LE100
LE110

General Description

The LE100/110 is a microprocessor based level meter with many automatic features to simplify level measurements. Its features include high repeatability, accuracy, and capable of displaying level in a variety of measurement units.
The LE100/110's specific gravity compensation function eliminates the need to set liquid level with actual liquid and is easily accomplished during chemical change.

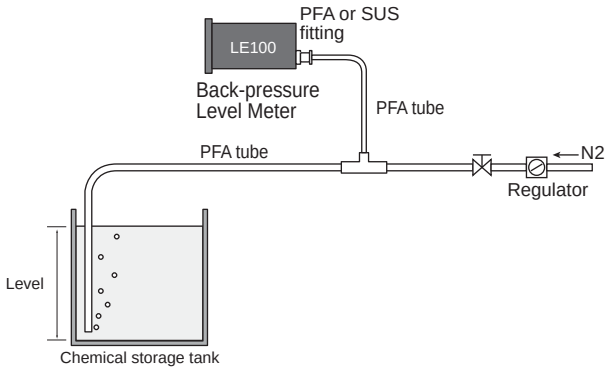
Features

- ☆ Level settings 6 or 8 points
- ☆ Measuring range 0 to 1000 mm
- ☆ Selectable display units (mm, %, l, cc, Pa, KPa)
- ☆ High repeatability 0.3% full scale
- ☆ Specific gravity compensation
- ☆ One - touch empty and span adjustment
- ☆ Volume compensation
- ☆ Available for complex tank shapes
- ☆ Digital communication (Optional)
- ☆ Monitoring output (Optional)

Back-pressure Level Meter

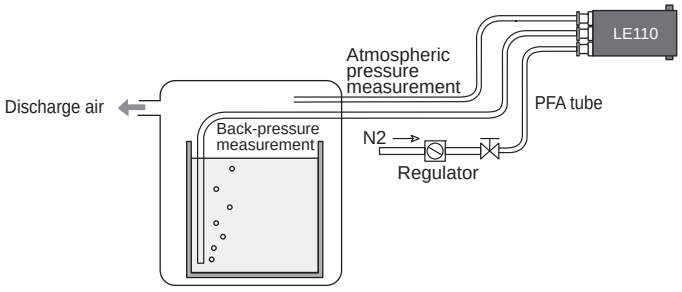
● LE100

The LE100 measures liquid levels by supplying inactive gas at fixed pressure to the sensor tube installed in the storage tank. Back-pressure is determined by measuring the changing liquid level. The sensor tube pressure varies proportionately to changes in liquid level.



● LE110 (Differential pressure sensing type)

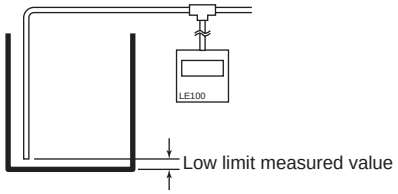
LE100 with differential pressure (Air opening and atmospheric pressure variation) sensor function.
It can also be used in semi-enclosed tanks whose internal pressure varies.



• Two kinds of special order are possible for the LE110.
Gauge pressure sensing type with orifice but without differential sensing function
: Special order code Z-1099
Differential pressure sensing type without orifice
: Special order code Z-1097
Standard type : Differential pressure sensing type with orifice.

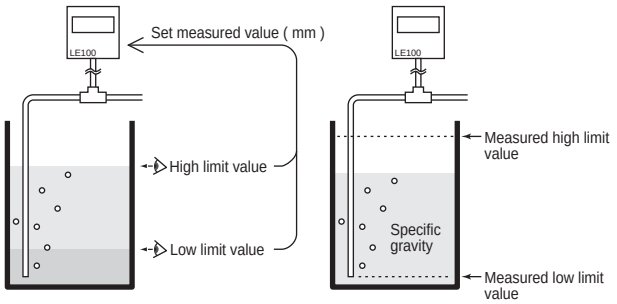
Empty Adjustment Function

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 with Actual Liquid

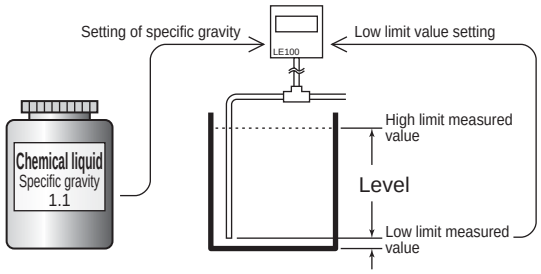
The specific gravity and high/low limit measured values are computed automatically and the liquid level (mm) is displayed linearly by inputting two optional points of actual liquid levels.



Features

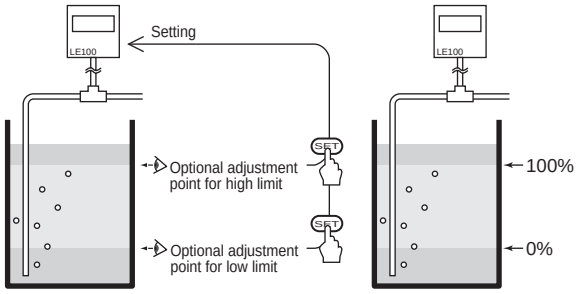
Specific Gravity Compensation

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.



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

LE100/110 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 specific gravity is known

Empty adjustment ⇒ Specific gravity compensation ⇒ Volume compensation ⇒ Measurement

- When specific gravity is unknown

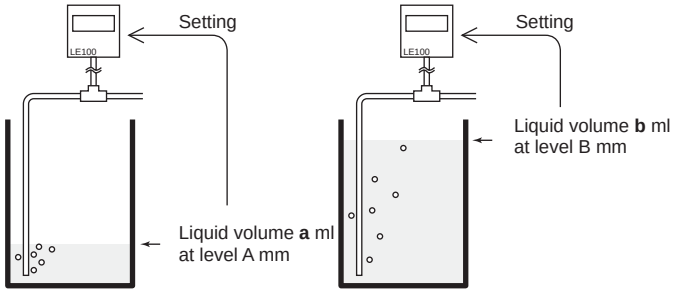
Empty adjustment ⇒ Specific gravity compensation with actual liquid ⇒ Volume compensation ⇒ Measurement

- 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.

Low level A mm | Liquid volume **a** ml

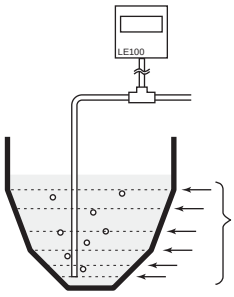
High level B mm | Liquid volume **b** ml



- When the tank has a complex shape

Liquid volume in a tank with a complex shape changes depending on variations of the tank shape. The LE100/110 has up to 11 adjustment points that compensate for these variations to linearize the displayed value throughout the measurement range.

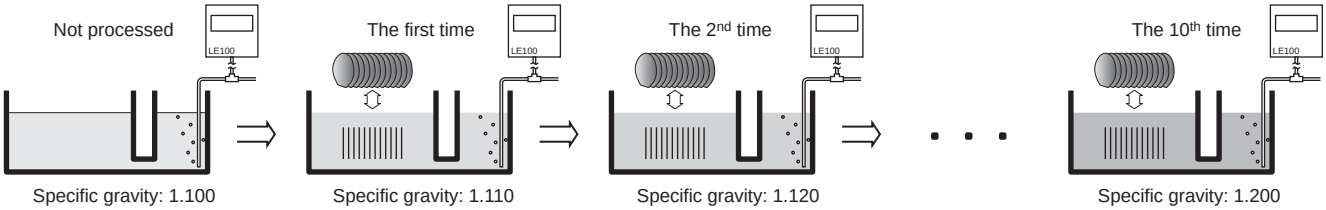
The built-in linearizer has a maximum of 11 adjustment points.



The built-in linearizer accurately displays liquid volume at any level.

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 LE100/10 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.

Specifications

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 : ± 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)

Level Setting

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)

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)

Performance

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

Specific Gravity Compensation

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

Empty Adjustment

Through the use of the empty adjustment, the tube tip can cancel an offset to an atmospheric open state.

Specific Gravity Compensation with Actual Liquid

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

•A specific gravity compensation with actual liquid measurement determines the liquid's specific gravity and allows calculation of either high or low limit values.

Span Adjustment Function

Number of set points : 2 points

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

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)

•Settable when unit is *l* or *ml*.
•Linearization setting allows the LE100/110 to display a liquid volume value.
•Measuring accuracy can not be guaranteed if the setting extends over the inflection point or if a 1mm level change is greater than 4.4% of the total volume.

Automatic Specific Gravity Compensation

•Automatic specific gravity compensation is achieved by defining initial and final specific gravity settings and the number of processing times. Output activation point then becomes constant despite varying specific gravity.

Level Setting with Actual Liquid

Number of set points : 1 to 6 points (1 to 8 points optional)
•Each output activation point can be set in relation to actual liquid level.

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.
Hold action : ON / OFF settable (Independently for each channels)
Interlock : Settable independently for each output
Output type : Selectable for each output either for ON or OFF at operation
Output : Open collector output 24V DC 50 mA

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.

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.

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 : ±0.3% of span
Ripple of output : ±0.1% of span or less than 1 mV (resistive load)
Output resolution : More than 10 bit

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

General Specifications

Supply voltage : 21.6 to 26.4V DC (Rating 24V DC)
Power consumption : Less than 130 mA
Memory backup : Backed up by EEP-ROM
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)
Power failure : A power failure of 30 ms of 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

Compliance with Standards

• CE Mark
• UL/cUL Recognized

Model and Suffix Code

Specifications	Model and Suffix Code
Model	LE100- (Gauge pressure type) LE110- (Differential pressure sensing type, Built-in orifice) □ □∗□ □ □ □−□ □／Y
Number of outputs	6 points 8 points 6 8
Power supply	24V DC 6
Contact input (DI)	Not supplied External contact input N 1
Communication	Not supplied RS-485 N 5
Monitor output	Not supplied Monitor output N 1
Waterproof/Dustproof	Not supplied Waterproof/Dustproof (To be released soon) N 1
Connector type [1]	10 pins type 16 pins type 1 2
Attached connector [2]	Not supplied For 10 pins type (Model code: W-BP-01-N or equivalent) For 16 pins type (Model code: W-BP-02-N or equivalent) N 1 2

[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.

Units and Range

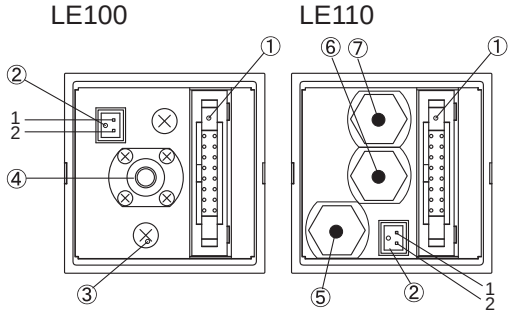
Set code	Unit	Range
0	mm	0 to 400 (1250) •High limit value is decided by the measurement of specific gravity.
1	%	0.0 to 100.0
2	l	0 to 360 •Decimal point is decided by the setting of decimal point position.
3	ml	0 to 360 •Decimal point is decided by the setting of decimal point position.
4	kPa	0 to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

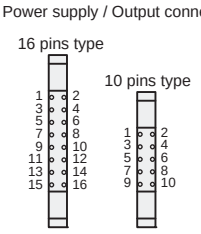
Cable

Specifications	Model and Suffix Code	
Cable name	W-BP-	□□- □ 000
Connector type	10 pins type, Power supply / Output connector	0 1
	16 pins type, Power supply / Output connector	0 2
	Monitor output connector	0 3
Cable length	Unit : mm (1,000 to 10,000 mm, Specify every 1000 mm units) No connector on open end.	□ 000

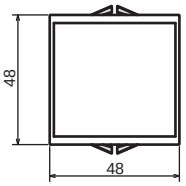
• Model code of connector without cable : For 10 pins type: W-BP-01-N, For 16 pins type: W-BP-02-N, For monitor: W-BP-03-N

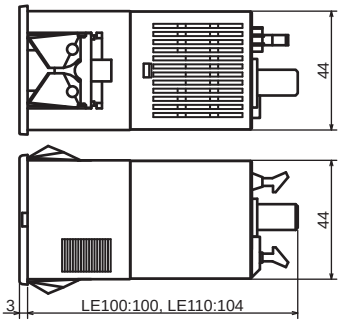
External Dimensions and Rear Terminals





Unit : mm





① Power supply / Output connector

Pin number		Description	
16 pins	10 pins		
1	—	T/R(A)	Communications
2	—	T/R(B)	
3	—	SG/DI	Contact input
4	—	DI	
5	1	OUT1	Open collector output
6	2	OUT2	
7	3	OUT3	
8	4	OUT4	
9	5	OUT5	
10	6	OUT6	
11	—	OUT7	
12	—	OUT8	
13	7	COM(−)/ 24V DC	Power supply
14	8	COM(−)/ 24V DC	
15	9	+24V DC	
16	10	+24V DC	

② Monitor output connector

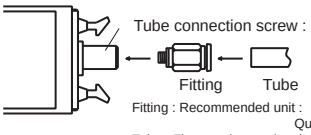
Pin number	Description
1	+ Monitor output
2	−

③ Ground terminal

Screw size : M3 X 6

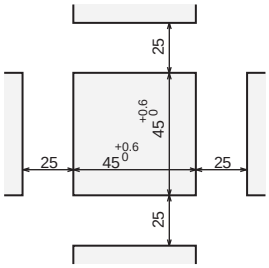
④⑤⑥⑦ Tube connection screw

⑤ Gas purge input
⑥ Level sensing
⑦ Atmospheric pressure measurement



Fitting : Recommended unit : One-touch fitting PC6-M5SUS (NIHON PISCO CO., LTD)
Quick-action fitting TS6-M5-SUS (Koganei Corporation)
Tube : Fluorocarbon resin tube ϕ6 x ϕ4
•The fitting and tube shall be prepared separately.

• Panel cutouts



Panel thickness : 1 to 9 mm

Connector type

Power supply / Output connector [1]	Monitor output connector [2]
10 pins type : PS-10PE-D4LT1-LP1 16 pins type : PS-16PE-D4LT2-M1	S2B-XH-A

[1] Manufactured by Japan Aviation Electronics Industry, Limited
[2] Manufactured by JST Mfg. Co., Ltd.