TECHNICAL GUIDANCE

COMPACT AND USER FRIENDLY

MX Series

Metal Tube Type Variable Area Flowmeter

OUTLINE

MX Series flowmeter is the metal tube type variable area flowmeter having the unified 250mm face-to-face dimension.
The compact and space saving size allows simpler piping design. The standardization of specifications and materials offers you competitive prices and short delivery.
The local indication, alarm output and current output functions meet various applications.

MX-400, MX-71□

STANDARD SPECIFICATION

- Measuring fluids : Liquids, Gases
- Connection size : 15mm to 100mm (1/2 inch to 4 inch)
- Connection rating : Flange connection JIS 10K, 20K RF/FF
  ANSI Class 150, 300RF
  Connections of other standards are available. Consult TOKYO KEISO.
- Face-to-face dimensions : See below unit in mm.

Connection rating	Fluids	Meter size (mm) / Connection size (A)						
		15	20	25	40	50	80	100
JIS 10K	Liquids	250						250
ANSI 150Lb	Gases							300
JIS 20K	Liquids	250					300	
ANSI 300 Lb	Gases							

MX-52E

- Fluid temperature : –20 to +120°C
- Ambient temperature : –25 to +80°C (local indication type)
  : –20 to +55°C (transmitter type)
- Fluid pressure : 4.1MPa at ambient temperature
  3.3MPa at 120°C
- Flow direction : Bottom to Top
- Indication accuracy : ±1.5% F.S. as standard
- Rangeability : 10 : 1
- Indicator construction : IP 65
- Painting : Munsell 7.5 BG 4/1.5

MODEL CODE

Model	Function
MX-400	Local indication with pointer and scale plate
MX-710	Local indication with pointer and scale plate and 1 point alarm (Non explosion proof)
MX-71S	Local indication with pointer and scale plate and 1 point alarm (Intrinsically safe)
MX-52E	Local indication with pointer and scale plate and current output (Flameproof)
MX-52D	Local indication with LCD and current output (Flameproof)

MX-52D

MX Series flow rate range

● For liquid measurement

Meter size mm / Connection size in mm and inch		Flow rate m³/h	Max. pressure loss kPa	Max. viscosity ✻1 mPa·s
15	(1/2)	0.1 to 1.5	11	30
20	(3/4)	0.9 to 2	9	40
25	(1)	0.9 to 4	9	50
40	(1・1/2)	2 to 12	26	80
50	(2)	3 to 20	14	100
80	(3)	17 to 40	19	100
100	(4)	36 to 85	30	100

✻1 Consult TOKYO KEISO for the fluid having more than above viscosity.

Flow rates on the Flow rate table are for liquid application equivalent to water (Density 1.0g/cm³ and Viscosity 1.0 mPa•s). If actual fluid condition has different values, a conversion calculation is required per following formula:

$Qw = Q \times 2.59 / \sqrt{((7.7/\rho) - 1)}$

Qw : Water converted flow rate (m³/h)

Q : Flow rate of actual fluid (m³/h)

ρ : Density of actual fluid (g/cm³)

Consult us about high viscosity specification.

● For gas measurement

Meter size mm / Connection size in mm and inch		Flow rate m³/h (nor)	Max. pressure loss kPa
15	(1/2)	3 to 35	11
20	(3/4)	27 to 60	9
25	(1)	27 to 100	9
40	(1・1/2)	56 to 250	26
50	(2)	84 to 500	14
80	(3)	420 to 1000	19
100	(4)	1025 to 1500	30

✻1 Consult TOKYO KEISO when connection size requires bigger than meter size

Flow rates on the Flow rate table are measurable flow rates for air 20°C, 0MPa (1atm). If actual fluid condition has different from values, a conversion calculation is performed by the following formula:

$QA = Q \times 0.01635 \times \sqrt{(\rho \times (273+t) / (0.1013+P))}$

QA : Converted flow rate in air 0°C, 0MPa [m³/h(nor)]

Q : Flow rate of gas to be measured [m³/h(nor)]

ρ : Density of gas to be measured [kg/m³ (nor)]

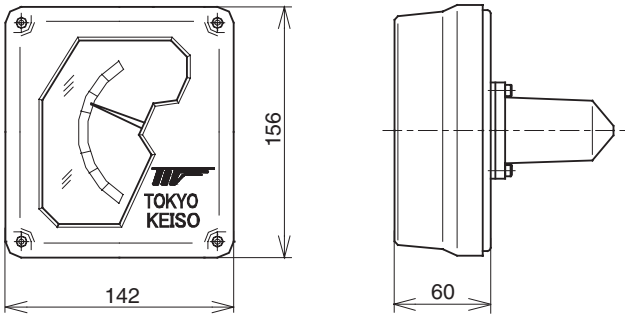
P : Operating pressure (MPa)

t : Operating temperature (°C)

MX-400 Local indication with pointer and scale plate

The instantaneous flow rate is indicated with the pointer on the scale plate.

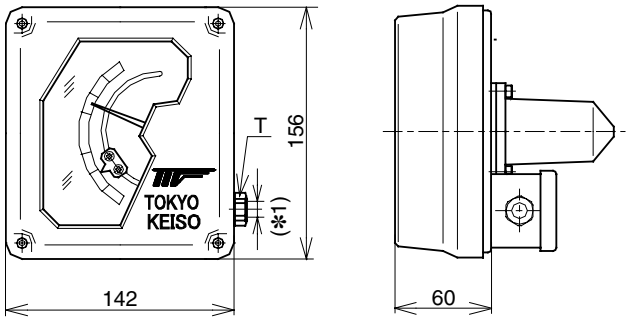
● Dimensions of the indicator



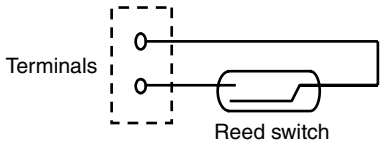
MX-710/71S Local indication with pointer and scale plate and 1 point alarm

An alarm output function can be added to local indicator upon your request. Please specify it when ordering including whether high or low alarm with its motion of open or close at alarm activation, which are required for manufacturing.

● Indicator dimensions



● Terminal connection diagram



● Alarm output specification

· Alarm set points : High alarm 1 point (open or close)
: Low alarm 1 point (open or close)
· Contact system (self-holding) : Reed switch 1point, variable with pointer
· Electrical rating
Max. voltage : 125 V AC or 100 V DC
Operating current capacity : 10 μA to 0.5 A
Max. switching capacity : 10 VA or 10W

Note) The rating metioned above shows the case of resistance load. When using other loads, welding of a contact may be caused by an inrush current. Use it not to exceed rating at the maximum inrush current.

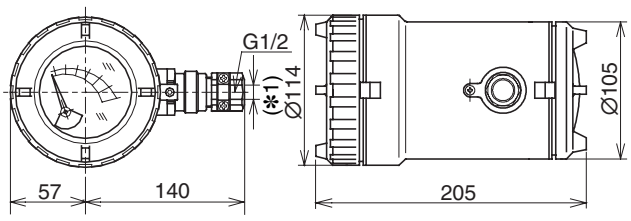
Kind of load	Inrush current
Lamp load	5 to10 times of ordinary use
Motor load	10 to 15 times of ordinary use
Inductive load	4 to 5 times of ordinary use

· Wiring connection : Waterproof gland (T) SCLOCK
: Applicable cable diameter *1 is 4.5mm ∅ to 6.5mm ∅
· Terminal screw : M3
· Setting accuracy : ±2% F.S.
· Reset span : Less than 20%F.S.
◆Intrinsically safe MX-71S
· Protection class : Ex ia IIC T6
· Safety barrier (intrinsically safe relay)
: EB3C manufactured by IDEC
Install the barrier in the non-hazardous area.

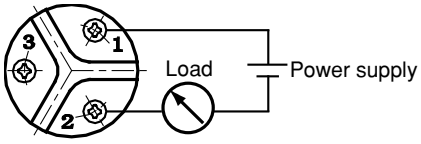
MX-52E Local indication with pointer and scale plate and current output

The current output function is added to local indicator.
The instantaneous flow rate is indicated with the pointer and scale plate locally. The flow rate of 4 to 20mA current signal is transmitted.

● Indicator dimensions



● Terminal connection diagram



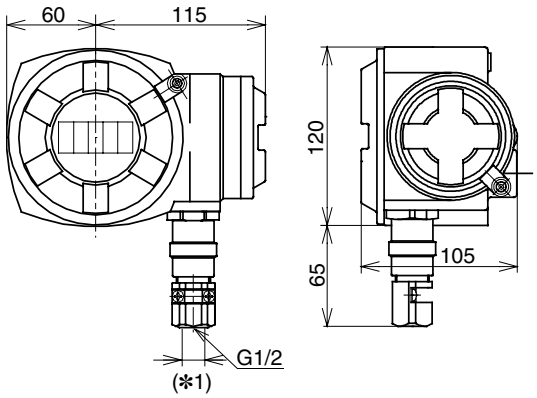
● Current output specification

· Power supply : 14 to 33 V DC (Voltage between transmitter terminals)
· Current output : 4 to 20mA DC
· Output accuracy : ±1.0% F.S. (against scale plate)
· Allowable load resistance : 0 to 600 Ω (at 24 V DC)
· Type of protection : Flame proof
· Protection class : Ex d IIC T6
· Cable connection : Cable gland
Explosion proof cable gland : SXBM-16B manufactured by Shimada Electric Co., Ltd. (attached as standard)
Applicable cable diameter *1 : 8mm ∅ to 12mm ∅
Specify the cable diameter when ordering.
Cable outlet direction : Right ward
Conduit screw : G1/2
· Terminal screw : M4

MX-52D Local indication with LCD and current output

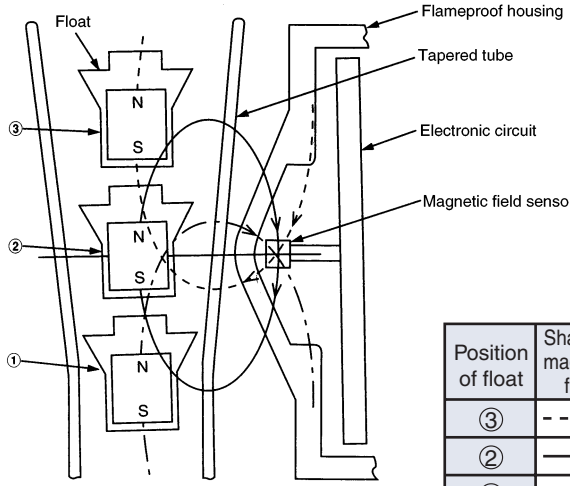
The current output function with intelligent 2-wire transmitter is added to flameproof LCD local indicator.
The location of magnet housed in the float is detected directly. No moving part except the float leads to the low cost of wiring connection. The instruments are used for the vast applications.

● Indicator dimensions



● Operating principle

As shown in figure below a magnet with vertical polarity is molded in the float. Float moves vertically in response to the flow rate of fluid. An oval shaped magnet field exists between N pole and S pole of the magnet. Two magnet sensors whose sensitivities are designed equal are located at 90° angle, close to the tapered tube.
These 2 sensors generate output signal which corresponds to the strength of magnetic field and its angle. By differential data processing of these outputs from 2 sensors, the angle of magnetic field which represents the position of float is obtained.
Thus, the flow rate of fluid can be calculated from the position of float.

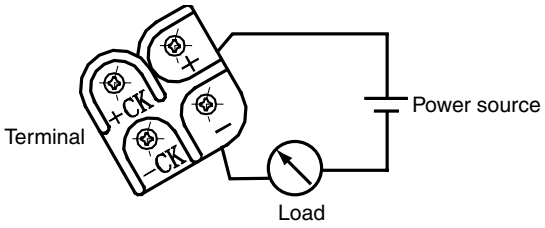


Position of float	Shape of magnetic field
③	- - - - -
②	———
①	—— - ——

● Current output specification

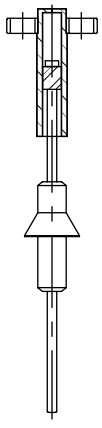
· Power supply	: 12 to 33 V DC (Voltage between transmitter terminals)
· Current output	: 4 to 20mA DC
· Output accuracy	: ±1.0% F.S.
· Indication	: 3-1/2 digits LCD indication in percentage or flow rate unit
· Response time	: 1 second (adjustable between 0.5 sec. and 60 sec.)
· Allowable load resistance	: 0 to 500 Ω (at 24 V DC)
· Type of protection	: Flameproof
· Protection class	: Ex d IIC T6
· Cable connection	: Cable gland
· Explosion proof cable gland	: SXBM-16B manufactured by Shimada Electric Co.,Ltd. (attached as standard)
Applicable cable diameter *1	: 8mm Ø to 12mm Ø Specify the cable diameter when ordering.
Conduit screw	: G1/2
Cable outlet direction	: Downward or backward Downward is standard.
· Terminal screw	: M4

● Terminal connection diagram

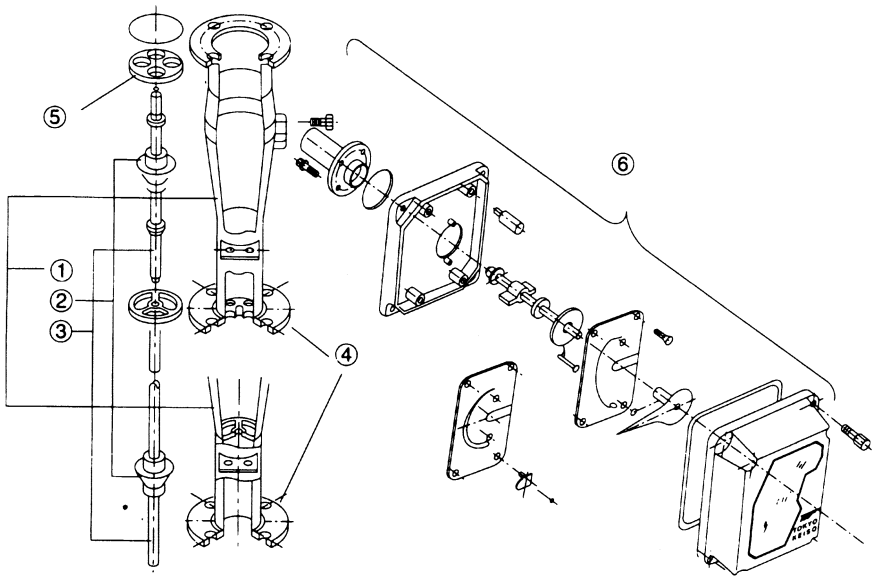


DAMPER DEVICE

These units of all sizes for gas measurement type are equipped with dampers as a standard. The damper device can be added at the liquid measurement with pulsation.
The damper should be avoided for such services as chlorine gas that tends to form chemical compounds and fluids that contain rusts, debris and oil. They might hinder the damping effect.



CONSTRUCTIONS AND MATERIALS



Indicator is the one for MX-400

● STANDARD MATERIALS

No.	Wet parts	Combination 1	Combination 2	Combination 3	Combination 4
①	Tapered tube	SUS316	SUS316	SUS316	SUS316L
②	Float	SUS316	SUS316	SUS316	SUS316L
③	Float axis	SUS316	SUS316	SUS316	SUS316L
④	Flange	Carbon steel	SUS304	SUS316	SUS316L
⑤	Float guide	SUS316	SUS316	SUS316	SUS316L
⑥	Indicator	ADC12	ADC12	ADC12	ADC12

Consult TOKYO KEISO for other materials.

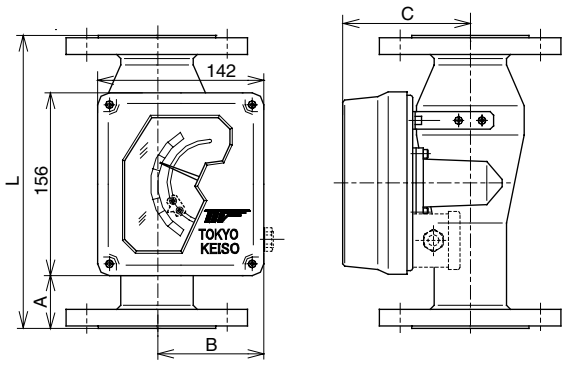
STANDARD GRADUATION DIVISION

Following table shows 16 kinds of standard graduation pattern.

Scale range	Subdivision of graduation						
1 — 10	1	2	4	6	8	10	
1.2 — 12	1.2	2	4	6	8	10	15
1.5 — 15	1.5	5	10	15			
1.6 — 16	1.6	5	10	15	16		
2 — 20	2	5	10	15	20		
2.5 — 25	2.5	5	10	15	20	25	
3 — 30	3	10	20	30			
3.5 — 35	3.5	10	20	30	35		
4 — 40	4	10	20	30	40		
4.5 — 45	4.5	10	20	30	40	45	
5 — 50	5	10	20	30	40	50	
6 — 60	6	10	20	30	40	50	60
7 — 70	7	20	40	60	70		
7.5 — 75	7.5	20	40	60	75		
8 — 80	8	20	40	60	80		
9 — 90	9	20	40	60	80	90	

SIZE AND WEIGHT

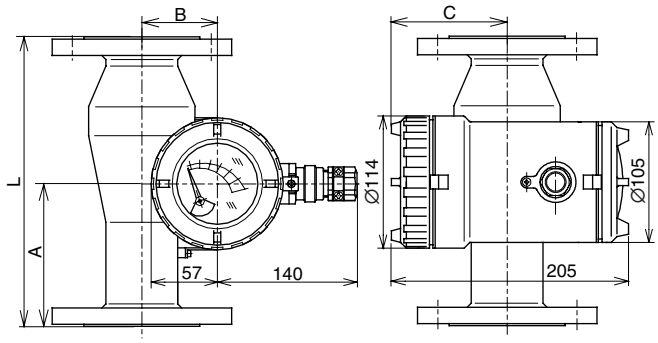
● MX-400,71□



Meter size mm	L*1 mm	A mm	B mm	C mm	Approx. Mass*1 (kg)
15	250	40	85	90	5
20	250	40	85	85	5.5
25	250	40	90	95	6
40	250	45	100	100	8
50	250	45	105	110	10
80	250	45	120	125	15
100	250/300*2	45	135	150	20

*1 Approx. mass shows the case of ANSI Class 150 and JIS 10K.
*2 For gas service.

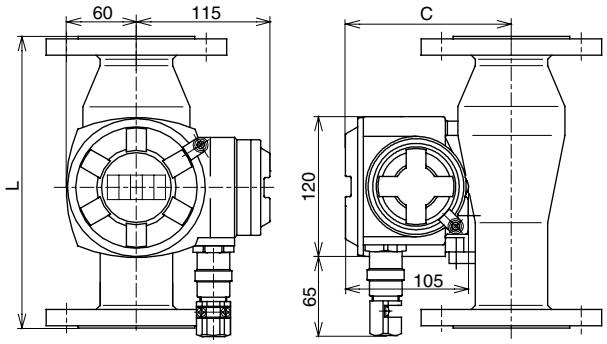
● MX-52E



Meter size mm	L*1 mm	A mm	B mm	C mm	Approx. Mass*1 (kg)
15	250	135	51	90	6.5
20	250	132	53	90	7
25	250	130	58	90	7.5
40	250	127	66	100	9.5
50	250	127	73	100	11.5
80	250	127	90	100	16.5
100	250/300*2	121	110	100	21.5

*1 Approx. mass shows the case of ANSI Class 150 and JIS 10K.
*2 For gas service.

● MX-52D



Meter size mm	L*1 mm	C mm	Approx. Mass*1 (kg)
15	250	121	6.5
20	250	123	7
25	250	128	7.5
40	250	138	9.5
50	250	148	11.5
80	250	166	16.5
100	250/300*2	188	7.5

*1 Approx. mass shows the case of ANSI Class 150 and JIS 10K.
*2 For gas service.

* Specification is subject to change without notice.

TOKYO KEISO CO., LTD.

Head Office : Shiba Toho Building, 1-7-24 Shibakoen, Minato-ku, Tokyo 105-8558
Tel : +81-3-3431-1625 (KEY) ; Fax : +81-3-3433-4922
e-mail : overseas.sales@tokyokeiso.co.jp ; URL : http://www.tokyokeiso.co.jp

ISO 9001 Certified JQA-2172