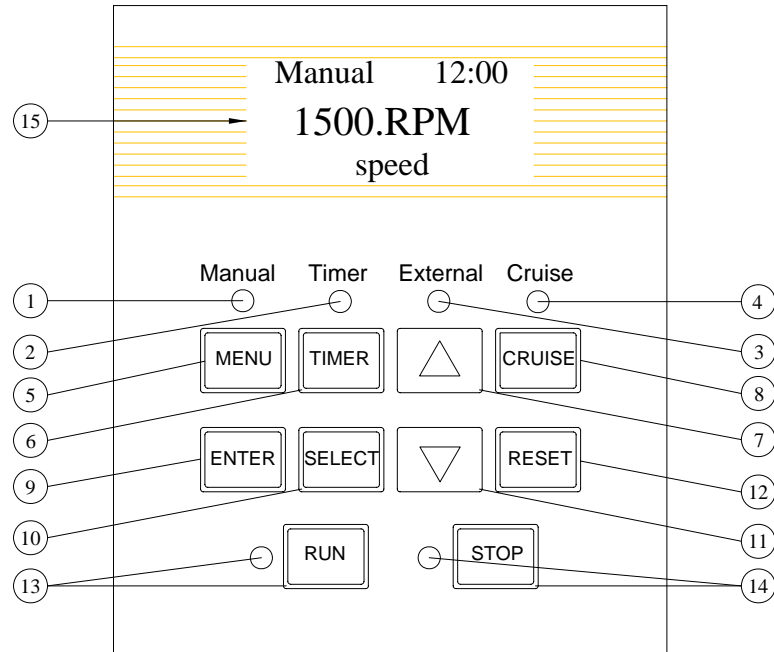


Operator Control Panel

This section describes the operator control panel controls and LEDs.

Red Devil Operator control Panel



Controls and LEDs

- ① **Manual LED:** The LED is on when Manual mode is active.
- ② **Timer LED:** The LED is on when Timer function is active.
- ③ **External LED:** The LED is on when rotor speed command comes from external signal like 0~5V voltage input, or Host controller.
- ④ **Cruise LED:** The LED is on when Cruise function is active.
- ⑤ **Menu button:** Access the menu items and modified parameters when pump is stopped.
- ⑥ **Timer button:** Starts or stops Timer mode set by “Timer Mode” menu item.
- ⑦ **Up arrow button:** Move one level up in the menu tree or increase a digit when editing a setting.
- ⑧ **Cruise button:** Starts or stops Cruise mode.
- ⑨ **Enter button:** Save current menu item settings. Also, press this button to acknowledge alarms and warning alerts.
- ⑩ **Select button:** Display available menu items or enters edit mode for changing a value on line two of the display.
- ⑪ **Down arrow button:** Move one level down in the menu tree or increase a digit when editing a setting.

- ⑫ **Reset button:** Reset controller for initializing program when in Alert.
- ⑬ **Run button/LED:** Start the pump. When the LED is lit it indicates the pump is running.
- ⑭ **Stop button/LED:** Stop the pump. When the LED is lit it indicates the pump is stopped.

⑮ **Control Panel LCD Display**

LCD Display Lines:

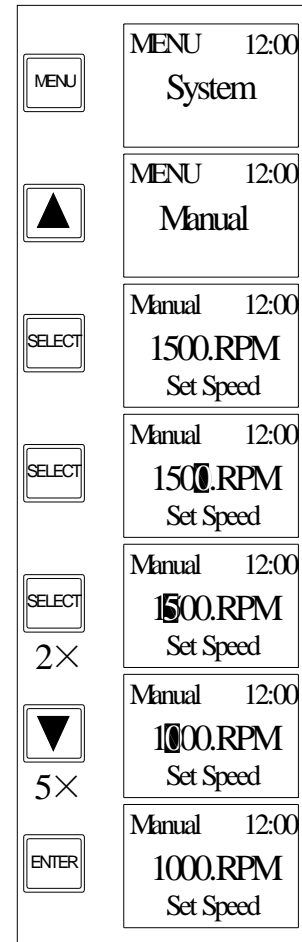
- Line 1 – Mode and time
- Line 2 – Data or variable
- Line 3 – name of data or variable on line 2

Navigating the Menu Structure

Before navigating the control panel menu structure, first familiarize yourself with the menu buttons. To change a parameter setting, use the **Select** button to select the digit, then the **Up** and **Down** arrow buttons to edit the digit. The following example shows how to set the RPM.

To set the “Set Speed” settings:

1. Ensure that the pump is stopped, the **Stop** led is lit.
If the pump is running, press the **Stop** button.
2. Press the **Menu** button. “System” is displayed.
3. Press the **Up** arrow button. “Manual” is displayed.
4. Press the **Select** button to access Manual menu. Value of “Set Speed” is displayed.
5. **Set the RPM:** Press the **Select** button to select which digit to modify. Press the **Up** and **Down** arrows to change the selected digit.
6. When you are done, press the **Enter** button to save the changes. To cancel any changes, press the **Menu** button to exit edit mode without saving.



Operating Red Devil Controller

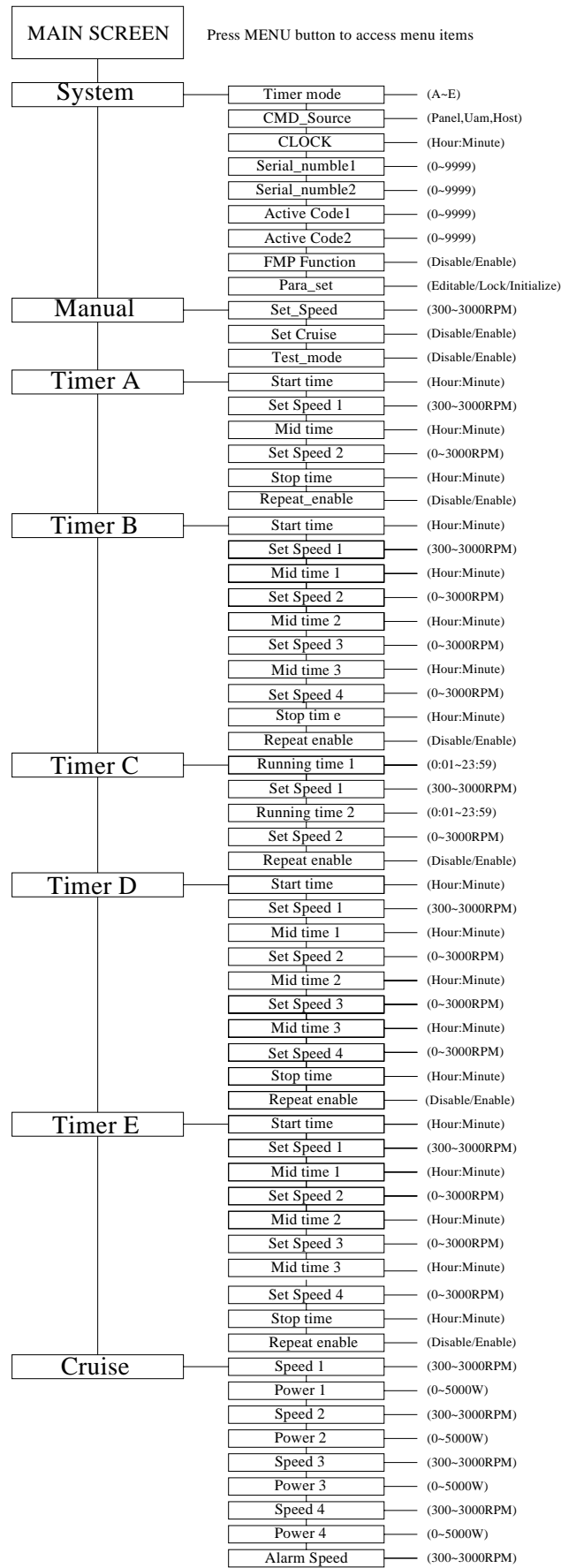
This section describes how to use the Red Devil pump control panel.

Red Devil Control Panel Menu

Use the control panel menu to setup and configure Red Devil controller.

To modify the menu features, ensure the pump is stopped. Press **Menu** button. Use the **Up** or **Down** arrow button to scroll through the menu items. Use the **Select** button to select a menu item. Press the **Enter** button to save a setting. Press the **Menu** button to move up a level from a selected menu item.

Main Structure



System Menu

Use the “System” menu to set the timer mode, the command source and the system clock. The timer mode decides which timer mode the controller takes when the **Timer** button is pressed. The command source indicates where the pump rotation speed command comes from. The system clock controls all scheduled start and stop times, functions and programmed cycles. The system clock can store the correct time for up to 96 hours after power is shut off. After 96 hours the clock must be reset to the correct time.

To access the System menu:

1. Ensure that the power is on and the pump is stopped.
2. Press the **Menu** button.
3. Press the **Up** and **Down** arrow buttons to scroll through the menu items. Press the select button to access the “System” menu.
4. **To enter the Timer mode:** Press the **Up** and **Down** arrow buttons to select “Timer mode” setting. To set the Timer mode, see step 11.
The “Timer mode” value from A to E decides which timer mode the controller takes when the **Timer** button is pressed.
5. **To set the command source:** Use the **Up** and **Down** arrow buttons to select “CMD_source”. To set the command source, see step 11.
The “CMD_source” value “Panel” means the pump rotation speed is set by controller panel, value “Uam” means the pump rotation speed comes from 0~5V voltage input, and value “Host” means the pump rotation is set by host controller.
6. **To enter the clock:** Use the **Up** and **Down** arrow buttons to select “CLOCK”. To set the Clock, see step 11.
7. **To read the serial number:** Use the **Up** and **Down** arrow buttons to select “Serial num 1” and then “Serial num 2”. The serial number of the controller will be XXXX(“serial num 1”)-XXXX(“Serial num 2”), which set by product, and can’t be modified by customer.
8. **To enter the active code:** Use the **Up** and **Down** arrow buttons to select “Active code 1” and then “Active code 2”. To set the active code, see step 11.
The active code of the controller will be XXXX(“Active code 1”)-XXXX(“Active code 2”). The default value of the active code is 0000-0000. If you want to use some advanced functions such as “no water protection”, “Timer function” and “Cruise control”, please contact the product

MENU	12:00
System	

System	12:00
A	
Timer Mode	

System	12:00
Panel	
CMD Source	

System	12:00
12:00	
Clock	

System	12:00
0000	
Serial num1	

System	12:00
0000	
Serial num 2	

System	12:00
0000	
Active code 1	

System	12:00
0000	
Active code 2	

System	12:00
Disable	
FMP Function	

System	12:00
Editable	
Para set	

to buy an active code.

9. **To set the FMP function:** Use the **Up** and **Down** arrow buttons to select “FMP function”. Press the **Select** button then the **Down** arrow button to select **Enable** if not already selected. Press the **Enter** button to save the setting.

If the FMP function is enabled, the signal port will output a square wave whose frequency is linear to the pump rotation speed. The detail will be show at chapter of External feature.

10. **To set the parameter mode:** Use the **Up** and **Down** arrow buttons to select “Para set”. Press the **Select** button then the **Down** arrow button to select Editable/LOCK/Initial if not already selected. Press the **Enter** button to save the setting.

The “Para set” value “Editable” means you can edit the parameters except the serial number, value “LOCK” means the parameter just for reading, value “Initial” means all the parameters be reset to initial value which set by product.

11. To enter a new setting, press the **select** button to select which digit to modify, then use the **Up** and **Down** arrow buttons to change the selected digit.
12. When you are done, press the **Enter** button to save the changes. To cancel any changes, press the **Menu** button to exit edit mode without saving.

Manual Mode

The manual mode is the default operation mode for the pump controller. Users may change the pump rotation speed by manual. Also, the cruise curve can be set in this mode.

When the pump is operating in manual mode, the **Manual LED** will be lit and the control panel **LCD** will display “Manual” on first line. The pump will start with the reference speed set by “set speed” item in Manual Menu. In running state, pressing **Up** and **Down** arrow buttons can change the pump rotation speed from 300 to 3000 RPM (Round per Minute)

Manual Menu

To access the Manual Menu:

1. Ensure that the power is on and the pump is stopped.
2. Press the **Menu** button.
3. Press the **Up** and **Down** buttons to scroll through the menu items. Press the **Select** button to access the “Manual” menu.
4. **To enter the set speed:** Press the **Select** button to access “Set Speed” setting. To enter the set speed, see step 7.

Enter the set speed from 300 rpm – 3000 rpm (Default 1500rpm). If the pump starts running in manual mode, the rotation speed will run up to the set speed. If you change the speed when pump is running, the value of the modified speed will be saved to “Set Speed” after 10 seconds, and

MENU	12:00
Manual	

Manual	12:00
1500.RPM	
Set Speed	

Manual	12:00
Disable	
Set Cruise	

Manual	12:00
Disable	
Test mode	

pump will go back to the speed at next starting.

5. **To enable set cruise function:** Use the **Up** and **Down** arrow buttons to select “Set Cruise”. Press the **Select** button then the **Down** arrow button to select **Enable** if not already selected. Press the **Enter** button to save the setting.
You can’t set cruise curve in manual mode until you enable the set cruise function.
6. **To Enable Test mode:** Use the **Up** and **Down** arrow buttons to select “Test mode”. Press the **Select** button then the **Down** arrow button to select **Enable** if not already selected. Press the **Enter** button to save the setting.
If the test mode is enable, and the controller works at manual mode, the pump will run at the speed set by “Set Speed” for 30 seconds, then slow down to 300RPM for 30 seconds, and back to “Set Speed”, and etc.
7. Press the **Select** button to change the current setting.
8. To enter a new setting, press the **Select** button to select which digit to modify, the use the **Up** and **Down** arrow buttons to change the selected digit.
9. When you are done, press the **Enter** button to save the changes. To cancel any changes, press the **Menu** button to exit edit mode without saving.

Timer Modes

Timer Modes can be used with water features such as spa, cleaner, waterfalls, etc. You can schedule start and stop times for each timer. All timers are operated using speed control. The Timer Modes include: Timer A ~ E mode.

Timer A Menu

To access the Timer A menu:

1. Ensure that the power is on and the pump is stopped.
2. Press the **Menu** button.
3. Press the **Up** and **Down** buttons to scroll through the menu items. Press the **Select** button to access the “Timer A” menu. The Timer A menu setting is displayed.
4. Press the **Up** and **Down** buttons to scroll through the Timer A menu items.
5. Press the **Select** button to select which digit to modify, then use the **Up** and **Down** arrow buttons to change the selected digit.
6. When you are done, press the **Enter** button to save the changes. To cancel any changes, press the **Menu** button to exit edit mode without saving.

MENU	12:00
Timer A	

Timer A	12:00
8:00	
Start Time	

Timer A	12:00
1500.RPM	
Set Speed 1	

Timer A	12:00
12:00	
Mid Time	

Timer A	12:00
300.RPM	
Set Speed 2	

Timer A	12:00
22:00	
Stop Time	

Timer A	12:00
Disable	
Repeat enable	

Timer A settings

Name	Value	Description
Start time	00:00 – 23:59 (Default 8:00)	Start time for Timer A
Set speed 1	300 – 3000 RPM (Default 1500.RPM)	Pump running at this speed from start time to mid time
Mid time	00:00 – 23:59 (Default 12:00)	Pump changes running speed at the setting time
Set Speed 2	0 – 3000 RPM (Default 300.RPM)	Pump running at this speed from mid time to stop time, but if the setting speed is smaller than 300, the pump will be stopped in this schedule.
Stop time	00:00 – 23:59 (Default 22:00)	Pump stops at the setting time. If repeat by day is disabled (set by “Repeat enable”), the controller will show “Finished Program”.
Repeat enable	Disable/Enable (Default Enable)	The setting decides whether timer A mode repeat by day or not.

Notes: The time settings should be meet: the start time< the Mid time<the stop time, or the LCD will show “Alert” in line 2, and “Setting Err” in line 3.

Timer B Menu

To access the Timer B menu:

1. Ensure that the power is on and the pump is stopped.
2. Press the **Menu** button.
3. Press the **Up** and **Down** buttons to scroll through the menu items. Press the **Select** button to access the “Timer B” menu. The Timer B menu setting is displayed.
4. Press the **Up** and **Down** buttons to scroll through the Timer B menu items.
5. Press the **Select** button to select which digit to modify, then use the **Up** and **Down** arrow buttons to change the selected digit.
6. When you are done, press the **Enter** button to save the changes. To cancel any changes, press the **Menu** button to exit edit mode without saving.

MENU 12:00 Timer B	Timer B 12:00 00:00 Start Time	Timer B 12:00 2500.RPM Set Speed 1	Timer B 12:00 8:00 Mid Time 1	Timer B 12:00 300.RPM Set Speed 2	Timer B 12:00 16:00 Mid Time 2
Timer B 12:00 1500.RPM Set Speed 3	Timer B 12:00 20:00 Mid Time 3	Timer B 12:00 2500.RPM Set Speed 4	Timer B 12:00 23:00 Stop Time	Timer B 12:00 Enable Repeat enable	

Timer B settings

Name	Value	Description
Start time	00:00 – 23:59 (Default 00:00)	Start time for Timer B
Set speed 1	300 – 3000 RPM (Default 2500.RPM)	Pump running at this speed from start time to mid time 1
Mid time 1	00:00 – 23:59 (Default 8:00)	Pump changes running speed at the setting time
Set speed 2	0 – 3000 RPM (Default 300.RPM)	Pump running at this speed from mid time 1 to mid time 2, but if the setting speed is smaller than 300, the pump will be stopped in this schedule.
Mid time 2	00:00 – 23:59 (Default 16:00)	Pump changes running speed at the setting time
Set speed 3	0 – 3000 RPM (Default 1500.RPM)	Pump running at this speed from mid time 2 to mid time 3, but if the setting speed is smaller than 300, the pump will be stopped in this schedule.
Mid time 3	00:00 – 23:59 (Default 20:00)	Pump changes running speed at the setting time
Set speed 4	0 – 3000 RPM (Default 2500.RPM)	Pump running at this speed from mid time 3 to stop time, but if the setting speed is smaller than 300, the pump will be stopped in this schedule.
Stop time	00:00 – 23:59 (Default 23:00)	Pump stops at the setting time. If repeat by day is disabled (set by “Repeat enable”), the controller will show “Finished Program”.
Repeat enable	Disable/Enable (Default Enable)	The setting decides whether timer B mode repeat by day or not.

Notes: The time settings should be meet: Start time < Mid time 1 < Mid time 2 < Mid time 3 < Stop time, or the LCD will show “Alert” in line 2, and “Setting Err” in line 3.

Timer C Menu

To access the Timer C menu:

1. Ensure that the power is on and the pump is stopped.
2. Press the **Menu** button.
3. Press the **Up** and **Down** buttons to scroll through the menu items. Press the **Select** button to access the “Timer C” menu. The Timer C menu setting is displayed.
4. Press the **Up** and **Down** buttons to scroll through the Timer C menu items.
5. Press the **Select** button to select which digit to modify, then use the **Up** and **Down** arrow buttons to change the selected digit.
6. When you are done, press the **Enter** button to save the changes. To cancel any changes, press the **Menu** button to exit edit mode without saving.

MENU 12:00 Timer C	Timer C 12:00 10:00 Running Time 1	Timer C 12:00 2500.RPM Set Speed 1	Timer C 12:00 01:00 Running Time 2	Timer C 12:00 300.RPM Set Speed 2	Timer C 12:00 Enable Repeat enable
-----------------------	--	--	--	---	--

Timer C settings

Name	Value	Description
Running Time 1	00:01 – 23:59 (Default 10:00)	Pump keeps running at the speed set by “Set Speed 1”, until the time set by “Running Time 1” is over.
Set speed 1	300 – 3000 RPM (Default 2500.RPM)	Press the Run button, Pump starts running at the speed set by “Set Speed 1”
Running Time 2	00:01 – 23:59 (Default 01:00)	Pump keeps running at the speed set by “Set Speed 2”, until the time set by “Running Time 2” is over.
Set speed 2	0 – 3000 RPM (Default 300.RPM)	Pump will change the speed to “Set Speed 2” when the timer set by “Running time 1” is over. If the setting speed is smaller than 300.RPM, the pump will be stopped.
Repeat enable	Disable/Enable (Default Enable)	The setting decides whether timer C mode repeats by cycles or not.

Timer D Menu

Timer D Menu is the same as Timer B Menu.

Timer E Menu

Timer E Menu is the same as Timer B Menu.

Cruise Mode

In the cruise mode, the controller will adjust the pump rotation speed to keep a stable flow. Customer will set 2 or more up to 4 cruise points in manual mode before using the cruise control mode.

Cruise Menu

To access the Cruise menu:

1. Ensure that the power is on and the pump is stopped.
2. Press the **Menu** button.
3. Press the **Up** and **Down** buttons to scroll through the menu items. Press the **Select** button to access the “Cruise” menu. The Cruise setting is displayed.
4. Press the **Up** and **Down** buttons to scroll through the Cruise menu items.
5. Press the **Select** button to select which digit to modify, then use the **Up** and **Down** arrow buttons to change the selected digit.
6. When you are done, press the **Enter** button to save the changes. To cancel any changes, press the **Menu** button to exit edit mode without saving.

Cruise settings

Name	Value	Description
Speed 1	300 – 3000 RPM (Default 0.RPM)	Speed of set point 1 when presetting the Cruise function.
Power 1	0 – 3000W (Default 0W)	Power of set point 1 when presetting the Cruise function.
Speed 2	300 – 3000 RPM (Default 0.RPM)	Speed of set point 2 when presetting the Cruise function.
Power 2	0 – 3000W (Default 0W)	Power of set point 2 when presetting the Cruise function.
Speed 3	300 – 3000 RPM (Default 0.RPM)	Speed of set point 3 when presetting the Cruise function.
Power 3	0 – 3000W (Default 0W)	Power of set point 3 when presetting the Cruise function.
Speed 4	300 – 3000 RPM (Default 0.RPM)	Speed of set point 4 when presetting the Cruise function.
Power 4	0 – 3000W (Default 0W)	Power of set point 4 when presetting the Cruise function.
Alarm Speed	300 – 3000 RPM (Default 2500.RPM)	Alarm will be triggered when the rotation speed of the pump gets to the speed set by this parameter.

Notes: The Cruise settings should be meet: Speed 1 < Speed 2 < Speed 3 < Speed 4 , or the LCD will show “Alert” in line 2, and “Setting Err” in line 3.

To set the Cruise points:

1. Ensure that the power is on and the controller is in manual mode.
2. Press the **RUN** button to start the pump.
3. Press the **Up** or **Down** buttons to modify the rotation speed of the pump, until the flow meet your need.
4. Press the **Cruise** button, the LCD will show “Point 1” with blinking. Press the **Enter** button to save the data on this state.
5. Reduce the area of the outlet by degrees, the flow will decrease.
6. Press the **Up** or **Down** buttons to modify the rotation speed of the pump, until it gets the flow as the same at “point 1”.
7. Press the **Cruise** button, the LCD will show “Point 2” with blinking. Press the **Enter** button to save the data on this state.
8. Repeat **step** 5, 6, and 7, controller will save the states of Point 3, and 4. The setting of Cruise points is done.

Notes: you should set two or more cruise points. The more points you set, the more accuracy you get. When the speed is lower than 1500 RPM, the cruise control may be not so accurate.

Advanced Menu(just for product)

Advanced	Pr.070	Power Margin (0~3000W)
	Pr.071	Uam_rate (10~200%)
	Pr.072	FMP_rate (100~1000%)
	Pr.073	Max_speed (300~3600RPM)
	Pr.074	RPM_Rate (1~1000RPM)
	Pr.075	Accel_time (2.0~600.0Second)
	Pr.076	Decel_time (2.0~600.0Second)
	Pr.077	(reserved for model of controller)
	Pr.078	software version (1.00~99.99)
	Pr.079	reserved
	Pr.080	reserved
	Pr.081	Trip_clear (0/1), set 1 will clear the reason of failure
	Pr.082	Trip_reason1(0~25), for recording the reason of failure
	Pr.083	Trip_reason2(0~25), for recording the reason of failure
	Pr.084	Trip_reason3(0~25), for recording the reason of failure
	Pr.085	Trip_reason4(0~25), for recording the reason of failure
	Pr.086	Trip_reason5(0~25), for recording the reason of failure
	Pr.087	reserved
	Pr.088	reserved
	Pr.089	reserved

To access the Advanced menu:

1. Ensure that the power is on and the pump is stopped.
2. Press the **Menu** button.
3. Press the **Up** and **Down** arrow buttons at the same time, and keep pressing them for two seconds.
4. Press the **Up** and **Down** buttons to scroll through the menu items. Press the **Select** button to access the “Advanced” menu.
5. Press the **Up** and **Down** buttons to scroll from “Pr.070” to “Pr.090”, with the parameter name show on the third line of the LCD.
6. **To enter the Power margin:** Use the **Up** and **Down** arrow buttons then **Enter** button to select “Power margin”. To set the Power margin, see step 11.
The power margin is set for cruise control mode. In Cruise control mode, the controller calculates the power of output and compares it to the cruise power. If the deference of these two values is out of the power margin, controller will adjust the speed to meet the power.
7. **To set the Uam rate:** Use the **Up** and **Down** arrow buttons then **Enter** button to select “Uam Rate”. To set the Uam rate, see step 11.
Enter the Uam rate from 10% – 200% (Default 100%).

MENU	12:00
Advanced	
Advanc	12:00
Pr.070	Power margin
Advanc	12:00
Pr.071	Uam_rate
Advanc	12:00
Pr.072	FMP rate
Advanc	12:00
Pr.073	RPMRate
Advanc	12:00
Pr.074	Accel time
Advanc	12:00
Pr.075	Decel time
Advanc	12:00
Pr.0xx	Pr.0xx

The function of the Uam rate will be explained at the chapter of External feature.

8. **To set the FMP rate:** Use the **Up** and **Down** arrow buttons then **Enter** button to select “FMP Rate”. To set the FMP rate, see step 11.
Enter the FMP rate from 100% – 1000% (Default 100%). The function of the FMP rate will be explained at the chapter of External feature.
9. **To enter the RPM rate:** Use the **Up** and **Down** arrow buttons then **Enter** button to select “RPM Rate”. To set the RPM rate, see step 11.
The RPM rate means the increment or decrement of speed corresponding to one press on the **Up** or **Down** arrow buttons.
10. **To set the Acceleration/Deceleration time:** Use the **Up** and **Down** arrow buttons then **Enter** button to select “Accel time” or “Decel time”. To set the value, see step 11.
The value of “Accel time” means the lasting time for pump to speed up for 750 RPM. As the same, the value of “Decel time” means the lasting time for pump to speed down for 750RPM. But the acceleration time is not effective when the speed of pump is under 300RPM.
11. To enter a new setting, press the **Select** button to select which digit to modify, the use the **Up** and **Down** arrow buttons to change the selected digit.
12. When you are done, press the **Enter** button to save the changes. To cancel any changes, press the **Menu** button to exit edit mode without saving.

The parameters (Pr.076~Pr.089) without name but number, are just for read. Please don't modify them.

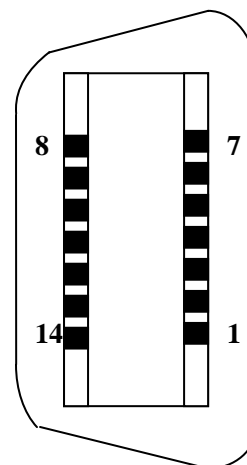
External Feature

The External feature includes Uam mode, FMP output, Potential free contact, Programmer mode and Host mode. The signal port connects the controller with outside.

Signal Port

The signal port connection:

- 1---Voltage source (+5V)
- 2---No connection
- 3---GND
- 4---No connection
- 5---DC voltage input(0~5V)
- 6---Pulse output (1Hz~30000Hz)
- 7---Programmer pin (RXD)
- 8---Programmer pin (TXD)
- 9---Potential free contact (NO)
- 10---Potential free contact (NC)
- 11---Host control pin (485A)
- 12---Host control pin (485B)
- 13---No connection



14---No connection

Note: The connector show on the photo below, have relation to signal port as:

Connector pin---Signal port pin

1---1

2---3

3---5

4---6

5---7

6---8

7---9

8---10

9---11

10---12



Uam Mode

If the “CMD Source” set as “Uam”, the controller will run in Uam mode.

The speed of pump rotation is controlled by DC voltage input (0~5V) through pin 5th of the signal port. The speed will be set by the formula as below:

$$\text{Speed} = \text{DC voltage} * \text{Uam rate} * \text{Rated speed}$$

Uam rate can be set by Menu, and Rated speed is 3000 RPM.

FMP Function

If “FMP Function” in the MENU set as “enable”, the controller will output a square wave whose frequency set by the formula as below:

$$\text{Frequency of square wave} = \text{Pump speed (RPM)} * \text{FMP Rate}$$

FMP rate can be set by Menu.

No water protection feature

If the pump is running without water, and the speed is bigger than 1500RPM, the controller will stop the pump after 5 seconds, and show “no water” on the third line of the LCD. After one minutes the controller will restart the pump, and if there is still no water, the controller will shut off output again. After retry for four times, if there is still no water, the controller will restart the pump once an hour.

The indicate of Error code

If “Alert” show on the second line of the LCD, it means some error or change happened with the controller. The third line of the LCD will show the error code.

Index of error codes

Over Voltage	The DC voltage is higher than 400V, which may happened when pump speed down quickly without load.
Low Voltage	The DC voltage is lower than 240V, which may happened on the time of the power just on or off.
Over Imotor	The current of pump get too big suddenly, and controller stop output to protect the pump.
P to P short	There is a short circuit between two output phases.
P to E short	There is a short circuit between phase and earth.
Data Error	The data in eeprom get wrong, should initial all data to recover this error.
All Data Ini	All data in eeprom was initial.
User DataIni	User data in eeprom was initial.
EEPROM chang	An important data in eeprom was changed.
CT U Error	The current transducer on U phase is wrong.
CT V Error	The current transducer on V phase is wrong.
Input Error	The input power is wrong.
Over heat	The temperature of controller gets too high.
PFC error	The circuit for power factor correction is wrong.
Over Input	The current of input gets too big.
Blocked	The pump is blocked and controller can't start it.
No Water	There is no water when pump is running.
Cable Error	The output cable connection is wrong.
Setting Err	The parameter setting in timer menu or cruise menu is wrong.
Unauthorized	The software is unauthorized.