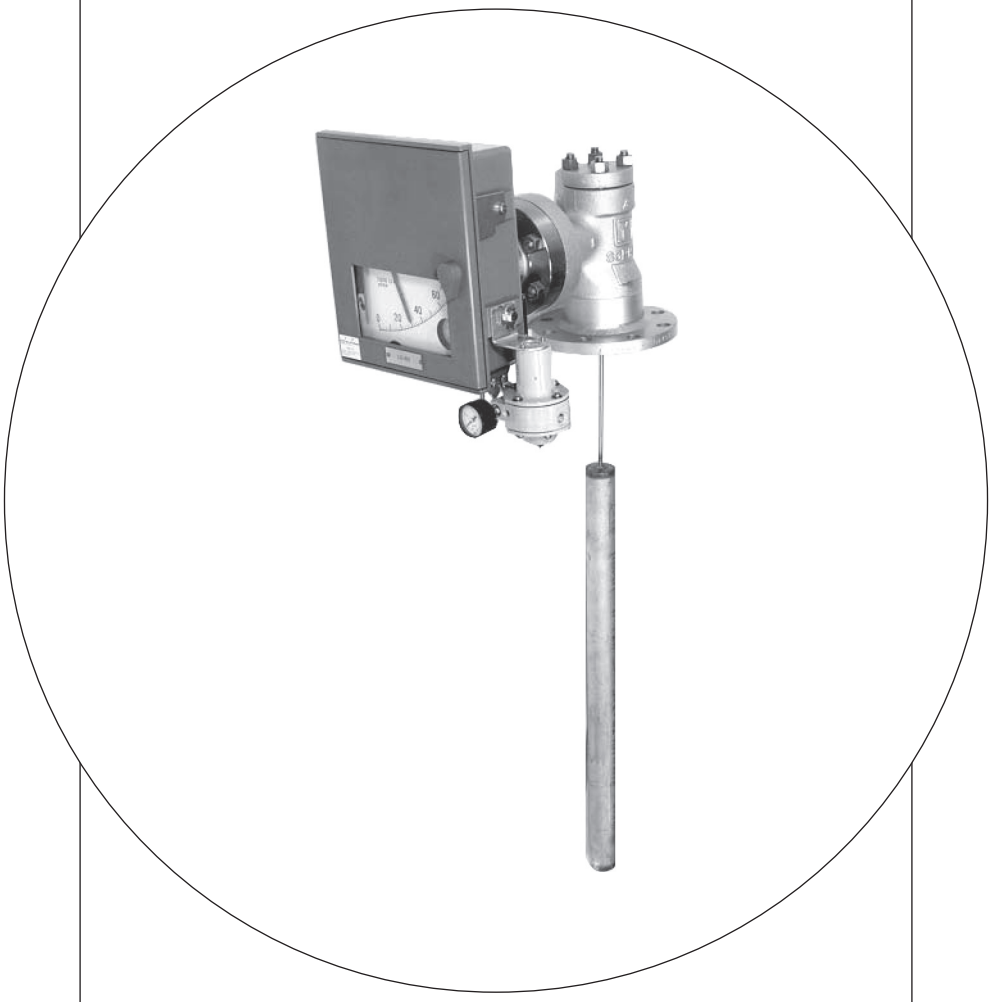
azbil

OM2-5260-2100

Liquid Level Detectors (Meter Bodies)

Model KFLB

User's Manual



Azbil Corporation

NOTICE

While the information in this manual is presented in good faith and believed to be accurate, Azbil Corporation disclaims any implied warranty of merchantability or fitness for a particular purpose and makes no express warranty except as may be stated in its written agreement with and for its customer.

In no event shall Azbil Corporation be liable to anyone for any indirect, special or consequential damages. This information and specifications in this document are subject to change without notice.

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GENERAL

1. Description

The liquid level (density) meter body is installed with flanges on the side or top of an open or closed tank. The meter body detects the top level, boundary level, or specific-gravity of liquid contained in the tank into buoyancy of a float. The buoyancy is converted into torque by a torque tube an the torque force is applied to a pneumatic signal transmitter (Model KFLB) or to a controller (Model KFL). The meter body is directly coupled to the instrument. The detecting section is comprised of a meter body, a chamber, and a bonnet.

2. Types of Meters

Type/Specific-gravity Range	Instrument Used in Conjunction	Operator's Manual Used in Conjunction
Torque tube type, medium specific-gravity range	KFLB_ _ -61	OM2-6220-0000
Torque tube type, low specific-gravity range	KFLB_ _ -62	

3. Instructions for Instrument (Transmitter or Controller) to be Used in Conjunction

Refer to the operator's manuals mentioned in Section 2. These manuals cover the operating principles, replacement procedures of service units, and calibration and adjustment procedures of the instruments.

4. Combination of Float, Bonnet, and Chamber

The float diameter and length differ by the specific-gravity range and measuring range, and the sizes of the bonnet and chamber to be used in conjunction differ accordingly.

STRUCTURE OF METER BODY

1. Torque Tube Type

1.1 General

The structure of the torque tube assembly is as shown in Fig. 1.

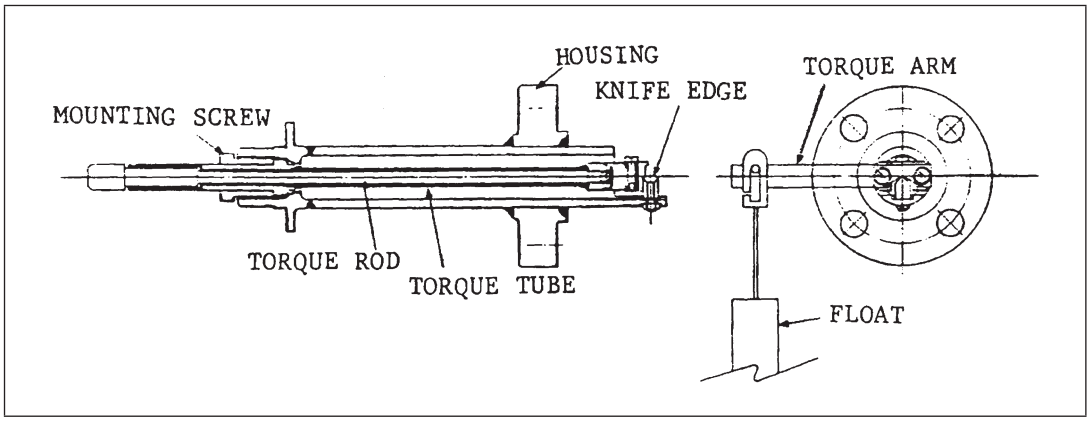

Fig. 1. Structure of the Torque Tube Assembly

1.2 Operating Principles

One end of the torque tube is fixed to the housing and the other end is coupled to a torque arm which is supported with a knife edge fulcrum. A float is hung at the end of the torque arm, keeping the torque tube constantly in a twisted state.

As the liquid level rises, a buoyancy force in the upward direction is exercised on the float. This force is fed via the torque arm and knife edge to the torque tube in the direction that its torque is reduced. The torque in the form of the rotating angle of the torque rod is fed to the transmitter.

2. High Damping Type

2.1 General

The structure of the meter body is as shown in Fig. 2.

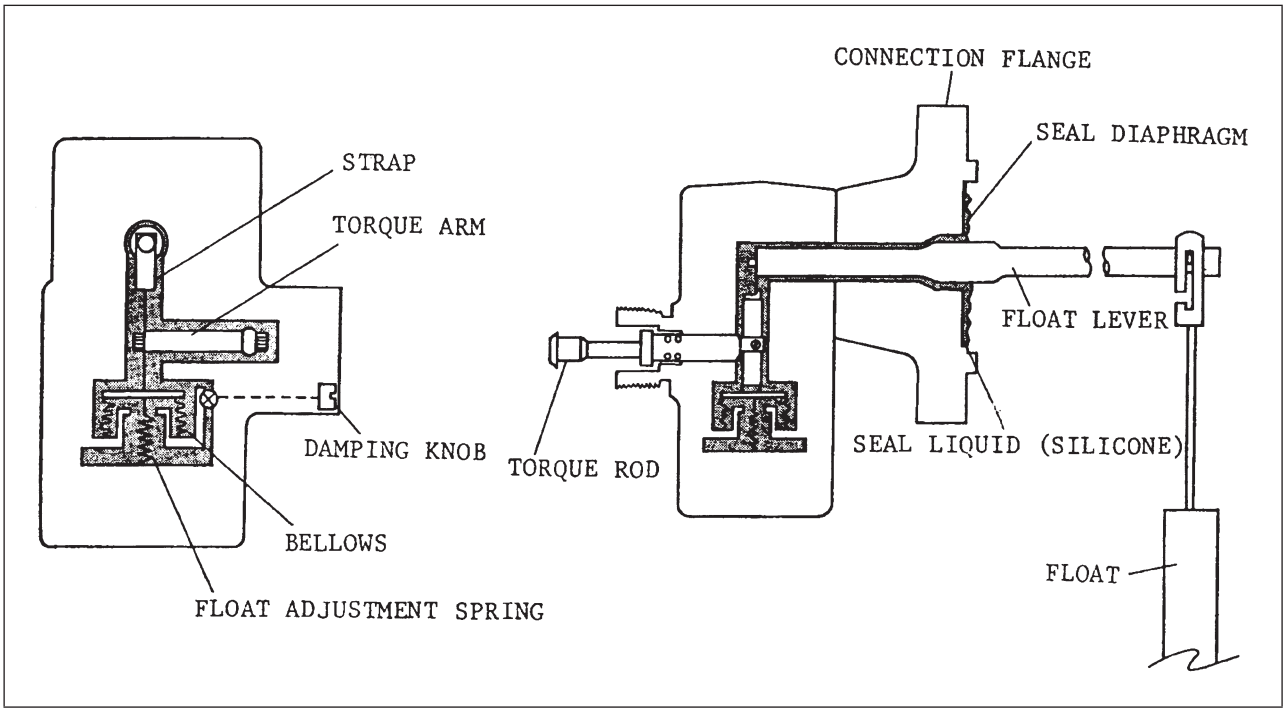

Fig. 2. Structure of the Meter Body

2.2 Operating Principles

As the liquid level rises, the upward buoyancy force exercised on the float increases. This force is fed via the float lever and diaphragm to the strap in the downward direction. Then the force is fed via the torque arm, in the form of the rotary angle of the torque rod, to the transmitter.

A bellows and a spring is connected to the strap. The bellows has two chambers, which are filled with seal liquid and are connected with a restriction for damping adjustment. The spring balances out the weight of the float so that no excessively large force is applied to the torque tube.

INSTALLATION METHOD

1. External Chamber Type

The float chamber must be installed in such manner that, as the liquid level in the tank changes for the full measuring range, that in the float chamber also changes for the full measuring range. The connection method between the tank and the float chamber is as shown in Fig. 4A. It is most recommendable to provide stop valves in the connection pipes between the tank and the float chamber in order that the float chamber can be completely isolated from the tank for calibration and maintenance service.

When the liquid level changes very rapidly, it is recommendable to provide an oscillation prevention restriction in the pipe which connects the tank to the float chamber.

It also is recommendable to provide a drain valve at the bottom of the float chamber so that the liquid level in the float chamber is readily adjustable for instrument calibration.

The float chamber and the connecting pipes should be protected with heat insulator when there is a possibility of increase in viscosity of the measured liquid in the float chamber due to cooling or when heat loss is required to be prevented.

2. Internal Chamber Type *

The internal type of float should be installed as shown in Fig. 4B. When there is a possibility of agitation of the measured liquid, side plates or guide plates should be provided as shown in Fig. 4B. in order to prevent sway of the float.

*Note: For the side mount type, the flange section is delivered with a protector fixed with two sets of bolts and nuts. Remove the protector before installing the flange section.

3. Tightening Torques of Chamber Flange Bolts

The sizes of bolts and the tightening torques of the bolts after replacing the gaskets with new ones should be as shown in the below table. When the flange and/or bonnet of a used instrument are removed by removing their bolts, their gaskets should be replaced with new ones. Note that leak may result if the old ones are re-used.

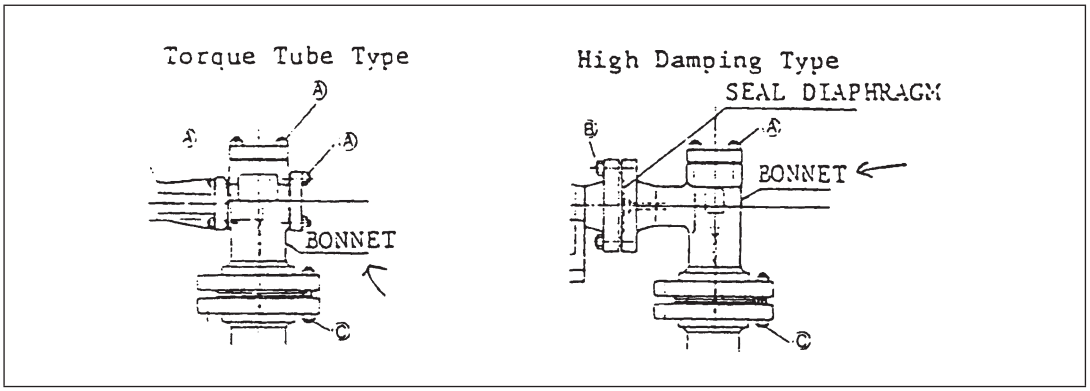

Fig. 3. Flange Section

	Bolt Size		Tightening Torque (N·m)
A		M14	130±20 {1326±204 kgf·cm}
B	300 or less	M14	130±20 {1326±204 kgf·cm}
	600	M20	250±20 {2549±204 kgf·cm}
C	3B, 4B 150	M16	150±20 {1530±204 kgf·cm}
	Other than the above	M20	250±20 {2549±204 kgf·cm}

4. Installing the Float

Normally *, the float is delivered separately from the instrument (including the meter body).

*Note: Except the floats which have been approved for high pressure chambers and whose lengths are not greater than 2 meters .

Of the torque tube type of instrument, the float hanger may be hung in either direction on the arm pin. Of the high damping type of instrument, however, it must be hung from the outer side.

5. Dashpot Pin

A pin is provided at the cap section of the dashpot of the transmitter beam in order to prevent leak of dashpot oil. When operating the instrument, remove the dashpot pin.

6. General Precautions

Install the instrument to the process in the direction that the instrument is positioned vertically.

The allowable ambient temperature range of the instrument is -30 to +80 degrees C. Protect the instrument within this temperature range.

The stop valves and mating flanges shown in Fig. 4 must be provided by the process side (by the customer). The instrument supplied is up to the flange of the meter body (chamber).

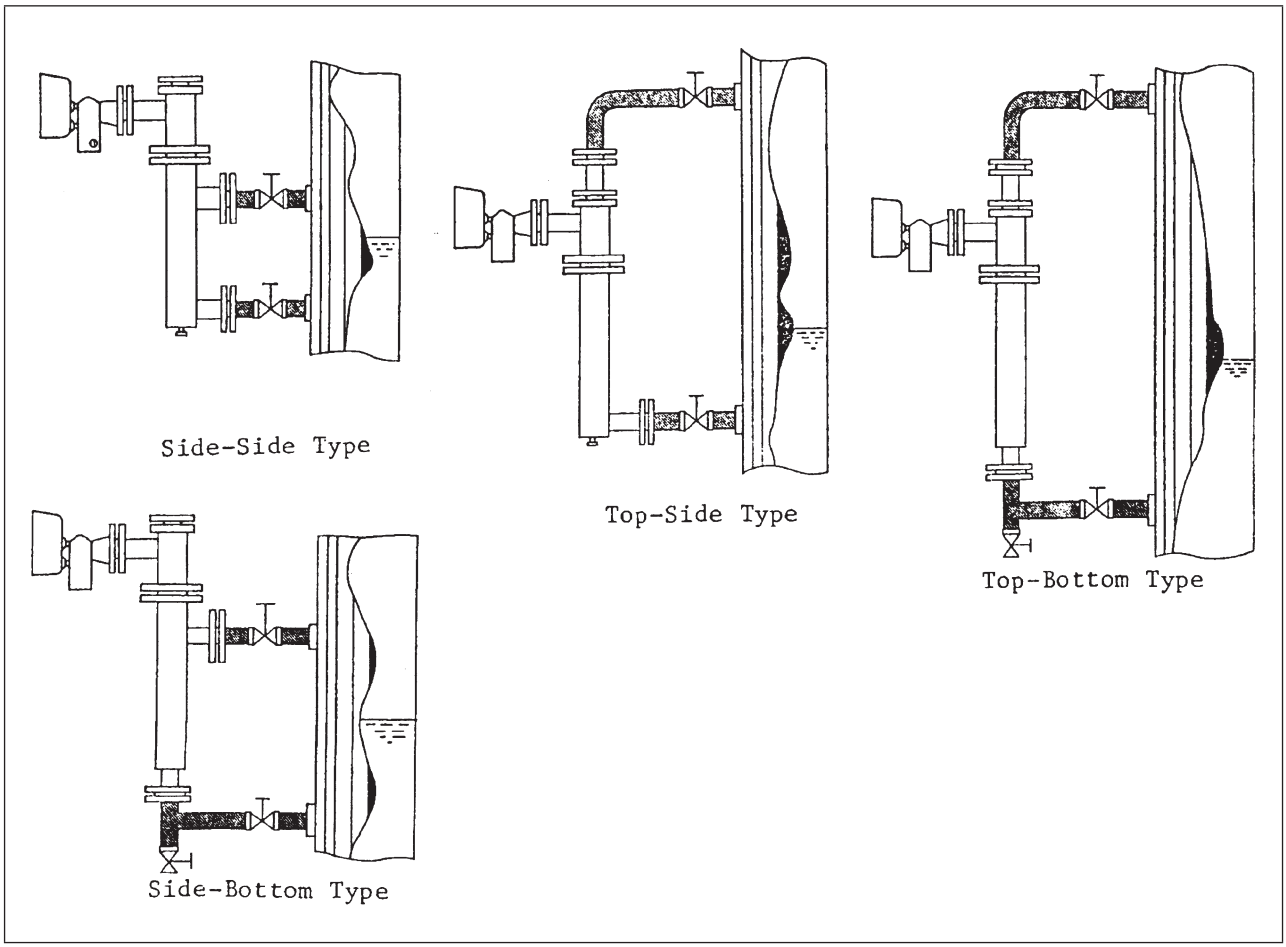

Fig. 4A. External Chamber Type

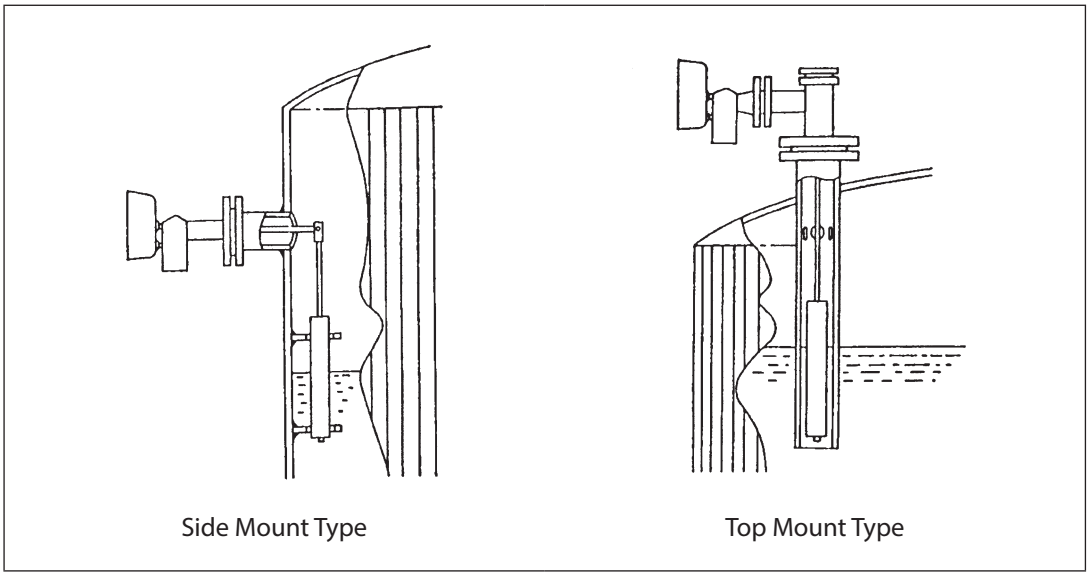

Fig. 4B. Internal Float (Chamber) Type

OPERATION AND MAINTENANCE

1. Operation

For the preparative adjustments to be rendered before starting operating the liquid level transmitter, refer to the operator's manual of the instrument.

When feeding liquid into the chamber, gradually open the valve so that no abrupt change of pressure or liquid level (including flushing) is caused.

Note: When measuring the boundary level between two liquids, the float must be completely submerged in the upper liquid.

2. Maintenance

The instrument should be carefully serviced when the process is in pause as the instrument cannot be readily serviced when the process is in operation.

So far as the instrument (meter body) is operated in the specified conditions, it will not be corroded or damaged and it will require no particular service.

Note: When the float is damaged by abnormal pressures or by corrosion, it should be immediately replaced.

Sediment collected at the bottom of the float chamber can be eliminated by draining out. If sediment cannot be completely removed by draining alone, clean the inside of the chamber employing steam or other means as follows:

(a) Close the stop valves of the top and bottom connecting pipes between the tank and the float chamber.
(b) Carefully disconnect the meter body from the float by removing the bolts and nuts which connect the meter body to the bonnet, exercising care so that no abnormally large force is applied to the torque arm.
(c) Disconnect the bonnet by removing the bolts and nuts which connect the bonnet to the chamber.
(d) Disconnect the chamber from the connecting pipes and clean the insides of the bonnet and chamber.
(e) To assemble the instrument, follow the above procedure in the reverse order, referring to the instructions given in Section "INSTALLATION METHOD."

Terms and Conditions

We would like to express our appreciation for your purchase and use of Azbil Corporation's products.

You are required to acknowledge and agree upon the following terms and conditions for your purchase of Azbil Corporation's products (system products, field instruments, control valves, and control products), unless otherwise stated in any separate document, including, without limitation, estimation sheets, written agreements, catalogs, specifications and instruction manuals.

1. Warranty period and warranty scope

   1.1 Warranty period

   Azbil Corporation's products shall be warranted for one (1) year from the date of your purchase of the said products or the delivery of the said products to a place designated by you.

   1.2 Warranty scope

   In the event that Azbil Corporation's product has any failure attributable to azbil during the aforementioned warranty period, Azbil Corporation shall, without charge, deliver a replacement for the said product to the place where you purchased, or repair the said product and deliver it to the aforementioned place. Notwithstanding the foregoing, any failure falling under one of the following shall not be covered under this warranty:

   (1) Failure caused by your improper use of azbil product (noncompliance with conditions, environment of use, precautions, etc. set forth in catalogs, specifications, instruction manuals, etc.);
   (2) Failure caused for other reasons than Azbil Corporation's product;
   (3) Failure caused by any modification or repair made by any person other than Azbil Corporation or Azbil Corporation's subcontractors;
   (4) Failure caused by your use of Azbil Corporation's product in a manner not conforming to the intended usage of that product;
   (5) Failure that the state-of-the-art at the time of Azbil Corporation's shipment did not allow Azbil Corporation to predict; or
   (6) Failure that arose from any reason not attributable to Azbil Corporation, including, without limitation, acts of God, disasters, and actions taken by a third party.

   Please note that the term "warranty" as used herein refers to equipment-only-warranty, and Azbil Corporation shall not be liable for any damages, including direct, indirect, special, incidental or consequential damages in connection with or arising out of Azbil Corporation's products.

2. Ascertainment of suitability

   You are required to ascertain the suitability of Azbil Corporation's product in case of your use of the same with your machinery, equipment, etc. (hereinafter referred to as "Equipment") on your own responsibility, taking the following matters into consideration:

   (1) Regulations and standards or laws that your Equipment is to comply with.
   (2) Examples of application described in any documents provided by Azbil Corporation are for your reference purpose only, and you are required to check the functions and safety of your Equipment prior to your use.
   (3) Measures to be taken to secure the required level of the reliability and safety of your Equipment in your use
   Although azbil is constantly making efforts to improve the quality and reliability of Azbil Corporation's products, there exists a possibility that parts and machinery may break down. You are required to provide your Equipment with safety design such as fool-proof design,*1 and fail-safe design*2 (anti-flame propagation design, etc.), whereby preventing any occurrence of physical injuries, fires, significant damage, and so forth. Furthermore, fault avoidance,*3 fault tolerance,*4 or the like should be incorporated so that the said Equipment can satisfy the level of reliability and safety required for your use.

   *1. A design that is safe even if the user makes an error.
   *2. A design that is safe even if the device fails.
   *3. Avoidance of device failure by using highly reliable components, etc.
   *4. The use of redundancy.

3. Precautions and restrictions on application

   3.1 Restrictions on application

   Please follow the table below for use in nuclear power or radiation-related equipment.

	Nuclear power quality*5 required	Nuclear power quality*5 not required
Within a radiation controlled area*6	Cannot be used (except for limit switches for nuclear power*7)	Cannot be used (except for limit switches for nuclear power*7)
Outside a radiation controlled area*6	Cannot be used (except for limit switches for nuclear power*7)	Can be used

   *5. Nuclear power quality: compliance with JEAG 4121 required
   *6. Radiation controlled area: an area governed by the requirements of article 3 of "Rules on the Prevention of Harm from Ionizing Radiation," article 2 2 4 of "Regulations on Installation and Operation of Nuclear Reactors for Practical Power Generation," article 4 of "Determining the Quantity, etc., of Radiation-Emitting Isotopes,"etc.
   *7. Limit switch for nuclear power: a limit switch designed, manufactured and sold according to IEEE 382 and JEAG 4121.

   Any Azbil Corporation's products shall not be used for/with medical equipment.

   The products are for industrial use. Do not allow general consumers to install or use any Azbil Corporation's product. However, azbil products can be incorporated into products used by general consumers. If you intend to use a product for that purpose, please contact one of our sales representatives.

   3.2 Precautions on application

   you are required to conduct a consultation with our sales representative and understand detail specifications, cautions for operation, and so forth by reference to catalogs, specifications, instruction manual, etc. in case that you intend to use azbil product for any purposes specified in (1) through (6) below. Moreover, you are required to provide your Equipment with fool-proof design, fail-safe design, anti-flame propagation design, fault avoidance, fault tolerance, and other kinds of protection/safety circuit design on your own responsibility to ensure reliability and safety, whereby preventing problems caused by failure or nonconformity.

(1) For use under such conditions or in such environments as not stated in technical documents, including catalogs, specification, and instruction manuals
(2) For use of specific purposes, such as:
    * Nuclear energy/radiation related facilities
      [When used outside a radiation controlled area and where nuclear power quality is not required]
      [When the limit switch for nuclear power is used]
    * Machinery or equipment for space/sea bottom
    * Transportation equipment
      [Railway, aircraft, vessels, vehicle equipment, etc.]
    * Antidisaster/crime-prevention equipment
    * Burning appliances
    * Electrothermal equipment
    * Amusement facilities
    * Facilities/applications associated directly with billing
(3) Supply systems such as electricity/gas/water supply systems, large-scale communication systems, and traffic/air traffic control systems requiring high reliability
(4) Facilities that are to comply with regulations of governmental/public agencies or specific industries
(5) Machinery or equipment that may affect human lives, human bodies or properties
(6) Other machinery or equipment equivalent to those set forth in items (1) to (5) above which require high reliability and safety

4. Precautions against long-term use

   Use of Azbil Corporation's products, including switches, which contain electronic components, over a prolonged period may degrade insulation or increase contact-resistance and may result in heat generation or any other similar problem causing such product or switch to develop safety hazards such as smoking, ignition, and electrification. Although acceleration of the above situation varies depending on the conditions or environment of use of the products, you are required not to use any Azbil Corporation's products for a period exceeding ten (10) years unless otherwise stated in specifications or instruction manuals.

5. Recommendation for renewal

   Mechanical components, such as relays and switches, used for Azbil Corporation's products will reach the end of their life due to wear by repetitious open/close operations.

   In addition, electronic components such as electrolytic capacitors will reach the end of their life due to aged deterioration based on the conditions or environment in which such electronic components are used. Although acceleration of the above situation varies depending on the conditions or environment of use, the number of open/close operations of relays, etc. as prescribed in specifications or instruction manuals, or depending on the design margin of your machine or equipment, you are required to renew any Azbil Corporation's products every 5 to 10 years unless otherwise specified in specifications or instruction manuals. System products, field instruments (sensors such as pressure/flow/level sensors, regulating valves, etc.) will reach the end of their life due to aged deterioration of parts. For those parts that will reach the end of their life due to aged deterioration, recommended replacement cycles are prescribed. You are required to replace parts based on such recommended replacement cycles.

6. Other precautions

   Prior to your use of Azbil Corporation's products, you are required to understand and comply with specifications (e.g., conditions and environment of use), precautions, warnings/cautions/notices as set forth in the technical documents prepared for individual Azbil Corporation's products, such as catalogs, specifications, and instruction manuals to ensure the quality, reliability, and safety of those products.

7. Changes to specifications

   Please note that the descriptions contained in any documents provided by azbil are subject to change without notice for improvement or for any other reason. For inquires or information on specifications as you may need to check, please contact our branch offices or sales offices, or your local sales agents.

8. Discontinuance of the supply of products/parts

   Please note that the production of any Azbil Corporation's product may be discontinued without notice. After manufacturing is discontinued, we may not be able to provide replacement products even within the warranty period.

   For repairable products, we will, in principle, undertake repairs for five (5) years after the discontinuance of those products. In some cases, however, we cannot undertake such repairs for reasons, such as the absence of repair parts. For system products, field instruments, we may not be able to undertake parts replacement for similar reasons.

9. Scope of services

   Prices of Azbil Corporation's products do not include any charges for services such as engineer dispatch service. Accordingly, a separate fee will be charged in any of the following cases:

   (1) Installation, adjustment, guidance, and attendance at a test run
   (2) Maintenance, inspection, adjustment, and repair
   (3) Technical guidance and technical education
   (4) Special test or special inspection of a product under the conditions specified by you

   Please note that we cannot provide any services as set forth above in a nuclear energy controlled area (radiation controlled area) or at a place where the level of exposure to radiation is equivalent to that in a nuclear energy controlled area.

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