GEC4510/GEC4520

GENSET CONTROLLER USER MANUAL (V1.1)

SHANGHAI FORTRUST POWER ELECTRIC CO., LTD

This document provides a brief operation instruction for using GEC4500 series controllers. Please refer to the standard user manual for details.

GEC4500 series include the following two types:

Model	Function
GEC4510	It is used for single machine automation, controlling the start and stop of genset by remote signal.
GEC4520	It adds the functions of mains monitoring and AMF on the basis of GEC4510.

1. KEY DESCRIPTION

	Stop	In manual/auto mode, it can stop the running genset. During stopping process, press this key again can stop generator immediately.
	Start	In manual mode, pressing this key can start the genset.
	Manual/Auto Switch	Pressing this key to switch the controller in manual/auto mode.
	Close/ Open	Pressing this key to switch closing/ opening; Pressing up/down key to control closing and opening in manual mode;
	Set/Confirm	Pressing this key to enter menu interface; Shift cursor to confirm in parameters setting menu.
	Up/Increase	Screen scroll; Up cursor and increase value in setting menu; When in closing/ opening interface in manual mode; Pressing this key to control mains closing/ opening (for GEC4520); Pressing this key to control Gen closing/ opening (for GEC4510);
	Down/Decrease	Screen scroll; Down cursor and decrease value in setting menu; When in closing/ opening interface in manual mode; Pressing this key to control mains closing/ opening (for GEC4520); Pressing this key to control Gen closing/ opening (for GEC4510);
	Reset/Return	In the state of alarm, pressing this key to reset the alarm; Pressing this key to exit the parameter setting;

2. DIMENSION

Overall Dimension	Panel Cutout
152mm x 100mm x 45mm	115mm x 89mm

3. CONTROLLER PANEL

GEC4500

4. PARAMETER SETTING STEP

Parameters Setting

1） After the controller starts up, press the button to enter the menu, as chart 1;

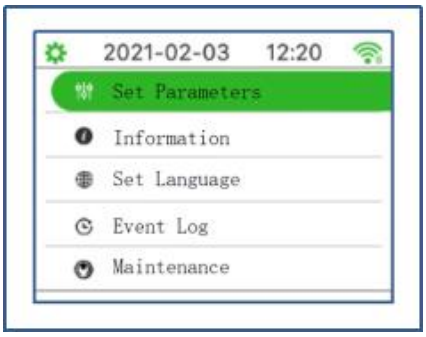


chart 1

2） Press the cursor (up/increase) or (down/decrease) to select the controller’ s information;

3) Press the button transferring setting the parameter to inputting the password, as chart 2;

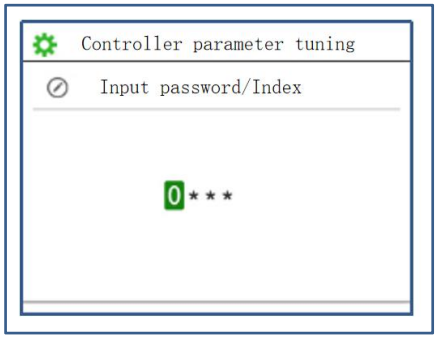


chart 2

4) Press the button to enter the interface for parameter setting and password inputting, and then enter the password” 1921” to set all the parameters. The setting method is as step 5 and 6;

5） Press the button (up/increase) or (down/decrease) to move the item up and down or modify the value. Press the button (set/confirm) to confirm the current value and move the cursor to the right;

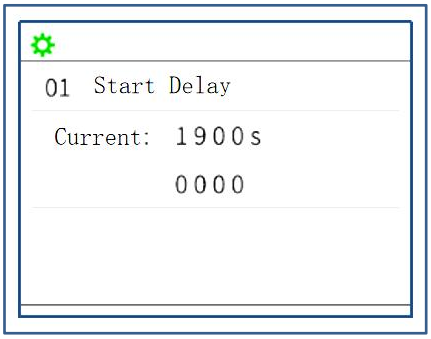


chart 3

6） Press the button (home/return) to return to the previous menu;

7) If the input configuration password is correct, then we enter the parameter setting interface (the first line is

setting page flag line, the second is setting parameter item, the third is the current value, the fourth is setting parameter value). Press the  button (up/increase) or  (down/decrease) to select the parameter configuration items. Click the button to enter the correct parameter configuration mode as chart 3.

8） Set the parameter according to the step 5 and 6. If the value is within the range, it will be saved. If it is out of the range, it cannot be saved.

5. PARAMETER SETTING CONTENTS

NO.	ITEM	Range	Default	Description
1	Mains Normal Delay	(0-3600)S	10	The delay from abnormal to normal or from normal to abnormal. It is used for ATS (automatic transfer switch) control.
2	Mains Abnormal Delay	(0-3600)S	5	
3	Mains Under Voltage	(30-60000)V	184	When mains voltage is under the point, mains under voltage active. When the value is 30, mains under voltage disabled. voltage .
4	Mains Over Voltage	(30-60000)V	276	When mains voltage is higher than the point, mains over voltage active. When the point is 60000V, mains over voltage disabled.
5	Transfer Delay	(0-99.9)S	1.0	It’ s the delay from mains open to generator closed or from generator open to mains closed.
6(1)	Start Delay	(0-3600)S	1	Time from mains abnormal or remote start signal is active to start genset.
7(2)	Stop Delay	(0-3600)S	1	Time from mains normal or remote start signal is inactive to stop genset.
8(3)	Start Times	(1-10)	3	When engine start failure, it’ s the

				maximum cranking times. When setting crank times out, controller sends start fail signal.
9(4)	Preheat Time	(0-300)S	0	Time of pre-powering heat plug before starter is powered up.
10(5)	Cranking Time	(3-60)S	8	Time of starter power up each time.
11(6)	Crank Rest Time	(3-60)S	10	The second waiting time before power up when engine start fail.
12(7)	Safety On Time	(1-60)S	10	Alarm for low oil pressure, high temp, under speed, under frequency/voltage, failed to charge are all inactive.
13(8)	Start Idle Time	(0-3600)S	0	Idle running time of genset when starting.
14(9)	Warm-up Time	(0-3600)S	10	Warming time between genset switch on and high speed running.
15(10)	Cooling Time	(3-3600)S	10	Time for cooling before stopping.
16(11)	Stop Idle Time	(0-3600)S	0	Idle running time when genset stop.
17(12)	ETS Solenoid Hold	(0-120)S	20	Stop electromagnet’ s power-on time when genset is stopping.
18(13)	Wait for Stop Time	(0-120)S	5	If “ETS Solenoid Hold” set as 0, it is the time from end of idle delay to genset at

				rest; if not 0, it is from end of ETS solenoid delay to genset at rest.
19(14)	Switch Close Delay	(0.0-10.0)S	5.0	Mains' or generator' s switch closing pulse width, when it is 0, output is continuous.
20(15)	Flywheel Teeth	(10-300)	118	Number of flywheel teeth, it can detect disconnection conditions and engine speed.
21(16)	Gen Abnormal Delay	(0-20.0)S	10.0	Over or under voltage alarm delay.
22(17)	Gen Over Voltage Shutdown	(30-60000)V	276	When genset voltage is over the point, generator over voltage is active. When the point is 60000V, generator over voltage is disabled.
23(18)	Gen Under Voltage Shutdown	(30-60000)V	184	When generator voltage is under the point, generator under voltage is active. When the point is 30V, generator under voltage is disabled.
24(19)	Under Speed Shutdown	(0-6000)r/min	1200	When the engine speed is under the point for 10s, shutdown alarm signal is sent.
25(20)	Over Speed Shutdown	(0-6000)r/min	1710	When the engine speed is over the point, shutdown alarm signal is sent.

26(21)	Engine Rated Idle	(0-6000)r/min	750	The engine started successfully and reached the required rated idle.
27(22)	Engine Rated Speed	(0-6000)r/min	1500	Rated speed required by high speed engine operation.
28(23)	Gen Under Frequency Shutdown	(0-75.0) Hz	40	When generator frequency is lower than the point (not equal to 0) for 10s, shutdown alarm signal is sent.
29(24)	Gen Over Frequency Shutdown	(0-75.0) Hz	57	When generator’s frequency is over the point and continues for 2s, generator overfrequency is active.
30(25)	High Temperature Shutdown	(80-300) ºC	98	When the temperature sensor value is over this point, it sends out high temp. alarm. When the value is 300, warning alarm won’t be sent. (only suited for temperature sensor, except for high temp. pressure alarm signal inputted by programmable input port.)
31(26)	Low Oil Pressure Shutdown	(0-400) kPa	103	When the oil pressure sensor value is under this point, Low Oil Pressure alarm is sending out. When the value is 0, warning alarm won’t be sent. (only suited for oil pressure sensor, except for low oil pressure alarm signal inputted

				by programmable input port.)
32(27)	Low Fuel Level Alarm	(0-100)%	10	When liquid level sensor value is under this point and remains for 10s, genset sends out warning alarm, only warn but not shutdown.
33(28)	Low Fuel Level Stop	(0-100)%	5	If the liquid level of the external liquid level sensor is lower than this value and lasts for 5s, the shutdown signal will be sent.
34(29)	Speed Signal Loss Delay	(0-20.0)S	5.0	When the delay setting as 0s, it only warn but not shutdown.
35(30)	Charging Failure Volt. Difference	(0-30)V	6.0	During genset normal running, when B+ and charger D+ (WL) voltage difference is above this value for 5s, the controller issues “Charging Failure” warning.
36(31)	Battery Over Voltage	(12.0-40.0)V	33	When generator battery voltage is over the point and remains for 20s, battery over voltage signal is active. it only sends warn but not shutdown.
37(32)	Battery Under Voltage	(4.0-30.0)V	8	When generator battery voltage is under the point and remains for 20s, battery under voltage signal is active. it only sends warn but not shutdown.

38(33)	CT Ratio	(5-6000)/5	500	External current transformer ratio.
39(34)	Full Load Rating	(5-6000)A	500	Rated current of generator, used for calculating over load current.
40(35)	Over Current Protection	(0-2)	2	According to the selected action, action for the power generation over current 0: no action, 1: break or 2: alarm shutdown.
41(36)	Over Current Percentage	(50-130)%	120	When load current is over the point, the over current delay is initiated.
42(37)	Over Current Delay	(0-3600)S	30	When load current is over the point, over current signal is sent.
43(38)	Fuel Pump On	(0-100)%	25	When the fuel level lower than the set value for 2s, it sends a signal to open fuel pump.
44(39)	Fuel Pump Off	(0-100)%	80	When the fuel level higher than the set value for 2s, it sends a signal to close fuel pump.
45(40)	Aux. Output 1	(0-27)	2	Factory default: Energized to stop.
46(41)	Aux. Output 2	(0-27)	3	Factory default: Idle control.
47(42)	Aux. Output 3	(0-27)	5	Factory default: Gens closed.
48(43)	Aux. Output 4	(0-27)	6	Factory default: Mains closed.
49(44)	Digital Input 1	(0-26)	26	Factory default: emergency stop.
50(45)	Digital Input 1	(0-1)	0	Factory default: closed.

	Effective			
51(46)	Digital Input 1 Delay	(0-20.0)S	2.0	Input signal active delay.
52(47)	Digital Input 2	(0-26)	2	Factory default: remote start input.
53(48)	Digital Input 2 Effective	(0-1)	0	Factory default: closed.
54(49)	Digital Input 2 Delay	(0-20.0)s	2.0	Input signal active delay.
55(50)	Digital Input 3	(0-26)	10	Factory default: under oil pressure alarm input.
56(51)	Digital Input 3 Effective	(0-1)	0	Factory default: closed.
57(52)	Digital Input 3 Delay	(0-20.0)s	2.0	Input signal active delay.
58(53)	Digital Input 4	(0-26)	11	Factory default: under fuel level warning input.
59(54)	Digital Input 4 Effective	(0-1)	0	Factory default: closed.
60(55)	Digital Input 4 Delay	(0-20.0)s	2.0	Input signal active delay.
61(56)	Power On Mode	(0-2)	0	0：Stop；1：Manual；2：Auto
62(57)	Module Address	(1-254)	1	Module communication address.

63(58)	Password	(0-9999)	1921	All parameters can be set. See note 4.
64(59)	Engine Speed of Crank Disconnect	(0-3000)r/min	360	When engine speed is over this point, starter will disconnect.
65(60)	Frequency of Crank Disconnect	(0.0-30.0) Hz	14	When generator frequency is over this point, starter will disconnect.
66(61)	Oil Pressure of Crank Disconnect	(0-400) kPa	200	When engine oil pressure is over this point, starter will disconnect.
67(62)	High Temp. Stop Inhibit	(0-1)	0	Default: when temperature is overheat, the genset alarm and shutdown. Details see NOTE2.
68(63)	Low OP Inhibit Stop Inhibit	(0-1)	0	Default: when oil pressure is too low, it sends alarm and shutdown. Details see NOTE3.
69(64)	Communication Wire	(0-2)	0	0 Three phase four wire(3P4W); 1 Two phase three wire(2P3W); 2 Single phase two wire(1P2W);
70(65)	Temp. Sensor Curve Type	(0-10)	8	SGX
71(66)	Pressure Sensor Curve Type	(0-9)	8	SGX

72(67)	Fuel Level Sensor Curve Type	(0-3)	3	SGD
73(68)	Generator Poles	(2-64)	4	Number of magnetic poles, used for calculating rotating speed of generator without speed sensor.
74(69)	Temp. Sensor Open Circuit Action	(0-2)	1	0: Not used; 1: Warning; 2: Shutdown
75(70)	Oil Pressure Sensor Open Circuit Action	(0-2)	1	0: Not used; 1: Warning; 2: Shutdown
76(71)	Fuel Level Sensor Open Circuit Action	(0-2)	1	0: Not used; 1: Warning; 2: Shutdown
77(72)	Disconnect Oil Pressure Delay	(0-20.0)S	0	When disconnect conditions include oil pressure and engine oil pressure is higher than disconnect oil pressure delay, the genset is regarded as start successfully and starter will disconnect.
78(73)	Over Power	(0-2)	0	0: Not used; 1: Warning; 2: Shutdown When the power is greater than the set value and the duration is greater than

				the delay value, the overpower alarm is effective. The return value and delay value can also be set.
79(74)	Start Interface	(0-1)	1	0: Disabled; 1: Enabled. Start interface delay can be set.
80(75)	Maintenance Password	(0-9999)	1234	Enter password interface of maintenance configuration.
81(76)	Date			Set the date of controller.
82(77)	Fuel Output Time	(1-60)S	1	It is the time of the genset fuel output during power on.
83(78)	Manual Mode ATS	(0-1)	0	0: Key Switch; 1: Auto Switch.
84(79)	Speed Raise Pulse	(0-20.0)S	0.2	It is the speed-up pulse output time, when the unit enters the high-speed warm-up.
85(80)	Speed Drop Pulse	(0-20.0)S	0.2	It is the speed-drop pulse output time, when the unit enters the stop idling.
86(81)	ATS Open Time	(1.0-60.0)S	3.0	ATS Open Time
87(82)	Flexible Sensor Curve Type	(0-2)	0	0 User-defined temperature sensor 1 User-defined pressure sensor 2 User-defined level sensor

				Choose sensor which need to be set, input every point resistance (or current, voltage) and corresponding value of curve, 8 points need to be input
88(83)	Engine Type	(0-29)	00	00 Conventional Gen-set 01 Standard J1939 See Table 11 for others
89(84)	CAN Address	(0-255)	3	
90(85)	Rated Active Power	(0-6000) Kw	100	Used to calculate active power/rated power percentage
91(86)	Crank Disconnect Condition	(0-6)	04	Conditions of disconnecting starter (generator, magnetic pickup sensor, oil pressure), each condition can be used alone and simultaneously to separating the startermotor and genset as soon as possible.
92(87)	Over Speed Alarm	(0-6000)r/min	1650	When the engine speed is over the point for 2s, alarm signal is sent.
93(88)	Under Speed Alarm	(0-6000)r/min	1300	When the engine speed is under the point for 10s, alarm signal is sent.
94(89)	Gen Under Voltage	(30-6000 0)V	200	Gen A/B/C phase low voltage alarm value

	Alarm			
95(90)	Gen Over Voltage Alarm	(30-60000)V	260	Gen A/B/C phase high voltage alarm value
96(91)	Gen Under Frequency Alarm	(0-75.0) Hz	43	When generator frequency is lower than the point (not equal to 0) for 5s, alarm signal is sent.
97(92)	Gen Over Frequency Alarm	(0-75.0) Hz	54	When generator’ s frequency is over the point and continues for 1s, alarm signal is sent.
98(93)	D+ Enable		Disable	
99(94)	Programmed Sensor Type	(0-3)	0	00 Digital input 4 01 Temperature sensor 02 Pressure sensor 03 Liquid level sensor
100(95)	Programmed Sensor Stop Inhibit	(0-1)	0	0 Stop； 1 Stop Inhibit
101 (96)	Programmed Sensor Warn	(0-400)	98	Select the corresponding programming sensor type, the threshold unit will be transformed with the sensor type, if higher or lower than the set threshold, after a sustained delay, an alarm or stop

				alarm signal will be sent
102 (97)	Programmed Sensor Curve		3	Select the corresponding programming sensor type, the curve will be transformed with the sensor type
103 (98)	Programmed Sensor Open Circuit Action	(0-2)	1	0: Not used; 1: Warning; 2: Shutdown
104(99)	Presupply Time	(0-300)S	0	Output time for oil pump control

Note 1: The first column in the sequence number column defaults to the GEC4520 parameter, and the sequence number in parentheses is the GEC4510 parameter sequence number;

Note 2: If the parameter setting option 'over temperature stop inhibit disable' is set to stop inhibit, or if the programmable input port is set to high temperature stop inhibit , and the input port is valid, when the temperature value is higher than the set threshold, the controller will only send out an alarm signal for high temperature without shutdown.

Note 3: If the parameter setting option 'under oil pressure stop inhibit disable' is set to stop inhibit, or if the programmable input port is set to under oil pressure stop inhibit , and the input port is valid, when the oil pressure is lower than the set threshold, the controller will only send out an alarm signal for low oil pressure without shutdown.

Note 4: When setting parameters through PC software, the default password (1921) is not changed and does not need to be entered. If the password is changed and the configuration parameters are first written through PC software, the module's password needs to be written in the input password window.

Note 5: After entering the password correctly, it is not necessary to enter the password again within one minute (exit and retime). You can directly enter the parameter setting interface by entering the parameter number.

6. DEFINED CONTENTS OF PROGRAMMABLE OUTPUT

NO.	Items	Description
0	Non used	Output is disabled when this item is selected.
1	Common Alarm	Including all shutdown alarm and warning alarm. When warning alarm occurs, the alarm won’ t self-lock; When a shutdown alarm occurs, the alarm will self-lock until alarm is reset.
2	Energize to Stop	Used for the gen-set with stop solenoid. Pick-up when idle speed is over while disconnect when ETS delay is over.
3	Idle Control	Used for the gen-set with idle speed. Pick-up when crank while disconnect when enter into warming up. Pick-up when stop idle while disconnect when gen-set stop completely.

NO.	Items	Description
4	Preheat Control	Close before started and disconnect before powered on.
5	Close Gen Output	When close time is set as 0, it is continuous closing.
6	Close Mains Output	GEC4510 without.
7	Open Breaker	When close time is set as 0, Open Breaker is disabled.
8	Speed Raise Relay	Pick-up when enter into warming up time.
9	Speed Drop Relay	Pick-up when enter into stop idle or ETS solenoid stop (shutdown alarm).
10	Run Output	Output when gen-set is in normal running, disconnect when rotating speed is lower than engine speed after fired.
11	Fuel Pump Control	Pick-up when the fuel level lower than the open threshold or low fuel level warning is active; disconnect when the fuel level over the close threshold and the low fuel level warning input is disabled.
12	High Speed Control	Output when it enters into warming up time, and disconnect after cooling.
13	Auto Mode	The controller is in Auto Mode.

NO.	Items	Description
14	Shutdown Alarm	Output when shutdown alarm occurs.
15	Audible Alarm	When shutdown alarm and warn alarm occur, when "alarm mute" input is active, it can remove the alarm.
16	Non used	
17	Fuel Output	Action when genset is starting and disconnect when stop is completed.
18	Start Output	Genset output in start output status and open in other status.
19	Non used	
20	ECU Power	No output when energize to stop and fault shutdown status or emergency stop is effective, and other states will output normally。
21	Non used	
22	Non used	
23	Non used	
24	Speed Raise Pulse	Raising speed time is output while the unit entering into high-speed warming up.
25	Speed Drop Pulse	Dropping speed time is output while the unit entering into stop idling.
26	Idle Control	Used for the gen-set with idle speed. Pick-up when

NO.	Items	Description
		crank while disconnect when enter into warming up. Pick-up when stop idle while disconnect when gen-set stop completely.
27	Oil Pump Control	When the power is turned on, when the pre supply time is not set to zero, the relay will close. The closing time is the pre supply time, and when the pre supply time is set to zero, it will not close and directly enter the next stage

7. DEFINED CONTENTS OF PROGRAMMABLE INPUT

NO.	Items	Description
0	Non Used	
1	High Temperature Shutdown	If the signal is active after safety run delay over, gen-set will immediately alarm to shutdown.
2	Low Oil Pressure Shutdown	If the signal is active after safety run delay over, gen-set will immediately alarm to shutdown.
3	Warn Input	Only warning, not shutdown.
4	Shutdown Input	If the signal is active, gen-set will immediately alarm to shutdown.

NO.	Items	Description
5	WTH STOP by Cool	During engine running and the input is active, if high temperature occurs, controller will stop after high speed cooling; when the input is disabled, controller will stop immediately. （Default as with this function when enable is 1）
6	Generator Closed Auxiliary	Connect to auxiliary port of gen load breaker.
7	Mains Closed Auxiliary	Connect to auxiliary port of mains load breaker.
8	Inhibit WTH STOP	When the temperature is over, only alarm no shutdown. See Note2 for more details.
9	Inhibit OPL STOP	When the oil pressure is under, only alarm no shutdown. See Note3 for more details.
10	Remote Start	In Auto mode, when input active, gen-set can start and take load after gen-set is OK; when input inactive, gen-set will stop automatically.
11	Fuel Level Low Warning	Connected to sensor digital input. The controller sends an warning alarm signal when active.
12	Coolant Level Low Warning	
13	Fuel Level	Connected to sensor digital input. The controller sends

NO.	Items	Description
	Low Shutdown	an shutdown alarm signal when active.
14	Coolant Level Low Shutdown	
15	Inhibit Auto Start	In Auto Mode, when the input is active, no matter mains normal or not, gen-set won’ t start. If gen-set is in normal running, stop process won’ t be executed. When input is disabled, gen-set will automatically start or stop judging by mains normal or not.
16	Remote Control	All buttons in panel is inactive except   and Remote Mode is displayed on LCD. Remote module can switch module mode and start/stop operation via panel buttons.
17	Charge Alt Fail IN	Connect to failed to charge output.
18	Panel Lock	All keys in panel are inactive except   set-keys and there is in the first row of the front page in LCD when input is active.
19	Alarm Mute	Can prohibit “Audible Alarm” output when input is

NO.	Items	Description
		active.
20	Idle Mode	In this mode, under voltage, under frequency and under speed are not protected.
21	Fuel Leakage	When input is active, controller will initiate Fuel leakage alarms.
22	Non Used	
23	Non Used	
24	Over Current Fault Shutdown	When input is active, controller will initiate shutdown alarms.
25	Over Speed Shutdown	When input is active, controller will initiate shutdown alarms.

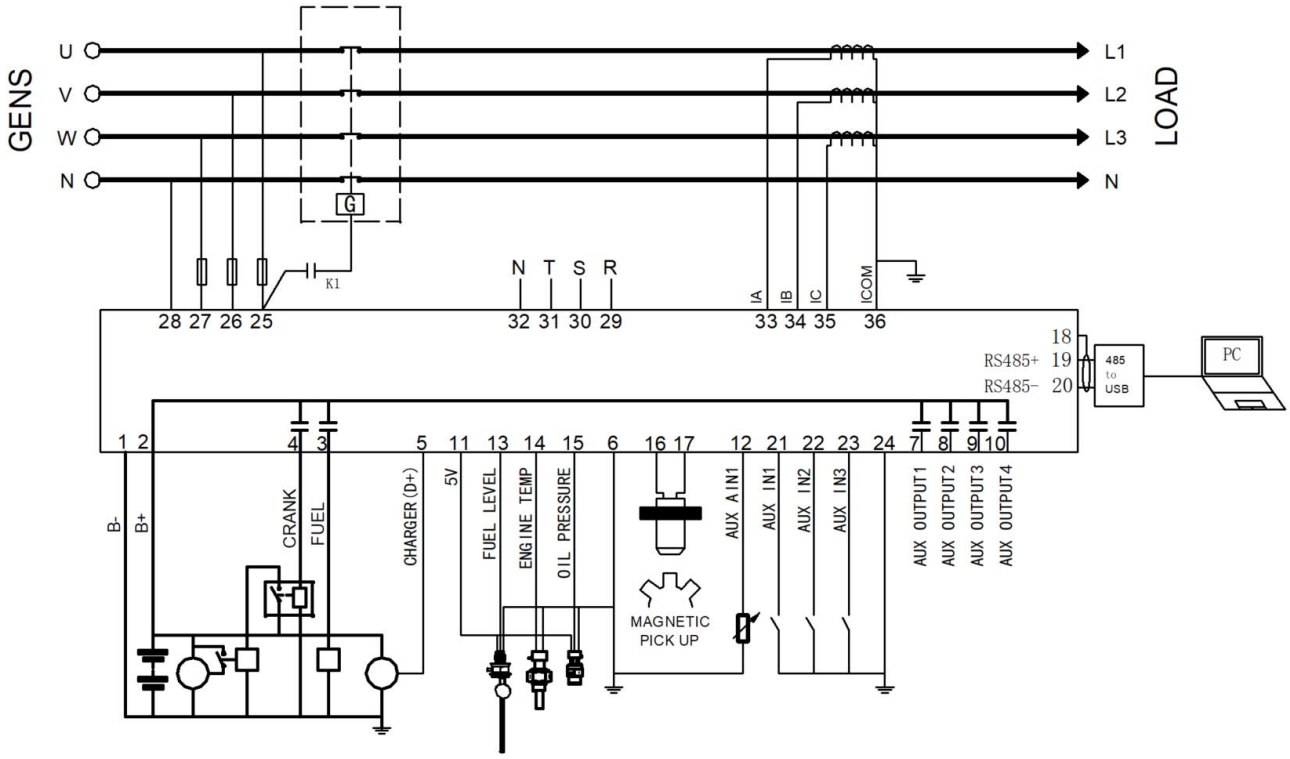
8. SENSORS

No.		Contents	Notes
1	Temp Sensor	0 Non used 1 Resistance-type 2 VDO 3 SGH 4 SGD 5 CURTIS 6 DATCON 7 VOLVO-EC 8 SGX 9 PT100 10 Euro III 11 Dongfeng 3845	Defined input resistance range is 0Ω~6000Ω，factory default is SGX Sensor.
2	Pressure Sensor	0 Non used 1 Resistance-type 2 VDO 10Bar 3 SGH 4 SGD 5 CURTIS 6 DATCON 10Bar 7 VOLVO-EC	Defined input resistance range is 0Ω~6000Ω，factory default is SGX Sensor.

No.		Contents	Notes
		8 SGX 9 Reserved 10 Euro III	
3	Fuel Level Sensor	0 Non used 1 Resistance-type 2 SGH 3 SGD 4 Fortrust fuel level sensor	Defined input resistance range is 0Ω~6000Ω，factory default is Fortrust fuel level sensor.

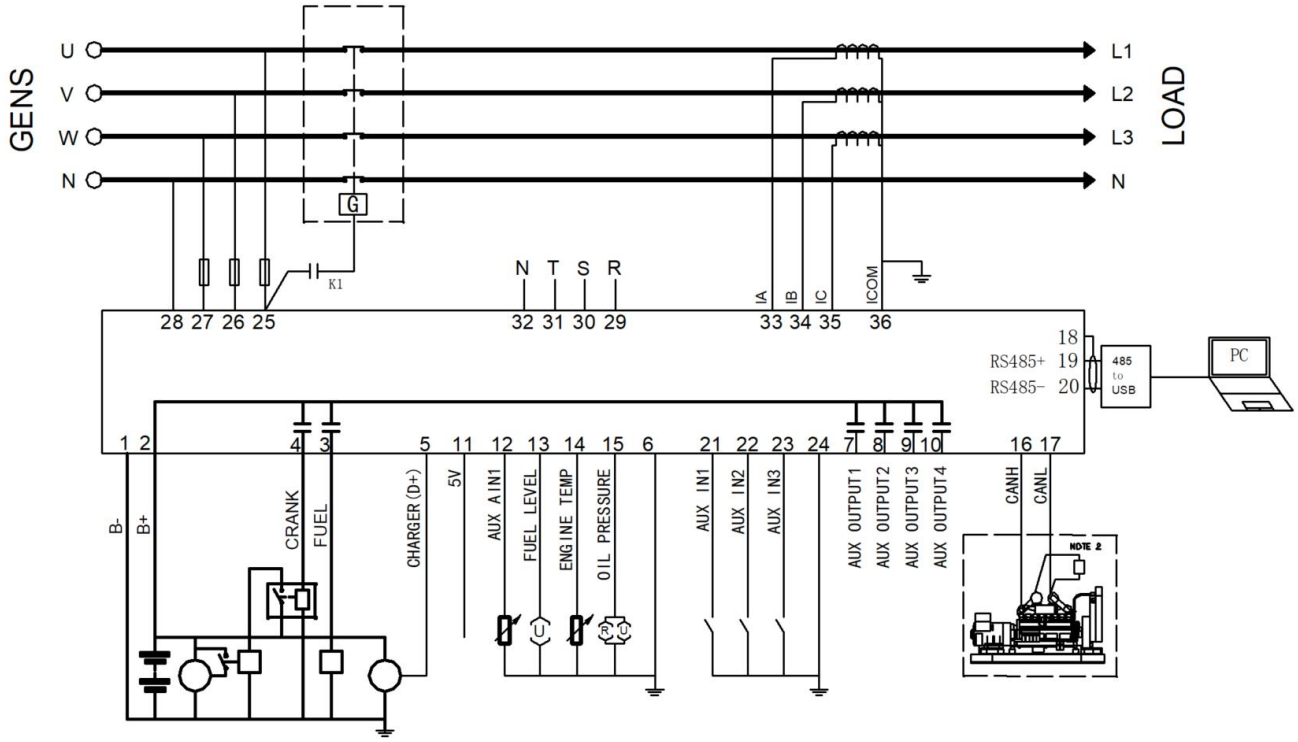
9. TYPICAL APPLICATION

This scheme is applied to the single machine scenario. In the case of non-EFI units, it can be built according to the typical application diagram.



Non-EFI Typical Application

This scheme is applied to the single machine scenario. In the case of EFI units, it can be built according to the typical application diagram.



EFI Typical Application

Web：www.fortrustpower.com

Email: info@fortrust.cn

Address: Room 803, Building A, Senlan Meilun Building, 555 Lansong Road, Pudong New District, Shanghai
Sales Hotline：19851351321
Postcode：200137

Factory Address: No.49 Mingzhu Road, High-Tech Industrial Development Zone,Qidong, Nantong, Jiangsu Province
Sales Hotline：19851351386
Postcode：226236

Cloud Factory Address: 4th Floor, Building 9, Zone B, Electronic Science and Technology Park, No. 1 Shuangxing Avenue, Shuangliu District, Chengdu City, Sichuan Province
Sales Hotline：13918022476
Postcode：610299