TAKEX

Barrier sensor
(Intrinsically-safe explosion-proof structure photoelectric sensor)

XAS2-U30P Instruction manual

Type Approved No. : TC20206 (TIIS) Exia II B T4 Manual NO.ABH-HS-0136

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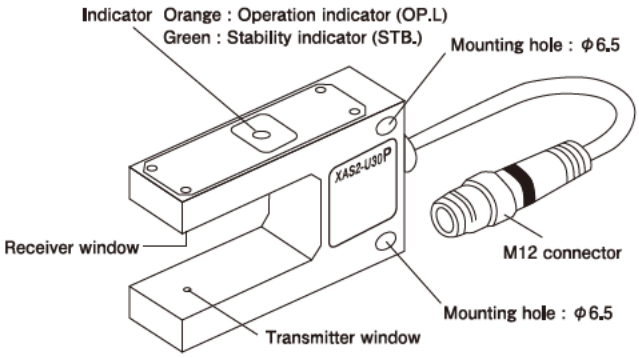
1 PARTS DESCRIPTION



2 SAFETY PRECAUTIONS ⚠WARNING

1. Read this instruction manual carefully and use it according to the explosion-proof rating/rated values/performance/ specifications of the product. Incorrect handling may result in an accident causing serious injury or property damage due to a malfunction, explosion, ignition, etc.
2. Do not use this product for life or safety critical applications.
3. Work such as installation, piping, operation, handling, maintenance and inspection must be performed by persons having expertise in the principles and functions of explosion-proof structures, with installation skills in electrical facilities, and knowledge of related laws and regulations.
4. Confirm that the operating environment conforms to explosion-proof criteria (Exia II B T4).
5. Do not use this product when its housing or cable is damaged.
6. Do not attempt to disassemble, repair, or modify this product.
7. Do not connect this product to equipment other than the matching intrinsically-safe equipment (barrier relay).
8. Do not use this product in an environment exposed to water including outdoors or under the water.
9. Do not use this product in an environment exposed to vibration or shock.
10. Do not expose this product to direct sunlight.
11. Do not apply excessive force to the cable.
12. This product should be disposed of as an industrial waste.

3 PRECAUTIONS DURING USE

- Be sure to route the sensor cables separate from any power transmission or high voltage line, or else use shielded cables. Using the same conduit or duct as high voltage or power lines will cause malfunctions or damage because of electromagnetic induction.

4 MOUNTING

(1) Installation

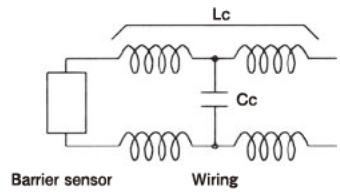
- Wiring and installation must be performed under the direction of the person responsible for the explosion-proof construction.
- Barrier sensor can be installed in a hazardous area.
- Barrier sensor must be secured firmly to a grounded conductive frame. For grounding of the conductive frame, class D grounding or better is recommended.
- Fix the barrier sensor with M6 screws. The tightening torque should be 2 N·m or less.

(2) Wiring for intrinsically-safe circuit

- Regarding wiring method, refer to Explosion-proof Guidelines for Electrical Facilities in Factories (Technical Guideline Consistent with International Standards 2008) and Factory electrical equipment guide for users (Gas Explosion-proof 1994).
- Relation between barrier sensor (intrinsically-safe equipment) and barrier relay (intrinsically-safe related equipment) to maintain the explosion-proofing standard is shown as below :

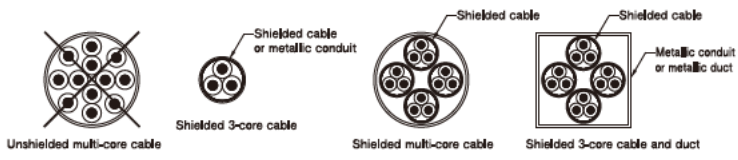
Barrier sensor side	Connection between barrier sensor and barrier relay	Intrinsically-safe related equipment (Barrier relay side)
Allowable voltage applied to intrinsically-safe circuit (Ui):13.7V	≧	Maximum voltage applied to intrinsically-safe circuit (Uo)
Allowable current in intrinsically-safe circuit (Ii):72.9mA	≧	Maximum current in intrinsically-safe circuit (Io)
Allowable power of intrinsically-safe circuit (Pi):250mW	≧	Maximum power of intrinsically-safe circuit (Po)
Internal capacitance (Ci):4.5μF	(4.5μF+Cc)≦	External allowable capacitance (Co)
Internal inductance (Li):2.9μH	(2.9μH+Lc)≦	External allowable inductance (Lo)

- ≧ indicates that the value on barrier relay side is lower, and ≦ indicates that the value on barrier relay side is higher.
- Lc and Cc are parameter values of external wiring.
- The product cannot be used unless all of the barrier relay parameters and the barrier sensor parameters correspond to the values shown in the above table.



- Cables to be used and their length
  - Use a cable of 0.5 ㎟ cross-sectional area or more and an insulation withstand voltage of 500 V AC or better.
  - Length of wire differs depending on parameters. Approximate standard is 200 m or less.
- Wiring method
  - Cables must be used to connect with intrinsically-safe related equipment. The wiring must be isolated from other intrinsically-safe circuit.
  - To prevent electromagnetic or electrostatic induction, use shielded cables or use separate duct or conduit from that of other intrinsically-safe circuits.

Reference example



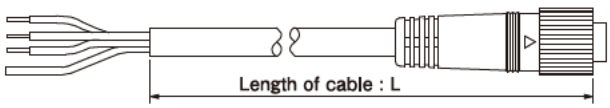
● Connection and branching
  · If it is necessary to connect or branch wiring in hazardous area, use a junction box in Zone 1 or Zone 2 areas, but not in Zone 0.
  · It is recommended to relay or branch using a terminal block in a metal junction box rated IP20 or more and grounded (Class D grounding or better is recommended).
● Prevention of electrostatic charge
  Be sure to ground the barrier sensor container and the shield wire of the cable. (Class D grounding or better is recommended)
● Prevention of explosion due to light metal dust
  Do not use light metal such as aluminum or magnesium for metal junction box. Also, do not use in an environment where dust of light metals can be generated.
● Identification of intrinsically-safe circuit
  Use light blue as the color to identify intrinsically-safe circuit.
● Be sure to confirm that values of capacitance (Cc) and inductance (Lc) of wires to be used, including extension cable (option), do not exceed the parameter value.

(Table 1)

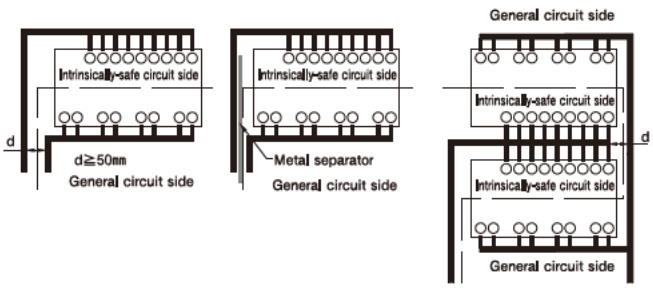
Pin No.	Color of wire	Description
1	Brown	Power supply + side
2	—	—
3	Blue	Power supply - side
4	Black	Output

(Table 2)

Model	Length(L)	Inductance	Capacitance
FAC-X43S2S	2m	1.6 μH	400pF
FAC-X43S5S	5m	4.0 μH	1000pF
FAC-X43S10S	10m	8.0 μH	2000pF



(3) Connection to barrier relay in non-hazardous area
● Prevention of explosive gas leakage
  Fill the parts separating non-hazardous and hazardous areas with sealing compound material to avoid leakage of explosive gas to non-hazardous areas.
● Connection with barrier relay
  To avoid electromagnetic or electrostatic induction to the intrinsically-safe circuit, leave a space of 50 ㎜ or more between each wire, or use grounded metallic board or separator (conduit) which has no openings or holes.

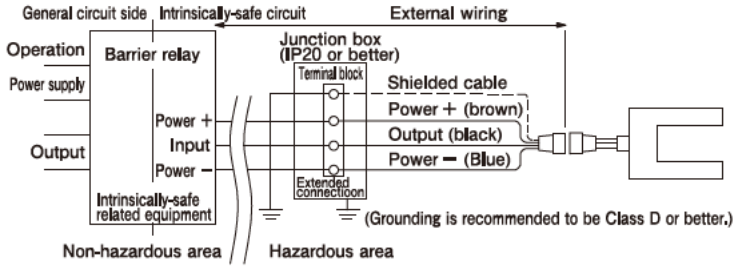


(4) Certification mark
● Paste the attached certification mark on the sensor body or a visible place nearby.
● When replacing the sensor, be sure to replace the mark with the attached certification mark.

(5) Others
● Optical axis and sensitivity is fixed.
● To ensure suitable operation according to the detection target, install the product at the appropriate position.
● When the detection object such as shielding plate passes, avoid contact with the transmitter or the receiver window of optical axis.

5 CONNECTION

Example of connection with barrier relay
(Grounding is recommended to be Class D or better.)



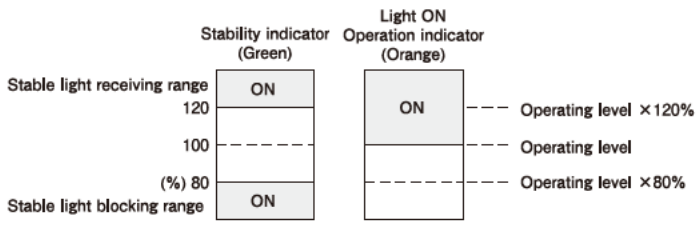
The wire color of the connectors shows that of TAKEX products.

Pin No.	Color of wire	Description
1	Brown	Power +
2	—	—
3	Blue	Power −
4	Black	Output

● For wiring work, follow the instruction manuals of the intrinsically-safe related equipment.
● It is recommended to use a terminal block in a metal junction box, which is connected to ground with IP20 protection or better (Class D grounding or better is recommended).
● Keep the insulation withstand voltage of 500 V AC or more between the intrinsically-safe circuit and the grounding, and insulation resistance of 500 V DC Megger, 10 MΩ or more.

6 INDICATOR

● Operation indicator (orange LED), stability indicator (green LED) show the following status level:



● Use a detection object to block and unblock the light beam several times to make sure that the both activation and deactivation are occurred within the stable light receiving range and the stable light blocking range.
● The orange LED is the operation indicator. Turns ON when receiving light.

7 MAINTENANCE/INSPECTION

● Perform inspection after ensuring there is no hazardous gas remained.
● Maintenance and inspection must be performed by persons having expertise in principles and functions of explosion-proof structures, with installation skills in electrical facilities, and knowledge of related laws and regulations.
● Do not inspect or exchange barrier relay (intrinsically-safe related equipment) or intrinsically-safe equipment before power is shut down.
● When replacing equipment or cables, do not restore the power until all equipment and cables are properly installed.
● Be sure to periodically confirm that the product operates properly.
● Clean plastic parts gently with a wet soft cloth.

8 SPECIFICATION

- This product is intrinsically-safe equipment (barrier sensor) which has passed equipment qualification testing.
- This product must be used in combination with intrinsically-safe equipment (barrier relay) which passes the equipment qualification testing complying with the following standards or later standards.
  - · Type examination guide for explosion-proof machinery equipment (Technical Standards Consistent with International Standards)
  - · Explosion-proof Guidelines for Electrical Facilities in Factories (Application to Technical Standards Consistent with International Standards 2006)
  - · Explosion-proof Guidelines for Electrical Facilities in Factories (Technical Guideline Consistent with International Standards 2008)

(1) Explosion-proof performance

Explosion-proof performance	Ｅｘｉａ　ⅡＢ　Ｔ４
Installation location	Hazardous area (Special hazardous area: zone 0)
Intrinsically-safe circuit ratings	Allowable voltage(Ui) : 13.7V／Allowable current(Ii) : 72.9mA／Allowable power(Pi) : 250mW
Internal capacitance (Ci)	4.5μF
Internal inductance (Li)	2.9μH
Ambient temperature (Ta)	−20℃ to +50℃

(2) Specification

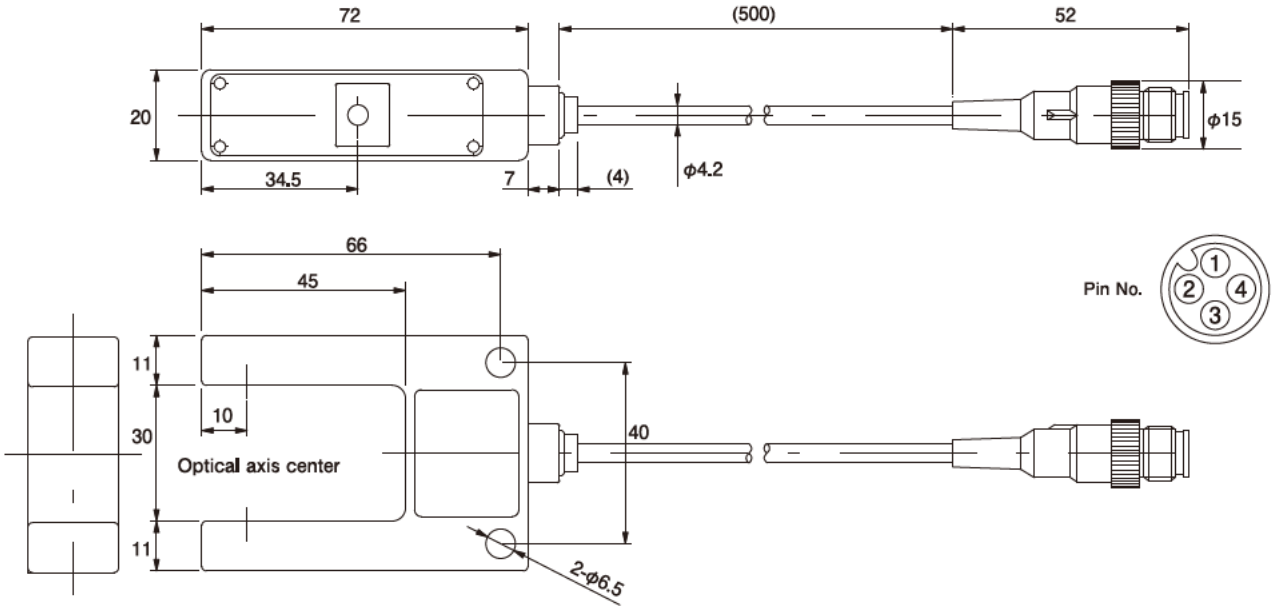
Model	XAS2−U30P
Detection method	U-shape through beam type
Detecting distance	Fixed to 30 ㎜
Detection object	Opaque object of φ2 ㎜ or more
Power voltage	Maximum voltage: 13.7 V, Minimum voltage: 6.0 V
Current consumption	14 mA or less
Output mode	NPN open collector output
Output rating	Minimum operation current: 1 mA, Maximum current depends on the intrinsically-safe related equipment (barrier relay)
Operation mode	Light ON
Response time	0.5 ms or less
Light source (wavelength)	Orange LED (624 nm)
Indicator	OP.L: Operation indicator (orange LED), STD: Stability indicator (green LED)
Protection function	Protection against power reversed connection
Material	Case: Zinc die cast
Connection method	Attached cable with connector (4.2 ㎜ o.d.) 0.22 ㎟ x 4-core: 0.5 m, Outer sheath: light blue, M12 connector 4-pin
Weight	Approx. 230g
Accessories	Instruction manual (ABH-HS-0136), certification mark

(3) Environmental specification

Ambient light	5,000 lx or less
Ambient temperature	−20 to +50 ℃　−40 to +70 ℃ at storage (Non-freezing)
Ambient humidity	35 to 85 % RH (Non-condensing)
Protection rating	IP44
Anti-vibration	10 to 55 Hz　Double amplitude 1.5 ㎜　X, Y, Z directions　2 hour each
Impact resistance	100 m/s²　X, Y, Z directions　3 times for each
Withstand voltage	1000 V AC　One minute　Between over-all charge circuit and the case
Insulation resistance	20MΩ or more when tested with 500VDC Megger

- Adaptable intrinsically-safe related equipment (barrier relay)
  Model: TBD series (Manufactured by TAKEX)
  For details, refer to the instruction manual of TBD series.

9 DIMENSIONS (in mm)



10 WARRANTY

The product is covered by a warranty based on the Quality Regulations of Takenaka Electronic Industrial Co., LTD. (Takenaka). Regarding the warranty, please feel free to ask any questions to Takenaka, Takex sales office or authorized distributors.

1 《Warranty period》

The warranty period is one (1) year after delivery to a designated location. This warranty does not apply to expendable supplies like batteries or relays, and products of other manufacturers which Takenaka markets.

2 《Scope of warranty》

If any defect is found during the warranty period. Takenaka will, at its option, repair or replace the defective product at the location of delivery. This warranty is void and of no effect if the product is subject to improper use or handling, improper maintenance, modification, repair made by persons not authorized by Takenaka or a lack of reasonable care. The warranty does not cover defects caused by the other product, reason including fire, flood, earthquake, lighting surge and other natural disasters.

① If the product is used inappropriately or used under inappropriate conditions that are not described in the instruction manual or specifications.
② If the defect is caused by improper maintenance, including a failure to replace consumable or periodical parts as described in the instruction manual or specifications.
③ If the defect is not directly caused by the warrantied product.
④ If the products is modified or repaired by persons not authorized by Takenaka.
⑤ If the defect is caused by rough handling, dropping, or collision after the product is delivered.
⑥ If the defect could not be predicted from a technical viewpoint at the time Takenaka made the agreement for, manufactured, or installed the product.
⑦ If the defect is caused by a natural disaster such as a fire, flood, earthquake, lightning (including a lightning surge) and so on, or an accident such as an abnormal voltage that Takenaka is not responsible for.

The warranty provided here is only for the Takenaka product and does not cover any secondary damage caused by problems related to the product.

3 《Target of Warranty》

(1) In case that the product is used in combination with other products or as a part of a system, Buyer should confirm the compatibility of the product to the application by relevant laws, decrees, standards and regulations.
(2) This product is designed and manufactured for use in general industries. This warranty does not cover the application of the product to:
① Nuclear power facilities including power station, incineration plant, public utilities including railway, vehicle and airway facilities, medical devices, amusement machines, safety devices and facilities that are governed by regulation of government or industrial organization.
② Facilities that may cause danger or serious effects on human life and assets.
③ Utilities like electricity, gas or water facilities. Facilities that are required 24 hour continuous operation.
④ Outdoor use or use in improper conditions or enviroment.
⑤ Other facilities which requires broad and detail consideration concerning safety and reliability equivalent to the above.

This warranty may cover these application in case that Takenaka is notified about the application of the product before sale and Buyer approves the compatibility and the specifications of the product by written agreemennt and / or by providing r

11 DISCLAIMER

- This product is designed to detect a presence or passage of an object. This product does not have any function to prevent accidents, death or injuries.
  Takenaka will assume no responsibility for damages or losses resulting from accidents or disasters caused by a failure of the product, complete wiring or installation or any act that does not follow the instruction manual.
- Earthquakes, lightning (including lightning surges), fires that we are not responsible for, acts or incidents aused by third parties, intentional or accidental misuse, or usage under other abnormal conditions.
- Any secondary damage caused by the usage, faulty operation, or malfunction of the product like spended operation or malfunction of a connected device or system, damage to a device, loss of profit, interruption of business, corruption or loss of memory contents, cost of restoration, etc.
- Misuse, failure related to maintenance, installation or deinstallation, or failure to follow the contents of the instruction manual.
- Any malfunction (including false alarm or lost alarm) caused by the combination with a connected device or software over that we have no control.
- The responsibility of Takenaka is limited to the extent of repair or replacement of the product. The expenses we are liable for will not exceed the original product cost.