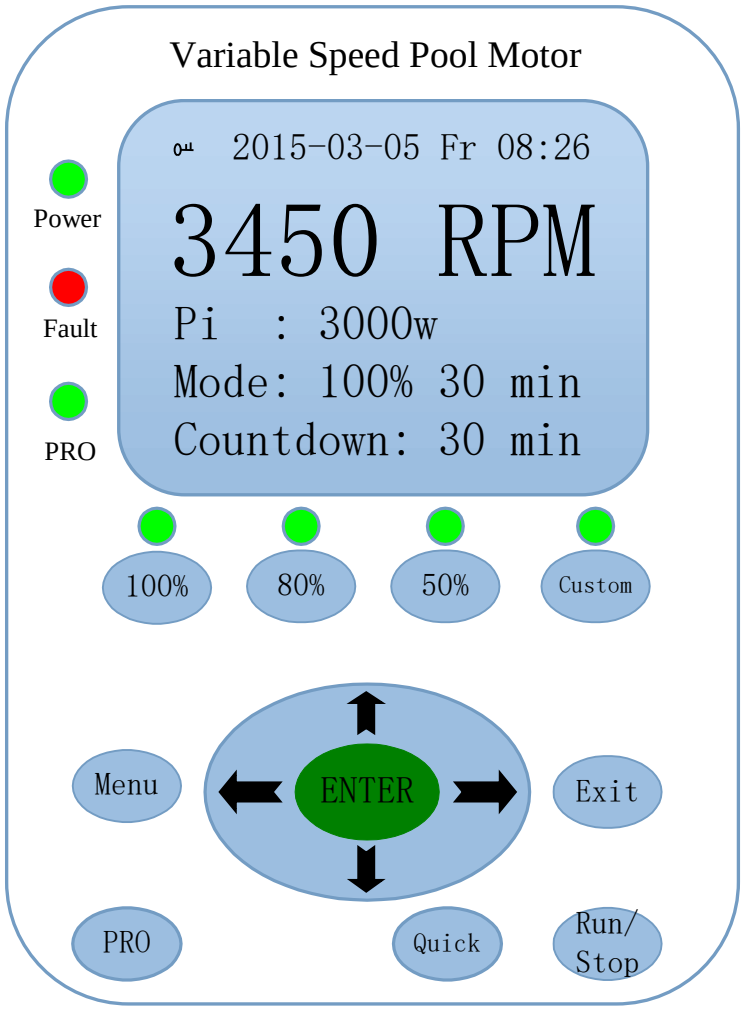
PM BRIEF INTRUDUCTION

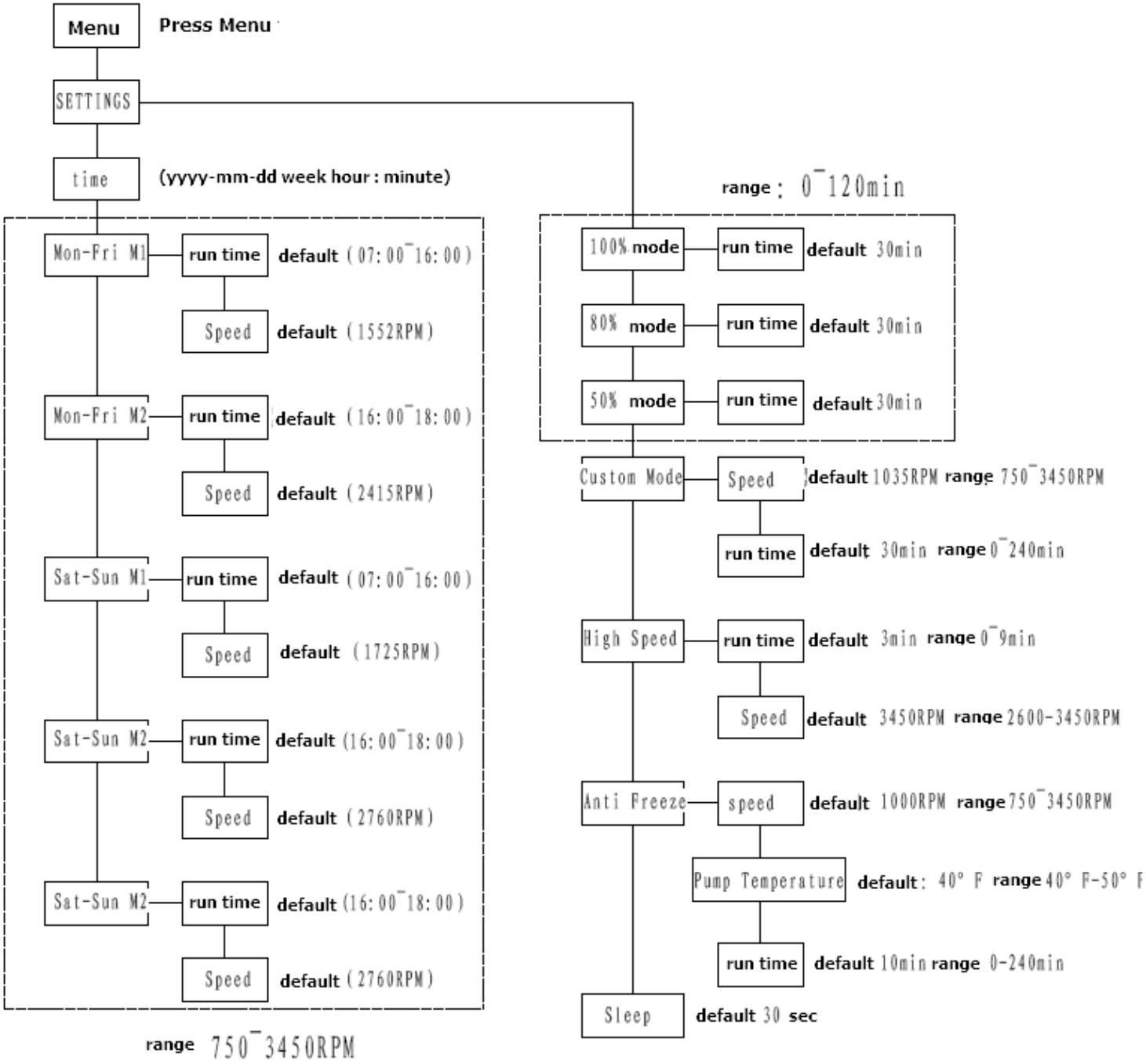


1. Introduction of buttons function.

1.1. Run/Stop: Start up / Shut down.
1.2. Enter: Confirm and save settings. Long press of the “Enter” button in standby mode to active the state of absolute protection/ self-state water protection.
1.3. Directional buttons: Move in settings, increase or decrease values.
1.4. 100%, 80%, 50% buttons: Quick start of fixed speed.
1.5. Custom button: Quick start of customer set speed.
1.6. Menu: Enter settings mode.
1.7. Exit: Return to the main directory, back to the previous page and error deleting button.
1.8. PRO: Short press to power on. Long press to enter into water protection function setting interface.
1.9. Quick: Run, quit, switch of 100%, 80%, 50% and Custom task/interface.

Note: During task settings and time settings, the interface must be in stand-by state.

2. Settings mode process.



Note: During program settings and time settings, the interface must be in stand-by state.
Is possible to move up and down with left and right directional buttons. Long press of right directional button to move down and long press of left directional button to move up.

3. Special function and application descriptions.

3.1. **Language settings:**

1. The factory setting language is English
2. Press for 3 seconds “Menu” and “ENTER” buttons at the same time to enter in language settings mode.

3.2. **Lock screen function:**

1. Long press for 2 seconds “Menu” and “Exit” buttons at same time to enter in lock screen mode, on the left top corner of the screen will appear a key sign. In the locked state, only through the combination of “Menu” and “Exit” buttons can unlock the screen.
2. Long press for 2 seconds “Menu” and “Exit” buttons at same time to unlock the screen mode, on the left top corner of the screen will disappear the key sign.

3.3. **Memory function (PRO button):**

1. Press PRO button and the light indicator will turns on, it means the set program is on function. The power outage could cause the controller to starts up by itself; otherwise the controller could be shut down mode (this is default function).

3.4. **Display light and standby function (Sleep)**

1. The light of the display will turn on automatically inserting any commands. With no operations, the system will turn off the light of the display.
2. The default backlight sleep time is 30 seconds.

3.5. **Internal protection function (check the error code on the error code list)**

1. Too high or too low voltage protection: if the AC voltage is higher than 270V or less than 190V.
2. Overload protection.
3. IPM MODE protection.
   Note: If on the display continuously appears OC3 error, it means an internal hardware problem, so please contact the manufacturer base.
4. Phase loss protection.
5. Thermal Protection: when the module temperature reaches 95 degrees, the system will automatically reduce the speed gradually of 50 RPM to protect the motor.
6. Run-dry protection (no water protection).
   Function (long press PRO key):
   1) The function indicates that the pumps has entered in the normal operation of the protection process:
      a. The default system will run each first start at the high speed for 3 minutes to drain out the air in the pipeline. After 3 minutes the system will back to the regular speed.
      b. If the customer set “0” in the high speed parameter, the system will start directly with the regular speed.
   2) In the factory default settings the run-dry protection is disabled (OFF) and the sensitivity parameter is 1.1. The system will not allow the activation of the protection before starting self-apprehending mode.

3) In the standby display, with long press of the "Enter" button, the system will enters in the self-apprehending mode. After self-apprehending mode, the system will automatically turn on the run-dry protection. Long press of PRO button in the standby display to enter in the run-dry protection settings (it is easier to turn on the protection with lower sensitivity).

Note: in the run-dry protection mode the speed is not less than 1000r/min and the sensitivity parameter is between 1.1 – 1.3. Long press of PRO button could shut down the memory of the system and the power.

7. Anti-Freeze protection: to avoid water freezing inside the pump.
    1) The protection in enabled by default
    2) The parameter settings are:
        a. The protection will active at default temperature of 40°F (4.4°C) and it is changeable between 40ºF - 50ºF(4.4ºC - 10ºC).
        b. The default operating speeds is 1000 RPM and it is changeable between 450 RPM – 3450 RPM.
        c. The default operating duration is 10 min and it is changeable between 0 min – 240 min. It the 0 min time parameter the protection will turn of automatically.
    3) In the off condition the system will show the ambient temperature.
    4) If the ambient temperature is lower than the programmed temperature, the system will processes with the programmed time and speed.
    5) This mode will run during the operation of other modes, the end of the direct mode of operation
    6) Press STOP button to stop the operation. During the process is not possible to stop the running except the power shut down cases.

8. Display background settings (long press of up directional button).
    3.5.8.1.1.1. LCD default background color is orange.
    3.5.8.1.1.2. The user can change display background color long pressing for 15s the up directional button to enter in the display background settings.
        3.5.8.1.1.2.1. Select "Color" option to change background color.
        3.5.8.1.1.2.2. Select "Image" to change background image.
        3.5.8.1.1.2.3. The factory default image is as the following:

9. Display background color settings (long press of the down directional button)
    3.5.9.1.1.1. The pump system LCD board is RGB565 type.
    3.5.9.1.1.2. The LCD factory default setting is with orange background, RGB date is 0xFBE0.
    3.5.9.1.1.3. The default color setting is with a single background color, is possible to

change background pressing for 15s the down directional button to enter background image settings.

3.5.9.1.1.4. The interface provides R, G, B user settings in RGB888 code. The user settings will be automatically converted to RGB565 mode, and on the center of the display will appear the screen renderings.

3.5.9.1.1.5. The user can customize their favorite color with Windows operating system, in order to insert their favorite RGB code for the display. Since the user code is in RGB888 type and the system LCD display is in RGB568 type, the showed color could be a little different than the chosen.

10. Restore factory settings: Long press "Menu", "Enter" and "Exit" buttons for 3 seconds at the same time to restore the factory settings.

4. Notes.

4.1. **Standby switch.**

Manual control: during the process of the programed dates, press "RUN" or "STOP" buttons to change the state of the programs. The system will memorize each changes, until to start up or shut down. The user can also decide to reboot the system again or not.

The system will recognize the manually stopped control and will not proceed more according to the automatic program dates.

To delete the manual control follow the following methods:

a) Start the set program through one of four shortcut buttons as 100%, 80%, 50% or Custom buttons.

b) Press RUN or STOP buttons:

I. Active the auto programming mode before the system programming process.
Note. If press these buttons and appears system no programmed signal, means the presence of an error inside the program and the system could also shut down at the same time.

II. Delete the manual control before the system programming process.

4.2. **During the starting of the motor, for 3 min the default speed will be at 3450 RPM.**
The speed and the time of the motor staring can be changed in the HighSpeedRunnig setting list.

a) Each time the pump reboots, the system will send the directive to run at the high speed per X time to avoid the air in the pipeline.

b) The high speed running can be changed from 2600-3450 RPM.

4.3. **Program operation mode settings.**

1) If the startup time coincide with the shut down time the program will not available, for example: from 07:00 - 07:00 the pump will remain in the off state.
If the shut down time is less than the startup time the program will not available too, for example: 07:00 – 05:00 the pump will remain in the off state.

2) If Mon-Fri RPM 1 mode setting and Mon-Fri RPM 2 mode setting are different program, the system will execute the program and the speed of the Mon-Fri RPM 1 mode setting.

3) If Sat-Sun RPM 1 mode setting and Sat-Sun RPM 2 mode setting are different, the system will execute the program and the speed of the Sat-Sun RPM 2 mode setting.

4.4. **The normal processing mode.**

1) When the user press 100%, 80%, 50% or Custom buttons, the system will run in the following order 100%, 80%, 50% and Custom modes. After the startup process the system will pass automatically to the programmed cycle mode.
2) If the user presses any button during one of four programming phases, the system will change the program immediately. Instead the system will reboot the program if the pressed button has the same function as the activated program.

4.5. **The use of directional buttons.**

Long press of directional buttons can allow the user to select settings more quickly during the navigation.

1) Long press of the right or left directional buttons in the settings interface can allows to shift continuously or line feed.
2) Long press of the up or down directional buttons in the settings interface can allows to add or subtract continuously parameters.
3) In the Custom program mode, long press of the up or down directional buttons, the parameter of the speed will changes 50 RPM by 50 RPM.

4.6. **Standby mode.**

Two kinds of standby modes:

1) "Welcome" mode.
2) "Mode Standby" mode.

Details of standby mode.

1) "Welcome" mode:

This mode indicates that the manual control has intervened to shut down the pump.
In this case the system will not automatically run the programmed tasks.
There are two kinds of situations:

a) A manual control has intervened pressing RUN or STOP buttons, or has entered to the settings mode during the running operation, than has caused the shutdown of the pump.
b) A manual control has intervened pressing RUN or STOP during the Mode Standby mode, then switched to the Welcome standby mode.

2) "Mode standby" mode:

This mode indicates an unplanned tasks state.
In this case the system will plan and run an automatic program (MI 07：00-10:00, M2 10:40-16:00).
This mode is determined by the system. So after the end of running, the system will recognize that the previous time does not belong to the programmed time, then goes to the Mode Standby mode.

In this case, enter in the setup menu interface to back out from the programmed plan.

a) If the main page time matches with the programmed time, it will change to the Mode

Standby mode.

b) If the main page time does not matches with the programmed time, it will change to Welcome standby mode.

3) Welcome standby mode and Mode Standby mode are settable by RUN or STOP buttons.
   a) During the Mode Standby mode, press RUN or STOP to enter Welcome standby mode.
   b) During the Welcome standby mode, press RUN or STOP to:
      I. Enter automatically in the Mode Standby mode after the planned running, if the time in the main page matches with the programmed time (except power shut down cases) .
      II. Enter directly in the Mode Standby mode if the time in the main page does not matches with the programmed time.

Attached file one

Error Code List

Error	Error Name	Causes
OC1	over-current in shift speed	Speed up too fast, overload, motor and inverter does not match
OC2	over-current in stable speed	Module damage, output short circuit
OV1	Over-voltage in deceleration	Slowing down too fast, braking resistance is too large or not connected, brake module failure
OV2	Over-voltage in non-deceleration	The input voltage is too high, drag down load, the brake resistance is too large or not connected, brake module failure
OC3	Instantaneous over-current	Speed up too fast, overload, motor and inverter does not match
UV1	Voltage too low	The power supply voltage is too low, the contactor is disconnected, or the input phase is short.
OC4	Module over current	
OU3	Abnormal power supply voltage	The power supply voltage exceeds a threshold braking
GF	Leakage to the ground	Low impedance of motor
OL3	Inverter overload	Overload, the motor and inverter does not match
OH2	Other overhead	small cooling fan failure, the charging resistance of overheating, external overheating (motor, brake resistance)
BRE	Built in brake unit abnormal	Brake unit and its drive circuit fault
BD	board failure1	Strong interference or bad board
BER1		board failure 2
BER2		board failure 3
PGF	Encoder error	
CE	Self-checking fault of current transformer	Strong interference or bad board
DRE	Driving unit exception	
PRE	Program error	
EST	Manual emergency stop	
EF	Positive inversion simultaneous input	
LE	Self-learning failure	
PRE1	Extension program	

	error	
PRE2	Extension program error	
PRE3	Extension program error	
BER3	Board failure 2	
BER4	Board failure 3	
UV	Low control power	
OPE1	Over range of parameters	
OPE2	Unreasonable parameters	
OPE3	Parameter settings conflict or duplicate	
OPE4	V/FParameter setting failure	
OPE5	Parameter uninitialized	
OPE6	Multi-function terminal function setting conflict	
OPE7	Analog terminal function settings conflict	
OPE8	Extended parameter over range	
OPE9	Extended parameter setting failure	
OPF	External error	
OUT	Beyond the limit	
OH1	Module overheating	Radiator temperature is too high, the cooling fan failure
PF1	Input missing phase	Overload, the motor and the inverter does not match, enter the missing phase, power supply capacity is small, instantaneous power failure
PF2	Output missing phase	Motor break or wrong motor type
OS1	Over speed	Overload or poor control
OS2	stall	Overload or poor control
PGO	Encoder break	Encoder break
PGE	Wrong phase	Encoder phase and motor phase contrast
OL2	Over torque	Over load, or the parameter settings are not correct.
OL3	The maximum current / inverter overload	Over load, or motor stalling
OL1	Motor overload	Over load, Motor and inverter does not match
EE	External error	
OH3	Motor over heat	

CCE	Communication disconnection	
JE	Phase correction failure	
POE1	localization imprecision	
POE2	Location correction failure	
PID1	PID lose feedback	
NO FLOW	Run-dry protecting	Inlet water without water filling, 1) no water in the water supply source , 2) the water pump inlet is blocked