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# EMPR SERIES

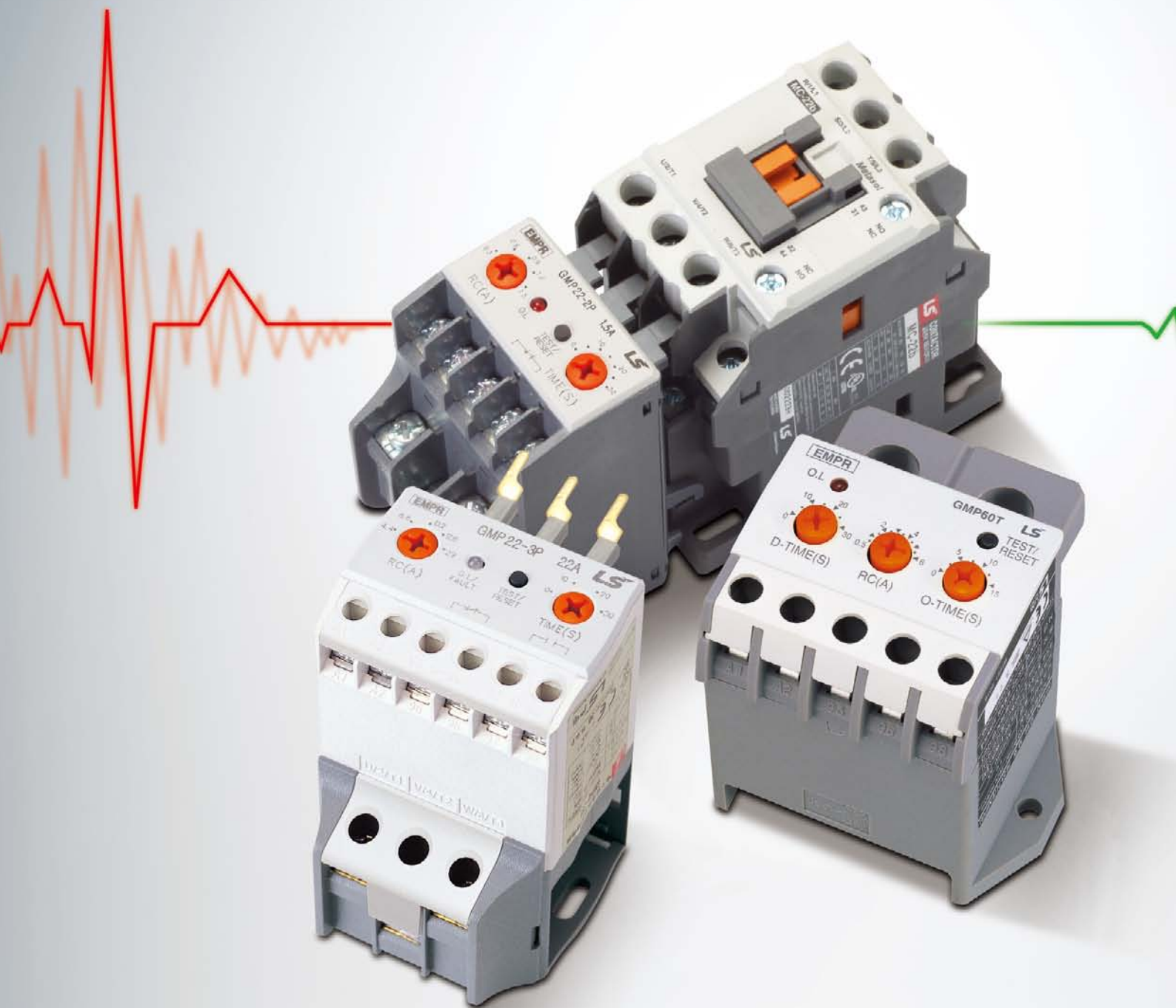
Electronic Motor Protection Relays




**LS** ELECTRIC

## ***The new standard of next-generation motor protection relay!***

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



# A list of standard models



Rated current	Connection method	Type name	over-current	Locked rotor	Phase failure	Phase unbalance	Reverse phase	low current	Ground Fault	Characteristic	
0.3~1.5 1~5 4.4~22A	Pin type <small>note 1)</small>	GMP22-2P Sol	●	●	●	-	-	-	-	Inverse time	
		GMP22-2PD Sol	●	●	●	-	-	-	-	Definite time	
		GMP22-2P Sol	●	●	●	-	-	-	-	Inverse time	
		GMP22-2PA Sol	●	●	●	-	-	-	-	Definite time/ Automatic return	
	Screw type	GMP22-3P Sol	●	●	●	●	-	-	-	Inverse time	
		GMP22-3PR Sol	●	●	●	●	●	-	-	Inverse time	
		GMP22-2S	●	●	●	-	-	-	-	Inverse time	
		GMP22-3S	●	●	●	●	-	-	-	Inverse time	
		GMP22-3SR	●	●	●	●	●	-	-	Inverse time	
		Tunnel types	GMP22-2T	●	●	●	-	-	-	-	Inverse time
	GMP22-3T		●	●	●	●	-	-	-	Inverse time	
	GMP22-3TR		●	●	●	●	●	-	-	Inverse time	
4~20 8~40A	Pin type <small>note 1)</small>	GMP40-2PD Sol	●	●	●	-	-	-	-	Definite time	
		GMP40-2P Sol	●	●	●	-	-	-	-	Inverse time	
		GMP40-2PA Sol	●	●	●	-	-	-	-	Inverse time/ Automatic return	
		GMP40-3P Sol	●	●	●	●	-	-	-	Inverse time	
	Screw type	GMP40-3PR Sol	●	●	●	●	●	-	-	Inverse time	
		GMP40-2S	●	●	●	-	-	-	-	Inverse time	
		GMP40-3S	●	●	●	●	-	-	-	Inverse time	
		GMP40-3SR	●	●	●	●	●	-	-	Inverse time	
		Tunnel types	GMP40-2T	●	●	●	-	-	-	-	Inverse time
			GMP40-3T	●	●	●	●	-	-	-	Inverse time
	0.5~6 3~30 5~60A	Tunnel types	GMP40-3TR	●	●	●	●	●	-	-	Inverse time
			GMP60T	●	●	●	-	-	-	-	Inverse time
GMP60TE			●	●	●	-	-	-	-	Inverse time	
GMP60TA			●	●	●	-	-	-	-	Definite time/ Automatic return	
GMP60TD			●	●	●	-	-	-	-	Definite time	
GMP60TDa			●	●	●	-	-	●	-	Definite time/ Automatic return	
Tunnel types		GMP60-3T	●	●	●	●	-	-	-	Definite time	
		GMP60-3TR	●	●	●	●	●	-	-	Definite time	
		GMP60-3TZ <small>※2)</small>	●	●	●	●	-	-	●	Definite time	
		GMP60-3TN	●	●	●	●	-	-	●	Definite time	
		GMP60-3TZR	●	●	●	●	●	-	●	Definite time	
		GMP60-3TNR	●	●	●	●	●	-	●	Definite time	
Screw type	GMP60-3S	●	●	●	●	-	-	-	Definite time		
	GMP60-3SR	●	●	●	●	●	-	-	Definite time		
	GMP60-3SZ	●	●	●	●	-	-	●	Definite time		
	GMP60-3SN	●	●	●	●	-	-	●	Definite time		
	GMP60-3SZR	●	●	●	●	●	-	●	Definite time		
	GMP60-3SNR	●	●	●	●	●	-	●	Definite time		
16~80A	Screw type	GMP80-2S	●	●	●	-	-	-	-	Inverse time	
		GMP80-2SA	●	●	●	-	-	-	-	Inverse time/ Automatic return	
		GMP80-3S	●	●	●	●	-	-	-	Inverse time	
		GMP80-3SR	●	●	●	●	●	-	-	Inverse time	

Note) 1. Direct coupling type (Pin) supports direct coupling of Metasol MC. With your order, it is required to describe "Sol".

2. For GMP60-3TZ/3TZR, use ZCT (100mA/40~55mV) for EMPR only.

3. In case of GMP60-3S Series, it is required to purchase a terminal block separately.

4. This product is designed for protecting a low-voltage motor with 1,000V or less. Therefore, it should not be used in high voltage lines.

## GMP22-2P, 2PD 1c



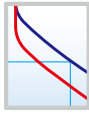

GMP22-2P(1c)  
GMP22-2PD(1c)

### Specification (Direct type EMPR)

Connection: Accessible electronic contactors	Minimum direct connection with width 44mm : MC-9b, 12b, 18b, 22b
Auxiliary contact	1SPDT 1c (N type) <small>note1)</small>
Current setting range	0.3~1.5/1~5/4.4~22A
Operating time characteristics	Inverse time, Definite time (PD)
Number of built-in CT (deflector)	2 (R, T phase)
Operating power	AC 110/220V (±10%)
Return (reset) method/time	Manual/Electrical return
Using Inverter Secondary	Available

Type	GMP22-2P (1c) Sol	GMP22-2PD (1c) Sol
Protection	Overcurrent	✓
	Lock/Stall	✓
	Phase failure	✓ <small>note 2)</small>
Certification	UL, CE	✓

### Order type

Type	Model/CT	Operating characteristics	Current setting range	Order type
Pin type	GMP22-2P(1c) - 2CT type	 Inverse time (0~30sec)	0.3 - 1.5A	GMP22-2P(1c) 1.5A Sol
			1 - 5A	GMP22-2P(1c) 5A Sol
			4.4 - 22A	GMP22-2P(1c) 22A Sol
			0.3 - 1.5A	GMP22-2P(1c) 1.5A [N]
			1 - 5A	GMP22-2P(1c) 5A [N]
			4.4 - 22A	GMP22-2P(1c) 22A [N]
	GMP22-2PD(1c) - 2CT type	 Definite time D-Time : 0~60sec O-Time : 5sec(Fixed)	0.3 - 1.5A	GMP22-2PD(1c) 1.5A Sol
			1 - 5A	GMP22-2PD(1c) 5A Sol
			4.4 - 22A	GMP22-2PD(1c) 22A Sol
			0.3 - 1.5A	GMP22-2PD(1c) 1.5A [N]
			1 - 5A	GMP22-2PD(1c) 5A [N]
			4.4 - 22A	GMP22-2PD(1c) 22A [N]
			0.3 - 1.5A	GMP22-2P(1c) 1.5A [R]
			1 - 5A	GMP22-2P(1c) 5A [R]
			4.4 - 22A	GMP22-2P(1c) 22A [R]
			0.3 - 1.5A	GMP22-2PD(1c) 1.5A [R]
			1 - 5A	GMP22-2PD(1c) 5A [R]
			4.4 - 22A	GMP22-2PD(1c) 22A [R]

Note) 1. 1c contacts have two types of products: N-type (Fail Safe/Normal Energized) and R-type(Non Fail Safe / Normal De-Energized). In terms of product reliability, N-type (Fail Safe) product is recommended to be used.

2. The product detects phase failure of the phase (R, T) connected with two CTs in order for protection.

Contactor  
MC-9b, 12b, 18b, 22b



Contactor  
Direct  
connection



### Technical information

Installation	Direct connection to contactors (not alone)
Tolerance	Current : ±5% Time : ±5% (or±0.5sec)
Frequency	50/60Hz
Aux. contact Ratings	5A/250VAC Resistive load
Insulation resistance	Min 100MΩ at 500Vdc
Lightning impulse voltage	1.2×50μs 5kV With standard waveform (IEC1000-4-5)
Fast Transient Burst	2kV/5min (IEC1000-4-4)
Environment	Operation : -25~70°C Storage : -30~80°C Relative humidity : within 80% RH, no condensation
Trip indicator	Red LED
Application specification	UL508, IEC60947-1

# Rated specifications & order type

## GMP22-□



Pin type  
GMP22-□P, PR



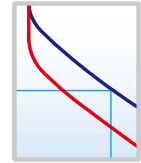
Screw type  
GMP22-□S, SR



Tunnel type  
GMP22-□T, TR

### Specification

Various connection methods : Electronic contactors applied	Pin, Screw, Tunnel type : MC-9b, 12b, 18b, 22b
Auxiliary contact	2SPST (1a1b at energization)
Current setting range	0.3~1.5/1~5/4.4~22A
Operating time characteristics	Inverse time
Number of built-in CT (deflector)	2 (R, Tphase) or 3
Operating power	AC 100~260V
Return (reset) method/time	Manual/Electrical return (Standard) Manual/Auto/Electrical return (2PA)
Using Inverter Secondary	Available (Exclude GMP22-3PR, 3TR, 3SR)







Inverse time

\*GMP22-2PA automatically returns within 60 seconds in case of overcurrent.

Type (GMP22-□)	2P, 2PA, 2T, 2S	3P, 3T, 3S	3PR, 3TR, 3SR
Overcurrent	✓	✓	✓
Lock/Stall	✓ <i>note</i>	✓	✓
Phase failure	✓	✓	✓
Phase unbalance	-	✓	✓
Reverse phase	-	-	✓
Certification	UL, CE	✓ (Exclude 2PD)	✓

Note) The product detects phase failure of the phase (R, T) connected with two CTs in order for protection.

### Order type

Mounting type	Model/CT	Current setting range	Order type	
Direct mount onto a Metasol MC   Electronic contactor MC-9b, 12b, 18b, 22b  	GMP22-2P (1a1b) - 2CT type	0.3 - 1.5A	GMP22-2P(1a1b) 1.5A Sol	
		1 - 5A	GMP22-2P(1a1b) 5A Sol	
		4.4 - 22A	GMP22-2P(1a1b) 22A Sol	
	GMP22-2PA (1a1b) - 2CT type - Automatic return	0.3 - 1.5A	GMP22-2PA(1a1b) 1.5A Sol	
		1-5A	GMP22-2PA(1a1b) 5A Sol	
		4.4-22A	GMP22-2PA(1a1b) 22A Sol	
	GMP22-3P - 3CT type	0.3 - 1.5A	GMP22-3P 1.5A Sol	
		1 - 5A	GMP22-3P 5A Sol	
		4.4 - 22A	GMP22-3P 22A Sol	
	GMP22-3PR - 3CT type - Reverse phase protection	0.3 - 1.5A	GMP22-3PR 1.5A Sol	
		1 - 5A	GMP22-3PR 5A Sol	
		4.4 - 22A	GMP22-3PR 22A Sol	
Screw type   Install Screw/Rail	GMP22-2S - 2CT type	0.3 - 1.5A	GMP22-2S 1.5A	
		1 - 5A	GMP22-2S 5A	
		4.4 - 22A	GMP22-2S 22A	
	GMP22-3S - 3CT type	0.3 - 1.5A	GMP22-3S 1.5A	
		1-5A	GMP22-3S 5A	
		4.4-22A	GMP22-3S 22A	
	GMP22-3SR - 3CT type - Reverse phase protection	0.3 - 1.5A	GMP22-3SR 1.5A	
		1 - 5A	GMP22-3SR 5A	
		4.4 - 22A	GMP22-3SR 22A	
	Tunnel type   Install Screw/Rail	GMP22-2T - 2CT type	0.3 - 1.5A	GMP22-2T 1.5A
			1 - 5A	GMP22-2T 5A
			4.4 - 22A	GMP22-2T 22A
GMP22-3T - 3CT type		0.3 - 1.5A	GMP22-3T 1.5A	
		1-5A	GMP22-3T 5A	
		4.4-22A	GMP22-3T 22A	
GMP22-3TR - 3CT type - Reverse phase protection		0.3 - 1.5A	GMP22-3TR 1.5A	
		1 - 5A	GMP22-3TR 5A	
		4.4 - 22A	GMP22-3TR 22A	

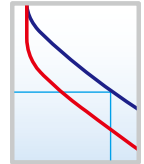
## GMP80



GMP80

### Specification

Connection methods	Screw type (No direct connection with Metasol MC)
Auxiliary contact	2SPST (1a1b at energization)
Current setting range	16~80A
Operating time characteristics	Inverse-time
Number of built-in CT (deflector)	2 (R, T type) or 3
Operating power	AC 100~260V
Return (reset) method/time	Manual/Electrical return (Standard) Manual/Auto/Electrical return (GMP80-2SA)
Using Inverter Secondary	Available (Exclude GMP80-3SR)



Inverse-time

Model numbering	GMP80-2S	GMP80-2SA	GMP80-3S	GMP80-3SR
Overcurrent	✓	✓	✓	✓
Locked rotor	✓	✓	✓	✓
Phase loss	✓ <i>note)</i>	✓ <i>note)</i>	✓	✓
Phase unbalance	-	-	✓	✓
Reverse phase	-	-	-	✓
Certification	UL, CE	-	✓	✓

*Note)* The product detects phase failure of the phase (R, T) connected with two CTs in order for protection.

### Order type



Mount/Connection	Model numbering system / CT	Setting range	Catalog No.
Screw type Screw / rail mounting	GMP80-2S - 2CT	16 - 80A	GMP80-2S 80A
	GMP80-2SA - 2CT - Automatic return	16 - 80A	GMP80-2SA 80A
	GMP80-3S - 3CT	16 - 80A	GMP80-3S 80A
	GMP80-3SR - 3CT - Reverse phase protection	16 - 80A	GMP80-3SR 80A

### Rated specifications

Tolerance	Current : $\pm 5\%$ Time : $\pm 5\%$ (or $\pm 0.5\text{sec}$ )
Frequency	50/60Hz
Aux. contact Ratings	5A/250VAC Resistive load
Insulation resistance	Min 100M $\Omega$ at 500V DC
Lightning impulse voltage	1.2 $\times$ 50 $\mu\text{s}$ 5kV With standard waveform (IEC60255-22-5)
Fast Transient Burst	2kV/1min (IEC61000-4-4)
Environment	Operation : -25~70°C Storage : -30~80°C Relative humidity : within 80% RH, no condensation
Trip indicator	Red LED (2CT : 1, 3CT : 2)
Application specification	UL508, IEC60947-1

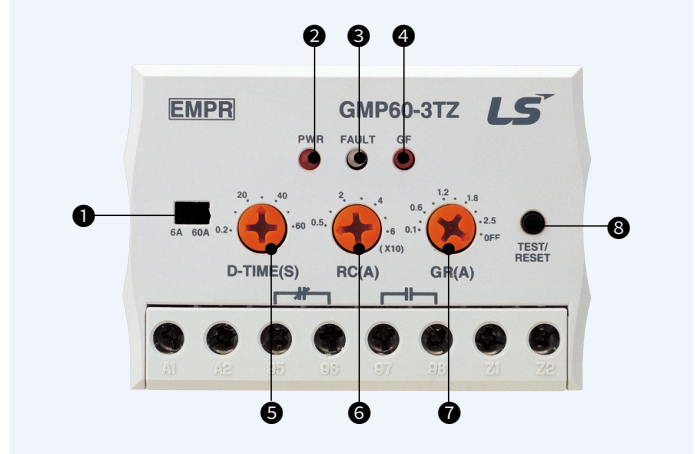
# Operation & setting method

## 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%
- 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

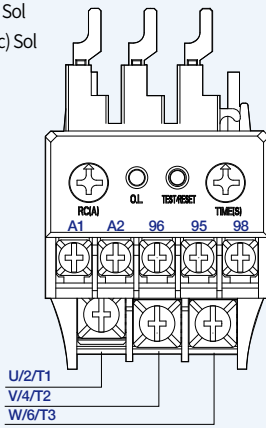
Note) In case of load less than minimum rating of EMPR make the number of penetrating through CT more than 2 times. If not, error may happen to phase loss .

### 5. Status of LED configuration

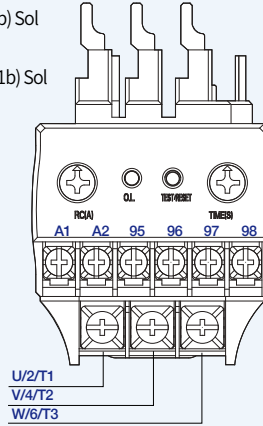
NO	Function	Setting	Description	Remark
①	6A/60A	Slide switch	Maximum rated current (6A/60A) setting	-
②	PWR.	Red LED	Lights up when power is ON Blinking in the failure mode	-
③	Fault	Red / Green LED	Overcurrent / unbalance in progress : Overcurrent TRIP : Phase loss (unbalance) TRIP · R-phase : · S-phase : · T-phase : · Reverse phase :	Red LED Green LED
④	GF	Red LED	Lights up after blinking in the event of ground fault	-
⑤	D-Time (S)	KNOB	Delay time (0.2 to 60 sec.)	-
⑥	RC (A)	KNOB	Rated current setting: 0.5~6A/5~60A	-
⑦	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)	-
⑧	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

## Terminal configuration

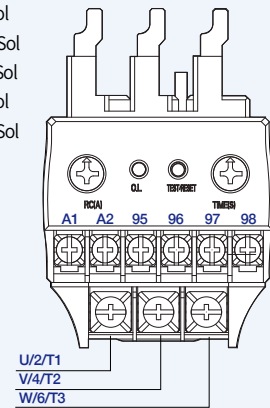
GMP22-2P (1c) Sol  
GMP22-2PD (1c) Sol



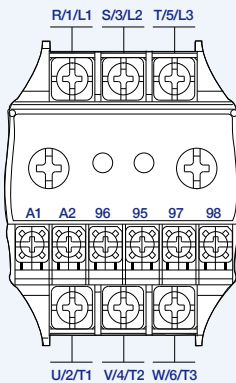
GMP22-2P (1a1b) Sol  
GMP22-3P Sol  
GMP22-2PA (1a1b) Sol  
GMP22-3PR Sol



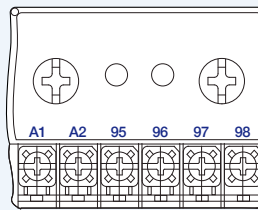
GMP40-2P Sol  
GMP40-2PD Sol  
GMP40-2PA Sol  
GMP40-3P Sol  
GMP40-3PR Sol



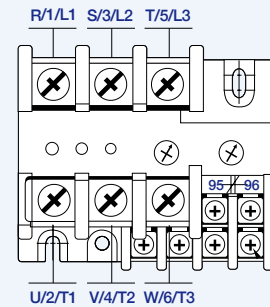
GMP22-2S  
GMP22-3S  
GMP22-3SR  
GMP40-2S  
GMP40-3S  
GMP40-3SR



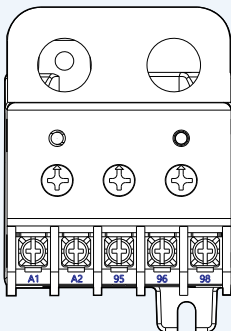
GMP22-2T  
GMP22-3T  
GMP22-3TR  
GMP40-2T  
GMP40-3T  
GMP40-3TR



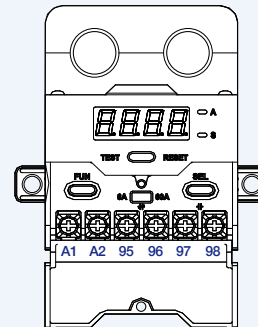
GMP80-2S  
GMP80-3S  
GMP80-3SR



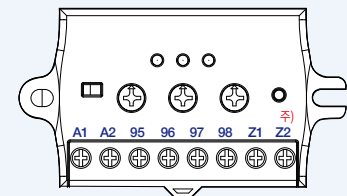
GMP60T  
GMP60TE  
GMP60TA



GMP60-TD  
GMP60-TDa



GMP60-3TZ, TZR  
GMP60-3TN, TNR  
GMP60-3T, TR



Engrave	Description
A1, A2	Input terminal for operation power
95, 96, 98	Output terminals at power-on
95-96	When the power is ON (NC contact output)
97-98	When the power is ON (NC contact output)
Z1, Z2	ZCT output connection
U/2/T1, V/4/T2, W/6/T3	Power side connection
R/1/L1, S/3/L2, T/5/L3	Load side connection

- Note) 1. GMP60-3TN/3TNR and GMP60-3T/3TR models are not wired to Z1 and Z2 terminals.  
 2. In case of 1c(N), only if control power (A1, A2) is On, output contact occurs (if power Off or Trip, 95-96: Open, 95-98: Close)  
 3. In case of 1c(R), output contact occurs regardless of control power (A1, A2). (Contact chattering can occur in a very vibrating place.)