APC715

Pump Unit Controller

USER MANUAL

SMARTGEN (ZHENGZHOU) TECHNOLOGY CO., LTD.

potentiometer, more reliability and stability;

- Waterproof security level IP55 due to rubber seal installed between the controller enclosure and panel fascia;
- Metal fixing clips enable perfect performance in high temperature environment;
- Modular design, anti-flaming ABS plastic enclosure, pluggable connection terminals and embedded installation way; compact structure with easy mounting.

3 SPECIFICATION

Items	Contents
Working Voltage	DC8. 0V to 35. 0V, Continuous Power Supply.
Overall Consumption	<4W(Standby mode: ≤2W)
Speed Sensor Voltage	1.0V to 24V (effective value)
Speed Sensor Frequency	10,000 Hz (max)
Start Relay Output	16Amp DC28V power supply
Fuel Relay Output	16Amp DC28V power supply
Programmable Relay Output 1-6	7Amp DC28V power supply
Programmable Relay Output 7-10	7Amp AC250V power supply
Analog Sensor	4 fixed sensor, 6 configurable sensor
Overall Dimensions	266 mm x 182 mm x 45 mm
Panel Cutout	214mm x 160mm
Working Condition	Temperature: (-25~70)ºC; Humidity: (20~93)%RH
Storage Condition	Temperature: (-25~70)ºC
Protection Level	IP55 Gasket
Weight	0.95kg

4 OPERATION

4.1 INDICATOR LIGHT

NOTE: Selected indicators description:

Warning indicator and Alarm indicator:

Alarm Type	Warning Indicator	Alarm Indicator
Warning	Slow flashing	Slow flashing
Shutdown Alarm	Off	Fast flashing

Running indicator: illuminated from crank successful to ETS while off during other periods.

4.2 PUSHBUTTONS

	Stop	Stop running pump unit in Auto/Manual mode; Reset alarm in stop mode; Lamp test (press at least 3 seconds); During stopping process, press this button again to stop pump unit immediately.
	Start	Start pump unit in Manual/Test mode.
	Manual Mode	Press this key and controller enters in **Manual** mode.
	Auto Mode	Press this key and controller enters in **Auto** mode.
	Mute	Alarming sound off; If there is alarm, pressing the button at least 3 seconds can reset this alarm.
	Load	Can control the clutch to switch on or off in manual mode.
	Adjust Speed	Enter/Exit the speed adjust menu.
	Up/Increase	1) Screen scroll; 2) Up cursor and increase value in setting menu.
	Down/Decrease	1) Screen scroll; 2) Down cursor and decrease value in setting menu.
	Left	1) Screen scroll; 2) Left move cursor in setting menu.
	Right	1) Screen scroll; 2) Right move cursor in setting menu.
	Set/Confirm	1. Enter into “help” interface; 2. Pressing and holding for more than 3 seconds enters parameter configuration menu; 3. In settings menu confirms the set value.
	Exit	1. Returns to the main menu; 2. In settings menu returns to the previous menu.

NOTE: In manual mode, pressing  and  simultaneously will force generator to crank. Successful start will not be judged according to crank disconnect conditions, operator will have to crank the starter motor manually; when operator decides that the engine has fired, he/she should release the button and start relay will be deactivated, safety on delay will start.

WARNING: Default password is 00318, user can change it in case of others change the

advanced parameters setting. Please clearly remember the password after changing. If you forget it, please contact Smartgen services and send all information in the controller page of "**ABOUT**" to us.

4.3 LCD Display

4.3.1 MAIN DISPLAY

Main screen is divided into left and right separate viewing areas, use 

to select a viewing area; the selected area is marked with  in its upper left corner. Both viewing areas show pages; use  to scroll the pages and  to scroll the screen.

★**Engine**, including as below,

Engine status, engine temperature, engine oil pressure, fuel level, Configurable Sensor 1, battery voltage, charger voltage, accumulated run time, accumulated start times.

NOTE: If connected with J1939 engine via CANBUS port, this page also includes: coolant pressure, coolant level, fuel temperature, fuel pressure, inlet temperature, exhaust temperature, turbo pressure, fuel consumption, total fuel consumption and so on. (Different engine with different parameters)

★**Pump Unit**:

Outlet pressure, pump flow, pump head, config. sensor 2~6 (can be set as temperature sensor, pressure sensor or level sensor)

Formula: Pump Head = (Outlet pressure - Static Pressure)/0.0098.

Pump flow is calculated according to relation curve of outlet pressure and flow; the relation curve should be set by users according to the actual usage.

★**Alarm:**

Display all warnings, shutdown alarms, trip shutdown alarms and the corresponding information.

NOTE: For ECU alarms and shutdown alarms, if the alarm information is displayed, check engine according to it, otherwise, please check the manual of generator according to SPN alarm code.

◙ **Event log**

Records all start/stop events (shutdown alarm, trip shutdown alarm, manual/auto start or stop) and the real time when alarm occurs.

Others, including,

Time and Date, maintenance due time, input/output ports status.

◙ **About,** including,

Issue time of software and hardware version, product PD number.

★**Miscellaneous**, including:

Working mode，engine status，engine temperature，engine oil pressure，fuel level，outlet pressure，config. sensor 2(inlet pressure), accumulated run time, real-time clock.

Press 

in main screen can jump to **miscellaneous screen**

4.5 MANUAL START/STOP OPERATION

1 Manual Start: Manual mode is selected by pressing the 

button; a LED besides the button will illuminate to confirm the operation; then press 

button to start the unit; can automatically detect crank successful, and unit accelerates to high-speed running automatically.

When "After Unload Idle" is enabled, the unit is idle running when crank succeed; unit accelerates to high-speed running automatically and take load after press 

key by manual.

With high temperature, low oil pressure and over speed during pump unit running, controller can protect it to stop quickly (please refer to No.2~7 of Auto start operation for detail procedures).

2 MANUAL STOP: Press 

can stop the running pump unit. (please refer to No.2~7 of Auto stop operation for detail procedures).

NOTE: In "manual mode", users can control the pump unit on load or off load via "Load" key.

4.6 On-load control process

When controller is in Manual mode, manual control will be executed.

Users can control the pump unit on load or off load by pressing 

key. The pump unit will unload automatically when it is stopped.

If "After Unload Idle" is selected "Disable"

Start the pump unit in manual mode and press 

key during the genset is normal running, then the engine will take load; press 

key again, the engine will unload and the generator is normal running.

If "After Unload Idle" is selected "Enable":

Start the pump unit in manual mode and it enters into idle running process. The pump unit will not enter into normal running status until 

key is pressed and it will take load as soon as the on-load requirements have reached.

When the pump unit is normal running with load, press 

key once again will lead to the unit's offload (i.e. load relay deactivated); then the "cooling delay" will be initiated. Once this has expired, the unit will enter into idle running status.

When controller is in Auto mode, auto control will be executed.

The pump unit will take load automatically when it is normal running and the on-load requirements

have reached while unload automatically when it is stopped.

4.7 ADJUST SPEED CONTROL

Users can set the outlet pressure as the rated value simply by adjusting the engine speed. The "Adjust Speed Control" was divided into auto control and manual control.

Manual Adjust Speed: Adjust Speed mode is selected by pressing the 

button; In this interface, users can adjust speed using navigational button:  , manual adjust speed;  , auto adjust speed;  , manual raise speed;  , manual drop speed. "  , manual raise speed" and "  , manual drop speed" buttons are active only when pump unit is normal running under "Manual Adjust Speed" mode.

Auto Adjust Speed: Under this mode, during the unit is normal running, the controller will adjust the outlet pressure/inlet pressure according to the preset to rated speed and maintain its steady automatically.

The "Auto Adjust Speed" was divided into relay adjust speed, GOV adjust speed and CAN adjust speed.

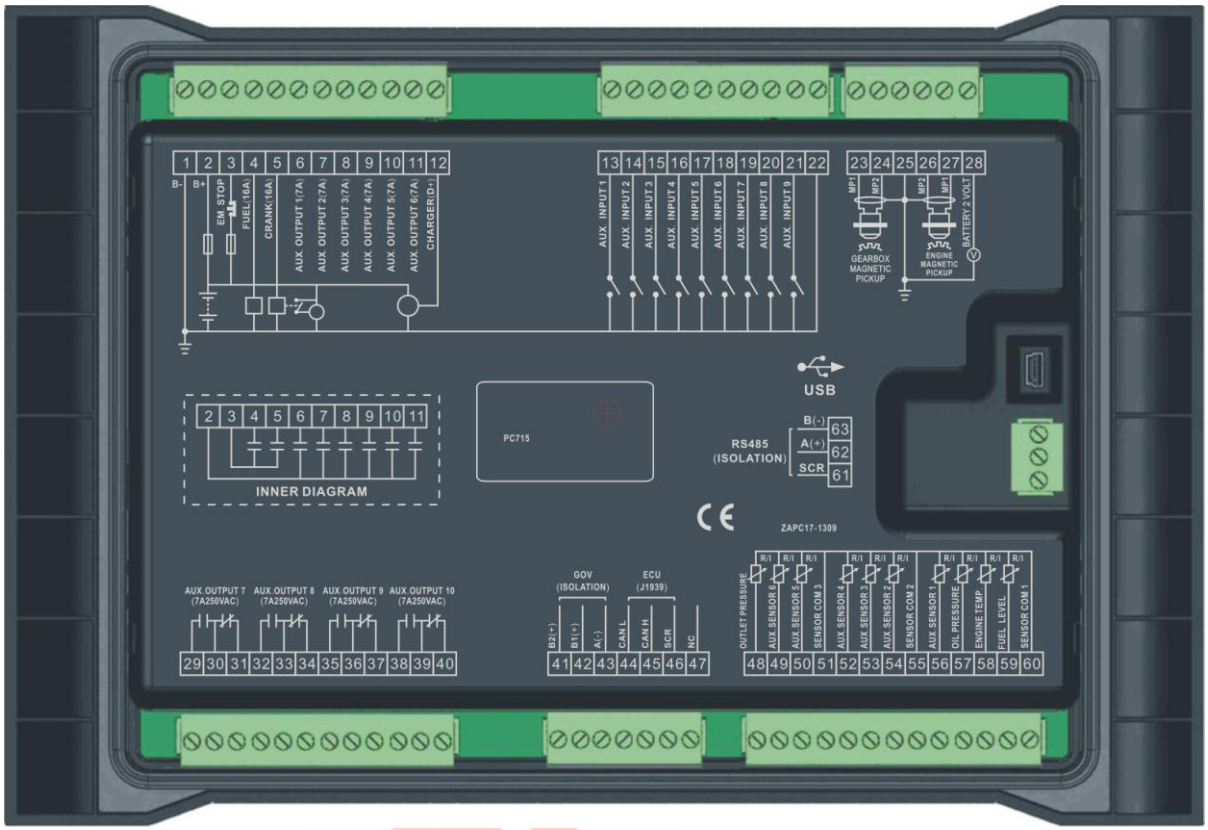
Relay Adjust Speed: Control the engine servo motor simply by using speed raise relay and speed drop relay.

GOV Adjust Speed: Control the electronic speed regulator simply by using GOV analog signal. Users should set parameters according to the actual situation as different regulators have different parameters.

CAN Adjust Speed: Control the ECU engine speed simply by using CAN interface. Parameters setting and speed adjustment method are same as GOV. SW1 should set as 5.0 and SW2 as 2.0 while adjusting.

6 CONNECTIONS

APC715 controller back panel is shown below:



Description of terminal connections:

Pin	Function	Cable Size	Description	
1	B-	2.5mm^2	Connected with negative of starter battery.	
2	B+	2.5mm^2	Connected with positive of starter battery. If wire length is over 30m, better to double wires in parallel. Max. 20A fuse is recommended.	
3	Emergency Stop	2.5mm^2	Connected with B+ power supply via emergency stop button.	
4	Fuel Relay Output	1.5mm^2	B+ power is supplied by terminal 3, rated 16A	
5	Start Relay Output	1.5mm^2	B+ power is supplied by terminal 3, rated 16A	Connected to starter coil
6	Aux. Output 1	1.5mm^2	B+ power is supplied by terminal 2, rated 7A	Details see form 2
7	Aux. Output 2	1.5mm^2	B+ power is supplied by terminal 2, rated 7A	
8	Aux. Output 3	1.5mm^2	B+ power is supplied by terminal 2, rated 7A	

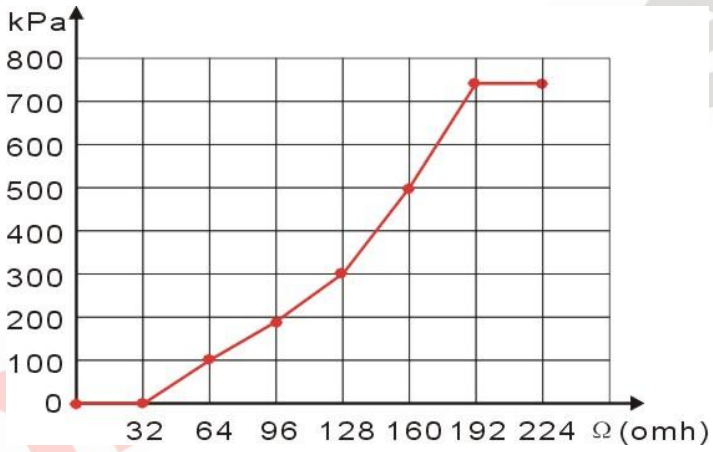
Pin	Function	Cable Size	Description	
9	Aux. Output 4	1.5mm^2	B+ power is supplied by terminal 2, rated 7A	
10	Aux. Output 5	1.5mm^2	B+ power is supplied by terminal 2, rated 7A	
11	Aux. Output 6	1.5mm^2	B+ power is supplied by terminal 2, rated 7A	
12	Charger(D+)	1.0mm^2	Connected with charger starter's D+ (WL) terminals. Being hang up If there is no this terminal.	
13	Aux. Input 1	1.0mm^2	Ground connected is active (B-)	Details see form 3
14	Aux. Input 2	1.0mm^2	Ground connected is active (B-)	
15	Aux. Input 3	1.0mm^2	Ground connected is active (B-)	
16	Aux. Input 4	1.0mm^2	Ground connected is active (B-)	
17	Aux. Input 5	1.0mm^2	Ground connected is active (B-)	
18	Aux. Input 6	1.0mm^2	Ground connected is active (B-)	
19	Aux. Input 7	1.0mm^2	Ground connected is active (B-)	
20	Aux. Input 8	1.0mm^2	Ground connected is active (B-)	
21	Aux. Input 9	1.0mm^2	Ground connected is active (B-)	
22	Common GND(B-)	1.0mm^2	(B-) has already connected innerly.	
23	Gearbox Magnetic Pickup 1	0.5mm^2	Connected with Gearbox Speed Sensor, shielding line is recommended. (B-) has already connected with speed sensor 2 innerly.	
24	Gearbox Magnetic Pickup 2			
25	Magnetic Pickup GND		(B-) has already connected with ground innerly.	
26	Engine Magnetic Pickup 2	0.5mm^2	Connected with Engine Speed Sensor, shielding line is recommended. (B-) has already connected with speed sensor 2 innerly.	
27	Engine Magnetic Pickup 1			
28	Battery 2 Volt	1.0mm^2	Connected with positive of battery 2.	
29	Aux. Output 7	1.5mm^2	Normally close output, rated 7A	Details see form 2
30			Public points of relay	
31			Normally open output, rated 7A	
32	Aux. Output 8	1.5mm^2	Normally close output, rated 7A	
33			Public points of relay	
34			Normally open output, rated 7A	
35	Aux. Output 9	1.5mm^2	Normally close output, rated 7A	
36			Public points of relay	
37			Normally open output, rated 7A	
38	Aux. Output 10	1.5mm^2	Normally close output, rated 7A	
39			Public points of relay	

Pin	Function	Cable Size	Description	
40			Normally open output, rated 7A	
41	GOV B2+	0.5mm^2	120kΩ resistor had been connected between it and GOV B1(+) innerly.	
42	GOV B1+	0.5mm^2	2-core shielding wire is recommended, its GOV end shall be earth connected.	
43	GOV A-	0.5mm^2		
44	ECU CAN L	0.5mm^2	Impedance-120Ω shielding wire is recommended, its single-end earthed. 120Ω matched resistance has already connected internally.	
45	ECU CAN H	0.5mm^2		
46	ECU CAN COM	/		
47	NC		Not connect.	
48	Outlet Pressure Sensor	1.0mm^2	Connect to outlet pressure sensor	
49	Aux. sensor 6	1.0mm^2	Spare sensor of pump unit	Details see form 4
50	Aux. sensor 5	1.0mm^2		
51	Sensor COM 3	1.0mm^2	Public terminal of sensor, (B-) has already connected.	
52	Aux. sensor 4	1.0mm^2	Spare sensor of pump unit	
53	Aux. sensor 3	1.0mm^2		
54	Aux. sensor 2	1.0mm^2		
55	Sensor COM 2	1.0mm^2	Public terminal of sensor, (B-) has already connected.	
56	Aux. sensor 1	1.0mm^2	Spare sensor of engine	
57	Oil pressure sensor	1.0mm^2	Connected to oil pressure sensor	
58	Temperature sensor	1.0mm^2	Connected to temperature sensor	
59	Fuel level sensor	1.0mm^2	Connected to fuel level sensor	
60	Sensor COM 1	1.0mm^2	Public terminal of sensor, (B-) has already connected.	
61	RS485	/	Impedance-120Ω shielding wire is recommended, its single-end earthed.	
62	RS485+	0.5mm^2		
63	RS485-	0.5mm^2		

NOTE: USB ports in controller rear panel are programmable parameter ports, user can directly configure controller via PC in stop mode.

9 SENSOR SELECT

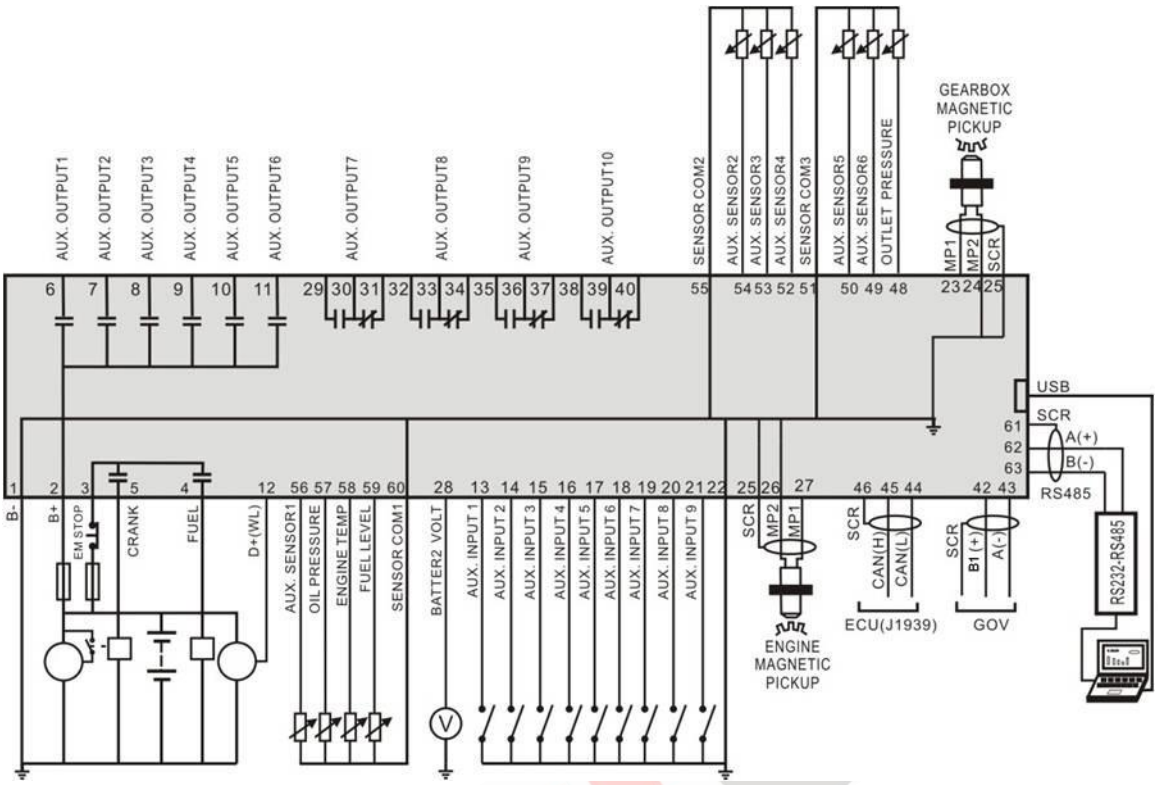
1) When reselect sensors, the sensor curve will be transferred into the standard value. For example, if temperature sensor is SGX (120°C resistor type), its sensor curve is SGX (120°C resistor type); if select the SGD (120°C resistor type), the temperature sensor curve is SGD curve.
2) When there is difference between standard sensor curves and using sensor, user can adjust it in “curve type”.
3) When input the sensor curve, X value (resistor) must be input from small to large, otherwise, mistake occurs.
4) If select sensor type as “None”, sensor curve is not working and LCD does not display the sensor information.
5) If there is alarm switch only for the select sensor, user must set the sensor as “None”, otherwise, maybe shutdown or warning occurs.
6) The headmost or backmost values in the vertical coordinates can be set as same as below,



Common unit conversion table

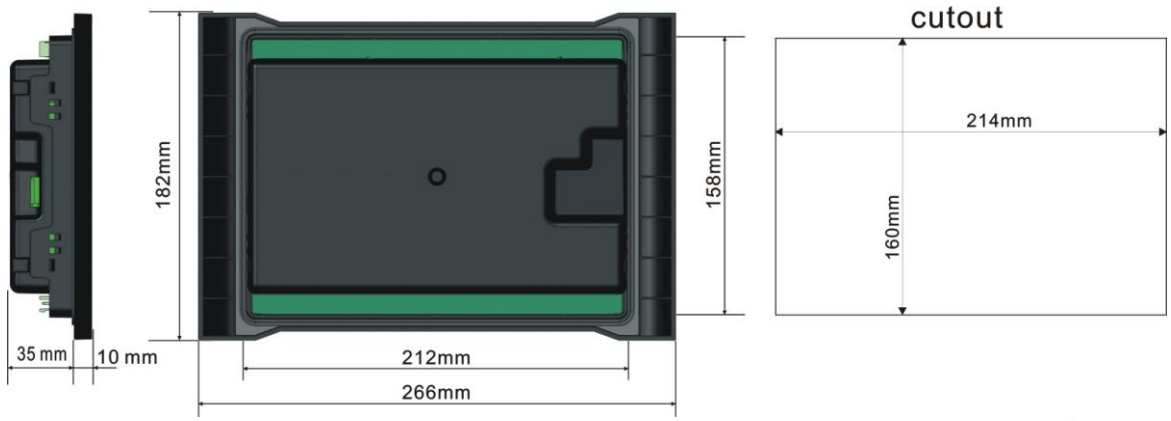
	N/m^2 (pa)	kgf/cm^2	bar	(p/in^2.psi)
1Pa	1	1.02x10^{-5}	1x10^{-5}	1.45x10^{-4}
1kgf/cm^2	9.8x10^4	1	0.98	14.2
1bar	1x10^5	1.02	1	14.5
1psi	6.89x10^3	7.03x10^{-2}	6.89x10^{-2}	1

10 TYPICAL APPLICATION



11 INSTALLATION

Controller is panel built-in design; it is fixed by clips when installed.



1) Battery Voltage Input

NOTE: APC715 controller can suit for widely range of battery voltage DC(8~35)V. Negative of battery must be connected with the engine shell soundly. The diameter of wire which from power supply to battery must be over 2.5mm^2. If floating charge configured, please firstly connect output wires of charger to battery's positive and negative directly, then, connect wires from battery's positive and negative to controller's corresponding input ports in order to prevent charge disturbing the controller's normal working.

2) Speed Sensor Input

NOTE: Speed sensor is the magnetic equipment which be installed in starter and for detecting flywheel teeth. Its connection wires to controller should apply for 2 cores shielding line. The shielding layer should connect to shielding GND terminal in controller while another side is hanging in air. The else two signal wires are connected to MP1 and MP2 terminals, moreover, MP2 has already connected to B- innerly. The output voltage of speed sensor should be within AC(1~24)V (effective value) during the full speed. AC12V is recommended (in rated speed). When install the speed sensor, let the sensor is spun to contacting flywheel first, then, port out 1/3 lap, and lock the nuts of sensor at last.

3) Output And Expansion Relay

NOTE: All outputs of controller are relay contact output type. If need to expand the relays, please add freewheel diode to both ends of expand relay's coils (when coils of relay has DC current) or, add resistance-capacitance return circuit (when coils of relay has AC current), in order to prevent disturbance to controller or others equipment.