TECHNICAL GUIDANCE

Metal Tube Type Variable Area Flowmeter

NMX Series

OUTLINE

NMX is the renewal product which made popular MX series still simpler. Piping design has been made easier by unifying the face-to-face dimension in 250 mm, and the space-saving installation on the spot has been enabled. This is suitable for the flow measurement of liquid, gas, and steam.

FEATURES

❑ Standardized total length
Easy piping with standardized product concept of 250mm total length. (Sizes are 15mm to 100mm)

❑ Complying with extensive fluids
Measurement of various fluids such as liquid, gas, and steam can be made.

❑ Complying with anti-corrosive fluids
316LSS (Highly anti-corrosive material) is adopted as the standard material.

STANDARD SPECIFICATION

- Available size — Meter size : 15mm to 100mm
- Rating — Flange connection : JIS 10K, 20KRF
  ANSI Class 150, 300RF

*: JIS10K of connection size 15 to 40mm is made by JIS20K.
A size is the same although thickness becomes thick 2mm to JIS10K.

- Connection size

Meter size	Rating	Against meter size			
		−1 size	±0 size	+1 size	+2 size
15	10K	×	○*	○*	○*
	20K	×	○	○	○
	150lb	×	○	○	○
	300lb	×	○	○	△
25	10K	×	○*	○*	○
	20K	×	○	○	○
	150lb	×	○	○	○
	300lb	×	○	○	△
40	10K	×	○*	○	○
	20K	×	○	○	○
	150lb	×	○	○	○
	300lb	×	○	○	△
50	10K	×	○	○	○
	20K	×	○	○	○
	150lb	×	○	○	○
	300lb	×	○	○	△
80	10K	×	○	○	△
	20K	×	○	○	△
	150lb	×	○	○	△
	300lb	×	○	×	×
100	10K	×	○	○	△
	20K	×	○	○	△
	150lb	×	○	○	△
	300lb	×	○	×	×

Contact Tokyo Keiso for nonstandard sizes with △.

- Fluid temperature — –20 to +300°C (Local indication)
  –20 to +200°C (With output version)
- Ambient temperature — –25 to +100°C (Local indication)
  –20 to +60°C (With output version)
- Fluid pressure — 4.1MPa / AMB
  3.3MPa / 120°C
  Maximum allowable operating pressure changes with fluid temperature.
  (It is based on JIS and ASME/ANSI flange rating for details.
- Material in contact with fluid — Equiv. to 316LSS.
- Flow rate range — 40 to 100000 L/h
  (Density 1.0 g/cm^3, Viscosity 1.0mPa•s)
  1.2 to 600 m^3/h(nor)
  (Air, 0°C, 0MPa [1atm])
- Indication accuracy — ±1.5%F.S. (Std.)
- Rangeability — 10 : 1
- Indicator construction — IP65 (Equiv. to NEMA 12/13)
- Painting — Std. : Epoxy painting
  (External surface of indicator)
  Color : RAL5018
  (Equiv. to Munsell 7.5BG 5/4.5)

ADDITIONAL FUNCTION

❑ Alarm output function

When specified in placing order, an alarm output function can be added to the local indicator type. Alarm mode can be selected from a low or high alarm. Be sure to specify since the alarm mode and alarm actuation when placing order are necessary for the sake of production convenience.

Alarm output specification

- Contact method : Reed switch 1 point, Setting point is freely adjustable (With setting pointer)
- Electric rating : Max.voltage 125V AC or 100V DC
  Operating current capacity 10 μA to 0.5A
  Max. switching capacity 10VA or 10W

Note) The above-mentioned rating 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 in the maximum of an inrush current.

Kind of load	Inrush current
Load of lamp	5 to 10 times of usual
Motor load	10 to 15 times of usual
Inductive load	4 to 5 times of usual

- Suitable wiring : 0.2 to 2.5 mm^2 / 24 to 12 AWG (Single wire, stranded wire)
- Insulation resistance : 100MΩ or more (500V DC)
- Withstand voltage : 1500V AC (Holding time 1min.)
- Setting accuracy: ±2% F.S.
- Reset span : Less than 15% F.S. (Less than 20% F.S. for flow range with " ＊ " mark as shown in the Flow rate table.)
- Intrinsically safe version: Recommending the intrinsically safe relay EB3C. (Ex ia IIC IDEC)

❑ Current output function

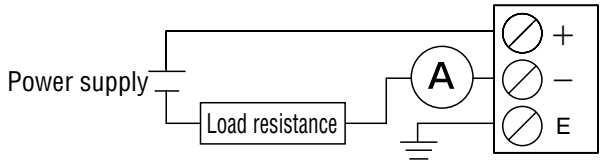
When specified in placing order, current output function can be added to the local indicator type. (Specify when placing order.)

Model code

NMX1□□□— ··· / E1 : Non-intrinsically safe circuit transmitter
NMX1□□□— ··· / E2 : Intrinsically safe circuit transmitter
4 to 20mA DC against 0 to 100% span

1. Current output specification

- Power supply : 11 to 35V 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 600Ω (at 24V DC)
- Influence of power supply variation : 0.2%F.S. or less
- Load resistance influence : 0.2%F.S. or less
- Insulation resistance : 100MΩ or more (500V DC)
- Withstand voltage : 500V AC (Holding time: 1min.)
- Terminal schematics



2. Intrinsically safe specification

Intrinsically safe version is available for electric transmitter as additional functions.

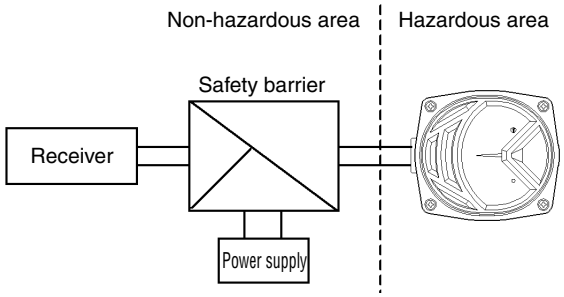
Model code

NMX1□□□— ··· / E2 / JI : TIIS certification
(Pending)
NMX1□□□— ··· / E2 / CI : NEPSI certification
Enclosure : Intrinsically safe
Protection class : Ex ia IIC T4

Rating

- Max. voltage for intrinsically safe circuit : 28V
- Max. current for intrinsically safe circuit : 93mA
- Max. power for intrinsically safe circuit : 650mW
- Internal capacitance : 0.01302 μ F
- Internal inductance : 0.3697mH

Specified safety relay is to be properly installed in non-hazardous area and operated in accordance with specified safety rating.
(Refer to the following figure.)



3. HART communication

HART communication is available for electric transmitter as additional functions.

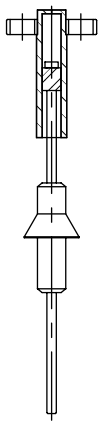
Model code

NMX1□□□— ··· / E1 / HC
NMX1□□□— ··· / E2 / HC
Intrinsically safe version is also applicable.

❑ Damper device

This unit (all sizes) for gas measurement type is equipped with a damper as a standard. The damper device can be added at the liquid measurement type with pulsation.

Chlorine gas (easy to form chemical compound) and fluid containing rust, trash and oil may hinder the function of piston part. Consult factory for details.



❑ Cable entry

Select from MODEL CODE table.

❑ Flow rate table

Meter size	Water		Air	
	Flow rate L/h	Max.press.loss kPa	Flow rate m^3/h (nor)	Max.press.loss kPa
15	40～ 1850	11	1.2～ 45	17
25	1500～ 5400	16	45～135	30
	5400～ 6000*	19		
40	5000～ 10500	8	130～230	10
50	9000～ 16800	10	220～300	8
	16800～ 21500*	16	300～400*	10
80	20000～ 40000	22	390～600*	13
	40000～ 50000*	32		
100	50000～100000*	26	–	–

*Flow rate range of 20% (F.S.) of alarm reset span

Flow rate shows the value converted into water (Density 1.0g/cm^3, Viscosity 1.0mPa•s) and air (0°C, 0MPa [1atm]).

The numeric value as indicated shows the flow range in the maximum graduation.

❑ Flow conversion method

1. Liquid application

Flow rates on the Flow rate table are for liquid application equivalent to water (Density 1.0g/cm^3 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 (m^3/h)

Q : Flow rate of actual fluid (m^3/h)

ρ : Density of actual fluid (g/cm^3)

Consult us about high viscosity specification.

2. Gas application

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 [m^3/h(nor)]

Q : Flow rate of gas to be measured [m^3/h(nor)]

ρ : Density of gas to be measured [kg/m^3 (nor)]

P : Operating pressure (MPa)

t : Operating temperature (°C)

3. Steam application

Steam flow rate is to be converted into Air (0°C, 0MPa) flow rate by the following formula.

$QA = 0.8488 \times Q_{S1} / \sqrt{\rho s}$

$QA = 0.8488 \times Q_{S2} / \sqrt{\rho s}$

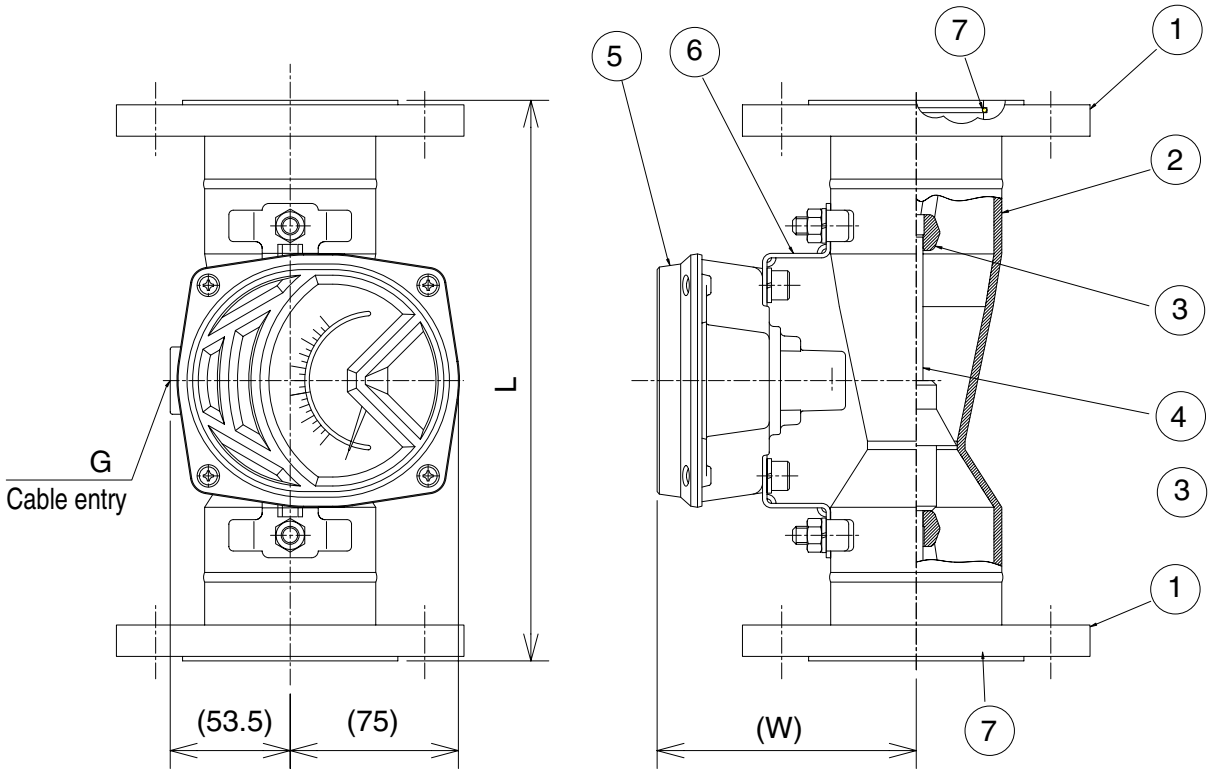
QA : Air (0°C, 0MPa) converted flow rate [Unit: m^3/h (nor)]

Q_{S1} : Flow rate (Mass) (Unit: kg/h)

Q_{S2} : Flow rate (Volume) (Unit: m^3/h)

ρs : Density of steam (kg/m^3)

DIMENSIONS



Size and Weight

Meter size	Connection size	Dimension (mm)		Approx. weight* (kg)
		L	W	
15	15 (1/2)	250	115.5	2.5
25	25 (1)	250	115.5	4.0
40	40 (1 1/2)	250	115.5	4.5
50	50 (2)	250	115.5	7.0
80	80 (3)	250	115.5	13.0
100	100 (4)	250	135.5	18.0

*Approx. weight shows the case of ANSI Class 150.

MATERIAL

No.	Description	Material
1	Flange	316L SS
2	Tapered tube	316L SS
3	Float guide	316L SS
4	Float	316L SS
5	Indicator	ADC 12
6	Fittings	316 SS
7	Stop ring	316L SS

Note)
- In gas, steam, or damper specification, an up float guide is replaced with damper (cylinder).
- The lower float guide of 15mm and 100mm of meter size is being fixed to the flange. Removal is impossible.

MODEL CODE

NMX	*	*	*	*	– **	**	*	–*	*	*	*	/**	/**	/*	Specification	Restriction of selection: Liquid	Restriction of selection: Gas
Indicator type	1														Non-flameproof type indicator	Selection is unnecessary.	
Main body		1													Standard		
Material in contact with liquid			1												316L SS		
Float material				1											316L SS		
Rating					–J1										JIS10K PF	The connection size is 50mm or more.	
					–J4										JIS20K PF	Without selection restriction	
					–A2										ANSI 150Lb RF		
					–A5										ANSI 300Lb RF	Refer to the Connection size.	
Connection						RF									RF flange	Selection is unnecessary.	
Connection size							1								15A (1/2")	Standard: They are the same size or 1and 2 sizes rise to meter size. (Refer to the Connection size.)	
							2								20A (3/4")		
							3								25A (1")		
							4								40A (1 1/2")		
							5								50A (2")		
							6								65A (2 1/2")		
							7								80A (3")		
							8								100A (4")		
							9								125A (5")		
							A								150A (6")		
Meter size								–1							15mm	Qw (L/h) 20℃, Water: 40~1850	QA (m³/h) 0℃, 0MPa, Air: 1.2~45
								–3							25mm	1500~6000	45~135
								–4							40mm	5000~10500	130~230
								–5							50mm	9000~21500	220~400
								–7							80mm	20000~50000	390~600
								–8							100mm	50000~100000	
Tapered tube									*						Tapered tube number	Selection is unnecessary. Manufacture's code	
Float										*					Float number		
Float damper											1				Not provided	Standard	×
											2				Provided	Selectable	Standard
Additional function: Alarm output (1 point)												/1A			1 point alarm (High Close)	Duplication selection cannot be performed.	
												/1B			1 point alarm (High Open)		
												/1C			1 point alarm (Low Close)		
												/1D			1 point alarm (Low Open)		
Current output (2-wire, 4 to 20mA DC output)												/E1			TYPE 1 (Non-intrinsically safe circuit)		
												/E2			TYPE 2 (Intrinsically safe circuit)		
												/HC			HART communication	Available for /E1 or E2	
												/CI			Intrinsically safe (NEPSI certification)	Available for /E2, Duplication selection cannot be performed.	
												/JI			Intrinsically safe (TIIS certification)		
Cable entry												/M1			M16×1.5 (F)	Duplication selection cannot be performed.	
												/M2			M20×1.5 (F)		
												/GH			G 1/2 (F)		
												/NP			NPT 1/2 (F)		
Special: Cleaning													/OL		Degrease treatment	Without selection restriction	
													/WL		Non-water treatment		
													/AP		Acid pickling		
Painting													/PS		Special painting	Without selection restriction	
Inspection													/LT		Gas leakage test	Without selection restriction	
Accessories													/AC		Provided	IP series, Amplifier for alarm etc.	
Special specification														/Z	Others	Consult us for details.	

❑ Standard graduation division.
There are 17 kinds of standard graduation pattern as shown to the right.

Scale range	Subdivision of graduation						
1 - 10	1	2	4	6	8	10	
1.2 - 12	1.2	2	4	6	8	10	12
1.5 - 15	1.5	2.5	5	7.5	10	12.5	15
1.6 - 16	1.6	5	10	15	16		
1.8 - 18	1.8	5	10	15	18		
2 - 20	2	5	10	15	20		
2.5 - 25	2.5	5	10	15	20	25	
3 - 30	3	5	10	15	20	25	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	

Cautions

- This flowmeter transmits displacement by magnetic coupling. Influence may be received in the measurement to which a magnetic field exists on the spot.

- Please choose a place without a magnetic field around installation. The approaching magnetic material may also affect measurement. Please do not bring close to less than 20cm. A keeping-warm cover etc. should be careful.

- In installing a flow instrument adjacently, in order to avoid a mutual interference, please install the interval of 30cm or more.

* Specification is subject to change without notice.

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