

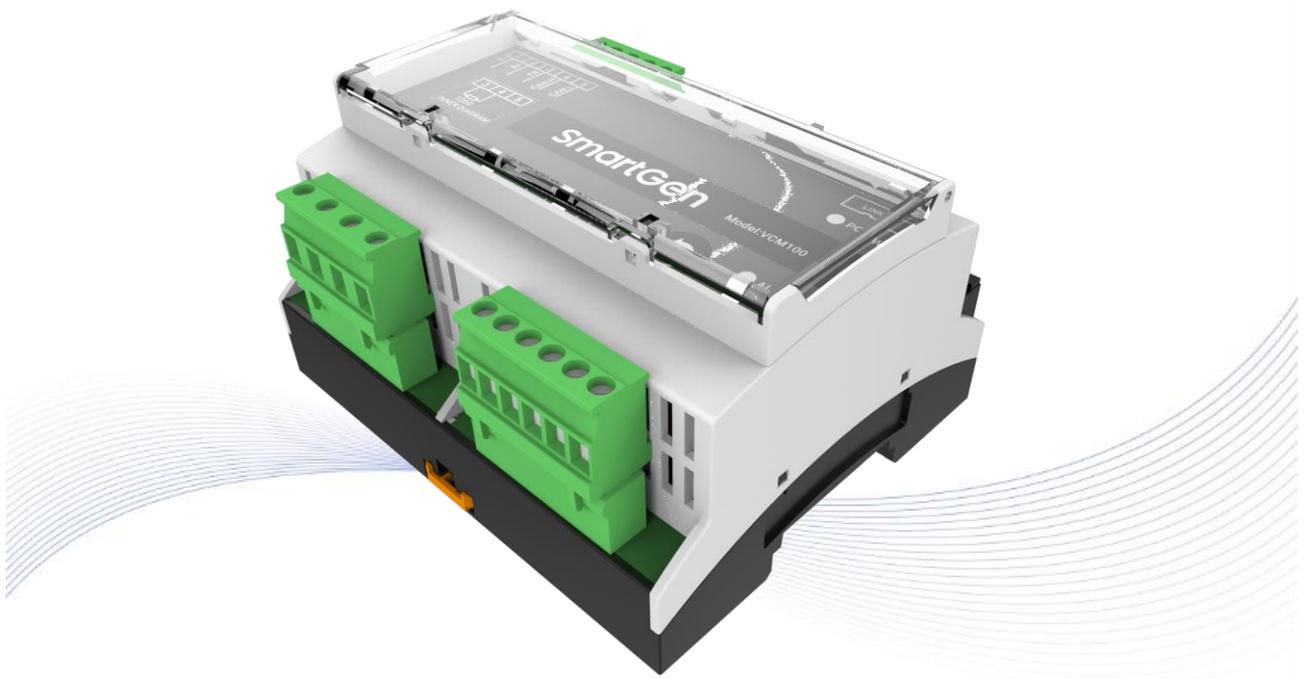
# SmartGen

MAKING CONTROL SMARTER

## VCM100

### ELECTRIC PARAMETER COLLECTION MODULE

### USER MANUAL



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**Table 1 Software Version**

Date	Version	Note
2024-11-11	1.0	Original release.

**Table 2 Notation Clarification**

Sign	Instruction
 NOTE	Highlights an essential element of a procedure to ensure correctness.
 CAUTION!	Indicates a procedure or practice, which, if not strictly observed, could result in damage or destruction of equipment.
 WARNING!	Indicates a procedure or practice, which could result in injury to personnel or loss of life if not followed correctly.

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## 1 OVERVIEW

**VCM100 Electric Parameter Collection Module** integrates digital, intelligent and network technology, which is used for collecting the parameter of generator set, including voltage, current, power and frequency.

**VCM100 Electric Parameter Collection Module** adopts micro-processor technology with precise parameter measuring, fixed value adjustment, set value adjusting functions, etc. All parameters can be configured through LINK port via PC. It can be widely used in all types of marine/land power distribution equipment with compact structure, simple connections and high reliability.

## 2 PERFORMANCE AND CHARACTERISTICS

Main features are as below:

- Equipped with LINK communication port, data monitoring and parameters setting can be achieved via the port on PC.
- Equipped with CANBUS port, it can connect with HMC9000/HMC6000 module to realize the data collection and display for power and engine at the same time.
- Protections for over/under voltage, over/under frequency, reverse power, over power and over current.
- Harmonic test function, and each phase voltage/current harmonic distortion rate can be tested.
- Suitable for 3-phase 4-wire, 3-phase 3-wire, single phase 2-wire, and 2-phase 3-wire systems under frequency of 50/60Hz.
- Collects and displays parameters of 3-phase voltage, 3-phase current, frequency and power.

### Generator

Line voltage (Uab, Ubc, and Uca)

Phase voltage (Ua, Ub, and Uc)

Frequency Hz

### Load

Current (Ia, Ib, Ic) A (unit)

Each phase and total active power (P) kW (unit)

Each phase and total reactive power (Q) kvar (unit)

Each phase and average power factor (PF)

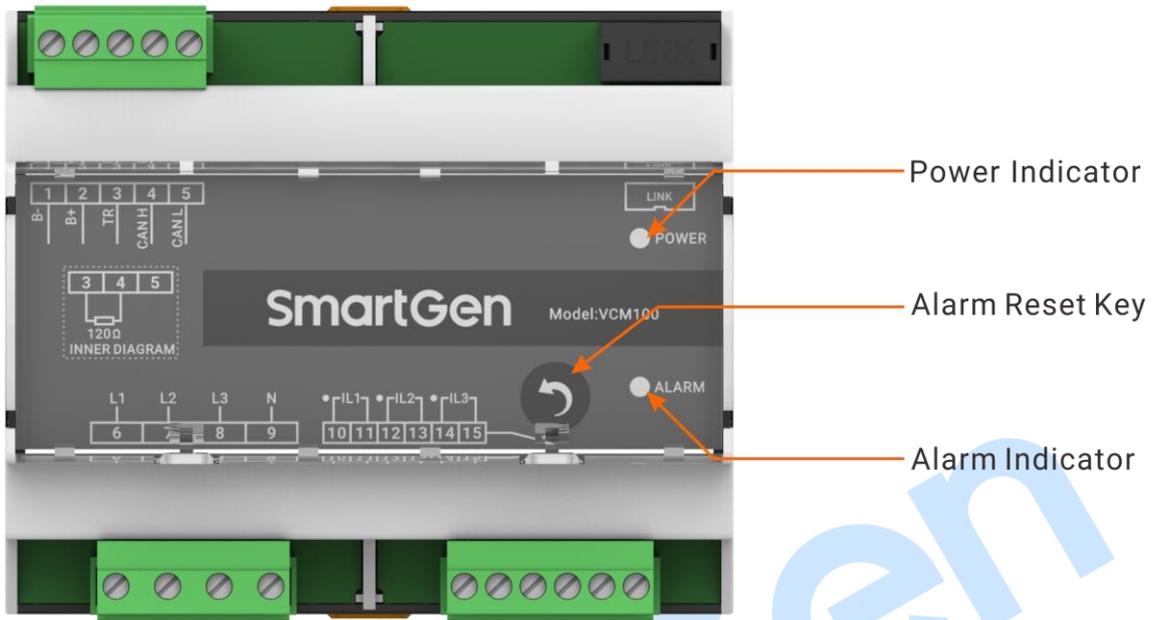
- Parameter setting function: users are allowed to set and change parameters. The parameters shall be stored in the internal FLASH memory, which cannot be lost even in case of power outage.
- Wide power supply range (8~35) VDC, which is suitable for different voltages of starting battery.
- All parameters can be adjusted in digital way, instead of conventional analog modulation with normal potentiometer, improving the reliability and stability of module.
- Module is mounted on the 35mm DIN rail.

3 SPECIFICATIONS

Table 3 Performance Parameters

Item	Content
Operating Voltage	DC8.0V to DC35.0V, Continuous Power Supply
Power Consumption	<3W (standby mode ≤2W)
AC Voltage	Phase Voltage Range: 30VAC ~ 360 VAC (ph-N) Resolution: 1V Accuracy: 1%
	Line Voltage Range: 30VAC ~ 620 VAC (ph-ph) Resolution: 1V Accuracy: 1%
AC Frequency	Range: 10Hz ~ 65Hz Resolution: 0.1Hz Accuracy: 1%
AC Current	Rated: 5A Range: 0A ~6A Resolution: 0.1A Accuracy: 0.1A
Power Factor	Resolution: 0.01 Accuracy: 2%
Overall Dimensions	107.6mm x 91mm x 60.7mm
Working Temperature	(-25~+70)°C
Working Humidity	(20~93)%
Storage Temperature	(-30~+80)°C
Insulation Strength	Apply AC2.2kV voltage between high voltage terminal and low voltage terminal and the leakage current shall be no more than 3mA within 1min
Weight	0.25kg

## 4 OPERATION



**Fig. 1 Keys and Indicators**

**Table 4 Description of Keys**

Icons	Function	Description
	Reset	Press this key to reset the alarms.
Press and hold the	key to test the lamps (indicators).	

5 PROTECTION

5.1 WARNING

When the module detects the warning signals, the alarm indicator on the panel flashes, and the warning information can be viewed on the PC.

**Table 5 Module Warning Types**

No.	Type	Description
1	Over Voltage	When the module detects that the genset voltage has exceeded the pre-set value, it will initiate a warning alarm and the corresponding alarm information will be displayed on the PC.
2	Under Voltage	When the module detects that the genset voltage has fallen below the pre-set value, it will initiate a warning alarm and the corresponding alarm information will be displayed on the PC.
3	Over Frequency	When the module detects that the genset frequency has exceeded the pre-set value, it will initiate a warning alarm and the corresponding alarm information will be displayed on the PC.
4	Under Frequency	When the module detects that the genset frequency has fallen below the pre-set value, it will initiate a warning alarm and the corresponding alarm information will be displayed on the PC.
5	Over Power	When the module detects that the genset power (power is positive) has exceeded the pre-set value, it will initiate a warning alarm and the corresponding alarm information will be displayed on the PC.
6	Over Current	When the module detects that the genset current has exceeded the pre-set value, it will initiate a warning alarm and the corresponding alarm information will be displayed on the PC.
7	Current Pre-alarm	When module detects genset current is above the current pre-alarm limit, it will initiate a warning alarm and the corresponding alarm information will be displayed on the PC.
8	Reverse Power	When the module detects that the genset reverse power value (power is negative) has exceeded the pre-set value, it will initiate a warning alarm and the corresponding alarm information will be displayed on the PC.

**5.2 TRIP ALARM**

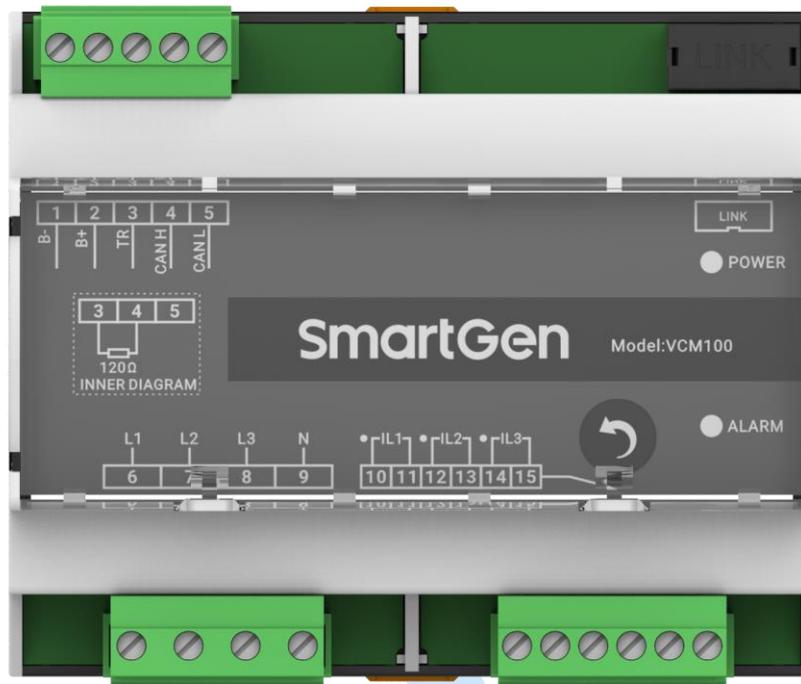
When controller detects trip alarm, it will send signals to trip the generator and the corresponding alarm information will be displayed on LCD.

**Table 6 Trip Alarms**

No.	Type	Description
1	Over Voltage	When the module detects that the genset voltage has exceeded the pre-set value, it will initiate a trip alarm and the corresponding alarm information will be displayed on the PC.
2	Under Voltage	When the module detects that the genset voltage has fallen below the pre-set value, it will initiate a trip alarm and the corresponding alarm information will be displayed on the PC.
3	Over Frequency	When the module detects that the genset frequency has exceeded the pre-set value, it will initiate a trip alarm and the corresponding alarm information will be displayed on the PC.
4	Under Frequency	When the module detects that the genset frequency has fallen below the pre-set value, it will initiate a trip alarm and the corresponding alarm information will be displayed on the PC.
5	Over Power	When the module detects that the genset power (power is positive) has exceeded the pre-set value, it will initiate a trip alarm and the corresponding alarm information will be displayed on the PC.
6	Over Current	When the module detects that the genset current has exceeded the pre-set value, it will initiate a trip alarm and the corresponding alarm information will be displayed on the PC.
7	Reverse Power	When the module detects that the genset reverse power value (power is negative) has exceeded the pre-set value, it will initiate a trip alarm and the corresponding alarm information will be displayed on the PC.
8	Loss of Phase	When the module detects that genset voltage phase loss, it will initiate a trip alarm signals and the corresponding alarm information will be displayed on the PC.
9	Reverse Phase Sequence	When the module detects that genset voltage phase sequence wrong, it will initiate trip alarm signals and the corresponding alarm information will be displayed on the PC.

## 6 WIRING CONNECTION

The panel of VCM100 module is as below:



**Fig. 2 Panel of VCM100**

**Table 7 Terminal Wiring Connection**

No.	Function	Cable Size	Remarks
1	B-	1.5mm <sup>2</sup>	Connected with negative of starter battery, engine starter battery can be used directly.
2	B+	1.5mm <sup>2</sup>	Connected with positive of starter battery, engine starter battery can be used directly.
3	120Ω	1.0mm <sup>2</sup>	After short connecting with CANL, it doesn't need to externally connect with 120Ω.
4	CANH	1.0mm <sup>2</sup>	CANBUS Communication port, which supports J1939-81 power data communication protocol.
5	CANL	1.0mm <sup>2</sup>	
6	Gen L1 Phase Volt Monitoring Input	1.0mm <sup>2</sup>	Connect with output U Phase of generator (2A fuse is recommended).
7	Gen L2 Phase Volt Monitoring Input	1.0mm <sup>2</sup>	Connect with output V Phase of generator (2A fuse is recommended).
8	Gen L3 Phase Volt Monitoring Input	1.0mm <sup>2</sup>	Connect with output W Phase of generator (2A fuse is recommended).
9	Gen N Wire Input	1.0mm <sup>2</sup>	Connect with output N Wire of generator.
10	CT A-Phase Monitoring Input	2.5mm <sup>2</sup>	External connected current transformer secondary coil (rated 5A).
11		2.5mm <sup>2</sup>	
12	CT B-Phase Monitoring Input	2.5mm <sup>2</sup>	External connected current transformer secondary coil (rated 5A).
13		2.5mm <sup>2</sup>	

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No.	Function	Cable Size	Remarks
14	CT C-Phase Monitoring	2.5mm <sup>2</sup>	External connected current transformer secondary coil (rated5A).
15	Input	2.5mm <sup>2</sup>	
LINK			Test software interface. Connect with PC test software via SG72 module.

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7 SCOPES AND DEFINITIONS OF PROGRAMMABLE PARAMETERS

7.1 CONTENTS AND SCOPES OF PARAMETERS SETTING

Table 8 Parameters Setting Contents and Scopes

No.	Items	Range	Default	Description
<b>Voltage Settings</b>				
1	AC System	(0-3)	0	0: 3P4W 1: 3P3W 2: 2P3W 3: 1P2W
2	Rated Voltage	(30-30000)V	230	Provide standard for over/under voltage and voltage on load. If voltage transformer is used, this value is primary voltage of transformer. When AC system is 3P3W, this setting value is line voltage; for other supply AC systems, it is phase voltage.
3	Voltage Transformer Enabled	(0-1) 0: Disabled 1: Enabled	0	Disabled
4	Primary Voltage	(30-30000)V	100	Primary voltage of voltage transformer.
5	Secondary Voltage	(30-1000)V	100	Secondary voltage of voltage transformer.
6	Over Volt Warning Enabled	(0-1) 0: Disabled 1: Enabled	1	When it is enabled, module starts to detect over voltage warning.
7	Over Volt Warning Value	(0-200)%	110%	When generator voltage has exceeded the set value and warning delay is expired, module will initiate over voltage warning alarm.
8	Over Volt Warning Delay	(0-3600)s	3	Time duration from alarm is detected to it initiates alarm.
9	Over Volt Trip Enabled	(0-1) 0: Disabled 1: Enabled	1	When it is enabled, module starts to detect over voltage trip.
10	Over Volt Trip Value	(0-200)%	120	When generator voltage has exceeded the set value and trip delay is expired, module will initiate over voltage trip alarm.
11	Over Volt Trip Delay	(0-3600)s	2	Time duration from alarm is detected to it initiates alarm.
12	Under Volt Warning Enabled	(0-1) 0: Disabled 1: Enabled	1	When it is enabled, module starts to detect under voltage warning.
13	Under Volt Warning Value	(0-200)%	84	When generator voltage has fallen below the set value and warning delay is expired,

No.	Items	Range	Default	Description
				module will initiate under voltage warning alarm.
14	Under Volt Warning Delay	(0-3600)s	3	Time duration from alarm is detected to it initiates alarm.
15	Under Volt Trip Enabled	(0-1) 0: Disabled 1: Enabled	1	When it is enabled, module starts to detect under voltage trip.
16	Under Volt Trip Value	(0-200)%	80	When generator voltage has fallen below the set value and trip delay is expired, module will initiate under voltage trip alarm.
17	Under Volt Trip Delay	(0-3600)s	2	Time duration from alarm is detected to it initiates alarm.
18	Loss of Phase Detection Enabled	(0-1)	0	0: Disabled 1: Enabled
19	Phase Sequence Wrong Detection Enabled	(0-1)	0	
20	Under Volt Threshold Voltage	(0-200)%	60	When threshold voltage is exceeded, module starts to detect under voltage alarm.
21	Voltage On Load	(0-200)%	90	When voltage is over this threshold, it meets the on-load conditions.
<b>Frequency Settings</b>				
22	Rated Frequency	(50.0-60.0)Hz	50.0	Provide standard for over/under frequency and frequency on load.
23	Frequency On Load	(0-200)%	90	When frequency is over this value, it meets the on-load conditions.
24	Over Frequency Warning Enabled	(0-1) 0: Disabled 1: Enabled	1	When it is enabled, module starts to detect over frequency warning.
25	Over Frequency Warning Value	(0-200)%	110	When generator frequency has exceeded the set value and warning delay is expired, module will initiate over frequency warning alarm.
26	Over Frequency Warning Delay	(0-3600)s	3	Time duration from alarm is detected to it initiates alarm.
27	Over Frequency Trip Enabled	(0-1) 0: Disabled 1: Enabled	1	When it is enabled, module starts to detect over frequency trip.
28	Over Frequency Trip Value	(0-200)%	114	When generator frequency has exceeded the setting value and trip delay is expired, module will initiate over frequency trip alarm.
29	Over Frequency Trip Delay	(0-3600)s	2	Time duration from alarm is detected to it initiates alarm.

No.	Items	Range	Default	Description
30	Under Frequency Warning Enabled	(0-1) 0: Disabled 1: Enabled	1	When it is enabled, module starts to detect under frequency warning.
31	Under Frequency Warning Value	(0-200)%	84	When generator frequency has fallen below the set value and warning delay is expired, module will initiate under frequency warning alarm.
32	Under Frequency Warning Delay	(0-3600)s	3	Time duration from alarm is detected to it initiates alarm.
33	Under Frequency Trip Enabled	(0-1) 0: Disabled 1: Enabled	1	When it is enabled, module starts to detect under frequency trip.
34	Under Frequency Trip Value	(0-200)%	80	When generator frequency has fallen below the set value and trip delay is expired, module will initiate under frequency trip alarm.
35	Under Frequency Trip Delay	(0-3600)s	2	Time duration from alarm is detected to it initiates alarm.
<b>Current Settings</b>				
36	Rated Full-load Current	(5-6000)A	500	It is generator's rated current, and used for provide standard for load current.
37	Current Transformer Ratio/5	(5-6000)/5	500	External connected current transformer ratio.
38	Over Current Warning Enabled	(0-1) 0: Disabled 1: Enabled	1	When it is enabled, module starts to detect over current warning.
39	Over Current Warning Value	(0-200)%	110	When generator current has exceeded the set value and warning delay is expired, module will initiate over current warning alarm.
40	Over Current Warning Delay	(0-3600)s	10	Time duration from alarm is detected to it initiates alarm.
41	Over Current Trip Enabled	(0-1) 0: Disabled 1: Enabled	1	When it is enabled, module starts to detect over current trip.
42	Over Current Trip Value	(0-200)%	114	When generator current has exceeded the set value and trip delay is expired, module will initiate over current trip alarm.
43	Over Current Trip Delay	(0-3600)s	2	Time duration from alarm is detected to it initiates alarm.
44	Current Pre-alarm	(0-1) 0: Disabled 1: Enabled	1	When it is enabled, module starts to detect current pre-alarm.
45	Current Pre-alarm Value	(0-200)%	100	When current is over this value and lasts for the pre-set pre-alarm delay, module will

No.	Items	Range	Default	Description
				initiate current pre-alarm.
46	Current Pre-alarm Delay	(0-3600)s	3	Time duration from alarm is detected to it initiates alarm.
<b>Power Settings</b>				
47	Rated Power	(0-6000)kW	276	It is generator's rated power, and used for provide standard for power alarm.
48	Rated Reactive Power	(0-6000)kvar	200	Generator's rated reactive power.
49	Over Power Warning Enabled	(0-1) 0: Disabled 1: Enabled	1	When it is enabled, module starts to detect over power warning.
50	Over Power Warning Value	(0-200)%	110	When active power (positive) has exceeded the set value and warning delay is expired, module will initiate over power warning alarm.
51	Over Power Warning Delay	(0-3600)s	3	Time duration from alarm is detected to it initiates alarm.
52	Over Power Trip Enabled	(0-1) 0: Disabled 1: Enabled	1	When it is enabled, module starts to detect over power trip.
53	Over Power Trip Value	(0-200)%	114	When active power (positive) has exceeded the set value and trip delay is expired, module will initiate over power trip alarm.
54	Over Power Trip Delay	(0-3600)s	2	Time duration from alarm is detected to it initiates alarm.
55	Reverse Power Warning Enabled	(0-1) 0: Disabled 1: Enabled	1	When it is enabled, module starts to detect reverse power warning.
56	Reverse Power Warning Value	(0-200)%	20	When reverse power (negative) has exceeded the set value and warning delay is expired, module will initiate reverse power warning alarm.
57	Reverse Power Warning Delay	(0-3600)s	3	Time duration from alarm is detected to it initiates alarm.
58	Reverse Power Trip Enabled	(0-1) 0: Disabled 1: Enabled	1	When it is enabled, module starts to detect reverse power trip.
59	Reverse Power Trip Value	(0-100)%	30	When reverse power (negative) has exceeded the set value and trip delay is expired, module will initiate reverse power trip alarm.
60	Reverse Power Trip Delay	(0-3600)s	2	Time duration from alarm is detected to it initiates alarm.

No.	Items	Range	Default	Description
<b>Module Settings</b>				
61	Module Address	(1-254)	1	Module address when remote monitoring control.
62	CANBUS Baud Rate	(0-1) 0: 250Kbps 1: 500Kbps 2: 125Kbps 3: 50Kbps	0	CANBUS communication baud rate configuration.
63	Power Data Sending Enable	(0-1) 0: Disabled 1: Enabled	0	When it is enabled, module starts to send the power data.
64	CAN ID Setting	(0-10)	0	Configuration for CAN ID.

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8 PARAMETERS SETTING

Parameters can be set through PC software via SG72 module. Password is not required for parameter setting on PC software. If it needs to set more parameters (such as voltage/current calibration) or the password is forgotten, please contact the factory.

NOTES:

- a) Over voltage set value must be higher than under voltage set value, otherwise over voltage and under voltage condition may occur simultaneously.
- b) For alarms not needed, please select "Disabled" in the alarm enabled selection.

9 TYPICAL APPLICATION

9.1 MODULE TYPICAL APPLICATION

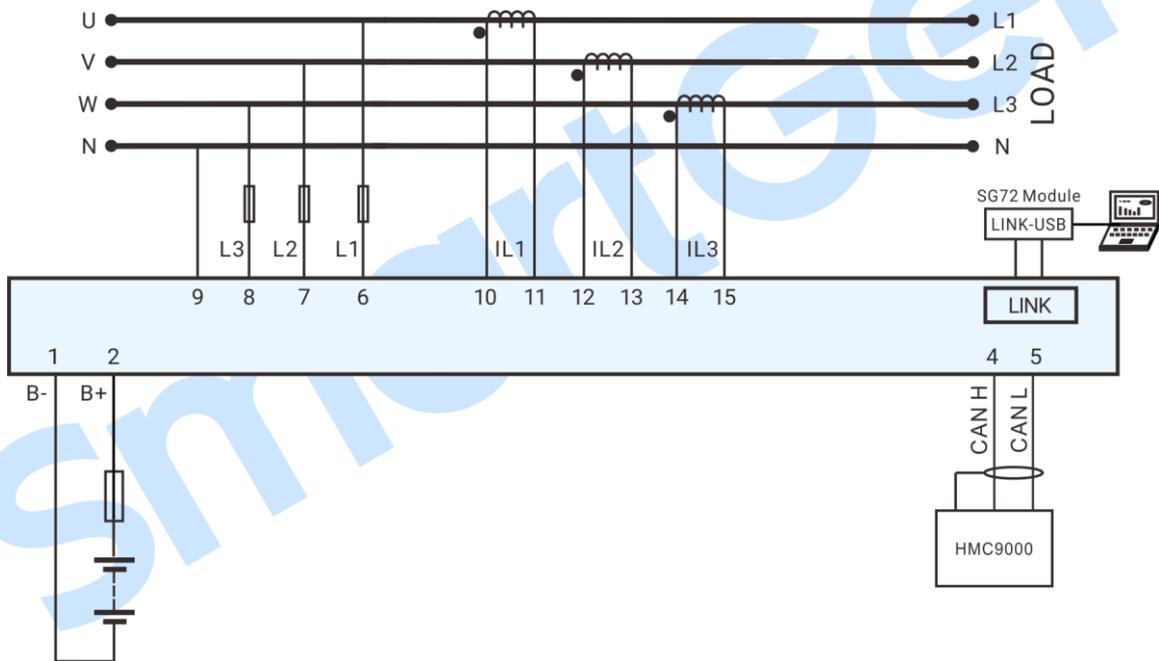


Fig.3 VCM100 Typical Application Diagram

10 INSTALLATION

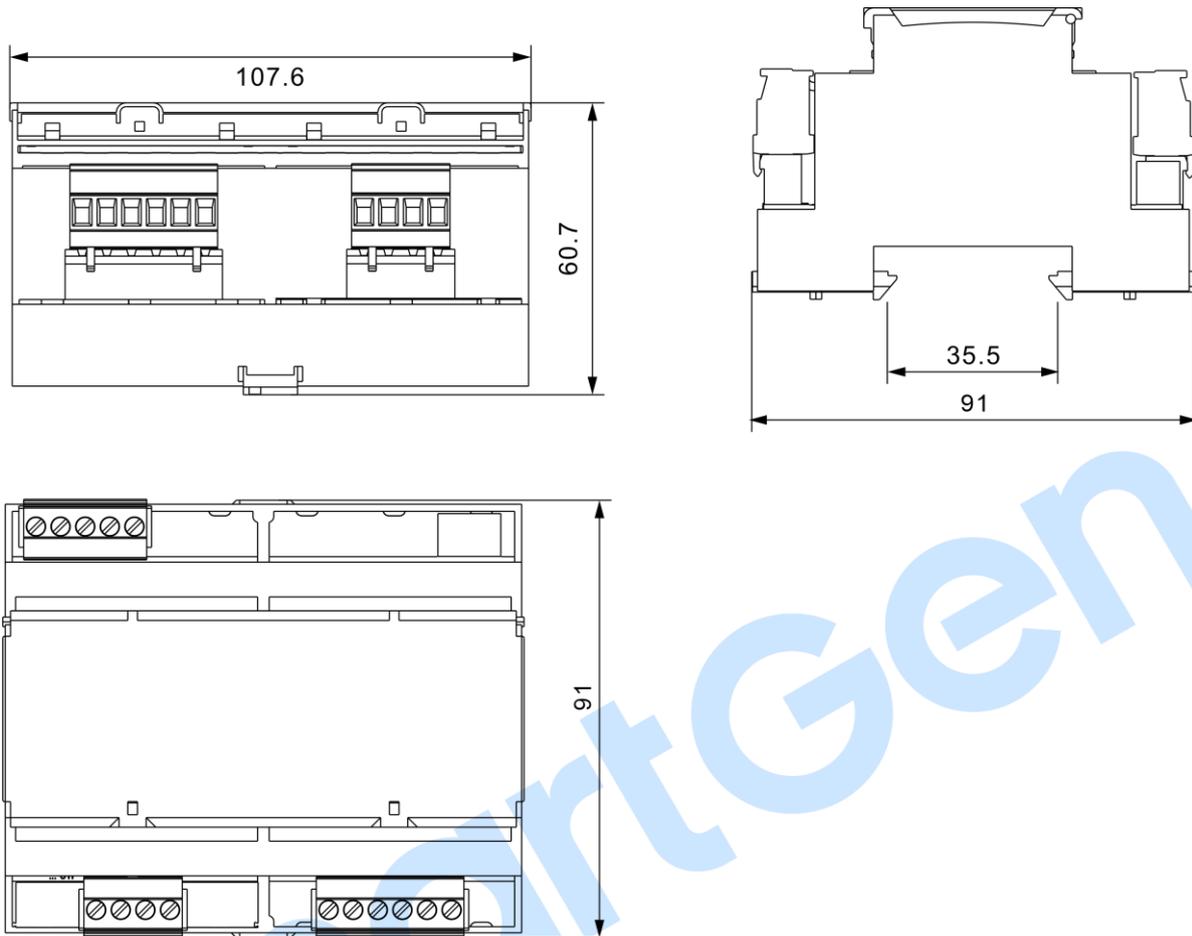


Fig.4 Overall and Cutout Dimensions

**ATTENTION:**

— **AC INPUT**

Current input of controller must be connected to outside current transformer. And the current transformer's secondary current must be 5A. At the same time, the phases of current transformer and input voltage must be correct. Otherwise, the collected current and active power may be not correct.

**NOTE:** When there is load current, transformer's secondary side is prohibited to open circuit.