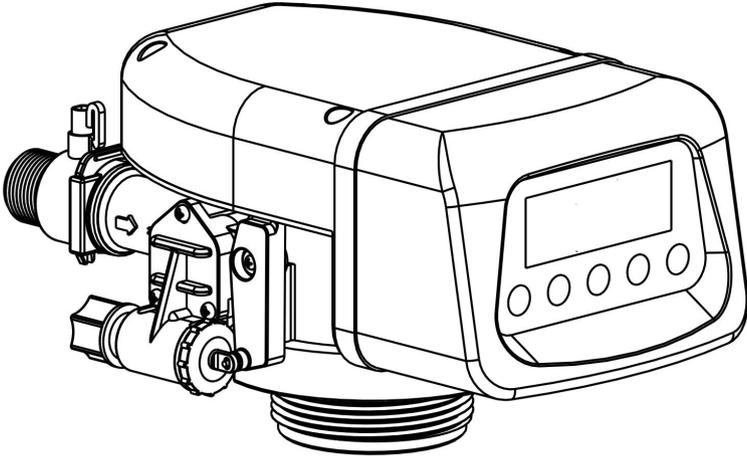# GRDR-1

Series single tank softening valve
Installation, use and maintenance manual

（GRDR2-1、GRDR4-1、GRDR10-1、GRDR10-1S）

Scan Qr cord for the latest

GRDR-1 shift	GRDR-1 install	DR10-1S install	GR10-1S install
animation	animation	animation	animation

Ⅰ. **Operating Board**

1、**Instructions of the LCD display controller**

Station Brine (Absorb→Rinse)
Station Backwash (Appear perodicity)
"Meter"mode
Flow rate(IN)
Manual shifting (Forced backwash)
Mode switch
Set

Station
B. wash Brine Clean
Syc S: 0125 D: 0125 L
00. 00t/h 00000. 0t
Button

Station Clean (Wash+Refill)
Button Lock indicator
Setting Water volume
Station parameter
Remaining Water Volume
Total water Volume(IN)
Plus"1"
Next digital
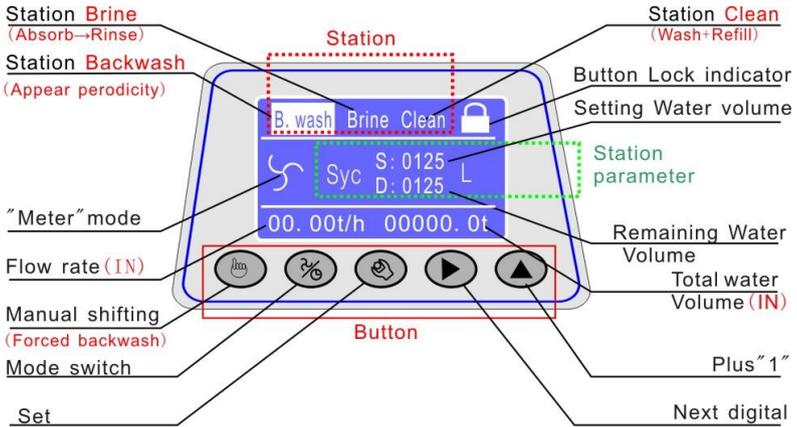
Pic1：LCD Screen

Flow mode" ↻ "interface

B.wash Brine Clean 🔒 ↻ Syc S:0125 D:0125 L 00.00t/h 0000000t	**B.wash:**(Appear according to the setting cycle value**)** 　　**S:0125**: Setting water for backwash , measured by the inlet flow meter, 　　**D:0125**:Decrementing State, Decrement to zero and switch to the next station ; **00.00t/h**: The current flow rate of inlet 　**0000000t**: Accumulative water amount of inlet
Brine Clean Soft 🔒 ↻ Syc S:0125 D:0125 L 00.00t/h 0000000t	**Brine(Brine in → Slow wash)** **S:0125**: Setting water for Brine absorb and Slow wash, measured by the inlet flow meter, it is amount of water passing through the ejector **D:0125**:Decrementing State, Decrement to zero and switch to the next station ;

Brine Clean Soft 🔒 ↻ Syc S:0125 D:0125 L 00.00t/h 0000000t	**Clean（Wash+ Refill）** **S:0100**: Setting of Washing and refill to salt tank water, measured by the inlet flow meter; **D:0100**: Decrementing State,Decrement to zero and switch to the next station;
Brine Clean Soft 🔒 ↻ Syc S:0125 D:0125 L 00.00t/h 0000000t	**Soft（Softening）** **S:0005.5**: water volume of one cycle setting, measured by the inlet flow meter.unit:ton **D:0005.5**:　Decrementing State, to zero and switch to the next station

Time mode"🕐 "interface

B.wash Brine Clean 🔒 🕐 Set:005 Min 　 Dec:005 Min	Brine Clean Soft 🔒 🕐 Set:036Min 　 Dec:036Min
B.wash(Appear according cycle**)**	Brine(**Brine→Rinse)**
Brine Clean Soft 🔒 🕐 Set:005Min 　 Dec:005Min	Brine Clean Soft 🔒 🕐 Set:9999Min 　 Dec:9999Min
Clean(**Wash+ Refill**)	Soft**(Softening**)

The operation button：

🖐：Manual button；✍：Parameter setting；⏍：Mode Switch；▶：next；
▲：plus 1

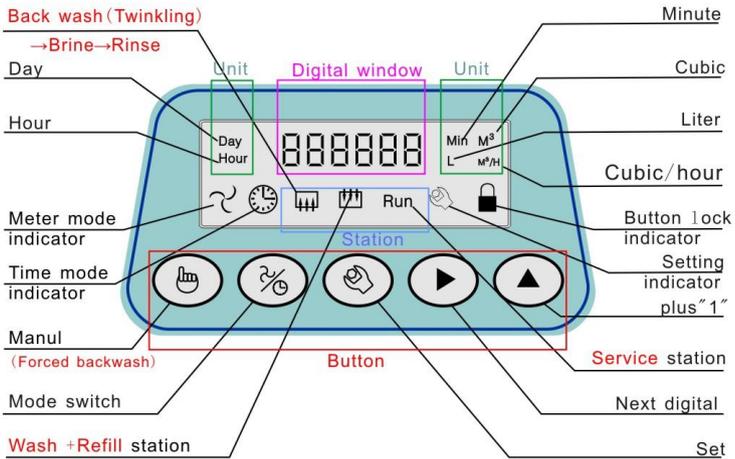**A**、**Unlock**：Press and hold ▶ & ▲ simultaneously for one second ,Displaying 🔓.

B、 **Lock**：After three minutes of inactivity, the display panel will automatically lock.

C、⏍ **Mode switch**：When unlocked, pressing it switches between time mode 🕐 and meter mode ↻.

D、 🖐 **Manual** button：When unlocked, pressing it switches to the next station.

E、 ✍ **Parameter setting**：When unlocked, pressing it display the interface to change parameter settings.

F、 🖐 **Backwash**：When locked, press 6 times the valve shift to **B.wash** station.

Mode"↻"parameter setting	**Mode "🕐"parameter setting**
Push "▶&▲" To unlock	Push "▶&▲" To unlock
Brine Clean Soft ↻ Syc S:0125 L D:0125 00.00t/h 0000000t	Brine Clean Soft 🕐 Set:0125Min Dec:0125Min
Push✍ to setting interface	Push✍ to setting interface
B wash: █125L Brine: 0125L Clean: 0100L Soft: 0005.5T	B wash: █12Min Brine: 012Min Clean: 010Min Soft: 0001Min
Push"✍"To next page	Push"✍"To next page
B.wash Syc：█ Address: 01 Shift_W Time: 04s	B.wash Syc：█ Address: 01 Shift_W Time: 04s
Push"✍"To next page	Push"✍"To next page
Set parameter Time: █H:05M:33S Set: 99H-00M-01D Out_Mode: 2	Set parameter Time: █H:05M:33S Set: 99H-00M-01D Out_Mode: 2
Push"✍"To confirm	Push"✍"To confirm

2、 LED Controller Operation instruction

Pic2：LED Screen

LED Display

Day \ hour \ min \ M³ \ L \ M³/H are the units of time or flow, respectively, with the content, as suggested by the highlighted display

$\backsim$： Flow mode symbol

$\bigoplus$： Time mode symbol

$\boxplus$： Indicator of station **Brine→Slow wash** station

Twinkling when the valve is in **B.wash** station

$\boxplus$： Indicator of **Wash + Refill** station

Run: Indicator of **Softening** station

$\mathbb{Q}$： Enter to the setting status indicator

$\blacksquare$： Buttons locked indicator

Button：

Name:

$\mathbb{E}$：

Manual button:Unlock state.press it the valve shifting to next station

Backwash: Lock state.press it 6 times the valve shifting to **B.wash**

5

station

✍：Parameter Set

✂：Mode switch

► ：Next

▲：Plus 1

Setting the defined parameters

C1: Meter Mode, Setting water for Brine inhalation and slow wash water. Unit: L

C2: Meter Mode,Setting water of **Wash+Refill**. Unit: L

C3: Meter Mode, Setting Softening water quantity of one cycle. Unit: m^3

CO：Meter mode:setting water volume for B.wash(backwash).unit:L

C4: Time mode: Setting Brine in and slow wash time. Unit: Min

C5: Time mode: Setting **Wash + Refill** water time. Unit: Min

C6: Time mode: Setting Softening time of one cycle. Unit: Min

CP：Time mode:setting time for B.wash.unit:Min

C7: Hour clock setting 0-23(Hours)

C8 Minute clock setting 0-59(Minutes)

C9 Delay Regeneration 0-23. if the valve is in servicing and can not switch to regenerate.it can be take delay regeneration.set a day any 0-23 hour , set 99 is to cancel this function.

CF：When the delay regenerate is enabled, If you want to take days as the unit of time; Regenerate once per set number of days. To achieve daily regeneration, set parameter C6 not more than one day (1440 minutes)

CC: Relay output control mode , set the mode 0, 1, 2, 3, 4, 5, 6 in the following table(page:9).

CL: Number of regeneration： Such as setting "2", the program will realize ⊞ and ⊞ twice one cycle ;

CE：Backwash cycle：The number is set to indicate how many cycles(⊞ →⊞→**RUN**)backwash is performed once;

(1)、Working station parameter

|	
C2-060 L	⟳：Meter mode
	⛲：Station(**Wash+Refill**)
60 L	**C2-060:** Station water volume is set as 60L. Alternately display the decrement state, decrement to zero and switch to the next station.

(2)、Parameter setting（Flow mode example）

C1-060 L 闪烁	Simultaneously press the ▶ & ▲ buttons to unlock
	Press ✍ to enter parameter setting interface
	Press ▲, plus 1 to change value of the number.
	Press ▶ to confirm ,press it continue proceed to next C2、C3、CO.Nether to Set C4→CP to
	Press ⏱ to time mode.

(3)、Instantaneous flow and accumulative water quantity query

00.0000 M³/H	locked state 🔒
	Press ▶ to display the current flow rate of inlet .unit is M³/h
00000.0 M³	locked state 🔒
	Press ▲ to display the accumulated water inlet，unit is M³

Ⅱ、**Input/output control instructions**

1、Interlock line connection as below
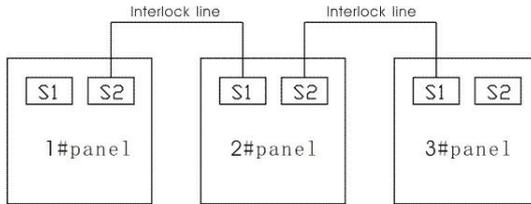
Pic3：Interlock

2．External control interface

In RUN station，The valve can be controlled into **Brine**(⊞) **by** the external other control system.
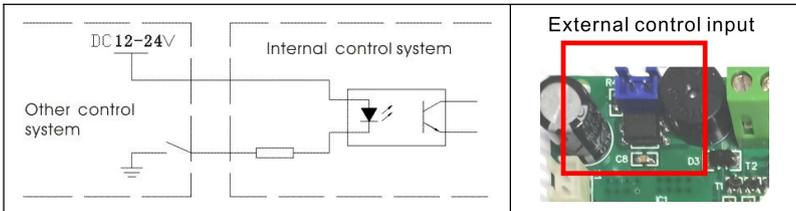
Pic4：External control input

3．Relay Output and mode set（CC）

A.　The contact capacity of the relay is 5A/250V.
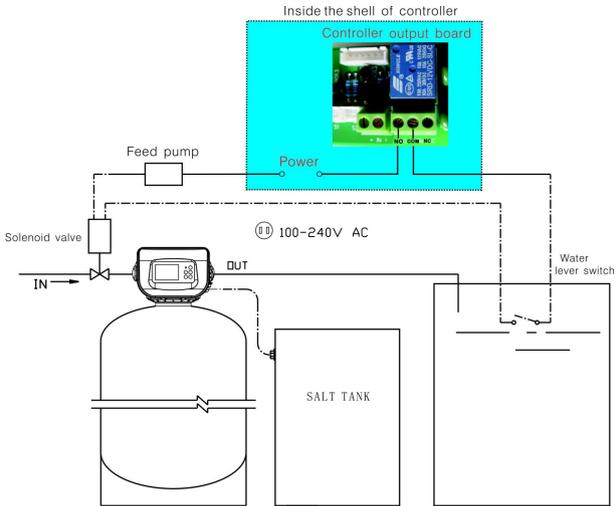
B.　Relay output port:

　　NO= normally open, **NC**=normally closed, **COM** = common

C.　When connecting the output of the relay, the AC110V-220V power supply input end shall be connected with the leakage circuit breaker.

In different modes, the relay outputs NO and COM, which is connected as "C", disconnected as "×"

Mode	⊞ B.wash	Brine→ Rinse	⊞Clean Wash+Refill	**RUN** Soft	Valve shifting
0	C	C	C	C	✕
1	C	✕	C	✕	✕
2	✕	✕	✕	C	✕
3	C	C	C	✕	✕
4	C	C	C	✕	✕
5	✕	✕	✕	**CX**	✕
6	C	✕	✕	✕	✕

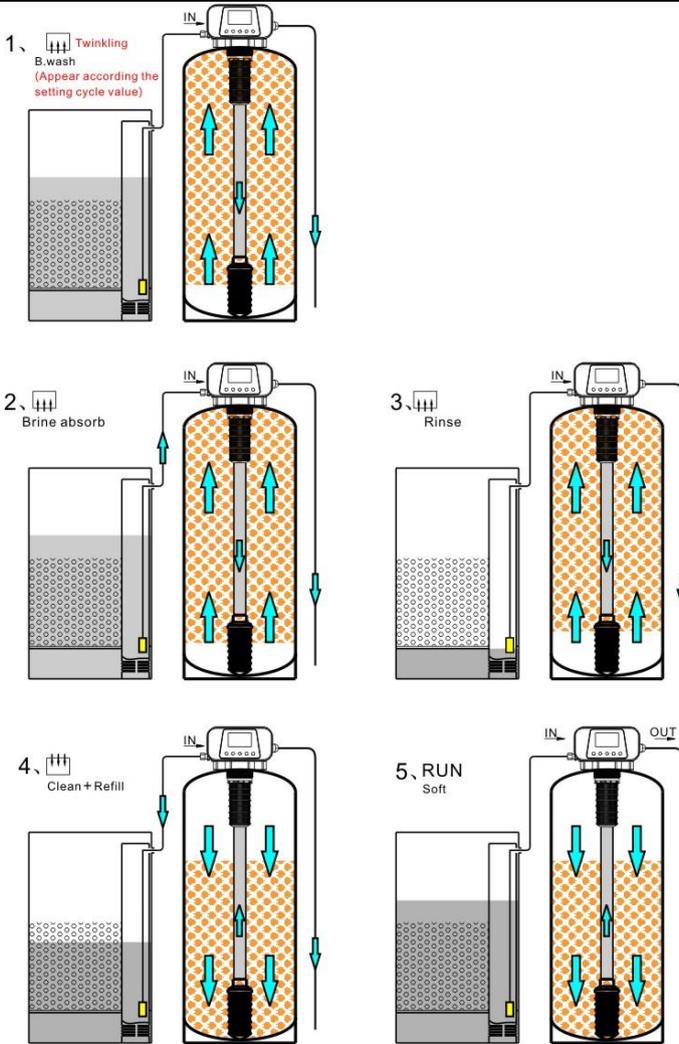| Mode	Applications
0	**Inlet Solenoid valve mode:** Pressure relief during transposition,lever switch and feed pump control. Pic 5
1	**Inlet pump mode:** When its station is in ⊞(B.wash、Brine、Rinse) and ⊞(Clean+Refill),Start the inlet booster pump
2	**Outlet pump mode:** For example, for subsequent RO high pressure pump start-stop control.
3	**Tow valve one RUN & one standby water inlet solenoid valve mode**:Interlock line connected. When one valve completes⊞(B.wash、Brine、Rinse) and ⊞(Clean+Refill) and switches to **soft(Run)** station, judge that if another valve is also in **Run(Soft)** station, the valve close its own inlet solenoid valve and wait for backup. As shown in figure 6.
4	**Inlet solenoid valve double valve parallel interlock respectively backwash mode**:Interlock line connection is required, this mode for filter valve use.
5	**CX(Mode2 additional conditions) :** When the inlet flow meter check the water flow signal in **Soft** station.the Relay is Connected.
6	**Backwash booster and compressed air mode**

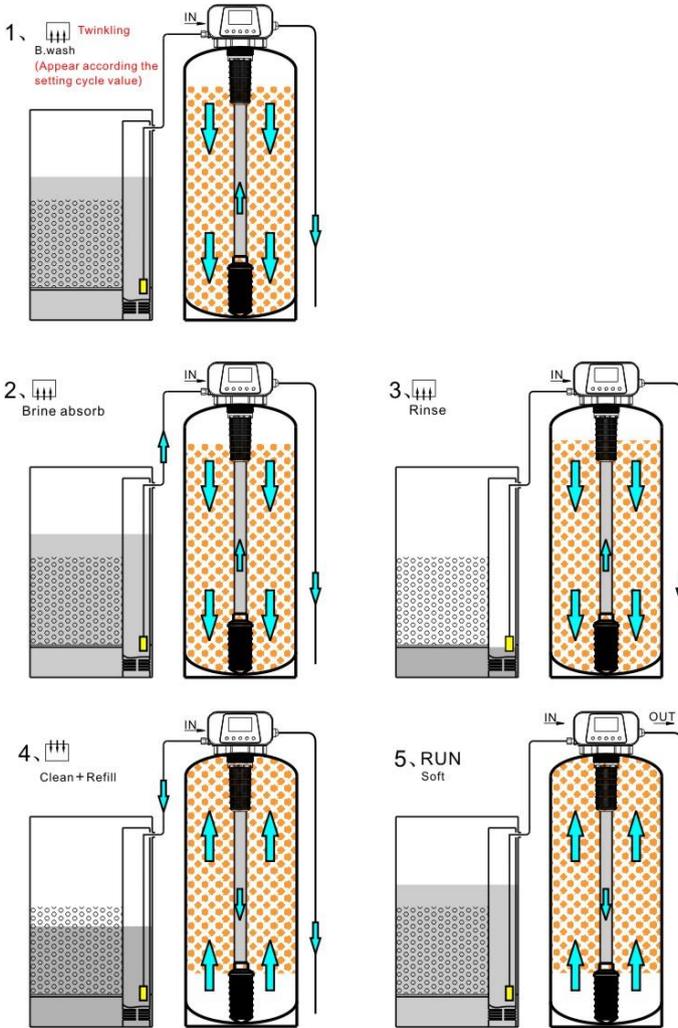**Pic5：Mode(0): Solenoid valve liquid level switch and feed pump**
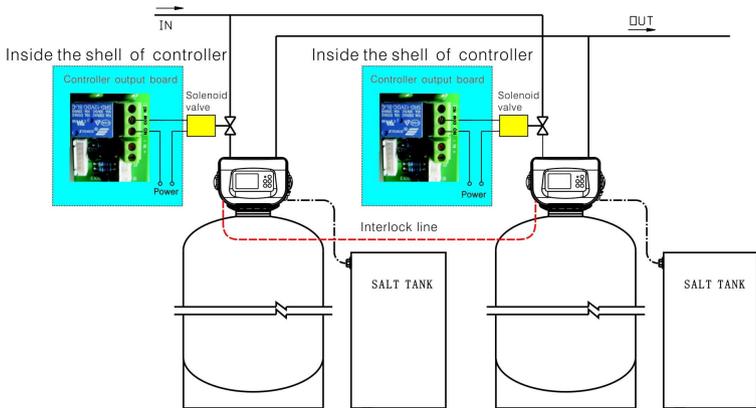
Pic6：Mode(3): Tow valve one RUN & one standby inlet water

solenoid valve mode:

Ⅲ、Process

Pic7：GR-1 fixed bed back flow regenerate flow process

1、 Twinkling
B.wash
(Appear according the setting cycle value)
IN

2、 Brine absorb
IN

3、 Rinse
IN

4、 Clean+Refill
IN

5、RUN
Soft
IN   OUT

Pic8：DR-1 floated bed process

IV Configuration, installation and raw water condition

1，If the raw water contains mechanical impurities of gel or powder, it is necessary to install sand filter, cloth bag or disc type functional filter, factory valve inlet filter can only ensure the occasional large particles into the valve body.

2. The diameter of the exchange tank should meet the flow rate requirements of ion exchange.

3. The volume of the salt tank is not less than the volume of the exchange tank.

4.The GR fixed bed resin filling rate ensures 30% backwash space on the top of the exchange tank.

5.The DR floated bed resin filling rate 90% space of the tank. to avoid resin layer disorder.

6, Drainage pipe exports nearly flush with the ground, too high or too low will affect the equipment of Brine,Pipe must be mounted stable.

7, Pipe valve specifications is not less than control valve in and out of the size.

8, Water static pressure is 0.1～ 0.6 MPa.water temperature is 0°C～55°C .

9, the equipment is installed in the room, the humidity should not be too high, there should be no corrosive chemical gas around, to avoid strong electromagnetic interference to affect the power supply of the control valve.

10. Floor drain or trench drainage shall be set around the equipment to avoid accidental water leakage causing the floor and other indoor items to be flooded.
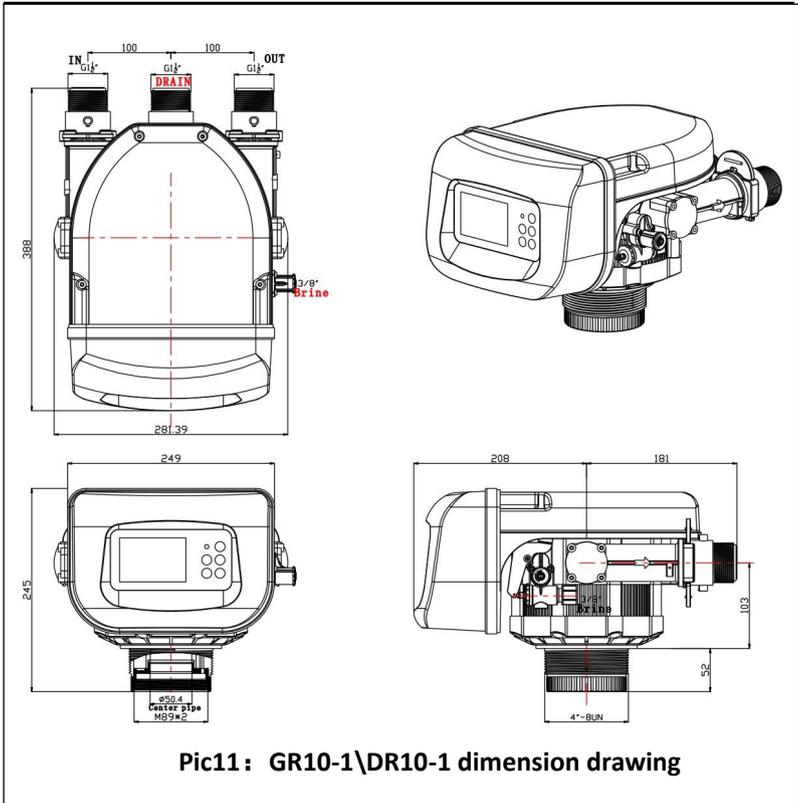
GR2-1\DR2-1 dimension drawing
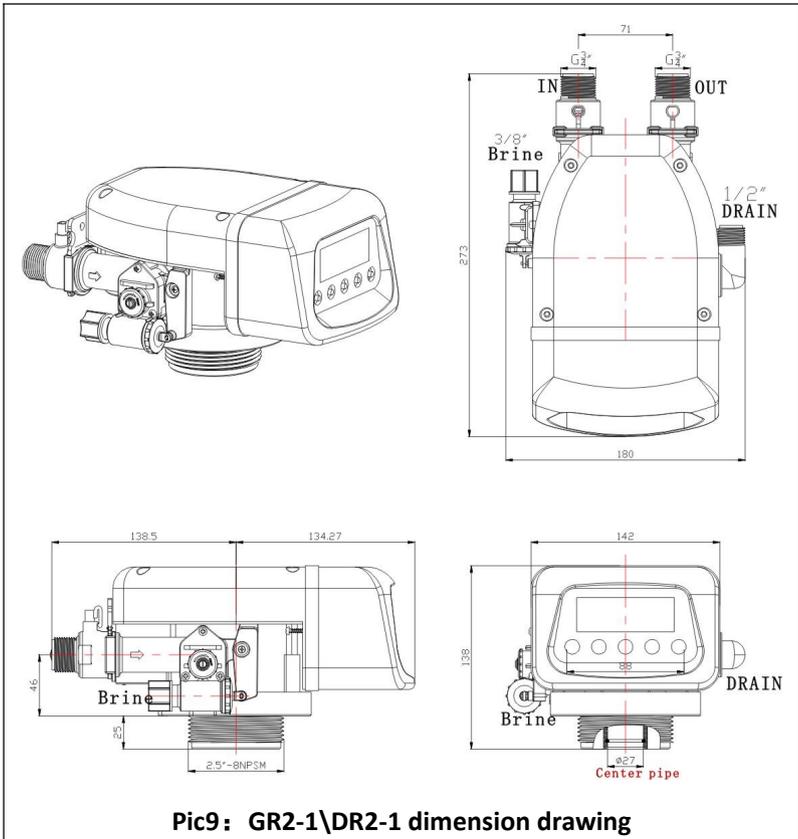
Pic9：GR2-1\DR2-1 dimension drawing
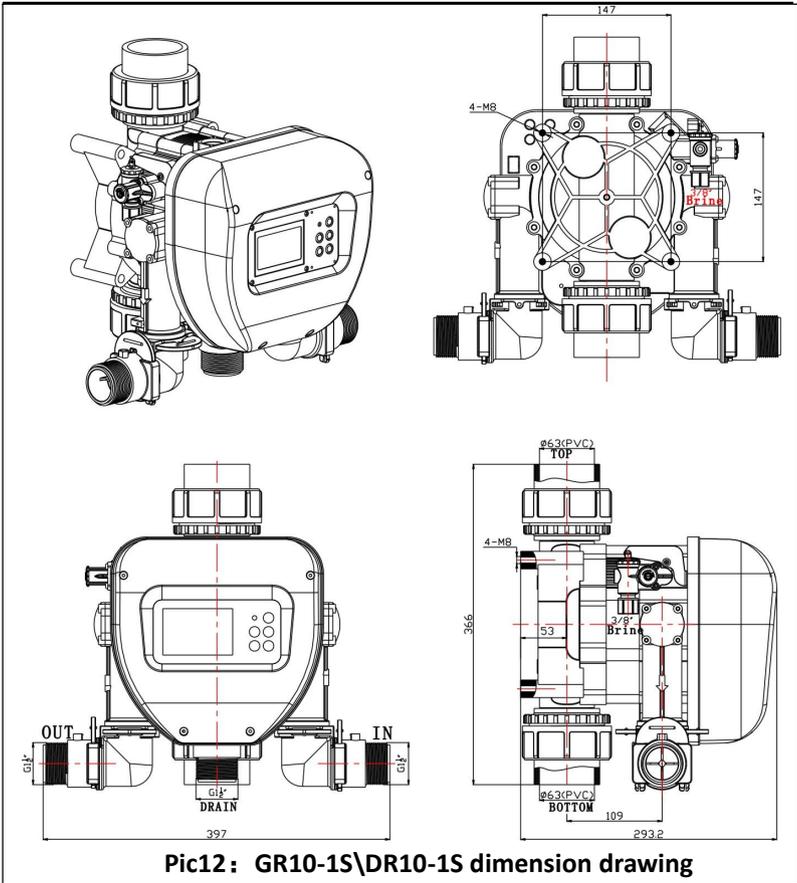
GR4-1\DR4-1 dimension drawing

Pic10：GR4-1\DR4-1 dimension drawing
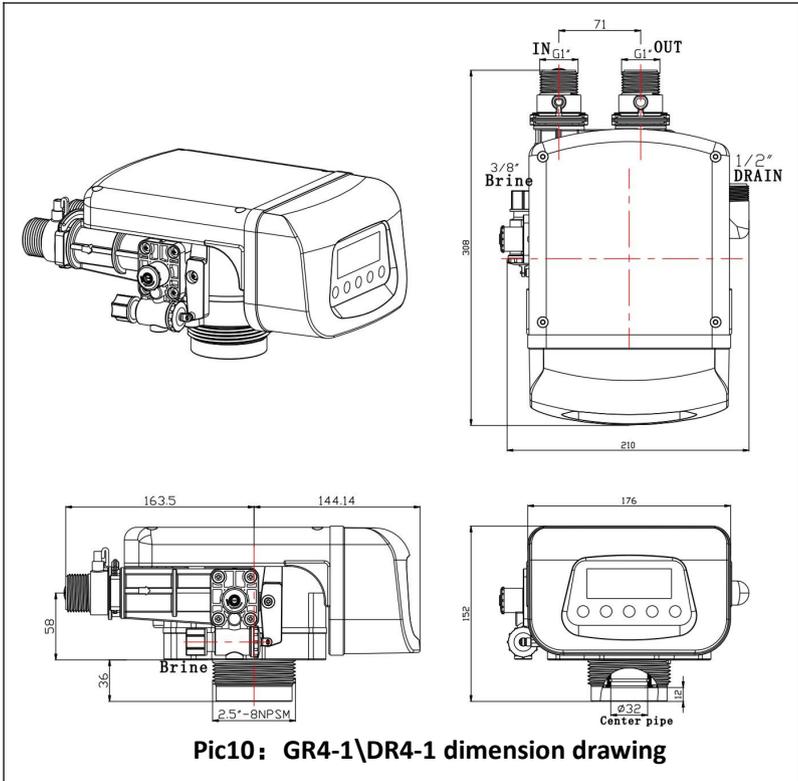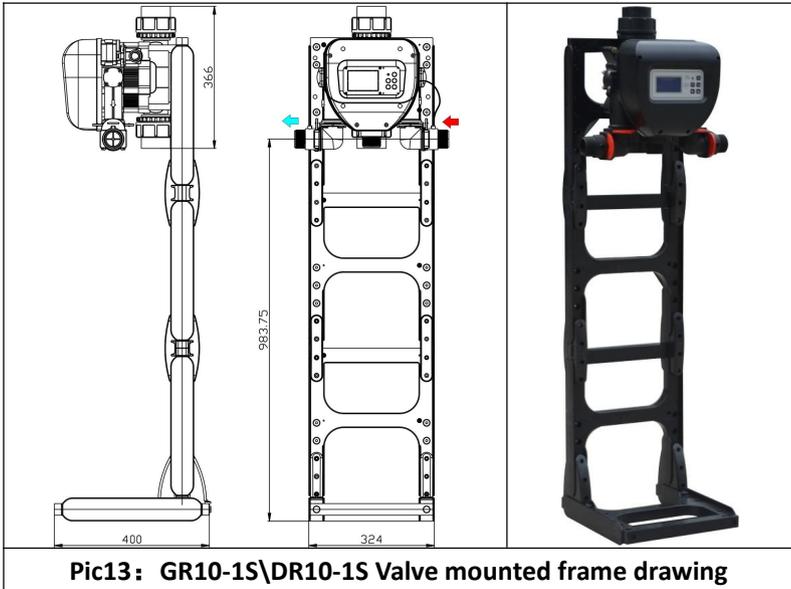
GR10-1\DR10-1 dimension drawing

Pic11：GR10-1\DR10-1 dimension drawing

GR10-1S\DR10-1S dimension drawing

Pic12：GR10-1S\DR10-1S dimension drawing

GR10-1S\DR10-1S Valve mounted frame drawing

Pic13：GR10-1S\DR10-1S Valve mounted frame drawing

V. Configuration and setting

Formula for GR

Describe	Display	Formula
Service	**RUN（Soft）：T**	C3=[resin filling volume (L) x 90%] ÷ Raw water hardness (mmol/L)
Brine absorb →Rinse	（**Brine**）：L	C1=Resin filling volume (L) x 250%*
Wash+Refill	（**Clean**）：L	C2=Resin filling volume (L) x 200%(40%+160)**
Backwash	（**B.Wash**）：L	CO=Resin filling volume (L) x 100%

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Formula for DR

describe	display	Formula
Service	**RUN（Soft）：Ton**	C3=[resin filling volume (L) x 70%] ÷ Raw water hardness (mmol/L)
Brine absorb →Rinse	⊞（**Brine**）：L	C1=Resin filling volume (L) x 150%*
Wash + Refill	⊞（**Clean**）：L	C2=Resin filling volume (L) x 150%**
Backwash	⊞（**B.Wash**）：L	CO=Resin filling volume (L) x 100%

Note!

1、 *The setting water refers to the process of jet injection quantity sum, including Brine Absorption and slow washing quantity；

2、**1/5 of the set water amount is the salt tank refill water and 4/5 is the washing water. This ratio is based on the valve body channel design and test.The total water quantity shall be based on 200% resin filling quantity, and the principle shall meet the requirements of 1/5×200%=40% resin filling quantity (1 liter of pure brine regenerate 2.5 liters of resin). .The only way to increase the salt absorption is to increase the value of this parameter；

3、Water hardness unit is mmol/L；

4、Resin work exchange capacity calculating is 1000 mol/m³;

5、Design and calculation of brine concentration is 20%;

6、1Liter brine(20%)Molar value=1000g×20%/58.8g(NaCL)×1.4(specific consumption) ≈200/80=2.5mol

VI Mode choice

(1) Meter mode "↻ " (Default mode)

Under normal circumstances, should choose meter mode, the mode is not affected by the feed water pressure changes in equipment operation effect.Very important,the flow meter have water stop memory.

(2) Time mode"🕐" (standby mode)

When the water pressure is stable, instantaneous water yield stability,
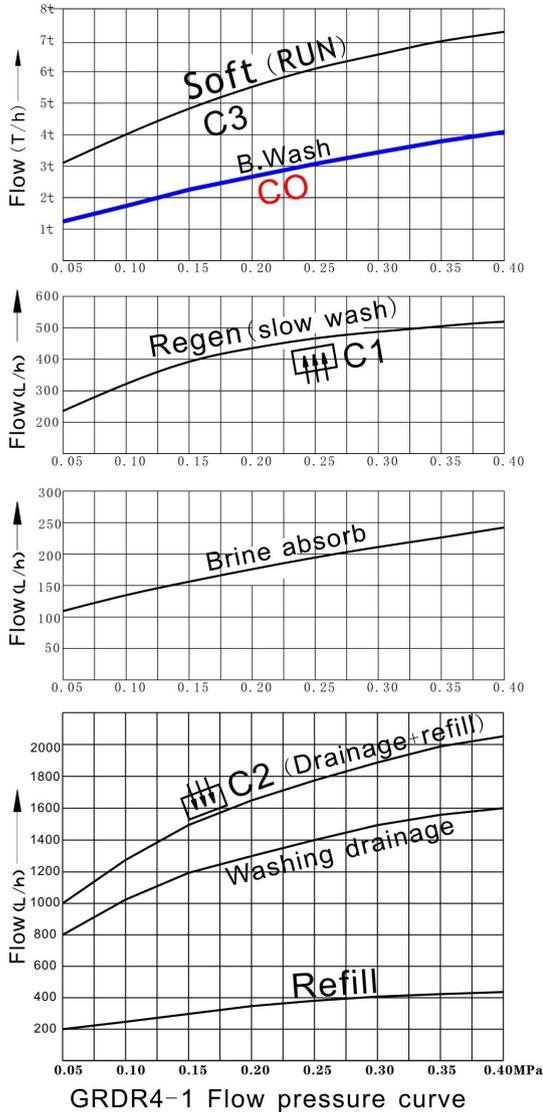
equipment according to user requirements can choose **Time mode**.If the flow meter is fault,you can switch to **Time mode** by the button ⏱ temporary.

VII. Curve of Flow and Pressure for the Valve
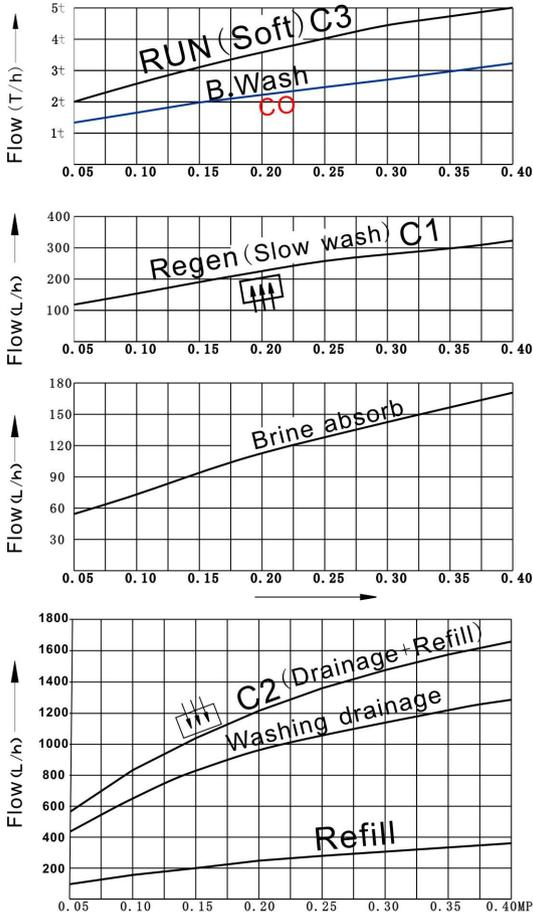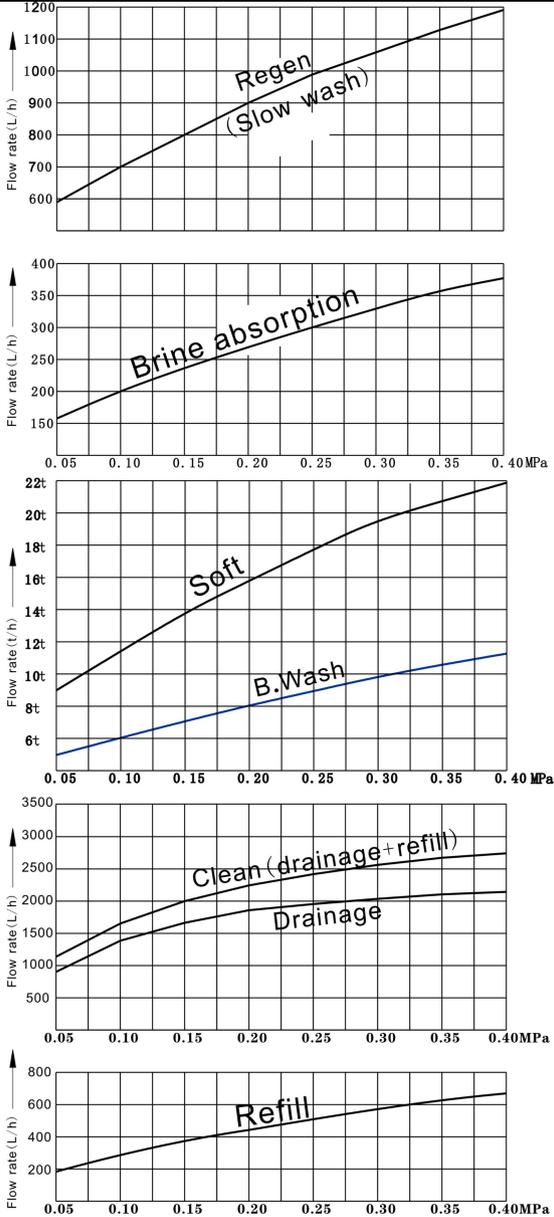

GRDR2-1 Flow pressure curve

Pic14: GR2-1 /DR2-1 Curve of Flow and Pressure for the Valve

GRDR4-1 Flow pressure curve

Pic15: GR4-1 /DR4-1 Curve of Flow and Pressure for the Valve

Pic16: GR10-1\GR10-1S Flow and Pressure curve

VIII. Tips and Precautions for Equipment

Produced water is not qualified

Phenomena/reasons	Solution
No salt in the salt tank	Add salt to the brine tank
No enough absorption of salt water	Increase " Clean" setting value to increase refilling water to salt tank
DR type No enough resin and too much space at the top of the tank	Add more resin or other to reduce the space
The sealing problem of the center pipe or the pipe is too short	Check the center pipe and the sealing ring

Brine water leaking out to the water outlet

Phenomena/reasons	Solution
Insufficient amount of cleaning	Increase " Brine " value to extended slow wash time

Increase of the inflow pressure and decrease of the flow rate of outlet

Phenomena/reasons	Solution
Resin is being polluted by the suspended matter	Manual carry out Backwash in unlock state,or reduce the backwash cycle,or increases B.wash water amount
Water distributor is blocked by broken resin	Unload the water distributor and clean it.
Water Outlet pipe system have jam phenomenon	Check and eliminate the problem

The salt tank overflowed

Phenomena/reasons	Solutions
The ⊞**Clean** value setting is too large or the salt tank is too small	Reduce the parameter of the ⊞. or exchange the large salt tank

No brine absorb in

Phenomena/reasons	Reasons and Solution
Drainage pipe have less water out, no brine absorption	Check whether the drain pipe system have any jam ,or check the jet nozzle has any jam
Inflow pressure become low	Check feed water and inflow pipe system have any jam.

IX. Tips and Precautions of Equipment

1. **Add salt to salt tank**

The equipment should use large particles industrial salt. If some fine salt is used, please keep it at small amount. Otherwise, it will get agglomerated, leak to the salt filter and clog the tube.
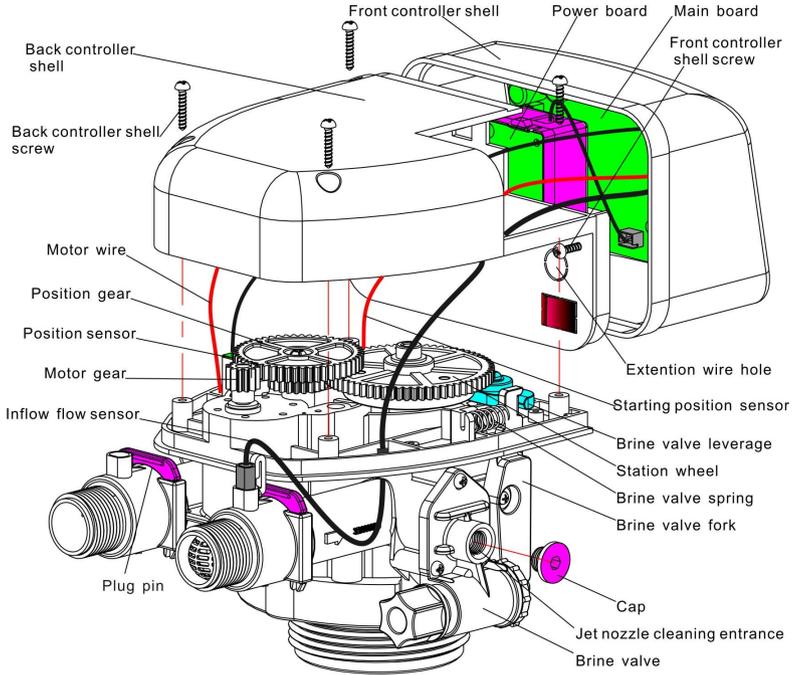
2. Clean salt tank

The bottom of the salt tank needs to be checked frequently; the deposit and sludge need to be cleared out.

3. Clean inflow filter

The filter of inflow needs to be cleaned periodically in case that the inflow clogs the tubes and leads to low efficiency of the equipment as well as the decrease of the outflow amount.

X Control valve structure

Front controller shell   Power board   Main board

Back controller shell

Front controller shell screw

Back controller shell screw

Motor wire

Position gear

Position sensor

Motor gear

Inflow flow sensor

Extention wire hole

Starting position sensor

Brine valve leverage

Station wheel

Brine valve spring

Brine valve fork

Plug pin

Cap

Jet nozzle cleaning entrance

Brine valve

Pic17: Control valve structure(GRDR2-1\GRDR4-1)

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External control input
485 Interface
Inflow meter
Positioning sensor
Start sensor
Backwash solenoid valve DC12V
Interlock
Front shell
Main board
Output relay
Motor DC12V
Power DC12V
Back shell
Inflow meter
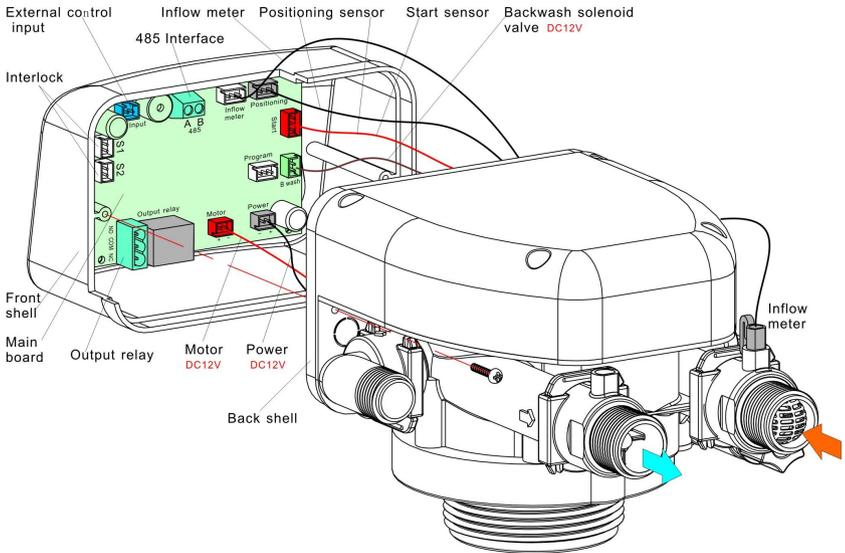
Pic18: Controller front shell disassembly(GRDR2-1\GRDR4-1)

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Front shell

Screw

Back Controller shell

Motor wire

Position sensor

Start Position sensor

Cover

Main board

Key board

Output board

Station wheel

Backwash solenoid valve   DC12v

Brine valve leverage

Brine valve fork

Brine valve spring

Brine valve cap

Jet nozzle
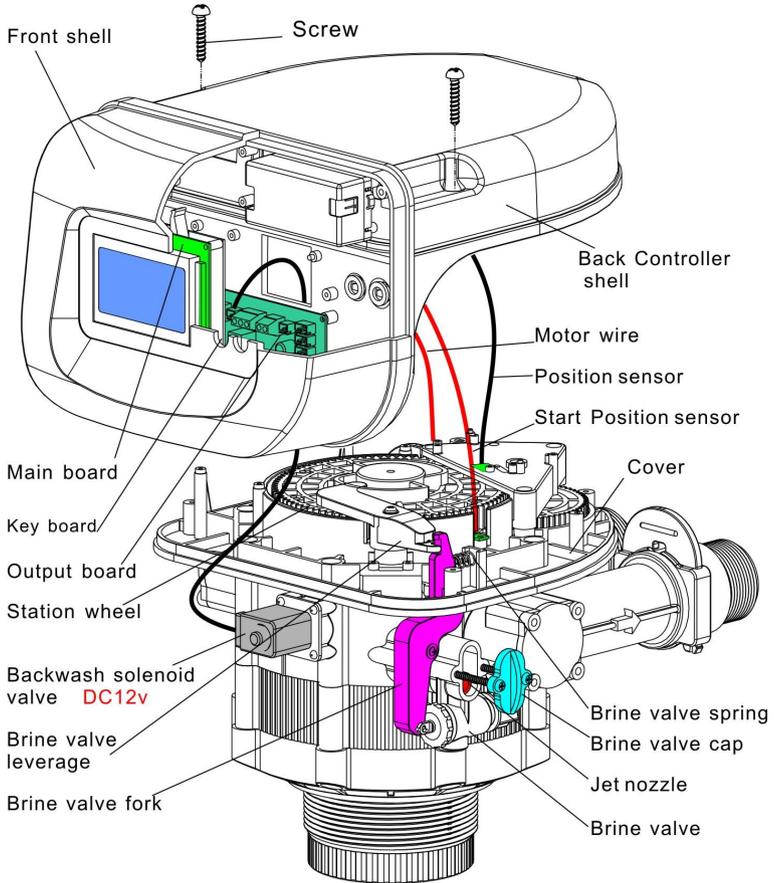
Brine valve

Pic19: GRDR10-1 Control valve structure

Backwash
solenoid valve

Cover
Brine valve leverage
Station wheel
Output board
Main board
Controller shell

Brine
valve fork

Brine valve &
ejector

Brine valve
spring

Key board

Start Position
sensor

Position
sensor

Front controller shell
screw

Brine valve

Ejector cap

Jet nozzle

Brine valve & ejector
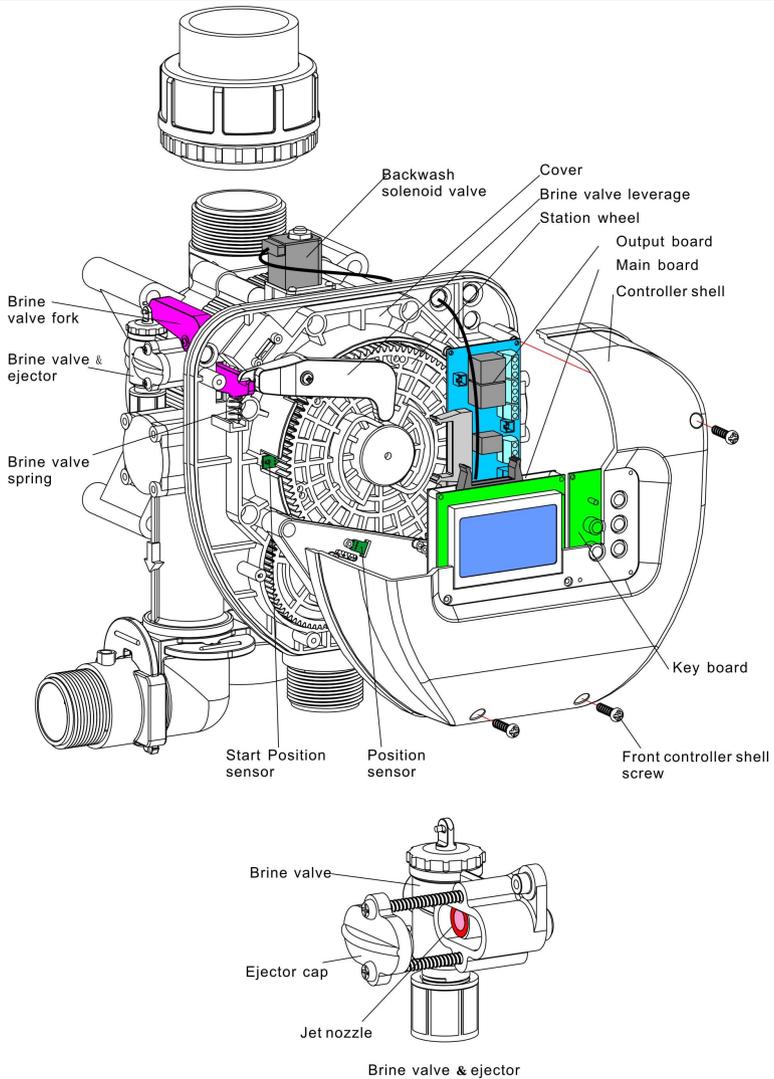
Pic20: GRDR10-1S Control valve structure

XI、Explode drawing（GR4-1 example）

Back controller shell

Back shell screw

Front shell

Station wheel screw

Station wheel

Motor gear

Cam gear

Cover screw

Motor

Valve cover

Main valve body

Shaft

Shaft sealing

Injector Brine valve
B. **Wash** component

Shaft gear

Rotating valve core

Valve body screw（7pices）

Ceramic ring（12pices）

O type sealing ring（12pices）

Valve body sealing

Lower valve body
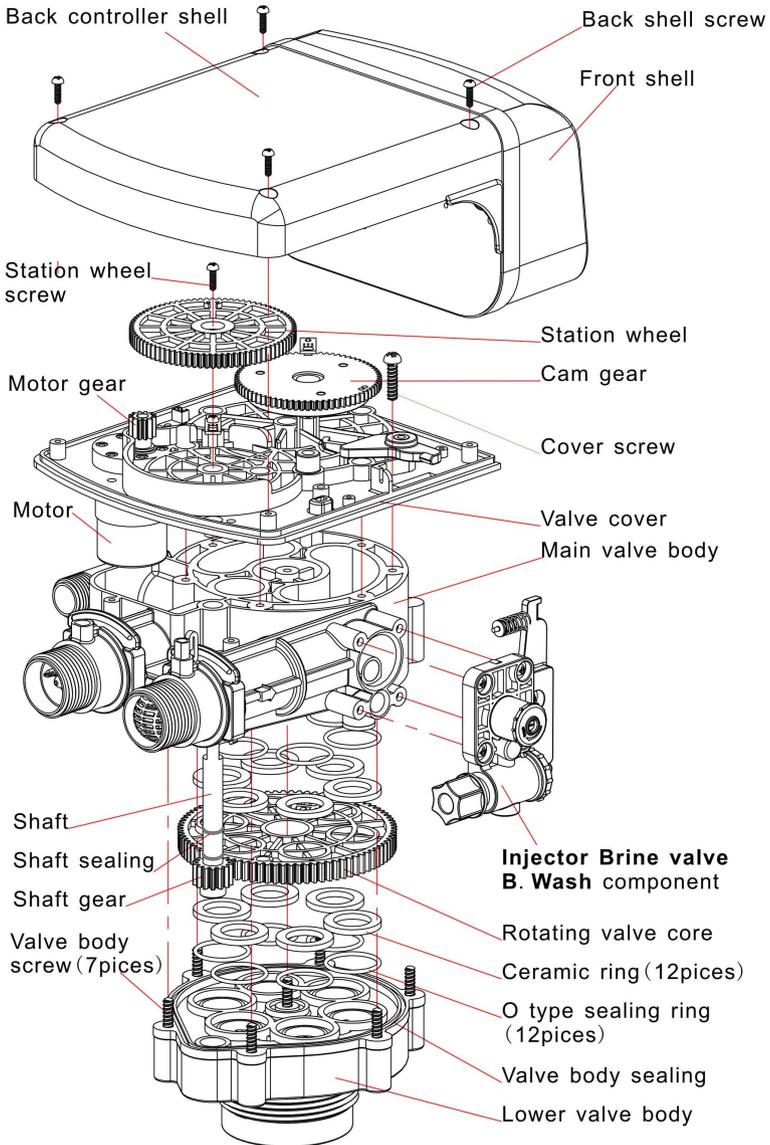
Pic21:Explode drawing（GR4-1 example）
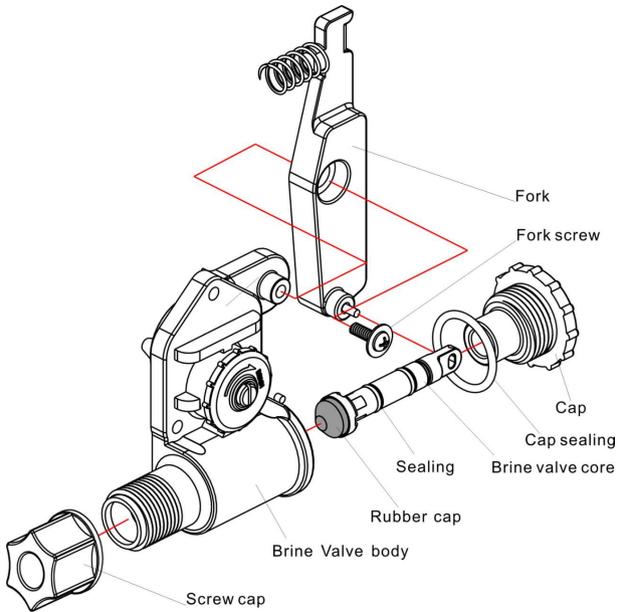
Pic22:Brine valve explode drawing（GR2-1 example）