CKD

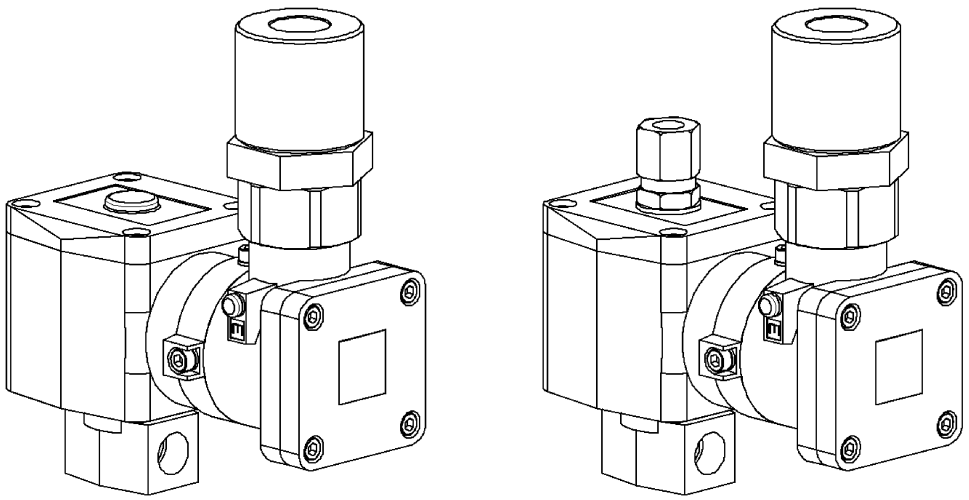
SM－50788－A

INSTRUCTION MANUAL

Explosionproof MULTILEX VALVE

(Complies with internationally harmonized guide on explosion protection)

AB41EX2 Series
AB41EX4 Series
AG41EX4 Series
AG43EX4 Series
AG44EX4 Series



- Please read this instruction manual carefully before using this product, particularly the section describing safety.
- Retain this instruction manual with the product for further consultation whenever necessary.

Ver.1

CKD Corporation

Safety precautions

When designing and manufacturing a device using CKD products, the manufacturer is obligated to manufacture a safe product by confirming safety of the system comprising the following items:

- Device mechanism
- Pneumatic or water control circuit
- Electric control that controls the above

It is important to select, use, handle, and maintain the product appropriately to ensure that the CKD product is used safely.
Observe warnings and precautions to ensure device safety.
Check that device safety is ensured, and manufacture a safe device.

⚠ WARNING

1. This product is designed and manufactured as a general industrial machine part. It must be handled by someone having sufficient knowledge and experience.

2. Use this product within its specifications.

This product cannot be used beyond its specifications. Additionally, the product must not be modified or machined.
This product is intended for use in general industrial devices and parts. Use beyond such conditions is not considered. Consult with CKD for details when using the product beyond the unique specification range in the following conditions or environments. In any case, measures for safety shall be provided when the vavle malfunctions.

① Use for special applications requiring safety including nuclear energy, railroad, aviation, ship, vehicle, medical equipment, equipment or applications coming into contact with beverage or food, amusement equipment, emergency shutoff circuits, press machine, brake circuits, or for safeguard.
② Use for applications where life or assets could be adversely affected, and special safety measures are required.

3. Observe corporate standards and regulations, etc., related to the safety of device design and control, etc.

ISO4414, JIS B 8370 (pneumatic system rules)
JFPS2008 (principles for pneumatic cylinder selection and use)
Including High Pressure Gas Maintenance Law, Occupational Safety and Sanitation Laws, other safety rules, standards and regulations, etc.

4. Do not handle, pipe, or remove devices before confirming safety.

① Inspect and service the machine and devices after confirming safety of the entire system related to this product.
② Note that there may be hot or charged sections even after operation is stopped.
③ When inspecting or servicing the device, turn off the energy source (air supply or water supply), and turn off power to the facility. Release any compressed air from the system, and pay enough attention to possible water leakage and leakage of electricity.
④ When starting or restarting a machine or device that incorporates pneumatic components, make sure that system safety, such as pop-out prevention measures, is secured.

5. Observe warnings and cautions on the pages below to prevent accidents.

■The safety cautions are ranked as "DANGER", "WARNING" and "CAUTION" in this section.

⚠ DANGER :When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries, or when there is a high degree of emergency to a warning.

⚠ WARNING :When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries.

⚠ CAUTION :When a dangerous situation may occur if handling is mistaken leading to minor injuries or physical damage.

Note that some items described as "CAUTION" may lead to serious results depending on the situation. In any case, important information that must be observed is explained.

Precautions with regard to guarantee

- **Guarantee period**

The guarantee period of our product shall be one (1) year after it is delivered to the place specified by the customer.

- **Guarantee coverage**

If any failure for which CKD CORPORATION is recognized to be responsible occurs within the above warranty period, a substitute or necessary replacement parts shall be provided free of charge, or the product shall be repaired free of charge at the plant of CKD CORPORATION.

However, the guarantee excludes following cases:

① Defects resulting from operation under conditions beyond those stated in the catalogue or specifications.
② Failure resulting from malfunction of the equipment and/or machine manufactured by other companies.
③ Failure resulting from wrong use of the product.
④ Failure resulting from modification or repairing that CKD CORPORATION is not involved in.
⑤ Failure resulting from causes that could not be foreseen by the technology available at the time of delivery.
⑥ Failure resulting from disaster that CKD is not responsible of.

Guarantee stated here covers only the delivered products. Any other damage resulting from failure of the delivered products is not covered by this guarantee.

- **Confirmation of product compatibility**

Our customer shall be responsible of confirming compatibility of our product used in our customer's system, machinery or device.

Complies with “Recommended practices for explosion-protected electrical installations in general industries”

AB41EX4, AG4□EX4 Series
Explosionproof functionality Exd II BT4X
(Flameproof enclosure “d” /Group IIB / Temperature class T4)

AB41EX2 Series
Explosionproof functionality Exd II BT2X
(Flameproof enclosure “d” /Group IIB /Temperature class T2)

● Suitable for outdoor use
Protected against water jets as specified in JIS and suitable for outdoor use
(This evaluation is not based on explosion proof certification.)

NOTE
Because this product is small electrical equipment and marking space is limited, cable temperature and bolt strength class are not included in the marking. To indicate this reduction in the marking, the symbol “X” is included.

【Contents】

1. Unpacking

⚠ CAUTION	Do not remove the port covering until just before piping. Otherwise, foreign matter enters the valve and cause malfunction or bad operation.

(1) Check that the model No. shown on the Name Plate of the product is the same with what you ordered.

(2) Check that the product has no external damages.

(3) When storing the product, keep the product inside the packing box to prevent the intrusion of foreign matter to the valve. Take out the valve when piping.

2. Installation

⚠WARNING	a) This explosionproof solenoid valve is certified as having an explosionproof construction in the "Recommended Practices for Explosion-Protected Electrical Installations in General Industries". If this product is used as an explosionproof electrical equipment, the product cannot be used beyond specifications, since its use is regulated by law. b) Select and install the mode following JIS C60079. Please perform the factory explosionproof equipment guide for a user(JNIOSH-TR-NO.44 (2012)).

2. 1 Conditions for installation

⚠WARNING	a) This valve is used in the first dangerous spot (Zone 1) or the second dangerous spot (Zone 2) containing combustible gas or vapor. It cannot be used in a Class 0 Zone. b) Determine the group and temperature class of explosive gas and make sure the solenoid valve's type of protection is applicable. ・Some gases such as hydrogen and acetylene cannot be conveyed even with explosionproof construction valves. c) Confirm that the fluid pressure, fluid temperature, and ambient temperature are within specifications. ・Observe specifications, since fluid pressure affects operation of the solenoid valve, and since temperature affects the risk of explosion. d) The coil generates heat. ・If the product is to be installed inside a control panel, or if energizing time is long, provide ventilation measures. Temperature around the product will be high. e) The product cannot be used in a corrosive or solvent environment. f) Avoid humid environments, since condensation may occur with change in temperature. g) This explosionproof construction is intended for factory use. Do not use this valve for coal mines or marine vessels.

(1) Provide appropriate measures to prevent the product from freezing at cold places.

(2) This product can be used outdoors. (The evaluation of this item is not approved by explosion test.)

Ingress Protection code rating defined in JIS C0920 is IP65.

(3) Do not wash the product with water or solvents. Do not paint the product. Resin material used in the product may break down.

(4) Do not use the product under vibration or inertia.

2. 2 Installation method

⚠ CAUTION	a) Read this instruction manual thoroughly and understand the contents before installing the product. b) Always take hold of the body portion when handling and mounting the product. c) Confirm leakage from the piping after installation.

(1) Mounting posture is unrestricted.
However, avoid positioning the coil side down, since foreign matter in the fluid accumulates around the plunger and result in beat sounds and malfunction.

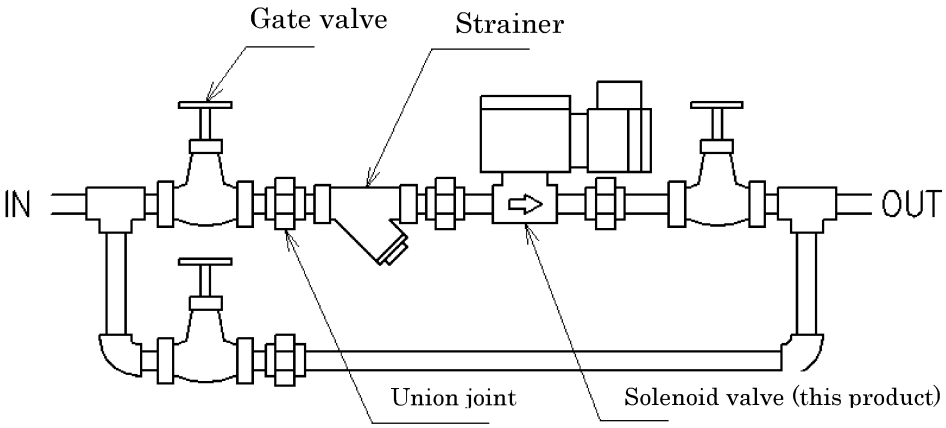
(2) Provide enough space for safe maintenance and troubleshooting work.

2. 3 Piping

⚠ CAUTION	a) When piping or re-piping, fix the product. b) Fix and provide appropriate support to the piping, so that the weight and vibration of the piping will not directly be applied to the product. c) When piping is finished and fluid is to be flown, supply pressure gradually. ・If the piping is improper, the piping may disconnect or the fluid may leak.

(1) Installing a bypass circuit

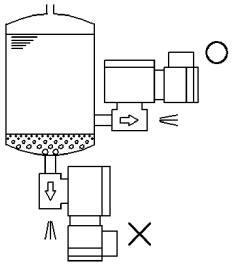
・To ease maintenance work, install a bypass circuit in the piping (Refer to Figure 1.).



(Figure 1.) Bypass circuit

(2) When installing the product on a drain circuit of a tank

・ When installing the product to control drain from a tank, do not install the product at the bottom of the tank. Otherwise, foreign matter accumulated at the bottom of the tank enters the product and cause malfunction. Install the product a little above the tank bottom (Refer to Figure 2.).



(Figure 2.) Drain circuit from the tank

(3) Cleaning the pipes

・Before piping, flush the pipes with compressed air 0.3MPa or more in order to remove foreign matter such as dust, metal powder, rust, and seal tape.

(4) Removal of foreign matter

・Foreign matter such as dust in the fluid causes malfunction and leakage.

To remove foreign matter, attach an appropriate apparatus to the primary side of the product. When the fluid is air, attach a filter 5μm or finer. When the fluid is water, attach a strainer 80 mesh or finer.

(5) When the fluid is steam

This item is for normally closed 2 port valve: AB41EX2 only.

・When the fluid is steam, a drain trap must be installed. Steam generated in a boiler contains a large amount of drain that needs to be removed.

・When the fluid is steam, a device to soften supply water, and a filter for steam must be installed. Supply water to the boiler contains calcium salts and magnesium salts, which react with oxygen and carbon dioxide. The reaction makes scale and sludge that needs to be removed.

(6) Piping

・Make sure that the piping port is correct.

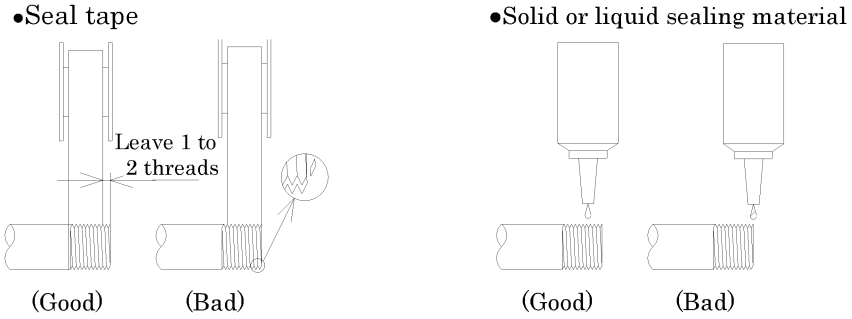
If the supply port is unclear, check the product catalog to confirm the model number and the JIS symbol indicating flow direction.

・When piping to the "NO" Socket port of a 3 port solenoid valve, fix the Socket with a tool such as an adjustable spanner to tighten the pipe.

(7) Sealing material

・When using sealing material, make sure the sealing material do not enter the piping. Also, make sure there is no external leakage. When taping seal tape to the pipe thread, leave 1 to 2 threads at the tip without taping.

Also, when using liquid sealing material, leave 1 to 2 threads at the tip without sealing material. Do not apply too much sealing material on the thread. Do not apply sealing material to the internal thread (refer to Figure 3.)



(Figure 3.) How to apply sealing material

(8) Tightening

・Refer to Table 1. for the recommended port tightening torque.

Table 1. Recommended port tightening torque

Port size	Recommended torque
Rc1/4	23 to 25 N・m
Rc3/8	31 to 33 N・m

(9) Lubricated or non-lubricated operation

・This product does not require lubrication. Therefore, no lubricator is needed.
If the product is to be lubricated, use turbine oil Class 1, ISO VG32 (additive-free) or equivalent. Once lubricated, do not stop periodical lubrication. Otherwise, disappearance of initial lubrication will result in operation malfunction.

(10) Insulation cover of the piping

・When placing an insulation cover to the piping conveying fluids such as steam or hot water, structure the insulation cover so that it can be easily detached at the time of maintenance.

・Do not insulate the Coil Case portion of the solenoid valve.

2. 4 Wiring

⚠ CAUTION

a) Those who wire explosionproof solenoid valves shall have read the “Chapter3 Institutions for Explosion-Protected Electrical Installation” of the “factory explosion-proof equipment guide for a user (JNIOSH-TR-NO.44, 2012)” thoroughly, and have enough knowledge and skill to perform work.

b) Read this instruction manual thoroughly and understand the contents before wiring the product.

- You need to understand the structure and the operation principle of the solenoid valve. You additionally need knowledge to secure safety.
- If the bolt on the Terminal Box is loosened, explosionproof performance is lost. Sufficient skill is required when handling these bolts.

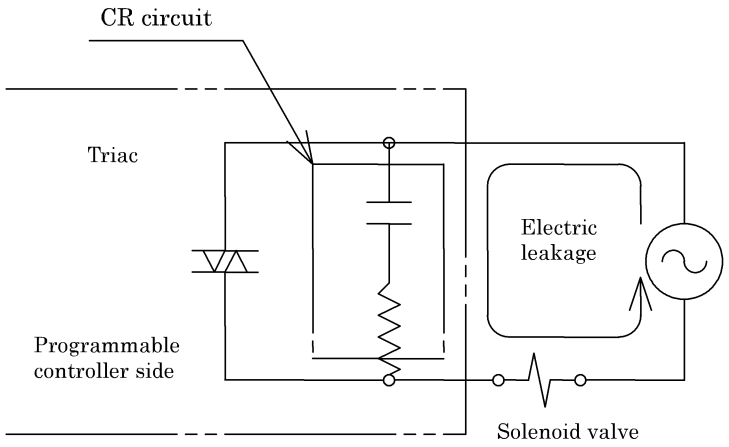
⚠ CAUTION

a) Confirm the voltage and the alternating or direct current type.

b) To prevent unintended operation caused by electric leakage of other control components, confirm electric leakage.

- When using a control circuit such as a programmable controller, the solenoid valve may operate without intention because of the electric leakage from the control components.
- When using this product, keep the electric leakage from other components below the value shown in the table below.

Rated voltage	Electric leakage
AC100V	6mA or less
AC200V	3mA or less
DC12V	2mA or less
DC24V	1mA or less
AC100V (with built-in diode)	2mA or less
AC200V (with built-in diode)	1mA or less



(1) Maintenance of the electric equipment

- To maintain the electric equipment, install a breaker such as a fuse (1A) in the control circuit side.

(2) Polarity for DC voltage types

- This solenoid valve does not have polarity (+)(-)even for DC voltage types.

(3) Wiring

⚠WARNING	When wiring to the terminal box, do not damage Terminal Case and Terminal Cap where they engage and where they are sealed with O-ring. Damage to the engaging section may affect its flameproof property and result in an explosion in explosive atmosphere. Damage to the O-ring may affect its waterproof property. ・If damaged, repairs are impossible and replacements are required.

①In order to ensure the valve's explosion-proof performance, choose the cabtire cable for use on the valve from the circular cables specified below according to the option symbol in the valve model number. Only use applicable cable since the packing is specific to each cable diameter.

If the option symbol is "G9" … Cabtire cable with outer diameter of φ7.5 to φ9.5

If the option symbol is "G10" … Cabtire cable with outer diameter of φ9.5 to φ10.5

If the option symbol is "G11" … Cabtire cable with outer diameter of φ10.5 to φ11.5

If the option symbol is "G13" … Cabtire cable with outer diameter of φ11.5 to φ13.5

Nominal cross-sectional area of the cabtire cable must be 1.04 to 2.63 mm² (AWG41, AWG16) and the permissible temperature must be as follows:

AB4□EX4, AG4□EX4, AP□□EX4, AD□□EX4, ADK1□EX4 …At least 80°C

AB4□EX2, AP□□EX2 …At least 100°C

②Pass Cabtire Cable through Connector Cap, Connector, Spacer, Packing, and Terminal Case.

③Insert the insulated crimp terminal onto the Cabtire Cable lead wires. Crimp the terminal.

④Secure the crimped lead wires to Screw.

Connect the earthing conductor to the earthing terminal on Terminal Case.

⑤Adjust the position of Cabtire Cable so that it is retained by Packing. Screw in Connector.

⑥Screw in Connector completely to the end face of Terminal Case and secure with a set screw.

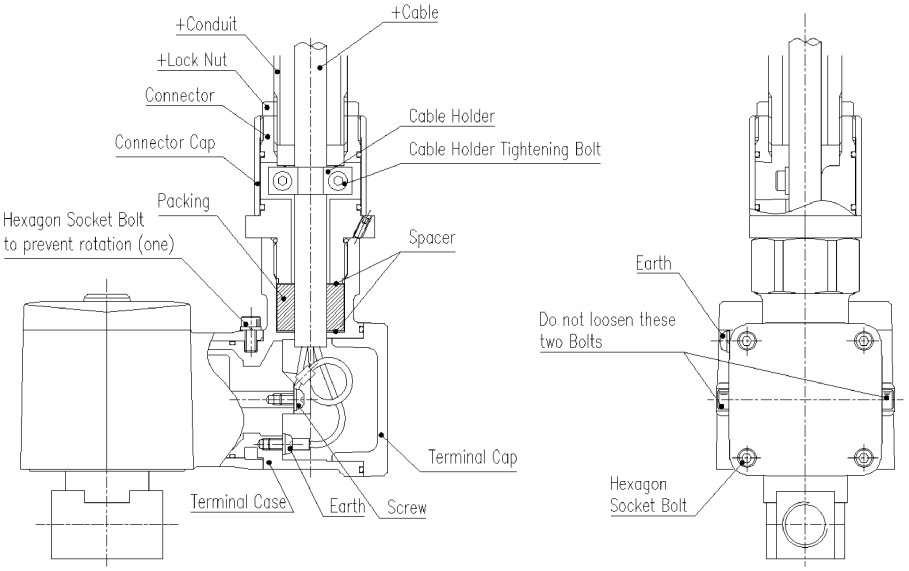
⑦Tighten Cable Holder Tightening Bolts (at tightening torque of 1.9 to 2.0 N·m) to secure Cabtire Cable with Cable Holder.

⑧Screw in Connector Cap.

⑨Place Terminal Cap. Tighten Hexagon Socket Bolts to secure Terminal Cap.

When placing Terminal Cap onto Terminal Case, be careful not to damage the sections where they engage and where they are sealed with O-ring. Tighten the four Hexagon Socket Bolts equally at tightening torque of 1.9 to 2.0 N·m.

⑩Secure Lock Nut and Conduit to Connector.



Parts marked with "+" are not included in the product.

(Figure 4) Example of wiring the pressureproof packing type

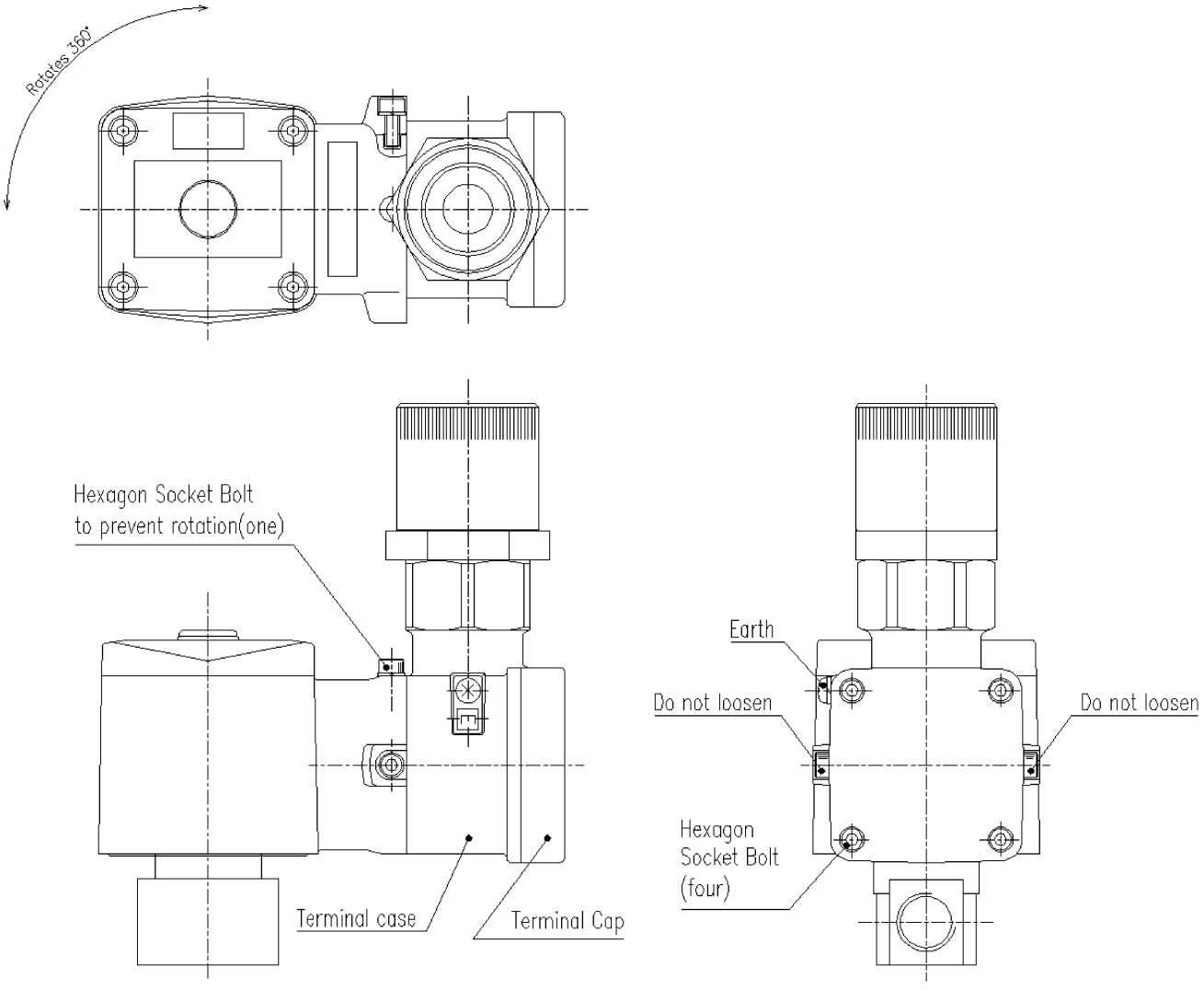
(4) Adjusting the direction of the wire outlet of the Terminal Box

The Terminal Box rotates 270°. It can be rotated when the “Hexagon Socket Bolt to prevent rotation (one)” is loosened (Refer to figure 5.).

① After wiring is completed, and after the wire outlet direction is set, fix the Terminal Box by the Hexagon Socket Bolt to prevent rotation with tightening torque 0.6 to 0.8N･m.

If the “Hexagon Socket Bolt to prevent rotation” is loose, the Bolt may fall off while use. Additionally, the rotation portion may break or internal wiring may disconnect resulting from rotation of the Terminal Box.

② Do not loosen the Bolts other than the four Terminal Cap fixing Bolts, which are needed for wiring, and other than the one “Hexagon Socket Bolt to prevent rotation”. Otherwise, explosionproof performance cannot be guaranteed.



(Figure 5.) Wire outlet direction of the Terminal Box

3. Pre-operation (post-installation) check

3. 1 Appearance check

⚠ WARNING	Stop the flow of the fluid（shut the supply）. Discharge the fluid inside the product.

(1) Push the product by hand and confirm that the product is firmly fixed on the piping.
(2) Confirm that threaded parts such as bolts, nuts and screws are not loose.

3. 2 Leakage check

(1) Confirm leakage at the connection part by applying pressure to the fluid.
We recommend leakage check by the following method:

- Supply compressed air (0.3 to 0.5MPa)
- Apply soap water to the portion to check for leakage
- Bubbles will appear if there is any leakage.

3. 3 Electrical check

⚠ WARNING	Cut off the electricity. Check while taking serious care to avoid electric shock.

(1) Check the supply voltage.
Voltage variation shall be within -10% to +10% of the rated voltage.
Use beyond the allowed variation range will cause malfunction or damage to the coil.
(2) Check insulation resistance
Check the insulation resistance between dead metal parts and uninsulated live parts (such as the tip of the lead wire) that are assembled to the product.
Confirm that insulation resistance is over 100MΩ at DC500V megger.

3. 4 Operation check

(1) Apply rated voltage to the valve and rated pressure to the working fluid. Confirm normal operation of the product.

4. Instructions for proper use

4. 1 Handling precautions

⚠ WARNING	a) Do not use this product as an emergency shut-off valve. ・ This product is not designed as a safety-securing valve, such as an emergency shut-off valve. For such systems, use this valve after providing another method of securing safety. b) Take measures to prevent harm to operators or objects if this product fails. c) Liquid-filled state ・ When conveying a liquid in a circuit, operation may fail if liquid-filled state occurs. This is because pressure rises in the liquid-filled state when temperature rises. Provide an escape valve in the system so that a liquid-filled state circuit is not created. d) Working fluids ・ Do not use this product for fluids other than the working fluids listed in the catalog specifications. ・ Before use, confirm the compatibility of the product and applicable fluid with the Applicable Fluid Check List. ・ Depending on the model, internal parts may wear when the valve operates. Caution is required because wear chips could enter the secondary side of the valve.

⚠ CAUTION	a) Do not touch the coil sections or actuator sections when energized or immediately after energizing. Depending on the product, directly touching these products could cause burns. b) Do not touch the wiring connection sections (bare live part) when energized. There is a risk of electric shock. c) Always use within the maximum working pressure and maximum working pressure differential range.

(1) When carrying the solenoid valve, hold the main body.
Do not carry the valve by the cable attached to the terminal box.

(2) Do not use the product as footings, or place heavy loads on the product.

(3) If the product has not been used for more than a month, the seal rubber and metal at the valve seat may stick and operation time may be delayed. Carry out trial run in such cases.

(4) When the 3-port solenoid valve is to be energized continuously pressurized from the NO port, select a normally open type (model: AG44EX4)
Additionally, if the valve is to be energized continuously for the universal type (model: AG41EX4) or normally closed type (AG43EX4), select options with fluoro rubber sealing.

(5) If the fluid is dry air or inert gas, number of duration cycles decrease significantly due to abrasion.

(6) This product cannot be used for vacuum holding. Please contact CKD if the product is to be used for vacuum holding.

(7) Fluid viscosity shall be 50 mm^2/s or less. Otherwise, the product will malfunction.

(8) Refer to “6. Troubleshooting” if any trouble occurs.

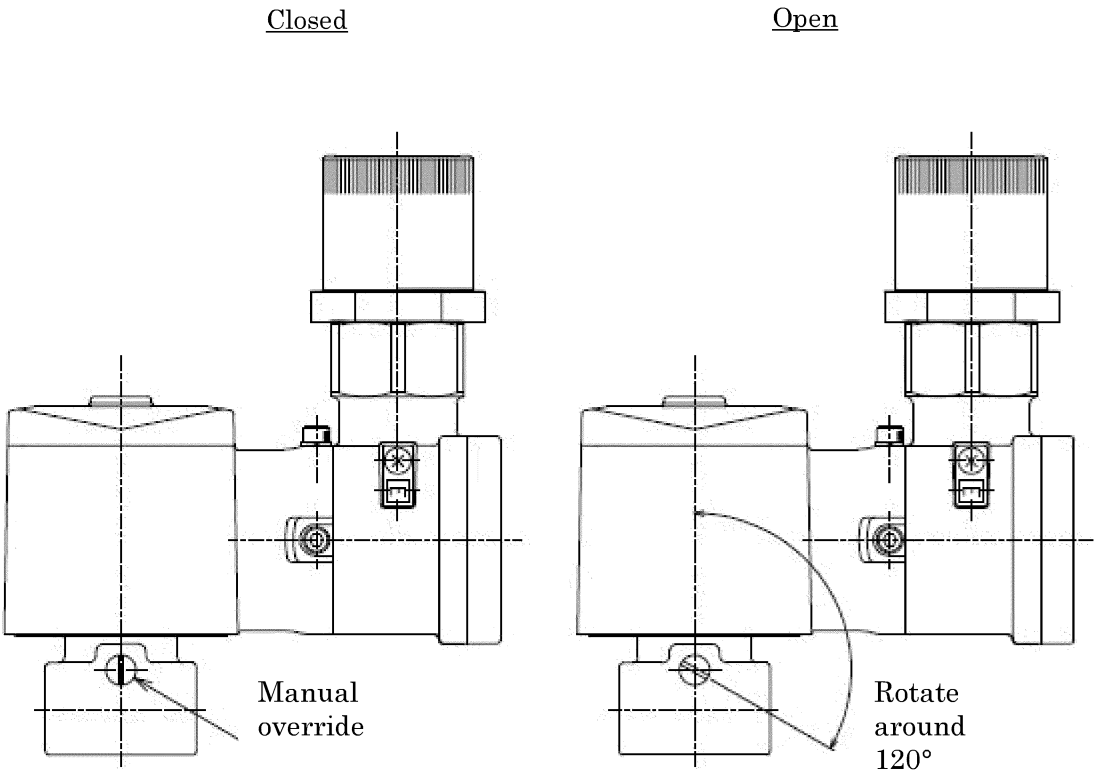
4. 2 Manual override (For option with manual override)

⚠ CAUTION	Confirm that the manual override is reset to its initial position after it is operated.

(1) Manual operation

① When the manual override is rotated clockwise about 120°with a slotted screwdriver, the plunger lifts and the valve opens (refer to figure 6.).

② Return the manual override to its initial position after it is operated.



(Figure 6) Operation method of the manual override

5. Maintenance

5. 1 Maintenance and inspection

⚠CAUTION	When performing maintenance and inspection of the explosionproof solenoid valve, read the "Chapter4 Maintenance for Explosion-Protected Electrical Installations" of the "factory explosion-proof equipment guide for a user (JNIOSH-TR-NO.44,2012)" thoroughly, and observe its requirements.

⚠ CAUTION	a) Read this Instruction manual thoroughly and understand the contents well before performing maintenance and inspection. b) Shut off the power supply and release the fluid pressure before performing maintenance. c) To guarantee the explosionproof performance, do not disassemble and repair the product.

(1) Regularly inspect the product to ensure optimum performance. Although inspection frequency differs based on the working state, the product should be inspected every half year.

(2) Refer to "3.Pre-operation check" for contents of inspection.

(3) When not using the product for one or more month after passing water or hot water, completely remove any water or hot water left in the product. Water or hot water residue will cause rust and may lead to operation failure or leaks.

(4) Beware the clogging of the strainer and filter.

5. 2 Repairing the explosionproof solenoid valve

(1) Do not disassemble the explosionproof solenoid valves that are used at hazardous areas, even if the valve needs repairing.

・This product is an approved explosionproof equipment regulated by acts, laws and regulations. Therefore, in association with the disclaimer at "Precautions with Regard to Guarantee", we do not allow our customer to disassemble and repair this product.
We shall not be held responsible for any accidents resulting from disassembly and repairing by our customer.

・Please consult our sales staff if there is a need to disassemble or repair the explosionproof solenoid valve. In order to maintain the explosionproof performance, we will keep the explosionproof solenoid valve, and repair it in our factory.

6. Troubleshooting

⚠ CAUTION	Do not disassemble the Coil Case portion, which is an explosionproof construction. Otherwise, explosionproof performance cannot be guaranteed.

(1) If the solenoid valve does not operate as intended, check according to tables 2.

Table 2. Cause of malfunction and countermeasures

State of failure	Cause	Countermeasure
Fluid does not flow	Valve is not energized.	Confirm wiring and fuse, then energize the valve.
	Voltage applied is lower than the allowable voltage range.	Confirm the power supply, and apply rated voltage.
	Applied fluid pressure is too high.	Set pressure within allowable range.
	Foreign matter caught in.	Blow air from ports, or replace the product.
Fluid does not stop flowing	Wrong port is connected to the high pressure side.	Pipe correctly.
	Electricity is not shut off.	Check for leak of electricity. Modify the circuit to shut off electricity completely.
	Foreign matter caught in.	Blow air from ports, or replace the product.
Fluid leaks externally	Abrasion or flaw of packing and O ring.	Replace the product.
	Core Assembly or Socket is loose.	Replace the product.
Fluid leaks internally	Abrasion or flaw of Body valve seat.	Replace the product.
	Abrasion or flaw of the sealing side of the Plunger Assembly.	Replace the product.
	Foreign matter caught in the Valve Seat.	Replace the product.

(2) Please contact CKD or your nearest agent for any unclear points.

7. Appropriate disposal

(1) When disposing this product, dispose this product as industrial waste.

8. Internal construction

8. 1 Internal construction of the 2-port valve

Model：AB41EX4・AB41EX2

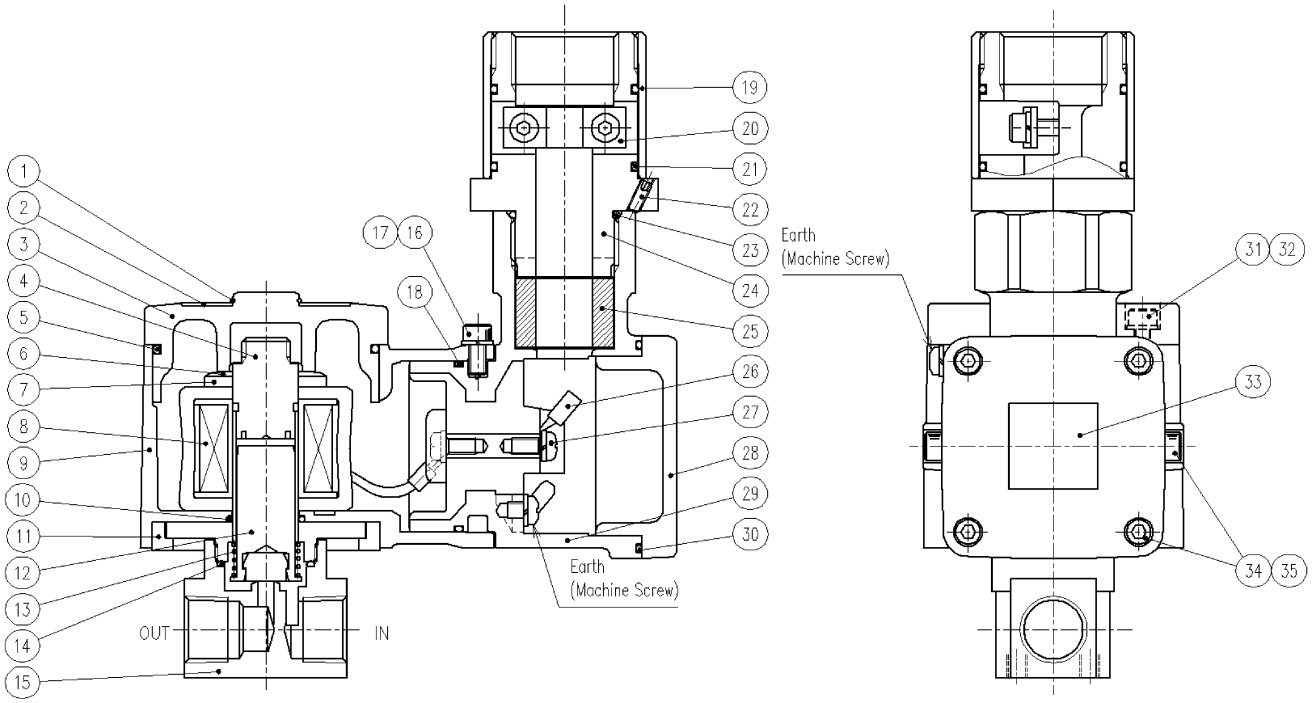


Table3. Parts of the 2-port valve

No.	Part name	Quantity	No.	Part name	Quantity
1	Snap Ring	1	19	Connector Cap	1
2	Name Plate	1	20	Holder	1
3	Coil Cap	1	21	O ring	2
4	Core Assembly	1	22	Upper Screw	1
5	O ring	1	23	O ring	1
6	Waving Washer	1	24	Connector	1
7	Spacer	1	25	Packing	1
8	Coil Assembly	1	26	Crimp Style Terminal	3
9	Coil Case	1	27	Cross Recess Pan Head Machine Screw with Washer	6
10	O ring	1	28	Terminal Cap	1
11	Holder	1	29	Terminal Case	1
12	Plunger Assembly	1	30	O ring	1
13	Plunger Spring	1	31	Hexagon Socket Bolt	4
14	O ring	1	32	Spring Washer	4
15	Body	1	33	Certificated Label	1
16	Hexagon Socket Bolt	1	34	Hexagon Socket Bolt	6
17	Spring Washer	1	35	Spring Washer	6
18	O ring	1			

8. 2 Internal construction of the 3-port valve

Model:AG41EX4･AG3EX4･AG44EX4

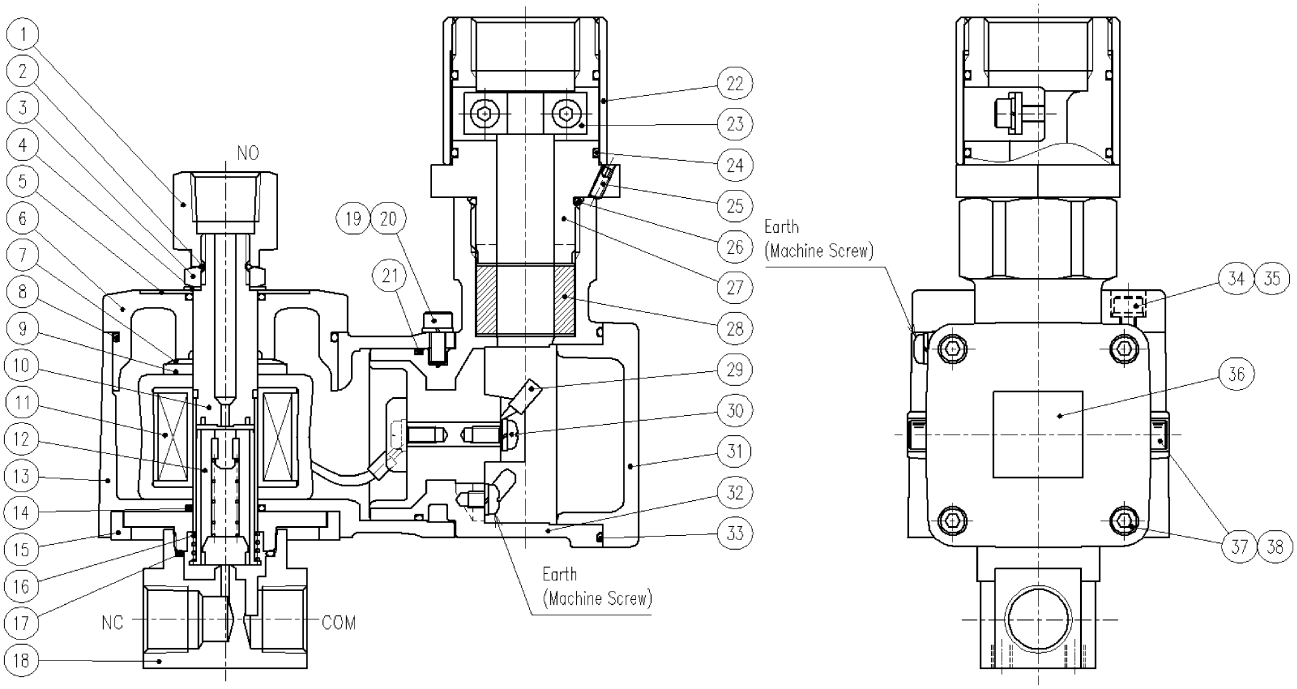


Table4. Parts of the 3-port valve

No.	Part name	Quantity	No.	Part name	Quantity
1	Socket	1	20	Spring Washer	1
2	O ring	1	21	O ring	1
3	Nut	1	22	Connector Cap	1
4	Spacer A	1	23	Holder	1
5	Name Plate	1	24	O ring	2
6	Coil Cap	1	25	Upper Screw	1
7	Waving Washer	1	26	O ring	1
8	O ring	1	27	Connector	1
9	Spacer	1	28	Packing	1
10	Core Assembly	1	29	Crimp Style Terminal	3
11	Coil Assembly	1	30	Cross Recess Pan Head Machine Screw with washer	6
12	Plunger Assembly	1	31	Terminal Cap	1
13	Coil Case	1	32	Terminal Case	1
14	O ring	2	33	O ring	1
15	Holder	1	34	Hexagon Socket Bolt	4
16	Plunger Spring	1	35	Spring Washer	4
17	O ring	1	36	Certificated Label	1
18	Body	1	37	Hexagon Socket Bolt	6
19	Hexagon Socket Bolt	1	38	Spring Washer	6

9. Explosionproof electrical magnet specification

Table5. Explosionproof electrical magnet specifications

Model	AB41EX4 (AC)	AB41EX4 (DC、Coil diode)	AB41EX2 (AC)
Type of certification	EH21－G	EB21－G	EH21－G
Certificate number	TC20594	TC20618	TC20614
Explosionproof construction	ExdⅡBT4X		ExdⅡBT2X
Ambient temperature	－10℃ to ＋50℃		－10℃ to ＋40℃
Fluid temperature	－10℃ to ＋60℃		－10℃ to ＋170℃
Bolt Strength	A2－70		
Use Cable	Permission temperature 80 degrees Celsious		100 degrees Celsious

Model	AG4□EX4 (AC)	AG4□EX4 (DC、Coil diode)
Type of certification	EH31－G	EB31－G
Certificated number	TC20593	TC20617
Explosionproof classification	ExdⅡBT4X	
Ambient Temperature	－10℃ to ＋50℃	
Fluid Temperature	－10℃ to ＋60℃	
Bolt Strength	A2－70	
Use Cable	Permission temperature 80 degrees celsious	

10. APPENDIX

10. 1 Explosionproof certification model

Explosionoproof certification is certificate to the electromagnet for solenoid valve.

Certification type and model of the electromagnet for solenoid valve is as the following table.

Table6. Confrontation model

Certification type	Model
EH21－G	AB41EX4－□□－□－□4G□－AC__V
	AB41EX2－□□－□－□4G□－AC__V
EB21－G	AB41EX4－□□－□－□3G□－DC__V
	AB41EX4－□□－□－□5G□－AC__V
EH31－G	AG4□EX4－□□－□－□4G□－AC__V
EB31－G	AG4□EX4－□□－□－□3G□－DC__V
	AG4□EX4－□□－□－□5G□－AC__V

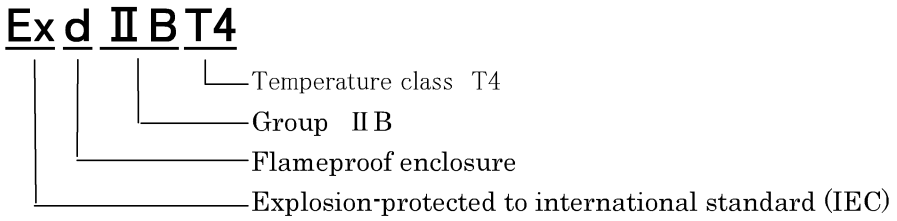
10. 2 Explosive gas and type of protection

Explosive gas and its degree of risk are classified by group and temperature. Gasses with same degree of risk belong to same group, and the standard for the type of protection is determined for each group.

Explosion-protected electrical equipment must be marked with the type of protection, group and temperature class (in this order) using symbols. The marking indicates the type of gas (group and temperature class classification) the electrical equipment was manufactured to be used for.

It's shown what the device is intended for.

For example, an explosion-protected equipment marked "Exd Ⅱ BT4" indicates the following



and any gas with risk classified as group IIB and temperature class T4 in Table2 can be used. The marking also indicates that the equipment is suitable for use with gases with lesser risk (that is, IIB equipment is suitable for applications requiring II A equipment).

The temperature class indicates that the degree of risk of ignition. There are six temperatures classes divided by point of ignition, and the maximum surface temperature of the equipment for each class is specified (Table 7). Larger temperature class number means lower ignition temperature, and such gas is the most dangerous since it can ignite easily.

The group indicates the risk that fire can escape through small gaps and is subdivided into three based on those gaps. The symbols used are shown in Table7. It can be said that this grouping is based on the size of explosion energy. Smaller maximum safe gap means more likely the fire will escape through small gaps, and such gas is the most dangerous since it has large explosion energy.

Table7. Temperature class and group

Item	Symbol	Description
Temperature class	T 1 T 2 T 3 T 4 T 5 T 6	Maximum surface temperature 450℃ 300℃ 200℃ 135℃ 100℃ 85℃
Group	ⅡA ⅡB ⅡC	Maximum safe gap 0.9mm and larger Larger than 0.5 mm and smaller than 0.9 mm 0.5mm and smaller

Table8.

Ignitability / Flame-proof grade	T1	T2	T3	T4	T5
ⅡA	Acetone Ammonia Carbon Monxide Ethane Acetic acid Ethyl acetate Toluene Propylene Benzene Ethanol Methane	Ethanol Isoamyl acetate Butane Acetic acid anhydride	Gasoline Hexane	Acetaldehyde	
ⅡB		Ethylene Ethylene oxide		Ethyl ether	
ⅡC	Hydrogen	Acetylene			Carbon disulfide

10. 3 Danger zone

Zone where flammable gases and air mix at a level high enough to cause an explosion or combustion are called danger zones These zones are classified into Class O zones, Class I zones and Class 2 zones according to the time and frequency that the dangerous atmosphere exists. The explosion proof structure that can be used is determined according to these classes.

● Class 0 zone（Explosionproof multilex valve cannot be used.）

Zone where a dangerous atmosphere is or could be continuously generated, and where the concentration of flammable gas is maintained continuously or for a long term above the lower limit for explosions.

Example: a. Room above liquid level in vessel or tank of flammable liquid.

b. Inside of a flammable gas vessel and a tank etc.

c. Close to liquid level of flammable liquid in a opened vessel.

● Class 1 zone

1）Zone where flammable gas could accumulate to a dangerous concentration during normal operation such as during opening- closing of product take-out lid, or operation of a safety valve.

2）Zone where flammable gas could accumulate to a dangerous concentration during repairs, maintenance or due to a leakage etc.

● Class Zone2

1） Zone where combustible gases or flammable fluids are always handled, but where the gases and fluid are sealed in a vessel or equipment and where the gas could leak to a dangerous concentration only if the vessel or equipment breaks by accidents or if the operation is mistaken.

2） Zone where measures to prevent accumulation or flammable gas are taken with a certain mechanical ventilation device but where flammable gas could accumulate to a dangerous concentration if the ventilation device fails.

3） The place around Class I zone or the room which adjacent to Class 1 zone and flammable gas that reaches hazardous concentration may enter into.