



TECHNICAL GUIDANCE

Metal Tube Type Variable Area Flowmeter

NLZ Series

MODEL CODE

NLZ	1	1	1	1	-□□	RF	□	-□	+	+	□	/□□**	specifications	Restriction of selection																	
														Liquid	Gas																
Indicator type	1												Non-flameproof type indicator	Selection is unnecessary.																	
Main body	1												Standard																		
Material in contact with fluid	1												316LSS/SCS16A																		
Float material	1												316LSS																		
Connection					-J1								JIS10K	The connection size is 50mm or more.																	
					-J4								JIS20K	Without selection restriction																	
					-A2								ANSI150Lb	Refer to the Connection size.																	
					-A5								ANSI300Lb	Refer to the Connection size.																	
Flange face						RF							RF flange	Selection is unnecessary.																	
Connection size													1	DN15, 1/2", 15A	As the standard, connection size is the same as meter size or 1 or 2 rank larger than meter size. For details refer to the connection size.																
													2	DN20, 3/4", 20A																	
													3	DN25, 1", 25A																	
													4	DN40, 1 1/2", 40A																	
													5	DN50, 2", 50A																	
													6	DN65, 2 1/2", 65A																	
													7	DN80, 3", 80A																	
													8	DN100, 4", 100A																	
													9	DN125, 5", 125A																	
													A	DN150, 6", 150A																	
Meter size													-1	15mm	<table border="1"> <tr> <td rowspan="2">Qw (m³/h)</td> <td>0.04 to 1.85</td> <td rowspan="2">QA (m³/h)</td> <td>1.2 to 45</td> </tr> <tr> <td>1.5 to 6</td> <td>45 to 135</td> </tr> <tr> <td rowspan="4">20°C, Water</td> <td>5 to 10.5</td> <td rowspan="4">0°C, OMPpa, Air</td> <td>130 to 230</td> </tr> <tr> <td>9 to 21.5</td> <td>220 to 400</td> </tr> <tr> <td>20 to 50</td> <td>390 to 600</td> </tr> <tr> <td>50 to 100</td> <td></td> </tr> </table>	Qw (m ³ /h)	0.04 to 1.85	QA (m ³ /h)	1.2 to 45	1.5 to 6	45 to 135	20°C, Water	5 to 10.5	0°C, OMPpa, Air	130 to 230	9 to 21.5	220 to 400	20 to 50	390 to 600	50 to 100	
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													-3	25mm																	
													-4	40mm																	
													-5	50mm																	
													-7	80mm																	
													-8	100mm																	
Tapered tube													+	Tapered tube type	Selection is unnecessary.																
Float													+	Float type	Manufacturer's code																
Damper													1	Not provided	Standard	N.A.															
													2	Provided	Selectable	Standard															
Additional function	Alarm contact output : Reed switch (1 point)			/RA	1 point alarm (High Close)	Duplication selection cannot be performed.																									
				/RB	1 point alarm (High Open)																										
				/RC	1 point alarm (Low Close)																										
				/RD	1 point alarm (Low Open)																										
	Alarm contact output : Proximity sensor (1point or 2 points)			/NA	1 point alarm (High Close)	** shows conditions of switch action, A : High close B : High open C : Low close D : Low open																									
				/NB	1 point alarm (High Open)																										
				/NC	1 point alarm (Low Close)																										
				/ND	1 point alarm (Low Open)																										
	Current output (2wires, 4-20mA DC transmitter)			/NW**	2 points alarm	Example : High alarm close × 1, High alarm open × 1 : /NWAB																									
				/E1	Electrical transmitter																										
	Current output with HART communication (2wires, 4-20mA DC transmitter with HART)			/E2	Electrical transmitter (intrinsically safe)	Available for /E1 or /E2 or /H1 or /H2																									
				/H1	Electrical transmitter with HART																										
	Option			/H2	Electrical transmitter with HART (intrinsically safe)	Available for or /E2 or /H2																									
				/TZ	LCD indicater																										
Intrinsically safe explosion-proof construction			/EI	ATEX certification	Duplication selection cannot be performed.																										
			/CI	NEPSI certification																											
			/UI	FM certification																											
			/XI	IEC-Ex certification																											
Cable entry			/M2	M20×1.5(F)	Duplication selection cannot be performed.																										
			/GH	G 1/2(F)																											
			/NP	NPT 1/2(F)																											

Special	Washing	/OL	Degrease treatment	No restriction
		/WL	Non-water treatment	
		/AP	Pickling processing	
	Painting	/PS	Special painting	No restriction
	Inspection	/AT	Airtightness inspection	No restriction
Special specification	Accessories	/AC	Provided	Amplifier for alarm etc.
		/Z	Special	Consult us for details.

NLZ1□□□/R□ SERIES (REED SWITCH TYPE ALARM)

NLZ1□□□/R□ indicates flow rate by pointer and outputs SPST contact at set point for flow alarm.

In addition to the dust tight and water immersion proof type, the intrinsically safe version is under examination for certification.

● SPECIFICATION OF TRANSMITTER

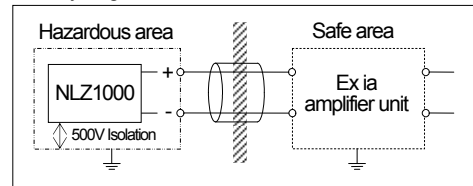
- Alarm point : 1 point
- Contact system : Reed switch (a or b contact)
- Rating : Reed switch (SPST) 10VA AC, 10W DC as resistance load
Max. 125V AC/0.5A, Max. 100V DC/0.5A
- Setting accuracy : ±2% F.S. (Against flow calibration)
- Reset span : Less than 15% F.S. or 20%F.S. (Against flow calibration)
- Cable entry : M20×1.5, G1/2, NPT1/2
- Enclosure : Dust tight and water immersion proof IP67
: Intrinsically safe Ex ia IIC T3...T6
- Ambient temperature : Dust tight and water immersion proof -20 to 80°C
: Intrinsically safe -20 to 60°C
- Insulation resistance : 100 MΩ or more/500V DC (between batch of power supply terminal and indicator case)
- Withstand voltage : 1500V AC/1min (between batch of power supply terminal and indicator case)

● INTRINSICALLY SAFE SPECIFICATION

- Max. input voltage : 30 Vdc
- Max. input current : 500 mA

The specified safety barrier is to be properly installed in non-hazardous area to establish the intrinsically safe system. See the following diagram.

Safety diagram



NLZ1□□□/N□ SERIES (PROXIMITY SENSOR TYPE ALARM)

With local flow rate indication, NLZ1□□□/N□ series has a proximity sensor which outputs alarm signals complying with NAMUR standard.

In addition to the dust tight and water immersion proof type, the intrinsically safe version is under examination for certification.

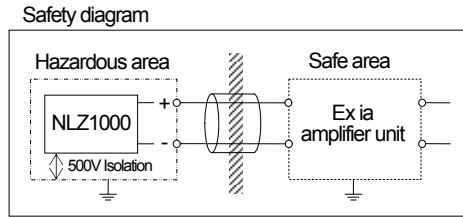
● SPECIFICATION OF TRANSMITTER

- Alarm point : 2 points (1 point high alarm, 1 point low alarm or 2 points high and low alarm)
- Switch : Proximity sensor
- Power supply voltage : 8V DC
- Operating current : Proximity sensor complying with NAMUR, ON : 1mA or less, OFF : 3mA or more
- Setting accuracy : ±2% F.S. (Against flow calibration)
- Reset span : Less than 1.5% F.S. (Against flow calibration)
- Cable entry : M20×1.5, G1/2, NPT1/2
- Enclosure : Dust tight and water immersion proof IP67
: Intrinsically safe Ex ia IIC T3...T6
- Ambient temperature : Dust tight and water immersion proof -25 to 80°C
: Intrinsically safe -20 to 60°C
- Insulation resistance : 100 MΩ or more/500V DC (between batch of power supply terminal and indicator case)
- Withstand voltage : 500V DC/1min (between batch of power supply terminal and indicator case)

● INTRINSICALLY SAFE SPECIFICATION

- Max. input voltage : 16 Vdc
- Max. input current : 25 mA
- Max. input power : 64 mW
- Max. internal capacitance : 150 nF
- Max. internal inductance : 150 μH

The specified safety barrier is to be properly installed in non-hazardous area to establish the intrinsically safe system. See the following diagram.



■ NLZ1□□□/E□ SERIES (ELECTRIC TRANSMITTER)

■ NLZ1□□□/H□ SERIES (ELECTRIC TRANSMITTER & HART COMMUNICATION)

NLZ1□□□/E□ indicates flow rate by pointer and scale plate, and outputs electric (4 to 20mA DC) signal which is proportional to flow rate.

In addition to the dust tight and water immersion proof type, the intrinsically safe versions are under examination for certification.

NLZ1□□□/H□ indicates flow rate by pointer and scale plate, and outputs electric (4 to 20mA DC) signal equipped with HART Communication complying with Multi-drop. In addition to the dust tight and water immersion proof type, the intrinsically safe versions are under examination for certification.

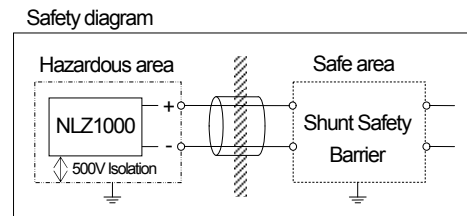
● SPECIFICATION OF TRANSMITTER

- Power supply voltage : 10 to 30V DC [Voltage between transmitter terminals]
- Current output : 4 to 20mA DC
[Effective output range : 4.0 to 21.6mA At abnormal condition, however, 22.8mA or 3.75mA as an option can be output.]
- Allowable load resistance : [NLZ1□□□/E□] Less than 830Ω (580Ω or less / 24V DC)
[NLZ1□□□/H□] 230 to 830Ω (Not less than 230Ω load resistance is needed for "with HART communication.")
Determine the allowable load resistance for each supply voltage using following formula.
Allowable load resistance ≤ (Power supply voltage [V] - 10) / 0.024 [Ω]
The allowable load resistance includes the one of circuit wiring.
- Output accuracy : ±1.0%F.S. (Against flow calibration)
- Low cut off : 0 to 20%F.S. (default 7%F.S.)
- Damping : 0 to 20s (default 1s)
- Cable entry : M20×1.5, G1/2, NPT1/2
- Construction : Dust tight and water immersion proof IP67
: Intrinsically safe Ex ia IIC T3...T6
- Ambient temperature : Dust tight and water immersion proof -20 to 70°C
: Intrinsically safe -20 to 60°C
- Insulation resistance : 20 MΩ or more / 500V DC (between batch of power supply terminal and indicator case)
- Withstand voltage : 500V AC/1min (between batch of power supply terminal and indicator case)

● INTRINSICALLY SAFE SPECIFICATION

- Max. input voltage : 28 V dc
- Max. input current : 93 mA dc
- Max. input power : 650 mW
- Max. internal capacitance : 5 nF
- Max. internal inductance : 0.2 mH

The specified safety barrier is to be properly installed in non-hazardous area to establish the intrinsically safe system. See the following diagram.



● OPTION

- Totalizing count indication : Max. 8 digits LCD
- Accuracy : ±1.0%F.S. (Against flow calibration)
- Count Rate : Less than 10 Hz (Less than 36000 c/h)
- Flow Rate indication : Max. 8 digits LCD
- Accuracy : ±1.0%F.S. (Against flow calibration)
- Indication value : Selectable from
 1. Instantaneous flow rate
 2. Percents of full scale (%)
 3. Current output (mA)

NLZ1□□□/□□/□ SERIES (INTRINSICALLY SAFE TYPE) - under examination by authorities -

Ex Type	Safe class	Certification No.
ATEX	II2G Ex ia IIC T3...T6 Gb	<Pending>
NEPSI	Ex ia IIC T3...T6 Gb	<Pending>
FM	Class I Division 1 Groups A, B, C and D	<Pending>
IEC-Ex	Ex ia IIC T3...T6 Gb	<Pending>

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 marked as * has the alarm reset span of 20% of F.S. The above flow rate shows the value converted into water (Density 1.0 g/cm³, Viscosity 1.0mPa·s) and air (0°C, 0 MPa, i.e. 1 atm). 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/cm³ and Viscosity 1.0 mPa·s). If actual fluid condition has different values, a conversion calculation is required per following formula:

$$Q_w = Q \times 2.59 \times \sqrt{\frac{7.7}{\rho} - 1}$$

Q_w : Water converted flow rate (m³/h)

Q : Flow rate of actual fluid (m³/h)

P : Density of actual fluid (g/cm³)

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:

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

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

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

P : Density of gas to be measured [kg/m³ (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.

$$Q_A = 0.8488 \times \sqrt{Q_{s1} / \rho_s}$$

$$Q_A = 0.8488 \times \sqrt{Q_{s2} / \rho_s}$$

Q_A : Air (0°C, 0MPa) converted flow rate

Q_{s1} : Flow rate (Mass) (Unit: kg/h)

Q_{s2} : Flow rate (Volume) (Unit: m³/h)

ρ_s : Density of steam (kg/m³)

□ Standard graduation division.

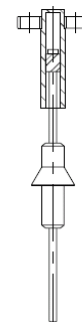
There are 17 kinds of standard graduation pattern as shown to the right.

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	

□ 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.

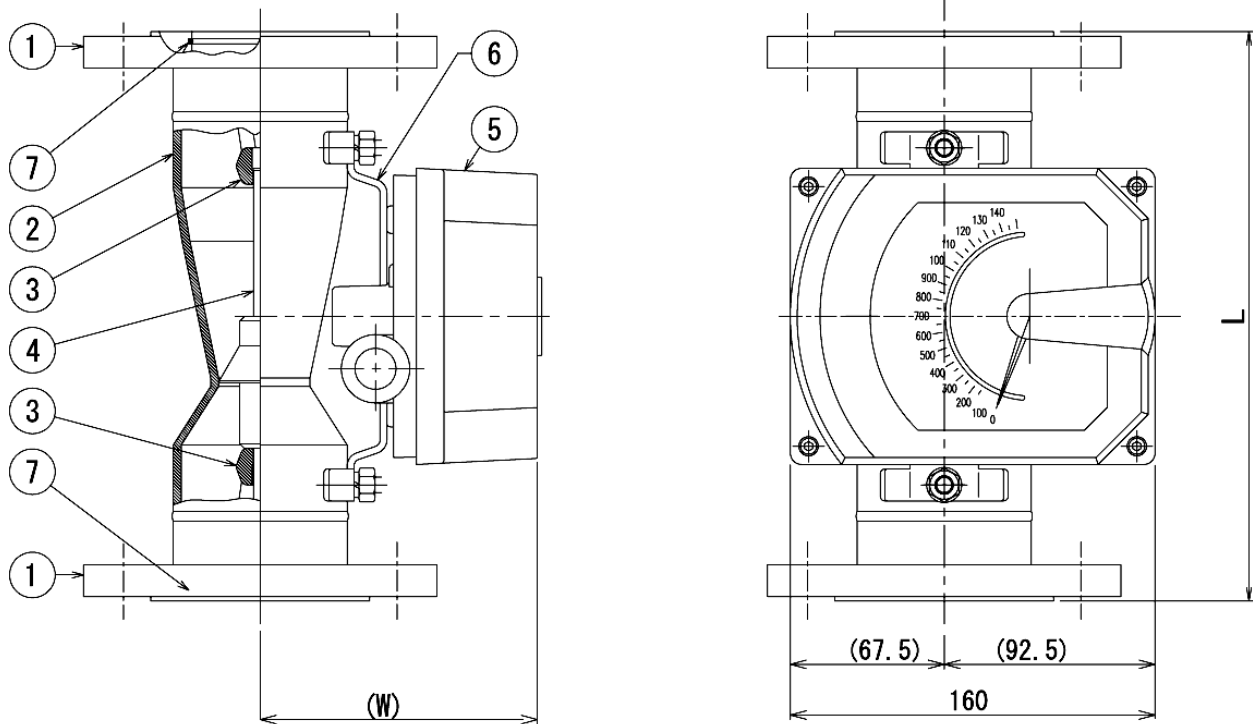
Chlorine gas (easy to form chemical compound) and fluid containing rust, trash and oil may hinder the function of piston part. Consult factory for details.



Cautions

- This flowmeter in its principle transmits the displacement caused by the magnet coupling. The surrounding magnet field might affect the performance of the instrument.
- Avoid the installation in the magnet field and do not bring the magnet material close less than 20 cm including insulation cover which may affect the performance.
- When installing two or more flowmeters, install them in more than 30cm distance to avoid the mutual interferences.

DIMENSIONS



Size and Weight

Meter size	Connection size JIS A size (inch)	Dimension(mm)		Approx weight* (kg)
		L	W	
15	15 (1/2)	250	123.5	3.0
25	25 (1)	250	123.5	4.5
40	40 (1 1/2)	250	123.5	5.0
50	50 (2)	250	123.5	7.5
80	80 (3)	250	123.5	13.5
100	100 (4)	250	145.5	18.5

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

MATERIAL

No.	Description	Material
1	Flange	316L SS
2	Tapered tube	316L SS or SCS16A
3	Float guide	316L SS
4	Float	316L SS
5	Indicator	ADC 12
6	Fittings	316 SS
7	Stop ring	316L SS

Note)

- The upper float guide is replaced with the damper (cylinder) for gas, steam services and other services where a damper required.
- The lower float guides being fixed to the flanges of 15mm and 100mm meter size can not be removed.

• Specification subject to change without notice.

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