# TECHNICAL GUIDANCE

### Metal Tube Type Variable Area Flowmeter

# **NLZ Series**

#### OUTLINE

 $\ensuremath{\text{NLZ}}$  Series flowmeter is the simple and compact product updated from current NMX Series that is enjoying a good reputation. The unified 250mm face-to-face dimension makes piping design and work simpler which results in saving of the engineering cost and installation space. It covers liquids, gases and steam measurement in various industrial fields.

#### **FEATURES**

- The face-to-face dimensions are unified for all sizes from 15mm to 100mm, which allows well arranged piping design.
- Simple and rugged design allows many kinds of flow measurements of liquids, gases and steam for various applications.
- Highly anti-corrosive materials of 316LSS or equal are resistant to corrosive fluids.

#### **STANDARD SPECIFICATION**

STANDARD SPEC	דוי	ICATION								
Available size	Μ	eter size	: 15mm to 10	00mm						
	С	onnection size	: See the tab	le						
	fo	r the availability	of the connection	ı size.						
<ul> <li>Connection rating</li> </ul>	FI	ange connectio	on : JIS 10K, 20	KRF						
			ANSI Class 1	50,300RF						
*: Flov	Sector									
spec. can be made. Contact us for details.										
*: The	JIS	6 10K flanges o	f the connection s	size						
15n	nm	to 40mm as ma	arked " YES 米 "	in the fol-						
low	ing	table are made	e of JIS 20K.							
The	J	S20K flanges a	re 2mm thicker th	an						
		-	ther dimensions a							
san	ne.	-								
<ul> <li>Fluid temperature</li> </ul>	-2	20 to +300°C (lo	ocal indication typ	e)						
	-2	20 to +200°C (ti	ransmitter type)							
		Intrinsica	lly safe type							
		Temp. class	Max. Fluid temp.							
		Т6	85°C							
		T5	100°C							
		T4	135°C							
		Т3	200°C							
Ambient temperature	: -:	25 to +100°C (I	ocal indication typ	e only)						
<ul> <li>Fluid pressure</li> </ul>	4.	1MPa at ambie	ent temperature							
	3.	3MPa at 120°C	;							
	FI	owmeters for h	igh pressure can	be						
	m	ade. Contact u	s for details.							
	Μ	aximum allowa	ble operating pre	ssure						
	di	ffers with tempe	erature, complying	g with						
	J	S and ANSI fla	nge standards.							
Material s		Wet	parts : 316L SS /	i i						
SCS16A or equal.										
Flow rate range	0.	04 to 100m3/h								
-	(L	iquids equivale	nt to water, densi	ty 1.0g/						
	•	n3, viscosity 1.0								
		2 to 600 m3/h (								
	(G	Sases equivaler	nt to air at 0°C an	d 0MPa,						
	i.e. 1 atm.)									

i.e. 1 atm.)



- Indication accuracy ±1.5%F.S.
- Rangeability 10:1
- Indicator construction IP65 (Equiv. to NEMA 12/13) Indicator external surface only
- Painting
- Color
- : RAL3004 equivalent to Munsell 10RP 3/8
- Connection size

Meter	Connection		ilability of c inst meter		size
size mm	Rating	1 rank smaller than meter	Same size as meter	1 rank larger than meter	2 rank larger than meter
	10K	NO	YES *	YES *	YES*
15	20K	NO	YES	YES	YES
10	150lb	NO	YES	YES	YES
	300lb	NO	YES	YES	Consult us
	10K	NO	YES *	YES*	YES
25	20K	NO	YES	YES	YES
20	150lb	NO	YES	YES	YES
	300lb	NO	YES	YES	Consult us
	10K	NO	YES *	YES	YES
40	20K	NO	YES	YES	YES
40	150lb	NO	YES	YES	YES
	300lb	NO	YES	YES	Consult us
	10K	NO	YES	YES	YES
50	20K	NO	YES	YES	YES
00	150lb	NO	YES	YES	YES
	300lb	NO	YES	YES	Consult us
	10K	NO	YES	YES	Consult us
80	20K	NO	YES	YES	Consult us
80	150lb	NO	YES	YES	Consult us
	300lb	NO	YES	NO	NO
	10K	NO	YES	YES	Consult us
100	20K	NO	YES	YES	Consult us
100	150lb	NO	YES	YES	Consult us
	300lb	NO	YES	NO	NO

Consult TOKYO KEISO marked as "Consult us" and other standards not mentioned above table.

## TOKYO KEISO CO., LTD.

TG-F1067-0E

# TECHNICAL Guidance

Metal Tube Type Variable Area Flowmeter

# **NLZ Series**

#### MODEL CODE

NLZ	1	1	1	1	-00	RF		-0	+	+		/**	specifications		Restriction	of selecti	on
	1			'				-	т	т			specifications		Liquid		Gas
Indicator type	1												Non-flameproof type indicator				
Main body		1											Standard	Selectio	Selection is unnecessary.		
Material in contac	t with	fluid	1										316LSS/SCS16A	00.0000		,.	
Float material				1									316LSS				
					-J1								JIS10K	The cor	nection size is 5	0mm or	more.
Connection					-J4								JIS20K	Without	selection restrict	ion	
					-A2								ANSI150Lb				
					-A5								ANSI300Lb	Refer to	the Connection	size.	
Flange face						RF							RF flange	Selectio	n is unnecessar	y.	
							1						DN15, 1/2", 15A				
							2						DN20, 3/4", 20A				
							3						DN25, 1", 25A				
							4						DN40, 1 1/2", 40A		standard, connec		
Connection size							5						DN50, 2", 50A	same a than me	s meter size or 1 eter size	or 2 ranl	klarger
- 5.1.10040110420							6						DN65, 2 1/2", 65A		ails refer to the co	nnection	size.
							7	L					DN80, 3", 80A				
						8						DN100, 4", 100A					
							9						DN125, 5", 125A				
							А						DN150, 6", 150A		I		1
								-1					15mm		0.04 to 1.85	QA	1.2 to 45
								-3					25mm	Qw (m3/h)	1.5 to 6	(m3/h)	45 to 13
Meter size								-4					40mm	(mom)	5 to 10.5	0°C,	130 to 23
								-5					50mm	20°C,	9 to 21.5	0MPa,	220 to 40
								-7					80mm	Water	20 to 50	Air	390 to 60
								-8					100mm		50 to 100		
Tapered tube									+				Tapered tube type	_	n is unnecessar	y.	
Float										+			Float type	Manufa	cture's code		
Damper											1		Not provided	3	Standard N.A.		N.A.
Bampo											2		Provided	S	Selectable	5	Standard
												/RA	1 point alarm (High Close)				
		Alarm	conta	act outr	out : Re	ed swi	rch (1)	ooint)				/RB	1 point alarm (High Open)	Duplication selection cannot be performed. ** shows conditions of switch action, A : High close B : High open C : Low close			
	Í	ucann	00114	iot ouq		00.011		501 it )				/RC	1 point alarm (Low Close)				
												/RD	1 point alarm (Low Open)				
												/NA	1 point alarm (High Close)				
												/NB	1 point alarm (High Open)				
	/	Alarm	conta	act outp	out : Pro	oximity	senso	r (1poi	nt or 2	point	s)	/NC	1 point alarm (Low Close)				
												/ND	1 point alarm (Low Open)		ow open		
												/NW**	2 points alarm	Evan	Evampla ·		
	(	Curre	nt outp	put								/E1	Electrical transmitter		Example : High alarm close × 1,High alarm open × 1		
Additional functio	n	(2win	es, 4-2	20mAl	DC tran	smitter	)					/E2	Electrical transmitter (intrinsically safe)	: /NV	VAB		
		Curre	nt outp	put wit	n HART	comr	nunica	tion				/H1	Electrical transmitter with HART		-		
		(2win	es, 4-2	20mA I	DC tran	smitter	with H	iart)				/H2	Electrical transmitter with HART (intrinsically safe)				
	0	Optio	n									ЛZ	LCD indicater	Availabl	e for /E1 or /E2 o	or/H1 or/	'H2
												/El	ATEX certification				
		ntrino	icallu	safe es	nlocion	nnof	met	uction				/CI	NEPSI certification	Availabl	e for or /E2 or /H	2	
	['	i iu ir 1S	icallys	sale ex	plosion	μοσι	UNIST	ucuON				/UI	FM certification	Duplicat	tion selection car	nnot be p	erformed.
												/XI	IEC-Ex certification				
	ſ											/M2	M20×1.5(F)		-		
		Cable	entry									/GH	G 1/2(F)	Duplicat	tion selection car	not be p	erformed.
Cable entry													· · · ·	Duplication selection cannot be performed.			

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		/OL	Degrease treatment	
	Washing	<b>AVL</b>	Non-water treatment	No restriction
Special			Pickling processing	
Special	Painting	/PS	Special painting	No restriction
	Inspection	/AT	Air tightness inspection	No restriction
	Accessories	/AC	Provided	Amplifier for alarm etc.
Special specification	n	ΙZ	Special	Consult us for details.

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

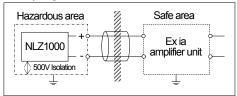
#### • SPECIFICATION OF TRANSMITTER

Alarm point	: 1 point						
Contact system	: Reed switch (a or b co	: 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	v 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 in	nmersion proof IP67					
	: Intrinsically safe	Ex ia IIC T3T6					
Ambient temperature	: Dust tight and water in	nmersion proof –20 to 80°C					
	: Intrinsically safe	–20 to 60°C					
Insulation resistance	: 100 M $\Omega$ or more/500\	/ DC (between batch of power supply terminal and indicator case)					
Withstand voltage	: 1500V AC/1min (betw	een 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.						





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

With local flow rate indication,  $NLZ1 \square \square / N \square$  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

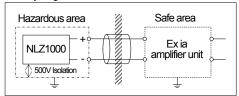
	-	
Alarm point	: 2 points (1 point high alarm, 1 point lo	ow alarm or 2 points high and low alarm)
Switch	: Proximity sensor	
Power supply voltage	: 8V DC	
Operating current	: Proximity sensor complying with NAM	MUR, ON :1mA or less, OFF : 3mA or more
Setting accuracy	: ±2% F.S. (Against flow calibration)	
Reset span	: Less than 1.5% F.S. (Against flow ca	libration)
Cable entry	: M20×1.5, G1/2, NPT1/2	
Enclosure	: Dust tight and water immersion proof	IP67
	: Intrinsically safe	Ex ia IIC T3T6
Ambient temperature	: Dust tight and water immersion proof	F −25 to 80°C
	: Intrinsically safe	–20 to 60°C
Insulation resistance	: 100 M $\Omega$ or more/500V DC (between	n batch of power supply terminal and indicator case)
Withstand voltage	: 500V DC/1min (between batch of po	wer 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.

Safety diagram



# NLZ1000/E0 SERIES (ELECTRIC TRANSMITTER) NLZ1000/H0 SERIES (ELECTRIC TRANSMITTER & HART COMMUNICATION)

 $NLZ1_{\Box\Box\Box}/E_{\Box}$  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.  $NLZ1_{\Box\Box\Box}/H_{\Box}$  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

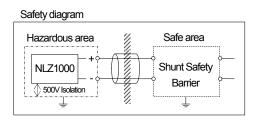
Power supply voltage	: 10 to 30V DC [Voltage between transmitter	terminals]
Current output	: 4 to 20mA DC	
	[Effective output range : 4.0 to 21.6mA At ab	pnormal condition, however, 22.8mA or 3.75mA as an option can be output. ]
Allowable load resistance	: [ NLZ1===/E= ] Less than 830 $\Omega$ (580 $\Omega$ or les	ss / 24V DC)
	[ NLZ1===/H= ] 230 to 830 $\Omega$ (Not less than 2	$230\Omega$ load resistance is needed for "with HART communication.")
	Determine the allowable load resistance for	each supply voltage using following formula.
	Allowable load resistance $\leq$ (Power supply v	roltage [V] –10 ) / 0.024 [Ω]
	The allowable load resistance includes the c	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 T3T6
Ambient temperature	: Dust tight and water immersion proof	–20 to 70°C
	: Intrinsically safe	–20 to 60°C
Insulation resistance	: 20 $M\Omega$ or more / 500V DC (between batch of	f power supply terminal and indicator case)
Withstand voltage	: 500V AC/1min (between batch of power sup	ply 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 intrinsic	ally safe system. See the following diagram.				

#### 

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

Ex Type	Safe class	Certification No.
ATEX	II2G Ex ia IIC T3T6 Gb	<pending></pending>
NEPSI	Ex ia IIC T3T6 Gb	<pending></pending>
FM	Class I Division 1 Groups A, B, C and D	<pending></pending>
IEC-Ex	Ex ia IIC T3T6 Gb	<pending></pending>

#### **FLOW RATE TABLE**

Meter	Wat	ter	Air		
size	Flow rate L/h	Max.press.loss kPa	Flow rate m³/h (nor)	Max.press.loss kPa	
15	$40 \sim 1850$	11	1.2~ 45	17	
25	$1500 \sim 5400$	16	45~135	30	
25	5400~ 6000*	19	45~135		
40	$5000 \sim 10500$	8	$130 \sim 230$	10	
50	$9000 \sim 16800$	10	$220 \sim 300$	8	
50	$16800 \sim 21500*$	16	300~400*	10	
80	$20000 \sim 40000$	22	390~600*	13	
	$40000 \sim 50000^{*}$	32	390~000*	13	
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/cm<sub>3</sub>,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:

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

- Qw : Water converted flow rate (m<sup>3</sup>/h)
- Q : Flow rate of actual fluid  $(m^3/h)$
- P : Density of actual fluid (g/cm<sup>3</sup>)

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

- QA : Converted flow rate in air 0°C, 0MPa [m<sup>3</sup>/h(nor)]
- Q : Flow rate of gas to be measured [m<sup>3</sup>/h(nor)]
- P : Density of gas to be measured [kg/m<sup>3</sup> (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×√ Q<sub>S1</sub>/ps QA =0.8488 / √ Q<sub>S1</sub>/ps

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

Q<sub>S1</sub>: Flow rate (Mass) (Unit: kg/h)

- $Q_{\mbox{\scriptsize S2}}$  : Flow rate (Volume) (Unit: m3/h)
- ps : Density of steam (kg/m3)

#### Standard graduation division.

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

-							
Scale range			Subdivis	ion of gr	aduatior	1	
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.

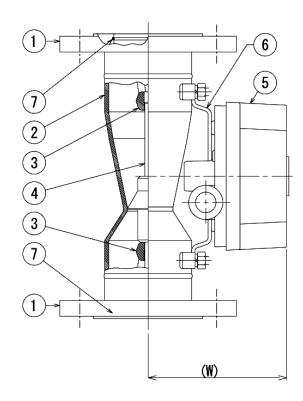


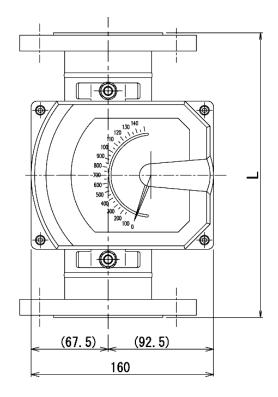
Cautions

- This nowmeter 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.

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#### DIMENSIONS





#### Size and Weight

Meter size	Connection size	Dimension(mm)		Approx weight*
weter size	JIS A size (inch)	L	W	(kg)
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.





Head Office : Shiba Toho Building, 1-7-24 Shibakoen, Minato-ku, Tokyo 105-8558 Tel : 03-03431-1625 (KEY) ; Fax : 03-3433-4922 e-mail : overseas.sales@tokyokeiso.co.jp ; URL : http://www.tokyokeiso.co.jp