

GTR-20

Generator Controller

Manual



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1. Feature

- Monitor and display fault information include: Over Frequency, Low Frequency, High Coolant Temperature, Low Oil pressure, Over Crank, Low Fuel Level, Low Coolant Level, Low Battery, Sensor Open and Sensor Short.
- LCD Display: Coolant temperature, Oil pressure, Running hour, Frequency and Battery voltage.
- Operation Keypads: Off, Auto, Manual, Pre-Heat, Stop, Run and Idle.
- Parameters can be setup by user using 6 dedicated setup keypads.
- Super wide operating DC power range from 8 to 38 volts.
- Equipped with high security terminal connector that provide easy plug-in and removal.
- Ultra low power consumption 80 mA @ 12 V; 45 mA @ 24 V.
- Two colors screen back light make it easier to distinct system in normal or faulty status.

2. Introduction

GTR-20 is a full digitized controller equipped with all basic functions such as display error messages, detect inputs, measured signals and generator status. When the error occurred, GTR-20 shuts down the engine, diagnosis can be known easily by reading LCD panel information. Parameters can be adjusted from front panel in accordance with any special requirements. Operating DC power range is from 8 to 38 volts, and low power consumption in standby mode which is suitable for small battery.

3. Specifications

- Operational DC power input
8 ~ 38 V (DC)
- Power consumption
Max. 4 W, 300 mA @ 12 V; 160 mA @ 24 V
- Frequency Measurement
Minimum detecting voltage: 10 V (AC)
Range: 0 ~ 80 Hz
Accuracy: 99%
- DC volt measurement
Range: 10 ~ 31 V
Accuracy: 99 %
- Maximum output capacity
6A / 30 V
- Operating temperature
-20 °C ~ 60 °C
- Storage Temperature
-30 °C ~ 70 °C
- Dimensions
144 mm x 216 mm x 89 mm
- Panel cutout
138 mm x 210 mm
- Weight
745 g

4. Panel descriptions

4.1 Front view

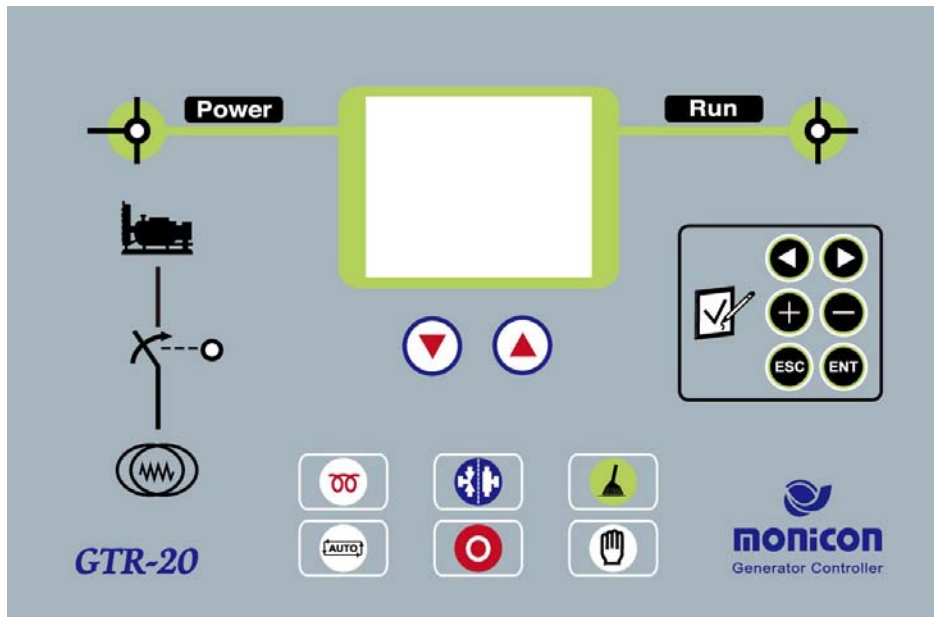


Fig. 1

4.2 LCD Icon Explanations















Icon	Description	Icon	Description
	Emergency stop	AC	AC readout
	High coolant temperature	DC	DC readout
	Idle Mode	V	Unit in voltage
	Low frequency	Hr	Running hours
	Low battery voltage	Hz	Unit in frequency
	Low fuel level	°C	Unit in Celsius
	Low oil pressure	PSI	Unit of pressure
	Low coolant level	Trip	System trip
	System not in auto position	STAND BY	Auto mode
	Crank failed	_OP_	Sensor is open
	High frequency	_Sh_	Sensor is short
	Pre-heat	SAVE	Save configuration
	Running	UP_L	Configuration upper limit
	Stop	bt_L	Configuration lower limit
MANUAL	Manual Mode	PAR	Parameter number

Fig. 2

4.3 LCD Information

- 4.3.1 Battery voltage readout
- 4.3.2 AC frequency readout
- 4.3.3 Coolant temperature readout
- 4.3.4 Oil pressure readout
- 4.3.5 Running hours

4.4 Keypad Functions



【Manual Start】



【Auto Start】



【Engine Stop】





【Clear Error】










【Preheat】






【Idle】




Manual Start : Press and hold  for 2 seconds under “AUTO” or “OFF mode” until LCD displays “MANUAL”. Then the controller starts count down and LCD shows an icon “” to represent pre-heat stage. After countdown, engine starts immediately. If engine fails to start, the system returns to mode “OFF”. When the parameter setting value for pre-heat is 0 second, the pre-heat won't be executed and starts the engine immediately after pressing the button.

Auto Start : Press the button  to switch into “AUTO” mode. When terminal 18 and 19 are shorted, the system runs into start sequence. Then LCD shows the icon  to represent the pre-heat stage and starts the engine after pre-heat is done. When engine start failed, the system returns to the “Pre-heat” stage and prepares to start the engine again. If the parameter setting for stop duration is 10 seconds, the engine rests for 10 seconds between each crank. If after 3 attempts (default setting) of cranking and the engine still fails to start, the LCD screen shows the icon  (over crank) and activates the alarm.

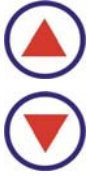
Engine stop : Press the button  while engine is running, the system executes steps as below. The engine switches into Off mode. the screen shows the icon  the system sends stop signal for 10 seconds (default setting), then LCD clears the icon  on the screen and cease the stop signal output. 

Clear Error : When the GTR-20 detects error, the system stops the engine and shows the error message on the LCD screen. By pressing  to mute the alarm and start to diagnose the problem. To clear the error message, press the  again. After the message has been cleared, the system returns to off mode.

Pre-heat: Press and hold the button  under “OFF” or “AUTO” mode, the system executes the pre-heat function. Release the button turns off the Pre-heat function. When the engine is running, the pre-heat function is disabled.

Rated speed | Idle: Press the button  while the engine is operating under rated speed, the LCD screen shows the icon  and switches the engine into idle speed. Contrary, press the button  while the engine is operating under idle speed, the LCD

screen clears the icon  and switches the engine into rated speed.



Press these two buttons to swap engine information, the display sequence are:
Frequency ⇔ Battery Voltage ⇔ Water Temperature ⇔ Oil Pressure

4.5 Setup Keypads



A: Under password mode, this button changes the fourth digit.
B: Under parameter setting mode, this button switches to next parameter



A: Under password mode, this button changes the third digit.
B: Under parameter setting mode, this button switches to previous parameter.



A: Under password mode, this button changes the second digit.
B: Under parameter setting mode, this button increases the setting value



A: Under password mode, this button changes the first digit.
B: Under parameter setting mode, this button decreases the setting value










Enter or Exit the parameter setting mode



Confirm and save the settings

5. Entrance of Parameter Setting

The GTR-20 must be in “OFF” mode to enter parameter setting mode.

Press  to enter password mode as fig.5 , The password is 『1215』 , the procedures are pressing  once,  twice,  once, and  5 times as Fig. 6, then press  to enter parameter setting mode as Fig.7. The LCD panel shows Parameter 0 for stop duration 10 seconds. Press  once more goes to parameter 1 and so on.

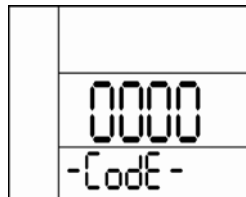
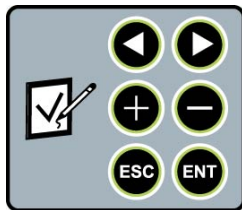


Fig.5

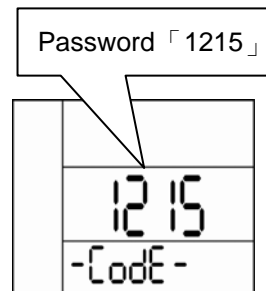


Fig. 6

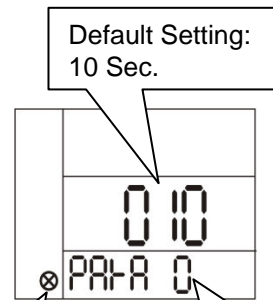








Fig. 7

Stop Duration.

Parameter No.

For example,

1. To change default setting from 10 seconds to 8 seconds by pressing  twice as Fig. 9 then press  , the LCD shows SAVE as Fig. 10 for 1 second. Afterwards it returns to Fig. 9, that means it has been saved.
2. To change the setting to 12 seconds by pressing  4 times and repeat the above procedure.
3. TO ignore the setting by pressing  to exit the setting mode or press  to next parameter or  to previous parameter.

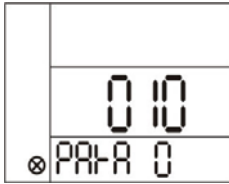


Fig. 8

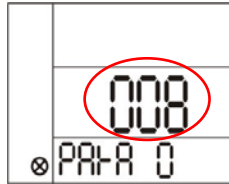


Fig. 9



Fig. 10

For example, Stop duration ranges from 1 to 40 seconds. In Fig. 11 and Fig. 12 show the minimum and maximum value respectively. Notice the LCD shows *bt_L* when minimum value is reached and LCD shows *uP_L* when maximum value is reached.



Fig. 11



Fig. 12

6. Parameter Setting

6.1 Stop duration

Range: 5~40 sec

Default: 10 sec

Description: Engine stopping time, this affects the duration between each crank.

6.2 Pre-heat duration

Range: 0~10 sec

Default: 0 sec

Description: Time to pre-heat before starting engine.

6.3 Crank attempts

Range: 1~9 attempts

Default: 3 attempts

Description: When number of attempts is equal or greater than this setting, system indicates over crank failure.

6.4 Cooling duration

Range: 0~1250 sec (display value x 5)

Default: 0 sec

Description: When system received normal stop command, engine switches into cooling mode and engine idles until the time of this setting is reached. (malfunction or manual stop does not perform this function)

6.5 4 Idle Time

Range: 0~1250 sec (display value x 5)

Default: 0 sec

Description: The idle running time. After engine starts successfully, the system goes into idle mode if the setting is not zero.

6.6 5 Low battery voltage

Range: 9~32 V

Default: 11 V

Description: When the battery voltage is under this setting, system activates a low battery voltage alarm.

6.7 6 High frequency setting

Range: 48~70 Hz

Default: 55 Hz

Description: When frequency is greater than this setting, system indicates a high frequency failure and shuts the engine down.

6.8 7 Function enable

Range: 0~255

Default: 127

Description: Enable or disable functions according to user's specifications.

	O.P release motor	EMS	L.O.P	H.W.T	L.W.L	L.F.L	High frequency	Low frequency	Result
Weight	128	64	32	16	8	4	2	1	
Ex.									
Disable O.P release motor	✗	✓	✓	✓	✓	✓	✓	✓	127

Table 2

☒ In Table 2, "✓" means Enable and "✗" means Disable.

☒ The setting can be calculated by adding all related bit multiplies its weighted value.
 $64 + 32 + 16 + 8 + 4 + 2 + 1 = 127$

6.9 8 Low frequency setting

Range: 42~61 Hz

Default: 45 Hz

Description: When frequency is under this setting, system indicates a low frequency failure and shuts the engine down.

6.10 9 Input switch type

Range: 0~31

Default: 29







Description: Select switch type for the faulty input switch.

	Reserve	Reserve	Reserve	L.F.L switch	L.W.L switch	H.W.T switch	EMS. switch	L.O.P. switch	Result
Weighted	128	64	32	16	8	4	2	1	
Ex.									
EMS. switch N.C.				N.O.	N.O.	N.O.	N.C.	N.O.	29

Table 3

☒ In Table 3, "1" means input switch is normally open type and "0" means input switch is normally close type.

☒ The setting can be calculated by adding all related bit multiplies its weighted value.
 $16 + 8 + 4 + 1 = 29$

- 6.11  Oil pressure switch delay 
Range: 0.4~6 sec (Range 2~30, value x 0.2)
Default: 1.2 sec
Description: If both of the options of deactivate starter motor by O.P. switch is checked and the oil pressure switch is activated, the oil pressure switch active period is longer than this setting triggers the system cease the starter motor immediately. This setting has nothing to do with low oil pressure delay.
- 6.12  The brand of coolant temperature sender 
Range: 0~2
Default: 0
Description: User selects which brand is used for measuring coolant temperature.
(0: SUSUKI, 1: SCD, 2: VDO)
- 6.13  The brand of oil pressure sender 
Range: 0~3
Default: 2
Description: User selects which brand is used for measuring oil pressure.
(0: SUSUKI, 1: SCD, 2: VDO 10 BAR, 3: VDO 5 BAR)

7. System parameters

1. Emergency stop delay: 0.1 sec/ action: stop
 2. Over frequency delay: 2 sec/ action: stop
 3. High coolant temperature delay: 1 sec/ action: stop
 4. Low oil pressure delay 1 sec / action: stop
 5. Low coolant level delay: 4 sec/ action: stop
 6. Low frequency: 6 sec/ action: stop
 7. Low fuel level delay: 4 sec/ action: alarm
 8. Low Battery Voltage 5 sec/ action: alarm
 9. Circuit breaker closed delay: 7.5 sec/ action: stop
(After engine normally runs about 7.5 second, the terminals 41 and 42 forms a closed circuit for about 1 second and then open the circuit.)
 10. Cranking speed upper limit: 20 Hz
 11. Cranking time: 10 sec
 12. Protection pending time: 10 sec
- (During engine starts successfully for 10 seconds, the GTR-20 ignores the faulty signal, except the emergency stop and the over speed.)

8. Back view Description

Back view

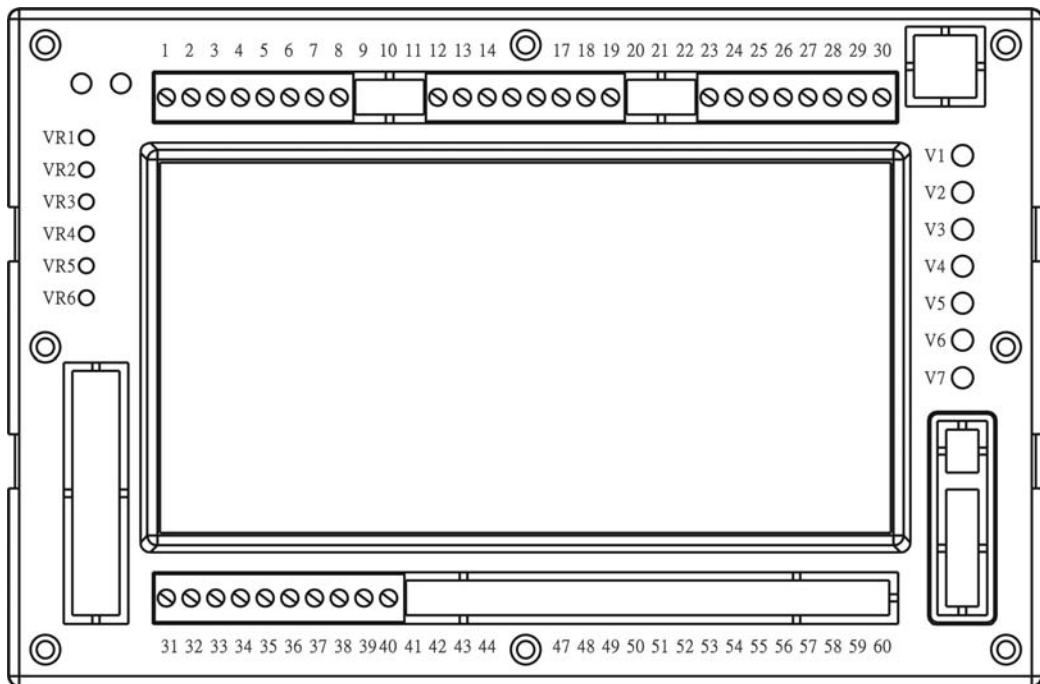


Fig. 10

Pin definition

Pin	Description	Pin	Description
1	Positive	21	N/C
2	Negative	22	N/C
3	Starter motor output	23	Frequency input pin1
4	Fuel valve output	24	Frequency input pin2
5	Charger fire output	25	N/C
6	Stop output	26	Water temp sender input
7	Alarm output	27	Oil pressure sender input
8	Trip relay contact output pin1	28	N/C
9	N/C	29	N/C
10	N/C	30	N/C
11	N/C	31	Circuit breaker closed output pin1
12	Trip relay contact output pin2	32	Circuit breaker closed output pin2
13	Low coolant level switch input	33	Load indicator input pin1
14	Emergency stop switch input	34	Load indicator input pin2
15	Low fuel level switch input	35	Pre Heat output pin1
16	Low oil pressure switch input	36	Pre Heat output pin2
17	High water temp switch input	37	Idle output pin1
18	ATS1 remote start input pin1	38	Idle output pin2
19	ATS2 remote start input pin2	39	N/C
26	N/C	40	N/C

9. Dimension

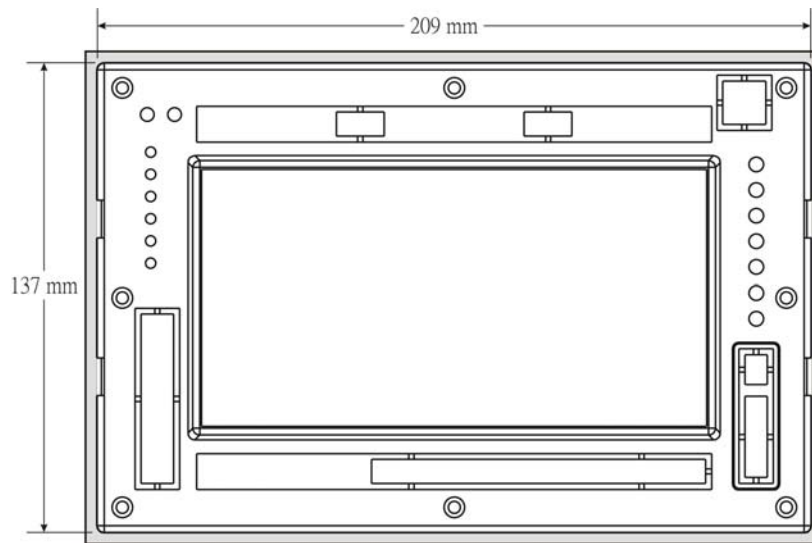


Fig. 11 Back view

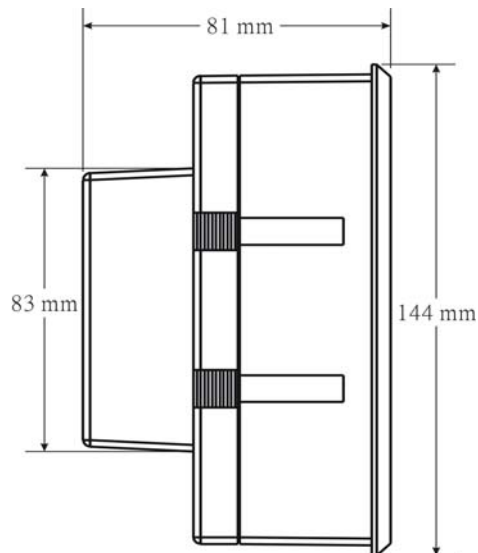


Fig. 12 Side view

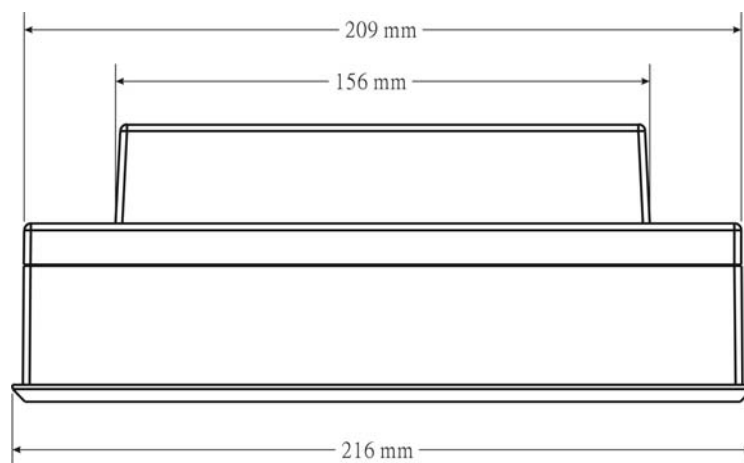


Fig. 13 Top view

10. wiring

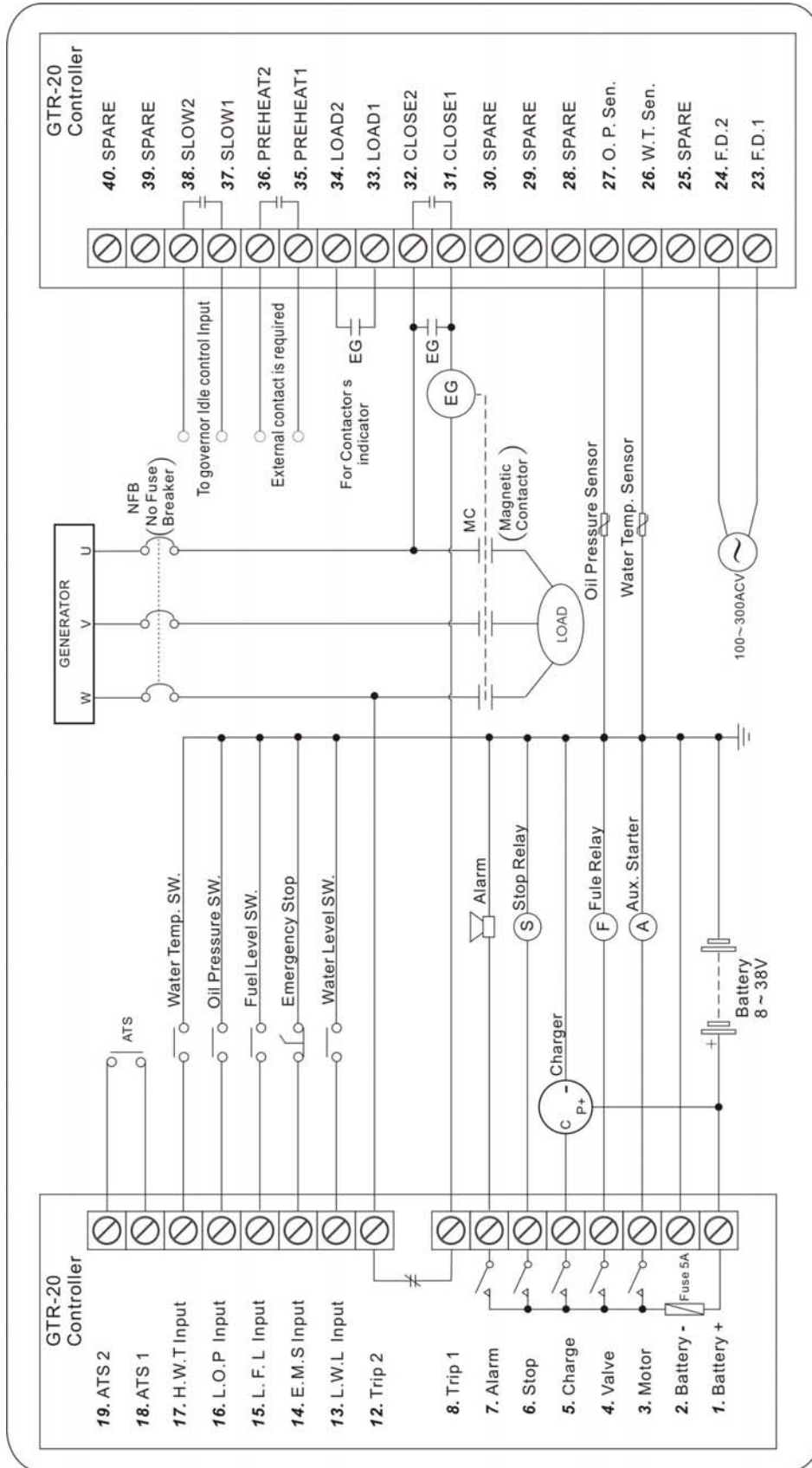


Fig.14