

Instruction and Operating Manual

Valve Monitoring Indicator LSB-3000 Series



< LSB-3000 >

< Ver. 1.0 >

Power-Genex Ltd.





Safety Instructions 1

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “**Caution**,” “**Warning**” or “**Danger**.” They are all important notes for safety and must be followed in addition to International Standards (IEC)^{Note 1}, and other safety regulations.

Note 1) IEC 60079-0 : 2007 EN 60079-0 : 2012
IEC 60079-1 : 2007 EN 60079-1 : 2007



Caution

Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.



Warning

Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.



Danger

Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.



Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalogue information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment. The product specified here may become unsafe if handled incorrectly.

The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact POWER-GENEX beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalogue.
3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

5. Do not open when an explosive gas and dust atmosphere may be present

6. To avoid the risks of electrostatic discharges, the user has to make sure of the absence of dangerous atmosphere before cleaning the device, or will have to clean it only with a damp cloth or antistatic products.

7. The gap of flameproof joints is less than the values specified in the table of the EN 60079-1 standard. The width of the different flameproof joints is superior to the values specified in the table of the EN 60079-1 standard.



Safety Instructions 2



Caution

1. The product is provided for use in manufacturing industries.

The product herein described is basically provided for peaceful use in manufacturing industries. If considering using the product in other industries, consult POWER-GENEX beforehand and exchange specifications or a contract if necessary. If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements". Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered. Note 2)

Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.

2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided. This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.

3. Prior to using POWER-GENEX products, please read and understand the warranty terms and disclaimers noted in the specified catalogue for the particular products.

Note 2) Vacuum pads are excluded from this 1 year warranty.

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.

Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1. The use of POWER-GENEX products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.

2. The exports of POWER-GENEX products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a POWER-GENEX product to another country, assure that all local rules governing that export are known and followed.



Precautions 1

Be sure to read before handling.

Operation



Warning

1. Do not operate the positioner outside the specified range as this may cause problems. (Refer to the specifications.)
2. Design the system to include a safety circuit to avoid the risk of danger should the positioner suffer failure.
3. Be sure that exterior lead-in wiring to the terminal box is based on the guidelines for explosion-protection of manufactory electric equipment when being used as a flame proof, explosion proof construction.
4. Do not remove terminal cover in a hazardous location while the power is on.
5. Covers for the terminal and body should be in place while operating.
6. When using as an intrinsically safe explosion-proof product, do not wire in a hazardous location while the power is on.



Caution

1. Do not touch the actuator or valve's oscillating section when supply pressure has been added, as this is dangerous.
2. Make sure fingers do not get caught when mounting and aligning the cam.
Cut off the pressure supply and always release the compressed air inside the positioner and actuator before performing this work.
3. Always use with the body cover unit mounted.
Moreover, the positioner may not meet degrees of protection IP68 depending on the body cover mounting conditions. In order to meet degrees of protection IP68, tighten threads using the proper tightening torques (2.8 to 3.0 N·m).
4. Always flush the pipe's inside before piping to ensure foreign objects such as machining chips do not enter the positioner.
5. The actuator opening may become unstable when using the booster relay.
6. Always use a ground connection to prevent noise from the input current and to prevent damage because of static electricity.
7. Use the pressure reading on the supplied pressure gauge as an indication.
8. The supplied pressure gauge's needle will malfunction if the pressure supply to the internal mechanism or positioner freezes. Ensure that the pressure gauge's internal parts do not freeze if using the pressure gauge in an operating environment with an ambient temperature of less than 0°C.
9. Electromagnetic compatibility (EMC)
The housing is made of metal in order to increase the electromagnetic compatibility in case of high frequency radiation. Note that this protection can only become effective if you connect the ground connection of the housing to grounded valves using a short, sufficiently-thick electrical cable. The ground connection is also used for connection to potential equalizing bars. Conductor cross-sections of up to 4mm² can be connected. To avoid device malfunctions, it should only be operated in a controlled electromagnetic environment. This means that radio transmitting devices, such as cellular phones must not be used in the direct vicinity.

For users



Caution

1. Assemble, operate and maintain the positioners after reading the operation manual thoroughly and understanding the content.



Precautions 2

Be sure to read before handling.

Handling



Caution

1. Avoid excessive vibration or impact to the positioner body and any excessive force to the armature, as these actions may cause damage to the product. Handle carefully while transporting and operating.
2. If being used in a place where vibration occurs, using a binding band is recommended to prevent broken wires because of the vibration.
3. When exposed to possible moisture invasion, please take the necessary measures. For example, if the positioner is left onsite for long periods, a plug should be put in the piping port and a body cover unit fitted to avoid water penetration.
Take measures to avoid dew condensation inside the positioner if exposed to high temperature and humidity. Take enough measures against condensation especially when packing for export.
4. Keep magnetic field off the positioner, as this affects its characteristics.

Air Supply



Caution

1. Use only dehumidified and dust extracted clean compressed air as the air supply.
2. Do not use compressed air containing chemicals, organic solvents, salinity or corrosive gases, as this may cause malfunction.
3. When operating below the freezing point, protect the positioner from freezing.

Operating Environment



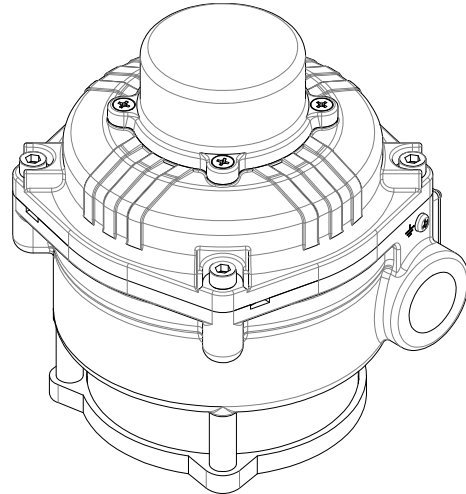
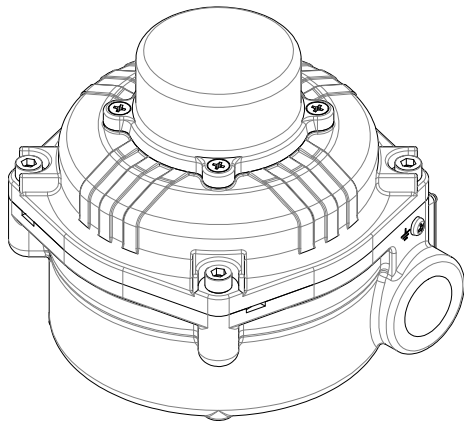
Caution

1. Do not operate in locations with an atmosphere of corrosive gases, chemicals, sea water, or where these substances will adhere to the regulator.
2. Do not operate out of the indicated operation temperature range as this may cause damage to electronic parts and seal materials to deteriorate.
3. Do not operate in locations where excessive vibration or impact occurs.

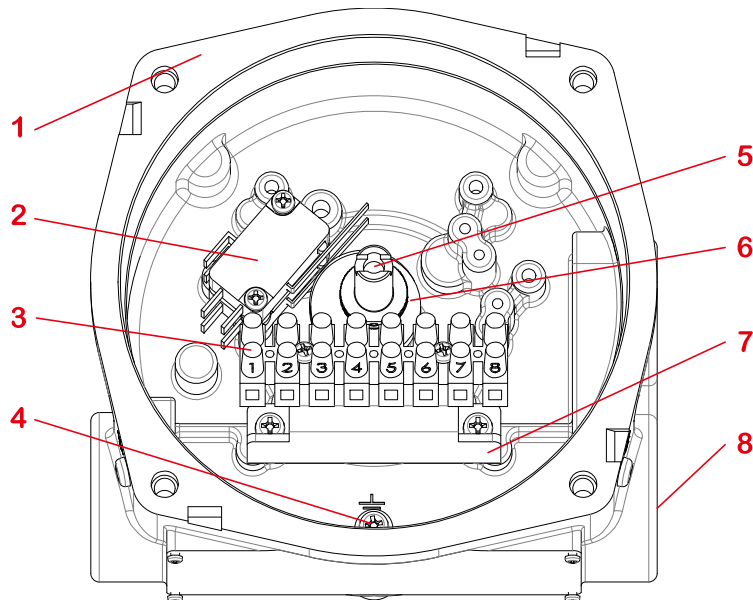
2. Overview of Structure

This product consists of the following parts optionally.

- SPDT / DPDT / P&F NJ2-V3-N / P&F NJ2-12GM-N
- Potentiometer for position feedback
- Able to Bottom visual indicator



The followings are descriptions of internal parts without cover.



No.	Description
1	Main body
2	Switches or sensors
3	Terminal
4	Ground
5	Feedback shaft
6	Cam
7	Terminal bracket
8	Cable entry

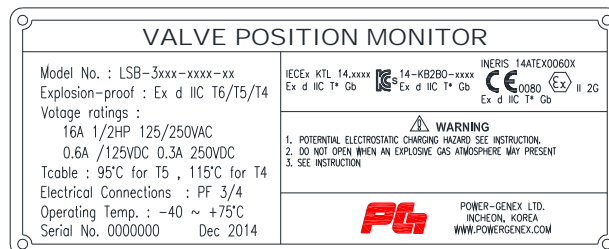
3. Specifications

	LSB - 30xx	LSB - 31xx & LSB - 32xx
Explosion proof / protection class	Ex d IIC T* / IP68	
	Ambient Temperature	T6 : -40 ~ +75 °C
		T5 : -40 ~ +90 °C Tcable : 95°C
		T4 : -40 ~ +110 °C Tcable : 115°C
Switches / Sensor **	Mechanical switches	SPDT (Starion / Haneywell) DPDT (ITW-switch)
	Proximity sensors	NJ2-V3-N (P&F) NJ2-12GK-N (P&F)
	Magnet proximity sensors	Magnum XT-90 (Westlock) CD-90 (Celduc)
	GO switch	Model 35 (Topworx)
Operating Temperature	-40 ~ +110°C (-40 ~ +230°F) **	
Electrical connections	PT 1/2 , NPT 1/2, M20 x 1.5, PT 3/4, NPT 3/4	NPT 1/2, NPT 3/4
Body material / painting	Aluminum diecast / powder coating	Stainless steel, 316SS
Weight	2 Kg	4 kg

* See Ambient Temperature

** See Specifications of Switches and Sensors

4. Description on Nameplate



- .. MODEL NUMBER : Model number and options are described.
- .. Switch Type : Mechanical switches / Proximity sensors type / Magnet sensors type / GO switch type
- .. Voltage Ratings : switche / sensor voltage ratings
- .. Electrical Connections
- .. Operating Temp.
- .. Serial No : A serial number and a manufacturing date for tracking are described.
- .. Certificate No
 INERIS 14ATEX 0060x / IECEx KTL 14.xxxx / 14-KB2BO-xxxx
- .. Code : Ex d IIC T* Gb(T6 : -40 to +75°C / T5 : -40 to +90°C / T4 : -40 to +110°C)
 Cable temperature : 95°C for T5 and 115°C for T4
- .. WARNING
 1. Potential electrostatic charging hazard
 2. Do not open when an explosive gas may be present
 3. See Instruction

5) Part numbering system

Switch Box Type	Body Material	Switches / Sensors	Position Transmitter	Explosion Proof	Beacon / Indicator	Electrical Connections	Number of Electrical Connections	Feedback Shaft	Mounting Bracket
LSB-3 Explosion - proof Type	0 Aluminum die-cast	Mechanical switches 0 (2) SPDT 2 (4) SPDT 3 (2) DPDT P&F sensors 4 (2) NJ2-V3-N 5 (4) NJ2-V3-N 6 (2) NJ2-12GK-SN or NJ4-12GK-SN 7 (2) NBB3-V3-Z4 9 (2) NBB3-V3-E2 Autonics sensors 8 (2) PSN17-5D PNP or NPN	0 None T 4~20mA output signal		A Beacon indicator 90° (Open / Close) B Bottom indicator 90° (Open / Close) C Beacon & bottom indicator 90° (Open / Close) D Other flow direction indicator (L or T port) N None	A PF 3/4 B NPT 3/4 C PF 1/2 D NPT 1/2 E M20 x 1.5 F PF 1 G NPT 1	2 2 PCs 3 3 pcs	Rotary type N NAMUR shaft F Fork lever	Rotary type N None 1 30x80 2 30x80 3 30x130 4 30x130 M Multi-size Bracket
	1 Stainless steel 316 2 Stainless steel 316L (On request)	Hermetically sealed proximity sensors A (2) XT-90 B (4) XT-90 C (2) MS-20 D (4) MS-20 E (2) MS-100 F (4) MS-100 Honeywell switches J (2) SPDT(SILVER) K (4) SPDT(SILVER) L (2) SPDT(GOLD) M (4) SPDT(GOLD) GO switches (only LSB-3000) P (2) Model35 Q (4) Model135			A ATEX / IECEx Ex d IIC				A Stroke B Stroke C Stroke D Stroke 80 ~ 150mm D Stroke 80 ~ 200mm

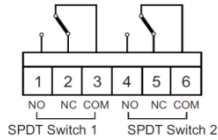
6. Specifications of Switches and Sensors

6.1 Mechanical Switches

6.1.1 SPDT, SZM-V16-2FA-61 (STARION)



< SPDT Mechanical Switch >



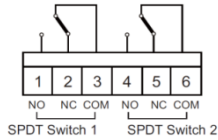
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Type		Non-inductive load		Inductive load	
		Resistive	Lamp	Inductive	Motor
Rating	250VAC	16A	2A	10A	3A
	8VDC	16A	4A	10A	6A
	30VDC	10A	4A	10A	4A
	125VDC	0.6A	0.1A	0.6A	0.1A
	250VDC	0.3A	0.05A	0.3A	0.05A
Operating Temperature		-20 ~ +105 °C			

6.1.2 SPDT, V7-1C17E9-022 (Honeywell)



< SPDT Mechanical Switch >



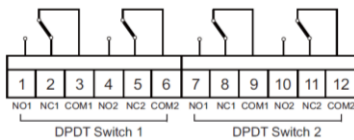
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Type		Resistive load / Inductive load
Rating	125VAC	15.1A 1/2HP
	250VAC	15.1A 1/2HP
	277VAC	15.1A 1/2HP
	125VDC	0.5A
	250VDC	0.25A
Operating Temperature		-40 ~ +82 °C

6.1.3 DPDT, Licon-22 (ITW)



< DPDT Mechanical Switch >



< Wiring >

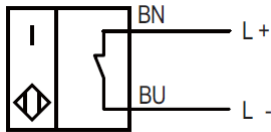
Type		Resistive load	Inductive load
Rating	125VAC	10A 1/2HP	10A 1/2HP
	250VAC	10A 3/4HP	10A 3/4HP
	28VDC	10A	7A
Operating Temperature		-20 ~ +80 °C	

6.2 Proximity Sensors

6.2.1 NJ2-V3-N (P&F)



< Proximity Switch >



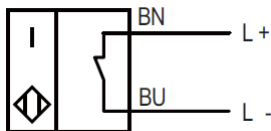
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General Specifications Switching element function Rated operating distance Installation Output polarity Assured operating distance	NAMUR NC 2mm embeddable NAMUR 0 ~ 1.62 mm
Nomial Ratings Nominal voltage Switching frequency Hysteresis Current consumption Measuring plate not detected Measuring plate detected	8.2 VDC 0 ~ 1000 Hz 0.01 ~ 0.1 mm > 3mA < 1mA
Mechanical Specifications Connection type Core cross-section Housing material Sensing face Protection degree	Cable PCV, 130 mm 0.14 mm PBT PBT IP67
Operating Temperature	-25 ~ +100 °C

6.2.2 NJ2-12GK-SN (P&F)



< Proximity Sw itch >



< Wiring >

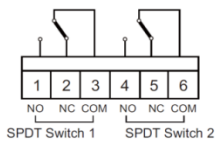
General Specifications Switching element function Rated operating distance Installation Output polarity Assured operating distance	NAMUR NC 2mm flush Safety Function 0 ~ 1.62 mm
Nomial Ratings Nominal voltage Switching frequency Hysteresis Current consumption Measuring plate not detected Measuring plate detected	8 VDC 0 ~ 2000 Hz 3% > 3mA < 1mA
Mechanical Specifications Connection type Core cross-section Housing material Sensing face Protection degree	Cable PCV, 2 m 0.34 mm PP PP IP68
Operating Temperature	-40 ~ +100 °C

6.3 Magnet switch

6.3.1 Magnam XT-90



< XT-90 >



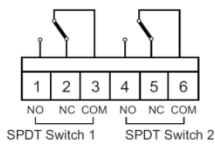
< Wiring >

Technical Data Contact Arrangement Contacts Operating Time Initial Contact Resistance Seal Housing(Flame Retardant) Approvals Temperature Range Operational Life Repeatability	SPDT, Form C (Normally Open) Pure Tungsten 3.0m Sec. 0.50 ohms (Max.) Hermetic High Impact PBT UL, CSA -40 ~ +80 °C 600,000 Cycles (full rated load) 0.125mm
Electrical Rating Rhodium Tungsten	SPDT Form C (Normally Open) 1 amp / 24 VDC 0.200 amps / 120 VAC SPDT Form C (Normally Open) 3 amp / 120 VAC 1.5 amps / 240 VAC 2 amps / 24 VDC

6.3.1 Celduc CD-30



< Proximity Sw itch >

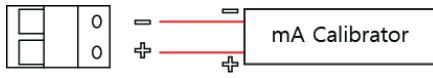
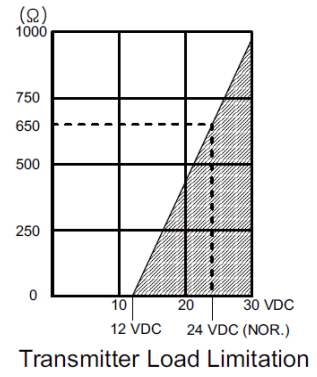


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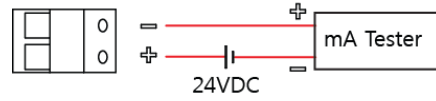
Technical Data Contact Arrangement Contacts Operating Time Initial Contact Resistance Seal Housing(Flame Retardant) Approvals Temperature Range Operational Life Repeatability	SPDT, Form C (Normally Open) Pure Tungsten 3.0m Sec. 0.50 ohms (Max.) Hermetic High Impact PBT UL, CSA -40 ~ +125 °C 500,000 Cycles (full rated load) 0.125mm
Electrical Rating Tungsten	SPDT Form C (Normally Open) 2 amp / 120 VAC 1 amps / 240 VAC 3 amps / 24 VDC

7. Specifications of Position Transmitter

<p>General Specifications</p> <p>Current Output Signal 4 ~ 20mA , 2-wire</p> <p>Power Supply Range 12 ~ 30VDC (24VDC recommendable)</p> <p>Span Adjustable Angle 0 ~ 120°</p>	
<p>Nominal Ratings</p> <p>Linearity Within ± 1.0% F.S.</p> <p>Repeatability Within ± 0.25% F.S.</p> <p>Hysteresis Within ± 1.0% F.S.</p>	



<with mA calibrator>



<with mA tester>

8. Electrical Connections



- ① Be sure to supply the rated voltage and current stated on this manual. Otherwise, it may cause a serious damage or malfunctions.
- ② Check polarity of + and – exactly and connect wires.
- ③ When it is necessary to open the positioner cover at a humid place, more attention is required. It may cause a serious damage or malfunctions.

Explosion-proof construction

LSB-3 becomes explosion proof as certified by IECEx/ATEX/KC, according to the model selected.

The explosion-proof grade has the following approval : Ex d IIC T*

Take extra care when handling the LSB-3 as explosion-proof equipment

To use as Ex d IIC T*

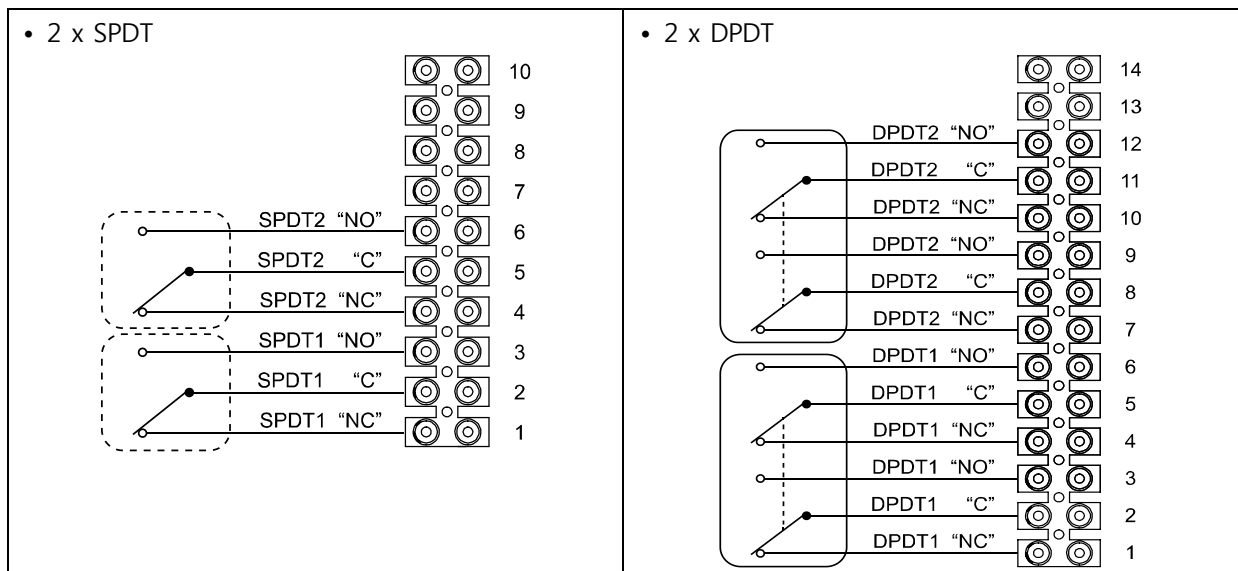
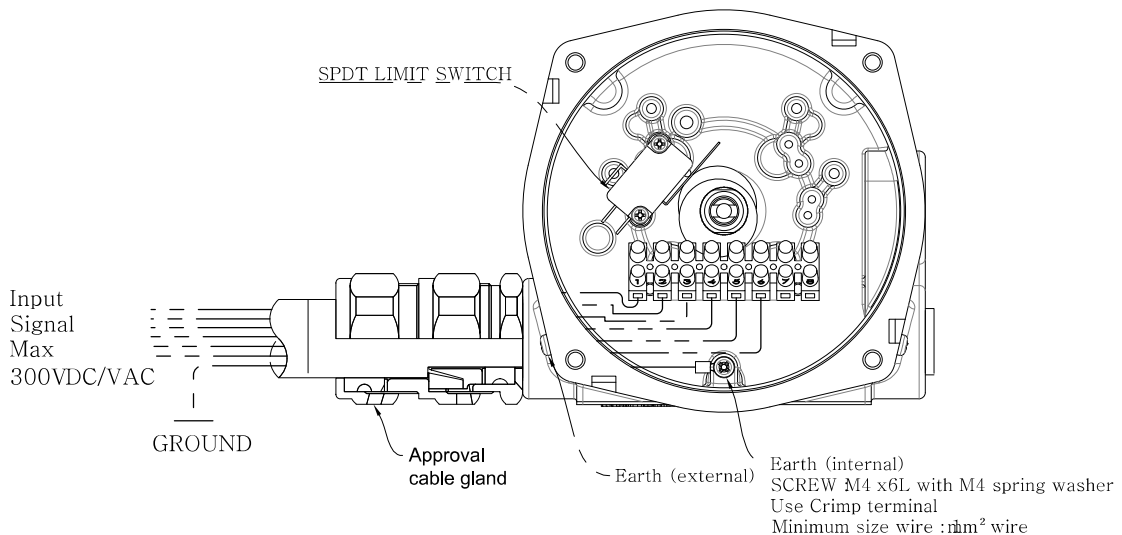
A) Pressure-proof packing.

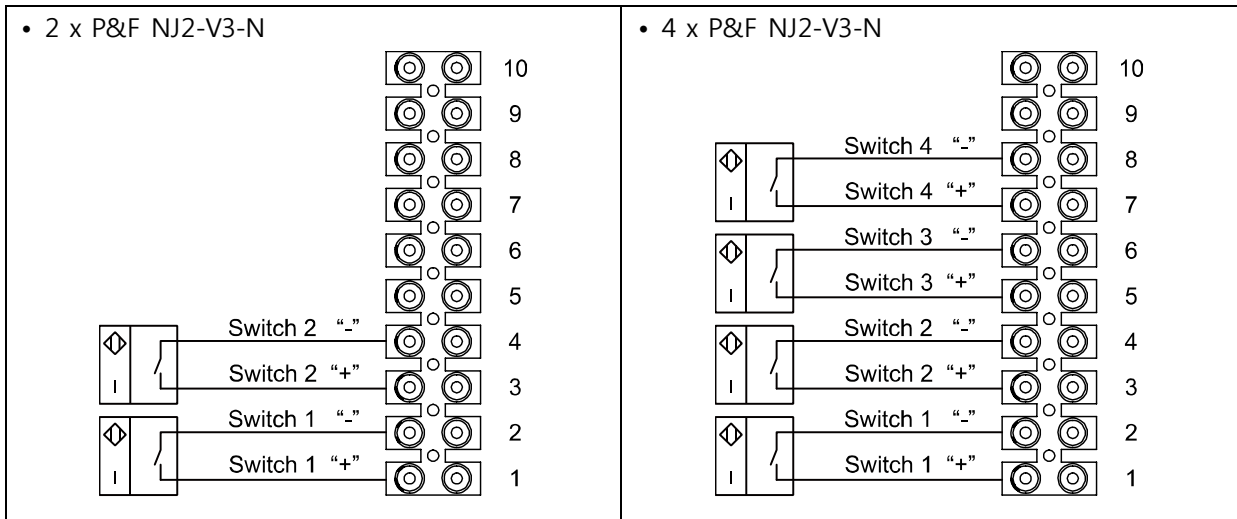
As shown below in the chart, use "Cable gland"

B) Metal Piping.

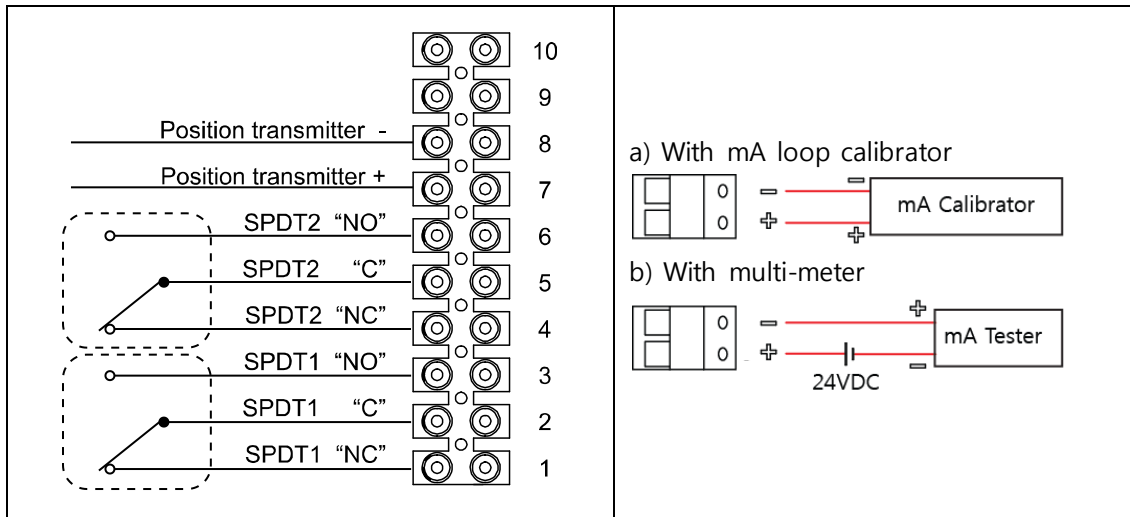
Attach the sealant fitting bracket near the cable port.

(For details, refer to "The guideline on electric equipment explosion proof" published by the Technology Institution of Industrial Safety).





Position Transmitter Option



<2 x SPDT + Position transmitter>



- ① It is necessary to set Zero and Span of position transmitter manually.
- ② The power supply of 12 – 30VDC should be supplied.

c) Setting

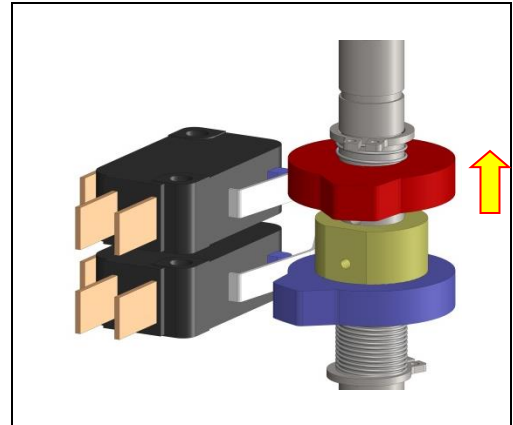
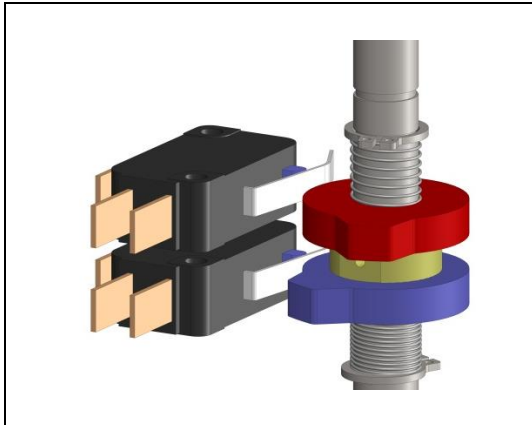


- Install the LSB-3000 properly before setting the position transmitter.
- Check the proper position of the RA/DA switch before setting.
- 1. Turn the Zero screw until the output signal reaches 4mA.
- 2. Turn the Span screw until the output signal reaches 20mA.
- 3. Repeat the above procedure until the output signals reach 4mA and 20mA.
- 4. Operate the valve and check if the output signals are transmitted properly.

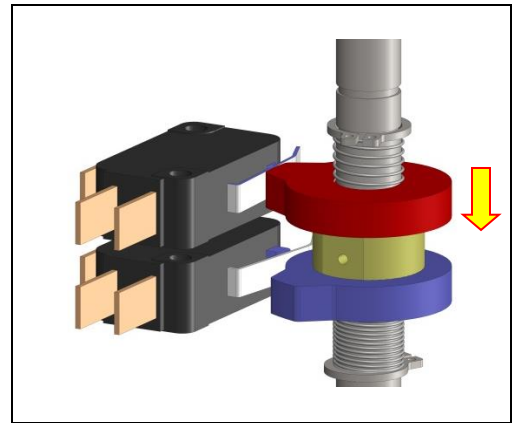
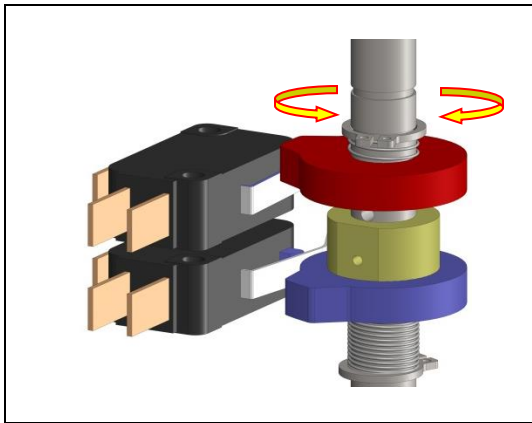
8.1 Earthing

The LSB-3000 must be connected to a good quality earth. The units are provided with internal and external earthing terminals which are both located on the terminal chamber section of the unit

9. Setting of Cams and Switches



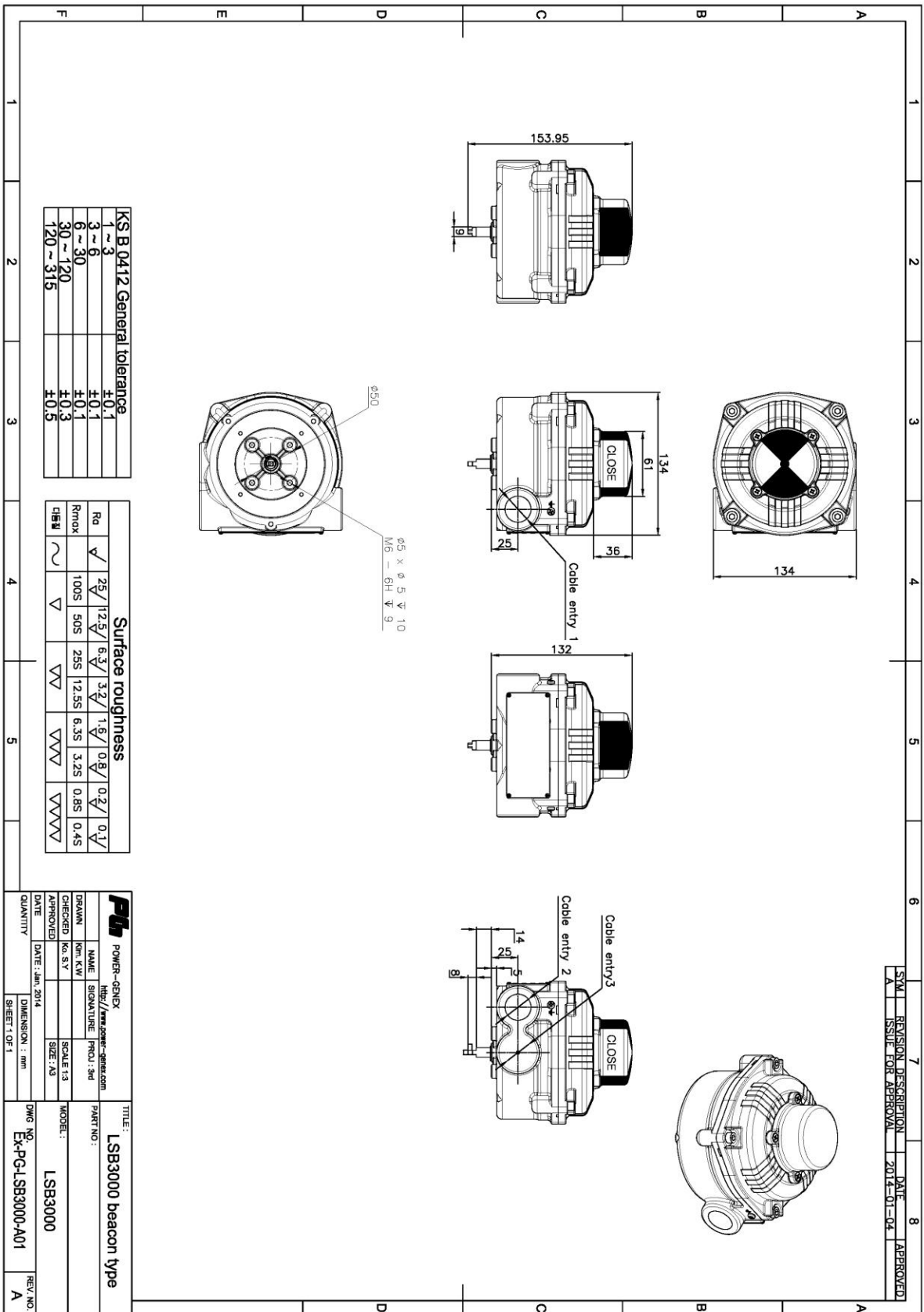
a) Push up the red cam if it is necessary to set the position of the red cam.



b) Turn the red cam until it touches the limit switch. And put down and fix it with a wrench bolt.

c) Do the same procedure for setting of the blue cam. But push it down to move.

10. Dimensions





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Subject to change without prior notice