Safety Precautions

Be sure to read this section before use.
Refer to Intro Page 59 for general precautions for using valves.

Product-specific cautions: Pilot operated explosion-proof 5-port valve pneumatic valve 4F**0EX series

Design/selection

⚠ WARNING

■ Usable in Class 1 and 2 danger zones (Zone 1 and 2) where there is combustible gas or steam. Cannot be used in Class 0 special danger zone.

■ Select models and perform installation in accordance with JIS.C.60079 “Factory Explosion-Proof Guidelines for Users JNIOSH-TR-NO.44 (2012)”.

⚠ CAUTION

■ Explosive gas and explosion-proof enclosure

The degree of explosive gas danger is classified according to the group and temperature grade. Gases with equivalent risk are grouped into one group, and explosion-proof structure standards are set for each group.
Codes to indicate the type, group and temperature grade must be indicated in this order on the electrical components of explosion-proof structures. These codes indicate which group and temperature grade the electrical components have been manufactured for, and which gases can be used.
For the example of explosion-proof solenoid valve of Exd II BT4

ExdIIBT4X

- X: Specific working conditions
- T4: Temperature class T4
- IIB: Group II B
- Exd: Pressure and explosion proof structure

Table 2 indicates the classification of gases with a danger category of Group II B and Grade T4 temperature that are compatible with the product. Less dangerous gases are also listed that are guaranteed to be explosion-proof.
Temperature grade refers to the degree of ignition risk, and is classified into six grades according to the ignition point. It defines the maximum surface temperature of the device corresponding to each grade (Table 1).
Higher numbers indicate a higher risk that the gas will ignite at low igniting temperatures. Group refers to the risk of fire leaping to the exterior from small gaps. The level is classified into three grades according to the gap, and the codes shown in Table 1 are used. It can be said that this group expresses the classification by size of the explosive energy. Lower maximum safety clearance indicates more dangerous gases with higher explosive energy that can cause flames to pass through small gaps and leap to the exterior.

Table 1

Item	Code	Provision
Temperature grade	T1	Max. surface temperature: 450°C
	T2	300°C
	T3	200°C
	T4	135°C
	T5	100°C
	T6	85°C
Group	II A	Max. safety clearance: 0.9 mm or more
	II B	0.5 to 0.9
	II C	0.5 mm or less

Table 2

Temp class / Group	T1	T2	T3	T4	T5
II A	Acetone, Ammonia, Carbon monoxide, Ethane, Acetic acid, Ethyl acetate, Toluene, Propane, Benzene, Methanol, Methane	Ethanol, Isoamyl acetate, Butane, Acetic anhydride	Gasoline, Hexane	Acetaldehyde	
II B		Ethylene, Ethylene oxide		Ethyl ether	
II C	Hydrogen	Acetylene			Carbon disulfide

■ “X” in “explosion-proof Exd II BT4X” that represents “A2-70 grade bolt strength (bolts used in actuator assembly only)” and “allowable cable temperature of 85°C or more” has been omitted.

■ Dangerous zone

Situations where explosive gases and air mix at a high enough level to cause an explosion or fire are called “danger zones”. These zones are classified into Class 0 special danger zones, Class 1 danger zones and Class 2 danger zones according to the time and frequency at which the dangerous atmosphere is reached. The explosion-proof structure that can be used is determined according to these classes.

● Special danger zone (Zone 0) (4F explosion-proof Series cannot be used.)

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

Example a: The open space above a flammable fluid inside a container or tank
b: Inside a combustible gas container or tank
c: Near flammable fluid in an open container

● Class 1 special danger zone (Zone 1)

(1) Zones where explosive gas could accumulate to a dangerous concentration during operations such as the opening/closing of the lid for removing the product or operation of the safety valve, etc.
(2) Zones where explosive gases are likely to accumulate to dangerous concentrations during repair or maintenance or due to leakage, etc.

● Class 2 special danger zone (Zone 2)

(1) Zones where combustible gases or flammable fluids are regularly handled, but where the gases and fluids are sealed in a vessel or equipment, and where the gases and fluids could leak to dangerous concentrations only if the vessel or equipment breaks by accident or due to misoperation.

■ Conformity Certificate No.

Explosion-proof certification has been obtained with the pilot actuator assembly. The test model and product model No. of the pilot actuator assembly are as listed in the table below.

(Example)

Product model No.	Test model
4F310EX to 4F350EX-G*	EX3-GP
4F410EX to 4F710EX-G*	EX4-GP
4F420EX to 4F720EX-G*	EX5-GP
4F430EX to 4F730EX-G*	
4F440EX to 4F740EX-G*	
4F450EX to 4F750EX-G*	

■ Under the present local laws, solenoid valve units that are CKD Taiwan certified cannot be exported to anywhere else from Japan except to CKD Taiwan. However, if the components are assembled within an equipment, that equipment can be exported to countries other than Taiwan.

Mounting, installation and adjustment

1. Piping

⚠ CAUTION

■ A pilot exhaust hole is provided on the pilot actuator. Contact CKD before using this product if problems could occur from the exhaust, such as in a clean room.

2. Wiring

⚠ WARNING

■ Packing size (numerical packing value): there are 4 types as indicated below.

(In the case of "KR" or "TW", ø8.5−9.5, ø9.5−10.5, ø10.5−11.5)

Be sure to use a cable diameter that is within the Packing value range. If the packing size and cable sizes are mismatched, the explosion-proof function will be impaired.

Bracket kit 4F310EX-G□-GLAND-KIT-□

Code	Cable diameter
9	ø7.5 to 9.5 (In the case of "KR" "TW", ø8.5 to 9.5)
10	ø9.5 to 10.5
11	ø10.5 to 11.5
13	ø11.5 to 13.5 (In the case of "KR" "TW", N/A)

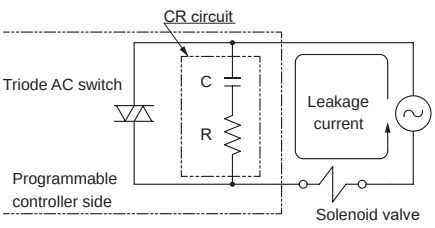
Packing kit 4F310EX-G□-PACKING-KIT-□

Code	Cable diameter
9	ø7.5 to 9.5 (In the case of "KR" "TW", ø8.5 to 9.5)
10	ø9.5 to 10.5
11	ø10.5 to 11.5
13	ø11.5 to 13.5 (In the case of "KR" "TW", N/A)

⚠ CAUTION

■ Check for leakage current to avoid malfunction caused by leakage current from other fluid control components.

● When absorbing a surge voltage with the CR circuit and using a PLC that protects the switching element, be careful as a leakage current will flow through the CR element and negatively affect product operation.

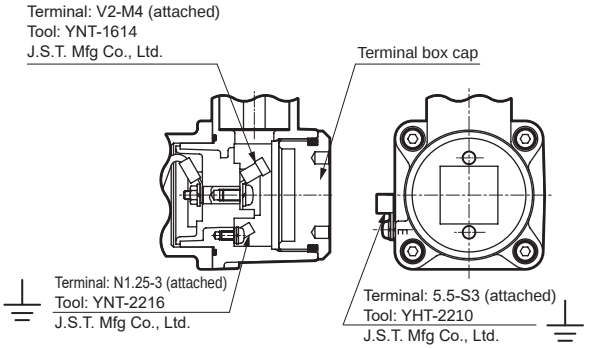


Be sure to keep the size of the residual leakage current
4.0 mA or less with 12 to 127 VAC,
2.0 mA or less with 200 to 380 VAC,
1.5 mA or less with 12 to 48 VDC, and
0.6 mA or less with 80 to 125 VDC.

■ Wiring

● Install wiring in accordance with JIS explosion-proof guidelines.

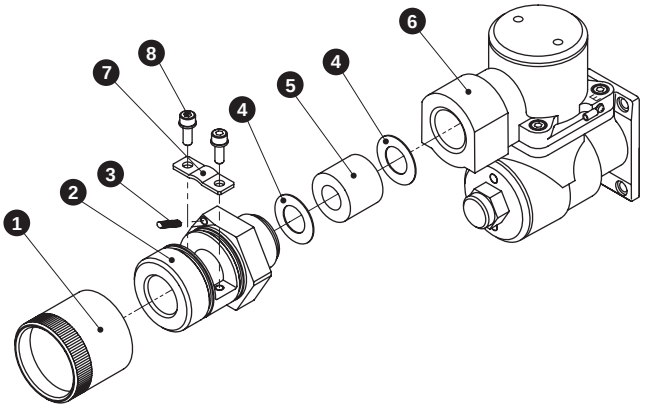
● Remove the terminal box cap with the attached tools for disassembly and install the wiring. Use the tools specified in the following diagram for crimping the crimp terminals upon wiring. After finishing wiring, securely tighten the terminal box cap.
Keep the disassembly tools for future maintenance.



■ Be sure to use a cable with temperature rating of 85°C or more.

■ Tightening the gland

1. Pass the cable through (1) connector cap, (2) gland, (4) spacer, (5) packing and (4) spacer, and connect to (6) terminal box.
2. Insert (4) spacer, (5) packing and (4) spacer to (6) terminal box, and screw (2) gland into (6) terminal box with 40 to 44 N·m of torque until the gap is eliminated.
3. Be sure to tighten (3) low head hexagon socket set screws to prevent (2) glands from loosening.
4. Tighten (7) holder using (8) low head hexagon socket bolt x 2 and spring washers x 2 with 1.9 to 2.0 N·m of torque to hold the cable.
5. Tighten (1) connector cap until it comes in contact with (2) gland.



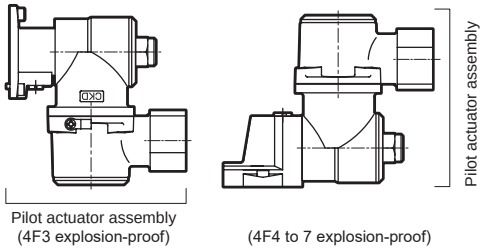
● Be sure that the spacer does not get caught in the threaded portion of the terminal box.
It may cause insufficient tightening of gland or make it impossible to disassemble.

● Be sure to replace the used packing and not reuse it.

Use/maintenance

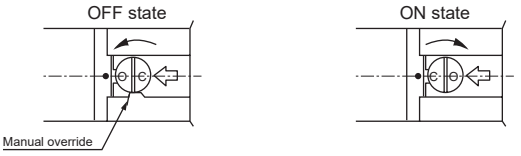
⚠ WARNING

■With the pilot actuator assembly, do not disassemble anything other than the gland parts and the terminal box cap (as performance of the explosion-proof enclosure cannot be guaranteed if the unit has been disassembled.)
As explosion-proof certification has been obtained with the pilot actuator assembly, perform replacement of the coil with the pilot actuator assembly.



■Manual override
As the manual override is equipped with a lock, turn this OFF when it will not be in use. For use, turn with a flathead ⊖ screwdriver.

● **4F3**
OFF : Align “C” with the large arrow.
ON : Turn clockwise until “O” stops at large arrow.
(Note: Arrow and “O” may not align with each other)



● **4F4/5/6/7**
0 ..... OFF: Align ● and “0”
1 ..... Turn dial clockwise until it stops.
(Note: 1 and ● may not align with each other)