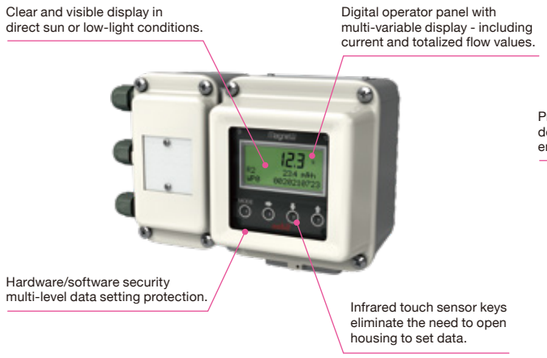
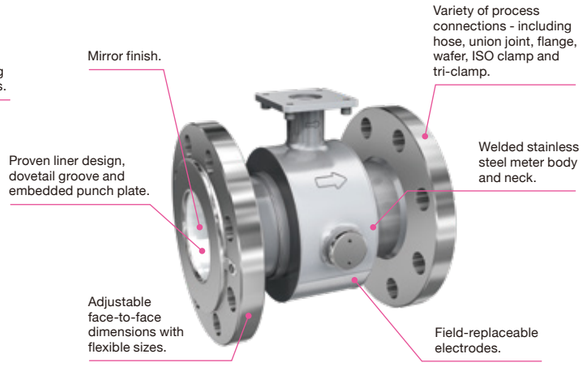
SPECIFICATIONS

CONVERTER Model MGG14



ITEM	SPECIFICATIONS
Style	Integral / Remote
Power supply	90 to 250 VAC
	24 V DC
Structure	IEC IP66 / NEMA 4X
Output	4 to 20 mA DC
	Pulse outputs
	Contact outputs
	HART / DE
Input	Contact inputs (2 max)
Display	Backlight LCD
Data setting	Infrared ray touch sensor
Accuracy	0.35% of rate / 0.5% of rate
Power consumption	10 W
Housing	Aluminum alloy
Ambient temperature	-25 to +60 °C (-13 to +140 °F)
Ambient humidity	5 to 100 % RH
Mounting	Integral
	Wall mounting
	2-inch pipe mounting
Weight	3.1 kg (7.0lb)
Electrical conductivity	3 µS/cm or greater
Functions	Empty pipe detection
	Data setting protection
	Digital communication, etc.

DETECTOR Model MGG18



ITEM		SPECIFICATIONS
Diameter		2.5, 5, 10, 15, 25, 40, 50, 65, 80, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000, 1100 mm (0.1, 0.2, 3/8, 1/2, 1, 1-1/2, 2, 2-1/2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 24, 25, 32, 36, 40, 44 inches)
Style		Integral / Remote
Structure		IEC IP67 or IP68
Approvals		FM/CSA Nonincendive
		FM/CSA/TIIS Flameproof
Pipe connection		Flange/Wafer
		JIS 10/20/30K, JIS G 3443-2
		JPI 150/300
		ANSI 150/300
		DIN PN10/16/25/40
		Union joint / Hose / ISO clamp / Tri-clamp
Face-to-face dimensions		ISO standard dimensions
		Azbil corporation standard dimensions
		Adjustable dimensions（Flexible sizes）
Liner		PFA, ETFE, Polyurethane rubber, Chloroprene rubber
Electrode		SUS316L, ASTM B574 (Hastelloy C-276 equivalent), Titanium, Zirconium, Tantalum, Platinum-Iridium, others
Grounding ring		SUS316, ASTM B575 (Hastelloy C-276 equivalent), Titanium, Zirconium, Tantalum, Platinum, others
Housing	2.5 to 200mm (0.1 to 8 inches)	Stainless Steel
	250 to 1100mm (10 to 44 inches)	Carbon Steel
Weight	10mm Diameter	Wafer type 2.6 kg (5.7 lb)
		Flange ANSI 150 type: 5.0 kg (11.0 lb)
	50mm Diameter	Wafer type: 3.4 kg (7.5 lb)
		Flange ANSI 150 type: 8.5 kg (18.7 lb)
	100mm Diameter	Wafer type: 6.7 kg (14.8 lb)
		Flange ANSI 150 type: 18.4 kg (40.6 lb)
Fluid temperature	Integral style	-40 to +120 °C (-40 to +248 °F)
	Remote style	-40 to +160 °C (-40 to +320 °F)
	Submersible type	-40 to +60 °C (-22 to +140 °F)
Ambient temperature	Integral style	-25 to +160 °C (-13 to +140 °F)
	Remote style	-30 to +80 °C (-22 to +176 °F)
	Submersible type	-30 to +60 °C (-22 to +140 °F)
Ambient humidity		5 to 100% RH

Please read “Terms and Conditions” from the following URL before ordering and use.
https://www.azbil.com/products/factory/order.html

Azbil Corporation
Advanced Automation Company

1-12-2 Kawana, Fujisawa
Kanagawa 251-8522 Japan

URL: https://www.azbil.com

1st Edition : Apr. 2020-SK
2nd Edition : Apr. 2021-SK

azbil

Magnetic Flowmeter

MagneW™ PLUS+

Flowmeter Focused on Reliability and Ease of Use

1. Mirror Liner - Resistant to Adhesion -
2. Reinforced Liner - Resistant to Temperature Change -
3. High Electrical Insulation Structure - Long Life of Product -
4. Exchangeable Electrode - Easy to Maintain -

Azbil Corporation

LINER PERFORMANCE IS ALL ABOUT MAGNETIC FLOWMETER PERFORMANCE

Azbil put maximum effort into making the liner for MagneW. Among various types of flowmeters, mag flowmeter is one of the few flowmeters that can work without changing shape of the flow path from main pipe. For this flowmeter, the most important part is the liner. The quality of the liner has a great influence on the completeness, the usability and lifetime of the mag flowmeter. As a long-established manufacturer of mag flowmeters, Azbil has created the best liner to provide usability and longevity of mag flowmeters.

feature 01 Mirror Liner - Resistant to Adhesion -

The liner of magnetic flowmeter must be clean to measure accurately. If dirt adheres to the liner surface, the cross-sectional area of the flow tube decreases, and flow meter output would have errors. Therefore, the liner is required smooth surface for free to dirt deposition. The liner of MagneW has a very smooth surface like “mirror” whose roughness is about 0.05μm and very strong against to dirt deposition.

feature 02 Reinforced Liner - Resistant to Temperature Change -

The temperature of fluid flowing in the flowmeter would change depending on the process conditions. If the piping is emptied after high temperature fluid flow, the piping cooled and negative pressure will occur. Then, that would cause the deformation and/or peeling of the liner. The MagneW has the built-in punched plate liner to prevent the liner deformation and peeling.

feature 03 High Electrical Insulation Structure - Long Life of Product -

If the magnetic flowmeter is used under severe condition such like high temperature heat shock for a long time, the measured fluid may penetrate the electrode structure and causes insulation deterioration. This not only causes inaccurate measurement, but also causes a leakage accident if the fluid penetration progresses. The MagneW is used high-strength springs which can withstand big temperature change for seal structure around electrodes, and keeps high insulation performance.

feature 04 Exchangeable Electrode - Easy to Maintain -

Since the electrodes of the MagneW can be removed, the maintenance of the electrode part and changing the electrode material are possible. And more, it is not necessary to have spare flowmeters with various materials of electrodes. It is also contributing to reducing the number of spare flowmeters.

feature 05 Infrared Human Machine Interface - Easy to Operate -

The MagneW is equipped with the infrared touch sensors that can be used to operate without opening the housing. Therefore, the user can change the settings without the hand-held communicator or other special tools.

feature 06 Backlight Display - Good Visibility in Dark Place -

The MagneW is equipped with the backlight LCD display which helps the visibility in dark location.

6 MAJOR FEATURES

06 Backlight Display

Converter : model MGG14C

01 Mirror Liner

02 Reinforced Liner

03 High Electrical Insulation Structure

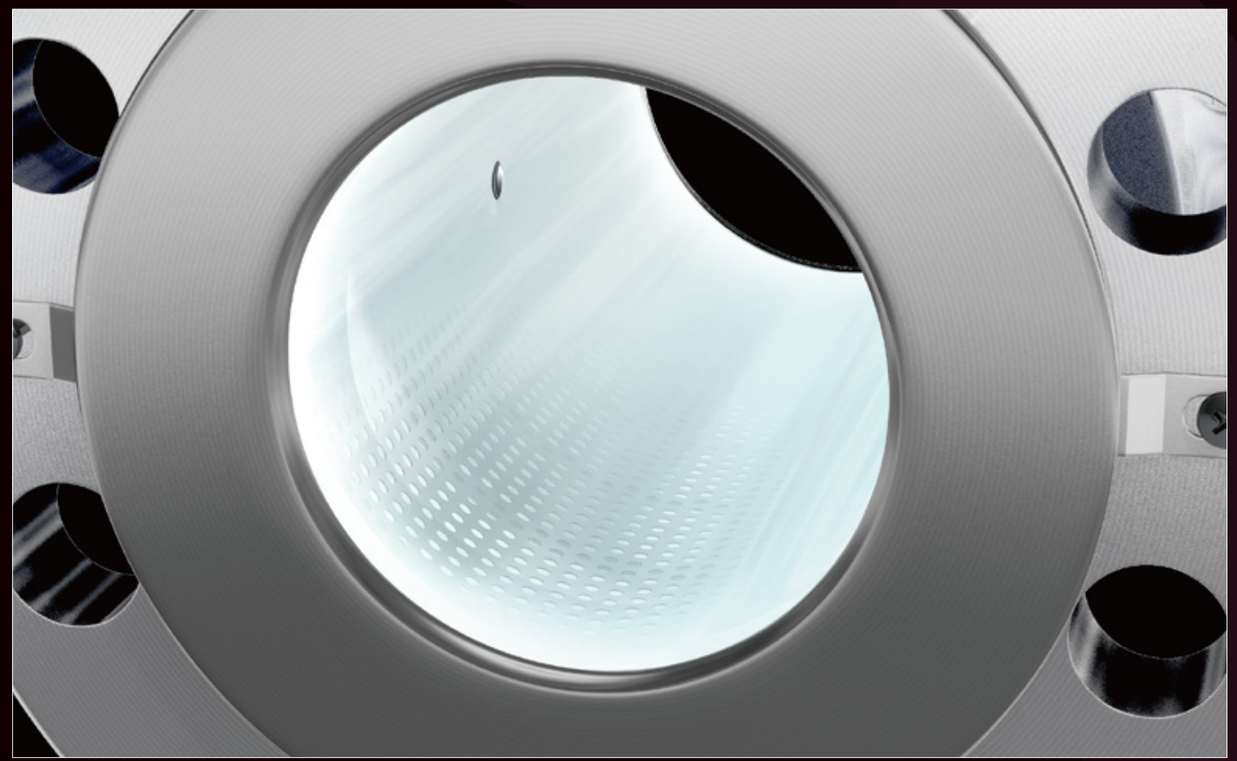
04 Exchangeable Electrode

05 Infrared Human Machine Interface

Detector : model MGG18F

Benefits

- Displays flow rate / Integrated value / Percentile flow rate simultaneously.
- Eliminates special programming tools.
- Enhances local operation.
- Reduces installation, troubleshooting and maintenance time.

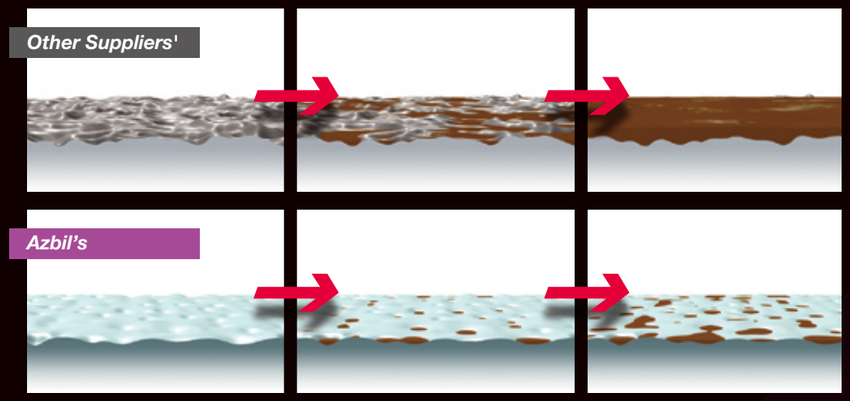


feature 01

Mirror Liner
- Resistant to Adhesion -

Mirror Finish Surface Liner

The liner of Azbil's magnetic flowmeter is manufactured in house and the surface roughness is well controlled. The surface roughness of liner affects to the adhesion of the dirt which may cause the reading error or other trouble of flowmeter. Smooth surface like mirror makes well adhesion resistance, lengthen the maintenance period to remove the scales and brings longer life of the detector.



Its surface is uneven and the dirt on the part of the groove gets dirty. And also, that dirt is easy to grow adhering each other.

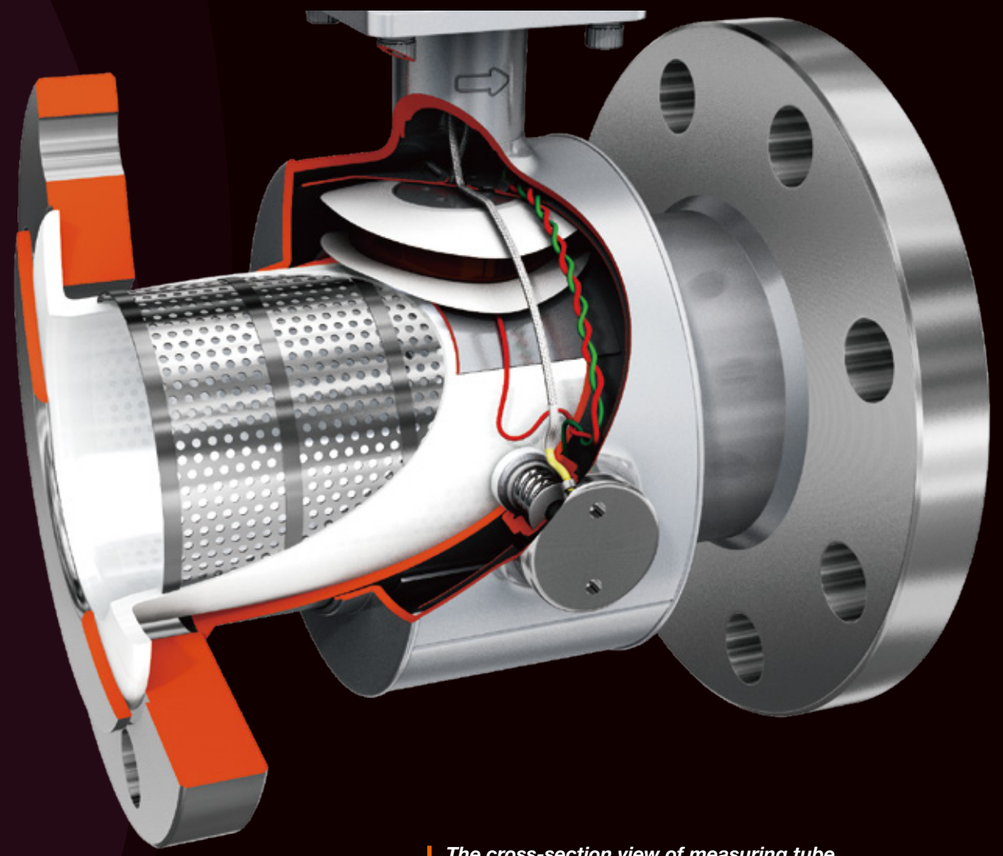
Ours' surface is very smooth like mirror and has very small groove. So, it is hard to get dirty and that dirt is difficult to grow.

feature 02

Reinforced Liner
- Resistant to Temperature Change -

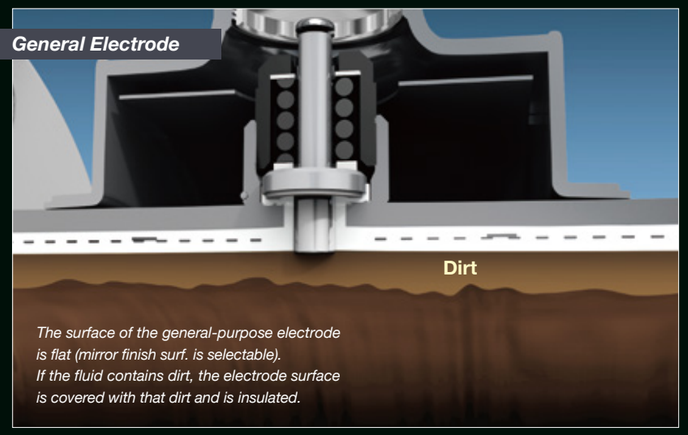
Perforated Plate in Liner

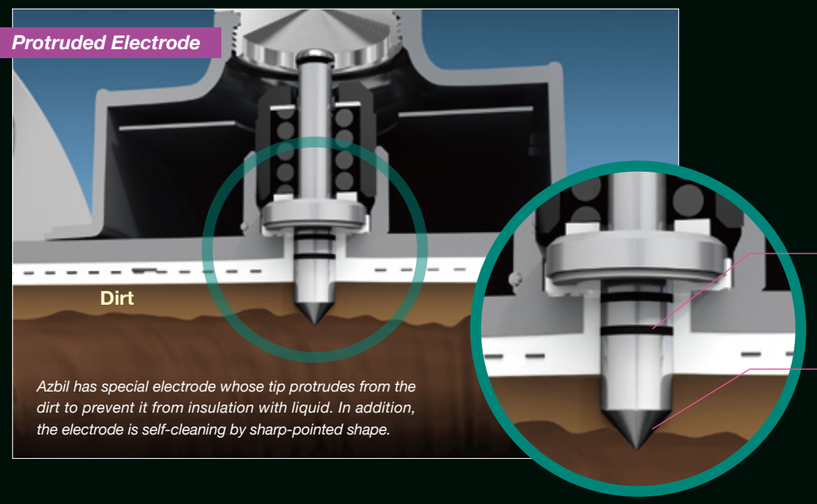
The liner may deform by the negative pressure in the pipe which is caused by temperature change of fluid in it. To strengthen and prevent the deformation of liner, it contains the perforated plate which works as rebar in the reinforced concrete. This is also one of the features brought by "in house" liner manufacturing.



The cross-section view of measuring tube

The perforated plate stays inside the liner material and behaves like iron rod of reinforced concrete. It brings strengthen against the external force applied to the liner material.





Various Types of Electrodes

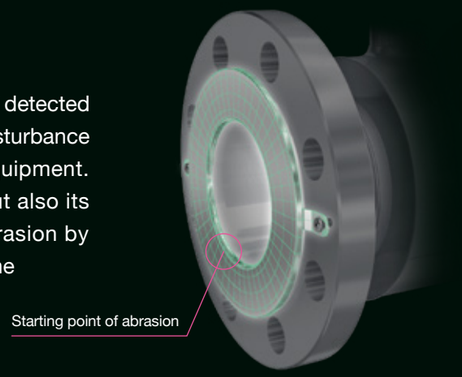
The electrodes are the key component which works as the inlet of flow signal. Azbil can provide the variety of electrode not only its materials but also its shapes. For example, for the application that the slurry contained in measured fluid is easy to deposition, the protrude electrode is effective to keep the surface of the electrodes exposed.

feature 03 High Electrical Insulation Structure - Long Life of Product -

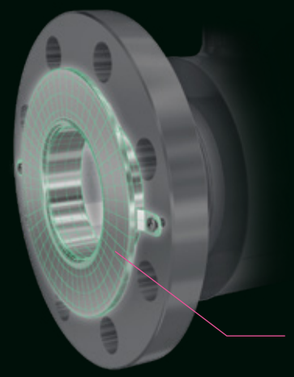
Various Types of Grounding Ring

The grounding ring touches the fluid and provides a zero base for the EMF detected by the electrode. It also works to prevent that the leaked current cause disturbance and hinder stable measurement that is occurred by the fluid feeding equipment. Azbil can provide the variety of grounding ring not only its materials but also its shapes. For example, hat-shaped grounding ring protects the liner abrasion by hard-slurry flow. In such case, the abrasion may start at the end face of the flowmeter due to the difference of inner diameter between flowmeter and pipe. The hat-shaped grounding ring covers that starting point and prevents the abrasion.

Standard Grounding Ring



Hat-shaped Grounding Ring



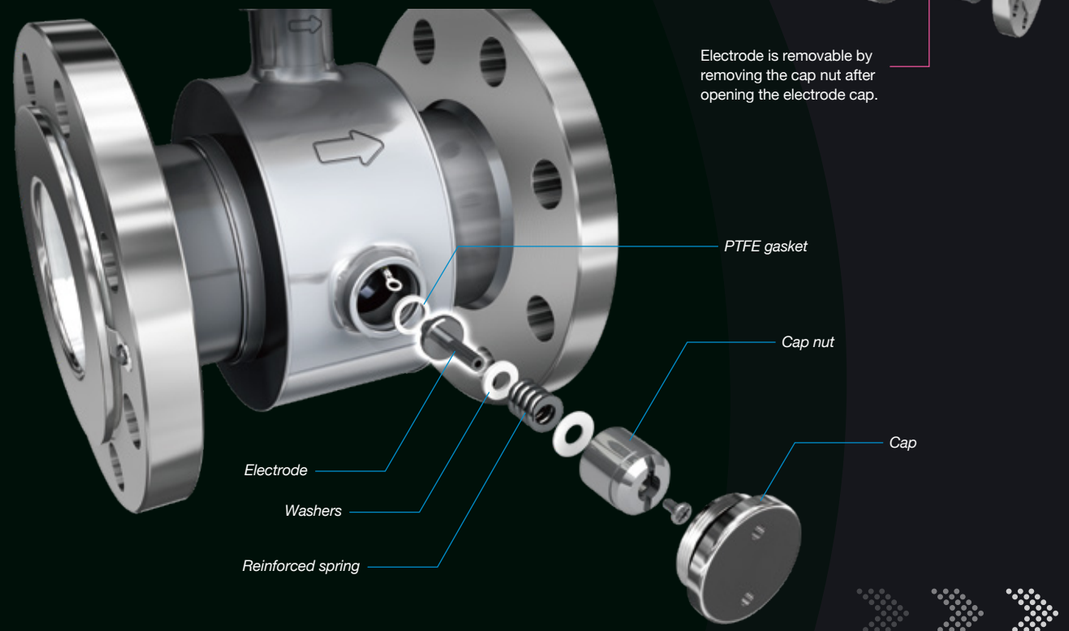
If the liner still abrasions, Hat-shaped grounding ring is effective.
The general abrasion of liner starts from the corner of liner and is caused by a slightly different inner diameter of pipe and mag meter or misalignment center of them.
The hat-shaped grounding ring prevent liner abrasion by covering that corner.

feature 04 Exchangeable Electrode - Easy to Maintain -

Replaceable Electrodes

One of the major troubles of the magnetic flowmeter is the insulation deterioration of the electrode portion. Azbil’s magnetic flowmeter’s electrode part can be opened and solved such problem. That structure also allows the replacement of the electrode unit. The user can reduce the spare unit stock by stocking the spare electrode unit which can be applied to various sizes of flowmeter detector.

Electrode is removable by removing the cap nut after opening the electrode cap.



feature 05

Infrared Human Machine Interface
- Easy to Operate -

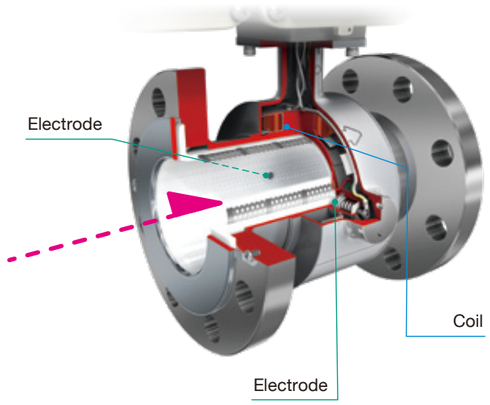
feature 06

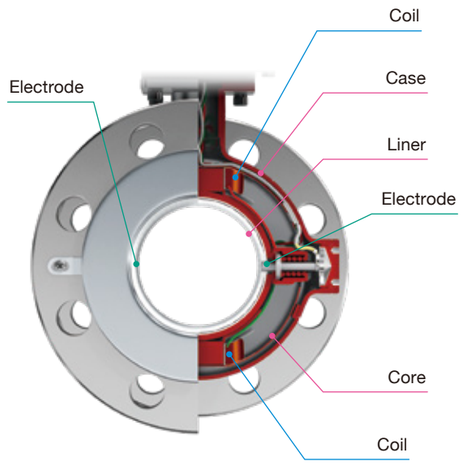
Backlight Display
- Good Visibility in Dark Place -

“Ease of use” is the concept of the MagneW convertor. To ensure visibility in dark places, the backlight is implemented to the LCD. To set the parameters in local without the handheld communicators, the infra-red sensors are equipped. These switches can be operated without opening the cover. In addition, to ensure that they perform well even in high-temperature and high-humidity environment and realize long life in such condition, the convertors are designed with humidity measures. Without that measure, the insulation failure may occur by external humidity.

MEASUREMENT PRINCIPLE OF ELECTROMAGNETIC FLOWMETER

Electromagnetic flowmeter uses the “Faraday’s law of electromagnetic induction” as its measurement principle. The “Faraday’s law” is that when a conductive object moves in the magnetic field, an electromotive force (EMF) is generated inside the object. When applying this as the measurement principle of an electromagnetic flowmeter, the measurement fluid works as the conductive object and electrodes are settled to measure the generated EMF.





In the case of shown in figure 1, the relationship between averaged flow velocity v [m/s] and EMF e_s [V] would be following equation.

$$e_s = k \cdot B \cdot d \cdot v \qquad (1)$$

here, k is the coefficient (constant), B [Wb/m^2] is the magnetic flux density and d [m]is the pipe inner diameter. Then, the relationship between volumetric flow rate Q [m^3/s] and averaged flow velocity v would be

$$Q = \frac{\pi d^2}{4} \cdot v \qquad (2)$$

From equation (1) and (2), following equation (3) is obtained.

$$e_s = \frac{4kB}{\pi \cdot d} \cdot Q \qquad (3)$$

This equation means, EMF e_s is in proportion to the flow rate Q. Those base equation stand following assumptions.

a) Magnetic flux density, axis of electrodes and axis of the pipe are orthogonal to each other.
b) Measured fluid is electrically homogeneous.
c) Measured fluid is incompressible.
d) All physical quantities are uniform on the plane perpendicular to the pipe axis.
e) Magnetic field exists over an infinite length in the tube axis direction.
f) Pipe inner wall is made of insulating material and flow velocity is zero on its surface.
g) Flow is axisymmetric and flow velocity is a function of the pipe radius.
h) Magnetic field is uniform and its magnitude is constant.

HALF-CENTURY HISTORY OF AZBIL'S MAGNETIC FLOWMETER

1975
· Launch **MagneW series**, adopting pulsed DC excitation
· Open channel type detector, **model NNK**, compliant with total wastewater regulation

1984
· Launch lightweight / compact **model KID/KIC**

2000
· Launch high speed remote type **model MGR13**

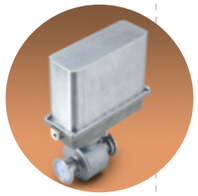
2002
· Launch low cost model, **model MCB**

2011
· Launch New JIS water meter **model MGT20**

2000
· Launch JIS water meter, **model MGT10**

1995
· Launch renewal 4-wire **MagneW3000 FLEX**

2007
· Expansion of line size



2008
· Launch high speed integral type, **model MGR11U**

1970 1980 1990 2000 2010 2020

High reliability has been established through wide applications and many installations

Azbil (former Yamatake Honeywell) developed its first magnetic flowmeter in early 1970s. The innovative technologies at that time such as "built in punched plate liner" and "pulsed DC (rectangular wave-form) excitation" were adopted to that.
The perforated metal in the liner resin increases the strength. So that liner structure withstands pressure changes in the pipe due to sudden temperature changes of measuring fluid and prevents the deformation of liner. This raised the reliability of magnetic flowmeter tube markedly. Before the pulsed DC excitation was invented, the AC excitation was the common. The pulsed DC excitation makes it possible to measure the electromotive force (EMF) in a stable magnetic field and improve the accuracy and stability. This design policy – to have high reliability and high performance - has been continuously passed down to Azbil's magnetic flowmeters.

1976
· Launch general purpose model adopting PFA molding liner and built-in punch plate, **model NNM**

1983
· Launch micro controller integrated converter, **model NNX**

1992
· Launch **model SMT**, industrial smart 2-wire electromagnetic flowmeter

2001
· Launch dehydrated sludge meter, **model MGD**

2002
· Launch renewal 2-wire, **model MTG**

2010
· Launch **MagneW Neo PLUS, model MTG** (Digital HART)

2010
· Launch battery type, **MGB12**

1987
· Launch digital converter, **model KIX**

1994
· Expansion of line size

1999
· Launch multi-variable meter, **model MGM**
· Launch pulp slurry meter, **model MGH**

2011
· Start **JCSS certified calibration service**

Azbil considers the liner is the most important component for the magnetic flowmeter. The quality of the liner affects to the adhesion condition of dirt and the insulation of the electrodes and Azbil believes keeping them healthy brings "ease of use" to the customer. Smooth surface of the liner restrains the adhesion of the dirt on both inner surface and electrodes. Then, it prevents the trouble of attenuation or loss of EMF.
Therefore, Azbil's magnetic flow meter is manufactured with super smooth inner wall surface whose roughness is controlled less than 0.05 mm. Smooth liner brings prevention of not only the inner diameter change by scale adhesion but also, dirt on the electrode surface. The electrodes that are kept clean are less likely to cause attenuation or disappearance of the EMF and greatly contributing to reducing trouble.
Also, the liner is the important to insulate the electrodes from the measuring tube. If a gap is created between the electrodes and the liner due to the thermal deformation, moisture will enter the inside of the detector case and cause insulation failure. Therefore, the liner is also required strength. For that reason, Azbil molds the liner material to incorporate the punched metal which works as reinforcement. That molding method is not transfer-molding which is generally performed. The transfer-molding uses a die to mold the inner surface of flow channel. Since the smoothness of the die is directly transferred to the inner surface, it cannot be made with a smoothness of 0.05 Ra. Azbil uses a unique invented molding method to ensure its smoothness. In this way, Azbil offers an unparalleled smooth and high-strength liner.