



International Professional Manufacturer of  
Control Valve for Water Treatment Systems

# China RUNXIN Valve

## Technical Support and Service Manual(2015)



WENZHOU RUNXIN MANUFACTURING MACHINE CO.,LTD.



Runxin company outer view

## ● Company Profile

Founded in 2000, Wenzhou Runxin Manufacturing Machine Co., Ltd. is located in Wenzhou, Zhejiang. Runxin is titled with the "National New High-tech Enterprise", "Zhejiang Patent Model Enterprise", "Wenzhou High Integrity Enterprise" and "Interview Base". Its main products include multi-functional flow control valve for water treatment systems, residential softener, ceramic ball valve, valve for solar energy heating and so on, which are rewarded of Zhejiang famous trademark and Wenzhou famous product. With more than ten years development, Runxin becomes one of three global professional manufacturers of control valve for water treatment systems. Up till November of 2014, Runxin products are widely spread in China and exported to 84 countries and regions in Asia, Europe, Oceania, Africa and America.

Self-researched and developed with intellectual property right, the core product "Multi-functional flow control valve for water treatment systems" creatively adopts ceramic hermetic head faces and multiple passages which bring the breakthrough in the water treatment field. It is not only authorized with many patents from America, Russia, South Korea, Mexico, Australia, India, Philippines and European countries more than ten, like Germany, Italy and France and Taiwan of China, but also recognized by National Sanitary Foundation(NSF), thus gaining good reputation both at home and abroad. These patents, combined with other 20 more patent technologies which are gained by successively researching "Multi-functional softener valve", "Integrated softener" and "Ball valve" form a patent net that establish the technology leading status of Runxin in water treatment field.

The new developed Runlucky residential softener and the whole house water filter based on Runxin valve technology is favored in the market once it launched. Till now, it has been exported to 24 countries and regions, such as America, Russia, France, Italy, Brazil, etc.. Runxin successfully uses the ceramic hard sealing technology on ball valve. The patented ceramic ball valve improved the shortage of traditional metal core ball valve which is easy leakage, heavy torque and the sealing surface is not corrosion resistance, and overcame the difficulties of tough process technology. Till now, it has three series which are manual, automatic and pneumatic.

We established the R&D center, testing center, laboratory, measuring room with strictly requirements and heavy investment. Talents converge on Runxin and Runxin is equipped with the best testing equipments which can do bursting pressure test, cyclic pressure test, life time test and simulated transportation test. They can detect the performance on mechanics, thermology, environmental aging and electronic interference aspects of plastic, rubber and electronic components, to make sure each product which from raw material, spare part and finished product is safety and reliable on from design, manufacturing to leave from factory. Runxin has more than 400 sets of production equipments, including 63 sets of precision injection machines, 8 sets of process centers, 15 sets of CNC machines, etc., concentrated feed systems and mechanical arm, adopts automated assembly line. Through implementing PDM, ERP, OA systems to realize standardization and information management.

Now, Runxin has established distributors and after sales service offices in more than 30 cities in China including Beijing, Shanghai, Guangzhou, Wuhan, Chengdu etc., and in 50 countries including America, Russia, France, India, Spain, Brazil etc.. Products have been exported to 84 countries and regions, such as America, Germany, Japan, England, Italy, etc., serviced for millions of users in all five continents.

With the spirits of "Humbleness, gratefulness, honesty, wisdom and diligence" and value of "Surpass myself, dedicate to society", Runxin is devoted to shaping herself as a "Global professional manufacturer of residential softener and control valve for water treatment systems" and making more people benefit from our innovation and enjoy a better life.



Injection Workshop



Production Workshop



Process Center



Test Center



Water Quality Test

# ● Certificate and patent

Runxin valve with the design of ceramic hermetic head faces, multi-flow passages, have achieved 18 countries' innovation patents including USA, Russia, South Korea, Mexico, Australia, India, Philippines and EU ten members Germany, Italy, France, Netherlands, etc..Products have been authorized by NSF, CE and RoHS.



● NSF Certificate



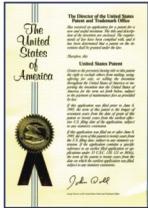
● CE Certificate



● RoHS Certificate



● ISO9001:2008 Certificate



● US Patent



● Russia Patent



● Taiwan Patent



● South Korea Patent



● EU Patent



● Philippines Patent



● India Patent



● Mexico Patent



● Australia Patent



● Multi-functional Flow Control Valve for Continuous Water Supplying



● Multi-function Softener Valve for Energy Saving



● A Valve Remotely Controlled by Cell Phone



● Automatic Water Treatment Device

# ● Company honor



● National New High-tech Enterprise



● Wenzhou High Integrity Enterprise



● China Customs Recognized Class A Enterprise



● Zhejiang Province Famous Trademark



● ISO9001:2008 Certificate



● Wenzhou Credit Management Model Company



● Wenzhou Top Industrial Enterprise



● Zhejiang Industrial Product Exportation Management Class 1 Enterprise



● One of Main Pioneer Enterprises for Performance Testing in Lucheng District in Wenzhou



● Wenzhou Propaganda Interview Base



# Preface

Since launched in 2003, Runxin Valve, as a brand-new and milestone product, has gone through a process of doubts, trials, acceptance and recommendations, and its reliability has been fully verified in the market.

Runxin valve's structure is totally different from others. Its functions and features are also unique. In order to make customer understand Runxin valve completely, use Runxin valve properly, and help them solve the problems in practical application, based on our experiences in recent years, summarizing the solutions in practical cases and refer some technical documents, we edit this service manual for China Runxin Valve.

With more and more Runxin valves introduced to market, its related products are getting plenty. Ceramic ball valve is a perfect example of adopting ceramic sealing technology. It is not only matched with Runxin valve, but also widely used in water treatment, food engineering, solar energy, petroleum, chemical, metallurgy, light industry, papermaking, power plant, refrigeration and other fields. So ceramic ball valve is introduced in an individual chapter in detail to make more friends to learn about it.

The manual has seven chapters, mainly including: General Introduction for Runxin Valve, Construction and Features, System Design and Application, Installation and Trouble-Shooting, Maintenance Guide and Ceramic Ball Valve.

The calculation in manual refers some water treatment book, standard and regulations. I would like to give my apology for taking some sentence from the book not having been authorized by author. The case is from practical cases which are designed by customer. It doesn't remark the real customer's name in the book. The manual is only for technical data but not for commercial purposes.

There are some shortcomings in the book due to my limited

knowledge and I sincerely appreciate if readers can give their criticisms, point out mistakes and make corrections. Please feel free to contact with me via [sales@run-xin.com](mailto:sales@run-xin.com).

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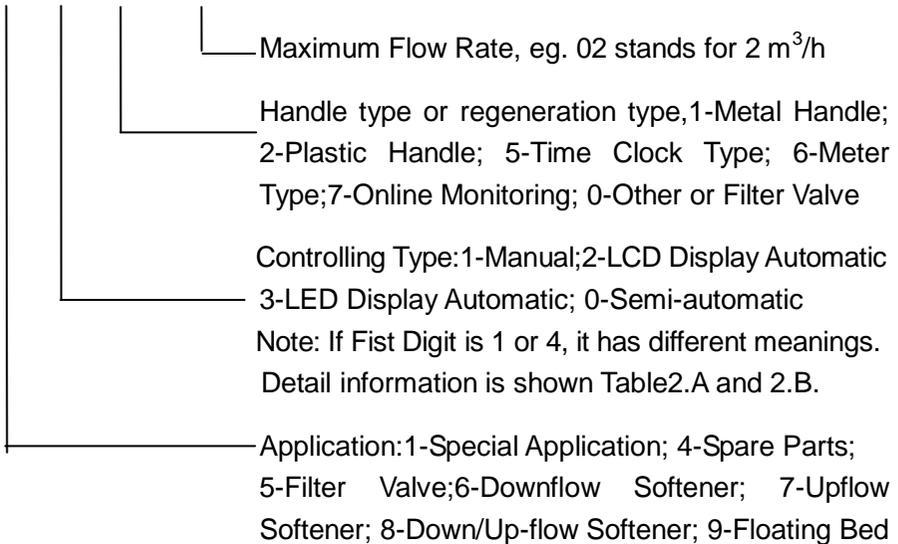
# 1. The Principle and Construction of Runxin Valves

## 1.1. Nomenclature of Runxin Valves

### 1.1.1. Nomenclature

A. Runxin valves are named according to below table. Its model number consists of 5 digits.

□ □ □ □ □



#### Remark:

If Model No. follows by a new English character, it means this is a Derivative product from above model.

If Model No. follows by P, it means the valve body is PPO material.

If Model No. follows by -□□ (-□□ is 2 characters), it means it is customized.

#### Examples:

63504S means the valve with a manual wheel. (F63B1);

51104/P means the valve body of 51104 is PPO(Old Model No.:F56A/P.)

The data of maximum capacity measured on 0.3MPa of inlet pressure.

1.1.2.Nomenclature Regulation

A.Comparison List of New and Old Valve Models

New Model	Old Model	Max. Flow Rate m <sup>3</sup> /h	Remark	New Model	Old Model	Max. Flow Rate m <sup>3</sup> /h	Remark
Manual filter valve series				Automatic softener valve series (Down-flow regeneration)			
51101A	F52	1	Base M82*3	62502H	F65D1	2	LCD, Residential
51101B	F56B	1	10" Filter housing	62504H	F63D1	4	LCD, Residential
51101C	F56C	1	20" Filter housing	63502	F65B1	2	
51102	F56E	2		63502B	F65G1	2	New appearance
51202C	F56EC	2	Side-control	63502P	F65P1	2	Light indicator
51104	F56A	4		63504	F63C1	4	
51204C	F56AC	4	Side-control	63504B	F63G1	4	New appearance
51106	F56F	6		63504P	F63P1	4	Light indicator
51110	F56D	10		63504S	F63B1	4	With hand wheel
51215	F77BS	15		63510	F74A1	10	
51230	F78BS	30		63510B	F74B1	10	Top-mounted or Side-mounted
3 <sup>rd</sup> Digit stands for handle material, 1-Metal, 2-Plastic				63515	F99A1	15	
Manual softener valve series				63518	F77A1	18	
61202	F64B	2		63520	F95A1	20	F77 Improved type
61202C	F64BC	2	Side-control	63520C	F111A1	20	F95 Side-mounted
61104	F64A	4		63540	F78A1	40	Piston, Side-mounted
61204C	F64AC	4	Side-control	63550	F96A1	50	Piston, Side-mounted
61106	F64F	6		Automatic softener valve series (Up-flow regeneration)			
61210	F64D	10		72502H	F69D1	2	LCD, Residential
61215	F77AS	15		72504H	F68D1	4	LCD, Residential
61240	F78AS	40		73502	F69A1	2	
71202	F64C	2		73502B	F69G1	2	New appearance

Automatic filter valve series				73502P	F69P1	2	Light indicator
52502H	F71D1	2	LCD Outlet behind	73504	F68C1	4	
52504H	F67D1	4	LCD Outlet behind	73504B	F68G1	4	New appearance
53502	F71B1	2		73504S	F68A1	4	With hand wheel
53502B	F71G1	2	Different appearance	73504P	F68P1	4	Light indicator
53502P	F71P1	2	Light indicator	73605	F92A3	5	Refilled with soft water
53504	F67C1	4		73620	F95D3	20	
53504B	F67G1	4	Different appearance	Automatic softener valve series (Down-flow regeneration)			
53504S	F67B1	4	With hand wheel	82601	F81	1	LCD
53504P	F67P1	4	Light indicator	82602	F79A-LCD	2	LCD
53506S	F67B-A	6	Riser pipe 1"-GB	82602B	F79B-LCD	2	LCD
53510	F75A1	10		82602H	F79D	2	LCD, Residential
53510B	F75B1	10	Top-mounted or Side-mounted	82604	F82A-LCD	4	LCD
53518	F77B1	18	Two valve cores	82604B	F82B-LCD	4	LCD
53520	F95B1	20	F77 Improved type	82604H	F82D	4	LCD, Residential
53530	F78B1	30	Piston, Side-mounted	82602E	F105A	2	Refilled with soft water
53540	F96B1	40	Piston, Side-mounted	82604E	F97A	4	Refilled with soft water
Valves for floating bed systems series				83602	F79A3	2	Meter type
91215	F77CS	15	Manual	83602B	F79B3	2	Hard water bypass
91240	F78CS	40	Manual, hard water for regeneration	83604	F82A3	4	Meter type
93504	F83A	4	Signal valve	83604B	F82B3	4	Hard water bypass
93620	F95C3	20	Signal valve, soft water for regeneration	Semi-automatic control valve series			
93540	F78C	40	Signal valve, soft water for regeneration	50002	F71C	2	Filter
93606	F98C	6	One in service one standby	70002	F69C	2	Up-flow softener
93610	F88C	10	One in service one standby	60002	F65C	2	Down-flow softener

## The Principle and Construction of Runxin Valves

In above table, for automatic valve, there are meter type (The 3<sup>rd</sup> digit with 6) and time clock type (The 3<sup>rd</sup> digit with 5). F95 (F111) is the improved F77 valve. F112 is the improved F78 valve.

### B.Special Application Valves

New Model	Description	Max. Flow Rate m <sup>3</sup> /h	Old Model		New Model	Description	Max. Flow Rate m <sup>3</sup> /h	Old Model
11501	Removal Fluoride Valve	1	F83B1		17603	One in Service One Standby	3	F73
13504	Deaerator Valve	4			17606		6	F98A
15702	Mixed Bed Valve	2			17610		10	F88A
15704		4						

11- Removal Fluoride Valve; 13-Deaerator Valve; 15-Mixed Bed Valve; 17-One in Service One Standby; In this Table, the 2<sup>nd</sup> digit has different meaning from above normal nomenclature.

### C.Accessories

New Model	Description	Max. Flow Rate m <sup>3</sup> /h	Old Model		New Model	Description	Max. Flow Rate m <sup>3</sup> /h	Old Model
41102	Bypass Valve	2	F70B		43010	Brine Valve	/	With 0717 Tank
41202		2	F70D		43011			With 0713 Tank
41104		4	F70A		43020			1.2 meters high
41204		4	F70C		43021			1 meters high
41206		6	F70F		43022			0.8 meters high
42020	Tee Valve	20	F80		43023			0.6 meters high
44310	Hardness Online Monitoring Instrument		F84		45006	Disc Filter	6	Inlet/Outlet Size 1"
48810	Salt Shortage Alarm Device		F100		45012		12	Inlet/Outlet Size 2"
46010	One in Service One Standby Controller		F91		45020		20	Inlet/Outlet Size 2"
47010	Disinfection Device				45040		40	Inlet/Outlet Size 2.5"

4-Accessories; 41-Bypass Valve; 42-Tee Valve; 43-Brine Valve or Water Level Controller; 44-Online Monitoring Unit; 45-Disc Filter; 46-One in Service One Standby Controller; 47-Disinfection Device; 48- Salt Shortage Alarm Device. In this Table, the second digit has different meaning from above normal nomenclature.

### 1.1.3. Table of System Configuration with Runxin Valves

Max. Flow Rate	Filter		Manual Softener		Automatic Softener		
	Manual	Automatic	DF	UF	DF	UF	DF/UF
1-2 m <sup>3</sup> /h	51101B/C	53502	61202	71202	63502	73502	82602
	51102/C	53502P	61202C		63502P	73502P	82602E
	F56B/C F56E/EC	F71B1 F71P1	F64B F64BC	F64C	F65B1 F65P1	F69A1 F69P1	F79A F105A
3-4 m <sup>3</sup> /h	51104	53504	61104		63504	73504	82604E
	51104C	53504P	61104C		63504P	73504P	17603
	F56A F56AC	F67C1 F67P1	F64A F64AC		F63C1 F63P1	F68C1 F68P1	F97A3 F73
5-6 m <sup>3</sup> /h	51106	53506S	61106		17606	73605	
	F56F	F67B-A	F64F		F98A	F92A3	
8-12 m <sup>3</sup> /h	51110	53510	61210		63510 17610		
	F56D	F75A1	F64D		F74A1 F88A		
15-20 m <sup>3</sup> /h	51215	53518	61215	91215	63518 63520	73520	
	F77BS	F77B1	F77AS	F77CS	F77A1 F95A1	F95D1	
30-40 m <sup>3</sup> /h	51230	53530	61240	91240	63540 63540B	93540 93540B	
	F78BS	F78B1	F78AS	F78CS	F78A1 F112A1	F78C1 F112C1	
40-50 m <sup>3</sup> /h		53540			63650		
		F96B1			F96A1		

Remark: The digit model No. is the new model, the model No. beginning with F is the old model. Each automatic softener valve has meter type.

## 1.2. Principle

### 1.2.1. Working Principle

Using hermetic head faces theory, Runxin valve is designed to integrate multi-ports round closely to one valve body. When the rotor rotates, some ports will be shut off and meanwhile some other ports will be open, and thus the water will flow in and out this valve.

#### A. Construction

Runxin valve uses high-flatness moving disk and fixed disk to work as a valve. Fixed disk is fixed and moving disk is driven by handle or motor to rotate closely over fixed disk. There are several blind via and through-holes on fixed disk and moving disk, when moving disk stays on different positions of fixed disk, and then different flow passages will be formed. For softener valves, these positions are Service, Backwash, Brine & Slow Rinse, Brine Refill and Fast Rinse. If it is a filter valve, it has 3 positions: Service, Backwash and Fast Rinse.

#### B. Controller

Signal→Controller→Actuator→Moving Disk→ Locating Device→ Controller

The controller gets signal from Timer, Meter or Water Quality Detecting Instrument, and then will initiate the motor to drive the actuator to rotate the moving disk, and when the moving disk rotates to the correct position, another signal will be sent to the controller through the locating device, and the controller will stop the moving disk until it finishes this step; When next new signal is received by the controller, the controller will drive the moving disk to rotate to a new position and so on until all steps are finished.

The operational process for F63 and F96 are below:

### 1.2.2. The Principle of F63 Softener Valve

In Figure 1-1, it shows moving disk and fixed disk of F63 Runxin valve. Fixed disk is fixed on the valve body. Valve body has ports of Inlet, Outlet, Drain, Brine and Top/Bottom strainers, and these ports are connected with through hole on fixed disk. On the moving disk, it has a

through-hole permanent connect with inlet, two blind holes. The moving disk will closely attach the fixed disk and rotates and thus flow passages are formed, named Service, Backwash, Brine & Slow Rinse and Fast Rinse working positions, as shown in Figure 1-2 to Figure 1-6.

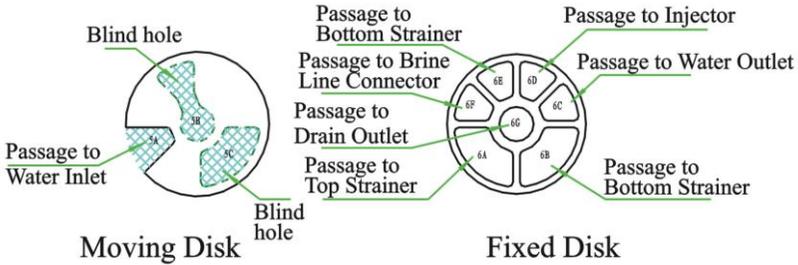


Figure 1-1 Moving Disk and Fixed Disk of F63

**A. Service Position**

In Service position, hard water enters unit at valve inlet and flows through-holes on moving disk-then flows through the fixed disk-then flows through top strainer- then flows down through the resin in the resin tank. In the resin bed, the hard water is revert to soft water after ion-exchange process. Soft water enters center tube through the bottom distributor — then flows up thru the center tube — then through valve body-then through the passage formed by the fixed disk and moving disk-then flows through out of valve.

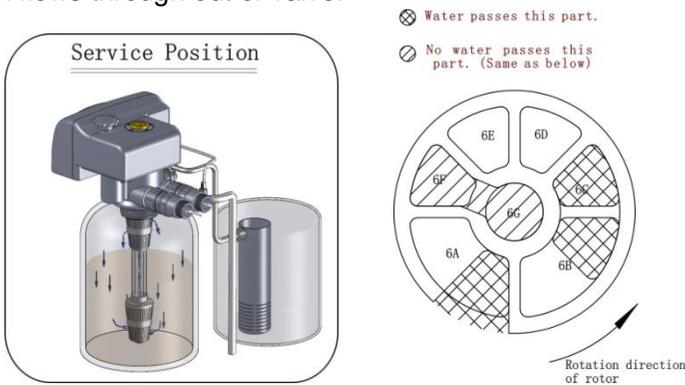


Figure 1-2 Flow Process of Service Position

## B. Backwash Position

In Backwash position, hard water enters unit at valve inlet - flows to the passage of moving disk- enters the Stator-through valve body- down the center tube - through the bottom distributor and up through the resin – flows up to top distributor – to valve body – to the fixed disk- to the moving disk-flows out the drain line.

**(Under backwash status, outlet water could pass through brine line connector into brine tank so a check valve is suggested to be installed in water outlet.)**

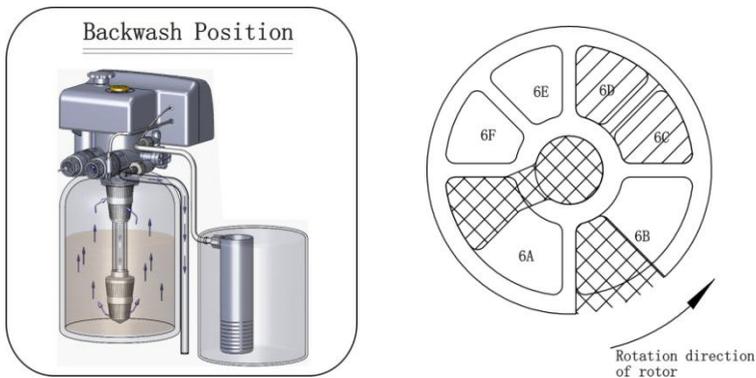


Figure 1-3 Flow Process of Backwash Position

## C. Brine & Slow Rinse Position

In Brine & Slow Rinse Position, hard water enters unit at valve inlet - flows through-holes on moving disk-then flows through the fixed disk - flows up into injector housing and down through nozzle and orifice to draw brine from the brine tank —mixed salt water flows down thru resin – after finishes ion-exchange – to bottom distributor — flows up thru center tube —flows up to top distributor – to valve body – to the fixed disk- to the moving disk-flows out the drain line.

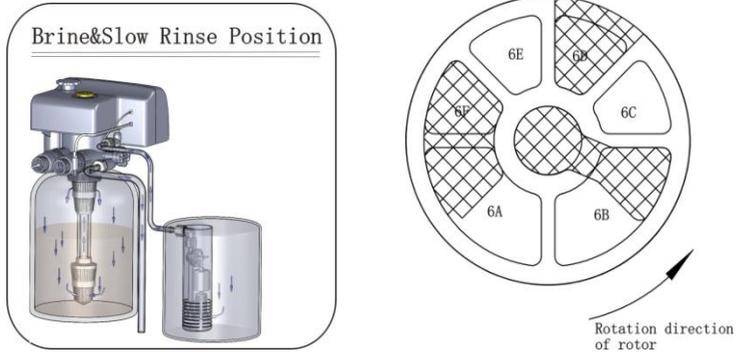


Figure 1-4 Flow Process of Brine & Slow Rinse Position

#### D. Brine Refill Position

In Brine Refill Position, hard water enters into the fixed disk via through-holes on moving disk-flows through the injector, one part of water fills into the brine tank from brine line connector, another part cleans up the injector-then flows through the passage formed by the fixed disk and moving disk-flows out the drain line.

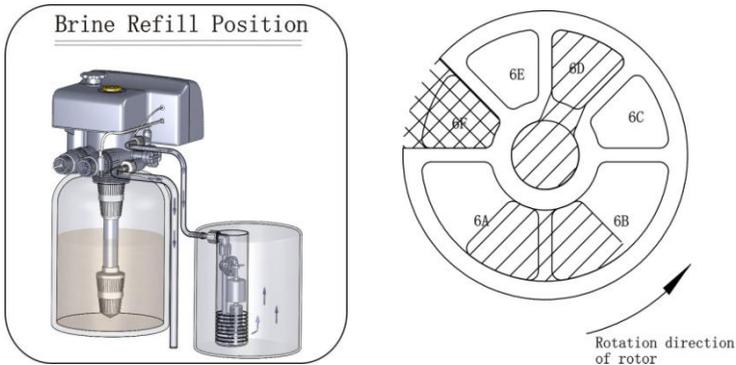


Figure 1-5 Flow Process of Brine Refill

#### E. Fast Rinse Position

In Fast Rinse Position, hard water enters into the fixed disk via through-holes on moving disk-then flows through valve body and top strainer- then flows down through the resin in the resin tank-after rinse, sewage enters center tube through the bottom distributor-then

through the passage formed by the fixed disk and moving disk- flows out the drain line.

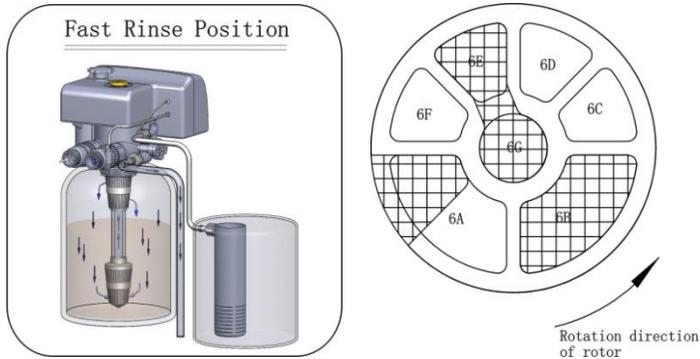


Figure 1-6 Flow Process of Fast Rinse

Runxin filter control valve, it only has Service, Backwash and Fast Rinse total 3 steps.

### 1.2.3. The Principle of F96 Softener Valve

F96 has 4 Tee piston valves A, B, C, D inside the valve body (Figure1-7). The moving disk has 4 through-holes and 1 blind hole (Figure1-8). The fixed disk has A upper, A lower, B upper, B lower, C upper, C lower, D upper, D lower, total 8 passages (Figure1-9) and interlink with upper/lower rooms of A, B, C, D of tee piston valve (Figure1-10).

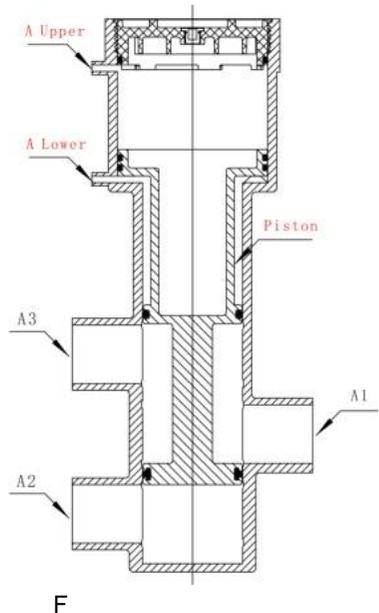


Figure 1-7 Tee Piston Valve

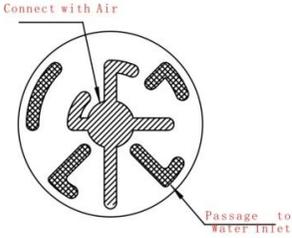


Figure1-8 The Moving Disk

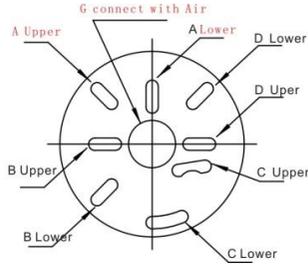


Figure1-9 The Fixed Disk

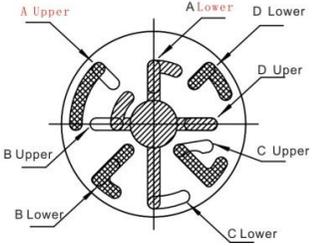


Figure1-10 The Fixed Disk/Moving Disk in Service Position

### A. Service Position

In Service position, as shown in Figure1-10, distribution valve control four tee piston valves to realize A piston downward, B piston upward, C piston downward, D piston upward, then it can form passage as Figure1-11.

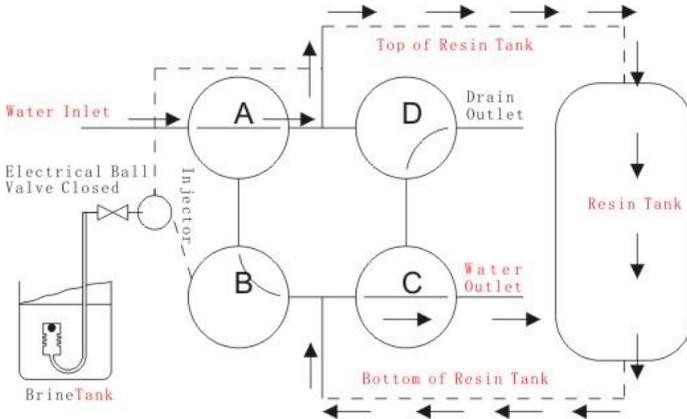


Figure1-11 Water Flow Process in Service Position

### B. Backwash Position

In Backwash position, through different angles of fixed and moving disks located respectively, distribution valve control four tee piston valves to realize A piston upward, B piston upward, C piston upward, D piston downward, then it can form passage as Figure1-12.

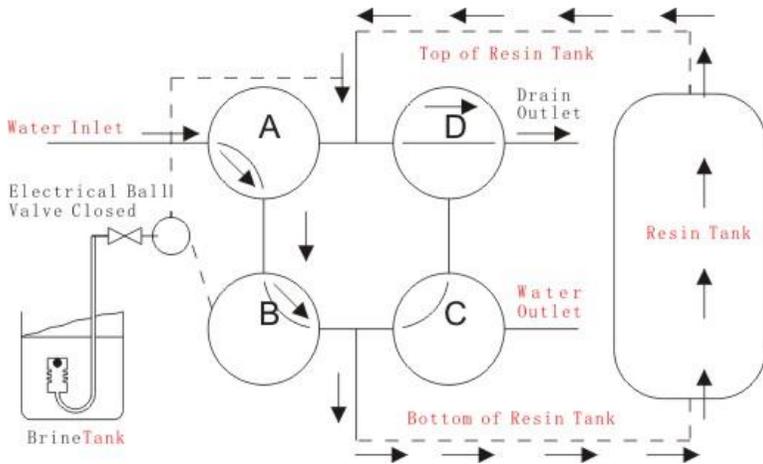


Figure1-12 Water Flow Process in Backwash Position

### C.Brine & Slow Rinse Position

In Brine & Slow Rinse position, through different angles of fixed and moving disks located respectively, distribution valve control four tee piston valves to realize A piston upward, B piston downward, C piston upward, D piston upward, meanwhile, electronic ball valve will be opened, then it can form passage as Figure1-13. When brine draw finished, the ball valve will be turned off and enters into slow rinse status.

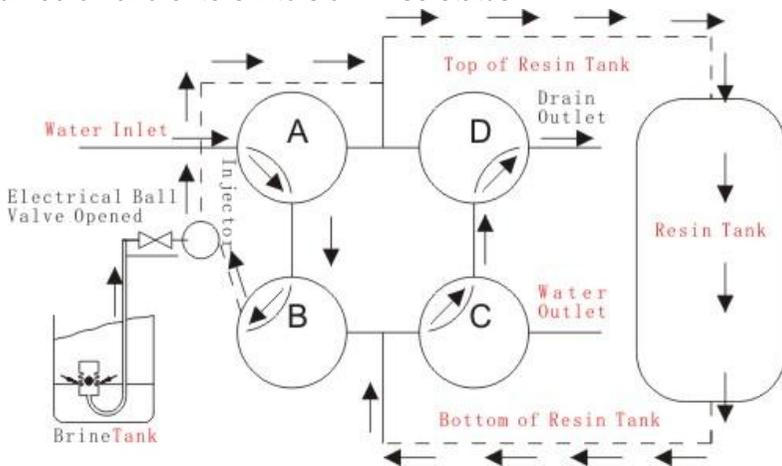


Figure1-13 Water Flow Process in Brine& Slow Rinse Position

### D. Fast Rinse Position

In Fast Rinse position, through different angles of fixed and moving disks located respectively, distribution valve control four tee piston valves to realize A piston downward, B piston upward, C piston upward, D piston upward, then it can form passage as Figure1-14.

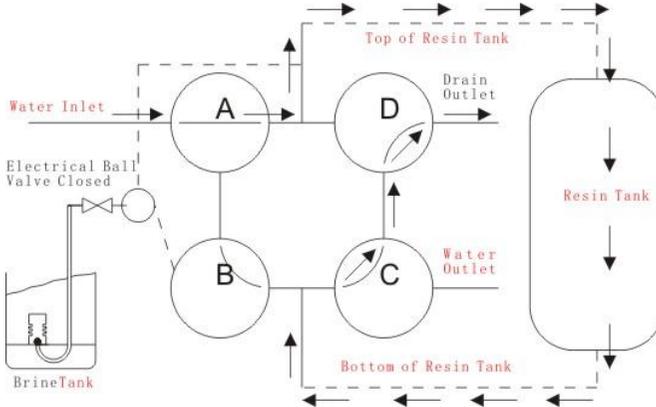


Figure1-14 Water Flow Process in Fast Rinse Position

### E. Brine Refill Position

After the unit finishes Fast Rinse position, it will return service position again. In the same time, the electrical ball valve will opened, a small part of hard water fills into brine tank though injector. The electrical ball valve will be turned off when the set Brine Refill Time ends.

From its principle, F96 softener valve distributes the pressure source on four tee piston valves through distribution valve. The area of bearing pressure on the top and bottom of piston is different which forms pressure difference and result in piston moves in or out in chamber. In order to make this pressure difference, there is a diaphragm pump matched with control valve to make **inlet pressure  $\geq 0.2\text{MPa} \geq$  inlet pressure of main valve ensure fixed disk is connected with G.**

When used as a filtration system, distribution valve controls pistons to run Service, Backwash and Fast Rinse functions.

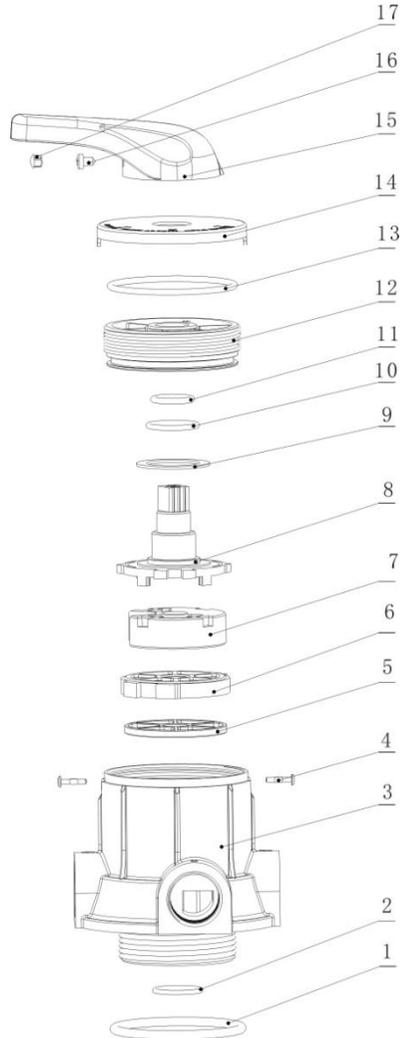
## 2.Product Construction and Features

### 2.1.Assembly & Parts of Runxin Valve

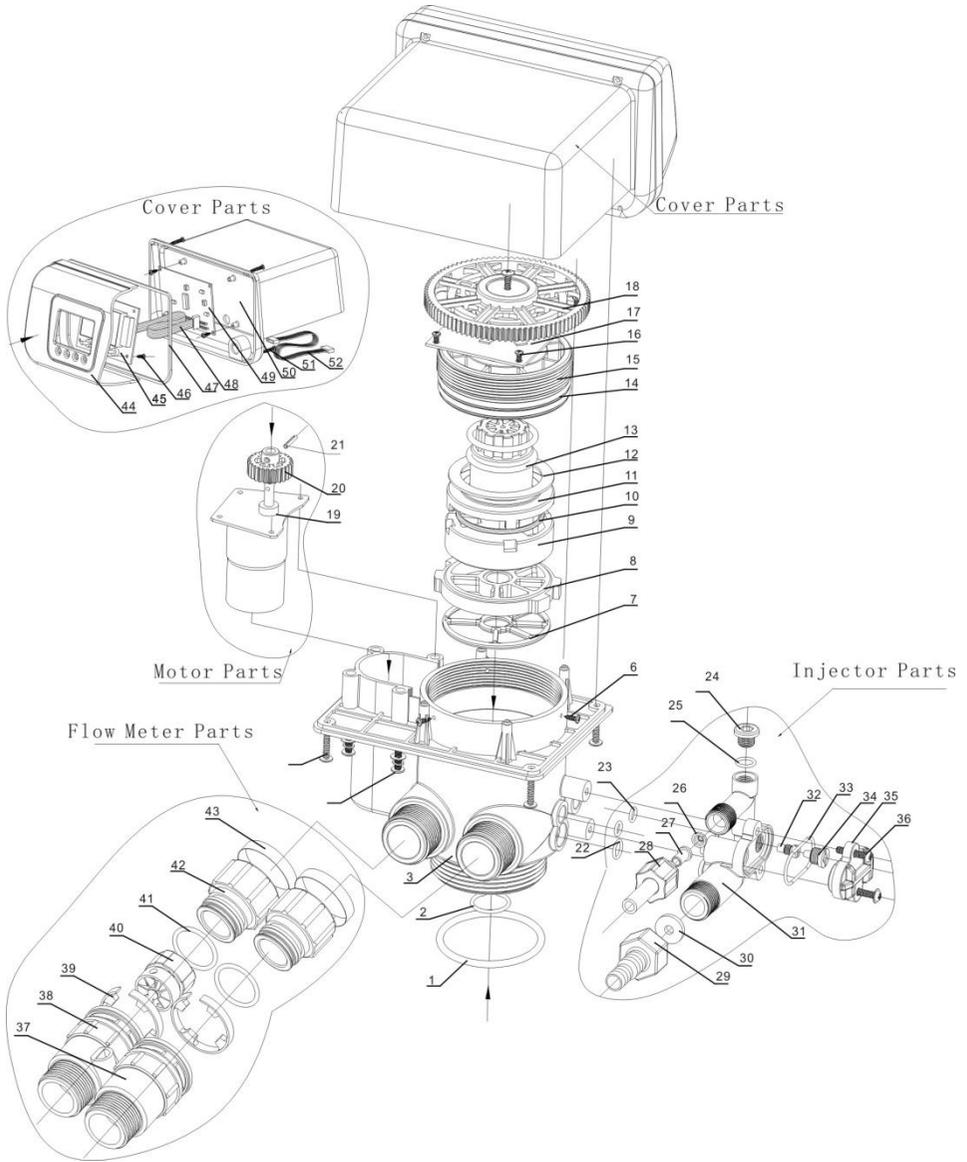
#### 2.1.1. F56A Valve Assembly

##### F56A Valve Assembly

Item No.	Description	Part No.	Quantity
1	O-Ring	8378143	1
2	O-Ring	8378078	1
3	Valve Body	8022002	1
4	Screw, Plastic	8993002	2
5	Seal Ring	8370005	1
6	Fixed Disk	8469003	1
7	Moving Disk	8459003	1
8	Shaft	8258003	1
9	Anti-friction Washer	8216003	1
10	O-ring	8378115	1
11	O-ring	8378113	1
12	Fitting Nut	8092003	1
13	O-ring	8378128	1
14	Cover	8444020	1
15	Handle	8253005	1
16	Screw, Cross	8902014	1
17	Buckle	8323001	1



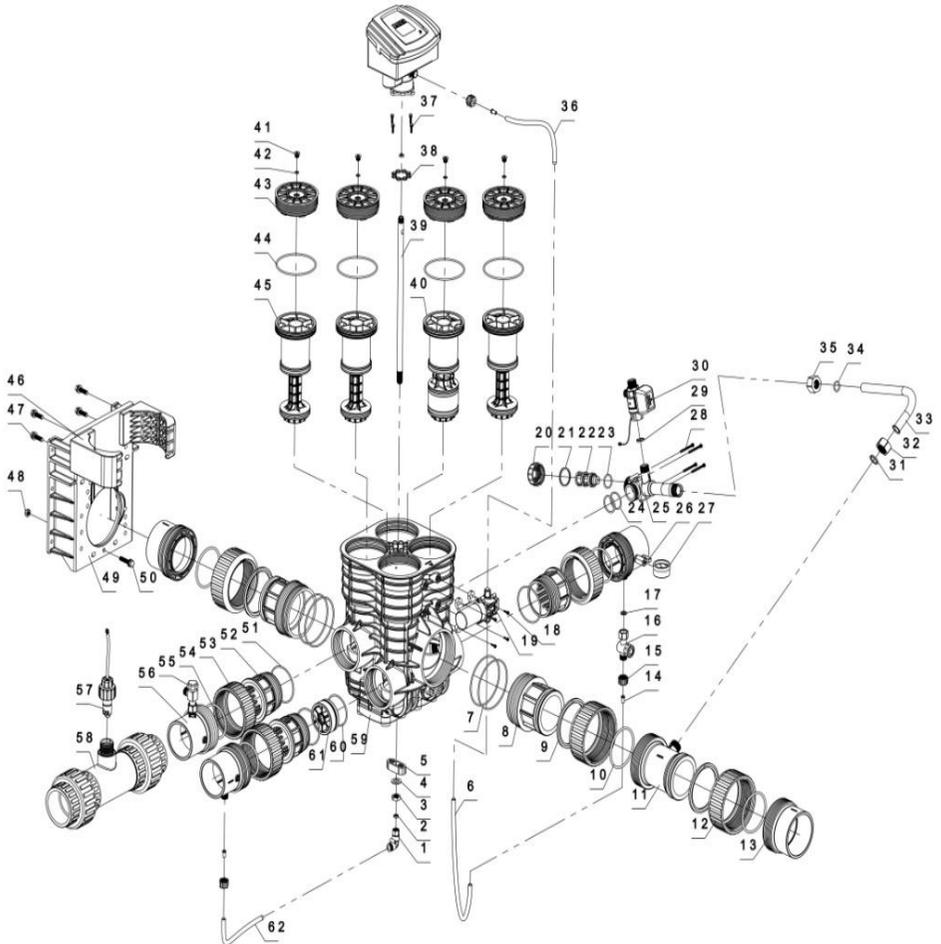
### 2.1.2. F63C3 Valve Assembly



**F63C3 part No.**

Item No.	Description	Part No.	Quantity	Item No.	Description	Part No.	Quantity
1	O-ring	8378143	1	27	Tube	8457004	1
2	O-ring	8378078	1	28	Nut, Hex.Hd	8940001	1
3	Valve Body	5022033	1	29	Joint	8458017	1
4	Screw, Cross	8902009	4	30	Drin Line Flow Control	8468017	1
5	Screw, Cross	8909016	4	31	Injector Body	8008001	1
6	Screw, Cross	8909010	3	32	Throat, Injector	8467009	1
7	Seal Ring	8370002	1	33	O-ring	8378025	1
8	Fixed Disk	8469001	1	34	Nozzle, Injector	8454009	1
9	Moving Disk	8459001	1	35	Cover, Injector	8315001	1
10	Moving Seal Ring	8371001	1	36	Screw, Cross	8902017	2
11	Shaft	8258004	1	37	Joint	8458038	1
12	Anti-friction Washer	8216004	1	38	Cover	8002001	1
13	O-ring	8378118	2	39	Clip	8270001	2
14	O-ring	8378143	1	40	Turbine	5295001	1
15	Fitting Nut	8092004	1	41	O-ring	8378081	2
16	Screw, Cross	8909007	4	42	Fitting Nut	8945001	2
17	Locating Board	6380002	1	43	Ferrule	8270002	2
18	Big Gear, Driven	5241002	1	44	Front Cover	8300001	1
19	Motor	6158011	1	45	Display Board	6381003	1
20	Small Gear, Motor	8241003	1	46	Screw, Cross	8909004	4
21	Pin	8993001	1	47	Seal Ring	8371001	1
22	O-ring	8378012	1	48	Wire for Display Board	5512001	1
23	O-ring	8378016	2	49	Control Board	6328003	1
24	Plug	8323002	1	50	Dust Cover	8005006	1
25	Seal Ring	8370003	1	51	Screw, Cross	8909010	4
26	Brine Line Flow Control	8468002	1	52	Wire for Locating Board	5511001	1

### 2.1.3. F96A3 Valve Assembly (The Main Valve Body Part)

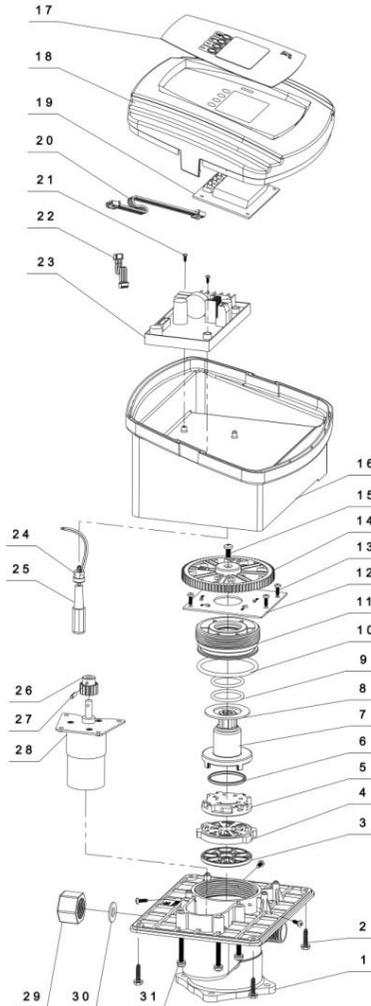


F96A3 main valve body part No.

Item No.	Description	Part No.	Quantity	Item No.	Description	Part No.	Quantity
1	Air Pipeline Connector	5455001	1	32	Nut	8940006	1
2	Seal Washer	8371011	2	33	Elbow Pipeline	8457072	1
3	Nut	8940005	1	34	O-ring	8378113	1
4	Washer	8952003	1	35	Nut	8940007	1
5	Gasket	8156003	1	36	Air Pipeline	8465012	1
6	Air Pipeline	8465010	1	37	Hexagonal Bolt Set	5851006	4
7	O-ring	8378218	4	38	Seal Washer	8371047	8
8	Connector	8458081	2	39	Pipeline	8457075	1
9	Clip	8270011	3	40	Piston	5450002	1
10	O-ring	8378219	3	41	Plug	8323016	4
11	Connector	8458078	1	42	O-ring	8378031	4
12	Animated Nut	8947030	3	43	Cover	8315037	4
13	Connector	8458077	2	44	O-ring	8378214	4
14	Pipeline	8457025	3	45	Piston	5450001	3
15	Hexagonal Nut	8940016	3	46	Support	5156002	2
16	Filter	3914001	1	47	Hexagonal Bolt Set	5851001	4
17	Seal Washer	8371021	1	48	Hexagonal Nut	8940023	1
18	Hexagonal Bolt	8909016	4	49	Fixer	8109053	1
19	Diaphragm Pump	2976091	1	50	Hexagonal Bolt Set	5851009	1
20	Injector Cover	8315013	1	51	O-ring	8378199	3
21	Seal Washer	8371006	1	52	Connector	8458080	3
22	Nozzle	8454025	1	53	Animated Nut	8947031	3
23	O-ring	8378104	1	54	O-ring	8378216	12
24	O-ring	8378101	2	55	Corner Valve	3911004.0 5	1
25	Injector Body	8008006	1	56	Connector	8458079	3
26	Pressure Gauge Protect Valve	2976013	1	57	Impeller Set	5295004	1

27	Pressure Gauge	6342001	1	58	Tee Valve	5457026	1
28	Hexagonal Bolt Set	5851005	4	59	Valve Body	5022068	1
29	Seal Washer	8371019	1	60	O-ring	8378217	1
30	Ball Valve	2976064	1	61	Flow Control	8468071	1
31	Washer	8371001	1	62	Air Pipeline	8465013	1

F96A3 Valve Body Assembly (The Distribution Valve Part)



F96A3 Distribution Valve Part No.

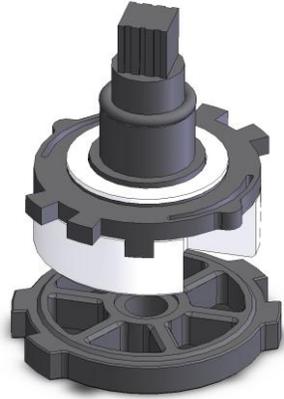
Item No.	Description	Part No.	Quantity	Item No.	Description	Part No.	Quantity
1	Valve Body	8022169	1	17	Label	8865001	1
2	Hexagonal Bolt	8909016	4	18	Front Cover	8300002.05	1
3	Seal Ring	8370031	1	19	Display Board	6381003	1
4	Fixed Disk	8469023	1	20	Wire for Display Board	5512001	1
5	Moving Disk	8459025	1	21	Screw, Cross	8909004	2
6	Moving Seal Ring	8370053	1	22	Wire for Locating Board	5511019	1
7	Shaft	8258009	1	23	Main Board	6382057	1
8	Anti-friction Washer	8216010	1	24	Wire Clip	8126014	1
9	O-ring	8378078	2	25	Power Wire	5513011	1
10	O-ring	8378107	1	26	Small Gear	8241010	1
11	Fitting Nut	8092007	1	27	Pin	8993003	1
12	Locating Board	6380034	1	28	Motor	6158506	1
13	Screw, Cross	8909008	4	29	Blind Hole Nut	8940012	1
14	Gear	5241005	1	30	Seal Washer	8371020	1
15	Screw, Cross	8909013	1	31	Screw, Cross	8902008	4
16	Back Cover	8005002	1				

## 2.2. Advantages

### 2.2.1. Hermetic Head Faces Construction

#### A. Ceramic Moving Disk

- ① Ceramic Disk is fired at 1680°C.
- ② Content :  $Al_2O_3 \geq 95\%$
- ③ HRA  $\geq 85^\circ$  , Flatness  $\leq 0.0003mm$  , Parallelism  $\leq 0.015mm$
- ④ Acid and alkaline resistance: Ceramic has excellent stability against Inorganic acid and alkaline at normal temperature.



#### B. High Strength Synthetic Fixed Disk

- ① High Strength Synthetic material ensure the fixed disk resisting corrosion from many kinds acids and strong alkalines except hot concentrated Nitric acid.
- ② The fixed disk is grinded to have same flatness as the ceramic moving disk to keep good and reliable sealing.
- ③ Hermetic head faces construction has better ability to prevent damage from foreign substance in the water.

**Because of good corrosion resistance, Runxin control valve has a very good application in Anion/Cation ion-exchange system.**

C. For each softener valve, it adopts partly balance construction to prevent big torque as water pressure increasing.

### 2.2.2. Operate with Pressure

Runxin valve uses two high-flatness sealing disks closely located respectively. When switch the working positions, it could operate with pressure.

Note: The valves which uses soft sealing element like rubber parts, it can't operate with pressure. It needs to shut off the inlet valve before switching.

### 2.2.3. No Hard Water Bypass Option

No Hard Water Bypass (NHWP) means the valve can internally

prevent raw water from getting into service lines during regeneration. All Runxin valves can shut off the passage to outlet during regeneration except Model: F79, F82 and F92.

### 2.2.4. Varieties of Specifications injector

The ratio of injector draw to total flow rate is around 25%~35%.  
Each tank has a specific injector matched.

## 2.3.Features

### 2.3.1.Features of Manual Valve

Manual valve initiates regeneration by rotating handle, and it has vivid symbols on the valve body, these symbols indicates service and all regeneration cycle steps position. Please refer to below table:

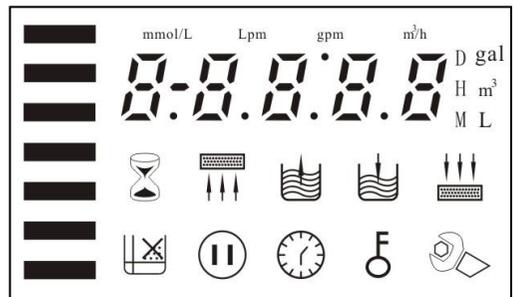
English	Figure	Description
SERVICE		In Service Status
BACK WASH		In Backwash Status
BRINE&SLOWR.		In Brine&Slow Rinse Status
BRINE REFILL		In Brine Tank Refill Status
FAST RINSE		In Fast Rinse Status

### 2.3.2.Features of Automatic Valve (LED)

#### 1). LED Dynamic Screen Display

Controller display screen uses colorful LED, and it has vivid symbol to indicate all working status of system.

The stripe on Dynamic Screen and  both flash, it indicates the control valve is In Service. Otherwise, it is in Regeneration Cycle.



## 2). Buttons Lock

Function: Buttons Lock can avoid incorrect operation.

- ① Lock: No operations to buttons on the controller within 1 minute, Button Lock Indicator light on, and then self-locking happens.
- ② Unlock: Press and hold both“▲”and“▼” buttons for 5 seconds, it can unlock the Buttons Lock Status.

## 3). Long Outage Indicator (Time of Day Indicator)

Time of Day can be reserved 3 days even electrical service is interrupted. If outage overrides 3 days, program setting are still reserved in the controller but Time of Day Indicator will flash to remind people to reset new Time of Day after power supply is recovery. It uses clock chip to count the time which is high precision.

## 4). Diagnosis Display Definitions and Correction

When a program error or controller faulty occurs, Digital Area will display error code and flash. The according definitions please refer to chapter 5.2. on Page 95.

## 5).Regeneration Start Type

**A. Time Clock Type:** The controller regenerates on the days or hours.

**Regeneration by Days:** The valve initiates regeneration every some days, minimal by 1day.

**Regeneration by Hours:** The valve initiates regeneration every some hours, minimal by 1hour.

### B. Meter Type:

The control regenerates when the available volume of treated water drops to zero. Possible Settings are:

**Meter Delayed: Setting [A-01]**

The control regenerates on the day although the available volume of treated water drops to zero. Regeneration starts at the Regeneration Time.

**Meter Immediate: Setting [A-02]**

The control regenerates immediately when the available volume of treated water drops to zero (0).

**Intelligent Meter Delayed: Setting [A-03]**

Meter Delayed Regeneration type, but by setting Resin Volume, Feed Water Hardness, Regeneration Factor, the controller will calculate the System Capacity.

**Intelligent Meter Immediate: Setting [A-04]**

Meter Immediate Regeneration type, but by setting Resin Volume, Feed Water Hardness, Regeneration Factor, the controller will calculate the System Capacity.

Menu A-01 (02.03.04) in program, set by buttons.

**6).Signal Output Connector**

There is signal output connector on main control board which is used for controlling external wiring. The middle one is common (COM), two beside ones are normal close (NC) and normal open (NO). The usage refers to chapter 3.5.2. on Page 69.

**7).Interlock Function**

Two or more Runxin valves can be connected together as a parallel or series system through Interlock Cable to avoid two or more valves start regeneration simultaneously.

A. As treated water is used, the Volume Remaining display counts down from the calculated system capacity to zero, then this occurs a Regeneration Cycle queues. If no other valve is in Regeneration the valve sends a lock command and starts a Regeneration Cycle.

B. If another valve is in Regeneration (i.e. the system is already locked) the valve remains In Service with Regeneration queued (“⌚” flashes) until other valves complete Regeneration. Then the system locks and Regeneration begins.

C. Each valve works following its program individually and interlocks when it starts regeneration.

**Note: Use interlock function to realize valves supplying water simultaneously, but regeneration in sequenced. Interlock signal could be used in series systems.**

**8).Remote Handling Connector**

This connector could receive external signal to control valve regeneration. The usage refers to chapter 3.5.2. on Page74.

### **9).Interval Backwash Times for Up-flow Regeneration Softener Valves**

The flow direction of regeneration reagent is opposite of service's direction for up-flow regeneration. When UF valve regenerates, the prevent resin disorder layering. It doesn't need backwash in every regeneration time. (Depending on raw water quality)

**Interval backwash times:** F-02 two regenerations with one backwash which is to say three services with one backwash.

### **10). Washing Frequency for Automatic Filter Valve**

When raw water quality is bad, even through lengthen the backwash time, the dirt will not be flushed out easily. It could set control valve to wash twice or more in a filter system, and more dirt will be flushed out and mineral bed will be cleaner.

**Washing (Backwash and fast rinse) frequency:** F-01 one service with two backwash and fast rinse. Working cycles will be:  
Service→Backwash→Fast Rinse→Backwash→Fast Rinse→Service.

### **11). Interval Regeneration Day for Meter Type Valve (0~40 days)**

This program step sets the maximum amount of time (in days) the unit can be in service without regeneration. For any Meter Delayed Types, Valve only regenerates after it reaches at maximum interval regeneration days although the remaining capacity is not dropped to zero. When it is set as zero, it means this parameter is invalid.

### **12). Regeneration Cycle Steps Time Range 0~99 Minutes**

Wider application. GB1576 boiler water supplying regulation: The  $Cl^-$  content of outlet water should be no more 1.1 times of  $Cl^-$  content in inlet water. It needs fast rinse time of control valve could be adjustable to flush out the dirt.

### **13).Wide Range of Voltage**

The adapter for Runxin control valves is 100~240V/50~60Hz.

## 2.4.Runxin Valves Overview

### 2.4.1.Manual Filter Valves Overview

New Model	Old Model	Inlet/Outlet	Drain	Mounting Base	Riser Tube	Max Flow Rate m <sup>3</sup> /h	Tank Size (in)	Remark
51101A	F52	1/2"F	1/2"F	M82x3	Φ16.5	1	6"~10"	
51101B	F56B	1/2"or 3/4"F	1/2"or 3/4"F	Tr95x6or φ98sawtooth thread	1.05"OD	1	10"Filter Housing	
51101C	F56C	1/2"or 3/4"F	1/2"or 3/4"F	Tr118x6or Tr110x6or	1.05"OD	1	20"Filter Housing	
51102	F56E	1/2"or 3/4"F	1/2"or 3/4"F	2.5"- 8NPSM	1.05"OD	2	6"~10"	
51102C	F56EC	1/2"or 3/4"F	1/2"or 3/4"F		1.05"OD	2	6"~10"	Side-control
51104	F56A	1"F	1"F	2.5"- 8NPSM	1.05"OD	4	6"~12"	
51204C	F56AC	1"F	1"F		1.05"OD	4	6"~12"	Side-control
51106	F56F	1"F	1"F		1"D-GB	6	6"~14"	
51110	F56D	2"F	1.5"F	4"-8UN	1.5"D-GB	10	10"~24"	
51215	F77BS	2"M	2"M	4"-8UN	1.5"D-GB	15	14"~30"	
51230	F78BS	DN65	DN65	DN80(T&B strainer)		30	24"~42"	
Structure Features	A.Hermetic head faces structure (F78BS adopts piston structure).							
	B.No hard water bypass and operating can happen on service.							
	C.Manual regeneration. Handel could be rotated and assembled within 180°.							
Applications	A.Household Filter System (F52.F56A.F56B.F56C.F56E.F56F).							
	B.A/C filter or sand filter system for RO pretreatment system.							
	C.Swimming Pool Filter System (F56D.F77BS.F78BS).							
	D.F56D, F77BS can be used for Iron/Manganese Removal system if side mount adapter is installed upside down.							
Remark	A.Side mount adapter available for 2.5" and 4" base.							
	B.Metal or plastic handle options(Except F77BS and F78BS).							

**Remark:** F-Female thread M-Male thread OD-Outer diameter D-GB CN standard nominal diameter, same as below.

### 2.4.2.Manual Softener Valves Overview

New Model	Old Model	Inlet/Outlet	Drain	Brine Line Connector	Mounting Base	Riser Tube	Max Flow Rate m <sup>3</sup> /h	Tank Size (in)	Remark
61202	F64B	3/4"F	1/2"M	3/8"M	2.5"-	1.05"OD	2	6"~12"	DF
61202C	F64BC	3/4"F	1/2"M	3/8"M	8NPSM		2	6"~12"	S/C DF
61104	F64A	1"F	1/2"M	3/8"M	2.5"-	1.05"OD	4	6"~18"	DF
61204C	F64AC	1"F	1/2"M	3/8"M	8NPSM		4	6"~18"	S/C DF
61206	F64F	1.5"M	3/4"M	1/2"M	4"-8UN	1.25"D-GB	6	10"~24"	DF
61210	F64D	2"M	1"M	1/2"M	4"-8UN	1.5"D-GB	10	10"~30"	DF
61215	F77AS	2"M	1.5"M	3/4"M	4"-8UN	1.5"D-GB	15	24"~42"	DF
61240	F78AS	DN65	DN65	3/4"M	DN80 (T&B strainer)		40	36"~63"	DF
71202	F64C	3/4"F	1/2"M	3/8"M	2.5"-8NPSM	1.05"OD	2	6"~12"	UF
Structure Features	A.Hermetic head faces structure (F78AS adopt piston structure).								
	B.No hard water bypass and operating can happen on service.								
	C.Start regeneration by manual, and handle can be rotated 360° cycle.								
	D.F64BC, F64AC could be side-operated.								
Applications	A.Residential Softener System (F64A, F64AC, F64B, F64BC, F64C).								
	B.Softener system for RO.								
	C.Boiler softener system; Ion Exchange units.								
Remark	A.Side mount adapter available for 2.5" and 4" Base.								
	B.Metal or plastic handle options for F64A.								

2.4.3. Automatic Filter Valves (LED) Overview

New Model	Old Model	Inlet/Outlet	Drain	Mounting Base	Riser Tube	Max Flow Rate m <sup>3</sup> /h	Tank Size (in)	Remark	
53502	F71B1	3/4"M	3/4"M	2.5"-8NPSM	1.05"OD	2	6"~10"		
53604B	F107A3	1"F	1"F		1.05"OD	4	6"~12"	Meter Type	
53602B	F107B3	3/4"M	3/4"M		1.05"OD	2	6"~10"	Meter Type	
53504S	F67B1	1"F	1"F	2.5"-8NPSM	1.05"OD	4	6"~12"		
53506S	F67B-A	1"F	1"F	1"D-GB	6	6"~14"			
53510	F75A1	2"M	2"M	4"-8UN	1.5"D-GB	10	10"~24"		
53518	F77B1	2"M	2"M	4"-8UN	1.5"D-GB	18	16"~36"		
53520	F95B1	2"M	2"M	2"M (T&B strainer)		20	20"~36"	Side-Mounted	
53520B	F111B1	2"M	2"M	4"-8UN	2"D-GB	20	20"~36"	Top-Mounted	
53530	F78B1	DN65	DN65	DN80(T&B strainer)		30	24"~42"	Improved	
53530B	F112B1								
53540	F96B1	DN80	DN80	DN100T&B strainer		50	36"~48"		
Structure Features	A.Hermetic head faces structure (F78, F112 and F96 have piston structure). F112 is the improved type of F78.								
	B.Indication of long time power cut, data saved after power off (Saved for three days).								
	C.No hard water bypass in rising cycle.								
	D.Remote handling connector b-01(02).								
	E.Backwash, fast rinse frequencies setting F-00, service one time, backwash and fast rinse several times.								
	F.Remote signal input connector.								
	G.Interlock function for contemporary system and individual rising.								
	H.F95B1 and F96B1 start rising only by days, others start rising by days or hours.								
	I.F77, F95 and F111 have two valve cores, one is for controlling water in, the other is for out.								
	J.F95B1 and F96B1 have meter type: 53620 and 53650.								
Applications	A.Residential Filter System (F71B, F67B).								
	B.A/C filter or sand filter system for RO pretreatment system.								
	C.F107A and F107B are used for Iron and manganese removal device.								

## 2.4.4. Automatic Softener Valves (LED) Overview

New Model	Old Model	Inlet/Outlet	Drain	Brine Line Connector	Mounting Base	Riser Tube	Max Flow Rate m <sup>3</sup> /h	Tank Size (in)	Remark
63604S	F63B3	1" M	1/2" M	3/8" M	2.5"-8NPSM	1.05" OD	4	6"~18"	DF
63604	F63C3								DF
63602	F65B3	3/4" M	1/2" M	3/8" M	2.5"-8NPSM	1.05" OD	2	6"~12"	DF
73604S	F68A3	1" M	1/2" M	3/8" M	2.5"-8NPSM	1.05" OD	4	6"~18"	UF
73604	F68C3								UF
73602	F69A3	3/4" M	1/2" M	3/8" M	2.5"-8NPSM	1.05" OD	2	6"~12"	UF
73605	F92A3	1" M	NPT3/4	3/8" M	2.5"-8NPSM	1"D-GB	6	6"~24"	UF
63610	F74A3	2" M	1" M	1/2" M	4"-8UN	1.5"D-GB	10	10"~30"	DF
63615	F99A3	2" M	1.5" M	3/4" M	4"-8UN	1.5"D-GB	15	14"~36"	DF
63618	F77A3						18	14"~42"	DF
63620	F95A3	2" M	1.5" M	3/4" M	2" M ( T&B strainer )		20	24"~48"	DF
63620B	F111A3	2" M	1.5" M	3/4" M	4"-8UN	2"D-GB	20	24"~48"	Top-Mounted
63640	F78A3	DN65	DN65	3/4" M	DN80(T&B strainer)		40	24"~60"	DF
63640B	F112A				Improved				
63650	F96A3	DN80	DN80	3/4" M	DN100( T&B strainer )		50	48"~63"	DF
Structure Features	A. Hermetic head faces structure (F78, F112 and F96 have piston structure). F112 is the improved type of F78.								
	B. Indication of long time power cut, data saved after power off (Saved for three days).								
	C. No hard water by pass in regeneration cycle. (Except F92).								
	D. Signal output connector, remote handling connector could receive passive signal.								
	E. Interlock function for contemporary system and individual regeneration.								
	F. F77, F78, F95, F96, F111 and F112 adopt ball valve for brine drawing and refill.								
	G. Time clock regeneration option: by days or by hours; Meter valve regeneration option: Meter delayed(A-01), Meter immediate(A-02), Intelligent meter delayed(A-03), Intelligent meter immediate(A-04).								
	I. Time available: 0-99 minutes per cycle; Meter range: F63.F65.F68.F69(0~99.99m <sup>3</sup> ), F74(0~999.9m <sup>3</sup> ), F78(0~9999m <sup>3</sup> ).								

## Product Construction and Features

	J.Up-flow valve interval backwash times setting F-00, service several times, but backwash one time.
	K.Meter type valve max interval regeneration days setting (0~40days).
	L.F77, F95 and F111 have two valve cores, one is for controlling water in and brine drawing, the other is for out.
Applications	A.Residential Softener Systems (F63, F65, F68, F69).
	B.Softener for RO pretreatment System.
	C.Boiler Softening System, Ion-exchange system.
Remark	A.The model with a "S" means the valve with manual operation.
	B.F77, F78 and F95 brine refilled while service, brine refilling controlled by electronic ball valve.
	C.F63, F65, F68 and F69 have a variety of appearances optional.
	D.Controller for F74 can be top or side mounted.
	E. F95A can be top mounted (F111A).
	F.The above products have time clock type, such as 63504 (Old model F63C1).

### 2.4.5.One valve for Twin Tanks, Alternating Regeneration Valve Overview

New Model	Old Model	Inlet/Outlet	Drain	Brine Line Connector	Mounting Base	Riser Tube	Max Flow Rate m <sup>3</sup> /h	Tank Size (in)	Remark
17603	F73	1"M	1/2"M	3/8"M	2.5"-8NPSM	1.05"OD	3.5	6"~14"	DF/UF
17606	F98A	1"M	1/2"M	3/8"M	1"M (T&B strainer)		6	20"~24"	DF
17610	F88A	1.5"M	1"M	1/2"M	1.5"M T&B strainer)		10	20"~30"	DF
93606	F98C	1"M	1/2"M	3/8"M	1"M (T&B strainer)		6	14"~18"	Floating
93610	F88C	1.5"M	1"M	1/2"M	1.5"M (T&B strainer)		10	18"~20"	Bed
Structure Features	A.Ceramic valve core, hermetic head faces structure.								
	B.One valve on twin tanks, one is on service and the other is standby.								
	C.Regeneration tank standby after exchange, fast rinse before service.								
	D.Regeneration start type: Meter type only.								
	E.Two valve cores, one is for tanks switching, the other is for regeneration.								
	F.It is side-mounted and uses soft water for regeneration, except F73.								
Applications	Continuous Soft Water Supplying.								

### 2.4.6. Residential Valves Overview

New Model	Old Model	Inlet/Outlet	Drain	Brine Line Connector	Mounting Base	Riser Tube	Max Flow Rate m <sup>3</sup> /h	Tank Size (in)	Remark
82602	F79A-LCD	3/4"M	1/2"M	3/8"M	2.5"-8NPSM	1.05"OD	2	6"~12"	
82602B	F79B-LCD	3/4"M	1/2"M	3/8"M			2	6"~12"	HWB
82604	F82A-LCD	1"M	1/2"M	3/8"M			3.5	6"~16"	
82604B	F82B-LCD	1"M	1/2"M	3/8"M			3.5	6"~16"	HWB
52502H	F71D1	3/4"M	1/2"M	/	2.5"-8NPSM	1.05"OD	2	6"~10"	Filtration
52504H	F67D1	1"M	1/2"M	/			4	6"~12"	Filtration
62602H	F65D3	3/4"M	1/2"M	3/8"M			2	6"~12"	DF
62604H	F63D3	1"M	1/2"M	3/8"M			4	6"~18"	DF
72602H	F69D3	3/4"M	1/2"M	3/8"M			2	6"~12"	DF/UF
72604H	F68D3	1"M	1/2"M	3/8"M			4	6"~18"	DF/UF
82602H	F79D3	3/4"M	1/2"M	3/8"M			2	6"~12"	DF/UF
82604H	F82D3	1"M	1/2"M	3/8"M			3.5	6"~16"	DF/UF
82602E	F105A3	3/4"M	1/2"M	3/8"M	2.5"-8NPSM	1.05"OD	2	6"~12"	DF/UF
82604E	F97A3	3/4"M	1/2"M	3/8"M			4	6"~18"	DF/UF

Structure Features	A.LCD display, intuitional and convenient.
	B.Indication of long time power cut, data saved after power off (Saved for three days).
	C.Up-flow valve interval backwash times setting F-00. service several times, but backwash one time.
	D.Down-flow or Up-flow option can be set in the program, and also can mix hard water to the system if required not too soft water.
	E.Disinfection connector. Electrolyze brine in regeneration to disinfect.
	F.Salt Shortage Alarm connector.
	G.D series valve has foreground and background operation to prevent incorrect operation.
	H.F105 and F97 use soft water for brine refilling, both UF and DF option, have vacation mode and dry brine mode.
Applications	A.Residential Softener or the Whole House Water Filter.
	B.RO Pre-treatment Softener.

### 2.4.7.P Series Control Valve Overview

New Model	Old Model	Inlet/Outlet	Drain	Brine Line Connector	Mounting Base	Riser Tube	Max Flow Rate m <sup>3</sup> /h	Tank Size (in)	Remark
63502P	F71P1	3/4"M	3/4"M	/	2.5"-8NPSM	1.05"OD	2	6"~10"	Filter
63504P	F67P1	1"F	1"F	/			4	6"~12"	Filter
63602P	F65P3	3/4"F	1/2"M	3/8"M			2	6"~12"	DF
63604P	F63P3	1"M	1/2"M	3/8"M			4	6"~18"	DF
73602P	F69P3	3/4"F	1/2"M	3/8"M			2	6"~12"	UF
73604P	F68P3	1"M	1/2"M	3/8"M			4	6"~18"	UF
Structure Features	A.Locate by optcupler, more stable performance. F63P, F67P and F68P adopt the same locating board, while F65P, F69P and F71P use the same locating board. They all use the same main control board.								
	B.Hermetic head faces structure, no hard water bypass when regeneration cycle.								
	C.When electrical service recover, program run one cycle then locate at the previous position.								
	D.Cheaper and simpler.								
Applications	A.Residential Softener or Filter system.								
	B.Boiler Softener, Ion-Exchange Equipment.								

### 2.4.8.Disc Filter Overview

New Model	Inlet/Outlet	Drain	Filtering Accuracy	Working Pressure	Max. Flow Rate(m <sup>3</sup> /h)
45006	1"M	3/4"M	150μm	0.15~0.6MPa	6
45012	1.5"M	3/4"M	150μm	0.15~0.6MPa	12
45020	2"M	3/4"M	150μm	0.15~0.6MPa	20
45040	2.5"M	3/4"M	150μm	0.15~0.6MPa	40
Structure Features	A.Filter Disc can be repeated to wash and use, and be disassembled easily.				
	B.It has storage space for filtered dirt and flush dirt directly by opening the draining valve.				
	C.Reliable and low operating cost, long service life.				
Applications	Installed on the inlet of Filters or Softeners.				

### 2.4.9.Runxin Valves for Floating Bed Systems Overview

New Model	Old Model	Inlet/Outlet	Drain	Brine Line Connector	Mounting Base	Riser Tube	Max Flow Rate m <sup>3</sup> /h	Tank Size (in)	Remark
93604	F83A3	1"M	1/2"M	3/8"M	2.5"-8NPSM	1.05"OD	4	6"~14"	Hard Water Regeneration
93606	F98C	1"M	1/2"M	3/8"M	1"M (T&B strainer)		6	14"~18"	One Valve on Twin Tanks
93610	F88C	1.5"M	1"M	1/2"M	1.5"M (T&B strainer)		10	18"~20"	Continuous Soft Water Supplying
91215	F77CS	2"M	1.5"M	3/4"M	4"-8UN	1.5"D-GB	15	20"~30"	Hard Water Regeneration
93620	F95C3	2"M	1.5"M	3/4"M	2"M (T&B strainer)		20	24"~36"	Soft Water Regeneration
91240	F78CS	DN65	DN65	3/4"M	DN80(T&B strainer)		40	36"~48"	Hard Water Regeneration
93640	F78C3	DN65	DN65	3/4"M	DN80(T&B strainer)		40	36"~48"	Soft Water Regeneration
Structure Features	A.Hermetic head faces structure (F78 and F96 have piston structure)								
	B.One valve on twin tanks, one in service, the other standby.(F88 and F98)								
	C.F83, F77CS and F78CS are hard water for regeneration, others are soft water for regeneration.								
	D.Adopt the technological process of up-flow service --brine draw--brine refill--fast rinse.								
Applications	Suitable for high hardness(Less than 15mmol/L) water treatment applications.								

2.4.10.Runxin Valves for Mixed Bed Systems Overview

New Model	Inlet	Outlet	Drain	Top Strainer	Alkaline /Acid	Air In	Air Out	Max. Flow Rate m <sup>3</sup> /h	Tank Size (in)
15702	3/4"F	3/4"M	3/4"M	3/4"M	3/8"M	1/2"F	3/4"F	2	6"~12"
15704	1"F	1"M	3/4"M	1"M	3/8"M	1/2"F	3/4"F	4	6"~18"
Structure Features	A.LED display, remote signal input, keyboard lock and other functions.								
	B.Use first or second grade demineralized water to regenerate could be switched in program.								
	C.Multi-times of connect and disconnect water at the end of backwash to improve the effect of layering of anion and cation resin.								
	D.No water used, valve could wait in service position. If power cut, valve goes to fast rinse after power on.								
	E.Resistivity on outlet. When outlet water is disqualified, it will regenerate automatically.								
Applications	Mixed Cation/Anion Resin Bed Desalination System.								

2.4.11.Hardness Online Monitoring Instrument Overview

Model	Inlet	Outlet	Sampling Connector	Flow Meter Inlet	Flow Meter Outlet
44710	Ø6 Gas-type quick fitting	Ø8 Gas-type quick fitting	Ø6 Gas-type quick fitting	1"F	1"M
Structure Features	A.Using constant volume for through-holes and mixing chamber, good consistency for water sample testing.				
	B.Several time modes optional: a).It can adjust the monitoring time according to the water quality : 0-300minutes: b).Input the resin volume, water hardness and the average water consumption per hours, the system will calculate the operate time automatically.				
	C.Easy to set up: Only need to set the test interval time (Detection period), others set as the default time.				
	D.The system will alarm when the reagent exhausted and turn the time mode program by hours until add reagent.				

Applications	Test treated water hardness on outlet of softener valve, depending on the test result to control the softener valve regeneration. Suitable for softening water treatment system which has a high requirement for treated water application, steam boiler and hot water boiler application.
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### 2.4.12. Bypass Valve Overview

New Model	Old Model	Inlet/Outlet	Valve Size	Inlet Outlet Distance	Remark
41104	F70A	1"M	1"F	50mm	For F63/F68
41102	F70B	3/4"M	3/4"M	65/70mm adjustable	For F65/F69
41204	F70C	1"M	1"F	50mm	For F63/F68/F82
41202	F70D	3/4"M	3/4"M	50mm	For F79
41206	F70F	1"M	NPT 1" or 1"M	50mm	For F92/F82
Structure	A.4 positions: Partly bypass, Bypass, Close, Service.				
	B.Figure represents bypass volume.				
Features	C.If install flow meter inside it and connect with control valve, then it can revert it to a meter type valve.				
Applications	A.Bypass required raw water when the softener is on maintenance.				
	B.Bypass required raw water when softener is on regeneration.				
	C.It can mix raw water to system to supply not very soft water.				
Remark	When operate F70B, two handles should be operated at same position (when inlet handle at position 1, while outlet handle at position 1 too). But when inlet handle at bypass and outlet handle at service, then it represents closed position which means no water come in.				

2.4.13. Deaerator Valve Overview

Model	Inlet	Outlet	Drain	Top Distributor	Left and Right Chamber Connector	Max. Flow Rate m <sup>3</sup> /h	Tank Size (in)
13504	1" M	1" M	1" M	1" M	1" M	3.5	10"~18"
Structure Features	A.LED display, remote signal input, keyboard lock and other functions.						
	B.Several time modes optional: Operate by Day, Hour, Point (Two, Three, Four points)						
	C.It has two type of water for backwash: oxygen removal water or hard water.						
	D.There are left and right chambers to increase the backwash flow rate.						
Applications	Steam boiler system and double chambers sponge iron deoxidized system.						

2.4.14. Cell Phone Control Valve Overview

<p>Mainly used valve models : F79/F82/F74/F75/F78</p> <p>Adopt different main control board, control board has a GSM card port, can be installed the GSM card.</p>	
Structure Features	A.It can inquire or modify the parameter of valves by mobile phone or tablet PC.
	B.It can remotely control the valve to switch to the next working position.
	C.It will take a feedback to the mobile phone or tablet PC if the valve has an error.
Applications	F79 and F82 mainly used in residential softener system.
	F74, F75 and F78 mainly used in industrial filtration and softener system.

**Note: The Inlet and Outlet Direction of Each Runxin Valve**

Inlet/Outlet Direction	Model
Left In and Right Out	F56A, F56D, F56E, F56AC, F56EC, F64A, F64B, F64C, F64D, F64F, F64AC, F64BC, F74A, F75A, F78A/B, F96A, F99A, F95C
Right In and Left Out	F56F, F67B, F71B, F78C, F88C, F95A/B, F111A/B, F107A/B
Rear In and Out	F63B, F65B, F67D, F68A, F69A, F71D, F73A, F77, F79, F82, F83, F92

### 3. System Design and Application of Runxin Valves

#### 3.1. Commonly Used Parameter Table

##### 3.1.1. Injector Sizes and Draw Rates Table

###### Injector 6300 series

Inlet Pressure (MPa)	Draw Rate (L/M)									
	6301 Brown	6302 Pink	6303 Yellow	6304 Blue	6305 White	6306 Black	6307 Purple	6308 Red	6309 Green	6310 Orange
0.15	0.81	1.12	1.58	2.21	2.45	3.30	3.44	4.08	5.19	5.69
0.20	0.95	1.41	1.87	2.53	2.89	3.88	4.21	4.83	5.36	6.80
0.25	0.99	1.61	2.08	2.79	3.30	4.30	4.66	5.39	6.86	7.65
0.30	1.30	1.81	2.18	3.05	3.66	4.74	5.15	5.95	7.50	8.60
0.35	1.45	1.96	2.39	3.27	3.94	5.02	5.55	6.51	8.30	9.57
0.40	1.56	2.12	2.55	3.50	4.25	5.41	5.88	6.77	8.74	9.90

###### Injector 6800 series

Inlet Pressure (MPa)	Draw Rate (L/M)									
	6801 Brown	6802 Pink	6803 Yellow	6804 Blue	6805 White	6806 Black	6807 Purple	6808 Red	6809 Green	6810 Orange
0.15	1.3	1.45	2	2.68	2.72	3.72	4.52	4.85	5.75	6
0.20	1.52	1.73	2.37	3.16	3.27	4.27	5.03	5.7	6.4	6.26
0.25	1.77	1.9	2.7	3.46	3.78	4.8	5.65	6.22	7.19	7.13
0.30	1.9	2.13	3	3.8	4.16	5.23	6.19	6.81	7.97	8.53
0.35	2.08	2.2	3.23	4.05	4.5	5.57	6.67	7.27	8.5	8.8
0.40	2.23	2.27	3.46	4.38	4.88	5.95	6.95	7.63	8.8	9.3

Remark: 6800 series injector is improved based on 6300 series injector. 6800 series adopt new brine line flow control and drain line flow control, and there are different specifications for optional. It is much more stable on brine drawing, brine refill and backwash positions when inlet pressure changed.

### Injector 7400 Series

Inlet Pressure	Draw Rate (L/M)			
MPa	7401 Brown	7402 Pink	7403 Yellow	7404 Blue
0.15	10.61	13.86	16.08	25.02
0.20	13.00	16.60	19.32	29.37
0.25	14.47	18.17	21.30	32.91
0.30	16.00	20.00	23.40	36.20
0.35	17.28	21.64	25.19	38.73
0.40	18.55	23.33	26.98	41.43

### Injector 7700 Series

Inlet Pressure	Draw Rate (L/M)				
MPa	7701 Brown	7702 Pink	7703 Yellow	7704 Blue	7705 White
0.20	18.72	25.83	35.52	42.27	49.25
0.25	26.83	32.42	45.59	57.02	63.58
0.30	32.08	39.41	51.16	64.90	72.37
0.35	37.56	49.79	59.17	70.75	79.85
0.40	42.14	54.77	63.77	76.46	85.86

### Injector 7800 Series

Inlet Pressure	Draw Rate (L/M)				
MPa	7801 Brown	7802 Pink	7803 Yellow	7804 Blue	7805 White
0.20	51.03	69.41	93.57	107.62	165.33
0.25	59.22	79.06	106.01	121.89	181.00
0.30	65.06	88.02	115.29	134.47	203.33
0.35	72.29	95.97	125.96	149.96	223.33
0.40	78.23	103.62	134.41	155.07	226.67

### 3.1.2. Standard Injector Size and DLFC Configuration Table

Tank (mm)	Injector #	Injector Color	Draw Rate (Total)	Slow Rinse	Brine Refill	DLFC	Backwash/ Fast Rinse
			L/m	L/m	L/m		L/m
150	6301	Brown	1.30	0.91	3.0	1#	4.7
175	6302	Pink	1.81	1.32	3.7	1#	4.7
200	6303	Yellow	2.18	1.73	3.8	2#	8.0
225	6304	Blue	3.05	2.14	3.3	2#	8.0
250	6305	White	3.66	2.81	4.3	3#	14.4
300	6306	Black	4.74	3.32	4.2	3#	14.4
325	6307	Purple	5.15	3.55	4.1	4#	22.8
350	6308	Red	5.95	4.0	4.0	4#	22.8
400	6309	Green	7.50	5.13	4.0	5#	26.4
450	6310	Orange	8.60	5.98	3.9	5#	26.4
500	7401	Brown	16.0	10.56	23	1#	46.3
550	7402	Pink	20.0	13.88	28.2	2#	67
600	7403	Yellow	23.4	15.75	32.9	3#	71
750	7404	Blue	36.2	24.17	50.5	4#	75
700	7701	Brown	32.08	20	59.4	No hole	125
800	7702	Pink	39.41	26.5	59.4	Hole 1×φ6	153
900	7703	Yellow	51.16	33.3	59.4	Hole 2×φ6	170
1000	7704	Blue	64.90	42	59.4	Hole 3×φ6	187
1050	7705	White	72.37	48.7	59.4	Hole 4×φ6	217
1000	7801	Brown	65.97	42.5	35.8	No hole	207
1200	7802	Pink	88.02	51.2	35.8	Hole 2×φ7	283
1400	7803	Yellow	113.55	80	56.7	Hole 4×φ8	372
1600	7804	Blue	132.33	98.5	56.7	Hole 5×φ10	447

6800 Series Injector Size and DLFC Configuration Table (The configuration is the same as above table if tank diameter is bigger than 500mm)

Tank (mm)	Injector #	Injector Color	Draw Rate (Total)	Slow Rinse	BLFC	Brine Refill	DLFC	Backwash/ Fast Rinse
			L/m	L/m		L/m		L/m
150	6801	Brown	1.93	0.8	8468057	0.83	8468043	4.46
175	6802	Pink	2.26	1.24	8468057	0.83	8468043	4.46
200	6803	Yellow	3.0	1.7	8468056	1.13	8468042	6.78
225	6804	Blue	3.8	2.4	8468056	1.13	8468060	9.68
250	6805	White	4.2	2.65	8468052	1.47	8468061	12.12
300	6806	Black	5.23	3.3	8468053	3.14	8468077	18.1
325	6807	Purple	6.20	3.73	8468053	3.14	8468062	26.4
350	6808	Red	6.80	4.1	8468054	4.99	8468062	26.4
400	6809	Green	8.0	4.87	8468055	5.6	No DLFC	32.0
450	6810	Orange	8.50	5.6	8468055	5.6	No DLFC	32.0

### 3.1.3.Common Units Conversion Table

1ppm=1mg/L	1 German hardness =28ppm	1mmol/L=50mg/L
1 inche (in) =25.4mm	1feet(ft)=12in	1m=39.37in
1U.Sgallon=3.78L	1 m <sup>3</sup> =264gallons	1 ft <sup>3</sup> = 28.3L
1MPa=10Kgf/cm <sup>2</sup>	1bar=1 Kgf/cm <sup>2</sup>	1L/ (m <sup>2</sup> .s) =3.6m/h
1bar =14.5psi	1 Pound=0.4536kg	1mol=771.5U.S Grain

Note: German hardness is calculated by CaO.

### 3.1.4. Automatic Softener Specification

Tank Size			Service Flow Rate	Resin Tank Capacity	Resin Volume	Backwash Flow Rate	Injector	Brine Tank Capacity	Minimal Salt Consumption	Matched Valve Model	
Diameter		H								DF	UF
in	mm	in	m <sup>3</sup> /h	L	L	m <sup>3</sup> /h		L	kg		
6	152	35	0.4	14.4	10	0.3	6301/6801	25	1.5	F65 or F63	F69 or F68
7	178	44	0.6	25.4	17	0.4	6302/6802	25	2.55		
8	203	44	0.8	32.9	22	0.5	6303/6803	60	3.3		
9	229	48	1.0	44.7	30	0.6	6304/6804	60	4.5		
10	254	54	1.2	65.3	41	0.7	6305/6805	60	6.15		
12	305	65	1.7	89.2	59	1.1	6306/6806	100	8.85		
13	330	54	2.1	113.8	69	1.3	6307/6807	100	10.35	F63	F68
14	356	65	2.4	150.3	103	1.4	6308/6808	200	15.45		
16	406	65	3.1	189.6	120	1.9	6309/6809	200	18		
18	457	65	4.1	253	169	2.5	6310/6810	200	25.35		
20	508	72	4.9	310	207	2.9	7401	300	31.05	F74	F92
22	550	72	5.9	385	255	3.6	7402	500	38.25		
24	610	88	7.0	480	320	4.2	7403	500	48		
30	762	96	11.0	740	493	6.6	7404/7701	1000	73.95	F74/F77	/
32	800	96	12.5	1075	715	7.5	7702	1000	107.25	F77	/
36	900	96	15.5	1150	765	9.5	7703	1000	114.75	F77/F95	F95
40	1000	96	19.6	1250	830	11.8	7704/7801	1000	124.5	F95	F95
42	1050	72	21.6	1430	950	13	7705/7801	1000	142.5		
48	1200	96	28.2	1820	1200	17	7802	1500	180	F78	/
54	1370	72	36.8	2250	1500	22	7803	2000	225		/
60	1500	86	44.1	2830	1880	26.5	7804	2000	282	F78/F96	/
63	1600	86	50.3	3218	2145	30.1	7805	2000	321.75	F96	/

Service flow rate of softener calculation is based on velocity 25 m/h and backwash flow rate is based on 4.2L/(m<sup>2</sup>·s).

Salt consumption calculation is based on 150g/L(Resin).

### 3.1.5. Filter Specification

Tank Size				A/C Filter				Sand Filter			
Diameter		H.	Capacity	Serv. Rate	B.K. Rate	Capacity		Serv. Rate	B.K. Rate	Capacity	
in	mm	in	L	m <sup>3</sup> /h	m <sup>3</sup> /h	Manual	Automatic	m <sup>3</sup> /h	m <sup>3</sup> /h	Manual	Automatic
6	152	35	14.4	0.2	0.7	F56E or F56A	F71 or F67	0.4	1.0	F56E or F56A	F71 or F67
7	178	44	25.4	0.3	0.9			0.6	1.3		
8	203	44	32.9	0.4	1.1			0.8	1.7		
9	229	48	44.7	0.5	1.5			1.0	2.2	F56A or F56F	F67
10	254	54	65.3	0.6	1.7	1.2	2.6				
12	305	65	89.2	0.8	2.5	F56A or F56F	F67	1.7	3.8		
13	330	54	113.8	1.0	3.0	F56F	F75	2.1	4.6	F56D	F75
14	356	65	150.3	1.2	3.4	F56D		2.4	5.2		
16	406	65	189.6	1.5	4.5			3.1	6.8		
18	457	65	253	2.0	5.9			4.1	8.8		
20	508	72	310	2.4	7.0		4.9	10.6			
22	550	72	385	2.8	8.5	F77BS	F77B/ F95B	5.9	12.8	F77BS	F77B/ F95B
24	610	88	480	3.4	10.0			7.0	15.2		
30	762	96	740	5.3	15.9			11.0	23.8		
32	800	96	1075	6.0	18.0			12.5	27.0		
36	900	96	1150	7.6	23.0	F78BS	F78B	16.0	34.0		
40	1000	96	1250	9.4	28.2			19.6	42.4		
42	1050	72	1430	10.4	31.1			21.6	46.7	/	F96B
48	1200	96	1820	13.5	40.7			28.3	61.0		
54	1370	72	2250	17.7	53	/	F96B				
60	1500	86	2830	21.2	63.6						

Service flow rate of active carbon filter calculation is based on velocity 12m/h and backwash flow rate is based on 10L/(m<sup>2</sup>·s). Service flow rate of sand filter calculation is based on velocity 25m/h and backwash flow rate is based on 15L/(m<sup>2</sup>·s). If use multi-types of media for filtration, it has bigger flow rate of service.

### 3.1.6.Runxin Valves Performance Parameter Table

Max. Flow Rate 1-2m<sup>3</sup>/h

Valve Model	F65	F69	F79	F71	
Valve Body Material	ABS+GF10	ABS+GF10	PPO	ABS+GF10	
Working Voltage	DC12V	DC12V	DC12V	DC12V	
Flow Rate (Pressure Drop 0.1MPa)	1.1m <sup>3</sup> /h	1.1m <sup>3</sup> /h	1.1m <sup>3</sup> /h	1.8m <sup>3</sup> /h	
Max. Flow Rate (Pressure Drop 0.175MPa)	1.5m <sup>3</sup> /h	1.5m <sup>3</sup> /h	1.5m <sup>3</sup> /h	2.35m <sup>3</sup> /h	
Service Kv Value	1.08	1.08	1.08	1.83	
Backwash Kv Value	0.54	0.54	0.54	1.78	
Technical Parameter	Inlet/Outlet	3/4"			3/4"
	Drain	1/2"			3/4"
	Brine Line Connector	3/8"			/
	Mounting Base	2.5"-8NPSM			
	Riser Pipe	1.05"OD (Φ26.7 mm)			
Flow Meter	3/4"	3/4"	3/4"	/	
Installation Type	Top-mounted	Top-mounted	Top-mounted	Top-mounted	
Regeneration Type	DF softener	UF softener	DF softener	Filter	
Hard Water Bypass	Optional	Optional	Optional	/	
Display Mode	Indicator /LED/LCD		LED/LCD	Indicator /LED/LCD	
Matched Bypass Valve	F70B	F70B	F70D	/	
Matched Injector	6301~6306 or 6801~6806		/		

Max. Flow Rate 3-4m<sup>3</sup>/h

Valve Model		F63	F68	F82	F67
Valve Body Material		ABS+GF10	ABS+GF10	PPO	ABS+GF10
Working Voltage		DC12V	DC12V	DC12V	DC12V
Flow Rate (Pressure Drop 0.1MPa)		3.1m <sup>3</sup> /h	3.1 m <sup>3</sup> /h	3.1 m <sup>3</sup> /h	3.18 m <sup>3</sup> /h
Max. Flow Rate (Pressure Drop 0.175MPa)		4.2 m <sup>3</sup> /h	4.2 m <sup>3</sup> /h	4.2 m <sup>3</sup> /h	4.3 m <sup>3</sup> /h
Service Kv Value		3.13	3.13	3.13	3.18
Backwash Kv Value		1.25	1.25	1.25	3.1
Technical Parameter	Inlet/Outlet	1"			1"
	Drain	1/2"			1"
	Brine Line Connector	3/8"			/
	Mounting Base	2.5"-8NPSM			
	Riser Pipe	1.05"OD (Φ26.7 mm)			
Flow Meter		1"	1"	1"	/
Installation Type		Top-mounted	Top-mounted	Top-mounted	Top-mounted
Regeneration Type		DF softener	UF softener	DF softener	Filter
Hard Water Bypass		Optional	Optional	Optional	/
Display Mode		Indicator /LED/LCD		LED/LCD	Indicator /LED/LCD
Matched Bypass Valve		F70A/F70F		F70C	/
Matched Injector		6301~6310 or 6801~6810			/

Max. Flow Rate 5-6m<sup>3</sup>/h

Valve Model		F92	F98A	F98C
Valve Body Material		PPO	ABS+GF10	ABS+GF10
Working Voltage		DC12V	DC12V	DC12V
Flow Rate(Pressure Drop 0.1MPa)		4.77 m <sup>3</sup> /h	4.43 m <sup>3</sup> /h	3.1 m <sup>3</sup> /h
Max. Flow Rate (Pressure Drop 0.175MPa)		6.5m m <sup>3</sup> /h	5.8 m <sup>3</sup> /h	4.2 m <sup>3</sup> /h
Service Kv Value		4.77	4.43	4.43
Backwash Kv Value		1.35	1.22	/
Technical Parameter	Inlet/Outlet	1"	1"	1"
	Top and Bottom Connector	/	1"	1"
	Drain	3/4"	3/4"	3/4"
	Brine Line Connector	3/8"	3/8"	3/8"
	Mounting Base	2.5"-8NPSM	/	/
	Riser Pipe	1"D-GB(Φ32 mm)	/	/
Flow Meter		1"	1"	1"
Installation Type		Top-mounted	Side-mounted, one in service one standby	Side-mounted, one in service one standby
Regeneration Type		DF softener	DF softener	Floating bed softener
Hard Water Bypass		Optional	/	/
Display Mode		LED/LCD	LED	LED
Matched Bypass Valve		F70F	/	/
Matched Injector		F92.1#~10#	17610.2#~3#	

Max. Flow Rate 8-12m<sup>3</sup>/h

Valve Model		F74	F75	F88A	F88C	
Valve Body Material		ABS+GF10	ABS+GF10	ABS+GF10	ABS+GF10	
Working Voltage		DC24V	DC24V	DC24V	DC24V	
Flow Rate(Pressure Drop 0.1MPa)		6.5m <sup>3</sup> /h	8.7 m <sup>3</sup> /h	6.5 m <sup>3</sup> /h	6.5 m <sup>3</sup> /h	
Max. Flow Rate (Pressure Drop 0.175MPa)		8.8 m <sup>3</sup> /h	11.4 m <sup>3</sup> /h	9.0 m <sup>3</sup> /h	9.0 m <sup>3</sup> /h	
Service Kv Value		6.5	8.7	6.5	6.5	
Backwash Kv Value		3.57	8.0	4.24	/	
Technical Parameter	Inlet/Outlet	2"	2"	1.5"		
	Top and Bottom Connector	/	/	1.5"		
	Drain	1"	2"	1"		
	Brine Line Connector	1/2"	/	1/2"		
	Mounting Base	4"-8UN			/	
	Riser Pipe	1.5"D-GB (Φ50 mm)			/	
Flow Meter		2"	/	1.5"		
Installation Type		Top-mounted or side-mounted		Side-mounted, one in service one standby		
Regeneration Type		DF softener	Filter	UF softener	Floating bed	
Hard Water Bypass		/	/	/		
Display Mode		LED	LED	LED		
Matched Injector		7401~7404	/	17610.2#~17610.3#		
Matched Three-way Valve		Two sets of F74A3+F80 as a system with one in service one standby			/	

Max. Flow Rate 15-20m<sup>3</sup>/h

Valve Model		F77A	F77B	F95A	F111B
Valve Body Material		ABS+GF10	ABS+GF10	ABS+GF10	ABS+GF10
Working Voltage		DC24V	DC24V	DC24V	DC24V
Flow Rate (Pressure Drop 0.1MPa)		12.37 m <sup>3</sup> /h	11.71 m <sup>3</sup> /h	16.48 m <sup>3</sup> /h	16.71 m <sup>3</sup> /h
Max. Flow Rate (Pressure Drop 0.175MPa)		17.2 m <sup>3</sup> /h	15.2 m <sup>3</sup> /h	21.3 m <sup>3</sup> /h	22.5 m <sup>3</sup> /h
Service Kv Value		12.37	11.71	16.48	16.71
Backwash Kv Value		7.43	13.13	8.41	18.97
Technical Parameter	Inlet/Outlet	2"	2"	2"	2"
	Top and Bottom Connector	/	/	2"	/
	Drain	1.5"	2"	1.5"	2"
	Brine Line Connector	3/4"	/	3/4"	/
	Mounting Base	4"-8UN		/	4"-8UN
	Riser Pipe	1.5"D-GB (Φ50 mm)		/	2"D-GB(Φ63 mm)
Flow Meter		2"	/	2"	/
Installation Type		Top-mounted or side-mounted		Side-mounted	Top-mounted
Regeneration Type		DF softener	Filter	DF softener	Filter
Hard Water Bypass		LED		LED	
Display Mode		7701~7705	/	7701~7705	/
Matched Injector		Two sets of F74A3+F80 as a system with one in service one standby		/	

F95A has filter valve F95B. F111B has softener valve F111A. F111 and F95 have the same valve core, only with different installation type, F111 is top-mounted, F95 is side-mounted.

Max. Flow Rate 30-40m<sup>3</sup>/h

Valve Model		F78A	F78B	F112A	F112B
Valve Body Material		ABS+GF10	ABS+GF10	ABS+GF10	ABS+GF10
Working Voltage		DC12V	DC12V	DC24V	DC24V
Flow Rate (Pressure Drop 0.1MPa)		26.36 m <sup>3</sup> /h	25.94 m <sup>3</sup> /h		
Max. Flow Rate (Pressure Drop 0.175MPa)		35.2 m <sup>3</sup> /h	35.2 m <sup>3</sup> /h		
Service Kv Value		26.36	25.94		
Backwash Kv Value		16.58	22.62		
Technical Parameter	Inlet/Outlet	DN65	DN65	DN65	DN65
	Top and Bottom Connector	DN80	DN80	DN80	DN80
	Drain	DN65	DN65	DN65	DN65
	Brine Line Connector	3/4"	/	3/4"	/
Flow Meter		2.5"	/	2.5"	/
Installation Type		Side-mounted		Side-mounted	
Regeneration Type		DF softener	Filter	DF softener	Filter
Display Mode		LED		LED	
Matched Injector		7801~7804	/	7801~7804	/
Matched Disc Filter		45040		45040	

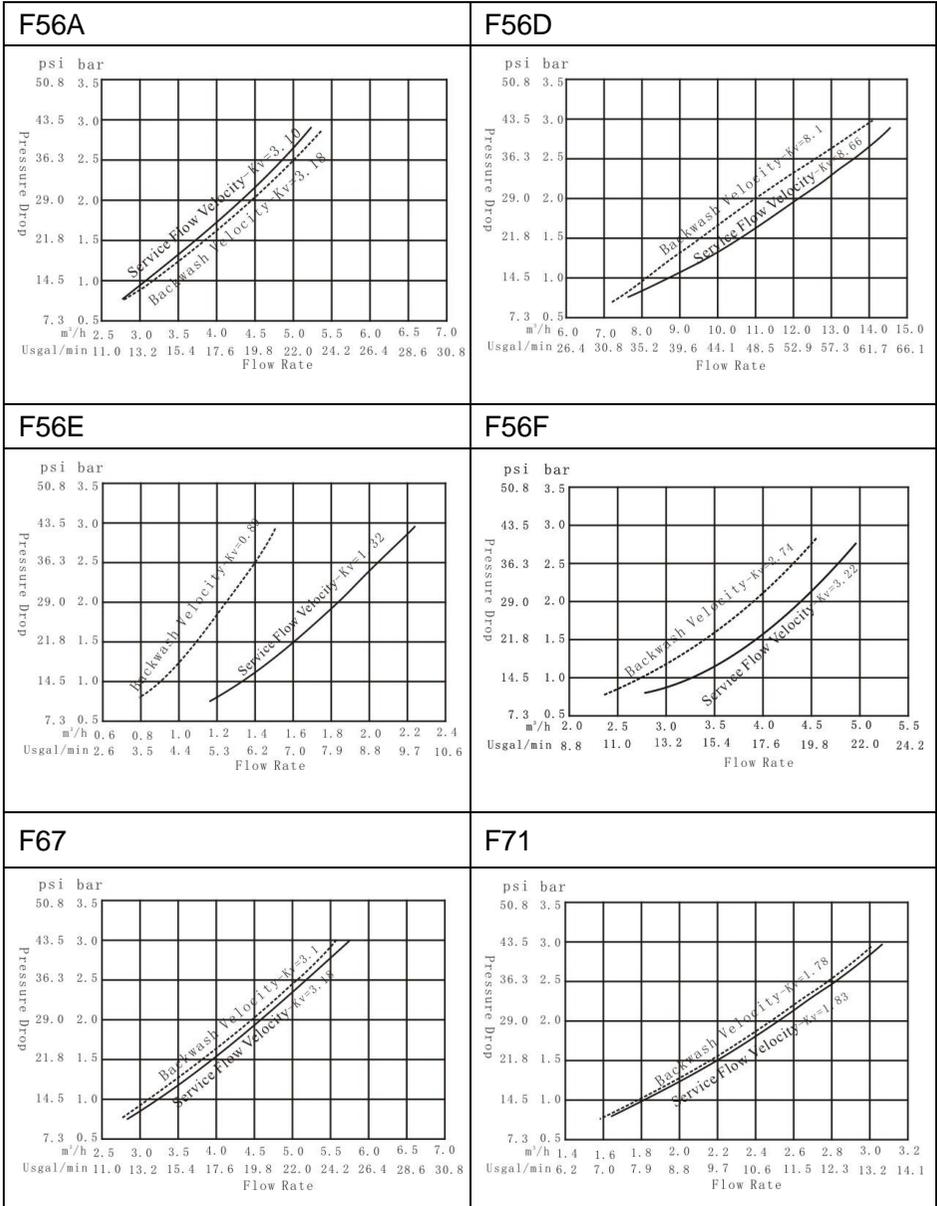
According to F96 construction, improve F78 valve as F112, matched with booster pump which has a low request for inlet pressure.

Max. Flow Rate 50m<sup>3</sup>/h

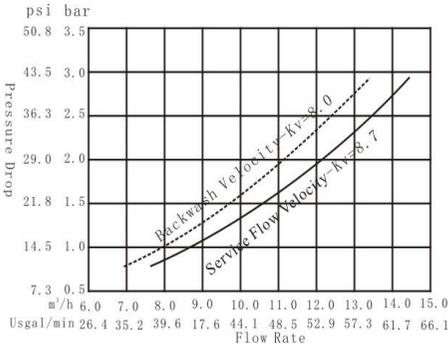
Valve Model		F96A	F96B
Valve Body Material		ABS+GF10	ABS+GF10
Working Voltage		DC24V	DC24V
Flow Rate (Pressure Drop 0.1MPa)		45.72 m <sup>3</sup> /h	44.97 m <sup>3</sup> /h
Max. Flow Rate (Pressure Drop 0.175MPa)		60.8 m <sup>3</sup> /h	60.8 m <sup>3</sup> /h
Service Kv Value		45.72	44.97
Backwash Kv Value		16.73	38.46
Technical Parameter	Inlet/Outlet	DN80	DN80
	Top and Bottom Connector	DN100	DN100
	Drain	DN80	DN80
	Brine Line Connector	3/4"	/
Flow Meter		3"	/
Installation Type		Side-mounted	Side-mounted
Regeneration Type		DF softener	Filter
Display Mode		LED	LED
Matched Injector		7804~7805	/
Matched Disc Filter		45040	45040

### 3.2. Flow Data

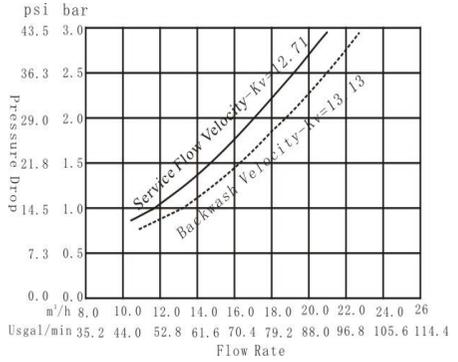
#### 3.2.1. Flow Data of Filter Valve



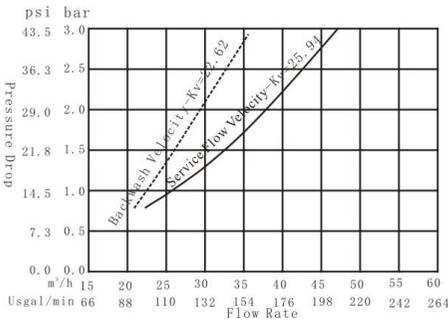
### F75B



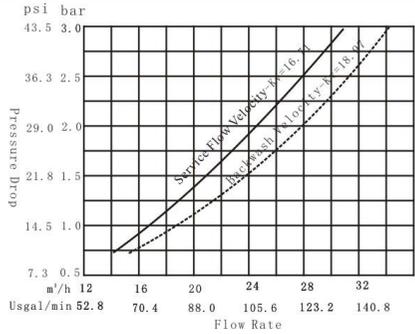
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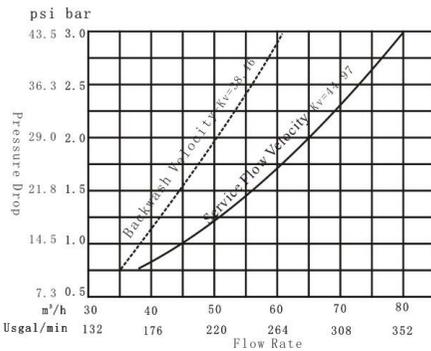
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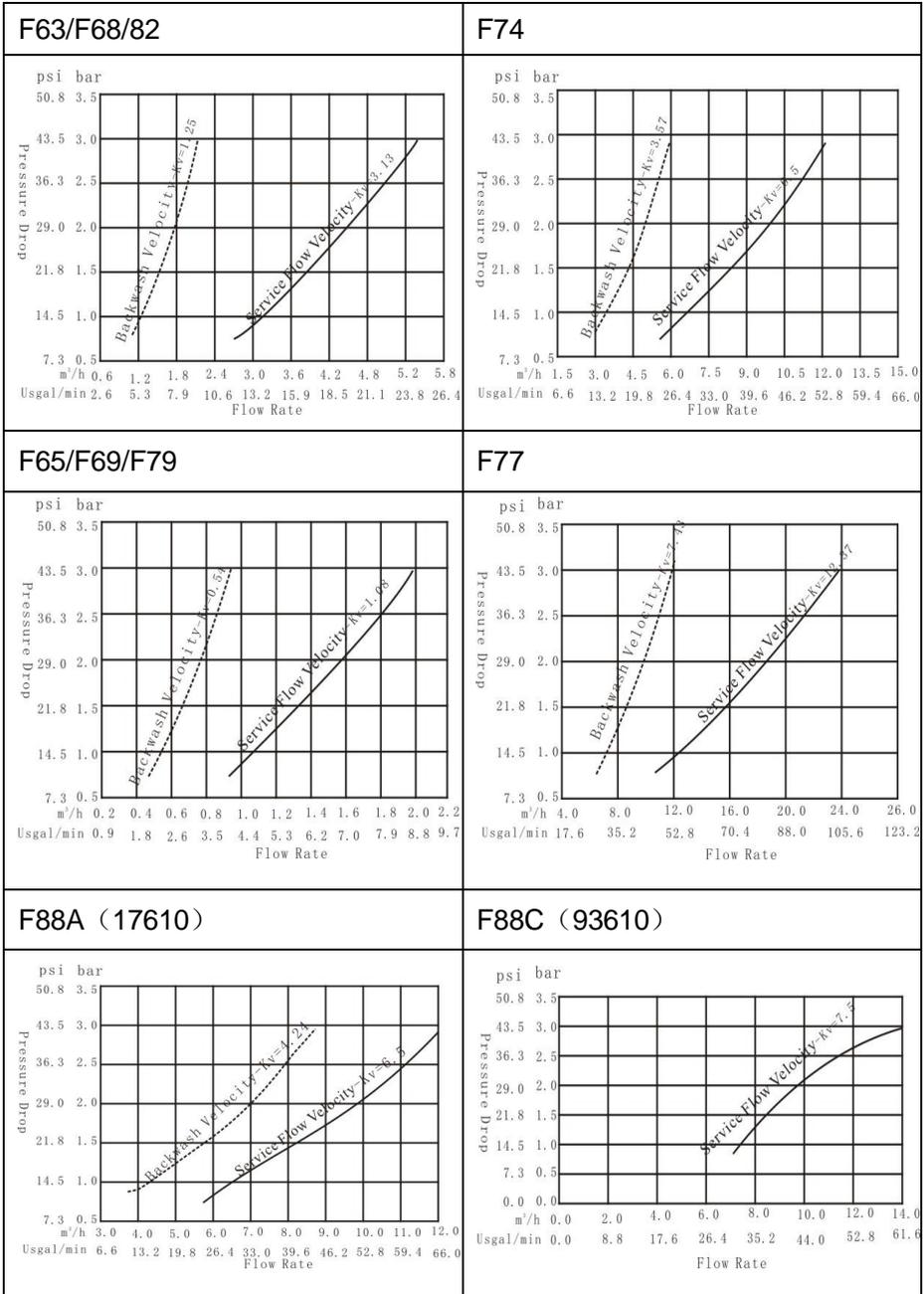
### F95B/F111B



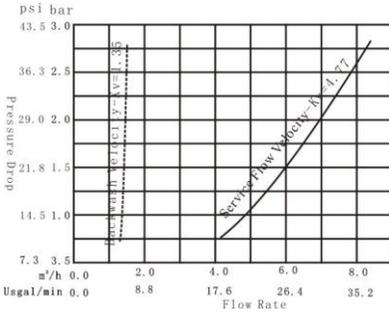
### F96B



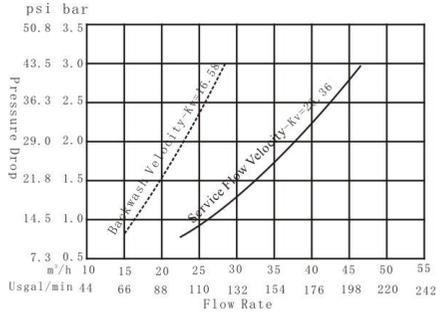
3.2.2. Flow Data of Softener Valve



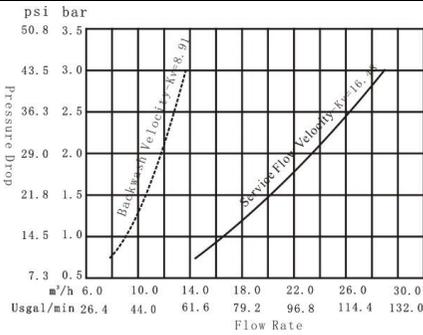
F92



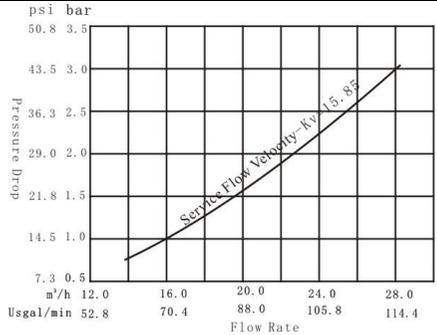
F78 (63640)



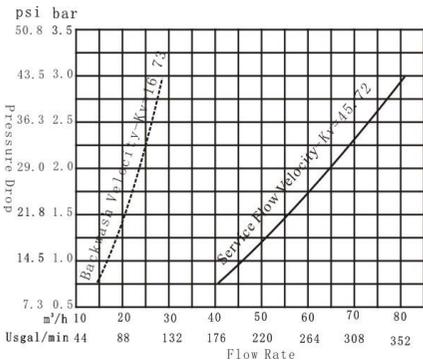
F95A (63620)



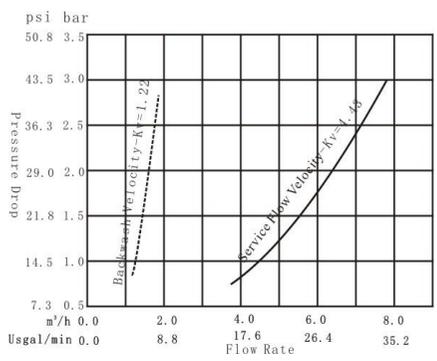
F95C (93620)



F96A (63650)



F98A (17606)



### 3.3.The Design of Filtration System

#### 3.3.1.Filtration Requirement

Filtration is the process of separating suspended solids from the water through filtering media.

The filter media should meet the following conditions: Stable chemical performance; Does not affect the outlet water quality; Good mechanical strength, not easy to fragment; Appropriate particle size, good uniformity. The common filter medias are quartz sand, anthracite, marble etc..

#### 3.3.2. Factors of Affecting the Operation of Filtering

The operation process of filtering system: During the service, the water pass through the media from top to bottom, separating suspended solids from the water; When the pressure drop reach a certain value or the turbidity of outlet water failed to meet the requirement, the system need to start the backwash from bottom to top, cleaning up the sludge and powder on the media and recovering media's filtration ability; After backwash, the fast rinse is needed till the turbidity of outlet water is qualified; Then, the system will start a new service cycle.

There are main aspects to evaluate the filtration effect: One is the outlet water quality which is measured by turbidity; Another is filtration ability of media which is also called sludge treatment capacity. It means under the conditions of keeping qualified outlet water, the sludge volume which unit volume filtering media can hold back during a filtering cycle.

The main factors that affect the filtration effect are filtering velocity, backwash and water homogeneity. The analysis is below:

##### A. Filtering velocity

$$v=Q/S \text{ (m/h)}$$

In the formula, Q—Outlet flow rate of filter, m<sup>3</sup>/h.

S—Sectional area of filtration, m<sup>2</sup>.

It can be seen that the filtering velocity doesn't mean the rate that

water pass through the hole between the media. It is the rate that water pass through the filter tank under the assumption that the filtering media doesn't occupy the space. That is the relative data that indicate the speed of water flow.

**The best filtering velocity is related to the media characteristics and inlet/outlet water quality.** The maximum filter velocity is depending on the diameter of media. The smaller diameter is, the lower velocity will be.

## B. Backwash

**The way to determine whether the backwash is needed is not by the turbidity of drain water, it is depending on the pressure drop when water pass through the filtering media.** This is because the turbidity is hard to detect as its changes regularity is not obvious. While, for the pressure drops, it is easily to test as its change is obvious.

When the pressure drop reaches a certain value, the filters should stop service and start backwash. **It is avoid that the filter conducts backwash when pressure drop is high. The reason is: High inlet water pressure is required when pressure drops too much. It will cause the media easily broken, resulting the water flow out from the crack and destroy the filtration effect. And then, make the outlet water unqualified easily.**

The backwash flow rate can be expressed by “backwash intensity” whose unit is  $L / (m^2 \cdot s)$ , indicating the backwash water volume(L) that water pass through per square meter of filtering section per second. The proper backwash intensity not only can make filtering layer become less crowded, washing away the sludge and media powder by crash and friction between the particles, but also can avoid the good filtering media being washed away. Usually, the backwash intensity of quartz sand is  $15 \sim 18 L / (m^2 \cdot s)$ , and the intensity of anthracite should be  $10 \sim 12 L / (m^2 \cdot s)$  due to its low density. The backwash time usually takes 5~10 minutes.

### 3.3.3. Filtration System Design with Runxin Valve

There are some notes when select valve model for the filtration system. The backwash velocity of Runxin filter valve is similar with the service velocity. **Therefore, you should combine your backwash intensity that your system is designed with Runxin filter valve's backwash velocity to select the proper valve model**, but not make decision depending on the water treatment capacity of your system and the maximum capacity of Runxin filter valve. For example: If an active carbon filter system with 10m<sup>3</sup>/h water treatment capacity require 25 m<sup>3</sup>/h backwash flow rate, you need to choose Runxin F78 valve but not F75A.

## 3.4.The Design of Softener System

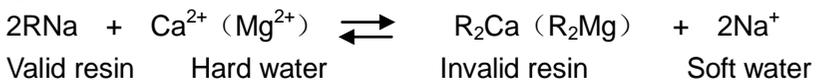
### 3.4.1.Working Process of the Ion Exchanger

The following information mainly introduces the sodium ion exchange softening process.

The main purpose of sodium ion exchange is to remove Ca<sup>2+</sup>, Mg<sup>2+</sup> from water, make hard water to be soft and prevent lime scale in boiler. When the alkalinity of raw water is low, it could use sodium ion exchange treatment for feed water for low pressure boiler system. Softener has five stages which are service, backwash, brine & slow rinse, brine refill and fast rinse.

#### A. Service

Water pass through the resin layers in resin tank, most part or full part of calcium and magnesium are removed from water. The ion exchange process is as following:



When the raw water pass through resin layers from top, the top layer of resin is getting invalid. Then water continuously flow down and make ion exchange with the next layer of resin which makes the working layer

of resin moving down. There are three areas of exchange layers, showed as Figure 3-1.

The top is the invalid resin layer, as the ion exchanging, the exchange reagent is in the form of  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$  which lose the softening ability. When hard water pass through this layer, it won't get ion exchanging anymore, so it is called invalid resin layer(Which is also called saturated layer). The middle layer is the working layer. When water pass through, the  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$  in water will get exchanged with  $\text{Na}^+$  in exchange reagent, so in this layer, the reagent is in both form of  $\text{Na}^+$  and  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ . The bottom exchange reagent is not exchanged, mostly in form of  $\text{Na}^+$ . As the ion exchange proceed, the invalid resin layers is getting expand, the working layer moves down and the non-exchanged layer is getting less. When the working layer is close to the bottom of reagent layers, there may be calcium and magnesium in outlet water which causes it is unqualified. To ensure the quality of outlet water, there should be a certain layer of non-exchanged, it is called protection layer.

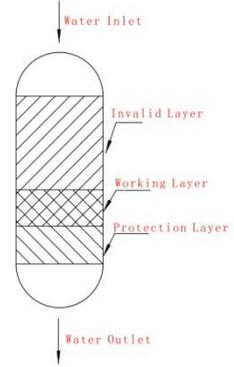


Figure 3-1 Ion exchange process

### The factors of affecting the thickness of working layer:

①.Service: The faster of water passing through the exchange reagent layer is, the thicker of working layer will be.

②.Raw water quality: When the treated water standard is certain, the bigger ion concentration in water which should be removed, the thicker of working layer will be.

③.The bigger particle size of exchange reagent, the lower temperature of water flow, the slower exchanging process, the thicker of working layer will be.

### B. Regeneration process

Recover the exchanging ability for invalid resin, including but not

limited to backwash, regeneration, exchanging, fast rinse, etc..

### C. Backwash

When ion exchange resin is invalid, use water to clean resin from bottom to top to make it expanded and loose, meanwhile, to wash away the suspended solids, broken resin, etc..

The purpose of backwash: One is to make tightened resin be loose, which makes resin particle be contacted with regeneration reagent sufficiently. Another is to wash away the suspended solids and broken resin to prevent water resistance getting bigger. Keep a certain backwash space on the top of tank to ensure the good shape of resin do not be washed away. The bigger backwash intensity is, the bigger space will be. When design the system, keep 40%~50% of expansion height of the resin height in resin tank for down-flow or up-flow regeneration fixed bed softener system.

### D. Regeneration

The regeneration reagent with a certain concentration pass through the invalid ion exchange resin layer with a certain speed, which makes the resin recovering the exchange ability. Depending on the flow direction, there are down-flow (The regeneration reagent flow direction is the same as service's) and up-flow (The regeneration reagent flow direction is the opposite of service's). The regeneration is called brine draw in this manual.

The consumption of regeneration reagent is defined the regeneration reagent consumed (g) for recovering the exchange reagent per mol. If use NaCl for regeneration, it is called salt consumption.

### E. Exchanging

Exchanging is the continued step of regeneration. After brine draw finished, the water is continued pass through the exchanger with the same direction and flow speed of regeneration reagent passing, which makes the further regeneration and wash away the waste water.

There are still some valid regeneration reagent on the top of tank or

in resin after brine draw finished, use this part of reagent to clean the injector nozzle. The cleaning water volume is about 0.5 or 1 times of resin volume. During the exchanging, the air check in brine tank should be closed to prevent water entering into tank.

#### F. Brine refill

After brine draw, refill water into brine tank.

Under temperature 25°C, 360g of salt could be dissolved in 1L of water to be saturated brine (Concentration 26.4%).

To ensure the brine in tank is saturated, the dissolving time should longer than 6hours and there is always solid salt in brine tank.

#### G. Fast rinse

After exchanging or before softener reusing after stopping for a while, water pass through the ion exchange resin layer in the same direction of service's to wash away the waste liquid or residual ion until the outlet water is qualified. The water volume for fast rinse is about 3~6 times of resin volume.

### 3.4.2.Factors of Influencing the Regeneration

#### A. Regeneration way

General speaking, up-flow regeneration has better effect than down-flow regeneration.

In down-flow regeneration, the regeneration reagent firstly contacts the fully invalid exchanger on the top of the tank. When regenerate reagent flow down to the protection layer of exchanger on the bottom, in reagent there are less content of  $\text{Na}^+$  and big content of  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$  which is exchanged, but ion exchange is reversible. So the exchanger on the bottom of tank could not be exchanged completely. Even the protection layer of exchanger may be polluted by the exchanged  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$  which affect the treated water quality. In order to improve the exchanger regeneration level, it needs to add the reagent.

In up-flow regeneration, the regeneration reagent firstly contacts the

protection layer of reagent. When it flows to the top of tank where the exchanger is high degree of invalid, even through the exchanged  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$  concentration increasing, but it will be drained immediately, so it helps for regeneration. Up-flow regeneration could make protection layer of exchanger regeneration completely, so even if the exchanger regeneration ability is not good, it won't affect the treated water quality.

**Up-flow regeneration has advantage of good quality of treated water, low salt consumption, big exchange capacity, etc..**

#### B. Regeneration reagent consumption

If it is short of reagent, regeneration capacity get lower, working exchange capacity affected, water treatment circle get shorter, waterconsumption increase and water quality will be affected as well. Add reagent volume to improve the degree of regeneration effect. Generally speaking, the regeneration reagent consumed (mz) per regeneration for fixed bed ion exchanger uses the following formula to calculate:

$$mz = V_R \cdot E \cdot k \cdot M / (\epsilon \times 1000)$$

In this formula:

mz—Regeneration reagent consumed per regeneration, kg.

$V_R$ — Resin volume ( $\text{m}^3$ )

E—Exchange reagent working capacity, strong acid cation resin is about  $800 \sim 1500 \text{mol}/\text{m}^3$ .

k—Regeneration reagent consumption, for strong ion exchange resin, down-flow regeneration, k range from 2 to 3.5, up-flow regeneration, k range from 1.2~1.8. For weak ion exchange resin, down-flow regeneration, k range from 1.1~1.5. For sulfonated coal, k range from 3~4.5.

M—Molar mass of reagent, g/mol. 58.5g/mol for NaCl.

$\epsilon$ —Purity of reagent, 95% to 98% for the NaCl content of table salt.

#### C. Regeneration reagent concentration

When the reagent volume is fixed, **the bigger concentration is, the higher capacity of regeneration will be.** If the concentration is low, regeneration will be incomplete with longer time and more water consumed. But the concentration can't be too high, when there is a fixed quantity of reagent, the higher concentration, the smaller volume of reagent. If the concentration is too high, the reagent will not process exchanging evenly, exchange group will be compressed which reduce the regeneration effect. Generally speaking, **the regeneration reagent concentration is 5%~8%.** The saturated brine concentration is 26%. So the valve requires the ratio of injector draw to total flow rate is around 20%~32%. All of Runxin valve comply with this requirement.

#### D. Regeneration reagent flow rate

Regeneration reagent flow rate means the flow rate when reagent pass through the exchanger layers. If the flow rate is too fast, the reagent will not have enough time to contact exchanger, the exchanging process insufficient and the reagent is drained out from the tank. For down-flow regeneration, the flow rate of reagent is around 4~8m/h. For up-flow regeneration tank without top pressure, the flow rate should be lower, about 2~4m/h to prevent exchanger layer disorder.

In order to make the sufficient exchanging, the time of regeneration reagent connecting with resin should be no less than 30 minutes. When the regeneration reagent volume and flow rate are fixed, it could use the following formula to calculate the reagent entering time:

$$t=60Vz/ (Su)$$

Thereinto,  $Vz=m_{CZ}/ (C\rho\times 10^3)$

In this formula:

t—Regeneration reagent entering time, min.

Vz—Regeneration reagent entering volume, m<sup>3</sup>.

S—Sectional area of exchanger, m<sup>2</sup>.

u—Regeneration reagent flow rate, m/h.

$m_{CZ}$ —Purity 100%, regeneration reagent volume consumed per regeneration, kg.

C—Regeneration reagent concentration, %.

$\rho$ —Regeneration reagent density, kg/L or t/m<sup>3</sup>.

#### E. Regeneration reagent temperature

The reagent temperature has a big influence on regeneration effect. Increase the temperature properly, it could fasten the ion spread to improve the regeneration effect. When ion exchange, if the reagent temperature is up to 50°C, it could improve the regeneration effect rapidly. But as ion exchange is limited by thermostabilization, the temperature can't be too high, or the exchange group will be disintegrated and affect the exchange capacity.

#### F. Regeneration reagent purity

The reagent purity has a big influence on regeneration effect and treated water quality. If the reagent contents lots of impurity ion, it will reduce the regeneration effect. If the NaCl concentration is low in sodium, it can't be used as regeneration reagent.

### 3.4.3.The Design of Runxin Valve in Softener System

#### A. Standard complied with ——GB/T 50109 Demineralization design regulation for industrial water supplying

Status	Item	Parameter	Remark
Service	Filtering velocity	20~30m/h	The bigger velocity is, the bigger working layer will be needed. The slow flow rate will result in raw water only exchange with the surface ion of resin.
Backwash	Flow rate	15m/h	The backwash expansion space is 50%.
	Time	15min	
Regeneration	Regeneration reagent consumption	2~2.4Kg/KgCaCO <sub>3</sub> (100~120g/mol)	The salt consumption is depending on salt containing in inlet water.
	Regeneration reagent concentration	5~8%	
	Flow rate	Down-flow regeneration	4~6m/h
Up-flow regeneration		2~4m/h	Use the minimal flow rate for non top pressure up-flow regeneration system to prevent resin in disorder.
Exchanging	Water consumption	0.5 ~ 1 times of resin volume	
	Flow rate	The same as regeneration's	The actual exchanging flow speed=Total flow speed of injector-brine draw flow speed.
	Time	Need calculation	
Fast rinse	Water consumption	3~6 times of resin volume	Till to outlet water is qualified.
	Flow rate	15~20m/h	

Working exchanging capacity	Down-flow	40~45KgCaCO <sub>3</sub> /m <sup>3</sup> (0.8~0.9mol/l)	
	Up-flow	50~60KgCaCO <sub>3</sub> /m <sup>3</sup> (0.9~1.2mol/l)	

## B. Parameter

No.	Description	Symbol	Unit	Formula or value
①Service time or water treatment capacity				
1	Resin volume	V <sub>R</sub>	m <sup>3</sup>	
2	Resin working capacity	E	mol/ m <sup>3</sup>	For down-flow, is 800~900 mol/ m <sup>3</sup> , for up-flow, is 900~1200 mol/ m <sup>3</sup> .
3	Raw water hardness	Y <sub>D</sub>	mol/ m <sup>3</sup>	
4	Security factor	K		Always take 1.2~2. It is related to the hardness of inlet water: the higher the hardness is, the bigger the K will be.
5	Water treatment capacity	Q	m <sup>3</sup>	Q=V <sub>R</sub> ×E/ (Y <sub>D</sub> ×K)
6	Service time	t <sub>1</sub>	Day	t=Q/Water consumption per day
7	Service time	t <sub>1</sub>	Hour	t=Q/Water consumption per hour
②Backwash time				
8	Backwash time	t <sub>2</sub>	min	According to GBJ109-1987, backwash time is always set 10~15 minutes.
③Brine &slow rinse time				
9	Regeneration reagent consumption	k		Down-flow, k is 2~3.5. Up-flow, k is 1.2~1.8.
10	Molar mass of reagent	M		58.5 for NaCl.
11	Purity of reagent	ε	%	95% to 98% for the NaCl content of table salt.
12	Regeneration reagent volume consumed per regeneration	Mcz	Kg	Mcz=V <sub>R</sub> ×E×k×M/ (ε×1000)

13	Regeneration reagent concentration	C	%	Under normal temperature, saturated NaCl concentration is 26.3%.
14	Regeneration reagent density	$\rho$	Kg/L	Saturated NaCl density is 1.2.
15	Regeneration reagent entering volume	Vz	m <sup>3</sup>	$Vz = Mcz / (C \times \rho \times 1000)$
16	Total flow rate of injector	v	L/min	Check injector parameter table.
17	Brine draw flow rate	vx	L/min	$vx = v \times 25\%$ (Brine draw flow rate is 25% of total flow rate of injector)
18	Brine draw time	t31	min	$t31 = Vz / vx$
19	Exchanging water volume	Qh	L	$Qh = (0.5 \sim 1) \times V_R$
20	Exchanging flow rate	vh	L/min	$vh = v \times 75\%$ (Brine draw flow rate is 25% of total flow rate of injector)
21	Exchanging time	t32	min	$t32 = Qh / vh$
22	Brine & exchanging time	t3	min	$t3 = t31 + t32$
④ Brine refill time (As the water pressure in end user's is different, it is suggested to lengthen 1~2 minutes of calculated brine refill time to ensure sufficient water refilled on one condition that there is safety brine valve in brine tank.)				
23	Brine refill flow rate	vr	L/min	Check Injector Size and DLFC Configuration Table on Page 39.
24	Water consumed for saturated brine	Qz	L	$Qz = Mcz / 0.357$ (When saturated brine concentration is 26.3%, 1 L of water could dissolve 0.357Kg of salt.)
25	Brine refill time	t4	min	$t4 = Qz / vr$
⑤ Fast rinse time				
26	Fast rinse flow rate	vc	L/min	It is depending on DLFC, check Injector Size and DLFC Configuration Table on Page 39.
27	Water consumed in fast rinse	Qc	L	$Qc = (3 \sim 6) \times V_R$ (Till outlet water is qualified.)
28	Fast rinse time	t5	min	$t5 = Qc / vc$

⑥. Regeneration time

The whole cycle for generation is about two hours. Please try to set up the regeneration time according to the actual situation when you don't need water. The regeneration time could be set in minute.

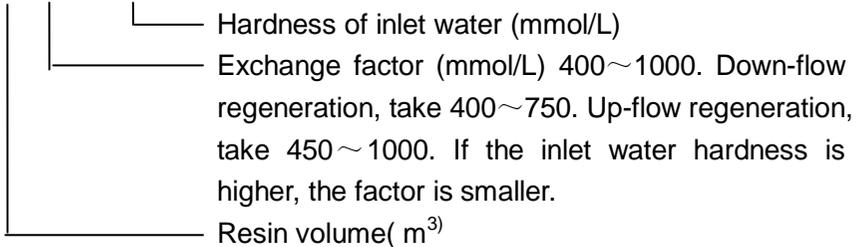
C. Parameter settlement

Based on the above standard, it has the below calculations:

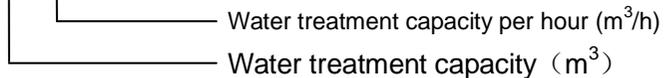
① Service time T1

Water treatment capacity:

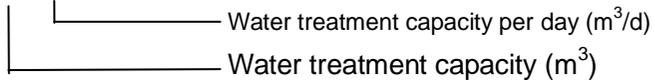
$$Q = V_R \times K \div Y_D \quad (\text{m}^3)$$



By hours:  $T1 = Q \div Q_h$  (Hour)



By days:  $T1 = Q \div Q_d$  (Day )



② Backwash time T2

It is subject to the turbidity of inlet water. Generally, It is suggested to be set 10~15 minutes. The higher the turbidity is, the longer backwash time can be set. However, if the turbidity is more than 5FTU, it should be better to install a filter in front of the exchanger.

③ Brine & slow rinse time T3

$$T3 = (40 \sim 50) \times H_R \quad (\text{min.})$$

Generally,  $T3 = 45 H_R$  (min.)

In this formula,  $H_R$  — The height of resin in exchange tank (m.)

④ Brine refill time T4

Down-flow regeneration:  $T4=0.45 \times V_R \div \text{Brine refill speed (min.)}$

Up-flow regeneration:  $T4=0.34 \times V_R \div \text{Brine refill speed (min.)}$

In this formula,  $V_R$ — Resin volume ( $\text{m}^3$ )

The Brine refill speed is related to inlet water pressure. It is suggested to lengthen 1~2 minutes of calculated brine refilling time to make sure there is enough water in tank. (The condition is that there is a brine valve installed in the brine tank)

⑤ Fast rinse time  $T5$

$$T5=12 \times H_R \text{ (min.)}$$

Generally, the water for fast rinse is 3~6 times of resin volume. It is suggested to be set 10~16 minutes, but subject to the outlet water reaching the requirement.

⑥ Exchange factor

$$\text{Exchange factor} = E / (K \times 1000)$$

In this formula,  $E$ —Resin working exchange capability ( $\text{mol/m}^3$ ), it is related to the quality of resin. Down-flow regeneration, take 800~900. Up-flow regeneration, take 900~1200.

$K$ —Security factor, always take 1.2~2. It is related to the hardness of inlet water: the higher the hardness is, the bigger the  $K$  is.

The calculation of parameters for each step is only for reference, the actual proper time will be determined after adjusting by water exchanger supplier. **This calculation procedure of softener is only for industrial application; it is not suitable for small softener in residential application.**

### 3.5. Function Application of Runxin Valve

#### 3.5.1 Function List on Main Control Board

The form with “√” means having this function.

Function Product Model	Signal Output Connector	Pressure Relief Connector	Remote Handling Connector	Interlock Connector	Salt Shortage Alarm Connector	Disinfection Connector
F63,F65,F68,F69,F67,F71	√	√	√	√		
F74A,F74B,F75A,F75B	√	√	√	√		
F77A,F77B	√	√	√	√		
F78A, F78B, F78C, F95C	√		√	√		
F95A,F95B,F95C,F95D,F 111A,F111B	√	√	√	√		
F96A,F96B	√	√	√	√		
F88,F98	√	√	√			
F92A,F92B (LED)	√		√	√		
F74F75F78 Could be connected with cell phone.	√	√	√	√		
F63P,F65P,F68P,F69P,F6 7P,F71P	√			√		
F79/82 With eastern Europe 7 languages	√		√		√	√
F79/82 With western Europe 7 languages	√		√		√	√
F79-DJ,F82-DJ					√	√
F63D,F65D,F68D,F69D,F 67D,F71D,F79D,F82D					√	√
F73	√	√	√			

### 3.5.2. Function Application

Part of Runxin valves adopt LED display board. The main functions on main control board as below:

Function	Application	Explanation
Signal output connector b-01	Outlet solenoid valve or electronic ball valve.	If system strictly require no hard water flow from outlet or controlling the liquid level in water tank.
	Inlet pump.	Increase pressure for regeneration or washing. Use the liquid level controller to control inlet pump to ensure there is water in tank.
Signal output connector b-02/Pressure relief connector	Inlet solenoid valve or electronic ball valve, or bypass pressure relief.	When inlet pressure is high, it needs to close water inlet when valve is rotating to protect motor.
Interlock connector	To ensure only one control valve regeneration or washing in system.	Use in RO Pre-treatment, water supply together but regeneration in turn. Second grade ion exchange equipment, etc.
Remote handling connector	Receipt signal to make the control rotate to next circle.	It is used for on-line inspection system, PC connection, and realize automatically or remote controlling valve.

#### A. Signal Output Connector

There is signal output connector on main control board which is used for controlling external wiring. The middle one is common (COM), two beside ones are normal close (NC) and normal open (NO). The signal output is as table 3-1:

Table 3-1 Signal Output

Set: b-01			Set: b-02		
	COM and NO	COM and NC		COM and NO	COM and NC
Service position	No connected	Connected	Each working position	No connected	Connected
Other position	Connected	No connected	Motor switching position	Connected	No connected

a).Control Solenoid Valve or Electronic Ball Valve (Set b-01)

①Solenoid Valve on Outlet Controls Water Level in Brine Tank.

**Instruction:** If system strictly require no hard water flow from outlet in regeneration cycle( Mainly for no hard water flow out when valve is switching or valve in backwash or brine drawing positions), a solenoid valve could be installed on outlet, the wiring refers to Figure 3-2.

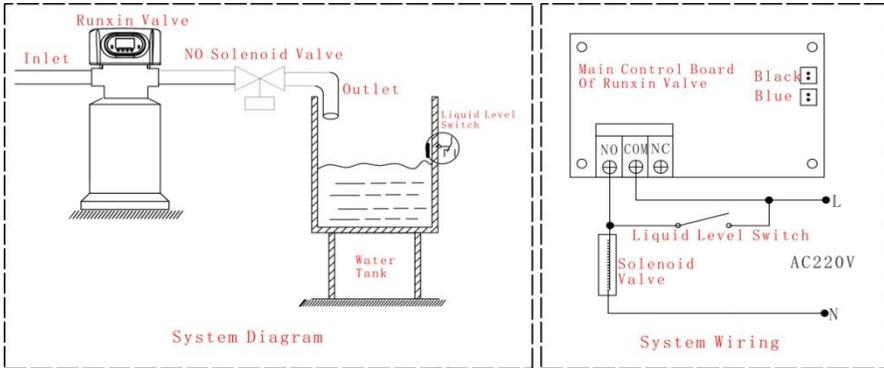


Figure 3-2

Function:

When valve in service status, if soft water tank is short of water, solenoid valve is open to supply soft water, but if water tank has enough water, solenoid valve is closed, so no soft water supplied.

When the valve in backwash status, NO and COM port is connected. So, solenoid valve is closed, and now water flow into soft water tank.

②Solenoid Valve or Electronic Ball Valve on Inlet (Set b-02)

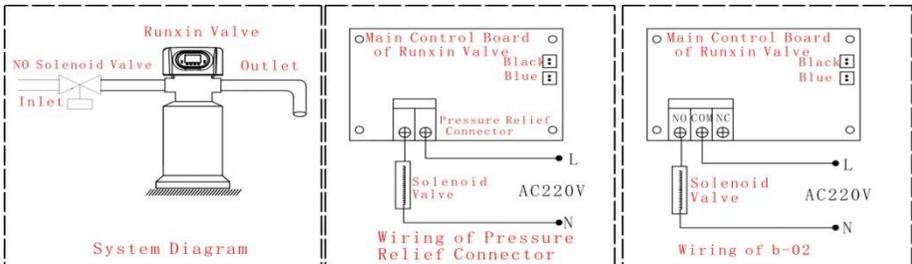


Figure 3-3

**Instruction:** When inlet pressure exceeds 0.6MPa, install a solenoid valve on inlet. Control mode is b-02. Pressure relieved when valve switching, the wiring refers to Figure 3-3.

**Function:**

When inlet pressure is high, install a solenoid valve on inlet to ensure valve switching properly. When valve is exactly in position of Service, Backwash, Brine& Slow Rinse, Brine Refill and Fast Rinse, solenoid valve is open. When valve is switching, solenoid valve is closed, no water flow into valve to ensure valve switching properly. It could prevent the problem of mix water and water hammer.

Use interlock cable to realize valves in parallel and series in same system which is suited for RO pretreatment system or second grade Na<sup>+</sup> system. The Wiring refers to Figure 3-4:

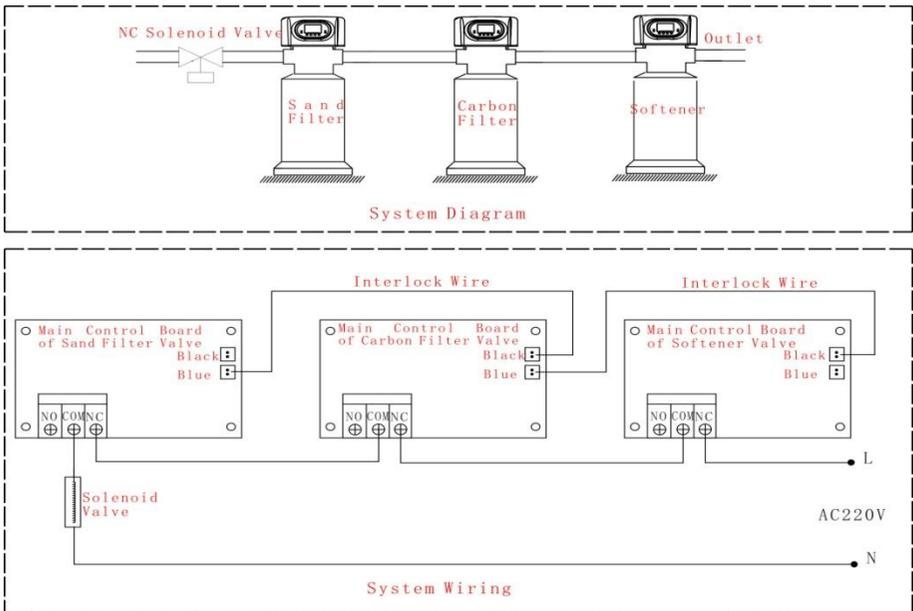


Figure 3-4

c).Liquid Level Controller Controls Inlet Pump( Two-phase Motor)( Set b-01)

**Instruction:** For the system using well or middle-tank supplying water,

switch of liquid level controller and valve together control pump opening or closing. The wiring refers to Figure 3-5:

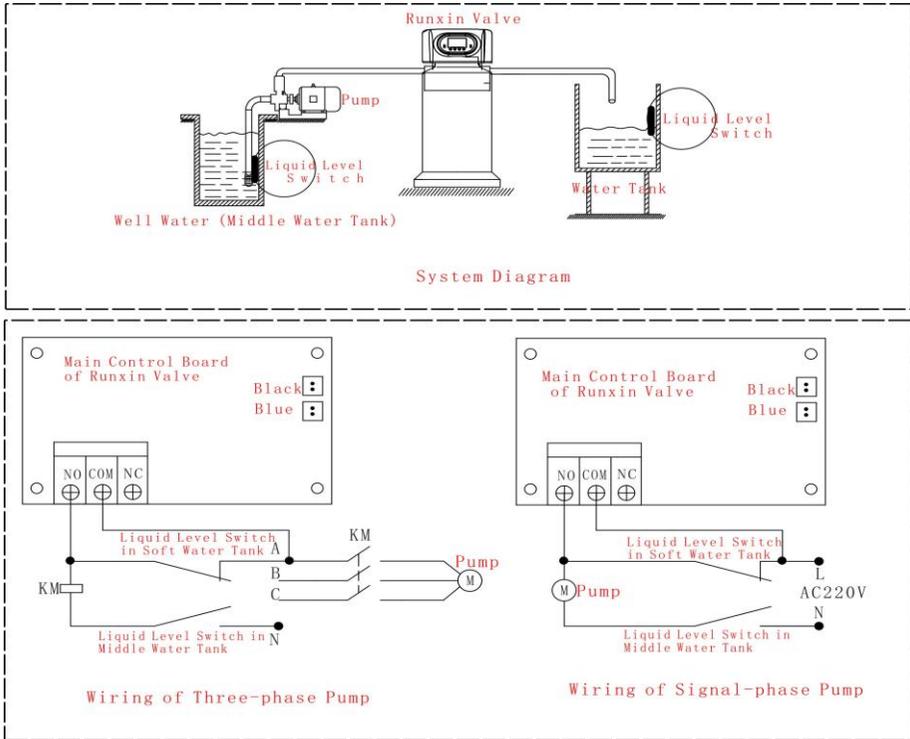


Figure 3-5

Function:

When valve in service status, if water tank is short of water, start up pump, but if water tank has enough water, the switch of liquid level controller is closed, so pump doesn't work.

When valve in regeneration cycle, inlet always has water no matter what is water condition in water tank. As Runxin valve no water pass outlet in regeneration cycle, it ensures no water fill into brine tank.

A liquid switch at the top opening of well or in middle water tank in RO system protect pump from working without water in case of out of raw water.

d).Liquid Level Switch in Water Tank Controls Inlet Pump (Three-phase)  
(Set b-01)

The principle is the same as for two-phase's, only change single-phase into three-phase motor, and use an AC contactor (Refer to Figure 3-5)

e).Control Inlet Booster Pump( Set b-01 or b-02)

**Instruction:** If inlet water pressure is less than 0.15MPa, which makes backwash or brine difficult, a booster pump is suggested to be installed on inlet. Control mode b-01. When system in regeneration cycle, booster pump is open, the wiring refers to Figure 3-6. If the booster pump current is bigger than 5A, system need to install a contactor, the wiring refers to Figure3-6.

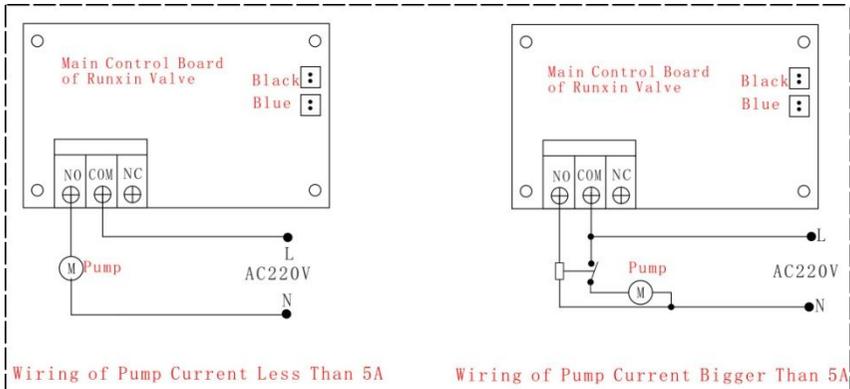


Figure 3-6

Function: If inlet pressure for softener or filter is low, system need to install a booster pump on inlet to increase pressure for regeneration or washing.

B. Interlock

**Instruction:** In the parallel water treatment system, it ensures only one valve in regeneration or washing cycle and (n-1) valves in service, that is, realizing the function of supplying water simultaneously and regenerating individually.

In the series and parallel water treatment system(Second grade Na+ Exchanger or RO pre-treatment system), it ensure only one valve in regeneration or washing cycle and there is/are water(s) in service. The

wiring refers to Figure3-7.

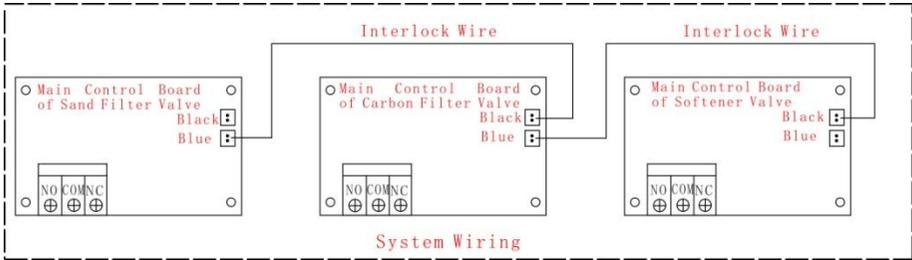


Figure 3-7

Use Interlock Cable to connect CN8 to CN7 on next valve in the loop.

One system with several valves, if interlock cable is disconnected, the system is divided into two individual system.

### C.Pressure Relief Output

Runxin valve will cut off feeding water to drain line when it switches in regeneration cycles. Thus in some water treatment system, e.g. Deep Well, one booster pump was installed on the inlet to increase the system water feeding pressure, this cut-off will cause pressure on inlet rising too fast to damage the valve. Pressure Relief Output can be used to avoid this problem. The wiring refers to Figure3-8.

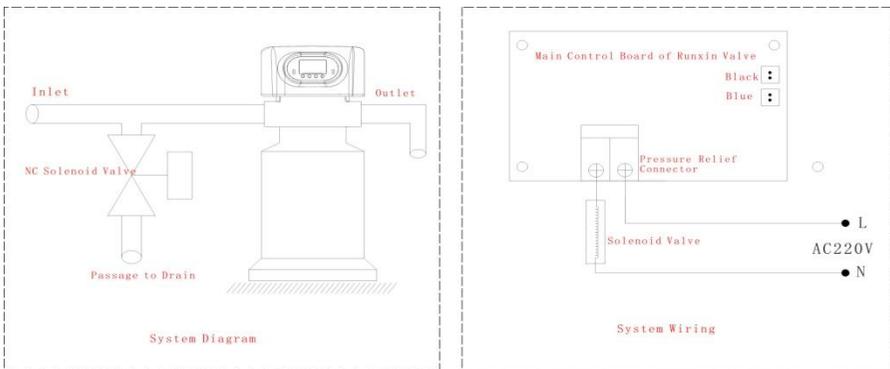


Figure 3-8

### D.Remote Handling Connector

Online TDS meter monitors treated water other than a flow meter, or

PLC controls the regeneration time. When the controller receives a contact closure from above instruments, regeneration begins. The wiring refers to Figure3-9.

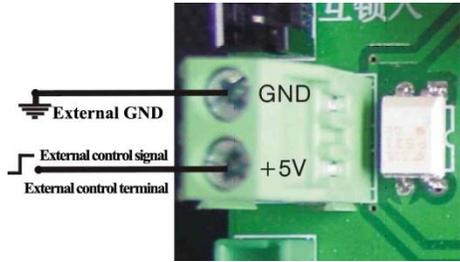


Figure 3-9

Extended function: If use PLC to control time clock type control valve, set each time of softener valve to be maximum. PLC will send the signal to valve to make it regeneration. For example, the backwash time set PLC is 20 minutes, when time drops to zero (But the time not arrive at zero in softener valve), PLC will send the signal to valve to make it end the backwash to the next position.

#### E.Maximum Interval Regeneration Days

When you use meter type control valve, there is any problem with flow meter and you don't have replacement part, you could set maximum interval regeneration days H-30 as a time clock type valve.

Setting method: Set A-01 meter delayed, regeneration time and service days which is suited for your practical application, such as regeneration every 2 days, you could set H-02. So it is a time clock type valve.

#### F.Interlock System

2 or more than 2 valves are interlocked connecting in one system and all valves are in service but regenerate individually. The wiring refers to Figure3-10.

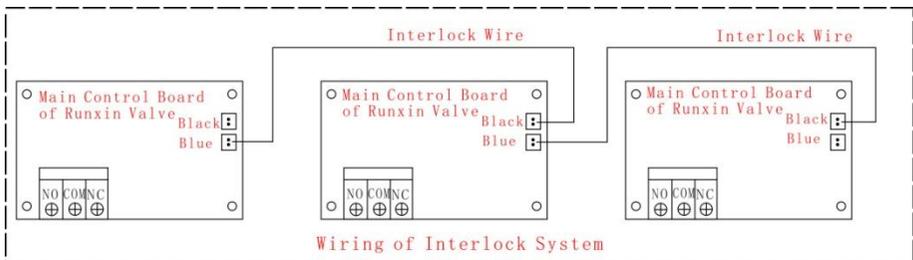


Figure 3-10

### G.Series System

This is a 2 or more than 2 valves system, all in service, with one flow meter for the entire system. For the time clock type valve, the regeneration time should be set and adjusted to the max. For the meter type valve, connect its signal output connector with the remote handle connector of the time clock type valve. That can realize the function of supplying water simultaneously and regenerating orderly. The wiring refers to Figure 3-11:

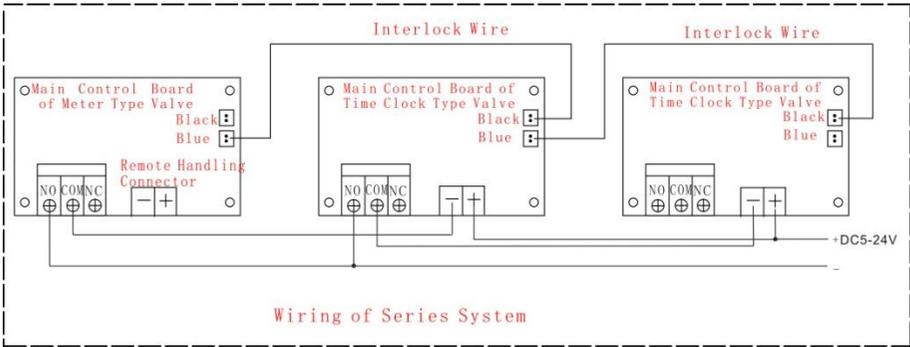


Figure 3-11

### H.One in Service One Standby Softening System

Use two pieces of F74A3, F77A3 or F95A3 with one piece of F80 three-way valve as a system of one in service one standby, the wiring refers to Figure 3-12.

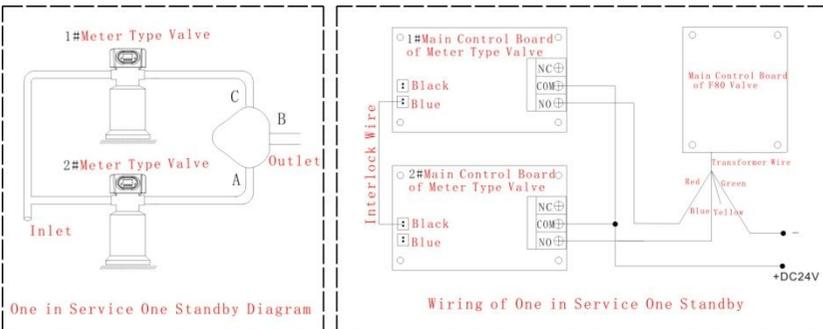


Figure 3-12

### I.Pre-treatment +RO System

**Instruction:** In pre-treatment + RO system, the liquid level switch in water tank and control valve together control pump open or close. The wiring refers to Figure 3-13.

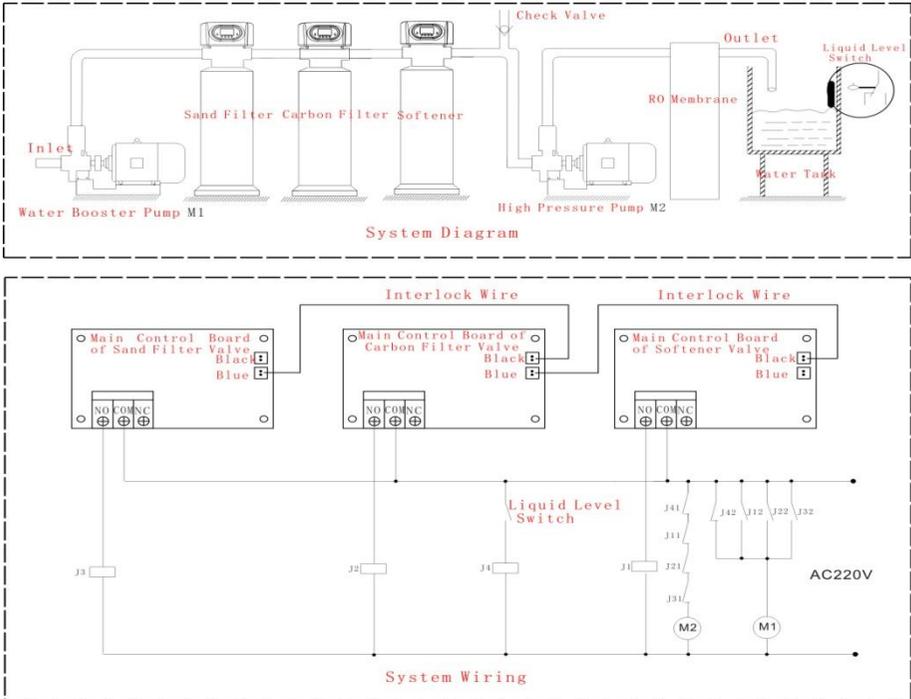


Figure 3-13

Function: Runxin valve set b-01; A.If soft water tank is short of water, the booster pump and high pressure pump are opened. B.If soft water tank has enough water, the booster pump and high pressure pump are closed. C.Runxin valve in regeneration, the booster pump is opened and the high pressure pump is closed. D.The check valve is mainly used to prevent the below situation happening: When the water supplying in pre-treatment is insufficient, and there is no low pressure protection switch or the switch invalid, the high pressure pump will make negative pressure in front which result in the tank in pre-treatment system is sucked deformed.

## 4. Installation and Adjusting of Runxin Valve

### 4.1. Installation of Runxin Valve

#### 4.1.1. Service Condition

Runxin valve should be operated under the conditions as below:

Water Pressure	0.2MPa~0.6MPa
Water Temperature	5°C~50°C
Environment Temp.	5°C~50°C
Relative Humidity	≤95% (At 25°C)
Electrical Facility	AC100~240V/50~60Hz
Water Turbidity	Down-flow Reg. < 5FTU; Up-flow Reg. < 2FTU; Filter<10FTU.
Water Hardness	First Grade Na <sup>+</sup> <6.5mmol/L; Second Grade Na <sup>+</sup> <10mmol/L
Free Chlorine	<0.1mg/L
Iron <sup>2+</sup>	<0.3mg/L
CODMn	<2mg/L (O <sub>2</sub> )

In the above table, First Grade Na<sup>+</sup> represents First Grade Na<sup>+</sup> Exchanger. Second Grade Na<sup>+</sup> represents Second Grade Na<sup>+</sup> Exchanger.

#### 4.1.2. Location

- A. The filter or softener should be located close to a drain;
- B. Ensure the unit is installed in enough space for operating and maintenance.
- C. The brine tank should be close to the softener.
- D. The unit should be kept away the heater, and not be exposed outdoor. Sunshine or rain will cause the system damage.

- E. Please avoid to install the system in one Acid/Alkaline, Magnetic or strong vibration circumstance, because above factors will cause the system disorder.
- F. Do not install the filter or softener, drain pipeline in circumstance which temperature below 5°C or above 50°C.
- G. One place is recommended to install the system which causes the minimum loss in case of water leaking.

#### 4.1.3. Control Valve Installation

- A. Glue the riser tube to the bottom strainer and put it into the mineral tank, cut off the exceeding tube out of tank top opening. Plug the riser tube in case of mineral entering.
- B. Fill the mineral to the tank, and the height is accordance with the design code.
- C. Remove the tap covering on the central tube and check if the riser tube is on the central of tank.
- D. Install the top distributor to the valve and insert the riser tube into control valve, and screw tight control valve.

Note:

- The length of riser tube should be neither higher 2mm nor lower 5mm than tank top opening height, and its top end should be rounded to avoid damage of O-ring inside the valve.
- Avoid floccules substance together with resin to fill in the mineral tank.
- Avoid O-ring inside control valve falling out while rotating it on the tank.

#### 4.1.4.Plumbing

All plumbing of inlet/outlet, drain line, brine line should be done in accordance with local plumbing codes. Figure 4-1 is a sample of valve plumbing.

Instruction: Adopt 3 ball valves connected between inlet and outlet pipeline with the control valve. Valve B connected with the inlet of control valve, while valve C connected the outlet of control valve.

A: Bypass Valve

B: Inlet Shutoff

C: Outlet Shutoff

D: Sampling Valve

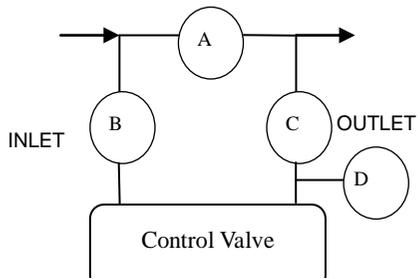


Figure 4-1 Inlet/Outlet Plumbing

When system replace mineral or check tank, open A, close B and C. When system in service, open B and C, close A. Valve D is a sampling valve.

#### 4.1.5. Optional Configuration

If signal output connector, remote handling connector, pressure relief connector, interlock functions are needed by the system, please refer to content of Chapter “Function Application” on Page 69 and connect them accordingly.

#### 4.1.6. Installation Notice

##### A. General Requirement

- a). Forbid use handle or valve body to carry tank.
- b). Forbid use injector as support to carry.
- c). In case of feed water turbidity is out of standard range, suggest to deposit feed water or install a pre-filter before valve.

##### B. Plumbing Requirement

- a). Valve mounting base has 2.5-8NPSM or 4-8UN(Both US Standard). The tank matched should be at the same standard.
- b). When install water inlet and outlet, suggest to use PPR pipeline, Wave-thread pipeline or UPVC pipeline, avoid to use Aluminum Plastic pipeline.
- c). Forbid over tighten the pipelines to avoid broken.

- d).Ensure pipeline is straight. No bearance of all stresses on all ports of the valve.
- e).In case the outlet pipeline or reserve tank is higher than F63, F65, F68, F69, F74 control valve, a liquid level controller should be installed in brine tank, otherwise, in backwash status, outlet water or water in tank will flow back to brine tank.
- f).Drain should not be higher than control valve.
- g).A booster pump is suggested be installed before outlet in case of feed water pressure is not enough.

### C. Softener Valve

- a).If customer has high requirement for softener outlet water, a solenoid valve is suggested to be installed at inlet to avoid hard water pass into outlet during regeneration.
- b).When install brine tube for F63, F65, F68, F69, insert the red brine line flow control in brine port (Cone side of control should face into valve), and insert tube bushing into the end of brine tube, then tight the 3/8"connector. (No brine line flow control in other model valves)
- c).When install drain for F63, F65, F68, F69, do not tighten drain washer, otherwise, may result in backwash flow rate or brine sucked is not enough, even no brine sucking.
- d).Brine tank should be close to resin tank as possible. The distance should be no more than 2 meters.

### D. Manual Filter Valve

- Manual filter valve handle could be disassembled and rotate 180°to assemble.

### E.F78 Installation Note

#### a).Water Turbidity<2FTU

F78 is piston structured valve, and if the turbidity is high, then it will cause the piston cannot move smoothly and also scratch easily. If necessary, one pre-filter should be installed before it to protect F78.

b).Drain Line Plumbing

- ①.Drain line should be lower than control valve inlet and outlet.
- ②.The valve should be located close to the drain, and maximum distance 5m can be used between F78 softener valve and drain, and 3m is between filter valve and drain.

If the practical installation can't meet either of above requirements, it may cause back pressure of distribution valve too big to make piston moving. It could disconnect drain line of distribution valve from drain line of main valve. Expose it in the air, plug the drain line of main valve. It could make valve switching positions normally.

c).Brine Line Plumbing

- ①.Not more than 4 elbows can be used in the pipe from valve to air check in the brine tank. Movable joint should be available to detect safety brine valve.
- ②.Make sure the salt clean to avoid brine line plugging.

d).Flow Meter Installation

Water meters are to be installed on soft water outlets if meter is needed in F78 valve system. Please make sure 10 times distance before the meter and 5 times distance after it than its pipe diameter.

e).Water Inlet Pressure $\geq$ 0.2MPa

- ①.F78 is driven by water pressure, so water pressure for each unit should have 0.2MPa $\sim$ 0.6Mpa to make sure the control valve works well. Here the water pressure means control valve inlet pressure, not means water supplying pump pressure.
- ②.Series System

For RO pretreatment system with two or more valves, or second grade Na<sup>+</sup> exchanger system, the first control valve outlet is the second valve inlet, the second control valve outlet is the third valve inlet. As there is pressure drop, it may difficult to make the second or the third valve inlet pressure above 0.2MPa. It could connect the inlets of the second and the third distribution valve directly with the first one's, which

make the first inlet pressure same as the second and the third. Figure 4-2 shows the system.

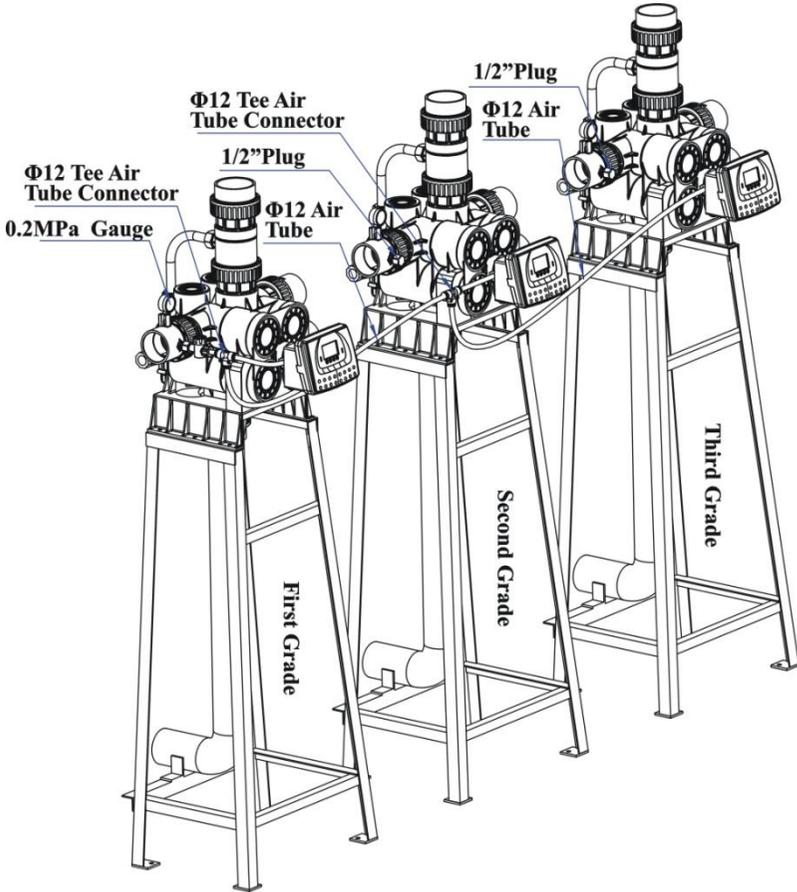


Figure 4-2

### ③.Parallel System

For two or more control valves in alternating system, feed water with pump, should ensure the water pressure for the valve in regeneration cycle above 0.2MPa.

So low head with big flow rate pumps are preferred for alternating system. Suggest to select pump with lift more than 30m, flow rate bigger than (30xvalve sets)  $m^3/h$ .

## 4.2. Adjusting of Runxin Valve

Runxin valve controller is as below figure. Through operating the buttons to adjust each parameters of the valve. Meter type and time clock type are basically the same, only set the service time to water treatment capacity, and there is a flow meter for meter type valve.

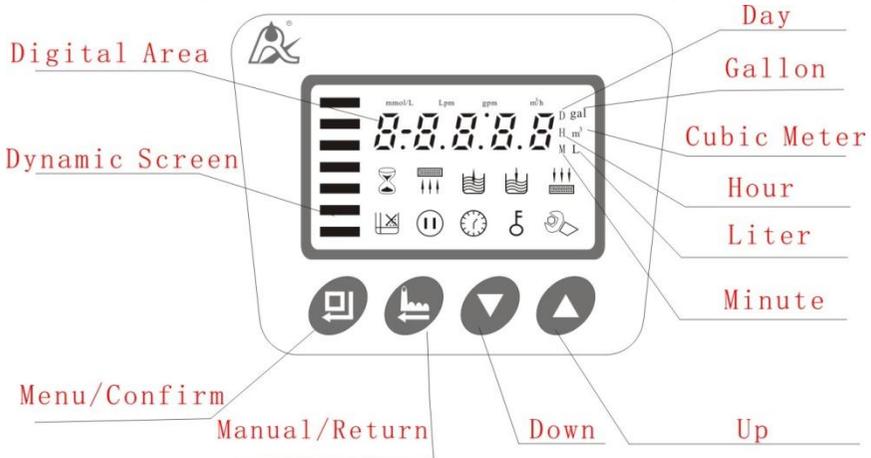


Figure 4-3 Controller Display Board

### 4.2.1. Figure Area Description

1).Indicator of each working positions

 **In Service Indicator**(Valve in Service, Light On);

 **Backwash Indicator**(Valve in Backwash Status, Light On);

 **Brine & Slow Rinse Indicator**(Valve in Brine & Slow Rinse Status, Light On);

 **Brine Refill Indicator**(Valve in Brine Refill Status, Light On);

 **Fast Rinse Indicator**(Valve in Fast Rinse Status, Light On)

2).Other indicators

a).“” **Time of Day Indicator**

●“”Light on, display the time of day.

- “🕒” flash, remind you to reset the time of day if electrical service interrupted 3 days more (If electrical service interrupted within 3 days, it doesn't need to reset the time.)

**b). 🗝️ Button Locks Indicator**

- 🗝️ Light on, indicate the buttons are locked.

**c). 🧂 Salt Shortage Indicator**

- 🧂 Light on, indicate system lack of salt.

**d). ⏸️ Program Pause Status Indicator**

- ⏸️ Light on, program in pause status.

**e). 🔄 Program Mode Indicator**

- 🔄 Light on, enter program display mode. Use ⬆️ or ⬇️ to view all values.

🔄 Flash, enter program set mode. Press ⬆️ or ⬇️ to adjust values.

**f). 🗑️ Menu/Confirm Button**

- Press 🗑️, 🔄 light on, enter program display mode and use ⬆️ or ⬇️ to view all values.

● In program display mode, press 🗑️, 🔄 flash, enter program set mode, press ⬆️ or ⬇️ and adjust values.

● Press 🗑️ after all program are set, and then the voice “Di” means all setting are success and return program display mode.

**g). 🏠 Manual/Return Button**

- Press 🏠 in any status, it can proceed to next step.(Example: If outlet water is unqualified, press 🏠 in Service status, it will start regeneration cycles instantly; Press 🏠 while it is in Backwash status, it will end backwash and go to Brine & Slow Rinse at once.)

- Press  in program display mode, and it will return in Service; Press  in program set mode, and it will return program display mode.
- Press  while adjusting the value, then it will return program display mode directly without saving value.

#### h).Down▼ and Up▲

- In program display mode, press ▲ or ▼ to view all values.
- In program set mode, press ▲ or ▼ to adjust values.
- Press and hold both ▲ and ▼ for 5 seconds to lift the Button Lock status.

#### i). Unit Meaning

Hardness unit: mmol/L- Micro mole per liter

Flow rate unit: Lpm-Liter per minute; gpm-US gallon per minute; m<sup>3</sup>/h-Cubic meter per hour.

#### 3).Display Screen

**In Service:** Dynamic screen flashes,  or “” light on, in digital area time of day alternates with time remaining (Time clock type valve) or flow rate alternates volume remaining (Meter type valve).

**In Regeneration Cycles:** Dynamic screen not flash, and when the valve reaches each regeneration step, the indicators in figure area will be turned on accordingly. Digital area will alternate showing Time remaining with time of Day.

#### 4.2.2. Parameter Inquiry and Adjustment

Unlock the buttons (Press and hold both ▲ and ▼ buttons for 5 seconds until the  indicator light off), then operate the following steps:

Press , and  light on, use  or  to view all values (The related indicator light on. For example: “” light on, it displays the time

of day;  light on, it displays the service day or water treatment capacity). If don't adjust the value, press  exit and turn back to service status. If it is necessary to adjust the value, press  button again, then  flash, now press  and  to adjust values. Press , then the voice "Di" means all setting are completed and return program display mode.

For example, the fast rinse time of a softener is 10 minutes. After regenerating, the chloridion in the outlet water is always higher than normal, indicating that there is not enough time for fast rinse. If you want the time to set to 13 minutes, the adjusting steps as follows:

- ①. Press and hold both  and  to lift the button lock status ( light off) and  light on;
- ②. Press  or  continuously until  light on. Then the digital area shows: 5-10M(5 means the No. 5<sup>th</sup> parameter, 10M means 10 minutes);
- ③. Press ,  and 10 flash;
- ④. Press  continuously until 10 changed to 13;
- ⑤ Press , there is a sound "Di" and the figure stop flashing; the program back to inquiry status;
- ⑥. If you want to adjust other parameters, you can repeat the steps from ② to ⑤; If you don't, press  and quit from the inquiry status, the display will show the current service status.

### 4.3. Trail Running

After installing the multi-functional flow control valve on the resin tank with the connected pipes, as well as setting up the relevant parameter, please conduct the trail running as follows:

A. Close the inlet valve B & C, and open the bypass valve A. After cleaning the foreign materials in the pipe, close the bypass valve A. (As Figure 4-1 shows)

B. Fill the brine tank with the planned amount of water and adjust the air check valve. Then add solid salt to the tank and dissolve the salt as much as possible.

C. Switch on power. Press  and go in the Backwash position; when  light on, slowly open the inlet valve B to 1/4 position, making the water flow into the resin tank; you can hear the sound of air-out from the drain pipeline. After all air is out of pipeline, then open inlet valve B completely and clean the foreign materials in the resin tank until the outlet water is clean.

D. Press , turning the position from Backwash to Brine& Slow Rinse;  light on and enter in the process of Brine& Slow Rinse. The air check valve close when control valve finished sucking brine, then slow rinse start to work. It is about 60~65minutes for whole process.

E. Press  to Brine refill position.  light on and it indicates the brine tank is being refilled with water to the required level. It takes about 5~6minutes, then add solid salt to the brine tank.

F. Press , turning to Fast Rinse position.  light on and start to fast rinse. After 10~15minutes, take our some outlet water for testing: if the water hardness reach the requirement, and the chloridion in the water is almost the same compared with the inlet water, then go to the next step.

G. Press , making the control valve return to Service Status;  light on and start to running.

Note: When the control valve enter into the regeneration status, all program can be finished automatically according to the setting time; if you want one of steps terminated early, you can press .

## 4.4. The Usage of Runxin Valve

### 4.4.1. Basic Usage

After accomplishment of the installation, parameter setting and trial running, the valve could be put into use. In order to ensure the quality of outlet water can reach the requirement, the user should complete the below works:

①.Ensure that there is solid salt all the time in the brine tank in the course of using when this valve is used for softening. The brine tank should be added the clean water softening salts only, at least 99.5% pure, forbidding use the small salt and iodized salt.

②.Test the outlet water and raw water hardness at regular time. When the outlet water hardness is unqualified, please press the  and the valve will temporary regenerate again( It will not affect the original set operation cycle)

③. When the feed water hardness change a lot, you can adjust the water treatment capacity as follow:

Press and hold both  and  for 5 seconds to lift the lock status. Press , and the  light on, then press , the digital area show the control mode. If it shows A-01or A-02, press  three times, and the digital area will show the given water treatment capacity( If the control mode shows A-03 or A-04, then press  four times, the digital area will show the feed water hardness); Press  again,  and digital flash. Press  or  continuously, reset the capacity value (Or water hardness). Press  and hear a sound “Di”, then finish the adjustment. Press  exit and turn back the service status.

The estimation of water treatment capacity, you can refer to the professional application specification on Page 64 When select A-03 or A-04 intelligent control mode, the control will automatically calculate the water treatment capacity by setting resin volume, feed water hardness and regeneration factor.

④.For A-01 or A-03 control mode (Meter delayed regeneration type), please pay attention to whether the time is current or not. If the time is not right, you can adjust as follow: After lifting the lock status, press ,

the  and “” light on. Then press , the  and hour value flash. Press  or  continuously, reset the hour value; Press  again,  and minute value flash. Press  or  continuously, reset the minute value; Press  and hear a sound “Di”, then finish the adjustment. Press  exit and turn back the service status.

#### 4.4.2. Usage Note

##### 1).Manual filter valve

a).Roate the handle to the middle working position (Such as fast rinse), the arrow on handle should point to the fast rinse position on cover or hand felling(F56A, F56D, F56F) or hear the sound(F56B, F56C, F56E) to make sure it is rotated to the right position, or else, it may have internal mixing.

b).The handle only could be rotated within the remarked range. It can't be pulled up and down.

c).In service or backwash position, rotate the handle to the limiting position on two sides.

##### 2).Manual softener valve

a).During the usage, make sure the arrow on handle should point to the fast rinse position on cover or hear the sound to make sure it is rotated to the right position, or else, it may have internal mixing.

b).The outer appearance for F64B and F64C are the same. The only difference is remarking S means down-flow regeneration for F64B and N means up-flow regeneration for F64C.

c). The handle could be rotated within 360° range. It can't be pulled up and down.

##### 3).Automatic control valve

For automatic control valve, after parameters set, it will operate automatically. If electronic service interrupted, it could make manual regeneration firstly after power reconnected.

Operation method: After lift the button lock statues, pressure  to end service, and start a temporary regeneration. During the regeneration process, press  to end the current working position in advance

## 5. Trouble-Shooting

### 5.1. Mechanical Fault

The commonly-seen problems and errors, see table 5-1.

Table 5-1

Problem	Cause	Correction
1.Softener fails to regenerate.	<ul style="list-style-type: none"> <li>A. Electrical service to unit has been interrupted.</li> <li>B.Regeneration cycles set incorrect.</li> <li>C. Adapter is damaged.</li> <li>D.Main control board is damaged.</li> <li>E. The motor is damaged.</li> <li>F. The valve core is stuck.</li> <li>G. Turbine in the flow meter is stuck or covered with rust.</li> </ul>	<ul style="list-style-type: none"> <li>A.Assure permanent electrical service (Check fuse, plug, pull chain or switch).</li> <li>B. Reset regeneration cycles.</li> <li>C.Check and replace the adapter.</li> <li>D. Replace main control board.</li> <li>E. Check and replace motor.</li> <li>F. Check the valve core.</li> <li>G.Disassemble the flow meter and wash it. If stuck still, replace it.</li> </ul>
2.Regeneration time is not correct.	<ul style="list-style-type: none"> <li>A.Time of day isn't set correctly.</li> <li>B.Power failure persist more than 3 days.</li> </ul>	<ul style="list-style-type: none"> <li>A. Check program and reset time of day.</li> <li>B. Reset time of day.</li> </ul>
3.Softener supply hard water.	<ul style="list-style-type: none"> <li>A. Bypass valve is open or leaking.</li> <li>B. Less salt in brine tank</li> <li>C. Injector is plugged.</li> <li>D. Insufficient water flow into brine tank.</li> <li>E.Leakage at o-ring on riser pipe.</li> <li>F. Internal valve leak.</li> <li>G. Regeneration cycles is not correct or raw water is deteriorated.</li> <li>H. Shortage of resin.</li> <li>I. Bad quality of feed water or turbine is blocked.</li> <li>J. Resin is contaminated or going bad.</li> </ul>	<ul style="list-style-type: none"> <li>A. Close or repair bypass valve.</li> <li>B. Add salt to brine tank and maintain salt level above water level.</li> <li>C. Change or clean injector.</li> <li>D. Check brine refill time.</li> <li>E. Make sure riser pipe and o-ring is not cracked.</li> <li>F. Change valve body.</li> <li>G. Set correctly regeneration cycles in the program.</li> <li>H.Add resin to mineral tank and check why resin leaks.</li> <li>I. Reduce the inlet water turbidity, clean or replace turbine.</li> <li>J.Properly increase the backwash flow rate and lengthen backwash time. Use resin cleaner or change resin.</li> </ul>

<p>4.Softener fails to draw brine.</p>	<p>A. Inlet line pressure is too low.          B. Brine line is plugged or too long.          C. Brine line is leaking.          D. Injector is plugged or defective.          E. Internal valve leaks.          F. Drain line is plugged. (Over long of drain line)          G. Strainer is stuck.          H.Sizes of injector and DLFC don't match with tank.          I.Ball valve or connect wiring is defective.</p>	<p>A. Increase line pressure.          B. Clean brine line.          C. Check brine line.          D. Clean or replace new parts.          E. Replace valve body.          F. Clean drain line.          G.Clean up broken resin and sand.          H.Select correct injector size and DLFC accordingly, refers to Page 39.          I. Repair or replace ball valve or connect wiring.</p>
<p>5.Unit used too much salt.</p>	<p>A. Improper salt setting.          B. Excessive water in brine tank.</p>	<p>A.Check salt usage and salt setting.          B. See problem No. 6.</p>
<p>6.Excessive water in brine tank.</p>	<p>A. Overlong brine refill time.          B. Excessive water after brine draw.          C. Foreign material in brine valve.          D. Not install safety brine valve but power failure while brine draw.          E. Brine refill is out of control.          F. The ball valve is not completely closed.</p>	<p>A. Reset a correct refilling time.          B.Check if injector or brine line is plugged.          C.Clean up brine valve and pipeline.          D.Stop water supplying and restart or install safety brine valve in brine tank.          E.Check and repair safety brine valve.          F. Repair or replace ball valve.</p>
<p>7.Pressure lost or iron in conditioned water.</p>	<p>A.Iron mass in the water supply pipeline.          B.Iron mass in the softener.          C. Fouled resin bed.          D.Too much iron in the raw water.</p>	<p>A.Clean the water supply pipeline.          B. Clean valve, add resin cleaning chemical and increase frequency of regeneration.          C. Check backwash, brine draw and brine refill. Increase regeneration frequency and backwash time.          D.Iron removal equipment is required to install before softener.</p>

<p>8.Loss of resin through drain line.</p>	<p>A. Air in water system. B.Bottom strainer is broken. C. Improperly sized of drain line flow control.</p>	<p>A. Assure that well system has proper air eliminator control. B. Replace a new bottom strainer. C.Check for drain rate and choose the proper drain line flow control.</p>
<p>9.Control valve cycles continuously.</p>	<p>A.Locating signal wiring is broken down. B. Controller is broken down. C. Foreign material stuck the driving gear. D.Relative parameters in the program were set to zero. E.Locating board is damaged. F.The magnet inside the big gear is damaged.</p>	<p>A.Check and connect locating signal wiring. B. Replace controller. C. Take out foreign material. D. Check and reset parameters. E. Replace locating board. F. Replace the big gear.</p>
<p>10.Drain flows continuously.</p>	<p>A. Internal valve leaks. B. Power fails when valve is in backwash or fast rinse position. C. Problems of F78 series, see No.14.</p>	<p>A. Check and repair valve body or replace it. B. Adjust valve to service position or turn off bypass valve and restart it when electricity supply is recovered. C. See problem No.14.</p>
<p>11.Interrupted or irregular brine draw.</p>	<p>A. Water pressure is too low or not stable. B. Injector is plugged or faulty. C. Air in the resin tank. D.Floccule inside resin tank when in regeneration (Up-flow type).</p>	<p>A. Increase water pressure. B. Clean or replace injector. C. Check and find the cause. D.Clean floccule inside the resin tank.</p>
<p>12.Water flow or water drop from drain line or brine line after regeneration.</p>	<p>A.Control valve can't close because of foreign substance. B. Interval valve leaks. C.Water pressure is too high that makes valve positioned incorrectly. D.Ball valve is not completely closed.</p>	<p>A.Clean foreign substance inside the valve. B.Replace valve core or seal ring. C.Decrease the water pressure or use pressure relief connector. D. Repair or replace ball valve or connect wiring.</p>

<p>13. Water in brine tank overflow.</p>	<p>A. Overlong brine refill time.          B. Brine valve can't close.          C. Water pressure is not stable.          D. Ball valve is not completely closed.          E. The outlet connect with brine connector of Valve F63, F65, F68, F69, F74 when backwash.</p>	<p>A. Reset proper time.          B. Check and repair brine valve or clean foreign substance.          C. Increase a system making the pressure stable.          D. Replace the ball valve.          E. Make the outlet pipeline higher than water storage tank, or add a check valve on the outlet, or install safety brine valve in the brine tank.</p>
<p>14. F78 series drain flow continuously.</p>	<p>A. The inlet pressure is lower than 0.2MPa.          B. The drain line is overlong.          C. The inlet pipeline or drain pipeline of distribution valve is plugged.          D. Shortage of the flow rate of water supply system.          E. High inlet water turbidity makes the valve body damaged.          F. Diaphragm pump is broken down.</p>	<p>A. Increase the inlet water pressure.          B. Remove the drain line of the distribution valve from the main drain connector, then drain water directly.          C. Check and clean pipeline.          D. Increase water supply or control the drain flow.          E. Add a disc filter device before inlet water.          F. Replace the diaphragm pump.</p>
<p>15. No water flow out from drain when valve is in backwash.</p>	<p>A. The inlet and outlet are connected conversely.          B. Strainer is plugged.          C. The inlet water is cut off.</p>	<p>A. Check inlet and outlet.          B. Check the strainers.          C. Check water supply system or solenoid valve.</p>
<p>16. The inlet and outlet is cracked, handle is taken off and shaft is broken.</p>	<p>A. Caused by using accessories which are not from our company.          B. Improper installation.          C. Carry tanks by handle.</p>	<p>A. Avoid using of accessories that is not from our company.          B. Avoid using aluminum pipeline and keep it straight when installation.          C. Avoid operation like this.</p>

## 5.2. Controller Fault

The commonly-seen problems and error codes see table 5-2.

Table 5-2

Problem	Cause	Correction
1.All indicators display on display board.	A.Wiring of display board with main control board fails to work. B. Main control board is faulty. C. Adapter is damaged. D. Display board is damaged.	A. Check and replace it. B.Replace main control board. C.Check and replace adapter. D. Replace display board.
2.No display on display board.	A.Wiring of display board with main control board fails to work. B. Display board is damaged. C. Main control board is damage. D. Electricity is interrupted.	A. Check and replace it. B. Replace display board. C.Replace main control board. D. Check electricity.
3.E1 Flashes.	A.Wiring of locating board with main control board fails to work. B. Locating board is damaged. C. Mechanical driven is failure. D. Main control board is faulty. E.Wiring of motor with main control board is faulty. F. Motor is damaged.	A. Replace wiring. B. Replace locating board. C.Check and repair mechanical part. D.Replace main control board. E. Replace wiring. F. Replace motor.
4.E2 Flashes.	A.Hall component on locating board damaged. B.Wiring of locating board with main control board fails to work. C. Control board is faulty.	A. Replace locating board. B. Replace wiring. C.Replace main control board.
5.E3 or E4 Flashes.	Main control board is faulty.	Replace main control board.
6.Repeat all- screen display.	A .Motor is damaged. B. Valve core is stuck. C. Adapter is damaged.	A. Replace motor. B. Check valve core. C. Replace adapter.
7.Jumping working position or turn to next position before reaching the estimated time.	A.Wiring of locating board with main control board is damaged or loose. B. Interlock wiring is incorrect.	A. Check wiring. B. Check interlock wiring.

### 5.3. Common Fault Cases

#### 5.3.1. Riser pipe damaged or cracked

Figure 5-3 There were some welding slag remained in the pipeline after welding of inlet pipeline. During the usage, welding slag fell into the strainers which resulted in slow brine drawing after a period of time. When disassembled and checked, it was found the riser pipe was damaged by welding slag which finally made outlet water unqualified.



Figure 5-3

#### 5.3.2. Brine pipeline blocked

Figure 5-4 A softening water treatment equipment was installed in a petrol enterprise in Yan'an: Customers complained of its slow brine drawing. After checking out, the strainer served as brine valve was stuck.



Figure 5-4

5.3.3. The drain line of F78 is higher than control valve which result in big resistance for drain of distribution valve and pistons can't move smoothly.

Figure 5-5 Below is an equipment connected with 12 valves in parallel which requires 250m<sup>3</sup>/h water treatment capacity. The drain pipeline is up to 2<sup>nd</sup> floor for reusing, mixing water phenomenon happens.

**Solution:** Open the drain connector of the distribution valve and drain it to the air. Then use a 1/2" plug to block the drain connector on main drain.



Figure 5-5

5.3.4. High turbidity of raw water makes hermetic faces damaged.

Figure 5-6 Below is the valve sent back to repair because of mixing water according to customer's feedback. When disassembled, the valve core was found to be stuck by dirt.

A filter device or precipitation procedure is required before the inlet if the water turbidity is over standard.



Figure 5-6

### 5.3.5. Overlong brine pipeline

When the brine pipeline is too long, the brine draw will be harder as the big resistance. For softener valve, brine tank should be close to resin tank.

Figure 5-7 The overlong(Over 3 meters) brine pipeline of F77 in the middle makes control valve fail to brine draw, while the right one which is close to brine tank brine draw normally.



Figure 5-7

5.3.6. The drain line of F78 is too long which resulted in big resistance for piston and finally internal mixing water; Or water pressure of F78 is too low which resulted in piston not working correspondingly and finally mixing water.

Figure 5-8 An equipment in a flower farm in Beijing: Adopt 2 pieces of F78 in series to supply water and pipelines parallel to the drainage. The length between the control valve and drainage is about 20 meters which makes big resistance for distribution valve to drain, finally makes piston fail to work correspondingly.

**Solution:** Take out the drain connector of the distribution valve from main drain, let it drain to the air.



Figure 5-8

5.3.7. The inlet or drain pipeline of distribution valve of F78 control valve is plugged.

Figure 5-9 An equipment in a food company in Wuhan: Adopt the second grade filter to treat the underground water. The distribution valves of the second grade and the first grade are paralleled. It is installed outer door. As the drain pipeline is long, it may cause piston not working accordingly because of draining not smoothly. To prevent this phenomenon happening, the drain pipeline of distribution valve is parted from the main drain connector and add a transparent pipeline to drainage when installed. Customer complained the control valve of the second grade was not working after some time.

It is found on site the red inlet pipeline and transparent outlet pipeline are stuck by bacterium after exposing to sunlight. The distribution valve can't bring in pressure, so the main valve remains still.

**Solution:** Change the pipelines to black and opaque ones.



Figure 5-9

5.3.8. The top strainer of F78 was stuck by broken resin which result in less flow rate of backwash.

Figure 5-10 A softening system capacity with 25m<sup>3</sup>/h in a chemical factory in Zibo: It happened to not brine draw and no drain when backwash which resulted in unqualified water. It worked normally at the beginning 2 minutes of backwash, but flow got slowly. It was found out its top strainer is stuck by broken resin.



Figure 5-10

5.3.9. The flow meter of F78A3 is not working because of small flow rate of system.

Figure 5-11 An equipment in a factory in Shanghai: Adopt three sets of F78A3 to supply water. The water storage tank is on the top building (8 meters high )and water tank install a mechanic floating ball switch. Because the systems use pretty little water and water capacity is little, the turbine of flow meter can not rotate to count the current flow rate. So the remaining capacity will not count down, the current flow rate showed on display board is 0 m<sup>3</sup>/h.

**Solution:** Add a liquid level switch to the water storage tank to control the solenoid valve in the outlet which can prevent the system from little water capacity.



Figure 5-11

## 5.4. Trouble-Shooting Methods

### 5.4.1. Methods of Finding out the Faults for Unqualified Water.

Fault description: The outlet water is qualified when a softening equipment is firstly put into using. But after a period of time, the outlet water is unqualified.

Methods for finding out the faults:

A. Check and analyze the reason based on the third relative contents from “Softener Fails to Regenerate” in Figure 5-1. If still hard to find the reason, you are suggested to do as followed:

B. Test the raw water hardness to see if it is over the applying range and make sure the system installation is appropriate.

C. Disassemble the valve and test the water hardness in riser pipe (for top-mounted) or bottom strainer (for side-mounted).

①. If the water is qualified, the unqualified outlet water is because of internal water mixing.

②. If the water has almost the same hardness as the outlet (Both unqualified), it means the fault may be caused by improper matching of equipment, incomplete regeneration or poisoned resin.

### 5.4.2. Methods of Finding out the Faults for F78 no Brine Drawing.

Fault description: A softening equipment fails to brine draw after a period of time.

Methods for finding out the faults:

A. Adjust the inlet water pressure to 0.22MPa or above, switch the valve to brine draw position. After a minute, make an observation if it can brine draw normally. If can, fault falls in low inlet water pressure; If can not, follow the below procedures.

B. Unscrew the connector of brine pipeline to see if there is suction. If there is suction but still can not brine draw, the fault is caused brine valve; If there is no suction, follow the below procedures.

C. Adjust the inlet water pressure to 0.22MPa or above, switch the valve to backwash position. After a minute, unscrew the outlet connector to see if water flows out from the outlet. If water flows out, it means the valve core is mixing water; If no water flows out, screw the outlet

connector and follow the below procedures.

D. Adjust the inlet water pressure to 0.22MPa or above, switch the valve to brine draw position. After 2 minutes, close the inlet valve and unscrew the copper connector of top strainer, then connect the copper connector with a hosepipe. Open inlet valve, make an observation if it can brine draw.

- ①.If it can brine draw, it means the top or bottom strainer inside the tank is stuck or tank internal other problems.
- ②.If it can not brine draw, the fault is caused by valve itself.

#### 5.4.3. Methods of Finding out the Faults for no Brine Drawing of Control Valve which Adopt Hermetic Head Faces.

Fault description: A softening equipment fails to brine draw during application.

Methods for finding out the faults:

A. Check and analyze the reason based on the fourth relative contents from “Softener Fails to Brine Draw” in Figure 5-1. If still hard to find the reason, you are suggested to do as followed:

B. Unscrew the brine nut or disassemble the brine pipeline and plug the brine line connector with hands, seeing if there is suction. If there is, the fault may be caused by brine valve or brine valve connector leakage; If there is no suction, the fault may be caused by resin tank (Top or bottom strainers are stuck) or valve body (Injector is plugged or internal valve leaks).

C. For control valve which has no suction on brine line connector, if the condition is permitted, unscrew the control valve from the resin tank and connect inlet pipeline and brine pipeline to see if the control valve can brine draw.

- ①.If it can brine draw, it means the fault is caused by resin tank (Top or bottom strainers are stuck or resin is badly broken).
- ②.If it can not brine, the fault may be caused by the control valve.

#### 5.4.4. Methods of Finding out the Faults for F78 Internal Water Mixing.

Fault description: A softening or filtration equipment with using F78 valve

is mixing water during application.

Methods for finding out the faults:

A.Adjust the inlet water pressure to 0.22MPa or above, switch the working position. Keep the pressure gauge remained 0.2MPa above and see if there is water mixing after a minute. If not, it means the fault is caused by water pressure; If is, follow the below procedures.

B.Check the filter net between the distribution valve and the inlet pipeline and see if it is stuck. If not, pull out the gas pipeline backside of the valve from main drain pipeline and make gas pipeline connect with air. Then manually switch the working position to see if the valve works normally.

- ①.If it works normally, the gas pipeline backside of the valve do not connect with the drain pipeline.
- ②.If it works not normally, it means the piston inside of the valve was stuck by some foreign substance.

#### 5.4.5. Methods of Finding out the Faults for E1.

Fault description: Display board of F77 valve shows E1 and makes an alarm voice.

Methods for finding out the faults:

Cut off the power and reconnect it; After all the symbols light on for 10 seconds, then the model of valve and -00- will be showed on display board. When the -00- appears, check that if the motor of the valve rotate.

- ①.If the motor is not rotating, it means the motor is damaged or the motor plug with motor socket is loose.
- ②.Open the control valve front cover, check if the motor plug loose. If it is, reinsert it. Cut off the power and reconnect it. If the motor still can not move with displaying -00-, it means the motor is damaged.

B.Check the motor fault of the control valve: Cut off the power and reconnect it. When displaying -00-, if there is a multi-meter, test the motor socket on main control board. The one which output DC24V is the damaged motor. If there is no multi-meter, interchange the motor in socket and see which one can not rotate. The one can not is damaged. If both two motors can't rotate, it means the two motors are damaged or main control board damaged.

C. If the motor rotates all the way in the period of -00- until E1 appears, the fault may be big gear and motor gear slipping, wire of locating board is loosen or damaged, or main control board is damaged.

#### **5.4.6. Methods of Finding out the Faults for E2.**

Fault description: F63 valve happens to E2 when using.

Methods for finding out the faults:

A. After cutting off the power, open the control valve back cover and pull out the locating board wire. Then check if there is water drop on locating wire plug and relative socket on the control board. Wipe it or dry it, then reconnect it. Finally, provide the electronic supply to the valve. If still E2, follow the below procedures.

B. Open the control valve front cover. Use the above A method to check the connection with locating board wire and locating board. If still E2, the locating board may be damaged.

#### **5.4.7. Methods of Finding out the Faults for PCB Repeating Displaying.**

Fault description: F74A3 valve repeat happens to be all symbols light on of display board-model show-all symbols light off.

Methods for finding out the faults:

A. Open the control valve front cover and pull out the motor wire. If it shows -00- and no previous fault happens, it means the motor or adapter is damaged. If the previous fault happens again, it means the main control board may be damaged.

B. If the motor or adapter is damaged, replace the adapter and see if it works normally. If not, it means the motor is damaged.

#### **5.4.8. Methods of Finding out the Faults for Softener Valve Missing some Working Positions.**

Fault description: A new F63B1 is found to be no brine draw and brine refill when trial running.

Methods for finding out the faults:

A. Cut off the power and reconnect it. When restarting, see if it is model F63B1.

①.If the model is not F63B1, cut off the power, press and hold   two buttons together when power reconnected. When model number and setting figures show up, it means model can be reset. Press  or  to select the model and press the  to save the setting.

②.If the model is F63B1, follow the below procedure to check:

B. Unlock the button and enter inquiry interface. By pressing  and  to check the brine draw and brine refill working position. If the parameter is “0”, set relatively. If the parameter is not “0”, follow the below procedures.

C. Open the control valve back cover and front cover to check if both ends of locating board wires are loose or if locating board is damaged.

#### 5.4.9. Methods of Finding out the Faults for Display Board no Light on.

Fault description: The display board of F68A3 valve did not light on during using.

Methods for finding out the faults:

A. Cut off the power and reconnect it to check if there is a voice of “Di”.

①.If there is a voice of “Di”, it means the display board or the wire for display board is damaged.

②.If there is no voice of “Di”, it means adapter, main control board and display board are possibly damaged. Then follow the below procedures.

B. Replace an adapter and see if it is working normally. If not, pull out all the connecting wires from the main control board and then provide electronic supply to control board.

①.If there is no hearing of “Di”, it means the control board is damaged.

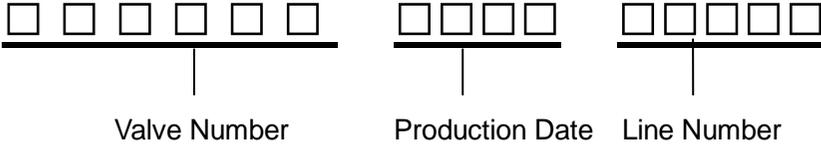
②.If there is hearing of “Di”, it means the main control board is normal.

Then connect the wires and check respectively.

## 6. Maintenance Guide

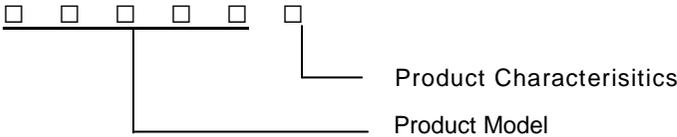
### 6.1. Product Code

#### 6.1.1. The Construction of Product Code



Valve number is presented by 6 digits; Production date is presented by the last two digits of the year and two digit of month; Line number is presented by 5 digits.

#### 6.1.2. Valve Number Reference



Example: 635041140800055, 635041 indicates F63C1;1408 means this valve was made in August, 2014; 00055 is production line number.

#### 6.1.3. Repaired Product Code Reference

If a valve was repaired, then one extra repaired product code (R plus 4 digits) will be added in the following of serial number, and they are in two lines.

Example:635041130800185

R1503

It means that 635041130800185 was repaired once on March, 2015.

### 6.2. Maintenance Notes

When maintain the valve, if mechanical part is disassembled, it needs to do seal test before assembly the fitting nut. Tighten the screw between valve body and fitting nut **(There is a locating mark on fitting nut and valve body. After valve maintenance, ensure the mark is at**

**the same location as previous.)** Take the flowing attention when repair different valves.

#### 6.2.1. Manual Filter Valve

A. Repairing manual filter valve, please note the moving disk gap points to the valve inlet when re-install the valve. If not, there will no water go into drain line while the valve starts fast rinse cycle.

B. Please note the smooth side of the fixed disk should be faced up, connecting with the moving disk.

C. Repair F52, F56E, please avoid the spring and moving copper ball in handle dropping out.

#### 6.2.2. Manual Softener Valve

A. Repair softener valve, please avoid the spring and moving copper ball dropping out.

B. Reassemble repaired valve, torque should match the value in Table 6-1.

C. For F64 Series, please note the back pressure rubber of shaft and moving disk can not drop out.

D. When installing the seal ring(The ring under the fixed disk), please note there is only one direction to install.

#### 6.2.3. Automatic Control Valve

A. Repairing softener valve, seal rings on the shaft and moving disk should be located properly. If not, the motor may not drive the control valve to move when the water pressure is high.

B. Repairing or replacing main control board, the position of wirings of power, indicator with board and motor need to be checked carefully. And then to connect them, also keep colors of wiring consistency.

C. Ensure the big driven gear keep same direction with the shaft while repairing valve, otherwise it will cause all positions not correct and thus the valve cannot work properly.

D.The terminal big gear of P Series (Like F63P) is different from F63C'S. F63P adopts optocoupler location with 5 positions in the terminal big

gear but without magnet; F63C adopts hall components location with magnet.

E. Please note when repairing: F63P has different terminal big gear with F67P and F68P's but has the same locating board; F63C has the same terminal big gear as F67C and F68C's but has different locating board.(Note: The relative models of F65,F69,F71 are having the same situation)

F. Motors and terminal big gears of F74 and F75 have same dimension but their magnet directions are different and rotating direction of motor are opposite. When valve stops at some working position, the magnet should be at the right above place of hall component. If assemble big gear of F74 on F75 valve, it results in incorrect locating and water mixing.

G. Assemble repaired valve, torque should also match the value in Table 6-1.

Table 6-1

Control Valve Model	Torque Range
F64B, F64C, F65, F69, F71, F78, F96	1.0~1.8N.m
F63, F64A, F67, F68, F79	2.5~3.2N.m
F73, F82, F83	3.0~4.0N.m
F92	5.0~6.0N.m
F64D, F64F, F74, F75, F77, F98	6.5~8.5N.m
F88	9~10N.m
F95	9~12N.m

Note: As manual filter valve has location limitation, so no torque requirement list here.

Torque requirement of side-mounted control valve is same as each model of top-mounted valve.

### 6.3. Adjust and Interchange Controller Boards

#### 6.3.1. Controller Boards List

Valve Model	Voltage	Locating Board	Main Control Board	Display Board	Remarks
F63C/B	DC12V , 1500mA	F63	F63(Model no. begging with F6 series)By day or hour interchanged via a switch.	5-Digit display board	When start, press and hold  and  two buttons for 5 seconds and then enter into the model adjustment interface.
F65B		F65			
F67C/B		F67			
F68C/B		F68			
F69A		F69			
F71B		F71			
F63P	DC12V , 1500mA	F63P	P Series	P Series	Same operation as F63C.
F67P					
F68P		F65P			
F65P					
F69P					
F71P					
F63D	DC12V , 1500mA	F63	Residential D Series	F79LC D	When start, press and hold  and  two buttons for 5 seconds and then enter into the model adjustment interface.
F65D		F65			
F67D		F67			
F68D		F68			
F69D		F69			
F71D		F71			
F79D		F79			
F82D		F82			
F73	DC12V , 1500mA	F73	F73	5-Digit display board	Same operation as F63C.
F107A		F71	F107		
F107B		F67			
F74A/B	DC24V , 1500mA	F74	F74	5-Digit display board	
F75A/B		F75			

F77A/B		F77	F77	F77	The buttons of display board are on two sides.
F78A/B/C	DC12V , 1500mA	F78	F78	5-Digit	Same operation as F63D.
F79-LCD		F79	F79	F79LCD	
F82-LCD		F82			
F79-LED		F79	F82	5-Digit display board	
F82-LED	F82				
F83	F83	F83			
F99	F99	F99			
F98A/C	DC24V , 1500mA	F98(17606 )	F98(17606 )	5-Digit display board	Same operation as F63C.
F88A/C		F88(93610)			
F95A/B/C/D		F95(93620)	F95(93620)		
F111					
F96A/B/C	DC24V , 4000mA	F96(93650)	F96(93650)		Same operation as F63D.
F112A/B		F112			
15702	DC12V , 2000mA	15702	15702	15702	
13504		13504	13504	5-Digit display board	
73605		73605	73605		
72605		72605	72605	F79LCD	

### 6.3.2. Inquiry and Setting of Flow Rate Factor for F78/F96 (K Value)

When start, press  and  for 5 seconds and enter the interface to inquiry and set flow rate factor. Then adjust the value by press up and down button and press  to save. The bigger value, the smaller relative current flow rate.

### 6.3.3. Model Adjustment Method of Valve with 5-Digit Display Board



For main control board of F63, F65, F67, F68, F69, F71 or F63P, F65P, F67P, F68P, F69P, F71P, all indicators display on display board when power on, press and to enter into model selection mode to adjust model.

### 6.3.4. Model Adjustment Method of F74/F75

By adjusting switches on F74A1, F74A2, F74A3, F75A1, F75A2 main control board, different configurations of F74/F75 can be set.

Example: To get model F74A3

Model adjusting switch: ON, Regeneration type switch: ON

Example: To get model F75A2

Model adjustment switch:1,Regeneration type switch:2

Time clock regeneration start by days: ON or by hours:1



Time Clock  
Regeneration Start by  
Hours or By Days  
1-By Hours  
ON-By Days

Regeneration Type  
Switch  
2-Timer Clock Type,  
On-Meter Type

Model Adjustment Switch:  
1---F75, ON---F74

## 7. Ceramic Ball Valve

### 7.1. Development Purpose of Ceramic Ball Valve

#### 7.1.1. Ball Valve Advantage

Ball valve is a kind of valve using sphere as a sealing part, driven by valve shaft and rotating around the axis of sphere. Compared with the gate valve and check valve, it has the following advantages:

- A. Small flow resistance, the resistance is the same as equal length of pipeline's.
- B. Compact structure, small volume, light weight.
- C. Convenient operation, open and close rapidly, only rotate 90 degree from fully opened to fully closed, easy for remote controlling.
- D. Simple structure, the seal rings are operative, easily disassemble and maintenance.
- E. When fully opened or fully closed, the sealing surface of sphere and valve seat are isolated from the media. When media pass through the ball valve, it won't cause sealing surface corrosion.
- F. Wide range of application, nominal diameter from few millimeters to several meters. Ball valve can be used in situation from high vacuum to high pressure. When the ball is rotated 90 degrees, the inlet and outlet surface should be spherical to cut off the flow passage.

#### 7.1.2. Ball Valve Application

Ball valve is mainly used to cut off or connect with media. It also can be used to adjust and control the flow passage.

V-shaped ball valve can accurately adjust and control the flow rate; Three-way ball valve can distribute media and change the flow direction of media.

Ball valves are often used in application which has strict requirement for sealing property. It could be used with media such as gas, liquid,

steam and water with fiber inside, widely used in water treatment, food engineering, solar energy, petroleum, chemical, metallurgy, light industry, papermaking, power plant, refrigeration and other fields.

### 7.1.3. Development Purpose of Ceramic Ball Valve

To match with control valve F77, F78, using the ball valve for controlling brine draw and brine refilling, we have purchased electronic ball valves from some manufacturer since 2008. But we found some problems of air and water leakage during the incoming inspection, problems of ball valve not fully closed or can not be opened during the practical usage. After communicated with supplier, it was still difficult to solve the problems. We decided to develop ceramic ball valve, which has ball core combined with ceramic ball and ceramic valve seat, by using our experience of hard sealing technology on control valves accumulated in past years at the beginning of 2009. The ball valve has features of reliable sealing, durability, low torque and easy controlling. Till to the end of 2009, the ceramic ball valves matched with F77 and F78 was more than 10 thousand pieces, no complained with water leakage. In 2013, we decided to expand the product line and make mass production for ceramic ball valve.

## 7.2. Features of Runxin Ceramic Ball Valve

### 7.2.1. Ceramic Ball Valve Design Reference

Reference	Chinese Standard	US Standard
Valve Design	GB/T 12237-2007	API 608
Structure Length	GB/T 12221-2005	ANSI B16.10
Inspection And Testing	GB/T 13927-2008	API 598
Driven Part Connecting Size	GB/T 12223	/

## 7.2.2. Structure and Features

### A. Ceramic Core Hard Sealing Structure

- Ball core and valve seat adopt ceramic.
- Ceramic core is fritted at 1680℃.
- Adopt corundum ceramics,  $Al_2O_3 \geq 95\%$  or SiC
- High hardness: Over HRA85
- Sphericity after grinding:  $\leq 5\mu m$



### B. Ceramic Material Performance

Material Description		Corundum Ceramics	Corundum Ceramics	Zirconium Oxide	Silicon Carbide
Mechanical Performance	Unit	95% $Al_2O_3$	99% $Al_2O_3$	ZiO	SiC
Volume Density	$g/cm^3$	3.5	3.9	6	3.15
Rockwell Hardness	HRA	85	90	82	95
Rupture Strength	MPa	300	350	1000	500
Compressive Strength	MPa	2500	2800	2100	2260
Acid Resistance (HF)	$mg/cm^2 \cdot d$	1.0	0.7	<0.1	<0.1
Alkaline Resistance	$mg/cm^2 \cdot d$	<0.1	<0.1	<0.1	<0.1
Wear Resistance	$mg/cm^2 \cdot d$	<0.1	<0.1	<0.1	<0.1
Fritting Temperature	℃	1680	1700	1550	1750
Coefficient of Thermal Conductivity	W/K, 20℃	20	25	2	146

When  $< 0.1mg/cm^2/day$ , it is considered no corrosion and recommended to use.

When  $0.1-0.3mg/cm^2/day$ , it is little corrosion and could be used.

When  $> 0.3mg/cm^2/day$ , medium or big corrosion, it is not recommended to use.

### C. Rubber Material Performance

Ball valve uses rubber to realize static sealing, frequently-used

rubber and its performance as follows:

Material Description	Operating Temperature	Advantages	Disadvantages
Nitrile Rubber (NBR)	-60 °C ~ 115°C	Oil resistance, wear resistance, ageing resistance(No light); Permanent compression with small deformation; Steam resistance (150 °C * 144 h)	Not resistance to ultraviolet (Aging under direct sunlight), easily oxidated by ozone.
Fluoro Rubber (FKM / FPM / VITON)	-40 °C ~ 250°C	Good weather resistance, ozone resistance; Burning, acid and oil resistance; High temperature resistance.	Common fluoro rubber is not alkali resistance.
Ethylene-Propylene-Diene Monomer Rubber (EPDM)	-55 °C ~ 130°C	Excellent aging resistance, (Ozone resistance, weather resistance, heat aging resistance); Good chemical resistance; Good electrical insulation.	Low vulcanization rate; Poor viscosity with itself or others; Poor oil resistance.
Silicone Rubber	-60 °C ~ 250°C	Heat resistance, cold resistance, dielectric properties, ozone resistance and excellent weather resistance, high and low temperature resistance, good stability.	Poor tensile strength, tear strength, poor oil resistance and solvent resistance.

In practical application, choose proper ceramic and rubber material according to the media and working condition.

### 7.2.3. Characteristics of Runxin Ceramic Ball Valve

#### A. Low Torque

- **Adopt patent design of partly balanced structure (Patent no. ZL201320732225.7)**, make sphere surface bear a small pressure so that the fiction is small even through valve is working under a high pressure.
- **Unique structure design, make the ball and seat have reliable lubrication.**

- Sphere and valve seat adopt the ceramic with high hardness and high performance, **good self-lubrication, low resistance, opening and closing smoothly.**
- Excellent wear resistance and erosion resistance of ceramic material ensure its torque won't have obvious changing even after a long time using.

The above characteristics of Runxin ceramic ball valve make its opening and closing torque is close to soft sealing fixed ball valve; The torque of ceramic ball valve under DN50 is only a half of soft sealing floating ball valve, while for DN65-DN200, its torque is lower more than 20% of soft sealing floating ball valve; For the same diameter ball valve, the torque of Runxin ceramic ball valve is only 1/4-1/6 of metal hard sealing ball valve. When uses pneumatic or electronic driven as a controller, the controller for Runxin ceramic ball valve could be smaller and economic.

Torque Table of Runxin Ceramic Hard Sealing Floating Ball Valve							
Nominal Diameter	DN	DN15	DN20	DN25	DN32	DN40	DN50
Specification	NPS	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
Opening and Closing Torque N·m	PN10	1.0	1.0	1.7	3.2	5.2	11.1
	PN16	1.5	1.5	2.6	4.9	8.2	17.5
Nominal Diameter	DN	DN65	DN80	DN100	DN125	DN150	DN200
Specification	NPS	2-1/2"	3"	14"	5"	6"	8"
Opening and Closing Torque N·m	PN10	24.6	42.5	73.7	/	/	/
	PN16	38.9	67.3	117.2	174	236.4	770

The above data is measured in the laboratory. For reference only. It may be different from the practical application.

## **B. Wear Resistance**

Ceramic is fritted at 1680 °C . It has extremely high hardness ( $\geq$ HRA85) so it can adapt in high abrasion, high flow-speed condition.

## **C. Corrosion Resistance**

Ceramic ball has a good performance of chemical stability, seldom react with great majority of media like esters, alcohols, hydrocarbons. So it can be applied in a lot corrosive-resistant situations by selecting different materials of valve body and valve shaft.

## **D. No Leakage**

The ceramic ball and ceramic valve seat are ground precisely to ensure no leakage. In some poisonous or highly corrosive applications, there will be great damage to both operator and equipment once leaked.

## **E. Complete Specifications**

- Nominal diameter: DN15-DN200; Nominal pressure: PN10-PN25.
- Valve seat and ball have 95%  $Al_2O_3$ , 99%  $Al_2O_3$ , Zirconium Oxide, Silicon Carbide and other materials for optional.
- Valve body has UPVC, PPO, Stainless Steel 304, 316, 316L and other materials for optional.
- Driven type: manual driven, pneumatic driven, electronic driven, etc.
- Connecting type: thread connecting, flange connecting, UPVC connecting, PPR hot melting, etc.
- Control type: Two wires, three wires, power reset, setting open and close time, with feedback, flow rate adjustable, controlled by cell phone.

**It can be customized by special requirements.**

## **F. High Self-protection Rank**

The self-protection of electronic ball valve ranks IP65 which allow it being used in humid environment.

### 7.2.4. Characteristics of Automatic Ceramic Ball Valve

Different valve body materials with different controllers can be applied in variety situations with different features. The below table shows the models and characteristics of our present automatic ball valves:

Characteristics	Matched Valve Body Material	Specifications	Model Example	Applications
Independent Controlling	Plastic, metal	DN15-DN50	Q91102-25-10	Agricultural drop irrigation, etc.
Angle Adjustable	Plastic, metal	DN65-DN200	VQ94153-80-16	Automatic adjust the flow rate and with feedback.
Remote Controlling	Plastic, metal	DN65-DN80	Q93153-65-10	Cell phone control, WIFI.
Automatic Closing When Power Cut Off	Plastic, metal	DN15-DN25	Q95102-20-10	In place of solenoid valve.
Pneumatic Controlling	Metal	DN100-DN200	Q64133-100-16	

#### 1). Electronic ball valve with independent controlling.

- a. It adopts 5 digital numbers to display opening and closing time.
- b. Two types of opening and closing time range: 000:01 ~ 999:59 hour: minute or 000:15 ~ 999:59 minute: second.
- c. The data are automatically saved after power off.
- d. The indicators show opening or closing status.

#### 2). Electronic ball valve with angle adjustable ( V-Type ball).

- a. It can be adjusted to any angle of opening by manual knob.
- b. The angle of opening can be automatically adjusted by PLC and IPC(Industrial Personal Computer),etc.
- c. There is a linear relationship to flow rate and opening angle.
- d. It can be restarted manually after power off.
- e. The opening angle can be reset to the original after power recovered.

- f. It has better linear relationship than straight-way ball valve which can adjust the flow rate more accurately, flexibly and quickly.
- g. In small opening, the ball valve does not oscillate, it has the function of micro-adjustment which allows it a stable working status.
- h. In the process of V-type ball opening and closing, the cutting function produced by its passage and valve base, it can cut out the fiber and solid particles of the media and wipe them away. The self-clean function of ceramic can prevent the sealing interface from foreign substance accumulating which may result in valve being stuck.

### 3). Electronic ball valve with automatic close after power off.

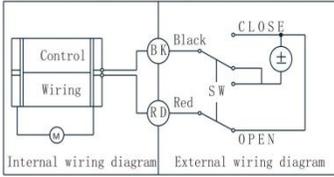
- a. The ball valve opens when power on, closes when power off.
- b. It could use PLC to control the ball valve opening or closing.
- It could be used instead of solenoid valve. The comparison between electronic ball valve and solenoid valve refers to below table:

The Comparison between Electronic Ball Valve and Solenoid Valve

Item	Electronic Ball Valve	Solenoid Ball Valve
Leakage	With the working principle of angular travel and double sealing, it is good at sealing and leakage-proof.	The solenoid valve is diaphragm-type or pilot-operated with the working principle of linear motion. It is highly required of the purity of the media for sealing interface and it is easily leaking if there is foreign substance in the media.
Installation Requirements	No requirement for installed angle.	With the working principle of linear motion, its sealing has to be realized by self gravity of valve and force of magnet. So the solenoid valve can only be horizontally installed. Other angles of installation will cause leakage.

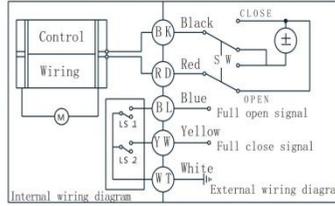
<p>Life Time</p>	<p>The electricity will be cut off by inner micro-switch when the opening and closing driven by electronic controller is done and it has the function of remaining working position. It only need electricity supply when controller working. When it is done, motor is not with electricity. So it has longer life time and more stable performance than solenoid valve.</p>	<p>The opening and closing of solenoid valve depends on current coil and remaining working position needs coil to be connected with electricity all the time (Like N/C solenoid has to be opened for a long time). So it is commonly seen that coil is easily burned down as it is electrified all the time.</p>
<p>Self-protection Rank</p>	<p>Controller is protected by shell body with self-protection ranking IP65/IP67 which can prevent the inner controller from dust and humidity, assuring its stable function.</p>	<p>With simple structure and low self-protection rank, it is easily susceptible to outer dust, air and temperature.</p>
<p>Cost Difference</p>	<p>1.6MPa is a common pressure to ball valve and the pressure can reach up to 13MPa. But the cost of 13MPa ball valve is not much more than 1.6MPa's. This is especially much more advantageous than solenoid valve when in high pressure application.</p>	<p>For solenoid valve, pressure above 1.0MPa can be regarded as middle and high requirement, and high-pressure solenoid valve is always expensive.</p>
<p>Function Difference</p>	<p>There is no need of bypass valve for electronic controller, as it has a manual operation device which can manually control the opening and closing of the valve.</p>	<p>Common solenoid valve can not be manually operated. Manual bypass valve is needed at pipeline for standby.</p>

Control wiring diagram-Q21



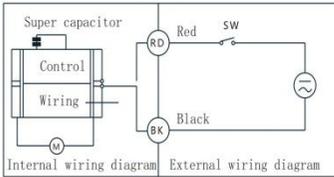
1. SW and OPEN connected, electric ball valve open, after putting in place and keep the same position.  
 2. SW and CLOSE connected, electric ball valve close, after putting in place and keep the same position.  
 Suitable for DC12V, DC24V, DC36V ball valve. SW is two wire switch.

Control wiring diagram-Q21F3



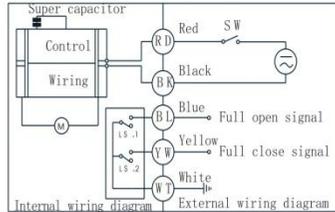
1. SW and OPEN connected, electric ball valve open, after putting in place and keep the same position. At the same time the LS. 1 connected and send out the full open signal, which is BL and WT connected.  
 2. SW and CLOSE connected, electric ball valve close, after putting in place and keep the same position. At the same time the LS. 2 connected and send out the full close signal, which is YW and WT connected.  
 Suitable for DC12V, DC24V, DC36V ball valve.

Control wiring diagram-Q22



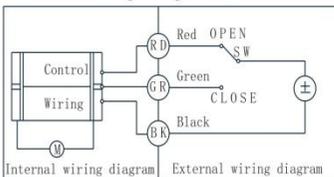
1. SW connected, electric ball valve open, after putting in place and keep the same position.  
 2. SW disconnected, electric ball valve close, after putting in place and keep the same position.  
 Suitable for AC/DC12V, AC/DC24V ball valve.

Control wiring diagram-Q22F3



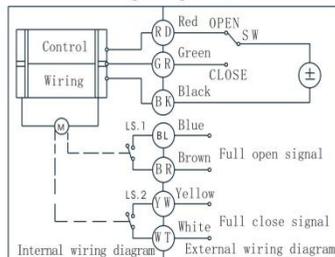
1. SW connected, electric ball valve open, after putting in place and keep the same position. At the same time the LS. 1 connected and send out the full open signal, which is BL and WT connected.  
 2. SW disconnected, electric ball valve close, after putting in place and keep the same position. At the same time the LS. 2 connected and send out the full close signal, which is YW and WT connected.  
 Suitable for AC/DC12V, AC/DC24V ball valve.

Control wiring diagram-Q31



1. SW and the red wire connected, electric ball valve open, after putting in place and keep the same position.  
 2. SW and the green wire connected, electric ball valve close, after putting in place and keep the same position.  
 Suitable for DC12V, DC24V, DC36V ball valve.

Control wiring diagram-Q31F4



1. SW and the red wire connected, electric ball valve open, after putting in place and keep the same position. At the same time the LS.2 connected and send out the full open signal, which is BL and BR connected.  
 2. SW disconnected, electric ball valve close, after putting in place and keep the same position. At the same time the LS. 2 connected and send out the full close signal, which is YW and WT connected. Suitable for DC12V, DC24V, DC36V ball valve.

Table 7-1 Electronic Controller Wiring Diagram

#### 4).Pneumatic ball valve.

- a. Rapid opening.
- b. It could match with speed adjustor to adjust the opening speed of ball valve.

#### 7.2.5.Electronic Controller Type

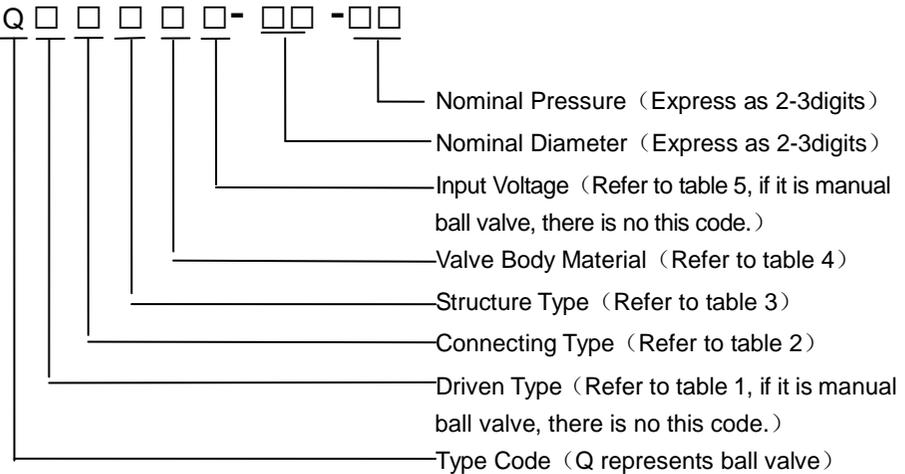
The electronic controllers for DN15-DN80 are made by ourselves, the other controllers for DN100-DN200 are purchased from other supplier. The controllers made by ourselves have two wires, three wires, with feedback, etc.

A. Two wires controlling: There are two wires of motor, by switching the polarity of motor to control ball valve opening or closing. The wiring refers to Q21 in table 7-2.

B. Three wires controlling: The combination of different two wires provides voltage to control ball valve opening or closing. The wiring refers to Q31 in table 7-1.

### 7.3.Model and Classification

#### 7.3.1.Nomenclature



**Table 1 Ceramic Ball Valve Driven Type Code**

Driven Type	Solenoid Driven	Worm Gear Driven	Bevel Gear Driven	Pneumatic Driven	Electronic Driven
Code	0	2	5	6	9

There is no this code for manual ball valve. For pneumatic driven ball valve, “6K” represents normal open, “6B” represents normal close.

**Table 2 Ceramic Ball Valve Connecting Type Code**

Connecting Type	Code	Connecting Type	Code	Connecting Type	Code
Female Thread	1	Flange	4	Butt Clamp	7
Male Thread	2	Hot Melting	5	Clamp	8
Glue	3	Weld	6	Clip	9

**Table3 Ceramic Ball Valve Structure Type Code**

Structure Type		Code	Structure Type		Code
Floatin g Ball	Straight Passway	1	Fixed Ball	Four-way Passway	6
	Y Shape Three-way Passway	2		Straight Passway	7
	L Shape Three-way Passway	4		T shape Three-way Passway	8
	T Shape Three-way Passway	5		L Shape Three-way Passway	9

**Table 4 Ceramic Ball Valve Material Code**

Valve Body Material	PPO	HPb59-1	304	316	316L	UPVC
Code	0	1	2	3	4	5

**Table 5 Ceramic Ball Valve Input Voltage Code**

Input Voltage	DC6V	DC12V	DC24V	DC36V	AC220V
Code	1	2	3	4	5

**Table 6 Other Function or Structure Ball Valve Code**

Function	Fireproof Type	Slow-closure Type	Slagging Type	Fast Type	(Shaft Seal) Corrugated pipe Type	Adjustable Type
Code	F	H	P	Q	W	V

7.3.2. Model Example

A. Adopt UPVC glue connecting, straight passway, PPO valve body material, DN32, PN1.0MPa, manual ball valve is expressed as: Q310-32-10.

B. Adopt female thread connecting ,T-shaped three-way passway, stainless steel 304 valve body material, DN25, PN1.6MPa, input voltage DC24V, electronic ball valve is expressed as: Q91523-25-16.

C. Adopt flange connecting, straight passway, stainless steel 316 valve body material, DN80, PN1.0Mpa, input voltage DC24V, V-shaped adjustable electronic ball valve is expressed as: VQ94133-80-10.

7.3.3. Classification

According to the driven type, connecting type and the valve body material, we classify the ceramic ball valve:

Valve Body Material		PPO	UPVC	Stainless Steel
Manual	Thread Connecting	DN20-DN50	/	DN20-DN80
	UPVC Glue	DN20-DN100	DN65-DN100	/
	PPR Hot Melting	DN15-DN32	/	/
	Flange Connecting	/	DN65-DN80	DN20-DN200
Electronic	Thread Connecting	DN20-DN50	/	DN20-DN80
	UPVC Glue	DN20-DN100	DN65-DN100	/
	PPR Hot Melting	DN15-DN32	/	/
	Flange Connecting	/	DN65-DN100	DN20-DN200

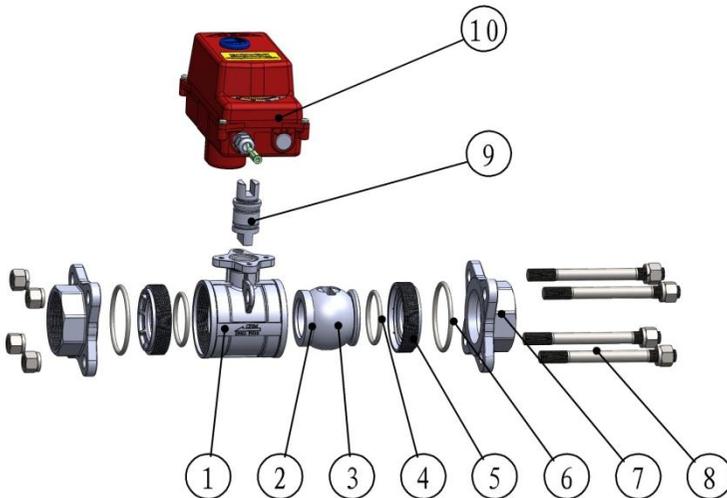
Pneumatic	Thread Connecting	/	/	DN20-DN80
	UPVC Glue	/	DN65-DN100	/
	Flange Connecting	/	DN65-DN100	DN100-DN200

Note: Stainless steel, as shown in the table above, can be 304, 316 or 316L, it also can be other corrosion-resistant steel.

The above table listed are existing products, we'll develop a full range of product and can be customized.

### 7.4. Structure of Ceramic Ball Valve

#### 7.4.1. Exploded Drawing of Automatic Ball Valve



### 7.4.2. Material of the Main Parts of the Ball Valve

Item No.	Description	Material	
		Stainless Steel Valve Body	Plastic Valve Body
1	Valve Body	CF8M/CF8 Stainless CF8M/CF8	PPO, UPVC
2	Valve Seat	95% Al <sub>2</sub> O <sub>3</sub> , 99% Al <sub>2</sub> O <sub>3</sub> , SiC	95% Al <sub>2</sub> O <sub>3</sub> , 99% Al <sub>2</sub> O <sub>3</sub> , SiC
3	Ball	95% Al <sub>2</sub> O <sub>3</sub> , 99% Al <sub>2</sub> O <sub>3</sub> , SiC	95% Al <sub>2</sub> O <sub>3</sub> , 99% Al <sub>2</sub> O <sub>3</sub> , SiC
4/6	Seal Ring	EPDM/Fluororubber	EPDM/Fluororubber
5/7	Pressure Cover/Valve Cover	Stainless Steel CF8M/CF8	PPO, UPVC
8	Bolt	304	304
9	Valve Shaft	Stainless SS316	Stainless SS316
10	Controller	Electronic Driven/Pneumatic Driven	Electronic Driven

### 7.5. Installation Requirements and Notes

7.5.1. Please note when power supplies: controllers of DN15-DN80 electronic ball valve should be equipped with four adapters: DC6V, DC12V, DC24V and DC36V.

7.5.2. The installation must be strictly followed the flow direction remarked on valve body when installing the pipeline, forbidden of wrong connecting.

7.5.3. The product default station is open, so customers can adjust the original station according to their own needs.

7.5.4. If there is a problem, non-professionals are forbidden to disassemble or repair, please feed back to our company or local agent.

7.5.5. Filter device is required to install at the inlet when the supplying media has plenty of dirt, sand and bigger particles.

7.5.6. Strong crush is forbidden in case of slow move or damage.

## 7.6. Trouble-shooting

Problem	Cause	Correction
Leakage in flange connecting.	The bolts or nuts connected with flange are loose or unevenly screwed.	Unscrew the bolts or nuts and re-tighten evenly.
	Foreign substance on sealing interface of flange.	Disassemble and clean.
	The seal washer of flange defaults.	Replace the seal washer.
Leakage at the valve shaft.	The o-ring of valve shaft defaults.	Replace the o-ring.
The valve shaft can not rotate or rotate abnormally.	The voltage of electronic controller is not matched properly.	Supply the power as required.
	The adapter of electronic controller is damaged.	Replace the adapter.
	The gas pressure of pneumatic driven controller is not enough.	Adjust the gas pressure.
	The control signal is ineffective or abnormal.	Check and adjust it to normal status.
	The pressure drop exceeds the limit.	Check and adjust it to normal status.
The valve can not open or close completely.	The gas pressure of pneumatic driven controller is not enough.	Adjust the gas pressure.
	The location device defaults.	Repair or replace the location device.
	Foreign substance on the sealing interface.	Disassemble the valve and wash the foreign substance out.

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11. China patent: ZL201320732225, a type of ball valve, Yuan Hailin, Wu Xiaorong



# Multi-functional Flow Control Valve for Water Treatment Systems

Has Own Intellectual Property  
And The Essential Patent



## Products series with 15m<sup>3</sup>/h-50 m<sup>3</sup>/h water treatment capacity

### Automatic Filter Softener Valve Series

Water Treatment Capacity  
(For signal valve):  
0.5m<sup>3</sup>/h-50 m<sup>3</sup>/h  
Products Series Formed

50 m<sup>3</sup>/h  
63550(F96A1)



15 m<sup>3</sup>/h

Manual Filter Valve

51215(F77BS)



20 m<sup>3</sup>/h

Automatic Filter/Softener

Valve (Top-mounted)

63520(F111A1)



40 m<sup>3</sup>/h

Automatic Softener Valve

63640(F78A3)



18 m<sup>3</sup>/h

Automatic Filter Valve

53518(F77B)



20 m<sup>3</sup>/h

Automatic Filter Valve

53520(F95B)



30 m<sup>3</sup>/h

Automatic Filter Valve

53530(F78B)

### ● Application

- Residential filtration, softening system
- Boiler softening system
- RO Pre-treatment filter/softener device
- Swimming pool filter system
- Iron and manganese removal system
- Ion exchange system



# Ceramic Ball Valve

Low torque

Corrosion resistance

Hard sealing

open and close easily



○ Pneumatic Ball Valve Series



○ Plastic Ball Valve Series



○ Metal Ball Valve Series



○ Roundness measurement



○ Assembly line of ball valve



○ Air pressure sealing test



○ Water pressure sealing test

© Patent No. : ZL201320732225.7

## DN20~DN200 Full series



Ball core adopts aluminum oxide ceramic material with good performance, partly adopts silicon carbide material.



### HIGH HARDNESS

The hardness is higher than wear-resistance steel and stainless steel.

### WEAR-RESISTANCE

Its wear-resistance is 266 times of manganese steel, 171.5 times of high-chromium iron.

### CORROSION RESISTANCE

Good resistance to acid, weak alkali solution which are corrosive liquid and organic solvent, such as ester, alcohol, hydrocarbon, etc..

## High hardness HRA $\geq 85^\circ$

Media: Low viscosity liquid in food and chemical industries, such as water, acid, alkaline, multi-polar liquid, glycol, etc..

Completely changed the shortage of traditional metal core ball valve which is easy leakage, heavy torque and the sealing surface is not corrosion resistance.



## ● Project Case for Runxin Valve



● Usage of Runxin F63C automatic softener valve (Australia)



● Usage of Runxin F92 automatic softener valve



● Usage of Runxin F78B automatic filter valve, water treatment capacity 80m<sup>3</sup>/h ● Iron removal/Filter system ● East Midlands company (South Africa)



● Usage of Runxin F77B automatic filter valve ● Commercial filter system (Russia)



● F78B automatic filter valve ● Sand filter, iron removal system, active carbon filter system (Brazil)



● Usage of Runxin F78A automatic softener valve ● Water treatment capacity 250m<sup>3</sup>/h filter system (Guatemala)



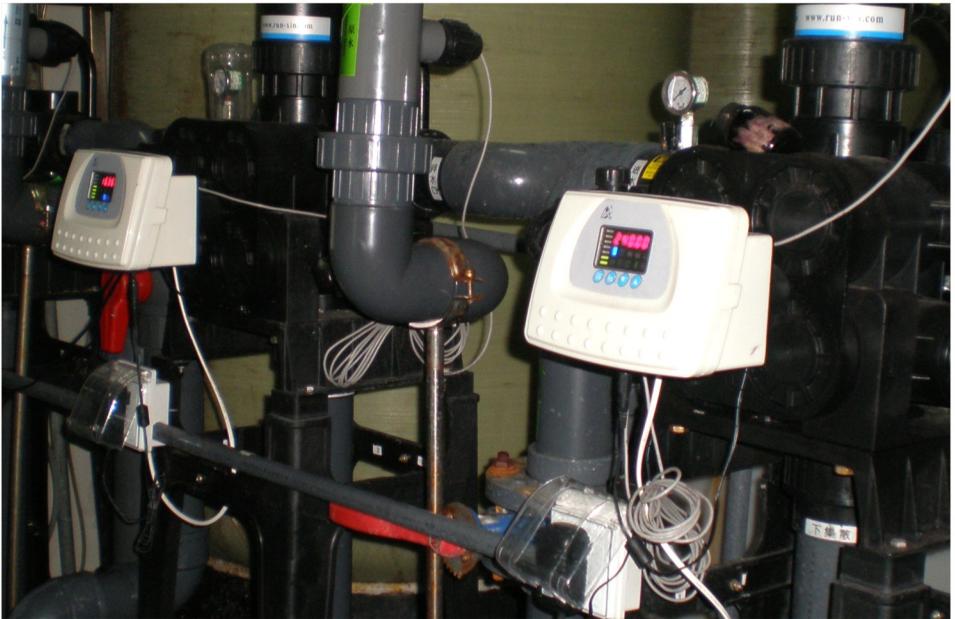
- Usage of Runxin F77B automatic filter valve/F64D manual softener valve
- Pre-treatment for boiler water and pure water in a Kunming Brewing Factory (Application site: Kunming)



- Usage of Runxin F77A automatic softener valve
- Pre-treatment for 20/h household water in Maternity and Child Service Center of Linhe, Inner Mongolia (Application site: Linhe, Inner Mongolia)



- Usage of Runxin F95C automatic softener valve
- Softening system of 10t in Qinghai Tibetan carpet factory (Application site: Qinghai)



- Usage of Runxin F78A automatic softener valve
- Pre-treatment for a Beijing pharmaceutical factory (Application site: Beijing)

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