PU setting
	13.rP	Reverse phase Note5)	Off/On	-	Off	
	14.rt	Reverse phase operating time	0.1~1.0	-	0.1	Displayed upon 13.rP setting
	15.UC	Under current	Off/30~90%	O	Off	
	16.gF	Ground fault	Off/0.03/0.05/0.1~3.0A	O	Off	
	17.gt	Ground fault operating time	0.05, 0.1~5.0sec	O	1	Displayed upon 16.gF setting
	18.gd	Ground fault delay time	0~200sec	O	200	Displayed upon 16.gF setting
	19.IC	Instance protection	Off/500~1500% Note6)	O	Off	
	20.Id	Instance protection delay Time	0~200	O	0	Displayed upon 19.IC setting
	21.cS	Output contact composition	2a, 1a1b, 2b Note7)	O	1a1b	
	22.AL	Alarm output conditions	I-tp, I-AL, ALo, U-C, OrH, g-F	O	I-tp	
	23.Ar	Current flow or not, alarm setting	On/60~110%	O	On	Displayed upon 22.AL Alo setting

Note) 1. When setting A group 1.PHA menu with 1P, restricted setting with limited functions can be made.
2. Operating characteristic th refers to the thermal heat build-up inverse time characteristic and n-th refers to the non-thermal heat build-up inverse time characteristic. When th is used, the quantity of heat generated will be reset as power is turned off. Thus, please pay attention to it.
3. CT Ratio is fixed to 1 for 65A Type model.
4. Some menus will not be displayed depending on the function setting for each model.
5. Reverse phase will be detected for only 1.5 seconds after load is activated. It is recommended to set as Off for a motor not in normal-reverse operation.
6. In case of 'Instance', the maximum setting value may change according to the rated current setting.
7. For models with ground fault and instance protection functions, the ground fault and instantaneous trip contacts may be separately set for use.

Operation & setting method

The output conditions of 95-96, 97-98 output contacts depending on the setting of A group 21.cS are as described below.

21.cS Setting	Output conditions	Contact output type	
		95-96	97-98
1a1b	Normal operation	NC Note)	NO Note)
	Ground fault / Short circuit	O Note)	C Note)
	Other failures, such as overcurrent, phase fail and reverse phase other than the ground fault	O	C
2a	Normal operation	NO	NO
	Ground fault/Short circuit	O	C
	Other failures, such as overcurrent, phase fail and reverse phase other than the ground fault	C	O
2b	Normal operation	NC	NC
	Ground fault/Short circuit	C	O
	Other failures, such as overcurrent, phase fail and reverse phase other than the ground fault	O	C

Note) NC: Normal Close, NO: Normal Open, O: Open, C: Close

The output conditions of 07-08 output contacts depending on the setting of A group 22.AL are as described below.

23.Ar setting	Output conditions	Alarm output type	
		Motor operation	07-08
I-tp	Momentary current detected	Motor stop	C
I-AL	Momentary current detected	State maintained	C
U-C	Current flow below the set low current detected	State maintained	C
OrH	Output exceeding the set operating time	State maintained	C
g-F	Ground fault detection	Motor stop	C
ALo	Conforming to the 23.Ar setting described below		
23.Ar setting	**ALo setting from menu No.22**	**Motor operation**	**07-08**
On	Current flow exceeding the measured minimun current value detected Note)	State maintained	C
60~110%	Current flow exceeding the setting value	State maintained	C

Note) The measured minimum current value is 30% of the minimum rated current value (0.15A for 0.6i type; 1.5A for 65i type)

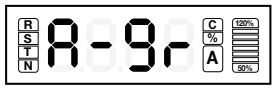
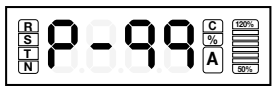
B-Group

Group	Display	Setting item	Setting value (Display value)	Single phase Note1)	Default	Remarks Note4)
B	1trt	Total operating time	0~9999day/0~23Time/0~59min	O	-	
	2r-t	Operating time	0~9999 Time/0~59min	O	-	
	3Srt	Operating time setting	Off/10~8760	O	Off	
	4S-d	Date setting Note2)	2017~2100yea/1~12month/1~31day/ 0~23hour/0~59min	O	2017.07.01 00:00	
	5A-r	Automatic reset Note3)	Off/1~20min	O	Off	
	bAdr	Communication network address	1~247	O	247	Displayed only for M485 model
	1bPS	Communication speed	9.6k/19.2k/38.4k/56.7k	O	9.6k	
	8S-P	Swap On/Off	On/Off	O	Off	
	9P-r	Parity setting	nonE/odd/EUEn	O	nonE	
	6t-d	20mA setting	0.5~6/5~65	O	6/65	Displayed only for A420 model

Note) 1. It can be set even when A group 1.PHA is set with the single phase (1P).
2. When power is supplied for the first time or after power failure, date must be set. For date setting, month, day, hour and minute should be respectively set for complete setting. (After date setting, it is saved every 10 minutes. When power is supplied again after power failure, the date before such power failure will be saved.)
3. Automatic reset is restricted for overcurrent trip.
4. Menus vary according to the model. (refer to the remarks)

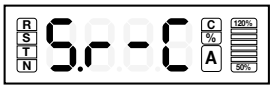
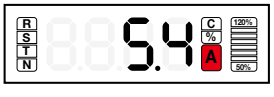
Phase setting

This is a function tdo set current input either as single or three-phase.

	The DMPi main screen display (0.00A)
	1. Press Enter from the main screen. (A-gr)
	2. Press Enter from the A-gr screen. (1. PHR)
	3. Press Enter from the PHR screen and the initial value 3P will be displayed.
	4. Here, use the Up / Down key to display P-99 from the screen. Change it into P-00 with the Up/Down key and press Enter. You are now ready for setting. (Only required for initial setting)
	
	5. The set value flickers. Use the Up / Down key to display 'phase' that is applicable depending on the motor specifications (1P: single-phase; 3P: three-phase). Then, press Enter to save the setting. (1P) ① Choose either 1P or 3P; the default is 3P ② When 1P is selected, A group items such as "9.P-F", "10.Pd", "11.PU", "12.Ud", "13.rP" and "14.rt" are excluded from the setting menu.
	6. Press Test / Reset to return to the display screen.

Rated current setting

This is a function to set a rated current.

	The DMPi main screen display (0.00A)
	1. Press Enter from the main screen. (A-gr)
	2. Press Enter from the A-gr screen. (1. PHR)
	3. Press the Up-key menu 3 or 4 times from the PHR screen. (5.r-C)
	4. Press Enter from the 5.r-C screen and the initial value 6.0A will be displayed.
	5. Here, use the Up / Down key to set the value as 0.5~6.0A. Then, press Enter to save the setting. Note1) (6.0→5.4A) ① 6A model: Set by 0.1A unit ranging from 0.5A to 6A (the default is 6.0A) ② 65A model: Set by 1A unit ranging from 5A to 65A (the default is 65A)
	6. Press Test / Reset to return to the display screen.

Note 1) Upon initial setting, P-99 is displayed on the screen. Here, use the Up / Down key to change it into P-00 and press Enter. You are now ready for setting.

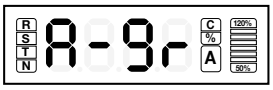
Operation & setting method

Overcurrent operating characteristic setting

This is a function to set the operating characteristic of the overcurrent element.



The DMPi main screen display (0.00A)



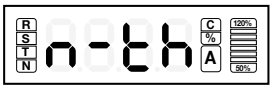
1. Press Enter from the main screen. (A-gr)



2. Press Enter from the A-gr screen. (1. PHR)

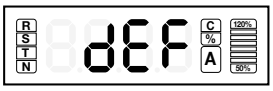


3. Press the Up-key menu once from the PHR screen. (2.CHA)



4. Press Enter from the 2.CHA screen to display 'n-th' (initial value).

5. The set value flickers. Use the Up / Down key to display the set value. Note1)



6. Press Enter for dEF setting.
   ① dEF (definite time), n-th (non-thermal heat build-up inverse time) or th (thermal heat build-up inverse time)
   ② When set as 'n-th' or 'th', "4.d-t" of the A group items is excluded from the setting menu.

7. Press Test / Reset to return to the display screen.

Note 1) Upon initial setting, P-99 is displayed on the screen. Here, use the Up / Down key to change it into P-00 and press Enter. You are now ready for setting.

Overcurrent operating time setting

This is a function to set the operating time of the overcurrent element.



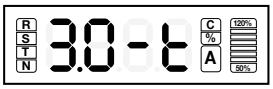
The DMPi main screen display (0.00A)



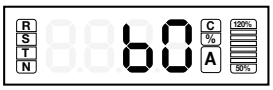
1. Press Enter from the main screen. (A-gr)



2. Press Enter from the A-gr screen. (1. PHR)



3. Press the Up-key menu twice from the PHR screen. (3.O-t)



4. Press Enter and the initial value 60sec will be displayed.

5. Use the Up / Down key to display the set value on the screen. Note1)



6. Press Enter to set as 30sec. (60 → 30 sec)

7. Press Test / Reset to return to the display screen.

Note 1) Upon initial setting, P-99 is displayed on the screen. Here, use the Up / Down key to change it into P-00 and press Enter. You are now ready for setting.

Overcurrent delay time setting

This menu is displayed only when the overcurrent operating characteristic is set as dEF (definite time).



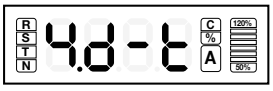
The DMPi main screen display (0.00A)



1. Press Enter from the main screen. (A-gr)



2. Press Enter from the A-gr screen. (1. PHR)



3. Press the Up-key menu 3 times from the 1.PHR screen. (4.d-t)



4. Press Enter from the 4.d-t screen and the initial value 200 will be displayed.

5. Use the Up/Down key to display the set value on the screen. Note1)



6. Press Enter to set as 100sec. (200 → 100sec)
   ① Set by 1sec unit ranging from 1 sec to 200sec; the default is 200sec.
   ② When the overcurrent operating characteristic is set as 'n-th' or 'th', it is excluded from the setting menu.

7. Press Test/Reset to return to the display screen.

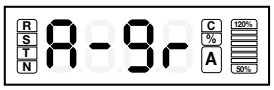
Note 1) Upon initial setting, P-99 is displayed on the screen. Here, use the Up/Down key to change it into P-00 and press Enter. You are now ready for setting.

Ground fault operating value setting

This is a function to set the operating value of ground fault.



The DMPi main screen display (0.00A)



1. Press Enter from the main screen. (A-gr)



2. Press Enter from the A-gr screen. (1. PHR)



3. Press the Up-key menu from the 1.PHR screen to proceed to 16.gF.



4. Press Enter from the 16.gF screen and the initial value OFF will be displayed.



5. Here, use the Up/Down key to set the value. Press Enter to save the setting. Note1) (OFF → 0.1A)
   ① Set by 0.1A unit ranging from 0.1A to 3.0A; or OFF, 0.03A, or 0.05A. (the default is OFF)

6. Press Test / Reset to return to the display screen.

Note 1) Upon initial setting, P-99 is displayed on the screen. Here, use the Up/Down key to change it into P-00 and press Enter. You are now ready for setting.

Operation & setting method

Ground fault operating time setting

This is a function to set the operating time of ground fault.

	The DMPi main screen display (0.00A)
	1. Press Enter from the main screen. (A-gr)
	2. Press Enter from the A-gr screen. (1. PHR)
	3. Press the Up-key menu from the 1.PHR screen to proceed to 17.gt
	4. Press Enter from the 17.gt screen and the initial value 1.0sec will be displayed.
	5. Here, use the Up / Down key to set the value. Press Enter to save the setting. Note1)(1.0→0.1sec) ① Set by 0.1sec unit ranging from 0.1sec to 5.0sec; the default value is 1.0sec.
	6. Press Test / Reset to return to the display screen.

Note 1) Upon initial setting, P-99 is displayed on the screen. Here, use the Up/Down key to change it into P-00 and press Enter. You are now ready for setting.
Note 2) When the operating value of ground fault protection (16.gF) is set as OFF, it is excluded from the setting menu.

Ground fault delay time setting

This is a function to set time for blocking operation of the ground fault element upon motor activation.

	The DMPi main screen display (0.00A)
	1. Press Enter from the main screen. (A-gr)
	2. Press Enter from the A-gr screen. (1. PHR)
	3. Press the Up-key menu from the 1.PHR screen to proceed to 18.gd.
	4. Press Enter from the 18.gd screen and the initial value 200sec will be displayed.
	5. Here, use the Up / Down key to set the value. Press Enter to save the setting. Note1) (200→100sec) ① Set by 1sec unit ranging from 0sec to 200sec; the default value is 200sec.
	6. Press Test / Reset to return to the display screen.

Note 1) Upon initial setting, P-99 is displayed on the screen. Here, use the Up/Down key to change it into P-00 and press Enter. You are now ready for setting.
Note 2) When the operating value of ground fault protection (16.gF) is set as OFF, it is excluded from the setting menu.



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IMP Series

Intelligent Motor Protection Relays

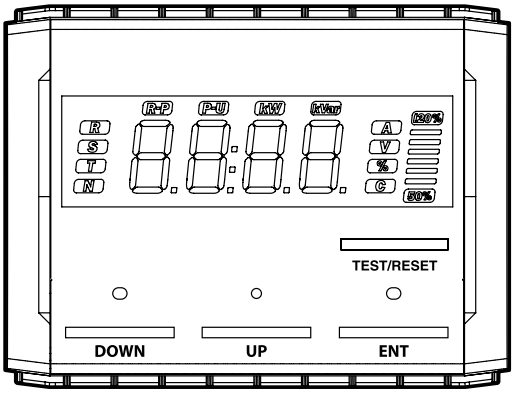
- Ground fault protection for both zero current/residual current
- Support rated current 0.12~100A without external current transformer
- Definite/inverse time selection and diverse protection factors
- Basic application of ground fault/instance protection
- Separation of the display part with the use of Cable
- MODBUS communication and 4~20mA DC output

Contents

62 Product characteristics
64 Rated specifications & model numbering system
65 Operation & setting method
69 Terminal configuration / Wiring & cable connection
70 Dimensions

Operation & setting method

1. Check the Test/Reset button



1) Check wires.
2) Note) While the motor is running, the Test/Reset key does not work.
3) Press again the Test/Reset key to reset the EMPR.

Note) While the motor is running, the Test/Reset key does not work.

2. Setting

1) Press the Enter key. Then “P-99” is displayed.
   Use the Up/Down keys to change the password.
2) Press the Enter key to enter A-gr setup mode.
   Use the Up/Down keys to select a group and Press the Enter key to enter the selected group. Press the Test/Reset key to move back to the previous mode.
3) In the A-Grp mode, Press the Enter key. Then “1.CHA” is displayed.
   Use the Up/Down keys to select an item and Press the Enter key to enter the selected item.
   Press the Test/Reset key to move back to the previous mode.
4) Use the Up/Down keys to set up the value and Press the Enter key to save it.

Note) When the power is supplied first or is resupplied after a power failure, must set up the date in b-gr, 5.S-d.
Set up the rated current S/W while the power is off.

3. Quick setup

1) Press the “Up and Enter” keys at the same time. “UPLD” is displayed and settings are uploaded to the display.
2) Insert the display to the body without settings, and then press the Test key to enter the test mode.
3) Press the “Down and Enter” keys at the same time. “TEST” is displayed and downloading is completed.
4) Press the Test key to return to the normal mode.

Note) Communication settings cannot be uploaded or downloaded.

4. Setting checkup

1) Press the Enter key.
2) Use the Up/Down keys to select a group and Press the Enter key to enter the selected group.
   Press the Test/Reset key to move back to the previous mode.
3) Use the Up/Down keys to select an item and Press the Enter key to enter the selected item.
4) Press the Enter key again to check settings.

5. Failure event checkup

1) Press the Up and Down keys at the same time to display “1.O-C” (recent failure events).

Note) When no failure events are stored, “1.non” is displayed.

2) Use the Up/Down keys to select an event and press the Enter key to go to the selected event.
3) The R-phased failure current is displayed. Every time the Down key is pressed, S-phased failure current, Tphased failure current, overload rate and date are displayed one after the other.
4) Press the Test/Reset key to move back to the previous mode.
5) Press the Up and Down keys at the same time to get out of the failure event checkup mode.

6. Forced thermal reset

When the system is tripped while it is in the thermal inverse time mode, if you want to turn the EMPR into the cold mode by resetting the motor’s heat amount, Press the Enter and Test/Rest keys at the same time.

* When a trip occurs due to the thermal excess current, if the motor is started right after it is reset, as the motor is hot, it is highly likely that the motor is tripped again.

Setting menu (A Group)

Group	Menu	Setting Value	Description	Default Value
A	1.CHA	dEF/th/n-th	Operation Characteristics (Definite/Thermal Inverse/Inverse)	n-th
	2.0-t	1~60s	Operation Time (sec)	60
	3.d-t	1~200s	Delay Time (sec)	If dEF
	4.r-C	0.5~10A/5~100A	Rated Current	Max. value
	5.Ctr	0.25, 0.5, 1~200 note 1)	CT Ratio (4 times, twice, once)	1
	6.Loc	Off, 200~800%	Lock Protection (sec)	Off
	7.StL	Off, 150~500%	Stall Protection (sec)	Off
	8.P-F	Off/On	Open Phase	Off
	9.P-U	Off, 10~70%	Unbalance Protection (%)	Off
	10.rP	Off/On	Reverse Phase	Off
	11.UC	Off, 30~90%	Under Current Protection (%)	Off
	12.gF	0ff, 0.03, 0.05/0.1~3A	Ground Fault Operation Current (Zero sequence CT) (A)	Off
	13.gn	Off, 20~500% (FLCmin) note 2)	Ground Fault Operation Current (Residual circuit) (FLCmin)	Off
	14.gt	0.05, 0.1~1.0s	Ground Fault Operation Time(sec)	-
	15.gd	On/Off	Ground Fault Delay During Start	On
	16.IC	Off, 500~1000%	Instantaneous Protection (%)	Off
	17.AL	I-tp, I-AL, ALo, U-C, OrH	07-08 Output setting (see the output information described below.)	I-tp
	18.Ar	On, 60~110/10% note 3)	07-08 Output setting (current or no current, and alarm)	On
	19.cS	1A1b, 2A, 2b	Contact (95-96, 97-98) Setting	1A1b

Note) 1. In case of CT ratio, rated current setting S/W is not displayed; in case of 100A product, 5.Ctr(CT) item is not displayed.
2. In case of 10A rating, it is possible to set to 0.1~2.5A; in case of 100A rating, it is possible to set to 1~25A.
3. No. 18 menu appears only if "ALo" is enabled in No. 17 menu.
(On: if a current is recognized, 07-08 contacts are displayed. 60~110%: if an on-load current value is higher than a set load factor, 07-08 contacts are displayed.)
4. No. 17 menu operation

17.AL Setting		Output conditions	Alarm display type	
			Motor operation	07-08
	I-tp	Detect instantaneous current	Motor stop	NC
	I-AL	Detect instantaneous current	Keep status	NC
	U-C	Detect on-load less than low current set value	Keep status	NC
	OrH	Set and display operating time	Keep status	NC
	ALo	Select 18.Ar setting	Comply with the set value of the No. 18 item	
18.Ar Setting		If ALo is set in the No. 17 menu	Motor operation	07-08
	On	Display on-load status(I > 0A)	Keep status	NC
	60~110%	On-load of current higher than a set value	Keep status	NC

19.cS Setting		Output conditions	Contact display type	
			95-96	97-98
	1A1b	Normal operation status	NC	NO
		Ground fault/leakage accident	NO	NC
		Failures including overcurrent, phase failure, reverse phase, and ground fault	NO	NC
	2A	Normal operation status	NO	NO
		Ground fault/leakage accident	NO	NC
		Failures including overcurrent, phase failure, reverse phase, and ground fault	NC	NO
	2b	Normal operation status	NC	NC
		Ground fault/leakage accident	NC	NO
		Failures including overcurrent, phase failure, reverse phase, and ground fault	NO	NC

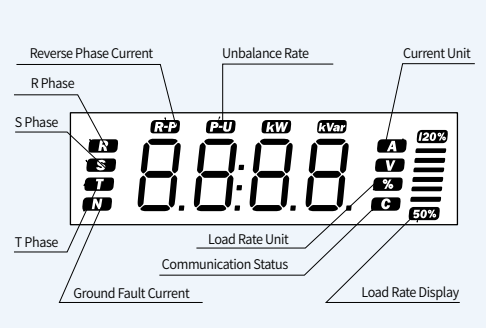
Setting menu (B Group)

Group	Menu	Setting Value	Description	Default Value
B	IE-r	On/Off	Electric Reset	On
	2A-r	Off, 1~20min	Automatic Reset (min)	Off
	3r-t	Hour/Minute	Run Time	Time Check
	4Srt	Off, 1~8760 time	Run Time Setup (Hour)	-
	5.S-d	2009/01.01/00:00	YY/MM/DD/ HH:MM (View/Setup)	-
	6.trt	Day/time : min	Total Run Time	Time Check
	At-d	0.5~10/5~100A	20mA Output settings	A420 model
	A.Adr	1~247	Communication address	M485 model
	b.bPS	96/192/384	Communication speed	
	c.S-P	On/Off	SWAP	

Note) 1. If power is first supplied or power is recovered after outage, make sure to enter date information (5.-sd).
2. Auto reset is applied only to overcurrent Trip.

Operation display

display	Description	Remark
O-C	Over current Trip	Operate within predefined time.
U-C	Under current Trip	Operate within 3 seconds
P-F	Open Phase Trip	Operate within 1.5 seconds when the unbalance rate is over 70%.
P-U	Unbalance Trip	Operate within 3 seconds. note 4)
Loc	Lock Trip	Operate within 0.5 seconds. note 4)
StL	stall Trip	Operate within 3 seconds.
r-P	Reverse Phase Trip	Operate within 0.1 second.
G-F	Ground Fault Trip	Operate within predefined time.
Sho	Instantaneous Trip	Operate within 0.05 seconds.
OrH	Elapsed Time (No Trip)	The operation time is reset when the Reset key is pressed.
CErr	Communication Fault between Body and Display (Press the ENTER/RESET key to return to the normal mode)	
uErr	Different program version between main body and display part (if this message appears, contact our company.)	



Note) kW, kVar, and V indicate the specification of the voltage models (under development).

Note) 1. The maximum allowable operating time of Loc function and reverse phase function is +50mSec.
2. Reverse phase function is detected for one second at the time of startup.
3. The allowable operating time of the instant function is +20mSec.
4. Inverse time: detect after O.t, Definite time: detect after D-t

7. IMP Specifications for low voltage 3-Phase induction motors (Reference)

Full Load Current for the Motor	IMP Settings			External CT	Motor Output (Less than kW)		
	Current Selection S/W	Wire Tunnel	CT ratio		220V	380V	440V
0.7A or less	0.5~10A	4 times	0.25	-	0.1	0.18	0.2
0.7~1.6A		Twice	0.5	-	0.25	0.55	0.6
1.6~8A		Once	1	-	1.5	3	3.7
7~100A	5~100A	Once	1	-	25	45	55
90~120A	0.5~10A	Once	30	SCT-150	30	55	55
120A~160A		Once	40	SCT-200	45	75	90
160~240A		Once	60	SCT-300	55	110	132
240~320A		Once	80	SCT-400	90	160	160
320~400A		Once	100	500 : 5	110	200	200
400~480A		Once	120	600 : 5	132	250	250
480~640A		Once	160	800 : 5	160	320	320

Note) 1. This table is written based on the full load current.
2. The CT is selected as a reference for the EMPR's current setting range.

8.Analog (DC 4~20mA) output

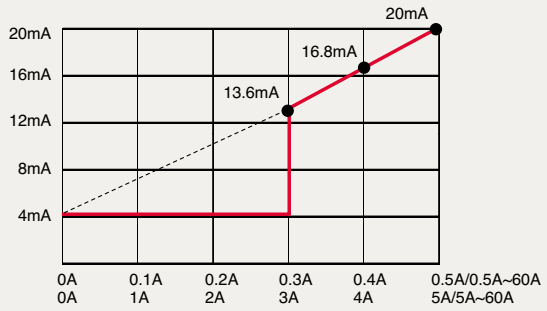
1) The biggest current out of measured 3-phase currents is converted into DC 4mA~20mA and the current measured remotely by digital meter can be displayed.
2) When there is no current, 4mA is sent. If the current goes beyond the predefined value, 20mA is sent.

$$\text{• Output Current} = \frac{16\text{mA} \times \text{Load Current} + 4\text{mA (Settings are changed in A.t-d of b-gr)}}{\text{Setting}}$$

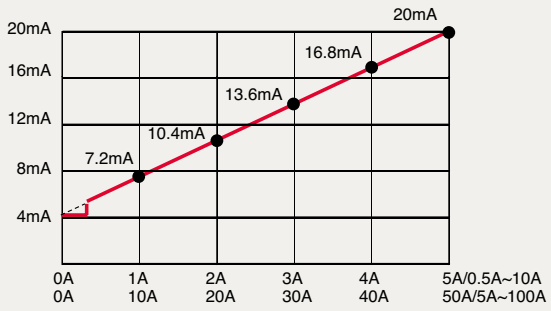
3) When the system is the 0.5A~10A setting mode, measurement starts from 0.3A. When the system is the 5A~100A setting mode, measurement starts from 3A. Thus, when the current is under 0.3A (3A), 0A is measured and output is 4mA. (To measure the load current correctly, an appropriate CT should be used).

Note) The allowable burden is less than 500Ω. Considering the receiver resistance (usually 250Ω) and track resistance), the shielding cable should be used.

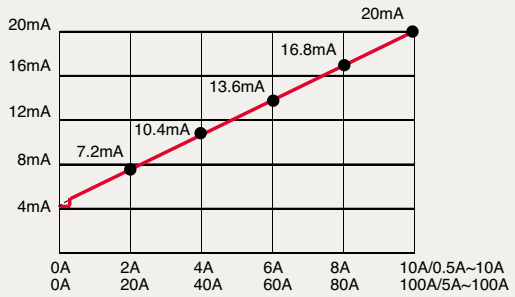
Analogue output when the output is set to be 0.5A (5A)



Analogue output when the output is set to be 5A (50A)



Analogue output when the output is set to be 10A (100A)



Innovative Upgrade of Motor Control Panel!

More compact and Safer! We implement perfect motor protection.



- Power, Voltage, Current (measurement error: 1%)
- Power, Voltage, Current, Power Factor Protection
- Harmonic measurement (1st to 16th)
- Diverse motor starting types
  (Full voltage, Y-D, Reversible, Reactor, Inverter Starting)
- Modbus communication and 4~20mA

One model with various motor starting types

One S-EMPR model is applicable to various motor staring types, such as full voltage starting, Y-△ starting, reversible staring, Reactor starting, and Inverter starting.

A variety of SCADA functions based on sequence structure

With a simple sequence, it is possible to not only control local operation panel (LOP) and MCC panel, but conduct Supervisory Control And Data Acquisition through SPLC or DCS based auto operation and communication.



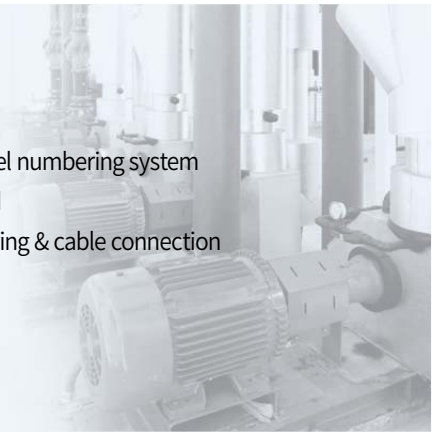
MMP Series

Smart Electronic Motor Protection Relays

- Current, Voltage, Power Measurement and Power Factor Protection
- Instantaneous interruption compensation and restarting
- Harmonic measurement (1st to 16th)
- Modbus communication and 4~20mA

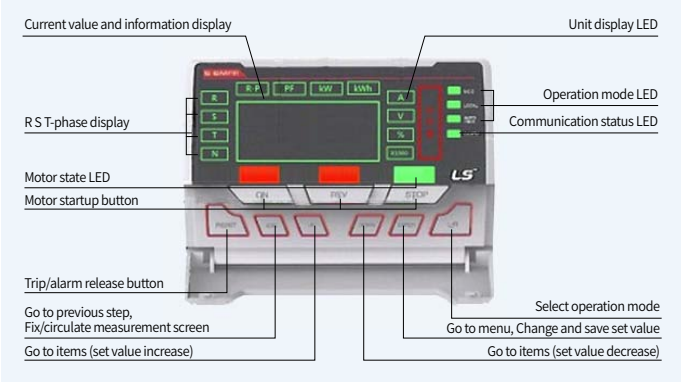
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83 Rated specifications & model numbering system
84 Operation & setting method
96 Terminal configuration / Wiring & cable connection
103 Dimensions



MMP-CB/CM/PB/PM/SB/SM-10/100 Model

Before starting the motor, proceed as follows :



1. Connect the display unit to the main unit of the device and then turn on. Verify that Power LED is switched on and the measurement screen is displayed.

1) Verify the operations of ON, REVand STOP keys which are used to control motor starting. Press ON key and then the red LED above the key is switched on and motor on signal is issued .
Press STOP key and then the green LED above the key is switched on and motor on signal is stopped .
Note) REV key is activated when the motor control is set to reverse starting mode.

2) Verify the operations of a mode control key. Each time pressing L / R key the control mode changes : MCC → AUTO → REMOTE → COM

3) When the device is booted up the measurement screen is display by default. Pressing Enter key allows to access the modes : Group → Menu → Setting value. Press Esc key to return to the previous mode.
Use Up & Down keys to change values in the screens of Measurement, Group, Menu, Setting. When the relay / alarm operates press Reset key to reset.
Note) refer to a manual for the details.

2. Verify the operations of Test function and Reset key through trip.

1) Verify the wiring first. Press Enter key to access Group menu, and use Up / Down keys to access B Group as shown "b-gr" and press Enter to access Menu with displaying "1.Loc". Use Up / Down keys to access "6.r-p" which denotes Phase reveral menu, and press Enter to access "CHEC" which denotes Setting value, and press Enter to view current wiring information.
Note) 1. The phase information is displayed only when current is applied. If there is no current "---" is displayed.
2. Voltage wiring information is available via "c-gr" (C group) → "8.urp" (Voltage phase reveral settings) → "CHEC" → Pressing Enter Key. The phase information is available when a voltage is applied.

2) Turn on the motor and access "d-gr" which denotes D group and move to "tESt" menu using Up / Down keys and press Enter to access Fault items. Select the desired Fault item and press Enter to trip the device.

3) Press Reset key to reset the device and return to the measurement screen.
Note) In the first access to change a parameter "P-99" for password input is displayed. Press Up key to change it to "P-00" and press Enter and then Setting change is allowed. If there is no input for 2 minutes it returns to the measurement screen.

3. Check the settings.

1) At normal state pressing Enter key access mode "A-gr" which enables setting. Select the desired group using the Up / Down keys and press Enter key to enter the desired group. To enter previous mode, press the Esc key.

2) The desired group displays from No. 1 menu. Select the desired menu using the Up / Down keys and press Enter key to enter the setting mode. To enter previous mode, press the Esc key.

3) Press Up / Down keys in the setting screen and then "P-99" is displayed. Press Up / Down keys to change the password to "P-00" and press Enter to release it. After that select the desired value and press Enter to save the setting.
Note) Enter the date exactly when the power is turned on for the first time or recovered after the outage.

Menu List (MMP-CB/CM/PB/PM-10/100)

A-group

Group	Menu	Description	Setting range	Default
A	1.PHA	Single-phase / 3-phase	1P/3P	3P
	2.5-F	Frequency	50/60	60
	3.CHA	Characteristics (Over Current Protection)	Off/dEF/th/n-th Note 1)	n-th
	4.0-t	Operating time	1~60sec (5/10/20/30/60)	60
	5.d-t	Time Delay	1~200sec	200
	6.r-C	Rated current (10, 100)	0.5~10/5~100	10
	7.Ctr	CT ratio Note 2)	0.25/0.5/1~200	1
	8.drU	Starting mode	dir/y-d/F-r/Ind/lut	dir
	9.d-t	Y start time (lut start time)	1~120sec (lut : 0.1~1sec)	5 (0)
	10.Yd	Y-D switching time	0.05/0.1/0.2	0.2
	11.St	Outage compensation time	Off/1~30sec	Off
	12.Sd	Restart time	0~300sec	0

Note) 1. Operating characteristic th denotes inverse-time curve with thermal-memory and n-th denotes inverse-time curve without thermal-memory .
2. For the 100A type there is no CT ratio as it is fixed as 1.
3. Some menu are not disabled depending on the related setting.
4. Phase reversal mode needs to be switched on only during test starting, or verify wiring via wiring CHEC function. it is recommended to turn off during normal running, .
(An error on phase reversal may occur due to noise.)

B-group

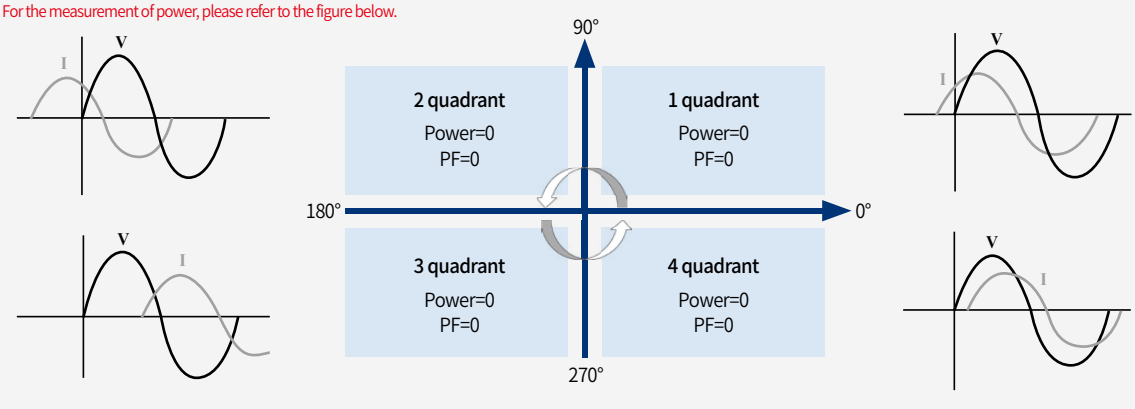
Group	Menu	Description	Setting range	Default
B	1.Loc	LOCK	Off/200~800%	Off
	2.StL	STALL	Off/150%~500%	Off
	3.P-F	Phasee loss (current)	On/Off	On
	4.P-U	Phasee unbalance (current)	Off/30~70%	Off
	5.Pdt	Phasee loss / unbalance Time-delay	0~200sec	0
	6.r-P	Phase reversal (current)	Off/On/CHEC Note 1)	Off
	7.Crt	Phase reversal operation time	0.1~1.0sec	0.1
	8.U-C	Undercurrent	Off/30~90%	Off
	9.Ect	ZCT selection (PC mV, 1.5mA)	100/1.5 Note 2)	Enbd
	10.9F	Ground fault (Zero-phase)	Off/0.03/0.05/0.1~3.0	Off
	11.9n	Ground fault (Residual current)	Off/30~100%	Off
	12.9t	Ground fault operation time	0.05~3.0sec	3.0
	13.9d	Phase unbalance delay time	0~00sec	60
	14.I C	Intance	OFF/10A type : ~100A Note3) /100A type : ~800A, 100A or more: using external CT	OFF
	15.AL	Output contact method	ALL I-tp, ALo, U-C, OrH Note4)	
	16.Ar	Current Y / N, Alarm	ON/60~110%	
	17.th	THD (voltage)	0~100%	

Note) 1. When CHEC set value of negative sequence item is selected, additional wire information is displayed.
2. ZCT selection is set depending on whether company dedicated product or universal product in the market is used.
3. Tolerance guarantee scope for 10A type: ~100A/100A type: 600A for 50Hz, 720A for 60Hz
4. I-tp: Instantaneous trip, Circuit breaker trip (interlocked), Alo: Current alarm setting, U-C: When operating under low current factor, OrH: When the motor consecutive operating time is over the set value and when ALL is set, output (AUX-C3) will be released at the time of all current relay factor (including I-tp) operation.

C-group : Menu for power type activation

Group	Menu	Description	Setting range	Default
C	1.r-u	Rated voltage (line to line)	110~480	380
	2.O-u	Over voltage	Off/105~130%	Off
	3.O-t	Over voltage operation time	1~30sec	30
	4.U-u	Under voltage	Off/50~95%	Off
	5.U-t	Under voltage operation time	1~30sec	30
	6.uPF	Phasee loss (voltage)	Off/On	Off
	7.uPU	Unbalance (voltage)	Off/5~40%	Off
	8.rP	Phase reversal (voltage)	Off/On/CHEC	Off
	9.rt	Phase reversal operation time	0.1~1.0sec	1
	10.nP	Rated power	0.1~999.9KW	999.9
	11.OP	Over power	Off/100~800%	Off
	12.Pt	Over power operation time	1~100sec	100
	13.UP	Under power	Off/20~100%	Off
	14.Pt	Under power operation time	1~100sec	100
	15.OF	Over power factor	Off/0.20~1.00	Off
	16.Ft	Over power factor operation time	1~30sec	30
	17.UF	Under power factor	Off/0.20~1.00	Off
	18.Ft	Under power factor operation time	1~30sec	30
	19.ry	Relay output selection	u-AL/u-tP	u-tP
	20.1P	Reactive power (meter)	0~999.9 Mvar	Unit : Kvar
	21.1h	Free Power Amount	0~999.9 Mvah	Unit : Kvah
	22.th	THD (Free Power Amount)	0~100%	Unit : %

Note) 1. For the measurement of power, please refer to the figure below.



D-group

Group	Menu	Description	Setting range	Default
D	1trt	Total running time	0~9999day / 0~23h / 0~59m	-
	2r-t	Running time	0~9999h /	-
			0~59m	
	3Srt	Running time setting	Off/10~8760	Off
	4CCh	Contactor check	Off/On	Off
	5S-d	Date note 1)	2013~2100y	2014
			/ 1~12 (Mon), 1~31 (Day)	01.01.
			/ 0~23h, 0~59m	0:00
	6CCC	Contactor counter note 2)	-	-
	7FLt	Fault cause check note 3)	1. The most recent	-
			2. The 2nd. recent	
			3. The 3rd. recent	
			4. The 4th. recent	
			5. The 5th. recent	
	8A-r	Automatic reset time note 4)	OFF / 1~20m	Off
	9r-n	Automatic reset number	Off/1~5	Off
		Set number of times		
	10Ad	Communication address note 5)	1~247	247
	11bS	Communication speed note 5)	9.6/19.2/38.4K	9.6K
	12SP	Swap note 5)	On/Off	Off
	13Pr	Parity setting note 5)	nonE/odd/EUEn	nonE
	14td	20mA setting note 5)	0.5~10/5~100	10/100
	rSt	Stored data deletion	All : for all subparameters	-
			A-P : active energy	
			rA-P : reactive energy	
			trt : total running time	
			CCC : contactor counter	
			CALo : calories	
			FALt : fault events	
	tESt	Operation test	o-L : overcurrent test	-
			o-U : overvoltage test	
			g-F : ground fault test	
			I-C : instantaneous test	

Note) 1. When power is supplied for the first time or recovered after blackout, date information (5.S-d) should be set up to enter the year, month, date, hour and minute.
2. The date setting can be stored after filling up month, day, hour and minute.
3. The trip cause can be stored up to 5 recent events and then the oldest event is deleted first.
4. Automatic recovery activates only in case of trip due to overload.
5. 10.Ad, 11.bs, 12.SP, 13.Pr, 14.td are available for communication type products.
6. Data clear and test can be inputted in the normal state, and test items can be viewed while a motor is switched on.

Operation & setting method

Menu List (MMP-SB/SM-10/100)

A-group

Group	Menu	Description	Setting range	Default
A	1.PHA	Single-phase / 3-phase	1P/3P	3P
	2.5-F	Frequency	50/60	60
	3.CHA	Characteristics (Over Current Protection)	Off/dEF/th/n-th Note 1)	n-th
	4.0-t	Operating time	1~60sec (5/10/20/30/60)	60
	5.d-t	Time Delay	1~200sec	200
	6.r-C	Rated current (10, 100)	0.5~10/5~100	10
	7.Ctr	CT ratio Note 2)	0.25/0.5/1~200	1
	8.drU	Starting mode	dir/y-d/F-r/Ind/lut	dir
	9.d-t	Y start time (lut start time)	1~120sec (lut : 0.1~1sec)	5 (0)
	10.Yd	Y-D switching time	0.05/0.1/0.2	0.2
	11.St	Outage compensation time	Off/1~30sec	Off
	12.Sd	Restart time	0~300sec	0

Note) 1. Operating characteristic th denotes inverse-time curve with thermal-memory and n-th denotes inverse-time curve without thermal-memory .
2. For the 100A type there is no CT ratio as it is fixed as 1.
3. Some menu are not disabled depending on the related setting.
4. Phase reversal mode needs to be switched on only during test starting, or verify wiring via wiring CHEC function. it is recommended to turn off during normal running, .
(An error on phase reversal may occur due to noise.)

B-group

Group	Menu	Description	Setting range	Default	Remarks
B	1.Loc	LOCK	Off/200~800%	Off	
	2.StL	STALL	Off/150%~500%	Off	
	3.P-F	Phasee loss (current)	On/Off	On	✓
	4.P-U	Phasee unbalance (current)	Off/30~70%	Off	✓
	5.Pdt	Phasee loss / unbalance Time-delay	0~200sec	0	✓
	6.r-P	Phase reversal (current)	Off/On/CHEC Note 1)	Off	✓
	7.Crt	Phase reversal operation time	0.1~1.0sec	0.1	✓
	8.U-C	Undercurrent	Off/30~90%	Off	
	9.Ect	ZCT selection (PC mV, 1.5mA)	100/1.5 Note 2)	Enbd	
	10.GF	Ground fault (Zero-phase)	Off/0.03/0.05/0.1~3.0	Off	
	11.Gn	Ground fault (Residual current)	Off/30~100%	Off	✓
	12.Gt	Ground fault operation time	0.05~3.0sec	3.0	
	13.Gr	Selective ground fault(SGR) current setting	Off/0.03/0.05/0.1~3.0	Off	
	14.GU	Selective ground fault(SGR) voltage setting	8~80V	80	
	15.GA	Selective ground fault(SGR) reference angle setting	0~90 angular measure	0	
	16.Gt	Selective ground fault(SGR) operating time	0.05~3.0sec.	3.0	
	17.Gd	Ground fault Time-delay(Ground fault, SGR)	0~200sec	60	
	18.IC	Instantaneous protection	Off/500~5000% Note 3)	Off	
	19.AL	Output contact method	I-tp, ALo, U-C, OrH Note 4)	I-tp	
	20.Ar	Current Y / N, Alarm	On/60~110%	On	
	21.oG	Ground fault Overvoltage	Off/8~80V	Off	
	22.ot	Operating time	0.05~3.0sec	3.0	
	23.ry	Relay output selection	u-AL, AtP	u-AL	
	24.th	THD (voltage)	0~100%	Unit : %	

Note) 1. If CHEC set value of reverse phase is selected, wiring information additionally appears.
2. ZCT is selected differently depending on whether to use our product or other universal products.
3. Tolerance guarantee scope for 10A type: ~100A/100A type : 600A for 50Hz, 720A for 60Hz
4. I-tp: Instantaneous trip, circuit breaker trip(interaction), Alo: instantaneous alarm, U-C: in case of low-current operation, OrH: if a motor's continuous operating time is higher than a set value In case of ATP setting, when all current relay factors (including I-tp) work, output (AUX-C3) appears.
5. No support is given for a single-phase motor.

D-group

Group	Menu	Description	Setting range	Default
D	1trt	Total running time	0~9999day / 0~23h / 0~59m	-
	2r-t	Running time	0~9999h /	-
			0~59m	
	3Srt	Running time setting	Off/10~8760	Off
	4CCh	Contactor check	Off/On	Off
	5S-d	Date note 1)	2013~2100y	2014
			/ 1~12 (Mon), 1~31 (Day)	01.01.
			/ 0~23h, 0~59m	0:00
	6CCC	Contactor counter note 2)	-	-
	7FLt	Fault cause check note 3)	1. The most recent	-
			2. The 2nd. recent	
			3. The 3rd. recent	
			4. The 4th. recent	
			5. The 5th. recent	
	8A-r	Automatic reset time note 4)	OFF / 1~20m	Off
	9r-n	Automatic reset number	Off/1~5	Off
		Set number of times		
	10Ad	Communication address note 5)	1~247	247
	11bS	Communication speed note 5)	9.6/19.2/38.4K	9.6K
	12SP	Swap note 5)	On/Off	Off
	13Pr	Parity setting note 5)	nonE/odd/EUEn	nonE
	14td	20mA setting note 5)	0.5~10/5~100	10/100
	rSt	Stored data deletion	All : for all subparameters	-
			trt : total running time	
			CCC : contactor counter	
			CALo : calories	
			FALt : fault events	
	tESt	Operation test	o-L : overcurrent test	-
			g-F : ground fault test	
			I-C : instantaneous test	

Note) 1. When power is supplied for the first time or recovered after blackout, date information (5.S-d) should be set up to enter the year, month, date, hour and minute.
2. Switch count is counted up to 65,000, and it resets once it reaches the limit.
3. Up to 5 trip causes are saved, and the oldest data is overwritten when a new entry is saved.
4. Automatic recovery activates only in case of trip due to overload.
5. 10Ad, 11.bs, 12.SP, 13.Pr and 14.td can be set only at communication type product.
6. Data clear and Test can be normally inputted only during NORMAL, and TEST item can be checked only when the motor is ON.

4. Up & downloading of all settings once (Quick setup)

1) Press Up and Enter keys at the same time at the status of normal, MCC mode and motor stop,
then "UPLd" begins to flash on the screen which denotes the setting values of the device are being uploaded in the display unit
and "U.END" is displayed when completed. Press Enter key to return to the measurement screen.

2) After installing the uploaded display unit onto the device that is not set yet, press Down and
Enter keys at the same time at the status of normal, MCC mode and motor stop,
then "dnLd" begins to flash on the screen which denotes the setting values of the display unit
are being downloaded in the device and "d.END" is displayed when completed.
Press Enter key to return to the measurement screen.

Note) 1. Up & downloading is available between the same models. If the models are different each other an error occurs with "d.Err" message.
2. Up & downloading of date, running time and fault cause are not available.

5. Checking fault history

1) Press Esc and Enter keys at the same time in the measurement screen,
then the most recent fault cause in #7 menu of D-group is displayed.
Note) If there is no fault history "1.non" is displayed.

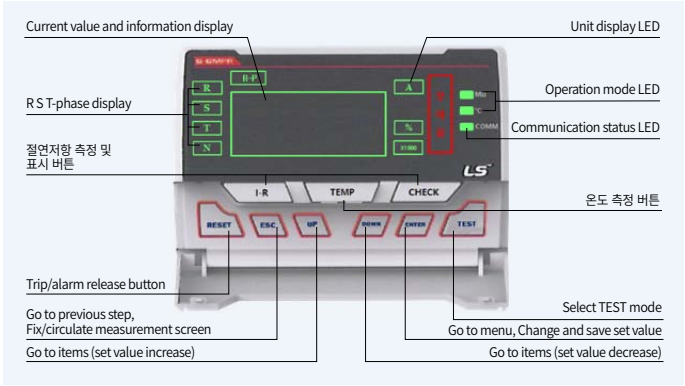
2) Use Up and Down keys to move to the desired one out of 5 fault events and select by pressing Enter key.
3) The fault current of phase R is displayed. Each time pressing the down key following informations are displayed in turn :
fault current of phase S / fault current of phase T / overload ratio / date
4) To enter the previous mode, press Esc key.
5) Press Esc and Enter keys at the same time to return to the measurement screen.

6. Forced reset of thermal memory

Press Esc and Stop keys at the same time to make the tripped motor become a cold state by force
when operating characteristic is set to inverse-time curve with thermal-memory (th).
If a motor is tripped due to overcurrent the immediate pressing of reset key at the hot state of the motor causes immediate tripping.
To avoid it reset via pressing Esc and Stop keys at the same time which makes the motor cold state.

MMP-IR-10/100 Model

Before starting the motor, proceed as follows :



1. Connect the display unit to the main unit of the device and then turn on. Verify that Power LED is switched on and the measurement screen is displayed.

1) Press and hold I-R Key and CHECK key simultaneously for 3 seconds to measure insulation resistance value of the motor. Insulation resistance is measured for 60 seconds and the measurement value is displayed.
Note) When the motor is operating, insulation resistance cannot be measured.

2) If TEMP key is pressed, temperature value measured is displayed.

3) When the device is booted up the measurement screen is display by default. Pressing Enter key allows to access the modes : Group → Menu → Setting value. Press Esc key to return to the previous mode.
Use Up & Down keys to change values in the screens of Measurement, Group, Menu, Setting. When the relay / alarm operates press Reset key to reset.
Note) refer to a manual for the details.

2. Verify the operations of Test key and Reset key through trip.

1) Verify the wiring first. Press Enter key to access Group menu, and use Up / Down keys to access B Group as shown "b-gr" and press Enter to access Menu with displaying "1.Loc". Use Up / Down keys to access "6.r-p" which denotes Phase reveral menu, and press Enter to access "CHEC" which denotes Setting value, and press Enter to view current wiring information.
Note) 1. The phase information is displayed only when current is applied. If there is no current "---" is displayed

2) If TEST key is pressed "TEST" appears at the screen and the device is Tripped.

3) Press Reset key to reset the device and return to the measurement screen.
Note) In the first access to change a parameter "P-99" for password input is displayed. Press Up key to change it to "P-00" and press Enter and then Setting change is allowed. If there is no input for 2 minutes it returns to the measurement screen.

3. Check the settings.

1) At normal state pressing Enter key access mode "A-gr" which enables setting. Select the desired group using the Up / Down keys and press Enter key to enter the desired group. To enter previous mode, press the Esc key.

2) The desired group displays from No. 1 menu. Select the desired menu using the Up / Down keys and press Enter key to enter the setting mode. To enter previous mode, press the Esc key.

3) Press Up / Down keys in the setting screen and then "P-99" is displayed. Press Up / Down keys to change the password to "P-00" and press Enter to release it. After that select the desired value and press Enter to save the setting.
Note) Enter the date exactly when the power is turned on for the first time or recovered after the outage.

Operation & setting method

Menu List (MMP-SB/SM-10/100)

A-group

Group	Menu	Description	Setting range	Default
A	1.PHA	Single-phase / 3-phase	1P/3P	3P
	2.5-F	Frequency	60	60
	3.CHA	Characteristics (Over Current Protection)	Off/dEF/th/n-th Note 1)	n-th
	4.0-t	Operating time	1~60sec (5/10/20/30/60)	60
	5.d-t	Time Delay	1~200sec	200
	6.r-C	Rated current (10, 100)	0.5~10/5~100	10
	7.Ctr	CT ratio	0.25/0.5/1~200 Note 2)	1
	8.1-r	Insulation resistance	n-c/Off/1/5/10/20	Off
	9.tEP	Temperature	n-c/Off/50~150°C (1°C Step)	Off
	t.CAL	Temperature compensation	0~50°C (1°C Step)	25

Note) 1. Operating characteristic th is the characteristic for thermal heat build-up type inverse time, and n-th is the characteristic for thermal heat non build-up type inverse time.
2. In case of 100A TYPE model, CT ratio is not indicated and fixed as 1.
3. Some menus are not displayed depending on function settings.

B-group

Group	Menu	Description	Setting range	Default	Remarks
B	1.Loc	LOCK	Off/200~800%	Off	
	2.StL	STALL	Off/150%~500%	Off	
	3.P-F	Phasee loss (current)	On/Off	On	
	4.P-U	Phasee unbalance (current)	Off/30~70%	Off	✓
	5.Pdt	Phasee loss / unbalance Time-delay	0~200sec	0	✓
	6.r-P	Phase reversal (current)	Off/On/CHEC Note 1)	Off	✓
	7.Crt	Phase reversal operation time	0.1~1.0sec	0.1	✓
	8.U-C	Undercurrent	Off/30~90%	Off	✓
	9.Ect	ZCT selection (PC mV, 1.5mA)	100/1.5 Note 2)	Enbd	
	10.9F	Ground fault (Zero-phase)	Off/0.03/0.05/0.1~3.0	Off	
	11.9n	Ground fault (Residual current)	Off/30~100%	Off	
	12.9t	Ground fault operation time	0.05~3.0sec	3.0	✓
	13.9d	Ground fault Time-delay	0~200초	60	
	14.IC	Instantaneous protection	Off/10A type: ~100A, 100A type: ~800A, 100A or more: using external CT Note 3)	Off	
	15.AL	Output contact method	I-tp, I-AL, Alo, U-C, OrH, tEP, Ir, IrtE Note 4)	I-세	Refer to contact output information
	16.Ar	Current Y / N, Alarm	On/60~110%	On	Refer to contact output information
	17.th	THD (Voltage)	0~100%	Unit :%	

Note) 1. When CHEC set value of negative sequence item is selected, additional wire information is displayed.
2. ZCT selection is set depending on whether built in ZCT or external ZCT is used.
3. Tolerance guarantee scope for 10A type: ~100A/100A type : 600A for 50Hz, 720A for 60Hz
4. I-tp: Instantaneous trip, Circuit breaker trip (interlocked), I-AL: Instantaneous alarm, Alo: Current alarm setting, U-C: When low current factor works, OrH: When continuous motor operating hour is over the set value, tEP: Alarm when temperature is over the set value, Ir: Alarm when the value is below insulation resistance value set, IrtE: Alarm when temperature is over the set value or insulation resistance is below the set value.
5. Menu 16 is displayed only when "Alo" is set at menu 15.

Contact output information

15.AL setting		Output condition	Alarm output type	
			Motor operation	07-08
	I-tp	Detection of instantaneous current	Motor stop	NC
	I-AL	Detection of instantaneous current	Maintain status	NC
	U-C	Detection of current carrying below low current set value	Maintain status	NC
	OrH	Operating time setting and output	Maintain status	NC
	Alo	Select 18.Ar setting	Follows setting at item 16	
	tEP	Exceeding set temperature	Maintain status	NC
	Ir	Detection of insulation resistance below set value	Maintain status	NC
	IrtE	In case of irregularity with temperature or insulation resistance	Maintain status	NC
16.Ar setting		In case Alo is set at item 15	Motor operation	07-08
	On	Output of current carrying (I>0A) status	Maintain status	NC
	60~110%	Current carrying of over the set value	Maintain status	NC

C-group

Group	Menu	Description	Setting range	Default
C	1trt	Total operating hour	0~9999day/0~23hr/0~59min	-
	2r-t	Operating hour	0~9999hr	-
			0~59min	
	3.Srt	Setting of operating hour	Off/10~8760	Off
	4.S-d	Date setting Note1)	2019~2100	2019
			1~12Month, 1~31f day	01.01.
			0~23hr, 0~59min	0:00
	5.FLt	Checking reason of failure	-	-
	6.A-r	Automatic recovery Note2)	Off/1~20min	Off
	7r-n	Restriction of restart	Off/1~5	Off
	8.Ad	Communication address	1~247	247
	9.bS	Communication speed	9.6/19.2/38.4K	9.6K
	10.SP	Swap or not	On/Off	Off
	11.Pr	Parity setting	nonE/odd/EUEn	nonE
	12.td	Setting of 20mA	0.5~10/5~100	10/100
	rSt	Deleting stored data Note3)	All the lower level items	-
			trt : Total operating hour	
			CALo : Heat quantity	
			FALt : Failure event	

Note) 1. In case power was supplied for the first time or recovered after blackout, date information (5.S-d) should be set up to enter the year, month, date, hour and minute.
2. Automatic recovery activates only in case of trip due to overload.
3. Data clear can be inputted normally only during NORMAL.

4. Up & downloading of all settings once (Quick setup)

1) When Up key and Enter key are pressed at the same time in the normal status or motor STOP status, “UpLd” blinks at screen and set value of main body is saved at display, and “U.End” is displayed after completion of saving. At this time, if Enter Key is pressed for confirmation, screen returns to measurement mode.

2) If Down key and Enter key are pressed at the same time in the normal status or motor STOP status, “dnLd” blinks at screen and set value of display is saved at main body, and “d.End” is displayed after completion of downloading. At this time, if Enter Key is pressed for confirmation, screen returns to measurement mode

Note) 1. Up & downloading is available between the same models. If the models are different each other an error occurs with "d.Err" message.
2. Up & downloading of date, running time and fault cause are not available.

5. Checking fault history

1) Press Esc and Enter keys at the same time in the measurement screen,
then the most recent fault cause in #7 menu of D-group is displayed.
Note) If there is no fault history "1.non" is displayed.

2) Use Up and Down keys to move to the desired one out of 5 fault events and select by pressing Enter key.
3) The fault current of phase R is displayed. Each time pressing the down key following informations are displayed in turn :
fault current of phase S / fault current of phase T / overload ratio / date
4) To enter the previous mode, press Esc key.
5) Press Esc and Enter keys at the same time to return to the measurement screen.

6. Forced reset of thermal memory

Press Esc and CHECK keys at the same time to make the tripped motor become a cold state by force
when operating characteristic is set to inverse-time curve with thermal-memory (th).
If a motor is tripped due to overcurrent the immediate pressing of reset key at the hot state of the motor causes immediate tripping.
To avoid it reset via pressing Esc and CHECK keys at the same time which makes the motor cold state.

Fault cause information

Screen		Fault cause	Additional information
Current	O-L	Overcurrent	phase, load rate, time
	LOC	Lock	phase, load rate, time
	StL	Stall	phase, load rate, time
	P-F	Phasee loss	phase, unbalance rate, time
	P-U	Phasee unbalance	phase, unbalance rate, time
	r-P	Phase reversal	time
	U-C	Undercurrent	phase, load rate, time
	Sho	Instantaneous	phase, load rate, time
	G-F	Ground fault (ZCT)	phase and neutral, time
	G-n	Ground fault (Residual)	phase and neutral, time
Voltage	O-u	Overvoltage	phase, rate, time
	U-u	Undervoltage	phase, rate, time
	uPF	Phasee loss	phase, unbalance rate, time
	uPU	Phasee unbalance	phase, unbalance rate, time
	urP	Phase reversal	time
Voltage	O-P	Overpower	phase voltage, rate, time
	U-P	Underpower	phase voltage, rate, time
	OPF	Over power factor	phase voltage, rate, time
	UPF	Under power factor	phase voltage, rate, time
Others	EtP	External input trip	time
	Err.1	Error.1 occured	Current detected after motor off
	Err.2	Error.2 occured	No current detected after motor on
	Err.3	Error.3 occured	For / Rev starting signal input at the same time in local / auto mode
	Err.4	Error.4 occured	External storage memory error
	OrH	Running hour over	Alarm occurs when accumulated running hour is over the setting value
	tAP	Temperature over the set degree	
	u Ir	In case insulation resistance below set value is measured	
	AcOn	In case measurement of insulation resistance is attempted during operation	
	L InE	Display comm. error	Comm. error occur between display unit and device. ※ Please contact us.
	Ex) 1.0 1.0	Version check	Press Reset+Esc keys in normal state

Digital motor protection control device is suited for multiple motor starting method with a single model



IMC-III

Intelligent Motor Controller

- 1 model can be used on various motor start methods
- Wide range of protection functions
- Variety of remote surveillance control functions according to the sequence structure

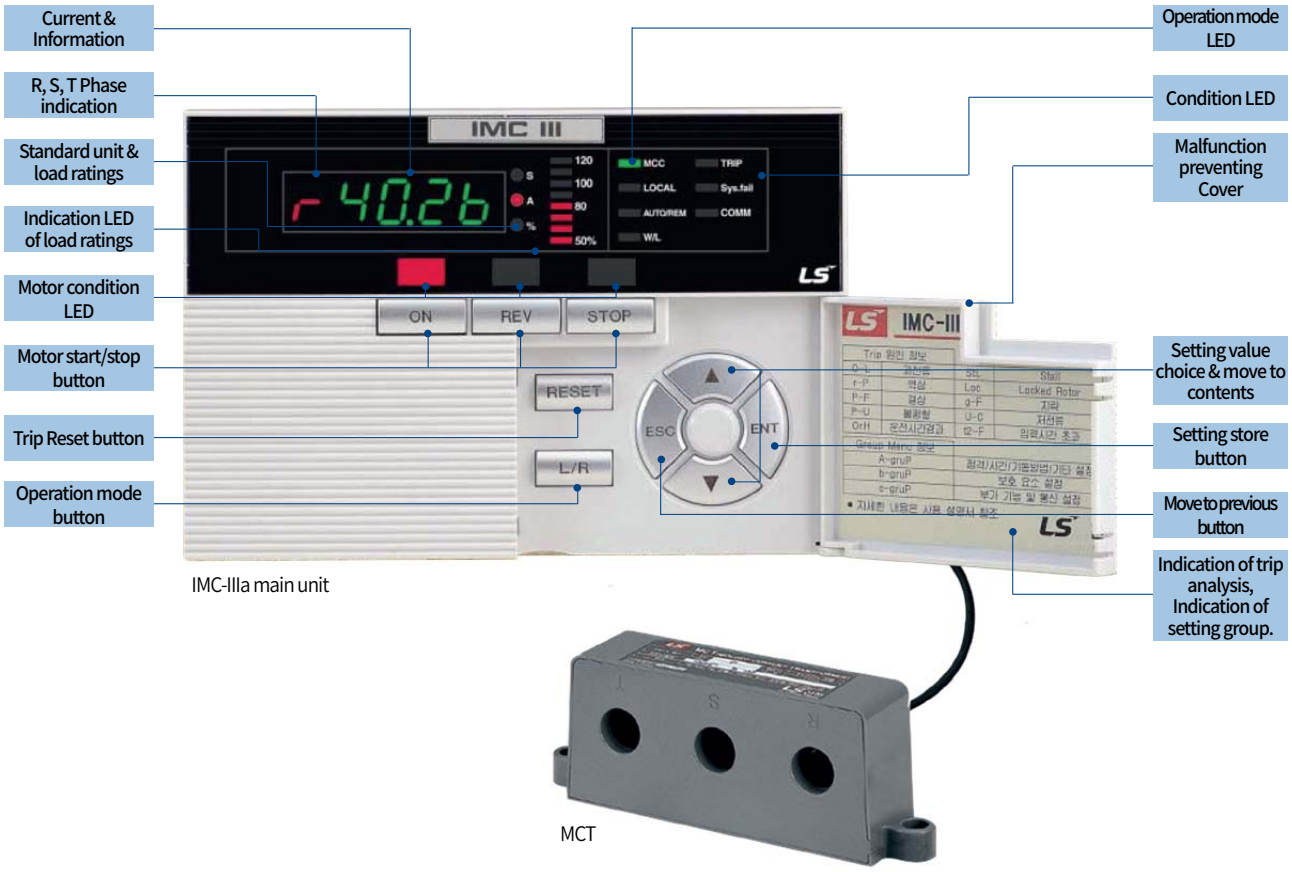
Contents

108 Product characteristics
113 Rated specifications & model numbering system
114 Operation & setting method
118 Wiring & cable connection
122 Dimensions

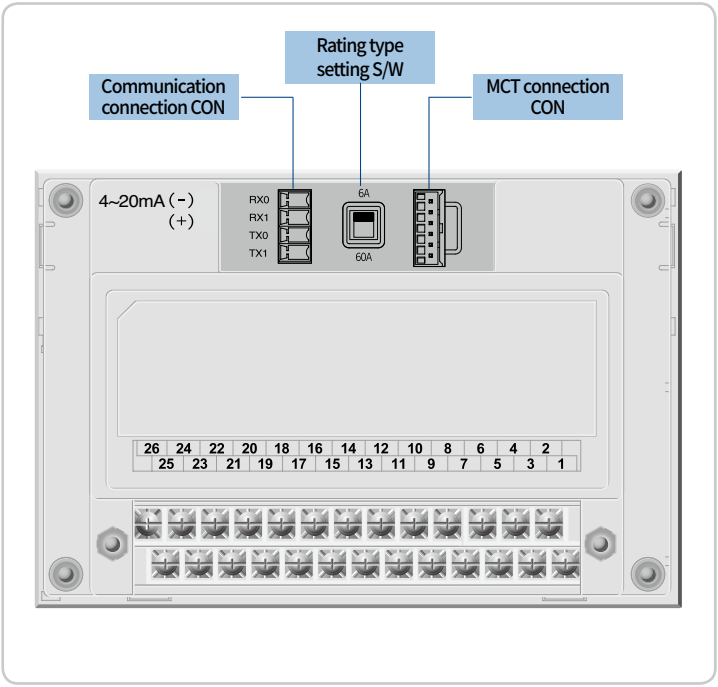


Operation & setting method

Display configuration



Rear view



Setting method

① The first stage will be indicated maximum current in znormal condition

② When the UP/DOWN(▲/▼) button is pushed, A, B, C group is indicated.

③ When user push the ENT button after selecting group, it move to the detail setting contents.

④ After selecting contents by pushing UP/DOWN(▲/▼) button, if user push the ENT button, the setting value will be stored.

⑤ When UP/DOWN(▲/▼) button is pushed, the setting value will change, so that after selecting contents, if you push the ENT button , setting value will be stored.

⑥ After setting, if user push the ESC button, IMC-IIIa will be returned normal operating condition.

⑦ Set the other setting items in the same way.

⑧ Press the RESET button during the setting to return to normal operation mode.

Note) 1. Pls note that setting value can be changed during motor operation.
2. If user did not operate for 10S , Setting value and group setting contents will returned to current indication mode automatically.

Group	No.	Setting	Indication	Setting value	Default value	Remark
A. grp Basic setting	1	Operating Characterist (Over current protection)	A. 1.CHA	Inu/dEF	Inu	Inverse/Definite time selection
	2	Operating time (Over current protection)	A. 2.0-t	1~60/1s	60	In case of definite time, motor operating time
	3	Operating delayed time (Over current protection)	A. 3.d-t	1~200/1s	200	
	4	Setting of rated current	A. 4.r-C	0.5~6/0.1(A), 5~60/1(A)	6/60	6/60A selection
	5	CT ratio	A. 5.Ctr	0.25, 0.5, 1~200/1	1	Impossible to set in case of selection 60A
	6	Start type selection	A. 6.dru	dir/y-d/F-r/Ind/Iut	dir	Direct, Y-Δ. Reactor, Inverter start
	7	Y operation time	A. 7.d-t	1~120/1	5 (Inverter start: 0)	Reactor start time Inverter start delayed time(0 ~ 1s)
	8	Y-D switching time	A. 8.ydt	0.05, 0.1, 0.2 (s)	0.2	
	9	Short time power off compensation time	A. 9.S-t	OFF, 1~20/1s	OFF	
	10	Re-start time	A. 10.Sd	0~300/1s	-	9. It can be indicated only in case of short time power stop compensation time
B. grp Protection function	1	Lock protection	b. 1.Loc	OFF, 200~700/100 (%)	OFF	
	2	Stall protection	b. 2.StL	OFF, 150, 200, 300 (%)	OFF	
	3	Phase-fault protection enabled	b. 3.P-F	OFF/On	On	
	4	Unbalance protection	b. 4.P-U	OFF, 30, 40, 50 (%)	OFF	
	5	Reverse phase protection	b. 5.r-P	OFF/On	OFF	Only during operation
	6	Under current protection	b. 6.U-C	OFF, 30~70/5 (%)	OFF	
	7	Ground fault protection	b. 7.9-F	OFF/On	OFF	OFF setting in case of inverter start
	8	Ground fault operation current	b. 8.9-C	0.1, 0.2, 0.5, 1.0, 1.5, 2.0, 2.5 (A)	0.1	7. Indication by ground fault protection seleection
	9	Ground fault operation time	b. 9.9-t	0.05, 0.1~1.0/0.1s	0.05	
	10	Ground fault delay	b. 10.9d	OFF/On	OFF	
C. grp Additional function	1	I/O state information	C. 1.I-O	4-segment		Notify the manual
	2	Total operation time	C. 2.trt	Total operation time checking	Time check, Setting disabled	Day → hour, min (Max.1year : 8760 hour)
	3	Operation time	C. 3.r-t	Operation time checking	Time check, Setting disabled	Operation time →Day → Hour, min (Max.1year : 8760 hour)
	4	Operation time setting	C. 4.Srt	OFF, 10~8760/10 (H)	OFF	After reached setting operation time, indicating "OrH"
	5	Contactor check	C. 5.CCh	OFF/On	On	MC condition input check (OFF→not indicated Err1,2)
	6	User contact mode	C. 6.n-F	nor/t-d/F-S	nor	Normal/Time delay/Flow switch
	7	ON Delay Timer	C. 7.tOn	0~300s/1s	0	Can be set when t-d or F-S mode is selected
	8	OFF Delay Timer	C. 8.tOF	0~300s/1s	0	
	9	comparison Timer	C. 9.t-C	0~300s/1s	0	Can be set when selecting F-S mode comparison Timer > ON Delay Timer
	10	Auto- returning	C. 10.Ar	OFF, 1~20min/1min	OFF	
	11	Communication address	C. 11.Ad	1~255	1	Only indication of communication model
	12	Communication Spped	C. 12.bS	96, 192, 384	96	bps (×100)
	13	SWAP	C. 13.SP	OFF/On	On	Floating data frame reverse (3, 4, 1, 2) selection

*Changing 6. Start Setting of A.grp basic settings, and 6. User Contact Mode of C.grp additional functions during motor operation can cause motor malfunctioning, so do not change their settings.
*If 10. Ground Fault Delay Function of B.grp protection function is set as ON, ground fault is detected after O-t in case of inverse time and d-t in case of definite time
*Menus 6-9 of C.grp additional functions are not displayed on IMC-IIIa.
*Some menus are not displayed according to their specific function settings (refer to remarks).

Operation & setting method

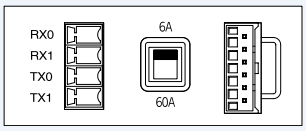
Rated current setting

1) IMC-IIIa rated current can be selected 6A(0.5 ~ 6A), 60A(5 ~ 60A)

① Protective operation is possible only above the minimum rated current.
(6A Tap is 0.5A or less, 60A Tap is 5A or less)

② Be sure to operate within the rated range because the current may be displayed incorrectly or the protection may be malfunctioning.

③ When changing the adjustment software, be sure to turn off the power.



Note) Don't change the switch during the operation.

2) To select the rated current.

① User has to switch the IMC-IIIa power OFF → ON

② User has to switch the IMC-IIIa ON → OFF

③ Turn on the IMC-III control

④ Move to [4.r-C] item in setting group A and set the detailed rated current.

- After finishing motor starting, set the 110~115% of real load current in the load operation condition.

• Load under 0.5A	• Over 60A load
- Set the CT ratio 0.5 or 0.25 in the [6.ctr]	- Usage of external CT
- MCT cable penetration increase from 2 times to 4 times	- CT ratio (1 ~ 200) : Maximum 1000A
- Rated current setting range : 0.25 ~ 3A(2 times), 0.125 ~ 1.5A (4 times)	

Operating time setting

1) It can be set 1 ~ 60s in the A group in [2.O-t]

① In case of selecting inverse time in the [1.CHA]
- Setting operation time is 600% standard of rated current

② In case of selecting the definite time
- The standard is over 105% of rated current.
- User has to set the operation delayed time 1 ~ 200s In the [3.d-t] considering motor operating time.

Special function key

- **Turn the heating capacity into clear and return by force**

IMC-IIIa inverse time protects overload fault by sensing the applied current on the motor, trace heating condition of motor. Motor has heating capacity until completed cold status even if . motor stopped. IMC-IIIa accumulates heating capacity values similar with motor.

In case of continuous re-start, or generating the trip, it can be tripped by acknowledgement Hot curve through the cumulated heating capacity.

Information

If user want to re-start even if damaged to motor, push the STOP + RESET button. in conclusion, cumulative heating capacity remove and can be reset.

- **Fault Recording**

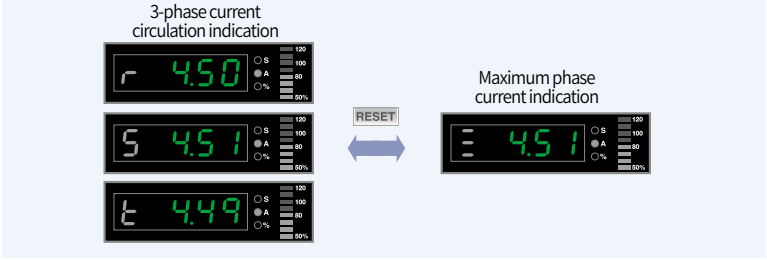
IMC-IIIa provides fault recording function even if power is OFF.

If user push the ESC + ENT button, user can check the Fault analysis and fault current value. If user push the RESET button, fault analysis and fault recording will be deleted.

If there is no string data, it will be indicated "non" And then if user push the ESC + ENT button, it will come back to normal mode.

- **Transfer to current indication mode.**

If user push the RESET button for 2 seconds, it will come back to current indication mode.



Note) If user push the RESET button for over 10s, IMC-IIIa will come back first manufacturing status. At this time, user has to know that setting and storing value is deleted and comes back first manufacturing status.

Total operation time

- Total operation time check: 2.trt → ENT → day → ▼ → Hour minute

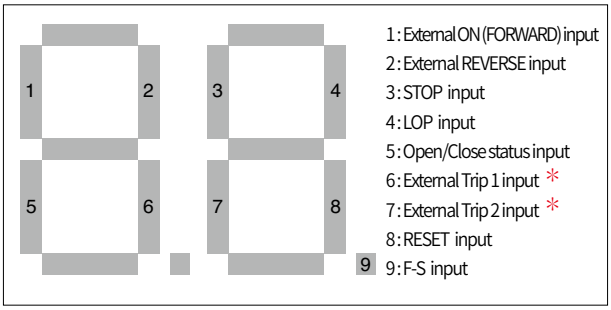
  ex) If total operation time is 50hours 50 minutes: 2.trt → ENT → 2 days → ▼ → 2.50(2 hours 50 minutes)

- Operation time 3.r-t → ENT → Total operation time → ▼ → converse day → ▼ → Extra hour, minutes

  ex) If operation time is 50 hours 50minutes: 3.r-t → ENT → 5 0 hours → ▼ → 2days → ▼ → 2.50 (2 hours 50 minutes)

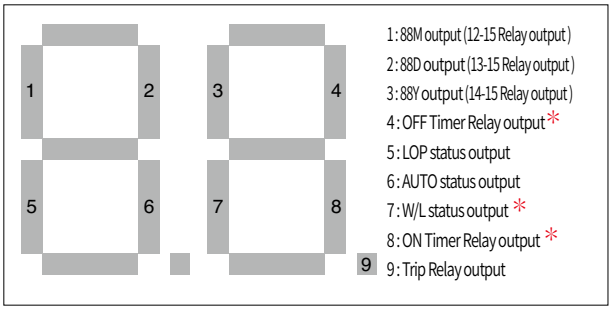
Refer to the following for I/O information:

- 1st and 2nd 7-segment are DI information which are as follows



- 3rd and 4th 7-segment are DO information which are as follows

  (#9 is trip relay output for which I/O information cannot be checked during trip status)



Note) Items with ✻ do not support IMC- II

Operation mode handling method

Operation priority: Local > MCC > Auto, W/L > Remote



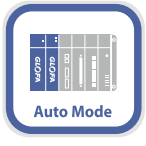
Local Operation Panel mode

The local operation mode is the highest priority mode, When the emergency situation generates, it can control motor in the local site. Only in case of closing switch to the local site, motor can be controlled.
At that time, Local LED of IMC-IIIa is lighting on, can not be controlled in another modes.



Motor Control Center mode

This mode is possible to operate in the IMC-IIIa of MCC panel. If MCC LED is lighting up by pushing the L/R button, it's possible to control motor in the IMC-IIIa.
At this time, it can not be controlled by in AUTO.



Auto - PLC automatic operation mode

This mode can provides automatic operation and remote control by PLC, DDC, DCS.
If Auto/Rem LED is lighting up by pushing the L/R button, it's possible to control motor in the IMC-IIIa.
In such a case, controls from MCC, Auto and Remote are unavailable.



W/L- Water Level Auto Operation Mode

It is the mode that allows auto operation and remote control according to level change.
If W/L LED is lighting up by pushing the L/R button, it's possible to control motor in the IMC-IIIa. Like Auto mode, auto operations using PLC or DDC are also available.
In such a case, controls from MCC, Auto and Remote are unavailable.

*If LOP/Auto mode are used together, to differentiate inputs, the interlock circuit must be configured with status output contacts. (refer to Wiring Method)

*IMC-IIIa excluded



Remote - communication operation mode

This mode is for remote monitoring control by Modbus, RS-485.
If the Auto / Remote LED blinks by operating the L/R button of IMC-III, remote control by MODBUS / RS485 communication is possible, and data such as 3-phase current value, fault value, and various setting values can be checked.
In such a case, controls from MCC, Auto and Remote are unavailable.

• 4~20mA output model can check only current Value through the Analog communication(4~20mA)