TECHNICAL SPECIFICATIONS

Supply Characteristics	
Power Supply Type	Self-Powered
Supply Voltage range	Line Voltage 500V to 1000V AC
Frequency	45Hz to 65Hz
Power consumption	Max 40VA at 750V, 50Hz
Measurement Characteristics	
Monitoring signals	R, Y, B
Reference voltage (Vref)	750V line voltage
Measuring Voltage Range	500V to 1000VAC
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	NC/NO - 8A @250VAC/24VDC, Resistive Load
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 @ 250VDC
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	
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
MTBF (IEC 62380)	Min. 499214 Hours
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

FUNCTIONAL CHARACTERISTICS

MONITORING FUNCTIONS	
Monitored Voltage	Phase to Phase (3 Phase 3 Wire)
Under Voltage (Asymmetrical)	
Settable Threshold Range	-2 to -22 % of Vref (735V to 585V)
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	2 to 22 % of Vref (765V to 915V)
Setting resolution	2.00%
Hysteresis	Fixed 1 % of Vref for 2% trip setting Fixed 2 % of Vref above 2 % setting
Asymmetry (%)	
Settable Threshold Range	2% to 22%
Setting resolution	2%
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
ON Delay (for all faults)	Potentiometer settable 1 - 30 Sec OR Fixed (refer DIP Switch settings) 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
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	
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%

Measuring and Monitoring Relay

Catalogue Number : SMB110

FEATURES

- True RMS measurement with 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
- Suitable for railway applications
- Complies to requirements of **EN50155 (IEC 60571)**

FUNCTION DESCRIPTION

Voltage Asymmetry: If measured asymmetry exceeds asymmetry threshold then device will declare it as asymmetry fault.

Percent Asymmetry:

Find out max line voltage, min line voltage and average line voltage.

Calculate two differences as D1 and D2:

D1 = Max line voltage – Average line voltage & D2 = Average line voltage – Min line voltage

% Asymmetry Calculation:

if (D1 > D2) then D = D1 otherwise D = D2.

% Asymmetry = (D / Average) x 100.

On Delay: On delay is time duration between fault recovery and relay action. ON delay is applicable for recovery of all type of faults.

Note: If fault occur again during ON delay, then device reload ON delay.

Off Delay: OFF delay is time duration between fault detection and relay action.

NOTE

- The technical information provided in this document was correct at the time of publish
- Product innovation being a continuous process, we reserve the right to alter specifications without any prior notice

ELECTROMAGNETIC COMPATIBILITY

EMI / EMC Test	
Harmonic Current Emissions	IEC 61000-3-2 Class A
ESD	IEC 61000-4-2 Level 3 Criterion A
Radiated Susceptibility	IEC 61000-4-3 Level 3 Criterion A
Electrical Fast Transients	IEC 61000-4-4 Level 4 Criterion A
Surge	IEC 61000-4-5 Level 4 Criterion A
Conducted Susceptibility	IEC 61000-4-6 Level 3 Criterion A
Power Frequency Magnetic Field	IEC 61000-4-8 Criterion A
Voltage Dips & Interruptions (AC)	EN50155-17 Class C1, C2 & S3 Criterion A
Conducted Emission	EN55011 Class B
Radiated Emission	EN55011 Class B

SAFETY DATA

Voltage Withstand test Test Voltage between I/P and O/P	IEC 60255-27 4kV
Test Voltage between all terminals and enclosure	IEC 60255-27 4kV
Impulse Voltage between I/P and O/P	IEC60255-27 8kV
Impulse Voltage between O/P1 and O/P2	IEC60255-27 6kV
Insulation Resistance	IEC 60255-27 >100MΩ at 500VDC
Leakage Current	<3.5mA UL508
Single Fault test	IEC 61010-1
Fire Safety	EN 45545-2, HL-2/3

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 "HL3".

ENVIRONMENTAL DATA

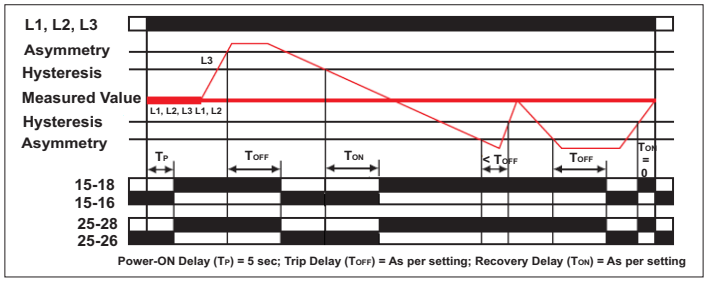
Cold Heat	IEC 60068-2-1
Dry Heat	IEC 60068-2-2
Damp Heat, Cyclic	IEC 60068-2-30
Vibration, Shock and Bump	EN61373 Category 1, Class B, Body Mounted

⚠ CAUTION

- Do not touch the terminals while power is being supplied
- Tighten terminal screws with the specified torque
- Always follow instructions stated in product leaflet
- Before installation, ensure that specifications agree with intended application
- During installation, keep 10mm distance on both sides of product from adjacent devices
- Suitable dampers should be provided in the event of excessive vibrations
- Only qualified persons are authorized to install the product
- Use slow blow fuse of 250mA rating in series with product supply
- Device should be kept away from wet, dust & humidity environments
- Device manufacturer will not be responsible if any incident occur due to negligence of cautions

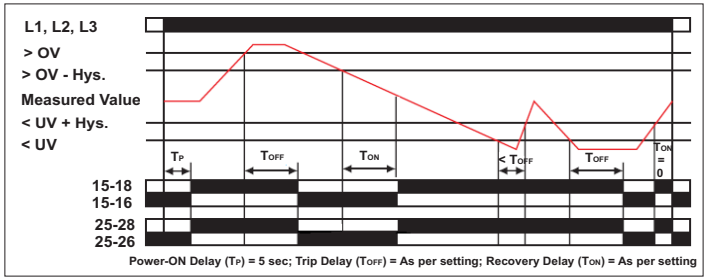
FUNCTION DIAGRAM

Asymmetry -



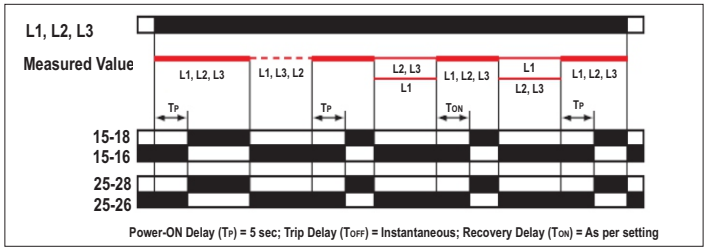
Power-ON Delay (T_P) = 5 sec; Trip Delay (T_{OFF}) = As per setting; Recovery Delay (T_{ON}) = As per setting

Under-Voltage & Over-Voltage -



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 -



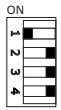
Power-ON Delay (T_P) = 5 sec; Trip Delay (T_{OFF}) = Instantaneous; Recovery Delay (T_{ON}) = As per setting

LED INDICATIONS

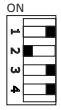
Conditions	Power LED	UV LED	OV LED	ASY/PR LED
Healthy	ON	OFF	OFF	OFF
UV	ON	ON	OFF	OFF
OV	ON	OFF	ON	OFF
Asymmetry	ON	OFF	OFF	SLOW BLINK (1000ms)
R-Phase Fail	SLOW BLINK (1000ms)	OFF	OFF	OFF
Phase Reverse	ON	OFF	OFF	ON
Low Cut Off	ON	SLOW BLINK (1000ms)	OFF	OFF
High Cut Off	ON	OFF	SLOW BLINK (1000ms)	OFF
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

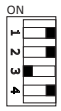
DIP SWITCH SETTING



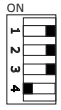
Switch 1 - Potentiometer Delay type
OFF Position = OFF Delay (Trip Delay)
ON Position = ON Delay (Recovery Delay)



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



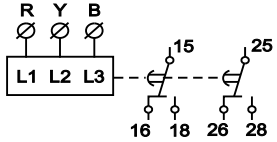
Switch 3- Delay Multiplier
OFF Position = 1
ON Position = 0.1 (Applicable to OFF delay only)



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

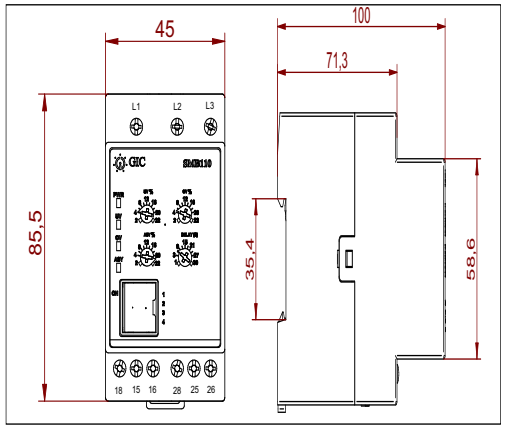
CONNECTION DIAGRAM



TERMINAL TORQUE & CAPACITY

Ø 3.5 mm....4.0mm	0.6 N.m (5.3 Lb.in)
	1 x 4.0 mm² Solid Wire
AWG	1 x 20 to 10

MOUNTING DIMENSION (mm)



E-Waste Regulatory notice:
Kindly treat, recycle or dispose of this equipment in an environmentally sound manner after End of Life, as per WEEE (Waste Electrical and Electronic Equipment) regulations; or hand it over to General Industrial Ltd, through website https://www.gicindia.com/get-in-touch/