

PRODUCT CATALOG

ELECTRONIC THREE PHASE VOLTAGE METER

VLC-110/ VLC-110L

ELECTRONIC THREE PHASE VOLTAGE METER

VLC-110/ VLC-110L

OUTLINE

- * Most suitable for measuring and monitoring three phase voltage of incoming, bus line and feeder.
- * Centralized monitoring system can be tailored by adding analog output.



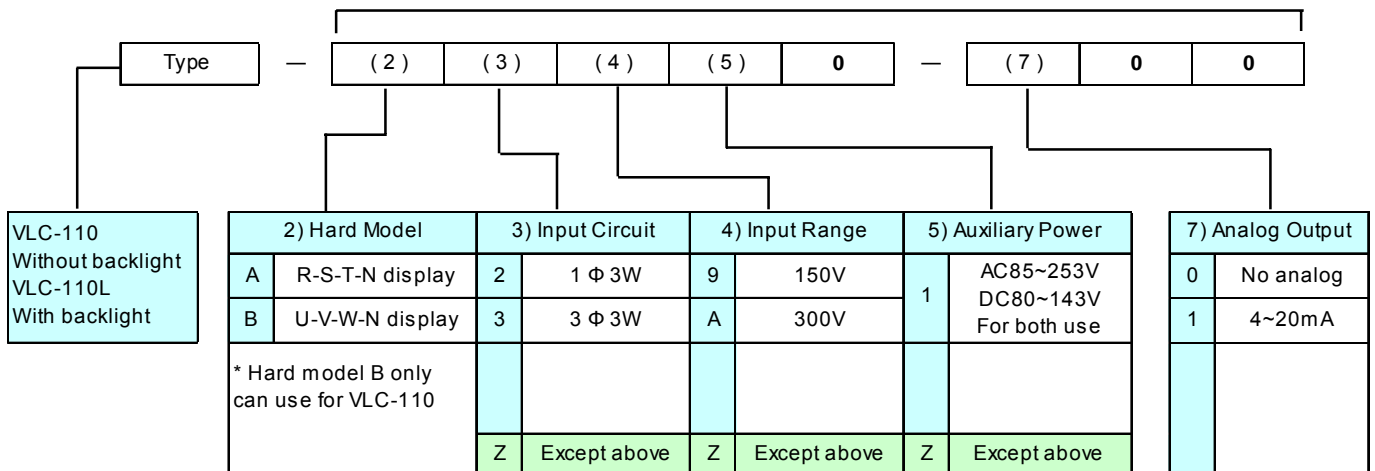
VLC-110/ 110L
110*110*68mm (500g)

FEATURES

- * Simultaneous measurement of 3 phase voltage is possible by 1 unit.
- * 1 bar graph and 3 digital display measurements can be displayed simultaneously.
- * Analog output DC4~20mA: 1-circuit is possible to extracted.

TYPE AND SPECIFICATION CODE

Specification Code



ELECTRONIC THREE PHASE VOLTAGE METER

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Equipment Specification

Connecting System	Input, Auxiliary power part, Screw M4
	Output, Screw M4
LCD Display	Main monitor: Character height 10mm 4 digits
	Sub monitor (L): Character height 6mm 4 digits
	Sub monitor (R): Character height 6mm 4 digits
	Bar graph: 30 dots
Display Update Time	Approx. 1 sec. (Bar graph: Approx. 0.25sec.)
Measurement	Three phase voltage
Operating Temperature/ Humidity Range	-10~+55°C, (No condensation) 30~85% RH
Storage Temperature Range	-25~+70°C
Material	ABS(V-0) Exterior color: Black (Munsell N1.5)
Mass	500g
Size	Refer to outline drawing (Compatible with wide angle indicator)

Auxiliary Power Specification

Power Consumption (With backlight)	AC85~253V 50/60Hz	7VA
	DC80~143V	3W
Power Consumption (Without backlight)	AC85~253V 50/60Hz	5VA
	DC80~143V	2W
Rush current (For backlight & without backlight use)	AC110V	5.0A (Approx. 1.6ms)
	AC220V	10.0A (Approx. 1.6ms)
	DC110V	3.5A (Approx. 1.6ms)

Input Specification

Input Power Consumption VA	Voltage circuit Rated value: 110V (FS:150V)	0.25VA or less
	Voltage circuit Rated value: 220V (FS:300V)	0.5VA or less

Output Specification

Analog output: 1 circuit	
Rated value	4~20mA: 550Ω or less
Response time	1 sec. or less. Time to be within ±1% of final constant value
Output ripple	1% P-P or less against output span

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PERFORMANCE

Item	Measuring Element	Measuring Range/ Display Specification	Allowance ^{*(1)}		Note
			Display	Output ^{*(2)}	
Measurement	Three phase voltage	AC150V~750.0kV (24 range)	±1.0%	±1.0%	RS-ST-TR line change ^{*(3)}
Display Setting Potential Element	Three phase 3-wire		Single phase 3-wire		
	V(RS), V(ST), V(TR)		V(RN), V(TN), V(RT)		
Bar Graph Display	Bar graph display of main monitoring element. Sub-monitor elements can be displayed by setting.				
Analog Output ^{*(2)}	Rated Value	AC0~150V/ DC4~20mA (3Φ3W, 110V input) AC0~300V/ DC4~20mA (3Φ3W, 220V input) AC0~300V/ DC4~20mA (1Φ3W) ^{*(4)}			
	Number	1			
	Load Resistance	550Ω or less			
	Response Time	1 sec. or less (Time to be within ±1% of final constant value)			
	Ripple	1% P-P or less against output span			
Outage guarantee	Setting value				

Note:

^{*(1)} Due to the operation principle, accuracy will decrease if the meter directly measures the output of cycle-control inverters, phase-angle-control SCR inverters and PWM control inverters.

^{*(2)} Analog output is option.

^{*(3)} Single phase 3-wire: RN-TN-RT.

^{*(4)} Setting for AC0~150V/ DC4~20mA is possible.

MEASURING RANGE

150V	(110V)	15.00kV	(11kV/110V)
150.0V	(110V)	30.0kV	(22kV/110V)
300V	(220V, 220V/110V)	45.0kV	(33kV/110V)
300.0V	(220V, 220V/110V)	90.0kV	(66kV/110V)
600V	(440V/110V)	105.0kV	(77kV/110V) ^{*(5)}
1500V	(1100V/110V)	150.0kV	(110kV/110V)
3000V	(2200V/110V)	180.0kV	(132kV/110V)
3.00kV	(2200V/110V)	210.0kV	(154kV/110V)
4500V	(3300V/110V)	255.0kV	(187kV/110V) ^{*(6)}
4.50kV	(3300V/110V)	300.0kV	(220kV/110V)
9000V	(6600V/110V)	375.0kV	(275kV/110V) ^{*(7)}
9.00kV	(6600V/110V)	750.0kV	(550kV/110V)

Note:

^{*(5)} Full scale of bar graph: 120kV

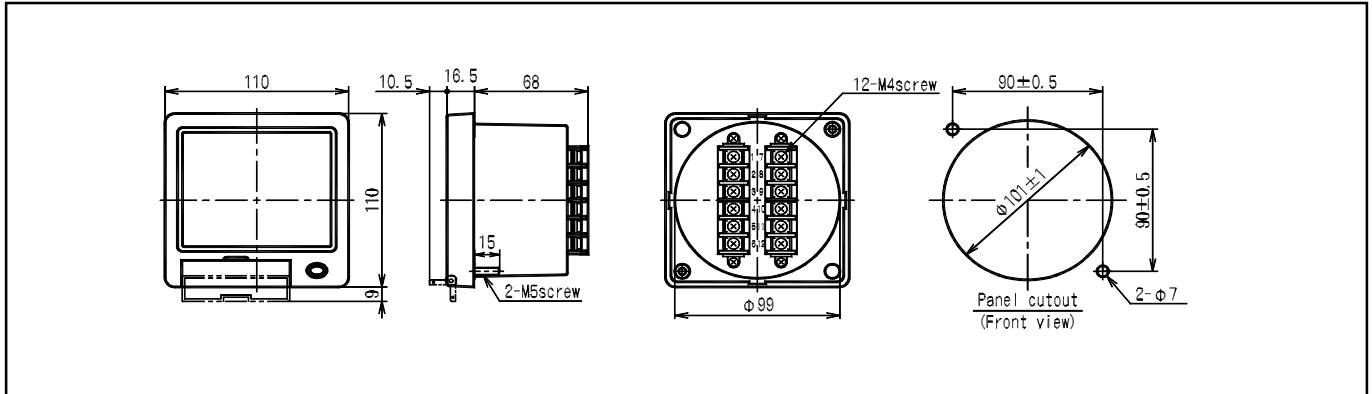
^{*(6)} Full scale of bar graph: 270kV

^{*(7)} Full scale of bar graph: 400kV

ELECTRONIC THREE PHASE VOLTAGE METER

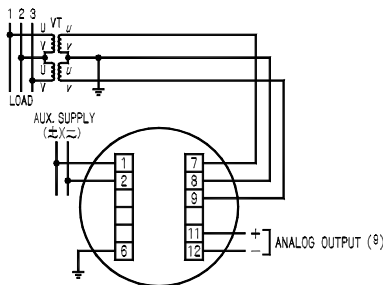
VLC-110/ VLC-110L

Outline Drawing (unit: mm)



Connection Diagram (10)

Three phase 3 wire, Single phase 3 wire (8)



Note:

(8) Three phase 3-wire: 1=R phase 2= S phase 3=T phase

Single phase 3-wire: 1=R phase 2= N phase 3=T phase

(9) Analog output is option.

(10) VT for secondary-side earth ground is unnecessary when low voltage circuit. Also when used 110V or 220V direct, VT is unnecessary.

ITEM TO SPECIFY WHEN PURCHASE

Specify for type product, specification code and units require.

Example of specification: Please refer to page 2 for specification code.

Type	Specification code
VLC-110 - L	A 3 5 1 0 - 1 0 0
Without Backlight: Blank	Hard Input Input Auxiliary
With Backlight : L	Model Circuit Range Power
	Analog Output

* Change from initial setting can be accepted with compensation. Specify the items to change.

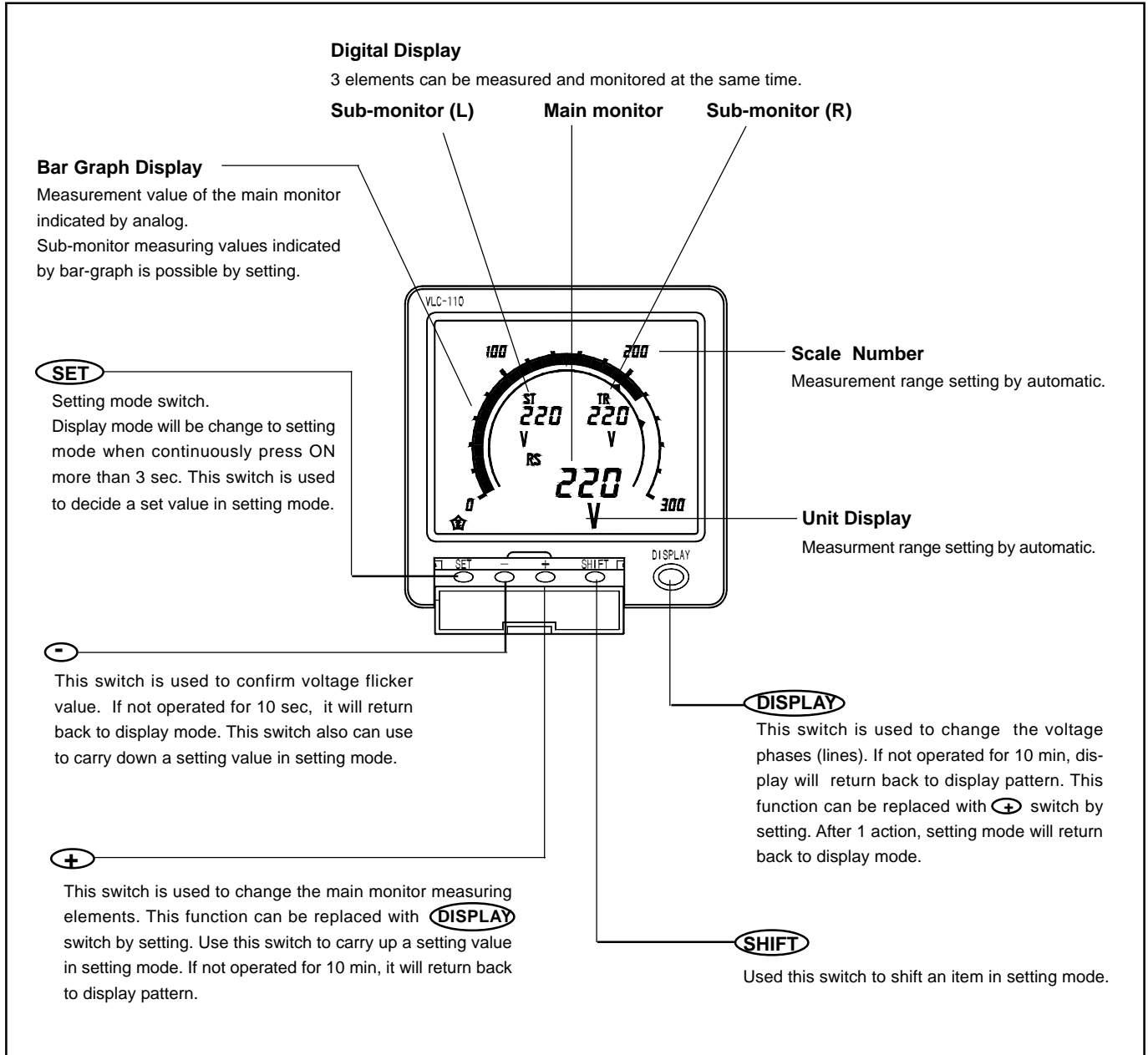
Refer to Page 10 for initialization value.

* Have a consultation with us for specification which is not in specification code.

ELECTRONIC THREE PHASE VOLTAGE METER

VLC-110/ VLC-110L

NAME AND THE FUNCTION OF EACH PART



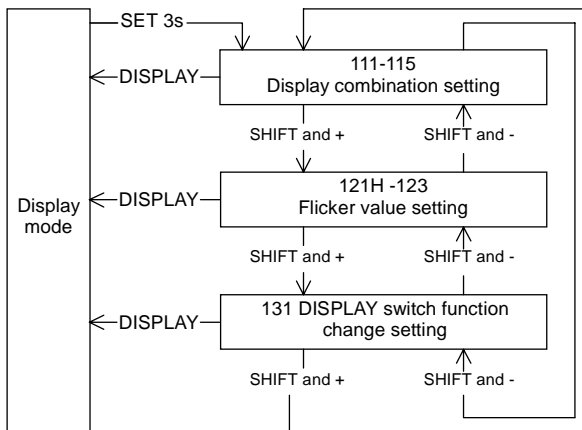
ELECTRONIC THREE PHASE VOLTAGE METER

VLC-110/ VLC-110L

SETTING

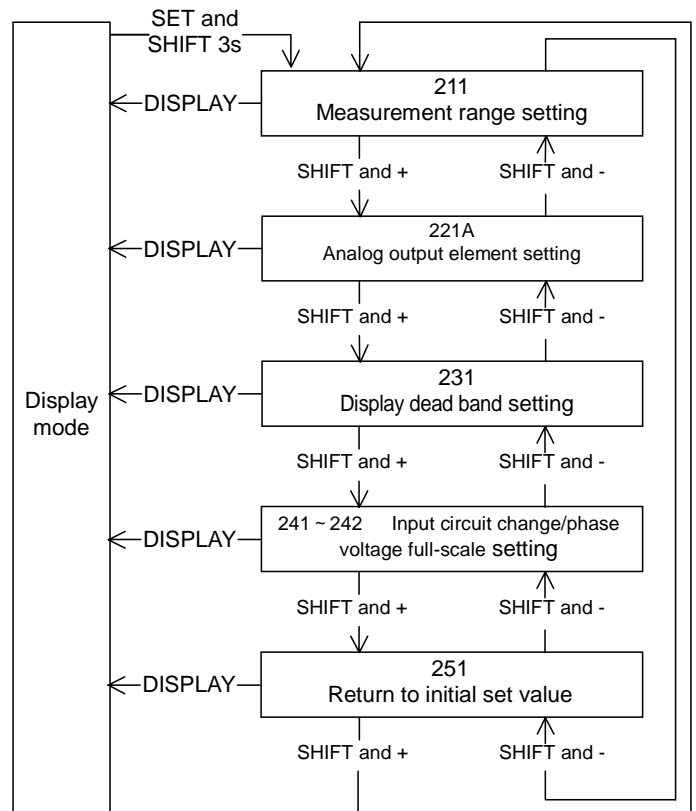
Refer to attached user's manual for setting method details.

SETTING - 1



* Refer to page 10 for display combination (pattern).

SETTING - 2



ELECTRONIC THREE PHASE VOLTAGE METER

VLC-110/ VLC-110L

LC-110 SERIES COMMON SPECIFICATION

Approved Standard/ Pulse Output/ Intensity

Item		Electronic multi meter	Electronic harmonics meter relay	Electronic demand multi meter	Electronic max./ min. multi meter	Electronic overload/ leakage detection meter relay	Electronic three phase current meter	Electronic three phase voltage meter	Electronic DC receiving meter	Electronic DC input meter																																															
Type	Without back light	QLC-110	HLC-110	DLC-110	MLC-110	LLC-110	ALC-110	VLC-110	XLC-110	TLC-110																																															
	With back light	QLC-110L	HLC-110L	DLC-110L	MLC-110L	LLC-110L	ALC-110L	VLC-110L	XLC-110L	TLC-110L																																															
Approved standard		JIS C 1102 -1, -2, -3, -4, -5, -7 JIS C 1111 JIS C 1216 JIS C 1263 Performance conformed EIA standard RS-485	JIS C 1102 -1, -2, -7 JIS C 1111 Performance conformed	JIS C 1102 -1, -2, -3, -5, -7 JIS C 1111 JIS C 1216 Performance conformed EIA standard RS-485	JIS C 1102 -1, -2, -7 JIS C 1111 Performance conformed EIA standard RS-485	JIS C 1102 -1, -2, -7 JIS C 1111 JIS C 8325 JIS C 8374 JIS C 1216 Performance conformed	JIS C 1102 -1, -2, -7 JIS C 1111 Performance conformed	JIS C 1102 -1, -2, -7 JIS C 1111 Performance conformed	JIS C 1102 -1, -2, -7, -9 JIS C 1111 JIS C 1010-1 Performance conformed EIA standard RS-485	JIS C 1102 -1, -2, -7, -8, -9 JIS C 1111 JIS C 1010-1 Performance conformed EIA standard RS-485																																															
Pulse output	Output element	Watt-hour / var-hour	-	Watt-hour	-	Watt-hour	-	-	-	-																																															
	Output pulse constant	<p>· Output system: Photo MOS-FET relay 1 N.O. contact Contact capacity: AC, DC125V 70mA (resistance load, inductive load) Output ON resistance: 10Ω or less.</p> <p>· Pulse width: 250ms±10% (in case of 100 ~ 130ms by range setting.) When the output pulse cycle at the rated electric power becomes the speed of 2 pulses or more per second by setting voltage measurement range, current measurement range, and output pulse unite, the output pulse width becomes 100 ~ 130ms. Output pulse cycle = Rated electric power [kW]/ output pulse unite [kWh/ pulse]/ 3600 [sec.] eg. In case when voltage measurement range: 9000V (6600V/ 110V), current measurement range: 80.0A (80A/ 5A), output pulse unit: 0.1kWh/ pulse rated electric power = 1kW × (6600/ 110V) × (80/ 5A) = 960 [kW] output pulse cycle = 960 [kW]/ 0.1 [kWh/ pulse]/ 3600 [sec.] = 2.667pulse/ sec. pulse width becomes 100 ~ 130ms.</p> <p>· Output pulse unit can be set in following range. Output pulse unit is not changed by changing measuring range.</p> <p>Three phase 3 wire/ three phase 4 wire: Full load power(kW, kvar) = 3 × rated voltage(V) × rated current(A) × 10⁻³ Single phase 3 wire: Full load power(kW, kvar) = 2 × rated voltage(V) × rated current(A) × 10⁻³ Single phase: Full load power(kW, kvar) = rated voltage(V) × rated current(A) × 10⁻³</p> <table border="1"> <thead> <tr> <th>Full load power kW, kvar</th> <th colspan="4">Output pulse unit kWh (kvarh)/ pulse</th> <th>Multiplying factor</th> </tr> </thead> <tbody> <tr> <td>Below 1</td> <td>0.1</td> <td>0.01</td> <td>0.001</td> <td>0.0001</td> <td>0.01*(1)</td> </tr> <tr> <td>1 or more</td> <td>Below 10</td> <td>1</td> <td>0.1</td> <td>0.01</td> <td>0.1</td> </tr> <tr> <td>10 or more</td> <td>Below 100</td> <td>10</td> <td>1</td> <td>0.1</td> <td>1</td> </tr> <tr> <td>100 or more</td> <td>Below 1000</td> <td>100</td> <td>10</td> <td>1</td> <td>10</td> </tr> <tr> <td>1,000 or more</td> <td>Below 10,000</td> <td>1,000</td> <td>100</td> <td>10</td> <td>100</td> </tr> <tr> <td>10,000 or more</td> <td>Below 100,000</td> <td>10,000</td> <td>1,000</td> <td>100</td> <td>1,000</td> </tr> <tr> <td>100,000 or more</td> <td>Below 1,000,000</td> <td>100,000</td> <td>10,000</td> <td>1,000</td> <td>10,000</td> </tr> </tbody> </table>									Full load power kW, kvar	Output pulse unit kWh (kvarh)/ pulse				Multiplying factor	Below 1	0.1	0.01	0.001	0.0001	0.01*(1)	1 or more	Below 10	1	0.1	0.01	0.1	10 or more	Below 100	10	1	0.1	1	100 or more	Below 1000	100	10	1	10	1,000 or more	Below 10,000	1,000	100	10	100	10,000 or more	Below 100,000	10,000	1,000	100	1,000	100,000 or more	Below 1,000,000	100,000	10,000	1,000
Full load power kW, kvar	Output pulse unit kWh (kvarh)/ pulse				Multiplying factor																																																				
Below 1	0.1	0.01	0.001	0.0001	0.01*(1)																																																				
1 or more	Below 10	1	0.1	0.01	0.1																																																				
10 or more	Below 100	10	1	0.1	1																																																				
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1,000 or more	Below 10,000	1,000	100	10	100																																																				
10,000 or more	Below 100,000	10,000	1,000	100	1,000																																																				
100,000 or more	Below 1,000,000	100,000	10,000	1,000	10,000																																																				

*(1) Only for DLC-110/ 110L.

Multiplying factor is 0.01, but multiplying factor display becomes with 0.1.

(Integer digit: 4 digits display. Enlarged display: 4 digits after decimal point.)

ELECTRONIC THREE PHASE VOLTAGE METER

VLC-110/ VLC-110L

LC-110 SERIES COMMON SPECIFICATION

Approved Standard/ Pulse Output/ Intensity

Strength	Overload capacity	(1) Voltage circuit: 2 times of rated voltage (10sec.) 1.2 times (continuity) (2) Current circuit: 40 times of rated current (1 sec.), 20 times (4 sec.), 10 times (16 sec.), 1.2 times (continuity) (3) Auxiliary power: 1.5 times of rated voltage (10 sec.), 1.2 times (continuity), 1.5 times of rated voltage at DC100/110 (10 sec.), 1.3 times (continuity) (4) DC input circuit (4 ~ 20mA): 10 times of rated current (5 sec.), 1.2 times (continuity)
	Insulation resistance	(1) Between electrical system and case (ground) DC500V 50MΩ or more (2) Between input, output and auxiliary power DC500V 50MΩ or more (3) Between analog output and pulse output DC500V 50MΩ or more (QLC, DLC, LLC) (4) Between analog output and alarm output DC500V 50MΩ or more (HLC, DLC, MLC, LLC) (5) Between communication output and pulse output DC500V 50MΩ or more (QLC, DLC) (6) Between communication output and alarm output DC500V 50MΩ or more (DLC, MLC) (7) Between pulse output and alarm output DC500V 50MΩ or more (DLC, LLC) (8) Between alarm output 1 and alarm output 2 DC500V 50MΩ or more (HLC, LLC) (9) Between DC input (4 ~ 20mA), AC input and auxiliary power DC500V 50MΩ or more (QLC with DC input) (10) Between DC inputs DC500V 50MΩ or more (XLC, TLC) (11) Non-insulation by minus common between analog outputs. (QLC, DLC, HLC, XLC, TLC, MLC)
	Withstand voltage	(1) Between electrical system and case (ground) AC2000V 50/60 Hz 1 min. (2) Between input, output and auxiliary power AC2000V 50/60 Hz 1 min. (3) Between analog output and pulse output AC1500V 50/60 Hz 1 min. (QLC, DLC, LLC) (4) Between analog output and alarm output AC1500V 50/60 Hz 1 min. (HLC, DLC, MLC, LLC) (5) Between communication output and pulse output AC1500V 50/60 Hz 1 min. (QLC, DLC) (6) Between communication output and alarm output AC1500V 50/60 Hz 1 min. (DLC, MLC) (7) Between pulse output and alarm output AC1500V 50/60 Hz 1 min. (DLC, LLC) (8) Between alarm output 1 and alarm output 2 AC1500V 50/60 Hz 1 min. (HLC, LLC) (9) Between DC input (4 ~ 20mA), AC input and auxiliary power AC2000V 50/60 Hz 1 min. (QLC with DC input) (10) Between DC inputs AC2000V 50/60 Hz 1 min. (XLC, TLC) (11) Non-insulation by minus common between analog outputs. (QLC, DLC, HLC, XLC, TLC, MLC)
	Lightning impulse withstand voltage	(1) Between electrical system (analog output/ communication output excluded) and ground 6kV 1.2/50μs positive/negative polarity 3 times for each (QLC, DLC) (2) Between electrical system (DC input 4 to 20mA excluded) and ground 5kV 1.2/50μs positive/negative polarity 3 times for each (3) Between analog output or communication output and ground 5kV 1.2/50μs positive/negative polarity 3 times for each (QLC, DLC) (4) Between auxiliary power and ground 7kV 1.2/50μs positive/negative polarity 3 times for each (LLC)
	Noise capacity	(1) Oscillatory surge voltage 1 ~ 1.5MHz peak voltage: When attenuated oscillatory waveform (2.5 ~ 3kV) is applied repeatedly: Measured error: within 10% (power circuit, AC voltage circuit, AC current circuit, XLC, TLC: DC voltage/ current circuit) No communication error/ communication halt (2) Square-wave impulse noise Noise (1μs, 100ns width) is repeatedly applied for 5 min.: Measured error is within 10% AC voltage/ AC current circuit (normal/ common) 1.5 kV or more Power circuit (normal/ common) 1.5 kV or more Pulse output (common) 1.0 kV or more Alarm output (common) 1.0 kV or more Operation input (common) 1.0 kV or more Analog output (Inductive) 1.0 kV or more Communication output (Inductive) 1.0kV or more (3) Radio noise: When radion wave (150, 400, 900MHz) is applied (5W, 1m) intermittently: Measured error is within 10% (4) Electrostatic noise: At the passage of electric current 8kV Measured error: within 10% At no passage of electric current 10kV: No damage (condenser charge system) Note: There are some cases that some item can not be applied for particular model. Refer to type and specification code.
	Vibration/ shock	Vibration: 1/2 peak-peak: 0.15mm 10 ~ 55Hz 1 octave/ min. 5 times sweep Shock: 490m/s ² 3 times for each direction.

ELECTRONIC THREE PHASE VOLTAGE METER

VLC-110/ VLC-110L

DISPLAY COMBINATION (Pattern)

Three Phase 3-wire

No.	Pattern NO.	Main monitor	Sub-monitor (L)	Sub-monitor (R)	Bar graph	Note
1	Pattern 1	V (RS)	V (ST)	V (TR)	V (RS)	Standard
2	Pattern 2	V (TR)	V (RS)	V (ST)	V (TR)	Specification
3	Pattern 3	V (ST)	V (TR)	V (RS)	V (ST)	

Single Phase 3-wire

No.	Pattern NO.	Main monitor	Sub-monitor (L)	Sub-monitor (R)	Bar graph	Note
1	Pattern 1	V (RN)	V (TN)	V (RT)	V (RN)	Standard
2	Pattern 2	V (RT)	V (RN)	V (TN)	V (RT)	Specification
3	Pattern 3	V (TN)	V (RT)	V (RN)	V (TN)	

INITIALIZATION VALUE

No.	Setting Item		Three Phase 3-wire		Single Phase 3-wire
			110V input	220V input	
1	Display Combination	Pattern	Pattern 1		Pattern 1
		Main monitor	V (RS)		V (RN)
		Sub-monitor (L)	V (ST)		V (TN)
		Sub-monitor (R)	V (TR)		V (RT)
		Bar graph	V (RS)		V (RN)
2	Flicker	Upper limit	7260V (/121V)	242V	110.0V
		Lower limit	5940V (/99V)	198V	90.0V
		Flicker ON/ OFF	OFF		OFF
3	Measuring Range		9000V (6600V/ 110V)	300V (220V Direct)	150.0V (100-200V)
4	Analog Output Element *(11)		V (RS)		V (RN)

***(11)** When option is specify.