

I N S T R U C T I O N M A N U A L

F O R

A I R B U B B L E R S Y S T E M L E V E L M E A S U R E M E N T

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Read and understand this manual for safely usage.

- This manual describes the product of standard specification. Read the other manual for the product of explosion-proof specification.
- This manual describes the handling, inspection and adjustment of the product which model is mentioned on cover page. Read and understand this manual before handling.
- Follow the additional document and/or direction, submitted by NOHKEN INC. and our distributor or agent, even if the terms are mentioned in this manual.
- Save this manual in proper place being available to refer immediately.
- The specification of product mentioned in this manual may not be satisfied by the condition of environment and usage. Check and consider carefully before using.
- Contact to sales office at NOHKEN INC. for any question or comment about this manual and product.

The followings are the description of the terms in this manual.

 WARNING	Indicates a potentially hazardous situation which, if not pay attention, could result in death, serious injury or serious disaster.
 CAUTION	Indicates a hazardous situation which, if not pay attention, may result in minor or moderate injury or damage to device.

	Indicates prohibited matter. The explanation with this mark shallbe followed
	Indicates instructed matter. The explanation with this mark shallbe followed.

⚠ **WARNING**

This product is not explosion-proof construction. Do not install this product to the place where the flammable gas or vapor is occurred.

If installed, the flammable gas or vapor may be ignited, and serious disaster may be occurred. Use the product of explosion-proof construction in this case.



Do not modify or disassemble the product. Otherwise, the product and connected device may be malfunctioned, damaged, fired, or miner injury and electric shock may be occurred. (Follow the additional document and/or direction, submitted by NOHKEN INC. and our distributor or agent.)



Turn off the power, before wiring and inspection. Otherwise, electric leakage, fire caused by short circuit, and electric shock may be occurred.



Ensure the wire is properly connected. The product and connected device may be malfunctioned, damaged, fired, or miner injury and electric shock may be occurred by improper wiring.



Turn off the power immediately, if the smoke, strange smell and sound are occurred.

Do not use it until the problem is solved.



⚠ **CAUTION**

Avoid shock and rough handling to this product. The product may be damaged by shock as dropping, falling, throwing, knocking, lugging, and etc.



Follow the specification of operating temperature, operating pressure, switch rating, and etc. Otherwise, the product and connected device may be malfunctioned, damaged, fired, or miner injury and electric shock may be occurred. Check the manual or specification sheet.



Operation test shall be done before practical usage. If the serious accident is expected to occur by malfunction of product, the other operating principle of product shall be installed in parallel.





CAUTION

Check and deeply consider the chemical compatibility for material of product in advance.



Hold the stem very close to mounting point, when carrying, installing, and removing. If hold the terminal box, it may be taken off from the flange or plug, and the product may be damaged by dropping.



The product is 50cm or longer

The product shall be kept in horizontally. The product and other goods be damaged, and miner injury may be occurred by falling.



Provide arrester or surge absorber to avoid electrical impact such as lightning and static electricity. If not provide, the product and connected device May be malfunctioned, damaged, and fired, or miner injury and electric shock may be occurred.



INTRODUCTION

- A) This manual specifies the specification of general product. If you order special product, some details of specification may be different with the manual.
- B) We are glad to suggest and advice for Model selection and chemical resistant of material, but final decision has to be made by the customer.
- C) This manual has prepared with close attention. Ask sales office at NOHKEN INC. for any question or comment about the contents of this manual.
- D) For replacement parts
The quality of product has frequently improved, so same spare part may not be supplied. In this case, replacement part or product may be supplied. Ask sales office at NOHKEN INC. for details.
- E) The contents of this manual are subject to change any time without notice due to the improvement of product.

WARRANTY & DISCLAIMER

- A) NOHKEN INC. warrants this product against defect in design, material and workmanship for a period of 1(one) year from the date of original factory shipment.
- B) The warranty only covers the damage of products. The secondary and third kind disasters are not covered by NOHKEN INC.
- C) NOHKEN INC. shall not be liable for the following.
 - C-a) Do not follow the description and direction in this manual.
 - C-b) Damage due to improper installation, wiring, usage, maintenance, inspection, storing, and etc.
 - C-c) Repair and modification are done by the person who is not employee of NOHKEN INC. and our distributor or agent.
 - C-d) Improper parts are used and replaced.
 - C-e) The damage is occurred by the device or machine except our products.
 - C-f) Improper usage. (See "Proper of usage" in chapter 1 in this manual)
 - C-g) Force Majeure including, but not limited to, fire, earthquake, tsunami, lightning, riots, revolution, war, radioactive pollution, acts of God, acts of government or governmental authorities, compliance with law, regulation, and order.

THE TERMS OF WARRANTY AND DISCLAIMER SHALL IN NO WAY LIMIT YOUR REGAL LIGHT.

TABLE OF CONTENTS

	Page No.
1. PURPOSE OF USE	1
2. SPECIFICATION	1
2.1 Standard Specifications	1
2.2 Dimensions	2
3. PRINCIPLE OF OPERATION	3
4. INSTALLATION	4
4.1 Unpacking	4
4.2 Installation Location	4
4.3 Installation of Sensor	4
4.4 Installation of Converter	4
5. PIPING AND WIRING	5

	Page No.
6. ADJUSTMENT	6
6.1 Start-up	6
6.2 Component Names	6
6.3 Air Source Adjustment	7
6.4 Offset and Gain Adjustment	7
6.5 Output Signal Adjustment	7
7. TECHNICAL NOTES	8
8. INSPECTION / MAINTENANCE	8
8.1 Sensor	8
8.2 Converter	8
9. TROUBLESHOOTING	9

1. PURPOSE OF USE

The Air Bubbler System Level Measurement is designed to measure for corrosive liquid or high viscosity liquid such as waste water.

This unit receives back pressure of liquid from the sensor, converts it into an electrical signal and outputs 4 to 20 mA DC.

Also this unit visually indicates liquid level due to having a indicator.

2. SPECIFICATIONS

2. 1 Standard Specification

(1) Sensor

Table 1

Model		LA100 (Flexible type)	LA110 (Pipe type)
Measuring object		Liquid	
Process connection ※1		Flange mounting JIS 10K 100A or equivalent (Proviso 4 holes)	Flange mounting JIS 5K 25A
Piping		Hose nipple for $\phi 8$	Ring joint for $\phi 6$
Dimension		See Fig. 1	See Fig. 2
Material ※1	Flange	PVC	304 Stainless steel
	Detector	PVC tube	304 Stainless steel pipe
	Anchor weight	304 Stainless steel	---

※1 Other materials or other process connection available.

(2) Converter

Model	: LA1000
Measuring range	: 0 to 10 m
Accuracy	: ± 0.5 % of span
Temp. characteristics	: ± 0.05 % of span
Power supply	: 24 V ± 2 V DC
Power consumption	: Approx. 1 W
Output signal	: 4 to 20 mA DC
Load resistance	: 800 Ω Max.
Amplification	: 1 to 5 times
Working temperature	: 0 to 50 $^{\circ}\text{C}$
Power pressure supply	: 200 to 300 kPa
Air source to sensor	: 0.3 to 1 l/minute variable
Overpressure of sensing element	: 300 kPa Max.
Material of casing	: CS plate
hose nipple	: Brass
Mounting	: Wall mounting (Pitch W155×H190 4× $\phi 6.5$ holes)
Construction	: IP23 (Rain proof)
Mass	: Approx. 5.5 kg

2. 2 Dimensions

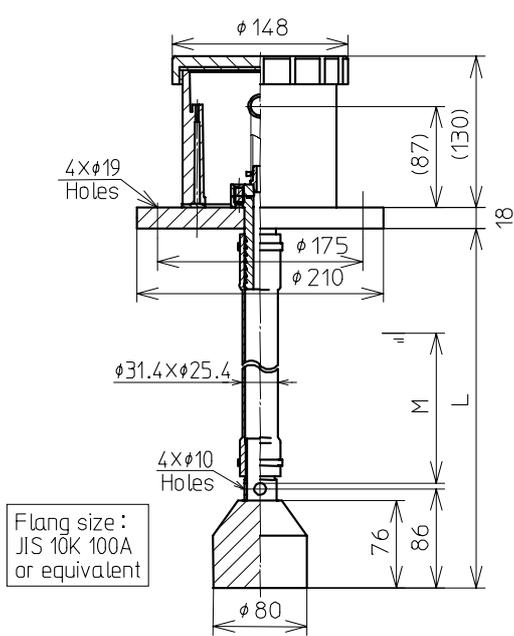


Fig. 1 LA100 Sensor

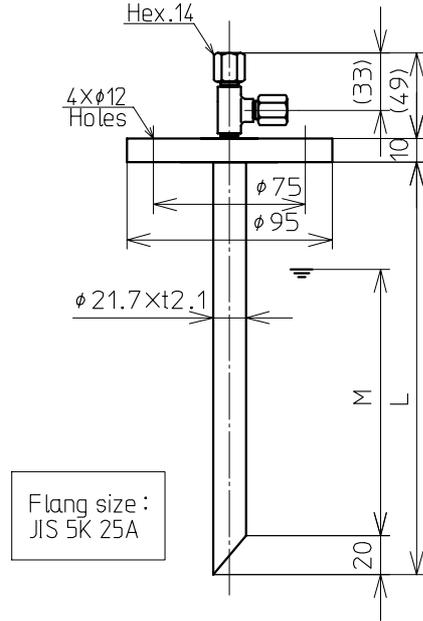


Fig. 2 LA110 Sensor

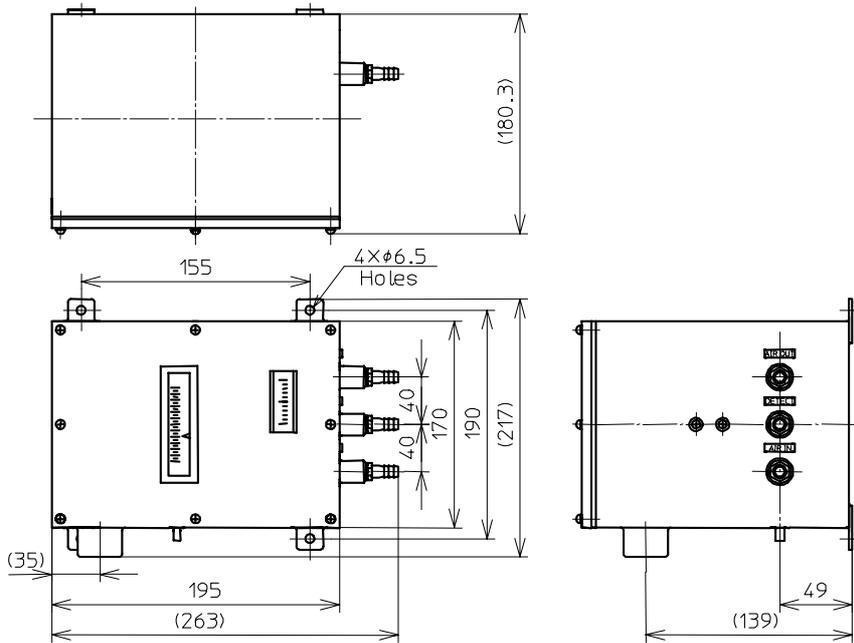


Fig. 3 LA1000 Converter

3. PRINCIPLE OF OPERATION

The Level Measurement contains the pressure element. The pressure element measures the differential pressure between the back pressure equivalent the depth of water and atmospheric pressure.

Built-in purge set consists of needle valve and constant differential valve, supplies constant air to sensor. The converter measures back pressure from sensor with pressure element due to spouting this air source through the sensor into liquid, converts it into an electrical signal (4 to 20 mA DC).

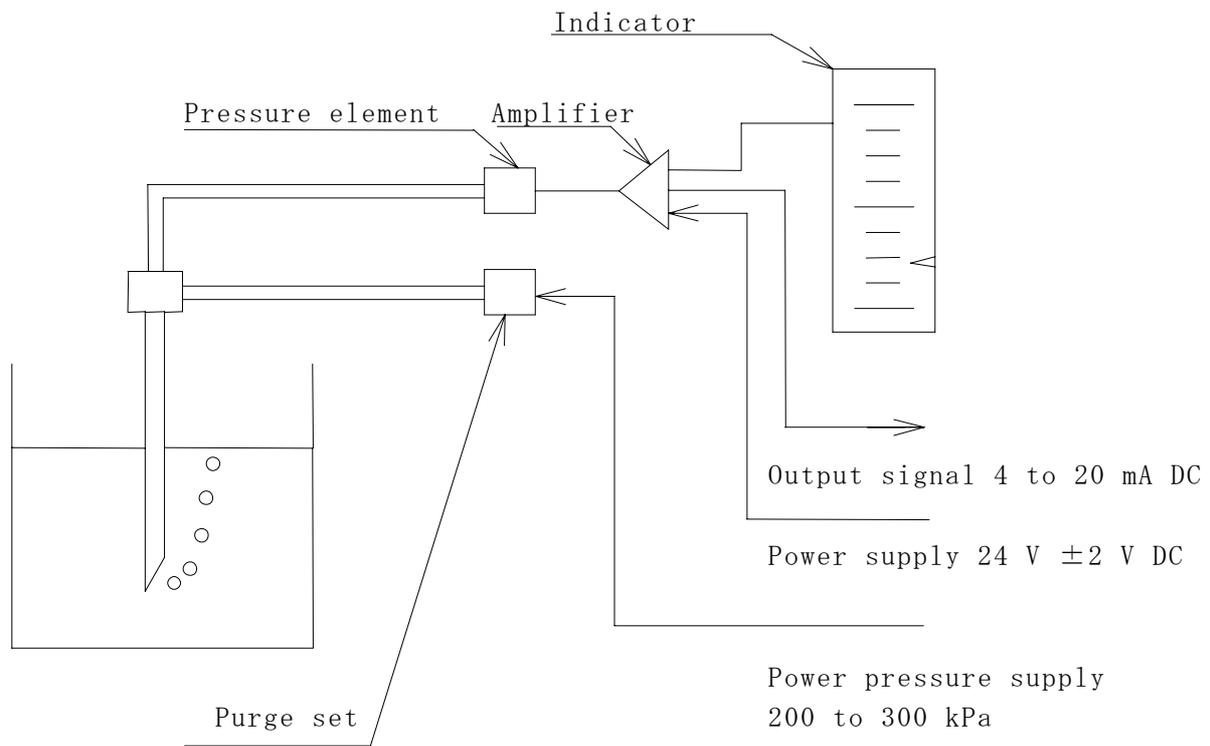


Fig. 4 Principle of operation

4. INSTALLATION

4.1 Unpacking

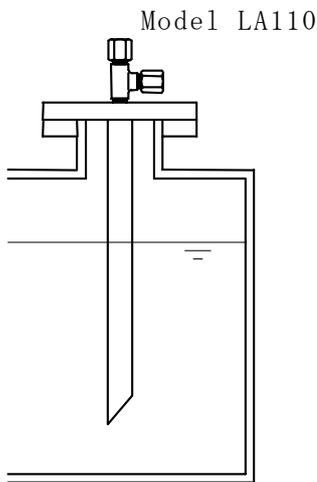
This Level Measurement have been thoroughly inspected and carefully packed at the factory to prevent from damage during shipment. When unpacking, exercise due care not to subject the instrument to mechanical shock. After unpacking, visually check the instrument exterior for damage.

4.2 Installation Location

This Level Measurement should be installed in an area where the following condition.

- (1) Provide ample space for maintenance / inspection.
- (2) Low relative humidity and no exposure to moisture.
- (3) No corrosive gases. (Such as NH_3 , SO_2 , Cl_2 etc)
- (4) No excessive vibration.

4.3 Installation of Sensor



NOTE ; When the liquid level falls below bubble outlet the sensor, the output current will remain at 4 mA DC nominal.

Fig. 5 Example of sensor installation

⚠ CAUTION

Do not bend or clog the sensor. Otherwise sensor operation may be incorrect or damaged.

4.4 Installation of Converter

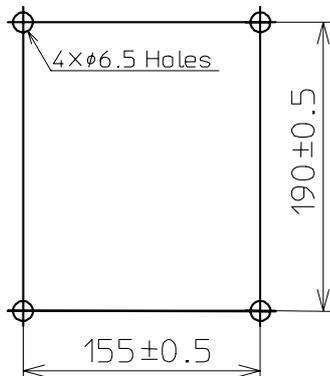


Fig. 6 Mounting pitch

Install the converter on a wall. Fig. 6 shows mounting pitch of the converter.

NOTE ; Install the converter as cable inlet position is toward ground to protect from rain or splashing water.

5. PIPING AND WIRING

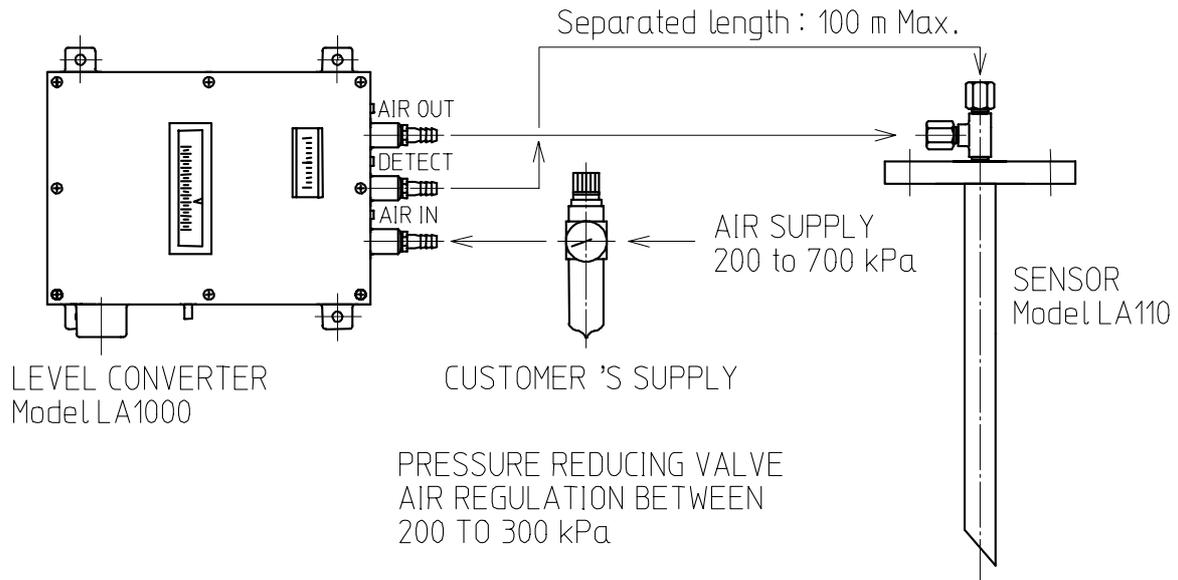


Fig. 7 Piping

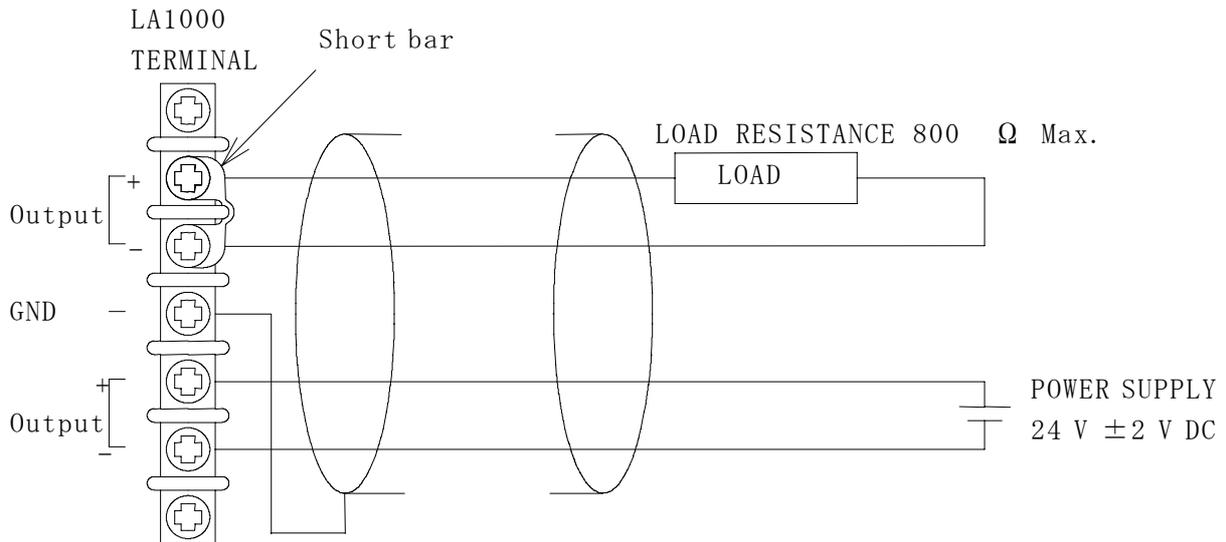


Fig. 8 Wiring

CAUTION

Short bar is installed on output terminals because of connected with indicator and output terminals in series. The load should be connected with converter after removed the short bar.

NOTE the following points:

- (1) This converter unit is designed to operate with load resistance 800 Ω Max.
- (2) Cable inlet are made G3/4 or equivalent. The cable finished outside diameter should be used between 11 to 12 mm.
- (3) Install solderless lugs fitted to M3 screw to the end of lead wires. Recommended lugs R1.25-3 or R1.25-3.5.

6. ADJUSTMENT

6.1 Start-up

Proceed as follows:

- (1) Make sure that there are no miswiring.

⚠ CAUTION

Supply voltage must match the terminals indicated on the terminal block. Incorrect voltage miswiring will damage the converter.

- (2) The sensor and the converter have been adjusted before shipment. If it need fine adjustment or if specification is changed, adjust output signal in accordance with adjustment procedure described blow.

NOTE: When adjustment, the sensor should be connected to power supply and allowed to stabilize for one hour in air.

6.2 Component Names

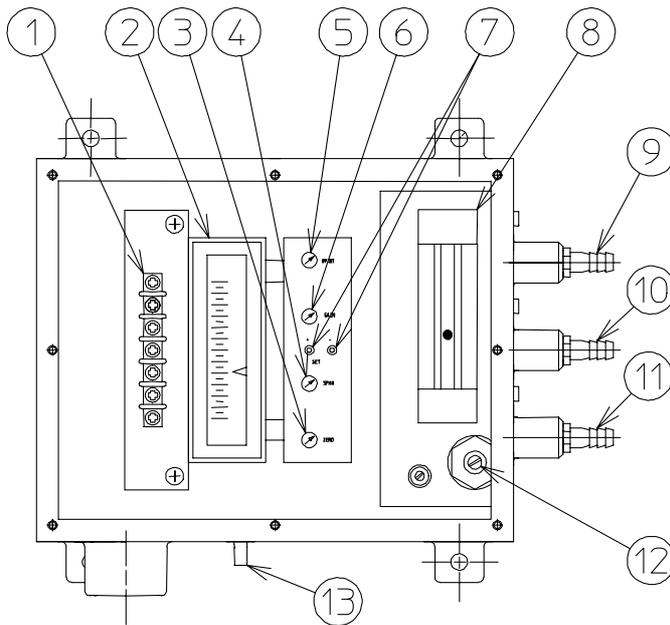


Fig. 9 Operational panel

- ① Terminals
- ② Indicator
For output current (4 to 20 mA DC) of zero position.
- ④ SPAN adjusting volume
For output current (4 to 20 mA DC) of span position.
- ⑤ GAIN adjusting volume
Correcting for input signal of span position. (0 to 2 V DC)
- ⑥ OFFSET adjusting volume
Correcting for input signal of zero position. (0 to 2 V DC)
- ⑦ CHECK point
Using at adjustment for OFFSET and GAIN.
- ⑧ Flow gauge
Fig. 9 Operational panel
- ⑨ Pipe fitting for "AIR OUT"
- ⑩ Pipe fitting for "DETECT"
- ⑪ Pipe fitting for "AIR IN"
- ⑫ Needle valve
- ⑬ Vent pipe

6. 3 Air Source Adjustment

Set 0.5 l/minute the air source with needle valve looking for flow gage.

NOTE; When measuring liquid is high viscosity, set 0.8 l/minute the air source with needle valve.

6. 4 Offset and Gain Adjustment

(1) Connect digital voltmeter (measuring range ; 0 to 2 V DC) to the check point terminals on operational panel.

NOTE; The red colored terminal is positive, the black colored terminal is negative.

(2) When the liquid level is zero, adjust 0 V DC between the check point terminals with OFFSET volume . (When turning a volume to the right, the voltage rises.)

NOTE; If the tank is already filled with liquid, lift up the sensor and adjust that above.

(4) When the liquid level is span, adjust 2 V DC between the check point terminals with GAIN volume. (When turning a volume to the left, the voltage rises.)

NOTE; If the tank is not filled up with liquid, measure the liquid level and adjust calculated value according to expression of ①.

6. 5 Output Signal Adjustment

(1) Connect digital ammeter (measuring range ; 4 to 20 mA DC) to output terminals reference with Fig. 8.

(2) When the liquid level is zero, adjust 4 mA DC with ZERO volume.

(When turning a volume to the right, the indication and the output rises.)

NOTE; If the tank is already filled with liquid, lift up the sensor and adjust that above.

(3) When the liquid level is span, adjust 20 mA DC with SPAN volume.

(When turning a volume to the right, the indication and the output rises.)

NOTE; If the tank is not filled up with liquid, measure the liquid level and adjust calculated value according to expression of ②

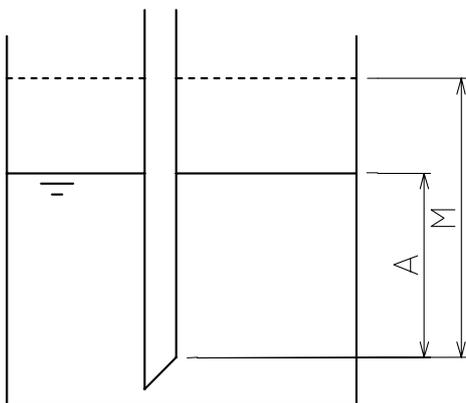


Fig. 10

For example

$M=8m$ [Measuring range]

$A=6m$ [Measured length]

$A/M \times 2 = 6/8 \times 2 = 1.5$ (V) [GAIN] . . . ①

$A/M \times 16 + 4 = 6/8 \times 16 + 4 = 16$ (mA) [SPAN]

. . . ②

7. TECHNICAL NOTES

- (1) Do not install the sensor near inlet or outlet of liquid.
- (2) Keep the sensor to protect away from mechanical shocks during carrying or installation.
- (3) When the liquid level falls below bubble outlet of the sensor, the output current will remain at 4 mA DC nominal.
- (4) After installation, provide the products to protect from rain or splashing water until completion the wiring and piping.

8. INSPECTION/MAINTENANCE

The following annual servicing tasks should be carried out on the sensor and control unit.

8. 1 S e n s o r

- a. Visually check the sensor exterior for damage.
- b. Make sure that there are no leak from piping connection with as soapy water.

8. 2 C o n v e r t e r

- a. Make sure that output current is 4 mA DC, when sensor is lifted up.
- b. Make sure that output current is correct equivalent to calculated value with expression of ②, when the sensor is installed.

NOTE; If out put signal is incorrect, re-adjust the control unit in accordance with " 6. ADJUSTMENT ".

9. TROUBLESHOOTING

⚠ CAUTION

Use the following chart to troubleshoot the malfunctioning sensor. If your remedies are unsuccessful, ask Nohken for repair and replacement.

Problems	Causes	Remedies
No output current.	There are broken of wire.	Replace the wire.
	Loosening terminals	Tighten terminals.
Indication(graduator) is correct, but no output.	Short bar is installed.	Remove the short bar on output terminals reference with "5 WIRING".
Output current does not follow with level falling or rising.	Installation on improper level.	Re-install in proper level.
	Supplied air is little.	Re-set air source according to "6.3 Air source Adjustment.
	Air leakage.	Check air leak on part of piping connection.
	Improper adjustment.	Adjust correctly according to "6 ADJUSTMENT".
	Change of liquid S.G.	Re-adjust according to "6 ADJUSTMENT".
	Sensor (detection pipe) is stopped up.	Clean the sensor.
Output current is instability.	Loosening terminals.	Tighten terminals.
	Affection wave motion of liquid.	Install stilling tube.
Excess current.	Short circuit.	Make sure that there are no miswiring.

NOHKEN INC.

HEAD OFFICE : 15-29, Hiroshiba-cho, Suita-city, Osaka 564-0052, Japan.

TEL:06-6386-8141 FAX:06-6386-8140

TOKYO BRANCH OFFICE : 67, Kandasakumagashi, Chiyoda-ku, Tokyo 101-0026, Japan.

TEL:03-5835-3311 FAX:03-5835-3316

NAGOYA OFFICE : 3-10-17, Uchiyama, Chikusa-ku, Nagoya-city, Aichi 464-0075, Japan.

TEL:052-731-5751 FAX:052-731-5780

KYUSHU OFFICE : 14-1, 2-chome, Asano, Kokurakita-ku, Kitakyushu-city, Fukuoka 802-0001, Japan.

TEL:093-521-9830 FAX:093-521-9834