



RELAY KNOCKER SERIES RELAY KNOCKER CONTROL PANEL OPERATION MANUAL



EKE5000

EXEN CORPORATION

☆ SAFETY PRECAUTIONS

- ☆ This product is a dedicated control panel for the relay knocker series.
Do not use the relay knocker control panel for any other purpose.
- ☆ Be sure to read and understand this operation manual carefully before using the product so that it can be operated safely and efficiently. Improper machine use may result in injury or machine failure. Keep this manual for further reference.
Also, read the operation manual of relay knocker carefully.
- ☆ The following symbols are DANGER, WARNING, and CAUTION instruction for the use of this product so that the product will not cause harm or damage to users or others.



DANGER

【DANGER】 indicates an imminent dangerous situation which may lead to death or serious injury.



WARNING

【WARNING】 refers to a hazard that may cause death or serious injury.



CAUTION

【CAUTION】 refers to a hazard that may cause minor or moderate injury.



WARNING

(To prevent death)



Do not use the product with a power supply that does not have a ground-fault interrupter. Otherwise, you may get an electric shock.



Be sure to connect the ground wire. Otherwise, you may get an electric shock.



This product is a control panel that is available for both indoor and outdoor use. Although this has a waterproof and dustproof structure, please pay attention enough to opening and closing of the door in areas with water, moisture, and dust, etc.

There is a possibility that water, moisture, and dust, etc. may cause electric shock.



(To prevent injury or damages)

-  Be sure to operate this product within the voltage specified in the nameplate. Use of a voltage higher than the one indicated on the nameplate may result in a malfunction or electric shock.
-  When attaching this product to a wall, fix the mounting legs firmly with bolts. Falling the product may lead to an unexpected injury.
-  When move this control panel, please be sure to make the power supply into "OFF" and to change into the state where electricity is not supplied to the control panel. Otherwise, relay knocker starts suddenly and there is a possibility of causing an electric shock and an unexpected injury.

○ INTRODUCTION

Thank you for purchasing the relay knocker control panel.

Be sure to read this operation manual before use.

Be sure to read and understand this operation manual carefully before using the product until it can be operated safely and efficiently. Handle and maintain it appropriately for safety operation.

Keep this manual for further reference.

CONTENTS

☆ SAFETY PRECAUTIONS.....	1
○ INTRODUCTION.....	4
○ SAFETY	5
○ NAMES OF PARTS	8
○ WIRING PROCEDURES	12
○ THE LENGTH OF EXTENSION TUBES	13
○ OPERATIONS.....	15
○ INSPECTION	23
○ TROUBLESHOOTING	24
○ SPECIFICATIONS	25

○ SAFETY



(For personal protection during operation)

- Put on a safety helmet, safety gloves, and safety boots before using the control panel.



Safety helmet



Safety gloves



Safety boots

- When a short circuit occurs in this control panel, the built-in ground fault interrupter will be activated. In such a case, be sure to turn OFF the input power supply so that no electricity is supplied to the control panel, investigate the cause, restore the power, and resume operation. Continued operation without knowing the cause may result in electric shock.
- The ground wire is green. When wiring, do not mistake the ground wire (E). If you connect the wrong wire, you may get an electric shock.
- When wiring or inspecting this product, be sure to turn "OFF" the input power supply, and do so with no electricity supplied to the control panel. Failure to do so may result in electric shock.



(For longer service life)

- Wiring connections must be made properly to avoid poor contact and wiring errors. They may cause failure of machinery.
- Install control panel at a place where it will suffer little vibration because it is electronic equipment.
- The operating temperature range of this unit is 0 to 40°C. Please use it in this range.
- When abnormal current flows into the solenoid valve, the built-in circuit protector goes trips.

Please investigate the cause, and exchange the circuit protector after restoring the control panel.

- Please operate the switch and the push button by hand.
- Make sure the force of percussion does not exceed the necessary level, as excessive percussion may damage mounting parts such as the hopper.
- When applying continuous percussion at short cycles, allow an interval of at least one second.

An interval of less than one second may lead to malfunction.

Note : Set the interval 10 seconds and above for RKV/RKD120P model.

- Please start piping after checking that there is no adhesion of foreign substance, machining dust and burr
- Perform flushing by blowing air at 0.3MPa or higher into the pipe to remove foreign matter, machining dust, and burr.
- Please use the air that passed through an air filter 5 micrometers or less. The moisture or powdering dust in piping has a possibility of causing poor operation and air leakage.
- The apparatus with direction should pipe to unite IN side of the direction of the flow of fluid and IN port displayed on the product.
- Regarding the use of sealing tape, please be sure not to get caught the tape inside the piping and not to cause air leak. When applying the sealing tape onto thread portions, avoid the 2-3 top threads. When applying liquid sealing material onto thread portions, avoid the 2-3 top threads and don't apply the excess amount. Avoid applying liquid sealing to female thread.
- In cold district use, take the suitable measures against freeze. (Air should not freeze.)
- Please use neither in the atmosphere of corrosive gas, nor the atmosphere of explosive gas.

- Please do not make valve into a scaffold or do not put heavy material.
- The bolting torque at the time of piping should be referred to the following table.

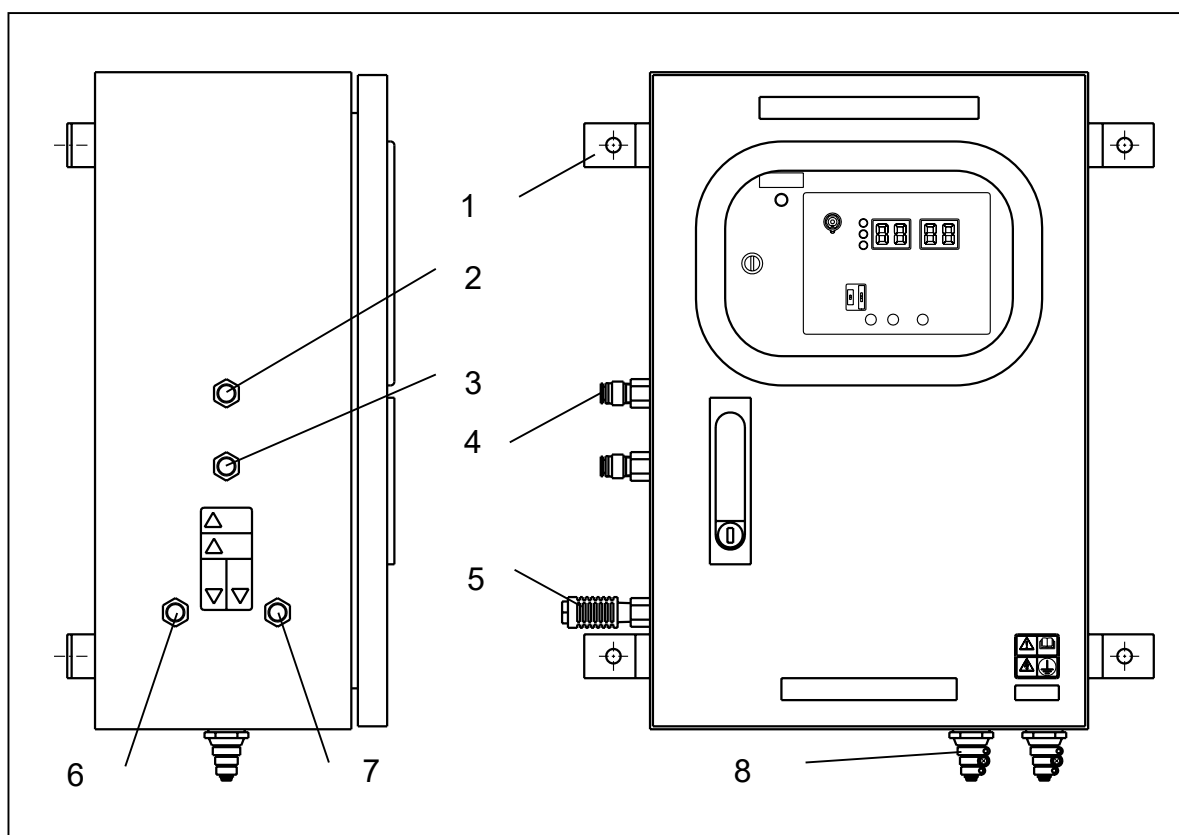
When the main part material is aluminum

Diameter of piping	Recommended bolting torque for piping (N·m)
Rc1/8	7 — 9
Rc1/4	12 — 14
Rc3/8	22 — 24
Rc1/2	28 — 30
Rc3/4	31 — 33

When the main part materials are metal other than aluminum

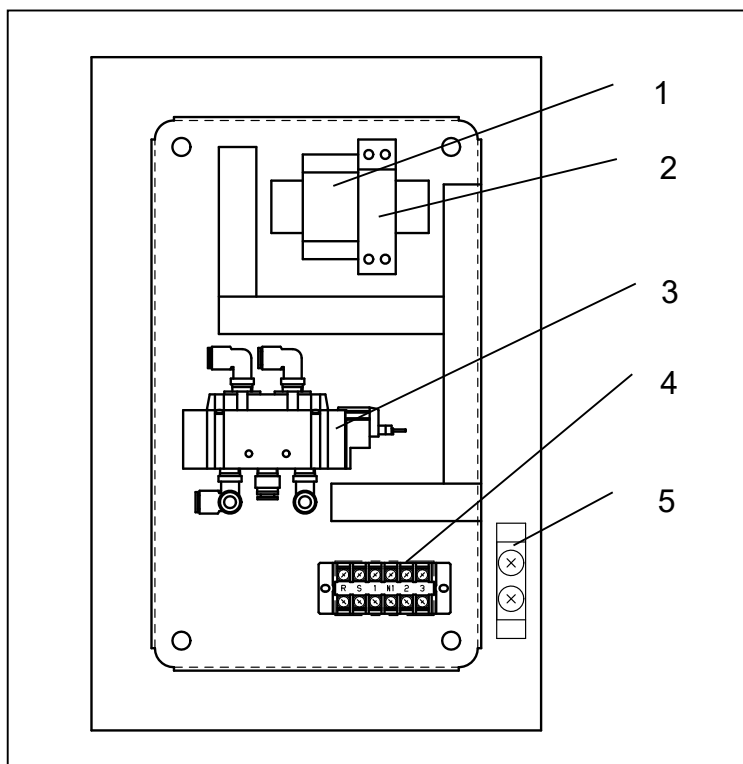
Diameter of piping	Recommended bolting torque for piping (N·m)
Rc1/8	18 — 20
Rc1/4	23 — 25
Rc3/8	31 — 33
Rc1/2	41 — 43
Rc3/4	62 — 65

○ NAMES OF PARTS



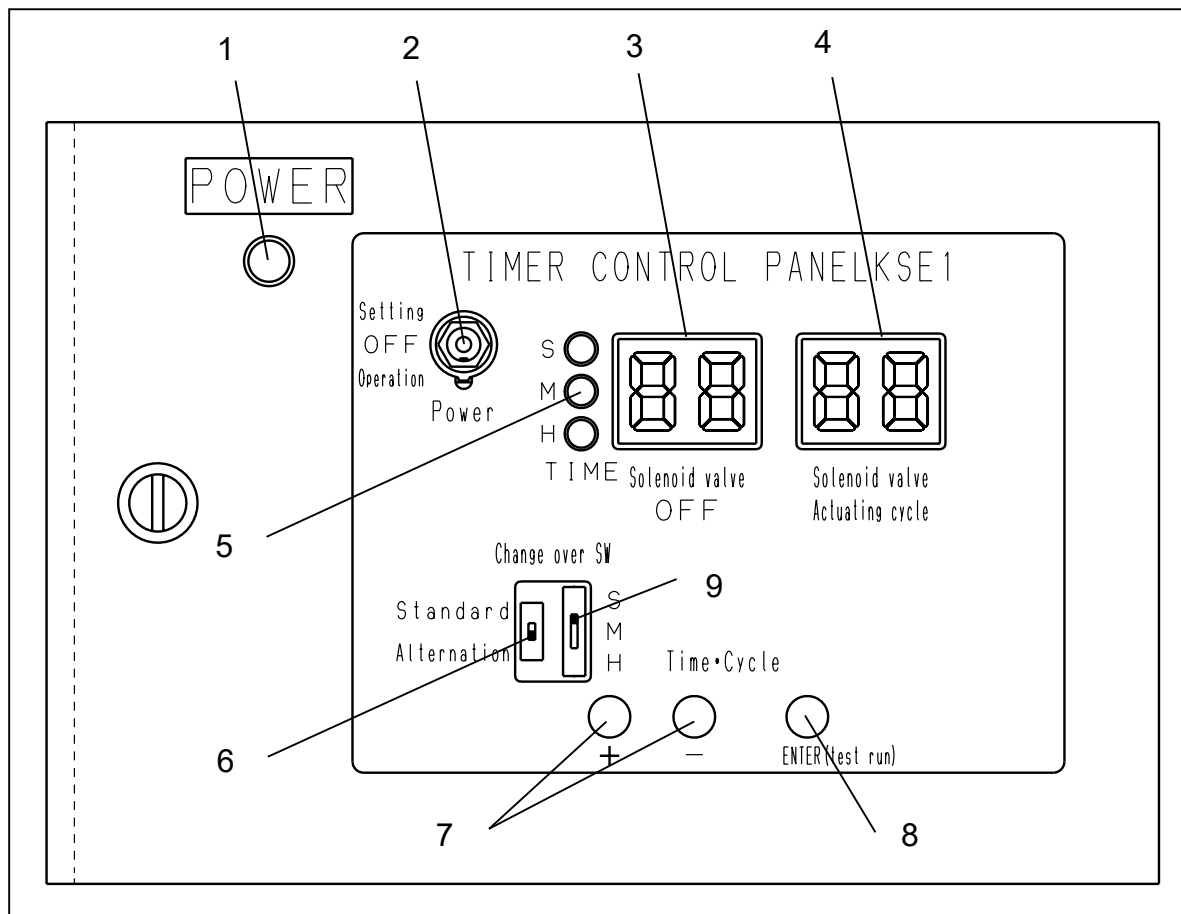
1	Mounting legs	5	Silencer
2	System A	6	Air supply port
3	System B	7	Exhaust port
4	Push one connector	8	Cable clamp (CAPCON)

■ Arrangement in control panel



1	Circuit protector	4	Terminal block
2	Power supply	5	Grounding terminal
3	Solenoid valve	-	-

■ Arrangement of control panel inner door



Note : Standard / alternation changeover switch is set up "alternation" at the time of delivery.

1	Power LED	6	Standard / Alternation Changeover switch
2	Power switch	7	+, - Button
3	Solenoid valve OFF time LED	8	ENTER Button
4	Solenoid valve actuating cycle LED	9	Time changeover switch
5	Time indication LED	-	-

■ Parts description

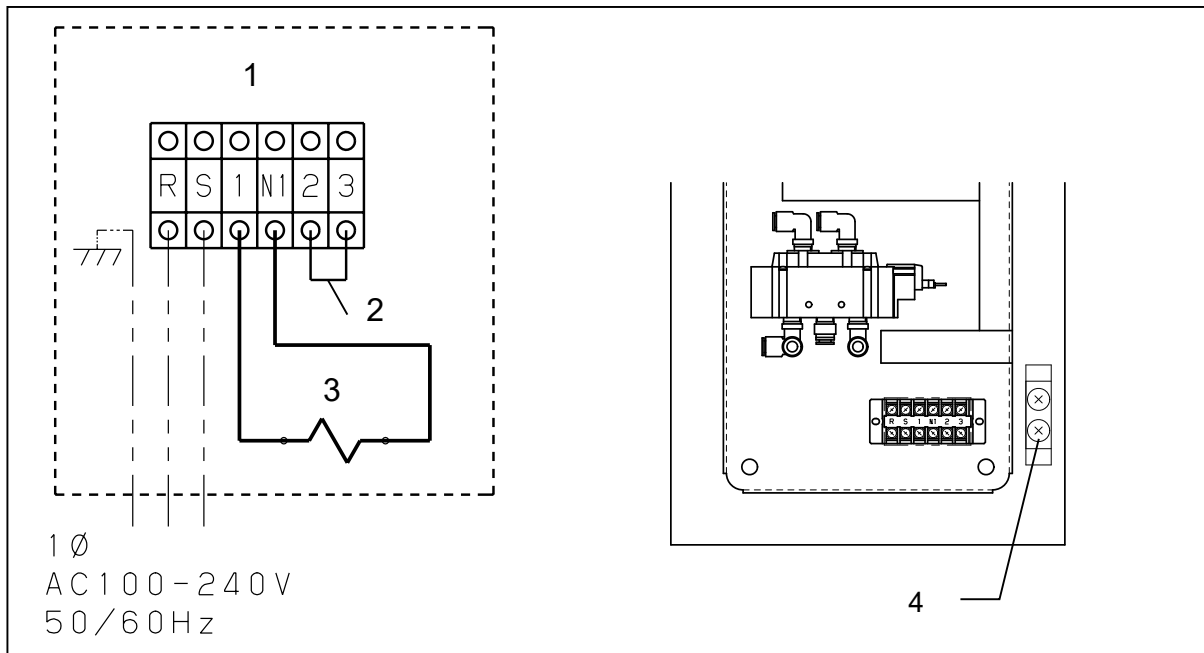
Power switch	It is a switch to switch between "Setting", "Operation" and "OFF".
Time changeover switch	S (second), M (minute), H (hour) changeover switch.
Standard and Alternation changeover switch	The switch changes operation of the timer to Standard mode or Alternation mode.
+ , - Button	The button makes selection of the time and actuating cycle at the time of the setting.
ENTER	The button fixes the time set up by + · - . Used also at the time of a test run.
Time indication LED	Indicates the time unit selected with the time changeover switch.
Solenoid valve OFF time LED	OFF time (Operation interval of knocker) is indicated at the time of setting.
Solenoid valve actuating cycle LED	The actuating cycle of operation is indicated at the time of setting.

○ WIRING PROCEDURES

- Input and external signal cable are connected to the inside of the box through the cable clamp. The terminal block screw is 4mm.
1. Connect the power supply to "R" and "S" on the terminal block. (Single phase AC100-240V)
 2. Make sure that grounding is equipped at the grounding terminal of the control panel box. The terminal screw is 8mm.
 3. When operate by an external signal, please remove the short circuit cable connected to 2 and 3 of the terminal block, and use it, providing a switch (non-voltage a-contact).

Note

- When not doing external signal operation, wiring of external signal cable is unnecessary. Please do not remove the short circuited cable.
- Please shorten wiring of the external signal as much as possible. Use of less than 100m shield wire is recommended.
- 1.25 mm² or more cables must be used for wiring.
- Please use pressure terminal for wiring for loose connection and fall away prevention.
- The solenoid valve is wired and piped in the control panel.



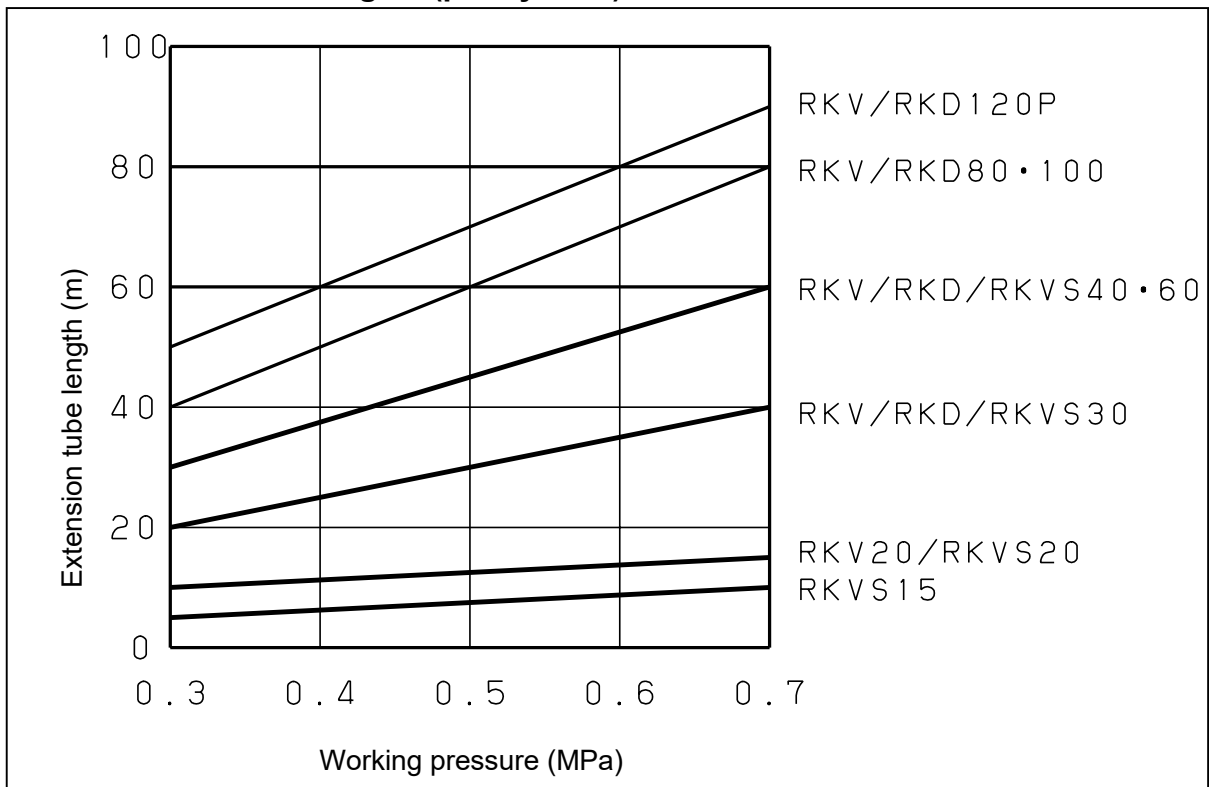
- ▶ 1. Control panel EKE/EVE 2. Short circuit cable 3. Solenoid valve 4. Grounding terminal

Control panel wiring diagram

○ THE LENGTH OF EXTENSION TUBES

- In order to efficiently use the relay knocker in a wide range of impact pressure including low and high impact, install the extension tubes for it as short as possible. Check the model to be used and the air pressure to decide the tube length. The total length of tubes should not exceed the limit line shown in the chart "The Length of Extension tube length".

■ " Extension tube length" (per system)



Note

The above-mentioned chart is data based on the examination using actual machine. Because of air apparatus, if piping length becomes long, the relay knocker may operate two or more. Although the performance does not change, it is recommended to use a master valve to acquire an accurate operation when extending piping length.

- When using the master valve, set supply pressure to 0.4 MPa or more. Be sure to set the piping length between a knocker and a master valve to 1m, and set distance between a master valve, and control board/solenoid valve to 50m or less.

Note

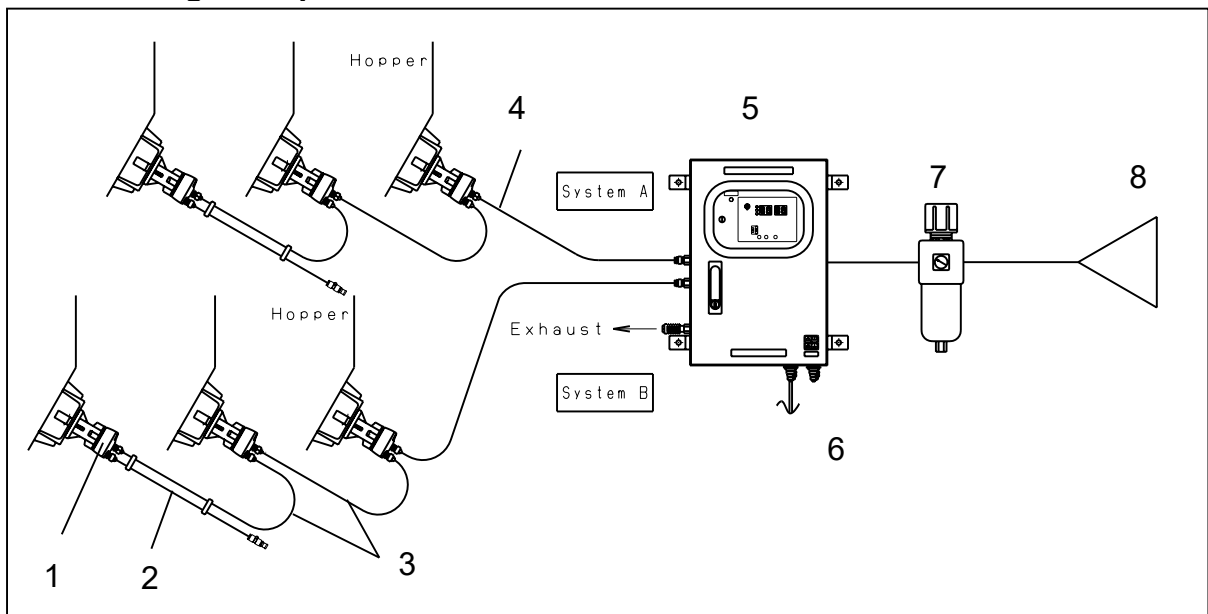
- The chart shows the total usable length of tubes for per system. If the total length of tubes exceeds the limit on the charts, it may cause malfunction and decrease in impact pressure. *Use below the limit line.
- Do not use relay knocker more than recommended number of units, as the machine's capacity decreases.
- When arranging the piping between the knocker and the control devices, use nylon tube or urethane tube which has a diameter of 8mm. (Use 6mm tube for RKV20P and RKVS20, and 4mm tube for RKVS15.)

○ OPERATIONS

⚠ **When using this product, do not let it get wet by rain etc. Electric shock may occur.**

- When make relay piping, please set up the Standard and Alternation changeover switch "Alternation." When the tube of relay piping becomes long, and/or the number of relay piping increase, please extend the timer set period.

■ Plumbing Examples



- ▶ 1. Relay knocker 2. Dummy tube 3. Relay tube 4. N2 tube $\phi 8 \times \phi 6$
 5. Control panel EKE model 6. Power supply 7. Air filter regulator 8. Compressor

Note

- Attach the air filter in front of the control panel to avoid malfunction due to foreign objects entering into the solenoid valve.
- Flush the tube before piping.
- Although two systems of relay knocker can be connected to the EKE control panel, the actions of pressure accumulation / percussion are alternated in system A and system B.
 Note : If only one system is used with the systems A and B, place a plug in the unused system.

■ Operating procedure

- Please start operation after checking that the surroundings are safe, even if knockers operate.
- Supply air to the control panel and following procedure.
- Turn on the input power after checking that the switch is in the position of "OFF".

Trial operation

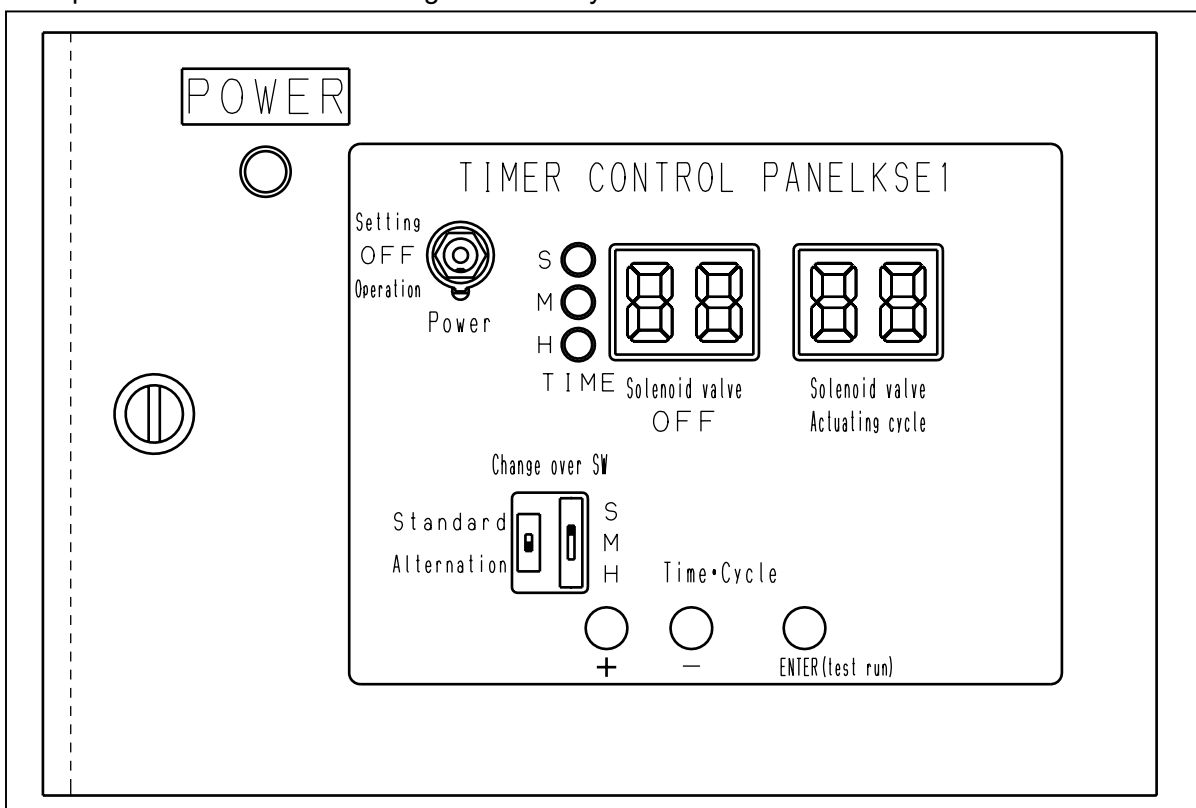
Turn ON the circuit protector on the control panel. The power LED lights.

When the power switch is put into "Setting", solenoid valve OFF time will be indicated as "00."

If ENTER is pushed in this state, solenoid valve can be worked while pushing regardless of the timer.

The connector part of the solenoid valve lights up red at the time of turning on electricity.

The panel indication under turning on electricity to the solenoid valve is "P0."



Note :

When not indicated as "00", please push +, - button and make it "00." It is set to "00", also when the switch is turned OFF once and set up again

Factory default value

The value at the time of delivery is "05/05" (solenoid valve OFF time / solenoid valve actuating cycle.)

When the switch is put into "operation", knocker begins first-time operation, 3 seconds (Set-up is not available) after turning on the switch (solenoid valve ON). system A and system B change by turns at intervals of 5 seconds and it will operate a total of 5 times, and will stop. Same operation will be done, if the switch is turned OFF once and it puts into operation again. The time changeover switch is set to S (second) at the time of delivery of goods.

The mode is set up "Alternation".

Solenoid valve OFF time / Setup of actuating cycle, operation (Automatic operation)

Note : In "alternation" mode, ON time of the solenoid valve becomes the same as the time set up in OFF time.

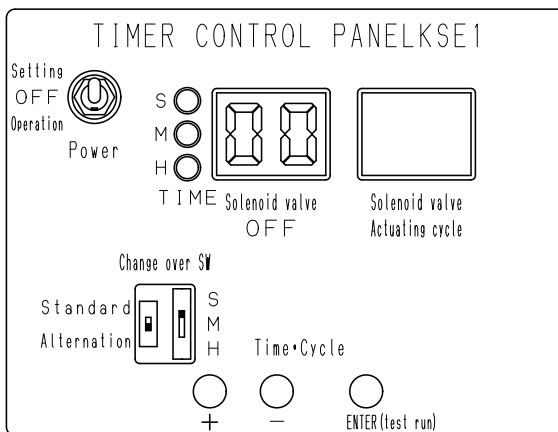
1. Changeover switch S, M, H

The time unit of the timer can be chosen from S (second), M (minute), and H(hour).

S, M, and H are indicated by LED at the time of operation.

Please change S, M, and H by time to set up.

Note : After change, turn OFF the power switch once and turn to "Operation" again. Thereby, the change of the time unit becomes effective.



2. Set up of time

When the power switch is put into "Setting", solenoid valve OFF time will be indicated as "00." Push +, - button and adjust to required time. Push the ENTER button and fix.

Note : When setting the time to 0.5 second, push + and - simultaneously and make it ".5" indication. When the time is set to 0.5, it is set to 0.5 second regardless of Changeover switches S, M, and H.

3. Set up of actuating cycle

The count of operation is indicated as "00" after setup of time.

Push +, - button and adjust to the required actuating cycle. Push the ENTER button and fix.

When the setup of time and the actuating cycle is completed, it will be indicated as "COP". Turn OFF the switch when COP is indicated.

Note : When setting up the actuating cycle "Unlimited", push +, - simultaneously and set as "--" indication.

4. Operation

When the power switch is put into Operation, automatic operation will be started after 3 seconds by the time and the actuating cycle which were set up.

Note : When the power switch is turned off on the way and put into Operation again, it will operate from the beginning by the solenoid valve OFF time and the actuating cycle which were set up.

Note : When starting operation again after the set up actuating cycle is finished, once turn off the power switch, and put the switch into Operation again. It starts operation by the same setup.

LED indication

Solenoid valve OFF time is counted down for every time progress.

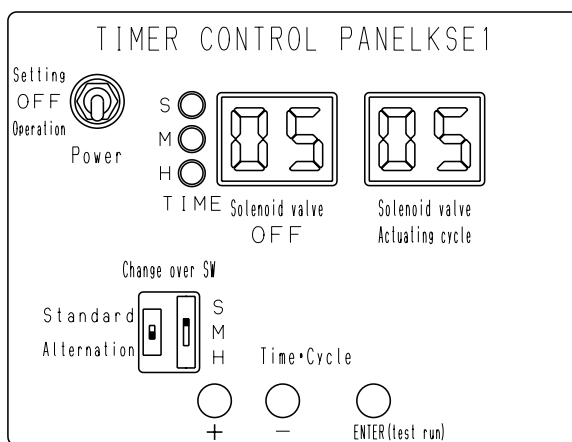
The actuating cycle is counted down for every operation, and "00" is indicated after the preset actuating cycle is completed.

External signal operation

The external signal terminal is connected by the short circuit cable at the time of delivery. When combining operation with the timing of granular material discharge of hopper, remove the short circuit cable and connect an external signal to it. This allows external signal operation at a set time and actuating cycle.

Note : Operation is started 3 seconds after an external signal enters, solenoid valve operates by the time and the actuating cycle which were set up, and knocker is operated automatically.

Note : When the external signal is turned off before reaching the actuating cycle of the setup, operation is finished at the time. When the external signal enters again, operation will be started by the time and the actuating cycle which were set up 3 seconds after.



Cautions!

Please connect an external signal terminal to a non-voltage a-contact.

Initialization of the setting

LED Indication (Preset value) is set as "05, 05" at the time of factory shipments.

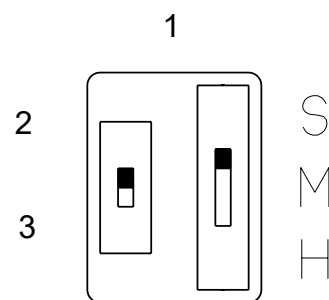
When initializing at the time of factory shipments, puts the power switch into "Setting", pushing ENTER.

"COP" is indicated and it will be in the state at the time of factory shipments.

Use in changeover switch Standard mode

ON time is fixed to 0.5 second if the changeover switch is put into standard.

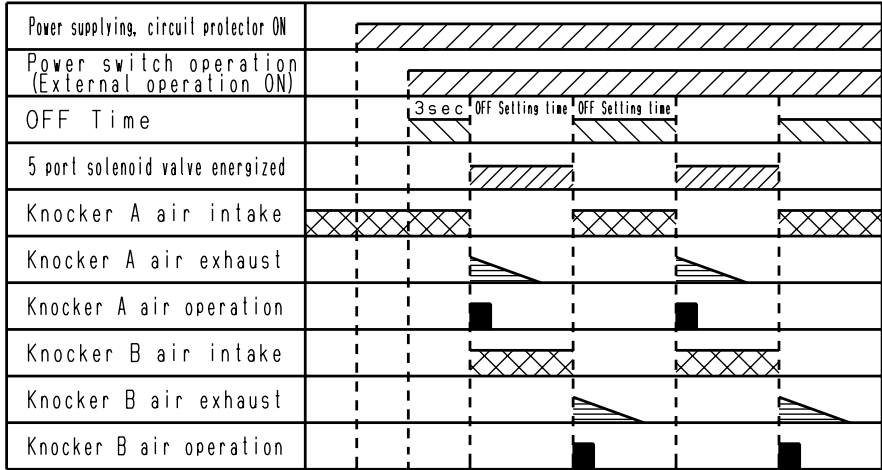
This is used when the timer set period is long at the time of system A single use.



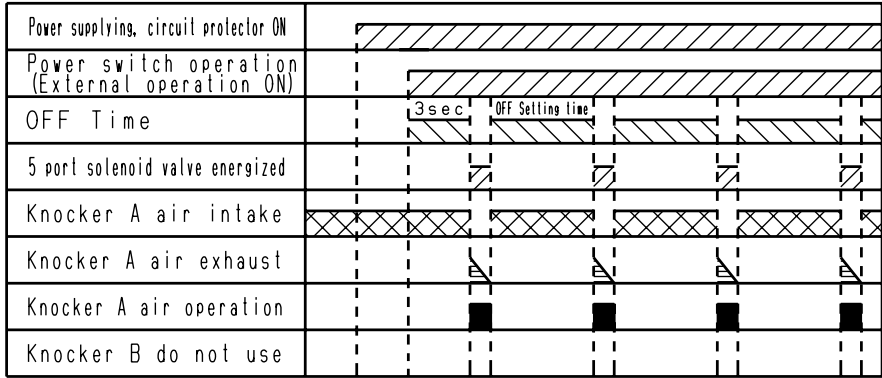
- ▶ 1. Changeover SW 2. Standard
3. Alternation

■ Time chart

Time chart (Alternation mode)



Time chart (Standard mode)



■ Operation procedure

1. When power is supplied to the control panel, the circuit protector is turned "ON", and the power switch is put into "Operation", the solenoid valve will be turned on electricity in 3 seconds (Set-up is not available).

Note : When air is supplied to the control panel, air is supplied to the knocker(s) connected to system A. (Since system A is connected by "normal opening")

2. Turn on electricity to the solenoid valve for the time set up by the OFF timer, and stop turning on electricity after the set period passes.

Note : When the solenoid valve turns on electricity, air of system A will be exhausted from the solenoid valve, and relay knocker connected to system A activates. At the same time, air is supplied to the relay knocker connected to system B.

Note : When turning on electricity is stopped, air is supplied to system A , and system B will be exhausted and the knocker will activates.

3. The knockers connected to system A and system B operates repeatedly in the timer set period.

○ INSPECTION

- Be sure to check the followings periodically to prevent any trouble as much as possible during use.
 - 1. Is there any break nor rust on the body?
 - 2. Is there any damage or scratches on the power cable or piping?
 - 3. Is there any loose attachment bolts?
 - 4. Is input voltage within the range of the specification?
 - 5. Is the indicator light light up normally?
 - 6. Does the relay knocker impact normally?

○ TROUBLESHOOTING

Phenomenon	Sign	Cause	Solution
LED is not indicated though put the switch into "Setting" or "Operation".	No LED indication	Power supply is OFF	Switched ON power supply
		Input cable is cutting on the way	Repair or replace the cable
		Wiring is mistaken	Check wiring and rewire
		Power supply failure	Check of output DC 24V Exchange of built in power supply
		Circuit board breakage by high voltage input	Replace the circuit board
	Solenoid valve works	Failure of circuit board LED	Replace the circuit board
	Other Abnormalities	Abnormality of main unit	Check and repair of main unit
LED is indicated when put the switch into "Setting" or "Operation"	Solenoid valve does not work	Wiring is mistaken	Check wiring and rewire
		Breakage of circuit board relay	Replace the circuit board
		Failure of solenoid valve	Replace the solenoid valve
	Malfunction of solenoid valve	Influence of noise etc.	Elimination of cause noise
	Other Abnormalities	Abnormality of main unit	Check and repair of main unit

○ SPECIFICATIONS

■ Specifications

Model	Structure	Input Voltage (V)	Solenoid valve ON time	Solenoid valve OFF time		Stroke cycle	Output voltage	Working pressure (MPa)	Mass (kg)
EKE5000	Indoor/ Outdoor	Single phase AC 100 - 240	Alternation mode, same as OFF time. Standard mode, 0.5sec. (Fix)	S (sec.)	0.5 1 - 99	1 - 99. Infinity	DC 24V	0.3~0.7	13.7
				M (min.)	1 - 99	1 - 99. Infinity			
				H (hrs.)	1 - 99	1 - 99. Infinity			

■ Number of the units can be operated

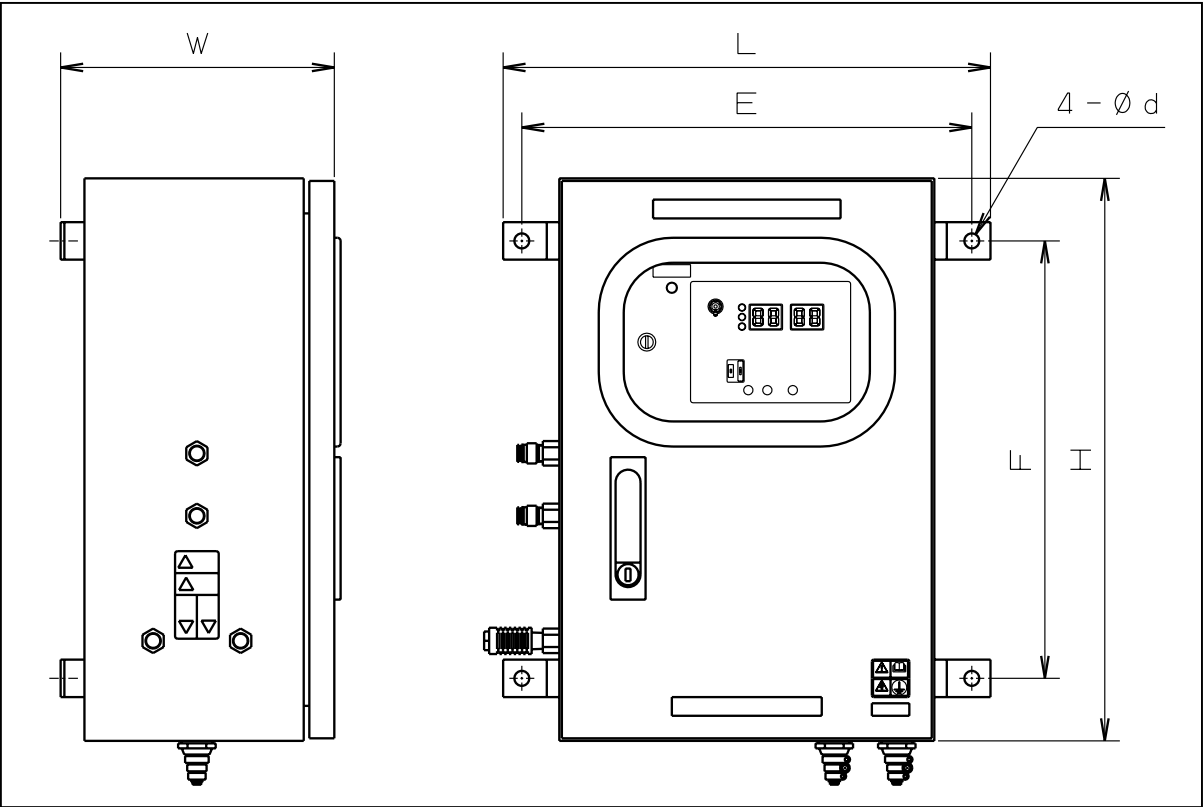
Model	Number of the units can be operated		Remarks
EKE5000	RKVS15	10 units	The number of units which can be used in per system (Standard piping)
	RKV/RKVS20	8 units	
	RKV/RKD/RKVS30	8 units	
	RKV/RKD/RKVS40	6 units	
	RKV/RKD/RKVS60	6 units	
	RKV/RKD80	4 units	
	RKV/RKD100	4 units	
	RKV/RKD120	2 units	

■ Dimension table

Unit : mm

Model	L	W	H	E	F	ϕ d
EKE5000	390	219	450	360	350	12

■ Dimension drawing



EXEN CORPORATION

1 - 17 - 13 Hamamatsucho, Minato - ku, Tokyo 105 - 0013, Japan

TEL 8 1 - 3 - 3 4 3 4 - 8 4 5 2 FAX 8 1 - 3 - 3 4 3 4 - 8 3 6 8

<http://www.exen.co.jp/English/>