

# Model NQI

## Electronic Liquid Level Transmitter

### OVERVIEW

Model NQI Electronic Liquid Level Transmitters are a displacement type of instruments to detect and transmit such process variables as liquid levels, boundary surfaces, and specific-gravities. They detect and transmit the process variable by converting its change into mechanical displacement by means of a float. They are a high damping type which is able to measure stably a pulsating process variable.



### FEATURES

- Various types of wet parts (liquid-contacting parts) are available.
- Able to cover a wide range of pressures and specific-gravities.
- The instruments are sturdy, and provide excellent maintainability and economy.
- Able to measure stably a liquid level with pulsation.
- Manufacturing and tes approvals awarded as per High Pressure Gas Control Ordinance.

**STANDARD SPECIFICATIONS****Detector Section****Measuring range**

0-300, 0-500, 0-700, 0-1000, 0-1500, 0-2000, 0-2500, 0-3000  
mm

**Specific-gravity**

0.1 - 1.6 (for details, see the following table)

Specific-gravity range	Pressure rating	General type		Corrosion resistant type (major component; hastelloy C)
		JIS 10K, 30K, ANSI/JPI 150, 300	JIS 63K, ANSI/JPI 600	
Medium	0.4 – 1.6	Applicable to all ranges except 300mm range.		
Sp.-gr.	0.6 – 1.6	Applicable to 300mm range only.		
Low Sp.-gr.	0.1 – 0.4	Applicable to all ranges except 300 mm and 500mm ranges. (only JIS 10K, ANSI/JPI 150)	—	—
	0.15 – 0.4	Applicable to 500 mm range only.	—	—
	0.2 – 0.6	Applicable to 300 mm range only.	—	—

**Process connection****Flange connections****External chamber type**

Connecting method

Side-side flanged, Side-bottom flanged,

Top-side flanged, Top-bottom flanged

Flange size

2 or 1½ in. RF, 2 or 1½ in. RTJ for ANSI 600

**Internal float type**

Connecting method

Top flanged, Side flanged

Flanged size

4 in. RF, 4 in. RTJ for ANSI 600

**Operating pressure and temperature range**

From -100kPa {-1.0 kgf/cm<sup>2</sup>} to respective pressure rating  
(refer to table 2 and Figure 1.)

**Materials****Table 1**

Model No. (temp range)	H	E	W	D
Major Components	(200 to 250°C)	(0 to 200°C)	(-40 to 200°C)	(-40 to 0°C)
Seal diaphragm	SUS316L		Hastelloy C	SUS 316L
Bonnet	Carbon steel (SFVC 2A), SUS304, SUS316, SUS316L			
Chamber	(Standard use of carbon steel is at temperatures higher than 0°C)			
Float	SUS 316L		Hastelloy C	SUS 316L
Bolts	Chromium-molybdenum steel (SNB 7)			SUS 304
Gaskets	Semi-metallic (Filler material ; Graphite)			
Sealing liquid	B	B	A	A

**Instrument Section****Accuracy**

± 0.5% F.S. (weight calibration)

**Dead band**

Within ± 0.1% F.S. (sensitivity is 0.05% F.S.)

**Damping adjustment****Adjustable range**

Approx. 100:1 or more (time constant is 20 sec. Or more at maximum damping.)

**Output**

4-20 mA DC

**Power supply**

$$13-44 \text{ V DC Load Impedance } [\Omega] = \frac{\text{SupplyVoltage} - 13[V]}{0.021[A]}$$

**Electrical conduit connection**

G1/2 internal thread

**Operating temperature**

-30 to 80 °C

**Operating humidity**

10-90% Rh

**Type of protection**

JIS Flame-proof approval:

Class d2G4 of JIS C 0903

JIS F 8001 Class 3 splash-proof included.

(Explosionproof terminal box or cable gland is required)

Equivalent to NEC Class 1, Group C, D, Division 1

Ambient temperature: -10 to 70 °C

JIS Intrinsically safe approval

I3nG5 of JIS C 0903

System No. YSS-24, Zener barrier 8907/51-24/45

Power supply: DC23 to 27.5V

Ambient temperature: -10 to 60 °C

**Casing material**

Aluminum alloy shell mold  
 Indicator window  
 Explosion-proof type: Glass  
 Weatherproof, Intrinsically safe type: Poly-carbonate

**Casing finish**

Baked acryl finish  
 (for corrosion-resistant and silver finish, refer to the semi-standard specifications.)

**Finish colors****Cover**

Light beige (Munsell 4Y7.2/1.3)

**Casing**

Dark beige (Munsell 10YR4.7/0.5)

**Weight****Explosion-proof type**

Approx.45kg (When model NQI310-11E4103-X)

**Weatherproof type, Intrinsically safe type**

Lighter than the above by 4kg.

**Optional Specifications****Elevation and suppression****Elevation**

Use for an input range the low limit of which is higher than zero.

**Suppression**

Reverse of elevation. Used primarily for measurement of levels of low specific-gravity liquids.

**Float weight adjustment mechanism**

(applicable also to floats which are not of standard types)

Use this mechanism to satisfy the following condition

$$W_A - W = W_e$$

$W_e$  : Elevation weight  $\leq 1.2$  kg

$W$  : Float weight

$W_A$  : Basic weight for adjustment

For details, please contact your Yamatake Corporation agent.

**Zero elevation mechanism (used for measuring range changed by zero-point elevation.)**

Use this mechanism to satisfy the following condition

$$F_e = \frac{\pi d^2}{4} \cdot \ell e \cdot \rho \leq 1.2 \text{kg}$$

$$F_R + F_e = \frac{\pi d^2}{4} \cdot (\ell R + \ell e) \cdot \rho \leq 1.6 \text{kg}$$

$$\frac{\ell R + \ell e}{\ell} \leq 1$$

$$F_e = \frac{\pi d^2}{4} \cdot \ell R \cdot \rho \geq 0.4 \text{kg}$$

$F_e$  : Buoyancy corresponding to amount of zero-elevation (kg)

$F_R$  : Buoyancy at measuring range (kg)

$d$  : Diameter of float (m)

$\ell$  : Total length of float before zero-elevation (m)

$\ell R$  : Measuring range after zero-elevation (m)

$\ell e$  : Zero-elevation range (m)

$\rho$  : Density of measured liquid (kg/m<sup>3</sup>)

**Explosion-proof terminal box (3-port type)**

Pressure-tight thread connection of conduits. Connecting port: G1/2 internal thread (In case of flame-proof packing type, JIS flame-proof type explosionproof requirements can be met by using flame proof type cable adaptors.)

**Optional Semi-standard Specifications**

**Blind transmitter (Y126)**

The output indicating meter on the front panel of the instrument is eliminated.

**Half range type (Y127)**

To measure a range which is one half of the standard range.

**Adjustable spacing gravity**

0.05 to 0.8

**Accuracy**

± 0.75% F.S.

**Stainless steel bolts (Y131)**

Stainless steel (SUS304) bolts are used to assemble the body. Special bolts are used for the transmitters with connection ratings of JIS 10K, ANSI 150 and JPI 150, which are models approved for use with high pressure gases (refer to your Yamatake Corporation representative for details).

**Corrosion-resistant and silver finish (Y138)**

Corrosion-resistant finish with baked acryl (Y138A)

Resistant against corrosive gases.

Corrosion-proof finish with baked epoxy resin (Y138B)

Resistant against corrosive liquids.

Regular silver finish with baked acryl (Y138C)

To suppress temperature rise caused by direct sunlight or other cause.

Corrosion-resistant silver finish with baked acryl (Y138D)

To suppress temperature rise caused as above and to be resistance against corrosive gasses.

Note: silver finish is not resistant against alkaline gasses.

**Induction lightning arrester (Y145)**

Arresting of induction lightning with a semiconductor arrester.

**With approvals for use on high pressure gases (Y2054)**

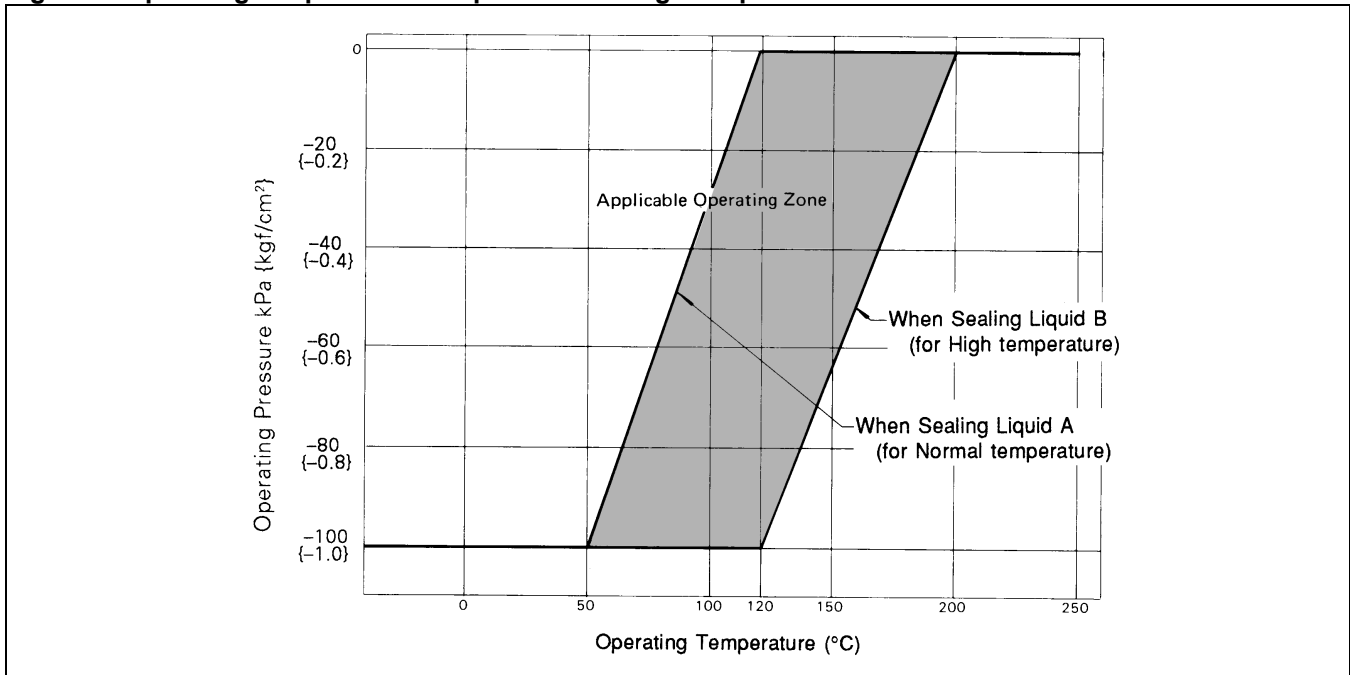
With approvals for use on high pressure gases

Body material	Design temperature		Design pressure	size
	Maximum	Minimum		
Carbon steel	350°C or less	-5°C or greater *1	6.4 MPa {65 kgf/cm <sup>2</sup> } or less	5 in. or less
Stainless steel	350°C or less	-10°C or greater	6.4 MPa {65 kgf/cm <sup>2</sup> } or less	5 in. or less
	Less than -40°C	-196°C or greater	3.5 MPa {35 kgf/cm <sup>2</sup> } or less	5 in. or less

\*1) Applied to SF440A.

Incase of standard material SFVC2A, design temp. is 0°C or greater

**Figure 1. Operating temperature and pressure at negative pressure**



**MODEL SELECTION**

Ex: NQI210-18N1103W-5, 8A

Basic model no.		Selections							Options
Type	Type of detector	Process connection	Mat'l. of bonnet/ chamber	Mat'l. of torque tube/ seal dia'm.	Pressure rating	Flange size	Measuring range	Type of casing	
NQI	I	II	III	IV	V	VI	VII	VIII	

I	310	High damping type, for medium specific gravity [[0.4-1.6, 0.6-1.6 (0-300mm range only)]]
	320	High damping type, for low specific-gravity [0.1-0.4, 0.15-0.4 (0-500mm range only), 0.2-0.6 (0-300mm range only)]

II	-1	External chamber type, side-side flanged
	-2	External chamber type, side-bottom flanged
	-3	External chamber type, top-bottom flanged
	-4	External chamber type, top-side flanged
	-5	Internal float type, top-flanged (Bonnet only)
	-6	Internal float type, side-flanged

III	0	None (applicable to type 6 detector.)
	1	Bonnet and chamber: Carbon steel
	2	Bonnet and chamber: SUS316
	7	Bonnet and chamber: SUS304
	8	Bonnet and chamber: SUS316L

IV	H	Seal diaphragm: SUS316L (0 to 250°C)
	E	Seal diaphragm: SUS316L (0 to 200°C)
	W	Seal diaphragm: Hastelloy C (-40 to 200°C) (applicable to the corrosion-proof of type 310 detector)
	D	Seal diaphragm: SUS316L (-40 to 0°C)

V	1	JIS 10K
	2	JIS 30K
	3	ANSI 150
	4	ANSI 300
	5	ANSI 600 (applicable to type 310 detector.)
	6	JIS 63K (applicable to type 310 detector.)
	7	JPI 150
	8	JPI 300
	9	JPI 600 (applicable to type 310 detector.)

VI	1	1½ in. RF flanges (external chamber type only)	See Note 3
	2	2 in. RF flanges (external chamber type only)	
	3	4 in. RF flanges (internal float type only)	
	4	1½ in. RTJ flanges (external chamber type only)	
	5	2 in. RTJ flanges (external chamber type only)	
	6	4 in. RTJ flanges (internal float type only)	

VII	03	0- 300mm	Type 320 detector can be used only for pressure rating JIS 10K/30K, ANSI 150/300 and JPI 150/300.
	05	0- 500mm	
	07	0- 700mm	Type 320 detector can be used only for pressure ratings JIS10K, ANSI150, and JPI150, (When used for pressure ratings ANSI / JPI300 or JIS30K, the float is resistant to the pressures as listed in Table 1 on page 5. The floats are for measuring fluids with a low specific gravity.)
	10	0- 1000mm	
	15	0- 1500mm	
	20	0- 2000mm	
	25	0- 2500mm	
30	0- 3000mm		

VIII	W	Weather-proof type
	E	Explosion-proof type
	H	Intrinsic-safety type

IX	-X	No options
	-5	Elevation (When this specification is not required, the option "5" should be omitted from the model No.)
	-8	Explosion-proof terminal box
	-8A	Explosion-proof terminal box (with one flame-proof packing type cable adaptor.)
	-8B	Explosion-proof terminal box (with two flame-proof packing type cable adaptors.)

**Notes**

**1) Measurement of specific gravity or boundary surface.**

For measurement of specific gravity or boundary surface, write suffix "Z" at the end of the basic model number. (for specific gravity measurement, mention the measuring range of specific gravity. For boundary surface measurement, mention the specific gravities of upper and lower liquids.)

**2) To specify a semi-standard specifications**

**(Y ):**

Enter "Y" at the end of the basic model number and the corresponding "Y number" at the end of the model number.

Example: NQI310Y-18N1103W-5, 8A(Y131)

**3) RTJ connection**

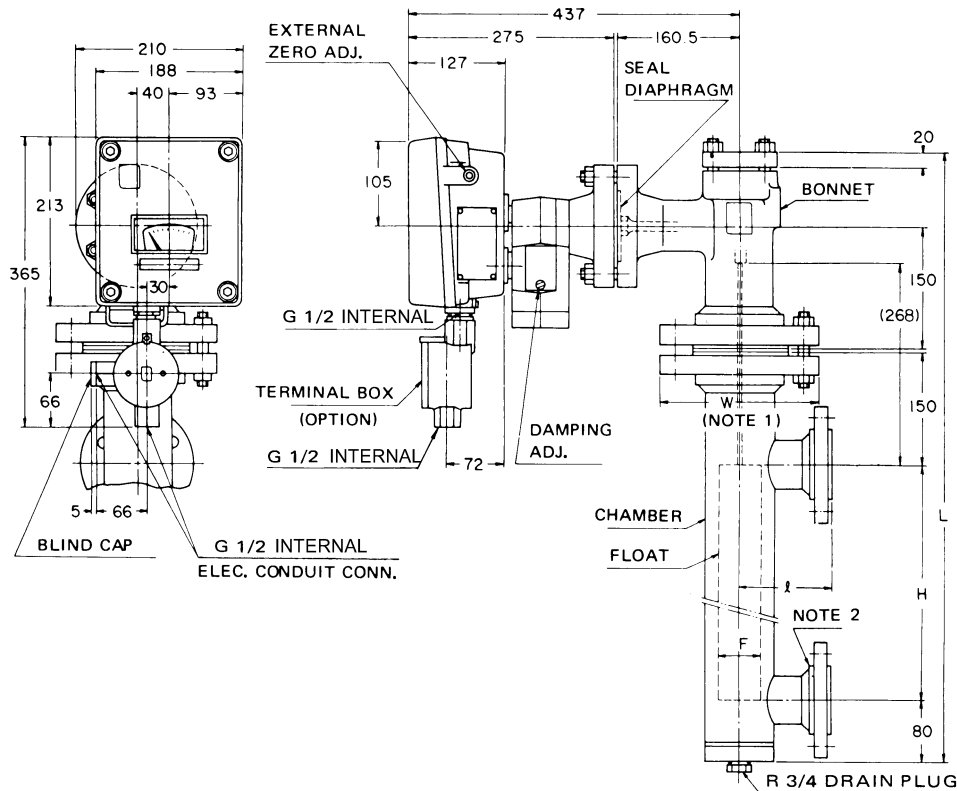
Only for the process connection flanges, they are of a ring joint type. (applicable to ANSI 600 only)

**4) When temperature of process fluid exceeds 100 degrees with boiler system, please consult us separately.**

**DIMENSIONS**

External chamber type, Side-side flanged, JIS 10K, 30K, ANSI / JPI 150, 300

(Unit:mm)



**Table 2. Main dimensions**

ITEM	Measuring range (mm)	H	L	Medium specific gravity			Lower specific gravity				
				ℓ	(Note 1) W	F	ℓ	(Note 1) W	F		
03	0 to 300	300	775	120	190 (210)	55	15.0 {150}	120	254 (279)	95	7.8 {78}
05	0 to 500	500	975			55					
07	0 to 700	700	1175			45					
10	0 to 1000	1000	1475			45					
15	0 to 1500	1500	1975			30					
20	0 to 2000	2000	2475			30					
25	0 to 2500	2500	2975			23					
30	0 to 3000	3000	3475	23	120	229 (254)	45	45	3.0 {30}		

Float weight : 3kg (Medium specific gravity type)

(When measuring the bounding surface or specific gravity of fluids with a low to medium specific gravity, the float weight varies depending on the specific gravity of the measured fluid.)

**Table 3. Hydraulic test press.**

Press. rating	Bonnet		Float
	Material	Press	
JIS 10K	CS, SUS	2.0 {20}	Refer to table 2.
JIS 30K	CS, SUS	7.5 {75}	
JIS 63K	CS, SUS	16.0 {160}	
ANSI / JPI 150	CS	3.2 {32}	
	SUS304, 316	3.0 {30}	
	SUS 316L	2.5 {25}	
ANSI / JPI 300	CS	8.0 {80}	
	SUS304, 316	7.8 {78}	
	SUS316L	6.4 {64}	
ANSI / JPI 600	CS	15.7 {157}	
	SUS304, 316	15.3 {153}	
	SUS316L	12.7 {127}	

CS : Carbon steel  
SUS :Stainless steel

Notes :

- 1) The dimensions not enclosed in parentheses are for pressure ratings of JIS 10K, ANSI 150 and JPI 150 and the dimensions enclosed in the parentheses are pressure ratings of JIS 30K or ANSI / JPI 300. The flanges comply with JPI ratings.
- 2) For instrument of JIS 10K, the hub shown in the illustration is not provided.
- 3) The illustrations are for typical examples of external chamber, side-side flange mounting, and flange rating JIS 10K / 30K, ANSI / JPI 150 / 300. For other models, refer to respective installation drawings.

Internal float type, Top-flanged, JIS 10K, 30K, ANSI / JPI 150, 300

(Unit : mm)

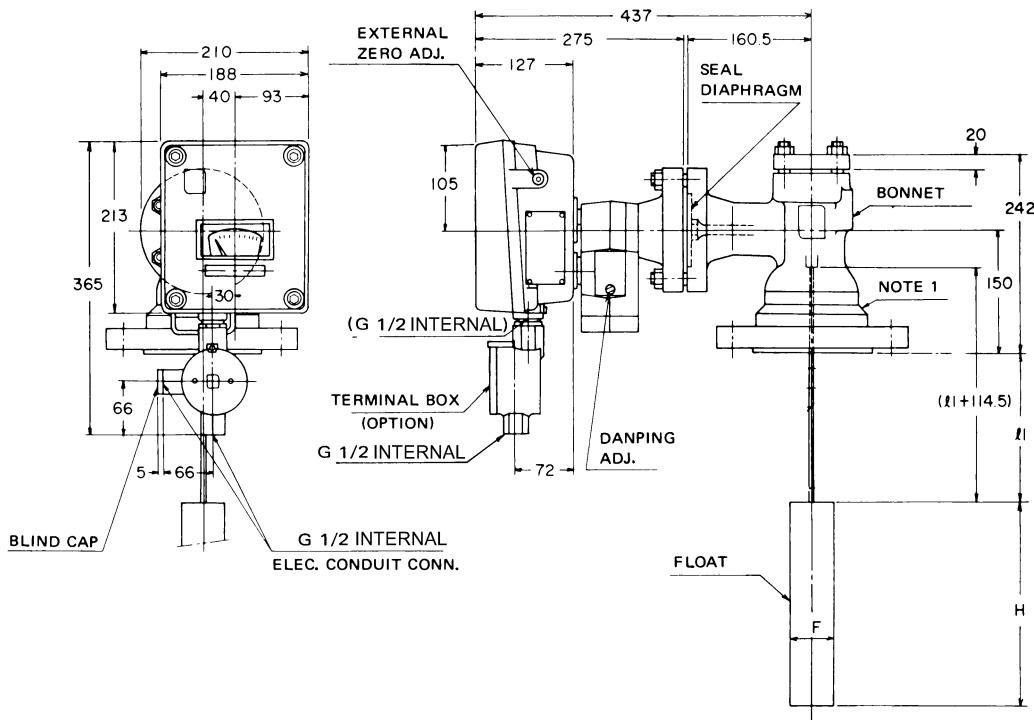


Table 4. Main dimensions

ITEM	Measuring range (mm)	H	ℓ1	Medium specific gravity		Lower specific gravity	
				Float		Float	
				F	Test press MPa {kgf/cm <sup>2</sup> }	F	Test press MPa {kgf/cm <sup>2</sup> }
03	0 to 300	300	55	15.0 {150}	95	7.8 {78}	
05	0 to 500	500					
07	0 to 700	700					
10	0 to 1000	1000	45	15.0 {150}	85	2.7 {27}	
15	0 to 1500	1500					
20	0 to 2000	2000	30	15.0 {150}	65	3.0 {30}	
25	0 to 2500	2500					
30	0 to 3000	3000					

Float weight : 3kg (Medium specific gravity. type)

(When measuring the bounding surface or specific gravity of fluids with a low to medium specific gravity, the float weight varies depending on the specific gravity of the measured fluid.)

Table 5. Hydraulic test press.

Press. rating	Bonnet		Float
	Material	Press	
JIS 10K	CS, SUS	2.0 {20}	Refer to table 4.
JIS 30K	CS, SUS	7.5 {75}	
JIS 63K	CS, SUS	16.0 {160}	
	CS	3.2 {32}	
ANSI / JPI 150	SUS304, 316	3.0 {30}	
	SUS 316L	2.5 {25}	
	CS	8.0 {80}	
ANSI / JPI 300	SUS304, 316	7.8 {78}	
	SUS316L	6.4 {64}	
	CS	15.7 {157}	
ANSI / JPI 600	SUS304, 316	15.3 {153}	
	SUS316L	12.7 {127}	

CS : Carbon steel  
SUS :Stainless steel

Notes :

- 1) For instrument of JIS 10K, the hub shown in the illustration is not provided.
- 2) The illustrations are for typical examples of internal cylinder, top flange mounting, and flange rating JIS 10K / 30K, ANSI / JPI 150 / 300. For other models, refer to respective installation drawings.

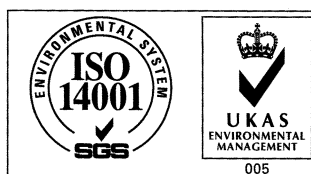
## Yamatake Corporation

Totate International Building  
2-12-19 Shibuya  
Shibuya-ku, Tokyo 150-8316  
Japan

Tel : 81-3-3486-2216  
Fax : 81-3-3486-2503



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