



F000000.eps

Contents

1.	Introduction	3
2.	Application	4
3.	ADMAG AXF Series Lineup	5
4.	Product Concept	6
5.	User-oriented Functionality	7
5.1	LCD Indicator	7
5.2	Compact and Light-weight Design	10
5.3	Flexible Electrical Connection Direction	11
6.	High Quality/High Performance	12
6.1	Fluid Adhesion Level Diagnosis	12
6.2	Replaceable Electrode	13
6.3	Enhanced Dual Frequency Excitation	14
7.	Wide Product Lineup	16
7.1	Extra Small Size Flange	16
7.2	Sanitary type	17
7.3	Size, Lining and Materials	18
7.4	Face-to-face Length	20
7.5	Explosion Proof Type Remote Converter AXFA14	21
7.6	Versatile Input/Output Function	22

1. Introduction

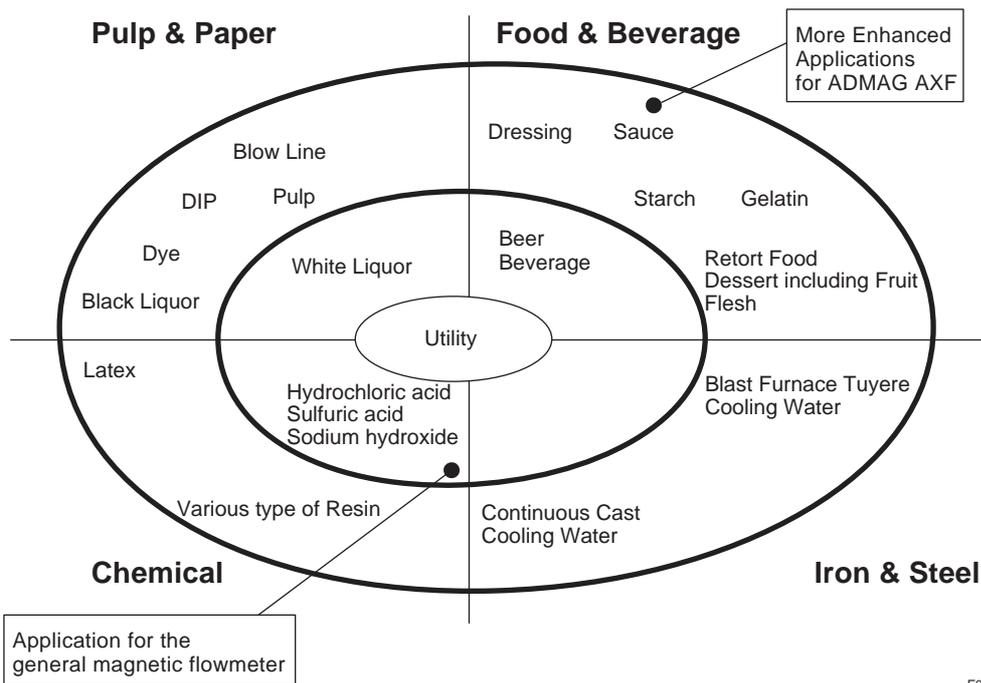
Yokogawa developed the first industrial magnetic flowmeter in Japan in 1955, and in 1988, the world's first dual frequency excitation method: ADMAG series was released. Afterwards, we have developed ADMAG AE which has the lineup of the flameproof construction of the integral type, and ADMAG CA of capacitance type which has no wetted electrode. Thus we have been leading the technology of this field and sold 350,000 or more units.

And now, true user-oriented functionality was achieved succeeding to high performance and the high quality as a successor of these series, the function was developed more greatly, and enhancing



was developed.

ADMAG AXF series is a product that has the best ability in the world to enhance the function of the conventional model. When developing, we heard the demand from the various customers, and most of the demands were achieved.



This figure is an application chart of each industry. Using ADMAG AXF series provides the customer the flow measurement of wider application.

In this TI (Technical Information), we introduce the example of the application and the functionality of ADMAG AXF series etc. Please read through this TI and select the ADMAG AXF series for your flow measurement.

Please confirm details of the specification with General Specification sheet. It can be found in the following URL.

<http://www.yokogawa.com/fld/FLOW/AXF/index.htm>

2. Applications

Following table shows the example of application for ADMAG AXF.

Industry	Application	Fluid	Feature of AXF																
			Standard Specification											Special Order Specification					
			Fluid Adhesion Level Diagnosis	Replaceable Electrode	Enhanced dual frequency Excitation	Low Conductivity(1μS/cm)	Flame Proof (AXFA14, AXF Integral, Remote)	10 KHZ Pulse output	Natural Soft Rubber Lining	EPDM Rubber Lining	Various Sanitary Connections	Extra Small Flange Type	/ELC :FDC Noise Cut Circuit	/DHC :For District Heating and Cooling or Condensation-proof	Internal Insertion Type Electrode	Change of Electrode Shape	Change of Surface Finishing (Lining/Electrode)	Abrasion Resistant Urethane Rubber Lining	JIS 63K Water Meter	Metal Hat Earth Ring
Food & Beverage	Bottling Machine	Beverage		√			√		√										
	Low Conductivity Fluid	Pure Water, Vinegar, Alcohol, Liquid Sugar, Carbohydrate Solution			√	√				√									
	Oily Adhesive Fluid	Mayonnaise, Dressing, Sauce, Baste	√							√					√	√			
	Solid included Liquid	Retort Food, Dessert including Fruit Flesh, Sherbet			√					√									
Iron & Steel	Blast Furnace Tuyere Cooling Water	Coolant Water	√											√	√				
	Continuous Cast Cooling Water	Coolant Water	√	√															
Chemical	Adhesive Fluid	Latex, Various types of Resin, Sodium Hydroxide	√	√			√								√	√			
	Electrolysis Plant	Electrolysis Solution					√				√								
	Low Conductivity Fluid	Pure Water, Alcohol, Acetic Acid, Organic Solvent			√	√	√												
	PVC Piping	Strong Acid, Strong Alkali									√								
Pulp & Paper	Digester	Black Liquor												√					√
	DIP	Pulp	√	√											√	√			
	Bleaching	Adhesive Liquid such as Chlorine, Alkali, HYPO.	√	√											√	√			
	Pulping	Size agent, Aluminum Sulfate	√	√											√	√			
	Recovery Boiler Line	Concentrated Black Liquor, Green liquor	√	√											√	√			
	PVC Piping	Additive,									√								
Construction	Shielding Machine	Excavated Mud			√				√									√	
	Slurry Shield	Excavated Mud			√				√									√	
	Mortar	Mortar			√				√									√	
	Grout	Cement Milk, Sodium Silicate												√				√	
Environment	Water & Waste process	Water								√									
	District Heating and Cooling	Coolant										√							
	PVC Piping	Sodium Hydroxide, Hydrochloric Acid, Hypochlorous Acid									√								

√: Proven Application

T020001.eps

In case of the high slurry, low conductivity or adhesive fluid, please consider to apply ADMAG CA.

3. ADMAG AXF Series Lineup

● Integral and Remote types are available

Integral Type Magnetic Flowmeter



Model
AXF□□□G : General-Purpose Use
W : Submersible Type
C : Explosion proof type
H : Sanitary Type

Remote Type Magnetic Flowmeter

Model
AXFA14G : General-Purpose Use
AXFA14C : Explosion proof type



Remote Converter

Model
AXF□□□G : General-Purpose Use
W : Submersible Type
C : Explosion proof type
H : Sanitary Type



Remote Flowtube



Remote High Spec. Converter

Remote High Spec. Converter
Model: AXFA11G (General-Purpose Use)

F030001.eps

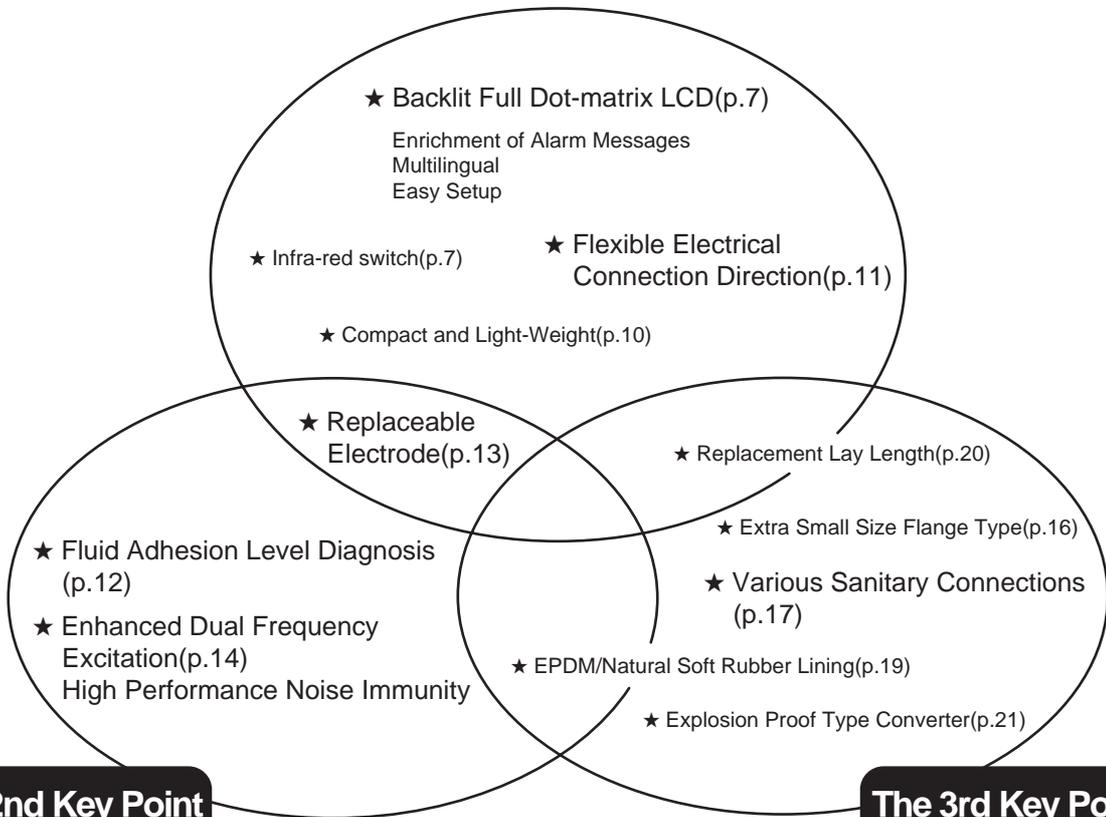
4. Product Concept

Concept of *ADMAG AXF*TM 3 Key Points of AXF

The 1st Key Point

I Pursuit of User Friendly

User-oriented Functionality



The 2nd Key Point

II Super Magmeter

High Quality/High Performance

The 3rd Key Point

III You can find what you want

Wide Product Lineup

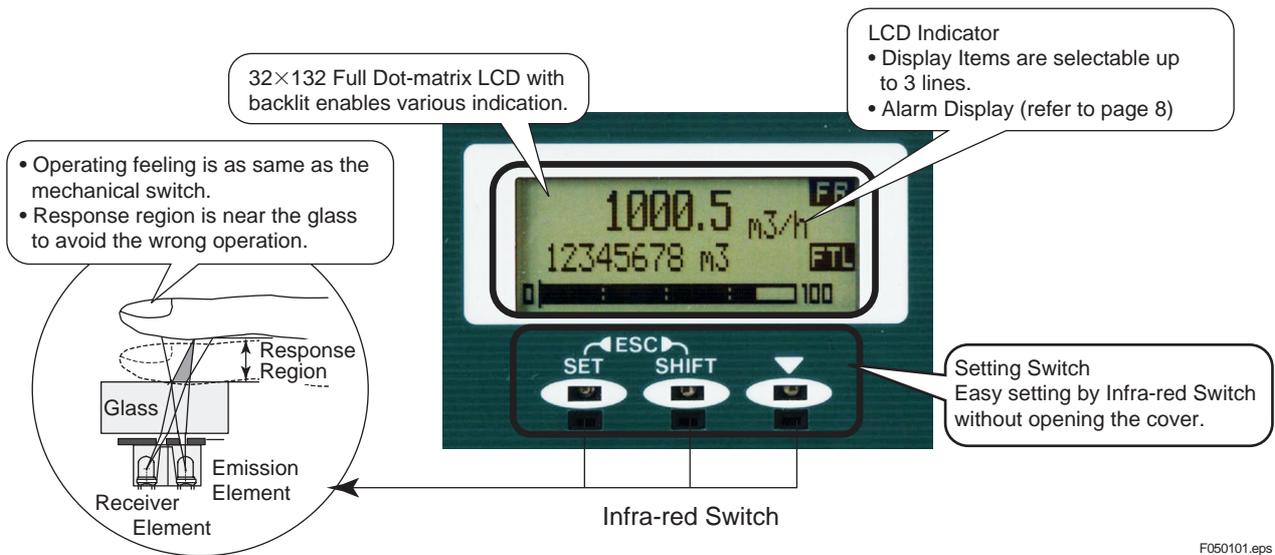
Please refer to the page number in each items parenthesis.

F040001.eps

5. User-oriented Functionality

5.1 LCD Indicator

- Display of Flow Rate etc. and Setting of the parameters are possible.
- Not only Alarm message but also Countermeasure is displayed at the same time.
- Infra-red switch enables easy setting without opening the cover.



F050101.eps

5.1.1 Flow Rate display and Parameter setting

[Example]

1 Line (Flow Rate)



2 Lines (Flow Rate and Flow Total)



3 Lines (Flow Rate, Flow Total and Bar graph)



Multi-line display up to 3 lines is possible.

Select Item (Parameter Number)

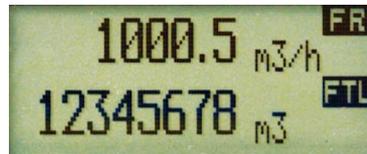
1st Line (H10)	2nd Line (H12) 3rd Line(H13)
Flow Rate(%)	(No indication)
Flow Rate	Flow Rate(%)
Flow Rate(mA)	Flow Rate
Forward Total	Flow Rate(mA)
Reverse Total	Flow Rate(Bar)
Dif Total	Forward Total
	Reverse Total
	Dif Total
	Tag No
	Adhesion Check
	Communication

F050102.eps

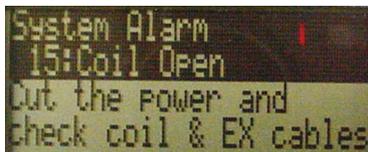
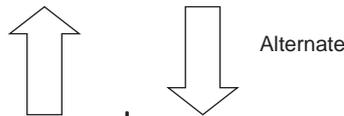
5.1.2 Alarm Display

● Alarm messages are displayed in multilingual

Normal Display and Alarm Display are displayed alternately when alarm is generated.



Normal Display Mode
2 seconds

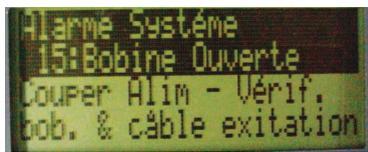


English

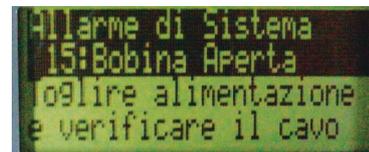


German

Alarm Display Mode
2 seconds



French



Italian



Spanish



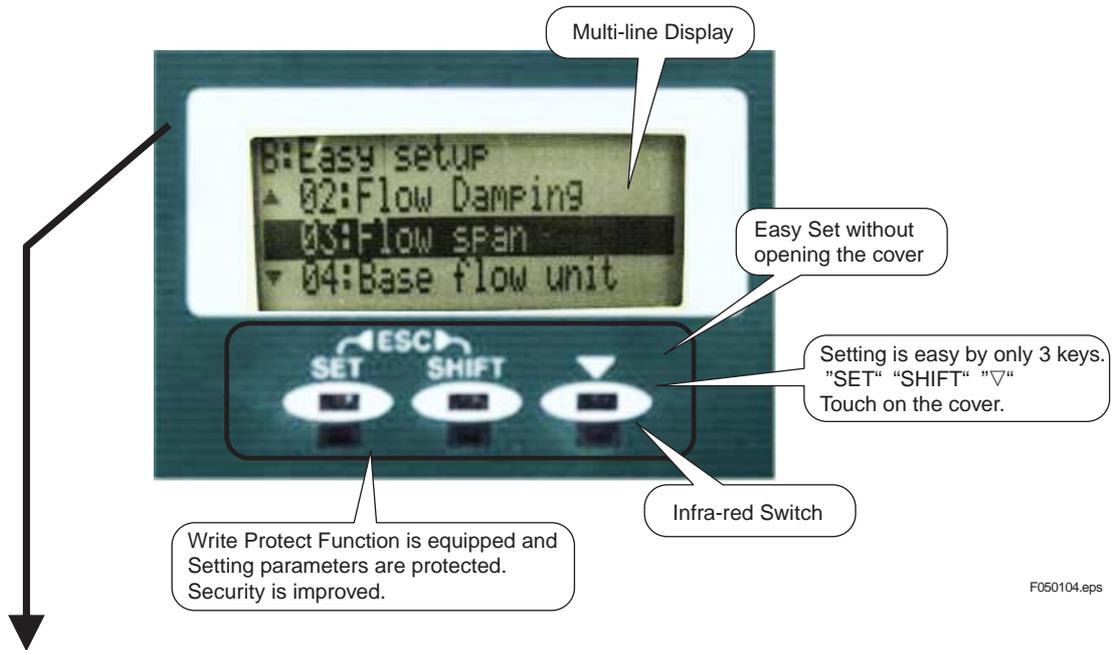
Japanese

Countermeasures are also displayed for the easy maintenance.

F050103.eps

Multilingual: English, German, French, Italian, Spanish and Japanese.

5.1.3 Parameter Setting



F050104.eps

5.1.4 EASY SETUP

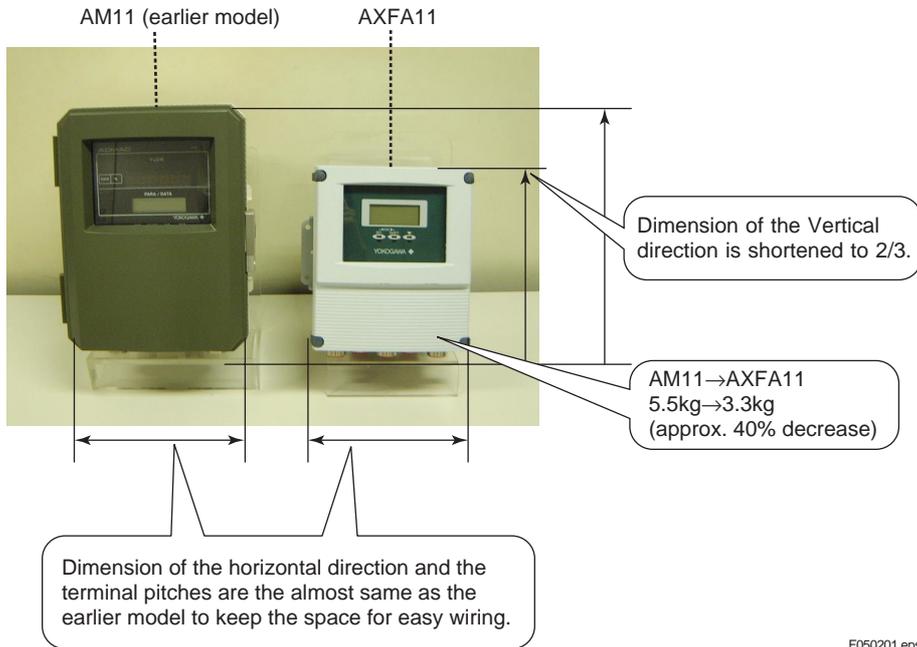
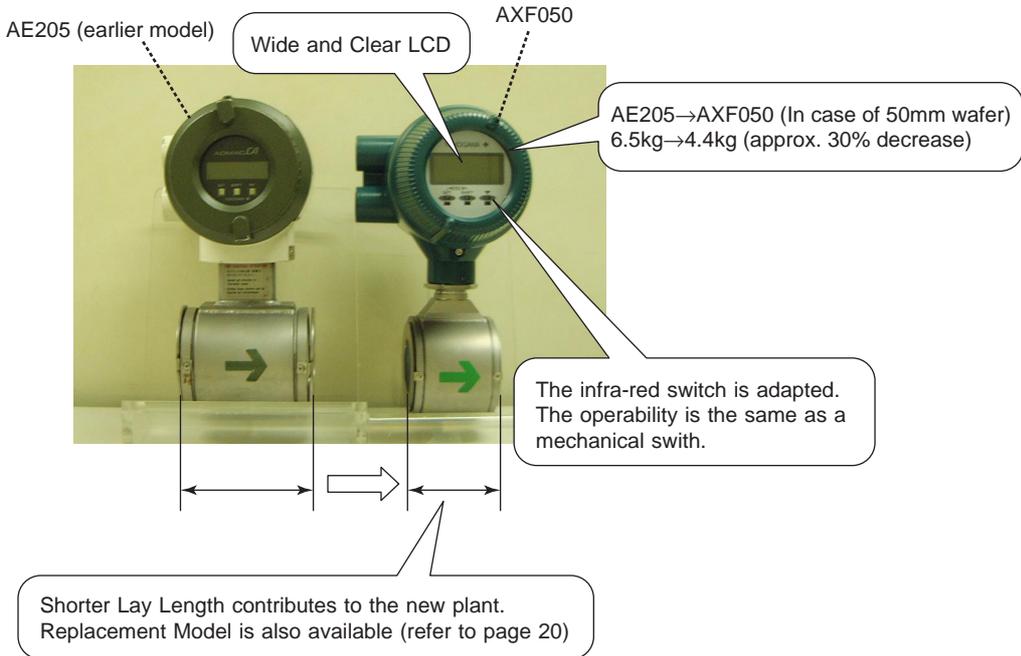
- The most frequently used 14 parameters among 95 parameters are arranged in a group at the top.
- General functions can be set by these parameters.
- Multilingual supports English, German, French, Italian, Spanish and Japanese.

.....	B:Easy Setup	B:Schnell Einstieg	.....	B10:Language	B10: Sprache
	↑	↑		B20:Flow Damping	B20:Flow Dämpfung
	English	German		B21:Base Flow Unit	B21:Flow Einheit
				B22:Base Time Unit	B22:Basis Zeiteinheit
				B23:Flow Span	B23:Flow Spanne
				B24:Flow Decimal Pnt	B24:Flow Dezimalpunkt
				B30:Total Unit	B30:Zähler Einheit
				B31:Total Scale	B31:Zähler Skalierung
				B32:Pulse Unit	B32:Puls Einheit
				B33:Pulse Scale	B33:Puls Skalierung
				B40:Display Select1	B40:Zeile 1 Auswahl
				B41:Display Select2	B41:Zeile 2 Auswahl
				B42:Display Select3	B42:Zeile 3 Auswahl
				B50:Auto Zero Exe	B50:Auto Zero Ausf.
.....	C:Basic Setup	C:Basis Einstellung	.....	
.....	D:Total Set	D:Zähler Setzen	.....	
.....	E:Pulse Set	E:Puls Setzen	.....	
.....	F>Status Function	F>Status Funktion	.....	
.....	G:Alarm	G:Alarm	.....	
.....	H:Display Set	H:Anzeige Konfi.	.....	
.....	J:Aux	J:Hilfsmen	.....	
.....	K:Diagnosis	K:Diagnose	.....	
.....	M:Adjustment	M:Justierung	.....	
.....	N:Test	N:Test	.....	
.....	P:Protect	P:Schutz	.....	

F050105.eps

5.2 Compact and Light-weight Design

● Shorter lay-length, Smaller case and Lighter weight.



F050201.eps

ADMAG AXF won iF design award 2005 (International Forum Design Awards)



The iF awards for outstanding design quality are one of the most prestigious recognitions given to international manufactures and designers by the International Forum Design in Hannover (Germany). The International Forum Design is internationally known as a leading design institute. Founded in 1953, iF has always been dedicated to promoting a close dialogue between industry and designers.

5.3 Flexible Electrical Connection Direction

The converter or the terminal box can be rotated arbitrarily to change the direction of electrical connection on the site.



0°

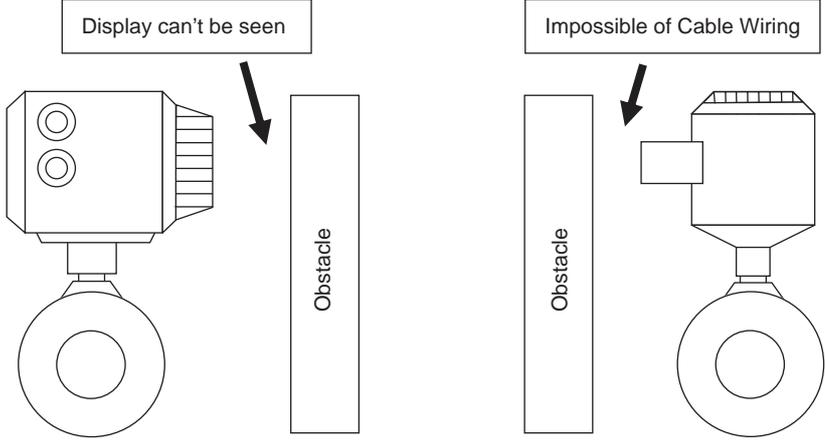
+90°

+180°

-90°

Rotation angle can be adjusted from -140 to 180 degrees arbitrarily. (Rotatable angle is limited by a stopper)

Useful case for Flexible Electrical Connection Direction



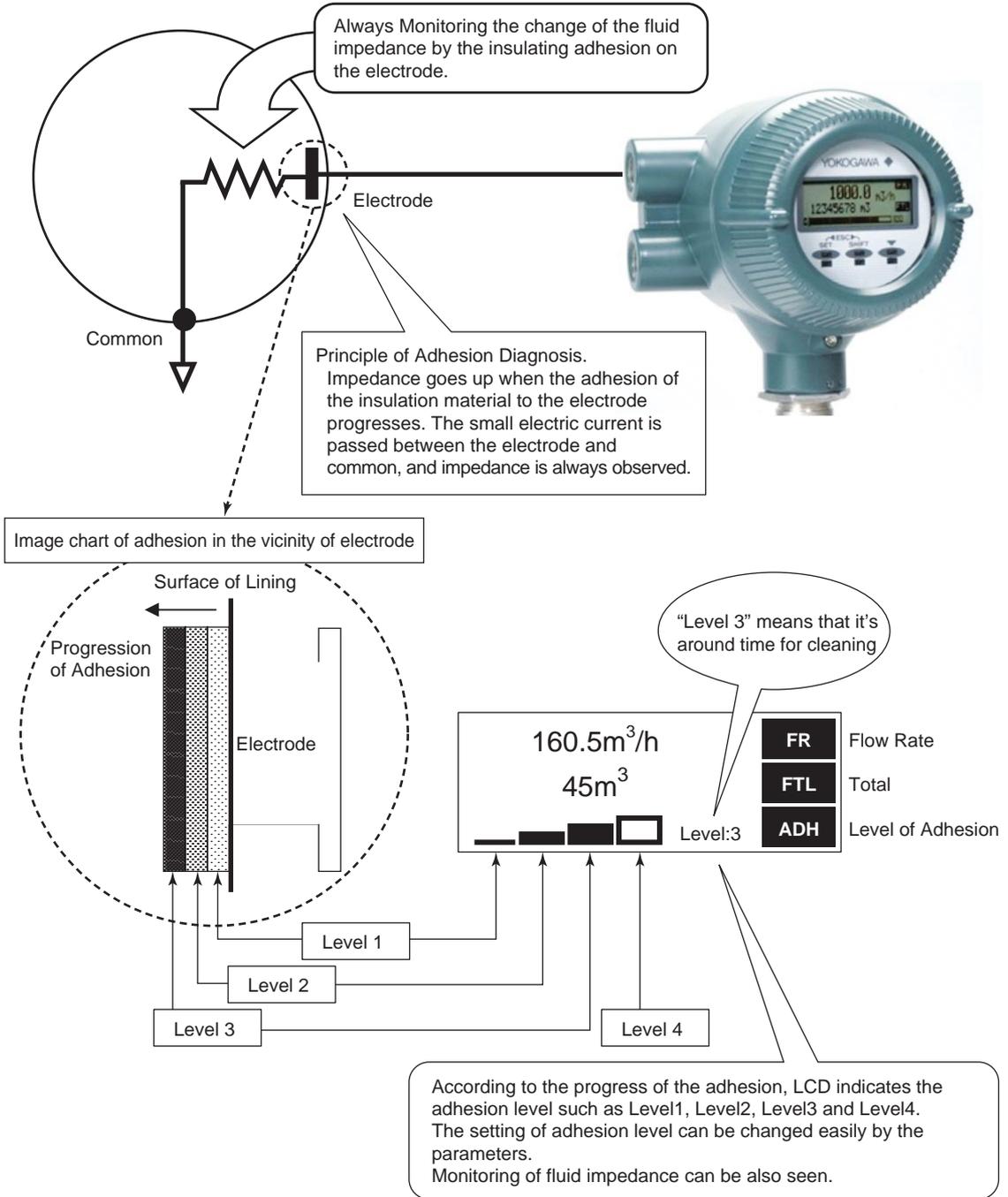
- Hexagonal wrench (accessory, nominal 1.5) and Wrench are necessary for direction change
- Details are described in the user's manual.

F050301.eps

6. High Quality / High Performance

6.1 Fluid Adhesion Level Diagnosis

- Always Monitoring the insulation adhesion helps to know the maintenance timing.

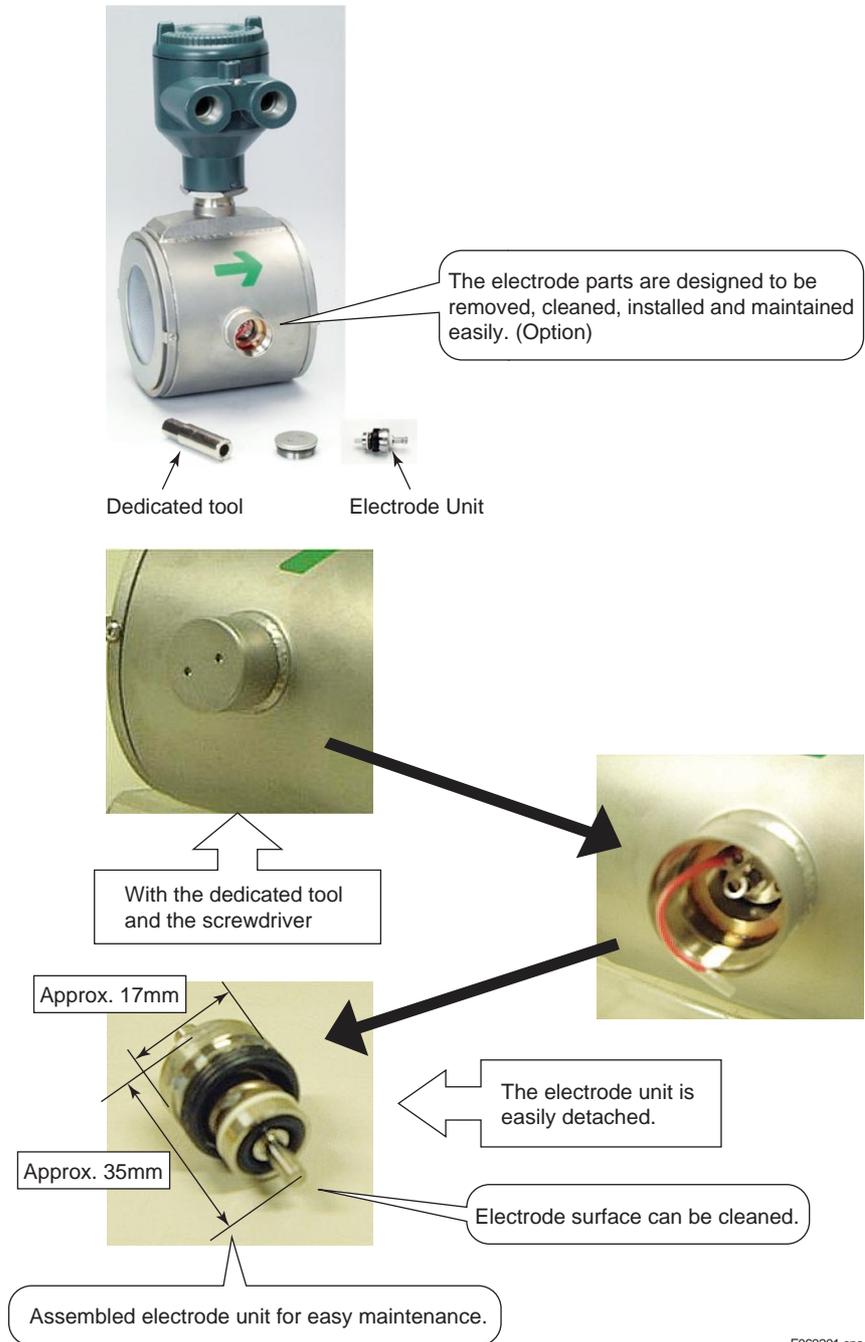


Replaceable Electrode Type is easier to be cleaned.

F060101.eps

6.2 Replaceable Electrode

- Replaceable Electrode can be detached and be cleaned easily when the adhesion is generated.



F060201.eps

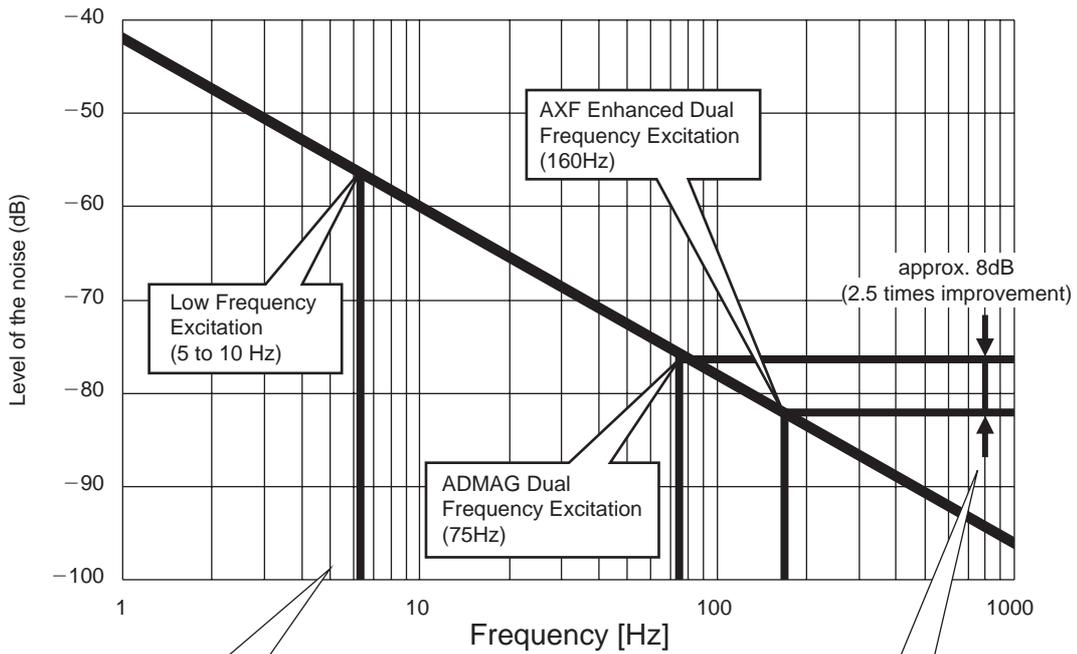
- The optional dedicated tool and the screwdriver are required to remove and install the electrode.
- Details for the removal and install method are described in the user's manual.
- Replaceable Electrode can be selected by the suffix code "2" of electrode structure.
- Applied sizes are 25mm to 400mm (General purpose use type only)
- Please refer to GS sheet for the detail.

6.3 Enhanced Dual Frequency Excitation

- Enhanced Dual Frequency Excitation can be optionally selected.
- Difficult applications such as for high concentration slurries or low conductivity fluid can be measured stably.

Why is Enhanced Dual Frequency Excitation tolerant to noise?

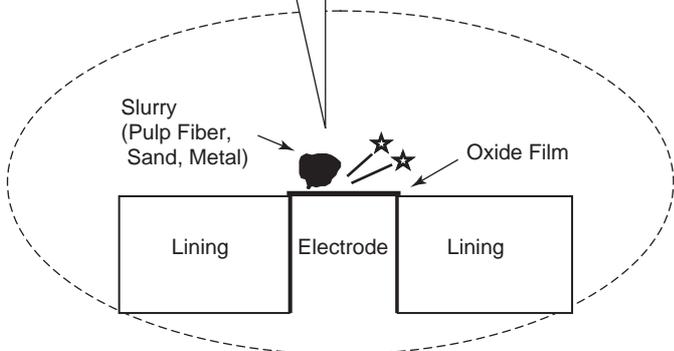
- Slurry Noise has a characteristic to decrease according to the increasing the frequency. So the higher the excitation frequency is introduced, the more stable measurement is possible.



This chart shows the relation between the excitation frequency and the slurry noise.

Increasing the excitation frequency to 160 Hz improved S/N ratio for the slurry noise by 2.5 times.

What is Slurry Noise?
The Noise generated when the slurry hit the electrode.



Result of the experiment :
Next page

This function is available in the case of the combination with AXF Flowtube and the selection of the option HF1 or HF2.

F060301.eps

● Evaluation of Slurry Noise

Data of In-house Examination

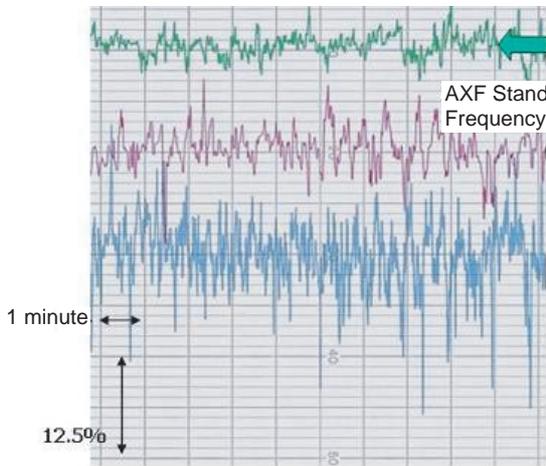


Slurry for Evaluation (Zinc Beads)

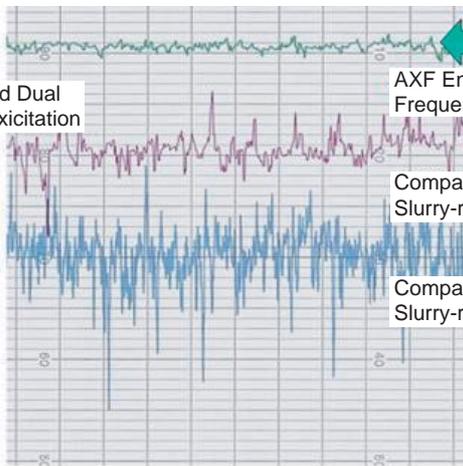


Piping for Test

Test Result of Standard Dual Frequency Excitation



Test Result of Enhanced Dual Frequency Excitation



Notice

AXF Standard Dual Frequency Excitation

AXF Enhanced Dual Frequency Excitation

Company A: Slurry-resistant type

Company B: Slurry-resistant type

Nominal Size: 50mm Flow Span: 240L/min
Fluid: Water with Zinc beads Measurement Flow: 220L/min
Damping: 3sec

Chart of the slurry noise test

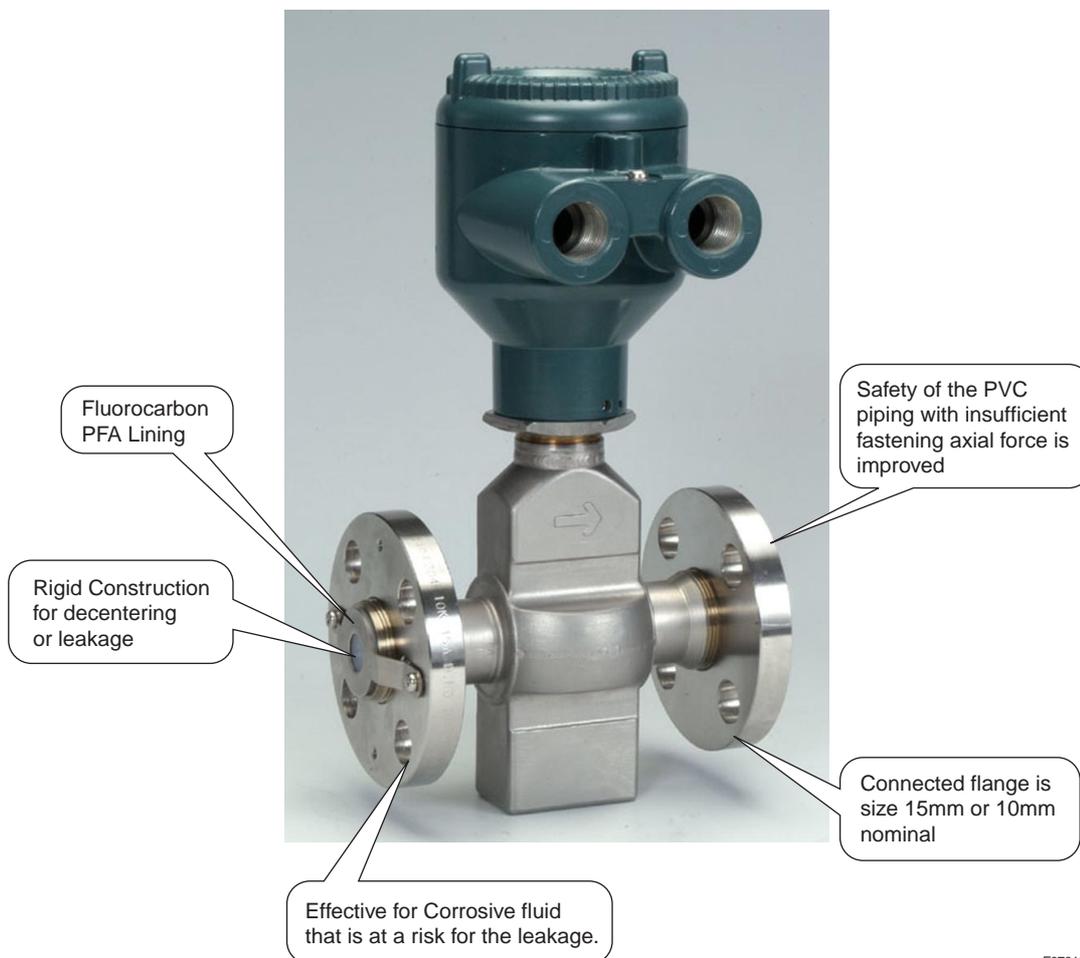
The tolerance to the slurry noise improved obviously in the case of Enhanced Dual Frequency Excitation.

F060302.eps

7. Wide Product Lineup

7.1 Extra Small Size Flange

- Nominal Size 2.5mm, 5mm and 10mm Flange Type are on the lineup



F070101.eps

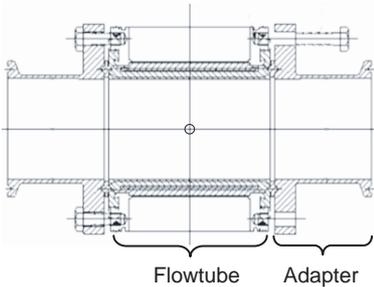
7.2 Sanitary Type

● Various Sanitary Connections are available

Adapters are for Clamp connection, Union connection and Butt weld.



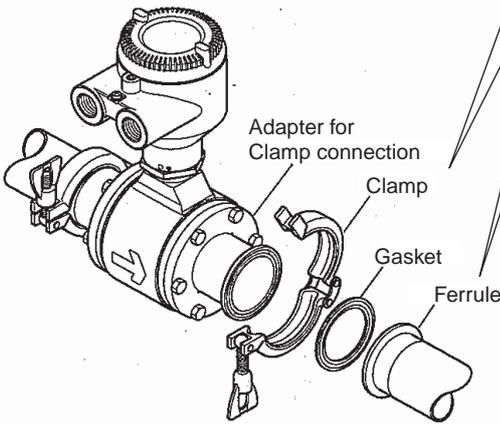
New Lineup
Tri-Clamp (3A), DIN32676 and
ISO2852/SMS3016



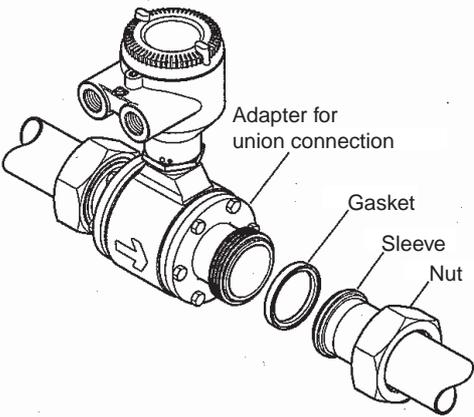
Cross-sectional View

New Construction of
Flowtube and Adapter.

The ferrule and the clamp are can be used on the market.



Clamp Connection



Union Connection

F070201.eps

7.3 Size, Lining and Materials

7.3.1 Nominal Size

Item	Detail	Applicable Nominal Size [mm]
Lining	Fluorocarbon PFA	2.5, 5, 10, 15, 25, 32 , 40, 50, 65 , 80, 100, 125 , 150, 200, 250, 300, 350, 400
	Polyurethane Rubber	25, 32 , 40, 50, 65 , 80, 100, 125 , 150, 200, 250, 300, 350, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1350, 1500, 1600, 1800, 2000, 2200, 2400, 2600
	Natural Soft Rubber	50 , 65 , 80 , 100 , 125 , 150 , 200 , 250 , 300 , 350 , 400
	EPDM Rubber	50 , 65 , 80 , 100 , 125 , 150 , 200 , 250 , 300 , 350 , 400
	Ceramics	2.5, 5, 10, 15, 25, 40, 50, 80, 100, 150, 200
Process Connection	Wafer	2.5, 5, 10, 15, 25, 32 , 40, 50, 65 , 80, 100, 125 , 150, 200, 250, 300
	Flange	2.5 , 5 , 10 , 15, 25, 32 , 40, 50, 65 , 80, 100, 125 , 150, 200, 250, 300, 350, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1350, 1500, 1600, 1800, 2000, 2200, 2400, 2600
Use	General-Purpose	2.5, 5, 10, 15, 25, 32 , 40, 50, 65 , 80, 100, 125 , 150, 200, 250, 300, 350, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1350, 1500, 1600, 1800, 2000, 2200, 2400, 2600
	Submersible	15 , 25, 32 , 40, 50, 65 , 80, 100, 125 , 150, 200, 250, 300, 350, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1350, 1500, 1600, 1800, 2000, 2200, 2400, 2600
	Explosion Proof	2.5, 5, 10, 15, 25, 32 , 40, 50, 65 , 80, 100, 125 , 150, 200, 250 , 300 , 350 , 400
	Sanitary	15 , 25, 32 , 40, 50, 65, 80, 100, 125
Replaceable Electrode		25 , 32 , 40 , 50 , 65 , 80 , 100 , 125 , 150 , 200 , 250 , 300 , 400
Enhanced Dual Frequency Excitation		25 , 32 , 40 , 50 , 65 , 80 , 100 , 125 , 150 , 200

The sizes enclosed with □ in the table are newly added. Refer to GS sheet for the detail.

T070301.eps

7.3.2 Wetted Part Material

Wetted Part	Material				
Lining	Fluorocarbon PFA, Polyurethane Rubber, Ceramics, Natural Soft Rubber , EPDM Rubber				
Electrode	JIS SUS316L (AISI 316L SS/EN 1.4404 equivalent), Hastelloy C276 equivalent, Tantalum, Titanium, Platinum-Iridium, Platinum-Alumina cermet (only for ceramics lining), Tungsten Carbide				
Grounding Ring	JIS SUS316 (AISI 316 SS/EN 1.4401 equivalent), Hastelloy C276 equivalent, Tantalum, Titanium, Platinum-Iridium, JIS SUS316L (AISI 316L SS/EN 1.4404 equivalent)				
Sanitary Connection	<table border="0"> <tr> <td>Clamp : Tri-Clamp(3A), DIN32676, ISO2852/SMS3016</td> <td rowspan="3">} JIS SUS316L (AISI 316L SS/EN 1.4404 equivalent)</td> </tr> <tr> <td>Union : DIN11851, ISO2853, SMS1145</td> </tr> <tr> <td>Butt Weld : DIN11850 Pipe, ISO2037 Pipe</td> </tr> </table>	Clamp : Tri-Clamp(3A), DIN32676, ISO2852/SMS3016	} JIS SUS316L (AISI 316L SS/EN 1.4404 equivalent)	Union : DIN11851, ISO2853, SMS1145	Butt Weld : DIN11850 Pipe, ISO2037 Pipe
Clamp : Tri-Clamp(3A), DIN32676, ISO2852/SMS3016	} JIS SUS316L (AISI 316L SS/EN 1.4404 equivalent)				
Union : DIN11851, ISO2853, SMS1145					
Butt Weld : DIN11850 Pipe, ISO2037 Pipe					

The descriptions enclosed with are newly added. Refer to GS sheet for the detail.

T070302.eps

7.3.3 Feature of the Lining Material

A :Suitable B :Usable C :Usable period may be short N :Unusable No symbol :No data available

	Abrasion resistance	Heat resistance	Pressure resistance	Corrosion resistance	Adhesion resistance	Ozone resistance*6
Fluorocarbon PFA *7	C	160°C max *5	4MPa max *5	A *1	A *3, *4	
Ceramics	A	180°C max *5	4MPa max *5	A *2	A *4	
Polyurethane rubber *8	B	40°C max *5	4MPa max *5	N	B	
Natural soft rubber *8	A	80°C max	4MPa max *5	B	B	
EPDM rubber *8	B	80°C max	4MPa max *5	B	B	A

- *1) Can not be used for potassium hydroxide; Vulnerable to nitric acid, hydrofluoric acid, and fluorine compound.
- *2) Vulnerable to high-temperature and high-concentration hydrofluoric acid, phosphoric acid, and strong alkalis.
- *3) Electrode should be protruded or shaped like a cone for greater adhesion resistance.
- *4) For adhesive fluids, the inner surface must be mirror-finished.
- *5) Max. pressure depends on sizes and models. Please refer to the GS sheet.
- *6) Ozone resistance may be required in the ozone injecting Water & Waste process.
- *7) Select a vent-hole option (/H) when using permeable fluids (such as nitric acid, hydrofluoric acid, or high-temperature sodium hydroxide).
- *8) Hardness of rubber lining: Polyurethane rubber: Hs80±5, Natural soft rubber: Hs58±5, EPDM rubber: Hs60±5 (Type A: JIS K6253).

T070303.EPS

7.4 Face-to-face Length (Lay Length)

- Both AXF Standard and Replacement Face-to-face Length are available

Nominal Size [mm]	Face-to-face Length of Wafer [mm]		Face-to-face Length of Flange [mm]	
	AXF Standard	Replacement	AXF Standard	Replacement
2.5	81	85	150	—
5	81	85	150	—
10	81	85	150	—
15	81	85	200	*
25	60	93	200	*
32	70	—	200	—
40	70	106	200	*
50	80	120	200	*
65	100	—	200	—
80	120	160	200	*
100	150	180	250	*
125	200	—	250	—
150	200	230	300	270
200	250	300	350	340
250	300	*	450	430
300	350	*	500	*
350	—	—	550	*
400	—	—	600	*

—: No Model
*: Same Face-to-face Length as earlier model.

—: No Model
*: Same Face-to-face Length as earlier model.

F070401.eps

- In case of the flange type of 15 to 100mm with platinum-iridium or tantalum or none grounding ring, the face-to-face length of AXF Standard are longer than those of earlier ADMAG or ADMAG AE.
- The face-to-face length of the ceramics lining types are the same as those of earlier model. So, they can be used for replacement.
- Please refer to the GS sheet for details.

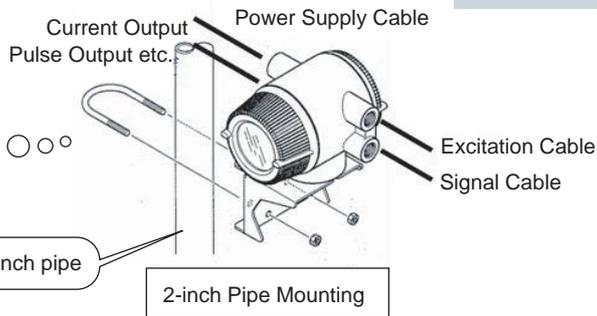
7.5 Explosion Proof Type Remote Converter AXFA14

● Compact Structure Suitable for On-site Installation.

Explosion Proof Lineup
(FM, CENELEC ATEX, CSA, IECEx, TIIS)
Available for hazardous areas.



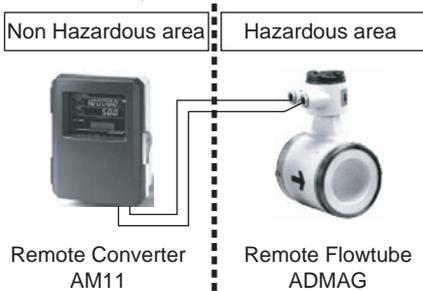
On-site installation
for AXFA14



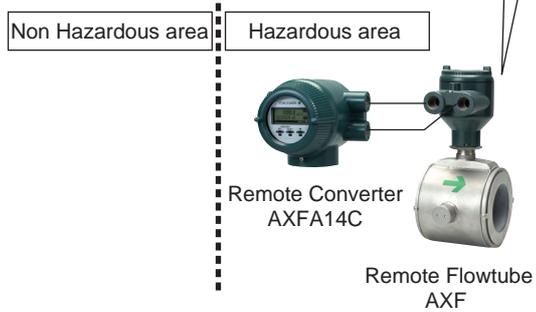
Mount on a 2-inch pipe

Installation Location can be selected freely

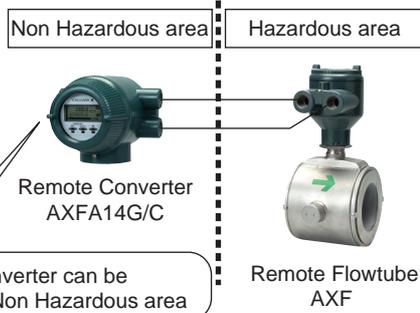
Installation example for earlier model



Installation example for Remote Type



or for Integral Type



Remote Converter can be installed in Non Hazardous area

Integral Flowmeter can be installed in a hazardous area

7.6 Versatile Input/Output Function

- Versatile Input/Output provides many useful functions.
- Integral Type and AXFA14 newly equipped the status input function, and can be controlled from outside.

The list of AXF Input/Output functions and Terminals

			Integral Type AXFA14	AXFA11G
Function	4 to 20mA DC Current Output	Output	√√	√√
	Pulse Output	Output	√	√√
	Alarm Output	Output	√	√
	Warning Output	Output	√	√
	Total Switch	Output	√	√
	H/L Alarm Output	Output	√	√
	Fwd/Rev Flowrate measurement	Output	√	√
	Automatic Ranges Switching	Output	√	√
	Answerback Ranges Switching	Output	√	√
	0% Signal Lock	Input	√	√
	Automatic Zero Adjustment	Input	√	√
	External Total Reset	Input	√	√
	External Forward Total Preset	Input	√	√
	External Reverse Total Preset	Input	√	√
	External Ranges Switching	Input	√	√
Terminal	Current Output		1	1
	Pulse Output		1 (*)	1
	Alarm Output		1 (*)	1
	Status Output		2 (*)	1
	Status Input		1 (*)	1

Input Function
External Control can be possible.

√√: Dedicated Terminal √ : Function Selectable
—: No Function (*): Selectable up to 2 Functions

F070601.eps

REVISION RECORD

Title: Magnetic Flowmeter ADMAG AXF
Manual No.: TI 01E20A01-20E

Edition	Date	Page	Revised Item
1st	Jul. 2006	—	New publication