SmartGen

MAKING CONTROL SMARTER

FPC1700

JOCKEY PUMP CONTROLLER

USER MANUAL

郑州众智科技股份有限公司

SMARTGEN(ZHENGZHOU)TECHNOLOGY CO.,LTD.

CONTENT

SmartGen **Registered trademark**

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Table 1 Software Version

Date	Version	Note
2023-10-31	1.0	Original release.
2024-07-18	1.1	1. Update the interface of home page; 2. Add output logic for the application of two pumps.
2024-12-18	1.2	Update the typical application diagram.
2025-12-06	1.3	1. Add descriptions for Auto Mode indicator light and Manual Start status indicator light; 2. Add descriptions for Auto/Manual Mode transfer key and Manual Start key; 3. Modify descriptions for Auto/Manual Mode; 4. Modify output logic diagram; 5. Update content in the parameter configuration table; 6. Add three-phase power typical application diagram.

Table 2 Notation Clarification

Sign	Instruction
 NOTE	Highlights an essential element of a procedure to ensure correctness.
 CAUTION!	Indicates a procedure or practice, which, if not strictly observed, could result in damage or destruction of equipment.
 WARNING!	Indicates a procedure or practice, which could result in injury to personnel or loss of life if not followed correctly.

1 OVERVIEW

FPC1700 Jockey Pump Controller is composed of a microprocessor as the core, which can be started/stopped according to the pipe pressure, stabilize the pipe pressure in the setting range and detect the grid voltage to protect the abnormal voltage, realizing the automation and intelligent control of the controller. It integrates LCD display and with good HMI function.

2 CHARACTERISTICS AND PERFORMANCE

——1P2W, 3P3W and 3P4W system types are configurable;
——The LCD is 128x64 pixels with backlight, optional Chinese and English;
——With MCU smart accurate monitoring and control;
——With OFF/Auto/Manual modes;
——With over/under voltage, over/under frequency and reverse phase detection functions, over/under voltage and frequency threshold values are available to set;
——Detection function for the start/stop pressure, and the threshold of start/stop pressure can be set;
——The pipe pressure sensor can be configured to resistance/current/voltage types, and can customize the sensor curves;
——Control logic for the single pump application and master/backup pumps application;
——LCD can visually display the current pipe pressure of one jockey pump or two jockey pumps, total running time, pump start times, AC power status and alarm status;
——All the output ports are relay output;
——Working temperature range is (-25°C ~+70°C), which can be used in the bad environments;
——Rubber seal designed between the enclosure and controller with protection level IP65;
——Modular design, anti-flaming ABS enclosure, pluggable terminals and built-in mounting with compact structure and easy installation.

3 SPECIFICATION

Table 3 Specification Parameters

Item	Content	
Working Voltage	AC power supply, applicable to AC24V system, the voltage range: AC10V~AC30V DC power supply, voltage range: DC8V~DC35V	
Overall Consumption	≤1W (Standby mode: <0.5W)	
AC Voltage	1P2W (L-N)	AC30V~AC360V
	3P4W (L-L)	AC50V~AC620V
	3P3W (L-L)	AC50V~AC620V
Rated Frequency	Rated: 50Hz/60Hz	
Relay Output Capacity	8A AC250V Volts free output	
Production Compliance	According to EN 61010-1 installation category (over voltage category) III, 300V, pollution class 2, altitude 3000m	
Case Dimensions	95mmx86mmx46.5mm	
Panel Cutout	78mmx66mm	
Working Temperature	(-25~+70)°C	
Working Humidity	(20~95)%RH	
Storage Temperature	(-30~+80)°C	
Protection Level	Front Panel: IP65, when waterproof gasket ring installed between control panel and enclosure. Back Panel: IP20	
Insulation	Apply AC2.2kV voltage between high voltage terminal and low voltage terminal. The leakage current is not more than 3mA within 1min.	
Weight	0.16 kg	

4 OPERATION

4.1 DESCRIPTION OF INDICATORS

Fig.1 Front Panel Indication

Table 4 Indicators Description

Indicator	Status Description
Alarm	Alarm on: light flashing Alarm-free: light off
OFF Mode	OFF mode: light on Other mode: light off
Auto Mode	Auto mode: light on Other mode: light off
Manual Mode	In manual mode, a successful start activates the jockey pump output and illuminates the indicator light. In manual mode, the indicator light remains off when the jockey pump is not outputting.

4.2 KEYS FUNCTIONS

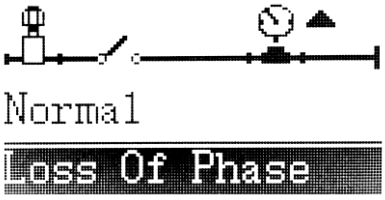
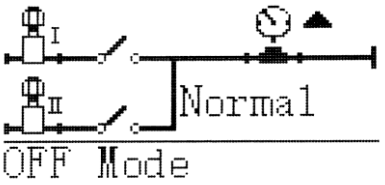
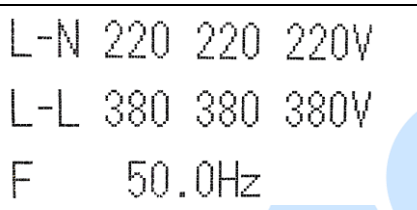
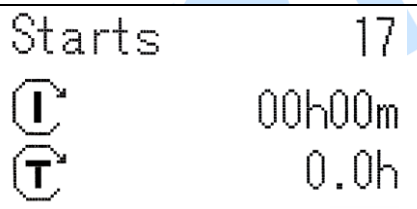
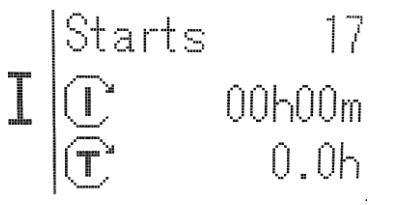
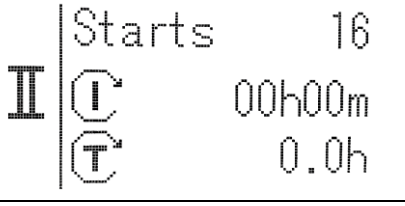
Table 5 Keys Description

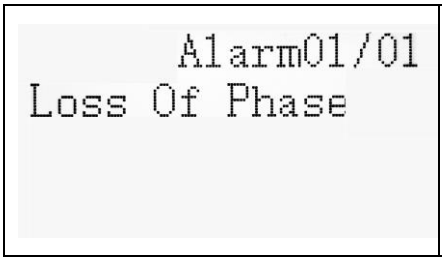
Icon	Key	Description
	Page down	Press this key in home page to scroll down; Press this key to enter the menu and can move down the cursor or decrease the value; Press and hold on this key in custom curve interface to return to the list.
	OFF/Set/Confirm	In the home page, short press to perform stop operation, long press to enter the menu; In the menu page, press the Page Down key to select the item, and short press this key to confirm. Press and hold on this key in parameter setting page to return to home page.
	Auto/Manual Mode Transfer	Press this key and set controller to Auto mode, and the indicator light illuminates. Press it again to transfer the controller to Manual mode, and the Auto mode indicator light turns off.
	Manual Start	In manual mode, short press this key, the jockey pump will remain output once the start conditions are satisfied.

5 LCD DISPLAY

5.1 MAIN DISPLAY

Table 6 Main Screen Display

Content	Description
	The output status of jockey pump If the curve type is set as digital input, it will display the status of pressure switch. If it is set as analog input, it will display the pipe pressure value. Voltage status, alarm information, working mode
	If the digital input is set as No.4, and the digital output is set as No.7, the home page will display: Jockey Pump I output status; Jockey Pump II output status. If the curve type is set as digital input, it will display the status of pressure switch. If it is set as analog input, it will display the pipe pressure value. Voltage status, alarm information, working mode
	Phase voltage Line voltage Frequency
	Start times Current running time Total running time
	If the digital input is set as No.4, and the digital output is set as No.7, the Total page will display: Jockey Pump I Start Times Jockey Pump I Current running time Jockey Pump I Total running time
	If the digital input is set as No.4, and the digital output is set as No.7, the Total page will display: Jockey Pump II Start Times Jockey Pump II Current running time Jockey Pump II Total running time

	Alarm page

5.2 STATUS DESCRIPTION

Table 7 Warning Alarm

When controller detects that the warning alarm is active, the alarm indicator will flash, while the alarm indicator will extinguish when the warning recovers, which means the warning alarm does not latch. The pump start relay will stop output when controller detects the alarm.

No.	Status	Description
1	Emergency Stop Input	Alarm when emergency stop input is active.
2	Sensor Open	Alarm when sensor is open.
3	Jockey Pump I Overload	Alarm when jockey pump I overloads.
4	Jockey Pump II Overload	Alarm when jockey pump II overloads.
5	Blackout	The voltage is 0.
6	Over Voltage	The AC voltage is greater than the setting upper limit.
7	Under Voltage	The AC voltage is less than the setting lower limit.
8	Over Frequency	The AC frequency is greater than the setting upper limit.
9	Under Frequency	The AC frequency is less than the setting lower limit.
10	Loss of Phase	Loss of single- phase or 2-phase among A, B, C.
11	Reverse Phase Sequence	Wrong phase sequence of A-B-C.

5.3 MAIN MENU

Press and hold  key in the home page to enter the main menu.

Table 8 Main Menu Display

Content	Description
	Press  to select the different parameter items, and then press  key to enter the corresponding display screen.

NOTE: Input password to enter parameter settings, default password "01234"; operator can change the password to prevent others changing controller configurations. After it is changed, please remember it clearly; If it is forgotten, please contact SmartGen's service personnel.

6 PARAMETER SETTING

6.1 SETTING INSTRUCTIONS

Press and hold key in the home page to enter the menu page, select “1. Configure”, then press key to confirm and enter the password confirmation interface. Input the correct password to enter the parameter main interface, if the password is incorrect, exit and return to the main screen, **the factory default password is: *01234.***

In the menu page, select “2. Pump Set”, then press key to confirm and enter the password confirmation interface. Input the password ***08880*** to enter the parameter main interface, if the password is incorrect, it will exit and return to the home page.

6.2 PARAMETER CONFIGURATION TABLE

Table 9 Parameter Setting Description

No.	Parameter	Default	Range	Description
1	Pipe Pressure Setting			
2	Curve Type	4	(0-4)	0: Not used 1: Custom resistance curve 2: Custom 4-20 mA 3: Custom voltage curve 4: Digital input
3	Open Action	0	(0-1)	0: Warn 1: No Action
4	Custom Curve			When selecting Custom Resistance Curve, Custom 4–20mA Curve, or Custom Voltage Curve in the Curve Type Setting, the corresponding curve must be configured.
5	Unit	0	(0-3)	0: kPa 1: bar 2: psi 3: MPa
6	Stop Pressure	1000 kPa	(0-9000) kPa	The pressure threshold when the jockey pump stops
7		3s	(0-3600)s	When the pipe pressure is greater than the stop pressure threshold, after the delay is over, the jockey pump stops.
8	Start Pressure	600 kPa	(0-9000) kPa	The pressure threshold when the jockey pump starts
9		3s	(0-3600)s	When the pipe pressure is lower than the start pressure threshold, after the delay is over, the jockey pump starts.
Time Setting				

No.	Parameter	Default	Range	Description
1	Normal Delay	5s	(0-9999)s	The delay of AC power normal
2	Abnormal Delay	5s	(0-9999)s	The delay of AC power abnormal
3	Start Delay	5s	(0-3600)s	The jockey pump runs when start delay is over.
4	Stop Delay	5s	(0-3600)s	The jockey pump stops when stop delay is over.
5	Overload Transfer Delay	3s	(1-30)s	If the Jockey Pump I Overload input is active, after the delay is over, it will transfer to the Jockey Pump II. If the Jockey Pump II Overload input is active, after the delay is over, it will transfer to the Jockey Pump I.
AC Setting				
1	AC type	1	(0-2)	0: 3P4W 1: 1P2W 2: 3P3W
2	Reverse Phase Sequence Monitoring	1	(0-1)	0: Disable 1: Enable
3	Rated Voltage	220V	AC(50-600)V	
4	Over Volt. Enable	0	(0-1)	0: Disable 1: Enable
5	Over Volt. Setting Value	120%	(100-200)%	
6	Over Volt. Return Value	115%	(100-200)%	
7	Under Volt. Enable	0	(0-1)	0: Disable 1: Enable
8	Under Volt. Setting Value	80%	(70-200)%	
9	Under Volt. Return Value	85%	(70-200)%	
10	Rated Freq.	50.0Hz	(10.0-75.0) Hz	
11	Over Freq. Enable	0	(0-1)	0: Disable 1: Enable
12	Over Freq. Setting Value	110%	(80-200)%	
13	Over Freq. Return Value	104%	(80-200)%	
14	Under Freq. Enable	0	(0-1)	0: Disable 1: Enable
15	Under Freq. Setting Value	90%	(80-200)%	
16	Under Freq. Return	96%	(80-200)%	

No.	Parameter	Default	Range	Description
	Value			
Module Setting				
1	Language Select	0	(0-1)	0: Simplified Chinese 1: English
2	Password	01234	(00000-65534)	
3	Module Address	1	(1-254)	
Input Setting				
1	Active Type	0	(0-1)	0: Closed as active 1: Open as active
Output Setting				
1	Active Type	0	(0-1)	0: Normally open output 1: Normally closed output
Aux. Input Setting				
1	Active Type	0	(0-1)	0: Closed as active 1: Open as active
2	Input Type	3	(0-5)	0: Not used 1: Emergency stop 2: Start Inhibit 3: Low pipe pressure 4: Jockey Pump II overload 5: Reserved
Aux. Output Setting				
1	Active Type	0	(0-1)	0: Normally open output 1: Normally closed output
2	Output Type	1	(0-9)	0: Not used 1: Jockey Pump I control output 2: Alarm output 3: OFF mode output 4: Auto mode output 5: Manual mode output 6: Jockey Pump I overload output 7: Jockey Pump II control output 8: Jockey Pump II overload output 9: Reserved

6.3 PARAMETERS SETTING OF JOCKEY PUMP

Table 10 Description for Parameters Setting

No.	Parameter	Default	Range	Description
1	Pump I Start Times Setting	0	(0-9999999)	
2	Pump I Total Running Time Setting	0	(0-9999999)min	
3	Pump II Start Times	0	(0-9999999)	

No.	Parameter	Default	Range	Description
	Setting			
4	Pump II Total Running Time Setting	0	(0-9999999)min	
5	Pump Start Setting	0	(0-1)	0: Pump I starts 1: Cycle start of Pump I/II

6.4 FUNCTION DESCRIPTION FOR DIGITAL INPUT PORTS

Table 11 Function Description for Input Port

No.	Input Ports	Description
0	Not used	The input port is inactive.
1	Emergency stop	The start relay will stop output when emergency input is active.
2	Start Inhibit	The start relay will stop output when the start input inhibit is active.
3	Low pipe pressure	The jockey pump will start when low pipe pressure is active.
4	Jockey Pump II overload	The Jockey Pump II overload warning will issue when the input is active.
5	Reserved	Reserved

6.5 FUNCTION DESCRIPTION FOR DIGITAL OUTPUT PORTS

Table 12 Function Description for Output Port

No.	Output Ports	Description
0	Not used	The output port is inactive.
1	Jockey Pump I Control Output	The Jockey Pump I will output.
2	Alarm Output	The relay will output when alarms.
3	OFFMode Output	The relay will output in Off mode.
4	Auto Mode Output	The relay will output in Auto mode.
5	Manual Mode Output	The relay will output in Manual mode.
6	Jockey Pump I Overload Output	It will output when Jockey Pump I is overloaded.
7	Jockey Pump II Control Output	The Jockey Pump II will output.
8	Jockey Pump II Overload Output	It will output when Jockey Pump II is overloaded.
9	Reserved	Reserved

7 OPERATIONS

7.1 OFF MODE

Press key, the indicator of Off mode is illuminated and the controller is in OFF mode.

In this mode, the jockey pump control relay stops to output.

7.2 AUTO MODE

Press the Auto/Manual transfer key , the indicator of Auto/Manual mode indicator is illuminated and the controller is in Auto mode.

In this mode, when the inputs of AC power normal, emergency stop and start inhibit are all inactive:

Pressure sensor is set as analog input: the jockey pump control relay outputs when the pressure value of sensor is lower than the start pressure threshold (if the aux. input is set as Low Pipe Pressure, the pressure value of sensor is between the start pressure and the stop pressure, when the aux. input is active, the jockey pump will also start), and the jockey pump control relay stops to output when the pressure value is higher than the start pressure return threshold.

Pressure sensor is set as digital input: if the aux. input is set as No.4 (Jockey Pump II overload), the aux. output is set as No.7 (Jockey Pump II Control Output), the jockey pump control relay outputs when the Terminal 6 and 5 are shorted, and it stops to output when the Terminal 6 and 5 are disconnected.

Pressure sensor is set as digital input: if the aux. input is set as No.3 (Low Pipe Pressure), the jockey pump control relay outputs when the Terminal 8 and 5 are shorted, and it stops to output when the Terminal 8 and 5 are disconnected.

7.3 MANUAL MODE

Press the Auto/Manual transfer key , the controller is in Manual Mode, and the indicator of Auto Mode status turns off.

In this mode, when the inputs of AC power normal, emergency stop and start inhibit are all inactive, short press key , the jockey pump control relay continuously output. In the event of a fault, it automatically transfers to OFF mode, while under fault-free conditions, press key to stop the output of the jockey pump control relay.

7.4 JOCKEY PUMP OUTPUT LOGIC

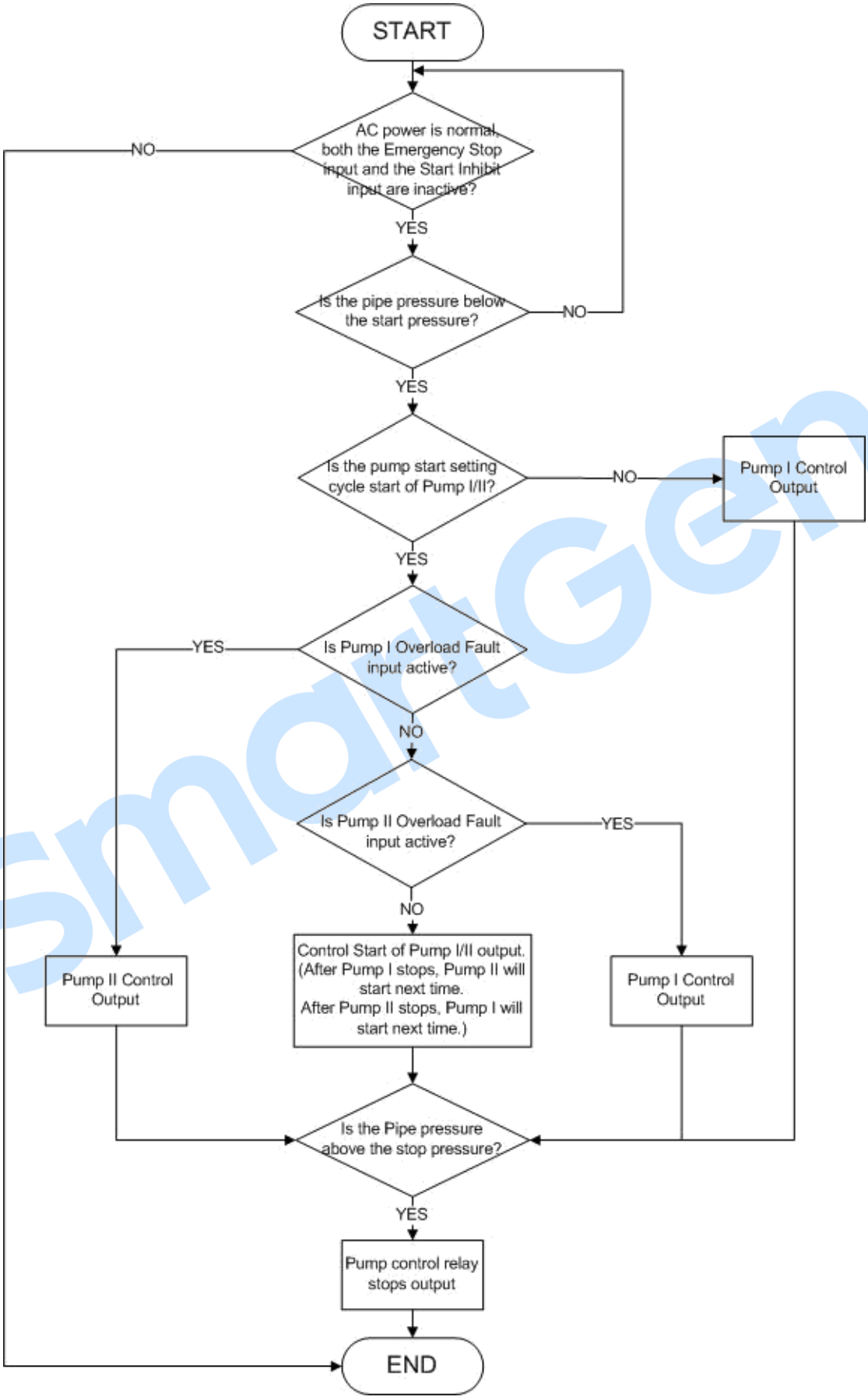


Fig.2 Jockey Pump Output Logic

8 TERMINAL DESCRIPTION

Fig.3 Back Panel

Table 13 Table Terminal Description

No.	Item	Functions	Remark
1	Pump Output	Pump controls relay to output.	Capacity 8A AC250V volts free output
2			
3	NC	Null	
4	+12V Output	The output of 12VDC power	
5	GND	Common port	
6	Pressure Sensor	Sensor input of pipe pressure	
7	Fault Input	Overload fault input of jockey pump 1	Connect to GND of input port is active.
8	Aux. Input	Aux. input port	Connect to GND of input port is active.
9	AC Power~24V	AC 24V power supply	
10			
11	Aux. Output	Aux. output port	Capacity 8A AC250V volts free output
12			
13	NC	Null	
14	A	AC 3P4W voltage input	If it is single phase input, only connect to A, N
15	B		
16	C		
17	N		

9 TYPICAL APPLICATION

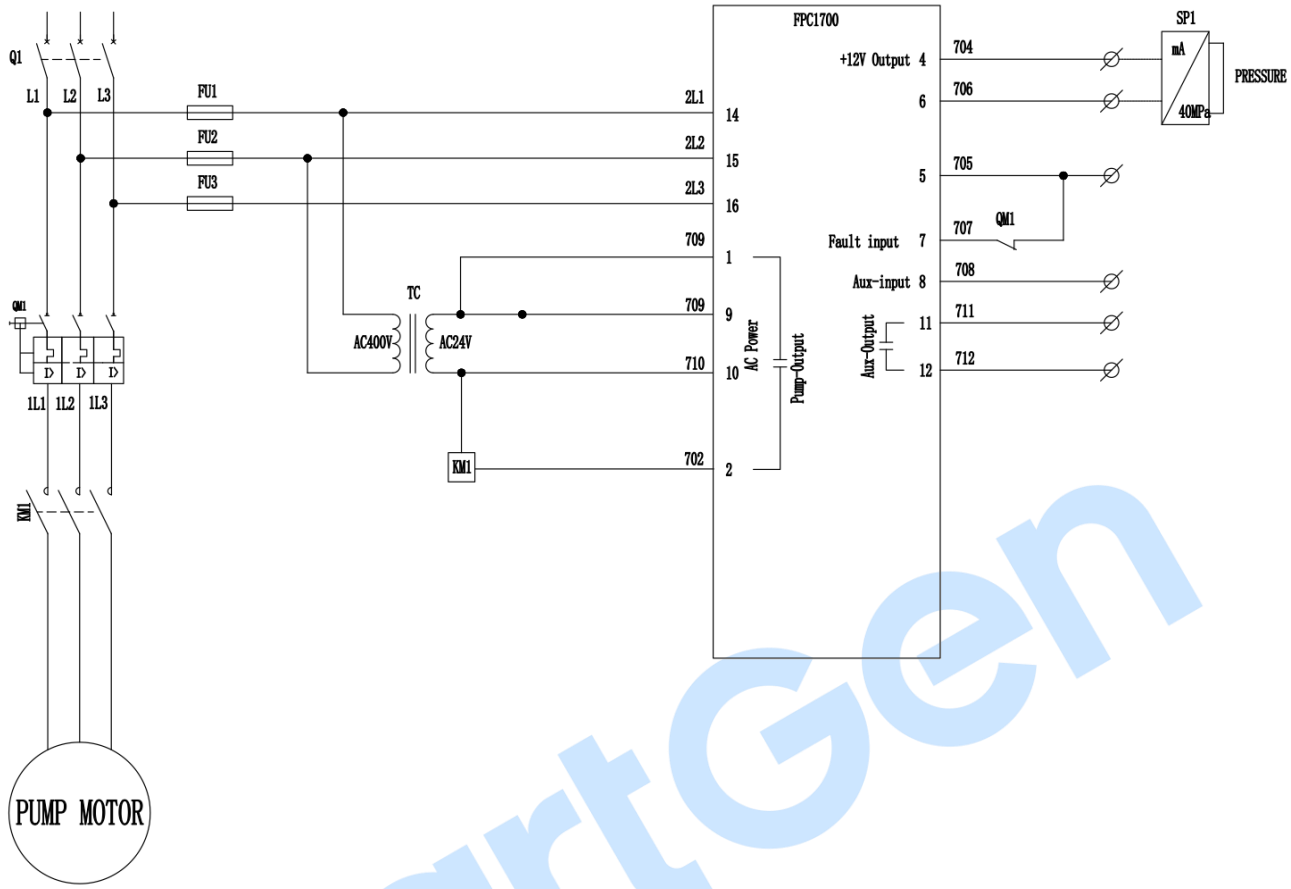


Fig.4 Typical Application Diagram of 3-Phase Power Supply

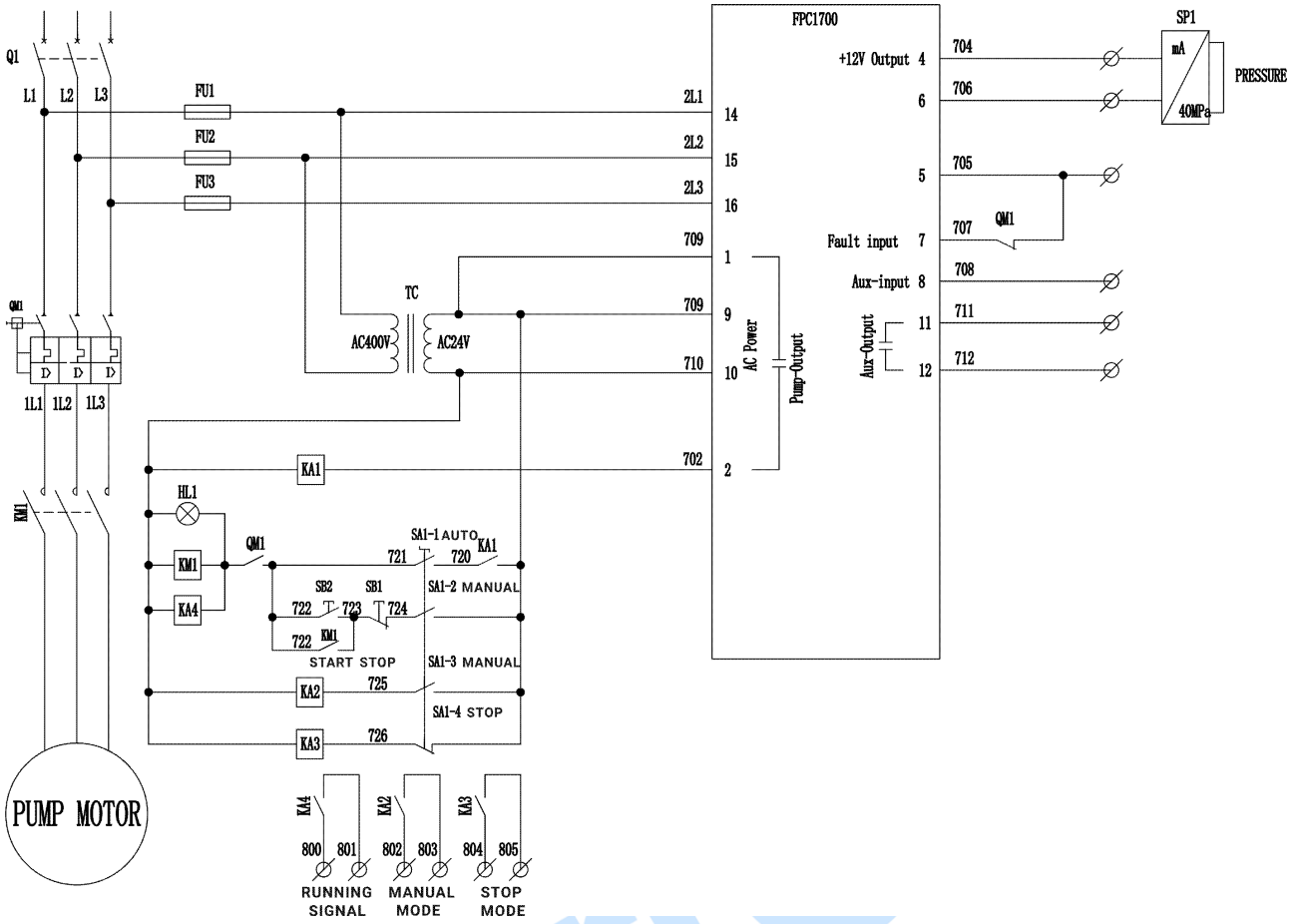


Fig.5 Application Diagram of External Manual Control Button

10 INSTALLATION DIMENSIONS

This control is panel built-in design, fix it by clips during mounting.

Unit: mm

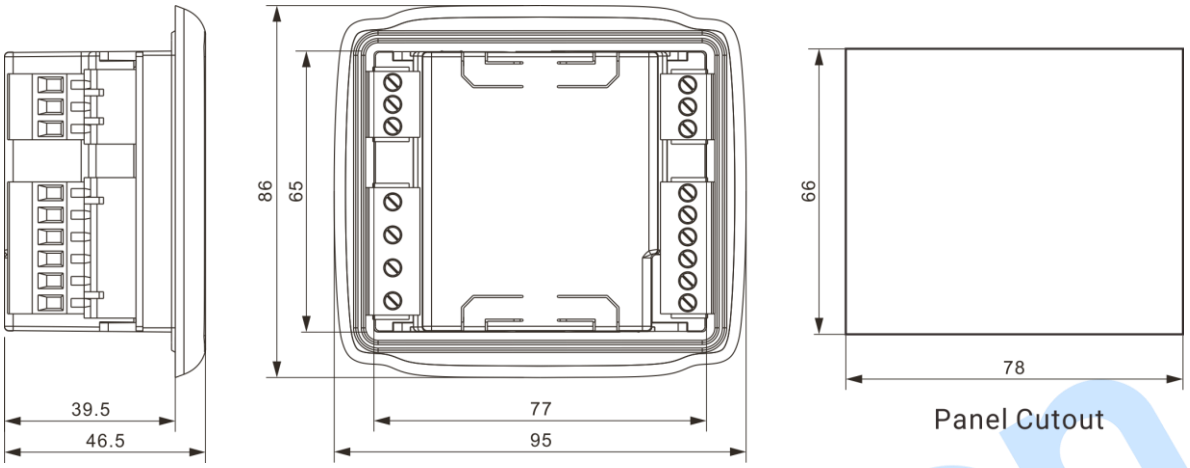


Fig.6 Case Dimensions and Panel Cutout

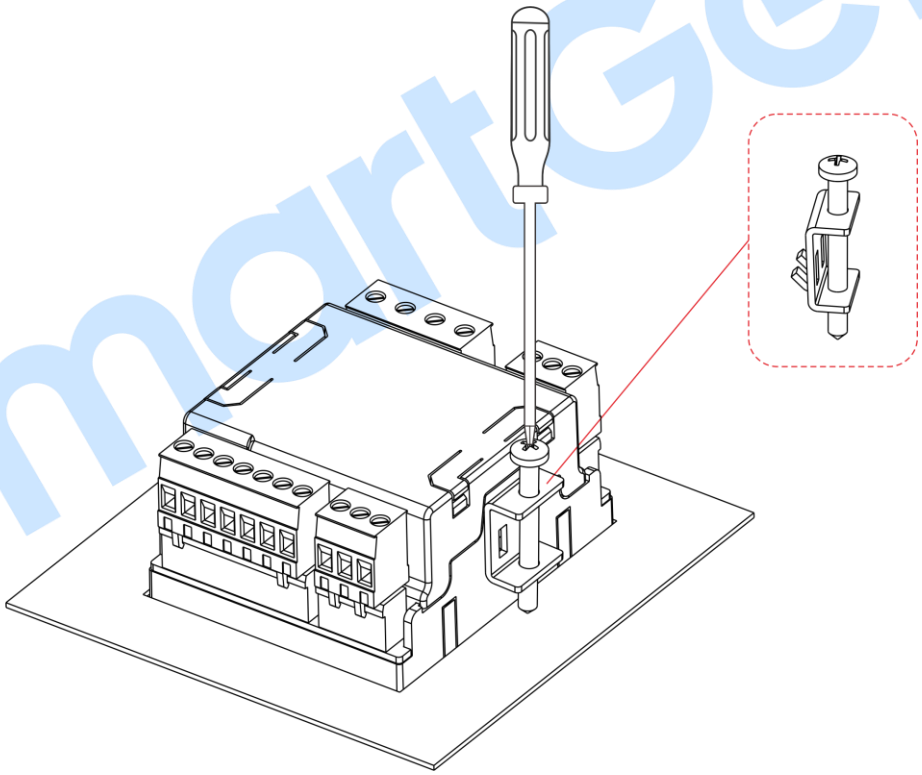


Fig.7 Clips Installation

11 TROUBLE SHOOTING

Table 14 Trouble Shooting

Symptom	Possible Solutions
Controller no response	Check the AC power supply.
No output of relay	Controller alarm is available; Unreasonable setting of start/stop pressure threshold value; The start inhibit of input port is active; The working mode is on OFF mode.