

FLOWMETER

CUSTOMER

ORDER NO.

MFG. NO.

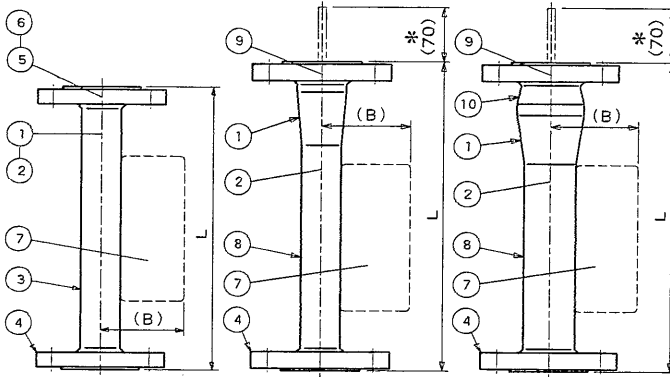
TYPE

AM-1741

FIG. a

FIG. b

FIG. c



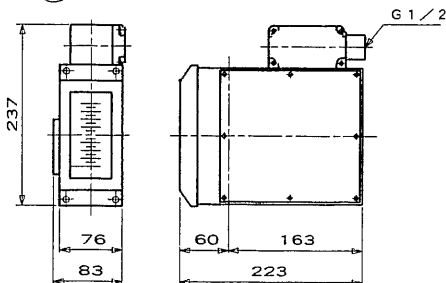
THE ARROWS (↓) SHOW THE GOOD(S) ORDERD.

NO.	1		
TAG NO.	*		
FLUID & STATE	WATER		
SCALE	MAX.	30	
	MIN.	3	m3/h
NOR. FLOW RATE	15		
PRESS.	0.1 MPa	MAX 0.3	
TEMP.	36 °C		
VISCOSITY	1.0 mPa·s		
SP. GR. (DENSITY)	1.0 g/cm3		
FLOW DIRECTION	BOTTOM→TOP	BOTTOM→TOP	BOTTOM→TOP
QUANT.	4		

NO.	FLANGE SIZE & RATING	
	FLANGE SIZE	FLANGE RATING
1	80A	ANSI-CLASS 150 R.F.

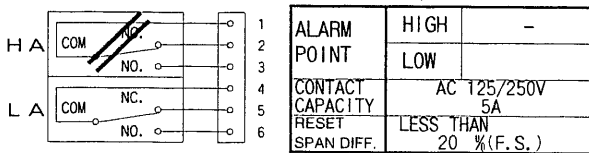
NO.	DIMENSION(mm)		METER SIZE	FIG.
	L	(B)		
	350	89	15A	a
	350	89	20A	b
	350	92	25A	b
	400	99	40A	b
	400	105	50A	c
	450	113	65A	c
1	450	120	80A	c
	450	132	100A	c
	500	145	125A	c
	500	158	150A	c

CASE



WIRING DIAGRAM

Wiring diagram shows alarm signal switch in the off position.



ACCESSORIES:

SPARE PARTS:

TEST PRESS. (WATER) MPa

FINISHING MUNSELL 7.5BG4/1.5

PAINTED: (Stainless steel of the meter size 50A and under is not painted)

No.	PARTS DESCRIPTION	MATERIAL	MATERIAL	MATERIAL
①	METERING TUBE	SUS 304	SUS 304	SUS 316
②	FLOAT ASSEMBLY	SUS 304	SUS 304	SUS 316
③	BODY	SUS 304	SUS 304	SUS 316
④	FLANGE	SS 400	SUS 304	SUS 316
⑤	STOPPER	SUS 304	SUS 304	SUS 316
⑥	PACKING	PTFE	PTFE	PTFE
⑦	CASE	ADC 12	ADC 12	ADC 12
⑧	LOWER BODY	SUS 304	SUS 304	SUS 316
⑨	GUIDE	SUS 304	SUS 304	SUS 316
⑩	UPPER BODY	STPG 370	SUS 304	SUS 316
⑪				
⑫				

NB.:The parts,marked"※",applicable to FIG. c

408010960144

TOKYO KEISO CO.,LTD.	
Date	H 16 . 12 . 10
Chief	royama
Examined	
Drawing	okugakiuchi

Mobarakeh Steel Company
Direct Reduction Plant Module F

IRITEC

COMPRESSOR UNIT : VARIABLE AREA FLOWMEMER										
No.	KSL ITEM NO.	TAG No.	TYPE	CONNECTION	ACCESSORIES	RANGE	Note	MAKER	Q'TY	DWG. No.
VARIABLE AREA FLOWMEMER (WITH TRANSMITTER)										
1	FIT-101	FIT-FE18A	AM-1521	40A ANSI-CLASS 150 RF		0~7m3/h		TOKYO KEISOU	1	AM-1521
2		FIT-FE18B	AM-1521	40A ANSI-CLASS 150 RF		0~7m3/h		TOKYO KEISOU	1	AM-1521
3		FIT-FE23	AM-1521	40A ANSI-CLASS 150 RF		0~7m3/h		TOKYO KEISOU	1	AM-1521
4		FIT-FE31	AM-1521	40A ANSI-CLASS 150 RF		0~7m3/h		TOKYO KEISOU	1	AM-1521
VARIABLE AREA FLOWMEMER (WITH SWITCH)										
					408010960144					
1	FIS-111	FISL-FM22A	AM1741	80A ANSI-CLASS 150 RF		0~30m3/h		TOKYO KEISOU	1	AM1741
2		FISL-FM22B	AM1741	80A ANSI-CLASS 150 RF		0~30m3/h		TOKYO KEISOU	1	AM1741
3		FISL-FM28	AM1741	80A ANSI-CLASS 150 RF		0~30m3/h		TOKYO KEISOU	1	AM1741
4		FISL-FM34	AM1741	80A ANSI-CLASS 150 RF		0~30m3/h		TOKYO KEISOU	1	AM1741

DATA SHEET AND SPECIFICATIONS
ROTAMETER (VARIABLE AREA FLOWMETER)

TAG NO.:FISL-FM22A/B,FM28,FM34		REVISIONS				SPEC NO.	REV.
P & I DIAGRAM NO.:		NO.	BY	DATE	DESCRIPTION	CONTRACT	DATE
FLOW SHEET LINE NO. :						REQ.	P.O.
PROJECT NO.						BY	CHK'D
							APPR.
GENERAL	1	Service	Mach.Water Flow of oil cooler outlet				
	2	Line No. / Vessel No.					
	3	Function	INDICATE/ALARM				
	4	Mounting	PIPE				
	5	Power Supply					
	6	Connection Size	Type	80A	ANSI 150 lb RF		
	7	Inlet Dir.	Outlet Dir.	BOTTOM	TOP SIDE		
	8	Fitting Material	SUS304				
	9	Packing or O-Ring Mtl.	PTFE				
	10	Enclosure Type					
METER	11	Size	Float Guide	80A	EXTENSION		
	12	Tube Mtl.	Float Mtl.	SUS304	SUS304		
	13	Meter Scale: Length & Type		MAGNET COUPLING			
	14	Meter Scale Range		3-30 m3/h			
	15	Meter Factor					
	16	Rated Accuracy		±2%FS			
	17	Hydraulic Calib. Required					
PROBE	18	Fluid		WATER			
	19	Color or Transparency					
	20	Maximum Flow Rate					
	21	Norm Flow	Min Flow	15 m ³ /h			
	22	Oper. Specific Gravity (Liq)		1			
	23	Max Oper. Viscosity		1 CP			
	24	Oper. Press.	Oper. Temp.	1 kg/cm ² G	36 °C		
	25	Oper. Density (Gas)					
	26	Std. Density	Mol. Wgt.				
	27	Max Allowable Press. Drop					
	28						
EXT	29	Extension Well Mtl.					
	30	Gasket Mtl.					
XMTR	31	Transmitter Output					
	32	Trans. Enclosure Class					
	33	Scale Range					
ALARM	34	No. of Contacts	Form	1 POINT	SPDT		
	35	Rating	Housing	AC 250V, 5A	IP 65 Equivalent		
	36	Action		LOW			
	37						
OPTIONS	38	Valve Size & Material					
	39	Valve Location					
	40	Const. Diff. Relay Mtl.					
	41	Purge Meter Tubing					
	42	Air Set					
	43						
	44	Manufacturer		TOKYO KEISO CO.,LTD. ←			
	45	Model No.		AM-1741			

Notes:

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■ GENERAL

AM-1000 series are most well accepted metal tube flowmeters which have been developed based on the long time experience of **TOKYO KEISO** in the field of flow measurement.

In addition to highly reliable local indicators, Pneumatic transmitters, Electric transmitters, Integrator with scaled pulse output as well as Alarm contact output versions are ready to meet the requirements. Standard metallic materials and full line-up of lined materials cover almost all fluids even they are very corrosive.

AM-1000 covers liquids, gases and steam measurement applications in various industrial fields.

*Current transmitter
with Flame Proof
for Hydrogen also!*



■ FEATURES

● **FULL LINE-UP TO MEET ALL POSSIBLE REQUIREMENTS!**

All the necessary functions required for variable area flowmeters, i. e. local indication, pneumatic transmission, electric transmission, integration and alarm are now available from one line.

● **COMPACT DESIGN**

Smaller and lighter To suit modern needs

● **WIDE PRESSURE RANGE**

150 lbs and 300 lbs rating are available as standard and higher pressure versions are also available as option.

● **WIDE RANGE OF MATERIAL SELECTION**

All possible metallic materials and a wide variety of lining materials are available even for corrosive fluids.

● **FOR HAZARDOUS AREA**

Flame proof and Intrinsically safe version (AM-1700) are available to meet hazardous area applications.

Especially, the flame proof enclosure covering hydrogen atmosphere with analog output is available. It is classified as IIC T4 without barrier.

■ MODEL CODE

		MODEL CODE					DESCRIPTION
		AM-1	-	-	-	-	Weather proof (IP54)
Construction	EP-						Flame proof
	IS-						Intrinsically safe *1
Function		40					Local indication
		31					Local indication + Pneumatic transmission
		52					Local indication + Electric transmission
		69					Local indication + Local integration + Pulse output
		74					Local indication + Alarm output
Flow direction		1	-				Bottom-Top
		1-LB	-				Bottom-Top, Long body design
		2	-				Bottom-Top side
		3	-				Bottom side-Top side
		6	-				Left-Right (Horizontal)
		7	-				Right-Left (Horizontal)
Additional function 1			D				Liquid damper *2
			DU				Gas damper
			F				Cooling fin
			DF				Damper + fin *2
Additional function 2				-	JS		Semi Jacket
					-	JF	Full Jacket
Pressure rating						-	General purpose 150 lbs (10K) class
						-	M Medium purpose 300 lbs (20K) class
						-	H High pressure

*1: Intrinsically safe versions is available for IS-AM-174□ with alarm output.

*2: Liquid damper is available for Bottom side-Top side version (AM-1□□3), Left-Right version (AM-1□□6) and Right - Left version (AM-1□□7) only.

STANDARD SPECIFICATION

● FUNCTIONS

AM-140□	AM-131□	AM-152□	AM-169□	AM-174□
Local indication	Local indication Pneumatic transmission	Local indication Electric transmission	Local indication Local integration Pulse output	Local indication Alarm output

- **METER SIZE** Standard 15mm (1/2") ~150mm (6")
(Please refer to M Series for more than 200 mm or 8 inch.)
- **MATERIAL** Standard Carbon steel, SUS304, SUS316, SUS316L
Rubber lining, Fluorocarbon resin lining, PVC lining and Glass lining
- On request Other metallic material
- **PRESSURE RATING** Standard 150lbs (10K) class
300lbs (20K) class
- On request Consult factory for higher pressure.
*Only 150 lbs (10K) class is available for full jacketed flowmeters (AM-1□□□-JF) and lining material flowmeters.

● OPERATING PRESSURE

		General purpose 150lbs (10K) class AM-1□□□-□			Medium pressure 300lbs (20K) class AM-1□□□-M				
		°C	°F	°C	°F	°C	°F	°C	°F
Fluid Temp		~120	~220	~300	~120	~220	~300	~350	~400
		248	428	527	248	428	527	662	752
Max.Op.Press	MPa	1.4	1.2	1.0	3.4	3.1	2.9	2.6	2.3

Consult factory for the specifications of higher pressure model, AM-1□□□-H.

● CONNECTION

- Standard Flange connection
- On request Screw connection (Consult factory)

Low pressure AM-1□□□-□	Standard JIS10KFF	ANSI, DIN, Other type are available
Middle pressure AM-1-□□□-M	Standard JIS20KRF	
High pressure AM-1-□□□-H	Consult factory	

Only RF (Raised faced) flange is available for glass, PVC and fluorocarbon resin lined flowmeters. Only FF (Flat faced) flange is available for rubber lined flowmeters.

● FLUID TEMPERATURE

a) Metallic material

Type		AM-1□□□1	AM-1□□□2/3	AM-1□□□2/3-F
Max.Op.Temp	°C	200 ^{*1}	149	400 ^{*2}
	°F	392	302	752

*1: Upto 250°C possible on request.

*2: Max. 300°C for general purpose 150lbs (10K) class

b) Lining Material

Lining Material		Rubber Lining	Fluorocarbon resin Lining	PVC Lining	Glass Lining
Op.Temp.Range	°C	-10~80	-10~80	0~60	-10~110*
	°F	14~176	14~176	32~140	14~230

*Max. 80°C for Fluorocarbon resin float

- **ACCURACY (LOCAL INDICATION)** Standard ± 1.5%F.S.*
On request ± 1.0%F.S., Consult factory
*± 2.0%F.S. for resin material float version
- **STANDARD SCALE LENGTH** 75mm
- **RANGEABILITY** 10 : 1
- **INDICATOR CONSTRUCTION** Weather proof (Equ. to IP54)

REFER TO THE PAGES OF APPLICABLE MODEL CODES FOR THE DETAILS OF TRANSMITTER SPECIFICATION.

■ DIMENSIONS, MATERIAL, PRESS. DROP, FLOW RATE TABLE

[METALLIC MATERIAL]

- **Type AM-1□□1 (Flow direction:Bottom-Top) For liquids**
 Type AM-1□□1-LB (Bottom-Top, Long body design)

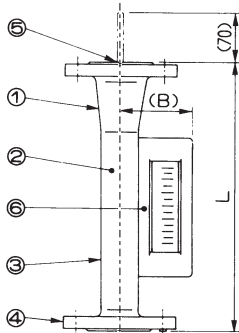


Fig. 15

*1 Float rod comes out 70mm during operation in meter size 20mm~150mm. In case of AM-1□□1-LB (Bottom-Top, Long body design) this coming out is avoided by extending the tube length. The extension length of body (L dimension) is 130mm for 10K (150lbs) version. Consult factory for length of 20K (300lbs) version.

■ Table 1

Meter size		Q _{water} (m ³ /h)	Pressure Loss (kPa)	10K Class AM-1□□□□			20K Class AM-1□□□□-M		
(mm)	(inch)			L ^{*1} (mm)	(B) (mm)	Mass (kg)	L (mm)	(B) (mm)	Mass (kg)
15	1/2	0.1 to 0.75 (0.7)	6.5	350	89	5	350	89	5
20	3/4	1.5 (1.5)	6.0	350	89	5	400	89	6
25	1	4.06 (3.8)	7.3	350	92	6	400	92	7
40	1-1/2	7.15 (7.15)	9.0	400	99	8	400	99	9
50	2	15.1 (15.1)	6.3	400	105	10	450	105	12
65	2-1/2	27.5 (26.5)	7.8	450	113	13	500	113	18
80	3	40.5 (39.5)	9.1	450	120	15	500	120	20
100	4	71.9 (67.5)	12.0	450	132	20	500	132	28
125	5	110 (-)	14.0	500	145	32	-	-	-
150	6	150 (-)	18.0	500	158	50	-	-	-

Figures in () are those of 20K class.

■ Table 2

No.	Description	Class 1	Class 2	Class 3	Class 4
1	Tapered tube	SUS304	SUS304	SUS316	SUS316L
2	Float ass'y	SUS304	SUS304	SUS316	SUS316L
3	Lower body	SUS304	SUS304	SUS316	SUS316L
4	Flange	SS400	SUS304	SUS316	SUS316L
5	Float guide	SUS304	SUS304	SUS316	SUS316L
6	Indicator	ADC12	ADC12	ADC12	ADC12

Other special metallic material available on request.

- **Type AM-1□□1-DU (Flow direction : Bottom-Top with damper) For gases**

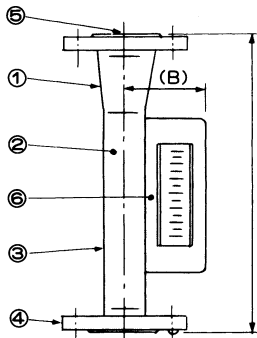


Fig. 16

■ Table 3

Meter size		Q _{air} m ³ /h(nor)	Pressure Loss (kPa)	Size (mm)		Mass (kg)
(mm)	(inch)			L	(B)	
20	3/4	16 to 50	10.0	500	89	5
25	1	120	10.0	500	92	6
40	1-1/2	210	12.0	500	99	8
50	2	420	10.0	500	105	10
65	2-1/2	820	16.5	600	113	13
80	3	1200	23.0	600	120	15
100	4	2050	24.0	600	132	20

■ Table 4

No.	Description	Class 1	Class 2	Class 3	Class 4
1	Tapered tube	SUS304	SUS304	SUS316	SUS316L
2	Float ass'y	SUS304	SUS304	SUS316	SUS316L
3	Lower body	SUS304	SUS304	SUS316	SUS316L
4	Flange	SS400	SUS304	SUS316	SUS316L
5	Float guide	SUS304	SUS304	SUS316	SUS316L
6	Indicator	ADC12	ADC12	ADC12	ADC12

Other special metallic material available on request.

- **Type AM-1□□2 (Flow direction : Bottom-Top side) For liquids**

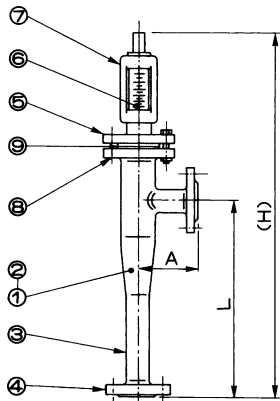


Fig. 17

■ Table 5

Meter size		Q _{water} (m ³ /h)	Pressure Loss (kPa)	10K Class AM-1□□□□				20K Class AM-1□□□□-M			
(mm)	(inch)			(H) (mm)	L (mm)	A (mm)	Mass (kg)	(H) (mm)	L (mm)	A (mm)	Mass (kg)
15	1/2	0.1 to 0.69 (0.69)	8.5	650	250	100	8	650	250	100	10
20	3/4	1.6 (1.6)	9.1	650	250	100	8	660	250	100	10
25	1	4.19 (3.6)	6.0	650	250	100	10	670	250	100	12
40	1-1/2	7.73 (5.9)	5.0	670	250	100	12	680	250	100	15
50	2	15.1 (12.4)	8.0	680	250	100	15	720	250	100	20
65	2-1/2	29.3 (25.0)	6.5	780	350	150	22	810	350	150	28
80	3	40.8 (34.3)	12.7	820	350	150	25	840*1	350	180	35
100	4	70.8 (55.0)	13.6	840*1	350	150	43	880*1	350	180	55
125	5	110 (-)	16.0	860*1	370	250	55	-	-	-	-
150	6	150 (-)	21.0	970*1	480	250	75	-	-	-	-

Figures in () are those of 20K class.

■ Table 6

No.	Description	Class 1	Class 2	Class 3	Class 4
1	Tapered tube	SUS304	SUS304	SUS316	SUS316L
2	Float ass'y	SUS304	SUS304	SUS316	SUS316L
3	Body	SGP*2	SUS304	SUS316	SUS316L
4	Flange	SS400	SUS304	SUS316	SUS316L
5	Upper flange	SS400	SS400	SS400	SS400
6	Lead pipe	SUS304	SUS304	SUS316	SUS316L
7	Indicator	ADC12	ADC12	ADC12	ADC12
8	Bolt&nut	SS400	SS400	SS400	SS400
9	Gasket	Non-asbestos/ PTFE	Non-asbestos/ PTFE	Non-asbestos/ PTFE	Non-asbestos/ PTFE

"H" dimension will be extended by 130mm if a cooling fin is provided

*1 "H" dimension will be extended by 30mm with pneumatic transmitter without fin.

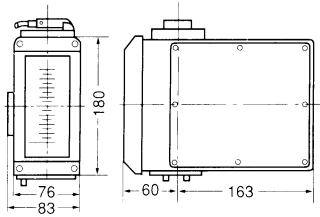
*2 STPG 370 for Medium press. 300 lbs (20K) class.

Other special metallic material available on request.

SPECIFICATION OF TRANSMITTER AND INDICATOR

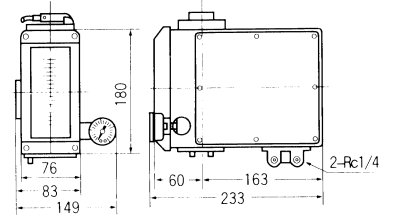
● AM-1401-SR
Local indication type

DIMENSION OF INDICATOR



● AM-1311-SR
Local indication + Pneumatic output type

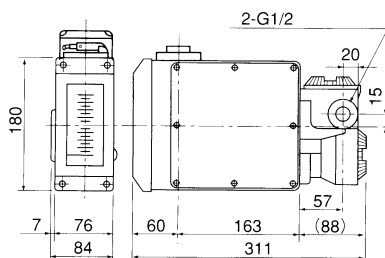
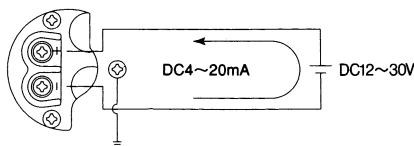
- Air supply : 0.14 ± 0.01MPa
- Outputs : Standard 20 to 100kPa (with output gauge)
- Air consumption : 14L/min(nor)
- Connection : Standard Rc 1/4
On request NPT 1/4
- Output accuracy : ±1.0%F.S.
- Construction : Weather proof (Equ. to IP54)
- Ambient Temp : -20 to 80°C
Provide heat insulation if required.
- Accessory : Air set (On request)



● AM-1521-SR
Local indication + Electric output type

- Power supply voltage : Weather proof and flame proof
DC12 to 30V
- Output : DC4 to 20mA
- Max load : Weather proof and flame proof
600Ω (DC24V)
- Cable entry : Weather proof :
2xG1/2 or 2xNPT1/2
Flame proof :
2xG1/2 or 2xNPT1/2
Option :
Packing type cable gland
Specified cable gland (Type SXC-16B Shimada Electric Co.) to be used for flame proof construction work.
- Output accuracy : ±1.0%F.S.
- Construction : Weather proof ;
Equ. to IP54 AM-152□
Flame proof ;
Exd II BT4 EP-AM-152□
On request ;
Exd II CT4 EP-AM-152□
- Amb. temp. : Weather proof ; -30 to +70°C
Flame proof ExdII BT4 ;
-20 to +55°C
ExdII CT4 ;
-20 to +55°C

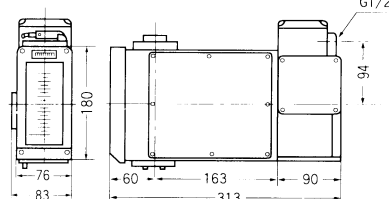
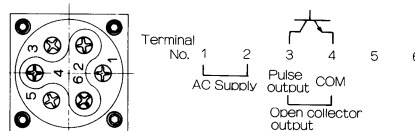
● Terminal and wiring



● AM-1691-SR
Local indication + Totalization + Scaled Pulse output type

- Integration : 6 digit with reset
- Count rate : 50 to 2000c/h
- Pulse output : Open collector output
Pulse width 100ms,
Rating DC35V, 50mA
(Signal circuit and power supply circuit are isolated.)
- Integration accuracy : ±2.0%F.S.
- Power supply : AC100V, 50/60Hz as standard. AC110V, 50/60Hz is also available on your request except flame proof version.
A separate transformer is required for other voltage.
- Power consumption : Max. 5VA
- Cable entry : Standard : G1/2 with female screw
Cable gland with flameproof gasket available on request
On request : NPT1/2
- Enclosure : Weather proof (Equ. to IP54)
type AM-169□
Flame proof (JISd2G4)
type EP-AM-169□
- Ambient temp : -20 to 80°C
for type AM-169□
-10 to 60°C
for type EP-AM-169□
Provide heat insulation if required

● Wiring diagram



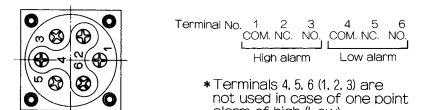
● AM-1741-SR
Local indication + Alarm Contact(s) type

- Alarm point : 1 point high alarm or
1 point low alarm or
2 points high and low
- Switch : Micro switch SPDT
- Rating : Standard : AC 125/250V, 5A
On request : DC 30V, 0.1A
Reset span : Weather proof and Intrinsically safe within 20% (F.S.)
Flame proof EP-AM-174□ within 30% (F.S.)
- Cable entry : Standard : G1/2 with female screw
Conduit connection is standard. Packing type cable gland is also available.
On request : NPT 1/2
- Enclosure : Weather proof (Equ. to IP54)
type AM-174□
Flame proof (JISd2G4)
type EP-AM 174□
Intrinsically safe (ExialICT6)
type IS-AM-174□*
* Supplied with safety barrier
- Ambient temp : -25 to 80°C
for type AM-174□
-10 to 60°C
for type EP-AM-174□
IS-AM-174□
Provide heat insulation if required

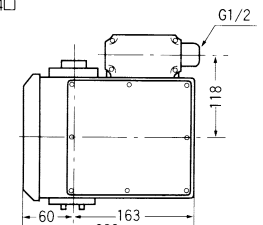
● Wiring diagram



AM-174□ and IS-AM-174□



EP-AM-174□

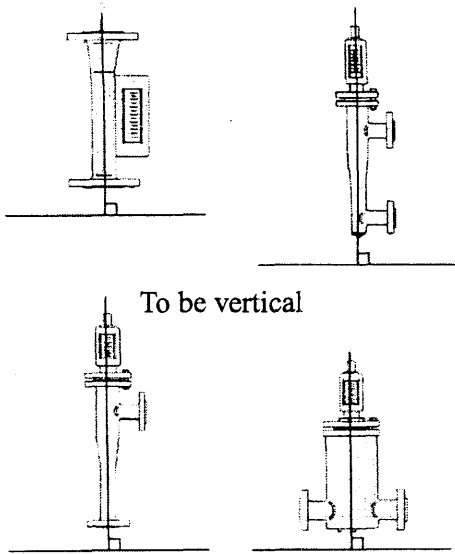


8.2.2 INSTALLATION ANGLE

For all types (for any flow direction), tapered tube portion is to be strictly vertical.

Inclination may produce indication error and/or wrong operation.

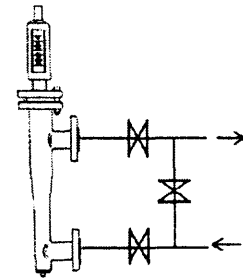
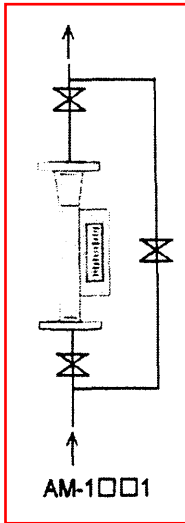
Acceptable inclination is 2°.



8.2.4 BYPASS PIPING

It is recommended to provide by pass piping with isolating valves for maintenance during operation.

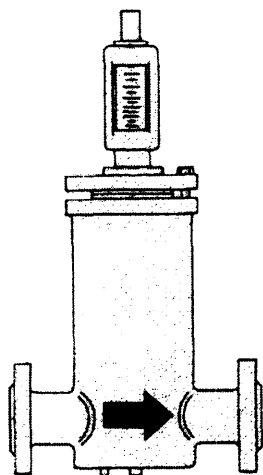
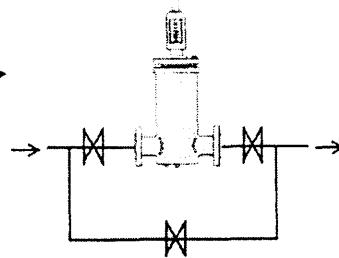
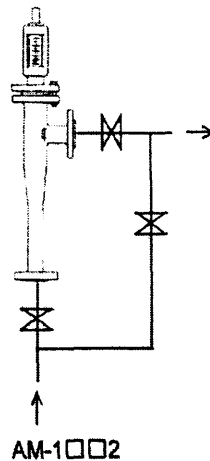
The following are examples of bypass piping:



8.2.3 FLOW DIRECTION

The measuring fluid is to be introduced from bottom end of flowmeter and discharged from top end of flowmeter for standard versions.

For horizontal piping versions(□□-AM-1□□6/7),an arrow mark is indicated on the tube part of flowmeter. The measuring fluid is to flow according to such arrow mark indication.



- For general gas application , Silicon oil is used. For corrosive gases, fluorine oil is used. Recommended oil and required volume of oil for sizes are as follows;

○ Recommended oil

For general gases	KF96-100 (Shinetsu Silicone Co.)
For corrosive gases	Difloil #10 (Daikin Co.)

○ Required volume of damper oil

Meter size	Required volume(cc)
15mm	20
20mm	45
25mm	70
40mm	155
50mm	255
65mm	255
80mm	555
100mm	555

- Close Damper plug properly.

- In case of glass lined material version (Type AM-1 □ □ 3-D), such damper plug is not provided. A spacer with injection plug is provided between damper unit and lower body. Inject damper liquid through such injection plug.

9. WIRING AND ADJUSTMENT

Local indication type (Type AM-140 □) may start up without any wiring or adjustment. For other types, conduct the following wiring, etc.

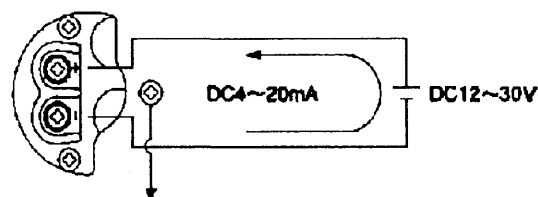
9.1 FOR ANALOG OUTPUT VERSION

(Type AM-152 □)

9.1.1 WIRING

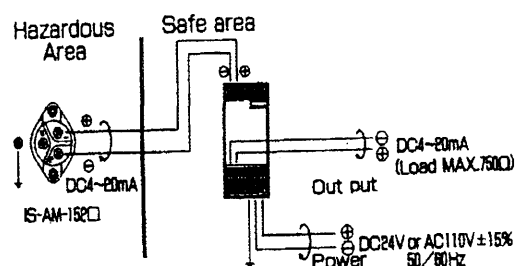
Wiring is to be conducted according to the following wiring diagram.

- For Weatherproof and Pressure tight Ex-proof versions



Use Pressure tight cable gland type SXC-16B manufactured by Shimada Electric for Ex-d applications.

- For Intrinsically Safe version



Use compression or other suitable terminal chips connection material for firm connection.

⚠ CAUTION

- Conduct watertight sealing for cable entry after completion of wiring to prevent introduction of rain water, etc.

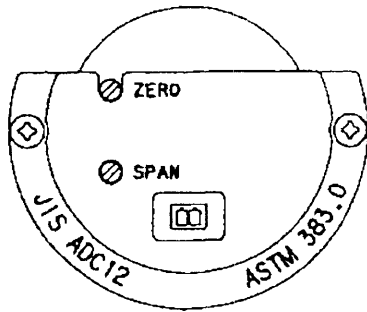
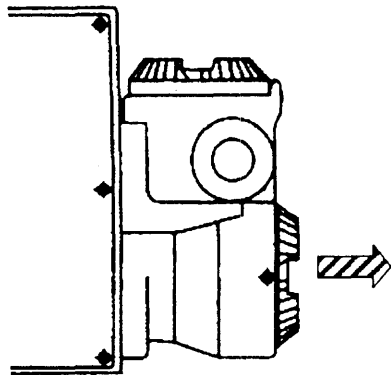
⚠ CAUTION

- The supply voltage and load resistance are to be according to the specification.

9.1.2 ADJUSTMENT OF ZERO AND SPAN

Output span and zero can be adjusted by the following procedure:

- Connect current meter.
- Open the housing cover of transmitter housing (Rear side). Position transducer can be approached.



- Open the front cover of indicator housing.
- Set pointer to Zero flow indication.
- Adjust Zero Potentio-meter to obtain 4 mA.
- Set pointer to 100% flow point.
- Adjust Span Potentio-meter to obtain 20 mA.
- Shift pointer to 50% position and confirm the output is 12mA.
- Close the front cover of indicator housing.
- Close the housing cover of transmitter housing.

⚠ CAUTION

When the housing cover of transmitter housing is opened, the ex-proof construction is not maintained. Thus adjustment is to be conducted in non-hazardous safe area.

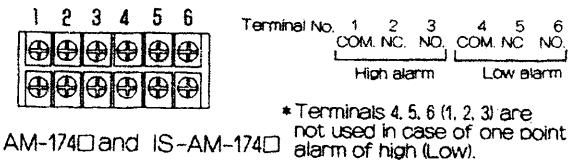
9.2 FOR ALARM CONTACT VERSION

(Type AM-174 □)

9.2.1 WIRING

Wiring is to be conducted according to the following wiring diagram.

- For Weatherproof and Intrinsically Safe version

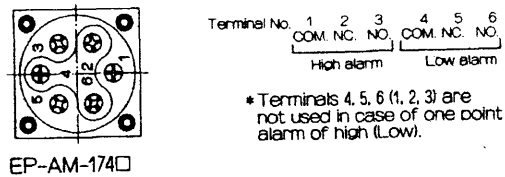


AM-174□ and IS-AM-174□

⚠ CAUTION

In case of Intrinsically Safe version, specified safety relay is to be properly installed.

- For Pressure tight Ex-proof versions



EP-AM-174□

⚠ CAUTION

Follow the regulation of explosion proof.

Use compression terminal chips or other suitable connection material for firm connection.

⚠ CAUTION

Conduct watertight sealing for cable entry after completion of wiring to prevent introduction of rain water etc.

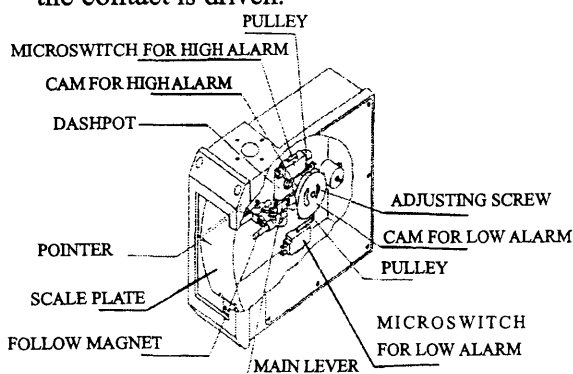
⚠ CAUTION

The contact capacity of alarm is to be strictly observed.

9.2.2 CHANGE OF ALARM SETTING POINT

In case of Weatherproof and Intrinsically safe version

- Alarm contact switch(es) is/are located in indicator housing.
- The following figure is for two point (High and Low) alarm version.
- Switch driving cam (s) is/are connected to Main Lever which moves up and down according to flow rate. The cam(s) rotate(s) in accordance with such change of flow rate. The cam(s) actuate(s) microswitch at set point and the contact is driven.



Change of alarm setting point is conducted as follows:

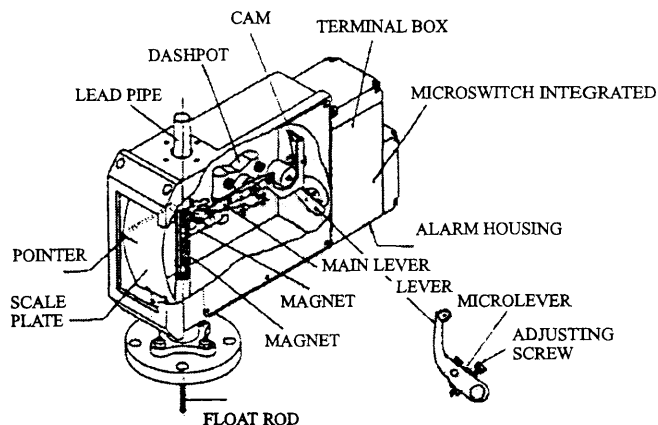
- Open front and side cover of indicator housing.
- Loosen adjusting screw to enable cam(s) to rotate freely.
- Move the pointer of flowmeter to required alarm setting position. Adjust the angle of subject cam to actuate alarm switch.
- The low alarm should be actuated in the direction of flow decrease. On the contrary, high alarm switch should be actuated for the direction of flow increase.
- After completion of such setting, tighten the adjusting screw to fix the cam(s).
- Move the pointer for full span to confirm the actuation and release of alarm switch(es) at required positions with acceptable reset span. (Use digital multi-meter or judge by the sound of clicking of switch)
- In case of two point alarm version, first remove outer cam and adjust inner switch first and then, install outer cam for further setting of another contact.
- After completion of setting, close front and side cover of indicator properly.

In case of Pressure tight explosion proof version

- The motion of indicator lever is converted into rotation angle by the cam. Such rotation is transmitted to the switch actuation mechanism in separate exproof housing.
- Digital multi-meter to check the switch actuation is required. Connect properly to subject alarm output terminal.
- Open front and side cover of indicator housing.

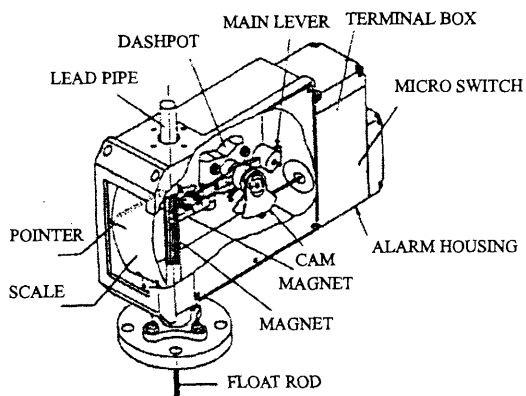
For One point alarm

- I. Move the pointer of flowmeter to required alarm setting position and fix it.
- II. Rotate the micro-lever to the point where the switch is actuated.
- III. Move the pointer for to span to confirm the actuation and release of alarm switch at required positions with acceptable reset span.



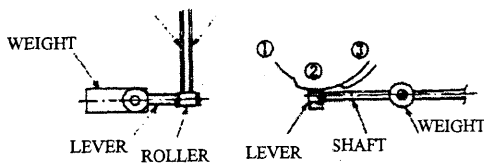
For Two point alarm

- I. Two separate cams are provided for High and Low alarm.
- II. First, remove cam at outer portion and adjust angle of inner cam (High) (loosen the set screw of cam and rotate the cam and then tighten the screw.)
- III. After completion of adjustment of High alarm, set the outer cam and adjust angle for Low alarm.



CAM FOR UPPER

CAM FOR LOWER



- Move the pointer to full span to confirm the actuation and release of alarm switch at required position with acceptable reset span.
- After completion of setting, close front and side cover of indicator properly.

⚠ CAUTION

Explosion proof construction is lost when the terminal box cover is opened. Such adjustment is to be conducted in non-hazardous safe area or after turning OFF the power supply to alarm contact.

9.2.3 CHANGE OF ALARM ACTION (H/L)

Change of alarm actuating cam is required. Modification is required. Contact Tokyo Keiso.

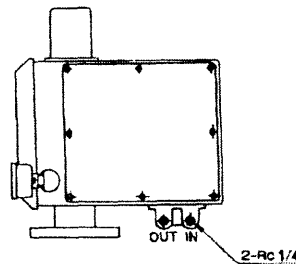
9.3 FOR PNEUMATIC OUTPUT VERSION

(TYPE AM-131□)

9.3.1 CONNECTION OF AIR PIPING

Supply and output ports are provided on the side of indicator housing. Standard connection is Rc1/4 thread. NPT 1/4 and other threads are also available as option. Confirm such connection in Approval Drawing.

- Connect piping to IN and OUT properly.

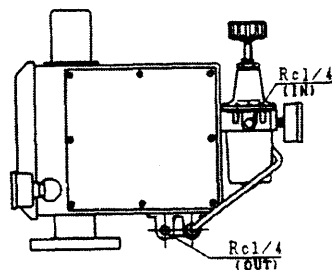


- Output pressure can be monitored by Output pressure gauge which is located on the left hand side of indicator.

📄 NOTES

The supply air is to be clean and free from condensation. Humidity/condensation may cause output error and/or wrong function of output. The supply air is to be 1.4 kgf/cm²G ± 0.1 kgf/cm²G.

Air set (Filter regulator) is additionally provided as option. For this version, the supply air is to be 2~9.9kgf/cm²G and reduced by the air set.



Example of Air set version

📄 NOTES

For Pneumatic output version (AM-131□), local pointer indication may be wrong if specified air is not supplied.

9.3.2 ZERO AND SPAN ADJUSTMENT

Requirements

- Plus driver for M4
- Pressure gauge with Rc 1/4 connection (Provided output gauge may also be used for rough adjustment.)
- Air supply of 1.4 kg/cm²

Checking of output

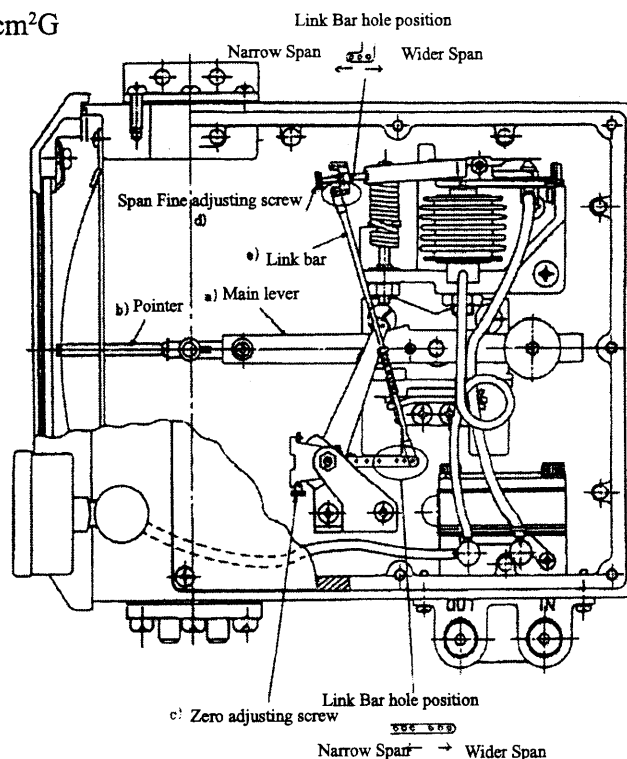
- Supply specified air source to transmitter
- Connect Pressure gauge to output port. (In case output gauge is used, close output port firmly.)
- Open the side cover of indicator housing.
- Move main lever and shift the pointer position and confirm the output corresponds to the standard output. Refer to the table below.
- In case the output is in specification, close the side cover of indicator housing and connect output properly.

Adjustment of output

If adjustment of output is required, follow the following procedure:

- Zero adjustment
 - Set the indication pointer at Zero position.
 - Rotate Zero adjusting screw to obtain specified output pressure.
- Span adjustment
 - Set the indication pointer at 100% position.
 - Rotate Span Fine adjusting screw to obtain specified output pressure. (1.0 kg/cm²G)
 - If Span Fine adjusting screw can not cover the adjusting range, shift the hole position of Link Bar connection and again conduct fine adjustment by Span Fine adjusting screw.
 - It is recommended to conduct Zero and Span adjustment several times in turn for better output accuracy.

Indication	Std. Output	Tolerance
0%	0.20 kg/cm ² G	±0.008kg/cm ² G
10%	0.28 kg/cm ² G	±0.008kg/cm ² G
25%	0.40 kg/cm ² G	±0.008kg/cm ² G
50%	0.60 kg/cm ² G	±0.008kg/cm ² G
75%	0.80 kg/cm ² G	±0.008kg/cm ² G
100%	1.00 kg/cm ² G	±0.008kg/cm ² G



13. REPLACEMENT OF ELECTRIC

TRANSMITTER FOR TYPE AM-152

⚠ CAUTION

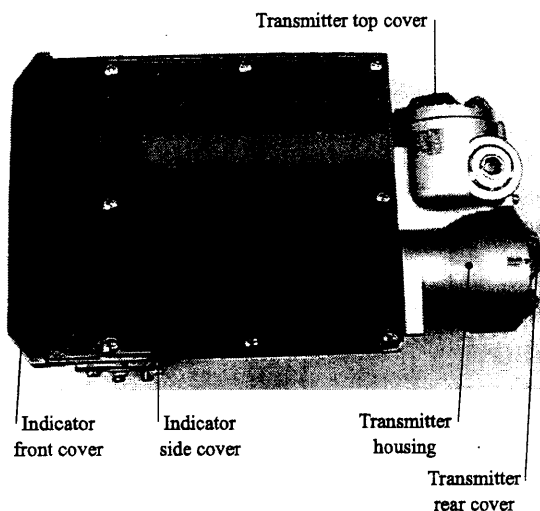
In case of EP-AM-1520(ex-proof versions), the replacement work must not be conducted in hazardous area. Indicator housing with transmitter is to be removed from rotameter and replacement is to be conducted in safe area.

13.1 REQUIRED TOOLS / INSTRUMENTS

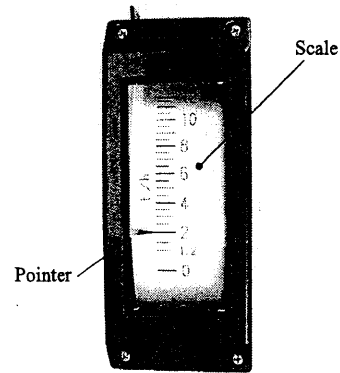
- ① Digital multi meter
To measure DC current and voltage for checking of output.
 - ② Hex wrenches
M3 for fixing micro lever.*
 - ③ Plus(+) screw driver
M4 for fixing front and side cover.*
M3 for fixing position transducer installation
M5 for fixing transmitter*
(Handle length requires more than 220 mm.)
 - ④ Minus(-) precision driver Width
= 1.4 ~ 2.0 mm
For Zero and Span adjustment
 - ⑤ DC24V power supply
- *: Required for Total Transmitter Housing Replacement

13.2 FOR REPLACEMENT OF TOTAL TRANSMITTER HOUSING

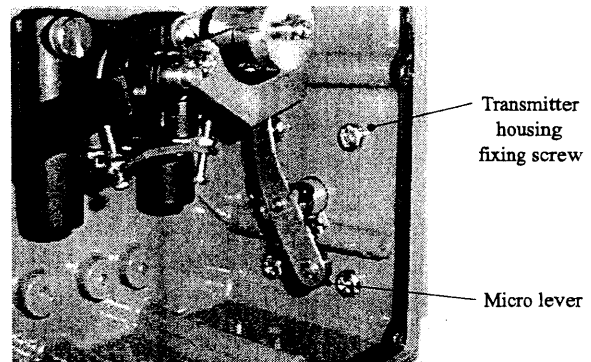
- ① Turn off power supply of transmitter.
- ② Open transmitter housing top cover and remove connected cables.
- ③ Remove front cover(M4 x 4) and side cover (M4 x 8w) of indicator.



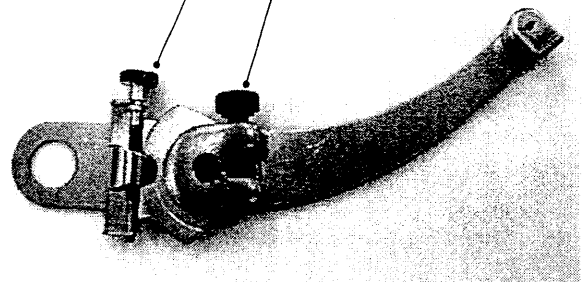
- ④ Remove scale plate.



- ⑤ Remove micro lever by loosening (M3 x 1) fixing screw.

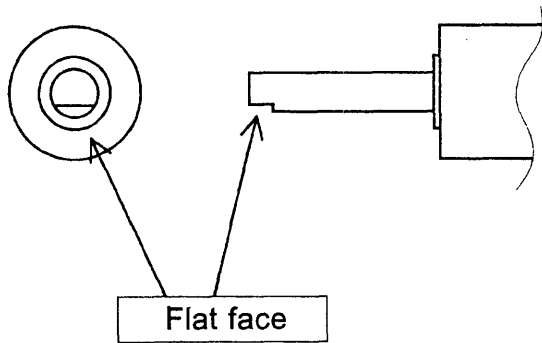


Zero adjustment screw Micro lever fixing screw



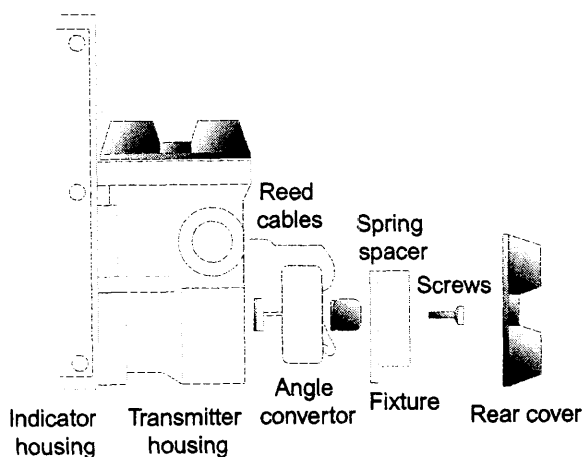
- ⑥ Remove transmitter unit as follows ;
 - a) Remove (M5 x 6) transmitter housing fixing screws from the front opening of indicator.
 - b) Pull out transmitter from housing.
- ⑦ Re-assembling new transmitter in order of ⑥-⑤-④-③-②.
- ⑧ In this case,
The pointer of the indicator is to indicate Zero point.
The micro lever is to be installed onto transmitter

housing shaft so that then flat face of the shaft matches to the flat portion of micro lever hole.



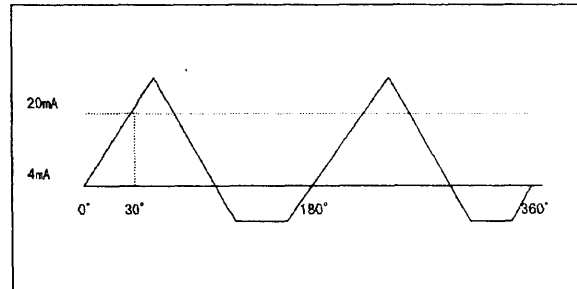
13.3 IN CASE OF REPLACEMENT OF ANGLE CONVERTER ONLY

- ① Turn off power supply of transmitter.
- ② Take off reed cables from angle converter.
- ③ Open rear cover of transmitter housing.
- ④ Remove angle converter fixing screws (x 2).
- ⑤ Pull out angle converter.
- ⑥ Fix new angle converter with magnet coupling.
- ⑦ Confirm the spring spacer is properly inserted between angle convertor and the fixture.
- ⑧ Connect reed cables to terminal block.
- ⑨ Turn on the power supply.
- ⑩ Conduct "ADJUSTMENT OF OUTPUT" according to 13.4.
- ⑪ Close rear cover of terminal box.

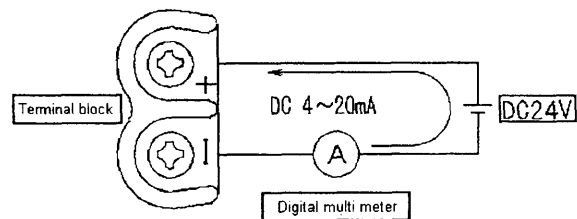


13.4 ADJUSTMENT OF OUTPUT

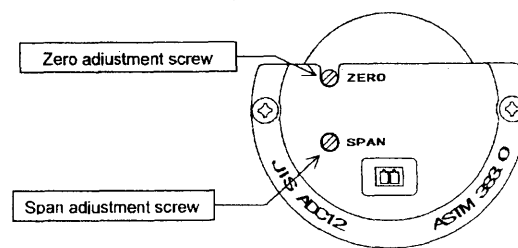
- ① Output slopes are obtained when the shaft of transmitter is rotated counter clockwise as shown in Figure blow.



- ② Connect digital multi meter to minus(-) and plus(+) terminals.



- ③ 4mA is to be obtained when main pointer indicates 0% of flow. Adjust Zero adjustment screw.
- ④ Move main pointer to indicate 100% and adjust output to be 20mA by span adjustment screw at the back of transmitter.



- ⑤ Confirm again zero point. Output will be 4mA.
- ⑥ If some tolerance is found, adjust again the zero adjustment screw.
- ⑦ Conduct ③ and ④ several times.
- ⑧ The acceptance tolerance is $\pm 0.16\text{mA}$.
- ⑨ Close covers properly.