

JKA multi-valve controller manual

JKA4.0

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1. General introduction

1.1 Function

JKA multi valve controller is specially designed for filtration, Water Conditioning, Softening, and Desalination systems which consist of multi valves. It has the following superior features:

- Power: 150~250V/AC. 50/60Hz. The power of motor is 4W.
- Chinese or English language can be selected. Easily programmed, No knowledge of programming languages needed to operate.
- Instrument adopt the MODBUS (RTU) protocol with CRC checksum.
- Password protection design prevents parameter setting from accidental or unexpected alterations.
- Flexible regeneration initiation modes (Volume, Remote, Interval, Week, Remote control regeneration). The selection of regeneration modes depends on specific technical and systemic conditions. Under special circumstances (e.g. on-site debugging) can be forced to manually start the regeneration. Regeneration can also be interrupted at any time, and any sequence may be skipped.
- Displays all functions on LCD panel with long lasting backlight that provides over ten years of use.
- Regeneration and relevant outputs signals are all Relay Dry Contacts. The capacity is 220VAC/5A.
- JKA Stager Controller contains four specified parameters:
 - a) Plan b) M program c) S program d) Commerce
- Remote control signal is dry contact. Signal can be reserved at least 2 seconds.
- JKA Controller equips two sets of level logic control unit with Relay Dry Contact output.

- Multiple controllers can be realised peripheral logic chain functionality. That can pass between multiple controllers S1 or S3 program as a neighbouring state feedback from both devices in order to achieve mutual linkage between each other, to avoid the two controllers at the same time start the regeneration process.
- Peripheral logic interlock function can be implemented among multiple JKA Stager Controllers through using S1 or S3 program of one JKA Stager Controller as state feedback to adjacent one. Hereby, Regeneration initiation on two JKA Stager Controllers is thus avoided.
- For commercial lock, please contact our technical personnel for further details.

1.2 Key and display

1.2.1 Keys

The Six function keys, located directly beneath the display, control the majority of JKA stager operation:

ESC: functional exit.

ENTER: confirmation/input.

▲▼: select /modify parameter.

◀ ▶: move cursor.

The setting point is up by 1 when the upward key is pressed each time, and will be down by 1 when the downward key is pressed each time. The cursor on the screen will move right when the rightward arrowhead is pressed, and will move left when the leftward arrowhead is press.

Note: keeping any key 5 seconds can get into setting state on main display.

1.2.2 Panel display

Working light and Regeneration light separately indicates operational status. Frequent flashing denotes rotational frequency of flow sensor if flow sensor is implemented in system. Send and receive light separately indicate the status of communication when sending or receiving data.

2. Parameters setting

2.1 Power supply connection

Properly link JKA Stager Controller to power supply before starting parameter setting. The screen displays as below:

2006-03-21	MO
14:18:58	
NEXT	Remote

2.2 Setting procedure

2.2.1 Password input

Constantly press any key on main display for 5 seconds, the screen will display as follow:

Password:
0 0 0 0

Use ◀ ▶ keys to move cursor, push ▲ ▼ key to modify value, transfer 0000 to 2008. Then press **ENTER** to get into main menu, screen displays as below:

Clock	Plan	M Prog
S prog	Test	Menu

2.2.2 Time calibration

Access to time calibration setting by pushing Clock and **ENTER** . Screen displays as below:

Clock	06-09-18
MO	14:02:59

If the time is not consistent with current time, push ◀ ▶ and ▲▼ keys to adjust.

Then press **ESC** to return to main menu.

2.2.3 Plan setting

Move the cursor to **Plan** and press **ENTER** to access plan setting program, display as follows:

Mode	Business
Address	Baud rate

- Mode setting: move the cursor to **Mode** and press **ENTER** to access to Modes choice, display as below

Mode:	Volume
	Remote
	Interval
	Week Timing

Note: Which regeneration mode is identified in the light of actual technique. Volume mode selection requires flow sensor matched that can generates rectangular pulse. (We recommend JM-TT flow sensor to match JMA Stager Controller usage)

If Volume mode is selected as regeneration initiation mode, then move cursor to **Volume** and press **ENTER** to get into **Volume** mode setting, display as below

K: 000.000	Σ
P: 00000.0	t

Note: K value is pipe coefficient. P is Total volume.

Press ◀ ▶ and ▲ ▼ keys to input K value and P value, and then press **ENTER** to confirm . Accumulative volume value checked by moving cursor on “ Σ ” and press **ENTER**, then display as below

Σ : (CLR 0000) 0000000.0 t

To remove accumulative volume value, press **ENTER** on the above display and type password “4321”. Then press **ENTER** to confirm this performance.

When setting week timing as system regeneration mode, moving cursor on **Week timing** and press **ENTER** to access, display as below:

Week Plan
SU MO TU WE TH FR SA

Use ◀ ▶ keys :to move cursor, push ▲ ▼ key to sets date and time requested to regenerate, then press **ENTER** to get into, display as below:

Week Timing	SU
01: 00: 00	

Note: Week timing mode, can only be activated once a day. Once select the mode, the specific regeneration time every day need to be set one by one. If you want to regenerate more than once a day, please select the interval mode.

Interval mode setting: Move cursor on **Interval** and press **ENTER** to get into, display as below:

Interval time
0000 min

Set interval time from 1 to 9999 minutes, and then press **ENTER** .

Note: among four regeneration modes, remote mode is highest priority, namely no matter Week timing or Interval mode, as long as Stager controller receives remote signal, it will initiate regeneration program, only one of the other three modes can be selected.

- Business Lock: if its function is needed please contact to us.
- Instrument address settings: Use ◀ ▶ key to move the cursor to the "Address" and press the (ENTER) key to enter the "Address" setting, display as below

Address
0 0 0 0

pressing the (◀ ▶) and (▲▼) keys to modify the device address. The address range is 0 ~ 255. After the modification, press the ENTER button to save the setting and return to the main setting menu.

- Meter baud rate setting: Use ◀ ▶ key to move the cursor to the "Baud Rate" and press the (ENTER) key to enter the setting, display as below

Baud rate
29000

Pressing the ◀ ▶ button to modify the baud rate of the device. The baud rate can be set as 1200, 2400, 4800, 9600, 14400 and 19200. After the modification, press ENTER to save the setting and returns to the main setup menu.

Note: Baud rate should not be higher than 9600 when RS485 transmission distance exceeds 1200 meters. Shielded cable is highly recommended for use to prevent the influence of other high-voltage or frequency converter on transmission data during transmission.

2.2.4 M program setting

Move cursor on **M Prog** and press **ENTER** to get into M program setting, display as below:

Program
Stages: 3

Change number of push ◀ ▶ key to change number of stages (1-16 total) and press **ENTER** (3 stager as example), display as below:

Program: 1/3 stages
Time: 0000 seconds

Push ◀ ▶ and press **ENTER** to access step width setting of first stage. Adjust this step width based on systematic requirement (from 1 second to 9999seconds). Up completion, press **ENTER** to confirm this setting. And then go to second stage setting by pressing ◀ ▶.

Note: How many total stages needed should be identified by technique of water treatment. For example, normally, Media Filter needs two stages, fast rinse and back wash. Softening system needs three stages, back wash, brine, slow rinse and fast rinse.

2.2.5 S program setting

Moving cursor to **S Prog** and pressing **ENTER** to access S program setting, screen displays as below.

S Prog: 1 N= /3 T=

S program including 3 sub-program can be set:

- S1, S3 program setting: when the cursor is in the “1” position, use ▲▼ to select S1 or S3 program, and then press ◀ ▶ to go into setting display. Move cursor (◀ ▶) to certain “-” which stage needs assistant signal output. And then transfer “-” to “*” to activate by ▲▼. S1 and S3 programs can be any combination of multistep, but are restricted by M program on the number of stages and the step width of each stage.
- S2 program setting: after setting S1 and S3, press **ENTER** to go into setting display.

S prog: 2 N=2/3
 T=3600
 Step 03 delay2700

Select **Step 00** and press **ENTER** . Push ◀ ▶ and ▲ ▼ keys to set the number of output stages (This number is limited by the number of main program stages). And then confirm by pressing **ENTER** . Select **delay0000** and press **ENTER** to set the step width of delay that can not exceed the length of relevant stage in main program. S2 output can only be implemented in one step during regeneration process.

Terminal # — — Connection

<i>Communication:</i>	<i>Flow sensor input:</i>	<i>Remote control:</i>	<i>Distributor control:</i>
01# 02# connect to PC, PLC or instrument.	03# DC 10v 04# SIN 05# GND	06 # Remote control signal 07# Interlock startup 08# Interlock startup 09# com	19# white 20# blue 21# black 22# yellow 23# green 24# brown
<i>Level control output:</i>	<i>220v power supply:</i>		
10# 11# S1 output 12# 13# S2 output 14# 15# S3 output	16# L 17# N 18# F		

3. Input/output equipment

Note: If SIGNET flow sensor is chosen, linking red line of flow sensor to 04 terminal SIN. And black line and shield line both link to 05 terminal GND. 03 terminal is no connection. If the JM-TT sensor is selected, it should be wired as follows: linking red line to 03 terminal + 10V, sensor black (white) line connected to 04 terminal SIN, shield line to 05 terminal GND.

Instructions: 1) when terminal 05 and 09 are short circuit, the regeneration program can be started after 2 seconds. 2) regeneration of JKA Stager Controller is restrained in 5 seconds when terminal 07 and 09 are shorted. As far as disconnection, regeneration can be available. 3) Any time both 08 and 09 terminal short circuit will disable the device regeneration.

4. Input/output device detection

Test setting: on the main menu display, operate ◀ ▶ button to select **Test** and press **ENTER** to get into setting state. Display as below.

09:34:21	step 0
Enter	ESC

Press **ENTER** to go into the first step of program.

09:34:21	step 1
118/121	
ENTER	ESC

Inspect validities of equipment and valve's connection before press **ENTER** to go into the second stage of program. The screen display is similar to the first step. Sequentially complete all the steps and then check if the process of all connected devices meets the requirements.

5. Process test and manpower control

5.1 Main screen

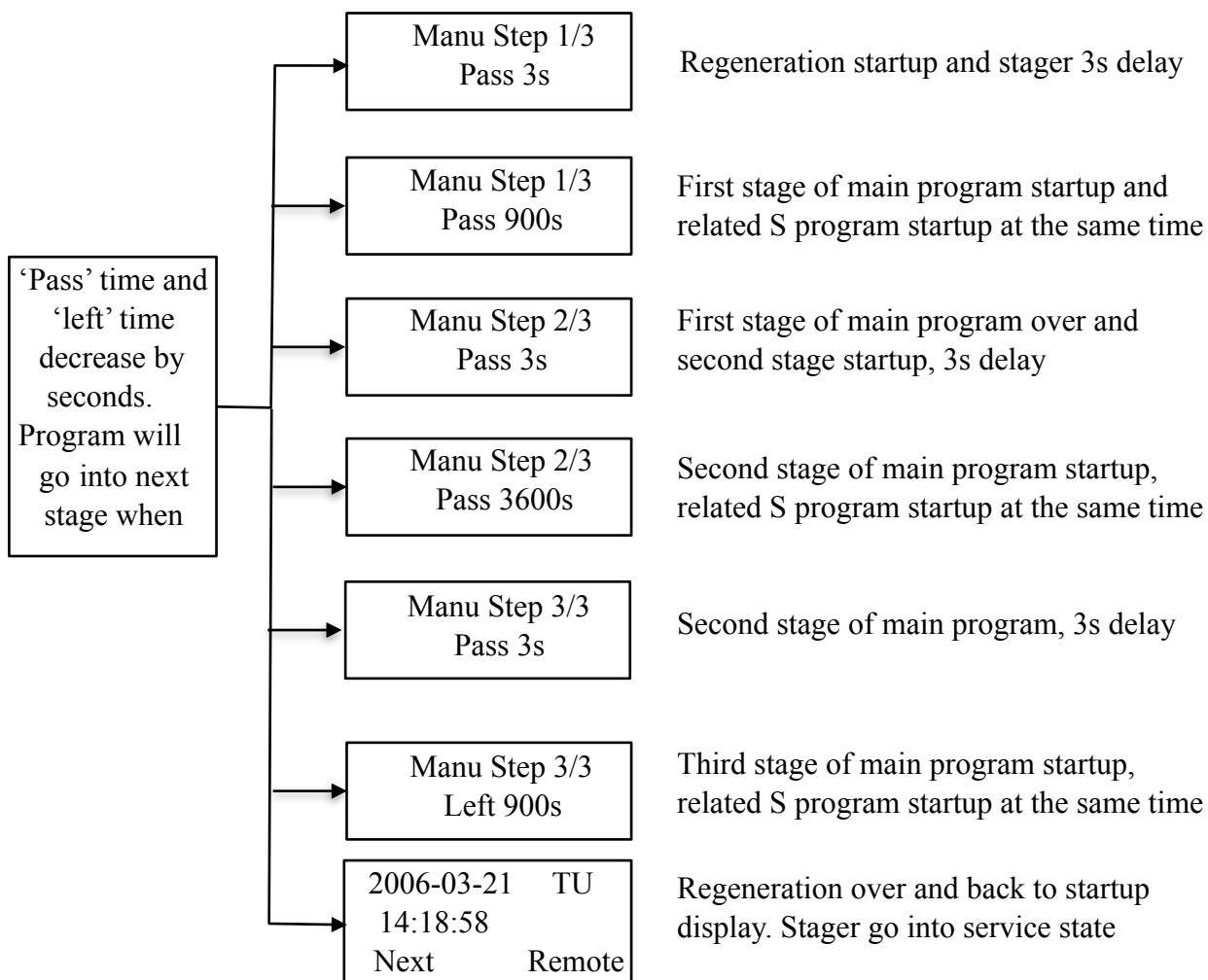
According to various systematic operational states, Screen may display current systematic state information. Under the working status, display as below:

2006-03-21	TU
14:18:58	
Next	Remote

- Acquire present date, time, and next regeneration time from main screen, when **Week timing** mode is adopted.
- Easily obtain volume, flow rate, and total volume in a set time period on main screen, when **Volume** mode is adopted.

- Know present date, time, week and remote regenerate control when **Remote** mode is selected.

JKA stager controller activates regeneration when residual flow rate/time value reaches setting or received remote signal. Under the regeneration states, screen displays various stages' information accorded with below:



5.2 Manpower initiation or stop

- Move cursor by pressing ◀ ▶ to **Manu** , and then push 强制 to initiate regeneration.

Display as below:

ManuStep STEP 1/3 Left 600

When regeneration program initiated, residual time of first stage decreases by 1. Till zero, program goes into second stage of the process, followed by all the steps. Regeneration program automatically exit after the program is finished.

- Press **ESC** constant for 5 seconds to stop regeneration, display as below.

ENTER	skip	1/3
Left	600	

Press **ENTER** to skip one stage and proceed directly to the next step. Press again (**ENTER**) key to skip all the steps until all over.

6. Communication

Instrument is equipped with RS485 communication interface, and adopt the MODBUS (RTU) protocol with CRC checksum. Communication format: 8 data bits, 1 starting bit, 1 stop bit, No parity.

In the use of configuration software, the equipment require Modicon PLC, which use Modbus-RTU address type, 16 bits integer data type. (For some configuration software, 3X register bank should be selected).

6.1 Reading to device register

PC instructs format as below:

Device address (1 byte) + Read (1 byte) + Register first address (2 bytes) + the number of Reading (2 bytes) + Check code (2 bytes)

Device return data format:

Device address (1 byte) + Read (1 byte) + number of bytes of data (1 byte) + data + Check code (2 bytes)

For example, the device issues a read command: 00 03 00 00 00 01 85 DB; The instrument returns data: 00 03 02 00 10 84 48.

Description of the send command: 00 is the address of the machine, 03 is the read command, 00 00 is the first address of the read register, 00 01 is the number of read addresses, and 85 0B is the check code of the current data, which is calculated by program.

Description of the returned Data: 00 the machine address, 03 for the read command, 02 returned data is 2 bytes; 00 10 returned data, 84 48 check code, run by the program.

6.2 Writing device

PC sends the instruction in following format:

Device address (1 byte) + Write (1 byte) + Register first address (2 bytes) + Written data (2 bytes) + Check code (2 bytes)

Return from write device registers: 01 06 00 06 00 12 E9 C6

Here, 01 write device address, 06 write command, 00 06 register address, 00 12 data to be written, E9 C6 check code.

6.3 The address of device register

Address of register	Description	Range	Function
0	Year (Current time)	0-99	read and write
1	Month (Current time)	1-12	read and write
2	Day (Current time)	1-31	read and write
3	Hour(Current time)	0-23	read and write
4	Minute (Current time)	0-59	read and write
5	Second (Current time)	0-59	read and write
6	Week (Current time)	0-6	read and write
7	Mode: Volume, Week timing, Interval, Remote	0-3	read and write
8	To next start time (Hour)	0-99	read only
9	To next start time (Minute)	0-99	read only
10	To next start time (Second)	0-99	read only
11	Flow sensor coefficient (High)	0-65535	read and write

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12	Flow sensor coefficient (Low)	0-65535	read and write
13	Instantaneous flow (high)	0-65535	read only
14	Instantaneous flow (low)	0-65535	read only
15	Set batch (high 2-bit)	0-65535	read and write
16	Set batch (low 4-bit)	0-65535	read and write
17	Remaining batch (high 2-bit)	0-65535	read only
18	Remaining batch (low 4-bit)	0-65535	read only
19	Accumulated flow (high 3-bit)	0-999	read only
20	Accumulated flow (low 4-bit)	0-9999	read only
21	Accumulated flow (1 decimal place)	0-9	read only
22	Weekly start (Sunday)	0, 1	read and write
23	Weekly start (Monday)	0, 1	read and write
24	Weekly start (Tuesday)	0, 1	read and write
25	Weekly start (Wednesday)	0, 1	read and write
26	Weekly start (Thursday)	0, 1	read and write
27	Weekly start (Friday)	0, 1	read and write
28	Weekly start (Saturday)	0, 1	read and write
29	Sunday's start time (Hour)	0-23	read and write
30	Sunday's start time (Minute)	0-59	read and write
31	Sunday's start time (Second)	0-59	read and write
32	Monday's start time (Hour)	0-23	read and write
33	Monday's start time (Minute)	0-59	read and write
34	Monday's start time (Second)	0-59	read and write
35	Tuesday's start time (Hour)	0-23	read and write
36	Tuesday's start time (Minute)	0-59	read and write
37	Tuesday's start time (Second)	0-59	read and write
38	Wednesday's start time (Hour)	0-23	read and write
39	Wednesday's start time (Minute)	0-59	read and write
40	Wednesday's start time (Second)	0-59	read and write
41	Thursday's start time (Hour)	0-23	read and write
42	Thursday's start time (Minute)	0-59	read and write

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43	Thursday's start time (Second)	0-59	read and write
44	Friday's start time (Hour)	0-23	read and write
45	Friday's start time (Minute)	0-59	read and write
46	Friday's start time (Second)	0-59	read and write
47	Saturday's start time (Hour)	0-23	read and write
48	Saturday's start time (Minute)	0-59	read and write
49	Saturday's start time (Second)	0-59	read and write
50	Interval of regeneration start time	1-9999	read and write
51	Steps of M program	1-16	read and write
52	Step width of 1st step	0-9999	read and write
53	Step width of 2nd step	0-9999	read and write
54	Step width of 3rd step	0-9999	read and write
55	Step width of 4th step	0-9999	read and write
56	Step width of 5th step	0-9999	read and write
57	Step width of 6th step	0-9999	read and write
58	Step width of 7th step	0-9999	read and write
59	Step width of 8th step	0-9999	read and write
60	Step width of 9th step	0-9999	read and write
61	Step width of 10th step	0-9999	read and write
62	Step width of 11th step	0-9999	read and write
63	Step width of 12th step	0-9999	read and write
64	Step width of 13th step	0-9999	read and write
65	Step width of 14th step	0-9999	read and write
66	Step width of 15th step	0-9999	read and write
67	Step width of 16th step	0-9999	read and write
68	S1 Step 1 (1 on, 0 off)	0-1	read and write
69	S1 Step 2 (1 on, 0 off)	0-1	read and write
70	S1 Step 3 (1 on, 0 off)	0-1	read and write
71	S1 Step 4 (1 on, 0 off)	0-1	read and write
72	S1 Step 5 (1 on, 0 off)	0-1	read and write
73	S1 Step 6 (1 on, 0 off)	0-1	read and write
74	S1 Step 7 (1 on, 0 off)	0-1	read and write

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75	S1 Step 8 (1 on, 0 off)	0-1	read and write
76	S1 Step 9 (1 on, 0 off)	0-1	read and write
77	S1 Step 10 (1 on, 0 off)	0-1	read and write
78	S1 Step 11 (1 on, 0 off)	0-1	read and write
79	S1 Step 12 (1 on, 0 off)	0-1	read and write
80	S1 Step 13 (1 on, 0 off)	0-1	read and write
81	S1 Step 14 (1 on, 0 off)	0-1	read and write
82	S1 Step 15 (1 on, 0 off)	0-1	read and write
83	S1 Step 16 (1 on, 0 off)	0-1	read and write
84	The step for output in S2	1-16	read and write
85	Output delay time in S2	1-9999	read and write
86	S3 Step 1 (1 on, 0 off)	0-1	read and write
87	S3 Step 2 (1 on, 0 off)	0-1	read and write
88	S3 Step 3 (1 on, 0 off)	0-1	read and write
89	S3 Step 4 (1 on, 0 off)	0-1	read and write
90	S3 Step 5 (1 on, 0 off)	0-1	read and write
91	S3 Step 6 (1 on, 0 off)	0-1	read and write
92	S3 Step 7 (1 on, 0 off)	0-1	read and write
93	S3 Step 8 (1 on, 0 off)	0-1	read and write
94	S3 Step 9 (1 on, 0 off)	0-1	read and write
95	S3 Step 10 (1 on, 0 off)	0-1	read and write
96	S3 Step 11 (1 on, 0 off)	0-1	read and write
97	S3 Step 12 (1 on, 0 off)	0-1	read and write
98	S3 Step 13 (1 on, 0 off)	0-1	read and write
99	S3 Step 14 (1 on, 0 off)	0-1	read and write
100	S3 Step 15 (1 on, 0 off)	0-1	read and write
101	S3 Step 16 (1 on, 0 off)	0-1	read and write
102	Experimental operation (1 launch the experiment)	0-1	write
103	Experiment flag (1 in working)	0-1	read only
104	Experimental operation (1 next step)	1	write
105	Experimental operation (1 to Exit program)	1	write

106	Regeneration flag (1 in working)	1	read only
107	Forced regeneration (1 mandatory)	1	write
108	The number of steps for regeneration	1-16	read only
109	Remaining time in this step (Seconds)	0-9999	read only

7. Appendix

7.1 K value reference

This table conforms to national PN10 and metric PVC pipe standard.

Metric PVC Pipe	DN40	DN50	DN65	DN80	DN100
Recommendatory K value	6.8—10.0	3.6—4.2	2.8—3.3	1.8—2.2	0.8-1.2
Installation pattern	Support base union connection	Support base union connection	Support base union connection	Support base Flange connection	Support base Flange connection

* All K values in this table are for reference only. In case of discrepancy, the K value of test reference table for specific flow sensor shall prevail.

7.2 Control principle drawing

