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MONITORING DEVICES

Voltage Monitoring Series

SM 175

SM 301

SM 500

SM 501

Product Selection Chart: Voltage Monitoring

Three Phase Indicator

Frequency Monitoring Series PD 225

Current Monitoring Series

Earth Leakage Relay Series CMR

CMR - Current Control

Temperature Monitoring Series

PTC Thermistor Relay Series PD 225

PTC Thermistor & Single Phasing Preventer Series PD225

Equipment Room Temperature Control Relay

Level Monitoring Series

Liquid Level Controller

Voltage Monitoring Series SM 175

- Compact 17.5 mm Wide
- Protects against Phase Loss, Phase Reversal & Phase Asymmetry
- Multi-Voltage: 3 x 208 to 3 x 480 V
- 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 Series SM 175



| Cat. No. | | MN21D5 | MK21D5 | MC21D5 | MA21DN |
|-------------------------------|-----------------------|---|--------------------|----------------------------|--------------------------|
| Parameters | | | | | |
| Supply Voltage (ϕ) | | 208 - 480 VAC, (3 Phase 3 Wire) | | | |
| Supply Variation | | -12% to + 10% (of ϕ) | | | |
| Frequency | | 50/60 Hz | | | |
| Power Consumption (Max.) | | 3.5 VA | | | |
| Trip Levels | Phase Loss | Yes | Yes | Yes | Yes |
| | Phase Sequence | N A | Yes | Yes | Yes |
| | Phase Asymmetry | N A | 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 | | - 15° C to +60° C | | | |
| Storage Temperature | | - 20° C to +80° C | | | |
| Humidity (Non Condensing) | | 95% (Rh) | | | |
| Enclosure | | Flame Retardant UL 94-V0 | | | |
| Dimension (W x H x D) (in mm) | | 17.5 X 90 X 58.5 | | | |
| Weight (unpacked) | | 70 g | | | |
| Mounting | | Base / DIN rail | | | |
| Degree of Protection | | IP 20 for Terminal, IP 30 for Enclosure | | | |
| Certification | |    | | | |

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 Series SM 175






Ordering Information

| Cat. No. | Description |
|------------|---|
| MD21DF | 208 - 480 VAC, UV / OV, Phase Loss & Sequence with Selectable ON 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 |
| MAE03D0200 | 115 VAC/DC or 240 VAC/DC, UV / OV with Selectable ON & OFF Delay, 1 C/O |

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

Voltage Monitoring Series SM 175



| Cat. No. | | MD21DF | MG21DH | MG21DF | MGD1DR |
|-------------------------------|-----------------------|---|---------------------------|---------------------------|---------------------------|
| Parameters | | | | | |
| Supply Voltage (Φ) | | 208 - 480 VAC, (3 Phase 3 Wire) | | | 400 VAC, (3 Phase 3 Wire) |
| Supply Variation | | -12% to + 10% (of Φ) | | | |
| Frequency | | 50/60 Hz | | | |
| Power Consumption (Max.) | | 3.5 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 Φ) | | -5% to -25% (of Φ) | |
| | Over Voltage | +2% to +20% (of Φ) | | +5% to +25% (of Φ) | |
| 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 ⁶ | | | |
| | 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 | | - 15° C to +60° C | | | |
| Storage Temperature | | - 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 59 X 90 | | | |
| Weight (unpacked) Approx. | | 70 g | | | |
| Mounting | | Base / DIN rail | | | |
| Degree of Protection | | IP 20 for Terminal, IP 30 for Enclosure | | | |
| Certification | |    | | | |

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 Series 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 |

Voltage Monitoring Series 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 | | - 15° C to + 50° C | | |
| Storage Temperature | | - 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 | |   | | |

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

Voltage Monitoring Series 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 Series SM 500



| Cat. No. | | MD71BH | MD71BF | MD71B9 |
|-------------------------------|-----------------------|---|--------------------------|------------------------------|
| Parameters | | | | |
| Supply Voltage (φ) | | 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 φ) | | |
| | Over Voltage | 105% to 125% (of φ) | | |
| 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 | | -15° C To + 55° C | | |
| Storage Temperature | | -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) Approx. | | 120 g | | |
| Mounting | | Base / DIN rail | | |
| Degree of Protection | | IP 20 for Terminals, IP 40 for Enclosure | | |
| Certification | |   | | |

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 Series 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 |
| MGH3BH | 220 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 |
| MGI3BF | 230 VAC, UV / OV & SPP with Selectable OFF Delay (0.5 to 15 sec), 2 C/O |

Voltage Monitoring Series SM 500



| Cat. No. | | MG73BH | MG73BF | MG73B9 |
|-------------------------------|-----------------------|---|--------------------------|------------------------------|
| Parameters | | | | |
| Supply Voltage (ϕ) | | 240 VAC (1 Phase & 3 Phase, 4 Wire) | | |
| Frequency | | 50/60 Hz | | |
| Power Consumption (Max.) | | 5 VA | | |
| Trip Settings | Phase Loss | Yes | | |
| | Phase Sequence | Yes | | |
| | Phase Asymmetry | 10% (of ϕ) | | |
| | Under Voltage | 55% to 95% (of ϕ) | | |
| | Over Voltage | 105% to 125% (of ϕ) | | |
| | Hysteresis | 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 | | -15° C To + 55° C | | |
| Storage Temperature | | -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 | |   | | |

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 Series SM500 - 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.

MAC04D0100



Description

415V AC, Neutral Loss Protection with Phase and Voltage Control, 2 C/O

Voltage Monitoring Series SM500 - Neutral Loss Protection



Cat. No. **MAC04D0100**

| Parameters | | | | | |
|---|---|---|------------------|-------|---------------------|
| Supply Voltage (φ) | | 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 φ) | | | |
| | Over Voltage | 105% to 125% (of φ) | | | |
| | 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 @ 250 VAC / 28 VDC (Resistive) | | | |
| | Electrical Life | 1X10 ⁶ | | | |
| | 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 | | -10° C To + 60° C | | | |
| Storage Temperature | | -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 | |   | | | |

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 Series 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 Series SM 501



| Cat. No. | | MG53BH | MG53BF | MG63BH | MG63BF |
|-------------------------------|-----------------------|---|--------------------------|---------------------------|--------------------------|
| Parameters | | | | | |
| Supply Voltage (φ) | | 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 φ) | | | |
| | Under Voltage | 55% to 95% (of φ) | | | |
| | Over Voltage | 105% to 125% (of φ) | | | |
| | Hysteresis | 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 | | -15° C To + 55° C | | | |
| Storage Temperature | | -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 | |   | | | |

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 Series 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 Series SM 501



| Cat. No. | | MG53BI | MG53BO | MB53BM |
|-------------------------------|-----------------------|---|----------------------------------|-----------------------------------|
| Parameters | | | | |
| Supply Voltage (ϕ) | | 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 ϕ) | 85% (of ϕ) Fixed | 80% (of ϕ) Symmetrical |
| | Over Voltage | 105% to 125% (of ϕ) | 110% (of ϕ) Fixed | 110% Fixed |
| | Hysteresis | 7 V (\pm 2 V) of Trip Voltage | 7 V (\pm 2 V) of Trip Voltage | 7 V (\pm 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 | | -15° C To + 55° C | | |
| Storage Temperature | | -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 | |   | | |

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: \pm 5 % of Full Scale; Time Setting Accuracy: \pm 10 % of Full Scale

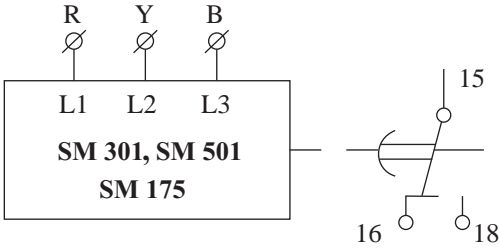
2) In the event of Phase Sequence or Phase Loss, OFF Delay is 100 ms

3) MG53BQ does not detect Phase Sequence Fault

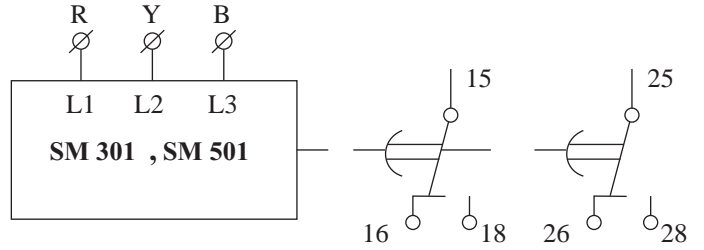


Voltage Monitoring Series

CONNECTION DIAGRAM

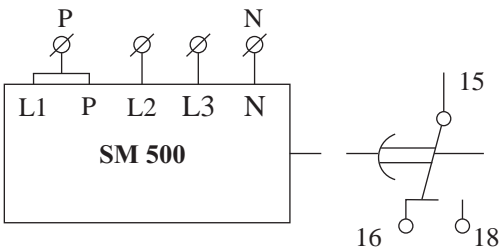


MA51BC, MA51BK, MN21D5, MK21D5, MC21D5
MA21DN, MD21DF, MG21DH, MG21DF, MGD1DR

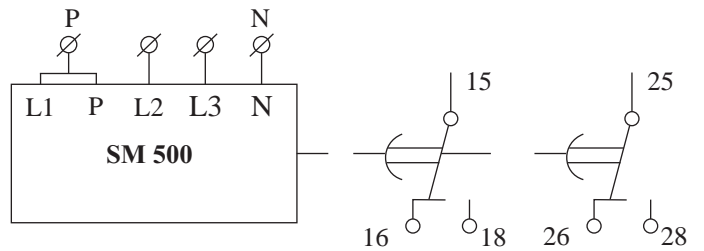


MG53BH, MG53BF, MG63BH, MG63BF
MG53BI, MG53BO, MB53BM, MC21B5

SINGLE PHASE

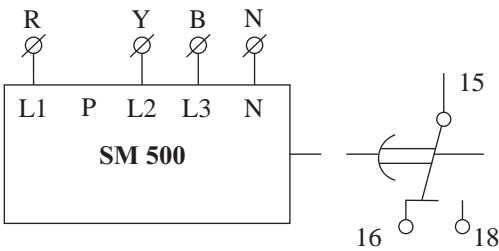


MD71BH, MD71BF, MD71B9

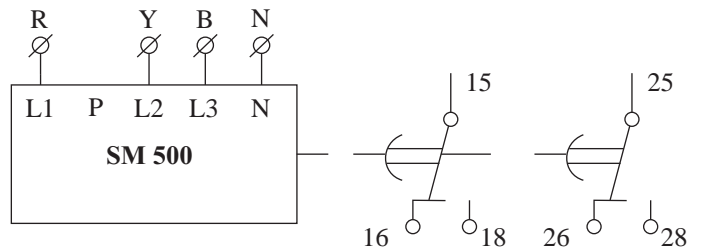


MG73BH, MG73BF, MG73B9

THREE PHASE

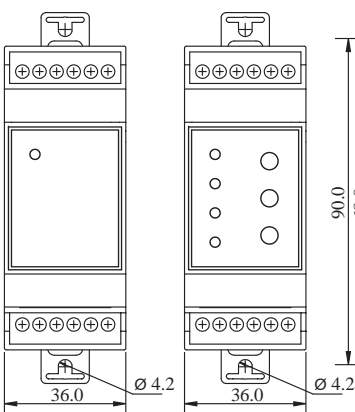


MD71BH, MD71BF, MD71B9



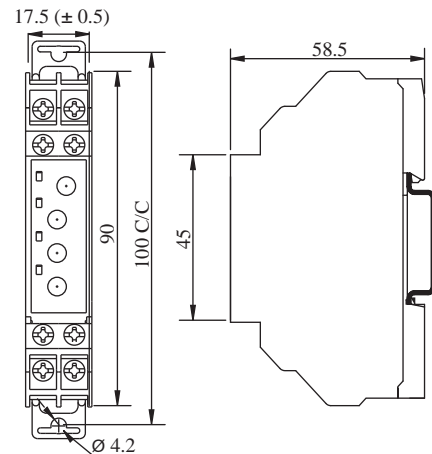
MG73BH, MG73BF, MG73B9, MAC04D0100 (P is not applicable in neutral loss)

MOUNTING DIMENSION (mm)



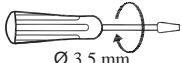

SM 301

SM 500, SM 501





SM 175

TERMINAL TORQUE & CAPACITY

| | |
|---|--|
|  Ø 3.5 mm | Torque - 0.54 N.m (5 Lb.in) Terminal screw - M2.6 |
|  | Solid Wire - 1 X 0.2...3.3 mm ² |
| AWG | 1 X 24 to 12 |

SM 301, SM 500, SM 501

| | |
|--|--|
|  Ø 3.5...5.0 mm | Torque - 1.1 N.m (10 Lb.in) Terminal screw - M3.5 |
|  | Solid Wire - 2 X 0.2...2.5 mm ² |
| AWG | 1 X 24 to 10 |

SM 175

Product Selection Chart: Voltage Monitoring

| Cat. No. | 3-Phase 3-Wire | 3-Phase 4-Wire | 1 - Phase | Under Voltage Protection | Over Voltage Protection | Phase Loss Protection | Phase Sequence Protection | Phase Asymmetry Monitoring | Settable ON Delay | Settable OFF Delay | 1 C/O Relay Output | 2 C/O Relay Output | Neutral Loss Protection | 115 VAC | 208 to 480 VAC | 240 VAC | 415 VAC |
|------------|----------------|----------------|-----------|--------------------------|-------------------------|-----------------------|---------------------------|----------------------------|-------------------|--------------------|--------------------|--------------------|-------------------------|---------|----------------|---------|---------|
| 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 | ● | | | ● | ● | ● | ● | ● | ● | ● | | ● | | | | | ● |

Note: The product can be made available in 120 VAC, 220 VAC, 230 VAC and 400 VAC.