

Warranty included

# Instruction Manual

For Gas Management & Control

## Turbine Gas Meter

TBZ60~TBZ300



Thank you for purchasing this product. Please read through this instruction manual carefully and use the product properly. The warranty is printed on the back cover. Please review the content and keep it for future reference.



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## 1 Instructions for safe and proper use

For proper use of the turbine gas meter for management and control, this instruction manual contains various pictograms intended to prevent injuries to you and other people or damage to property. Those pictograms and their meanings are listed below. Please understand the details before reading the body text.

Indication	Meaning	Page
 <b>Danger</b>	Failure to follow this instruction may pose an imminent risk of death or serious injury of the user.	None
 <b>Warning</b>	Failure to follow this instruction may pose a risk of death or serious injury of the user.	None
 <b>Caution</b>	Failure to follow this instruction may pose a risk of injury of the user or damage to property.	2

<p>The meanings of the pictograms are as follows:</p>						
	General caution	Do not touch	General prohibition	Do not disassemble	No fire	Do
Pages	2•4•9•11	-	2•4	2	-	2•3•4

## 2 Particular safety precautions. Please be sure to observe the following for safety.



### Caution

#### 1. Do not install the product at a dangerous place.



Do Not

The electric circuits in this turbine meter do not have an anti-explosion structure.

#### 2. Do not use this product for the measurement of corrosive gases or the gases listed below.



Do Not

It may corrode parts in use or cause a leakage of gas. In addition, the measurements can be inaccurate.

Toxic gases	Chlorine, hydrogen cyanide, nitrogen dioxide, fluorine
	Hydrogen chloride, boron trifluoride, boron dioxide
	Sulfur dioxide, hydrogen fluoride, hydrogen sulfide
Others	Ammonia, chlorine dioxide, oxygen, hydrogen, helium

Depending on the property of the gas to be measured, the meter may become deteriorated in performance or damaged. Contact us before measuring a special gas.

#### 3. Do not give an impact to the meter.



Do Not

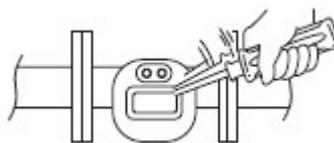


As a precision measuring instrument, do not give a strong impact to hit the meter with an object. Do not insert a cylindrical object into the meter. It may cause a leakage of gas or damage.

#### 4. Do not disassemble the meter.



Do not disassemble

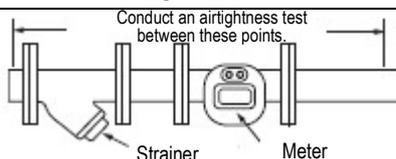


As a precision measuring instrument, do not disassemble it. It may cause a leakage of gas.

#### 5. Conduct an airtightness test to the installed meter, including the pipes located prior and subsequent to it.



Do



When a leakage occurs at a pressure 1.5 times larger than the allowable working pressure.

#### 6. Disposable after use



Do

This product contains a lithium battery, and therefore be sure not to dispose it in the general disposal route.

Be sure not to put this product into fire. It may cause fire and/or explosion.

Since the flow meter is made by putting metals and resin parts together, it must be discarded as industrial waste.

### 3 For proper use

1. Be sure that the gas the customer is going to use agrees with the specifications shown on the nameplate.



Check

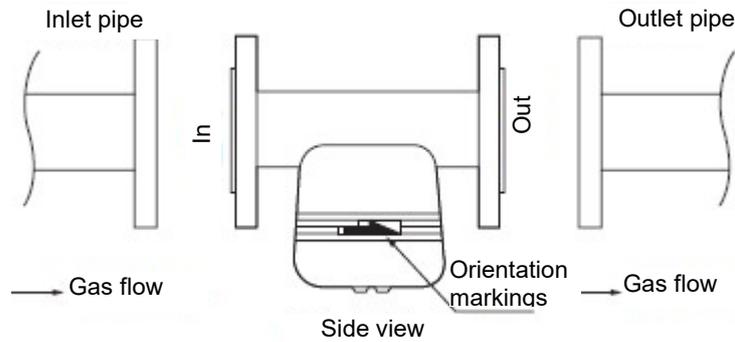
Model	TBZ150-3.5-N	
Range	12.5 ~ 150m <sup>3</sup> /h	
Max. Pressure	350kPa	(K670467)
Temperature	-10 ~ 60°C	
Standard point	0.0°C	0.0Pa
Output A [B]	0.10m <sup>3</sup> /P [461.6cm <sup>3</sup> /P]	
Pulse width [B]	40ms	
Date	'06-09	
Serial No.	0002397	
Aichi tokei denki co., Ltd.		

- Model
- Flow rate range
- Maximum working pressure (Pressure Sensor No.)
- Operating temperature range
- Standard point (Corrected temperature, corrected pressure)
- Output pulse unit
- Corrected pulse [Uncorrected pulse]
- Output pulse width
- Year / month of manufacturing
- Serial number

2. The orientation markings on the main body of the meter must be the same as the direction of the gas flow.



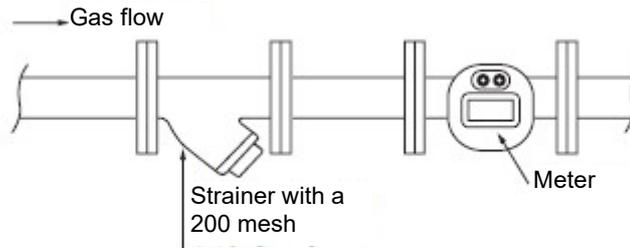
Do



3. A strainer must be installed upstream from the meter.



Do

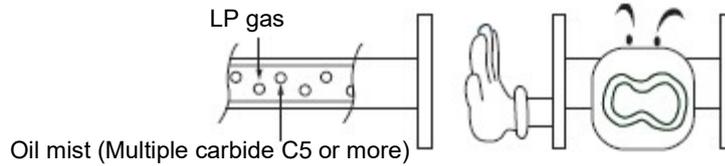


**4. Do not install the meter at a place where oil mist or powder of dust is wafting.**

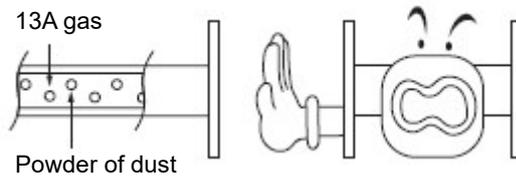


Caution

1. When this product is applied to LP gas using a vaporizer (petroleum gas), oil mist in the pipe (adhesive material caused by reliquefaction) may cause an abnormality in the rotating part and hinder accurate measurement.



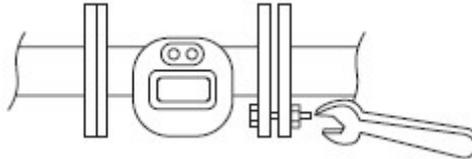
2. The powder of dust (foreign particles) in the pipes may cause a failure in the rotating part, hindering accurate measurement.



**5. Do not tighten the flange-stuffing nuts too strong when installing the meter.**



Do Not

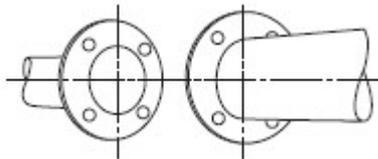


Fasten all the nuts softly before tighten them in an even, crisscross pattern.

**6. When connecting the meter to a counter pipe, align the centers.**



Do

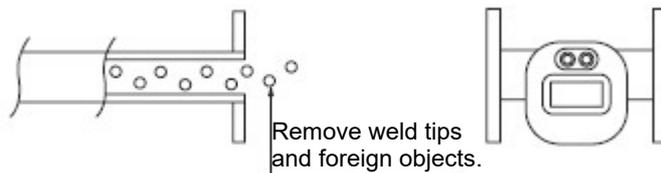


Use caution not to cause an eccentricity, inclination, or twist.  
Do not apply an excessive stress loading to the main body of the meter.

**7. When using newly installed pipes, purge the pipes for removing foreign objects before installing the meter.**



Do

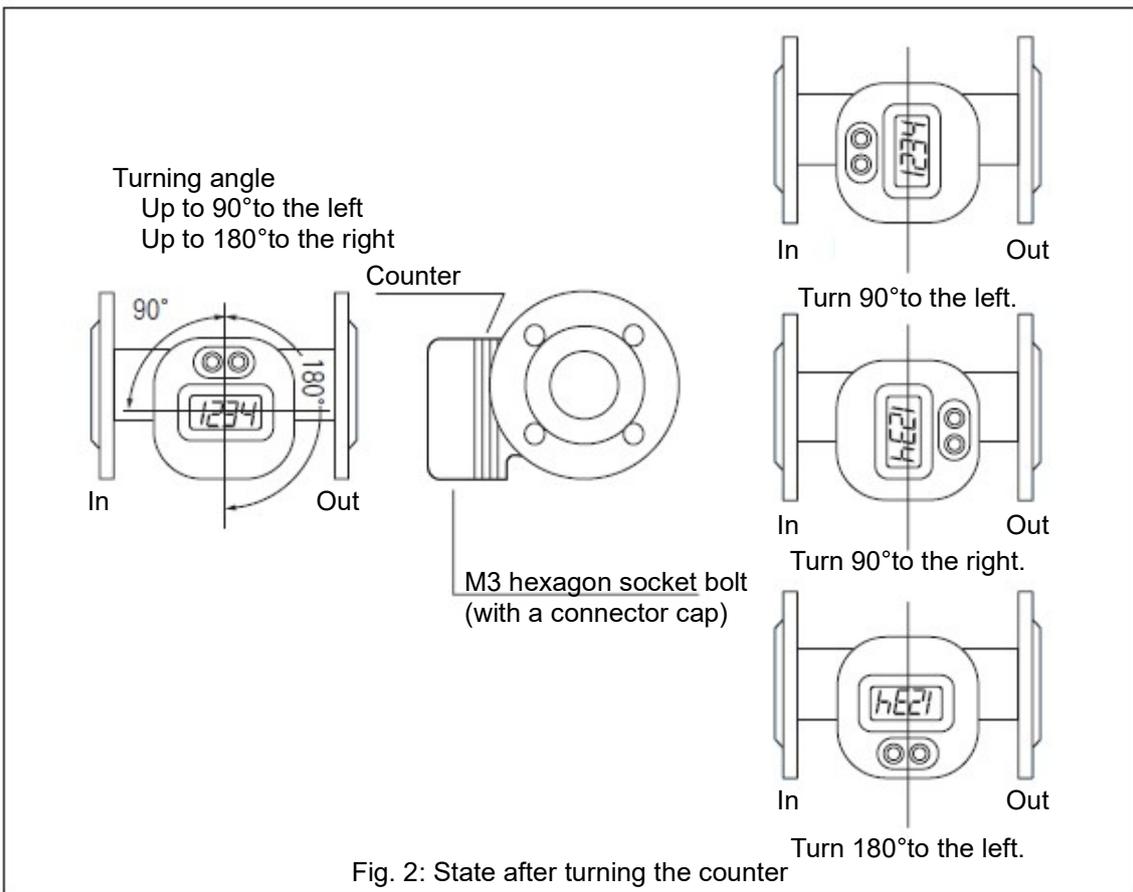
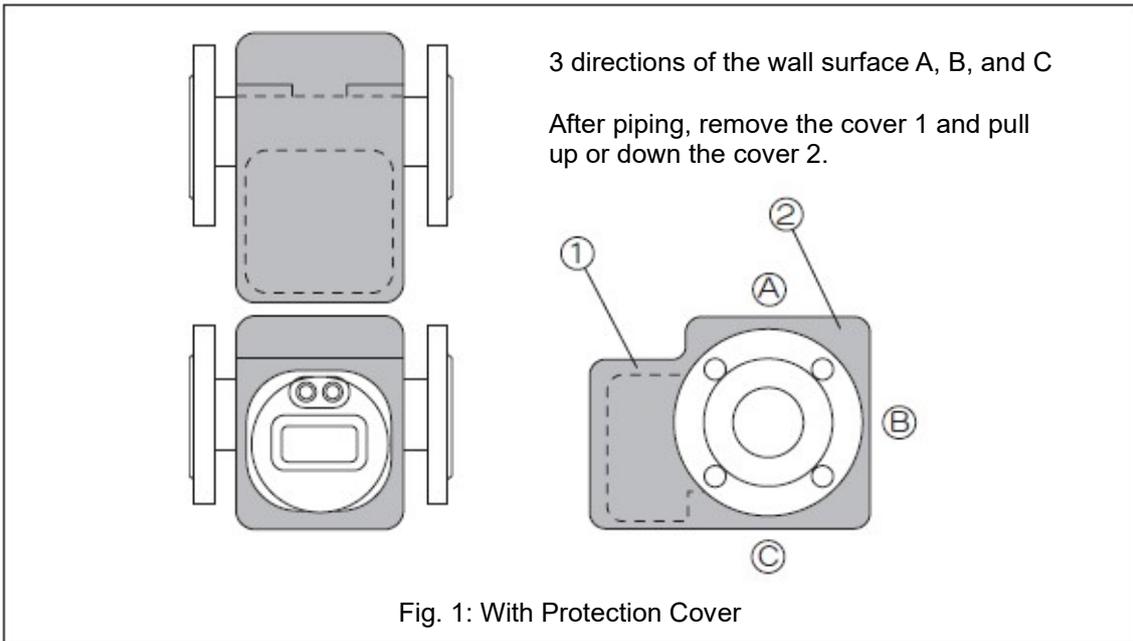


Remove weld tips and foreign objects.

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## 4 Instructions for installation and piping work

1. This turbine meter is designed with splash-proof and may be installed outdoors (under the eaves).
2. This turbine meter can be used with both horizontal pipes and vertical pipes. Install it in the middle of a straight pipe section.
3. Do not install this turbine meter at a place where liquid such as oil or water may accumulate.
4. Install a strainer (200 mesh) upstream from this turbine meter (see page 3).
5. Do not install this turbine meter at a place where oil mist or powder of dust is wafting. It may cause a failure in the rotating part, hindering accurate measurement (see page 4).
6. Do not install this turbine meter to equipment that generates pulsatory motion, such as a gas engine. The measurement will be inaccurate.
7. Straight pipes having a length of 10D (i.e. 10 times the pipe diameter) or greater must be provided prior and subsequent to this turbine meter.
8. Use caution not to let foreign objects such as weld tips, foreign objects, and sealant enter during the installation of pipes. (See P.4)
9. Do not install this turbine meter at a place where it is subjected to an impact pressure.
10. Place noise sources, such as a control device of electromagnetic valves and output signal lines, one to two meters away from the meter main body and the output signal line.
11. This product will set stand in three directions as shown in Fig. 1 of the protection covers provided on the display in packing, so it can be easily set without adjustment when the dimensions from the floor level are fit. To protect the display, the protection covers should not be removed until installation is completed.
12. The meter can be set in any direction against pipes.  
The counter can be rotated by loosening the screws (M3 hexagon socket bolts with a connector cap) at the lower part of the display about 4 mm (turn 8 times). The product shipped from the factory (Left inlet) can be changed to Right inlet, Top inlet, or Bottom inlet by turning 180° to the right, 90° to the left, or 90° to the right, respectively. After turning the counter 90°, fasten the screws to fix it. (See Fig.2)



## 5 Names and functions of the display

### Changeover switch 1

The display screen changes in the following order each time the switch is pressed.

- Type with correction function

A corrected integrated flow rate (\*1) → corrected trip flow rate (\*2) → uncorrected integrated flow rate (\*1) → corrected integrated flow rate (\*1)

- Type without correction function

Uncorrected integrated flow rate (\*1) → Uncorrected trip flow rate (\*2) → Uncorrected integrated flow rate (\*1)

\*1: The screen will change to the internal setting display mode when the changeover switch 1 is kept pressed for at least 3 seconds while (\*1) is displayed, and internal setting values are displayed in the following order each time the changeover switch is pressed. Note that internal settings cannot be changed. To return to the normal display mode, when the changeover switch 1 is kept pressed for at least 3 seconds or when no switch is pressed during 30 seconds or more.

Display order	Display item	Display order	Display item
(1)	Pulse constant	(7)	Pressure sensor characteristics 0%
(2)	Output pulse unit	(8)	Pressure sensor characteristics 50%
(3)	Standard pressure	(9)	Pressure sensor characteristics 100%
(4)	Standard temperature	(10)	Serial No
(5)	5V supply voltage	(11)	Pulse width
(6)	Pressure sensor No.		

\*2: Trip flow rate can be reset to zero when the changeover switch 1 is kept pressed for at least 3 seconds when (\*2) is displayed. Note that that trip flow rate is not kept when the display is changed.



#### Pilot

Indicates that a gas is measured when it is flowing.

Integrated flow rate display, trip flow rate display

Instantaneous flow rate display, pressure display, temperature display

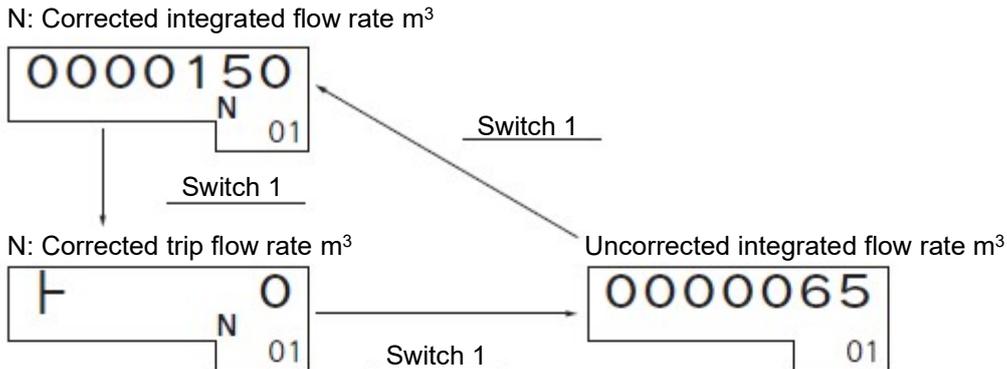
#### Changeover switch 2

The display screen changes in the following order each time the switch is pressed.

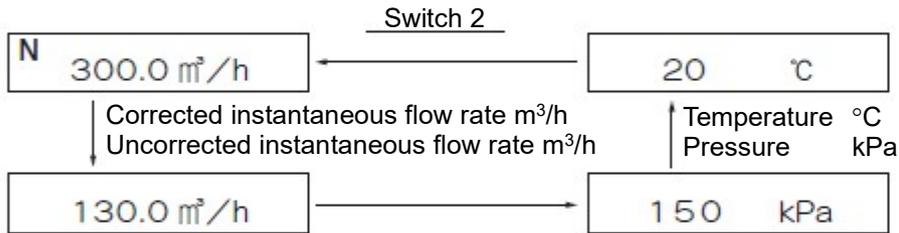
- Correction of temperature and pressure  
Corrected instantaneous flow rate →  
Uncorrected instantaneous flow rate →  
Supply pressure → Supply temperature  
→ Corrected instantaneous flow rate
- Correction of only pressure  
Corrected instantaneous flow rate →  
Uncorrected instantaneous flow rate →  
Supply pressure → Corrected  
instantaneous flow rate

**Corrected flow rate type (with temperature / pressure correction)**

- N: Base conditions represent standard state (normal correction).
- S: Base conditions do not represent standard state (normal correction) but are corrected with arbitrary conditions.



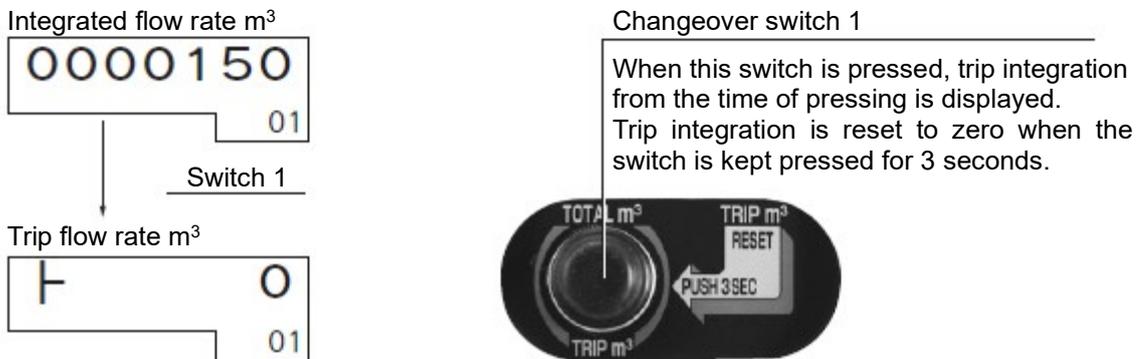
Integration is going on regardless of the display and is never reset.  
 Blinking of the most significant digit of the integrated / trip / uncorrected integrated flow rate represents a battery running-down alarm.



When the pressure unit display "kPa" blinks, it is warning an excessive pressure beyond the maximum working pressure.  
 When the temperature unit display "°C" blinks, it is warning a temperature out of the operating temperature range.

**Actual flow rate type (without temperature / pressure correction)**

Provided with only the switch for change-over between integrated flow rate and trip flow rate.



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## 6 Instructions for the beginning of use

1. Open the inflow valve (upstream from the meter) gradually.
2. Open the outflow valve (downstream from the meter) gradually.  
Check that the pilot is blinking.
3. Change the indicator display of the meter to an instantaneous flow rate value, and then adjust the valve so that the flow rate value is in the specified range.
4. Change to pressure display to check predetermined pressure.
5. Use the meter in the normal mode with the integrated flow rate display.

## 7 Instructions for inspection



Caution

Depending on the gas to be measured, installation environment, and use conditions, the performance of the meter can rapidly deteriorate. Periodically check the meter at the appropriate times in accordance with your usage conditions.

1. When the pilot does not blink in spite of the presence of a gas flow, detach the meter from the pipes and then gently blow air into the inlet of the meter to check whether or not the pilot on the indicator blinks. If the pilot does not blink, check whether or not foreign objects adhere to inside the meter. Remove such objects as necessary.
  - a. Foreign objects on the rim of the impeller can be removed by giving a light impact on the body.
  - b. Due to the structural restrictions, it would not be possible to restore a meter that has an adherent such as sealant that cannot be removed on-site. In such a case, you will need to purchase a new one (i.e. the meter is not repairable).
2. If the foreign objects can be removed, blow air into the inlet again. When the pilot blinks, the meter is now properly working.
3. When the most significant digit of the integrated flow rate display is blinking, it is warning that the battery is running down. It is recommended that the meter should be replaced immediately.

## 8 Specifications

This product consists of the corrected flow rate model and the actual flow rate model.

Basic models		TBZ60		TBZ150		TBZ300		
Model name	Corrected flow rate model (with temperature and pressure correction)	TBZ60-3.5	TBZ60-9.9	TBZ150-3.5	TBZ150-9.9	TBZ300-0	TBZ300-3.5	TBZ300-9.9
	Actual flow rate model (without temperature and pressure correction)		TBZ60-0		TBZ150-0			TBZ300-0
Operating flow rate range *1		6~60m <sup>3</sup> /h		12.5~150m <sup>3</sup> /h		30~300m <sup>3</sup> /h		
Maximum working pressure *2		350 kPa	980 kPa	350 kPa	980 kPa	980 kPa	350 kPa	980 kPa
Accuracy	Flow rate measuring part	±1% FS and ±3% RS						
	Computation / temperature and pressure correction part *3	±2%RS max	±3%RS max	±2%RS max	±3%RSmax	±2%RSmax		±3%RSmax
Display	Corrected integrated flow rate (only the corrected flow rate model)	Large LCD 9 digits		Minimum reading 10L		Minimum reading 100L		
	Trip flow rate *4	Large LCD 8 digits		Minimum reading 10L				
	Uncorrected integrated flow rate	Large LCD 9 digits		Minimum reading 10L				
	Corrected instantaneous flow rate (only the corrected flow rate model)	Large LCD 4 digits		Minimum reading 0.1m <sup>3</sup> /h		Minimum reading 1m <sup>3</sup> /h		
	Uncorrected instantaneous flow rate	Large LCD 4 digits		Minimum reading 0.1m <sup>3</sup> /h				
	Temperature (only the model with temperature and pressure correction)	Large LCD 3 digits		Minimum reading 0.1°C				
	Pressure (only the corrected flow rate model)	Large LCD 3 digits		Minimum reading 1kPa				
Connection diameter		JIS10K flange 40A		JIS10K flange 50A		JIS10K flange 80A		
Operating temperature range		-10°C ~ +60°C						
Measurable gases *5		City gas, LPG, air, nitrogen, etc.						
Installation posture		Horizontal / perpendicular (also applicable to the display)						
Installation place		Outdoor / indoor *6						
Case structure		Drip-proof structure, corresponding to IP x 2 (JIS-C0920)						
Power source		Internal lithium battery						
Output signal		Open collector output, 2 lines (corrected pulse, uncorrected pulse)						
Material		Main pipe: stainless steel, Flange: steel, Display: aluminum alloy						
Temperature sensor		Platinum resistance temperature sensor, JIS Class A						
Pressure sensor		Semiconductor type pressure sensor						
Weight		5.3kg		6.0kg		9.4kg		

\*1. The operating flow rate range corresponds to the flow rate range in actual flow rate (uncorrected flow rate).

\*2. The pressure sensor consists of two types -- 3.5K (350kPa) and 9.9K (980kPa) --- and working pressure is different according to each type. The maximum working pressure of actual flow rate model (without temperature and pressure correction) is 980 kPa.

\*3. Precision in use is 20 to 350 kPa for the 3.5 k type and 150 to 980 kPa for the 9.9 k type. Not applicable to the actual flow rate model (without temperature and pressure correction).

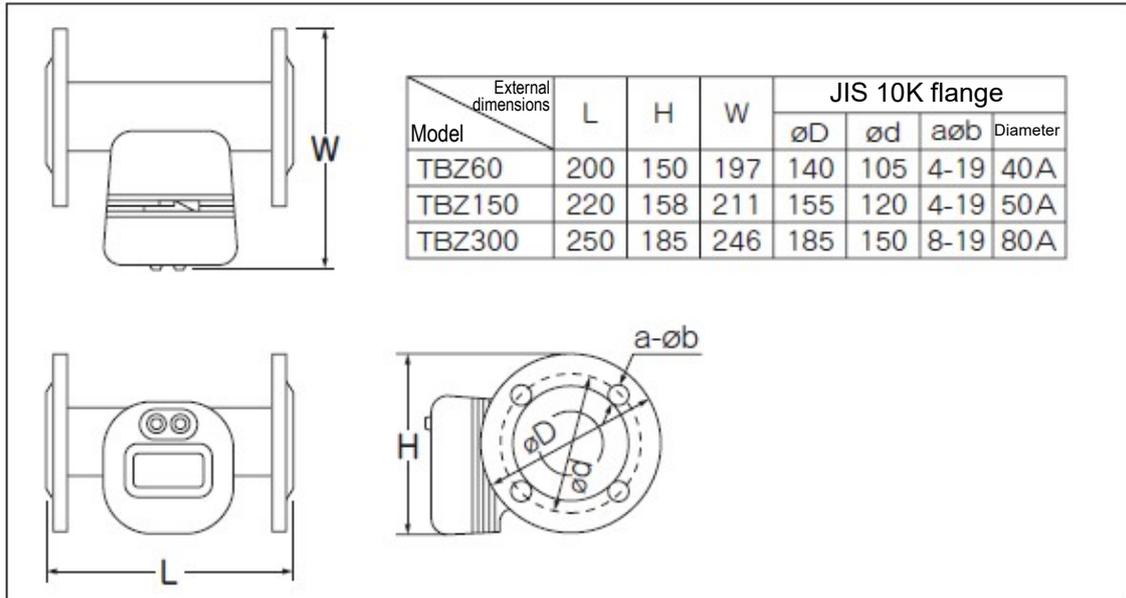
\*4. Corrected trip flow rate in the case of corrected flow rate model (with temperature and pressure correction), and uncorrected trip flow rate in the case of actual flow rate model (without temperature and pressure correction).

\*5. Prevent oil mist (multiple carbide C<sub>5</sub> or more), dust powder, etc. from entering into the meter.

\*6. In outdoor installation, avoid water from splashing on the meter.

## 9 Outside dimensions

(The corrected flow rate model has the same dimensions as the actual flow rate model.)



## 10 Service life

Name	Standard service life	Remarks
Turbine meter main body	7 years	 Caution The service life could be shortened when oil mist or powder of dust flows into the pipes or when the meter is used continuously at a rate exceeding the maximum flow rate for a long time.
Lithium battery	7 years	 Caution The battery life could be shortened when the meter is continuously used in high-temperature environments (approx. 60°C). The battery cannot be replaced.

Note: All TBZ models

Provided with the alarm function to warn running-down of the battery in about one month by blinking the most significant digit of the integrated flow rate display.

## 11 Applications

This product is available for the flow rate management and control of the following.

- Gas flow management and control of burning appliances such as burners, boilers, and furnaces.
- Gas flow management and control of small to medium size gas cooling / heating machines.
- Gas flow management and control of gas refrigerators.
- Gas flow management and control as part of plant instrumentation.
- Management of air used in the plant according to each line and control of the compressor operating time.  
(i.e. power-saving)
- Various experimental devices related to gas flow rate.

## 12 Output signal and signal line unit

This product has two lines for open collector output (\*1).

When taking out the output, use the dedicated signal line unit (TBZ-SS-B).

Attach the crimp terminal incidental to the signal line and then connect it to the terminal box.

Standard specifications

Model	Output signal type	Pulse type	Pulse unit	Pulse width (ON)	Maximum applied voltage	Maximum ON current	Maximum ON resistance
TBZ	Open collector	Corrected	100 [NL]	40 [msec]	24 [V·DC]	20 [mA]	50 [ $\Omega$ ]
	Open collector	Uncorrected	Approx. B [cm <sup>3</sup> ]	-	24 [V·DC]	10 [mA]	100 [ $\Omega$ ]
TBZ-O	Open collector	Unit pulse	100 [L]	40 [msec]	24 [V·DC]	20 [mA]	50 [ $\Omega$ ]
	Open collector	High-density pulse	Approx. B [cm <sup>3</sup> ]	-	24 [V·DC]	10 [mA]	100 [ $\Omega$ ]

Uncorrected pulse and high-density pulse are indicated on the name plate of each meter.

Model	TBZ60	TBZ150	TBZ300
B [cm <sup>3</sup> /P]	Approx. 180	Approx. 470	Approx. 920

\*1 Corrected pulse: A corrected flow rate pulse after the unit matching by an arithmetic circuit for meters with temperature and pressure correction.

Uncorrected pulse: An actual flow rate pulse that is output with one rotation of the impeller.

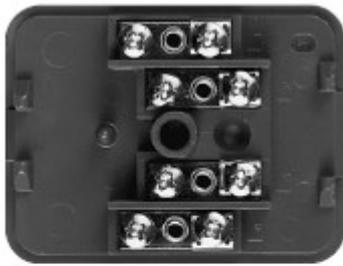
## 13 Options

### 1 Signal line unit (TBZ-SS-B)

A set of a 10-m wire with a plug for connecting the meter body with an indicator etc. and a relay terminal box.



Signal line with a plug (10 m)



Terminal box (inside)



Terminal box (outside)

#### Output signal connection method

Type of actual flow rate pulse	Unit pulse	High-density pulse
TBZ-O (actual flow rate type)	Blue    Black	Red    Black
Polarity of the terminal	+    -	+    -
Type of corrected pulse	Corrected unit pulse	Uncorrected pulse
TBZ-3.5 (correction type)	Blue    Black	Red    Black
TBZ-9.9 (correction type)	Blue    Black	Red    Black
Polarity of the terminal	+    -	+    -
Transmission method	Open collector type	
Contact capacity (Maximum rated value)	DC24V 20mA	DC24V 10mA
Maximum ON resistance	50 [ $\Omega$ ]	100 [ $\Omega$ ]

#### Standard specifications

Name	Specifications
Plug	3-core, waterproofed type
Signal line	Oilproof vinyl round cord 0.2mm <sup>2</sup> x 4C
Clamp filter *1	ZCAT3035-1330 (2 pcs)
Relay terminal box *1	For indoor communication lines, 4 terminals

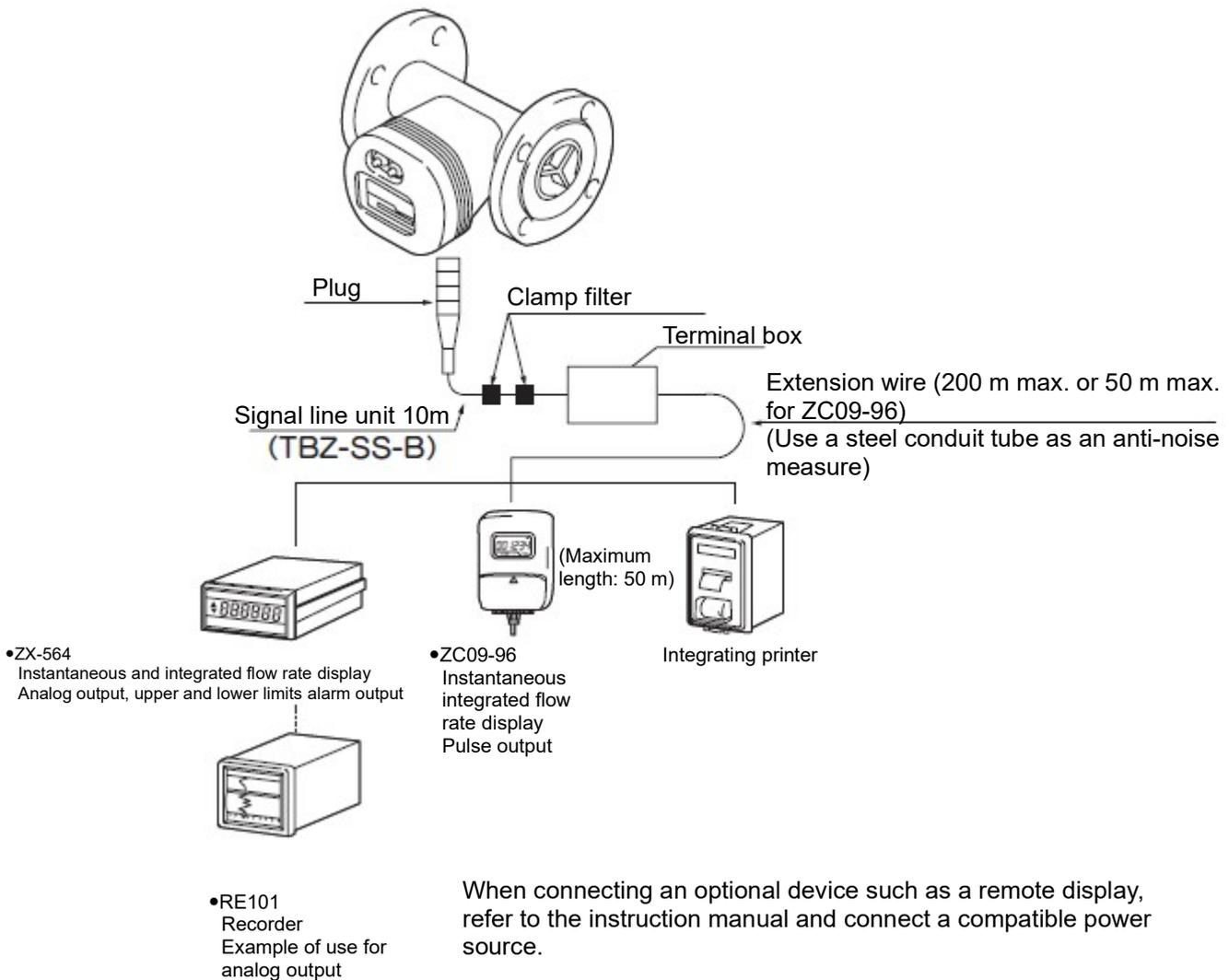
\*1 In installation, avoid an area exposed to direct sunlight or rain. Otherwise, the case may deteriorate and cause malfunction.

## 2 Remote indicator and connection

### 1) Type of remote indicators

Model	Functions	Power source
ZC09-96	Instantaneous flow rate display, integrated flow rate display, pulse output	Embedded battery
ZX-564	Instantaneous flow rate display, integrated flow rate display, pulse output, analog output, alarm output	85 to 264 VAC (free power source)
RE101	Recorder	Selectable from 100 VAC, 200 VAC, and 24 VDC

### 2) Connection diagram of the remote indicator (example)



## Warranty of the turbine gas meter for management and control

Base model names: TBZ60, TBZ150, TBZ300

This product has been delivered through strict quality control and close inspection. This warranty is to assure that this product will be replaced at no charge on the basis of the conditions described in this warranty, in the event that this product goes out of order under the customer's normal use conditions.

### Note

1. The warranty period is one year from the date of purchase, and the warranty covers only the main body. In the event that a failure occurs during the warranty period, contact us presenting this warranty.
2. This warranty will not be reissued. Retain it in a safe place.
3. Refer to the following for the provisions of this warranty.

### Provisions for free-of-charge repair

1. Aichi Tokei Denki will repair the product at no charge in the event that it goes out of order under normal use conditions in accordance with the directions in the instruction manual.
2. This warranty must be presented when you have the product that has gone out of order within the warranty period replaced at no charge.
3. Even in the warranty period, the following cases will be subject to repair with charge.
  - 1) Malfunction or damage due to an error in use or an illegal adaption
  - 2) Malfunction or damage due to the relocation of the mounting position, impact, or falling after the purchase
  - 3) Malfunction or damage due to a human-made disaster; flood damage, earthquake, lightening, or other natural disaster; pollution, or abnormal voltage
  - 4) Lack of presentation of this warranty
  - 5) Malfunction or damage due to the use of a gas out of specification
4. This warranty is valid only in Japan.

Date of purchase		___ / ___
Name of the customer		
Address		
Fill in the columns based on the nameplate.	Model	
	Serial	
Name of the gas used		

Dear customer,  
Please fill in the date of purchase, name, address, model, serial number, and name of the gas used when you receive this warranty.

1-2-70 Chitose, Atsuta-ku, Nagoya, 456-8691, JAPAN

Contact information for after sales service  
URL : <https://www.aichitokei.net>

Revised  
21.04



Preservation  
bag