

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

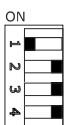
Cat. No.	Description
SMB110	500-1000V AC, Measuring and Monitoring Relay, 1C/O + 1C/O

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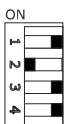
Cat. No.	SMB110
Supply Characteristics	
Power Supply Type	Self-Powered
Supply Voltage range	Line Voltage 500V to 1000V AC
Frequency	45Hz to 65Hz
Power consumption	Max 35VA at 750V, 50Hz
Measurement Characteristics	
Monitoring signals	R, Y, B
Reference voltage (Vref)	750V line voltage
Measuring Voltage 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



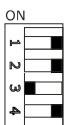
Switch 1 - Potentiometer Delay type

OFF Position = OFF Delay (Trip Delay)
ON Position = ON Delay (Recovery Delay)



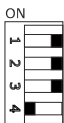
Switch 2 - Fixed Delay

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

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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%




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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
Certification	  
Standard	EN 50155

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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	IEC 60255-27
a) between input and output	
b) between all terminals and enclosure	
Leakage current	<3.5mA UL508
Single Fault test	IEC 61010-1

Fire Safety EN 45545-2, HL-2/3

NOTE:

Specifying Target Hazard Level: The material used complies with EN 45545-2 for fire protection on railway vehicles. SMB110 product belongs mainly to component class EL10, and therefore, requirement R26 applies and is achieved by using V0 material in our construction. According to Clause 4.1 of EN 45545-2, the targeted Hazard Level will be "H13".

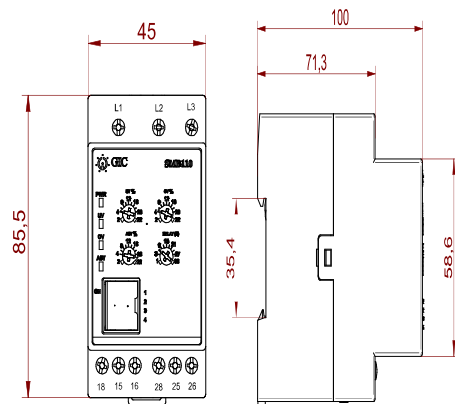
Environmental Testing

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

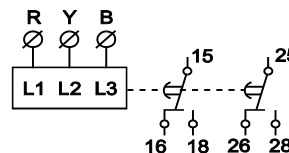
Approvals

CE, RoHS

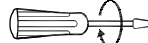

MOUNTING DIMENSION (mm)



CONNECTION DIAGRAM



TERMINAL TORQUE & CAPACITY

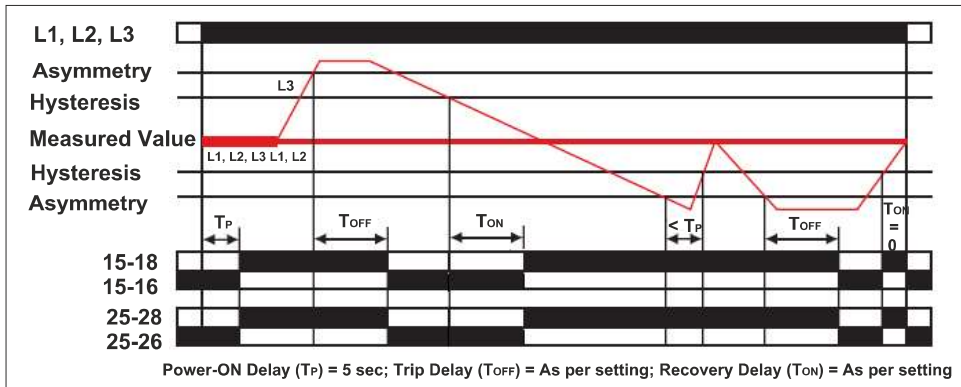
 Ø 3.5 mm...4.0mm	0.6 N.m (5.3 Lb.in)
	1 x 4.0 mm ² Solid Wire
AWG	1 x 20 to 10

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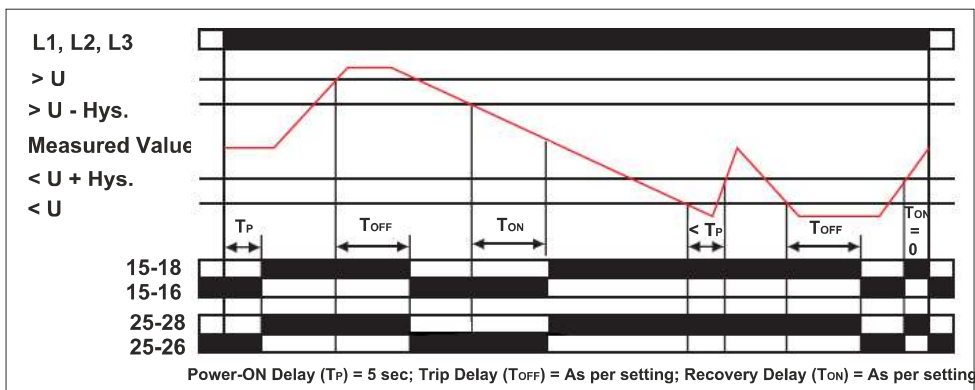


FUNCTION DIAGRAM

Asymmetry -



UV & OV -



Phase Fail & Phase Sequence -

