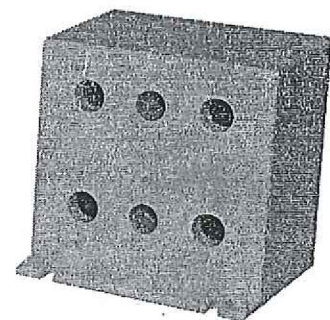
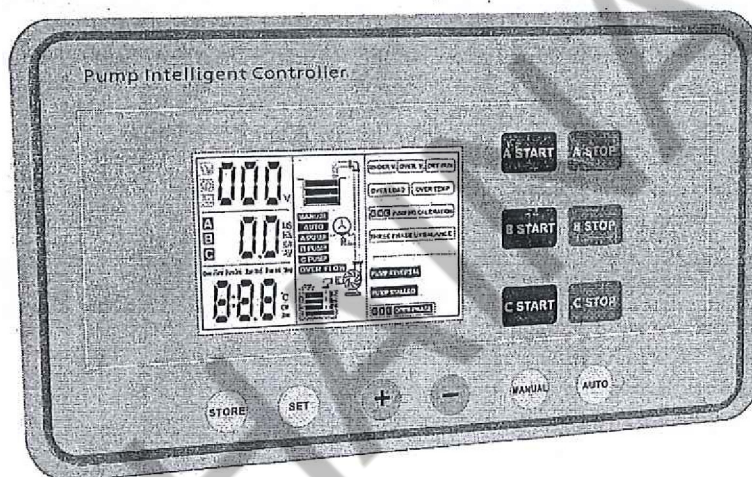


Smart Programmable Logic Controller For Triplex Pump

Installation & Operation Manual

Ver.1.1



Conventions used in this manual

In the manual the following symbols will be used:



Generic danger Failure to comply with the safety regulations that follow can irreparably damage the controller or equipment.



Electric shock risk Failure to comply with the safety regulations that follow can cause death or serious personal injury.

WARNINGS

Read this manual carefully before any operation.
Please keep this manual for future use.



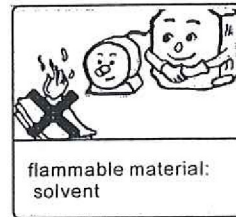
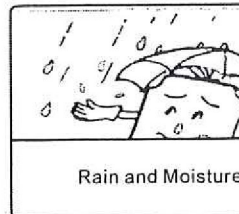
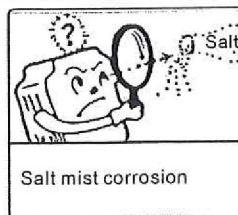
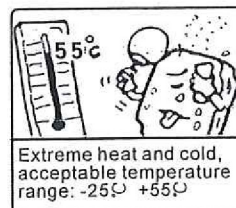
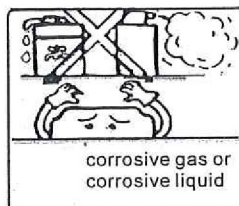
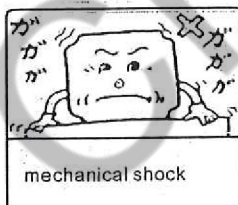
WARNING!!

- Before carrying out any installation or maintenance operation, controller must be disconnected from the power supply;
- Don't open the cover during running the controller;
- Don't put wire, metal bar filaments etc into the controller;
- Don't splash water or other liquid over the controller;



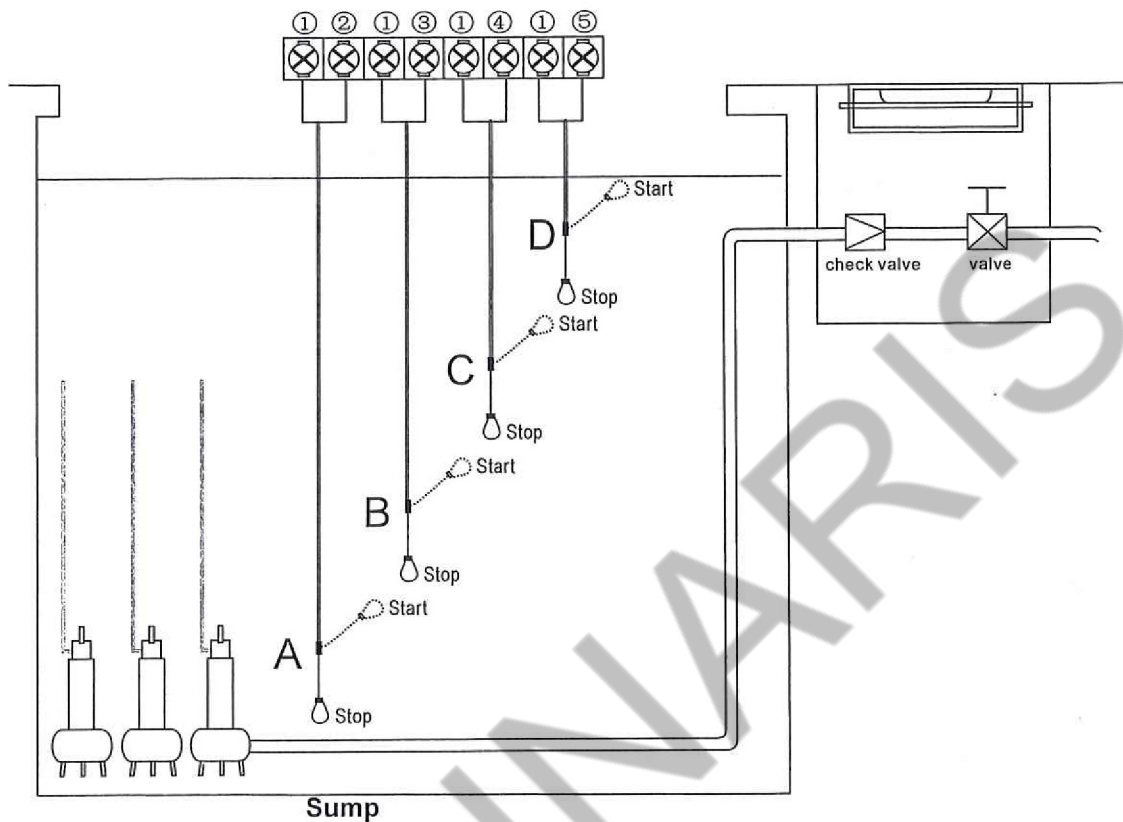
CAUTION

- The electrical and hydraulic connections must be carried out by competent, skilled, qualified personnel;
- Never connect AC power to output uvw terminals;
- Ensure the motor, controller and power specifications matching;
- Don't install the controller in the following condition;



8 WIRING DIAGRAM FOR DIFFERENT APPLICATION

8.1 Drainage by liquid level control through float switch



1). Normal liquid level in the sump

Liquid level reaches (Float Switch A: Up Level), control box will order single pump to run; liquid level declines to Float Switch A:Down Level, single pump stop running;

Control box will alternate A/B/C pumps running automatically when the liquid level varies from Float Switch A: Up level- Down level

2). Extra flowing in the sump

When single pump is running to drain, liquid level in the sump still increase to (Float Switch B: Up Level), control box will order the 2nd pump to run simultaneously to drain, until liquid level declines to (Float Switch A:Down Level), A/B pumps will not stop running.

When double pumps are running to drain, liquid level in the sump still increase to float switch C:Up level),control box will order the 3rd pump to run simultaneously to drain,until liquid level declines to Float switch A :Down Level),triplex pumps will not stop running .

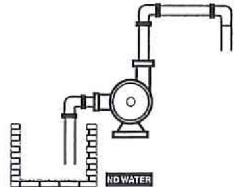
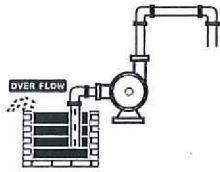
3). Overflow in the sump

When triplex pumps are running simultaneously, liquid level in the sump still increase to (Float Switch D: Up level), control box will sound overflow alarm; When liquid level declines to Float Switch D Down Level, control box stop sounding overflow alarm.

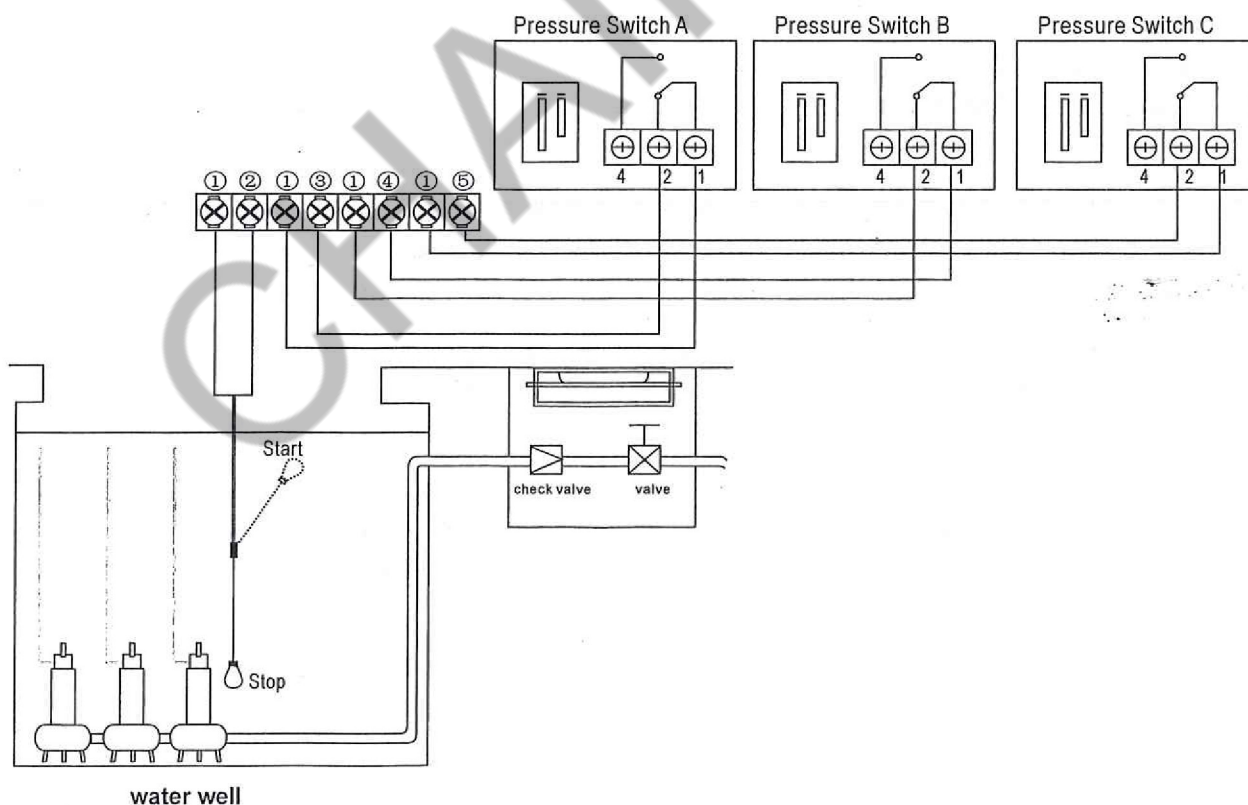
Auto Patrol (Antirust) function

Under Auto state, if control box inspects triplex pumps not running for ten days, control device will order pump A to run for 3 seconds and stop, after 10 seconds interval, control device will order pump B to run for 3 seconds and stop. then control device will order pump C to run for 3 seconds and stop.

Auto Patrol can prevent pump rusty and impeller jammed owing to long time no running.

Messages & Graphic	Description
	Lack of water in sump
	Overflow in sump

8.2 Booster by pressure control through pressure switch



Note 1: suppose the pressure setting of Pressure Switch C > Pressure Switch B > Pressure Switch A

Note 2: pressure switch with N/C (normal close) contacting point, no pressure, contacting point is ON; meet the pressure setting, contact point is OFF

Note 3: user can set the pressure value of the three pressure switches by themselves, but there must be pressure difference between pressure switch A&B&C

1). Normal pressure demanding

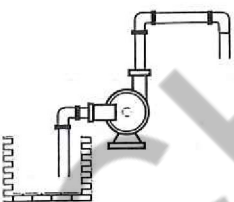
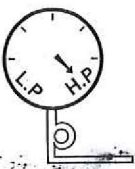
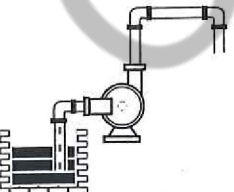
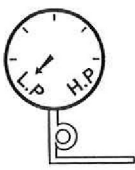
Pressure in the pipeline is lower than the setting of pressure switch C, control box will order single pump to run; pressure in the pipeline reaches the setting of pressure switch C, single pump stops running; control box will alternate triplex pumps running automatically when pressure in the pipeline varies in the range of pressure switch C

2). Extra pressure demanding

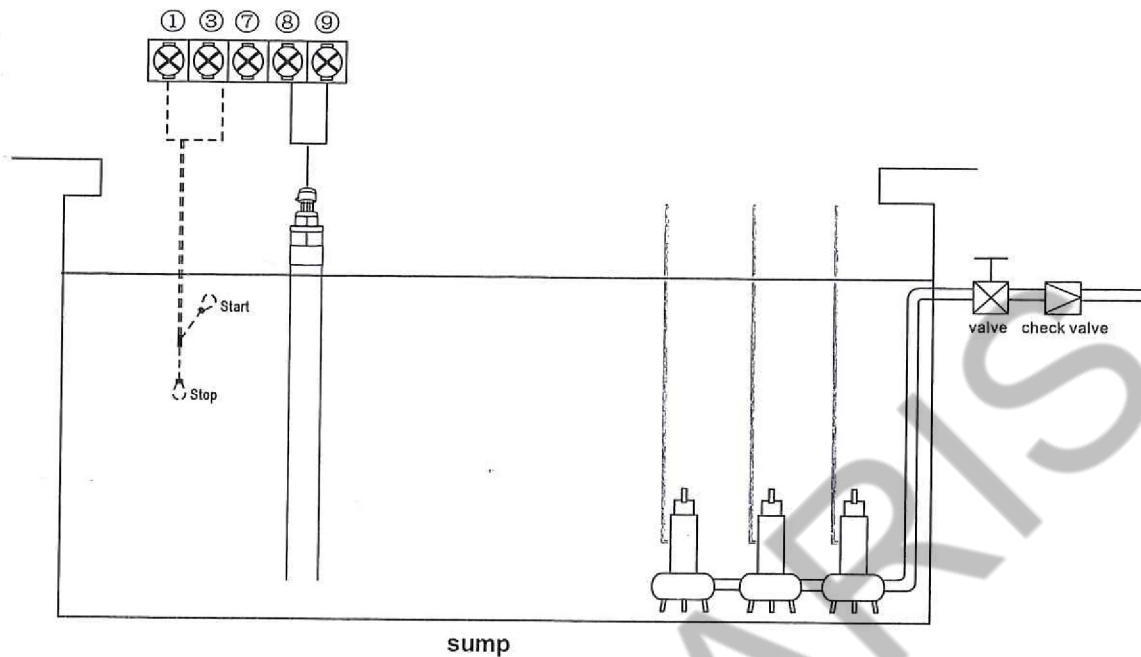
Single pump is running, pressure in the pipeline still decrease to the setting of pressure switch B, control box will order another pump to run simultaneously, till pressure in the pipeline reaches the setting of pressure switch C, duplex pumps will not stop running;

When duplex pumps are running to booster, pressure in the pipeline still decrease to the setting of pressure switch A, control box will order the 3rd pump to run simultaneously, till pressure in the pipeline reaches the setting of pressure switch C, triplex pumps will not stop running.

3). Meaning of the messages & graphic shown on the LCD screen

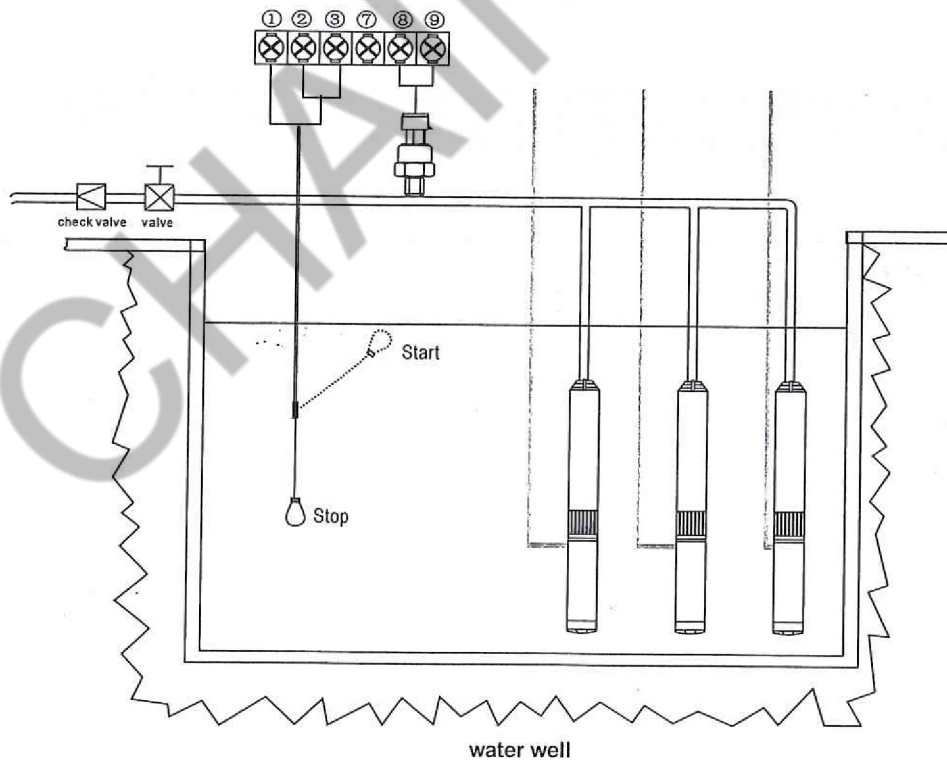
Messages & Graphic	Description	Messages & Graphic	Description
	Lack of water in water well		Full of pressure in pipeline or pressure tank
	Full of water in water well		Lack of pressure in pipeline or pressure tank

8.3 Drainage by liquid level transmitter




Remark: if 0.5–4.5V transmitter, connection at ⑦ ⑧ ⑨ (⑦ GND ⑧ VOUT ⑨ VCC)
if 4–20mA transmitter, connection at ⑧ ⑨ (⑧ P- ⑨ P+)


8.4 Booster by pressure control through pressure transmitter



Remark: if 0.5–4.5V transmitter, connection at ⑦ ⑧ ⑨ (⑦ GND ⑧ VOUT ⑨ VCC)
if 4–20mA transmitter, connection at ⑧ ⑨ (⑧ P- ⑨ P+)

9 Press button definition

BUTTON	DEFINITION & FUNCTION	NOTE & REMARK
AUTO	Auto state	Press Auto, switch SPLC -3 to Auto state
MANUAL	Manual state/Unlock the button	Press Manual for 10s, switch SPLC-3 to manual state/unlock the button
A STRAT	to start pump A running under manual state	
A STOP	to stop pump A running under manual state	under manual state and pump no running, press A STOP for 6seconds, it will clear parameter calibration of pump A
B STRAT	to start pump B running under manual state	
B STOP	to stop pump B running under manual state	under manual state and pump no running, press B STOP for 6seconds, it will clear parameter calibration of pump B
C STRAT	to start pump C running under manual state	
C STOP	to stop pump B running under manual state	under manual state and pump no running, press C STOP for 6seconds, it will clear parameter calibration of pump C
STORE	parameter calibration	under manual state, start A or B or C pump, press STORE, it will memorize the pump A/B/C's parameter
SET	parameter setting	<p>Keep 3P function switch in </p> <p>Hold pressing SET, enter into parameter setting, Sequence from code 001 starting. Press SET for the next code, press button + - to add or decrease value.</p> <p>When at booster with pressure transmitter, setting pressure value, go to code 021</p> <p>021 Measurement range</p> <p>022 STOP pressure value</p> <p>023 Start pressure value for No1 pump cut in</p> <p>024 Start pressure value for No 1 & No 2 pump cut in</p> <p>025 Start pressure value for No 1 & No 2 & No 3 pump cut in</p>

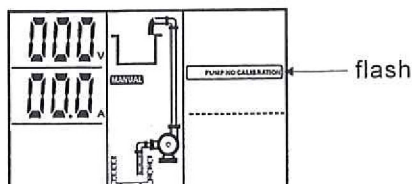
BUTTON	DEFINITION & FUNCTION	NOTE & REMARK
SET	parameter setting	<p>Keep 3P function switch in </p> <p>Hold pressing SET, enter into parameter setting, Sequence from code 001 starting. Press SET for the next code, press button + - to add or decrease value.</p> <p>When at sewage with level transmitter, setting level value, go to code 021</p> <p>021 Measurement range</p> <p>022 STOP level value</p> <p>023 Start level value for No1 pump cut in</p> <p>024 Start level value for No 1 & No 2 pump cut in</p> <p>025 Start level value for No 1 & No 2 & No 3 pump cut in</p> <p>026 Alarm level value for overflow</p>
STORE+A STOP	Pump A accumulative running time displaying	When in auto state, hold pressing Manual for 10s, switch to Manual state Hold pressing STORE and do not loose, then press A STOP
STORE+B STOP	Pump B accumulative running time displaying	When in auto state, hold pressing Manual for 10s, switch to Manual state Hold pressing STORE and do not loose, then press B STOP
STORE+C STOP	Pump C accumulative running time displaying	When in auto state, hold pressing Manual for 10s, switch to Manual state Hold pressing STORE and do not loose, then press C STOP
A STOP +Auto	Displaying pump A last five failure record	When in auto state, hold pressing Manual for 10s, switch to Manual state Hold pressing A STOP and do not loose, then press Auto to display pump A last five failure
B STOP +Auto	Displaying pump B last five failure record	When in auto state, hold pressing Manual for 10s, switch to Manual state Hold pressing B STOP and do not loose, then press Auto to display pump B last five failure
C STOP +Auto	Displaying pump C last five failure record	When in auto state, hold pressing Manual for 10s, switch to Manual state Hold pressing C STOP and do not loose, then press Auto to display pump C last five failure

10 Parameter Calibration setting & erasing

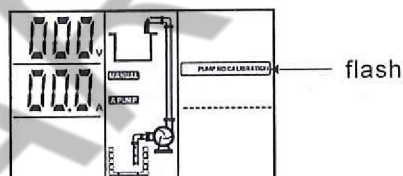
To achieve best level of protection of the pump, it is essential that parameter calibration must be done immediately after successful pump installation or pump maintenance.

Setting the parameter calibration(Pump A)

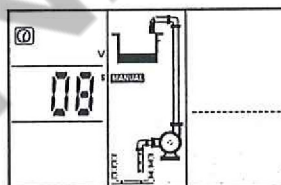
- Press the **MANUAL** for 10s to switch to manual state, make sure the pump not running and LCD screen displaying:



- Press the **START** to run pump, confirm the pump and all pipe network in normal working state (including voltage, running ampere et); LCD screen displaying:

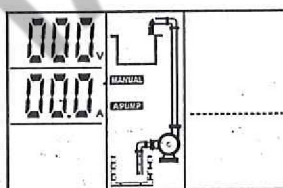


- Press the **STORE**; The controller makes a "Di" sound and starts countdown, LCD screen displaying:



- Pump A stops running and parameter calibration completed, LCD screen displaying:

Pump A is ready for running:



Note:Parameter calibration of pump B is same as pump A, just by pressing **B.START** instead of **A.START**

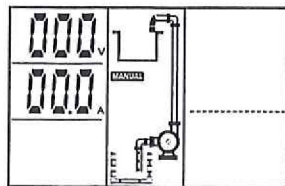
Parameter calibration of pump C is same as pump A, just by pressing **C.START** instead of **A.START**

Erasing former parameter calibration

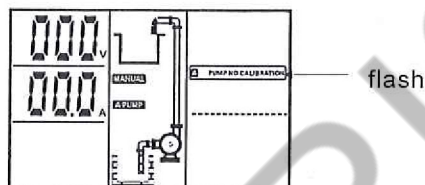
When pump is reinstalled after maintenance or new pump is installed, user must erase the former parameter calibration and a new calibration must be done.

Erasing the parameter calibration(Pump A)

- Press the **MANUAL** for 10s to switch to manual state, make sure the pump not running and LCD screen displaying:



- Press the **A STOP** and release till controller makes a "Di" sound, erasing parameter calibration completed and LCD screen displaying:



Note:Erasing the Parameter calibration of pump B is same as pump A, just by pressing

B STOP instead of **A STOP**

Erasing the Parameter calibration of pump C is same as pump A, just by pressing

C STOP instead of **A STOP**

11 BASIC OPERATION

11.1 Switching to MANUAL state

Press the **MANUAL** for 10s to switch to manual state, controller is under the manual control state; under manual state, press the **A START** / **B START** / **C START** to run pump; press the **A STOP** / **B STOP** / **C STOP** to stop pump running;

Note: under manual state, the controller can not receive the signal from float switch or pressure switch.

11.2 Switching to AUTO state

Press the **AUTO** to switch to auto state, controller is under the auto state; under auto state, controller will run or stop the pump according to the signal from liquid level probe or pressure switch.

Note: under auto state, if the pump is running and pump user wants to stop pump running compulsory, press the **MANUAL** for 10s to switch to manual state and press to **A STOP** / **B STOP** / **C STOP** pump stops running;

Note: under auto state, if the input power being cut off and recovery power again, the controller will enter operation state after 10seconds countdown;

Note: no matter the controller is under auto or manual state, if the input power being cut off and recovery power again, the controller will resume its operation state same as the operation state before power being cut off;

11.3 Pump protection

During pump running, if dry run, over load, under voltage, etc failures happened, the controller will immediately shut down the pump running and automatically execute a check for restarting conditions after a built in time delay has elapsed. The controller will not recover automatically until all the abnormal situation(s) have been cleared.

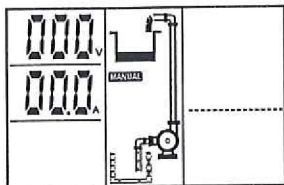
If pump stalled, open phase etc serious failures happened, pump user must check the pump and motor immediately and repair the pump.

11.4 Pump last five failure record displaying

The controller can memorize the last five failures of pump, so it is very convenient for the pump users to analyse the pump running conditions.

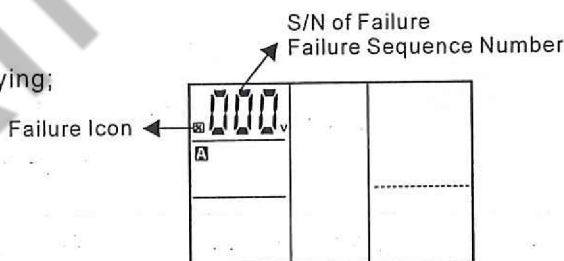
Displaying the pump A last five failure record

- Press the **MANUAL** for 10s to switch to manual state, make sure the pump not running and LCD screen displaying:



- Hold pressing **ASTOP** and press **AUTO**, the controller makes a "Di" sound, the controller displays pump failure record;

- Press **ASTOP** to quit the failure record displaying;



THE LATEST FAILURE OF PUMP A IS PUMP STALLED

Note: displaying the pump B last five failure record is same as pump A, just by pressing **B STOP** instead of **ASTOP**

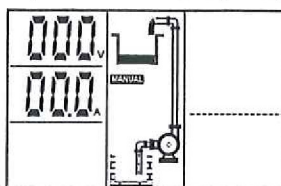
displaying the pump C last five failure record is same as pump A, just by pressing **C STOP** instead of **ASTOP**

11.5 Pump accumulative running time displaying

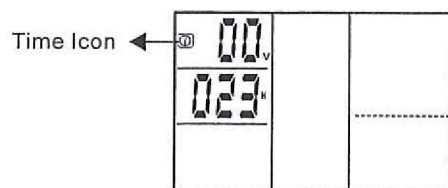
The controller can memorize how many hours of pump running, so it is very convenient for the pump users to analyse the pump running conditions and do maintenance

Displaying the pump accumulative running time

- Press the **MANUAL** for 10s to switch to manual state, make sure the pump not running and LCD screen displaying:



- Hold pressing **STORE** and press **ASTOP**, the controller makes a "Di" sound, the controller displays pump failure record;



THE PUMP A HAS RUN FOR 23 HOURS

- Press **ASTOP** to quit the accumulative running time displaying;

Note: displaying the pump B accumulative running time is same as pump A, just by pressing **B STOP** instead of **ASTOP**

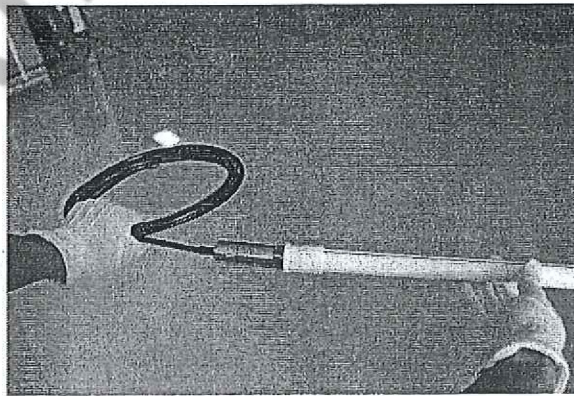
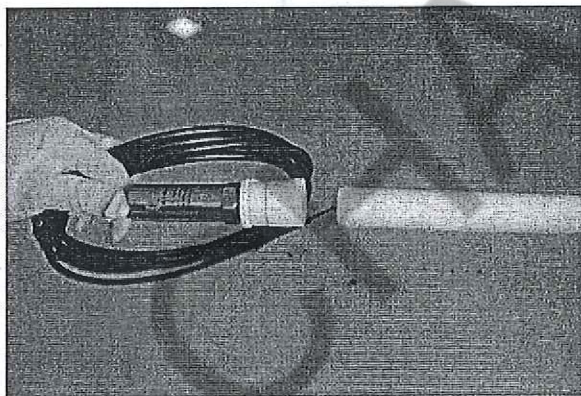
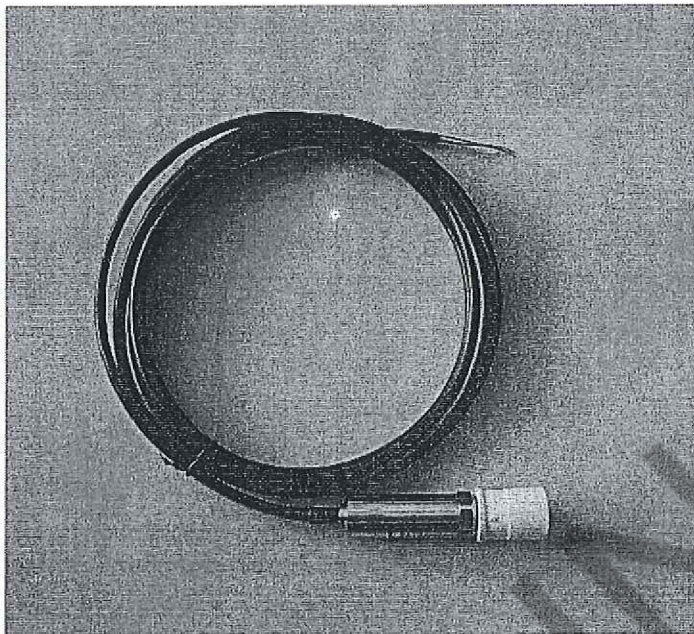
displaying the pump C accumulative running time is same as pump A, just by pressing **C STOP** instead of **ASTOP**

12 INSTALLATION OF LEVEL TRANSMITTER & PRESSURE TRANSMITTER

How to install the level transmitter and PVC pipe

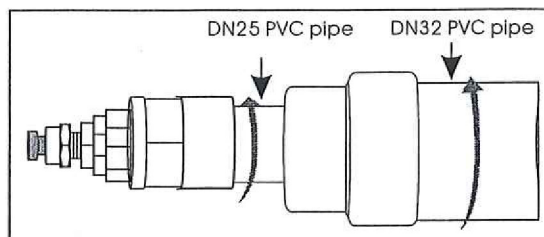
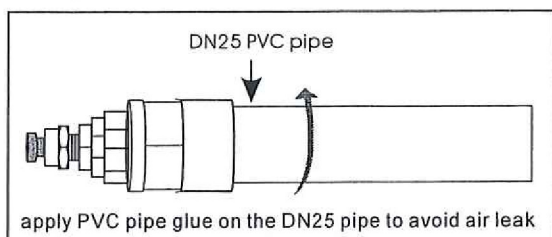
Step 1

Apply glue on the PVC pipe, insert the PVC pipe into the level transmitter



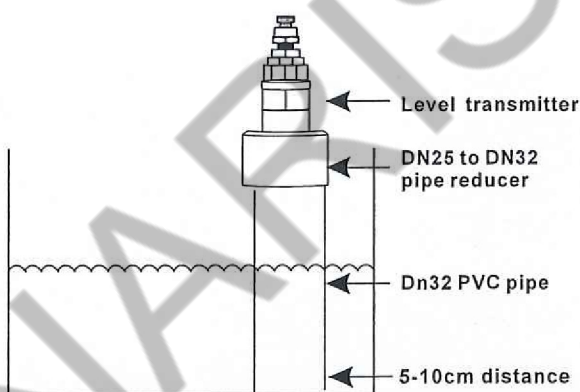
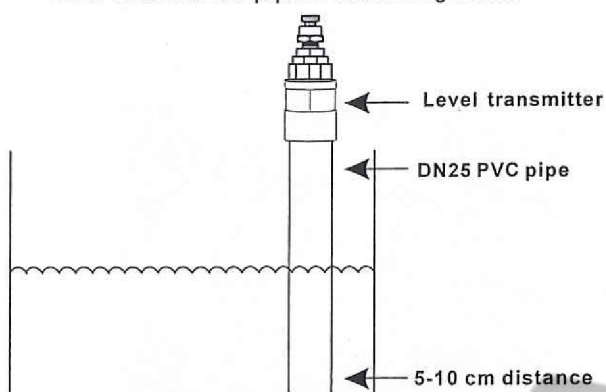
Step 2

Rotate the PVC pipe to make sure the inner wall of PVC pipe is covered with glue, so it can avoid air leakage



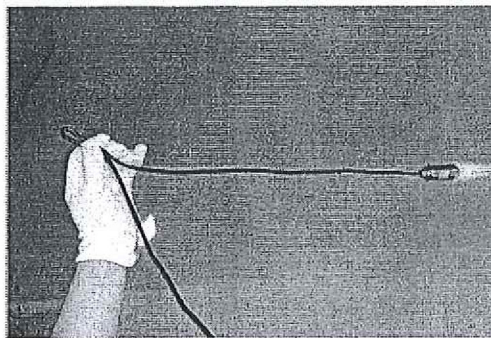
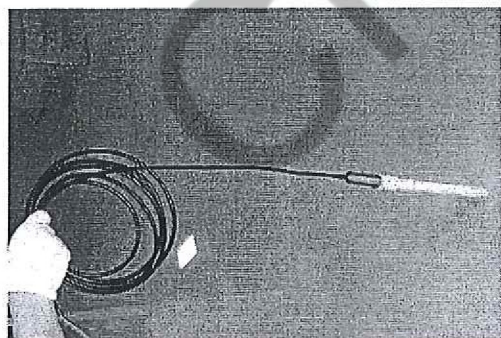
Step 3

How to install the pipe in the sewage tank



Installation notes:

- 1) The bottom of the PVC pipe and sewage pool keep 5-10 cm distance.
- 2) If in sewage pool the impurities or sludge thicker, users can use DN25 to DN32 pipe reducer connected to the large diameter PVC pipe, it can effectively prevent wrong pressure measurement if the sludge attached on the inner wall of the pipe
- 3) do not bend the hose during the pipe installation



How to install the pressure transmitter

Installation steps

1. Twine 6-10 layers PTFE tape on the pressure transmitter
2. Fix the pressure transmitter on the pipe network
3. Pay attention to the leak-proof treatment
4. Keep the 3 wires against from twining

13 TROUBLE SHOOTING GUIDE

Fault Message	Possible Cause	Solutions
UNDER V	The input power voltage is low.	Wait until power supply returns to normal.
	The input power voltage is normal. The displaying voltage is lower.	Please check the controller and adjust the blue VR (variable resistor) on the main board.
OVER V	The input power voltage is low.	Wait until power supply returns to normal.
	The input power voltage is normal. The displaying voltage is lower	Please check the controller and adjust the blue VR (variable resistor) on the main board.
PUMP STALLED	Calibration is completed under dry run.	Erase the former calibration. Complete the calibration when the pump is pumping water normally.
	A higher power pump is installed.	Erase the former calibration. Complete the calibration again.
	Improper calibration is done.	Erase the former calibration. Check the pump running current and pump outlet. If normal, complete the calibration.
	Impeller is broken or motor bearing is jamed.	Please check the impeller or motor bearing.
OVER LOAD	Improper calibration is done.	Erase the former calibration. Check the pump running current and pump outlet. If normal, complete the calibration.
	A higher power pump is installed.	Erase the former calibration. Complete the calibration again.
	Calibration is completed under dry run.	Erase the former calibration. Complete the calibration when the pump is pumping water normally.
	Impeller is broken or motor bearing is jamed.	Please check the impeller or motor bearing.

Fault Message	Possible Cause	Solutions
OPEN PHASE	The input power has open phase.	Please check the power supply or power resistor on main board.
	The output has open phase.	Please check the pump and wire.
PUMP NO CALIBRATION	Calibration has not been completed. Or calibration has been erased.	Complete the calibration.
DRY RUN	The water well is lack of water.	Controller will try to restart the pump after 30 minutes.
	Improper calibration is done.	Erase the former calibration. Check the pump running current and pump outlet. If normal, complete the calibration.
	A less power pump is installed.	Erase the former calibration. Complete the calibration again.
	The pump inlet or impeller is blocked.	Please check the inlet or impeller and clean the blockages.
PHASE REVERSAL	The input power wire phase is wrong.	Exchange the position of any two wires of the input power.