

LE100

Back-pressure level meter

LE110

Back-pressure level meter
(Differential pressure sensing type)

LT1

Back-pressure level switch

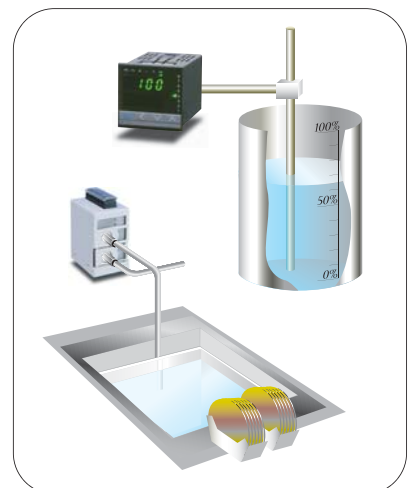
LE100



LE110



LT1



CE _C **UL** [®] US



RKC INSTRUMENT INC.



Perfect for level measurement of chemicals in applications such as wet processing equipment, wafer cleaning and etching systems.

Advanced functions type

*High accuracy linear liquid level measurement.
Alarm output of up to 8 points is available.*

Back-pressure level meter

LE100

Measures the purge pressure (back-pressure) in a tube which changes relative to the liquid level of a tank by converting it to level. Monitor output and level alarm output of up to 8 points are available.

Back-pressure level meter (Differential pressure sensing type)

LE110

LE100 with differential pressure (Air opening and atmospheric pressure variation) sensor function. It can also be used in semi-enclosed tanks whose internal pressure varies.

Compact

Sensor, indicator, and orifice are built into a 48mm square case.

*Only the LE110 has a built-in orifice.

High accuracy

High repeatability of $\pm 0.3\%$ (full scale)

Multiple functions

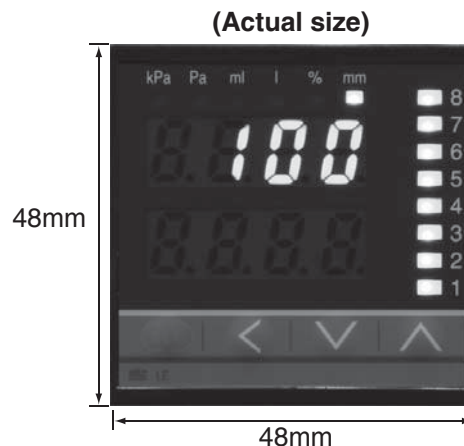
Compact size.

- Max 8 points Level alarm output (6 points : standard, 8 points : option)
- One-touch empty/span adjustment
- Specific gravity compensation number of times count
- Volume compensation
- Selectable display units
- Digital communication (option)
- DI (external contact input) (Option)
- Monitor output (Option)

LE100



LE110



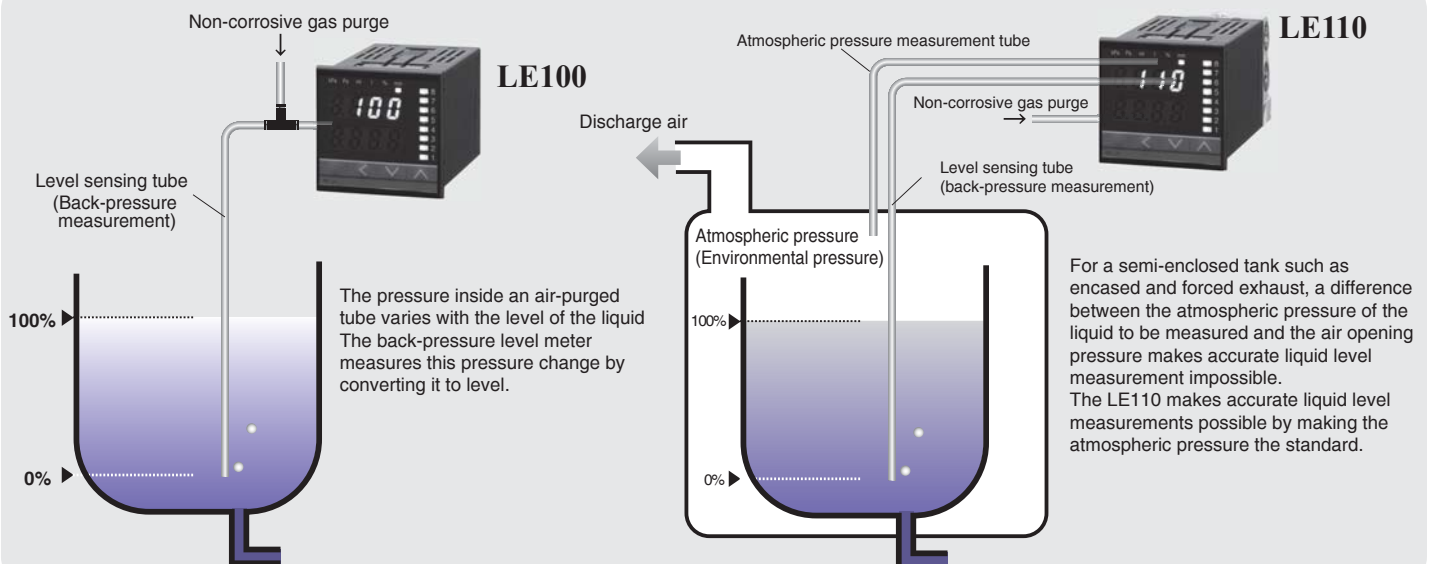
Built-in

Sensor

Indicator

Orifice

* Only the LE110 has a built-in orifice.



Simple, quick, and reliable.

Simple

Liquid level alarm point setting and sensing are possible with one tube

Back-pressure level switch

LT1

Perfect for upper limit/lower limit level sensing of liquids. It is a simple and compact level switch with built-in semiconductor back-pressure sensor and orifice.

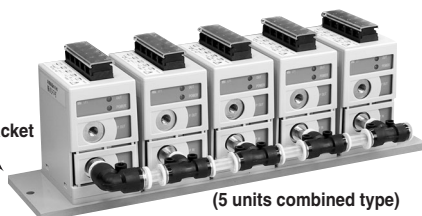
High reliability

Semiconductor back-pressure sensor used at the sensing section.
No mechanical moving parts to wear out means higher reliability.

No need to adjust

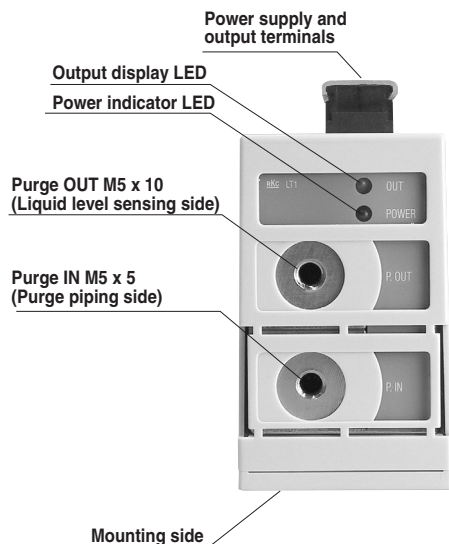
Simply set the length of the tube to an arbitrary length and preparations are complete. The end of the tube becomes the sensing point. An orifice is built into the unit for supplying 20 ± 1 kPa gas. Once the gas is supplied, it will automatically become the purge flow. When the liquid level reaches the end of the tube an alarm will be displayed.

Mounting bracket



* Up to 5 units may be combined.
Combined specification are available. (Specify when ordering)

Exterior view



* Relay contact output allows selection of excitation/non-excitation operation. (Specify when ordering)

Alarm output
Relay contact (1 point output)

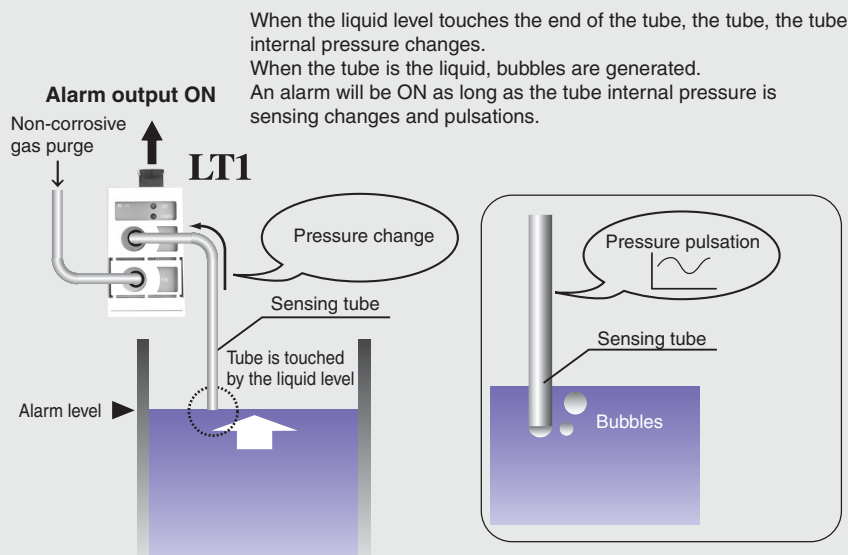
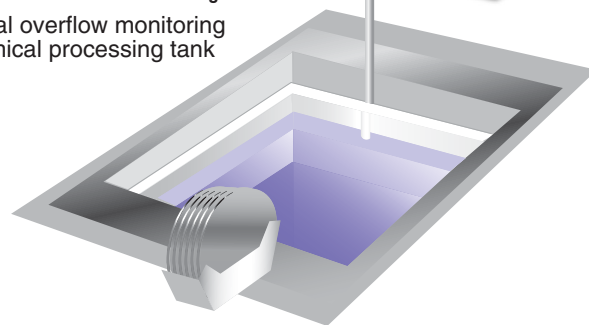
Typical composition

Operated by minimum supply gas
Input medium consumption : 40-100ml/min

Non-corrosive gas purge

Regulator

Chemical overflow monitoring for chemical processing tank



Back-pressure level meter

LE100

LE110

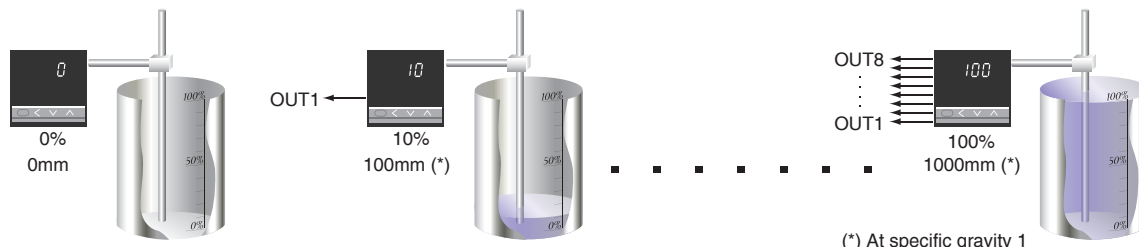
(Differential pressure sensing type)

Major Functions



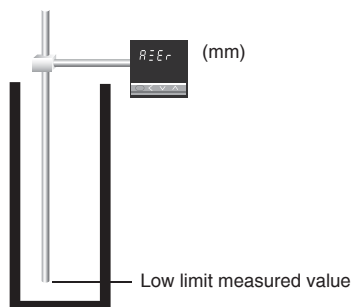
Level Measurement (% or mm)

LE100/LE110 converts back-pressure to display the actual level value in millimeters (mm) or percentage (%).



Empty Adjustment Function

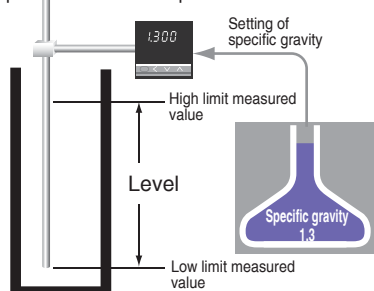
Empty adjustment function can adjust the displayed low limit measured value to the purge pressure at the end of the sensor tube exposed to atmosphere.



Specific Gravity Compensation

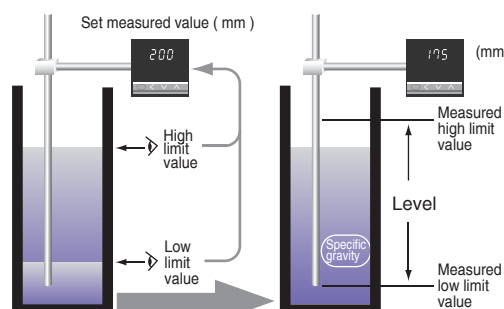
• When specific gravity is known

The high limit value is automatically computed and the liquid level is displayed linearly by setting the specific gravity of the liquid and the low limit measured value. If the specific gravity is known, the high limit measured value can be set without presence of actual liquid.



• When specific gravity is unknown

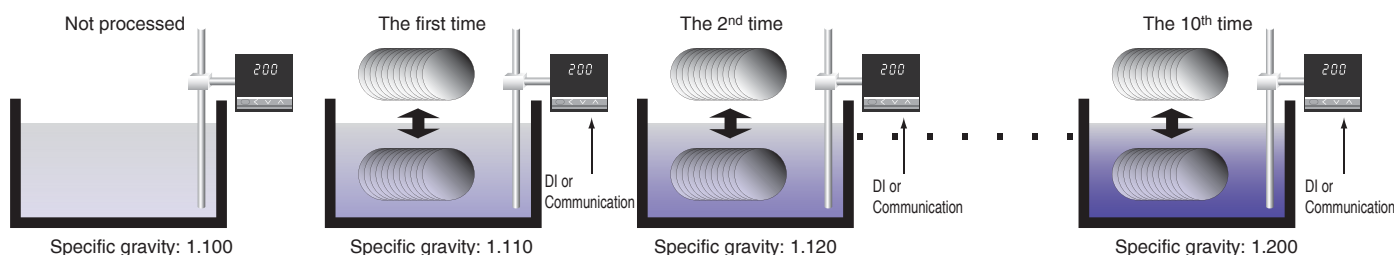
The specific gravity and high/low limit measured values are computed automatically and the liquid level (mm) is displayed linearly by inputting two optional points of actual liquid levels.



(*) At specific gravity 1, measuring high limit range is 1000mm. A specific gravity setting range is 0.800 to 2.500.

Automatic Specific Gravity Compensation

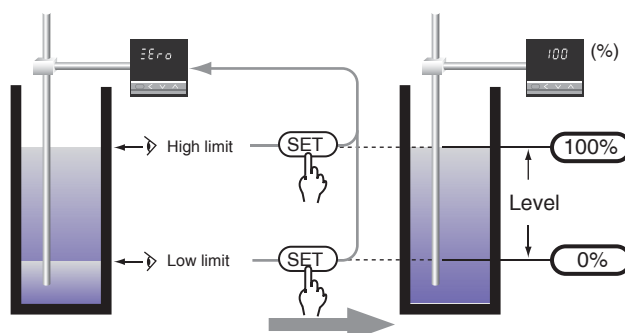
The LE100/110 automatically compensates for specific gravity according to the number of times a semiconductor wafer is chemically-processed in the same tank liquid.



This illustration shows how the LE100 automatically adjusts specific gravity compensation between 1.10 to 1.20 through ten processing cycles. The counting of wafer processing cycles can be entered manually at the front keypad with contact input or digital communication.

Span Adjustment Function

The percentage value display within a 0 to 100% range is achieved by setting the optional high and low limit adjustment points.

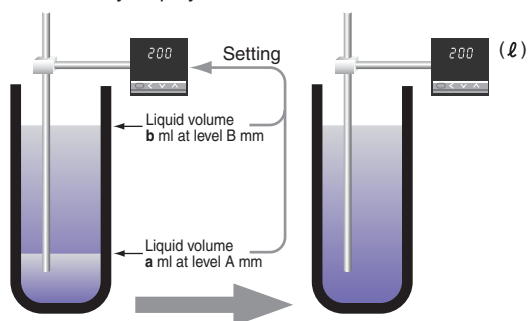


Liquid Volume Measurement (ℓ or mℓ)

LE100/LE110 converts the change of back-pressure caused by the rise and fall of chemical liquid level into the actual chemical liquid volume for display in milliliters (ml) or liters (ℓ).

• When the tank has a simple shape

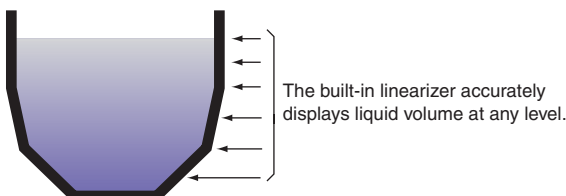
Liquid volume in a tank with simple shape changes linearly in relationship to liquid level. When the liquid volumes (ml/ℓ) of optional high/low points are set, the liquid volume measurement is accurately displayed.



• When the tank has a complex shape

The built-in linearizer has a maximum of 11 adjustment points.

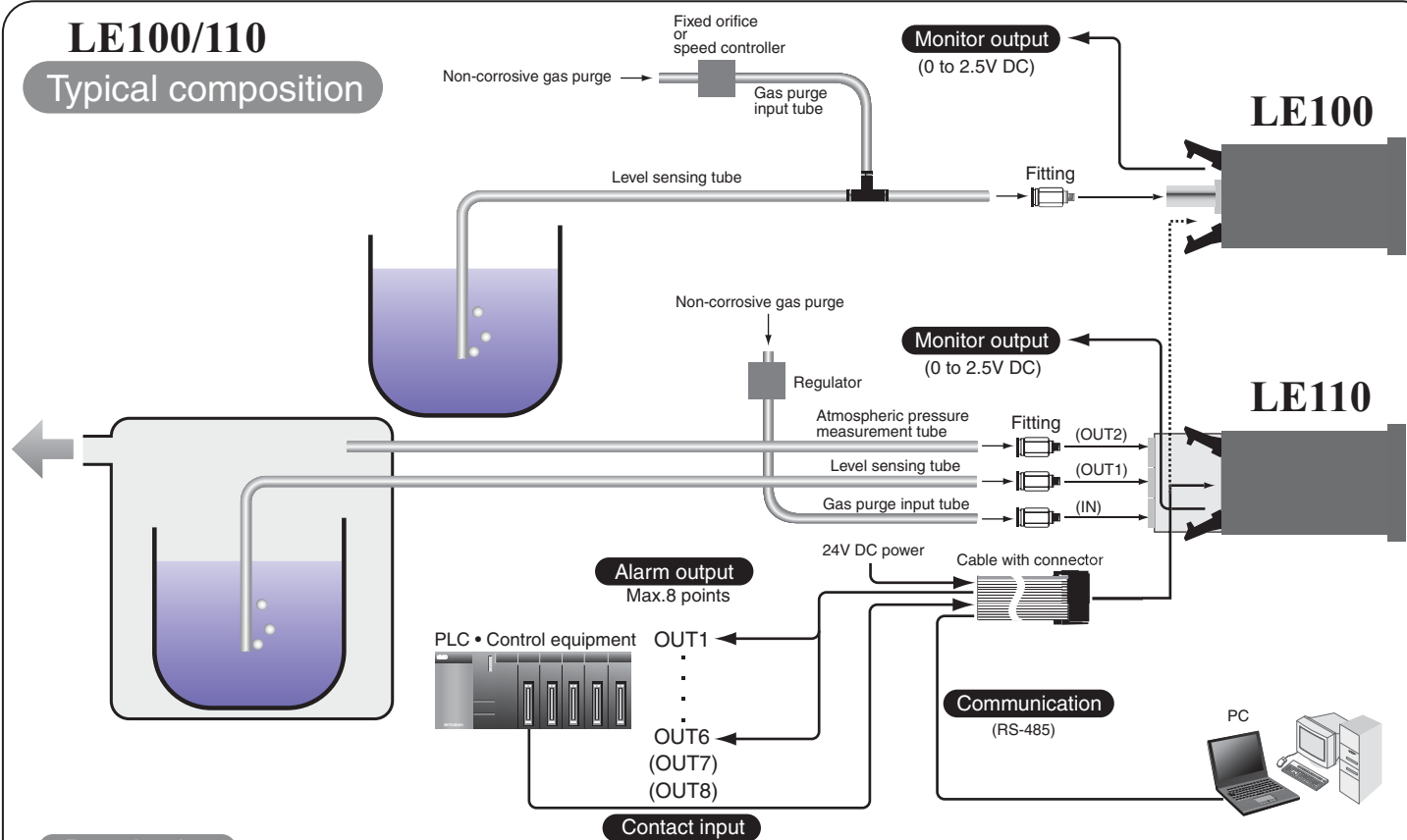
Liquid volume in a tank with a complex shape changes depending on variations of the tank shape. The LE100 has up to 11 adjustment points that compensate for these variations to linearize the displayed value throughout the measurement range.



Pressure Measurement (Pa or kPa)

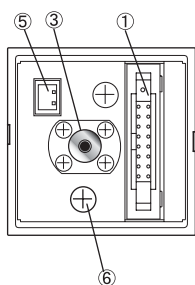
LE100/LE110 can be used as a pressure sensor (Pa or kPa) with high repeatability.

LE100/110 Typical composition

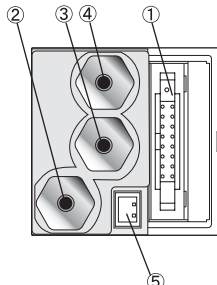


Rear drawing

LE100

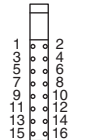


LE110



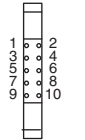
① Power/Output connector <LE100/110>

16 pin type



PS-16PE-D4LT2-M1
(Japan Aviation Electronics Industry, Limited)

10 pin type



PS-10PE-D4LT1-LP1
(Japan Aviation Electronics Industry, Limited)

- ② Gas purge input (IN) <LE110>
(Screw size : M5X10)
- ③ Level sensing (OUT1) <LE100/110>
(Screw size : M5X10)
- ④ Atmospheric pressure measurement (OUT2) <LE110>
(Screw size M5X10)
- ⑤ Monitor output <LE100/110>
Connector : S2B-XH-A (Manufactured by JST Mtg. Co., Ltd)
- ⑥ Ground terminal <LE100>
(Screw size M3X6)

* The fitting and tube shall be prepared separately by customers.

Specifications LE100/110

Inputs

Number of inputs : 1 point
 Input medium : Non-corrosive gas
 Input pressure range : a) LE100 : 0 to 9.807 kPa
 b) LE110 : Supply pressure range : 10 to 30kPa
 Guarantee withstanding pressure:
 Supply pressure 100 kPa
 Measurement pressure 10 kPa
 Zero point revision range : $\pm 5.0\%$ of full span
 Sampling time : 0.2 sec
 PV digital filter : 1 to 100 sec (No filter when setting 0)
 (First order lag filter)

Performance

Repeatability : $\pm 0.3\%$ of full span
 Non-linear : $\pm 0.5\%$ of full span
 Temperature characteristic : Zero output : $\pm 0.04\%$ of full span / °C
 Span output : $\pm 0.04\%$ of full span / °C

Level setting

Setting method : Interactive setting using front keys.
 Number of set points : 6 points (8 points optional)
 Setting range : Same as units and range.
 Setting resolution : Same as PV. (See *Units and range* table)

Specific Gravity Compensation

Number of set points : 1 point
 Setting range : 0.800 to 2.500
 Setting resolution : 0.001

Display

Input display : 7 segments LED (4 figures, green, height : 7.6 mm)
 Set display : 7 segments LED (4 figures, orange, height : 7.6 mm)
 Action display : Point LED (green, OUT1 to 8)
 Unit display : Point LED (green, mm, %, l, ml, Pa, kPa)

Unit and Range

Set Code	Unit	Range
0	mm	0 to 400 (1250) * High limit value is decided by the measurement of specific gravity.
1	%	0.0 to 100.0
2	g	0 to 360 * Decimal point is decided by the setting of decimal point position.
3	ml	0 to 360 * Decimal point is decided by the setting of decimal point position.
4	kPa	0 to 9.807
5	Pa	0 to 9807

Specific Gravity Compensation with Actual Liquid

Number of set points : 2 points
 Setting range : Scaling low limit to high limit.
 Setting resolution : 1

Volume Compensation Function

Number of set points : 2 to 11 points
 Setting range : Scaling low limit to high limit.
 Setting resolution : Same as PV. (See *Units and range* table)

Automatic Specific Gravity Compensation

End specific gravity setting : 0.800 to 2.500
 Number of wafer processing times setting : 1 to 20

Hold Function

Peak hold : Highest measured value is held
 Bottom hold : Lowest measured value is held
 • The Hold function is always operational.
 • After the Hold function is confirmed by operator, it can be reset at the front panel keypad.
 • When instrument power supply is OFF, Hold data is not backed up.

Specifications LM1

Inputs

Number of inputs : 1 point
 Input medium : Non-corrosive gas
 Input pressure range : 0 to 49kPa
 Input media pressure : 20 to 49kPa

Performance

(At the standard purge gas pressure 20 kPa and the ambient temperature $23\pm 2^\circ\text{C}$)

Response time : 0.2 sec
 Hysteresis time : Within 3 sec
 Input media consumption: 40 to 100 ml/min

Outputs

Number of output : 1 point
 Output type : Relay contact output, Form C contact,
 250V AC 3A (Resistive load), 30V DC 3A
 Energized or De-energized (Specify when ordering)

Display

Power ON lamp : Green LED
 Output lamp : Green LED

Outputs

Number of outputs : 1 to 6 points (1 to 8 points optional)
 Output action : Process high, Process low, Deviation high, Deviation low
 Setting range : Same as input range.
 Deviation setting range : -10 to 10 mm
 Differential gap : 0.0 to 10.0% of span
 Output timer : 0 to 600 sec.
 Interlock : Settable independently for each output
 Output type : Selectable for each output either for ON or OFF at operation
 Output : Transistor output (Open collector output)
 (sink type) (NPN) 24 V DC (31.2 V DC max.)
 Maximum load current: 60 mA DC

Contact Input

(Optional)

Number of inputs : 1 point
 • Auto-zero (empty adjustment) activation or incremental count of the number of processing times.
 Input type : Non-voltage contact input
 a) OPEN : 500kΩ or more
 b) CLOSE : 10Ω or less
 • Possible to be activated by open collector output.

Communications

(Optional)

Communication method : Based on RS-485 (two-wire)
 Synchronous method : Start-stop synchronous
 Communication speed : 2400, 4800, 9600, 19200 BPS (Selectable)
 Bit configuration : a) Start bit : 1
 b) Data bit : 7 or 8
 c) Parity bit : Without, Odd or Even
 d) Stop bit : 1 or 2

Maximum connection : 31

Monitor Output

(Optional)

Number of outputs : 1 point
 Output : 0 to 2.5V DC (Load resistance : More than 1kΩ)
 Input impedance : Less than 0.1Ω
 Output data type : Process value
 Output scaling : Available to high and low setting
 Output accuracy : $\pm 0.3\%$ of span
 Ripple of output : $\pm 0.1\%$ of span or less than 1 mV (resistive load)
 Output resolution : More than 10 bit

General Specifications

Supply voltage : 21.6 to 26.4V DC (Rating 24V DC)
 Power consumption : Less than 130 mA
 Memory backup : Backed up by EEPROM
 Data retaining period : Approx. 10 years
 Number of writing : Approx. 100,000 times
 Insulation resistance : More than 20MΩ (500V) between measured terminals and ground terminal (LE110 : Case)
 More than 20MΩ (500V) between power terminals and ground terminal (LE110 : Case)
 Dielectric voltage : 500V AC for one minute between measured terminals and ground terminal (LE110 : Case)
 500V AC for one minute between power terminals and ground terminal (LE110 : Case)
 Measuring tube length : Max.5m
 Diameter of measuring tube : $\phi 4\text{mm}$
 Power failure : A power failure of 30 ms or less will not affect the control action.
 Weight : LE100 : Approx. 150g, LE110 : Approx. 170g
 Ambient temperature : 0 to 50°C (32 to 122°F)
 Ambient humidity : 45 to 85% RH
 Absolute humidity : MAX.W.C 29 g/m³ dry air at 101.3 kPa
 Operating environment : Free from corrosive and flammable gas and dust.

General Specifications

Supply voltage : 21.6 to 26.4V DC (Rating 24V DC)
 Power consumption : Less than 45mA (24V DC)
 Insulation resistance : More than 20MΩ (500V) between power terminals and output terminal
 Dielectric voltage : 2300V AC for one minute between power terminals and output terminal
 Measuring tube length : Max.5m
 Diameter of measuring tube : $\phi 4\text{mm}$
 Weight : Approx. 170g
 Ambient temperature : 0 to 50°C (32 to 122°F)
 Ambient humidity : 35 to 85% RH
 Absolute humidity : MAX.W.C 29 g/m³ dry air at 101.3 kPa
 Operating environment : Free from corrosive and flammable gas and dust.

Caution

This instrument is for the level measurement of chemical liquids used for semiconductor washing machines. So far, it has been used for the following chemical liquids. In addition, Be careful that changes in liquid surface tension and specific gravity at the high or low temperature may result in incorrect level detection. This would also apply when using any liquid other than those listed below.

Relevant liquids	Surface tension (mN/m)	Gravity
Pure-water	72	1
Hydrochloric acid	72	1.19
Ethanol	22	0.79
Isopropyl alcohol (IPA)	21	0.79

This instrument detects a change in pressure within a measuring tube inserted into a measured liquid. Leakage of the gas thorough the tube connection may cause a detection error. Therefore, correctly connect the tube.

In addition, Be careful that incorrect detection may result if used in one of the following conditions:

- When there are rapid liquid level changes.
- When there are pressure changes and/or air stream in the measuring tank.
- When a closed tank is used for level measurement.

Model Code LE100/110

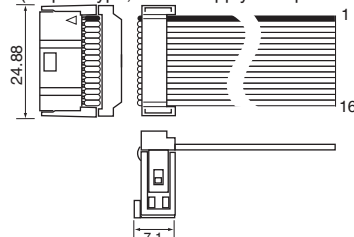
Specifications		Model and Suffix Code	
Type	Gauge pressure type	LE100A-□□6*□□□N-□□	
	Differential pressure sensing type (Built-in orifice)	LE110A-□□6*□□□N-□□	
	Transistor output (NPN output) (sink type)	D C	
	Transistor output (PNP output) (source type) (To be released soon)		
Number of outputs	6 points	6	
	8 points		
Power supply	24V DC	6	
Contact input (DI)	Not supplied	1	N
	External contact input		
Communication	Not supplied	5	N
	RS-485		
Monitor output	Not supplied	1	N
	Monitor output		
Waterproof/Dustproof	Not supplied		N
Connector type ¹	10 pins type	1	2
	16 pins type		
Attached connector ²	Not supplied	N	1
	For 10 pins type (Model code: W-BP-01-N or equivalent)		
	For 16 pins type (Model code: W-BP-02-N or equivalent)		

¹ When 8 output points, contact input or communication functions are selected, only the 16 pin connector is available.
² When using a connector (W-BP-03-N or equivalent) intended for monitor use, AWG # 28 ~ 22 wire is required.

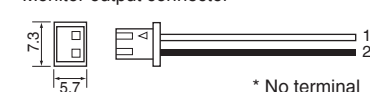
W-BP-01-□□□□□
 (10 pins type, Power supply / Output connector)



W-BP-02-□□□□□
 (16 pins type, Power supply / Output connector)



W-BP-03-□□□□□
 Monitor output connector

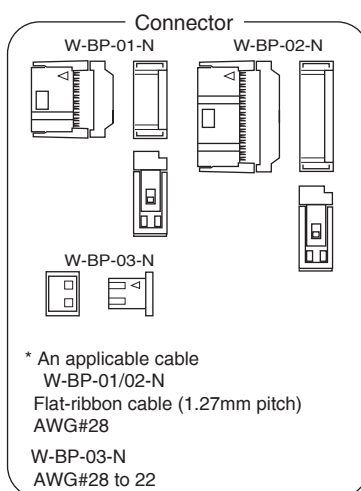


* No terminal

Cable

Specifications		Model and Suffix Code	
Connector type	10 pins type, Power supply / Output connector	W-BP-□□-□□□□	
	16 pins type, Power supply / Output connector	01	
	Monitor output connector	02	
Cable length	Unit : mm (1,000 to 10,000 mm, Specify every 1000 mm units)	□□□□	
	No connector on open end.		

• Model code of connector without cable : For 10 pins type: W-BP-01-N, For 16 pins type: W-BP-02-N, For monitor: W-BP-03-N



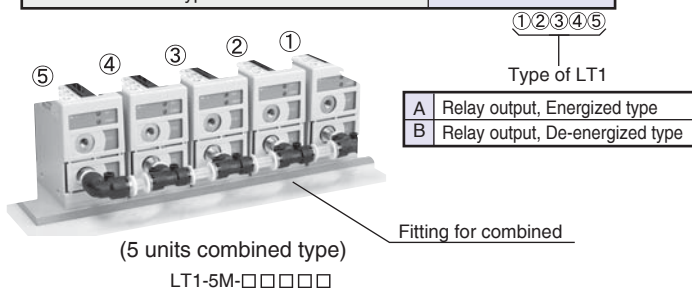
* An applicable cable
 W-BP-01/02-N
 Flat-ribbon cable (1.27mm pitch)
 AWG#28
 W-BP-03-N
 AWG#28 to 22

Model Code LT1

Specifications		Model and Suffix Code	
Relay output type	Energized type	LT1-□ N N /A	
	De-energized type	B	
Extremely small pressure detecting function	No function	N N	

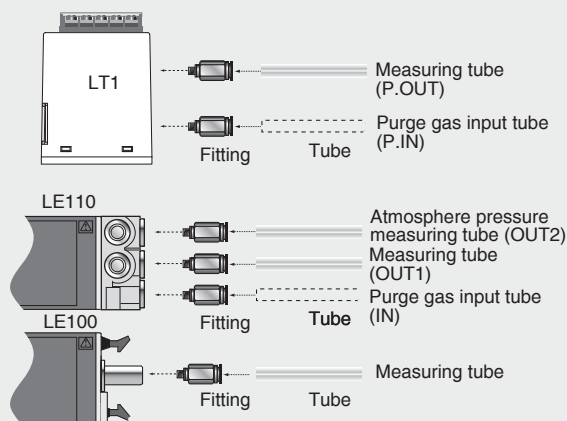
Combined type model code

Specifications	Model and Suffix Code
1 unit (With mounting bracket)	LT1-1M-□
2 units combined type	LT1-2M-□□
3 units combined type	LT1-3M-□□□
4 units combined type	LT1-4M-□□□□
5 units combined type	LT1-5M-□□□□□



• Prepare the fitting and tube separately

Fitting : Recommended unit : One-touch fitting PC6-M5SUS (NIHON PISCO CO., LTD)
 Quick-action fitting TS6-M5-SUS (Koganei Corporation)
 Tube : Fluorocarbon resin tube (New PFA) φ 6 x φ 4 (Max.5m)



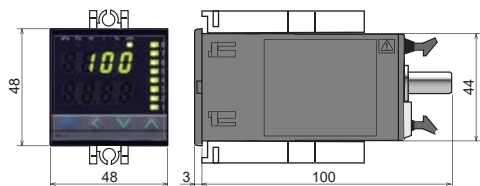
Rear terminals and external dimensions

LE100/110

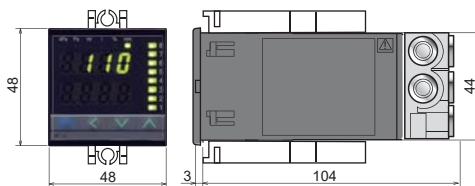
External dimensions

(Unit:mm)

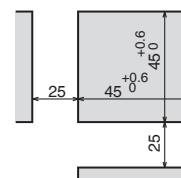
LE100



LE110



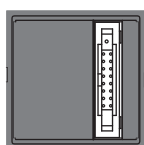
LE100 / LE110 <Panel Cutout>



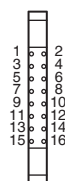
Panel thickness : 1 to 9mm

Rear terminals

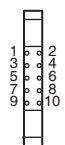
LE100/110 Connector



16 pins type



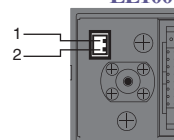
10 pins type



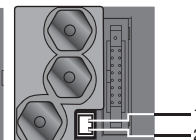
Pin Number		Description
16 pin	10 pin	
1	—	T/R(A) Communications RS-485
2	—	T/R(B)
3	—	SG/DI Contact input
4	—	DI
5	1	OUT1
6	2	OUT2
7	3	OUT3
8	4	OUT4
9	5	OUT5
10	6	OUT6
11	—	OUT7
12	—	OUT8
13	7	COM(-) / DC-24V
14	8	COM(-) / DC-24V
15	9	DC+24V
16	10	DC+24V

Monitor output (Optional)

LE100



LE110

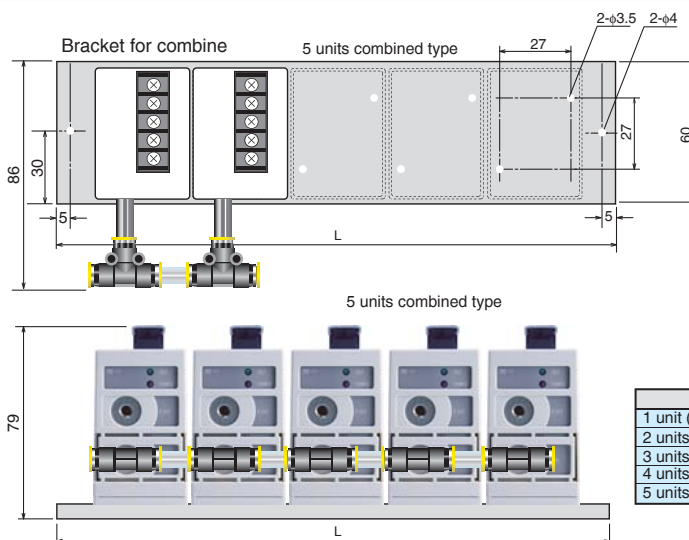
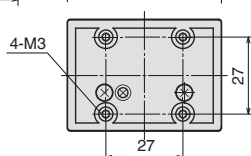
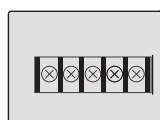


Pin Number	Description
1	+
2	-

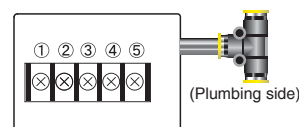
LT1

External dimensions

(Unit : mm)



Terminals



①	②	③	④	⑤	Terminal No.
24VDC	+	COM	NO	NC	
Power supply			Output		
			Relay contact output		

Type	L
1 unit (With mounting bracket)	79
2 units combined type	120
3 units combined type	161
4 units combined type	202
5 units combined type	243

Handling Caution

- Do not disconnect the tube for purge gas input with the liquid filled in the tank. If disconnected under the above condition, the liquid may flow backward.
- Do not use a closed tank.
- Install the level meter above the top of the tank.
- When applying back pressure, use high purity nitrogen gas to avoid contamination of the liquid. If there is no concern regarding pollution by the purge gas, use only air or nitrogen gas which has been separated oil content and garbage of 0.3μm greater or equal.
- Do not fully close the tube connecting section. If so, the built-in very low pressure sensor may be damaged.



• Before operating this product, read the instruction manual carefully to avoid incorrect operation.
 • This product is intended for use with industrial machines, test and measuring equipment. It is not designed for use with medical equipment.
 • If it is possible that an accident may occur as a result of the failure of the product or some other abnormality, an appropriate independent protection device must be installed.
 • When installing this product, avoid the following:
 • Direct exposure to sunlight.

• An ambient temperature lower than -10°C or higher than 50°C
 • Areas subject to high humidity. Ambient humidity should not be lower than 5% or higher than 95%RH
 • Direct contact with water.
 • Corrosive environments.
 • Hazardous areas containing explosive or flammable gases.
 • Vibration or shock.
 • Areas subject to electrical noise caused by inductive interference, static electricity or magnetic fields.

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