



RELAY KNOCKER SERIES RELAY KNOCKER CONTROL PANEL OPERATION MANUAL



HKE1100A／1200A／5100／5200

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.



(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.

 Do not use this product outdoor (in areas with water or moisture) for HKE1100A and 1200A. If so, electric shock may occur.

Note : HKE5100 and HKE5200 are waterproof and dustproof structure, so they can be used outdoors.



(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.

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○ 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

- 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)

- When arranging the piping, attach an air filter in front of the solenoid valve. If dust gets into the solenoid valve, the knocker may not operate properly.
- 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

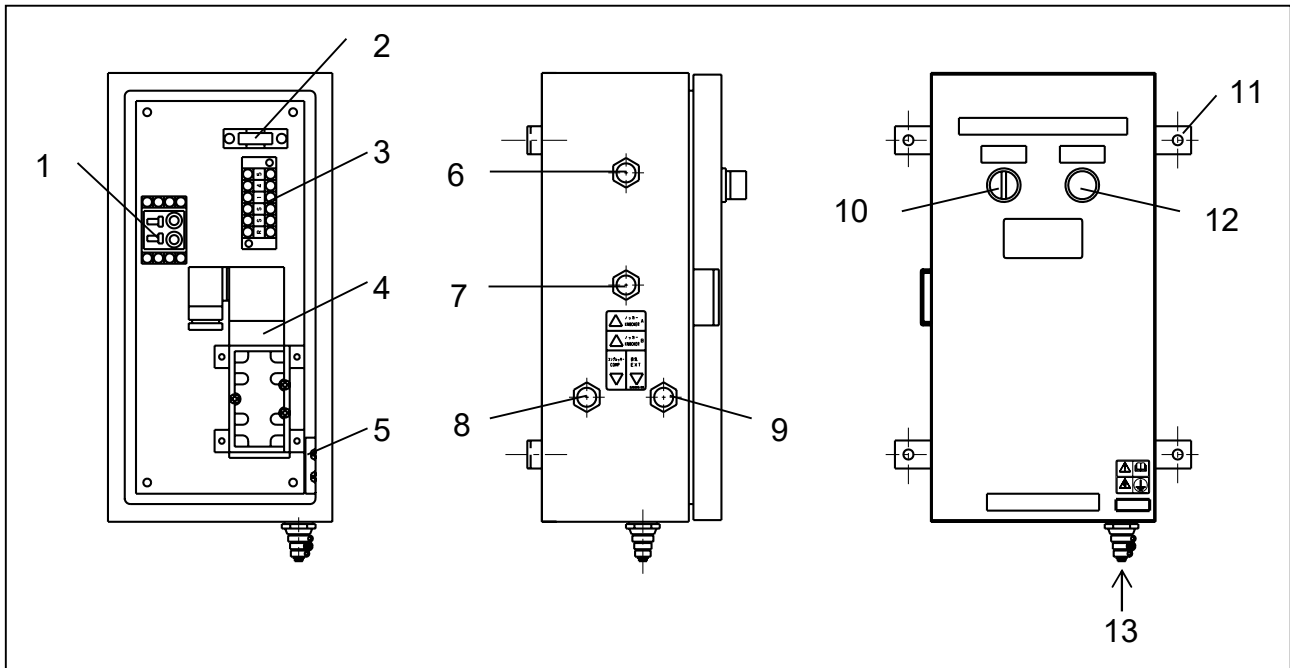
Diameter of piping	Recommended bolting torque for piping (N·m)
Rc1/8	7 — 9
Rc1/4	12 — 14
Rc3/8	22 — 24
Rc1/2	28 — 30
Rc3/4	31 — 33

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

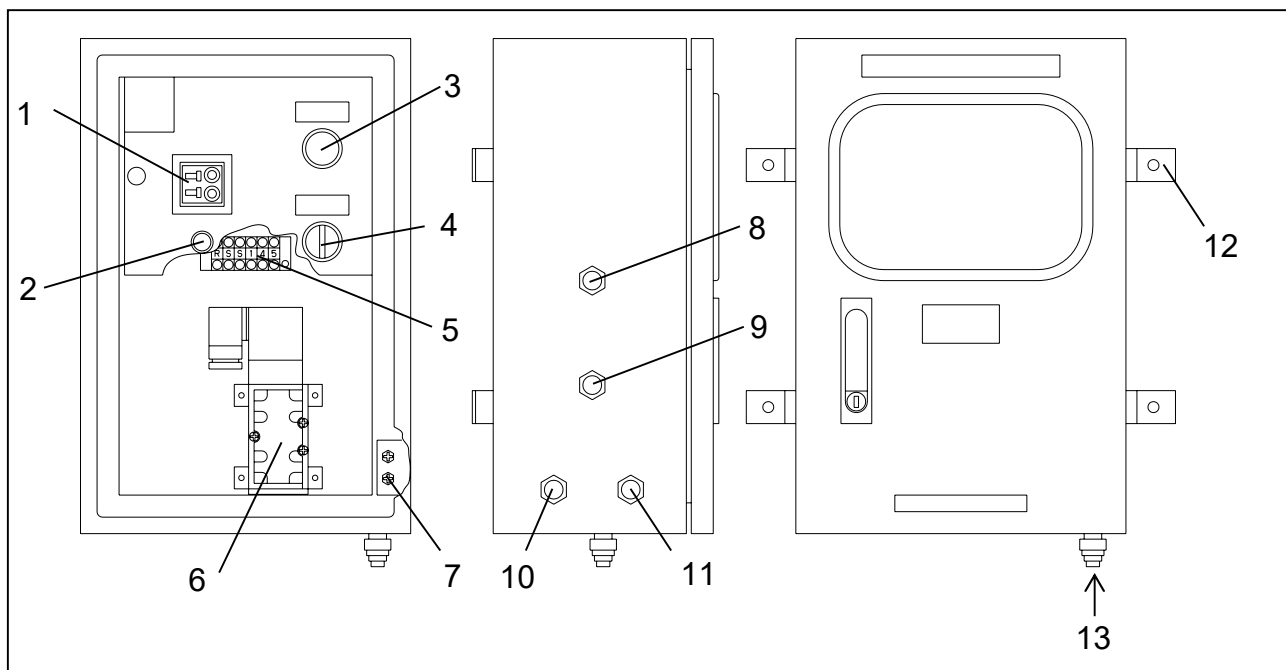
○ NAMES OF PARTS

■ HKE1100A/1200A



1	Timer	8	Air supply port
2	Fuse	9	Exhaust port
3	Terminal block	10	Selector switch
4	Solenoid valve	11	Mounting legs
5	Grounding terminal	12	Push button switch
6	System A	13	Power supply
7	System B	-	-

■ HKE5100/5200



1	Timer	8	System A
2	Fuse	9	System B
3	Push button switch	10	Air supply port
4	Selector switch	11	Exhaust port
5	Terminal block	12	Mounting legs
6	Solenoid valve	13	Power supply
7	Grounding terminal	-	-

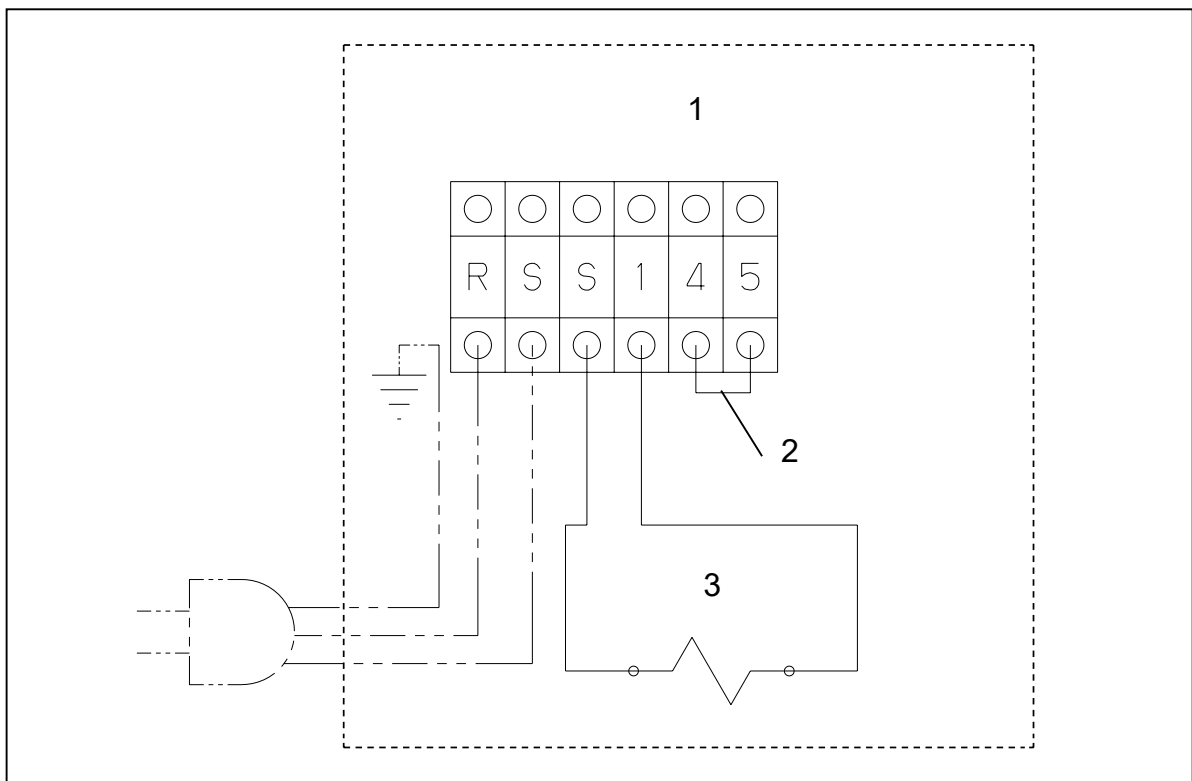
○ WIRING PROCEDURES

1. Connect the power supply (single phase) to "R" and "S" on the terminal block.
2. Make sure that grounding is equipped at the grounding terminal of the control panel box.

Note : "4" and "5" on the terminal block are used when operating the control panel from outside. Set a switch (contact point) between "4" and "5" for use.

*Use an A-contact or one which has at least 5A of contact capacity.

Note : 1.25 mm² or more cables must be used for wiring.



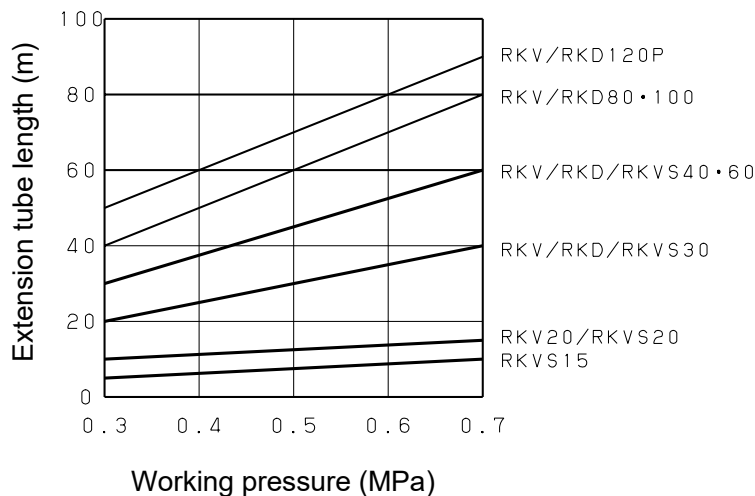
▶ 1. Control panel HKE model 2. Short circuit cable 3. Solenoid valve

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 "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 panel/solenoid valve to 50m or less.

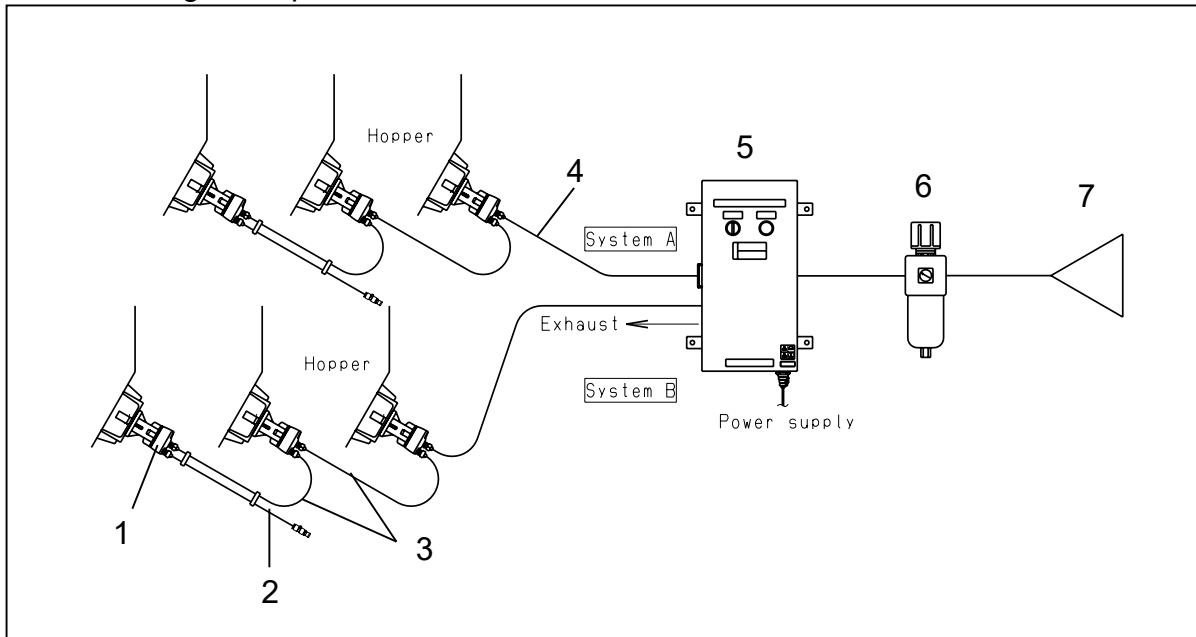
Note : The chart shows the total usable length of tubes for per system. If the total length of tubes exceeds the limit on the charts, it may cause malfunction and decrease in impact pressure.
*Use below the limit line.

- 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.

■ Plumbing Examples



1. Relay knocker 2. Dummy tube 3. Relay tube 4. N2 tube $\phi 8 \times \phi 6$
 5. Control panel HKE model 6. Air filter regulator 7. 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 model HKE control panel, the actions of pressure accumulation / percussion are alternated in system A and system B.
 *If only one system is used with the systems A and B, place a plug in the unused system.
- When arranging relay piping, please set the turning on electricity time of solenoid valve as 1second or more. When the tube length of relay piping becomes longer or the number of knockers in relay piping increase, please extend turning on electricity time of solenoid valve further till all the knockers become working.

■ Operating procedure

- Supply air to the control panel by applying current to the 3-way solenoid valve and then, operate it according to the following procedure.

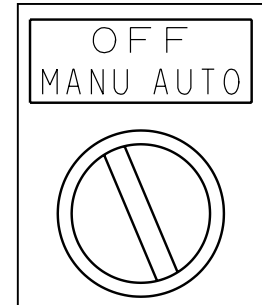
1. Manual Operation

1. Push the power switch. (The green lamp lights up.)
2. Turn the selector switch to the "Manu" position.

Note : The relay knocker connected to system A will start percussions. Air will be supplied to the relay knocker connected to system B.

3. Wait for 5 to 10 seconds with holding the selector switch at the "Manu" position as it is.
4. Turn the selector switch to the "OFF" position

Note : The relay knocker connected to system B will start percussions, and the other connected to system A will be supplied with air.



2. Automatic operation

1. Set the operation interval time by time range changeover switches and setting knob.

⚠ Do not change the timer's range changeover switches and the setting knob while the timer is working.

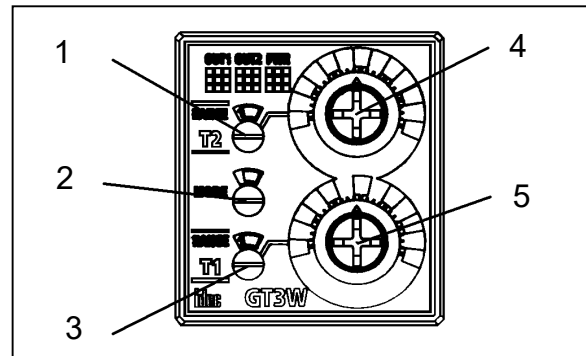
It may cause malfunction. To change the time interval, be sure that the power switch is "OFF".

⚠ There are operational mode: "A to H". Use "D" for automatic operation mode. If it is used in other modes, the operating state may vary.

*** "Time range changeover switches (T1) and (T2)" are set to about 2 seconds for factory default settings**

■ Changing time specification

- The time range changeover switches have grooves for changing the time using a flat screw driver etc.



- 1. Time range changeover switches (T2)
- 2. Operation mode changeover switch
- 3. Time range changeover switches (T1)
- 4. Setting knob (T2)
- 5. Setting knob (T1)

Note : When turning the knob to change the time, turn the knob until the number surely.
Do not keep it being between numbers. Make sure that the number sign is clearly indicated.

Note : Be sure that the power switch is "OFF" when changing the time.

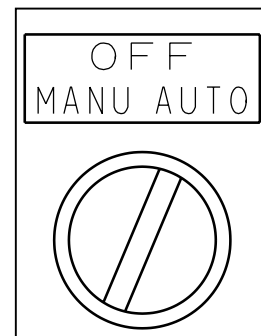
■ Selection of time ranges (Operation mode selection: D)

Time range selector	Scale	Time Range					
		0	0.2	0.4	0.6	0.8	1
1S	0 - 1	0 sec.	0.2 sec.	0.4 sec.	0.6 sec.	0.8 sec.	1 sec.
10S		0 sec.	2 sec.	4 sec.	6 sec.	8 sec.	10 sec.
10M		0 min.	2 min.	4 min.	6 min.	8 min.	10 min.
	Scale	1	2	3	4	5	6
1S	0 - 6	1 sec.	2 sec.	3 sec.	4 sec.	5 sec.	6 sec.
10S		10 sec.	20 sec.	30 sec.	40 sec.	50 sec.	60 sec.
1M		1 min.	2 min.	3 min.	4 min.	5 min.	6 min.
10M		10 min.	20 min.	30 min.	40 min.	50 min.	60 min.
1H		1 hr.	2 hr.	3 hr.	4 hr.	5 hr.	6 hr.

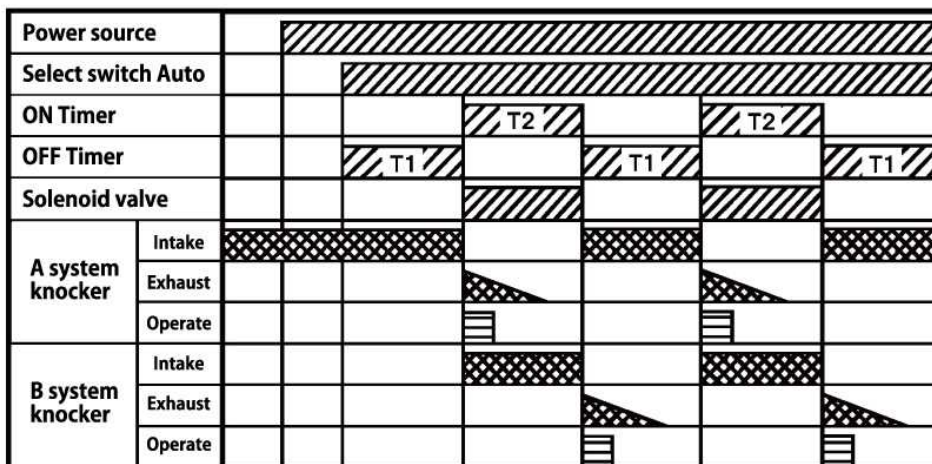
2. Push the power switch. (The green lamp lights up.)

3. Turn the selector switch to the "Auto" position.

Procedures are repeated as indicated in the following timing chart.



■ Timing chart



■ Setting operation time

- Adjust the time according to the scale.
- When more precise time needs to be set, calculate the operating time, and then, adjust the time before use.

■ Operation procedure

1. When the power is turned "ON", and the selector switch is set to "Auto", the "OFF timer" will be activated.

Note : Since system A is normally open, air has been previously supplied.

2. After T1 period, the "OFF timer" automatically switches to the "ON timer" and the 3-way solenoid valve is energized.

Note : The air in the system A relay knocker system is exhausted, and the knocker impact.

At the same time, air is supplied into the system B relay knocker during a T2 time period.

3. After T2 period, the "ON timer" automatically switches to "OFF timer", and the 3-way solenoid valve returns to its original position.

Note : The air in the system B relay knocker is exhausted, and the knocker impact.

At the same time, air is supplied into the system A relay knocker during a T1 time period.

4. These procedures are continuously repeated.

3. External signal control

Operating procedures are the same as "Automatic Operation".

(Automatically operated by external signals.)

1. Connect an external non-voltage contact between the terminal block 4 and 5.
2. Automatic operation starts when input operation instructions (continuous operation) is received from the outside of the control panel.

○ INSPECTION

- Be sure to check the followings periodically to prevent any trouble as much as possible during use.
- 1. Is there any damage or scratches on the N2 tubes?
- 2. Is the N2 tube clogged?
- 3. Can the selector switch be made the shift to “Auto” or “Manu” correctly?
(selector switch is always off at the time of shipment.)
- 4. Does the timer work normally?
- 5. Does the relay knocker impact normally?

○ TROUBLESHOOTING

Phenomenon	Sign	Cause	Solution
Relay knockers percussions	Air is exhausted. (Low impulsive force)	Air leakage due to damaged N2 tube	Repair or replace the N2 tube
		Solenoid valve failure	Repair or replace the solenoid valve
		Air pressure drop	Inspect and adjust the regulator and compressor.
	Abnormal impact interval	Timer malfunction	Repair or replace the timer
Relay knockers do not percussions	Air is exhausted	Air leakage due to damaged N2 tube	Repair or replace the N2 tube
		Selector switch failure	Repair or replace the solenoid valve
		Air pressure drop	Inspect and adjust the regulator and compressor.
	Air is not exhausted	Selector switch failure	Repair or replace the solenoid valve
		Blown fuse	Replace the fuse
		Timer failure	Repair or replace the timer
		Selector switch failure	Repair or replace the selector switch

○ SPECIFICATIONS

■ Specifications

Model	Structure	Input Voltage Single phase (V)	Timer's set time (ON timer, OFF timer)	Working pressure (MPa)	Mass (kg)
HKE1100A	Dustproof structure	AC 100	0.1 sec - 6 hour.	0.3-0.7	7.0
HKE1200A	Protection class IP4X (Indoor use)	AC 200			
HKE5100	Waterproof and dustproof structure	AC 100			13.0
HKE5200	Protection class IP44 (Outdoor use)	AC 200			

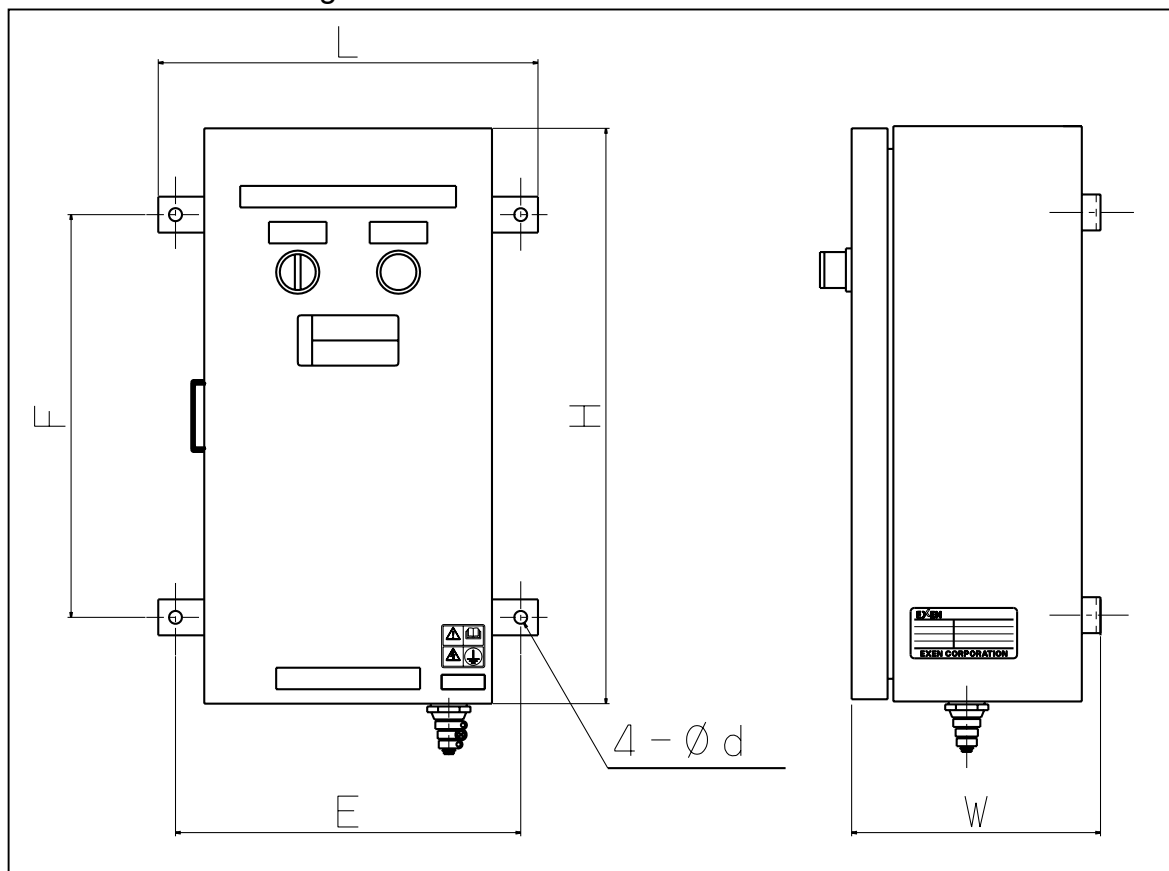
■ Number of the units can be operated

Model	Number of the units can be operated		Remarks
HKE1100A	RKVS15	10 units	The number of units which can be used in per system (Standard piping)
HKE1200A	RKV/RKVS20	8 units	
	RKV/RKD/RKVS30	8 units	
	RKV/RKD/RKVS40	6 units	
HKE5100	RKV/RKD/RKVS60	6 units	
	RKV/RKD80	4 units	
HKE5200	RKV/RKD100	4 units	
	RKV/RKD120	2 units	

Unit : mm

Model	L	W	H	E	F	ϕ d
HKE1100A/1200A	264	173	400	240	280	9
HKE5100/5200	390	220	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

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