Metasol

Meta Solution

Electronic motor protection relays

LS IS

EMPR replacing thermal overload relay is electronic motor protection relay which is used to protect the low voltage motor and also called as Electronic Overcurrent Relay or an Electronic Overload Relay.

As a digital motor protection relay with MCU, EMPR is highly reliable by implementation of real-time data processing and high precision and also can secure motor safely with various functions such as phase loss, phase reverse, unbalanced, stall, lock, ground fault, short circuit protection depending on the model .

EMPR has compact and simple appearance so it can be combined with the magnetic contactor. Various installation methods and separation of terminal block make easy design and manufacturing feature for MCC(Motor Control Center).

Especially, EMPR is EMC tested and approved to operate safely without any malfunction caused by electromagnetic wave and surge. Most of the models have received CE Mark and UL certification based on its product reliability.

Contents

General Motor Protection Relay

GMP Series

- Various connection & mount
- Inverse or definite time protection mode
- Ground fault type
- Display the causes of the falut by LED

Digital Motor Protection Relay

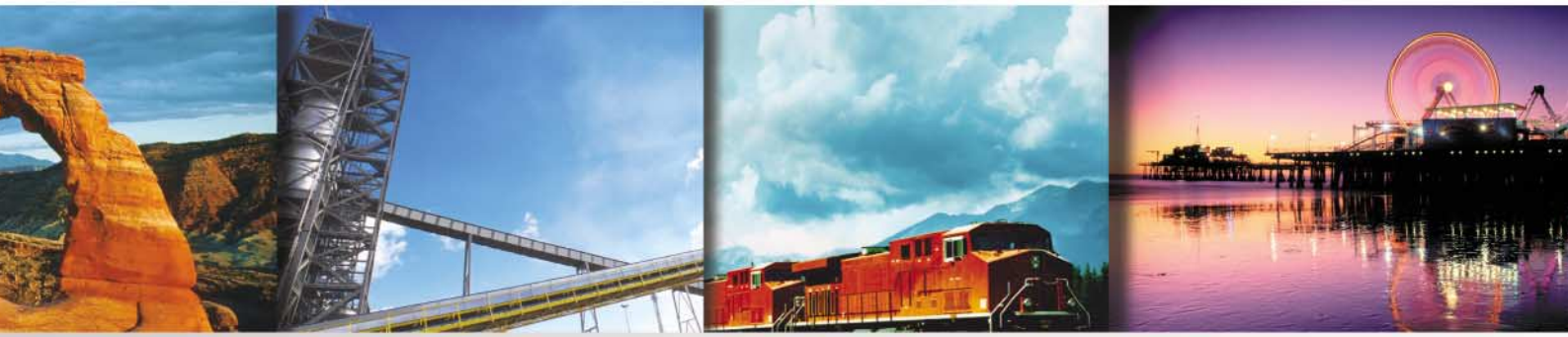
DMP Series

- Ampere meter, Load rate and the causes of fault Display
- Standard, Ground fault and short circuit protection type
- Select the Inverse or definite time protection mode
- Unit or Extension in one body by cable option
- Option function type (DMP-a)

Intelligent Motor Protection Relay

IMP Series

- Wide current setting range (0.125~100A)
- Communication support type (MODBUS. Analog)
- Zero current and residual current sensing
- Save the fault events and operating time setup
- Select the Inverse, thermal inverse or definite time modes
- Unit or Extension in one body by option cable



Electronic Motor Protection Relays

Electronic motor protection relays

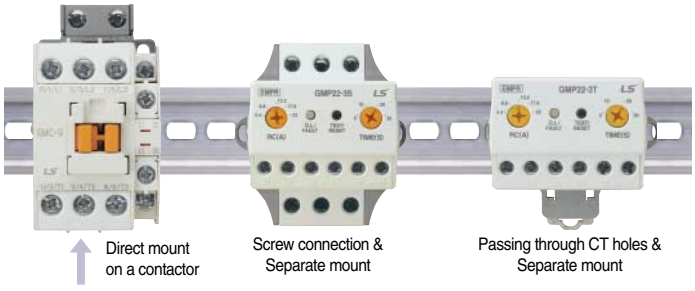
Features

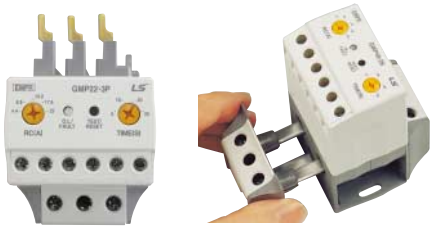
GMP Series

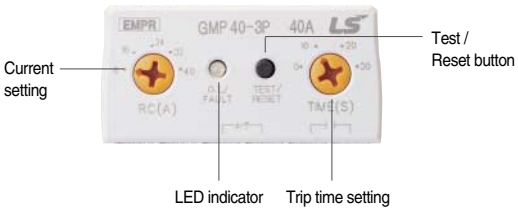
- Combination with Metasol contactors for compact motor starters

EMPR model	Contactor model
GMP22-2P/3P/3PR	MC-9b, MC-12b, MC-18b, MC-22b
GMP40-2P/3P/3PR	MC-32a, MC-40a

- Broad range of current setting
- Inverse time or definite time characteristics
- Simple operation and trip cause indication via LED
- Various Connection





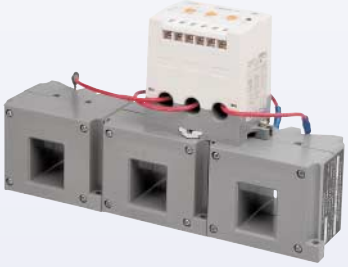


Certification of CE, UL, CCC and S mark

- Various protection functions

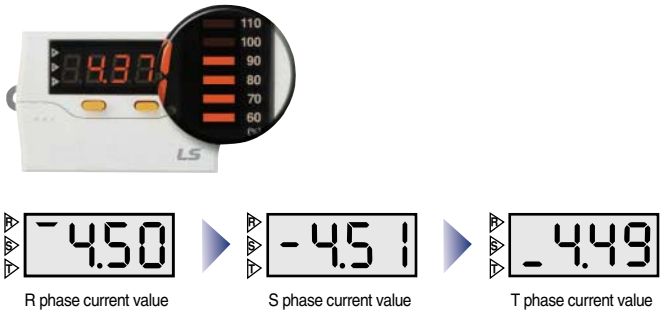
Types (GMP-□)	2P, 2T, 2S	3P, 3T, 3S	3PR, 3TR, 3SR	3TN, 3TZ	3TNR, 3TZR
Number of sensors	2CT	3CT			
Overcurrent	■	■	■	■	■
Phase failure	■	■	■	■	■
Lock/Stall	■	■	■	■	■
Phase unbalance		■	■	■	■
Reverse phase			■		■
Ground fault				■	■

- Large current can be applied through additional current transformers
- MCU (Microprocessor Control Unit) built-in
  - excellent reliability by achieving real-time data processing and high precision.
- Checking the last failure cause
  - can be checked by pushing Test/Reset button twice in 0.5 seconds,
- Products for ground fault protection
  - detecting of zero phase currents (ZCT used: GMP60-3TZ)
  - detecting of residual currents (ZCT unused: GMP60-3TN)



Features
DMP Series

• Digital measuring and displaying
- Display digital ampere-meter
- Save the causes of the fault and the value
- Display motor load rate by graph

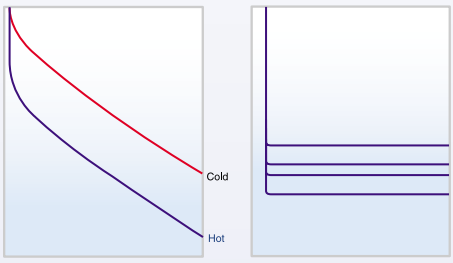


• Convenient structure
- Install the Unit / Extension type in one body
  The display part may be separated from the body
  You can check the values and the causes of the fault without opening the distribution panel door
- removable terminal block

• Various protection functions

Protection	DMP□-S/Sa	DMP□-SZ/SZa	DMP□-SI	DMP□-T/Ta	DMP□-TZ/TZa	DMP□-TI
Wiring	Screw type			Tunnel type		
Over current	■	■	■	■	■	■
Under current	■	■	■	■	■	■
Stall	■	■	■	■	■	■
Lock	■	■	■	■	■	■
Phase failure	■	■	■	■	■	■
Reverse phase	■	■	■	■	■	■
Phase unbalance	■	■	■	■	■	■
Ground fault		■			■	
Short circuit			■			■

• Trip curve selectable (Inverse/Definite)



Inverse time characteristics

Definite time characteristics

• Applicable to inverter control circuit

LS EMPR has high performance under the harmonic noise and can be used in the Inverter control circuit (20~200Hz), (except Ground fault model)

• Optional functions (DMP-a type)
- Storing up the last fault cause
- Storing up motor operation hours
- Checking replacement cycle of motor bearing by alarming

Electronic motor protection relays

Features

IMP Series

The EMPR IMP series are optimal solutions for protecting and monitoring motors in complex industrial fields needed high safety and productivity.

Wide Current Setting Range: 0.125~100A for One Model

With the slide S/W, the current setting range can be decided 0.5~10A or 5~100A. Depending on the number of CT penetration, even 0.125A current can be protected. (Wire penetration hole is required).

Communication support type

RS-485 MODBUS communication with various systems.The model with analogue signals (4~20mA) is compatible with transducer systems.

Thermal Inverse Time, Inverse Time and Definite Time Modes

According to user's needs, the motor can be protected in the inverse time mode or definite time mode.

Wide Setting of Ground Fault Current Sensitivity 30mA~25A

zero current sensing by zero sequence CT. zero current sensing by Residual circuit.

Date and Total Operating Time Setup

When a fault occurs, its date and time are stored for easy checkup. When the total operation time is over, it is displayed for changing motor bearings or supplying oil.

Quick Setup

All settings can be decided quickly on the display.

Comprehensive Digital Motor Protection Relay with the MCU (Microprocessor Control Unit)

Real-time processing and high precision

One-Body Type and Separate Body Type

The display can be attached to the panel front so that current, operation time and settings can be checked without fetching the unit. With the display separated, the motor protection is available.

Applicable to Inverter Circuits

Thanks to its characteristics to harmonic noise, it can be applied to the inverter control circuits. The available frequency range is 20~200Hz. When the relative harmonic factor is over 30%, a harmonic filter should be installed (However, the ground fault function should be off).

Various Reset Functions

Manual, automatic and electric reset functions are provided for customer convenience.

Password

Settings are protected with a password.

Storage of Fault Events

Up to 5 fault events can be stored for easy fault history management.

3-Phase Digital Ampere-Meter

3-phase current is displayed every two seconds for motor monitoring.

Ordering

GMP Series

GMP — 22 — 2 — P — R — a — 1.5A — 220 — 1a1b — Sol

Frame	Nominal Current	Type
22	1.5A	Direct Coupling, Terminal Connection, Penetration
	5A	
	22A	
40	20A	
	40A	
80	80A	Terminal Connection
60	06A	Penetration
	30A	
	60A	

CT Type	
2	2CT
3	3CT

Type	
P	Direct Coupling(Pin)
S	Terminal Connection(Screw)
T	Penetration (Tunnel)
TE	Economic
PD	Direct Coupling (Definite Time)
TD	Current Display (Definite Time)
TZ	Ground Fault Protection (Zero-Phase- Sequence Current Detection)
TN	Ground Fault Protection (Residual Current Detection)

Reverse Phase	
-	No Reverse Protection
R	Reverse Protection Protection Available
A	Automatic Recovery

Classification	
-	Existing Model
a	Operation Time Function

Nominal Current	Current Adjustment Range (A)
1.5A	0.3~1.5
5A	1~5
22A	4.4~22
20A	4~20
40A	8~40
80A	16~80
06A	0.5~6
30A	3~30
60A	0.5~60 Note)

Note) For GMP60-TD, GMP60-TDa 6/60A, GMP60-3TZ (R), 3TN (R), 3T (R)

Control Voltage	
110/220	AC 100~260V
24	AC 24V
48	AC 48V
110	AC 110V
220	AC 220V
380	AC 380 (440)V
480	AC 180~480V

Note) AC 24V, AC 48V, AC 380(440)V and AC 480V are for GMP60T.

Aux. contactor
1c (N)
1a1b

Note) When the power is applied, the system is in the contacting status.

• 1c (R) type is optional

Model Type	
-	Terminal (Screw) Penetration (Tunnel)
Sol	Metasol Direct Coupling (Pin)

DMP Series

DMP — 06 — S — Z — a — 220 — 1a1b

Current Adjustment Range	
06	0.5~6A
36	3~36A
60	5~60A

Wiring	
S	Terminal (Screw)
T	Penetration (Tunnel)

OPTION	
-	Standard Model
Z	Ground Fault Protection
I	Short circuit Protection

Classification	
-	Existing Model
a	Operation Time Function

Control Voltage	
220	AC 220V
110	AC 110V

Aux. contactor
1a1b
2a
2b
2a1b

Note) 1. Even the same model has different contact specifications.
2. When the power is applied, the system is in the contacting status.

IMP Series

IMP — C — A420 — 110/220

Factors Protected	
C	Current

Communication	
NO	None
A420	4~20mA Output
M485	MODBUS/RS-485

Control Voltage	
110/220	AC/DC 85~245V
24/36	AC/DC 24~36V

Electronic motor protection relays

Specification

GMP Series

Ratings								
Model		**GMP22-2P/PD (1c)**	**GMP22-2P(1a1b)**	**GMP22-3P/3PR**	**GMP22-2S**	**GMP22-3S/3SR**	**GMP22-2T**	**GMP22-3T/3TR**
Type		Pin type			Screw type		Tunnel type	
No. of CT		2CT	2CT	3CT	2CT	3CT	2CT	3CT
Protection	**Overcurrent**	●	●	●	●	●	●	●
	Phase failure Note1)	●	●	●	●	●	●	●
	Lock/Stall	●	●	●	●	●	●	●
	Phase unbalance	—	—	●	—	●	—	●
	Reverse phase	—	—	● (3PR)	—	● (3SR)	—	● (3TR)
Current setting range (A)		0.3~1.5, 1~5, 4.4~22						
Operating time characteristics		Inverse time (GMP22-2PD: Definite time)						
Time setting (sec)	**Inverse time**	0~30 sec						
	Definite D-time	0.2~60 sec for GMP22-2PD						
	O-time	5sec (Fixed) for GMP22-2PD						
	Reset-time	Manual reset						
Tolerance	**Current**	±5%						
	Time	±5%(or±0.5sec)						
Control power	**Voltage**	AC 110V/220V(±10%)	AC 100~260V					
	Frequency	50/60Hz						
Aux. contact	**Contact**	1SPDT: 1c (N) Note 3)	2SPST (1a1b)					
	Ratings	5A/250VAC Resistive load	3A/250VAC Resistive load					
	Operate	(95 ┤├ 96 Close)	(95 ┤├ 96 Close)	(97 ┤├ 98 Open)				
Insulation resistance		Min 100㏁ at 500Vdc						
Surge endurance (IEC 61000-4-5)		5kV Apply the standard wave						
Fast transient burst (IEC 61000-4-4)		2kV						
Environment	**Operation**	-25~70℃						
Temperature	**Storage**	-30~80℃						
	Relative humidity	30~90%RH(No freezing)						
Trip indicator		Red LED	Red/Green LED		Red LED	Red/Green LED	Red LED	Red/Green LED
Dimension (mm)	**W×H×D**	44×71×78	53×78×87.5		53×68×87.5		53×38×87.5	
Mounting type		Direct mount onto a Metasol MC (MC-9b-22b)			Separate mount (Screw or Din-rail) Note2)			
Certification		UL, cUL, CE (Except GMP22-2PD type)						

Note) 1. When it is 2CT modle, only two-phase protection is available
2. The bracket for Din-rail mount is optional
3. 1c(N): No volt release contact type [1c(R), Non-fail-safe operation contact type is optinal]

Specification
GMP Series

Ratings									
									
Model		**GMP40-2P/PD/PA**	**GMP40-3P/3PR**	**GMP40-2S**	**GMP40-3S/3SR**	**GMP40-2T**	**GMP40-3T/3TR**	**GMP80-2S/SA**	**GMP80-3S/3SR**
Type		Pin type *		Screw type		Tunnel type		Screw type	
No. of CT		2CT	3CT	2CT	3CT	2CT	3CT	2CT	3CT
Protection	**Overcurrent**	●	●	●	●	●	●	●	●
	Phase failure Note1)	●	●	●	●	●	●	●	●
	Lock/Stall	●	●	●	●	●	●	●	●
	Phase unbalance	—	●	—	●	—	●	—	●
	Reverse phase	—	● (3PR)	—	● (3SR)	—	● (3TR)	—	● (3SR)
Current setting range(A)		4~20, 8~40						16~80	
Operating time characteristics		Inverse time characteristics							
Time setting (sec)	**Inverse time**	0~30 sec							
	Definite D-time	0.2~60 sec (GMP40-2PD)							
	O-time	5sec (Fixed) (GMP40-2PD)							
	Reset time	Manual reset (Auto Reset type : GMP□-A)							
Tolerance	**Current**	±5%							
	Time	±5% (or±0.5 sec)							
Control power	**Voltage**	AC 100~260V, 50/60Hz							
Aux. contact	**Contact** Note2)	2SPST (1a1b)							
	Ratings	3A/250VAC Resistive load							
	Operate	(95 ㅗ 96 Close) (97ㅓ 98 Open)							
Insulation resistance		Min 100㏁ at 500Vdc							
Surge endurance (IEC 61000-4-5)		5kV Apply the standard wave							
Fast transient burst (IEC 61000-4-4)		2kV							
Environment Temperature	**Operation**	-25~70℃							
	Storage	-30~80℃							
	Relative humidity	30~90%RH (No freezing)							
Trip indicator		Red LED	Red/Green LED	Red LED	Red/Green LED	Red LED	Red/Green LED	Red LED	2Red LEDs
Dimension(mm)	**W×H×D**	53×78×87.5		53×68×87.5		53×38×87.5		89×77.5×97.4	
Mounting type		Direct mount onto a Metasol MC (MC-32a, 40a)		Separate mount (Screw or Din-rail)					
Certification		UL, cUL, CE (Except GMP-PD, PA, SA type)							

Note) 1. When it is 2CT modle, only two-phase protection is available
2. When power applied Aux. Contact operate

Specification

GMP Series

Ratings							
Model		**GMP60T**	**GMP60-TE**	**GMP60-TD**	**GMP60-TDa**	**GMP60-3T(R)**	**GMP60-3TZ(R) GMP60-3TN(R)**
Type		Tunnel type		Tunnel type		Tunnel type	Tunnel type
No. of CT		2CT		2CT		3CT	3CT
Protection	**Overcurrent**	●		●		●	●
	Phase failure	●		●		●	●
	Lock/Stall	●		●		●	●
	Phase unbalance	—		—		●	●
	Reverse phase	—		—		● (R Type)	● (R Type)
	Ground fault Note1)	—		—		—	●
Current setting range (A)		0.5~6, 3~30, 5~60		0.5~60		0.5~60	0.5~60
Operating time characteristics		Definite		Definite		Definite	Definite
Time setting	**D time**	0.2~30 sec		1~60 sec		0.2~60 sec	0.2~60 sec
(sec)	**O time**	0.2~15 sec	5 sec (Fixed)	0.5~30 sec		0.2~15 sec	3 sec (Fixed)
	A time (Reset)	—	0.2~120 Note4)	—	1~20 min	—	—
Tolerance		Current ±5% Time ±5% (or±5 sec)					
Control power	**Voltage** Note3)	AC 110V/220 (±10%) Note3)		AC 110V or 220V (±10%)		AC 100V~260V	
	Frequency	50/60Hz					
Aux. contact	**Contact**	1SPDT: 1c (N) Note 2)		2SPST (1a1b)			
	Ratings	1A/250VAC Resistive load		3A/250VAC Resistive load			
Insulation resistance		Min 100㏁ at 500Vdc					
Surge endurance (IEC 61000-4-5)		5kV Apply the standard wave					
Fast transient burst (IEC 61000-4-4)		2kV					
Environment	**Operation**	-25~70℃					
Temperature	**Storage**	-30~80℃					
	Relative humidity	30~90% RH (No freezing)					
Trip indicator		Red LED		7 Segment		Red/Green × 2-Color LED	Red/Green × 2-Color LED, Red LED
Dimension(mm)	**W × H × D**	72 × 67 × 69		75 × 72.8 × 47		94.6 × 95 × 97	94.6 × 95 × 97
Mounting type		Separate mount (Screw or Din-rail)					
Certification		UL, cUL, CE		—			

Note) 1. 3TZ(R): Zero sequence CT type, 3TN(R): Residual curcuit
2. 1c(N): No volt release contact type [1c(R), Non-fail-safe operation contact type is optinal]
3. GMP60T/TE: AC 24V, 48V, 380V or 480V 50/60Hz types a option
4. GMP60TA: Auto Reset type

Specification
DMP/IMP Series

Ratings								
Model		**DMP□-S/SZ/SI**	**DMP□-Sa/SZa**	**DMP□-T/TZ/TI**	**DMP□-Ta/TZa**	**IMP-C-NO**	**IMP-C-A420**	**IMP-C-M485**
Wiring		Screw type		Tunnel type		Tunnel type		
Panel mount		Unit or Extension Note1)				Unit or Extension		
Operation time		Inverse/Definite				Thermal Inverse/Inverse/Definite		
Protection	**Over current**	According to the setting time				According to the setting time		
	Phase failure	3 sec				1.5 sec		
	Reverse phase	Within 0.1 sec				Within 0.1 sec		
	Lock/Stall	Within 0.5 sec				Within 0.5 sec		
	Phase unbalance	5 sec				3 sec		
	Under current	3 sec				3 sec		
	Ground fault	Within 0.05~1 sec. (DMP□-Z/Za)				Within 0.05~1 sec Note2)		
	Short circuit	Within 50ms (DMP□-I)				Within 50ms		
Alarm		Variable (60~110% of the setting current)				Variable (60~110% of the setting current)		
Current setting range (A)		6: 0.5~6A, 36 : 3~36A, 60: 5~60A				0.5~100		
Time setting (sec)	**Definite D time**	0~60 sec				1~200 sec		
	O time	0~30 sec				1~60 sec		
	Inverse time	0~60 sec				1~60 sec		
	A time (Reset)	Manual reset				Manual reset/Autometic		
Tolerance	**Current**	±5%				±5%		
	Time	±5% (or±0.5 sec)				±5% (or±0.5 sec)		
Operating power	**Voltage**	AC 110V or 220V(±10%), 50/60Hz				AC/DC 85~245V, AC/DC 24~36V (50/60Hz)		
Aux. contact		2a, 2b, 1a1b				OL: 1a1b, AL: 1a		
Insulation resistance		Over DC 500V 100㏁				Over DC 500V 100㏁		
Surge impulse voltage (IEC 61000-4-5)		5kV				5kV		
Fast transient burst (IEC 61000-4-4)		2kV				2kV		
Environment Temperature	**Operation**	-25~70℃				-25~70℃		
	Storage	-30~80℃				-30~80℃		
	Relative humidity	30~90% RH (No freezing)				30~90% RH (No freezing)		
Display	**7-Segment**	Cause of a fault Ampere meter				3 phase current, cause of a fault		
	Bar-Graph	60~110% of real load current				60~110% of real load current		
Mounting type		35mm Din-rail/Panel				35mm Din-rail/Panel		
Certification		UL, cUL, CE (Except DMP36 type)				CE		

Note) 1. In extension type, the digital EMPR is calibrated with combining the display past and main body so, please cautious not to combine the display part and main body with different part No.
2. Zero current sensing by zero sequencee CT and Residual circuit.
3. DMP-a Type option : Operating time, Fault event save, 3phase current Ampere meter Function

Electronic motor protection relays

Inverse time characteristics

GMP22/40 Type

Description

- Wide and adjustable current range
- Adjustable trip time (trip class 5-30)
- Designed suitable for use with contactors
  Directly mountable on the Metasol contactors (Pin type)
  Separate mount versions are also available
  Separately mountable on 35mm DIN rail or with screws
- 1NO+1NC trip contacts
- Manual reset as standard (Automatic reset optional)

Front face configuration

Current setting

GMP22 type
0.3 ~ 1.5A
1 ~ 5A
1.1 ~ 22A
GMP40 type
4 ~ 20A
8 ~ 40A

LED indicator

Operation status indication
- Normal operating
- Overload
- Phase unbalance

Trip cause indication
- Overcurrent
- Phase loss
- Reverse phase

Test/Reset button

Trip time setting

- 0 to 30 sec
- Set time is the trip time at 6 x set current

Certificate
CE, ULcUL

Extended protective functions

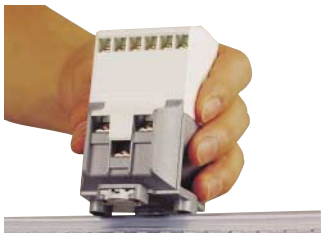
Types (GMP22/40-□)		-2P, -2T, -2S	-3P, -3T, -3S	-3PR, -3TR, -3SR
Number of sensors		2CT	3CT	3CT
Functions	Overcurrent	✓	✓	✓
	Phase failure	✓	✓	✓
	Locked rotor	✓	✓	✓
	Phase unbalance		✓	✓
	Reverse phase			✓

Technical information

Relay control voltage	100 to 260V AC 50/60Hz
Auxiliary contact	3A/250VAC at resistive load
	1NO (97-98) + 1NC (95-96)
Setting tolerance	Current ± 5%
	Time ± 5% (or ± 0.5sec)
Insulation resistance	Min 100㏁ at 500V DC
Impulse withstand voltage	5kV (IEC 61000-4-5)
Fast transient burst	2kV (IEC 61000-4-4)
Ambient temperature	-25 to 70℃ for operation
	-30 to 80℃ for storage
Humidity	30 to 90% RH

Inverse time characteristics

GMP22/40 Type



To mount on 35mm DIN rail

Cable connection part can be modified between screw connection and passing CT hole

Selection (GMP22 Type)

Mount/Connection	Sensor	Setting range	Catalog No.
Directly on a contactor	2-sensor	0.3 - 1.5A	GMP22 - 2P · 1.5
	(2 CT)	1 - 5A	GMP22 - 2P · 5
		4.4 - 22A	GMP22 - 2P · 22
	3-sensor	0.3 - 1.5A	GMP22 - 3P · 1.5
	(3 CT)	1 - 5A	GMP22 - 3P · 5
		4.4 - 22A	GMP22 - 3P · 22
	3-sensor	0.3 - 1.5A	GMP22 - 3PR · 1.5
	Reverse phase	1 - 5A	GMP22 - 3PR · 5
	detection	4.4 - 22A	GMP22 - 3PR · 22
Separate mount	2-sensor	0.3 - 1.5A	GMP22 - 2S · 1.5
	(2 CT)	1 - 5A	GMP22 - 2S · 5
Cable connection		4.4 - 22A	GMP22 - 2S · 22
with a screw	3-sensor	0.3 - 1.5A	GMP22 - 3S · 1.5
	(3 CT)	1 - 5A	GMP22 - 3S · 5
		4.4 - 22A	GMP22 - 3S · 22
	3-sensor	0.3 - 1.5A	GMP22 - 3SR · 1.5
	Reverse phase	1 - 5A	GMP22 - 3SR · 5
	detection	4.4 - 22A	GMP22 - 3SR · 22
Separate mount	2-sensor	0.3 - 1.5A	GMP22 - 2T · 1.5
	(2 CT)	1 - 5A	GMP22 - 2T · 5
Connection		4.4 - 22A	GMP22 - 2T · 22
without a screw	3-sensor	0.3 - 1.5A	GMP22 - 3T · 1.5
- cables pass	(3 CT)	1 - 5A	GMP22 - 3T · 5
through CT holes		4.4 - 22A	GMP22 - 3T · 22
	3-sensor	0.3 - 1.5A	GMP22 - 3TR · 1.5
	Reverse phase	1 - 5A	GMP22 - 3TR · 5
	detection	4.4 - 22A	GMP22 - 3TR · 22

Selection (GMP40 Type)

Mount/Connection	Sensor	Setting range	Catalog No.
Directly on a contactor	2-sensor	4 - 20A	GMP40-2P · 20
	(2 CT)	8 - 40A	GMP40-2P · 40
	3-sensor	4 - 20A	GMP40-3P · 20
	(3 CT)	8 - 40A	GMP40-3P · 40
	3-sensor	4 - 20A	GMP40-3PR · 20
	Reverse phase	8 - 40A	GMP40-3PR · 40
	detection		
Separate mount	2-sensor	4 - 20A	GMP40-2S · 20
	(2 CT)	8 - 40A	GMP40-2S · 40
Cable connection	3-sensor	4 - 20A	GMP40-3S · 20
with a screw	(3 CT)	8 - 40A	GMP40-3S · 40
	3-sensor	4 - 20A	GMP40-3SR · 20
	Reverse phase	8 - 40A	GMP40-3SR · 40
	detection		
Separate mount	2-sensor	4 - 20A	GMP40-2T · 20
	(2 CT)	8 - 40A	GMP40-2T · 40
Connection	3-sensor	4 - 20A	GMP40-3T · 20
without a screw	(3 CT)	8 - 40A	GMP40-3T · 40
- cables pass	3-sensor	4 - 20A	GMP40-3TR · 20
through CT holes	Reverse phase	8 - 40A	GMP40-3TR · 40
	detection		

Electronic motor protection relays

Definite time characteristics

GMP60-T(E) Type

Description

- Small size, economical
- Delay time setting in starting and operation
- Over current, phase failure protection
- Definite time characteristics
- Wide current setting range
- Screw or Din-rail mounting

Extended protective functions

Types		GMP60-T	GMP60-TE	GMP60-TA
Number of sensors		2CT	2CT	2CT
Functions	Overcurrent	✓	✓	✓
	Phase failure Note)	✓	✓	✓
	Locked rotor	✓	✓	✓
	Auto reset	-	-	✓

* Only two-phase protection is available.

Large current over 60A can be applied through additional current transformers

Ratings (Tunnel type)

Model		GMP-60T	GMP-60TE	GMP-60TA
Type		Tunnel type		
No. of CT		2		
Current setting range (A)		0.5~6, 3~30, 5~60		
Operating time characteristics		Definite time characteristics		
Time setting (sec)	Starting time	0~30		
	Operating time	0~15	5	5
	Reset time	Manual reset		0~120
Allowable error	Current	±5%		
	Time	±5% (or ±0.5 sec)		
Control power	Voltage	220V (AC 24V/48V/110V/380V(440))Note2), AC 180~480V		
	Frequency	50 / 60Hz		
Aux. s/w	Contact Note3)	1SPDT (1c)		
	Ratings	5A 250Vac, resistive load		
	Operation	95 ㅓㅏ 96close		
Insulation resistance		Min. 50㏁ at 500Vdc		
Surge insurance (IEC 61000-4-5)		5kV		
Fast transient burst (IEC 61000-4-4)		2kV		
Environment Temperature	Operation	-25~70℃		
	Storage	-50~80℃		
Relative humidity		46~85 RH (No freezing)		
Trip indicator		LED		
Dimension (mm) W×H×D		72×63×69		
Mounting type		Separate mount (Screw & Din-rail)		
Certification		UL, cUL, CE		-

Note) 1. Under phase failure condition over current flows. The EMPR tripped if it is over the setting over current
2. ( ) are optional specifications

Tunnel type EMPR protects the current under 0.1A

If we increase the number of times of a wire pass through the CT (Tunnel), the EMPR can detect the lower current

No. of times to pass through	Current setting range
1	0.5~6
2	0.25~3
3	0.17~2
4	0.12~1.5

Ampere meter function

GMP60-TD(a) Type

Description

- Definte time characteristics
- Delay time setting in starting and operation
- Over current, phase failure protection
- Definite time characteristics
- Wide current setting range
- Screw or Din-rail mounting
- Display the causes of the fault and the values

Extended protective functions

Types		GMP60-TD	GMP60-TDa
Number of sensors		2CT	2CT
Functions	Overcurrent	✓	✓
	Phase failure Note1)	✓	✓
	Locked rotor	✓	✓
	Under current	-	✓
	Auto reset	-	✓

* Only two-phase protection is available.

Ratings (Tunnel type)

Model		GMP60-TD	GMP60-TDa
Type		Tunnel type	
No. of CT		2	
Current setting range (A)		0.5~60	
Operating time characteristics		Definite time characteristics	
Time setting (sec)	Delay time	1~60	
	Operating time	0.5~30	
	Reset time	Manual reset	1~20min
Allowable error	Current	±5%	
	Time	±5% (or ±0.5 sec)	
Control power	Voltage	AC 110/220V (±10%)	
	Frequency	50 / 60Hz	
Aux. s/w	Contact Note2)	2SPST (1a1b)	
	Ratings	5A 250Vac, resistive load	
	Operation	95 ㅓ 96close 97 ㅏ 98open	
Insulation resistance		Min. 50㏁ at 500Vdc	
Surge insurance (IEC 61000-4-5)		5kV	
Fast transient burst (IEC 61000-4-4)		2kV	
Environment Temperature	Operation	-25~70℃	
	Storage	-50~80℃	
Relative humidity		46~85 RH (No freezing)	
Trip indicator		7-Segment	
Dimension (mm) W×H×D		72×63×69	
Mounting type		Separate mount (Screw & Din-rail)	

Note) 1. Under phase failure condition over current flows. The EMPR tripped if it is over the setting over current
2. When power applied the Aux. contact operate

Tunnel type EMPR protects the current under 0.1A

If we increase the number of times of a wire pass through the CT (Tunnel), the EMPR can detect the lower current

No. of times to pass through	Current setting range	Current Ratio
1	0.5~6	1
2	0.25~3	0.5
4	0.12~1.5	0.25

Electronic motor protection relays

Definite time characteristics with 3CT

GMP60-3T(R) Type

GMP60-3T
GMP60-3TR

Description

- Cable connecting through CT holes (option: with screw)
- Auxiliary contact: 2SPST (1a1b at energization)
- Wide and adjustable current range (0.5~60A)
- D-time: 0.2~60 sec. / O-time: 0.2~15 sec.
- Control voltage: AC100~245V 50/60Hz
- Manual(electrical) reset as standard
- Applicable to inverter at the secondary circuit (except GMP60-3TR)

Terminal Lug

Extended protective functions

Types		GMP60-3T	GMP60-3TR
Number of sensors		3CT	3CT
Protective functions	Overcurrent	✓	✓
	Phase failure	✓	✓
	Locked rotor	✓	✓
	Phase unbalance	✓	✓
	Reverse phase	-	✓
Storing the last fault cause		✓	✓

Large current over 60A can be applied through additional current transformers

Selection

Mount/Connection	Optional function	Setting range	Catalog No.
· Separate mount	None	0.5 - 60A	GMP60-3T
· Cable Connection through CT holes	Reverse phase	0.5 - 60A	GMP60-3TR

Technical information

Mounting	On 35mm rail or panel with screws
Setting tolerance	Current ± 5%
	Time ± 5% (or ±0.5sec)
Frequency	50/60Hz
Auxiliary contact rating	5A/250VAC at resistive load
Insulation resistance	Min 100㏁ at 500V DC
Surge insurance	5kV (IEC 61000-4-5)
Fast transient burst	2kV (IEC 61000-4-4)
Ambient temperature	-25 to 70℃ for operation
	-30 to 80℃ for storage
Humidity	30 to 90% RH
Operating indication	Red/Green 2-color LED, Red LED
Standard	IEC60947-1

For ground fault current protection

GMP60-3TZ(R), 3TN(R) Type

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

Terminal Lug

Description

- Cable connecting through CT holes
- Auxiliary contact: 2SPST (1a1b at energization)
- Wide and adjustable current range (0.5~60A)
- Definite time characteristics
  D-time: 0.2~60sec. / O-time: 3sec.
- With 3 sensors (CT)
- Control voltage: AC100~245V (50/60Hz)

Extended protective functions

Types		GMP60-3TZ, 3TN	GMP60-3TZR, 3TNR
Number of sensors		3CT	3CT
Protective functions	Overcurrent	✓	✓
	Phase failure	✓	✓
	Ground fault	✓	✓
	Locked rotor	✓	✓
	Phase unbalance	✓	✓
	Reverse phase	-	✓
Storing the last fault cause		✓	✓

Selection

Mount/Connection	Ground fault current	Optional function	Setting range	Catalog No.
• Separate mount • Cable Connection through CT holes	Zero phase current (0.1~2.5A) *ZCT required	None	0.5 - 60A	GMP60-3TZ
		Reverse phase	0.5 - 60A	GMP60-3TZR
	Residual current (0.5~6A)	None	0.5 - 60A	GMP60-3TN
		Reverse phase	0.5 - 60A	GMP60-3TNR

Note) Use ZCT for EMPR, 100mA/40 ~ 55mV

Technical information

Mounting	On 35mm rail or panel with screws
Setting tolerance	Current ± 5%
	Time ± 5% (or ±0.5sec)
Frequency	50/60Hz
Auxiliary contact rating	5A/250VAC at resistive load
Insulation resistance	Min 100㏁ at 500V DC
Surge insurance	5kV (IEC 61000-4-5)
Fast transient burst	2kV (IEC 61000-4-4)
Ambient temperature	-25 to 70℃ for operation
	-30 to 80℃ for storage
Humidity	30 to 90% RH
Operating indication	Red/Green 2-color LED, Red LED
Standard	IEC 61000, KEMC 1120

Electronic motor protection relays

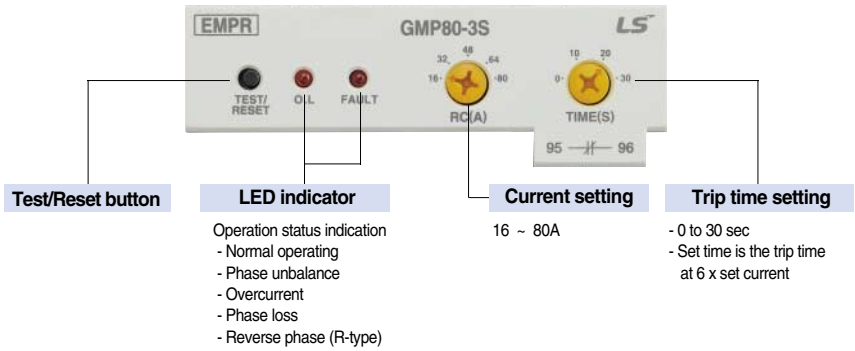
Inverse time characteristics

GMP80 Type

Description

- Wide and adjustable current range
- Adjustable trip time (trip class 5-30)
- Separately mountable on 35mm DIN rail or with screws
- 1NO+1NC trip contacts
- Manual reset as standard (Automatic reset optional: GMP80-2SA)

Front face configuration



Extended protective functions

Types (GMP80-□)		2S	2SA	3S	3SR
Number of sensors		2CT	2CT	3CT	3CT
Functions	Overcurrent	✓	✓	✓	✓
	Phase loss	✓	✓	✓	✓
	Locked rotor	✓	✓	✓	✓
	Phase unbalance	-	-	✓	✓
	Reverse phase	-	-	-	✓
	Auto reset	-	✓	-	-

Selection

Mount/Connection	Sensor	Setting range	Catalog No.
Separate mount	2-sensor (2 CT)	16 - 80A	GMP80-2S
Cable connection with a screw	3-sensor (3 CT)	16 - 80A	GMP80-3S
	3-sensor Reverse phase detection	16 - 80A	GMP80-3SR

Technical information

Relay control voltage	100 to 260V AC 50/60Hz
Auxiliary contact	3A/250VAC at resistive load
	1NO (97-98) + 1NC (95-96) (When power applied)
Setting tolerance	Current ± 5%
	Time ± 5% (or ±0.5sec)
Insulation resistance	Min 100㏁ at 500V DC
Surge insurance	5kV (IEC 61000-4-5)
Fast transient burst	2kV (IEC 61000-4-4)
Ambient temperature	-25 to 70℃ for operation
	-30 to 80℃ for storage
Humidity	30 to 90% RH

Certificate
CE, ULcUL

Characteristics DMP Series

DMP-S/SZ/SI, T/TZ/TI Type

Extention type (with cable)

- Unit type or extension type is available
  - Extension type:Remotely mounts the display unit on the panel surface
- Ampere meter function: current and setting value by press the display button
- Select the inverse time or definite time
- Display the causes of the fault and the values

Protect function

Over current	Depend on setting time	Selectable the inverse/definite
Phase failure	Within 3seconds	Over 70% of the rate of unbalance
Phase unbalance	Within 5seconds	Over 50% of the rate of unbalance
Reverse phase	Within 0.1seconds	Function enable
Stall	Within 5seconds	Over 180% of the setting current
Lock	Within 0.5seconds	Setting 200~900% of rated current
Under current	Within 3seconds	Setting 30~70% of rated current
Ground fault Note)	Selectable 0.05~1.0seconds	Grounded current setting by dip s/w (100~2500mA)
Short circuit	Within 50ms	300~1800% of rated current

Note) Lock protection is operated after setting D-time in case of definite time type

Function selection

FUNC	Sel	Description
1. CHA	Inv/dEF	Operating characteristics setting (Inverse/definite time type)
2. dEF Note1)	0~30 (S)	Setting the operating time (In definite type)
3. r.P	oFF/on	Reverse phase enable
4. Und	oFF/30~70 (%)	Under current enable and setting
5. Alt	oFF/60~110 (%)	Alerting enable and setting (DMP-S, T type)
5. g-F	oFF/0.05~1.0 (S)	Ground fault enable and setting (DMP-Z type)
5. Sho	oFF/300~1800 (%)	Short current enabling and setting (DMP-I type)
6. Stl	oFF/on	Stall enable
7. Loc	oFF/200~900 (%)	Lock enable and setting
8. Ct	1~120	CT ratio setting
9. P.F	on/oFF	Phase fault enable
A. gFd Note2)	oFF/on	Setting delay of ground fault (DMP-Z type)
b. StA	0~120	Operating time setting by month (DMP-a type)
c. StH	10~730	Operating time setting by hour (DMP-a type)
d. tAH	A000,000.0	Displaying total operating time (month, hour) (DMP-a type)
E. rAH	A000,000.0	Displaying operating time (month, hour) (DMP-a type)
Sto	Sto	Store

Note) 1. 2.dEF is only displayed when dEF s selected in a 1.CHA mode
2. Functions for A to E are available for only DMP-a type.

Ratings

Model			DMP□-S/Sa, T/Ta, SI	DMP□-SZ/SZa/SI, TZ/TZa/TI
Type	**Wiring method**		S: Screw, T: Tunnel	
	Panel mount		Unit or Extension	
Operating characteristics			Inverse/definite type	
Alerting function			Variable between 60 and 110%	
Current range (A)			06: 0.5~6, 36: 3~36, 60: 5~60	
Setting time	**Definite**	**Delay (D-T)**	0~60seconds	
		Operating (O-T)	0~30seconds	
	Inverse		0~60seconds	
	Reset type		Manual reset	
Operating voltage	**voltage**		AC 110V/220V (±10%)	
	Frequency		50/60Hz	
	ZCT input (07-08)		200mA/110mV (ZCT) [30ø, 50ø, 65ø, 80ø]	
Aux. contacts			3A/250Vac resistive load	
Indicate	**7-segment**		3-phase current value, fault cause	
	Bar-LED arrays		Load ratio (60~110%)	
Mounting			35mm Din-rail/Panel	
Certification			UL, cUL, CE (Except DMP36 type)	

Characteristics IMP Series

IMP-C Type

Extention type (with cable)

- MODBUS RS-485 Communication or 4~20mA analogue output
- 3 phase ampere meter function: Check the 3 phase current and setting value by press the display button
- Select the Thermal inverse/inverse time or definite time
- Easy to operate: Set the most function by the operation button and knob
- Display the causes of the fault and the values
- Adjustable wide current range (0.5~100A)

Protect function

Over current	Depend on setting time	Selectable the inverse/definite
Phase failure	Within 1.5seconds	Over 70% of the rate of unbalance
Phase unbalance	Within 3seconds	10~70% of the rate of unbalance
Reverse phase	Within 0.1seconds	Function enable
Stall	Within 3seconds	setting 150~500% of rated current
Lock Note1)	Within 0.5seconds	Setting 200~800% of rated current
Under current	Within 3seconds	Setting 30~90% of rated current
Ground fault Note2)	Selectable 0.05, 0.1~1.0seconds	gF: 0.03/0.05/0.1~3A gn: 20~500% of the FLC min

Note) 1. Lock protection is operated after setting D-time in case of definite time selected.
2. 12. gF Zero sequence CT, 13. gn Residual circuit sensing.

Setting Menu (A Group)

Menu	Setting Value	Item	Default Value
1.CHA	dEF/th/n-th	Operation Characteristics (Definite Time / Heat Accumulation Inverse Time /Inverse Time)	n-th
2.O-t	1~60s	Operation Time (sec)	60
3.d-t	1~200s	Operation Delay (sec)	In chase of dEF
4.r-C	0.5~10A/5~100A	Rated Current	Max.
5.Ctr	0.25, 0.5, 1~200	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%	Low Current Protection (%)	OFF
12.gF	0FF, 0.03, 0.05/0.1~3A	Ground Fault Operation Current (Zero-Phase-Sequence Current) (A)	OFF
13.gn	OFF, 20~500% (FLCmin)	Ground Fault Operation Current (Post-Arc Current) (FLCmin)	OFF
14.gt	0.05, 0.1~1.0s	Ground Fault Operation Time (Current)	-
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 setting	I-tp
18.Ar	On,60~110% On,60 0%	Alert setting	Only "ALo"
19.cS	1a1b, 2a, 2b	Contact setting	1a1b

Setting Menu (B Group)

Menu	Setting Value	Item	Default Value
1.E-r	On/OFF	Electric Recovery	On
2.A-r	OFF, 1~20 min	Automatic Recovery (Minute)	OFF
3.r-t	Hour/Minute	Operation Time	Time Check
4.Srt	OFF, 1~8760Hour	Operation Time Setup (Hour)	-
5.s-d	2009/01.01/00:00	YY/MM/DD/ HH:MM	-
6.Trt	Day/hour:minute	Total Operation Time	Time Check
A.t-d	0.5~10/5~100A	20mA Output Setup	A420
A.Adr	1~247	Communication Address	M485 Model
b.bps	96/192/384	Communication Speed	
c.S-P	On/OFF	SWAP	

Note) 1. When the power is supplied first or is resupplied after a power failure, must set up the date (5.S-d).
2. Automatic recovery is only possible in case of an excess current trip.

Note) 1. When the rated current S/W is 100A, the CT ratio is not displayed.
2. Some menus are not displayed if relevant functions are not available.

Ratings

Model			IMP-C-NO, M485, A420
Type	Wiring method		Tunnel
	Panel mount		Unit or Extension
Operating characteristics			defin/TH-Inv./n-TH
Alerting function			Variable between 60 and 110%
Current range (A)			0.5~100
Setting time	Definite	Delay (D-T)	1~200seconds
		Operating (O-T)	0~30seconds
	Inverse/TH-Inverse time		0~60seconds
	Reset type		Manual reset
Operating	Control power [A1(+), A2(-)]		AC 85~245V, AC 24~36V (50/60Hz)
ZCT input (Z1, Z2)			200mA/110mV (ZCT) [30 ø , 50 ø , 65 ø , 80 ø]
Aux. contacts (2a, 2b, 1a1b) OL, GR 2-SPST (95~98) AL (07-08)			5A/250Vac resistive load
Indicate	7-segment		3-phase current value, fault cause 5point
	Bar-LED arrays		Load ratio (60~110%)
Mounting			35mm Din-rail/Panel
Communication			A420: Analog, M485: Modbus
Certification			CE

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

2. Check the TEST/RESET button

1) When you press the 'Test/Reset' button, the O.L LED is turned on and the EMPR is tripped
2) When you press the 'Test/Reset' button under the EMPR is tripped, the O.L LED is turned off and the EMPR is reset
3) Auto reset function: When it is tripped by the over current, it is reset after 1 Min.(Optional)

3. Set the operating time

The operating time is set on the base of 600% of the rated current in the characteristic curve

1) Set the operating time by considering the operating time and start current according to the types of the load
2) If the time knob is set to 10sec, the EMPR is tripped when the start current (600% of the rated current) is applied for 10sec

Caution) The EMPR with inverse time characteristics can be tripped to protect the motor when the motor is started a few times continuously
When a motor is frequently changing the rotating direction (forward and reverse), set the operating time longer For the crane and hoist use, select the EMPR with definite time characteristics

4. Set the operating current

Set the current by considering the rated current of a motor to protect from the over current

1) Check the rated current of a motor is within the current setting range of an EMPR
2) Set the 'RC' (Rated current) knob to the maximum value and then start a motor
3) Under normal motor operation, rotate the 'RC' knob to the counterclockwise until the 'O.L' LED flickers The current at this point in the 100% current rating under real load
4) At this point, rotate the 'RC' knob to the clockwise until the 'O.L' LED turned off.
Ex) When the 'O.L' LED flickering at 20A, the setting current will be 22A(=20x1.1)

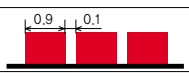
Note) The brackets for connection is offered standard

5. Check status of operation by LED

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
If there will be a phase failure in three phase load, it will be tripped within 3 seconds.

Note) 2CT EMPR can protect motor from R or T phase failure.

3) In case of phase unbalance
If phase unbalance rate is over 50%, FAULT LED will flicker 0.4 second intervals.
4) In case of Reverse phase
Red & green color LED will flicker alternately.

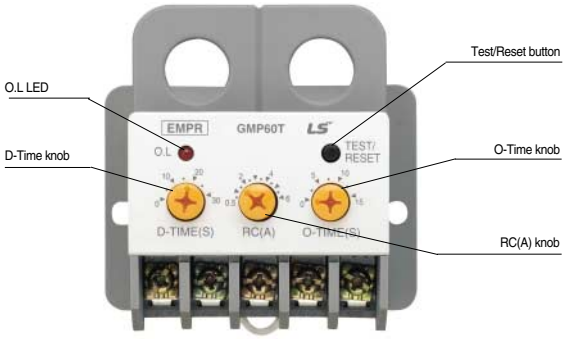
Condition			LED Status	LED Diagram	Remark
Operating status	Normal		LED OFF		
	Over current		0.4 Second intervals		
	Phase unbalance (30~50%)		0.4 Second intervals		GMP 80-3S/3SR model, only red color LED will flicker.
Tripped status	Over current		O.L LED light up		
	Phase failure (3CT)	R	1 time for 3 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	2 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

Setting method

GMP Series Definite time

Tunnel type mounting



1. Check the Test/Reset button operation

1) Check if the wiring is correct (Refer to the wiring diagram)
2) Set the 'D-Time' and 'O-Time" knob to the min. ratings
3) When the 'Test' button is pressed under tripped condition, the 'O.L' LED is turned off

Note) In operation, even though you press the 'Test/Reset' button, the EMPR do not trip

2. Set the operating time

● **D-time (Delay time): 0~30 sec**

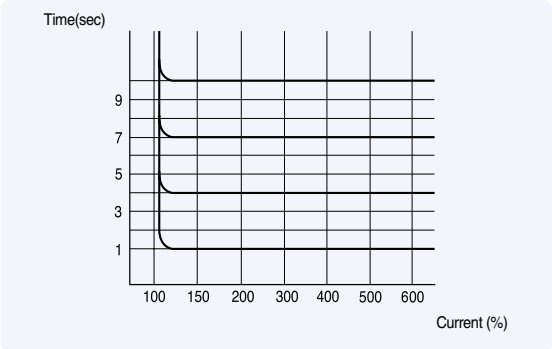
The motor starting current, which flows when the motor is starting, is generally 600% of the rated current. It is the time during which the EMPR do not operated by over-current during the starting time

1) Set the delay time by use of the 'D-time' knob
2) In case you do not know the delay time, start the motor by setting the 'D-time' knob to the max. position and after checking the time during which the staring current become stable, set the D-time (In general , the setting time is 3~5 seconds)

● **The operating time is the time during which the EMPR tripped by the over-current. The EMPR is tripped after the selected operation time**

1) Set the operation time by the 'O-time' knob
2) If you set the 'O-time' to the min value, the EMPR is tripped at once

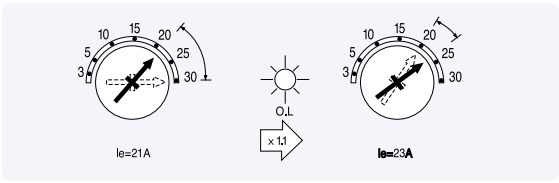
Note) Generally set it to 4~6 seconds



Definite time characteristics curve

3. Set the operating current

1) Start the motor by setting the 'RC' knob to the maximum position
2) Under operating condition, rotate the 'RC' knob to the counterclockwise until the 'O.L' LED turned on & off. The current at this point is the value (100%) under real load condition
3) Rotate the 'RC' knob to the clock-wise until the 'O.L' LED turned off.
   Ex) When the 'O.L' LED flickering at 20A, the setting current will be 22A(=20x1.1)



(ex: When the 'O.L' LED settings at 21A, the setting current will be 23A (=21*1.1))

4. Check the LED condition when operation

1) Over-current
   – The EMPR is not tripped during the D-time under over-current but the O.L LED turned on and off to indicate that the over-current flows
   – If the EMPR is tripped after D-time the O.L LED turned on

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

Setting method
GMP60-TD(a) Type

● Function & Setting menu

1) Automatic reset setting will work in the event of overcurrent trip
2) Func. A and b are to check the elapse time, not for setting
3) Undercurrent protection function will work at the current flow more than 0.4A
4) In case of changing the rating DIP S/W FUNC #1 should be changed accordingly
5) Function setting is allowable at TEST mode
   - Turn off the power before changing a current type switch, and then be sure to adjust the current in the menu

● Setting Menu

FUNC	SEL	Description	Remarks
I_Ct4	6A/60A	Current type selection	Set the same with rated current S/W
20-t	0.5/1~30(SEC)	Trip time setting	-
3d-t	1~60/1(SEC)	Time delay setting	-
4r-C	0.5~6.0/5~60	Rated current setting	-
SCtr	0.25/0.5/1~120	Current ratio setting	-
6P-F	oFF/on	Phase loss enable	-
7U-C	oFF/30~70(%)	Undercurrent setting	For TDa model only
8A-r	oFF/1~20(MIN)	Automatic reset setting	For TDa model only
9Srt	oFF/10~8760	Operation hour setting	For TDa model only
Atrt	-	Total running hour check	For TDa model only
br-t	-	Running hour check	For TDa model only
Sto	-	Store	-

Note) 1. If operation hour set at 9Srt is elapsed OrH is displayed and the relay operates normally. (There is no additional relay output)
2. How to check r-t and trt

Display	How to check			
trt	Press SEL	Day displayed	Press SEL	Hour, Min displayed
r-t	Press SEL	Operation hour displayed	Press SEL	Day displayed
	Press SEL	Min displayed		

3. When power is OFF the data in unit of minute is deleted at trt
4. Operation hour at r-t is the total running hour before the motor is oFF and displayed in Day, Hour and Min. When motor is OFF the data is deleted.

● 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	GMP60TDa
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	GMP60TDa

Note) When the 'FUN' Key and 'SEL' Key are pushed simultaneously, a last trip cause appears on the disply window.

Setting method

GMP60-3TZ(R) / 3TN(R) Type

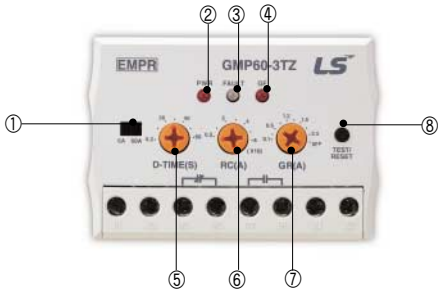
- **Trip curve: definite time characteristics**

- **Protective function: overcurrent, locked rotor, phase loss, phaseun balance, 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) phase reverse: trip within 1 sec. when any two phases out of three

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

- **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 .



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 ~ 60According 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.

- **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	Sensitivity current setting (0.1~2.5A)	Zero phase current detection type
			Sensitivity current setting (0.5~6A)	Residual current detection type
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

Setting method
DMP Series

1. Check the operation of the Test/Reset button

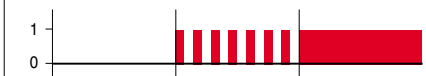
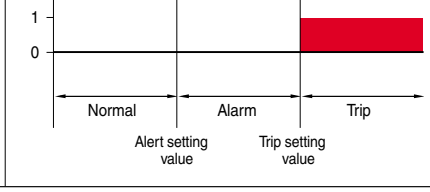
1) Check the wiring method
2) Press the Test/Reset button and then test is displayed on the LED and the DMPR is tripped
3) Press the Test/Reset button again and then it is reset

Note) The Test/Reset is not available when a motor is rotating.

2. Shift the mode by pressing the FUNC key and then select the values by the Sel key

1) First shift to the test mode by press the "Test/Reset" button and then set the functions by press the "FUNC" button
2) Each time you press the"FUNC" button, the function mode switches from 1.CHA mode to Sto mode.
When the mode that you want to change is displayed, push the "Sel" button to select the value you want.
After you select the value, press the "FUNC" button to finish the settings and it displays the next mode
3) If no button is pressed in the selection mode, it remains in that mode
4) If you select the inverse time characteristics it skips the mode 2 (Definite O-time) and go to the mode 3 (Reverse phase)
5) Alt is the alert setting mode. It displays the load rate of the current setting value by the bar LED (60~110%)
- If the current is higher than the setting value, the bar LED is switched on and off and the AL relay (07-08)
make close and open in 1sec interval unit the EMPR is tripped (Pre-alarm function)
- If the 5. Alt mode is set to off, the AL relay make close after the EMPR is tripped (Normal open contact)
6) To finish the settings you have to press the "Sel" button in the Sto mode

Alarm signal (Alert function)

5.ALt	AL(07-08) contact operation
On	
Off	

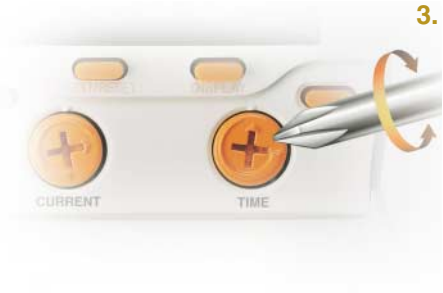
Setting Menu

FUNC	Sel	Functions	Note
1.CHA	I nu/dEF	Inverse or definite time characteristics	Default is inverse time characteristics
2.dEF	0~30	Set the O-time (Definite time only)	For D-time setting, use the time knob
3. rP	oFF/on	Reverse phases protection	Default is "Off"
4Und	oFF/30~70(%)	Under current protection	Default is "Off" Note1)
5.ALt	oFF/60~110(%)	Alarm function (With pre-alarm function)	Default is "Off" (DMP-S, T type)
5.9-F	oFF/0.05~1(SEC)	Ground fault and Setting the operating time	Default is "Off" (DMP-Z type)
5.Sho	oFF/300~1800(%)	Short current Protection enabling and setting	Default is "Off" (DMP-I type)
6.StL	oFF/on	Stall function	Default is "Off"
7.Loc	oFF/200~900(%)	Lock function	Default is "Off"
8. Ct	1~120	CT ratio	Default is 1:1 Note2) (DMP06 Modle)
9P-F	on/oFF	Phase failure	Default is "On" to store
A.9Fd	oFF/on	Setting delay of Ground Fault	Available for SZa/TZa
b.StA	0~120	Operating time setting (Month)	DMP□-Sa/Ta/SZa/TZa model
c.StH	10~730	Operating time setting (Hour)	
dtAH	A000,000.0	Displaying total operating time (Month, Hour)	
E.rAH	A000,000.0	Displaying operating time (Month, Hour)	
Sto	Sto	Store	Push the SEL button to store

Note) 1. Set the under current value from above 350mA
2. Do not change the CT ratio in 36, 60 type
3. When using DMP to loads over 60A, you should use DMP-06 and an external CT that secondary output is 5A
4. When using external CT, maximum primary current is 600A

Setting method

DMP Series



3. Adjust the operating time by the time knob

● **Inverse time characteristics**

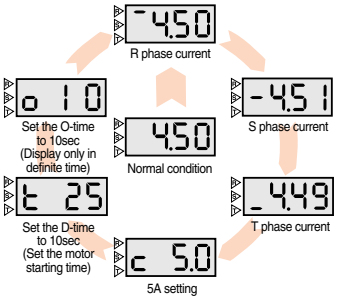
1) Select the inverse time in the 1. CHA mode, the default operating time is 600% of the setting current
2) The setting range of the operating time is 0~60sec. Set the time by considering the motor start time
3) When it is over the setting time, the EMPR operate in accord with the hot characteristics curve

● **Definite time characteristics**

1) Select the definite in the 1. CHA mode, it is operated by the definite time characteristics
2) D-time means the time that delays the operating time when the motor is starting
3) The setting range of the operating time is 0~60sec. Set the time by considering the motor start time
4) Set the O-time at the setting mode 2. dEF and the range is 0~30sec

4. Adjust the operating current by the current knob

1) Set the operating current based on the rated current that is described in the name plate. Generally set the 110~115% of the real load current in the normal load condition
2) There are 3 types according to the current range (6 / 36 / 60). When you use the external CT you can see the real current by setting the CT ratio
3) You can easily set the current value by refer to the load rate which is displayed on the bar-graph (Approx. 90% load rate)



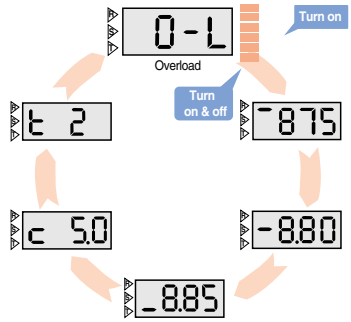
5. Check the setting state by the display key

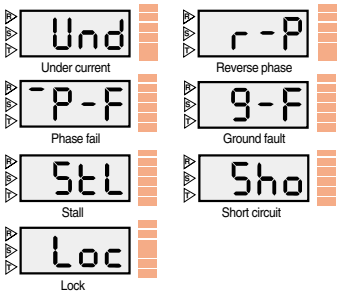
1) In normal condition it display the maximum current among the three phase current
2) Each time you press the "Display" button you can see the current and values
3) If no button is pressed for 3~4 seconds. It returned to the normal condition

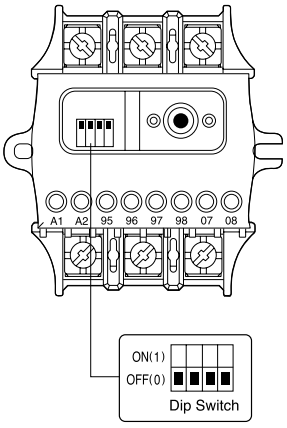
6. Check the causes of the fault by look at the display unit

The causes of the fault is switched on and off for 0.5sec interval. If you press the "Display" button at this time, you can see the values and the causes of the fault

ex)







Zero current sensitivity setting

Sensitivity (mA)	DIP S/W			
	1	2	3	4
100	○	○	○	○
200	1	○	○	○
500	○	1	○	○
1000	○	○	1	○
1500	○	○	○	1
2000	○	○	1	1
2500	1	1	1	1

Note) 1. Please use ZCT for LS EMPR.

1. Test/Reset

1) Check wires.
2) Press the Test/Reset key once. Then "TEST" is displayed and the EMPR is tripped.
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 Test/Reset key once. Then "TEST" is displayed and the EMPR is tripped.
2) Press the Enter key. Then "P-99" is displayed. Use the Up/Down keys to change the password.
3) 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.
4) 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.
5) 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.non3" 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 (Inverse)
	2.0-t	1~60s	Operation Time (sec)	60
	3.d-t	1~200s	Delay Time (sec)	200
	4.r-C	0.5~10A/5~100A	Rated Current (10/100A)	10/100A
	5.Ctr	0.25, 0.5, 1~200	CT Ratio (4 times, twice, once)	1 Note)
	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)	OFF
	13.gn	OFF, 20~500% (FLCmin)	Ground Fault Operation Current (Residual circuit)	OFF
	14.gt	0.05, 0.1~1.0s	Ground Fault Operation Time	-
	15.gd	On/OFF	Ground Fault Delay During Start	ON
	16.IC	OFF, 500~1000%	Instantaneous Protection (%)	OFF
	17.Io	I-tp, I-AL, U-C, OrH, ALo	AL(07-08) contact setting	I-tp
		I-tp	Instantaneous-current trip and warning	-
		I-AL	Instantaneous-Current warning only	-
		U-C	Under-Current warning only	-
		OrH	Run Time Elapsed warning only	-
		ALo	Activating 18.Ar. Menu	-
	18.Ar	On, 60~110%/10(%)	In case of ALO setting is done	not use
		On	On-load status (I > 0A) signal	-
		60~110%	Over-current waring signal (over the setting value)	-
	19.cS	1a1b, 2a, 2b	Contact (95-96, 97-98) Setting	1a1b

Note) 1. When the rated current S/W is 100A, the CT ratio is not displayed.
2. Some menus are not displayed if relevant functions are not available.

* Contact operation exemplification (Menu 19. cS)

19.cS	Setting Value	Motor state	Contact operation		Default Value
			95-96	97-98	
	1a1b	Normal running	NC	NO	1a1b
		Ground/Leakage Fault	NO	NC	
		Fault operation (except Ground fault)	NO	NC	
	2a	Normal running	NO	NO	
		Ground/Leakage Fault	NO	NC	
		Fault operation (except Ground fault)	NC	NO	
	2b	Normal running	NC	NC	
		Ground/Leakage Fault	NC	NO	
		Fault operation (except Ground fault)	NO	NC	

Operation and Setting
IMP Series

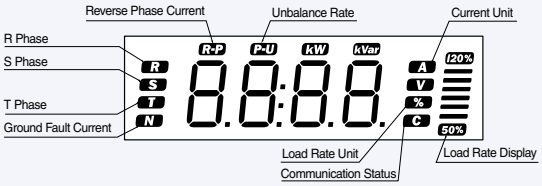
Setting Menu (B Group)

Group	Menu	Setting Value	Description	Default Value
B	tE-r	On/OFF	Electric Reset	On
	2A-r	OFF, 1~20 min	Automatic Reset	OFF
	3r-t	Hour/Minute	Run Time	Time Check
	45rt	OFF, 1~8760Hour	Run Time Setup (Hour)	-
	5S-d	2009/01.01/00:00	YY/MM/DD/ HH:MM (View/Setup)	-
	6trt	Day/hour:minute	Total Run Time	Time Check
	At-d	0.5~10/5~100A	Analog output	A420 Model
	AAdr	1~247	Communication Address	M485 Model
	bbPS	96/192/384	Communication Speed	
	cS-P	On/OFF	SWAP	

Note) 1. When the power is supplied first or is resupplied after a power failure, must set up the date (5.S-d).
2. Automatic reset is only possible in case of an excess current 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.
Loc	Lock Trip	Operate within 0.5 seconds.
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)	



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

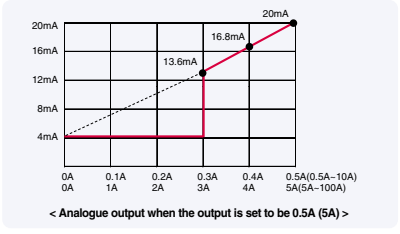
IMP Specifications for Low Voltage 3-Phase Induction Motors (Reference)

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

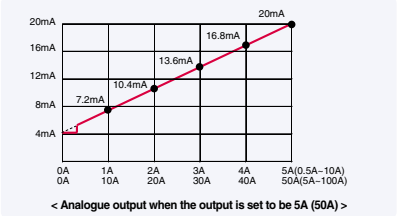
Note) 1. This table is written based on the full load current.
2. The CT is selected as a reference for the EMPR's current setting range.

Analog (DC 4~20mA) Output / Communication

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

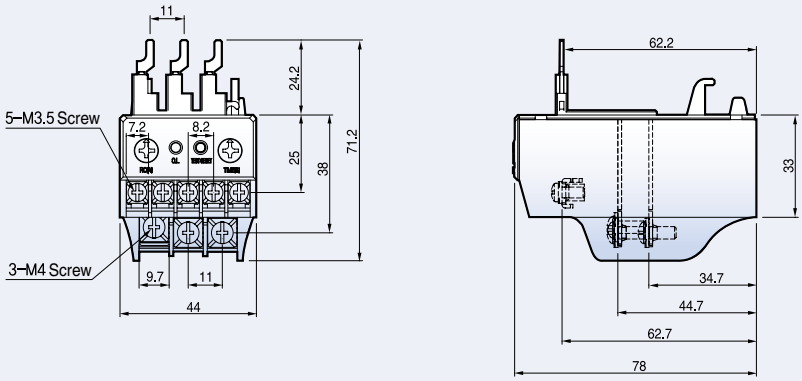
Communication Spec. :

Refer to 41 page and LSIS Homepage (www.lsis.biz)

Dimensions

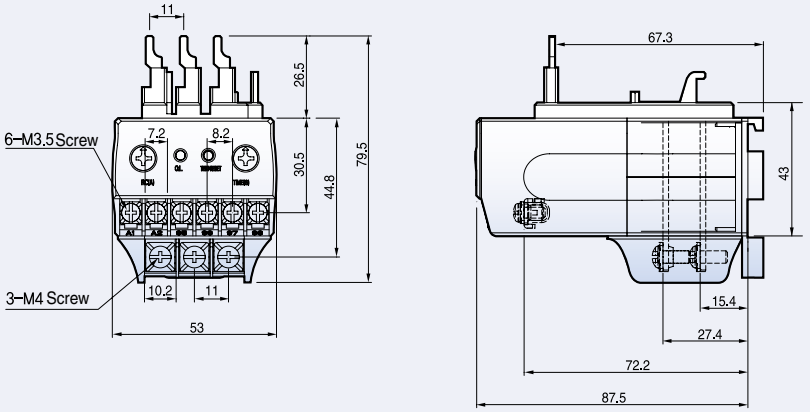
GMP Series

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



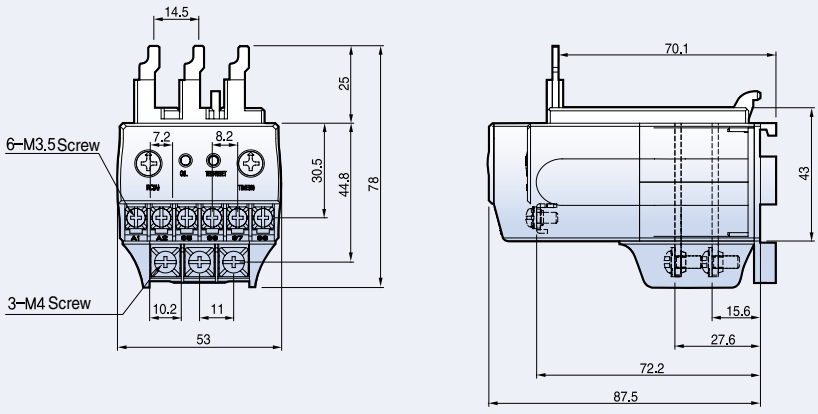
0.15kg

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



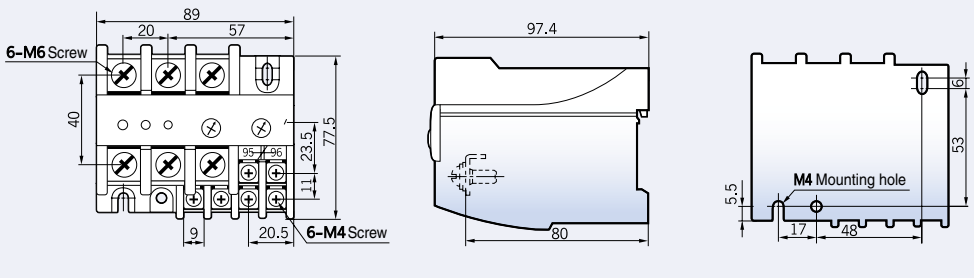
0.18kg

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



0.20kg/0.22kg

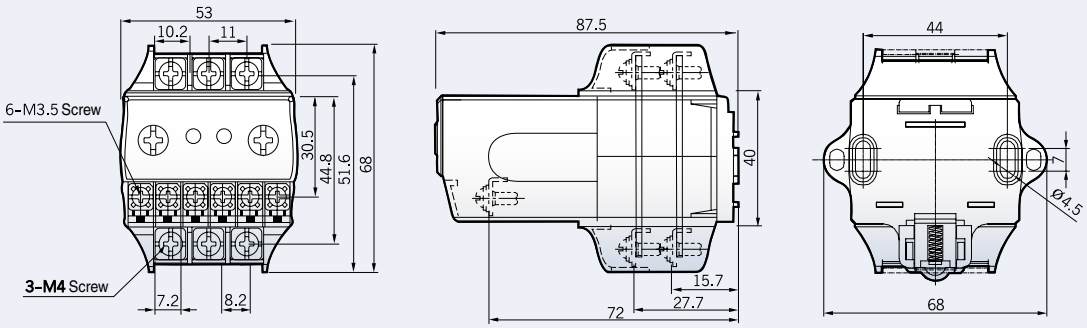
GMP80-2S
GMP80-3S
GMP80-3SR



0.42kg/0.46kg

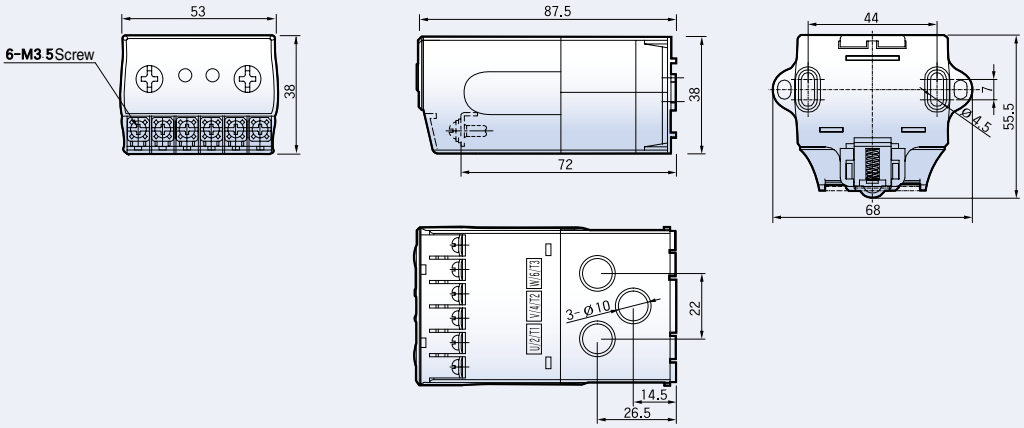
Dimensions
GMP Series

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



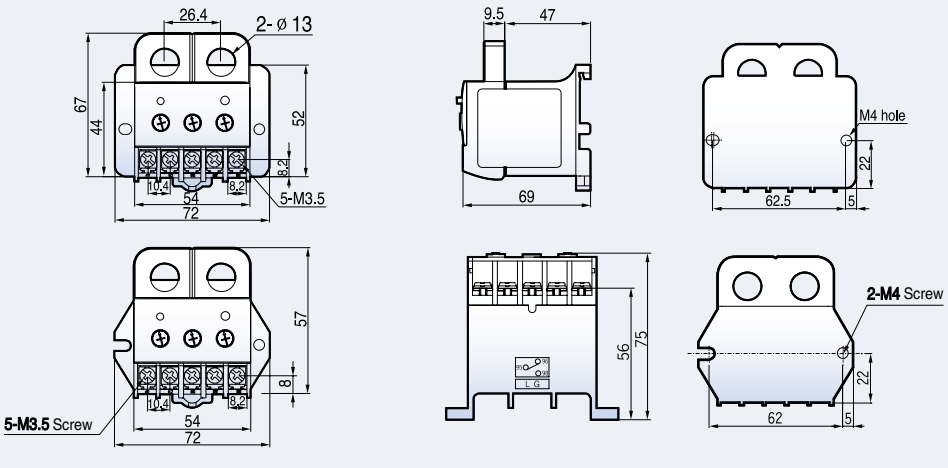
0.19kg/0.21kg

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



0.14kg/0.16kg

GMP60T
GMP60TE
GMP60TA

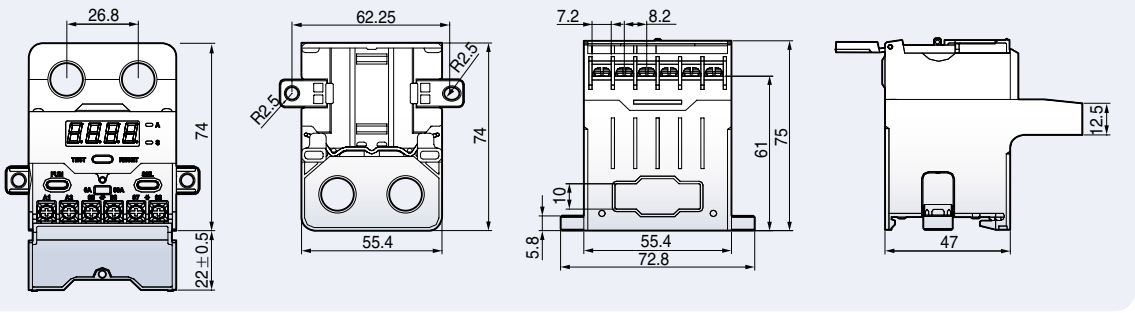


0.14kg

Dimensions

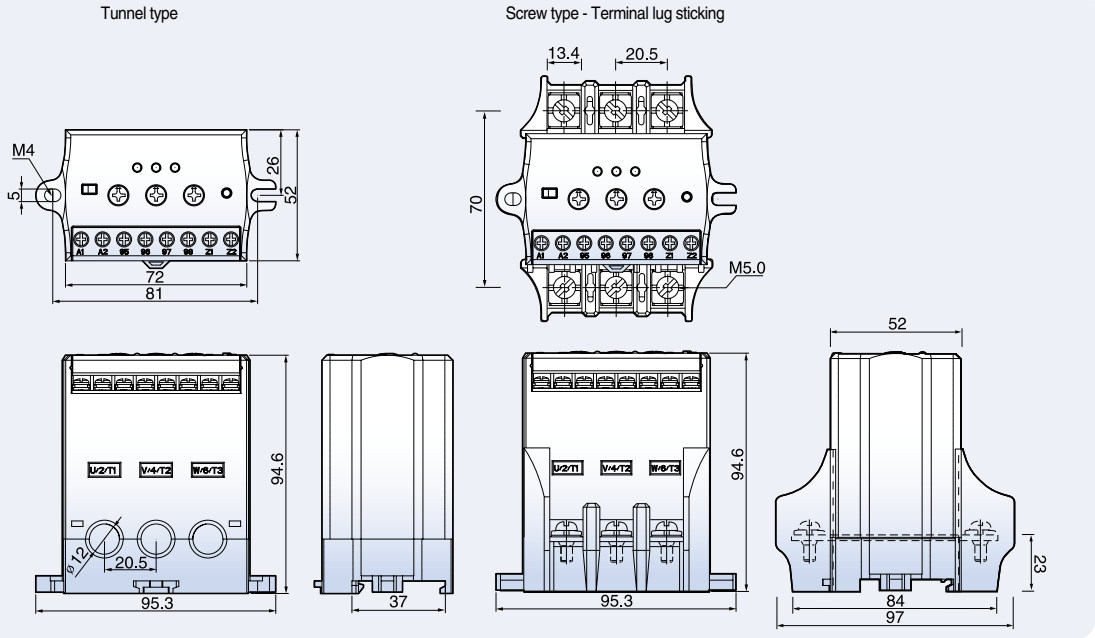
GMP Series

GMP60-TD
GMP60-TDa



0.25kg

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



Terminal arrangement

A1	A2		96	95	98
U/2/T1		V/4/T2		W/6/T3	

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

A1	A2	95	96	97	98
U/2/T1		V/4/T2		W/6/T3	

GMP22-2P (1a1b)
GMP22-3P
GMP40-2P/3P

R/1/L1		S/3/L2		T/5/L3	
A1	A2	95	96	97	98
U/2/T1		V/4/T2		W/6/T3	

GMP22-2/3S
GMP40-3/3S
GMP80-2/3S

A1	A2	95	96	97	98

GMP22-2/3T
GMP40-2/3T

A1	A2	95	96	98

GMP60-T/TE/TA

A1	A2	95	96	97	98

GMP60-TD
GMP60-TDa

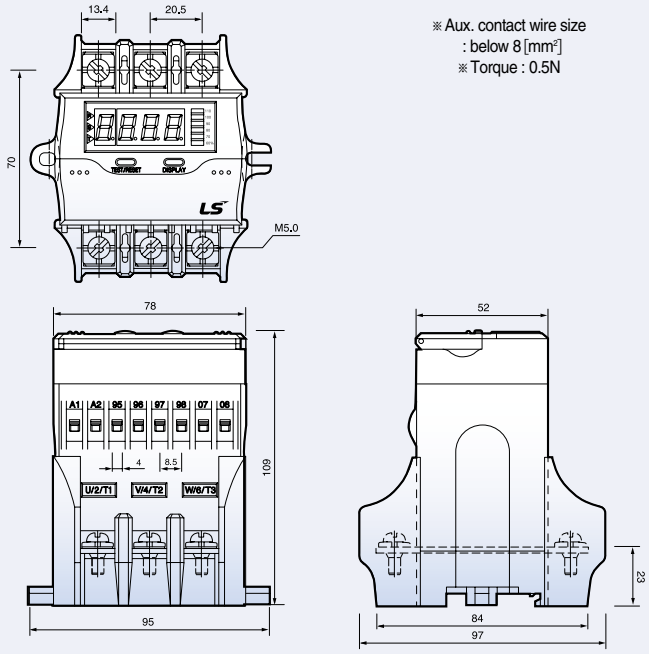
A1	A2	95	96	97	98	Z1	Z2

Note)
GMP60-3TZ, TZR
GMP60-3TN, TNR
GMP60-3T/3TR

Note) 1. Only for the GMP60-TZR modle.
2. Aux. Contacts are operate when power applied.

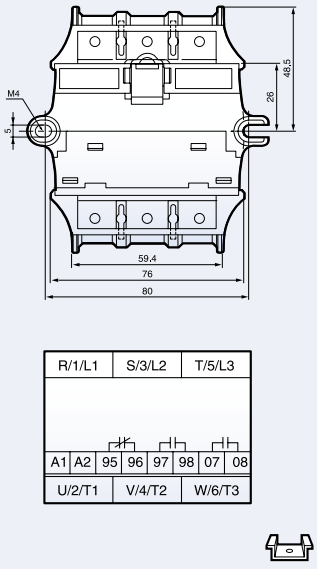
Dimensions
DMP Series

DMP□-S
DMP□-SZ
DMP□-Sa
DMP□-SZa



※ Aux. contact wire size
: below 8 [mm²]
※ Torque : 0.5N

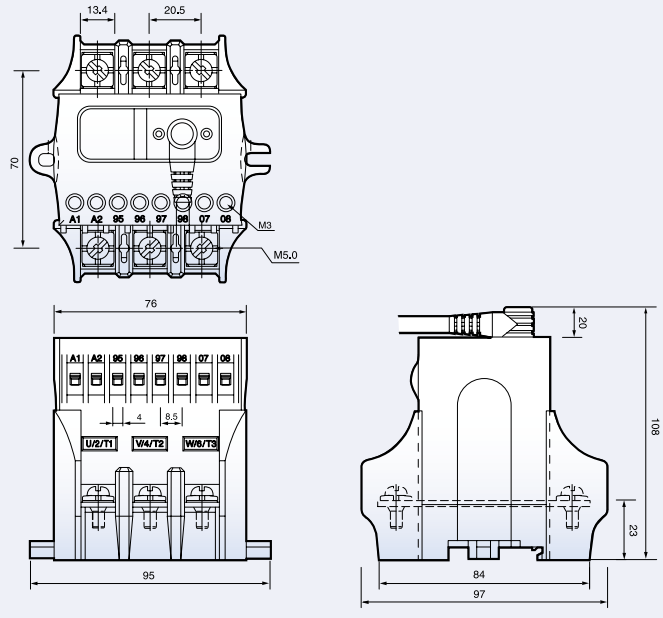
Mounting dimensions



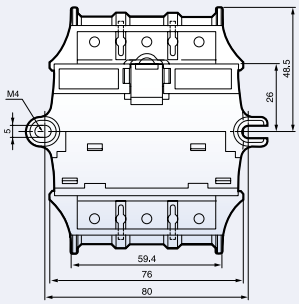
R/1/L1	S/3/L2	T/5/L3
A1 A2 95 96 97 98 07 08		
U/2/T1	V/4/T2	W/6/T3

0.7kg

DMP□-S
DMP□-SZ
DMP□-Sa
DMP□-SZa



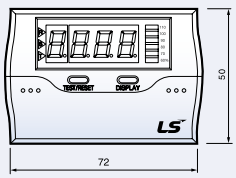
Mounting dimensions

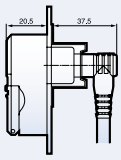


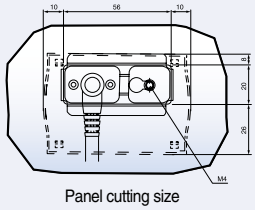
R/1/L1	S/3/L2	T/5/L3
A1 A2 95 96 97 98 07 08		
U/2/T1	V/4/T2	W/6/T3

0.64kg

Panel mounting







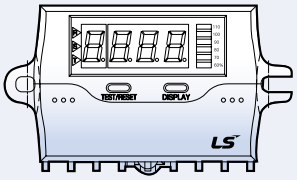
Panel cutting size

Note) 1. In extension type, the digital EMPR is calibrated with combining the display unit and mainbody so, please cautious not to combine the display unit and mainbody with different part No.
2. The 07-08 contacts are the ZCT input terminal (Digital EMPR with ground fault function)

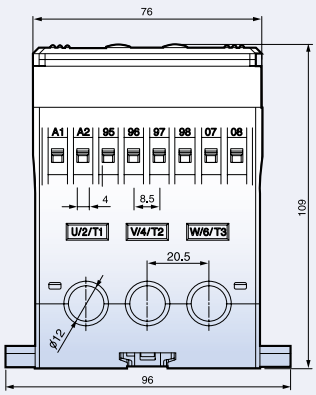
Dimensions

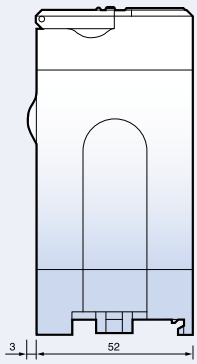
DMP Series

DMP□-T
DMP□-TZ
DMP□-Ta
DMP□-TZa

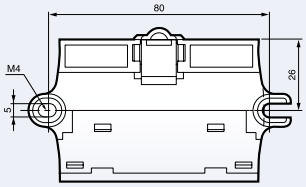


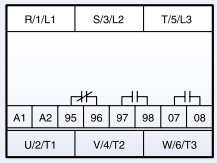
※ Wire size to penetrate a CT
:below 22 [mm²]





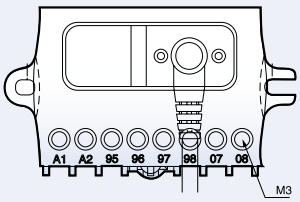
Mounting dimensions

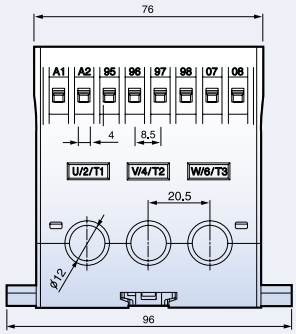


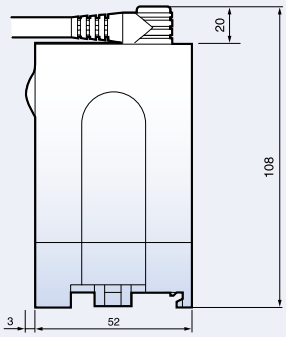


0.56kg

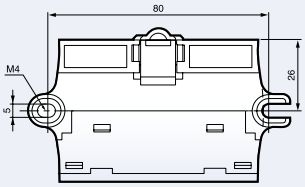
DMP□-T
DMP□-TZ
DMP□-Ta
DMP□-TZa

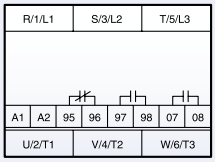






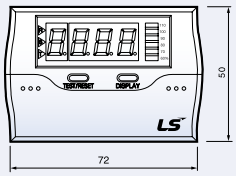
Mounting dimensions

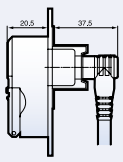


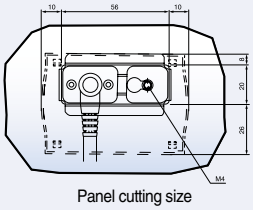


0.5kg

Panel mounting





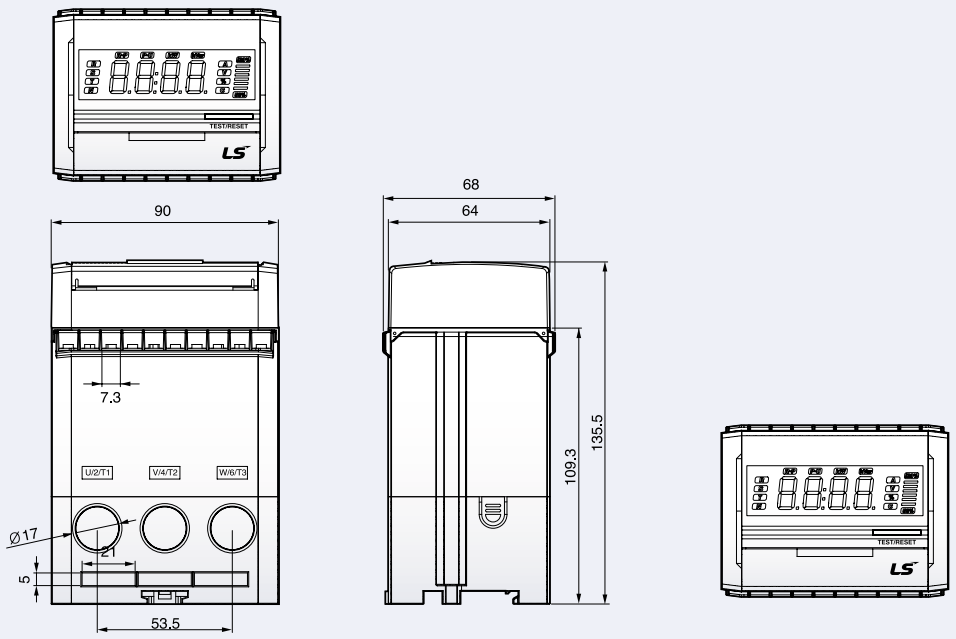


Panel cutting size

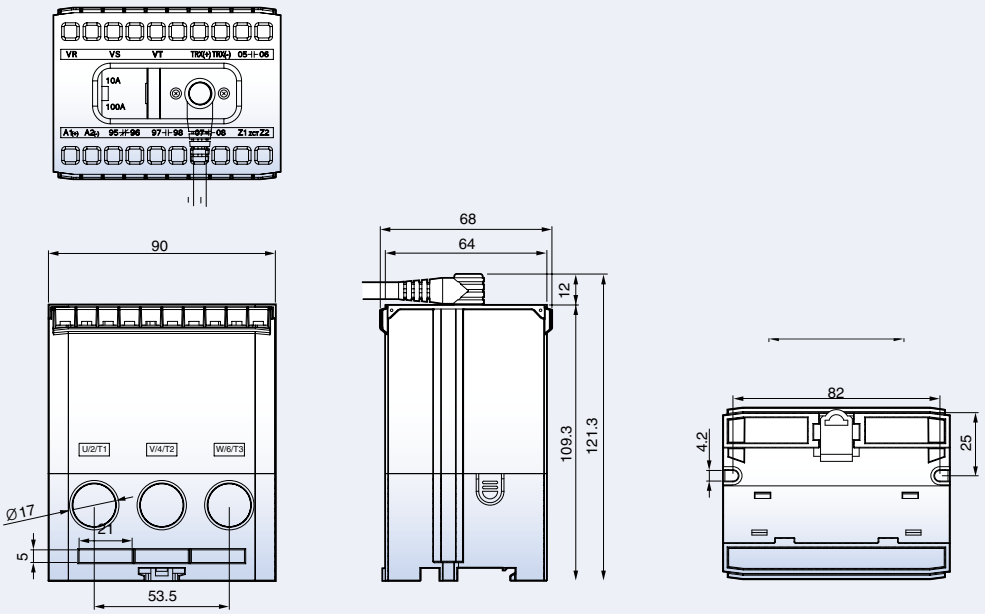
Note) 1. In extension type, the digital EMPR is calibrated with combining the display unit and mainbody so, please cautious not to combine the display unit and mainbody with different part No.
2. The 07-08 contacts are the ZCT input terminal (Digital EMPR with ground fault function)

Dimensions
IMP Series

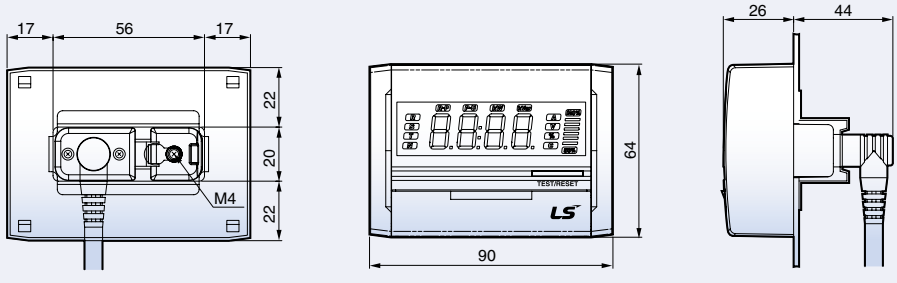
One-Body Type



Separate BOdy Type



Panel mounting



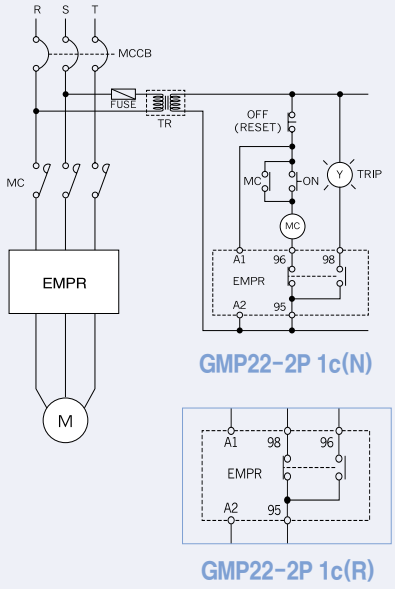
Note) The cable should be purchased separately (1m/1.5m/2m/3m).

Wiring method

GMP Series

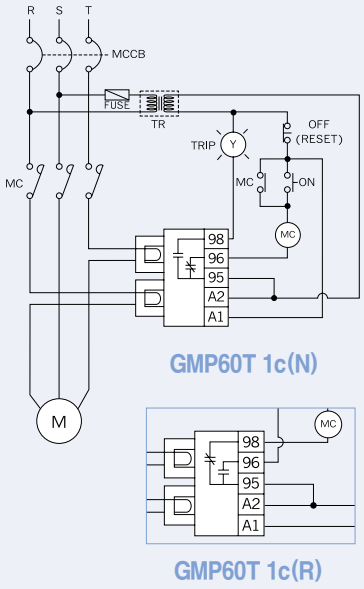
GMP22-2P (1c)

GMP60T (1c)



GMP22-2P 1c(N)

GMP22-2P 1c(R)

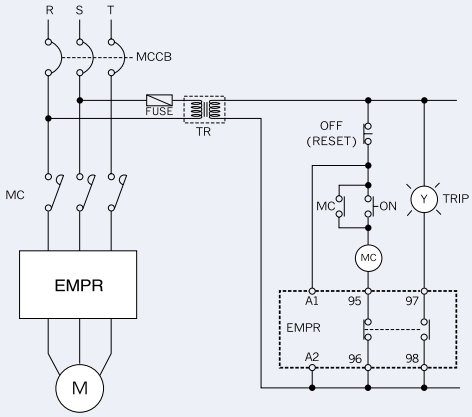


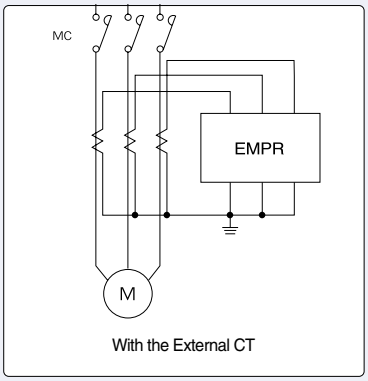
GMP60T 1c(N)

GMP60T 1c(R)

Note) 1c(N) Type: Fail-safe operation(No volt release) contact type (When power applied the Aux. contact operate)
1c(R) Type: Non-fail-safe operation contact type

GMP□-□ (1a1b)

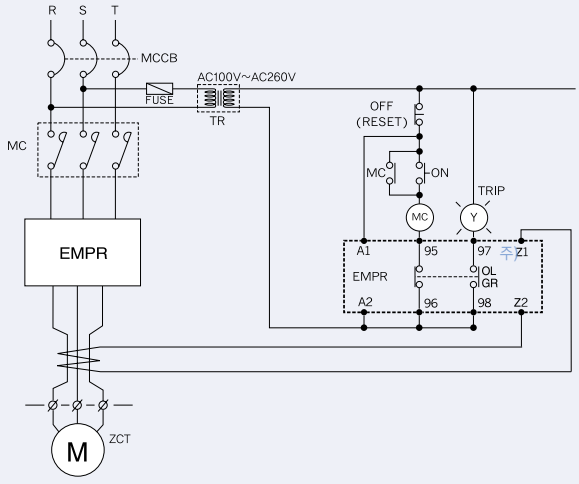




GMP60-3TZ, TZR

GMP60-3TN, TNR

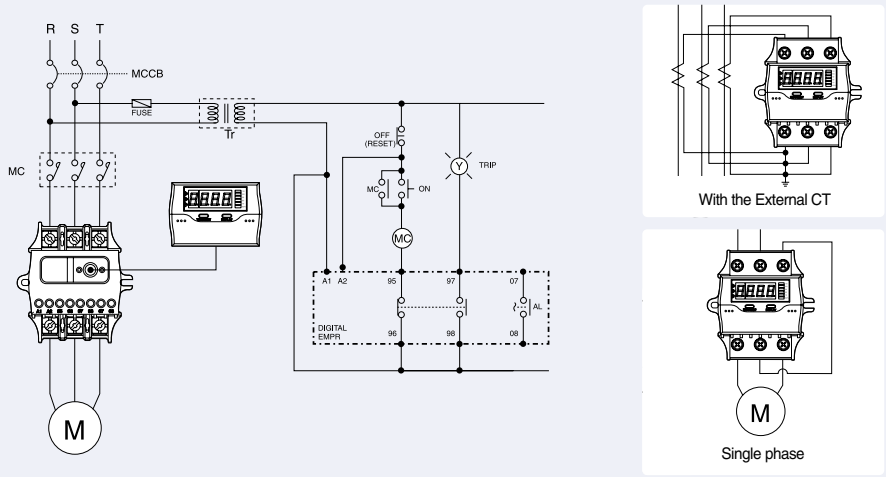
GMP60-3T, 3TR



Note) 1. The Z1, Z2 are the ZCT input terminal (GPM60-3TZ/TZ type)
2. Aux. contacts are operate when power applied.

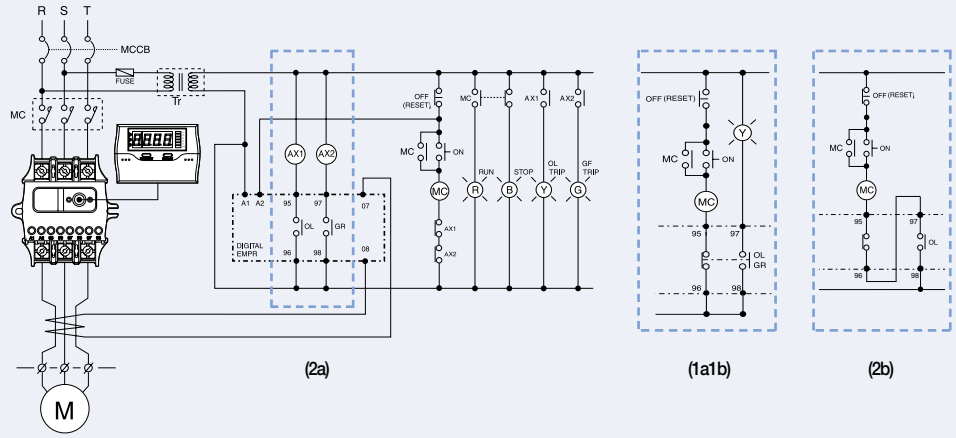
Wiring method
DMP Series

DMP-S/Sa
DMP-T/Ta

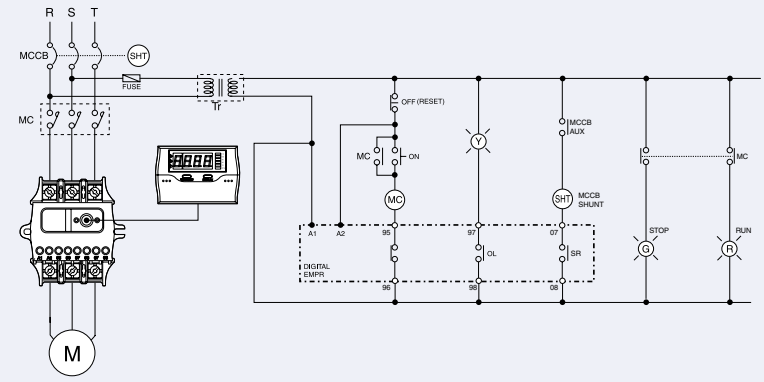


Note) When the single-phase motor is used, reverse phases protection should be set off.

DMP-SZ/SZa
DMP-TZ/TZa

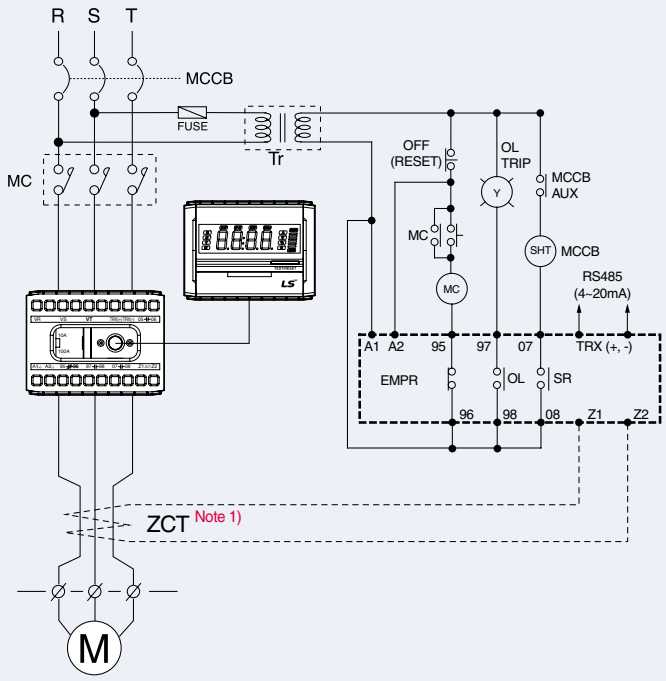


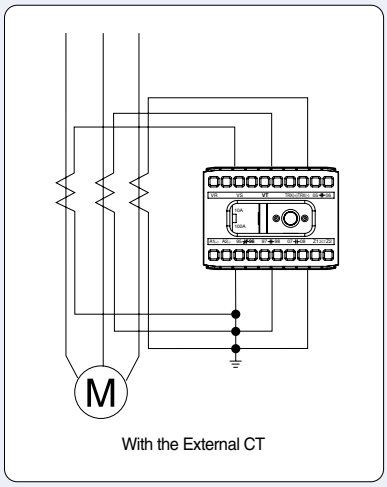
DMP-SI/TI



Wiring method

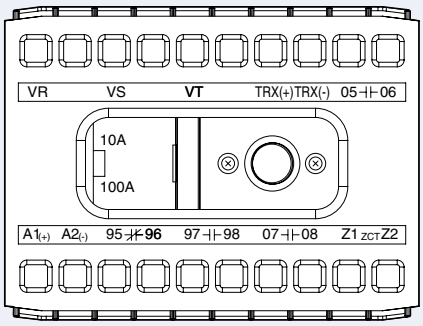
IMP Series





Note) 1. When the zero-phase-sequence current transformer is used to detect ground faults, connect the ZCT.
2. When the single-phase motor is used, all phases are connected except the S phase, and open-phase, unbalance and ground fault should be set OFF.

Terminal layout



Communication specification

- Operation mode: Differential
- Distance: Max. 1.2km
- General RS-485 shielded twist 2-pair cable
- Baud rate: 9600/19200/38400bps
- Transmission method: half-Duplex
- Max. In/Output voltage: -7V~+12V

Terminal Configuration

Engrave	Description	Remark
A1(+), A2(-)	Input terminal for operation power	AC/DC 85~245V, AC/DC 24~36V
95-96	When the power is ON (NC contact output)	In case of an instantaneous trip, if 17.1o is ALT, it is NC, and if 17.1o is Trip, it is NO.
97-98	When the power is ON (NC contact output)	In case of an instantaneous trip, regardless of 17 .1o setup, it is NC.
07-08	Converted to the NC mode only when an instantaneous trip occurs.	
Z1, Z2	Output terminal for the zero-phase sequence current transformer	Specific ZCT (for the EMPR)
TRX(+)	RS485 terminal (TRX+) Or 4~20mA (+) output	M485, A420 Type
TRX(-)	RS485 terminal (TRX-) Or 4~20mA (-) output	
10A/100A	Max. rated current change S/W	10A : 0.5~10A, 100A : 5~100A
VR/VS/VT	3-phase voltage input terminal	N/A
05-06	Output terminal for voltage protection	

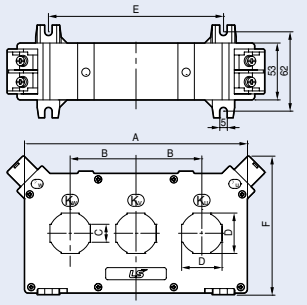
Note) 1. The 3-phase voltage input terminal and 05-06 output terminal should be connected only for voltage protection models, which will be released in the future.
2. For RS485 connection, the terminal resistance should be 120Ω .
3. For 4~20mA current, the maximum burden should be less than 500Ω .

Specification

Type	Model	Primary current	Secondary	Burden(VA)	Tunnel hole [mm]	Front mounting EMPR	Remarks
3CT type	3CT-23	80, 100, 150, 180, 200A	5A	1.5	21×21	GMP22/40/60T	1) Class: 1.0 2) Insulation voltage: 690V 3) Withstand voltage: 4kV/1min 4) Overcurrent strength: 40×In 5) Insulation Resistance: 10MΩ (DC 500V Megger) 6) Frequency: 50/60Hz
	3CT-43	100, 150, 200, 250, 300, 350, 400A			27×27	DMP/IMP series GMP60-3T/3TN/3TZ	
	3CT-63	400, 500, 600A			45×30	GMP22/40/60T	
2CT type	DCT-100	100A	5A	5	28.5×33.5	GMP22/40/60T	
	DCT-150	150A					
	DCT-200	200A					
	DCT-300	300A					
	DCT-400	400A					
1CT type	SCT-100	100A	5A	5	27.5×32.5	DMP/IMP series GMP60-3T/3TN/3TZ GMP22/40/60T	
	SCT-150	150A					
	SCT-200	200A					
	SCT-300	300A					
	SCT-400	400A					

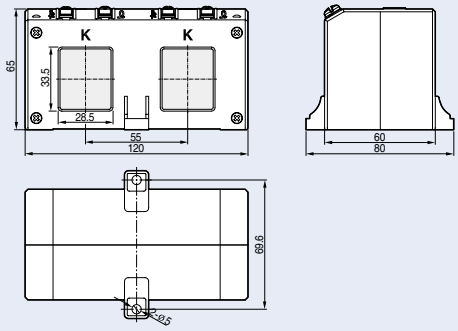
* Ref. When secondary cable is 2.5mm², 3m length burden is 0.52VA.

3CT



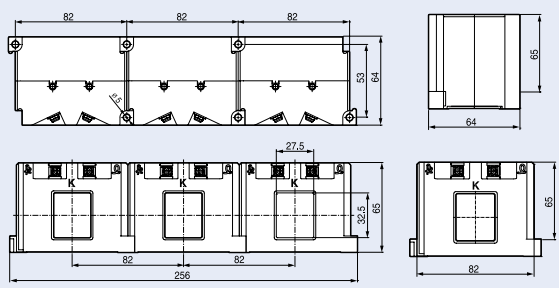
	3CT-23	3CT-43	3CT-63
A	119	149	218
B	35	44	70
C	9	11	20
D	21.5	27	45/30
E	89	117	183
F	78	93	96

DCT



SCT

Combination of 3 SCTs



Accessories

CT, ZCT, Cable and Terminal

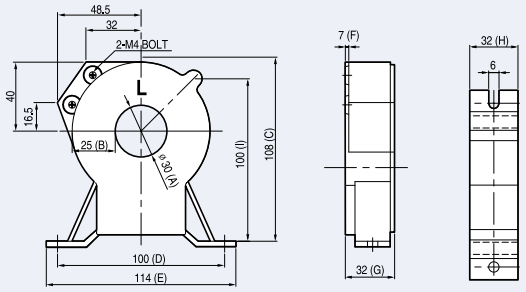
ZCT (Zero Sequence CT)

Ratings

Type	Diameter (A)	Ratio	Weight (kg)	Model
ZCT, D30	30	100mA/40~55mV 200mA/100mV	0.5	LZT-030
ZCT, D50	50		0.7	LZT-050
ZCT, D65	65		0.9	LZT-065
ZCT, D80	80		1.5	LZT-080

Dimension

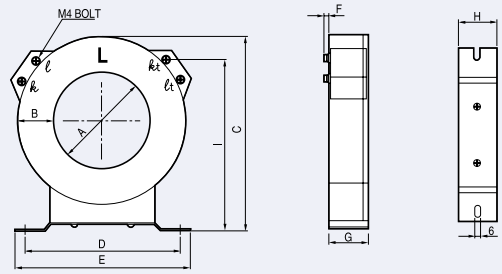
ZCT 30



Unit (mm)

Model	A	B	C	D	E	F	G	H	I	Ø
LZT-030	30	25	108	100	114	7	32	32	110	6

ZCT 50, 65, 80



Unit (mm)

Model	A	B	C	D	E	F	G	H	I	Ø
LZT-050	50	25	131	100	122	7	32	36	114	6
LZT-065	65	26	143	114	133	7	39	37	126	6
LZT-080	80	34	174	160	180	7	40	40	151	6

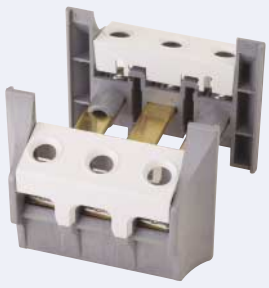
Other Options

Cable

Applicable Type	DMP, IMP Series
Spec.	1m, 1.5m, 2m, 3m, 4m

* Panel mount: Extension cable

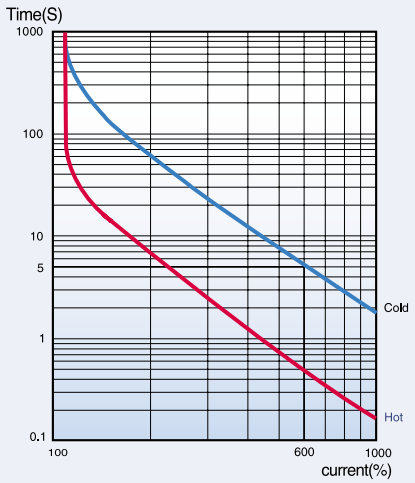
Terminal Block



Applicable Type	DMP Series, GMP60-3T, 3TZ, 3TN
Spec.	60A blelow

EMPR Curves

<Class5>



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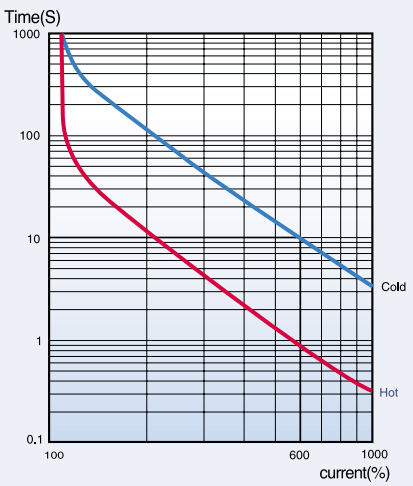

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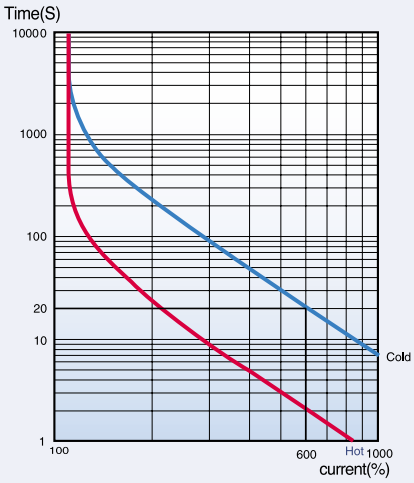

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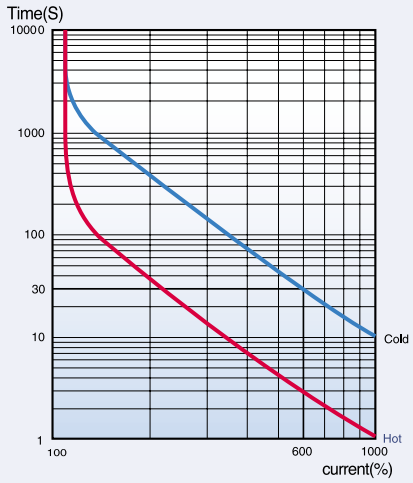

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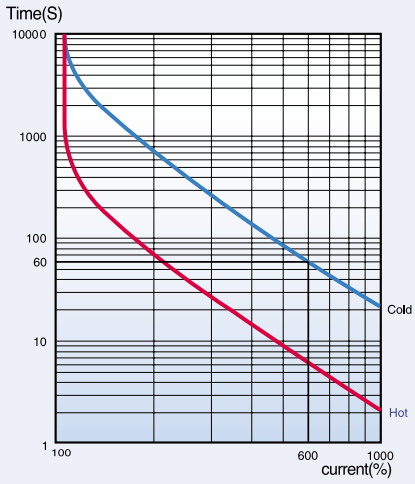
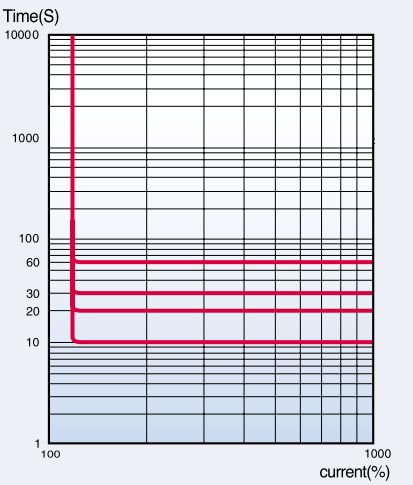
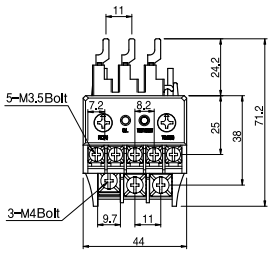
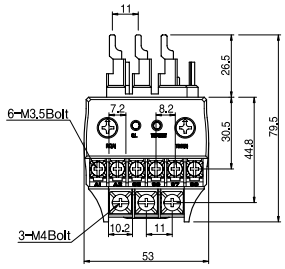
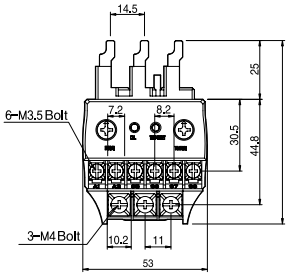
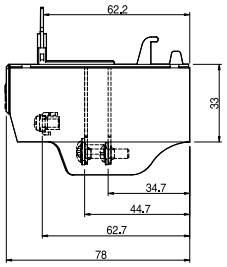
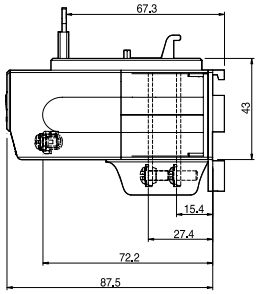
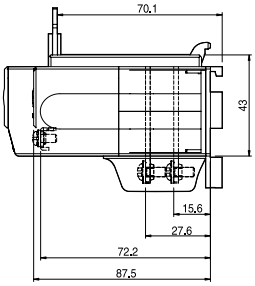
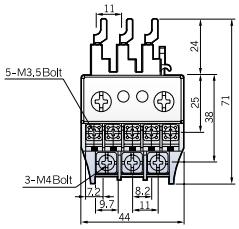
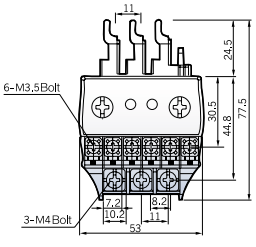
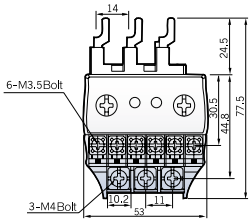
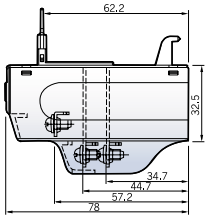
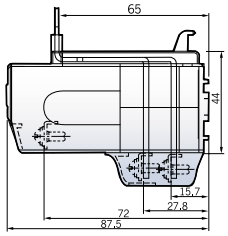
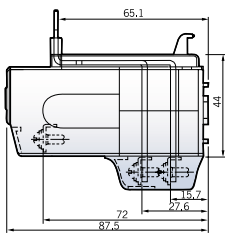


<Definite Curves>



Electronic motor protection relays

Direct mounting EMPR new/old comparative table

Type		GMP22-2P (1c) GMP22-2PD (1c)	GMP22-2P GMP22-2PA	GMP22-3P GMP22-3PR	GMP40-2P GMP40-2PD GMP40-2PA	GMP40-3P GMP40-3PR
Number of sensors		2	2	3	2	3
Protective function	Over current	✓	✓	✓	✓	✓
	Phase failure	✓	✓	✓	✓	✓
	Locked rotor	✓	✓	✓	✓	✓
	Phase unbalance			✓		✓
	Reverse phase			✓ (PR)		✓ (PR)
Aux. contact (at Energization)		1SPDT (1c)	2SPST (1a1b)		2SPST (1a1b)	
Rating Current		0.3~1.5, 1~5, 4.4~22A	0.3~1.5, 1~5, 4.4~22A		4~20, 8~40A	
Metasol (New)	EMPR Demension					
						
	Type of contactors	MC-9b, 12b, 18b, 22b	MC-9b, 12b, 18b, 22b		MC-32a, 40a	
Meta-MEC (Old)	EMPR Demension					
						
	Type of contactors	GMC-9, 12, 18, 22	GMC-9, 12, 18, 22		GMC-32, 40	
Wiring/Mounting Compatibity Note)		NO	NO		NO	
Retrofit Type (Tunnel)		GMP60T (1c) GMP22-2T	GMP22-2T GMP60TA (1c)	GMP22-3T GMP22-3TR	GMP40-2T GMP60T (1c) GMP60TA (1c)	GMP40-3T GMP40-3TR

Note) If you want to use Metasol EMPR with GMC Contactors, only tunnel type EMPR is avaliable.

Certificates

Type		Approvals					Certificates
	A Species of Standard	Safety certi	IEC	UL	GB	Gosstandart	IEC
	Mark or certification	S-Mark	CE	cUL	CCC	GOST	KEMA
		Korea	Europe	U.S.A/Canada	China	Russia	Netherlands
EMPR	GMP22-2P	●	●	●	●	●	
	GMP22-3P	●	●	●	●	●	●
	GMP22-3PR	●	●	●	●	●	●
	GMP22-2S	●	●	●	●	●	
	GMP22-3S	●	●	●	●	●	●
	GMP22-3SR	●	●	●	●	●	●
	GMP22-2T	●	●	●	●	●	
	GMP22-3T	●	●	●	●	●	●
	GMP22-3TR	●	●	●	●	●	●
	GMP40-2P	●	●	●	●	●	
	GMP40-3P	●	●	●	●	●	●
	GMP40-3PR	●	●	●	●	●	●
	GMP40-2S	●	●	●	●	●	
	GMP40-3S	●	●	●	●	●	●
	GMP40-3SR	●	●	●	●	●	●
	GMP40-2T	●	●	●	●	●	
	GMP40-3T	●	●	●	●	●	●
	GMP40-3TR	●	●	●	●	●	●
	GMP60-T	●	●	●	●	●	
	GMP60-TE	●	●	●	●	●	
	GMP80-2S	●	●	●	●	●	
	GMP80-3S	●	●	●	●	●	
	GMP80-3SR	●	●	●	●	●	
DMPR	DMP06,60-S	●	●	●	●	●	
	DMP06,60-Sa				●		
	DMP06,60-T	●	●	●	●	●	
	DMP06,60-Ta				●		
	DMP06,60-SI	●	●	●	●	●	
	DMP06,60-SZ	●	●	●	●	●	
	DMP06,60-Sza				●		
	DMP06,60-TZ	●	●	●	●	●	
	DMP06,60-Tza				●		
	DMP06,60-TI	●	●	●	●	●	
IMP	IMP-C-NO		●				
	IMP-C-A420		●				
	IMP-C-A485		●				

Type		Approvals						
	A Species of Standard	Marine classiflcation						
	Mark or certification	KR	LR	BV	ABS	GL	DNV	RINA
		Korea	U.K	France	U.S.A	Germany	Norway	Italy
DMPR	DMP06,36,60-S	●	●		●			
	DMP06,36,60-Sa	●	●		●			
	DMP06,36,60-T	●	●		●			
	DMP06,36,60-Ta	●	●		●			
	DMP06,36,60-SI	●	●		●			
	DMP06,36,60-SZ	●	●		●			
	DMP06,36,60-Sza	●	●		●			
	DMP06,36,60-TZ	●	●		●			
	DMP06,36,60-Tza	●	●		●			
	DMP06,36,60-TI	●	●		●			

Green Innovators of Innovation

Safety Instructions

- For your safety, please read user's manual thoroughly before operating.
- Contact the nearest authorized service facility for examination, repair, or adjustment.
- Please contact a qualified service technician when you need maintenance.
  Do not disassemble or repair by yourself!
- Any maintenance and inspection shall be performed by the personnel having expertise concerned.

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