

# GCU-100 Ver1.0

## *Automatic Engine Control and Protection Module Operators Manual*



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## ATTENTION

The User manual contains information on application, installation, wiring connections, operation and maintenance information. All user / operator should carefully go through the contents.

## INTRODUCTION

GCU-100 suitable for most generators available on the market, it is equipped with graphical warning signals and 3 sets of 4 digits LED display to display the real time 3 phase voltage, current, frequency, battery volt, running hours and setting values.

The customer can program the GCU-100 directly from the front panel without using a computer. Any new settings are recorded into the internal (EEPROM) and protected from erasure even without battery.

GCU-100 is operated via 3 selectable operation modes, the automatic mode (AUTO), the manual mode (MANU) and the engine shutdown mode.

### The main features includes the followings :

- Digital modularized design
- 3 Sets of 4 digits display
- Programmable multiple restart
- Programmable Idle time
- Programmable engine cooling time
- Programmable service and maintenance warning
- Full monitoring and protection

### Contents and readings displayed on the LED Displayer :

- Full phase AC voltage
- Full phase load current
- AC frequency
- Operation timer
- DC (Battery) voltage
- Warning signal
- System setting value

The readings from display can be set to display fixed valued or allow cycling value display, that enables user to obtain cycling repetition of all readings. If failure should occur during generator operation, the module will provide graphical warning signal(s) on the panel and a failure signal output to a remote site to alert the users / operator.

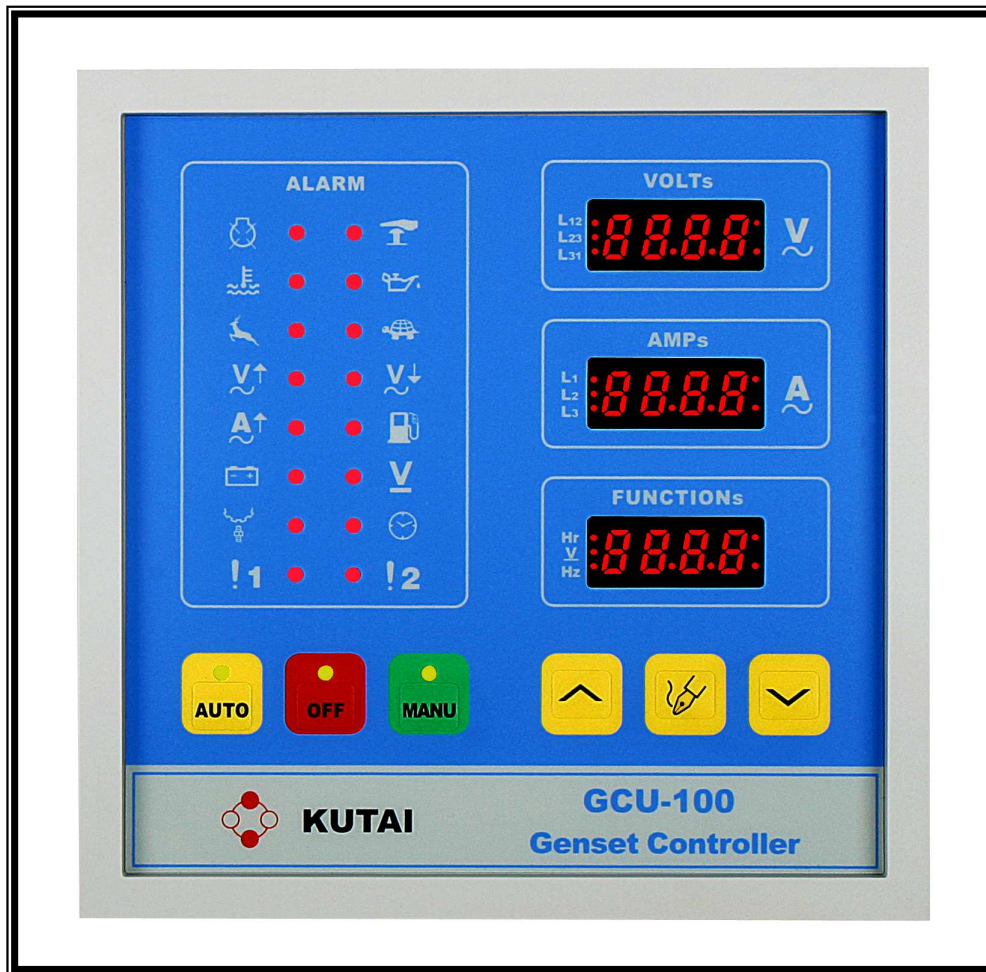
### Monitoring and Protection Function :

- Engine start failure
- Emergency stop
- High coolant temperature
- Low oil pressure
- Engine over speed
- Engine under speed
- Full phase AC over voltage
- Full phase AC under voltage
- Full phase load current monitoring
- Low fuel level
- Charge alternator failure (D+)
- DC (Battery) over and under voltage
- Magnetic Pick-up (MPU) failure
- Engine service and maintenance

The GCU-100 reserved 2 user defined warning signal inputs. This allows the user to freely plan out the preferred monitoring subject other than the already provided.

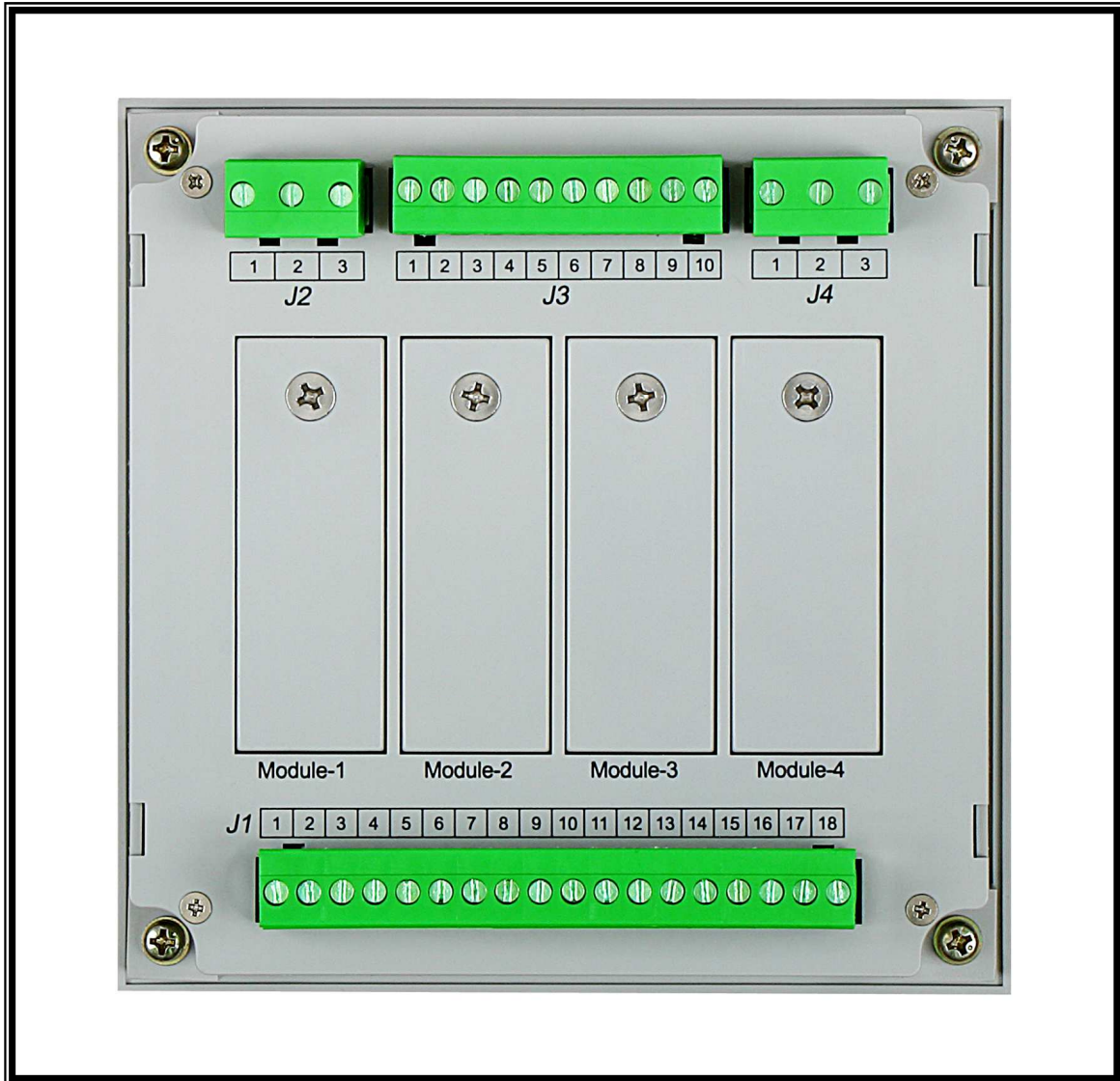
# 1. FRONT PANEL LAYOUT

## 1.1 Front Panel Layout

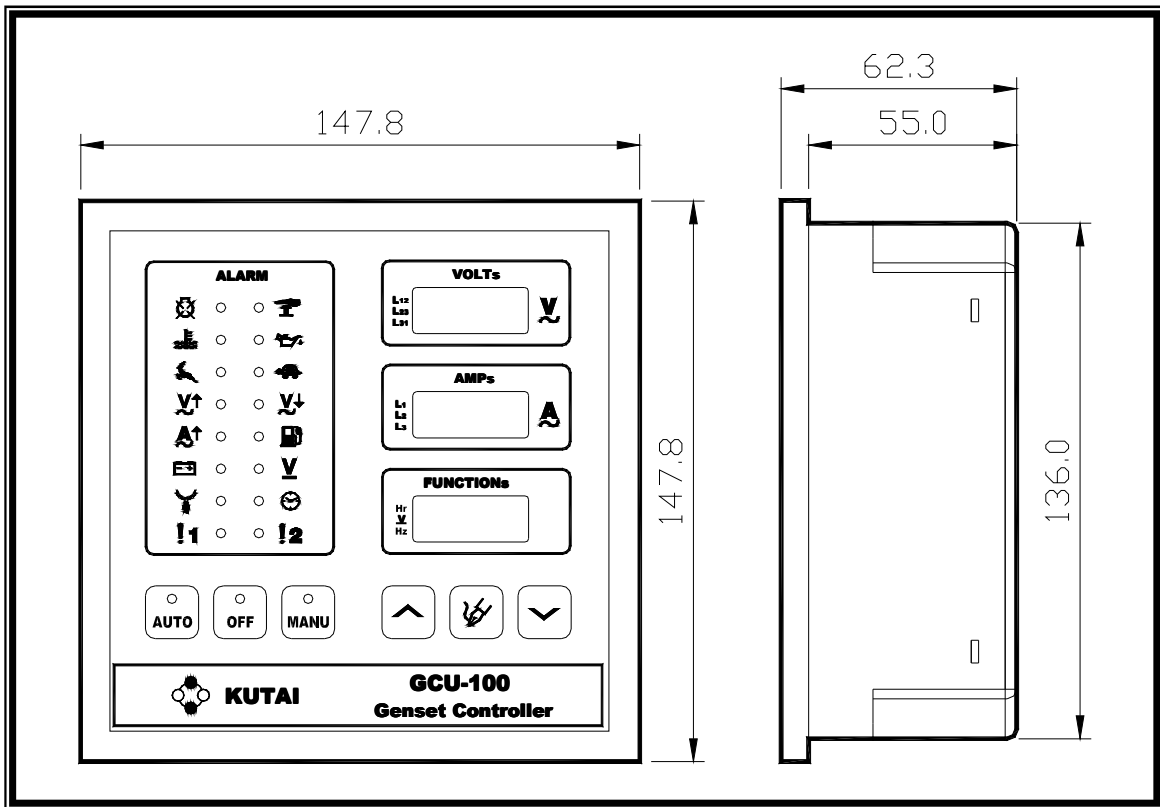


ICON	DESCRIPTION	ATTENTION
	Auto	Press to enter AUTO mode
	Off	Press to enter OFF mode
	Manual	Press to enter MANU mode
	Increase / Selection	Under system setting, press to increase value Under operation, press to select and display different phase voltage reading
	Program / Selection	Under OFF mode, press for 4 sec. To enter setting Under operation, press to select and display different phase current reading
	Decrease / Selection	Under system setting, press to decrease value Under operation, press to select and display AC frequency, battery volt or engine running hours

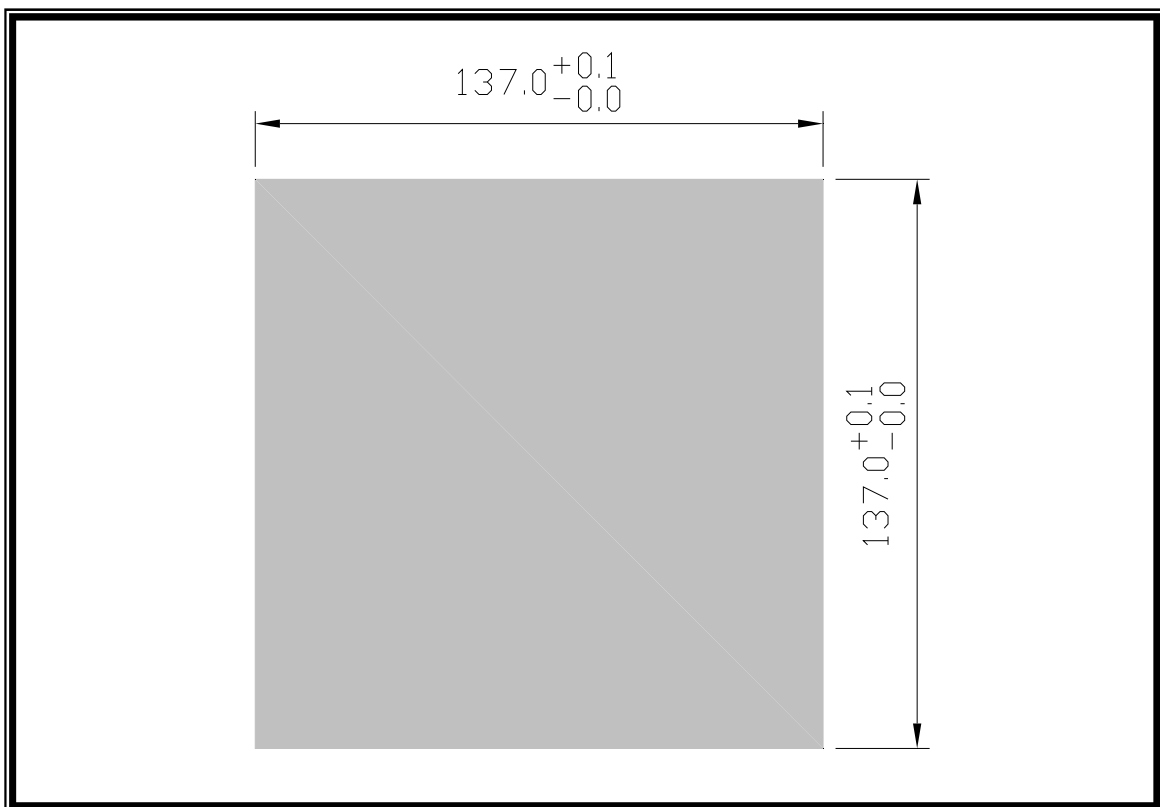
## 1.2 Rear panel layout



1.3 Unit Dimensions (Measurement : mm)



1.4 Panel Cut-out (Measurement : mm)



## 2. OPERATION

### 2.1 Summary

GCU-100 Operation Mode :

1. AUTO : Automatic Operation Mode
2. MANU : Manual Operation Mode
3. OFF : Engine Stop / Reset Mode

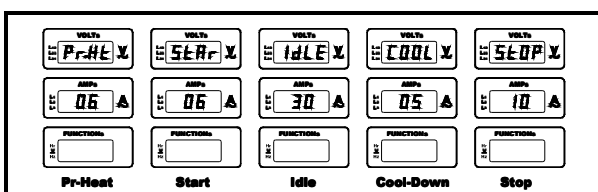
Operation Mode is selected via push button located on the front panel. Under all circumstances only single operation can be selected at once. Beside the operation mode buttons, there are also Increase, Decrease and Set / Select button. During normal genset operation, by pressing the Increase, Decrease and Set / Select button enables operators to obtain immediate operation parameter / value.

### 2.2 AUTO Mode

Under AUTO Mode the start and shutdown of the genset is completely governed by the module. When received a remote start signal, the module automatically starts the genset to provide power. To enter AUTO Mode, press the [ AUTO ] button and the LED above the button will begin to flash continuously. When remote start signal is received the LED indicator will stop flashing and illuminate continuously to indicate the status of entering the AUTO Mode start sequence.

The module will first initiate the Pre-heat countdown timer set by the user and display "Pr.Ht" on the "VOLTS" display screen and timer countdown on "AMPs" display screen.

When the Pre-Heat countdown is completed, the module will continue the engine start sequence and begin to crank start the engine, the starter motor crank timer is according to the user's setting, and display "StAr" on the "VOLTS" display screen and countdown timer on the "AMPs" display screen. If engine can not successfully start within the crank start timer countdown, the module will return engine Pre-Heat to execute start sequence for the second time. If the engine continues to fail start then the module will determine the situation as engine start failure and display "FAIL" on the display screen in the same time illuminate the engine start failure LED on the panel and activate the failure warning alarm signal output.



The GCU-100 determines if the genset is operable by the conditions listed below, when any of the condition is achieved, the module will immediately dis-energize the starter motor to prevent damage to the starter motor cause by the high engine speed.

- Engine oil pressure is built up (oil pressure switch activated).
- Rated AC voltage is achieved.
- Rated AC frequency reaches 18Hz and above.
- MPU detects 20% and above of the rated RPM.

GCU-100 also provides engine idle function. Once the engine is successfully fired and operating "IdLE" will be displayed on the "VOLTS" display screen and timer countdown displayed on the "AMPs" display screen. The idle function can be omitted by the setting if not required.

If the Idle function is cancelled, or timer countdown is completed, the GCU-100 will execute a 30 seconds countdown timer to let all standard parameter to build up and stabilize. If the condition fails to do so within 30 seconds then the module will stop the engine and display the associated failure and warning signals.

If the remote start signal disappears during operation, the module will execute Engine Cool-down timer countdown and all associated settings. The module will display "COOL" on the "VOLTS" display screen and countdown timer on the "AMPs" display screen. If the remote start signal re-appears during the engine Cool-down Timer countdown, then the module will cancel the countdown and return to normal operation and continue to provide load.

When engine Cool-down timer is completed, the module will execute engine stop sequence according to the user specified mode of energize to stop or energize to start. When executing engine stop, "StOP" will be displayed on the "VOLTS" display screen and countdown timer on the "AMPs" display screen.

#### **ATTENTION !!**

**When the generator is on engine Cool-down the GCU-100 remains in effect and if any failure occurs, the module bypasses the countdown and shutdown generator immediately.**

### 2.3 MANU Mode

Under MANU manual mode, user can start and stop the genset manually. When press OFF button under manual mode, the genset will follow the normal program and shutdown the genset accordingly.

The engine start and engine stop program are almost identical under MANU mode, but engine Cool-down timer countdown function is cancelled, please reference from chapter 2.2.

### 2.4 OFF Mode

OFF mode is used for shut down the operation of genset or fault failure reset. If OFF button is pressed during normal operation, the program will omit engine Cool-down timer countdown and execute engine shut down accordingly.

If the module detects major malfunction during operation, it will immediately shut down all the genset operation to prevent further damage to the equipment or operating personnel. The associated failure warning will be displayed on the module panel for maintenance person to carry out necessary repair. If there are multiple failures existing, all of the failure warnings will be displayed on the screen at the same time. To reset the failure warning(s) just press "OFF" button.

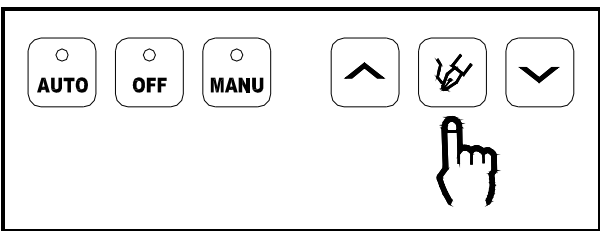
## 3. SYSTEM SETTING & OPERATION

**ATTENTION !!**

**Before the proceeding the system setting, please ensure all wiring and battery is connected.**

### 3.1 System Setting

There are total of 53 system setting entries in the GCU-100, user can program the module according to each different genset operation control and protection preference by pressing the setting key / buttons located on the front panel. To enter system setting switch to OFF mode and press program / select button for 4 seconds.

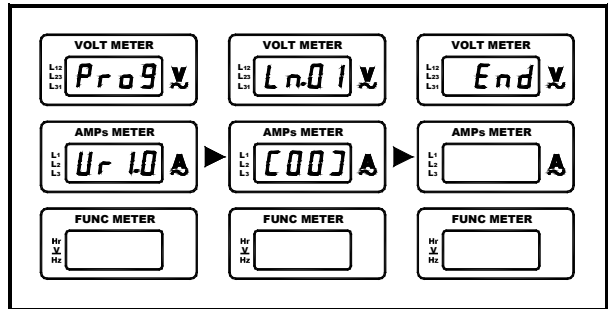


The display screen will display "Prog" & "Vr1.0" for 4 seconds, "Vr1.0" is the program version. Next "Ln.01" will appear on the display screen, representing the program setting entry, [ 00 ] represents the system setting parameter.

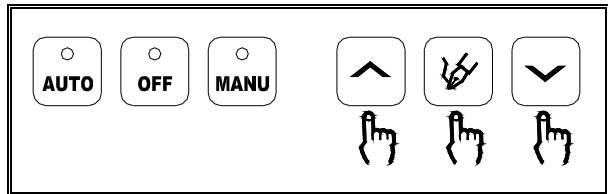
User can change the setting parameter / value via the increase / selection and decrease / selection button. Each time the user presses the program / selection button the system will advance to next setting entry and when press [ OFF ] button the setting will return to previous entry.

After last setting entry is completed or if the panel is left untouched for 10 seconds, the display screen will display "End" and the system will automatically record all setting inputs.

If user wish to terminate the system setting immediately, please press program / select button for 4 seconds until "End" appears on the display screen. (For setting information please reference from 3.13 system setting reference table)



The GCU-100 is released with already factory preset. If user wish to reset to the factory preset just press increase / Selection, program / Selection and decrease / Selection together at the same time for 4 seconds until "Au.PO" appears on the display screen.

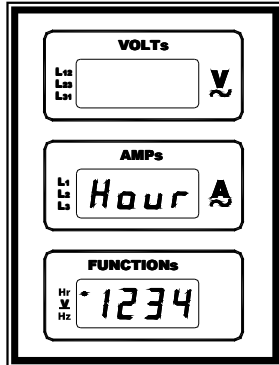




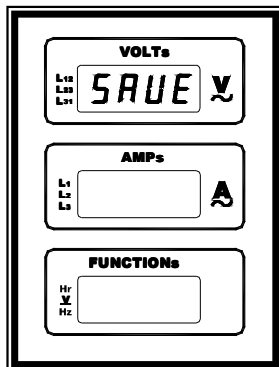
### 3.2 Operation Timer Setting

The engine running hours is accumulated and memorized in the system. The operation timer will not reset itself even with removal of the battery power.

If user wish to reset the operation timer please follow the system setting chapter 3.1 to enter to the system setting and before the Prog Vr1.0 message disappear from the display screen (appears for approximately 4 seconds) press [ OFF ] button for 4 seconds until screen displays "Hour" the [ 1234 / Value ] displayed in the screen represents the total accumulated operation time.



User can press Increase / selection and decrease / selection button to change the timer value. By holding onto the button will help to accelerate the changing value. When setting is completed, press set / select button for 4 seconds until [ SAVE ] appears on the display screen.



If the buttons are left untouched for 10 seconds, the program will terminate the operation timer setting and display [ END ] on the display screen and return to OFF mode and the modification of the operation timer value will not be recorded at this time.

### 3.3 Magnetic Pick-up (MPU) Setting

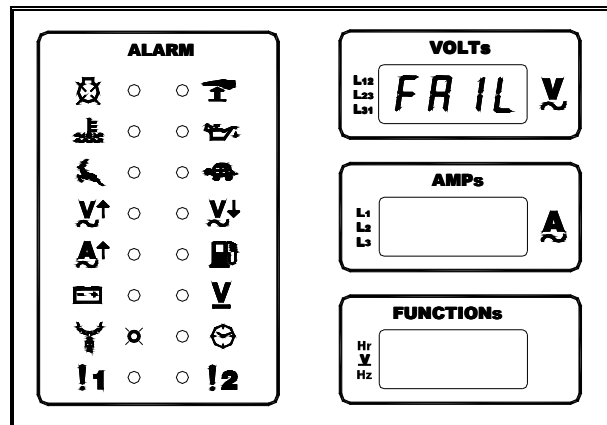
MPU (Magnetic Pick-up) is the magnetic sensing device installed on the flywheel. It detects the engine revolution according to the frequency measured on flywheel gear by the seconds. Most generators with electronics speed controllers / governors are equipped with it.

MPU rated frequency range : 100Hz ~ 10K Hz

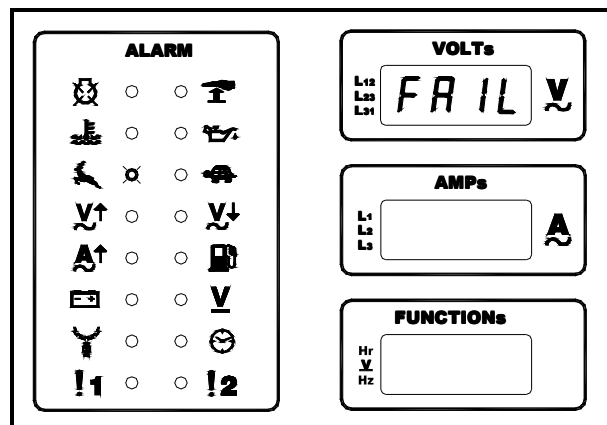
To set up the MPU rated frequency, switch to manual mode and start the engine to let operate to stabilized condition under 50Hz or 60Hz, press increase / selection, program / selection and

decrease selection together at the same time for 4 seconds until [ SAVE ] is displayed on the display screen.

If the module records frequency below 100Hz then it will consider it as MPU failure and display [ FAIL ] on the display screen and in the same time illuminate the corresponding warning LED and the previous frequency setting is ineffective. Please check MPU and wiring for incorrect wiring or bad contact. After the failure is excluded, please repeat the steps to set up the MPU rated frequency.



If the module records frequency over 10K Hz, then it will consider it as MPU failure and display [ FAIL ] on the display screen and in the same time illuminate the corresponding warning LED and the previous frequency setting is ineffective. Please check MPU and engine RPM. After the failure is excluded, please repeat the steps to set up the MPU rated frequency.



Some electronics speed controllers / Governors do not allow sharing the use of magnetic sensing device with other device. If MPU is required to confirm the engine over speed warning in the installation then we recommend an extra independent Magnetic Pick-up (MPU) for sensing input signal. When GCU-100 is programmed to adopt the use of MPU function, and if the MPU is malfunctioning or the signal wiring is open circuited, causing the system unable to read the MPU frequency signal, the system will shutdown the engine operation and MPU signal failure icon will appear on the display screen.

For MPU related settings please refer to System Setting Reference Table entries [ 2 ] \ [ 16 ] \ [ 17 ] \ [ 18 ] \ [ 19 ] \ [ 21 ] \ [ 22 ] \ [ 23 ] .

### 3.4 AC Voltage and Current Display Setting

Under genset normal operation, user can read-off instantaneous full phase voltage and current value from the display screen. The voltage and current measuring ratio is already precisely adjusted. But if the genset is used under heavy capacitive and conductive load then the wave form change may cause the system reading to minor difference from the user measured value.

If user wish to achieve identical readings, please enter system setting and adjust the system AC voltage and current reading according to the user measured value. Once the adjustment is completed, the 3 phases sensing reading will also increase and decrease at the same time and display in the display screen. The over, under voltage and load current protection will use the corrected value as the system's actual reference voltage, and provide monitoring.

For **AC voltage and current display** related settings please refer to system setting reference table entries [ 3 ] \ [ 4 ] \ [ 10 ] \ [ 11 ] .

### 3.5 AC Voltage Protection Setting

The module is equipped with full phase AC over and under voltage protection. If system detects abnormality in AC power, it automatically starts the abnormal AC voltage confirmation timer countdown and if the AC voltage does not recover within the countdown, the system will execute AC voltage protection and display abnormal voltage readings on the display screen and in the same time provide a failure warning output signal. If the voltage recovers within the count down then the system will automatically omit the abnormality.

The GCU-100 provides two kinds of warning and protection mode for such abnormal voltage.

- Engine stop mode : Execute engine stop immediately and display the abnormal reading on the display screen and provide a warning signal output.
- Warning mode : Display the abnormal reading on the display screen and provide a warning signal output. User can use the signal output to disconnect the load.

For AC voltage protection related settings please refer to system setting reference Table entries [ 5 ] \ [ 6 ] \ [ 7 ] \ [ 8 ] \ [ 9 ] .

### 3.6 Engine Over-load Protection Setting

To prevent inappropriate load usage and causing genset failure and damage, the module is equipped with engine over-load protection function. User needs to setup appropriate over load protection setting according to the genset maximum output.

If system detects engine overload, it automatically starts engine over-load timer countdown. If rated load usage does not recover within the countdown, the system automatically execute engine over-load protection and display failure signal on the panel and in the same time provides corresponding failure signal output. If rated load usage is resumed within the countdown timer, then it automatically omit the overload warning.

The GCU-100 provides two kinds of warning and protection mode for engine over-load protection.

- Engine Stop mode : When engine over-load the module will execute engine stop and display failure signal on the panel, in the same time provide corresponding failure signal output.
- Warning mode : display failure signal on the panel, in the same time provide corresponding failure signal output. User can use the signal output to disconnect the load and let genset operate without load to cool down.

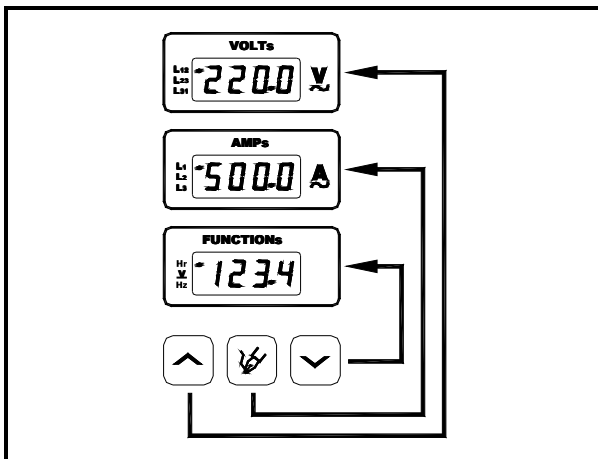
For engine over-load protection related settings please refer to system setting reference table entries [ 12 ] \ [ 13 ] \ [ 14 ] \ [ 15 ] ..

### 3.7 Panel Display Setting

There are two types of parameter display, fixed parameter display and circulating parameter display. Under normal operation the default setting is circulating parameter display and each parameter display is immobilized for 2seconds.

If user wishes to monitor particular parameter, just press the corresponding selection button to switch to fix display the desired parameter or switch back to circulating display.

- Press increase / selection button to interchange between different phase voltages.
- Press program / selection button to interchange between different phase current.
- Press decrease / selection button to interchange between AC frequency, Battery voltage and operation Timer.

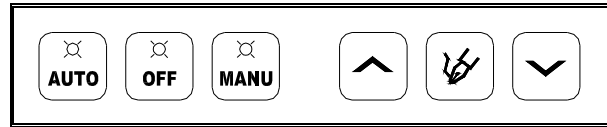


### 3.8 Manual Start and Stop Operation

GCU-100 provides an operation mode similar to a key switch system. This is an operation mode design to instruct the module to deactivate all failure protections, so user can perform adjustment and correction on a newly assembled generator without the module's interference. Under such operation mode user can use the [ AUTO / OFF / MANU ] buttons to start or stop the engine.

Prior to execute manual start or stop operation, user must ensure all wirings are correctly connected. After completing and confirming system setting entry [ 1 ] to entry [ 52 ], proceed to entry [ 53 ] and choose the manual setting. At this time the AUTO / OFF / MANU LED indicators will all illuminate to notify user to be aware of the current condition. Under such operation mode, the module

will continue to provide all warning signals but cancel the failure warning engine stop protection.



Under the manual start and stop operation, if user wish to start up the generator to perform voltage and engine speed adjustment, just press the [ MANU ] button until the engine is successfully started and the starter motor will disengage immediately. To stop the generator, press the [ AUTO ] button until the engine shuts down completely.

When setting is completed press [ OFF ] button, and the module will automatically adjust the system setting entry [ 53 ] back to normal operation and follow the standard engine stop procedure to shutdown the generator.

For manual start and stop operation related settings please refer to system setting reference table entry [ 53 ] .

**ATTENTION !!**

**Under Manual Start and Stop Operation, all of the protection operations are cancelled. If a major failure occurs during the operation, the module will not execute engine stop automatically and user will need to manually activate engine shutdown. We strongly suggest only use such operation for initial configuration of the generator only and not for providing load for long period of time to prevent possible damage to the genset.**

### 3.9 User Specified Monitoring Setting Alarm1 and Alarm2

The module reserves 2 sets of free unspecified monitoring and alarm outputs, to allow user to perform extra monitoring and warning protection.

For user specified monitoring Alarm1 and Alarm2 related settings please refer to system setting reference table entries [ 45 ] - [ 46 ] - [ 47 ] - [ 48 ] - [ 49 ] - [ 50 ] .

### 3.10 Service and Maintenance Setting

The scheduled service and maintenance setting can be configured by the user. When the engine operation time expires, the corresponding warning LED will illuminate to remind the user to perform necessary scheduled service and maintenance. Every defined value equals to 10 hrs of operating time. For example if enter 20, then the scheduled timer is set to 200 hrs (20 \*10 hrs = 200 hrs).

Once service maintenance is completed, user can use the [ 52 ] Erase service and maintenance warning signal and reset timer cycle setting to clear the service and maintenance warning and restart the timer countdown. For service and maintenance related settings please refer to system setting reference table entries [ 51 ] 、 [ 52 ] .

### 3.11 Engine Idle Operation Function

If genset immediately connects to full load operation when the engine only just started, the sudden heavy operation may cause the engine to shut down. To prevent this from happening, the module is equipped with engine Idle operation function, a timer countdown to allow the engine to establish proper operating temperature and condition before connect to load. User can choose to activate and deactivate the function according to the condition on site.

For engine idle operation function related settings please refer to system setting reference table entry [ 33 ] .

### 3.12 Charge Alternator Excitation Function

GCU-100 can provide intermitting excitation to the charge alternator D+ terminal in the early stage of engine operation. During the normal genset operation the module will continue to monitor the D+ terminal to see if the charge alternator is working properly in charging the battery. When a charger alternator is malfunctioning, the module will illuminate the corresponding charge alternator failure warning LED

For charge alternator excitation function related settings please refer to system setting reference table entries [ 39 ] 、 [ 40 ] 、 [ 41 ] .

### 3.13 System Setting Reference Table

















ITEM	DESCRIPTION	SETTING	FACTORY SETTING
1	Phase Selection (3Ø 3W 1Ø 3Wor 1Ø)	00 → 3Ø 3W 01 → 1Ø 3W 02 → 1Ø	<b>00</b>
2	AC Frequency (60 or 50 Hz)	00 → 60 Hz    01 → 50 Hz	<b>00</b>
3	AC voltage display function setting	00 → Cancelled 01 → Tune Up 02 → Tune Down	<b>00</b>
4	AC voltage display adjustment setting	00~ 99 V	<b>0V</b>
5	Abnormal AC voltage confirmation timer setting	00 ~ 99sec (00 – Option Cancelled)	<b>15</b>
6	Under voltage protection actuation value	08 ~ 47	<b>18 (180V)</b>
7	Under voltage protection execution mode selection	00 → Warning    01 → Stop	<b>01</b>
8	Over voltage protection actuation value	11 ~ 50	<b>25 (250V)</b>
9	AC over voltage protection execution mode selection	00 → Warning    01 → Stop	<b>01</b>
10	AC current display function setting	00 → Cancelled 01 → Tune Up 02 → Tune Down	<b>00</b>
11	AC current display adjustment setting	00~ 99 A	<b>0 A</b>
12	Rated Current Transformer (CT) ampere setting For example : Default value set to “5” = 100A/5A Current Transformer is selected (If external rated Current Transformer rating differs from the specified. It will result in inaccurate current value readings)	1 → 50/5    2 → 100/5    3 → 150/5 4 → 200/5    5 → 250/5    6 → 300/5 7 → 400/5    8 → 500/5    9 → 600/5 10 → 750/5    11 → 800/5    12 → 1000/5 13 → 1200/5    14 → 1500/5    15 → 1600/5 16 → 2000/5    17 → 3000/5	<b>12</b>
13	Engine overload timer setting	00 ~ 99sec (00 – Option Cancelled)	<b>0</b>
14	Engine Overload protection setting (The setting value is the percentage ratio from the primary current of Current Transformer) For example: CT=1000/5A and Overload protection setting is 80%, then the over current activation will be 1000A * 80% = 800A	30% ~ 99%	<b>80%</b>
15	Engine over-load protection execution mode selection	00 → Warning    01 → Stop	<b>01</b>
16	Engine over-speed setting	51 ~ 75HZ	<b>65HZ</b>
17	Engine over-speed confirmation timer setting	00 ~ 99 sec (00 – Option Cancelled)	<b>05</b>
18	Engine under-speed setting	40 ~59HZ	<b>55HZ</b>
19	Engine Under-speed confirmation timer setting	00 ~ 99 sec (00 – Option Cancelled)	<b>10</b>
20	Engine under-speed protection execution mode selection	00 → Warning    01 → Stop	<b>01</b>
21	Magnetic Pick-up (MPU) installation	00 → NO    01 → Yes	<b>00</b>
22	Magnetic Pick-up (MPU) signal used for confirming engine over speed	00 → NO    01 → Yes	<b>00</b>
23	Magnetic Pick-up (MPU) Failure execution mode selection	00 → Warning    01 → Stop	<b>00</b>
24	Oil pressure sensor type NO (Normal Open) or NC (Normal Close)	00 → NO    01 → NC	<b>01</b>

ITEM	DESCRIPTION	SETTING	FACTORY SETTING
25	Low oil pressure confirmation timer setting	02 ~ 99 sec	<b>05</b>
26	Water temperature sensor type NO (Normal Open) or NC (Normal Close)	00 → NO      01 → NC	<b>00</b>
27	High water temperature confirmation timer setting	02 ~ 99 sec	<b>05</b>
28	Engine pre-heat timer setting (Countdown)	02 ~ 99 sec	<b>06</b>
29	Allowed engine start attempt	01 ~ 09	<b>03</b>
30	Starter motor cranking crank timer setting	02 ~ 30 sec	<b>06</b>
31	Oil pressure switch selected for confirming engine start	00 → No      01 → Yes	<b>01</b>
32	Magnetic Pick-up (MPU) selected for confirming engine start	00 → No      01 → Yes	<b>00</b>
33	Engine idle speed timer setting	00 ~ 99 sec	<b>00</b>
34	Engine stop timer setting	02 ~ 99 sec	<b>10</b>
35	Engine stop (Energize to stop or energize to start)	00 → Energize to Stop 01 → Energize to start	<b>00</b>
36	Engine cool-down timer setting	00 ~ 60 min	<b>00</b>
37	Battery under voltage protection setting	08 ~ 23 VDC	<b>08 VDC</b>
38	Battery over voltage protection setting	13 ~ 35 VDC	<b>32 VDC</b>
39	Charge alternator failure confirmation timer setting	00 ~ 99 sec (00 – Option Cancelled)	<b>10</b>
40	Charge alternator D+ terminal minimum voltage Setting	08~ 25 VDC	<b>08 VDC</b>
41	Charge alternator failure execution	00 → Warning    01 → Stop	<b>00</b>
42	Fuel level Switch type NO (Normal Open) or NC (Normal Close)	00 → Not Available 01 → NO      02 → NC	<b>00</b>
43	Low fuel level confirmation timer	02 ~ 99 sec	<b>10</b>
44	Low fuel level warning execution	00 → Warning    01 → Stop	<b>00</b>
45	User defined Alarm1 as NO (Normal Open) or NC (Normal Close) type	00 → No Alarm1 input signal 01 → NO      02 → NC	<b>00</b>
46	Customer defined Alarm1 confirmation timer	02 ~ 99 sec	<b>10</b>
47	User defined Alarm1 warning execution	00 → Warning    01 → Stop	<b>00</b>
48	Customer defined Alarm2 as NO (Normal Open) or NC (Normal Close) type	00 → No Alarm2 input signal 01 → NO      02 → NC	<b>00</b>
49	User defined Alarm2 confirmation timer	02 ~ 99 sec	<b>10</b>
50	User defined Alarm2 warning execution	00 → Warning    01 → Stop	<b>00</b>
51	Engine service and maintenance timer setting (Every defined value represents 10 hrs)	00 ~ 25 (00 Option Cancelled)	<b>00</b>
52	Erase service and maintenance warning signal and reset timer cycle	00 → NO      01 → Yes	<b>00</b>
53	Manual start and stop operation mode	00 → Normal    01 → Manual	<b>00</b>

## 4. FAILURE WARNING DESCRIPTION

### 4.1 Failure Signal Reference Table

Icon Reference Table

WARNING SIGNAL	DESCRIPTION	EXECUTION
	Engine Start Failure	Shutdown
	Emergency Shutdown Activated	Shutdown
	High Water Temperature	Shutdown
	Low Oil Pressure	Shutdown
	Over-speed	Shutdown
	Under-speed	Shutdown or Warning
	AC over voltage	Shutdown or Warning
	AC under voltage	Shutdown or Warning
	Genset Over-load	Shutdown or Warning
	Low Fuel Level	Shutdown or Warning
	Charge alternator failure	Shutdown or Warning
	Low Battery Voltage Warning	Warning
	MPU Signal Failure	Shutdown or Warning
	Service & Maintenance Warning	Warning
	Spare Setting 1	Shutdown or Warning
	Spare Setting 2	Shutdown or Warning

### 4.2 Warning Mode

If a failure occurs during operation, but the condition do not pose immediate danger to the operator or genset, then the module will allow generator to continue to operate and provide load and corresponding failure warning signal LED will be illuminated and flash continuously, in the same time

activate the warning signal output. Once the failure is serviced and eliminated, the warning signal will automatically reset itself and return to normal operation.

### 4.3 Shutdown Mode

If a major failure occurs during operation which can cause danger to the operating personnel and the equipments, the module will execute a immediate engine shut down and display corresponding failure warning signals and in the same time activate the warning signal output to alarm the maintenance personnel to service and fix the problem. Once the failure is serviced and eliminated, user can press [OFF] button to reset the failure warning and also confirm if the failure is properly eliminated.

## 5. SPECIFICATION

ITEM	SPECIFICATION
DC Supply	9 ~ 36 VDC
Alternator Input Range	15 ~ 510 VAC (Ph-Ph)
Alternator Input Frequency	50 ~ 60 Hz
Start Signal Output	10 Amp @ 12/24VDC
Fuel Solenoid Signal Output	10 Amp @ 12/24VDC
Preheat Signal Output	10 Amp @ 12/24VDC
Accessory "ON" Output	10 Amp @ 12/24VDC
Idle Control Conductor Capacity	10 Amp @ 12/24VDC
Warning Signal Output	10 Amp @ 12/24VDC
Overload Alarm Output	1.0 Amp @ 12/24VDC
Normal Power Connect to Load Signal	8 Amp @ 250VAC
Stand by Power Connect to Load Signal	8 Amp @ 250VAC
Power Consumption	Under 5W
Operating Temperature	-20 to 70°C
Relative Humidity	Under 95%
Rated CT Capacity	Above 2.5VA
Secondary Rated current	5A
Weight	604 g ± 2%

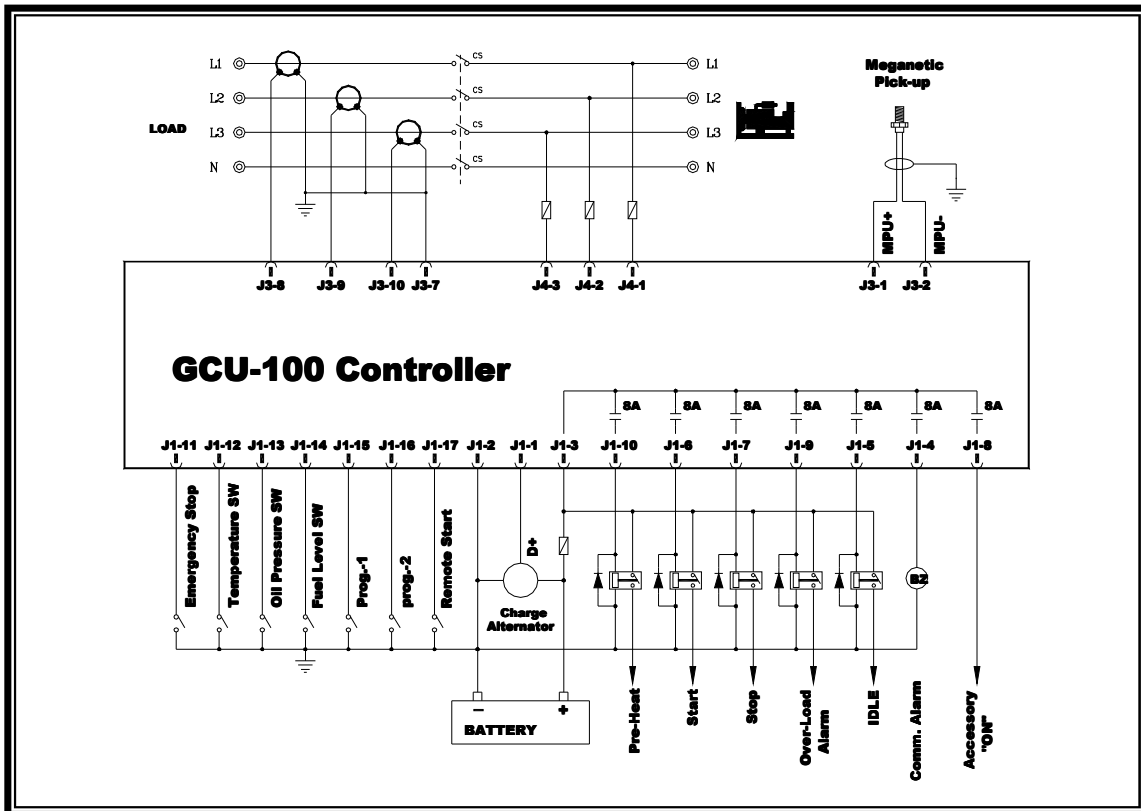
## 6. TERMINAL & WIRING DESCRIPTION

### 6.1 Connection Detail

PIN No.	DESCRIPTION	ATTENTION
J1-1	Charge alternator D+ terminal input	Connect to charge alternator D+ terminals
J1-2	Battery negative ( -V )	Connect to battery negative
J1-3	Battery positive ( +V )	Connect to battery positive (12 / 24V)
J1-4	Failure signal output	Used to control external alarm buzzer Supply (+V) (Max. rated output 8Amp)
J1-5	Idle speed control signal output	Connect to electronic governor for idle speed control Supply (+V) (Max. rated output 8Amp)
J1-6	Starter motor signal output	Connect to starter motor Supply (+V) (Max. rated output 8Amp)
J1-7	Fuel solenoid signal output	Connect to fuel solenoid or fuel valve control Supply (+V) (Max. rated output 8Amp)
J1-8	Accessory on output	Connect to the panel lamp (Max. rated output 8Amp)
J1-9	Overload alarm signal output	Used to trip the AC output breaker Supply (+V) (Max. rated output 8Amp)
J1-10	Preheat signal output	Used to control the internal heater Supply (+V) (Max. rated output 8Amp)
J1-11	Emergency stop signal output	Connect to panel emergency stop push button
J1-12	High water temperature signal input	Connect to water temperature switch
J1-13	Low oil pressure signal input	Connect to oil pressure switch
J1-14	Low fuel signal input	connect to fuel level switch
J1-15	User defined signal input 2	Negative input when action
J1-16	User defined signal input 1	Negative input when action
J1-17	Remote start signal input	Connect to A.T.S or remote start terminal
J1-18	Spare terminal	
J2-1	Spare terminal	
J2-2	Spare terminal	
J2-3	Spare terminal	
J3-1	Magnetic Pick-up input	Connect to magnetic Pick-up to monitor engine speed
J3-2	Magnetic Pick-up input	Connect to magnetic Pick-up to monitor engine speed
J3-3	Spare terminal	
J3-4	Spare terminal	
J3-5	Spare terminal	
J3-6	Spare terminal	
J3-7	CT (COMM) terminal input	Connect to external CTs common position
J3-8	CT Secondary for (L1)	Connect to secondary phase R (L1) monitoring CT
J3-9	CT Secondary for (L2)	Connect to secondary phase S (L2) monitoring CT
J3-10	CT Secondary for (L3)	Connect to secondary phase T (L3) monitoring CT
J4-1	AC Input (L1)	Connect to AC input phase R
J4-2	AC Input (L2)	Connect to AC input phase S
J4-3	AC Input (L3)	Connect to AC input phase T



### 6.2 Three Phase System External Wiring Diagram



### 6.3 Single Phase System External Wiring Diagram

