MONITORING DEVICES

Insulation Monitoring Relay

- Monitors insulation resistance of unearthed IT Systems in compliance with IEC 61557-8, EN 50155, IEC 61373 and EN 45545 HL-2/3
- Suitable for monitoring 1 Ph, 3P3W and 3P4W unearthed supply systems
- Measuring input L-PE with line voltages upto 520V AC
- Wide auxiliary supply voltage range 24V – 240V AC/DC
- Adjustable trip resistance value from 1K to 100Kohm
- 2 Relay outputs (1C/O + 1NO) for fail safe and non fail safe operation
- Test / Reset function with Manual and remote facility
- Configurable Auto / Manual Reset
- LED indication for insulation fault , Power and Relay output
- DIN Rail / Base Mounting

Ordering Information

Cat. No.	Description
IMR122	Insulation Control, Rated Voltage 0-520 VAC System with 2 output (1C/O + 1NO), Control Voltage 24-240VAC/DC

Insulation Monitoring Relay

Cat. No.	IMR122
Auxiliary Supply Characteristics	**A1 - A2**
Rated Supply voltage Us	24V to 240V AC/DC
Supply voltage tolerance	-15 to +10%
Rated frequency Fs	DC or 15 to 400 Hz
Frequency range	13.5 to 440 Hz
Typical Power Consumption	
Measurement Circuit Characteristics	**L, PE**
Monitoring function	Insulation resistance monitoring of IT system
Measuring principle	Superimposed DC voltage
Nominal voltage Un of distribution system to be monitored	0 to 450V AC
Voltage range of the distribution system to be monitored	0 to 520V AC
Rated frequency fn of the distribution system to be monitored	50-60 Hz
Tolerance of the rated frequency fn	45-65 Hz
System leakage capacitance Ce max.	10 µF
Adjustment range of the specified response value R (threshold) min.-max.	1-100 kΩ
Adjustment resolution	1 kΩ
Tolerance of the adjusted threshold value	+/- 5%
Hysteresis related to threshold value	25% ; min 2 Kohm
Internal impedance Zi @50Hz	>=135 Kohm
Internal DC resistance Ri	>=185 Kohm
Measuring voltage Um	15V
Tolerance of measuring voltage Um	+/-10 %
Measuring current Im max	<= 0.1mA
Response time tan 0.5 x Ran and Ce = 1 µF	max. 10 s
Repeat accuracy (constant parameters)	< 0.1 % of full scale
Accuracy of Ra (measured value) within the operation temperature range	at 1-10 kΩ RF 5 Ω / K at 10-100 kΩ RF 0.05 % / K
Relay output Characteristics	
Number of Relays	2 nos.
Contact arrangement	Relay 1 : 1 C/O (15,16,18) Relay 2 : NO (25,28)
Contact rating	NO - 5A @250VAC/ 30 VDC NC - 3A @250VAC/30 VDC
Mechanical Life	1×10^7 Operations
Electrical Life	1×10^5 Operations
Relay operation	Relay 1 (15,16,18) : Fail safe mode (De-energize to trip) Relay 2 (25,28) : Non fail safe mode (Energize to trip)

Insulation Monitoring Relay

USER INTERFACE

Threshold Resistance setting	
POT-1 (R1)	Setting of threshold resistance value from 0 ohm to 90K In multiples of 10K
POT-2 (R2)	Setting of threshold resistance value from 1K ohm to 10K In multiples of 1K
Final threshold value R	R= R1+ R2
LED Indications	
Auxiliary supply voltage (⏚)	Green LED
Fault Indication (F)	Red LED
Relay status Indication (R)	Amber LED
Test-Reset Functionality	**S1 - S2 - S3**
Inbuilt common key	To test and reset functionality
Potential free terminal S1, S2, S3	S1-S3 short- Remote Test S2-S3 short - Manual Reset from front S2-S3 -short through switch -Remote Reset S2-S3- Open- Auto Reset
Reset type	Manual reset and Auto reset
Environmental Parameters	
Operating Temperature	-25 °C to 70 °C
Storage Temperature	-40 °C to 85 °C
Humidity	95% RH (Without condensation)
Altitude	< 2000 meters
Pollution Degree	3
Over voltage category	III
Mechanical Parameters	
Operating Mode	Continuous operation
Degree of protection	
Enclosure	IP 40
Terminals	IP 20
Housing	UL94-00
Mounting	Din rail
Mounting position	any
Dimensions (L X W X D) in mm	83 x 23 x 114
Weight (Unpacked)	140 gm approx.

Insulation Monitoring Relay

EMI / EMC Test

Harmonic Current Emissions	IEC 61000-3-2
Voltage Flicker and Fluctuations	IEC 61000-3-3
ESD	IEC 61000-4-2
Radiated Susceptibility	IEC 61000-4-3
Electrical Fast Transients	IEC 61000-4-4
Surge	IEC 61000-4-5
Conducted Susceptibility	IEC 61000-4-6
Power Frequency Magnetic Field	IEC 61000-4-8
Voltage Dips & Interruptions (AC)	IEC 61000-4-11
Conducted Emission	EN 50155:2017, EN 50121-3-2 and EN 55011
Radiated Emission	EN 50155 and EN 50121-3-2/ EN 6100-6-4,EN 55011
Supply variations	EN 50155
Supply Over voltage	EN 50155

Safety test

Voltage Withstand test (Dielectric Strength)

a)Test Voltage between I/P and O/P	IEC 60255-27
b)Test Voltage between all terminals and enclosure	IEC 60255-27
c) Rated Impulse Voltage between I/P and O/P	IEC 60255-27
d) Rated Impulse voltage between I/P and measuring circuit	IEC 60255-27
e) Rated Impulse voltage between O/P and measuring circuit	IEC 60255-27
Fire Safety	EN 45545-2,HL-2/3
Insulation resistance a) between input and output b) between all terminals and enclosure	IEC 60255-27
Leakage current	<3.5mA UL508
Single Fault test	The equipment shall not present a risk of electric shock or fire after a single fault test. It does not have to be functional after the test.

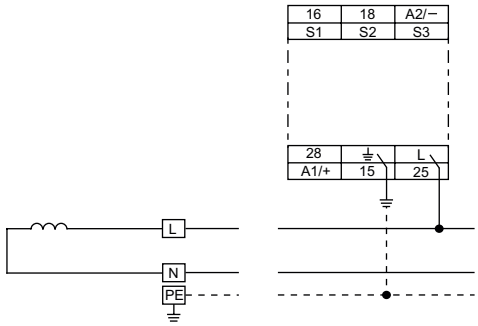
Environmental Testing

Cold Heat	IEC 60068-2-1
Dry Heat	IEC 60068-2-2,
Damp heat, cyclic	IEC 60068-2-30
Vibration, Shock and bump	EN 50155 and EN 61373 Category 1, Class B

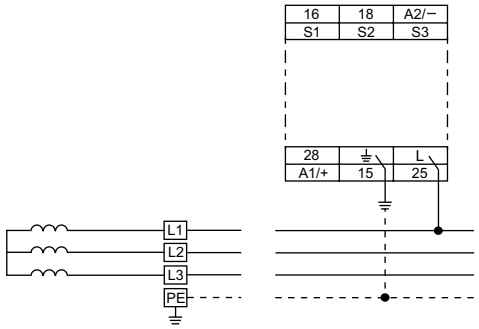
Insulation Monitoring Relay

CONNECTION DIAGRAM

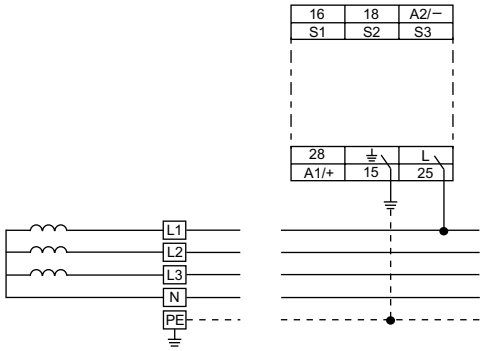
1 Phase AC System



3 Phase 3-Wire AC system

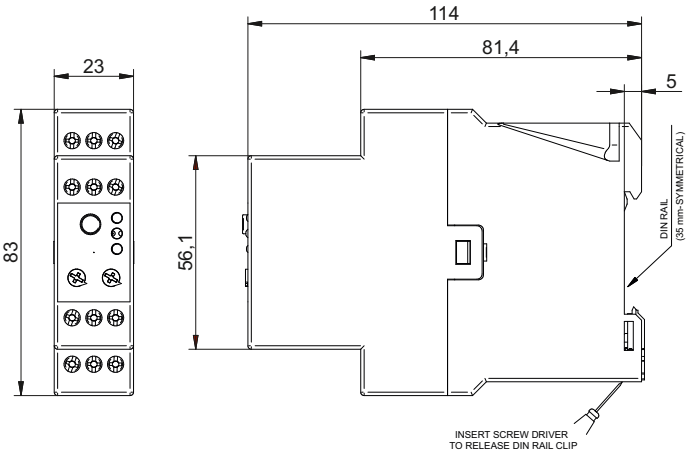


3 Phase 4-Wire AC system



Note :- Connection of measuring input ‘L’ to any of the conductors

MOUNTING DIMENSION (mm)



TERMINAL TORQUE & CAPACITY

Ø 3.5 mm....4.0mm	0.6 N.m (5.3 Lb.in)
	1 x 4.0 mm^2 Solid/Stranded Wire
AWG	1 x 20 to 10

Voltage Monitoring Relay SM 800

- LCD Display with Green backlight
- Multi-Voltage: Three Phase 4 Wire & Three Phase 3 Wire @ 145-500 VAC
- Protection against Phase loss, Phase Sequence, Phase Asymmetry, Under Voltage, Over Voltage, Neutral Open, Over Frequency & Under Frequency
- Can be configured for 3 Phase 3 Wire or 3 Phase 4 Wire system
- Selectable Over Voltage/ Under Voltage, Asymmetry, Phase Loss, Phase Sequence, Over Frequency/ Under Frequency
- Adjustable ON/OFF Time Delay in seconds/ minutes
- 5A Single and Dual relay outputs
- Two Separate Relay outputs with independent Programming
- Password protection
- Log of 5 previous faults for better monitoring
- Fail safe/ Non-Fail safe relay output
- Latch (Manual) and Non-Latch (Auto) Modes

Ordering Information

Cat. No.	Description
DMS110	145-500 VAC, Digital Voltage Monitoring Relay, 1C/O
DMS120	145-500 VAC, Digital Voltage Monitoring Relay, 1C/O + 1C/O
DMA220	85- 300 VAC/DC, Digital Voltage Monitoring Relay with Auxiliary supply, 1C/O + 1C/O

Voltage Monitoring Relay SM 800

Cat. No.			DMS110	DMS120	DMA220
Parameters					
Supply Voltage (⏚)			145 - 500 VAC		85 - 300 VAC/DC
Frequency			45 to 65 Hz		
Trip Settings	Phase Loss		Configurable (Enable/Disable) (Default : Enable)		
	Phase Reverse		Configurable (Enable/Disable) (Default : Enable)		
	Phase Asymmetry		2 to 50%		
	Under Voltage		Phase voltage : 90 to 288 VAC		Phase voltage : 50 to 288 VAC
			Line voltage : 155 to 500 VAC		Line voltage : 85 to 500 VAC
	Under Voltage Hysteresis		3 to 20VAC +/- 2V (7V Default)		
	Over Voltage		Phase voltage : 90 to 288 VAC		Phase voltage : 50 to 288 VAC
			Line voltage : 155 to 500 VAC		Line voltage : 85 to 500 VAC
	Over Voltage Hysteresis		3 to 20VAC +/- 2V (7V Default)		
	Under Frequency		45 to 65 Hz		
	Over Frequency		45 to 65 Hz		
	Frequency Hysteresis		0.1 to 5 Hz		
	Asymmetry		Voltage : 5 to 99 VAC (Default 60V) Percentage : 2 to 50%		
	Hysteresis for Asymmetry		Voltage : 3 to 99 VAC +/- 2V (Default 7V) Percentage : 2 to 15%		
Power Consumption (Max.)			5 VA		
Time Delay	ON Delay		2sec to 999sec (Default : 5sec)		
	Trip Time (OFF Delay)		0.1 to 999sec (Phase loss & Phase reverse : <100ms) Default : Neutral Loss is <500ms & UV, OV, Asymmetry fault 5sec.		
Output	Relay Output		1 C/O	1 C/O + 1 C/O	1 C/O + 1 C/O
	Contact Rating		5A (Resistive) @ 240 VAC / 30 VDC		
	Electrical Life		$1X10^5$ Operations		
	Mechanical Life		$1X10^7$ Operations		
Utilization Category	AC-15	(V)	120/240 V		
		(A)	3/1.5 A		
	DC-13	(V)	24/125/250 V		
		(A)	2/0.22/0.1 A		
Operating Temperature Storage Temperature			-10°C to + 60°C -20°C to + 70°C		
Humidity (Non Condensing)			95% (Rh)		
Enclosure			Flame Retardant UL 94-V0		
Dimension (W x H x D) (in mm)			36 x 90 x 67		
Weight			100 g		
Mounting			Base / DIN		
Degree of Protection			IP-20 for Enclosure & Terminals, IP-40 with Front Facia for Dust cover		
Certification			CE RoHS Compliant		

EMI / EMC

Harmonic Current Emissions	IEC 61000-3-2
Voltage Flicker and Fluctuations	IEC 61000-3-3
ESD	IEC 61000-4-2
Radiated Susceptibility	IEC 61000-4-3
Electrical Fast Transients	IEC 61000-4-4
Surges	IEC 61000-4-5
Conducted Susceptibility	IEC 61000-4-6
Voltage Dips & Interruptions (AC)	IEC 61000-4-11
Voltage Dips & Interruptions (DC)	IEC 61000-4-29
Conducted Emission	CISPR 11
Radiated Emission	CISPR 11
Swell	As per GTS Standard's

Safety:

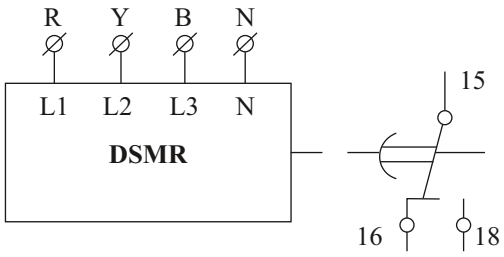
Test Voltage Between I/P & O/P	IEC 60947-5-1 / UL 508
Test Voltage Between all Terminals & Enclosure	IEC 60947-5-1 / UL 508
Impulse Voltage Between I/P & O/P	IEC 60947-5-1

Environmental

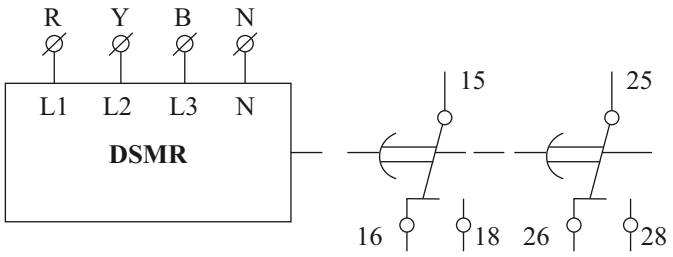
Cold Heat	IEC 60068-2-1
Dry Heat	IEC 60068-2-2
Vibration	IEC 60068-2-6

Voltage Monitoring Relay SM 800

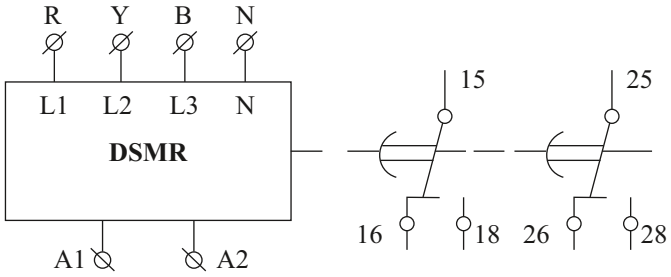
CONNECTION DIAGRAM



DMS110

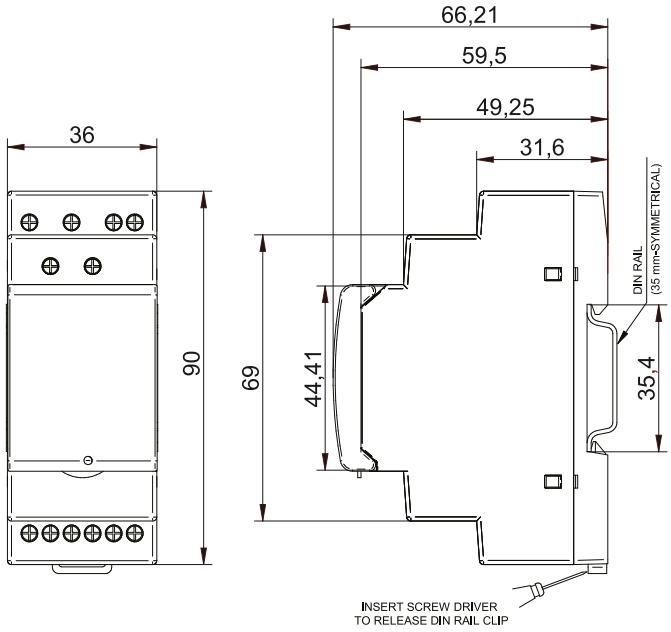


DMS120



DMA220

MOUNTING DIMENSION (mm)



TERMINAL TORQUE & CAPACITY

Ø 4.5mm	0.5 N.m (4.4 lb.in)
	1 x 4mm Solid / Standard Wire
AWG	26 to 10

Voltage Monitoring Relay SM 175

- Compact 17.5 mm Wide
- Multi-Voltage: Three Phase 3 Wire @ 208-480 VAC or Three Phase 4 Wire @ 120-277 VAC
- Can be configured for 3 Phase 3 Wire or 3 Phase 4 Wire system
- Protection against Phase loss, Phase Sequence, Phase Asymmetry, Under Voltage & Over Voltage
- Selectable Under Voltage / Over Voltage, Asymmetry and Phase Sequence
- LED Indication for all Faults & for change in dip switch settings during runtime for better security
- Adjustable ON/OFF Time Delay in seconds / minutes
- 1 C/O Configuration

Ordering Information

Cat. No.	Description
MAG03D0424	208-480 VAC, UV/OV, Phase Loss, Phase Sequence, Phase Asymmetry Monitoring, 1 C/O
MAG03D0425	415 VAC (3P, 3W) / 240 VAC (3P, 4W), UV/OV, Phase Loss, Selectable Phase Sequence, Phase Asymmetry, 1C/O
MAG03D0426	415 VAC (3P, 3W) / 240 VAC (3P, 4W),UV/OV, Selectable Phase Sequence & Phase Asymmetry, ON Delay and OFF Delay (in sec/min), 1C/O
MAG03D0427	208-480 VAC (3P, 3W), Phase loss Monitoring, 1 C/O
MAG03D0428	208-480 VAC (3P, 3W), Phase Loss, Phase Sequence, 1C/O

Voltage Monitoring Relay SM 175

Cat. No.		MAG03D0424	MAG03D0425	MAG03D0426	MAG03D0427
Parameters					
Supply Voltage (⏚)		208 to 480 VAC (3P,3W) 120 to 277 VAC (3P,4W)	415 VAC(3P,3W) / 240 VAC(3P,4W)		208-480 VAC(3P,3W)
Supply Variation		+/- 23% (of ⏚)			
Frequency		50/60 Hz			
Reference Voltage		Settable	Fixed	Fixed	Fixed
Trip Settings	Phase Loss	Yes	Yes	Yes	Yes
	Phase Reverse	Yes	Settable through DIP S/W	Settable through DIP S/W	NA
	Phase Asymmetry	10% Fixed	10% Fixed	10% Fixed / 5% to 25% Settable	30% Fixed
	Under Voltage	2% to 22% (of ⏚)	5% to 25% (of ⏚) / 60% (of ⏚) Fixed	5% to 25% (of ⏚) / 80% (of ⏚) Fixed	NA
	Over Voltage	2% to 22% (of ⏚)	110%(of ⏚) Fixed / 5% to 25%(of ⏚)	110%(of ⏚) Fixed	NA
	Hysterisis (Phase Asy.)	2.7% Fixed			NA
	Hysterisis (UV/OV)	2% Fixed	2% to 12% Settable	2.7% Fixed	NA
Power Consumption (Max.)		16 VA @ 415 VAC			
Time Delay	ON Delay	(0 to 15 Sec) settable / 5 sec (selectable DIP switch)		(0.5 to 15) settable sec / min	<=750 msec
	Trip Time (OFF Delay)	5 sec / (0 to 15 Sec) settable (selectable DIP switch)		(0.5 to 15) settable sec / min	<=500 msec
		100ms max for Phase loss & Phase Sequence			
Output	Relay Output	1 C/O			
	Contact Rating	5A @ 250 VAC / 30 VDC (Resistive)			
	Electrical Life	$5X10^4$			
	Mechanical Life	$1X10^7$			
Utilization Category	AC - 15	Rated Voltage (Ue): 120/240 V, Rated Current (Ie): 3.0/1.5 A			
	DC - 13	Rated Voltage (Ue): 24/125/250 V, Rated Current (Ie): 2.0/0.22/0.1 A			

LED Indications on front plate

Respective fault condition will be indicated by LED immediately & Relay will be tripped after specified trip time only.

	Power LED/RV (Green)	UV (Red LED)	OV (Red LED)	ASY/PR (Red LED)	
Power ON	ON	OFF	OFF	OFF	R LED ON indicates healthy supply & OFF indicates Phase loss
Phase reverse	ON	OFF	OFF	ON	
Asymmetry	ON	OFF	OFF	Slow BLINK	
UV	ON	ON	OFF	OFF	
OV	ON	OFF	ON	OFF	
B Phase Loss	Slow BLINK	OFF	OFF	OFF	
Voltage Int.	OFF	OFF	OFF	OFF	

* 1. Multiple LEDs can operate indicating multiple faults at a time e.g. in case of phase loss, UV and phase asymmetry faults may also occur.
2. For cat id MAG03D0428, R LED ON indicates healthy supply & OFF indicates Phase loss.
3. For Outer Mode fault in MAG03D0425 product, UV and OV LED blinks@200 msec.

Operating Temperature Storage Temperature	- 20°C to +60°C - 25°C to +70°C
Humidity (Non Condensing)	95% (Rh)
Enclosure	Flame Retardant UL 94-V0
Dimension (W x H x D) (in mm)	18 X 90 X 66.5
Weight (unpacked)	72 g
Mounting	Base / DIN rail
Degree of Protection	IP 20 for Terminals, IP 30 for Enclosure
Certification	CE RoHS Compliant

EMI / EMC

Harmonic Current Emissions	IEC 61000-3-2
ESD	IEC 61000-4-2
Radiated Susceptibility	IEC 61000-4-3
Electrical Fast Transients	IEC 61000-4-4
Surges	IEC 61000-4-5
Conducted Susceptibility	IEC 61000-4-6
Voltage Dips & Interruptions (AC)	IEC 61000-4-11
Conducted Emission	CISPR 11
Radiated Emission	CISPR 11

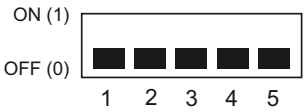
Environmental

Cold Heat	IEC 60068-2-1
Dry Heat	IEC 60068-2-2
Vibration	IEC 60068-2-6

Voltage Monitoring Relay SM 175

Selection of Function: Operating Mode & timing can be selected by using DIP switches

DIP SWITCH SELECTION



Cat. No.: MAG03D0424

1 0	480	277
1 0	440	256
1 0	415	240
1 0	400	230
1 0	380	220
1 0	240	139
1 0	220	127
1 0	208	120
1 2 3	**Ph - Ph (VAC)**	**Ph - N (VAC)**

1 0	Settable OFF Delay Fix ON Delay
1 0	Settable ON Delay Fix OFF Delay
4	**Delay**

1 0	Ph - Ph
1 0	Ph - N
5	**Supply Type**

Cat. No.: MAG03D0425

1 0	Settable UV with fix OV*
1 0	Settable OV with fix UV*
1 0	Inner Mode
1 0	Outer Mode
1 2	**Function**

1 0	Phase Seq. Disable
1 0	Phase Seq. Enable
3	**Function**

1 0	Settable OFF Delay Fix ON Delay
1 0	Settable ON Delay Fix OFF Delay
4	**Delay**

1 0	Ph - Ph
1 0	Ph - N
5	**Supply Type**

* Note : When POT - P1 is set as UV or OV through DIP S/W setting, then POT-P2 is used to set hysterisis ranging from 2% to 12%.

Cat. No.: MAG03D0426

1 0	Phase Seq. Disable
1 0	Phase Seq. Enable
1	**Function**

1 0	Settable UV(POT-P1) with fix assymetry
1 0	Settable ASY (POT-P1) with fix UV
2	**Function**

1 0	Settable (POT-P2) ON Delay in sec
1 0	Settable (POT-P2) ON Delay in min
3	**Delay**

1 0	Settable (POT-P3) OFF Delay in sec
1 0	Settable (POT-P3) OFF Delay in min
4	**Delay**

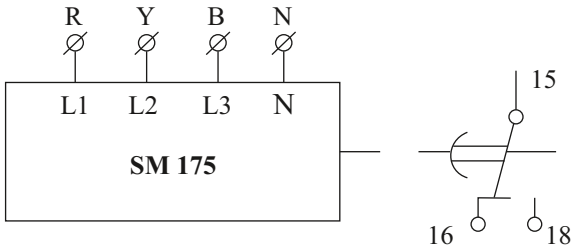
1 0	Ph - Ph
1 0	Ph - N
5	**Supply Type**

Cat. No.: MAG03D0425

Inner Mode: If user requires both UV and OV protection along with the healthy status of relay between UV and OV range then the user can set Inner mode configuration by selecting DIP switch 1 - high & 2 as low. For this setting P1 potentiometer will work as UV threshold and P2 potentiometer will work as OV threshold with fixed recovery hysteresis of 2% for both.

Outer Mode: If user requires both UV and OV protection along with the unhealthy status of relay between UV and OV range then the user can set outer configuration by selecting both DIP switches high. For this setting P1 potentiometer will work as UV threshold and P2 potentiometer will work as OV threshold with fixed recovery hysteresis of 2% for both.

CONNECTION DIAGRAM



MAG03D0424, MAG03D0425, MAG03D0426, MAG03D0427, MAG03D0428

Voltage Monitoring Relay SM 175

- Compact 17.5 mm Wide
- Protects against Phase Loss, Phase Reversal & Phase Asymmetry
- Multi-Voltage: Three Phase Three Wire @ 208 - 480 VAC
- Selectable Under Voltage / Over Voltage & Asymmetry
- LED Indication for all Faults & for change in settings during run time for better security
- Adjustable Time Delay
- 1 C/O Configuration

Ordering Information

Cat. No.	Description
MN21D5	208 - 480 VAC, Phase Loss Monitoring, 1 C/O
MK21D5	208 - 480 VAC, Phase Loss, Phase Sequence Monitoring , 1 C/O
MC21D5	208 - 480 VAC, Phase Loss, Phase Sequence, Phase Asymmetry Monitoring (30% Fixed), 1 C/O
MA21DN	208 - 480 VAC, Phase Loss, Phase Sequence, Phase Asymmetry Monitoring (5% to 15% Variable), 1 C/O
MOF1D51	208 - 480 VAC, Phase Loss, Phase Asymmetry Monitoring (10% Fixed), with trip time < 65 ms, 1 C/O

Voltage Monitoring Relay SM 175

Cat. No.			MN21D5	MK21D5	MC21D5	MA21DN
Parameters						
Supply Voltage (⏚)			208 - 480 VAC, (3 Phase 3 Wire)			
Supply Variation			-12% to + 10% (of ⏚)			
Frequency			50/60 Hz			
Power Consumption (Max.)			3 VA			
Trip Levels	Phase Loss		Yes	Yes	Yes	Yes
	Phase Sequence		N A	Yes	Yes	Yes
	Phase Asymmetry		30% Fixed	N A	30% Fixed	5% to 15%
Time Delay	ON Delay		< 750 ms	< 750 ms	< 750 ms	5s
	Trip Time (OFF Delay)		< 65 ms	100 ms	100 ms	0.5 to 15 s (Selectable)
Output	Relay Output		1 C/O			
	Contact Rating		5A @ 250 VAC / 30 VDC (Resistive)			
	Electrical Life		$1X10^5$			
	Mechanical Life		$3X10^6$			
Utilization Category		AC - 15	Rated Voltage (Ue): 120/240 V, Rated Current (Ie): 3.0/1.5 A			
		DC - 13	Rated Voltage (Ue): 24/125/250 V, Rated Current (Ie): 2.0/0.22/0.1 A			
LED Indication		Healthy	Relay LED Continuous ON			
		Phase Reverse	N A	Relay LED Flashing		
		Asymmetry	Relay LED Off (Red Colour)	N A	Relay LED Off (Red Colour)	
Operating Temperature Storage Temperature			- 15° C to +60° C - 20° C to +80° C			
Humidity (Non Condensing)			95% (Rh)			
Enclosure			Flame Retardant UL 94-V0			
Dimension (W x H x D) (in mm)			18 x 58.5 x 90			
Weight (unpacked)			70 g			
Mounting			Base / DIN rail			
Degree of Protection			IP 20 for Terminal, IP 30 for Enclosure			
Certification			CE cULus LISTED RoHS Compliant			

EMI / EMC

Harmonic Current Emissions	IEC 61000-3-2
ESD	IEC 61000-4-2
Radiated Susceptibility	IEC 61000-4-3
Electrical Fast Transients	IEC 61000-4-4
Surges	IEC 61000-4-5
Conducted Susceptibility	IEC 61000-4-6
Voltage Dips & Interruptions (AC)	IEC 61000-4-11
Conducted Emission	CISPR 14-1
Radiated Emission	CISPR 14-1

Environmental

Cold Heat	IEC 60068-2-1
Dry Heat	IEC 60068-2-2
Vibration	IEC 60068-2-6
Repetitive Shock	IEC 60068-2-27
Non-Repetitive Shock	IEC 60068-2-27

Voltage Monitoring Relay SM 175

Ordering Information

Cat. No.	Description
MD21DF	208 - 480 VAC, UV / OV, Phase Loss & Sequence with Selectable OFF Delay, 1 C/O
MG21DH	208 - 480 VAC, UV / OV & SPP with Selectable ON Delay, 1 C/O
MG21DF	208 - 480 VAC, UV / OV & SPP with Selectable OFF Delay, 1 C/O
MGD1DR	208 - 480 VAC, UV / OV & SPP with Selectable ON Delay & OFF Delay, 1 C/O
MG21D2	415 VAC, fix UV / OV with fix ON Delay & OFF Delay, 1C/O
MAE03D0200	240 VAC/DC, UV / OV with Selectable ON & OFF Delay, 1 C/O
MAE03D0202	115 VAC/DC, UV / OV with Selectable ON & OFF Delay, 1 C/O
MF41B0	230 VAC, Single Phase Under Voltage Relay
MF51B0	400 VAC, Three Phase Under Voltage Relay

UL Approval not applicable to Cat Nos. MN21D5, MOF1D51, MGD1DR, MAE03D0200, MF41B0, MF51B0

Voltage Monitoring Relay SM 175

Cat. No.		MD21DF	MG21DH	MG21DF	MGD1DR
Parameters					
Supply Voltage (⏚)		208 - 480 VAC, (3 Phase 3 Wire)			400 VAC, (3 Phase 3 Wire)
Supply Variation		-12% to + 10% (of ⏚)			
Frequency		50/60 Hz			
Power Consumption (Max.)		3 VA			
Settable Nominal Voltage		208 - 220 - 380 - 400 - 415 - 440 - 480 VAC			N A
Trip Levels	Phase Loss	Yes			
	Phase Sequence	Yes			
	Phase Asymmetry	N A	10% Fixed		
	Under Voltage	-2% to -20% (of ⏚)	-5% to -25% (of ⏚)		
	Over Voltage	+2% to +20% (of ⏚)	+5% to +25% (of ⏚)		
Time Delay	ON Delay	5 s	0.5 to 100 s (Selectable)	5 s	0.5 to 100 s (Selectable)
	Trip Time (OFF Delay)	0.5 to 15 s (Selectable)	5 s	0.5 to 100 s (Selectable)	0.5 to 15 s (Selectable)
Output	Relay Output	1 C/O			
	Contact Rating	5A @ 250 VAC / 30 VDC (Resistive)			
	Electrical Life	$1X10^5$			
	Mechanical Life	$3X10^6$			
Utilization Category	AC - 15	Rated Voltage (Ue): 120/240 V, Rated Current (Ie): 3.0/1.5 A			
	DC - 13	Rated Voltage (Ue): 24/125/250 V, Rated Current (Ie): 2.0/0.22/0.1 A			
LED Indication	Healthy	Red LED: Supply Healthy → Continuous ON, Phase Reverse → Flashing			
	UV	Red LED: Under Voltage → Continuous ON			
	OV	Red LED: Over Voltage → Continuous ON			
	Asymmetry	Red LED: Asymmetry → Continuous ON			
	All LED's	Phase Fail or Higher Cut OFF(> 560 VAC) or lower cut off (<175 VAC), Blinking → Pot changed during running conditions			
Operating Temperature Storage Temperature		- 15° C to +60° C - 20° C to +80° C			
Humidity (Non Condensing)		95% (Rh)			
Enclosure		Flame Retardant UL 94-V0			
Dimension (W x H x D) (in mm)		18 X 90 X 58.5			
Weight (unpacked) Approx.		70 g			
Mounting		Base / DIN rail			
Degree of Protection		IP 20 for Terminal, IP 30 for Enclosure			
Certification		CE, cULus LISTED, RoHS Compliant			

EMI / EMC

Harmonic Current Emissions	IEC 61000-3-2
ESD	IEC 61000-4-2
Radiated Susceptibility	IEC 61000-4-3
Electrical Fast Transients	IEC 61000-4-4
Surges	IEC 61000-4-5
Conducted Susceptibility	IEC 61000-4-6
Voltage Dips & Interruptions (AC)	IEC 61000-4-11
Conducted Emission	CISPR 14-1
Radiated Emission	CISPR 14-1

Environmental

Cold Heat	IEC 60068-2-1
Dry Heat	IEC 60068-2-2
Vibration	IEC 60068-2-6
Repetitive Shock	IEC 60068-2-27
Non-Repetitive Shock	IEC 60068-2-27

Voltage Monitoring Relay SM 301

- Protects against Phase Loss, Phase Reversal & Phase Asymmetry
- No Auxiliary Supply needed
- Voltage Sensing principle
- 1 C/O & 2 C/O Configurations
- Designed to meet Industrial and Agricultural segment applications

Ordering Information

Cat. No.	Description
MA51BC	415 VAC, Single Phasing Preventor with 65 VAC Asymmetry, 1 C/O
MA51BK	415 VAC, Single Phasing Preventor with 40 VAC Asymmetry, 1 C/O
MC21B5	415 VAC, Single Phasing Preventor with 65 VAC Asymmetry, 2 C/O
MA59B5	415 VAC, Phase Loss Monitoring with Non Fail Safe Type, 1 C/O

Voltage Monitoring Relay SM 301

Cat. No.			MA51BC	MA51BK	MC21B5
Parameters					
Supply Voltage (⏚)			415 VAC		
Frequency			50/60 Hz		
Power Consumption (Max.)			15 VA		
Trip Settings	Phase Loss		Yes	Yes	Yes
	Phase Sequence		Yes	Yes	Yes
	Phase Asymmetry		65 V (± 10V)	40 V (± 10 V)	65 V (± 10V)
	Hysteresis		10 to 18 V	10 to 18 V	10 to 18 V
Time Delay	ON Delay		2 s (± 2 s)	2 s (± 2 s)	< 550 ms
	Trip Time (OFF Delay)		7 s (± 2 s)	7 s (± 2 s)	< 550 ms
Output	Relay Output		1 C/O	1 C/O	2 C/O
	Contact Rating		5A (For 'NO') & 3A (For 'NC') @ 250 VAC / 28 VDC (Resistive)		5A @ 250 VAC / 28 VDC (Resistive)
	Electrical Life		$1X10^5$		
	Mechanical Life		$3X10^6$		
Utilization Category		AC - 15	Rated Voltage (Ue): 120/240 V, Rated Current (Ie): 3.0/1.5 A		
		DC - 13	Rated Voltage (Ue): 24/125/250 V, Rated Current (Ie): 2.0/0.22/0.1 A		
LED Indication			Red → Relay ON (Healthy), See Note 1		
Operating Temperature Storage Temperature			- 15° C to + 50° C - 20° C to + 65° C		
Humidity (Non Condensing)			95% (Rh)		
Enclosure			Flame Retardant UL 94-V0		
Dimension (W x H x D) (in mm)			36 X 90 X 60		
Weight (unpacked)			120 g		
Mounting			Base / DIN rail		
Degree of Protection			IP20 for Terminals, IP 40 for Enclosure		
Certification			CE RoHS Compliant		

EMI / EMC

Harmonic Current Emissions	IEC 61000-3-2
ESD	IEC 61000-4-2
Radiated Susceptibility	IEC 61000-4-3
Electrical Fast Transients	IEC 61000-4-4
Surges	IEC 61000-4-5
Conducted Susceptibility	IEC 61000-4-6
Voltage Dips & Interruptions (AC)	IEC 61000-4-11
Conducted Emission	CISPR 14-1
Radiated Emission	CISPR 14-1

Environmental

Cold Heat	IEC 60068-2-1
Dry Heat	IEC 60068-2-2

Note 1:- ON: Relay ON, OFF: Phase Loss, Blinking: Asymmetry (200 ms, On/Off), Flashing: Phase Sequence (1 s, On/Off)

Voltage Monitoring Relay SM 500

- Protects against Phase Loss, Phase Reversal & Phase Asymmetry
- Can be configured for 3 Phase 4 Wire or 1 Phase system
- Selectable Over Voltage / Under Voltage Trip level
- Selectable Time Delay
- LED Indications for Power and Fault conditions
- Voltage Sensing principle
- 1 C/O or 2 C/O Configuration

Ordering Information

Cat. No.	Description
MD71BH	240 VAC, UV / OV with Selectable ON Delay (0.5 to 15 sec), 1 C/O
MD71BF	240 VAC, UV / OV with Selectable OFF Delay (0.5 to 15 sec), 1 C/O
MD71B9	240 VAC, UV / OV with Selectable ON Delay (0.5 s to 15 min), 1 C/O

Voltage Monitoring Relay SM 500

Cat. No.		MD71BH	MD71BF	MD71B9
Parameters				
Supply Voltage (⏚)		240 VAC (1 Phase & 3 Phase, 4 Wire)		
Frequency		50/60 Hz		
Power Consumption (Max.)		4 VA		
Trip Settings	Phase Loss	Yes	Yes	Yes
	Phase Sequence	N.A	N.A	N.A
	Phase Asymmetry	N.A	N.A	N.A
	Under Voltage	55% to 95% (of ⏚)		
	Over Voltage	105% to 125% (of ⏚)		
Time Delay	ON Delay	0.5 to 15 s (Selectable)	5 s	0.5 s to 15 min (Selectable)
	Trip Time (OFF Delay)	5 s	0.5 to 15 s (Selectable)	5 s
Output	Relay Output	1 C/O		
	Contact Rating	5A @ 250 VAC / 28 VDC (Resistive)		
	Electrical Life	$1X10^5$		
	Mechanical Life	$3X10^6$		
Utilization Category	AC - 15	Rated Voltage (Ue): 120/240 V, Rated Current (Ie): 3.0/1.5 A		
	DC - 13	Rated Voltage (Ue): 24/125/250 V, Rated Current (Ie): 2.0/0.22/0.1 A		
LED Indication		Separate indications for Power ON, UV and OV		
Operating Temperature Storage Temperature		-15^{o} C To + 55^{o} C -25^{o} C To + 70^{o} C		
Humidity (Non Condensing)		95% (Rh)		
Enclosure		Flame Retardant UL 94-V0		
Dimension (W x H x D) (in mm)		36 X 60 X 90		
Weight (unpacked) Approx.		120 g		
Mounting		Base / DIN rail		
Degree of Protection		IP 20 for Terminals, IP 40 for Enclosure		
Certification		CE RoHS Compliant		

EMI / EMC

Harmonic Current Emissions	IEC 61000-3-2
ESD	IEC 61000-4-2
Radiated Susceptibility	IEC 61000-4-3
Electrical Fast Transients	IEC 61000-4-4
Surges	IEC 61000-4-5
Conducted Susceptibility	IEC 61000-4-6
Voltage Dips & Interruptions (AC)	IEC 61000-4-11
Conducted Emission	CISPR 14-1
Radiated Emission	CISPR 14-1

Environmental

Cold Heat	IEC 60068-2-1
Dry Heat	IEC 60068-2-2
Vibration	IEC 60068-2-6
Repetitive Shock	IEC 60068-2-27
Non-Repetitive Shock	IEC 60068-2-27

Note: 1) Voltage setting is with respect to Neutral. Voltage Setting Accuracy: ± 5 % of Full Scale; Time Setting Accuracy: ± 10 % of Full Scale

Voltage Monitoring Relay SM 500

Ordering Information

Cat. No.	Description
MG73B9	240 VAC, UV / OV & Single Phasing Preventor (SPP) with Selectable ON Delay (0.5 s to 15 min), 2 C/O
MG73BH	240 VAC, UV / OV & SPP with Selectable ON Delay (0.5 to 15 sec), 2 C/O
MG73BF	240 VAC, UV / OV & SPP with Selectable OFF Delay (0.5 to 15 sec), 2 C/O
MG73BQ	120 - 240 VAC Selectable, UV / Selectable OV & SPP with Selectable OFF Delay (0.5 to 15 sec), 2 C/O
MG73BR	240 VAC, Fixed UV / OV & SPP, 20% Asymmetry with Fixed ON (10 sec) & OFF (5 sec) Delay, 2 C/O
MGH3BH	220 VAC, UV / OV & SPP with Selectable ON Delay (0.5 to 15 sec), 2 C/O
MGH3BF	220 VAC, UV / OV & SPP with Selectable OFF Delay (0.5 to 15 sec), 2 C/O
MGI3BF	230 VAC, UV / OV & SPP with Selectable OFF Delay (0.5 to 15 sec), 2 C/O

Voltage Monitoring Relay SM 500

Cat. No.			MG73BH	MG73BF	MG73B9
Parameters					
Supply Voltage (⏚)			240 VAC (1 Phase & 3 Phase, 4 Wire)		
Frequency			50/60 Hz		
Power Consumption (Max.)			4 VA (Max)		
Trip Settings	Phase Loss		Yes		
	Phase Sequence		Yes		
	Phase Asymmetry		10% (of ⏚)		
	Under Voltage		55% to 95% (of⏚)		
	Over Voltage		105% to 125% (of⏚)		
	Hysterisis		7 V (± 2 V)		
Time Delay	ON Delay		0.5 to 15 s (Selectable)	5 s	0.5 s to 15 min (Selectable)
	Trip Time (OFF Delay)		5 s	0.5 to 15 s (Selectable)	5 s
Output	Relay Output		2 C/O		
	Contact Rating		5A @ 250 VAC / 28 VDC (Resistive)		
	Electrical Life		$1X10^5$		
	Mechanical Life		$3X10^6$		
Utilization Category		AC - 15	Rated Voltage (Ue): 120/240 V, Rated Current (Ie): 3.0/1.5 A		
		DC - 13	Rated Voltage (Ue): 24/125/250 V, Rated Current (Ie): 2.0/0.22/0.1 A		
LED Indication			Separate indications for Power ON, UV and OV; ON: Phase Reverse; BLINK: Phase Asymmetry		
Operating Temperature Storage Temperature			-15^{o} C To + 55^{o} C -25^{o} C To + 70^{o} C		
Humidity (Non Condensing)			95% (Rh)		
Enclosure			Flame Retardant UL 94-V0		
Dimension (W x H x D) (in mm)			36 X 60 X 90		
Weight (unpacked)			120 g		
Mounting			Base / DIN rail		
Degree of Protection			IP 20 for Terminals, IP 40 for Enclosure		
Certification			CE RoHS Compliant		

EMI / EMC

Harmonic Current Emissions	IEC 61000-3-2
ESD	IEC 61000-4-2
Radiated Susceptibility	IEC 61000-4-3
Electrical Fast Transients	IEC 61000-4-4
Surges	IEC 61000-4-5
Conducted Susceptibility	IEC 61000-4-6
Voltage Dips & Interruptions (AC)	IEC 61000-4-11
Conducted Emission	CISPR 14-1
Radiated Emission	CISPR 14-1

Environmental

Cold Heat	IEC 60068-2-1
Dry Heat	IEC 60068-2-2
Vibration	IEC 60068-2-6
Repetitive Shock	IEC 60068-2-27
Non-Repetitive Shock	IEC 60068-2-27

Note: 1) Voltage setting is with respect to Neutral. Voltage Setting Accuracy: ± 5 % of Full Scale; Time Setting Accuracy: ± 10 % of Full Scale

Voltage Monitoring Relay SM 500 - Neutral Loss Protection

- Phase loss (failure) detection
- Neutral loss detection
- Phase reverse detection
- Phase asymmetry
- Adjustable Over & Under voltage trip level
- LED indication for all failure conditions
- Automatic recovery on fault removal

Ordering Information

Cat. No.	Description
MAC04D0100	415 VAC, Neutral Loss Protection with Phase and Voltage Control, 2 C/O
MAC04D0119	380 VAC, Neutral Loss Protection with Phase and Voltage Control, 2 C/O
MAC04D0121	415VAC, Neutral Loss Protection with Phase & Voltage Control, Phase reverse disable, 2C/O
MAC04D0123	Selectable reference voltage (220-480VAC), Neutral Loss Protection with Phase & Voltage Control, 2C/O

Voltage Monitoring Relay SM 500 - Neutral Loss Protection

Cat. No.		MAC04D0100	
Parameters			
Supply Voltage (⏚)		415 VAC (Ph-Ph); 3 Phase, 4 Wire	
Frequency		47 to 53 Hz	
Power Consumption (Max.)		10 VA (max)	
Trip Settings	Phase Loss	Yes	
	Phase Sequence	Yes	
	Phase Asymmetry	94V ± 4V (Ph-Ph)	
	Under Voltage	55% to 95% (of ⏚)	
	Over Voltage	105% to 125% (of ⏚)	
	Hysterisis	7 V (± 2 V)	
Time Delay	ON Delay	5 s ±1 s (Fixed)	
	Trip Time (OFF Delay)	For Phase failure phase Imbalance Under voltage / Over Voltage	5 s ±1 s (Fixed)
		For Neutral Fail	500 ms -1s
Output	Relay Output	2 C/O	
	Contact Rating	5A @ 240 VAC / 28 VDC (Resistive)	
	Electrical Life	$1X10^5$	
	Mechanical Life	$1X10^7$	
Utilization Category	AC - 15	Rated Voltage (Ue): 120/240 V, Rated Current (Ie): 3.0/1.5 A	
	DC - 13	Rated Voltage (Ue): 24/125/250 V, Rated Current (Ie): 2.0/0.22/0.1 A	

LED Indications on front plate

Respective fault condition will be indicated by LED immediately & Relay will be tripped after specified trip time only.

	GREEN	UV	OV	Blink: ASY, ON: REV
Power ON	ON	OFF	OFF	OFF
Phase reverse	ON	OFF	OFF	ON
Asymmetry	ON	OFF	OFF	BLINK
UV	ON	ON	OFF	OFF
OV	ON	OFF	ON	OFF
Phase Fail	BLINK	OFF	OFF	OFF
Phase Fail *	BLINK	ON	OFF	BLINK
Neutral Fail	ON	BLINK	BLINK	BLINK

* Phase fail indications when I/P voltages are below UV set point and below asymmetry

Operating Temperature Storage Temperature	-10° C To + 60° C -10° C To + 70° C
Humidity (Non Condensing)	95% (Rh)
Enclosure	Flame Retardant UL 94-V0
Dimension (W x H x D) (in mm)	36 X 90 X 60
Weight (unpacked)	120 g
Mounting	Base / DIN rail
Degree of Protection	IP 20 for Terminals, IP 40 for Enclosure
Certification	CE RoHS Compliant

EMI / EMC

Harmonic Current Emissions	IEC 61000-3-2
ESD	IEC 61000-4-2
Radiated Susceptibility	IEC 61000-4-3
Electrical Fast Transients	IEC 61000-4-4
Surges	IEC 61000-4-5
Conducted Susceptibility	IEC 61000-4-6
Voltage Dips & Interruptions (AC)	IEC 61000-4-11
Conducted Emission	CISPR 14-1
Radiated Emission	CISPR 14-1

Environmental

Cold Heat	IEC 60068-2-1
Dry Heat	IEC 60068-2-2
Vibration	IEC 60068-2-6
Repetitive Shock	IEC 60068-2-27
Non-Repetitive Shock	IEC 60068-2-27

Voltage Monitoring Relay SM 501

- Protects against Phase Loss, Phase Reversal & Phase Asymmetry
- Suitable for 3 Phase 3 Wire system
- Selectable Under Voltage / Over Voltage Trip level
- Selectable Time Delay
- Models for Selectable Phase Asymmetry
- LED Indications for Power and Fault conditions
- Voltage Sensing Principle
- 2 C/O Configuration

Ordering Information

Cat. No.	Description
MG53BH	415 VAC, UV / OV & Single Phasing Preventor (SPP) with Selectable ON Delay (0.5 to 15 sec), 2 C/O
MG53BF	415 VAC, UV / OV & SPP with Selectable OFF Delay (0.5 to 15 sec), 2 C/O
MG63BH	220 VAC, UV / OV & SPP with Selectable ON Delay (0.5 to 15 sec), 2 C/O
MG63BF	220 VAC, UV / OV & SPP with Selectable OFF Delay (0.5 to 15 sec), 2 C/O

Voltage Monitoring Relay SM 501

Cat. No.			MG53BH	MG53BF	MG63BH	MG63BF
Parameters						
Supply Voltage (⏚)			415 VAC (3 Phase, 3 Wire)		220 VAC (3 Phase, 3 Wire)	
Frequency			50/60 Hz			
Power Consumption (Max.)			10 VA		5 VA	
Trip Settings	Phase Loss		Yes			
	Phase Sequence		Yes			
	Phase Asymmetry		10% (of ⏚)			
	Under Voltage		55% to 95% (of ⏚)			
	Over Voltage		105% to 125% (of⏚)			
	Hysterisis		7 V (± 2 V) of Trip Voltage			
Time Delay	ON Delay		0.5 to 15 s (Selectable)	5 s	0.5 to 15 s (Selectable)	5 s
	Trip Time (OFF Delay)		5 s	0.5 to 15 s (Selectable)	5 s	0.5 to 15 s (Selectable)
Output	Relay Output		2 C/O			
	Contact Rating		5A @ 250 VAC / 28 VDC (Resistive)			
	Electrical Life		$1X10^5$			
	Mechanical Life		$3X10^6$			
Utilization Category		AC - 15	Rated Voltage (Ue): 120/240 V, Rated Current (Ie): 3.0/1.5 A			
		DC - 13	Rated Voltage (Ue): 24/125/250 V, Rated Current (Ie): 2.0/0.22/0.1 A			
LED Indication			Separate indications for Power ON, UV and OV; ON: Phase Reverse; BLINK: Phase Asymmetry			
Operating Temperature Storage Temperature			-15° C To + 55° C -25° C To + 70° C			
Humidity (Non Condensing)			95% (Rh)			
Enclosure			Flame Retardant UL 94-V0			
Dimension (W x H x D) (in mm)			36 X 90 X 60			
Weight (unpacked)			120 g			
Mounting			Base / DIN rail			
Degree of Protection			IP 20 for Terminals, IP 40 for Enclosure			
Certification			CE RoHS Compliant			

EMI / EMC

Harmonic Current Emissions	IEC 61000-3-2
ESD	IEC 61000-4-2
Radiated Susceptibility	IEC 61000-4-3
Electrical Fast Transients	IEC 61000-4-4
Surges	IEC 61000-4-5
Conducted Susceptibility	IEC 61000-4-6
Voltage Dips & Interruptions (AC)	IEC 61000-4-11
Conducted Emission	CISPR 14-1
Radiated Emission	CISPR 14-1

Environmental

Cold Heat	IEC 60068-2-1
Dry Heat	IEC 60068-2-2
Vibration	IEC 60068-2-6
Repetitive Shock	IEC 60068-2-27
Non-Repetitive Shock	IEC 60068-2-27

Note: 1) Voltage Setting Accuracy: ± 5 % of Full Scale; Time Setting Accuracy: ± 10 % of Full Scale

2) In the event of Phase Sequence or Phase Loss, OFF Delay is 100 ms

Voltage Monitoring Relay SM 501

Ordering Information

Cat. No.	Description
MG53BI	415 VAC, UV / OV & Single Phasing Preventor (SPP) with 65 V Asymmetry, 2 C/O
MG53BO	415 VAC, UV / OV & SPP with 3 min ON Delay & 5s OFF Delay, 2 C/O
MB53BM	415 VAC, UV / OV (110% Fixed) & SPP with Selectable Asymmetry (5% to 17%), 2 C/O
MG53BQ	415 VAC, UV / OV & SPP with 30 V Asymmetry, 3 Sec ON Delay, 2 C/O

Voltage Monitoring Relay SM 501

Cat. No.		MG53BI	MG53BO	MB53BM
Parameters				
Supply Voltage (⏚)		415 VAC (3 Phase, 3 Wire)		
Frequency		50/60 Hz		
Power Consumption (Max.)		10 VA		
Trip Settings	Phase Loss	Yes	Yes	Yes
	Phase Sequence	Yes	Yes	Yes
	Phase Asymmetry	65 V	10%	5% to 17%
	Under Voltage	55% to 95% (of ⏚)	85% (of ⏚) Fixed	80% (of ⏚) Symmetrical
	Over Voltage	105% to 125% (of ⏚)	110% (of ⏚) Fixed	110% Fixed
	Hysterisis	7 V (± 2 V) of Trip Voltage	7 V (± 2 V) of Trip Voltage	7 V (± 2 V) of Input Voltage
Time Delay	ON Delay	5 s	3 min	0.5 to 15 s (Selectable)
	Trip Time (OFF Delay)	5 s	5 s	0.5 to 15 s (Selectable)
Output	Relay Output	2 C/O		
	Contact Rating	5A @ 250 VAC / 28 VDC (Resistive)		
	Electrical Life	$1X10^5$		
	Mechanical Life	$3X10^6$		
Utilization Category	AC - 15	Rated Voltage (Ue): 120/240 V, Rated Current (Ie): 3.0/1.5 A		
	DC - 13	Rated Voltage (Ue): 24/125/250 V, Rated Current (Ie): 2.0/0.22/0.1 A		
LED Indication		Separate indications for Power ON, UV and OV; ON: Phase Reverse; BLINK: Phase Asymmetry		
Operating Temperature Storage Temperature		-15° C To + 55° C -25° C To + 70° C		
Humidity (Non Condensing)		95% (Rh)		
Enclosure		Flame Retardant UL 94-V0		
Dimension (W x H x D) (in mm)		36 X 90 X 60		
Weight (unpacked)		120 g		
Mounting		Base / DIN rail		
Degree of Protection		IP 20 for Terminals, IP 40 for Enclosure		
Certification		CE RoHS Compliant		

EMI / EMC

Harmonic Current Emissions	IEC 61000-3-2
ESD	IEC 61000-4-2
Radiated Susceptibility	IEC 61000-4-3
Electrical Fast Transients	IEC 61000-4-4
Surges	IEC 61000-4-5
Conducted Susceptibility	IEC 61000-4-6
Voltage Dips & Interruptions (AC)	IEC 61000-4-11
Conducted Emission	CISPR 14-1
Radiated Emission	CISPR 14-1

Environmental

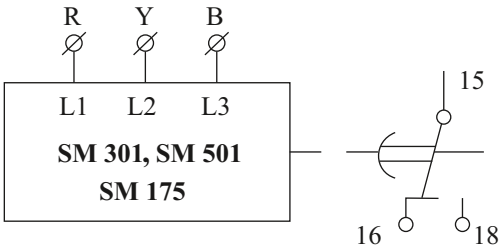
Cold Heat	IEC 60068-2-1
Dry Heat	IEC 60068-2-2
Vibration	IEC 60068-2-6
Repetitive Shock	IEC 60068-2-27
Non-Repetitive Shock	IEC 60068-2-27

Note: 1) Voltage Setting Accuracy: ± 5 % of Full Scale; Time Setting Accuracy: ± 10 % of Full Scale

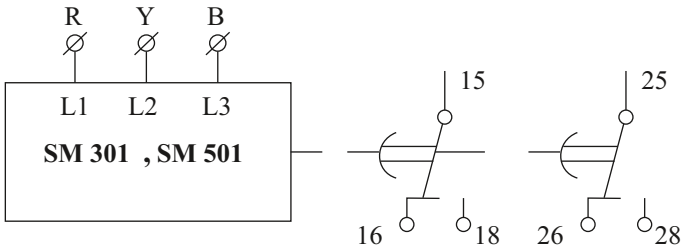
2) In the event of Phase Sequence or Phase Loss, OFF Delay is 100 ms
3) MG53BQ does not detect Phase Sequence Fault

Voltage Monitoring Relay

CONNECTION DIAGRAM

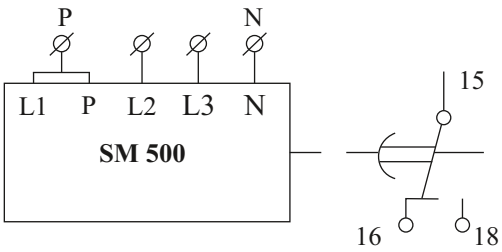


MA51BC, MA51BK, MN21D5, MK21D5, MC21D5
MA21DN, MD21DF, MG21DH, MG21DF, MGD1DR

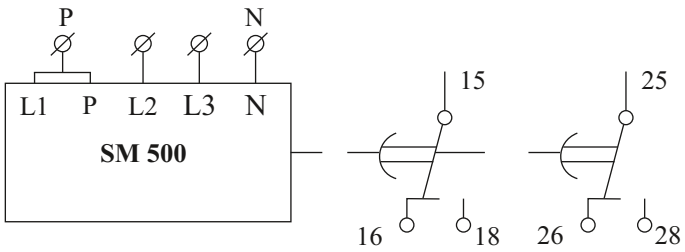


MG53BH, MG53BF, MG63BH, MG63BF
MG53BI, MG53BO, MB53BM, MC21B5

SINGLE PHASE

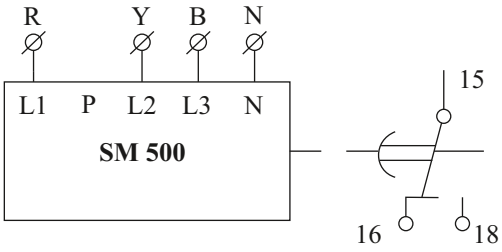


MD71BH, MD71BF, MD71B9

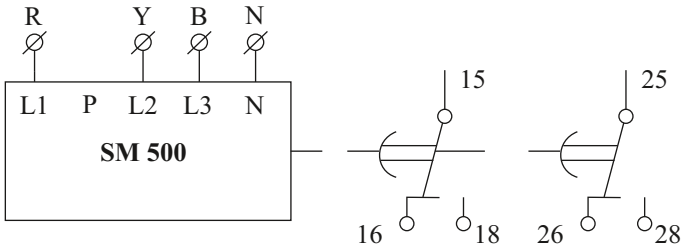


MG73BH, MG73BF, MG73B9

THREE PHASE

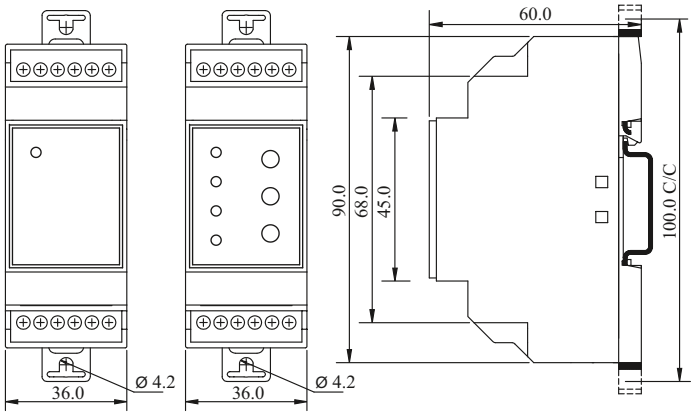


MD71BH, MD71BF, MD71B9

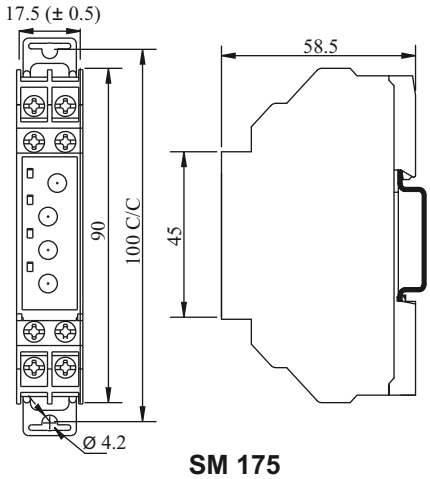


MG73BH, MG73BF, MG73B9, MAC04D0100 (P is not applicable in neutral loss)

MOUNTING DIMENSION (mm)



SM 301 SM 500, SM 501



SM 175

TERMINAL TORQUE & CAPACITY

Ø 3.5 mm	0.54 N.m (5 Lb.in) Terminal Screw - M2.6
	1 x 0.2...3.3 mm^2 Solid Wire
AWG	1 x 24 to 12

SM 301, SM 500, SM 501

Ø 3.5 mm	Torque-0.4 N.m (3.6 Lb.in) Terminal Screw - M3
	1 x 2.5 mm^2 Solid/Stranded Wire
AWG	1 x 24 to 12

SM 175

Voltage Monitoring Relay SM 600

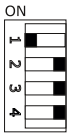
- True RMS Measurement
- Wide supply monitoring range from 500V-1000V AC
- Monitors own supply and detects fault conditions on one or more phases
- Protection against Phase loss, Phase Sequence, Phase Asymmetry, Under Voltage(UV), Over Voltage (OV) and 3 phase interruption
- Adjustable UV, OV and Phase asymmetry trip settings through Potentiometer
- LED Indication for supply and fault status
- Selectable ON or OFF delay through DIP Switch and adjustable delay time settings through Potentiometer
- Two SPDT relay outputs which can be configured separately for UV and OV fault through DIP Switch

Ordering Information

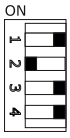
Cat. No.	Description
SMB110	500-1000V AC, Measuring and Monitoring Relay, 1C/O + 1C/O

Voltage Monitoring Relay SM 600

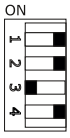
Cat. No.	SMB110
Supply Characteristics	
Power Supply Type	Self-Powered
Supply Voltage range	Line Voltage 500V to 1000V AC
Frequency	45Hz to 65Hz
Power consumption	Max 35VA at 750V, 50Hz
Measurement Characteristics	
Monitoring signals	R, Y, B
Reference voltage (Vref)	750V line voltage
Measuring Voltage Range	500V to 1000VAC
Measuring Frequency Range	45Hz to 65Hz
Relay Output Characteristics	
Number of Relays	2 nos. of 1 C/O relays
Contact arrangement (configurable)	1 x 2 C/O (SPDT) contacts 2 x 1 C/O (SPDT) contacts
Contact rating	NO - 8A @240VAC/ 30VDC
	NC - 8A @240VAC/30VDC
Mechanical Life	1×10^7 Operations
Electrical Life	1×10^5 Operations
Utilization Category	AC-15 3A @240VAC
	DC-13 0.22A @125VDC & 0.1A @250 VDC
Potentiometer	
No. of Potentiometer	4
Under-Voltage (UV)	Setting of UV threshold
Over-Voltage (OV)	Setting of OV threshold
Time	Setting of Delay (Delay type setting using DIP Switch)
Asymmetry	Setting of Asymmetry
Note: Run-time Potentiometer setting is applicable	
DIP Switches	



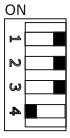
Switch 1 - Potentiometer Delay type
OFF Position = OFF Delay (Trip Delay)
ON Position = ON Delay (Recovery Delay)



Switch 2 - Fixed Delay
OFF Position = Instantaneous (<500msec)
ON Position = 5 Sec



Switch 3- Delay Multiplier
OFF Position = 1
ON Position = 0.1 (Applicable to OFF delay only)



Switch 4 - Output Relay Selection (1x2 C/O SPDT or 2x1 C/O SPDT)
OFF Position = 1x2 C/O (Relay 1&2 are assigned for all faults)
ON Position = 2x1 C/O (Relay 1 is assigned for UV)
(Relay 2 is assigned for OV)
Both relay for asymmetry / phase fail / phase reverse and interruption fault.

Note: 1. Run-time dip switch setting is applicable
2. After dip switch settings are changed LED's will blink for 3 times as mentioned in LED indication table

Voltage Monitoring Relay SM 600

Feature Characteristics	
Monitoring Functions	
Monitored Voltage	Phase to Phase (3 Phase 3 Wire)
Under Voltage (Asymmetrical)	
Settable Threshold Range (Potentiometer 1)	-2 to -22 % (735V to 585V of Vref)
Setting resolution	2.00%
Hysteresis	Fixed 1 % of Vref for -2% trip setting Fixed 2 % of Vref above -2 % trip setting
Over Voltage (Asymmetrical)	
Settable threshold Range (Potentiometer 2)	2 to 22 % (765V to 915V of Vref)
Setting resolution	2.00%
Hysteresis	Fixed 1 % of Vref for 2% trip setting Fixed 2 % of Vref above 2 % setting
Asymmetry (%)	
Asymmetry Setting Range	2% to 22% Potentiometer settable
Asymmetry Hysteresis	1% for 2% Asymmetry setting. 2% for greater than 2% Asymmetry setting.
Lower voltage cut-off	-30% of Ref Vtg = 525V Asymmetrical
Higher voltage cut-off	+30% of Ref Vtg = 975V Asymmetrical
Phase loss	Yes
Phase sequence	Yes
3 phase Interruption	32 ms +/-1ms
Timing Functions:	
Power ON Delay	Fixed at 5 Sec
Delay	Potentiometer Settable. Delay Type settable using DIP Switch 1
Range	0.1 - 30 Sec. Multiplying factor settable using DIP switch applicable to OFF delay only. Markings – 1, 3, 6, 9, 12, 15, 18, 21, 24, 27, 30
ON Delay (for all faults)	Potentiometer settable 1 - 30 Sec OR Fixed using DIP Switch 1
OFF Delay	
UV/OV / Asymmetry	Potentiometer settable 0.1 - 30 Sec OR Fixed using DIP Switch 1
Phase loss	< 100 ms
Phase Reversal	< 100 ms
Phase Interruption	< 100 ms
Low voltage and High voltage cut off	<= 500 ms
Setting Accuracy	
UV, OV and Asymmetry threshold	+/- 1% of set value
ON delay and OFF delay time	+/-1% of set value
Measurement Accuracy	
Voltage	
Accuracy within supply voltage range	+/- 2% of set value
Accuracy within temperature range	+/- 0.05 % / °C of set value
Time	+/- (100ms + 1% of set value)
Repeat accuracy	+/- 0.5%

Voltage Monitoring Relay SM 600

LED Indications

Conditions	Power LED	UV LED	OV LED	ASY/ PR LED
Healthy	ON	OFF	OFF	OFF
UV	ON	ON	OFF	OFF
OV	ON	OFF	ON	OFF
Asymmetry	ON	OFF	OFF	Slow Blink (1000ms)
R-Phase Fail	Slow Blink (1000ms)	OFF	OFF	OFF
Phase Reverse	ON	OFF	OFF	ON
Low Cut Off	ON	Slow Blink (1000ms)	OFF	OFF
High Cut Off	ON	OFF	Slow Blink (1000ms)	OFF
Interruption	ON	Fast Blink (200ms)	Fast Blink (200ms)	Fast Blink (200ms)
Dip Switch Change	ON	Fast Blink (400ms)	Fast Blink (400ms)	Fast Blink (400ms)

1) During delay respective LED blinks @ 200ms.

2) During device power on delay; Power LED is ON & other LED's blink fast @ 400ms in sequence one after another.

Environmental Parameters	
Operating Temperature	-25 °C to 70 °C
Storage Temperature	-40 °C to 85 °C
Humidity	95% RH (Without condensation)
Altitude	< 2000 meters
Pollution Degree	3
Over voltage category	III
Mechanical Parameters	
Operating Mode	Continuous operation
Degree of protection	
Enclosure / Internal Components	IP 40
Terminals	IP 20
Housing	UL94-00
Mounting	Din rail
Mounting position	any
Dimensions (L X W X D) in mm	85.5 x 45 x 100
Weight (Unpacked)	Aprox. 300 gm

Voltage Monitoring Relay SM 600

EMI / EMC Test

Harmonic Current Emissions	IEC 61000-3-2
Voltage Flicker and Fluctuations	IEC 61000-3-3
ESD	IEC 61000-4-2
Radiated Susceptibility	IEC 61000-4-3
Electrical Fast Transients	IEC 61000-4-4
Surge	IEC 61000-4-5
Conducted Susceptibility	IEC 61000-4-6
Power Frequency Magnetic Field	IEC 61000-4-8
Voltage Dips & Interruptions (AC)	IEC 61000-4-11
Conducted Emission	EN50155:2017, EN50121-3-2 and EN55011
Radiated Emission	EN50155 and EN50121-3-2/EN6100-6-4,EN55011
Harmonic immunity	Upto 30th Harmonics
Supply variations	EN50155
Supply Over voltage	EN50155

Safety test

Voltage Withstand test (Dielectric Strength)

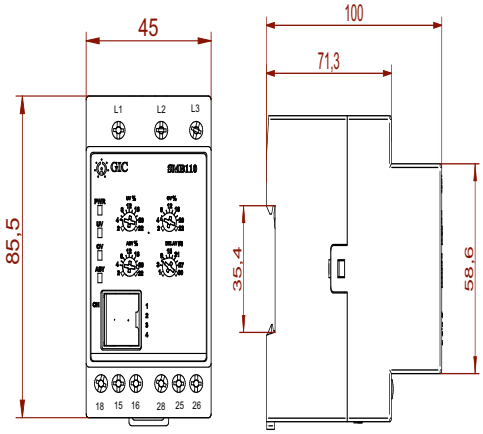
a)Test Voltage between I/P and O/P	IEC 60255-27
b)Test Voltage between all terminals and enclosure	IEC 60255-27
Rated Impulse Voltage between I/P and O/P	IEC60255-27
Rated Impulse voltage between O/P1 and O/P2	IEC60255-27
Insulation resistance a) between input and output b) between all terminals and enclosure	IEC 60255-27
Leakage current	<3.5mA UL508
Single Fault test	The equipment shall not present a risk of electric shock or fire after a single fault test. It does not have to be functional after the test.

Environmental Testing

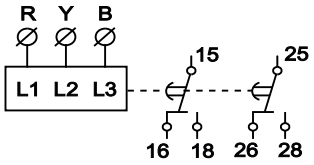
Cold Heat	IEC 60068-2-1
Dry Heat	IEC 60068-2-2,
Damp heat, cyclic	IEC 60068-2-30
Vibration, Shock and bump	EN50155 and EN61373

Approvals CE, RoHS

MOUNTING DIMENSION (mm)



CONNECTION DIAGRAM



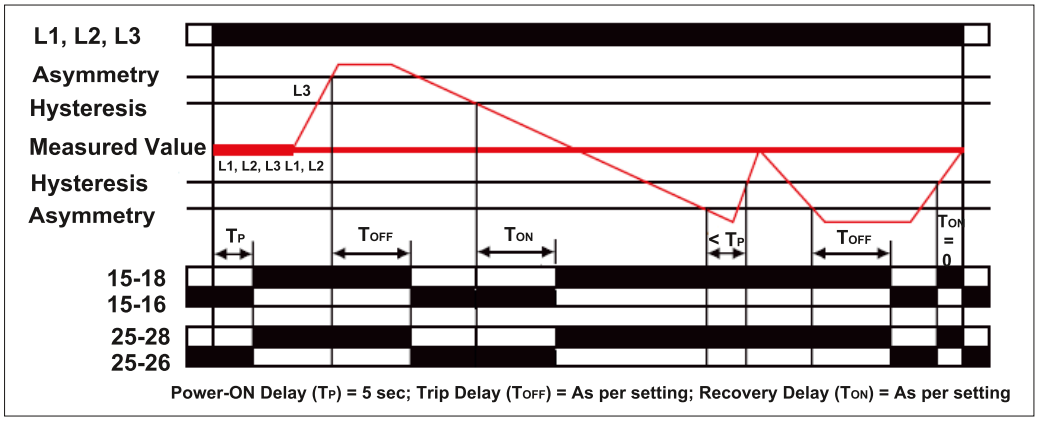
TERMINAL TORQUE & CAPACITY

Ø 3.5 mm....4.0mm	0.6 N.m (5.3 Lb.in)
	1 x 4.0 mm^2 Solid Wire
AWG	1 x 20 to 10

Voltage Monitoring Relay SM 600

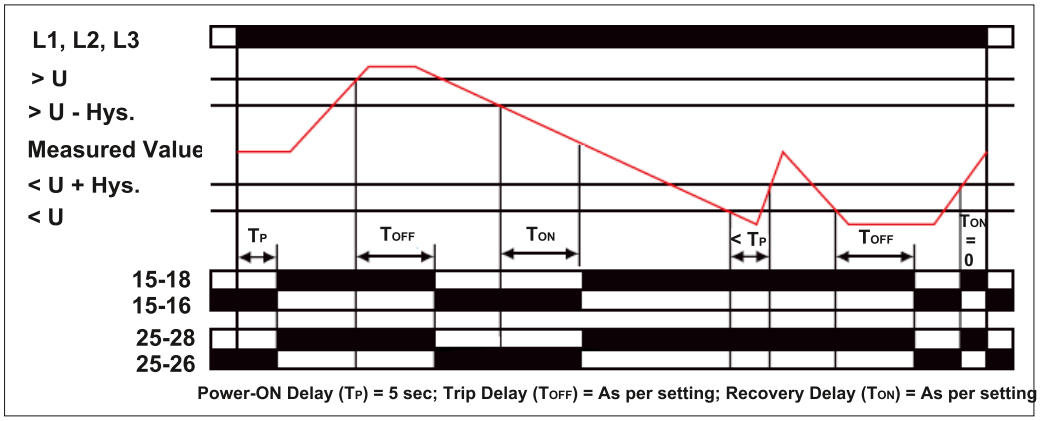
FUNCTION DIAGRAM

Asymmetry -



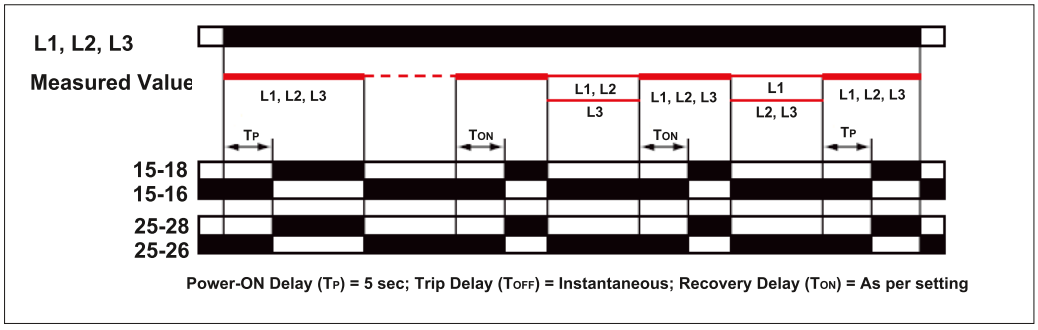
Power-ON Delay (T_P) = 5 sec; Trip Delay (T_{OFF}) = As per setting; Recovery Delay (T_{ON}) = As per setting

UV & OV -



Power-ON Delay (T_P) = 5 sec; Trip Delay (T_{OFF}) = As per setting; Recovery Delay (T_{ON}) = As per setting

Phase Fail & Phase Sequence -



Power-ON Delay (T_P) = 5 sec; Trip Delay (T_{OFF}) = Instantaneous; Recovery Delay (T_{ON}) = As per setting

Product Selection Chart: Voltage Monitoring

Cat. No.	3P - 3W	3P - 4W	1 - Phase	Under Voltage	Over Voltage	Phase Loss	Phase Sequence	Phase Asymmetry	Settable ON Delay	Settable OFF Delay	1 C/O Relay Output	2 C/O Relay Output	1 C/O+ 1 C/O Relay Output	Neutral Loss	115 VAC	208 to 480 VAC	240 VAC	415 VAC	145 to 500 VAC	500 to 1000 VAC	Auxiliary Supply
MAG03D0424 MAG03D0425 MAG03D0426	●	●		●	●	●	●	●	●	●	●					●					
MAG03D0427	●					●		●			●					●					
MAG03D0428	●					●	●				●					●					
DMS110*	●	●		●	●	●	●	●	●	●	●			●		●			●		
DMS120*	●	●		●	●	●	●	●	●	●			●	●		●			●		
DMA220*	●	●		●	●	●	●	●	●	●			●	●		●					●
MN21D5	●					●		●			●					●					
MK21D5	●					●	●				●					●					
MC21D5	●					●	●	●			●					●					
MA21DN	●					●	●	●		●	●					●					
MD21DF	●			●	●	●	●			●	●					●					
MG21DH	●			●	●	●	●	●	●		●					●					
MG21DF	●			●	●	●	●	●		●	●					●					
MOF1D51	●					●		●			●					●					
MAE03D0200			●	●	●				●	●	●				●		●				
MA51BC	●					●	●	●			●							●			
MA51BK	●					●	●	●			●							●			
MC21B5	●					●	●	●				●						●			
MD71BH		●	●	●	●	●			●		●						●				
MD71BF		●	●	●	●	●				●	●						●				
MD71B9		●	●	●	●	●		●	●		●						●				
MG73BH		●	●	●	●	●	●	●	●			●					●				
MG73BF		●	●	●	●	●	●	●		●		●					●				
MG73BR		●	●	●	●	●	●	●		●		●					●				
MG73B9		●	●	●	●	●	●	●	●			●					●				
MAC04D0100		●		●	●	●	●	●				●		●				●			
MG53BH	●			●	●	●	●	●	●			●						●			
MG53BF	●			●	●	●	●	●		●		●						●			
MG53BT	●			●	●	●	●	●		●		●						●			
MG53BQ	●			●	●	●		●		●		●						●			
MG53BI	●			●	●	●	●	●				●						●			
MG53BO	●			●	●	●	●	●				●						●			
MB53BM	●			●	●	●	●	●	●	●		●						●			
SMB110	●			●	●	●	●	●	●	●			●							●	

NOTE : 1. The product can be made available in 120 VAC, 220 VAC, 230 VAC and 400 VAC.
2. '*' DMS110/ DMS120/ DMA220 with LCD Display.

Current Monitoring Relay

- Protects against Overload, Phase Reverse, Phase Loss and Phase Unbalance faults
- Wide Range of Sensing Current : 1A-45A
- Models for 1 Phase and 3 Phase systems
- Auto/Manual Reset selection
- Fail-Safe Protection
- Inverse Time model with Under load, Locked Rotor Protection and Selectable Trip Class
- Definite Time model with Under load and selectable Start and Trip time

Ordering Information

Cat. No.	Trip Type	Current	Auto Reset Time
17C112EB0	Inverse	3 A - 9 A	As per trip class
17C212EB0	Inverse	8 A - 24 A	As per trip class
17C312EB0	Inverse	15 A - 45 A	As per trip class
17C412EB0	Inverse	2 A - 5 A	As per trip class
17B822MM0	Definite	0.5 - 3 A	As per trip class
17B922MM0	Definite	0.2 - 1.4 A	As per trip class
17D112DA0	Definite	3 A - 9 A	6 min
17D212DA0	Definite	8 A - 24 A	6 min
17D312DA0	Definite	15 A - 45 A	6 min
17D412DA0	Definite	2 A - 5 A	6 min

Current Monitoring Relay

Cat. No.		17C112EB0	17C212EB0	17D312DA0
Parameters				
Supply Voltage (⏚)		110 - 240 VAC		
Supply Variation		-20% to +10% of (⏚)		
Frequency		50 / 60 Hz		
Power Consumption (Max.)		5 VA		
Trip Settings	Trip Type	Inverse Time	Inverse Time	Definite Time
	Tripping Class	10, 10, 20, 30	10, 10, 20, 30	N A
	Current Ranges	3 - 9 A	8 - 24 A	15 - 45 A
	Thermal Memory	Yes	Yes	N A
	Underload	40% to 90%	40% to 90%	50%
	Trip Time	< 4sec after starting	< 4sec after starting	N A
Number of In-Built CT's		1		
Reset Mode		Auto, Manual		
Test Function		Yes		
Time Delay	Start Time	N A	N A	0.2 to 30s
	Delay Time	As per trip class	As per trip class	0.2 to 10s
	Auto Reset Time	3-15 min (As per trip class)	3-15 min (As per trip class)	6 min
	ON Delay	450 ms (±50ms)		
Setting Accuracy		± 5%		
Repeat Accuracy		± 2%		
Output	Relay Output	1 C/O		
	Contact Rating	5A @ 240 VAC (Resistive)		
	Electrical Life	1 x 10^5		
	Mechanical Life	1 x 10^7		
Utilization Category	AC - 15	Rated Voltage (Ue): 120/240 V, Rated Current (Ie): 3.0/1.5 A		
LED Indications		ON: Power ON, UL: Underload, OL: Overload		
Operating Temperature Storage Temperature		- 10° C to +60° C - 25° C to +70° C		
Humidity (Non Condensing)		95% (Rh)		
Enclosure		Flame Retardant UL94-V0		
Dimension (W x H x D) (in mm)		110.8 X 36.5 X 76.8		
Weight (unpacked) Approx.		200 g		
Mounting		Base Mounting		
Certification		CE RoHS Compliant		
Degree of Protection		IP 20 for Enclosure		

EMI / EMC

Harmonic Current Emissions	IEC 61000-3-2
ESD	IEC 61000-4-2
Radiated Susceptibility	IEC 61000-4-3
Electrical Fast Transients	IEC 61000-4-4
Surges	IEC 61000-4-5
Conducted Susceptibility	IEC 61000-4-6
Voltage Dips & Interruptions (AC)	IEC 61000-4-11
Power Frequency Magnetic Field	IEC 61000-4-8
Voltage Flickers & Fluctuation	IEC 61000-3-3
Conducted Emission	CISPR 14-1
Radiated Emission	CISPR 14-1

Environmental

Cold Heat	IEC 60068-2-1
Dry Heat	IEC 60068-2-2
Vibration	IEC 60068-2-6

Current Monitoring Relay

Ordering Information

Cat. No.	Trip Type	Current	Auto Reset Time
17A122CB0	Inverse	3 A - 9 A	As per trip class
17A222CB0	Inverse	8 A - 24 A	As per trip class
17A322CB0	Inverse	15 A - 45 A	As per trip class
17A422CB0	Inverse	2 A - 5 A	As per trip class
17B122AA0	Definite	3 A - 9 A	6 min
17B222AA0	Definite	8 A - 24 A	6 min
17B322AA0	Definite	15 A - 45 A	6 min
17B422AA0	Definite	2 A - 5 A	6 min
17B122PA0	Definite	3 A - 9 A	Instant (< 500 msec)
17B222PA0	Definite	8 A - 24 A	Instant (< 500 msec)
17B322PA0	Definite	15 A - 45 A	Instant (< 500 msec)
17B422PA0	Definite	2 A - 5 A	Instant (< 500 msec)

Current Monitoring Relay

Cat. No.		17A122CB0	17B222AA0	17A322CB0
Parameters				
Supply Voltage (⏚)		220 - 415 VAC (3 Phase, 3 Wire)		
Supply Variation		-20% to +15% of (⏚)		
Frequency		50/60 Hz		
Power Consumption (Max.)		12 VA		
Trip Settings	Trip Type	Inverse Time	Definite Time	Inverse Time
	Tripping Class	10A, 10, 20, 30	N A	10A, 10, 20, 30
	Current Ranges	3 - 9 A	8 - 24 A	15 - 45 A
	Thermal Memory	Yes	N A	Yes
	Phase Reverse Protection	Yes / (100 ms Approx.)		
	Phase Loss	> 70% of Unbalance		
	Current unbalance Protection	>50% of Unbalance		
	Underload	40% to 90%	50%	40% to 90%
	Trip Time	< 4sec after starting	N A	< 4sec after starting
Number of In-Built CT's		2		
Reset Mode		Auto, Manual		
Test Function		Yes		
Time Delay	Start Time	N A	0.2 to 30s	N A
	Delay Time	As per trip class	0.2 to 10s	As per trip class
	Auto Reset Time	3-15 min (As per trip class)	6 min	3-15 min (As per trip class)
	ON Delay	450 ms (±50ms)		
Setting Accuracy		± 5%		
Repeat Accuracy		± 2%		
Output	Relay Output	1 C/O		
	Contact Rating	5A @ 240 VAC (Resistive)		
	Electrical Life	1 x 10^5		
	Mechanical Life	1 x 10^7		
Utilization Category	AC - 15	Rated Voltage (Ue): 120/240 V, Rated Current (Ie): 3.0/1.5 A		
LED Indications		Separate indications for Phase Asymmetry, Phase Loss & Phase Sequence / Reverse, Power ON, Underload & Overload		
Operating Temperature Storage Temperature		- 10° C to +60° C - 25° C to +70° C		
Humidity (Non Condensing)		95% (Rh)		
Enclosure		Flame Retardant UL94-V0		
Dimension (W x H x D) (in mm)		110.8 X 36.5 X 76.8		
Weight (unpacked) Approx.		210 g		
Mounting		Base Mounting		
Certification		CE RoHS Compliant		
Degree of Protection		IP 20 for Enclosure		

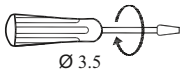
EMI / EMC

Harmonic Current Emissions	IEC 61000-3-2
ESD	IEC 61000-4-2
Radiated Susceptibility	IEC 61000-4-3
Electrical Fast Transients	IEC 61000-4-4
Surges	IEC 61000-4-5
Conducted Susceptibility	IEC 61000-4-6
Voltage Dips & Interruptions (AC)	IEC 61000-4-11
Power Frequency Magnetic Field	IEC 61000-4-8
Voltage Flickers & Fluctuation	IEC 61000-3-3
Conducted Emission	CISPR 14-1
Radiated Emission	CISPR 14-1

Environmental

Cold Heat	IEC 60068-2-1
Dry Heat	IEC 60068-2-2
Vibration	IEC 60068-2-6

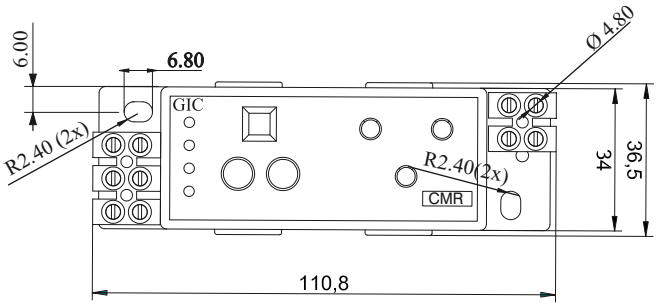
TERMINAL TORQUE & CAPACITY

 Ø 3.5	0.45 N.m (4 Lb.in)
	1 x 4 mmsq Rigid wire (without wire protection) 1 x 2.5 mmsq (with wire protection)
AWG	1 x 22 to 12

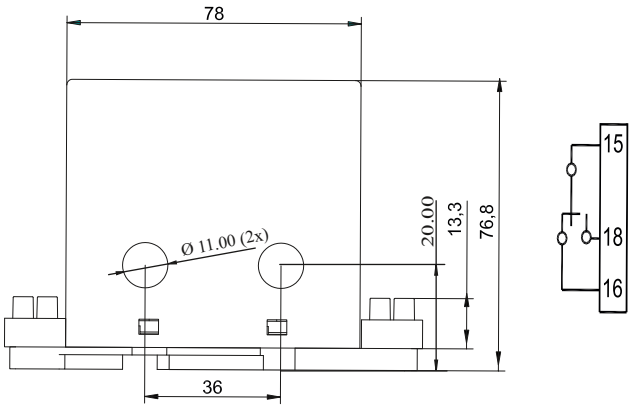
Note: 2 A - 5A products can be used with external CT. Load wires to be passed through the external CT and Secondary's wire terminals are to be looped through the Product CT.

Current Monitoring Relay

MOUNTING DIMENSION (mm)

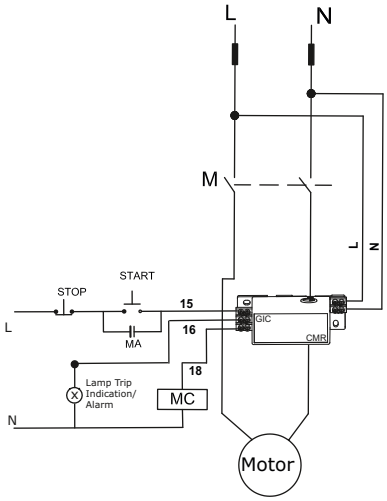


RELAY CONNECTION DIAGRAM

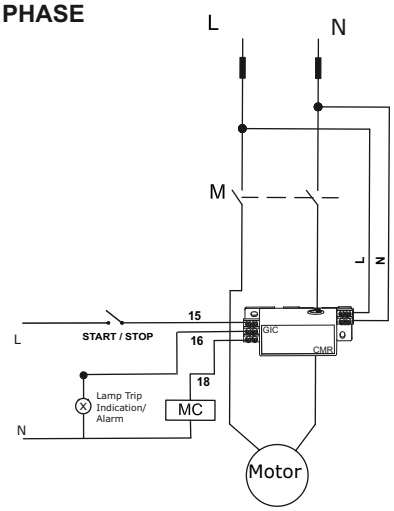


CONNECTION DIAGRAM

SINGLE PHASE

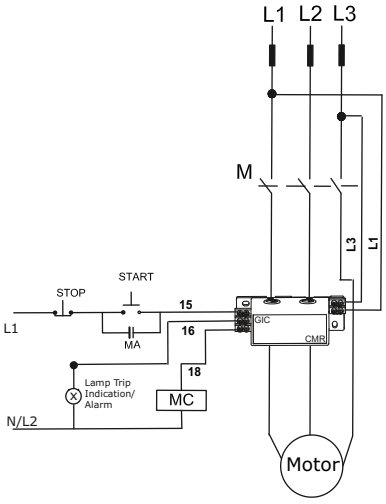


MANUAL RESET

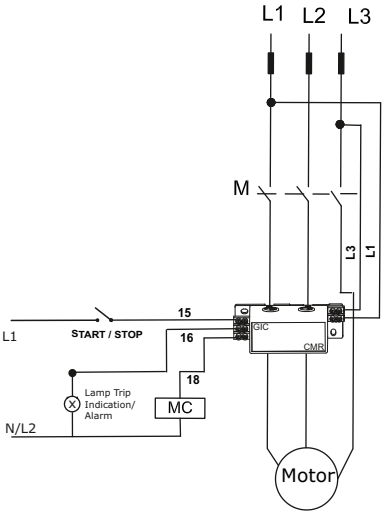


AUTO RESET

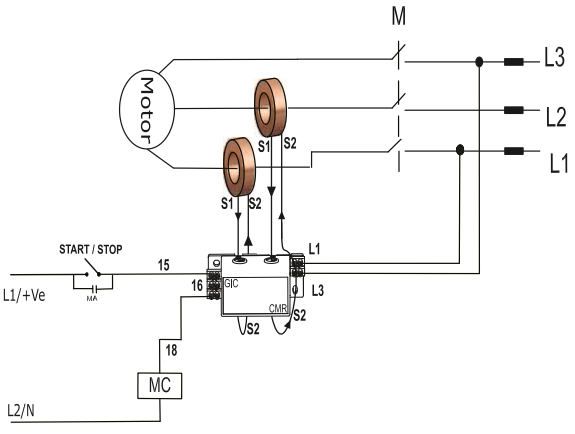
THREE PHASE



MANUAL RESET



AUTO RESET



EXTERNAL CT INTERFACE

Earth Leakage Relay

- Flush Mounting Version 96x96 mm with Digital Seven Segment Display
- Monitors, Detects and Protects Power systems from Earth Leakage Fault (Type 'A' & 'AC')
- Wide range of selectable Earth Leakage Current: 30 mA - 30 A
- Configurable Earth Leakage Trip time: 0 - 10 s
- Wide Auxiliary Supply Range: 110 - 240 VAC / DC
- Nano Crystaline CBCT measures the leakage current to the highest accuracy
- Instantaneous Trip for 5 times of set value of Leakage current
- Test feature to check complete product functionality
- LED Indication for Relay Status, Earth Leakage Fault & Alarm Condition
- Manual / Remote Reset feature
- Continuous Scrolling display for Set Current and Set time
- 1 C/O (Alarm Relay) + 1 C/O (Fault Relay)
- RS 485 Communication

Ordering Information

Cat. No.	Description
17K716QF4N	110-240V AC / DC, Current Range 30 mA - 30 A, 2 C/O
17K716QF4M	110-240V AC / DC, Current Range 30 mA - 30 A, 2 C/O with RS 485
17K726QF4N	220-415V AC / 220 V DC, Current Range 30 mA - 30 A, 2 C/O
17K726QF4M	220-415V AC / 220 V DC, Current Range 30 mA - 30 A, 2 C/O with RS 485
17H7NNHN3	CBCT 38 mm, Type A & AC Current
17H7NNIN3	CBCT 57 mm, Type A & AC Current
17H7NNQN3	CBCT 70 mm, Type A & AC Current
17H7NNJN3	CBCT 92 mm, Type A & AC Current
17H7NNLN3	CBCT 120 mm, Type A & AC Current
17H7NNKN3	CBCT 210 mm, Type A & AC Current
17H7NNRN3	CBCT 38 mm, Type AC Current
17H7NNVN3	CBCT 57 mm, Type AC Current
17H7NNSN3	CBCT 70 mm, Type AC Current
17H7NNTN3	CBCT 92 mm, Type AC Current
17H7NNUN3	CBCT 120 mm, Type AC Current

Earth Leakage Relay

Cat. No.		17K716QF4N	17K716QF4M	17K726QF4N	17K726QF4M
Parameters					
Supply Voltage (⏚)		110 - 240 V AC / DC		240-415 VAC/DC	
Supply Variation		-20 to +10%			
Frequency		50/60Hz			
Power Consumption (Max.)		6 VA			
Leakage Current Range (I△n)		30 mA to 30 A			
Threshold I△n (A)	I△n x 1	0.03 - 0.05 - 0.075 - 0.1 - 0.15 - 0.2-0.3 (A)			
	I△n x 10	0.03 - 0.5 - 0.75 - 1.0 - 1.5 - 2.0 - 3.0 (A)			
	I△n x 100	0.03 - 5 - 7.5 - 10.0 - 15.0 - 20.0 - 30.0 (A)			
Type Class		'A' True RMS measurement up to I△ 1A & I△ 3A (As per IEC 60947-2 Annex M)			
		'AC' True RMS measurement 30mA to 30A (As per IEC 60947-2 Annex M)			
Max. Crest Factor		4 (for 30 mA to 30 A)			
Reset Mode		Manual / Auto Reset			
No. of Resets		4 (Auto Mode)			
Clear Auto Reset		After 1 hour of healthy condition or supply interruption			
Reset Enable		Below 50% of set current threshold in presence of CBCT			
Trip Time (△t in sec)		0 - 0.06 - 0.15 - 0.25 - 0.5 - 0.8 - 1 - 2.5 - 5 - 10			
Test / Reset		Local & Remote (Non Potential free contacts, upto 10 m)			
Setting Accuracy		-20% (Including CBCT Accuracy)			
Repeat Accuracy		± 2%			
Output	Relay Output	1 C/O (Alarm Relay) + 1 C/O (Fault relay)			
	Contact Rating	5A (Resistive) @ 240 VAC / 30 VDC			
	Electrical Life	5×10^4			
	Mechanical Life	5×10^6			
Display	Trip Current Hold	Enable / Disable			
	Scrolling Display	Enable / Disable			
LED Indication	Power On	ON (Green LED)			
	Alarm	ON (Yellow LED) @ Alarm Relay Trip, (60% of set I△n)			
	Fault	ON (RED LED) @ 85% of set I△n (A) & Blink @ CT open			
RS 485 Communication		NA	Available	NA	Available
Operating Temperature Storage Temperature		- 20° C to +55° C - 20° C to +70° C			
Humidity (Non Condensing)		95% (Rh)			
Enclosure		Flame Retardant UL94-V0			
Dimension (W x H x D) (in mm)		96 X 96 X 83.7			
Weight (unpacked) Approx.		275 g			
Mounting		Panel / Flush Mountable			
Certification		CE RoHS Compliant			
Degree of Protection		IP 20 for Terminals, IP 40 for Enclosure			

EMI / EMC

Harmonic Current Emissions	IEC 61000-3-2
ESD	IEC 61000-4-2
Radiated Susceptibility	IEC 61000-4-3
Electrical Fast Transients	IEC 61000-4-4
Surges	IEC 61000-4-5
Conducted Susceptibility	IEC 61000-4-6
Voltage Dips & Interruptions (AC)	IEC 61000-4-11
Conducted Emission	CISPR 11
Radiated Emission	CISPR 11

Environmental

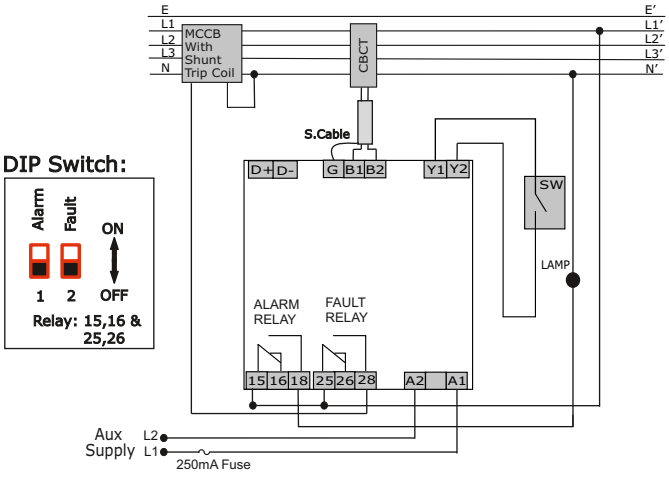
Cold Heat	IEC 60068-2-1
Dry Heat	IEC 60068-2-2
Vibration	IEC 60068-2-6

Earth Leakage Relay

CONNECTION DIAGRAM

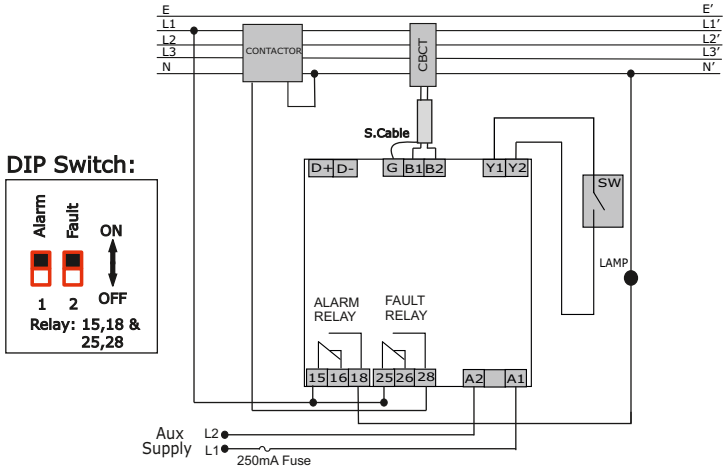
NON-FAIL SAFE MODE
(SHUNT TRIP COIL/UV TRIP COIL)

THREE PHASE APPLICATION



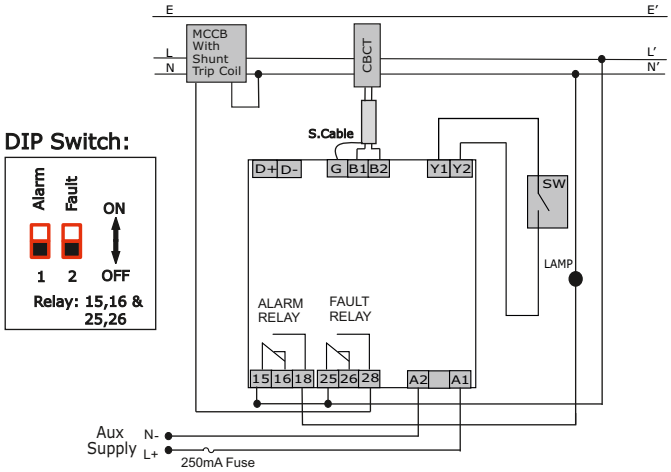
FAIL SAFE MODE (CONTRACTOR)

THREE PHASE APPLICATION



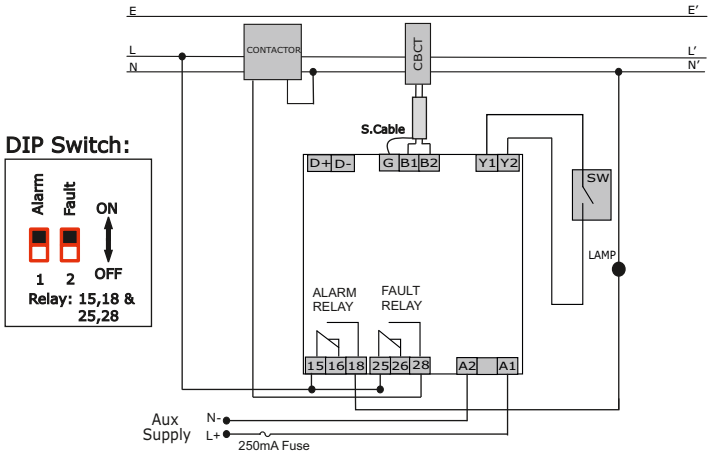
NON-FAIL SAFE MODE
(SHUNT TRIP COIL/UV TRIP COIL)

SINGLE PHASE APPLICATION



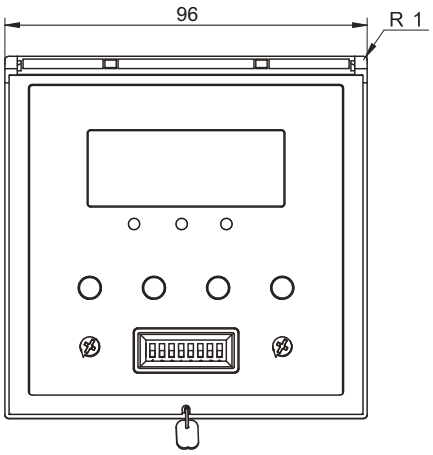
FAIL SAFE MODE (CONTRACTOR)

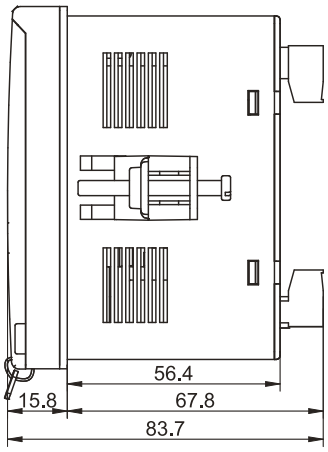
SINGLE PHASE APPLICATION



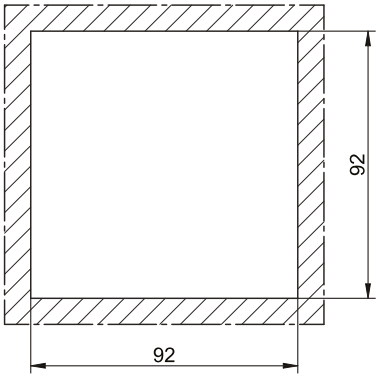
Earth Leakage Relay

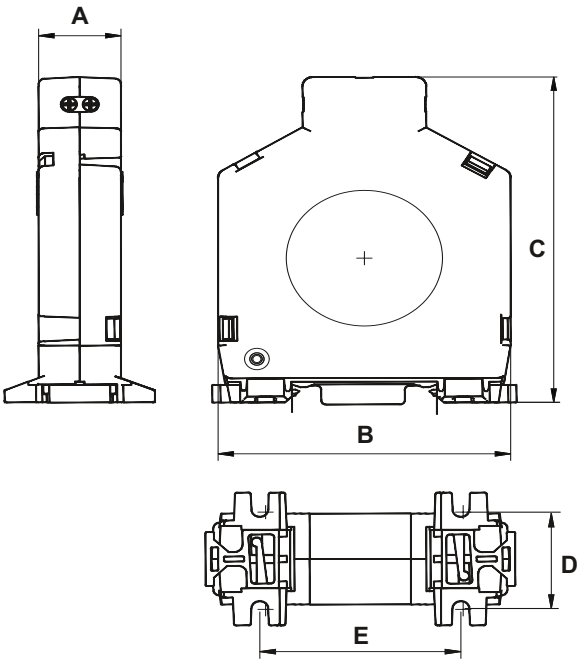
MOUNTING DIMENSIONS (mm)





Panel Cutout

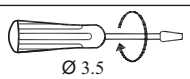




CBCT	SIZE	WEIGHT (in gms)	A	B	C	D	E
17H7NNHN3	38	110	20	71	91	27	48
17H7NNRN3							
17H7NNIN3	57	185	20	97	117	27	55
17H7NNQN3	70	240	20	109	133	27	60
17H7NNSN3							
17H7NNJN3	92	250	20	132	155	27	73
17H7NNTN3							
17H7NNLN3	120	255	20	153	176	27	73
17H7NNUN3							
17H7NNKN3	210	280	20.5	250	282	28	128
17H7NNWN3	322	1100	16	322.5	354.5	18.4	—

Dimensions in mm

TERMINAL TORQUE & CAPACITY

 Ø 3.5	0.5 N.m (4.4 Lb.in)
	1 x 2.5 mm^2 Solid Wire/Stranded
AWG	1 x 28 to 12

Earth Leakage Relay

- Monitors, Detects and Protects Power systems from Earth Leakage Faults
- Wide range of selectable Earth Leakage Current: 30 mA - 30 A
- Configurable Earth Leakage Trip time: 0 - 10 s
- Wide Auxiliary Supply Range:
  110 - 240 V AC / DC,
  220 - 415 V AC / 220 V DC
- Instantaneous Trip for 5 times of set value of Leakage current
- Test feature to check complete product functionality
- LED Indication for Relay status, CT open, Earth Leakage fault & Test/Reset switch feature
- Manual / Remote Reset feature
- 1 C/O + 1 NO Relay Output

Ordering Information

Cat. No.	Description
17G715GF2	110-240V AC / DC, Current Range 30 mA - 30 A, 1 C/O + 1 NO, Manual Reset
17G715KF2	110-240V AC / DC, Current Range 30 mA - 30 A, 1 C/O + 1 NO, Auto Reset
17G745GF2	220-415V AC / 220 V DC, Current Range 30 mA - 30 A, 1 C/O + 1 NO, Manual Reset
17G745KF2	220-415V AC / 220 V DC, Current Range 30 mA - 30 A, 1 C/O + 1 NO, Auto Reset
17G755GF2	15V DC, Current Range 30 mA - 30 A, 1 C/O + 1 NO, Manual Reset
17G755KF2	15V DC, Current Range 30 mA - 30 A, 1 C/O + 1 NO, Auto Reset
17G815GF2	110-240V AC / DC, Current Range 30 mA - 10 A, 1 C/O + 1 NO, Manual Reset
17G815KF2	110-240V AC / DC, Current Range 30 mA - 10 A, 1 C/O + 1 NO, Auto Reset
17G845GF2	220-415V AC / 220 V DC, Current Range 30 mA - 10 A, 1 C/O + 1 NO, Manual Reset
17G845KF2	220-415V AC / 220 V DC, Current Range 30 mA - 10 A, 1 C/O + 1 NO, Auto Reset

Note: For CBCT ordering information please refer to page no 170.

Earth Leakage Relay

Cat. No.		17G715GF2	17G715KF2	17G745GF2	17G745KF2
Parameters					
Supply Voltage (⏚)		110 - 240 V AC / DC		220 - 415 V AC / 220 V DC	
Supply Variation		-20 to +10%			
Frequency		50/60Hz			
Power Consumption (Max.)		5 VA		10 VA	
Leakage Current Range (I∆n)		30 mA to 30 A			
Threshold I∆n (A)	For '17G7' Devices	0.03 - 0.1 - 0.3 - 0.5 - 1 - 3 - 5 - 10 - 20 - 30			
	For '17G8' Devices	0.03 - 0.05 - 0.1 - 0.3 - 0.5 - 0.75 - 1- 3 - 5 - 10			
Type Class		'A' True RMS measurement (As per IEC 60947-2 appendix M) up to I∆ N= 3A			
Max. Crest Factor		5 (for 30 mA to 30 A)			
Reset Mode		Manual Reset	Auto Reset	Manual Reset	Auto Reset
No. of Resets		N A	4	N A	4
Clear Auto Reset		After 1 hour of healthy condition or supply interruption			
Reset Enable & Reset Time		Below 50% of set current threshold in presence of CBCT			
Trip Time (∆t in sec)		0 - 0.06 - 0.15 - 0.25 - 0.5 - 0.8 - 1 - 2.5 - 5 - 10			
Test / Reset		Local & Remote (Non Potential free contacts, upto 10 m)			
Setting Accuracy		-20% (Including CBCT Accuracy)			
Repeat Accuracy		± 2%			
Output	Relay Output	1 C/O + 1 NO			
	Contact Rating	5A (Resistive) @ 240 VAC / 30 VDC			
	Electrical Life	1 x 10^5			
	Mechanical Life	1 x 10^7			
Utilization Category	AC - 15	Rated Voltage (Ue): 120/240 V, Rated Current (Ie): 3.0/1.5 A			
	DC - 13	Rated Voltage (Ue): 24/125/250 V, Rated Current (Ie): 2.0/0.22/0.1 A			
LED Indication	Power	Green LED (ON)			
	EL / CT	Red LED (ON) → Relay Trip / Red LED (Blinking) → CT Open			
	Leakage Current / TST	By Bar Graph: 30% (Green), 45% (Green), 60% (Yellow), 75% (Red), Blink Test / Reset Switch is pressed			
Operating Temperature Storage Temperature		- 15° C to +60° C - 25° C to +80° C			
Humidity (Non Condensing)		95% (Rh)			
Enclosure		Flame Retardant UL94-V0			
Dimension (W x H x D) (in mm)		36 X 90 X 65			
Weight (unpacked) Approx.		150 g			
Mounting		Base / DIN rail			
Certification		CE RoHS Compliant			
Degree of Protection		IP 20 for Terminals, IP 40 for Enclosure			

EMI / EMC

Harmonic Current Emissions	IEC 61000-3-2
ESD	IEC 61000-4-2
Radiated Susceptibility	IEC 61000-4-3
Electrical Fast Transients	IEC 61000-4-4
Surges	IEC 61000-4-5
Conducted Susceptibility	IEC 61000-4-6
Voltage Dips & Interruptions (AC)	IEC 61000-4-11
Conducted Emission	CISPR 11
Radiated Emission	CISPR 11

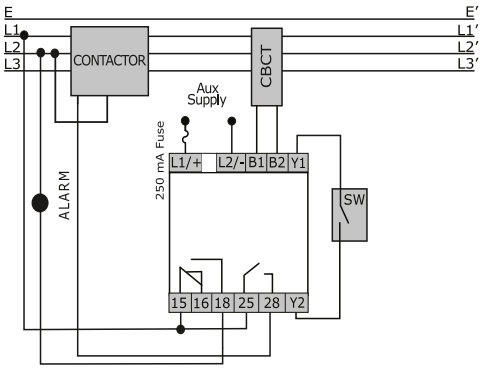
Environmental

Cold Heat	IEC 60068-2-1
Dry Heat	IEC 60068-2-2
Vibration	IEC 60068-2-6
Repetitive Shock	IEC 60068-2-27
Non-Repetitive Shock	IEC 60068-2-27

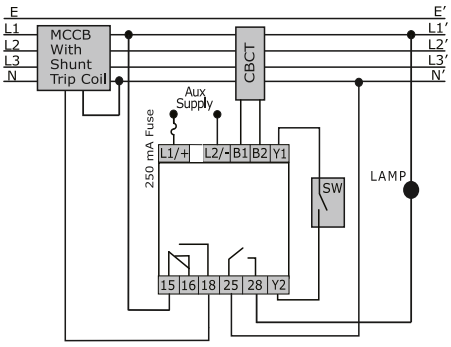
Earth Leakage Relay

CONNECTION DIAGRAM

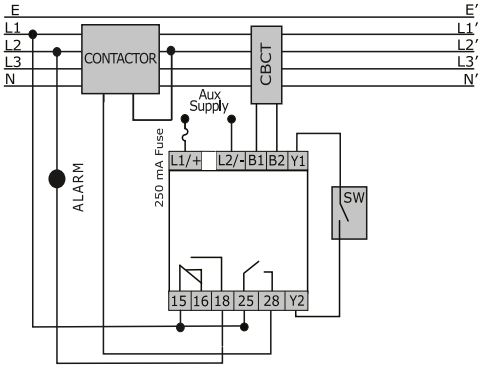
FAIL SAFE MODE (CONTACTOR)



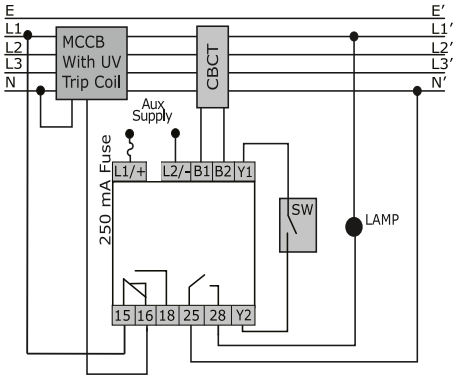
NON-FAIL SAFE MODE (SHUNT TRIP COIL)



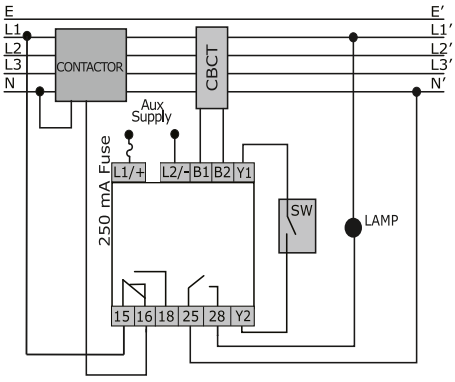
FAIL SAFE MODE (CONTACTOR)



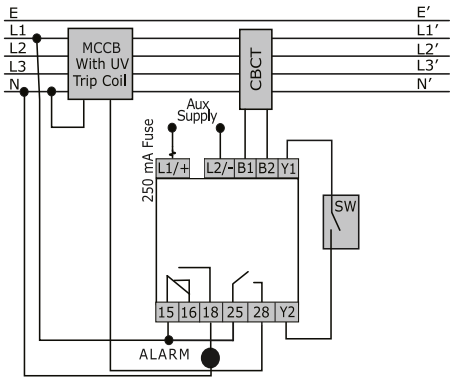
NON-FAIL SAFE MODE (UV TRIP COIL)



NON-FAIL SAFE MODE (CONTACTOR)

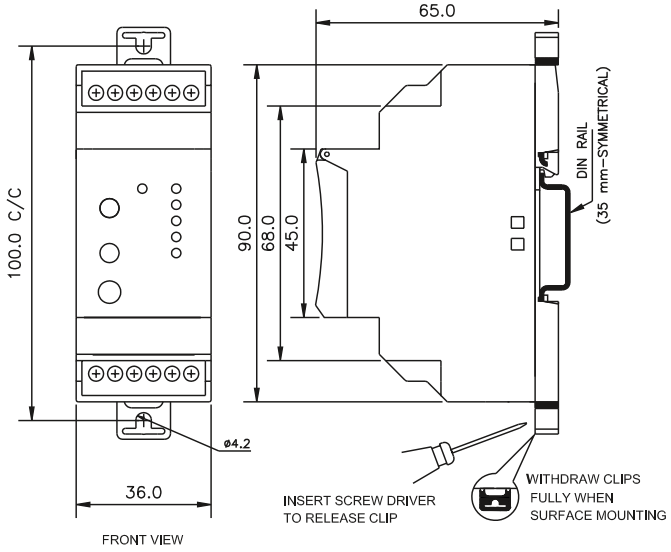


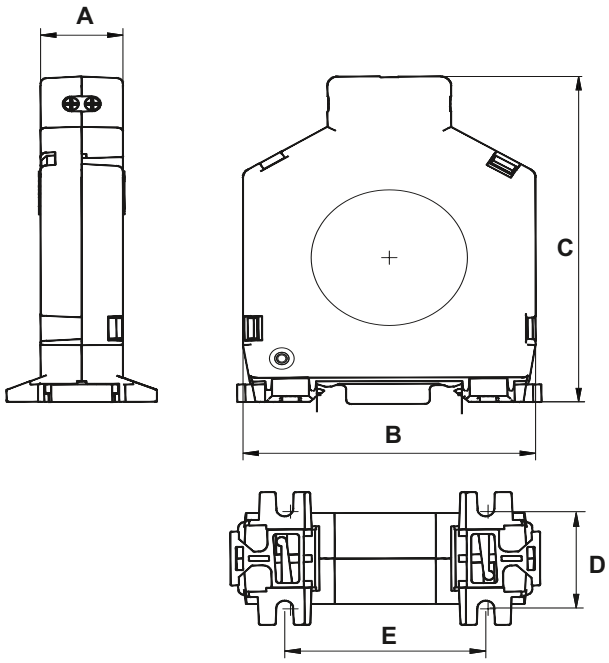
FAIL SAFE MODE (UV TRIP COIL)



Earth Leakage Relay

MOUNTING DIMENSIONS





CBCT	SIZE	WEIGHT (in gms)	A	B	C	D	E
17H7NNHN3	38	110	20	71	91	27	48
17H7NNRN3							
17H7NNIN3	57	185	20	97	117	27	55
17H7NNQN3	70	240	20	109	133	27	60
17H7NNSN3							
17H7NNJN3	92	250	20	132	155	27	73
17H7NNTN3							
17H7NNLN3	120	255	20	153	176	27	73
17H7NNUN3							
17H7NNKN3	210	280	20.5	250	282	28	128
17H7NNWN3	322	1100	16	322.5	354.5	18.4	—

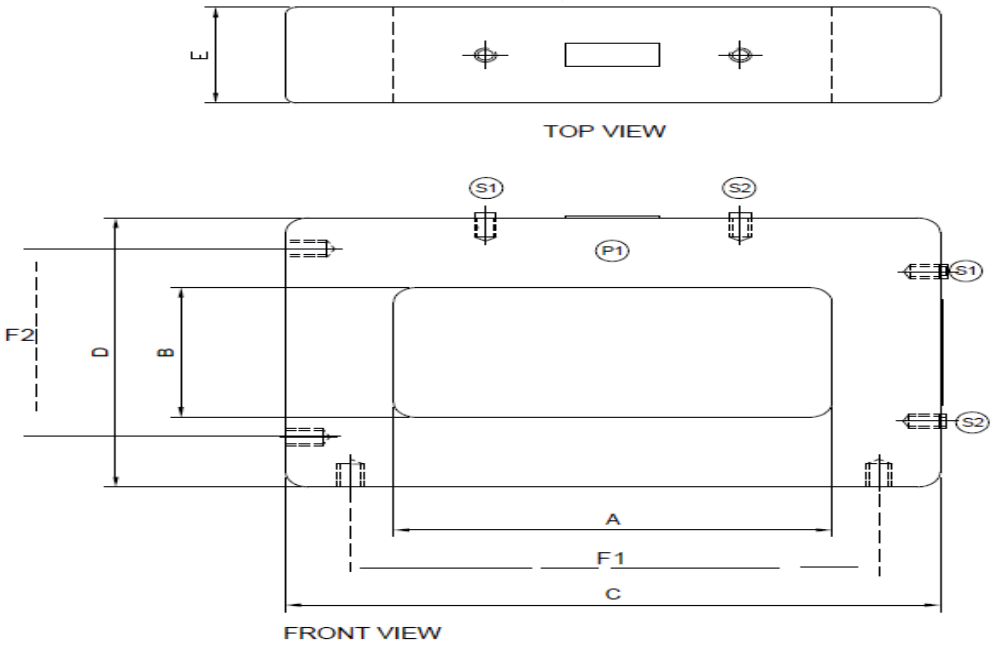
Dimensions in mm

TERMINAL TORQUE & CAPACITY

Ø 3.5	0.54 N.m (5 Lb.in)
	1 x 2.5 mm^2 Solid Wire/Stranded
AWG	1 x 24 to 12

Earth Leakage Relay

2. Rectangular CBCT



CBCT	SIZE	WEIGHT (in gms)	A	B	C	D	E	F1	F2
17H9NNWN0	300×50 mm	2.5 Kg.	300	50	395	130	30	355	90
17H9NNXN0	350×150 mm	3.7 Kg.	350	150	445	240	30	405	200

Dimensions in mm

Integral Earth Leakage Relay

- Monitors, True RMS Earth Leakage Current.
- Integral toroid-35mm Ø
- Earth Leakage Relay with Inbuilt CBCT of three variant available:30mA, 100mA, 300mA
- “Test” and “Reset” push buttons.
- SPDT Output Relay with Energized to trip.
- Protected against the nuisance tripping.
- Green LED indicates presence of power supply.
- Red LED flashing indicates when fault current is >50% of ∆n & fault current is >75% LED ON as relay has tripped.
- Base or DIN rail Mounting.
- Easy to install and compact size.

Ordering Information

Cat. No.	Description
ELR3A2030	Integral Earth Leakage Relay, 35mm CBCT, 240VAC(±15%), 50/60Hz, 30mA
ELR3A2100	Integral Earth Leakage Relay, 35mm CBCT, 240VAC(±15%), 50/60Hz, 100mA
ELR3A2300	Integral Earth Leakage Relay, 35mm CBCT, 240VAC(±15%), 50/60Hz, 300mA

Integral Earth Leakage Relay

Cat. No.	ELR3A2030	ELR3A2100	ELR3A2300
Parameters			
Supply Voltage (⏚)	240 V AC, 50/60Hz		
Supply Variation	-15% to +15%		
Frequency	50/60Hz		
Power Consumption (Max.)	8 VA		
Leakage Current Range (IΔn)	30 mA	100 mA	300 mA
Trip Recovery	<50% of IΔn (nominal)		
Trip Level	75% of IΔn (nominal)		
Type Class	'A' True RMS measurement (As per IEC 60947/ 60755)		
	'AC' True RMS measurement 30mA, 100mA, 300mA (As per IEC 6094/ 760755)		
Max. Crest Factor	5		
Memory	Storage of the leakage fault and reset with “Reset” push button		
Hysteresis	8% of IΔn (nominal)		
Reset Time	>200ms		
Reset Enable	Below 50% of rated current		
Trip Time (Δt in sec)	0 - 0.06 - 0.15 - 0.25 - 0.5 - 0.8 - 1 - 2.5 - 5 - 10		
Test / Reset	Manual Reset		
Accuracy	± 10%		
Output – Contact Arrangement	1 C/O		
Output – Contact Rating	5A (No) and 3A (NC)Resistive load @ 250 VAC / 30 VDC		
Output – Electrical Life	1 x 10^5		
Output – Mechanical Life	5 x 10^6		
Utilization Category – AC - 15	3.0 A at 120 V & 1.5 A at 240A		
Utilization Category – DC - 13	0.22 A at 125 V & 0.10 A at 250A		
LED Indication – Green	ON : Power On		
LED Indication – Red	Blinking : Leakage current is greater than 50% of rated value.		
	ON : Leakage current is greater than 75% of rated value.		
Storage Temperature	- 20° C to +60° C		
Operating Temperature	- 5° C to +55° C		
Humidity (Non Condensing)	95% Rh(without condensation)		
Enclosure	Flame Retardant UL94-V0		
Dimension (W x H x D) (in mm)	110 X 74 X 37		
Weight (unpacked) Approx.	120 g		
Mounting	Base / DIN rail		
Certification	CE RoHS Compliant		
Degree of Protection	IP 20		

EMI / EMC

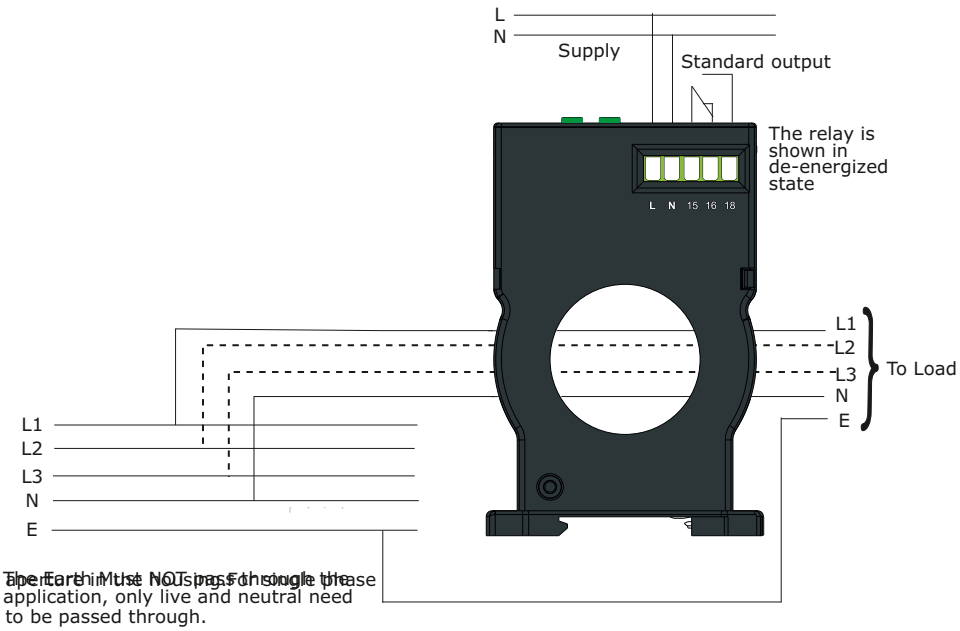
Harmonic Current Emissions	IEC 61000-3-2
Voltage Flicker and Emissions	IEC 61000-3-2
ESD	IEC 61000-4-2
Radiated Susceptibility	IEC 61000-4-3
Electrical Fast Transients	IEC 61000-4-4
Surges	IEC 61000-4-5
Conducted Susceptibility	IEC 61000-4-6
Voltage Dips & Interruptions (AC)	IEC 61000-4-11
Conducted Emission	CISPR 11
Radiated Emission	CISPR 11

Environmental

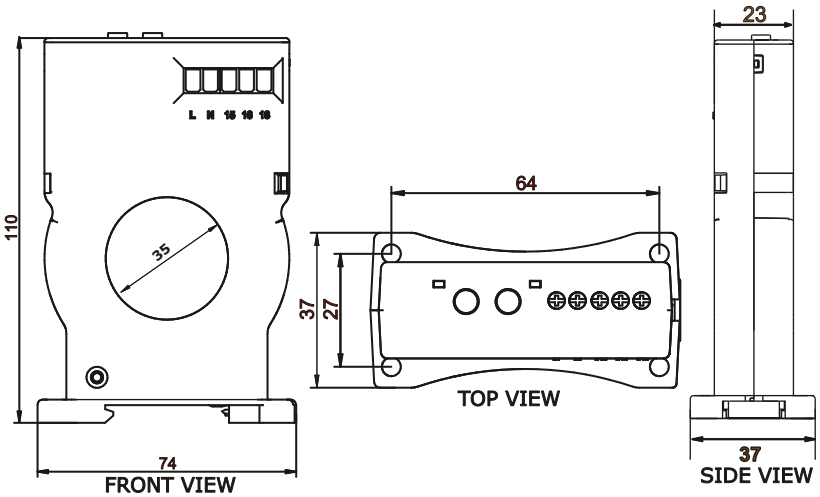
Cold Heat	IEC 60068-2-1
Dry Heat	IEC 60068-2-2
Vibration	IEC 60068-2-6

Integral Earth Leakage Relay

CONNECTION DIAGRAM



MOUNTING DIMENSIONS



TERMINAL TORQUE & CAPACITY

Ø3.5 mm	0.40 N.m (3.5 Lb.in) Terminal screw - M2.6
	1 x 2.5mm^2 Solid Wire
AWG	1 x 22 to 12

Liquid Level Monitoring Relay

- Fully Automatic operation enabling both draining and filling simultaneously with a single device
- Adjustable sensitivity level from 1k to 200k Ohm
- Includes provision for Manual start
- Protects submersible pumps against dry running and prevents overfilling
- Enables maximum utilization of incoming liquid (eg. water) supply
- Specially designed corrosion and shock resistant sensors to ensure trouble free operation.

Ordering Information

Cat. No.	Description
4411AD1	110VAC, 1 C/O,1K to 200K Sensitivity, Draining & Filling
4421AD1	240VAC, 1 C/O,1K to 200K Sensitivity, Draining & Filling
4431AD1	415VAC, 1 C/O,1K to 200K Sensitivity, Draining & Filling
44S0003	Accessories, Set of 3 Stainless Steel Sensors, -10°C to +65°C
44S0006	Accessories, Set of 6 Stainless Steel Sensors, -10°C to +65°C
44S0013	Accessories, Set of 3 Stainless Steel Sensors, -20°C to +165°C
44S0016	Accessories, Set of 6 Stainless Steel Sensors, -20°C to +165°C

Liquid Level Monitoring Relay

Cat. No.	4411AD1	4421AD1	4431AD1
Parameters			
Supply Voltage (⏚)	110VAC, +/-20%	240VAC, +/-20%	415VAC, +/-20%
Frequency	47Hz - 63Hz		
Power Consumption (Max.)	3VA		
Device Characteristics			
Conductive Sensor Probes	Stainless Steel SS316L, 3 or 6 Nos		
Sensor Length	10 cm		
Control Action Modes	Only Draining, Only Filling, Draining & Filling Simultaneous (One Tank or Two tanks)		
Sensitivity	1K to 200 K Ohm (Potentiometer adjustable)		
Sensor Voltage & Current	12 Vp-p, 100 Hz,< 1 mA		
Sensor cable	Cable gauge (Min):0.5 sq mm Tin coated, Cable dia(Min):1.5mm Max Cable Length-1000m (For set value < 50%) Max Cable Length-300m (For set value 100%) Max capacitances of wire- 80 nF / km		
Settable ON & OFF Delay Time	0.1 sec to 10 sec		
Manual Start Switch	If Lower tank water level is greater than Low level & upper tank water level is below High level then by pressing a switch Relay can be switched ON manually.		
Output Control Mode	Relay ON/OFF		
Contact Ratings	1 C/O,8A@250VAC,Resistive,Terminal 15-Pole, Terminal 16-NC,Terminal 18-NO		
Utilization Category	AC-15: Rated Voltage (Ue):120/240V, Rated Current(Ie): 3.0/1.5A DC-13: Rated Voltage (Ue):24/125/250V, Rated Current(Ie): 2.0/0.22/0.1A		
Electrical Life	1 x 10^5Operations		
Mechanical Life	1 x 10^7Operations		
LED Indication	GREEN LED: Power ON, RED LED : Relay Output ON		
Operating Temperature	-10°C to +60°C		
Storage Temperature	-10°C to +70°C		
Relative Humidity	5 to 95 % RH (non condensing)		
Mounting	Base/DIN Rail		
Dimension (W x H x D) (in mm)	36 X 90 X 65		
Weight (unpacked)	235 g (Controller), 45 g (Sensor)		
Certification	CE RoHS Compliant		

EMI/EMC

Harmonic Current Emission	IEC 61000-3-2
ESD	IEC 61000-4-2
Radiated Susceptibility	IEC 61000-4-3
Electrical Fast Transient	IEC 61000-4-4
Surge	IEC 61000-4-5
Conducted Susceptibility	IEC 61000-4-6
Voltage Dips & Interruptions (AC)	IEC 61000-4-11
Conducted Emission	CISPR 14-1
Radiated Emission	CISPR 14-1

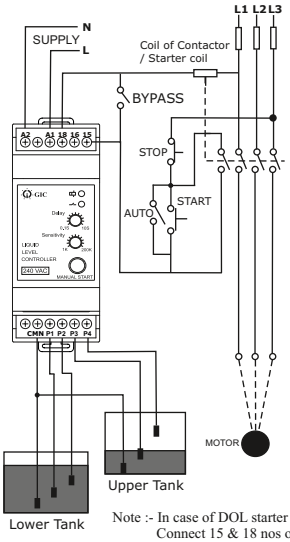
Environmental

Cold Heat	EC 60068-2-1
Dry Heat	IEC 60068-2-2
Vibration	IEC 60068-2-6
Repetitive Shock	IEC 60068-2-27
Non-Repetitive Shock	IEC 60068-2-27

Liquid Level Monitoring Relay

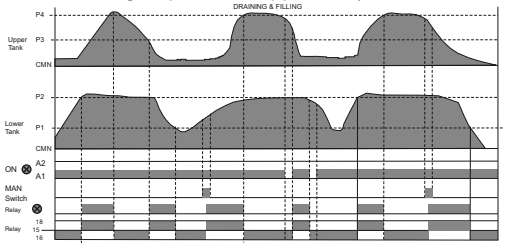
OPERATING FUNCTION DIAGRAM

Simultaneous filling and draining with 6 Sensors



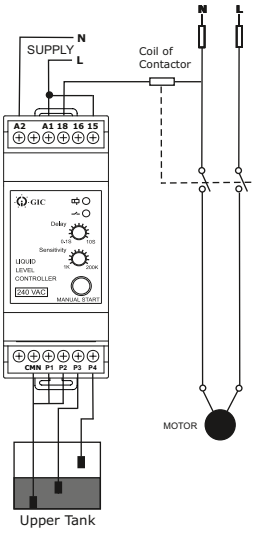
Note :- In case of DOL starter connection with LLC, Connect 15 & 18 nos of Liquid level controller to 93 & 95 nos. of DOL Starter respectively

The system starts up whenever the upper tank requires liquid and the lower tank has sufficient level to supply it, and it stops when the liquid reaches its maximum level in the upper tank or if the Lower tank reaches its minimum level. If all Sensors are non conducting then Relay is "OFF". If Liquid level reaches "P1" Sensor then relay will be OFF (maintains previous state). When the level reaches "P2" Sensor then relay will be switched ON (As the liquid level has reached maximum level of Lower tank). Now Filling of Upper tank will start. When liquid level reaches "P3" Sensor, relay will be ON (maintains previous state). Now when liquid level reaches "P4" Sensor relay will be switched "OFF" (As Liquid level has reached maximum level in the Upper tank). Now if Liquid level of upper tank is decreasing and it goes below "P4" Sensor, then the relay will be "OFF" (Maintains previous state), But when it falls below "P3" level, then relay will be switched "ON" until the liquid level is more than "P1" Sensor (i.e. until there is enough liquid in the upper tank).

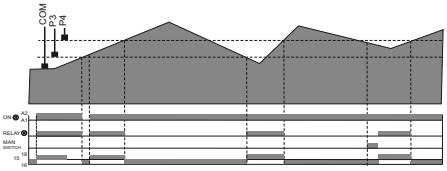


P1	P2	P3	P4	Relay & RED LED Indication
OUT	OUT	OUT	OUT	OFF
IN	OUT	OUT	OUT	OFF
IN	IN	OUT	OUT	ON
IN	IN	IN	OUT	ON
IN	IN	IN	IN	OFF
IN	IN	IN	OUT	OFF
IN	IN	OUT	OUT	ON
IN	OUT	OUT	OUT	ON
OUT	OUT	OUT	OUT	OFF

Filling Control (Single Tank Monitoring with 3 Sensors)

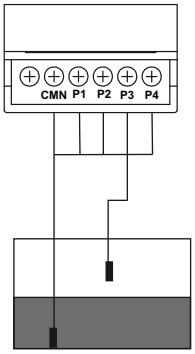


When the level in the tank drops below the low level Sensor, the relay energises. The relay then remains energized until the level reaches the high level Sensor. As soon as the high level Sensor becomes submerged, the relay de-energizes and remains OFF until the level has dropped sufficiently below the low level Sensor. When "P3" & "P4" are non-conducting i.e. tank is empty, Relay is "ON". Whenever water level reaches "P3" Sensor, then again the relay will be ON (Maintains previous state of relay). But when water level touches the "P4" Sensor, then relay will be switched "OFF" (As Liquid reaches the maximum level). Again when water level decreases below "P4" level, then the relay will be switched "OFF"(Maintains previous state of relay). When water level reaches below "P3", then the relay will be switched "ON" (As the Liquid reaches minimum level)

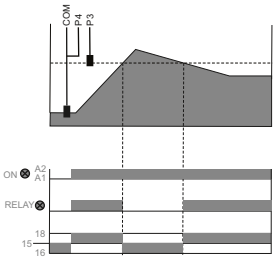


P3	P4	Relay & RED LED Indication
OUT	OUT	ON
IN	OUT	ON
IN	IN	OFF
IN	OUT	OFF
OUT	OUT	ON

Filling Control (Single level Monitoring with two Sensors)



The output relay switches "ON" which starts up the relay when the Minimum level Sensor "P3" is no longer in contact with the liquid and switches "OFF" when the liquid reaches "P3". **This operation is not recommended for pump controlling.**

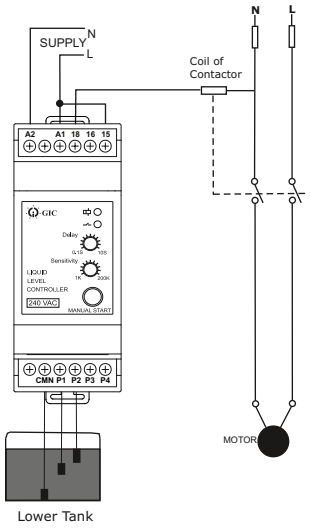


P3	Relay & RED LED Indication
OUT	ON
IN	OFF

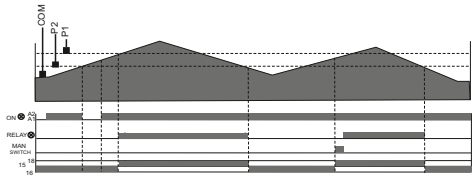
Liquid Level Monitoring Relay

OPERATING FUNCTION DIAGRAM

Draining Control
(Single Tank Monitoring with 3 Sensors)

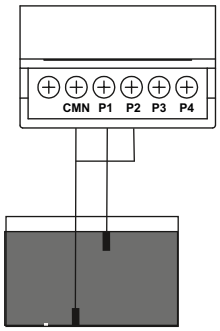


When the level in the tank rises sufficiently to submerge the high level Sensor, the relay energizes. The relay then remains energized until the level has dropped below the low level Sensor. As the liquid drops below the low level Sensor, the relay de-energizes and remains off until the level has risen sufficiently to submerge the high level Sensor. When "P1" & "P2" are non-conducting i.e. when the tank is empty, relay is "OFF". Whenever water level reaches "P1" Sensor, then again the relay will be "OFF" (maintains previous state of relay). But when water level touches the "P2" Sensor, then relay will be switched "ON" (as the Liquid reaches maximum level). Again, when water level decreases below "P2" level, then the relay will remain switched "ON" (maintains previous state of relay). When water level reaches below "P1", then relay will be switched "OFF" (as the liquid reaches minimum level).

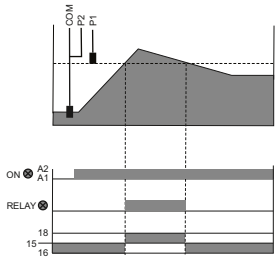


P1	P2	Relay & RED LED Indication
OUT	OUT	OFF
IN	OUT	OFF
IN	IN	ON
IN	OUT	ON
OUT	OUT	OFF

Draining Control
(Single level Monitoring
with two Sensors)



The output relay switches ON, when liquid level goes above a maximum level, fixed by the Sensor "P1", when the level drops below a "P1" Sensor, relay switches "OFF". **This operation is not recommended for pump controlling.**

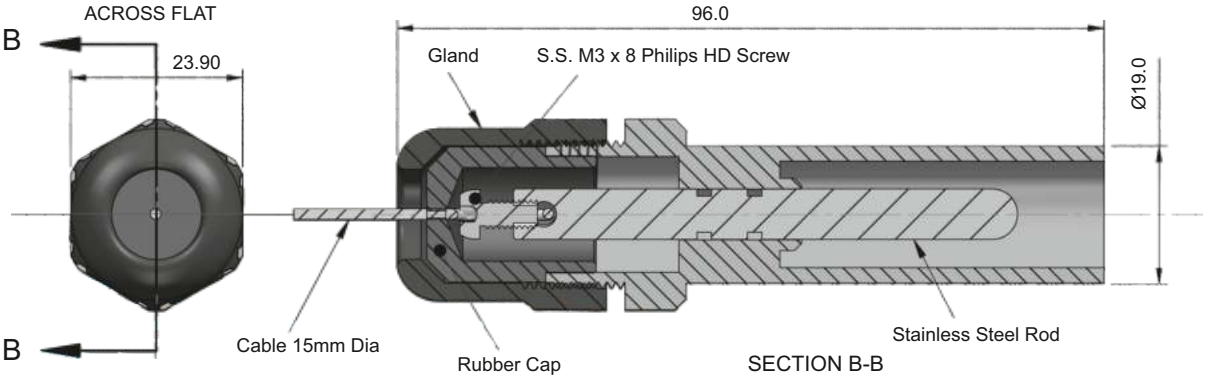


P1	Relay & RED LED Indication
OUT	OFF
IN	ON

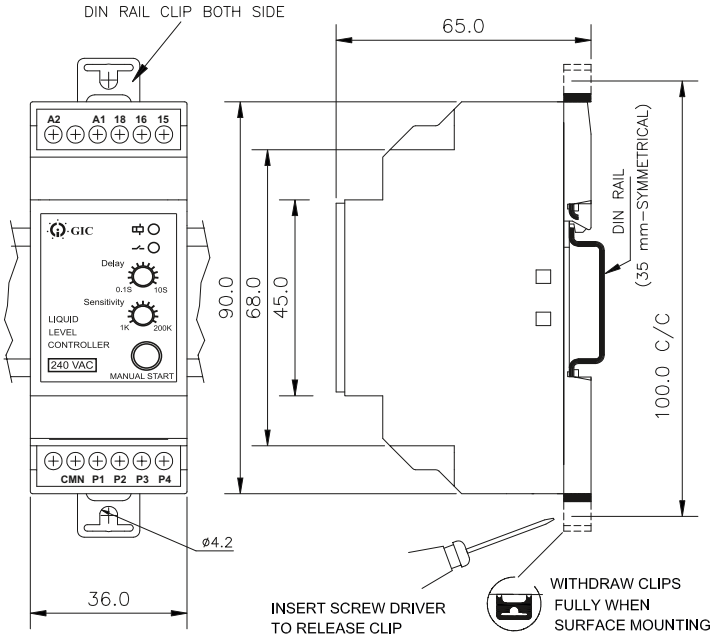
Liquid Level Monitoring Relay

SENSOR DIAGRAM

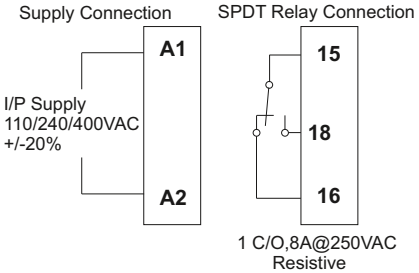
A single pole electrode used for level control in wells or storage tanks. It comprises of stainless steel Sensor with plastic holder and cable gland. A sealed ring and cable gland prevents liquid from entering the cable terminal connector and causing its oxidation.
Maximum operating temperature : -10°C to + 65°C
Cable connection: Screw
The external cable diameter must be 1.5 mm to warrant perfect sealing.



MOUNTING DIMENSIONS (mm)



CONNECTION DIAGRAM



TERMINAL TORQUE & CAPACITY

Ø 3.5	0.54 N.m (6 Lb.in)
	1 x 2.5 mm^2 Solid Wire/Stranded
AWG	1 x 24 to 12

PTC Thermistor Relay

- Monitors and Protects Motors with Integrated PTC Resistor sensors
- Protection against Over heating for Heavy Duty Load, High Switching Frequency, High operating temperature & Insufficient cooling conditions
- Wide Auxiliary Supply Voltage: 24 VAC/DC, 110 - 240 VAC & 220 - 415 VAC
- LED Indications for Healthy, Unhealthy, Sensor Open/Short conditions
- 1 C/O & 2 C/O Configuration
- Reset Options: Auto, Manual and Remote

Ordering Information

Cat. No.	Description
MJ83BK	110 - 240 VAC, PTC Thermistor Relay, 2 C/O
MJ93BK	220 - 440 VAC, PTC Thermistor Relay, 2 C/O
MJA3BK	24 VAC/DC, PTC Thermistor Relay, 2 C/O
MJ81BK	110 - 240 VAC, PTC Thermistor Relay, 1 C/O
MJ91BK	220 - 440 VAC, PTC Thermistor Relay, 1 C/O

PTC Thermistor Relay

Cat. No.			MJ83BK	MJ93BK	MJA3BK
Parameters					
Supply Voltage (⏚)			110 - 240 VAC	220 - 440 VAC	24 VAC/DC
Supply Variation			-20% to + 10% (of ⏚)		
Frequency			50/60 Hz		
Power Consumption (Max.)			4 VA	8 VA	2 VA
Trip Settings	Trip Level		2.7 kΩ, (± 5%)		
	Reset Level		1.71 kΩ, (± 5%)		
	Sensor Short		<20Ω, (±4Ω)		
	Hysterisis		40Ω, (± 4Ω)		
	Sensor Open		> 20 kΩ, (± 5%)		
Max Cold Res(Ω) of Sensor Chain			< 1.5 kΩ		
Reset Mode			Auto, Manual, Remote		
Repeat Accuracy			1%		
Time Delay	ON Delay		< 350 ms		
	OFF Delay		100 ms		
	Reset Time		150 ms		
Output	Coil Output		2 C/O		
	Contact Rating		5A (Resistive) @ 250 VAC / 28 VDC		
	Electrical Life		1 x 10^5		
	Mechanical Life		3 x 10^6		
Utilization Category		AC - 15	Rated Voltage (Ue): 120/240 V, Rated Current (Ie): 3.0/1.5 A		
		DC - 13	Rated Voltage (Ue): 24/125/250 V, Rated Current (Ie): 2.0/0.22/0.1 A		
LED Indications	Green LED		Continuous ON → Healthy Flashing → Sensor Open		
	Red LED		Continuous ON → Relay ON Flashing → Sensor Short		
	All LEDs OFF		Power Supply Fail		
Operating Temperature Storage Temperature			- 15° C to +60° C - 25° C to +80° C		
Humidity (Non Condensing)			95% (Rh)		
Enclosure			Flame Retardant UL94-V0		
Dimension (W x H x D) (in mm)			22.5 X 83 X 100.5		
Weight (unpacked)			120 g		
Mounting			Base / DIN rail		
Certification			CE RoHS Compliant		
Degree of Protection			IP 20 for Terminals, IP 40 for Enclosure		

EMI / EMC

Harmonic Current Emissions	IEC 61000-3-2
ESD	IEC 61000-4-2
Radiated Susceptibility	IEC 61000-4-3
Electrical Fast Transients	IEC 61000-4-4
Surges	IEC 61000-4-5
Conducted Susceptibility	IEC 61000-4-6
Voltage Dips & Interruptions (DC)	IEC 61000-4-29
Power Frequency Magnetic Field	IEC 61000-4-8
Voltage Flickers & Fluctuation	IEC 61000-3-3
Conducted Emission	CISPR 11
Radiated Emission	CISPR 11

Environmental

Cold Heat	IEC 60068-2-1
Dry Heat	IEC 60068-2-2
Vibration	IEC 60068-2-6
Repetitive Shock	IEC 60068-2-27
Non-Repetitive Shock	IEC 60068-2-27

PTC Thermistor &
Single Phasing Preventer Relay

- Thermistor Relay combined with Protection against Phase Sequence, Phase Loss & Phase Asymmetry Faults
- Monitor and Protects Motors with Integrated PTC Resistor sensors
- Protection against Over heating for Heavy Duty Load, High Switching Frequency, High operating temperature & Insufficient cooling conditions
- LED indications for Healthy, Unhealthy, Sensor Open/Short and Phase Sequence fault conditions

Ordering Information

Cat. No.	Description
ML64BS	230 VAC, Three Phase Three Wire PTC Thermistor & SPP, 1 NO + 1 NO
ML67BS	230 VAC, Three Phase Three Wire PTC Thermistor & SPP, 1 NO + 1 NC
MLD4BS	400 VAC, Three Phase Three Wire PTC Thermistor & SPP, 1 NO + 1 NO
MLD7BS	400 VAC, Three Phase Three Wire PTC Thermistor & SPP, 1 NO + 1 NC

PTC Thermistor & Single Phasing Preventer Relay

Cat. No.			ML64BS	MLD7BS
Parameters				
Supply Voltage (⏚)			230 VAC (3 Phase 3 Wire)	400 VAC (3 Phase 3 Wire)
Supply Variation			-15% to + 15% (of ⏚)	-15% to + 15% (of ⏚)
Frequency			50/60 Hz	50/60 Hz
Power Consumption (Max.)			15 VA	24 VA
Trip Settings	Trip Level		2.7 kΩ, (± 5%)	
	Reset Level		1.71 kΩ, (± 5%)	
	Sensor Short		<20Ω, (±4Ω)	
	Hysterisis		40Ω, (± 4Ω)	
	Sensor Open		> 20 kΩ, (± 5%)	
Max Cold Res(Ω) of Sensor Chain			< 1.5 kΩ	
Cable Resistance			20Ω	
Phase Asymmetry			70 VAC (± 10 VAC)	104 VAC (± 10 VAC)
Asymmetrical Phase Loss			110 VAC (± 10 VAC)	220 VAC (± 10 VAC)
Symmetrical Phase Loss			130 VAC (± 10 VAC)	240 VAC (± 10 VAC)
Restart Voltage			145 VAC (± 10 VAC)	265 VAC (± 10 VAC)
Reset Mode			Auto	
Repeat Accuracy			1%	
Time Delay	Operate Time		< 350 ms	
	Release Time		360 - 550ms for Asymmetrical or Symmetrical Phase Fault & 100ms (max.) for Phase Sequence, Thermistor Trip	
	Reset Time		100 - 750 ms	
Output	Relay Output		1 NO (SPP) + 1 NO (PTC Thermistor)	1 NO (SPP) + 1 NC (PTC Thermistor)
	Contact Rating		5A 'NO' & 3A 'NC' @ 240 VAC / 28 VDC (Resistive)	
	Electrical Life		1 x 10^5	
	Mechanical Life		3 x 10^7	
Utilization Category		AC - 15	Rated Voltage (Ue): 120/240 V, Rated Current (Ie): 3.0/1.5 A	
		DC - 13	Rated Voltage (Ue): 24/125/250 V, Rated Current (Ie): 2.0/0.22/0.1 A	
LED Indi-cations	⏚ (Green)	Continuous ON	Power Supply Healthy	
		Continuous OFF	Power Fail	
		Flashing	Sensor Open	
	+t° (Amber)	Continuous ON	Over Temperature Trip	
		Continuous OFF	Thermistor Relay ON	
		Flashing	Sensor Short or Cable Short	
	(Red)	Continuous ON	SPP Relay Trip (For Supply Above Restart Voltage)	
		Continuous OFF	SPP Relay ON (After ensuring the input Voltage of 5V above the Restart Voltage)	
		Flashing	Supply & SPP Fault below restart voltage	
Operating Temperature			- 10° C to +60° C	
Storage Temperature			- 15° C to +70° C	
Humidity (Non Condensing)			95% (Rh)	
Enclosure			Flame Retardant UL94-V0	
Dimension (W x H x D) (in mm)			22.5 X 83 X 100.5	
Weight (unpacked)			150 g	
Mounting			Base / DIN rail	
Certification			CE RoHS Compliant	
Degree of Protection			IP 20 for Terminals, IP 40 for Enclosure	

EMI / EMC

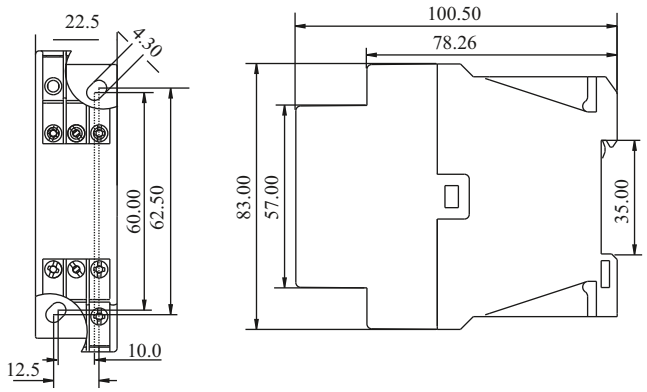
Harmonic Current Emissions	IEC 61000-3-2
ESD	IEC 61000-4-2
Radiated Susceptibility	IEC 61000-4-3
Electrical Fast Transients	IEC 61000-4-4
Surges	IEC 61000-4-5
Conducted Susceptibility	IEC 61000-4-6
Voltage Dips & Interruptions (AC)	IEC 61000-4-1
Conducted Emission	CISPR 14-1
Radiated Emission	CISPR 14-1

Environmental

Cold Heat	IEC 60068-2-1
Dry Heat	IEC 60068-2-2
Vibration	IEC 60068-2-6
Repetitive Shock	IEC 60068-2-27
Non-Repetitive Shock	IEC 60068-2-27

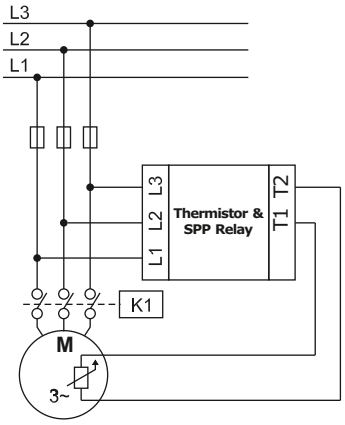
PTC Thermistor Relay

MOUNTING DIMENSION (mm)



PTC THERMISTOR RELAY SERIES PD 225 &
PTC THERMISTOR & SINGLE PHASING PREVENTER SERIES PD 225

CONNECTION DIAGRAM

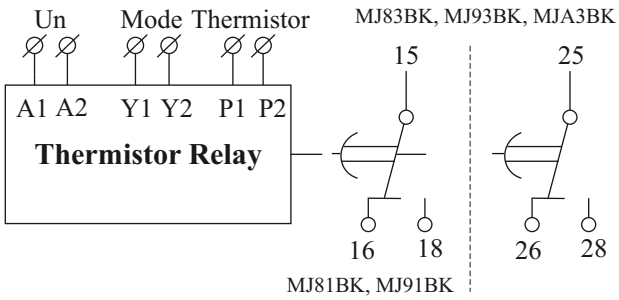


PTC THERMISTOR & SINGLE PHASING PREVENTER SERIES PD 225

CONTACT ARRANGEMENT

For 1 NO + 1 NO PRODUCT:
ML64BS, MLD4BS

For 1 NO + 1 NC PRODUCT:
ML67BS, MLD7BS



PTC THERMISTOR RELAY SERIES PD 225

TERMINAL TORQUE & CAPACITY

Ø 3.5 mm....4.0mm	0.60 N.m (6 Lb.in)
	1 x 4.0 mm^2 Solid/Stranded Wire
AWG	1 x 20 to 10

PTC THERMISTOR RELAY SERIES PD 225
PTC THERMISTOR & SINGLE PHASING PREVENTER SERIES PD 225

PT-100 Temperature Control Relay

- Wide operating Supply Range 24V to 240V AC/DC.
- Two analog outputs of 0 to 10V DC.
- Sensor Fault detection (open/short) indication through LED's as well as Analog outputs.
- LED Indications for power ON and relay ON status display.
- Adjustable wide temperature range from -50°C to 300°C through DIP switches.
- Auto/Manual reset mode selectable through DIP switch.
- Relay Normal/Inversion mode selectable through DIP switch.
- High load switching capacity of output up to 10A.

Ordering Information

Cat. No.	Description
47A3D412	24 - 240 VAC/DC, PT-100 Temperature Control Relay, 1C/O (10A), Two Analog Outputs (0-10) VDC

PT-100 Temperature Control Relay

Cat. No.	47A3D412
Parameters	
Supply Voltage	24V to 240V AC/ DC (±15%)
Supply Frequency	50/60Hz
Power Consumption(Max)	For AC <5 VA For DC approx. 1W
Device Characteristics	
Max Lead Resistance Compensated in 3 wire Pt-100 Sensor	10 Ohm per Lead
Max Error in 2 wire Sensor	2.6°C per Ohm
Temperature Trip Accuracy	±1°C
Temperature Drift	Max 0.05°C/°C
Temperature Ranges	-50°C to 50°C, 0°C to 100°C, 100°C to 200°C, 200°C to 300°C
Set Point	0%-20%-40%-60%-80%-100%
Hysteresis	2%-5%-8%-11%-14%-17%-20%
Sensor Fault	Open and Short (Relay OFF)
Sensor Fault Detection Time	<500 ms
Sensor Fault Recovery Time	1.8 to 2 sec.
Output Characteristics	
Contact Arrangement	1 C/O
Contact Ratings	10A @ 250VAC / 30VDC, 4KV Isolation between Coil & Contact.
Utilization Category	AC-15: 3A/250VAC
Response Time(Trip Delay)	min 600 ms to 1 sec
Analog Output Details	
Measured Point (Y1)	(0-10) VDC ± 200 mV
Set Point (Y2)	(0-10) VDC ± 100 mV
In case of sensor Fault (Open/Short) Measured Point output (Y1) is 12VDC.	
Ambient Conditions	
Operating Temperature	-10°C to +55°C
Storage Temperature	-15°C to +60°C
Relative Humidity	5 to 85% RH(non-condensation)
Degree of Protection	IP 20 for terminals & IP 40 for Enclosure
Max. Altitude	2000 m
Pollution Degree	II
Type of Insulation	Reinforced
Certification	CE RoHS Compliant

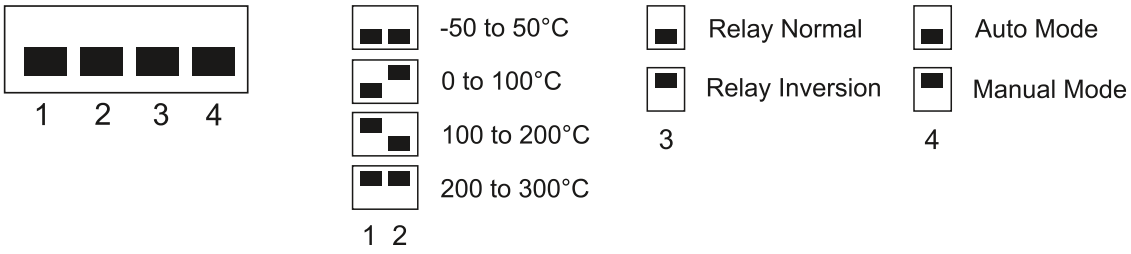
EMI/EMC Compliance	
Harmonic Current Emission	IEC 61000-3-2
ESD	IEC 61000-4-2
Radiated Susceptibility	IEC 61000-4-3
EFT on Supply	IEC 61000-4-4
EFT on I/P & O/P signal	IEC 61000-4-4
Surge	IEC 61000-4-5
Conducted Susceptibility	IEC 61000-4-6
Voltage Dips & Interruptions (AC model)	IEC 61000-4-11
Voltage Dips (DC model)	IEC 61000-4-29
Conducted Emission	CISPR 14-1
Radiated Emission	CISPR 14-1

Safety Compliance:	
Dielectric test voltage between I/P & O/P	IEC 60947-5-1
Impulse Voltage between I/P & O/P	IEC 60947-5-1
Single Fault Test	IEC 61010-1
Insulation Resistance	UL 508
Leakage Current	UL 508

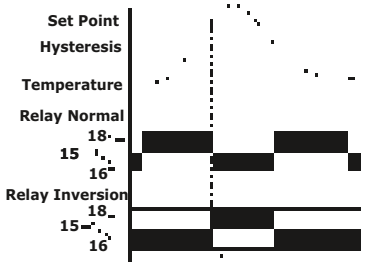
Environmental Compliance:	
Cold Heat	IEC 60068-2-1
Dry Heat	IEC 60068-2-2
Vibration	IEC 60068-2-6
Non-Repetative Shock	IEC 60068-2-27

PT-100 Temperature Control Relay

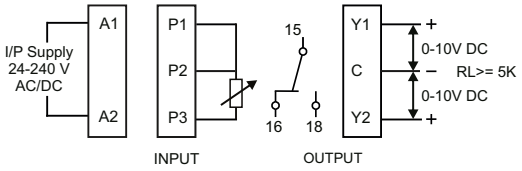
SELECTION OF TEMPERATURE RANGE & MODE



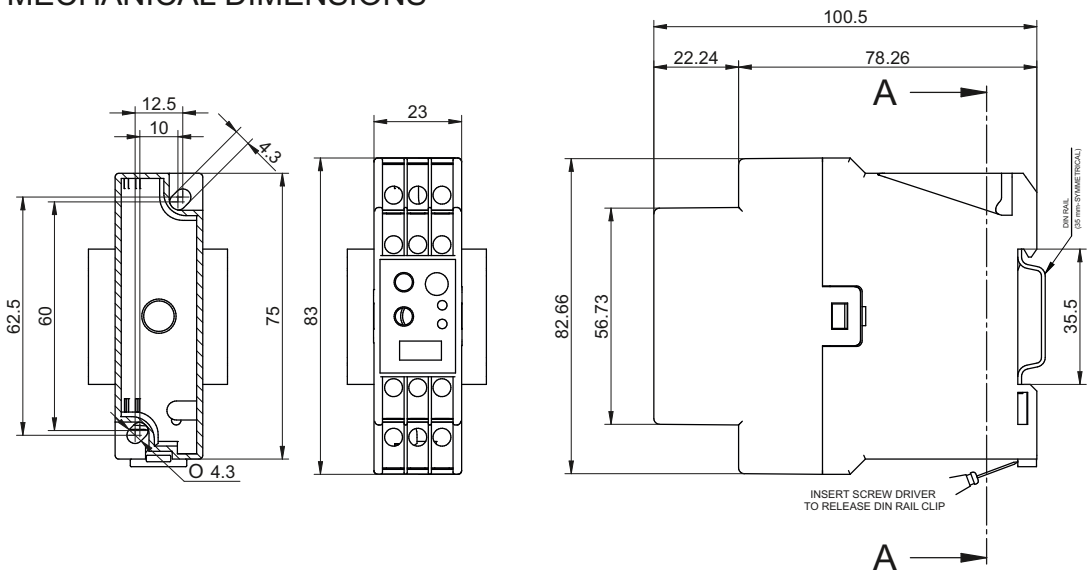
FUNCTION DIAGRAM



CONNECTION DIAGRAM



MECHANICAL DIMENSIONS



TERMINAL TORQUE & CAPACITY

Ø 3.5....4.0mm	0.6 N.m (5.3 Lb.in) Terminal screw - M3
	1 x 0.5...6mm^2 Solid Wire
WG	1 x 20 to 10

Temperature Control Relay

- Wide ambient Temperature monitoring & controlling range with inbuilt temperature sensor.
- Protection Relay against variations of the ambient temperature set point (StH & StL)
- 3 digit LCD display for Real time Temperature Indication.
- User adjustable offset (-10°C to +10°C)
- LED indication for Relay Trip.

Ordering Information

Cat. No.	Description
41A111AR	110 - 240 VAC, Temperature Control Relay (TCR - 111) Double SP
41A111BR	110 - 240 VAC, Temperature Control Relay (TCR - 112) Single SP

Temperature Control Relay

Cat. No.		41A111AR	41A111BR
Parameters			
Series nos.		TCR - 111	TCR - 112
Number of set points		Double SP	Single SP
Supply Voltage (⏚)		110 - 240 VAC, -20% to +10%	
Frequency		50/60 Hz	
Power Consumption (Max.)		3 VA	
Device Characteristics			
Sensor		Inbuilt Temperature Sensor	
Temperature Unit		°C	
Display Resolution		0.1°C	
Accuracy		± 3°C Max	
Output Control Mode		Relay ON/OFF	
Hysteresis		2°C (Fixed)	
Temperature measurement and Controlling Range		-10°C to 55°C	-5°C to 55°C
Set Point Range	Low Level (StL)	-10°C to (StH-4°C)	Internally Fixed to -5°C
	High Level (StH)	(StL + 4°C) to +55°C	0°C to +55°C
Offset		-10°C to 10°C	
Minimum difference between StH & StL (for double SP only)		4°C	
LED Indication		ON - Relay ON condition (Red Color)	
Display Type		Positive Image, Reflective, TN	
Contact Ratings		NO - 5A & NC - 3A @ 250 VAC / 30 VDC Resistive	
Operating Temperature Storage Temperature		- 10° C to +55° C - 20° C to +65° C	
Dimension (W x H x D) (in mm)		18 X 85 X 82	
Weight (unpacked)		70 g	
Mounting		DIN rail	
Certification		CE RoHS Compliant	
Degree of Protection		IP 20 for Terminals, IP 40 for Enclosure	

EMI / EMC

Harmonic Current Emissions	IEC 61000-3-2
ESD	IEC 61000-4-2
Radiated Susceptibility	IEC 61000-4-3
Electrical Fast Transients	IEC 61000-4-4
Surge	IEC 61000-4-5
Conducted Susceptibility	IEC 61000-4-6
Voltage Dips & Interruptions (AC)	IEC 61000-4-11
Conducted Emission	CISPR 14-1
Radiated Emission	CISPR 14-1

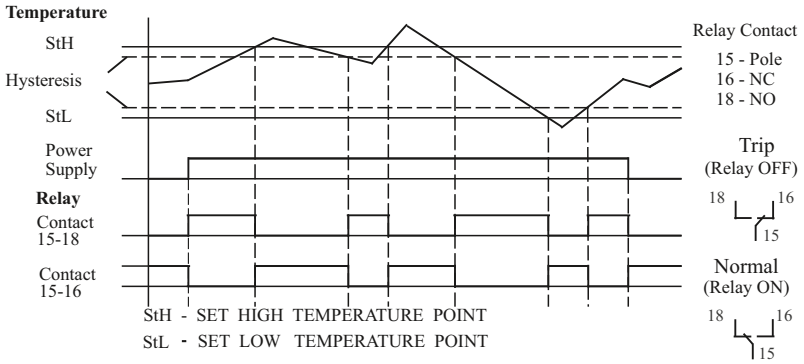
Environmental

Cold Heat	IEC 60068-2-1
Dry Heat	IEC 60068-2-2
Vibration	IEC 60068-2-6
Repetitive Shock	IEC 60068-2-27
Non-Repetitive Shock	IEC 60068-2-27

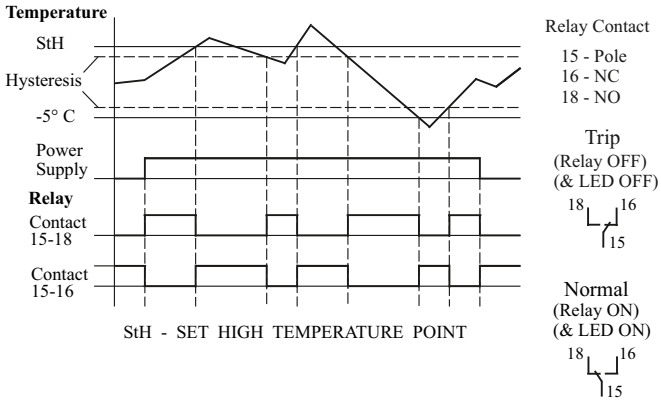
Temperature Control Relay

FUNCTION DIAGRAM

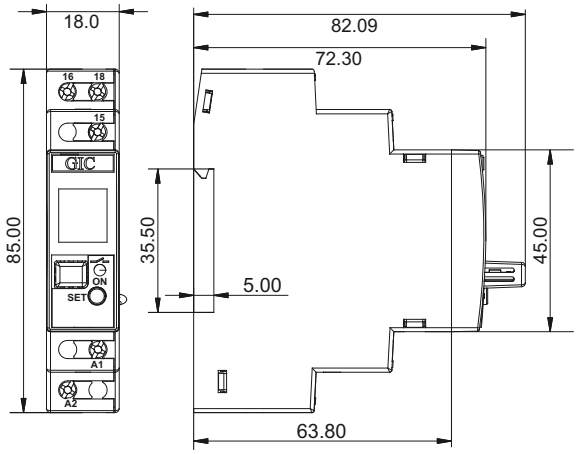
Double SP - 41A111AR:



Single SP - 41A111BR:

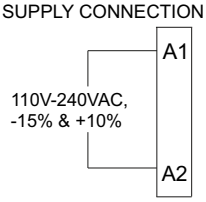


MOUNTING DIMENSIONS (mm)

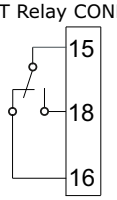


CONNECTION DIAGRAM

SUPPLY CONNECTION



SPDT Relay CONNECTION



NO-5A & NC-3A@
250VAC/30VDC RESISTIVE

TERMINAL TORQUE & CAPACITY

Ø 3.5 mm....4.0mm	0.60 N.m (5.3 Lb.in)
	1 x 4.0 mm^2 Solid/Stranded Wire
AWG	1 x 20 to 10

Frequency Monitoring Relay

- Wide Auxiliary Supply voltage Range: 110 - 240 VAC, 220 - 440 VAC
- Models for Over Frequency and Under/Over Frequency Monitoring
- Monitors Frequency of Three signals - Sine, Square & Triangular
- Model for Frequency Limit Control: 5 Hz to 135 Hz
- Wide Signal Input Voltage: 15 to 500 VAC
- Adjustable Relay status in Healthy or Unhealthy condition using DIP switch "ET" (Energize to Trip) or "DT" (De-energize to trip.)
- Ease of Frequency setting with simple Addition & Subtraction
- LED Indications for Healthy, Unhealthy & No signal conditions

Ordering Information

Cat. No.	Description
MI81BJ	110 - 240 VAC, Over Frequency Relay, 1 C/O
MI91BJ	220 - 440 VAC, Over Frequency Relay, 1 C/O
MI81BL	110 - 240 VAC, Over Frequency & Under Frequency Relay, 1 C/O
MI91BL	220 - 440 VAC, Over Frequency & Under Frequency Relay, 1 C/O

UL Approval for Cat Nos. MI81BL & MI91BL only.

Frequency Monitoring Relay

Cat. No.			MI81BJ	MI91BL
Parameters				
Supply Voltage (⏚)			110 - 240 VAC	220 - 440 VAC
Supply Variation			-15% to +15% (of ⏚)	
Frequency			50/60 Hz	
Power Consumption (Max.)			3 VA	
Signal Type			Sinusoidal, Square, Triangular	
Signal Input Voltage Range			(15 to 500) V	
Overall Frequency Range			(5 to 135) Hz	(40 to 70) Hz
Trip Settings	Over Frequency		0.33 to 1 of Full Scale	(+1 to +10) Hz above Selected Value
	Under Frequency		N A	(-1 to -10) Hz below Selected Value
	Reset Hysteresis		1.5 % of Full Scale selected	
Setting Accuracy			± 5%	
Repeat Accuracy			± 0.02%	
Time Delay	ON Delay		500 ms	
	OFF Delay		100 ms	500 ms to 5 s
	Reset Time		150 ms	
Output	Relay Output		1 C/O	
	Contact Rating		6A (Resistive) @ 250 VAC / 28 VDC	
	Electrical Life		1 x 10^5	
	Mechanical Life		3 x 10^6	
Utilization Category		AC - 15	Rated Voltage (Ue): 120/240 V, Rated Current (Ie): 3.0/1.5 A	
		DC - 13	Rated Voltage (Ue): 24/125/250 V, Rated Current (Ie): 2.0/0.22/0.1 A	
LED Indications	Relay		Red LED Flashing if No Signal	N A
	UF / OF		N A	Separate for UF & OF
Operating Temperature Storage Temperature			- 15° C to +60° C - 40° C to +80° C	
Enclosure			Flame Retardant UL94-V0	
Dimension (W x H x D) (in mm)			22.5 X 83 X 100.5	
Weight (unpacked)			120 g	
Mounting			Base / DIN rail	
Certification			CE cULus LISTED RoHS Compliant	
Degree of Protection			IP 20 for Terminals, IP 40 for Enclosure	

EMI / EMC

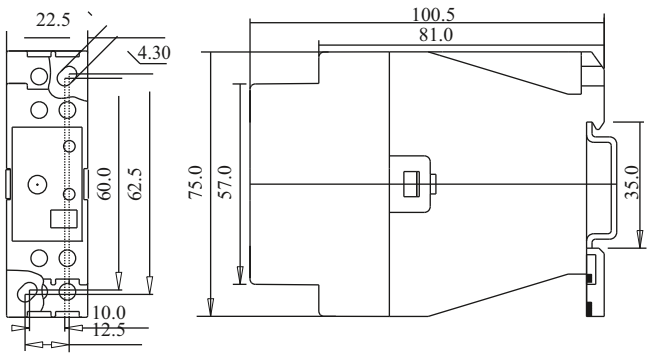
Harmonic Current Emissions	IEC 61000-3-2
ESD	IEC 61000-4-2
Radiated Susceptibility	IEC 61000-4-3
Electrical Fast Transients	IEC 61000-4-4
Surges	IEC 61000-4-5
Conducted Susceptibility	IEC 61000-4-6
Voltage Dips & Interruptions (AC)	IEC 61000-4-11
Conducted Emission	CISPR 14-1
Radiated Emission	CISPR 14-1

Environmental

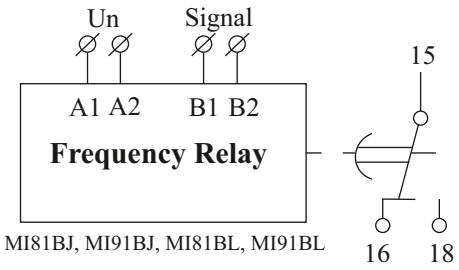
Cold Heat	IEC 60068-2-1
Dry Heat	IEC 60068-2-2
Vibration	IEC 60068-2-6
Repetitive Shock	IEC 60068-2-27
Non-Repetitive Shock	IEC 60068-2-27

Frequency Monitoring Relay

MOUNTING DIMENSION (mm)

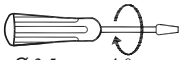


CONNECTION DIAGRAM



MI81BJ, MI91BJ, MI81BL, MI91BL

TERMINAL TORQUE & CAPACITY

 Ø 3.5 mm....4.0mm	0.60 N.m (6 Lb.in)
	1 x 4.0 mm^2 Solid/Stranded Wire
AWG	1 x 20 to 10