2-Point Detection Explosion-Proof Switches Compliant with IEC Standards

VCX-7000 Series

A compact vertical gas/steam explosion-proof limit switch for outdoor use, with 2-point detection and a pressure-resistant and increased-safety structure, conforming to IEC standards, and usable in a hydrogen gas atmosphere.

- **Certifications: KEMA (Europe), Technology Institution of Industrial Safety (Japan), NEPSI (China), KOSHA (Korea)**
- **Usable in a hydrogen gas atmosphere**
- **Light-weight and robust die-cast case cover made of aluminum alloy**
- **Die-cast surface with rust prevention treatment and baked finish offers excellent resistance to corrosion and weather.**
- **Anti-corrosion models made of die-cast anti-corrosive aluminum are also available.***
- **With the center neutral type, a single limit switch can detect two limit points (valve upper and lower limits), since two different internal switches operate depending on the direction of actuator rotation.**

***Contact our branch or sales office for details.**

External standards	Explosion-proof structure
TIIS (Japan)	Ex d e II C T6
NEPSI (China)	Ex d e II C T6
KOSHA (South Korea)	Ex d e II C T6 IP67
CNS (Taiwan)	Ex d e II C T6

External standards	Explosion-proof structure
ATEX (Europe)	II 2G Ex d e II C T6
IECEx	Ex d e II C T6
NK (shipping)	Ex d e II C T6

MODEL NUMBERS

Head type	Actuator	Cable lead-in	Contact material	External standards						
				TIIS	NEPSI	KOSHA	CNS	ATEX	IECEx	NK
Center-neutral type	Standard roller lever	G3/4	Silver alloy	VCX-7001-J	VCX-7001-P	VCX-7001-S	VCX-7001-ET	VCX-7001	VCX-7001-E	VCX-7001-N1
			Gold-alloy	VCX-7001-JK	VCX-7001-PK	VCX-7001-SK	VCX-7001-ETK	VCX-7001-K	VCX-7001-EK	VCX-7001-N1K
		Increased-safety packing	Silver alloy	VCX-7001-R						
			Gold-alloy	VCX-7001-RK						
		Cable Gland	Silver alloy	VCX-7001-A1						
			Gold-alloy	VCX-7001-A1K						
		M25	Silver alloy		VCX-7001-Q	VCX-7001-V	VCX-7001-FT	VCX-7001-C	VCX-7001-F	VCX-7001-N2
			Gold-alloy		VCX-7001-QK	VCX-7001-VK	VCX-7001-FTK	VCX-7001-CK	VCX-7001-FK	VCX-7001-N2K
	No lever	G3/4	Silver alloy	VCX-7002-J	VCX-7002-P	VCX-7002-S	VCX-7002-ET	VCX-7002	VCX-7002-E	VCX-7002-N1
			Gold-alloy	VCX-7002-JK	VCX-7002-PK	VCX-7002-SK	VCX-7002-ETK	VCX-7002-K	VCX-7002-EK	VCX-7002-N1K
		Increased-safety packing	Silver alloy	VCX-7002-R						
			Gold-alloy	VCX-7002-RK						
		Cable Gland	Silver alloy	VCX-7002-A1						
			Gold-alloy	VCX-7002-A1K						
		M25	Silver alloy		VCX-7002-Q	VCX-7002-V	VCX-7002-FT	VCX-7002-C	VCX-7002-F	VCX-7002-N2
			Gold-alloy		VCX-7002-QK	VCX-7002-VK	VCX-7002-FTK	VCX-7002-CK	VCX-7002-FK	VCX-7002-N2K
	Adjustable roller lever	G3/4	Silver alloy	VCX-7003-J	VCX-7003-P	VCX-7003-S	VCX-7003-ET	VCX-7003	VCX-7003-E	VCX-7003-N1
			Gold-alloy	VCX-7003-JK	VCX-7003-PK	VCX-7003-SK	VCX-7003-ETK	VCX-7003-K	VCX-7003-EK	VCX-7003-N1K
		Increased-safety packing	Silver alloy	VCX-7003-R						
			Gold-alloy	VCX-7003-RK						
		Cable Gland	Silver alloy	VCX-7003-A1						
			Gold-alloy	VCX-7003-A1K						
		M25	Silver alloy		VCX-7003-Q	VCX-7003-V	VCX-7003-FT	VCX-7003-C	VCX-7003-F	VCX-7003-N2
			Gold-alloy		VCX-7003-QK	VCX-7003-VK	VCX-7003-FTK	VCX-7003-CK	VCX-7003-FK	VCX-7003-N2K
Simultaneous operation type	Standard roller lever	G3/4	Silver alloy	VCX-7101-J	VCX-7101-P	VCX-7101-S	VCX-7101-ET	VCX-7101	VCX-7101-E	VCX-7101-N1
			Gold-alloy	VCX-7101-JK	VCX-7101-PK	VCX-7101-SK	VCX-7101-ETK	VCX-7101-K	VCX-7101-EK	VCX-7101-N1K
		Increased-safety packing	Silver alloy	VCX-7101-R						
			Gold-alloy	VCX-7101-RK						
		Cable Gland	Silver alloy	VCX-7101-A1						
			Gold-alloy	VCX-7101-A1K						
		M25	Silver alloy		VCX-7101-Q	VCX-7101-V	VCX-7101-FT	VCX-7101-C	VCX-7101-F	VCX-7101-N2
			Gold-alloy		VCX-7101-QK	VCX-7101-VK	VCX-7101-FTK	VCX-7101-CK	VCX-7101-FK	VCX-7101-N2K

*For G3/4 cable lead-in with TIIS certification (-J), use it in combination with a nipple and ceiling fitting. Anti-corrosion models are available except for cable gland type A1. For details, contact the local Azbil branch office or sales office.

Coding of catalog listing: **VCX-7□0□–□□M** **Example: VCX-7001-RKM**

Anti-corrosion type

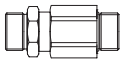
Head type	Actuator	Cable lead-in	Contact material	External standards						
				TIIS	NEPSI	KOSHA	CNS	ATEX	IECEx	NK
Simultaneous operation type	No lever	G3/4	Silver alloy	VCX-7102-J	VCX-7102-P	VCX-7102-S	VCX-7102-ET	VCX-7102	VCX-7102-E	VCX-7102-N1
			Gold-alloy	VCX-7102-JK	VCX-7102-PK	VCX-7102-SK	VCX-7102-ETK	VCX-7102-K	VCX-7102-EK	VCX-7102-N1K
		Increased-safety packing	Silver alloy	VCX-7102-R						
			Gold-alloy	VCX-7102-RK						
		Cable Gland	Silver alloy	VCX-7102-A1						
			Gold-alloy	VCX-7102-A1K						
		M25	Silver alloy		VCX-7102-Q	VCX-7102-V	VCX-7102-FT	VCX-7102-C	VCX-7102-F	VCX-7102-N2
			Gold-alloy		VCX-7102-QK	VCX-7102-VK	VCX-7102-FTK	VCX-7102-CK	VCX-7102-FK	VCX-7102-N2K
	Adjustable roller lever 	G3/4	Silver alloy	VCX-7103-J	VCX-7103-P	VCX-7103-S	VCX-7103-ET	VCX-7103	VCX-7103-E	VCX-7103-N1
			Gold-alloy	VCX-7103-JK	VCX-7103-PK	VCX-7103-SK	VCX-7103-ETK	VCX-7103-K	VCX-7103-EK	VCX-7103-N1K
		Increased-safety packing	Silver alloy	VCX-7103-R						
			Gold-alloy	VCX-7103-RK						
		Cable Gland	Silver alloy	VCX-7103-A1						
			Gold-alloy	VCX-7103-A1K						
		M25	Silver alloy		VCX-7103-Q	VCX-7103-V	VCX-7103-FT	VCX-7103-C	VCX-7103-F	VCX-7103-N2
			Gold-alloy		VCX-7103-QK	VCX-7103-VK	VCX-7103-FTK	VCX-7103-CK	VCX-7103-FK	VCX-7103-N2K

*For G3/4 cable lead-in with TIIS certification (-J), use it in combination with a nipple and ceiling fitting. Anti-corrosion models are available except for cable gland type A1. For details, contact the local Azbil branch office or sales office.

Coding of catalog listing: **VCX-7□0□–□□M** **Example: VCX-7001-RKM**

↓ Anti-corrosion type

●Nipple (increased-safety electrical pipe type, used in combination with VCX-7□0□-J(K))

Shape	Catalog listing	Dimensions						Material		
		A	B	C	Nickel, width across flats	Tightening nut, width across flats	Screw nominal size	O-ring	Nipple	Tightening nut
	**2PA-JEXN22**	80	15.5	15.5	34	34	G 3/4	Silicone rubber	Brass	Brass

*For product delivery dates, contact one of our sales representatives.

*For wiring and combinations with explosion-proof equipment, refer to product specifications or instruction manuals.

● Pressure-Resistant Packing Connector (used in combination with VCX7□0□-R(K))

Shape	Catalog listing	Protective pipe size	Applicable cable diameter	Catalog listing	Protective pipe size	Applicable cable diameter
	**2PA-JEX108PM**	G 1/2	7.5 to 8.5 mm dia.	**2PA-JEX208PM**	G 3/4	7.5 to 8.5 mm dia.
	2PA-JEX109PM		8.5 to 9.5 mm dia.	**2PA-JEX209PM**		8.5 to 9.5 mm dia.
	2PA-JEX110PM		9.5 to 10.5 mm dia.	**2PA-JEX210PM**		9.5 to 10.5 mm dia.
	2PA-JEX111PM		10.5 to 11.5 mm dia.	**2PA-JEX211PM**		10.5 to 11.5 mm dia.
	2PA-JEX112PM		11.5 to 12.5 mm dia.	**2PA-JEX212PM**		11.5 to 12.5 mm dia.
	2PA-JEX113PM		12.5 to 13.5 mm dia	**2PA-JEX213PM**		12.5 to 13.5 mm dia

*For product delivery dates, contact one of our sales representatives.

●Auxiliary Actuators

Type	Shape	Lever length	Model no.	Roller material	Lever material	Method of attaching lever
roller lever		38.1 mm	**6PA-J63**	Black nylon	Corrosion-resistant aluminum	Hexagon socket head bolt
		38.1 mm	**6PA-J78**	Brass	Corrosion-resistant aluminum	Hexagon head bolt
		38.1 mm	**LS-6PA44-002**	Black nylon	Stainless	Hexagon socket head bolt
		38.1 mm	**LS-6PA44-004**	Brass	Stainless	Hexagon socket head bolt
		30 mm	**6PA-J105**	Black nylon	Corrosion-resistant aluminum	Hexagon socket head bolt
		30 mm	**LS-6PA107**	Brass	Corrosion-resistant aluminum	Hexagon socket head bolt
		30 mm	**LS-6PA44-102**	Black nylon	Stainless	Hexagon socket head bolt
		30 mm	**LS-6PA44-104**	Brass	Stainless	Hexagon socket head bolt
Adjustable roller lever		26.0 to 89.0 mm	**6PA-J79**	Black nylon	Stainless/ Corrosion-resistant aluminum	Hexagon socket head bolt
		26.0 to 89.0 mm	**6PA-J119**	Brass	Stainless/ Corrosion-resistant aluminum	Hexagon socket head bolt

*For product delivery dates, contact one of our sales representatives.

●Shaft cover

Catalog listing	Material
PA-J269	Silicone (black)

*Sold in sets of 10.

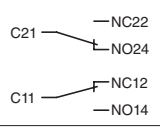
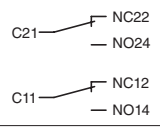
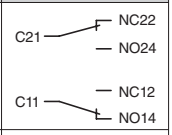
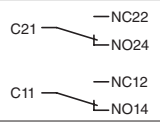
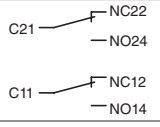
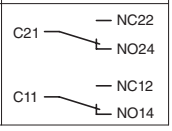
PERFORMANCE

External standards	Standards compliance		NECA C 4508
	Certifications	TIIS	Explosion-proof electrical apparatus (technical standard) (compatible with international standards)
		NK	Format number: 08T614
		KEMA	EN60079-0: 2006 (explosion-proof electrical apparatus, general rules) EN60079-1: 2007 (flameproof: “d”) EN60079-7: 2007 (increased safety explosion-proof: “e”)
		IECEx	IEC60079-0:2007 (explosion-proof electric apparatus, general rules) IEC60079-1:2007 (flameproof: “d”) IEC60079-7:2006 (increased safety explosion-proof: “e”)
		NEPSI	GB3836. 1-2000, GB3836. 2-2000, GB3836. 3-2000
		KOSHA	KSCIEC60079-0, KSCIEC60079-1, KSCIEC60079-7
		CNS	CNS 3376-0(2008) ; CNS 3376-1(2008) ; CNS 3376-7(2008)
Structure	Contact form		Single-pole double-throw (SPDT)×2
	Terminal type		M3.5 pan head screw with square washer
	Contact material		Silver: rivet. Gold alloy: cross-point
	Explosion-proof structure		Internal switch: d (explosion-proof), housing: e (increased-safety explosion-proof)
	Protective structure		IP67 (IEC 60529, JIS C 0920)
Electrical performance	Electrical rating		Silver: 5A at 250 Vac, 0.4A at 125 Vdc, 0.2A at 250 Vdc Gold-alloy: 0.1A at 125 Vac, 0.1A at 30 Vdc
	Dielectric strength		Between continuous terminals: 600 Vac, 50/60 Hz for 1 minute Between non-continuous terminals: 2,000 Vac, 50/60 Hz for 1 minute Between each terminal and non-live metal part: 2000 Vac, 50/60 Hz for 1 minute Between each terminal and ground: 2000 Vac, 50/60 Hz for 1 minute
	Insulation resistance		Min. 100 MΩ (by 500 Vdc megger)
	Initial contact resistance		Silver: max. 50 MΩ (6–8 Vdc, thermal current 1 A, measured by voltage drop method) Gold-alloy: max. 100 MΩ (6–8 Vdc, thermal current 0.1 A, measured by voltage drop method)
	Recommended min. contact operating voltage/ current		Silver: 10 mA at 24 V, 20 mA at 12 V Gold-alloy: 10 mA at 5 V
Mechanical performance	Actuator strength		Withstands loads 5 times O.F. (operating direction for 1 minute)
	Terminal strength		Withstands tightening torque of 0.6 N·m for 1 minute
	Impact resistance		200 m/s², contacts open for 1 ms max. in free position
	Vibration resistance		1.5 mm peak-to-peak amplitude, frequency 10 to 55 Hz, 2 h continuously, contacts open for 1 ms max. in free position and total travel position
	Allowable operating speed		0.3 mm/s to 0.5 m/s At min. speed, unstable state of contacts lasts for 0.1 s max. At max. speed actuator is not damaged.
	Operating frequency		Max. 120 operations/minute
Life	Mechanical		Min. 2 million operations (with overtravel at 70 to 100% of rated value)
	Electrical		Silver: min. 30,000 operations, 5 A at 250 Vac, 0.4 A at 125 Vdc, 0.2 A at 250 Vdc (Min. 100,000 operations, 3 A at 250 Vac, 0.4 A at 30 Vdc, 0.2 A at 125 Vdc, 0.1 A at 250 Vdc) Gold-alloy: min. 2 million operations, 0.1 A at 125 Vac, 0.1 A at 30 Vdc
Environment	Operating temperature		–10 to +60˚C (no freezing allowed)
	Operating humidity		45–85%RH
	Storage temperature		–10 to +60˚C
	Storage humidity		Max. 98% RH (with conduit section plug inserted)
	Group and temperature class		II C T6
	Hazardous area classification		Zone 1 and Zone 2 hazardous areas
Recommended tightening torque	Body		5–6 N·m (M5 hexagon socket head bolt)
	Cover		5–6 N·m (M5 hexagon socket head bolt with spring washer)
	Head		1.3–1.7 N·m (M4 pan head screw head with spring washer)
	Terminals		0.8–1.2 N·m (M3.5 pan head screw with square washer)
	Lever		4–5.2 N·m (M5 hexagon socket head bolt)
	Internal ground		0.4–0.6 N·m (M3 binding head machine screw with toothed washer)
	External ground		1.3–1.7 N·m (M4 binding head machine screw with spring washer)
Applicable cable size	Terminals	Stranded cable	Nominal cross-sectional area 0.5 mm² to 1.5 mm² (AWG20 to AWG16)
		Single cable	Nominal cross-sectional area 0.5 mm² to 1.5 mm² (AWG20 to AWG16)
	Internal ground		Uses M3 crimp-type terminal with insulating coating
	External ground		Uses M4 crimp-type terminal Cables with a nominal cross-sectional area of up to 4 mm² can be connected
Main materials	Housing parts		Aluminum alloy + dark beige baked acrylic resin finish
	External screws		Stainless steel
	Seal		Silicone rubber

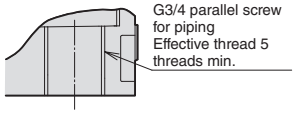
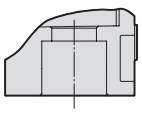
● Table 1. Electrical rating

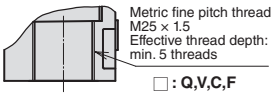
Catalog listing / Contact material	VCX-7□0□-J VCX-7□0□-R	VCX-7□0□ VCX-7□0□-C
Silver	5A-250 Vac 0.4A-125 Vdc 0.2A-250 Vdc	AC-12: 5A-250V DC-12: 0.4A-125V DC-12: 0.2A-250V
Gold plated (VCX-7□□□-□K ↑ Gold plated)	0.1A-125 Vac 0.1A-30 Vdc	AC-12: 0.1A-125V DC-12: 0.1A-30V

Circuit diagram

Code	Operation type	Circuit diagram		
		Counterclockwise direction operation	Free position	Clockwise direction operation
0	Center-neutral			
1	Simultaneous operation			

Conduit section details

Conduit section details	
VCX-7∗∗∗-Ⓙ∗∗ (Increased-safety conduit type)	**VCX-7∗∗∗-Ⓡ∗∗** (Increased-safety packing type)
	

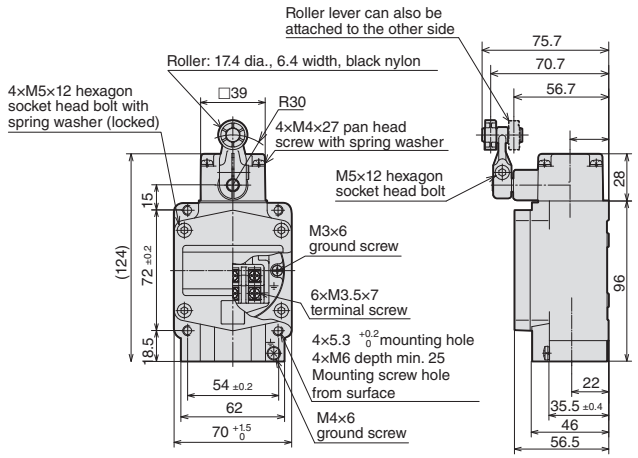
Conduit section details
VCX-7∗∗∗-□∗∗


EXTERNAL DIMENSIONS

Standard roller lever type VCX-7□0①-□□

(unit : mm)

Catalog listing	VCX-700□-□□
O.F. (Max. N)	15.7
R.F. (Min. N)	2.2
R.T. (Max. °)	10
M.D. (Max. °)	3
O.T. (Min. °)	35
2-switch simultaneous operation	—

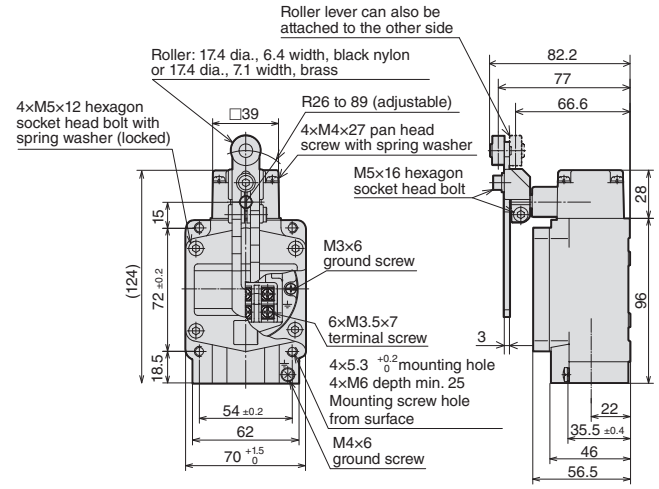


Notes:
※The diagrams above show the shape for brass rollers. For nylon roller shape, see the **VCX-7□03-□□** diagrams below.
※Dimensional tolerance is ±0.8 unless otherwise specified.

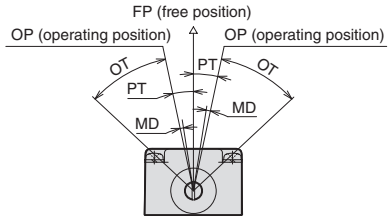
Adjustable roller lever type VCX-7□0③-□□

Catalog listing	VCX-710□-□□
O.F. (Max. N)	15.7*
R.F. (Min. N)	2.2*
R.T. (Max. °)	12
M.D. (Max. °)	3
O.T. (Min. °)	35
2-switch simultaneous operation	3

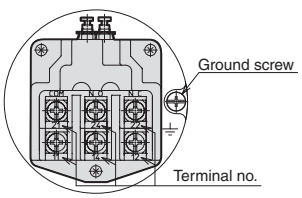
*When lever length is 38.1 mm



Notes:
※The diagrams above show the shape for nylon rollers. For brass roller shape, see the **VCX-7□01-□□** diagrams below.
※Dimensional tolerance is ±0.8 unless otherwise specified.



Detailed terminal diagram

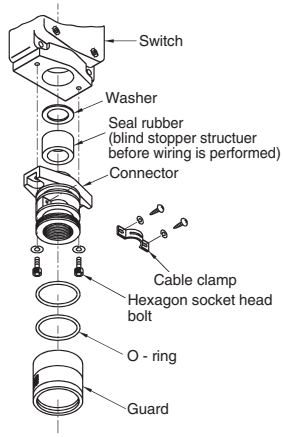


Terminal connections

Switch 1		Switch 2	
Terminal no.	Type	Terminal no.	Type
11	COM	21	COM
12	N.C.	22	N.C.
14	N.O.	24	N.O.

EXPLODED VIEW OF PRESSURE-RESISTANT PACKING CONNECTOR

Exploded view

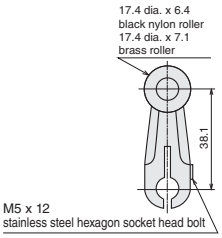


Note: regarding conduits in dimensional drawing
Switches with threaded electrical conduit connections have G3/4 threads, and a protective cap is provided to seal the opening until wiring work is done. On the pressure-resistant packing pull-in type, the conduit connections are not threaded because this type is used with a separately sold special connector.
Remove the protective cap and install the special connector.

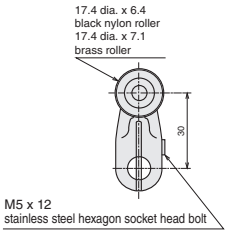
Auxiliary actuator for VCX explosion-proof switches

(unit: mm)

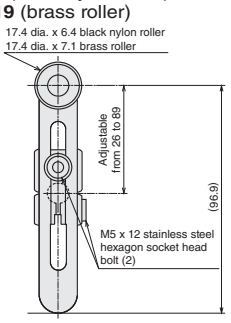
6PA-J63 (black nylon roller)
6PA-J78 (brass roller)
LS-6PA44-002 (black nylon roller)
LS-6PA44-004 (brass roller)



6PA-J105 (black nylon roller)
LS-6PA107 (brass roller)
LS-6PA44-102 (black nylon roller)
LS-6PA44-104 (brass roller)



6PA-J79 (black nylon roller)
6PA-J119 (brass roller)



Note: about conduit sections in dimension drawings
On conduit type switches, the conduit section has a G1/2 screw thread, and a blind stopper is inserted to seal the conduit before wiring. On switches with pressure-resistant packing lead-in, there is no screw thread because a special connector (sold separately) is used. Remove the stopper before attaching the connector.

NOTES FOR USE OF VCX-7000 SERIES

- Do not wire while the power is connected. Depending on the voltage used, there is a risk of electrical shock.
- Do not leave the switch unattended or use it with the cover or conduit section open. Doing so may lead to an explosion.
- This switch conforms to IEC-compliant explosion-proof standards. Use it in an area that is appropriate for its explosion-proof structure, in accordance with the standards for the facility or equipment.
- By removing the four head mounting screws, the switch head position can be rotated 180°. Retighten the head screws to a torque of 1.3–1.7 N•m.
- To wire the switch, remove the cover by removing the four M5 screws with a 4 mm hex key (Allen wrench), and then connect the wires to the required terminals. Make sure that the switch plunger does not come into contact with a wire. Note that if the cover is unevenly tightened, if the tightening force is insufficient, or if the conduit section after wiring is improperly attached, explosion-proof performance may be impaired.
- To utilize the TIIS certification, electric wires and cables must have an allowable temperature of 70 °C or higher.
- Do not disassemble the switch, except for removing the cover during wiring and removing the operation head to change its direction.
- If the switch has been damaged by a tool or dropped during construction work, do not it. Also, if there is a large dent or crack in the cover or housing, replace the switch immediately. The explosion-proof performance may be impaired.
- The lever is the only replaceable part. Otherwise the whole switch must be replaced.
- The housing, cover and head, are made of aluminum alloy finished with gray paint.
- External screws are stainless steel.
- Do not remove the protective plug until you begin the wiring work.
- Be sure to ground the switch by the ground screw.
- Hazardous areas where the switch can be used: Category I, Category II
  (Category I: areas that could be hazardous under normal conditions)
  (Category II: areas that could be hazardous under abnormal conditions)
- Do not use the switch in an environment where it may come into direct contact with strong acid or alkali.
- For increased-safety electrical conduit models, it is necessary to do explosion-proofing work by using sealing compound to make a sealed fitting for the electrical conduit close to the conduit section. Note that increased-safety electrical conduit type switches cannot be used in combination with commercially available packing-type connectors.
- Use electric wires or cables made to withstand temperatures of 70 °C or higher.
- When using an increased-safety packing type, use a **2PA-JEX1******L** series connector (protective tube size G1/2) or **2PA-JEX2******L** series connector (protective tube size G3/4) as stipulated in the certification for the switch. As the connector is not included, select an appropriate connector and order it separately.

Before use, thoroughly read the “Precautions for use” and “Precautions for handling” in the Technical Guide on pages **D-137** as well as the instruction manual and product specification for this switch.