Q02 Series Smart Water Pump Variable Frequency Drive User Manual

1. Safety Precautions

Thank you for using our product. Please read this manual carefully before using the product.

◆ Safety Precautions

■ Upon receiving the product, do not install or operate the inverter if it is damaged or any parts are missing. Doing so may result in equipment damage or personal injury.

■ Installation must be performed by qualified electrical personnel. Ensure power is disconnected and wiring terminals are correctly connected. Failure to do so may result in electric shock or fire.

■ Ensure the ground terminal (⏚) is securely grounded. Failure to do so may result in the inverter housing becoming electrically charged.

■ Do not touch the CMOS integrated circuit on the PCB board with your hands, as static electricity may damage the components.

■ Unauthorized modification of the inverter is strictly prohibited, as it may cause personal injury or death. Modified inverters will void the warranty.

■ Do not touch the terminals of the inverter while it is powered on, as this may cause electric shock.

■ Do not use circuit breakers to control the inverter's stop/start functions, as this may damage the inverter.

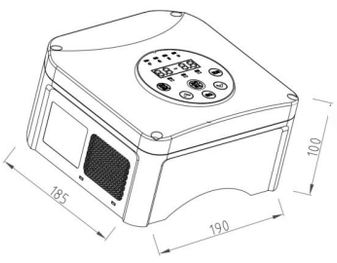
■ **Some functional parameters are not specified in this manual. Contact the company's after-sales technical personnel if required.**

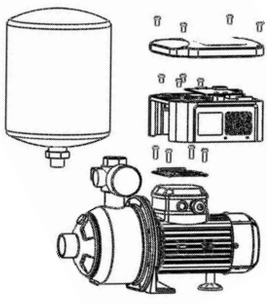
2. Model and Parameters

2.1 Model Specifications

Inverter Model	Rated Power (kW)	Output Current (A)	Compatible Motor (kW)	Notes
Q02-2S0022H	2.2	10.0	2.2	Factory default 2.2 kW, power can be set via P1-02
Q02-4T0022H	2.2	5.5	2.2	

2.2 Dimensions (Length 185mm × Width 190mm × Height 100mm)





3. Installation and Wiring

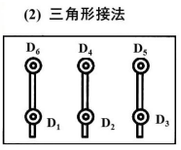
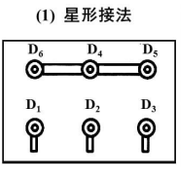
3.1 Mounting and Securing

1. Use a four-core power cable to connect the motor terminals.
2. Secure adapter plate ① to the water pump using the junction box bolts.
3. Secure the inverter to the adapter plate.
4. Connect the power cables and sensor cables to the VFD correctly.
5. Close the smart controller panel and secure it firmly with bolts.

Note: ① Different motor series require different adapter plate specifications.

3.2 Model and Wiring Method

Model	Input	Output	Motor Connection Method

Q02-2S0022H	Single-phase 220V power supply connected to L and N terminals	Outputs three-phase 220V via U, V, W terminals	
Q02-4T0022H	Three-phase 380V power supply connected to R,S,T terminals	Outputs three-phase 380V via U, V, W terminals	

Note: 1. If the power cord is damaged during transportation or handling, contact after-sales personnel to replace the power cord before use.

Otherwise, it may cause electric shock or fire hazards.

2. Ensure the power supply is properly grounded to prevent the risk of live metal surfaces.

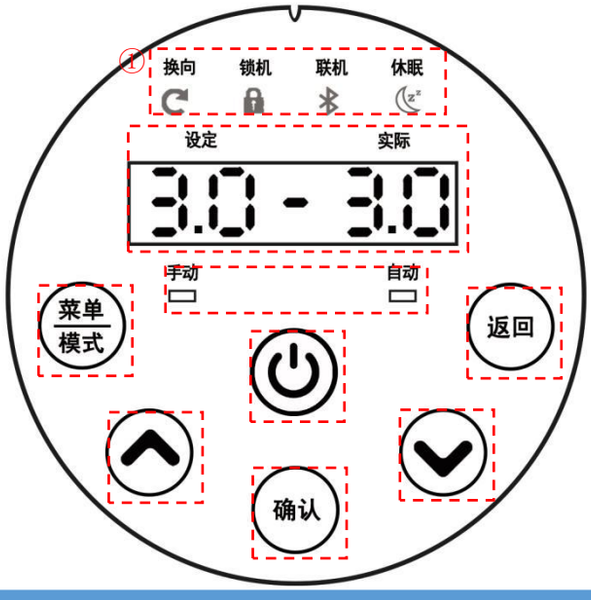
3. Verify the motor's rotation direction is correct. Swapping any two phase connections will reverse the motor's rotation. (The correct rotation direction is marked on the pump housing.)

3.3 Control Terminal Description

Terminal	VO	A1	GND	X1	SG+	SG-
Function	Sensor Red Wire	Sensor Black Wire	Signal Ground	Multifunction Terminal	RS485 Communication	

4. Operation and Control

4.1 Main Interface



Serial Number	Description
①	a) Reversal: Indicates pump reverse rotation status. b) Locked: Indicates inverter parameter lock status. c) Online: Indicates the inverter's online status. d) Sleep: Indicates pump sleep status.
②	a) Set Pressure/Feedback Pressure Display (Auto Mode). b) Speed (Manual Mode). c) Displays set value when in set mode. d) Press the return key to switch between running parameter displays. e) Fault code display.
③	a） Switch between manual and automatic modes. b） Press and hold for 3 seconds to enter the parameter setting interface. c） During parameter setting, press to shift.
④	Manual/Auto Mode Indicator Light
⑤	a） Increase the set pressure. b） The setting interface can be used to increase parameter values.

⑥	a） Button Function: Run/Stop the inverter. b) Indicator lights: 1. When power is on: 3/4 green lights; 2. During operation: Green light with rotation; 3. During sleep mode: Green light slowly flashes; 4. During fault: Red light stays on.
⑦	In the settings interface, press to enter the next level or confirm parameter value changes.
⑧	a) On the main interface, press to cycle through output frequency, actual flow rate, and current. b) In the settings interface, press to return to the previous level.
⑨	a） Decrease the set pressure. b) The settings interface can be used to decrease parameter values.

4.2 Shortcut Keys

- **Press the Confirm key + Up key simultaneously for 3 seconds: Lock parameters.**
- **Press and hold the Confirm key + Down key simultaneously for 3 seconds: Reset to factory defaults.**
- **Press the Back key and Confirm key simultaneously for 3 seconds: Set the pump model.**
- **Press and hold the Up and Down keys simultaneously for 3 seconds: Reverse the running direction.**

4.3 Pressure Setting

Pressure Setting: Can be directly adjusted using the Up and Down keys on the main menu interface; changes are automatically saved.	
P0-02 (Sensor Range) Factory default P0-02=10.0 (1 MPa)	
Step 1	Press and hold the Menu key until 00 is displayed. Briefly press the Confirm key to display P0-01.
Step 2	Use the up/down keys to navigate to P0-02, then press the confirmation key.
Step 3	Press the Up key to modify the value. Pressing the Menu key shifts the digits left to adjust to the corresponding sensor range. Press the Confirm key.
Final Step: Verify that the pump rotation direction matches the arrow marked on the motor impeller.	

4.4 Multi-Pump Parallel Connection Setup (All devices must connect SG+ and SG- in parallel during connection)

Pump Linkage Type	Primary Pump	Auxiliary Pump 1	Auxiliary Pump 2	Auxiliary Pump 3
Two-Pump Parallel Operation	P0-56=2	P0-56=5	/	/
Three-Pump Parallel Operation	P0-56=3	P0-56=5	P0-56=6	/
Four-Pump Interconnection	P0-56=4	P0-56=5	P0-56=6	P0-56=7
Sequential Pump Cycling	P0-58=1110	/	/	/
Timing Pump	P0-58=0110 P0-57=Time	/	/	/
Standby Host	/	P0-58=1101 to 1103 (corresponding to two-pump to four-pump operation)		
Emergency Water Supply Mode	Press the mode button to switch to manual mode			

4.5 Operating Mode

Manual Mode: Directly modify the set frequency using the up/down keys. The system operates according to the set frequency.

Note: In manual mode, sensor faults, overpressure, pipe burst, and dry-running faults will not trigger.

Auto Mode: The inverter operates based on the set pressure. If the feedback pressure falls below the set pressure, the pump accelerates; if it exceeds the set pressure, the pump decelerates. Through PID control, the feedback pressure is ultimately maintained at the set pressure. When there is no water usage, the system automatically enters sleep mode and will automatically wake up upon the next water usage.

4.6 Operating Parameter Display

Press the Return key to cycle through operational parameters:

Auto Mode

Display Content	Display Meaning
XX-XX	Set Pressure - Feedback Pressure
F X.XX	Maximum Frequency
H X.XX	Output Frequency
dXX.XX	Sleep Frequency
J .X	Output Torque

Manual Mode

Display Content	Display Meaning
XX-XX	Set frequency - Output frequency
AX.XX	Output Current
uXXX.X	Bus Voltage
1 XX	A1 Analog Input
o----	External I/O

6. Parameter Settings

Press and hold the Mode key for 3 seconds. The display will show 00. Press the Confirm key to enter parameter settings.

NO.	Function Description	Setting Range	Unit	Factory Default
P0-00	Control Mode	d00: Speed Mode d01: Constant Voltage Mode d02: Variable Pressure Mode	♂	01
P0-02	Sensor Range Setting	d0.10 to 99.00	Bar	10.00
P0-05	Feedback Signal Source Setpoint	d00: AI1 (Current) Input d01: AI1 (voltage) input d03: Sensorless d04: Communication Input (External Communication or Multi-Pump Communication)	♂	00
P0-06	Speed Signal Source Setpoint	d00: Panel Input d01: AI1 Input d03: Communication Input	♂	00
P0-07	Zero Flow Fluctuation Pressure	d0.00 to 1.50; 0: Invalid	Bar	0.10
P0-08	Zero Flow Delay	d00 to 1000	S	20
P0-09	Flutter frequency	d0.00 to 20.00	Hz	1.5
P0-10	Transition Time	d00 to 10	S	4
P0-11	Lower Pressure Limit Setting	d00～95	%	90

P0-12	Lower Pressure Delay	d01–50	S	6
P0-13	Upper Pressure Limit Setting	d105–150	%	110
P0-14	Upper Pressure Delay	d01–50	S	10
P0-15	Acceleration time	d0.1 to 999.9	S	5.0
P0-16	Deceleration time	d0.1 to 999.9	S	5.0
P0-20	Sleep Frequency Parameter	d0.50 to 1.50	%	1.10
P0-21	Sleep Detection Time	d00 to 1000	S	10
P0-22	Pump Control Settings	Units: Sensor Detection; 0: Off; 1: AI1 Detection; 2: AI2 Detection; 3: Both AI1/AI2 Detection; Tens place: Fan control: 0: Temperature control; 1: Always active; 2: Off Hundreds place: Zero flow and sleep mode: 0: Shutdown; 1: No shutdown; Thousands place: Adjustment direction: 0: Forward adjustment; 1: Reverse adjustment	♂	0001
P0-23	Specific Alarm Delay	d00～100	S	15
P0-24	Overpressure Alarm	d00～200; 00: Cancel	%	00
P0-25	Dry Run Protection Coefficient	d00～90; 00 cancel, based on torque	%	15
P0-26	Pipe burst detection time	d00～d600; 00: Invalid	S	180
P0-27	Water shortage/pipe burst pressure setting	d20–100%	%	20
P0-28	Anti-Sticking Rotation Time	d00～24000; 00: Invalid Operating time interval per 24 hours	min	00
P0-29	Anti-sticking rotation frequency	d0.0 to P0-03	Hz	20.00
P0-30	Anti-freeze operation time	d00–24000; 00: Invalid	min	00
P0-31	Anti-freeze operation frequency	d0.00 to P0-03	Hz	20.00
P0-32	Anti-freeze operation interval time	d00 to 24	H	2
P0-33	Startup Mode	d00: Local Start d01: Terminal Start d02: Communication Start	♂	00
P0-34	Stop Mode	d00: Deceleration stop; d01: Free stop	♂	00
	X1 Input	d00: No function	♂	01

P0-35	Terminal Mode	d01: Start d02: No water protection input (normally open) d03: Run Enable Input (Emergency Stop) d04: Fault reset input (RESET) d05: Low water protection input (normally closed)			
P0-40	Sensorless Operation Timer	d0-24		H	2
P0-42	Communication Address	d00–31		♂	01
P0-43	Pump Communication Method	d00: RS485 Communication		♂	00
P0-44	Communication Speed 0000000000000000 and Format	Ten's Place D0x: Data Format <8.N,1> D1x: Data format <8.N,2> D2x: Data format <8.E,1> D3x: Data Format <8.E,2> D4x: Data Format <8.0,1> D5x: Data Format <8.0,2>	Units digit dx0: 1200 bps dx1: 2400 bps dx2: 4800 bps dx3: 9600 bps dx4: 19200 bps dx5: 38,400 bps dx6: 57600 bps dx7: 115200 bps	♂	0026
P0-45	Carrier Frequency Setting	d0.8 to 16; corresponding to fc = 0.8 kHz to 16 kHz		♂	10.0
P0-56	Multi-Pump Function	d00: Disabled d01: Single-pump mode d02: Dual-Pump Mode d03: Triple-Pump Mode	d04: Quad Pump Mode d05: Auxiliary Pump 1 d06: Auxiliary Pump 2 d07: Auxiliary Pump 3	♂	00
P0-57	Pump Interval Time	d0.00 to d99.99; 0.00 invalid		h	12.00
P0-58	Online Function Settings	Unit: Standby Pump Function; 0: Disabled; 1: Dual-pump standby host function; 2: Three-pump standby host function; 3: Four-pump standby host function; Tens digit: Multi-pump control mode: 0: Multi-pump primary/secondary control			1110

		1: One active, one standby 2: Multi-pump synchronous control		
		Hundreds place: Online operation mode; 0: Overflow Mode 1: Equal distribution of operating frequencies among pumps		
		Thousands place: Online pump rotation timing mode; 0: Timed rotation 1: Sequential pump operation		

7. Common Function Settings

Definition	Description
Panel/Remote Control	Panel Control: Set P0-33 to 00; Remote Control: Set P0-33 to 01, set P0-35 to 01. Operation occurs when X1 and GND are closed; operation stops when disconnected.
Low Water Protection	Reserved interface for water tank float switch or pressure switch: P0-35 set to 02: X1 shorted to GND is normal; open circuit reports Err27; P0-35 set to 05: X1 and GND disconnected is normal; shorted reports Err27.
Disable Sleep Mode Pump Shutdown	Set P0-22 to 0101 to disable sleep mode pump shutdown. Once pressure is reached, the pump maintains operation at the lowest frequency.
Overpressure alarm	When feedback pressure > P0-24* set pressure and persists for 5 seconds, Err25 is reported.
Pipe Burst Protection	During operation, if the running power exceeds 50%*rated power within the time set by P0-26 and the feedback pressure remains below P0-27*set pressure, Err26 is triggered.
Dry Run Protection	If torque remains below P0-25 for the duration set at P0-23, the inverter reports Err28 fault.

8. Fault : Symptoms and Countermeasures

Fault Code	Fault Description	Cause of Failure	Troubleshooting
Err01	Short Circuit	Output short circuit	1. Inspect the motor and motor wiring 2. Inverter malfunction
Err02	Overcurrent	Output current is too high	1. Motor overload 2. Acceleration time set too fast 3. Motor or cable wiring error or fault
ERR03	Motor overload	1. Grid voltage too low 2. Load is in an overloaded state 3. Load obstructed by foreign object	1. Inspect the power supply 2. Check if the load is locked 3. Check if the load is overloaded
ERR04	Inverter overload	1. Grid voltage is too low 2. Incorrect motor rated current setting 3. Motor stalls or sudden load surge	1. Inspect the power supply 2. Verify motor parameter settings 3. Check for motor

		4. Mismatch between drive and load power	stalling
ERR05	Motor locked rotor	1. Inverter and motor are not matched 2. Inspect the water pump	1. Set inverter parameters according to motor nameplate 2. Motor identification is required 3. Verify pump functionality
Err08	Overvoltage	Power supply voltage is too high	Check the input power supply
PoFF	Undervoltage	Power supply voltage too low	Check input power supply
Err10	Overheating	Restricted ventilation/cooling of the frequency converter	Check the fan or heat sink
Err16	Abnormal reference current	1. Loose internal connectors in the inverter 2. Internal switching power supply abnormality 3. Signal sampling or comparison circuit malfunction	Contact technical support
Err17	Abnormal ground detection	1. Detected abnormal ground signal in the inverter	Check if the inverter or motor is properly grounded
Err18	Relay Abnormal	Input power supply insufficient	Check the input power supply
Err19	Startup resistor overheating	1. Damaged relay 2. Frequent power cycling	1. Contact technical support 2. Avoid frequent power cycling
Err20	Output Phase Loss Protection	1. Output for missing phase in U, V, W (or severe three-phase load imbalance)	1. Inspect output wiring 2. Inspect motor and cables
Err22	System fault	Operating time reached set time	Service required
Err25	Overpressure alarm	Sensor detects outlet pressure exceeding overpressure alarm threshold	1. Check parameter P0-24 settings 2. Verify sensor signal and range 3. Verify inlet pressure fluctuations
Err26	Pipe rupture alarm	The system is operating normally, but the pressure consistently fails to reach the set threshold pressure. The inverter has determined that a pipe rupture leak has occurred in the system.	1. Inspect the piping 2. Verify parameter P0-26 settings
Error 27	Low Water Alarm	Terminal X1 detects low water level alarm (closed indicates normal, open indicates fault)	1. Check water tank level 2. Inspect the liquid level switch and its wiring connections 3. Inverter terminal fault
Err28	Dry-running alarm	The inverter detected dry running of the water pump	1. Check if the pipeline is filled with water 2. Check if the pump has

			been bled of air 3. Parameter P0.25 is incorrectly set
Err31	Sensor signal missing	Sensor or wiring fault	1. Inspect the sensor 2. Inspect electrical connections

Warranty Terms

We solemnly promise that from the date of purchase, the user is entitled to the following warranty services:

1. The warranty covers the inverter unit itself.

2. The warranty period is eighteen months. During this period, if the product malfunctions or is damaged under normal use as specified in the manual, our company will provide free repair services.

3. The warranty period commences on the product's date of manufacture. The machine serial number serves as the sole basis for determining warranty eligibility. Equipment without a serial number will be treated as out of warranty.

4. Exclusions: During the warranty period, repair fees will apply for damage caused by the following reasons:

A. Damage resulting from misuse, unauthorized repairs, or modifications;

B. Damage caused by fire, flood, earthquake, lightning, abnormal voltage, other natural disasters, or secondary disasters;

C. Damage caused by accidental drops or transportation after purchase;

D. Product malfunctions or damage caused by factors unrelated to the product itself (e.g., external equipment issues);

E. Product malfunctions or damage resulting from use in harsh environments exceeding specifications outlined in the manual, such as exposure to gas corrosion, salt corrosion, or metal dust.

Official Account

Zhejiang Ruizhicheng Electric Co., Ltd.

Service Hotline: 18005773791 18106726858