Discontinue

EVB

Electric vacuum valve

Overview

Electric vacuum valve EVB Series which achieves diverse conductance by motorizing the valve opening.

Features

Motor driven, 30 increments of variable opening

3 bore size models in the lineup: NW25/NW40/NW50

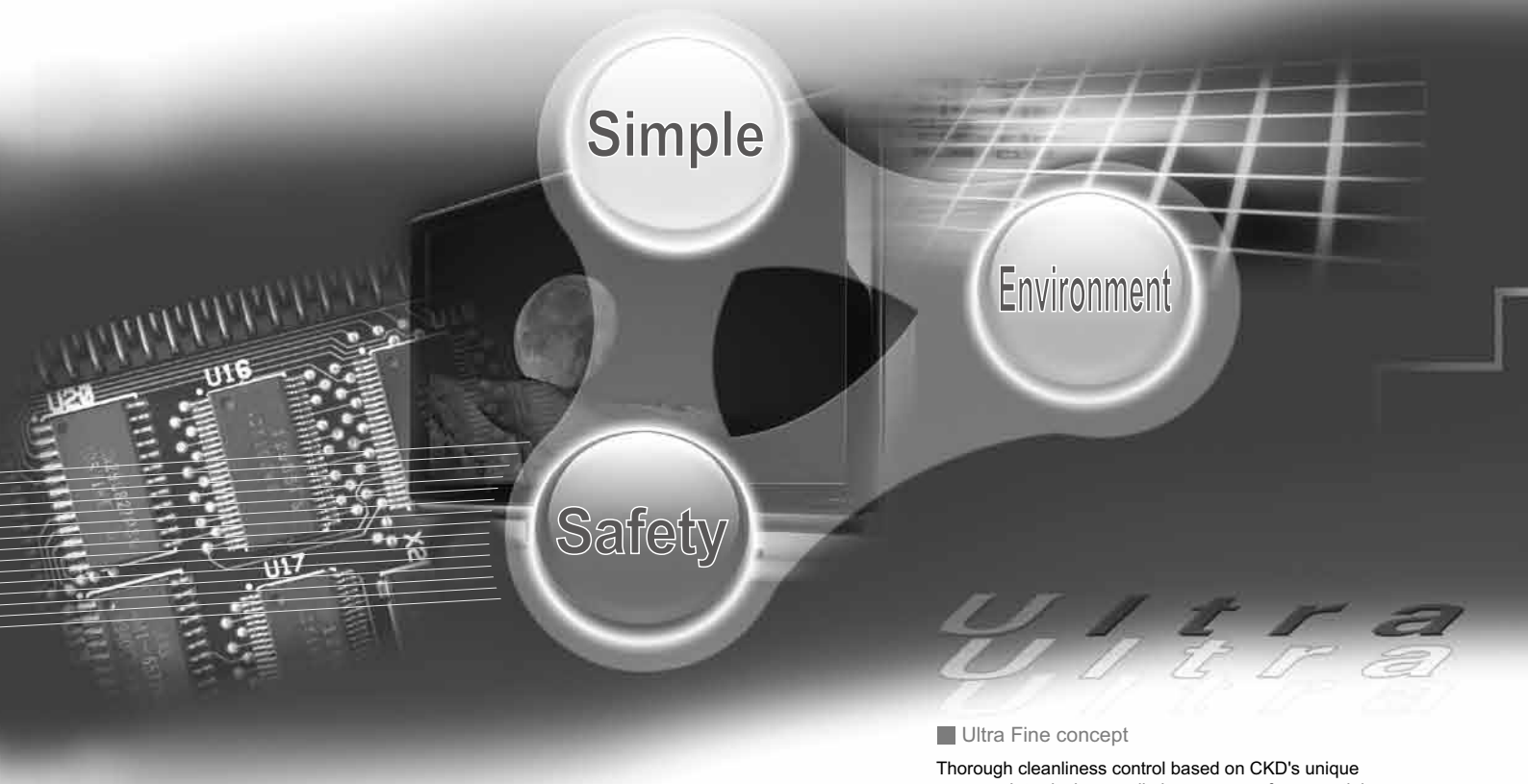
Opening monitoring function, various signal output functions.

CONTENTS

Discontinue

Further evolved, variable opening vacuum valve.

Electric vacuum valve EVB Series which achieves diverse conductance by motorizing the valve opening.



■ Ultra Fine concept

Thorough cleanliness control based on CKD's unique concept. Introducing an all-clean process for essential factors of product development from design to evaluation, manufacturing and production.

Motor driven 30 increments of valiable openings

Simple

Opening controlled by motor drive through external input.
Minimum pitch 0.15 mm (for NW25).
Ideal for simple conductance variable systems and automation of vacuum control.

Valve closing using proven spring seal

Safety

Proven spring seal is used
in air operated valve for high vacuum AVB**7 Series.
Even in the case of power failure such as power outages, it is safe as the valve can be forcibly closed with the spring.

Opening monitoring function, various signal outputs

Safety

Current opening is monitored with built-in encoder.
Operation completion signal of valve open/closed status, alarm output function.

Excellent service life/ seal performance

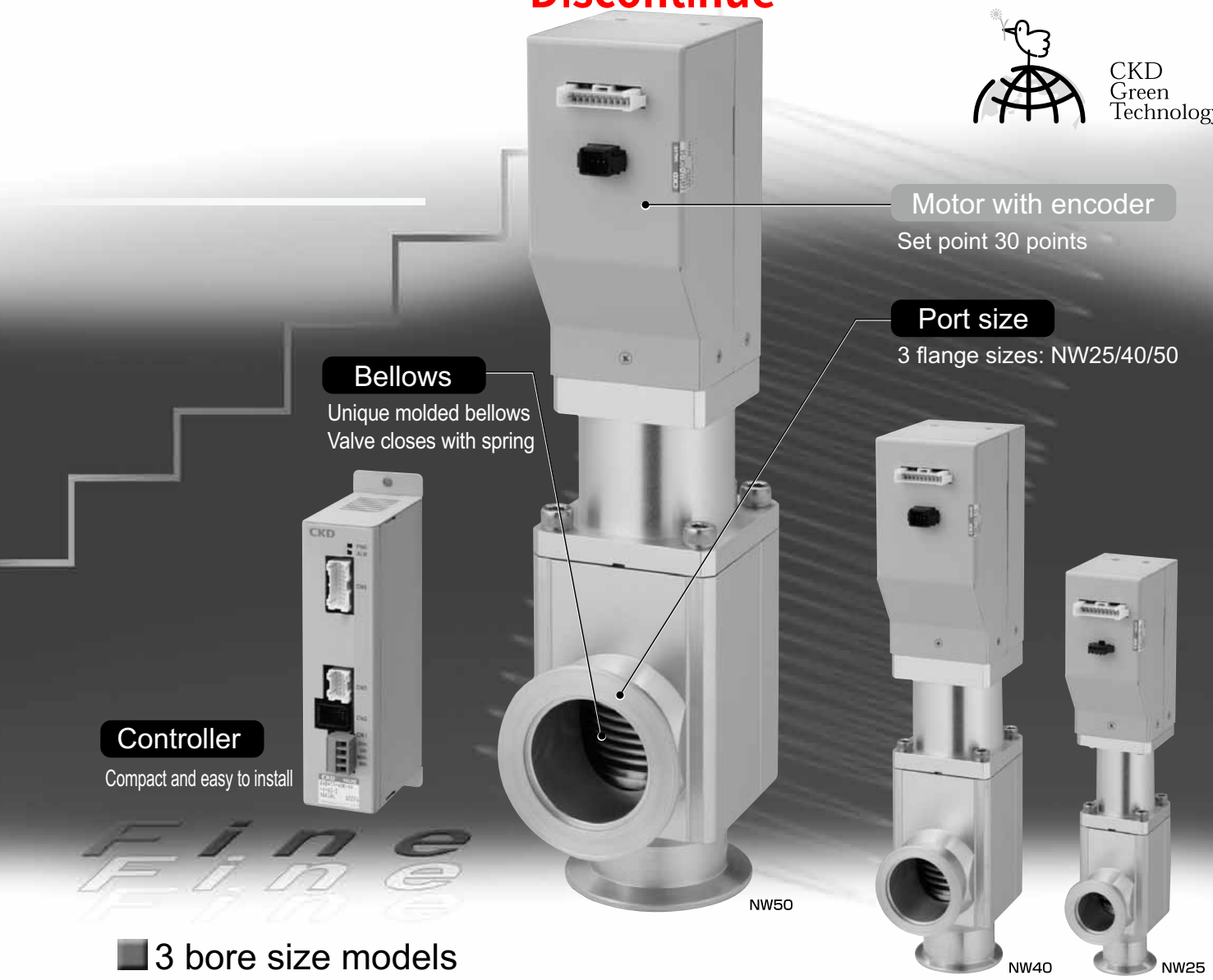
Environment

Proven bellows used in air operated valve for high vacuum AVB**7 Series.
Compared to the general butterfly valve system, this is a highly reliable poppet system with service life/seal performance.
· Nominal life is 1 million cycles (according to CKD testing).
· Seal performance is equivalent to conventional AVB Series.

Electric vacuum valve
EVB Series

Discontinue

CKD Green Technology



3 bore size models

3 bore size models in the lineup:
NW25/NW40/NW50.

Mounting compatibility

Mounting conforms to ISO 21358.
Mounting dimensions are compatible with AVB**7 Series.

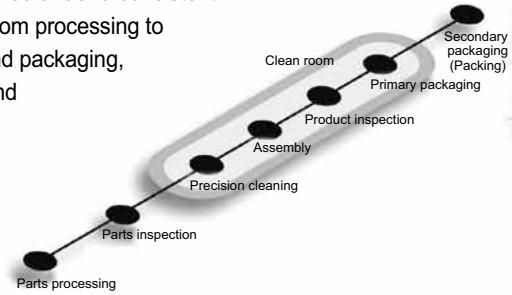
RoHS compliant

Environment RoHS

Free from substances that damage the global environment (lead, hexavalent chromium, etc.).

Thorough cleanliness control system

Products are manufactured under a consistent quality control system from processing to assembly, inspection and packaging, providing high quality and cleanliness.



Applications

- Air operated valve for soft exhaust (two-stage) replaces the AVB*47 Series, for applications with 3 stages or more.
- Once impossible with the air operated valves (2 stage), the opening can be monitored with the signal output.
- When you want to control the exhaust system remotely.
- For variable conductance in exhaust systems and to stabilize the chamber's interior conditions.

Discontinue

Electric vacuum valve

EVB*17 Series

● Molded bellows Aluminum body

RoHS

Specifications

Descriptions		EVB317	EVB417	EVB517
Working fluid		Vacuum and inert gas		
Working pressure	Pa(abs)	1.3×10^{-6} to 1×10^{5}		
Set point		(stroke length equally divided) 30 points		
Resolution	mm	0.15	0.30	0.40
Repeatability	mm	0.10	0.15	0.20
Max. working differential pressure	MPa	0.1		
Valve seat leakage	$Pa \cdot m^3/s$ (He)	1.3×10^{-10} or less		
External leakage *1	$Pa \cdot m^3/s$ (He)	1.3×10^{-11} or less		
Proof pressure	MPa	0.3		
Fluid temperature	°C	5 to 60		
Ambient temperature	°C	5 to 50 (no condensation, freezing)		
Operating ambient humidity	%	35 to 85 (no condensation, freezing)		
Storage ambient humidity	%	35 to 85 (no condensation, freezing)		
Working atmosphere		No corrosive gas		
Orifice size	mm	ø24	ø39	ø48
Conductance *2	ℓ/s	13	43	74
Connection		NW25	NW40	NW50
Weight	kg	1.1	2.6	3.3

*1: Grease for high vacuum is used on the O-rings of the outer seal.
*2: The conductance value is the theoretical calculation value in the molecular region, and not the actual measured value.

How to order

EVB | 4 | 17- | 40K | - | 4D | - S - | 05 | - | 2

Model No.

Ⓐ Series

Actuation NC

Ⓑ Connection

Ⓒ Controller

Ⓓ Bore size dedicated actuator cable

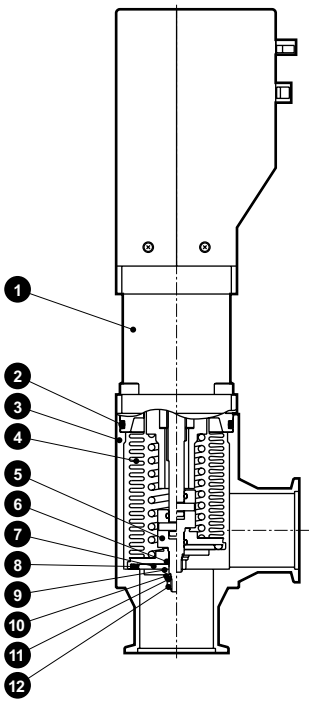
Ⓔ I/O cable

[Example of model No.]
EVB417-40K-4D-S-05-2
Model: EVB417 Electric vacuum valve

Ⓐ Series	: Orifice size ø39
Ⓑ Connection	: NW40
Ⓒ Controller	: For EVB417
Ⓓ Bore size dedicated actuator cable	: 5 m
Ⓔ I/O cable	: 2 m

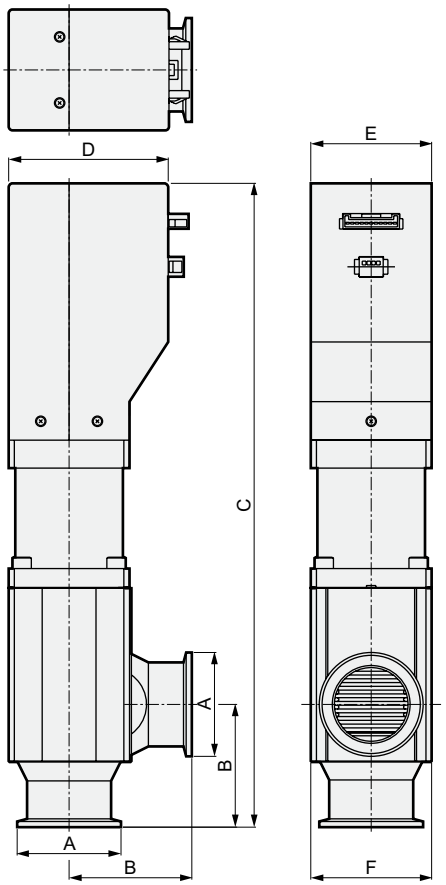
Code	Content	
Ⓐ Series		
3	Orifice size ø24	
4	Orifice size ø39	
5	Orifice size ø48	
Ⓑ Connection		
25K	NW25	Only EVB317 is available
40K	NW40	Only EVB417 is available
50K	NW50	Only EVB517 is available
Ⓒ Controller		
3D	Controller for EVB317	
4D	Controller for EVB417	
5D	Controller for EVB517	
Ⓓ Bore size dedicated actuator cable		
03	3 m	
05	5 m	
10	10 m	
Ⓔ I/O cable		
2	2 m	

Internal structure and parts list



No.	Part name	Material
1	Actuator	
2	O-ring	FKM
3	Body	A6063
4	Bellows	SUS316L
5	Rod cap	SUS304
6	O-ring	FKM
7	Valve disc B	SUS316L
8	O-ring	FKM
9	Skirt	SUS304
10	Plain washer	SUS304
11	Spring washer	SUS304
12	Hexagon nut	SUS304

Dimensions



Model No.	A	B	C	D	E	F
EVB317	ø40(NW25)	50	259	66	49	45
EVB417	ø55(NW40)	65	341	85	64	64
EVB517	ø75(NW50)	70	352	85	64	77

Discontinue

Controller for EVB

RoHS

General specifications

Descriptions		Specifications
Power supply	Power supply voltage	24 VDC ±10%
	Max. instantaneous current	4 A
	Average current	1.2 A
Control power	Power supply voltage	24 VDC ±10%
	Current consumption	0.3 A
Display		LED (green/red 1 pc. each)
Insulation resistance		50 MΩ (500 VDC) or more
Withstand voltage		No failure after 1 minute of 1,000 VAC application
Ambient temperature		0 to 50°C (no condensation, freezing)
Ambient humidity		35 to 85% (no condensation, freezing)
Storage ambient temperature		-20 to 60°C (no condensation, freezing)
Storage ambient humidity		35 to 85% (no condensation, freezing)
Atmosphere		No corrosive gas or dust
Weight		190 g

Use a power source with sufficient margin against max. instantaneous current for power supply.

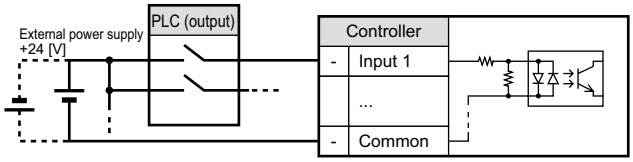
Input/output I/F specifications

Descriptions		Specifications
Input	Number of points	7 points (photo coupler isolation)
	Input voltage	24 VDC ±10%
	Input current	3 mA/point
	Min. input current when ON	2 mA
	Max. input current when OFF	0.5 mA
Output	Number of points	6 points (photo coupler isolation)
	Output voltage	24 VDC ±10%
	Max. load current	10 mA/1 point
	Max. internal voltage drop	6 V or less (at 25°C or less)*
	Max. leakage current	10 μA

* At 40°C, the load current is 9 mA and 6 V or less.

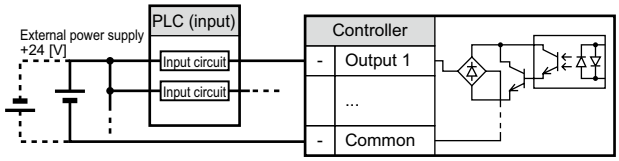
Input circuit

It is a circuit based on connection with the PLC, requiring an external power supply. Connect “+24 V” or “0 V” of the external power supply as the common terminal for “common”. Connect external output circuits such as PLCs as relay contacts or transistor output (NPN, PNP).



Output circuit

It is a circuit based on connection with the PLC, requiring an external power supply. Connect “+24 V” or “0 V” of the external power supply as the common terminal for “common”. Use an input circuit that allows maximum load current of 10 mA per output circuit.



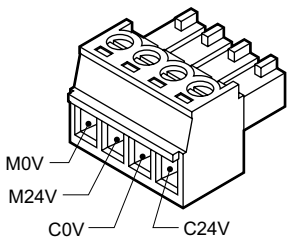
Connector terminal assignment of controller

CN1 (power supply)

Pin No.	Name
C24V	Control power (+)
C0V	Control power (-)
M24V	Power supply (+)
M0V	Power supply (-)

MINI-COMBICON plug MC1.5/4-ST-3.81 made by Phoenix Contact Co. is attached with CN1 (power supply).

- Connect CN2 (motor drive) with the dedicated harness cable attached with the product.
- CN2 (motor drive) dedicated harness cable differs for each valve bore size.
- Connect CN3 (rotation sensor communication) with the dedicated harness cable attached with the product.



Plug for CN1

CN5 (input/output I/F)

I/O	Pin No.	Dedicated harness lead wire color	Name	Function
Input	1	Orange_Black 1	SET1	Setting bit 0
	3	Gray_Black 1	SET2	Setting bit 1
	5	White_Black 1	SET3	Setting bit 2
	7	Yellow_Black 1	SET4	Setting bit 3
	9	Pink_Black 1	SET5	Setting bit 4
	11	Orange_Black 2	ENT	Set
	13	Gray_Black 2	MODE	Special mode switching
	15	White_Black 2	COMI	Input signal system common terminal
Output	2	Orange_Red 1	ALARM1	Alarm 1
	4	Gray_Red 1	ALARM2	Alarm 2
	6	White_Red 1	BUSY	Reception prohibited (Actuation/Stop judgment)
	8	Yellow_Red 1	CLOSE	Valve closed state
	10	Pink_Red 1	KEEP	Valve open holding state
	12	Orange_Red 2	MODE	Special mode
	16	White_Red 2	COMO	Output signal system common terminal
	14	-	N.C.	
	17	-	N.C.	
	18	-	N.C.	
	19	-	N.C.	
	20	-	N.C.	

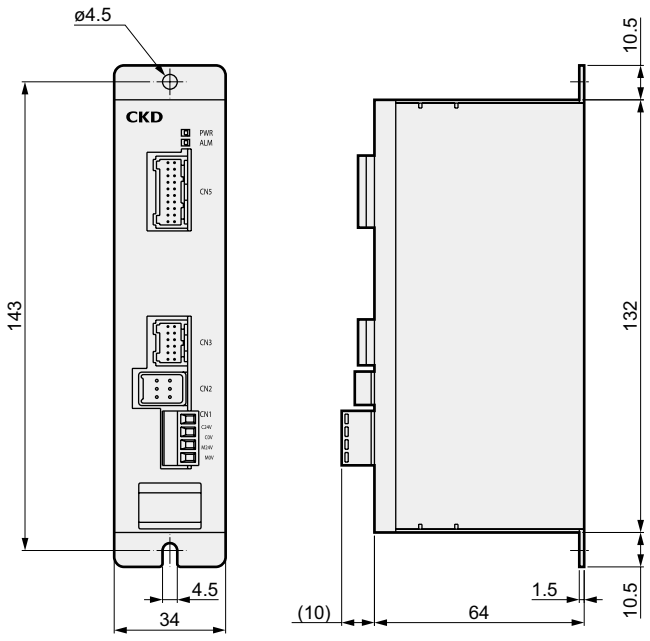
Do not connect anything to NC.

Special mode

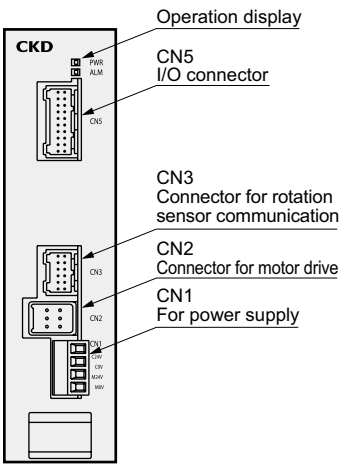
Code	SET5	SET4	SET3	SET2	SET1	Functional overview
0	Low	Low	Low	Low	Low	Alarm 2 release reset
1	Low	Low	Low	Low	High	Memory update of valve closing standard position
2	Low	Low	Low	High	Low	Fixed valve opening direction operation
3	Low	Low	Low	High	High	Fixed valve closing direction operation

Set “MODE” input to High level, special mode code “SET 5” to “SET 1” to input state and operate with “High” edge of “ENT” confirmation input.

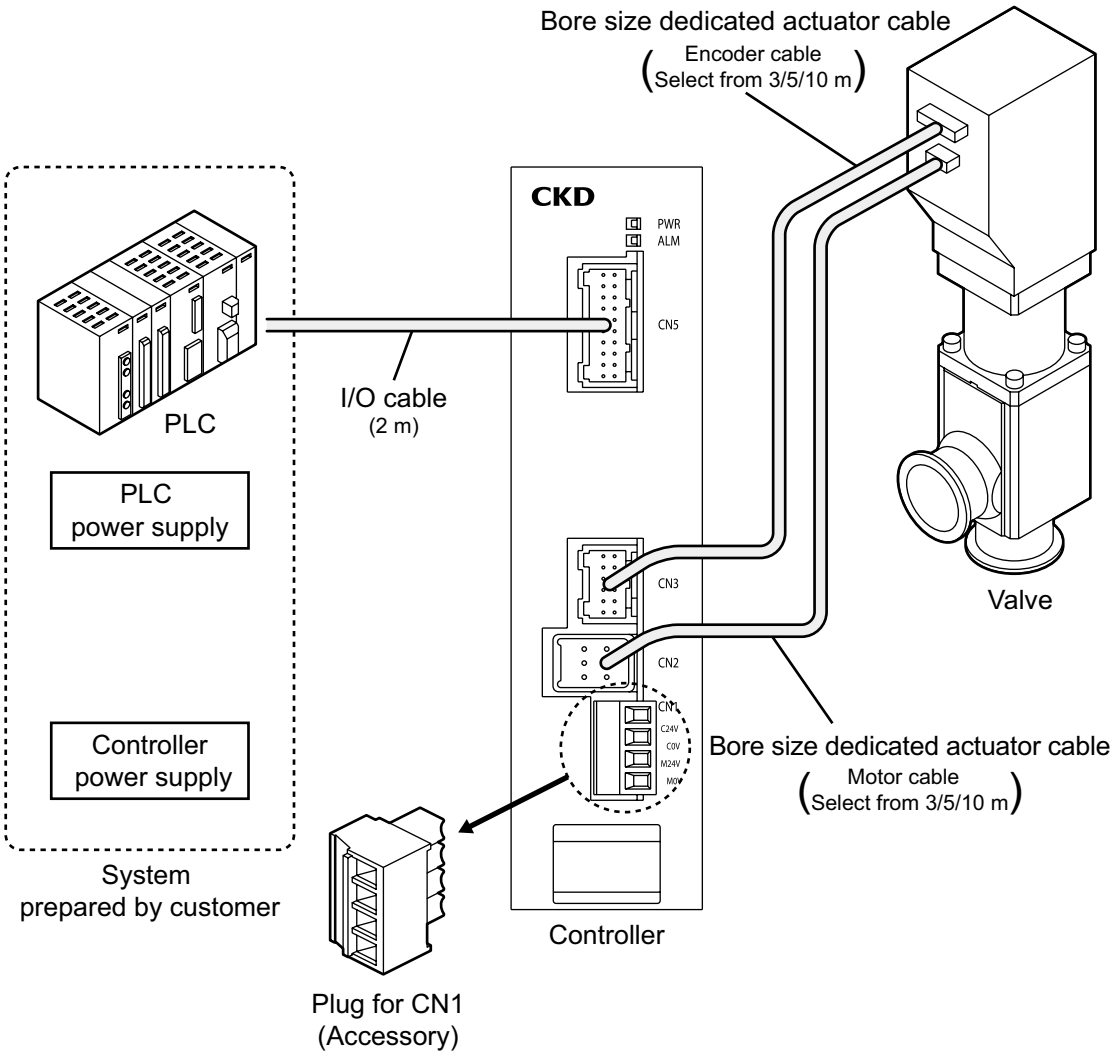
Dimensions



Panel description



System configurations table

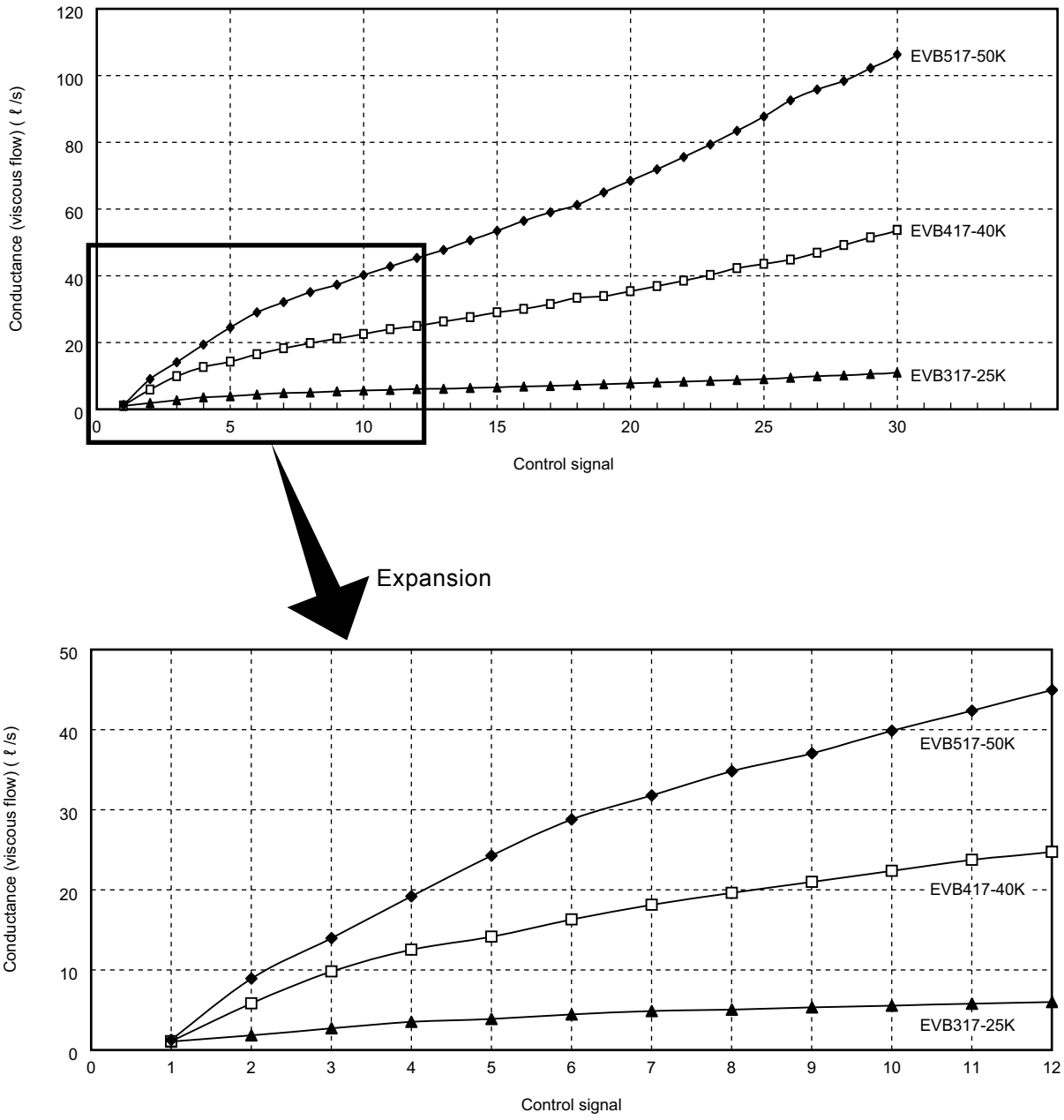


Configuration of product

Name	Quantity
Valve	1
Controller (CN 1 plug included)	1
Bore size dedicated actuator cable	1
I/O cable	1

The customer is responsible for confirming the compatibility of CKD products with the systems, machines and equipment used. When using multiple power supplies, make 0 V common. Control power supply requires a current of 300 mA per product. Motor power supply requires a maximum current of 4 A per product. Prepare a DC stabilized power supply with sufficient margin for the required capacity. Valves and controllers are adjusted by combination at shipment. Use the same display contents on the nameplate as a set.

Control signal x conductance



Discontinue

Electric vacuum valve

Safety Precautions

Be sure to read this section before use.
Refer to Intro Page 9 for general precautions.

Design/selection

1. Checking the specifications

DANGER

- Do not use in places where dangerous goods such as ignitable substances, inflammable substances or explosives are present.
  There is a possibility of ignition, combustion or explosion.
- This product is not waterproof. Ensure that the product is free of water droplets and oil droplets. Failure to do so may lead to fire or malfunction.
- Use a DC stabilized power supply (24 VDC ±10%) for the motor, control and input/output circuit power supplies.
  Connecting directly to the AC power supply may cause fire, explosion, damage, etc.

WARNING

- Incorrect equipment selection and handling can cause problems not only in this product, but also to your system. Check the specifications of this product and the compatibility with your system before use.
- Design a safety circuit or equipment so that damage to equipment, injury to persons, etc. does not occur when the machine stops in the event of a system failure such as emergency stop or power outage.
- Install indoors with low humidity.
  There is a risk of electric leakage or fire accidents in places exposed to rainwater or where there is high humidity (humidity of 85% or more, condensation). Oil drops and oil mist are also strictly prohibited.
- Use and store in accordance with the working/storage temperatures and where there is no condensation.
  Failure to do so may result in abnormal stop or decreased product service life. Ventilate in locations where heat may build up.
- Install in a location free from direct sunlight, dust, and corrosive gas/explosive gas/inflammable gas/combustibles, and away from heat sources. Chemical resistance has not been taken into account.
  This may lead to damage, explosions, or fire.
- Use and store in locations free from strong electromagnetic waves, ultraviolet rays, or radiation.
  This may cause malfunction or damage.

CAUTION

- While wiring, ensure that inductive noise is not applied and that high-current or strong magnetic field locations or large motor power lines for other devices do not use the same piping and wiring (through multi-core cables, etc.). Also, pay attention to the inverter power supply and wiring (same wiring/piping not possible) used for robot, etc. Apply the frame ground of this power supply and insert the filter to the output part.
- When surge-generating inductive loads or power supplies of product output and solenoid valve/relay, etc., are common, the surge current flows around the output part and may cause damage. Separate the inductive load output system from the output power supply of the product. If a separate power supply cannot be used, connect the surge absorption element directly to all inductive loads in parallel.
- Do not disassemble the product.
- Cable cannot be used for applications involving repeated bending.
- Fix the cable so that it does not move easily. Do not bend the cable at an acute angle when fixing.

2. Working fluids

CAUTION

- This product is designed for controlling vacuum or inert gas. If other fluids (active gas, liquids, solids, etc.) pass through, the product may fail to operate normally or may display decreased performance. Check the compatibility between the gas contact part materials and working fluid before use. If there is a risk of solidification of the working fluid, confirm that this poses no problems during use.
- Avoid using fluids that build up crystallization in the piping.

Mounting, installation and adjustment

1. Mounting

⚠DANGER

■ When mounting the product, be sure to hold and fix it securely. Falling, dropping, abnormal operation, etc. of the product may cause injury.

⚠WARNING

■ Incorrect mounting and piping will result in product trouble, may cause trouble in the user's system, and may result in death or serious injury. The user is responsible for making sure that the operator has read the instruction manual and fully comprehends the system. After mounting, confirm that the product is correctly mounted.

■ Precision parts are built in, so laying the product on its side or applying vibration or impact during transportation are strictly prohibited.
It may cause damage to the parts.

■ For preliminary installation, place horizontally.

■ Do not step onto the packaging or place objects on it.

■ Avoid condensation, freezing, etc., and maintain ambient temperatures of -20 to 60°C and ambient humidity of 35 to 85% when transporting and carrying.
Failure to do so may cause damage to the product.

■ Mount the product on incombustible materials. Direct mounting on combustibles or mounting near combustibles may cause fire.

■ Make sure that the product is D type grounding (ground resistance of 100 Ω or less).
Electric shock or malfunction may occur if there is electric leakage.

■ Wire the product securely while confirming with this catalog and ensuring that there is no miswiring or loose connectors. Check wiring insulation.
Due to contact with other circuits, ground faults and insulation failure between terminals, overcurrent may flow into the product and damage it. This may cause abnormal operation or fire.

■ Before turning ON power to the product, be sure to do a safety check around the equipment. Turn the power OFF immediately if the indicator light shows abnormality after turning ON.
Inadvertently supplying power can cause electric shock or injury.

■ Valves and controllers are adjusted by combination at shipment. Use the same display contents on the nameplate as a set. If the combination is changed, it will not operate normally.

■ Use the supplied cable between the valve and the controller, and install so that excessive force is not applied and it is not scratched. Do not remodel the attached cable (change the length or material) as it may cause malfunction, failure or misoperation.

■ Do not touch the product with hands or body during the operation or immediately after stopping.
There is a risk of burns.

■ Do not step onto the product or place objects on it.
This may result in falling, knocking the product over, injury due to falling, product damage and/or malfunctions due therein, etc.

■ When the power supply is cut off (including failures), take sufficient measures to protect workers and equipment.
There is a risk of unexpected accidents.

2. Securing of space

⚠CAUTION

■ Secure sufficient space for installation, removal, piping and wiring work.

■ Secure sufficient space for maintenance and inspection.

3. Piping

⚠CAUTION

- The bellows interior is directly connected to the atmosphere. Do not block the connecting hole between the bellows interior and the atmosphere (1 hole on the top of the body) in use.
- Foreign matter or burrs in the piping and piping work could damage the valve seat or O-ring seal and lead to leaks. Always remove dirt and burrs before installing the valve.
- When piping, do not apply tension, compression, bending or other forces to the valve body from the piping.
- Clean the seal surface of the vacuum flange and the centering O-ring with ethanol before installing.
- The vacuum flange surface has a step (concavity) of 0.1 to 0.2 mm to protect the seal surface. Handle it so that the seal surface is not scratched.
- Durability may decrease due to exhaust flow, so we recommend use of the bellows side as the exhaust side.
  Durability varies depending on the conditions of use, so check thoroughly.
- After completing piping work, always carry out a leak test, and confirm that there are no leaks.
- When transporting or installing, do not hold the cable part.
  This may lead to injury or disconnection.
- Do not lay piping in places where large vibration or impact is transmitted.
  If large vibration or shock is transmitted, it could result in malfunction. Especially if vibration continues, durability may decrease. Perform piping so no excessive vibration or shock is applied.
- Do not forcibly operate the movable parts of the product with external force.
  This may lead to malfunction or damage due to regenerative current.
- Do not apply external force to the valve during return to origin. There is a possibility of misrecognition of the origin.
- Do not bring objects such as rare earth magnets that emit powerful magnetic fields near the product body. It may not be possible to maintain the original accuracy.
- The external I/F input section recognizes when the input signal status continues for 50 msec or more, to prevent misoperation by chattering.
- This product is assembled in a cleanroom after precision cleaning treatment.
  Open the clean pack inside the packing box in a clean environment just before mounting.
- Perform piping so no excessive force is applied to the flange. If heavy objects and mounted components vibrate, fix so that torque is not applied directly to the flange.

Use/maintenance

1. Before use

⚠DANGER

■ Wiring work and inspection should be done by a specialized technician.

■ Be sure to install the piping before wiring the product.
Failure to do so may cause electric shock.

■ Do not operate the unit with wet hands.
Failure to do so may cause electric shock.

■ For wiring work and inspection, check the voltage with a tester after more than 5 minutes has elapsed since turning OFF the power.
Failure to do so may cause electric shock.

■ Do not attach or detach wiring or connectors while turning ON the power.
This may cause malfunction, failure, or electric shock.

⚠WARNING

■ Though the storage environment conforms to the installation environment, it is not recommended to store for longer than 1 month. In particular, take measures to prevent condensation.

2. Maintenance and inspection

⚠WARNING

■ Operate periodically according to the instruction manual.

■ Read the instruction manual thoroughly and make sure you understand the content before performing maintenance.

■ Always drain the fluid before performing maintenance.

⚠CAUTION

■ Perform the following periodic inspection to ensure that the valve is achieving optimal functionality.
(1) Inspection for leakage to the valve exterior
(2) Inspection for leakage (internal leakage) from the valve seat
(3) Confirmation that the valve operates smoothly
(4) Inspection for looseness in the piping and valve threads
(5) Inspection for abrasion or corrosion of the O-ring

■ When removing deposits, do not damage any of the parts.

■ If damage is expected before the specified duration, carry out maintenance and inspection earlier.

■ Product service life may decrease due to repeated minute opening/closing of the valve. It is recommended to fully open the valve at regular intervals.

■ If the product fails (abnormal heat generation, smoke emission, unusual odor, noise, vibration, etc.), immediately shut off the power supply. Otherwise, product damage or fire due to current flow may result.

■ When performing maintenance, inspection and repair, stop the power supply to this product. Caution people in the vicinity that a third party should not turn ON the power inadvertently or operate the product.

■ When disposing of the product, comply with laws pertaining to waste treatment and cleaning. Consign it to a specialized waste disposal company for processing.

■ This product has a spring closing (normally closed) valve structure when no power is supplied. Before turning ON the power, make sure that the leakage amount is allowable and then begin operation.

■ There is a possibility that the valve closed state may be misrecognized if foreign matter is caught at power ON. Before turning ON the power, make sure that the leakage amount is allowable and then begin operation.
After turning ON the power, operate so as to maximize the set opening and check that the opening does not become abnormal.

■ A capacitor is connected between this circuit and the metal body on the control board built into the product to prevent static damage. Avoid withstand voltage and insulation resistance tests on equipment with this product installed. If tests are done, the product will be damaged. If necessary for the equipment, remove the product before doing the test.