

# GTR-205 Generator Controller Manual



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## 1 INTRODUCTION

The **GTR-205** is a full digital Gen-set controller equipped with all basic functions. The LCD panel that includes: error message display, faulty input detection, analog signal measurement and generator status. When the error occurred, GTR-205 shuts down the engine and real-time diagnosis can be done easily by reading LCD panel information. Furthermore, parameters can be adjusted from front panel in accordance with user's requirement by six setup keypad. Operating DC power range is from 8 to 38 volts and low power consumption in standby mode which is suitable for small battery charger.

## 2 FEATURE

- Analog Display includes: Coolant temperature, Oil pressure, Running hour, AC Frequency, Engine speed, DC voltage, 3 phases AC voltage, 3 phases AC current, 3 phases to neutral AC voltage, utility 3 phases voltage and utility frequency.
- Protection information includes: Over speed (RPM), Low Frequency, High Frequency, High Coolant Temperature, Low Oil pressure, Over Crank, Low Fuel Level, Low Coolant Level, Low Battery, Sensor Open and Short, 24 error recorders, Fail to start recorder, and Total start attempts recorder.
- System Operation Buttons: Off, Auto, Manual, Test, Stop, and Rated / Idle.
- Parameters are Programmable by six setup keypads on the front panel.
- Super wide operating DC power range from 8 to 38 volts.
- Two colors back light makes it easier to distinct system status.
- 10 output Power Relays not only provide several functions but also endure heavy power capacity
- Equipped with high security terminal connector that provides easy plug-in and removal.
- Ultra low power consumption which is suitable for small battery charger
- Build in full functions of ATS controller.

## 3 Specifications

- DC power input range  
8 ~ 38 VDC
- Power consumption  
Max. 4 W, 300 mA @ 12 V; 160 mA @ 24 V
- Measured Frequency  
Range: 0 ~ 80 Hz  
Minimum detecting volts: 10 V (AC)  
Accuracy: 99.8%
- DC volt meter  
Range: 10 ~ 31 V  
Accuracy: 99.5%
- AC volt meter  
Range: 15 ~ 512 V  
Accuracy: 99.5%

- AC current meter  
Range: Converted via CT ratio  
Accuracy: 99.5%
- Output capacity  
8A / 30 V
- Operating temperature  
-30 °C ~ 70 °C
- Storage temperature  
-40 °C ~ 100 °C
- Dimensions  
216 mm x 144 mm x 89mm
- Panel cutout  
210 mm x 138 mm
- Weight  
960 g

## 4 Panel descriptions

### 4.1 Front view

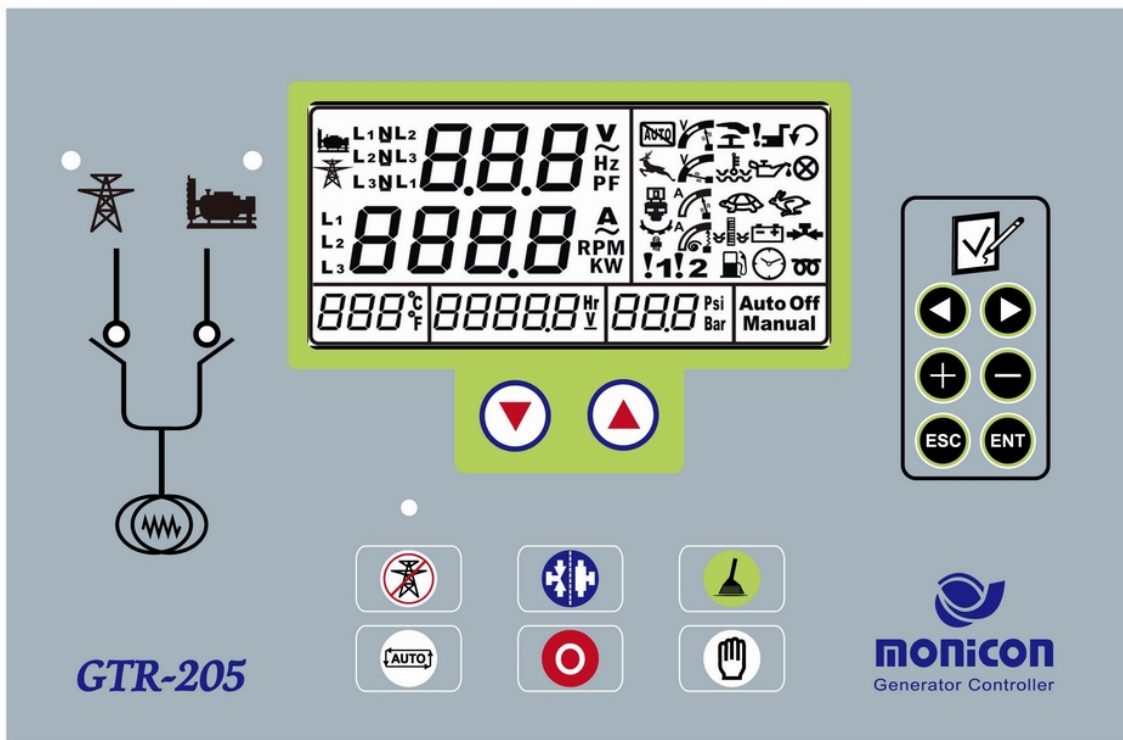
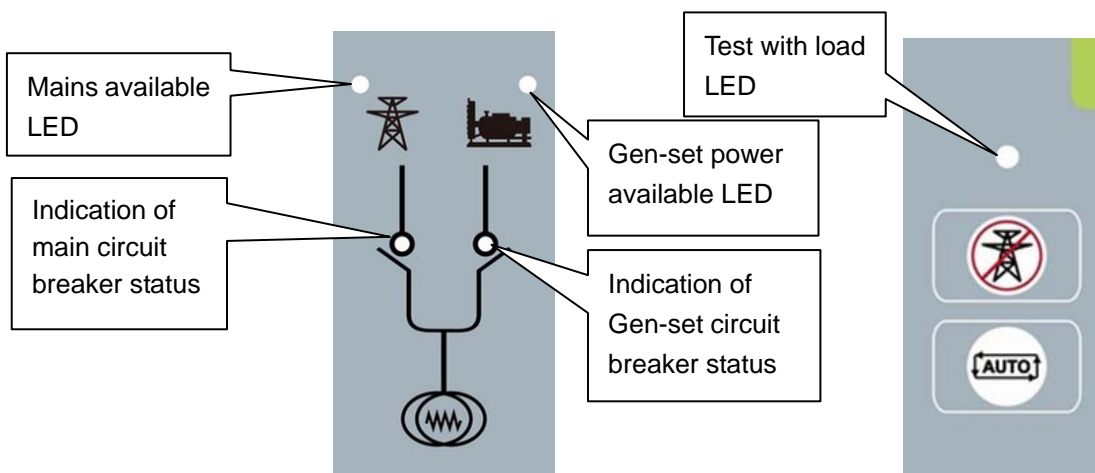


Fig. 1

## 4.2 LED illustration



### 4.2.1 Mains available LED

This LED lights up when the mains is normal and able to take load.

### 4.2.2 Gen-set available LED

This LED lights up when the Gen-set power is normal and able to take load.

### 4.2.3 Main Circuit Breaker Status LED

This LED lights up when terminal T35 and terminal T36 are wire shorted.

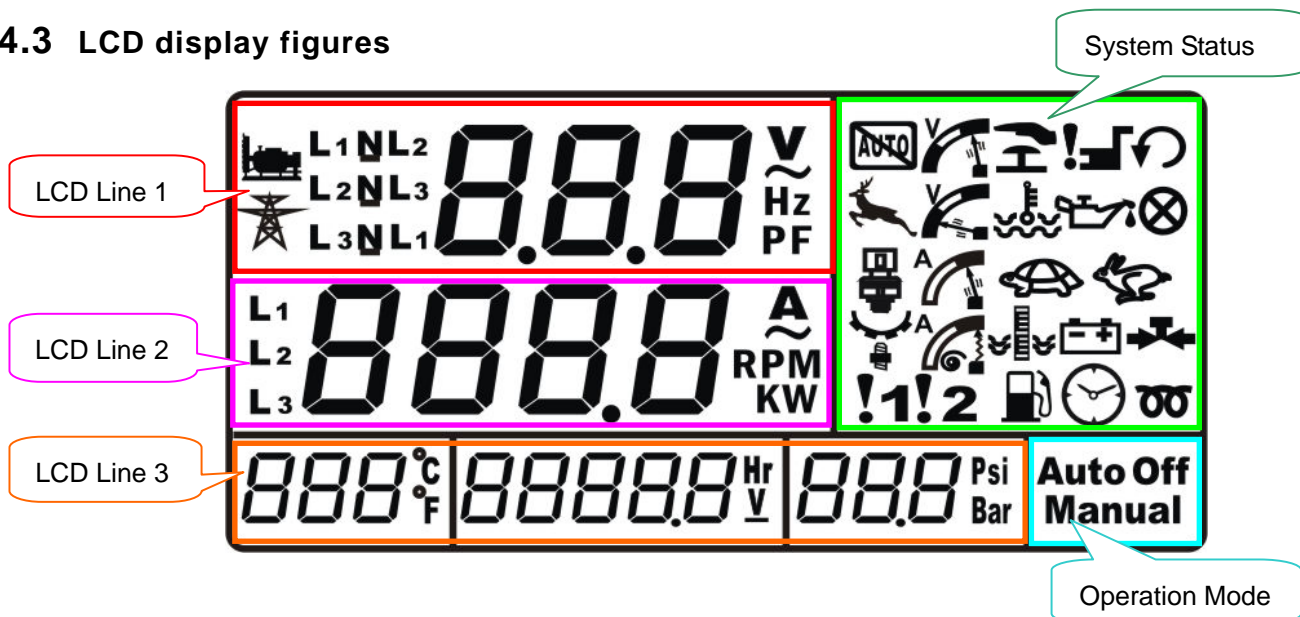
### 4.2.4 Gen-set power Circuit Breaker Status LED :

This LED lights up when terminal T43 and terminal T44 are wire shorted.

### 4.2.5 Test with load LED

Push  button to toggle this LED on and off. (see description below)

## 4.3 LCD display figures



#### 4.4 LCD Icon Explanations























Icon	Explanation	Icon	Explanation
	Emergency stop	<b>Auto</b>	Auto mode
	High coolant temperature	<b>MANUAL</b>	Manual mode
	Over speed	<b>Off</b>	Off mode
	Low frequency	<b>V</b>	Unit of AC voltage
	Low battery	<b>A</b>	Unit of AC ampere
	Low fuel level	<b>V</b>	Unit of DC voltage
	Low oil pressure	<b>Hz</b>	Unit of frequency
	Low coolant level	<b>RPM</b>	Unit of revolution
	System not in auto mode	<b>Hr</b>	Running hours
	Over crank	<b>°C</b>	Unit of Celsius
	Over frequency	<b>°F</b>	Unit of Fahrenheit
	Pre-heat	<b>Psi</b>	Unit of pressure
	Running	<b>Bar</b>	Unit of pressure
	Stopping		Gen-set system
	Idle Mode		Mains system
	High Voltage	<b>oPn</b>	Sensor is open
	Low Voltage	<b>ShE</b>	Sensor is shorted
	AC short circuit		Sensor alarm/Error occurred
	AC overload	<b>PARA</b>	Parameter number
<b>!1</b>	IN 1 Action	<b>SAVE</b>	Save configuration
<b>!2</b>	IN 2 Action	<b>UP_L</b>	Configuration upper limit
		<b>bt_L</b>	Configuration lower limit

Fig. 2

#### 4.5 LCD Information

- Battery DC voltage readout
- Running hours
- Coolant temperature readout
- Oil pressure readout
- AC frequency readout
- RPM readout
- Gen-set L1-L2 phase voltage readout
- Gen-set L2-L3 phase voltage readout
- Gen-set L3-L1 phase voltage readout
- Gen-set L1 phase ampere readout
- Gen-set L2 phase ampere readout
- Gen-set L3 phase ampere readout
- Gen-set L1-N phase Voltage readout
- Gen-set L2-N phase voltage readout
- Gen-set L3-N phase voltage readout

- Mains L1-L2 phase voltage readout
- Mains L2-L3 phase voltage readout
- Mains L3-L1 phase voltage readout
- Mains frequency readout
- Error records
- Failed to start record
- Total start attempts record

## 4.6 Operating keypads

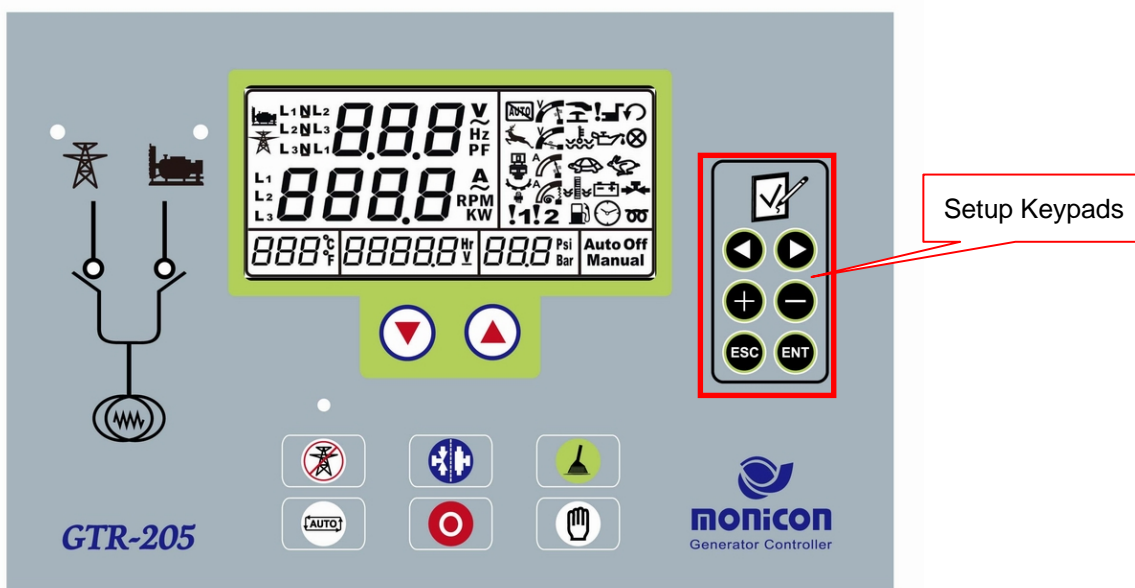






Fig.2 2

### 4.6.1 Setup Keypads

- 
  - a. Under the CODE entry mode, this keypad represents the fourth-digit.
  - b. Under the PARAMETER setting mode, this keypad switches to next parameter.
- 
  - a. Under the CODE entry mode, this keypad represents the third-digit.
  - b. Under the PARAMETER setting mode, this keypad switches to previous parameter.
- 
  - a. Under the CODE entry mode, this keypad represents the second-digit.
  - b. Under the PARAMETER setting mode, this keypad increases the setting.
- 
  - a. Under the CODE entry mode, this keypad represents the first-digit.
  - b. Under the PARAMETER setting mode, this keypad reduces the setting.

**ESC** Enter or Exit the parameter setting mode

**ENT** Confirm and save the settings

#### 4.6.2 Information swapping keypad



These two keypads are used for display gen-set information alternately



**LCD line 1 :** L1-L2 gen-set voltage ⇔ L2-L3 gen-set voltage ⇔ L3-L1 gen-set voltage ⇔ Gen-set frequency ⇔ L1-N gen-set voltage ⇔ L2-N gen-set voltage ⇔ L3-N gen-set voltage ⇔ L1-L2 utility voltage ⇔ L2-L3 utility voltage ⇔ L3-L1 utility voltage ⇔ Utility Frequency ⇔ L1-L2 gen-set voltage ⇔.....

**LCD line 2:** L1 gen-set current⇔ L2 gen-set current⇔ L3 gen-set current ⇔Engine RPM ⇔ L1 Gen-set current ⇔.....

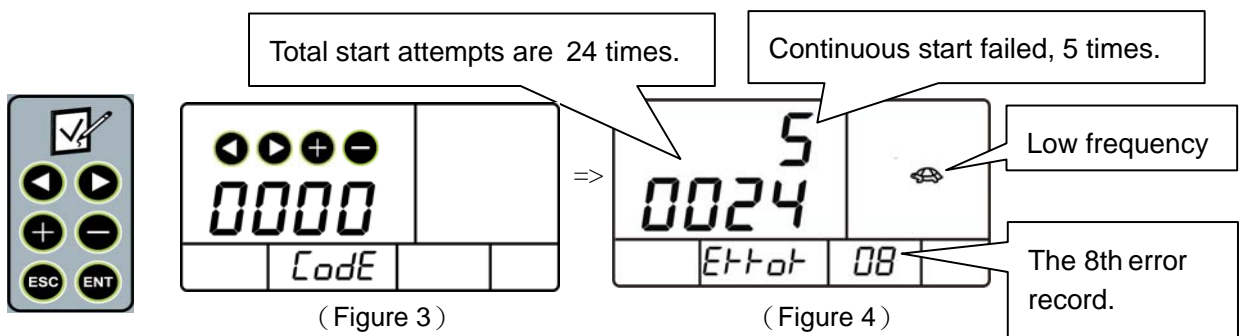
**LCD line 3 :** Coolant temperature · Run hours · Oil pressure ⇔ Coolant temperature · Battery voltage · Oil pressure ⇔ Coolant temperature · Run hours · Oil pressure...




#### 4.7 Enter code mode

The GTR205 enters the PARAMETER setting mode via the “OFF” mode by following steps.

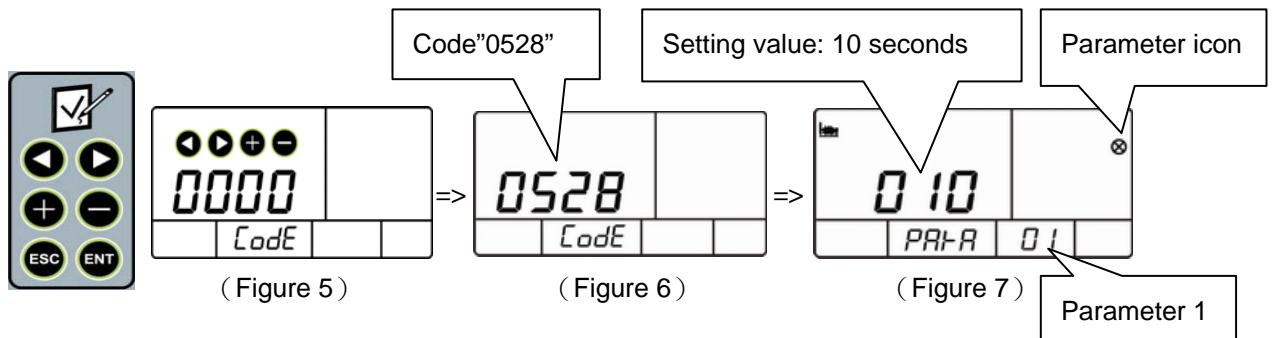
1. Under the OFF mode, press the keypad **ESC** to enter the CODE mode.
2. Press the keypad **ENT** under the code of “0000”, the GTR-205 shows the information about the total start attempt record and failed to start as well as error record. (see Figure 4)
3. Press the keypad **ENT** under the code display “0528”, the GTR-205 goes into the PARAMETER setting mode. (see Figure 6)

##### 4.7.1 Total start attempts, Failed to start record, and Error record.



Press the keypad **ENT** under code display “0000”, the GTR-205 shows the information of total start attempts and failed to start as well as error record. As the figure 4, LCD shows continuous start failed are 5 times and total start attempts are 24 times as well as the eighth error record is  (Low frequency). Press keypad **ENT** to see the previous error record and press  or  to see the previous or next error record.

### 4.7.2 CODE mode entry



Under the OFF mode, Press the keypad **ESC** to enter the CODE mode. Press the keypad **▶** 5 times and press the keypad **+** 2 times and press the keypad **–** 8 times to get the code “0528”. As shown on figure 6. To enter the PARAMETER setting mode by pressing **ENT** under correct code input, the GTR-205 switches into parameter setting mode and parameters switch alternately by pressing the keypad **▶** or **◀**.

### 4.7.3 Parameter setting mode

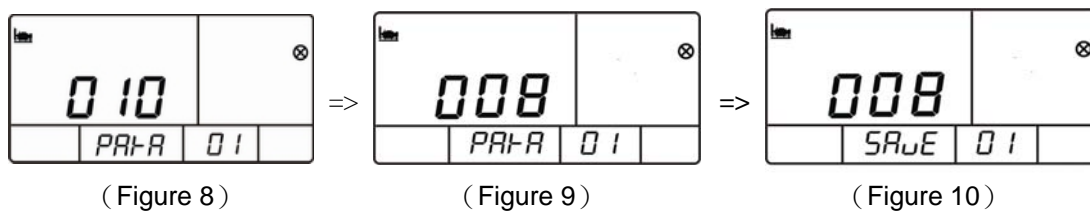
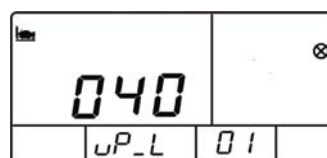


Figure 8 shows the Parameter 1 and the setting is 10 seconds. By pressing **–** or **+** to decrease or increase the setting. For example, To decrease the setting from 10 to 8 seconds by pressing the keypad **–** twice (As Figure 9) and then press the confirmation keypad **ENT**, the LCD shows “SAVE” on the place of “PARA” for half second. The “SAVE” shows up that means the parameter setting has been changed successfully. In the meantime, the LCD screen changes from Figure 9 to Figure 10 for one second and then back to figure 9 again. To increase the setting from 10 to 12 seconds, press the **+** keypad twice and then save the setting. To discard the parameter setting, press the keypad **ESC** to return to the previous page or pressing the keypad **◀** or **▶** to go to next or previous parameter.

### 4.7.4 Parameter setting value range



(Figure 11)



(Figure 12)

By pressing **+** or **–** may reach the upper or lower limit of parameter setting value. For example : The Stop duration **⊗** ranges from 5 to 40 seconds.

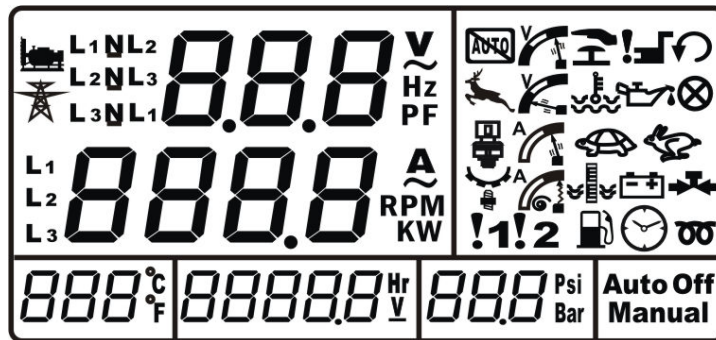


If the LCD shows  $bE\_L$  that means the setting has reached to bottom limit and  $uP\_L$  means that the setting has reached the upper limit.

## 5 Operation instruction

5.1. Please refer to Figure 17 for wiring connection.

5.2. When the GTR-205 connects to the DC power, the LCD panel lights up all icons.





5.3. After one second, the GTR-205 is in OFF mode and information page displays L2-L3 voltage, L2 current and Battery voltage.


### 5.4. Operating Buttons





#### 5.4.1 Manual:



Press the button  for 2 seconds under the mode of AUTO or OFF to start the engine. Then LCD shows the icon  representing it is in the state of pre-heat. After pre-heat, engine starts immediately. If engine failed to start, the GTR-205 returns to the OFF mode. The pre-heat state may not perform, if the parameter setting of pre-heat is 0 second.

#### 5.4.2 AUTO :





Press the button  to put the GTR-205 into AUTO mode. Following are two scenarios:

(A) In this mode, the GTR-205 detects utility to decide to start the engine or not. During the utility failure, the GTR-205 starts preheat function and LCD shows the icon  if pre-heat state is enabled. After pre-heat state is finished, the engine starts to crank. If the engine failed to start, the system returns to the pre-heat state and cranks the engine again. For example, the conditions and settings are given as follow: (a) Deactivate all Crank sensors such as release starter motor by (i) oil pressure switch (ii) frequency and (iii) RPM. (b) Parameter 1: Stop duration is 10 seconds; (c) Parameter2: Pre-heat duration is 0 second and (d) Parameter 3: Crank attempts are 3 times. Under these settings and detected the utility failure, the engine skips preheat function and cranks 10 seconds. The engine stops for 10 seconds if it failed to start. The LCD shows the over crank icon  and triggers the alarm, if 3 attempts of cranking are failed. If engine is running and utility is restored, the GTR-205 activates the cooling mode. After cooling time is


expired, the GTR-205 switches back to standby mode.

(B) In this mode, the GTR-205 detects the terminal T18 and T19 to decide to start the engine or not. If T18 and T19 are wire shorted, LCD shows the icon  if pre-heat state is enabled. After pre-heat state is finished, the engine starts to crank. If the engine failed to start, the system returns to the pre-heat state and start to crank the engine again. For example, the conditions and settings are given as follow: (a) Deactivate all Crank sensors such as release starter motor by (i)oil pressure switch (ii)frequency and (iii)RPM; (b) Parameter 1: Stop duration is 10 seconds; (c) Parameter2: Pre-heat duration is 0 second and (d) Parameter 3: Crank attempts are 3 times. Under these settings, the engine cranks 10 seconds after detected T18 and T19 are wire shorted, and then stops for 10 seconds. The LCD shows the over crank icon  triggers the alarm, if 3 attempts of cracking are failed. If engine is running and T18 and T19 are opened, the GTR-205 activates the cooling mode. After cooling time is expired, the GTR-205 switches back to standby mode.



### 5.4.3 OFF :

Press the keypad  to stop the running engine and  icon shows on the LCD. After 10 seconds (depends on Parameter 1), the engine stops completely and icon  disappears. The icon  appears on the LCD, if the idle function is enabled.




### 5.4.4 Clear :

Press the keypad  to clear error and deactivate alarm. The LCD back light turns red when error is detected and then GTR-205 stops the engine and shows the error messages on the LCD. After the error is cleared, the GTR-205 switches to OFF mode.

### 5.4.5 Test with Load:

Press the keypad  to forces the engine into test mode with load. The LED lights up and GTR-205 ignores the 3 phase power from mains and starts the engine as mains has failed. The load transfers from mains to gen-set by ATS which is controlled by a designated output relay. Press the keypad  again to leave the test mode and load switches back to main. Then the generator goes into cooling mode and stops after cooling time has expired.

### 5.4.6 Rated | Idle :

Press the keypad  to switch the engine to rated or idle speed. The icon  displays when the engine is running at idle speed. Press the keypad  again to switch the engine to rated speed and vice versa. The idle function performs by a relay which outputs a signal (dry contact) to speed governor controller.

## 6 Parameter settings

### 6.1. *PARAM 01* Stop duration

Range: 5~40 sec.

Default: 10 sec

Description: Engine stopping time, which affects the duration of the stop output period.

### 6.2. *PARAM 02* Pre-heat duration

Range: 0~10 sec.

Default: 0 sec.

Description: The pre-heat duration means the time before the engine starts.

### 6.3. *PARAM 03* Crank attempts

Range: 1~9 attempts

Default: 3 attempts

Description: When cranking attempt is equal or greater than this setting, the GTR-205 stops cranking the engine and display over crank failure.

### 6.4. *PARAM 04* Cooling duration

Range: 0~625 sec (Setting: 0~250, Cooling time=setting X 2.5sec)

Default: 0 sec

Description: After receiving stop command, engine goes into cooling mode and engine runs until the time of this setting is reached.

### 6.5. *PARAM 05* Idle duration

Range: 0~1250 sec (Setting: 0~250, Idle running time=Setting X 5secs)

Default: 0 sec

Description: After engine starts successfully, engine goes into idle mode if the idle duration is not zero.

### 6.6. *PARAM 06* Low battery

Range: 9~32 V

Default: 20 V

Description: When the battery voltage is lower than this setting, the GTR-205 shows low battery fault.

### 6.7. *PARAM 07* High frequency setting

Range: 48~70 Hz

Default: 66 Hz

Description: When frequency is greater than this setting, the GTR-205 shows high frequency fault and shuts down the engine.

### 6.8. PPR-08 Protection function 1

Range: 0~255

Default: 255

Description: Enable or disable protection function 1

	Over Frequency	EMS	L.O.P	H.W.T	L.W.L	L.F.L	Over Speed	Low Frequency	Result
Weight Ex.	128	64	32	16	8	4	2	1	
Default	✓	✓	✓	✓	✓	✓	✓	✓	255

Table 1

- ☒ In Table 1 “☒” means [Enable] and “☒” means [Disable].
- ☒ The setting can be calculated by adding all related bits multiply its weighted value.
- ☒ For example: The setting is  
 $128 + 64 + 32 + 16 + 8 + 4 + 2 + 1 = 255$

### 6.9. PPR-09 Low frequency setting

Range: 42~61 Hz

Default: 54 Hz

Description: When AC frequency is lower than this setting, the GTR-205 shows low frequency fault and shuts down the engine if protection function is enable.

### 6.10. PPR-10 Input switch type

Range: 0~63

Default: 29

Description: Designated switch type as normal open or normal close.

	Reserve	Reserve	Pressure build deactivate Starter	L.F.L switch	L.W.L switch	H.W.T switch	EMS. switch	L.O.P. switch	Result
Weighted Ex.	128	64	32	16	8	4	2	1	
Default			✗	✓	✓	✓	✗	✓	29

Table 2

- ☒ In Table 2, “✓” means input switch as [normal open type] and “✗” means input switch is [normal close type].
- ☒ The setting can be calculated by adding all related bits multiply its weighted value.
- ☒ For example: If the setting of *Pressure build deactivates Starter* is disabled and EMS switch type is normal close, the setting is  $16 + 8 + 4 + 1 = 29$

### 6.11. PPR-11 Oil pressure switch deactivates starter delay

Range: 0.4~6 sec (Setting: 2~30, Delay time=Setting X 0.2 sec)

Default: 1.2 sec (6 X 0.2 = 1.2)

Description: When oil pressure switch is activated and its active period is longer than this setting, the GTR-205 deactivates the starter motor if the Parameter 10 setting “Pressure build deactivate Starter” is enabled. This setting has nothing to do with low oil pressure delay. The Low oil pressure delay is 1 second which is a constant value and stated on the 7.4 system parameter.

## 6.12. *PARAM 12* Coolant temperature sensor brand selection

Range: 0~2

Default: 1

Description: Select the brand for coolant temperature sensor.

(0: SUSUKI, 1: SCD, 2: VDO)

## 6.13. *PARAM 13* Oil pressure sensor brand selection

Range: 0~3

Default: 1

Description: Select the brand for oil pressure sensor.

(0: SUSUKI, 1: SCD, 2: VDO 10 BAR, 3: VDO 5 BAR)

## 6.14. *PARAM 14* Current Transformer Ratio selection

Range: 50/5~6000/5

Default: 500/5

Description: select current transformer ratio.

50/5, 75/5, 100/5, 2: 150/5, 200/5, 250/5, 300/5, 400/5, 500/5, 600/5, 800/5, 1000/5, 1200/5, 1500/5, 1600/5, 2000/5, 2500/5, 3000/5, 3200/5, 4000/5, 5000/5, 6000/5

## 6.15. *PARAM 15* Low voltage setting

Range: 186~440

Default: 346

Description: When output AC voltage is lower than this setting, the GTR-205 shows low voltage fault and shuts down the engine if protection function is enabled.

## 6.16. *PARAM 16* High voltage setting

Range: 220~484 Volts

Default: 414 Volts

Description: When output AC voltage is higher than this setting, the GTR-205 shows high voltage fault and shuts down the engine if protection function is enabled.

## 6.17. *PARAM 17* AC short setting

Range: 100~500 (depends on Parameter 14 )

Default: 450

Description: When output AC current is higher than this setting, the GTR-205 shows AC short fault and shuts down the engine if protection function is enabled.

## 6.18. *PARAM 18* AC overload setting

Range: 40~500 (depends on Parameter 14 )

Default: 400

Description: When output AC current is higher than this setting, the GTR-205 shows AC overload fault and shuts down the engine if protection function is enabled.

**6.19. PARA 19 High coolant temperature setting** 

Range: 75~120 °C

Default: 100

Description: When coolant temperature is higher than this setting, the GTR-205 shows high coolant temperature fault and triggers the alarm.

**6.20. PARA 20 Low oil pressure setting** 

Range: 5~65 Psi

Default:15

Description: When oil pressure is lower than this setting, the GTR-205 shows low oil pressure fault and triggers the alarm.

**6.21. PARA 21 Protection function 2**

Range : 0~255

Default : 143

Description: Enable or disable protection function 2

	Shut down after trip	Not in Auto.	LOP alarm	HWT alarm	Over current	Short Circuit	Low voltage	High voltage	Result
EX. Weighted	128	64	32	16	8	4	2	1	
Default	✓	✗	✗	✗	✓	✓	✓	✓	143

Table 3

- ☒ In Table 3, “☑” means [Enable] and “☒” means [Disable].
- ☒ The setting can be calculated by adding all related bits multiply its weighted value.
- ☒ For example : 128 + 8 + 4 + 2 + 1 = 143

**6.22. PARA 22 Display option**

Range : 0~31

Default : 28

Description: Select an option for display the desired readout source or unit.

	Reserve	Reserve	Reserve	Minimum voltage detect	Minimum frequency detect	RPM-Real/convert.	PSI/BAR	°C/°F	Result
✗	Reserve	Reserve	Reserve	Disable	Disable	Real RPM	PSI	°C	
✓	Reserve	Reserve	Reserve	Enable	Enable	Frequency convert	BAR	°F	
EX. Weighted Sample	128	64	32	16	8	4	2	1	
Default				✓	✓	✓	✗	✗	28

Table 4

- ☒ In Table 4, “☑” means [Enable] and “☒” means [Disable].
- ☒ The setting can be calculated by adding all related bits multiply its weighted value.
- ☒ For example : 28 ( Display : Frequency convert to RPM and PSI as well as °C)

**6.23. PARAM 23 The revolution of deactivating starter**

Range : 150~900 (RPM)

Default : 480

Description: When engine RPM is higher than this setting, the GTR-205 deactivates the starter while cranking.

**6.24. PARAM 24 Over speed **

Range : 980~2100 (RPM)

Default : 1980 (RPM)

Description: When engine speed is higher than this setting, the GTR-205 shows over speed fault and shuts down the engine if protection function is enabled.

**6.25. PARAM 25 Stop / Trip Option**

Range : 0~255

Default : 0

Description: Select the protection level for each faulty input.

	Over Load	AC Short	Low Voltage	High Voltage	Low Fuel Level	IN2	IN1	Low Frequency	Result
Weighted Level	128	64	32	16	8	4	2	1	
Default	0	0	0	0	0	0	0	0	0

Table 5

- In Table 5 “” means [Trip] and “” means [Stop].
- All protection functions listed above are for shunting down the engine.

**6.26. PARAM 26 Pre-activate fuel timer**

Range : 0~30 (Second)

Default : 0

Description: This setting designates the fuel output time before cranking if the setting is not zero.

**6.27. PARAM 27 R.P.M. numerator **

Range : 0~200

Default : 10

Description: Please use value calculated from Parameter 28.

**6.28. PARAM 28 R.P.M. denominator **

Range : 0~200

Default : 10

The R.P.M. numerator and denominator are the ratio of engine revolution versus total number of fly wheel teeth or the RPM of fly wheel versus the RPM of alternator charger.

For example: Set up the revolution numerator and the denominator to 1 to find input pulse from the LCD.

(A) If the engine revolution is 1800 and alternator revolution is 460 (input pulse), the R.P.M. numerator could be set to  $90 \rightarrow (1800 \div 20)$  and R.P.M. denominator could be set to  $23 \rightarrow (460 \div 20)$ .

Solution:  $1800 / 460 = 3.913$

The R.P.M. calculation formula is as below

R.P.M. = Input pulse \* (revolution numerator / revolution denominator)

$1800 = 460 * (90/23)$

(B) If the engine revolution is 1500 and total count of fly wheel teeth in one second is 4437 (input pulse), the R.P.M. numerator should be set to 45 and R.P.M. denominator should be set to 133.

Solution:  $1500 / 4437 = 0.338$

The R.P.M. calculation formula is as below

R.P.M. = Input pulse \* (revolution numerator / revolution denominator)

$1500 = 4437 * (45/133)$

(C) If the teeth count of engine flywheel is 118. Assume the rated rpm of Gen-set is 1500 rpm. Then the  $1500 \text{ rpm}/50\text{hz} \Rightarrow 30 \text{ rps/per second}$  also generate  $30 \times 118 = 3540$  electronic signals. Then  $1500 / 3540 = 0.423$  ( $75/177=0.423$ ), set the R.P.M. numerator to 75 and R.P.M. denominator to 177.

## 6.29. *PARA 29* Safety on timer

Range : 5~40 (Second)

Default : 0

Description: All faulty inputs are ignored until safety on timer has expired except the Emergency stop, over speed, over frequency and low water level.

## 6.30. *PARA 30* Shut down after trip timer has expired


Range: 30~7200 (Second)

Setting Range: 1~240

Setting value: 1

Note: Delay time = Setting x 30 Sec.

Default: 30 ( $1 \times 30 = 30$ )

Description: When trip occurred, the running icon  is flashing and the designated relay output is activated. The GTR-205 shuts down the engine if the fault is not cleared before this timer expires.

## 6.31. *PARA 31* Output 0

Range : 0~27

Default: 0 (All errors)

Description: Please see Relay Output List.

## 6.32. *PARA 32* Output 1

Range : 0~27

Default : 3 (Pre-heat output)

Description: Please See Relay Output List

## 6.33. *PARA 33* Output 2

Range : 0~27

Default : 11 (System in Auto Mode)



Description: Please See Relay Output List

## 6.34. *PARA 34* Output 3

Range : 0~27

Default : 1 (System trip)

Description: Please see Relay Output List

## 6.35. *PARA 35* Output 4

Range : 0~27

Default : 2 (Transfer load to genset)

Description: Please see Relay Output List

## 6.36. *PARA 36* Output 5

Range : 0~27

Default : 29 (Transfer load to utility)

Description: Please see Relay Output List

## 6.37. *PARA 37* User code 1

Range : 01~99

Default : 28

Description: Change the user code 1 (0528).

Note: press  &  to save the changed value.

## 6.38. *PARA 38* User code 2

Range : 00~99

Default : 05

Description: Change the user code 2 (0528).

Note: Press  &  to save the changed value.

## 6.39. *PARA 39* Mains over voltage

Range:220~484 (Volts)

Default: 414

Description: When mains voltage is greater than this setting, the Mains available LED blinks and the TDES timer starts to count.

## 6.40. *PARA 40* Mains low voltage

Range:186~440 (Volts)

Default:346

Description: When mains voltage is less than this setting, the Mains available LED blinks and the TDES timer starts to counts.

## 6.41. *PARA 41* Mains high frequency

Range : 48~70 (Hz)

Default : 66

Description: When mains frequency is greater than this setting, the Mains available LED blinks and the

TDES timer starts to count.

### 6.42. *PARA 42* mains low frequency

Range : 42~61 (Hz)

Default : 54

Description: When mains frequency is less than this setting, the Mains available LED blinks and the TDES timer starts to count.

### 6.43. *PARA 43* Mains unbalance

Range : 5~30 (Volts)

Default : 5

Description: The offset of 3 phase mains voltage are greater than this setting, Mains available LED blinks and the TDES timer starts to count.

### 6.44. *PARA 44* TDES – Time Delay for Emergency Start

Range : 1~60 (Second)

Default : 5

Description: Prevent the start of the engine under temporary unstable mains power.

### 6.45. *PARA 45* TDNE– Time Delay for Normal to Emergency (Mains to Gen-set power)

Range : 1~60 (Second)

Default : 3

Description: Extend the period of switching mains to Gen-set . This feature ensures the stability of Gen-set power supply. The delay begins when the engine runs normally.

### 6.46. *PARA 46* TDEN– Time Delay for Emergency to Normal (Gen-set power to Mains)

Range : 1~60 (Second)

Default : 3

Description: Extend the period of switching Gen-set to mains. This setting prevents the unnecessary switch to unstable mains power. The delay time begins counting when mains power supplies normally.

## Relay Output List

0. All errors	14. Over Crank
1. System Trip	15. Over AC Voltage
2. Transfer load to genset	16. Under AC Voltage
3. Pre-heat Output	17. AC Over Current
4. Pre-activated fuel	18. AC Short Circuit
5. Idle Output	19. Low Battery
6. Over Speed (RPM)	20. Auxiliary Input 1
7. Over Frequency	21. Auxiliary Input 2
8. Low Frequency	22. Low Fuel Level
9. Low Oil Pressure	23. Low Water Level
10. High Water Temperature	24. Emergency Stop
11. System not in Auto Mode	25. Sensors Alarm
12. System in Auto Mode	26. Genset Power Ready
13. Genset Running by Manual operation	27. Geneset in Normal
	28. Utility power in Normal
	29. Transfer load to utility

Table 6

## 7 System parameters

- Emergency stop delay: 0.4 sec/ action: stop
- Over frequency delay: 2 sec/ action: stop
- High coolant temperature delay: 1 sec/ action: stop
- Low oil pressure delay: 1 sec / action: stop
- Low coolant level delay: 4 sec/ action: stop
- Low frequency delay: 6 sec/ action: trip or stop (see 6.25 parameter 25 )
- Low fuel level delay: 4 sec/ action: trip or stop (see 6.25 parameter 25 )
- Input 1 / Input 2 delay 2 sec/ action: trip or stop (see 6.25 parameter 25 )
- AC Over load delay 15 sec/ action: trip or stop (see 6.25 parameter 25 )
- AC short circuit delay 0.5 sec/ action: trip or stop (see 6.25 parameter 25 )
- AC Low voltage delay 2.5 sec/ action: trip or stop (see 6.25 parameter 25 )
- AC High voltage delay 2.5 sec/ action: trip or stop (see 6.25 parameter 25 )
- Low Battery: 5 sec/ action: alarm
- Circuit breaker closed delay: 7.5 sec  
(After Gen-set normally runs about 7.5 second, the terminal T41 and terminal T42 form a dry contact output circuit for about 1 second.)
- Frequency release motor: 16 Hz
- Cranking time: 10 sec

## 8 Back view Description

### 8.1. Back view

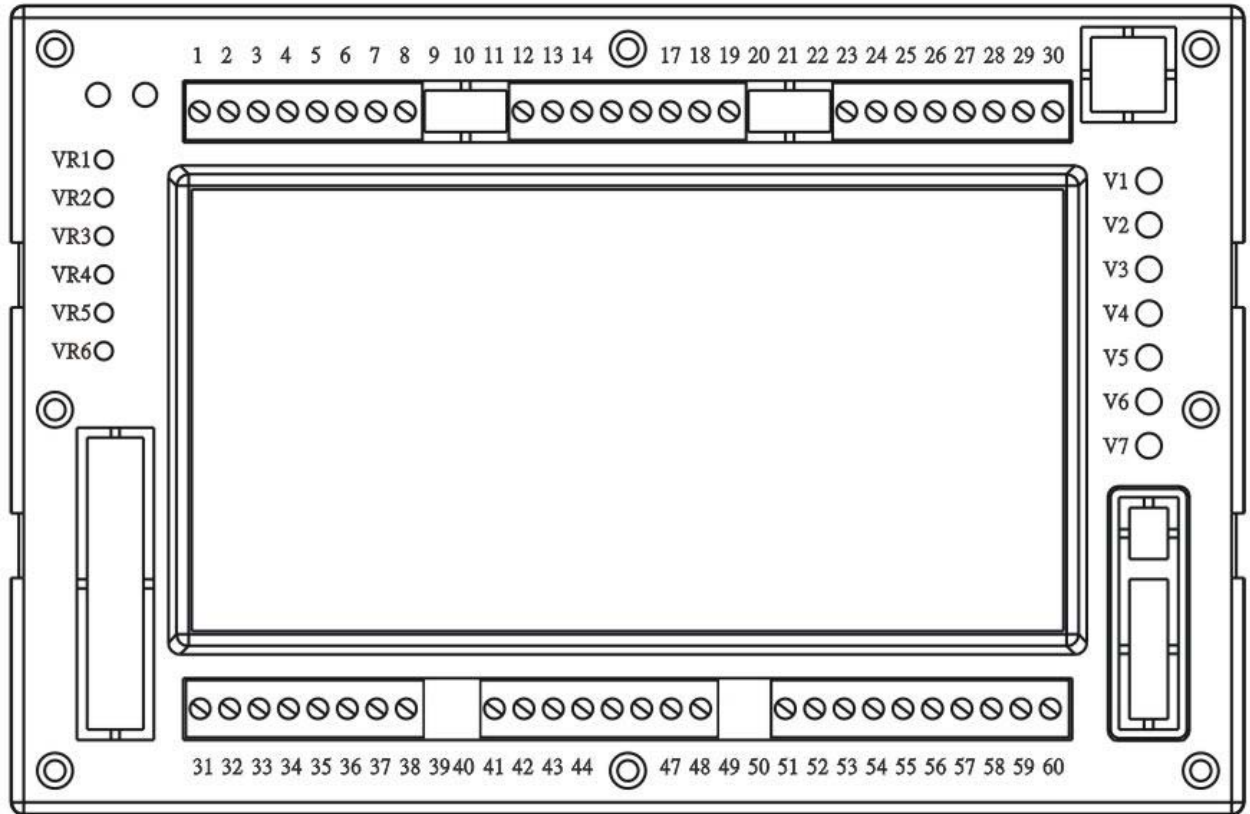


Fig. 13

## 8.2. Pin definition

Pin	Description	Pin	Description
1	Positive	32	L2 Phase Utility power input
2	Negative	33	L3 Phase Utility power input
3	Starter output	34	N Phase Utility power input
4	Fuel valve output	35	Utility on load indication input
5	Stop output	36	Utility on load indication input
6	Alarm output	37	Utility close relay contact 1 (output 5)
7	Aux. output 0	38	Utility close relay contact 2 (output 5)
8	Aux. output 1	41	Gen-set close relay contact 1 (output 4)
12	Aux. input 2	42	Gen-set close relay contact 2 (output 4)
13	Low coolant level switch input	43	Gen-set on load indication input
14	Emergency stop switch input	44	Gen-set on load indication input
15	Low fuel level switch input	45	Aux. output 2
16	Low oil pressure switch input	46	Aux. output 3 (Normal Open)
17	High coolant temperature switch input	47	Aux. output 3 (Common Pin)
18	ATS remote control input contact Pin1	48	Aux. output 3 (Normal Close)
19	ATS remote control input contact Pin2	51	L3 Phase Current Input (L)
23	Frequency input contact Pin 1	52	L3 Phase Current Input (K)
24	Frequency input contact Pin 2	53	L2 Phase Current Input (L)
25	Not Connected	54	L2 Phase Current Input (K)
26	Coolant sensor input	55	L1 Phase Current Input (L)
27	Oil pressure sensor input	56	L1 Phase Current Input (K)
28	Speed input contact Pin1	57	N Phase Power Input
29	Speed input contact Pin2	58	L3 Phase Power Input
30	Aux. input 1	59	L2 Phase Power Input
31	L1 Phase Utility power input	60	L1 Phase Power Input

List 6

## 8.3. V.R. Function

V.R. is adjustments for matching tolerance between external and internal measuring meter readout. All values can be shown on LCD panel.

- 8.3.1 **VR1** : AC Voltage adjust - fine tuning
- 8.3.2 **VR2** : AC Current adjust - fine tuning
- 8.3.3 **VR3** : Water temperature value - fine tuning
- 8.3.4 **VR4** : Oil pressure value - fine tuning

## 9 Dimensions

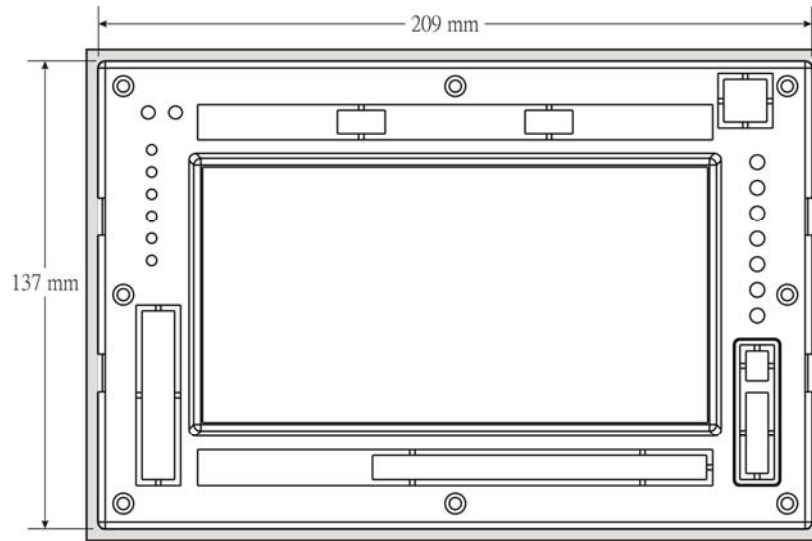


Fig. 14 Back view

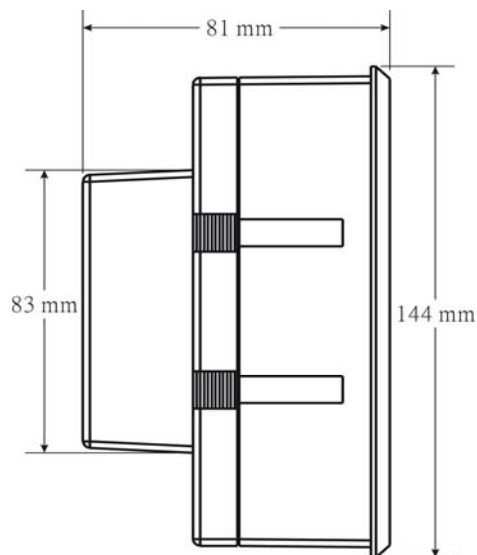


Fig. 15 Side view

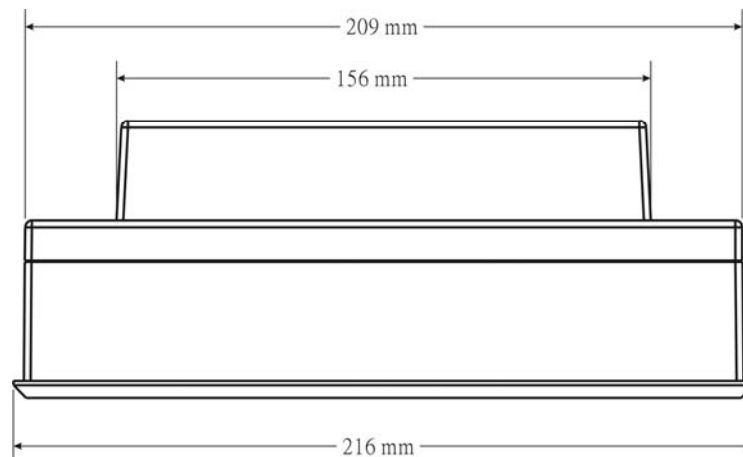


Fig. 16 Top view

## 10 Example wiring

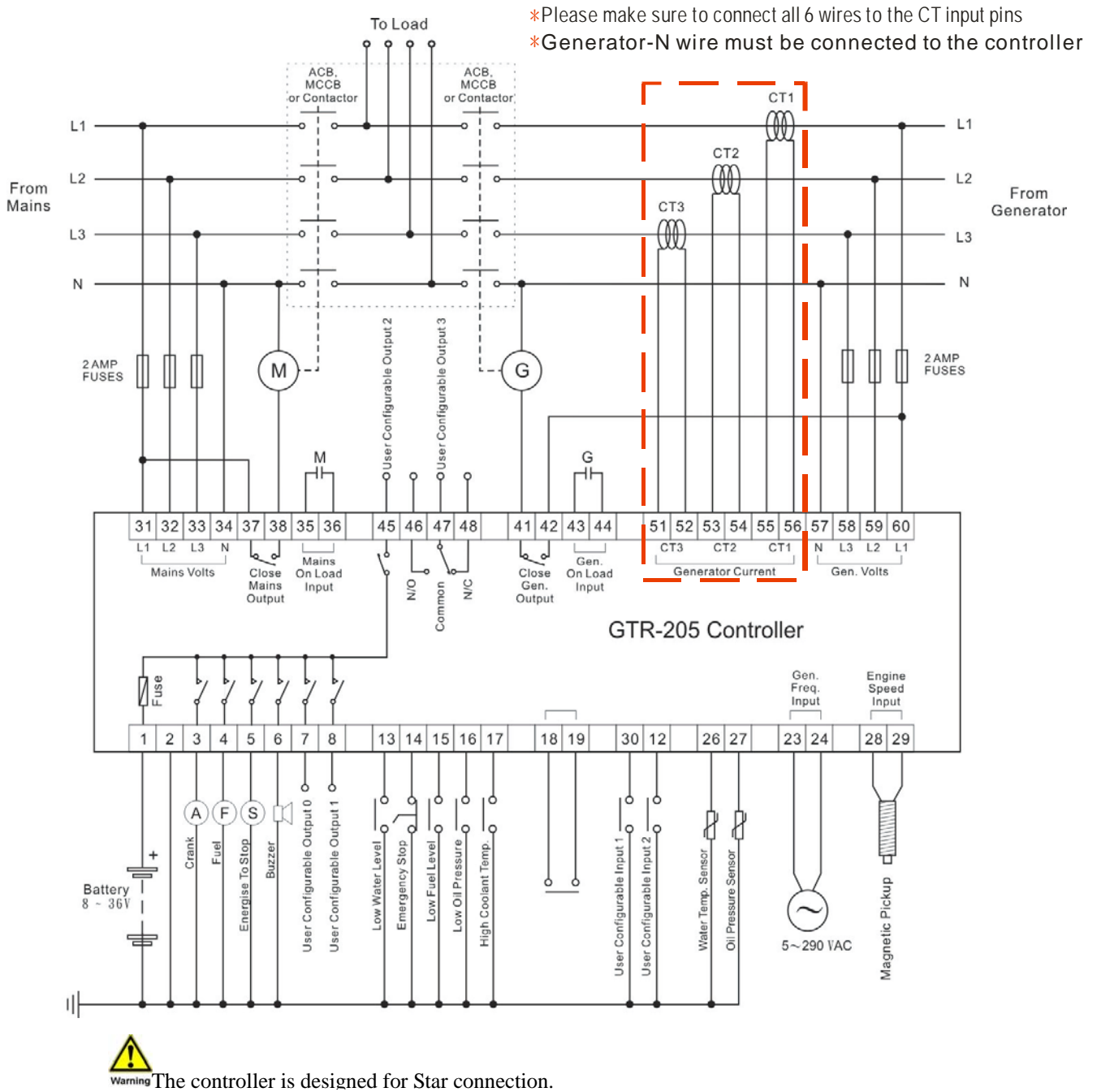


Fig.17