XLC-110/XLC-110L POWER LINE DC RECEIVING METER

OVERVIEW

- Display from electrical signals, which are conversed from measurement of physical elements.
- Display 3 measuring elements at the same time. Combine with the system and monitor centrally via analog output or communication output.

XLC-110 / 110L
110×110×105mm (520g)

FEATURES

- In 1 unit, possible to measure DC inputs of 3 circuits at the same time.
- Insulation: 2000V between inputs; 2000V between input and output.
- Possible to set the full scale of measuring value optionally.
- Possible to select from 18 kinds of units and set them display on LCD screen.
- Possible to display 1 bar graph and digital display of 3 measuring elements at the same time.
- Analog output (Max. 3 outputs) and Communication output are available.
- Possible to maintain Maximum and Minimum of measuring values.
- Use high quality, high contrast of LCD for display.
- Use high luminance of white backlight (in case of "with Backlight" option).
  Possible to select light-on, light-off and brightness when setting.

TYPE NAME & SPECIFICATION CODE

1. Without Backlight

Type: ①XLC-110 -

Specification Code: ② ③ ④ ⑤ ⑥ - ⑦ o ⑧

②Hard Model	③Input Circuit	④Input Range	⑤Auxiliary Power	⑥Reset Input (DI)
A No Backlight	6 1 circuit	1 DC1～5V	1 AC85～253V & DC80～143V Dual use	0 None
	7 2 circuits	2 DC0～1V	2 DC20～56V	2 With DI x1
	8 3 circuits	3 DC0～5V	Z Other than above	
		4 DC0～10V		
		5 DC4～20mA		
		6 DC0～1mA		
		7 DC0～5mA		
		8 DC0～10mA		
		9 DC0～16mA		
		A DC0～20mA		
		Z Other than above(1)		

⑦Analog Output (3) / Communication Output	⑧LCD View Angle
0 None	0 Upper view
Analog Output	
1 4～20mA	
2 0～1mA	
3 1～5V	
4 0～5V	
5 0～10V	
Communication Output	
M Modbus RTU	
A Protocol A (Com. Output)	
Z Other than above(2)	

2. With Backlight

①XLC-110L - ② ③ ④ ⑤ ⑥ - ⑦ o ⑧

②Hard Model	③Input Circuit	④Input Range	⑤Auxiliary Power	⑥Reset Input (DI)
D With Backlight WHITE	6 1 circuit	1 DC1～5V	1 AC85～253V & DC80～143V Dual use	0 None
	7 2 circuits	2 DC0～1V	2 DC20～56V	2 With DI x1
	8 3 circuits	3 DC0～5V	Z Other than above	
		4 DC0～10V		
		5 DC4～20mA		
		6 DC0～1mA		
		7 DC0～5mA		
		8 DC0～10mA		
		9 DC0～16mA		
		A DC0～20mA		
		Z Other than above(1)		

⑦Analog Output (3) / Communication Output	⑧LCD View Angle
0 None	F Upper & Lower Co-viewing angle
Analog Output	
1 4～20mA	
2 0～1mA	
3 1～5V	
4 0～5V	
5 0～10V	
Communication Output	
M Modbus RTU	
A Protocol A (Com. Output)	
Z Other than above(2)	

Note

(1) Manufacturing ranges of Input:

Standard range	1. Voltage Input: ±50mV～±300V 2. Current Input: ±500μA～±50mA
Special range	1. Input is not the same as Rated Input 2. Current Input from ±100μA～±499μA (Digital display accuracy will change from ±1.0% to ±1.5%)

(2) Manufacturing ranges of Analog Output:

Standard range	1. Voltage Output: ±100mV～±10V 2. Current Output: ±500μA～±20mA, -10mA 3. Quantity of Output circuit is the same as Input circuit
Special range	1. Output is not the same as Rated Output 2. Quantity of Input is different Output (Ex. 3-Input→1-Output) 3. Current Output from ±100μA～±499μA (Digital display accuracy will change from ±0.5% to ±1.0%)

(3) In the case that quantity of Analog Output and Input are the same.

■Equipment Specification

Connection	Input, Aux. power parts: by M4 Screw
	Reset Input (DI), Output parts: by M3 Screw
LCD Display	Main monitor: Text height 10mm 4 digits
	Sub-monitor (L): Text height 6mm 4 digits
	Sub-monitor (R): Text height 6mm 4 digits
	Bar graph: 30 dots
Time of Display update	Approx. 1 sec (Bar graph: approx.0.25sec)
Measurement	DC Input 3 circuits
Operating Temperature/ Humidity	-10 to +55℃ 30 to 85% (No condensation)
Storage Temperature	-25 to +70℃
Material	ABS(V-0) Exterior Color: Black (Munsell N1.5)
Weight	520g
Dimension	Refer to outline drawing (Compatible with wide angle analog meter)

■Auxiliary Power Specification

Power Consumption (With Backlight)	AC85～253V 50/60Hz	12VA
	DC80～143V	6W
	DC20～56V	7W
Power Consumption (No Backlight)	AC85～253V 50/60Hz	10VA
	DC80～143V	5W
	DC20～56V	6W
Inrush Current (For With backlight & No backlight dual use)	AC110V	5.2A (approx. 1.7ms)
	AC220V	10.4A (approx. 1.7ms)
	DC110V	3.7A (approx. 1.7ms)
	DC24V	5.5A (approx. 3.6ms)
	DC48V	10.9A (approx. 3.6ms)

■Output Specification

・Analog Output Quantity: Maximum 3 Outputs

Rated Output	4～20mA: 0-550Ω, 0～1mA: 0-10kΩ 1～5V: 600Ω or more, 0～5V: 600Ω or more, 0～10V: 2kΩ or more (Select one of above) Non-insulation (minus common) between analog outputs
Response Time	Below 1 sec. Time to be within ±1% of final constant value
Output Ripple	Under 1% p-p of output span

■Input Specification

Input	DC1～5V	Approx. 1MΩ	DI (Max/ Min Value)	Input Specification	DI: Possible to reset Max/Min value when adding voltage signal; Input and Aux. power are the same value; Min. pulse width is 300ms continuation.	
	DC0～1V			Power Consumption	AC, DC100/110V	0.4VA, 0.4W
	DC0～5V				AC200/220V	1.4VA
	DC0～10V				DC24V	0.3W
	DC4～20mA	Approx. 50Ω			DC48V	1.2W
	DC0～1mA	Approx. 1kΩ		Contact Capacity	AC, DC100/110V	3mA
	DC0～5mA	Approx. 200Ω			AC200/220V	6mA
	DC0～10mA	Approx. 100Ω			DC24V	10mA
	DC0～16mA	Approx. 50Ω			DC48V	20mA
	DC0～20mA					

■Communication Specification

・Protocol A

Communication method	TIA-485-A Half-duplex 2-wire, Asynchronous communication
Transmission Speed	1200 / 2400 / 4800 / 9600 bps
Transmission Code	NRZ
Start bit	1 bit
Data length	7/8 bits
Parity	None / even / odd
Stop bit	1bit / 2 bits
Cable length	1000m (Fully extended)
Address	1～254
Quantity of connection	Can connect up to 31 units. In case of over 32 units, please use repeater (connect up to 254 units)
Transmission character	ASCII Code

・Modbus RTU

Communication method	TIA-485-A Half-duplex 2-wire, Asynchronous communication
Transmission Speed	4800 / 9600 / 19200 / 38400 bps
Transmission Code	NRZ
Start bit	1 bit
Data length	8 bits
Parity	None / even / odd
Stop bit	1bit / 2 bits
Cable length	1000m (Fully extended)
Address	1～247
Quantity of connection	Can connect up to 31 units. In case of over 32 units, please use repeater (connect up to 254 units)
Transmission code	Binary
Error detection	CRC-16 ($x^{16}+x^{15}+x^2+1$)

■PERFORMANCE

Items		Measuring Range / Display Specification	Accuracy		Reference
			Display	Output	
Standard		JIS C 1102-1,2,7,9 : 1997 JIS C 1111-1989 JIS C 1010-1 : 1998 TIA-485-A : 2003			
Digital Display	Display Range	-9999～9999	±1.0%	±0.5%	Any setting of number of digits & decimal point location is possible
	Power Factor (cosφ) Display	(1) LEAD 0.500～1.000～LAG 0.500 (2) LEAD 0.000～1.000～LAG 0.000	±1.0%	±0.5%	4 digits and decimal point location are fixed
	Frequency Display	(1) 45.0～55.0Hz or 45.00～55.00Hz (2) 55.0～65.0Hz or 55.00～65.00Hz (3) 45.0～65.0Hz or 45.00～65.00Hz	±1.0%	±0.5%	3 digits or 4 digits are fixed. decimal point location are fixed
	Reactive Power Display (LEAD,LAG)	LEAD 9999～0～LAG 9999	±1.0%	±0.5%	Any setting of number of digits and decimal point location is possible
Bar graph Display	Maximum Scale	10 Integer Multiple (10^n) of 1, 1.2, 1.5, 1.6, 1.8, 2, 2.4, 2.5, 3, 3.2, 3.6, 4, 4.5, 4.8, 5, 6, 6.4, 7.2, 7.5, 8, 9, 9.6			Note: -9900 ≦ N ≦ 9900 (Scale value x 10^n = N)
	Power Factor (cosφ) Display	(1) LEAD 0.5～1～LAG 0.5 (2) LEAD 0～1～LAG 0			Scale value is fixed LEAD, LAG will display when power factor is selected.
	Frequency Display	(1) 45～55Hz (2) 55～65Hz (3) 45～65Hz			Scale value is fixed
	Reactive Power Display (LEAD,LAG)	LEAD □～0～LAG □ □ are the same as maximum value			Range: LEAD 9900～0～LAG 9900 LEAD, LAG will display when power factor is selected.
Bar graph Display Accuracy		±5.0% (% against span)			
Temperature Effect		Accuracy will not change when in 23℃±10℃			
Time of Display update		Approx. 1 sec (Approx. 0.25 sec for bar graph)			
Display Setting Element	Main monitor	Element of Input 1～Input 3 (depend on Display pattern)			
	Sub-monitor (L)	Element of Input 1～Input 3 (depend on Display pattern)			
	Sub-monitor (R)	Element of Input 1～Input 3 (depend on Display pattern)			
	Bar graph	Element of Input 1～Input 3			
LCD view	Up-Low co-viewing	75° view for each Up, Low, Left, Right			
	Upper view	10° view for Up, 60° for Low, 60° for each Left, Right			
Warranty when power cut-off		Remain Max, Min and setting value			

■UNIT DISPLAY

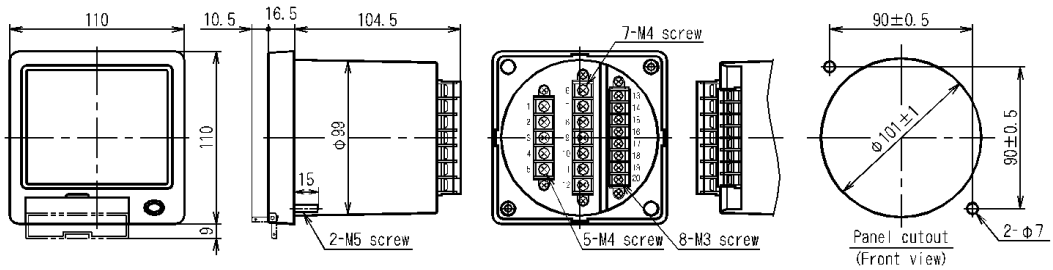
LCD only displays below 18 kinds of unit. If unit is not in this 18 kinds, we will use unit seal to stick on display screen.

LCD Display Units (18 Kinds)			Sticky seal Units (55 Kinds) (5)							
	Main monitor	Sub-monitor								
(1)	A	A	(1)	APm	(19)	L/h	(37)	Nm^3/min	(55)	℃
(2)	kA	kA	(2)	bar	(20)	L/min	(38)	N/m^2		
(3)	V	V	(3)	cm	(21)	mA	(39)	N/mm^2		
(4)	kV	kV	(4)	cosφ	(22)	mg/L	(40)	OPm		
(5)	W	-	(5)	ELm	(23)	min^{-1}	(41)	Pa		
(6)	kW	-	(6)	Hz	(24)	mL/min	(42)	pH		
(7)	MW	-	(7)	J	(25)	mm	(43)	ppm		
(8)	℃	℃	(8)	K	(26)	m/h (4)	(44)	R		
(9)	%	%	(9)	kg	(27)	m/min (4)	(45)	rad		
(10)	m	m	(10)	kg/h	(28)	m/s	(46)	rpm		
(11)	m^3	m^3	(11)	kg/m^2	(29)	mV	(47)	SPm		
(12)	m^3/h	m^3/h	(12)	kg/m^3	(30)	m^3/s	(48)	t		
(13)	m^3/min	m^3/min	(13)	kL	(31)	MPa	(49)	t/h		
(14)	m/h	-	(14)	kN	(32)	Mvar	(50)	TPm		
(15)	m/min	-	(15)	kPa	(33)	MW (4)	(51)	W (4)		
(16)	r/min	r/min	(16)	kvar	(34)	N	(52)	YPm		
(17)	min	min	(17)	kW (4)	(35)	N・m	(53)	μm		
(18)	no display	no display	(18)	L	(36)	Nm^3/h	(54)	μS/cm		

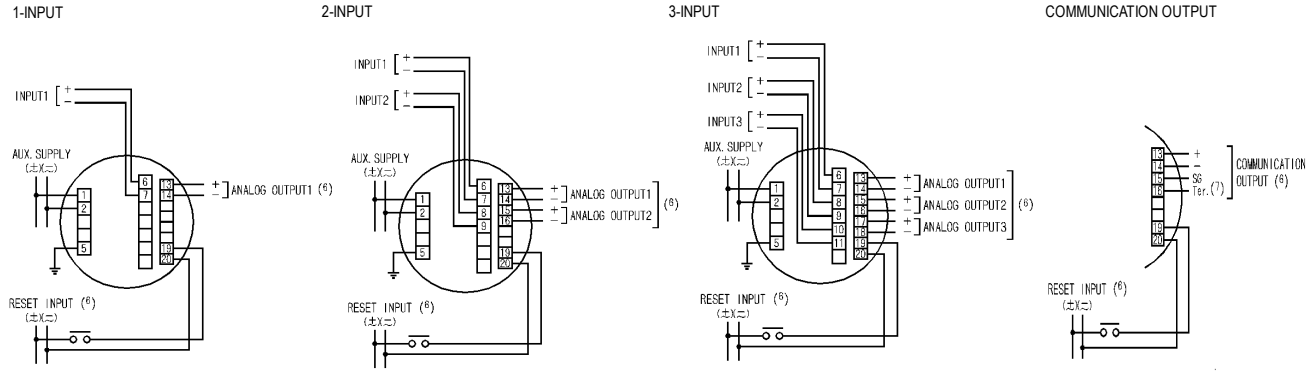
Note: (4) Possible for sticky seal unit only on sub-monitors. Main monitor will display by LCD.

(5) Letter height of sticky seal: 8.5mm in main monitor, 5mm in sub-monitor. Letter's color: gray (DIC 13^{th}541). Units of sticky seal are selected when ordering, and cannot be changed after purchased.

■ DIMENSIONS (Unit: mm)



■ CONNECTION DIAGRAM



Note: (6) Input 1, Input 2, Input 3, DI (Reset Input), Pulse Output, Communication Output are options (selected by customer)
(7) Terminating resistance can be connected internally by short circuit between Terminal (-) 14 and 16 (Ter.).

■ ORDER INFORMATION

Please specify below information to order:

① **Type name, Specification code**

② **Display Scales, Units**

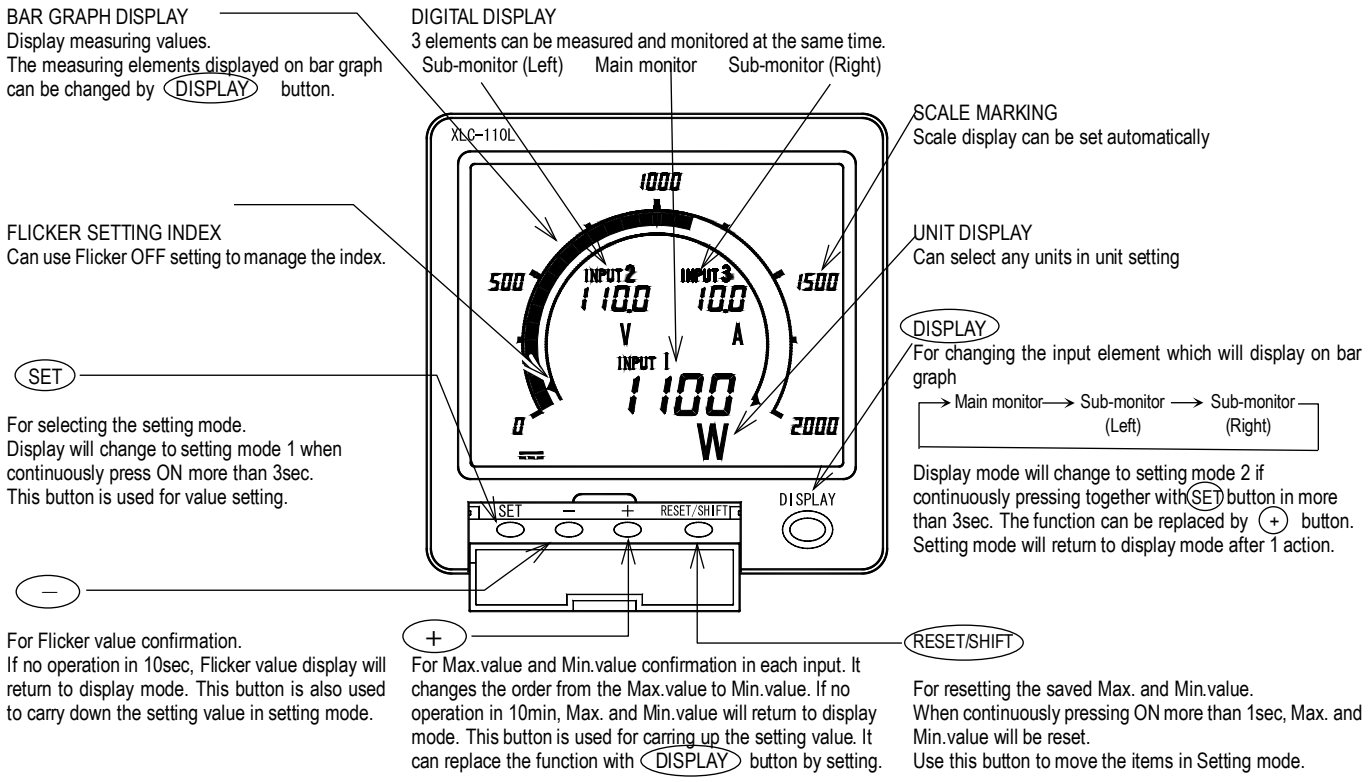
Please advise us the display scale and unit of each Input.

For Ex.: Input 1: 100.0℃ Input 2: 60.0℃ Input 3: 60.0℃

③ **Display Patterns**

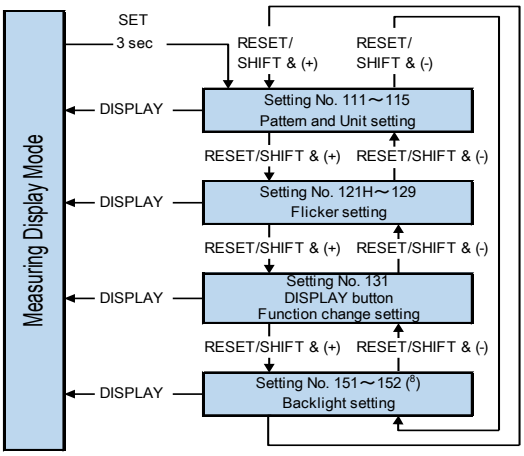
Please refer page 10 and advise us the patterns (Display form) from 1 to 6.

PARTS NAME & FUNCTION



SETTING

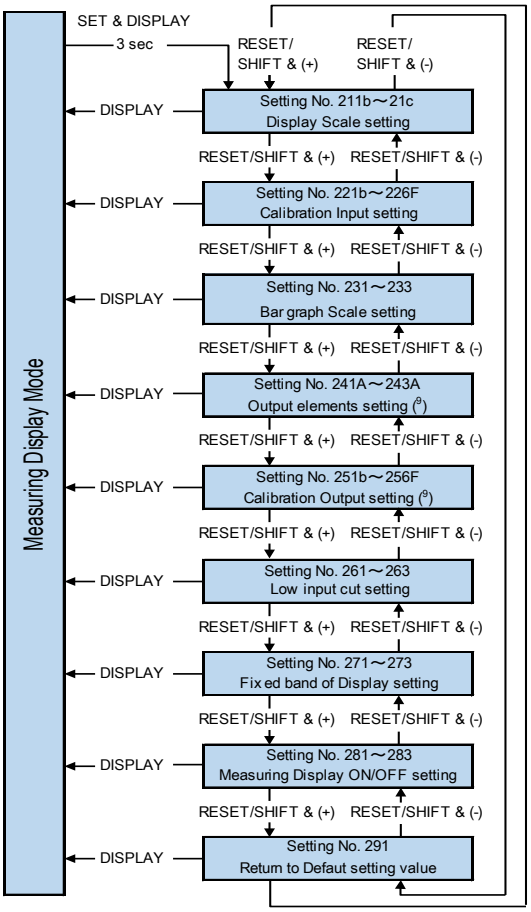
SETTING - 1



Note: (8) Setting only for Backlight specification

Note: Setting mode is a little different in case of Communication Output specification

SETTING - 2



Note: (16) There is no output in case that Analog Output is not selected

OVERVIEW

- Possible to monitor 3 measurements of Voltage (V), Current (A), Power (W), Energy (Wh) of DC circuits at the same time.
- Possible to combine with the system and monitor centrally via analog output or communication output.

TLC-110 / 110L
110×110×105mm (520g)

FEATURE

- In 1 unit, possible to display 3 measurement at the same time.
- Possible to set your optional value on Full scale.
- By DC Current Input & DC Voltage Input, Power (W, Wh) will be calculated to output and display.
- Insulation: 2000V between inputs; 2000V between input and output.
- Possible to check the display via bar graph like an analog meter.
- Possible to maintain Max.value and Min.value.
- High-Low Flicker setting is available (with setting index). Can use Flicker OFF setting to manage the index.
- 3 Analog Outputs or 2 Analog Outputs + 1 Pulse Output and communication output + 1 Pulse Output are available (option).
- Digital Input (DI – Reset Max.value & Min.value) is available.
- Wide range of Aux. power: AC85-253V, DC80-143V are dual use; DC20-56V is also available.
- Possible to replace our 110mm size Analog meter due to same form of installation on the panel (Installed by 2 screws).
- Use high quality, high contrast of LCD for display.
- Use high luminance of white backlight (in case of "with Backlight" option). Possible to select light-on, light-off and brightness setting.

TYPE NAME & SPECIFICATION CODE

1. Without Backlight

Type: ①TLC-110 - Specification Code: ② - ③ - ④ - ⑤ - ⑥ - ⑦ - ⑧ - ⑨ - ⑩

②Hard Model	
A	No Backlight

③Input 1 (DC Input Measuring)	
0	No Input
1	DC0～50mV
2	DC0～60mV
3	DC0～100mV
4	DC0～50V
5	DC0～75V
6	DC0～100V
7	DC0～150V
8	DC0～200V
9	DC0～1mA
Y	DC±301～±600V(4)
Z	Other than above

③Input 1 (DC W・Wh Measuring) (1)	
1	DC0～50mV
2	DC0～60mV
3	DC0～100mV
Z	Other than above

④Input 2	
0	No Input
1	DC0～50mV
2	DC0～60mV
3	DC0～100mV
4	DC0～50V
5	DC0～75V
6	DC0～100V
7	DC0～150V
8	DC0～200V
9	DC0～1mA
Y	DC±301～±600V(4)
Z	Other than above

④Input 2 (DC W・Wh Measuring) (1)	
4	DC0～50V
5	DC0～75V
6	DC0～100V
7	DC0～150V
8	DC0～200V
Y	DC±301～±600V(4)
Z	Other than above

⑤Input 3	
0	No Input
1	DC0～50mV
2	DC0～60mV
3	DC0～100mV
4	DC0～50V
5	DC0～75V
6	DC0～100V
7	DC0～150V
8	DC0～200V
9	DC0～1mA
Y	DC±301～±600V(4)
Z	Other than above

⑤Input 3 (DC W・Wh Measuring) (1)	
W	DC W DC Wh

⑥Auxiliary Power	
1	AC85～253V DC80～143V dual use
2	DC20～56V
Z	Other than above

⑦Reset (DI)	
0	None
2	with DIx1

⑧Analog Output / Communication Output	
0	None
Analog Output	
1	4～20mA
2	0～1mA
3	1～5V
4	0～5V
5	0～10V
Communication Output	
M	Modbus RTU
A	Protocol A (Com. Output)
Z	Other than above

⑨Pulse Output	
0	None
1	1 output (a contact)
Z	Other than above

⑩LCD View Angle	
0	Upper view

2. With Backlight

Type: ①TLC-110L - Specification Code: ② - ③ - ④ - ⑤ - ⑥ - ⑦ - ⑧ - ⑨ - ⑩

②Hard Model	
D	With Backlight WHITE

③Input 1 (DC Input Measuring)	
0	No Input
1	DC0～50mV
2	DC0～60mV
3	DC0～100mV
4	DC0～50V
5	DC0～75V
6	DC0～100V
7	DC0～150V
8	DC0～200V
9	DC0～1mA
Y	DC±301～±600V(4)
Z	Other than above

③Input 1 (DC W・Wh Measuring) (1)	
1	DC0～50mV
2	DC0～60mV
3	DC0～100mV
Z	Other than above

④Input 2	
0	No Input
1	DC0～50mV
2	DC0～60mV
3	DC0～100mV
4	DC0～50V
5	DC0～75V
6	DC0～100V
7	DC0～150V
8	DC0～200V
9	DC0～1mA
Y	DC±301～±600V(4)
Z	Other than above

④Input 2 (DC W・Wh Measuring) (1)	
4	DC0～50V
5	DC0～75V
6	DC0～100V
7	DC0～150V
8	DC0～200V
Y	DC±301～±600V(4)
Z	Other than above

⑤Input 3	
0	No Input
1	DC0～50mV
2	DC0～60mV
3	DC0～100mV
4	DC0～50V
5	DC0～75V
6	DC0～100V
7	DC0～150V
8	DC0～200V
9	DC0～1mA
Y	DC±301～±600V(4)
Z	Other than above

⑤Input 3 (DC W・Wh Measuring) (1)	
W	DC W DC Wh

⑥Auxiliary Power	
1	AC85～253V DC80～143V dual use
2	DC20～56V
Z	Other than above

⑦Reset (DI)	
0	None
2	with DIx1

⑧Analog Output / Communication Output	
0	None
Analog Output	
1	4～20mA
2	0～1mA
3	1～5V
4	0～5V
5	0～10V
Communication Output	
M	Modbus RTU
A	Protocol A (Com. Output)
Z	Other than above

⑨Pulse Output	
0	None
1	1 output (a contact)
Z	Other than above

⑩LCD View Angle	
0	Upper & Lower Co-viewing

(2) Manufacturing range of DC Input:

Standard range	1. Current Input: ±500μA～±50mA 2. Voltage Input: ±50mV～±600V
Special range	1. Current Input from ±100μA～±499μA (Digital display accuracy will change from ±1.0% to ±1.5%) 2. Voltage Input is from ±601V～±800V

(3) Manufacturing range of Input for W, Wh measurement

Standard range	1. Current Input: ±50mV～±10V (output of Shunt, hole CT,...) 2. Voltage Input: ±5V～±600V
Special range	1. .Current Input: not the same as Rated Input 2. Voltage Input: ±601V～±800V

In case that Current Input is over ±50mA, please use with Shunt (purchase separately).
For Ex.: If Shunt is 50A/60mV, please use code 2 for Input 1.

(4) If Voltage Input is over ±301V, resistor DM-1 (accessory) will be attached (no fee caused).

Note:
(1) ・For W, Wh Measuring, please select specification of Current (code 1～3) for Input 1, Voltage (code 4～8, Y)for Input 2, select "W" for Input 3.
・For display form of W and Wh, please select pattern 7～J.
・Current input is received from Shunt (we sell Shunt separately). In case of input not from Shunt, or ± input, please select code "Z".

■Equipment Specification

Connection	Input, Aux. power parts: by M4 Screw
	Reset Input (DI), Output parts: by M3 Screw
LCD Display	Main monitor: Text height 10mm 4 digits
	Sub-monitor (L): Text height 6mm 4 digits
	Sub-monitor (R): Text height 6mm 4 digits
	Bar graph: 30 dots
Time of Display update	Approx. 1 sec (Bar graph: approx.0.25sec)
Measurement	DC Input 3 circuits, W (calculated), Wh (calculated)
Operating Temperature/ Humidity	-10 to +55℃ 30 to 85% (No condensation)
Storage Temperature	-25 to +70℃
Material	ABS(V-0) Exterior Color: Black (Munsell N1.5)
Weight	520g
Dimension	Refer to outline drawing (Compatible with wide angle analog meter)

■Auxiliary Power Specification

Power Consumption (With Backlight)	AC85～253V 50/60Hz	12VA
	DC80～143V	6W
	DC20～56V	7W
Power Consumption (No Backlight)	AC85～253V 50/60Hz	10VA
	DC80～143V	5W
	DC20～56V	6W
Inrush Current (For backlight & no backlight dual use)	AC110V	5.2A (approx. 1.7ms)
	AC220V	10.4A (approx. 1.7ms)
	DC110V	3.7A (approx. 1.7ms)
	DC24V	5.5A (approx. 3.6ms)
	DC48V	10.9A (approx. 3.6ms)

■Input Specification

Input	DC0～50mV	Approx. 1MΩ
	DC0～60mV	
	DC0～100mV	
	DC0～50V	
	DC0～75V	
	DC0～100V	
	DC0～150V	
	DC0～200V	
	DC0～1mA	Approx. 1kΩ

DI (5) (Max/ Min Value)	Input Specification	DI: Possible to reset Max/Min value when adding voltage signal; Input and Aux. power are the same value; Min. pulse width is 300ms continuation.	
	Power Consumption	AC, DC100V/110V	0.4VA, 0.4W
		AC200V/220V	1.4VA
		DC24V	0.3W
		DC48V	1.2W
	Contact Capacity	AC, DC100V/110V	3mA
		AC200V/220V	6mA
		DC24V	10mA
		DC48V	20mA

Note (5) In DI (Reset Input), it is impossible to reset Power (Wh)

■Output Specification

・Analog Output Quantity: Maximum 3 Outputs

Rated Output	4～20mA: 0-550Ω, 0～1mA: 0-10kΩ, 1～5V: 600Ω or more, 0～5V: 600Ω or more, 0～10V: 2kΩ or more (Select one of above) Non-insulation (minus common) between analog outputs
Response Time	Below 1 sec. Time to be within ±1% of final constant value
Output Ripple	Under 1% p-p of output span

・Pulse Output Output element: DC Power (Wh)

Output Method	Photo MOS-FET relay 1a contact (N.O. contact)
Contact Capacity	AC, DC125V
Pulse width	250ms±10%
	100～300ms depending on setting range

Unit of Pulse Output is possible to set by below range:

Multiplier	Unit of Pulse Output			
0.1	1	0.1	0.01	0.001
1	10	1	0.1	0.01
10	100	10	1	0.1
100	1000	100	10	1
1000	(7) 10000	1000	100	10

For Ex.
←If multiplier 1 is selected, units of Pulse output can set as 10, 1, 0.1, 0.01

Setting range of multiplier is limited as below due to Power scale (VxA)

Voltage (V) x Current (A)	Possible range of multiplier
＜ 100kW	×0.1, ×1, ×10, ×100, ×1000
100kW ≦ ＜1000kW	×1, ×10, ×100, ×1000
1000kW ≦ ＜10000kW	×10, ×100, ×1000
10000kW ≦ ＜100000kW	×100, ×1000

Note: (6) In case of Pulse period speed setting is more than 1 pulse/sec ($\frac{VxA\ (kW)}{Pulse\ output\ unit} \geqq 3600$), Pulse width is 100-130ms. It loads about 2Hz when Pulse width is 250ms, 4.5Hz when Pulse width is 100-130ms.
(0 < Pulse output (Hz) < 2Hz or 4.5Hz)
(7) Because there are only 4 digits, unit 10000 of Pulse output will display: 9999

■Communication Specification

・Protocol A

Communication method	TIA-485-A Half-duplex 2-wire, Asynchronous communication
Transmission Speed	1200 / 2400 / 4800 / 9600 bps
Transmission Code	NRZ
Start bit	1 bit
Data length	7/8 bits
Parity	None / even / odd
Stop bit	1bit / 2 bits
Cable length	1000m (Fully extended)
Address	1～254
Quantity of connection	Can connect up to 31 units. In case of over 32 units, please use repeater (connect up to 254 units)
Transmission character	ASCII Code

・Modbus RTU

Communication method	TIA-485-A Half-duplex 2-wire, Asynchronous communication
Transmission Speed	4800 / 9600 / 19200 / 38400 bps
Transmission Code	NRZ
Start bit	1 bit
Data length	8 bits
Parity	None / even / odd
Stop bit	1bit / 2 bits
Cable length	1000m (Fully extended)
Address	1～247
Quantity of connection	Can connect up to 31 units. In case of over 32 units, please use repeater (connect up to 254 units)
Transmission code	Binary
Error detection	CRC-16 ($x^{16}+x^{15}+x^2+1$)

■PERFORMANCE

Item		Measuring Range / Display Specification	Accuracy		Reference
			Display	Output	
Standard		JIS C 1102-1,2,7,8,9 : 1997 JIS C 1111-1989 JIS C 1010-1 : 1998 TIA-485-A : 2003			
Digital Display	Display Range	-9999～9999	±1.0%	±0.5%	Any setting of number digits & decimal point location is possible
		in Wh measurement: 0～9999, display up to 3rd decimal digit.	±3.0%	±3.0%	When display is over 9999, it will continuously count from 0
Bar graph Display	Maximum Scale	10 Integer Multiple (10^n) of 1, 1.2, 1.5, 1.6, 1.8, 2, 2.4, 2.5, 3, 3.2, 3.6, 4, 4.5, 4.8, 5, 6, 6.4, 7.2, 7.5, 8, 9, 9.6	±5.0%	—	% against span Note: -9900 ≦ N ≦ 9900 (Scale value x 10^n = N)
Temperature Effect		Accuracy will not change when in 23°C±10°C			
Time of Display update		Approx. 1 sec (Approx. 0.25 sec for bar graph)			
Display Setting Element	Main monitor	Element of Input 1～Input 3 (When measuring W, elements: A, V, W. When measuring Wh, element: Wh)			
	Sub-monitor (L)	Element of Input 1～Input 3 (When measuring W, elements: A, V, W)			
	Sub-monitor (R)	Element of Input 1～Input 3 (When measuring W, elements: A, V, W)			
	Bar graph	Element of Input 1～Input 3 (When measuring W, elements: A, V, W)			
LCD view	Up-Low co-viewing	75° view for each Up, Low , Left, Right			
	Upper view	10° view for Up, 60° for Low, 60° for each Left, Right			
Warranty when power cut-off		Remain Max, Min, setting and calculation values			

■UNIT DISPLAY

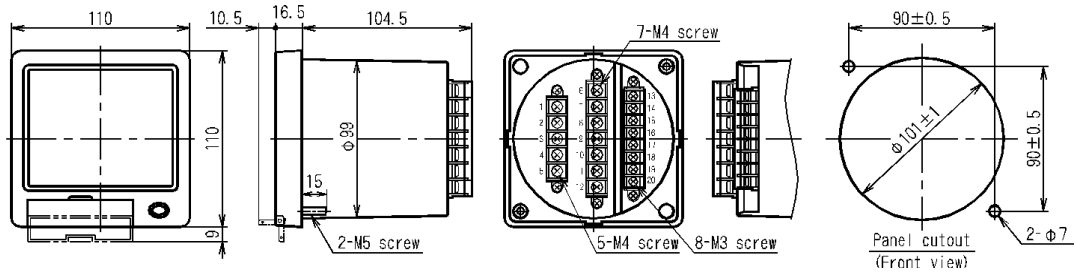
LCD only displays below 18 kinds of unit. If unit is not in this 18 kinds, we will use unit seal to stick on display screen.

LCD Display Units (18 Kinds)			Sticky seal Units (56 Types) (5)							
	Main monitor	Sub-monitor								
(1)	A	A	(1)	APm	(19)	L/h	(37)	Nm^3/min	(55)	°C
(2)	kA	kA	(2)	bar	(20)	L/min	(38)	N/m^2	(56)	kWh
(3)	V	V	(3)	cm	(21)	mA	(39)	N/mm^2		
(4)	kV	kV	(4)	cosφ	(22)	mg/L	(40)	OPm		
(5)	W	-	(5)	ELm	(23)	min^{-1}	(41)	Pa		
(6)	kW	-	(6)	Hz	(24)	mL/min	(42)	pH		
(7)	MW	-	(7)	J	(25)	mm	(43)	ppm		
(8)	℃	℃	(8)	K	(26)	m/h (8)	(44)	R		
(9)	%	%	(9)	kg	(27)	m/min (8)	(45)	rad		
(10)	m	m	(10)	kg/h	(28)	m/s	(46)	rpm		
(11)	m^3	m^3	(11)	kg/m^2	(29)	mV	(47)	SPm		
(12)	m^3/h	m^3/h	(12)	kg/m^3	(30)	m^3/s	(48)	T		
(13)	m^3/min	m^3/min	(13)	kL	(31)	MPa	(49)	t/h		
(14)	m/h	-	(14)	kN	(32)	Mvar	(50)	TPm		
(15)	m/min	-	(15)	kPa	(33)	MW (8)	(51)	W (8)		
(16)	r/min	r/min	(16)	kvar	(34)	N	(52)	YPm		
(17)	min	min	(17)	kW (8)	(35)	N・m	(53)	μm		
(18)	no display	no display	(18)	L	(36)	Nm^3/h	(54)	μS/cm		

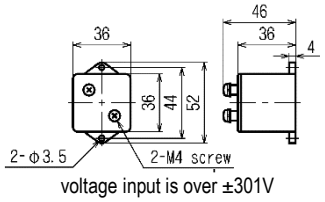
Note: (8) Possible for sticky seal unit only on sub-monitors. Main monitor will display by LCD.

(5) Letter height of sticky seal: 8.5mm in main monitor, 5mm in sub-monitor. Letter's color: gray (DIC 13th541). Units of sticky seal are selected when ordering, and cannot be changed after purchased.

■ DIMENSIONS (Unit: mm)



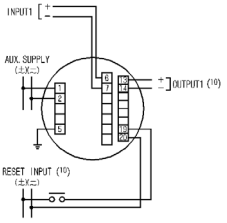
DM-1 Dimension



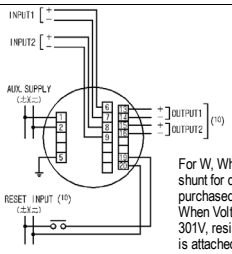
voltage input is over ±301V

■ CONNECTION DIAGRAM

1-INPUT

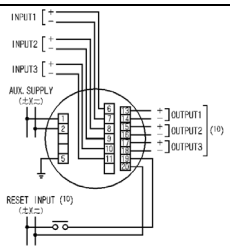


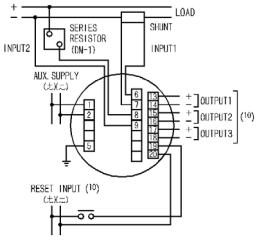
2-INPUT

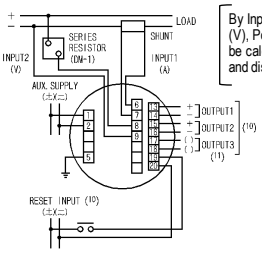


For W, Wh measurement, shunt for connection is purchased separately. When Voltage input is over 301V, resistor (Type: DM-1) is attached (no fee caused)

3-INPUT

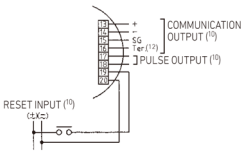






By Input 1 (A) & Input 2 (V), Power (W, Wh) will be calculated to output and display

COMMUNICATION OUTPUT



Note: (10) Input 1, Input 2, Input 3, DI (Reset Input), Pulse Output, Communication Output are options (selected by customer).
(11) Output 1, 2 are Analog type, Output 3 is Analog type or Pulse type. (Terminal 17(+), 18(-) if Output 3 is Analog). Output of Wh is Pulse Output in Output 3.
(12) Terminating resistance can be connected internally by short circuit between Terminal (-) 14 and 16 (Ter.).

■ ORDER INFORMATION Please specify below information to order:

1. For measuring DC Input

① Type name & Specification code
② Display Scales, Units: Please advise us the display scale and unit of each Input.
For Ex.: Input 1: 100.0A Input 2: 200.0V Input 3: 200.0V

2. For measuring W, Wh

① Type name, Specification code
② Display Scales, Units: Please advise us the display scale and unit of each Input.
For Ex.: Input 1: 100.0A Input 2: 200.0V Input 3: 200.0kW
③ Multiplier (In case of Wh): Please select at below table:

Voltage (V) x Current (A)	Possible range of multiplier
< 100kW	×0.1, ×1, ×10, ×100, ×1000
100kW ≦ < 1000kW	×1, ×10, ×100, ×1000
1000kW ≦ < 10000kW	×10, ×100, ×1000
10000kW ≦ < 100000kW	×100, ×1000

Cannot change the multiplier after purchase.

③ Analog output and quantity (1-3) of output.
④ Display Patterns:
Please refer page 10 and advise us the patterns (Display form) from 1 to 6.

④ Units of Pulse Output (In case of Pulse Output): Please select at below table:

Multiplier	Unit of Pulse Output			
0.1	1	0.1	0.01	0.001
1	10	1	0.1	0.01
10	100	10	1	0.1
100	1000	100	10	1
1000	10000	1000	100	10

⑤ Analog output and quantity of output.
In case of "No Pulse Output": please select quantity of Analog Output from 1-3
In case of "With Pulse Output": please select quantity of Analog Output from 1-2
⑥ Display Patterns: Please refer page 10 and advise us the patterns (Display form)
For measuring W: Select pattern from 7-C. For measuring Wh: Select pattern from D-J

Example of Order:

Type name & Specification code: TLC-110L-D24W12-11F
2-Input selected: Input 1: 2000A/60mV Input 2: 50.0V/50V W: 100.0kW Multiplier×10kWh
AC85-253V, DC80-143V
2-Output selected: DC4-20mA (below 550 Ω load), Output 1: A, Output 2: V, Pulse Output: 10kWh/Pulse
With DI (Reset Input) Display Pattern: D Quantity of order: 1 pc(s)

Select multiplier for measuring Wh
Select Unit for Pulse Output

PARTS NAME & FUNCTION

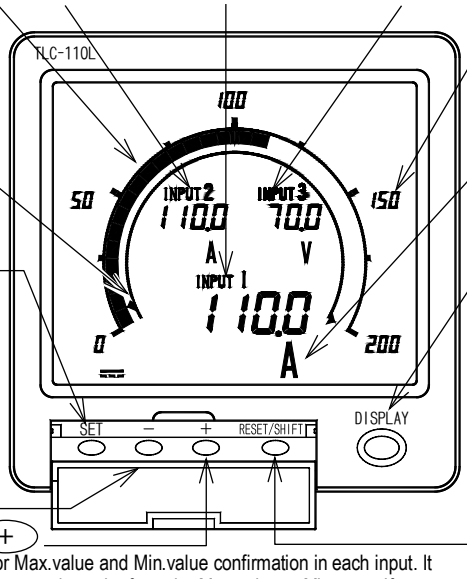
BAR GRAPH DISPLAY
Display measuring values.
The measuring elements displayed on bar graph can be changed by (DISPLAY) button.

DIGITAL DISPLAY
3 elements can be measured and monitored at the same time.
Sub-monitor (Left) Main monitor Sub-monitor (Right)

FLICKER SETTING INDEX
Can use Flicker OFF setting to manage the index.

SCALE MARKING
Scale display can be set automatically

UNIT DISPLAY
Select units in unit setting



(SET)

For selecting the setting mode.
Display will change to setting mode 1 when continuously press ON more than 3sec.
This button is used for value setting.
When measuring Wh, it can display up to the 3rd decimal digit.

(DISPLAY)
For changing the input element which will display on bar graph

→ Main monitor → Sub-monitor (Left) → Sub-monitor (Right)

Display mode will change to setting mode 2 if continuously press together with (SET) button in more than 3sec. The function can be replaced by (+) button. Setting mode will return to display mode after 1 action.

(–)

For Flicker value confirmation.
If no operation in 10sec, Flicker value display will return to display mode. This button is also used to carry down the setting value in setting mode.

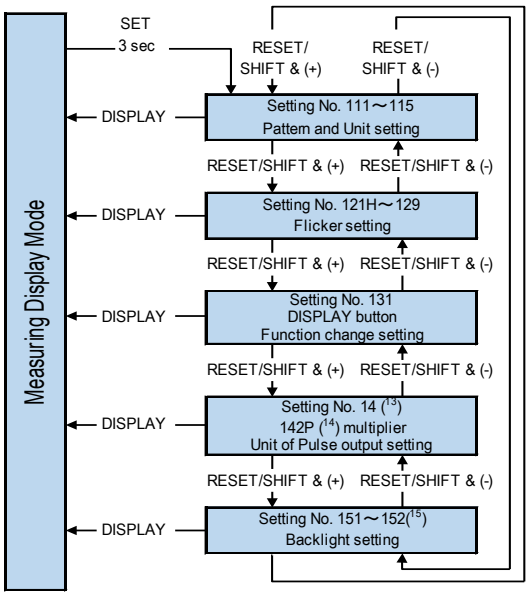
(+)

For Max.value and Min.value confirmation in each input. It changes the order from the Max.value to Min.vaue. If no operation in 10min, Max. and Min.value will return to display mode. This button is used for carry up the setting value. It can replace the function with (DISPLAY) button by setting.

(RESET/SHIFT)
For resetting saved Max. and Min.value.
When continuously press ON more than 1sec, Max. and Min.value will be reset.

SETTING

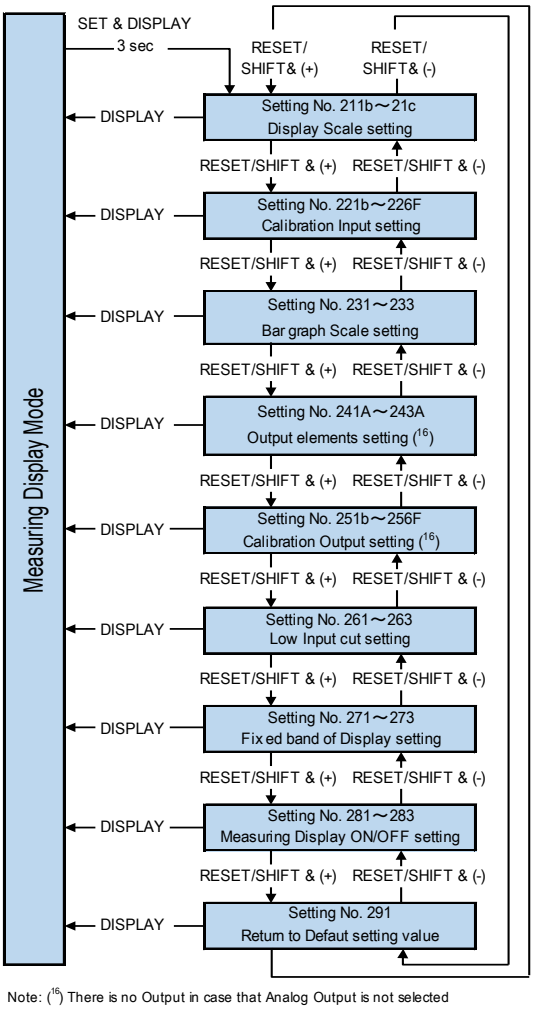
SETTING - 1



Note: (13) Setting only for measuring Wh (Display Pattern D-J)
(14) Setting only for Pulse output (option)
(15) Setting only for Backlight specification

Note: Setting mode is a little different in case of Communication Output specification

SETTING - 2



Note: (16) There is no Output in case that Analog Output is not selected

COMMON SPECIFICATION

■COMMON SPECIFICATION

Product Name		DC Receiving Meter	DC Multi Meter
Type Name	No Backlight	XLC-110	TLC-110
	With Backlight	XLC-110L	TLC-110L

Items		Specification	
Standard		JIS C 1102-1 : 1997 Direct acting analog electrical measuring instruments. Part 1: Definitions and general requirements	
		JIS C 1102-2 : 1997 Direct acting analog electrical measuring instruments. Part 2: Special requirements for ammeters and voltmeters	
		JIS C 1102-7 : 1997 Direct acting analog electrical measuring instruments. Part 7: Special requirements for multi-function instruments	
		JIS C 1102-8 : 1997 Direct acting analog electrical measuring instruments. Part 8: Special requirements for accessories	
		JIS C 1102-9 : 1997 Direct acting analog electrical measuring instruments. Part 9: Recommended test methods	
		JIS C 1111 : 1989 AC-DC Transducer	
		JIS C 1010-1 : 1998 Safety requirements for electrical equipment for measurement, control, and laboratory use. Part 1: General requirements	
		TIA-485-A : 2003 Electrical characteristics of drivers and receivers for use in balanced and multipoint systems.	
Withstand Overload	Voltage circuit	2 times of rated voltage for 10 sec., 1.2 times for continuous	
	Current circuit	10 times of rated current for 5 sec., 1.2 times for continuous	
	Auxiliary Power	1.5 times of rated voltage for 10 sec., 1.2 times for continuous When aux. power is DC110V: 1.5 times of rated voltage for 10 sec., 1.3 times for continuous	
Insulation Resistance		Between electric circuit and the outside box (earth)	DC500V 50MΩ or more
		Between input, output and aux. power	
		Between inputs	
		Between outputs (analog / communication / pulse)	
		Between analog outputs	Non- isolation (minus common)
Withstand Voltage		Between electric circuit and the outside box (earth)	AC2000V (50/60Hz), 1 min ([1])
		Between input, output and aux. power	
		Between inputs	
		Between outputs (analog / communication / pulse)	AC1500V (50/60Hz), 1 min
		Between analog outputs	Non- isolation (minus common)
Lightning Impulse Withstand Voltage		Between electric circuit and the outside box (earth)	5kV 1.2/50μs plus/minute polarity each 3 times
Noise Capacity		(1) Oscillatory surge voltage: If the attenuated oscillatory waveform of 2.5-3kV peak voltage and 1-1.5MHz frequency is applied repeatedly, there is no effect to measurement and communication (Accuracy of measurement is within ±10%) Voltage, Current input circuit (Common), Aux. power circuit (Normal/Common) (2) Square-wave impulse noise: If the square-wave impulse noise (1μs, 100ns width) is applied repeatedly in 5 min, there is no effect to measurement and communication. (Accuracy of measurement is within ±10%). Voltage, current input circuit (Common): 1.5kV or more Aux. power circuit (Normal/Common): 1.5kV or more External input (DI) (Common): 1.0kV or more Analog or Communication output circuit (Inductive): 1.0kV or more Pulse output (Common): 1.0kV or more (3) Radio noise: If radio wave of 150,400MHz is applied continuously by 5W, 1m, there is no effect to measurement and communication. (Accuracy of measurement is within ±10%) (4) Static noise: When electric connection (noise voltage: 8kV): Accuracy of measurement is within ±10% When no electric connection (noise voltage: 10kV): No damage caused. Condenser change method.	
Vibration / Shock		Vibration: (Positive scale only) 0.15mm width, 10-55Hz: 5 times sweep in 1 octave/min Shock: 490m²/s, X, Y, Z direction 3 times for each	
Structure		Dimension: length x height x width: 110 x 110 x 105mm. Diameter: 99mmΦ. Terminal cover attached. Protection class: IP40 Material of case: ABS(V-0). Out-looking color: Black (Munsell N1.5). Weight: approx.. 520g	
Power Outage Guarantee		Max. value, min. value, setting values, integrated values are saved by data memory	
Operating Temperature/ Humidity Range		-10℃～+55℃, 30～85% RH, no condensation	
Storage Temperature		-25～+70℃	

Note: ([1]) When circuit voltage is 501~800V, withstand voltage is AC2200V.

PATTERNS (DISPLAY FORMS)

XLC-110/110L

No.	Pattern No.	Specification of 1-input type			Specification of 2-input type			Specification of 3-input type			Bar graph	INPUT Display
		Main monitor	Sub-monitor (L)	Sub-monitor (R)	Main monitor	Sub-monitor (L)	Sub-monitor (R)	Main monitor	Sub-monitor (L)	Sub-monitor (R)		
1	Pattern 1	Input 1	-	-	Input 1	Input 2	-	Input 1	Input 2	Input 3	Input 1 (can change to 2, 3)	ON/OFF
2	Pattern 2	-	-	-	Input 1	-	Input 2	Input 1	Input 3	Input 2	Input 1 (can change to 2, 3)	OFF
3	Pattern 3	-	-	-	Input 2	Input 1	-	Input 2	Input 1	Input 3	Input 2 (can change to 1, 3)	OFF
4	Pattern 4	-	-	-	Input 2	-	Input 1	Input 2	Input 3	Input 1	Input 2 (can change to 1, 3)	OFF
5	Pattern 5	-	-	-	-	Input 1	Input 2	Input 3	Input 1	Input 2	Input 3 (can change to 1, 2)	OFF
6	Pattern 6	-	-	-	-	Input 2	Input 1	Input 3	Input 2	Input 1	Input 3 (can change to 1, 2)	OFF

- Pattern 1: Standard; Pattern 2~6: Specify and change the display position
- Only display elements of Input circuit number (For Ex.: In case of 1-input, only display on main monitor (Input 1), sub-monitors are non-display.

TLC-110/110L

No.	Pattern No.	Specification of 1-input type			Specification of 2-input type			Specification of 3-input type			Bar graph	INPUT Display
		Main monitor	Sub-monitor (L)	Sub-monitor (R)	Main monitor	Sub-monitor (L)	Sub-monitor (R)	Main monitor	Sub-monitor (L)	Sub-monitor (R)		
1	Pattern 1	Input 1	-	-	Input 1	Input 2	-	Input 1	Input 2	Input 3	Input 1 (can change to 2, 3)	ON/OFF
2	Pattern 2	-	-	-	Input 1	-	Input 2	Input 1	Input 3	Input 2	Input 1 (can change to 2, 3)	OFF
3	Pattern 3	-	-	-	Input 2	Input 1	-	Input 2	Input 1	Input 3	Input 2 (can change to 1, 3)	OFF
4	Pattern 4	-	-	-	Input 2	-	Input 1	Input 2	Input 3	Input 1	Input 2 (can change to 1, 3)	OFF
5	Pattern 5	-	-	-	-	Input 1	Input 2	Input 3	Input 1	Input 2	Input 3 (can change to 1, 2)	OFF
6	Pattern 6	-	-	-	-	Input 2	Input 1	Input 3	Input 2	Input 1	Input 3 (can change to 1, 2)	OFF
7	Pattern 7	-	-	-	W	A	V	W	A	V	W (can change to A, V)	OFF
8	Pattern 8	-	-	-	W	V	A	W	V	A	W (can change to A, V)	OFF
9	Pattern 9	-	-	-	A	V	W (sticky seal)	A	V	W (sticky seal)	A (can change to V, W)	OFF
A	Pattern A	-	-	-	A	W (sticky seal)	V	A	W (sticky seal)	V	A (can change to V, W)	OFF
B	Pattern B	-	-	-	V	A	W (sticky seal)	V	A	W (sticky seal)	V (can change to A, W)	OFF
C	Pattern C	-	-	-	V	W (sticky seal)	A	V	W (sticky seal)	A	V (can change to A, W)	OFF
D	Pattern D	-	-	-	Wh (sticky seal)	A	V	Wh (sticky seal)	A	V	A (can change to V)	OFF
E	Pattern E	-	-	-	Wh (sticky seal)	V	A	Wh (sticky seal)	V	A	V (can change to A)	OFF
F	Pattern F	-	-	-	Wh (sticky seal)	A	W (sticky seal)	Wh (sticky seal)	A	W (sticky seal)	A (can change to W)	OFF
G	Pattern G	-	-	-	Wh (sticky seal)	V	W (sticky seal)	Wh (sticky seal)	V	W (sticky seal)	V (can change to W)	OFF
H	Pattern H	-	-	-	Wh (sticky seal)	W (sticky seal)	A	Wh (sticky seal)	W (sticky seal)	A	W (can change to A)	OFF
J	Pattern J	-	-	-	Wh (sticky seal)	W (sticky seal)	V	Wh (sticky seal)	W (sticky seal)	V	W (can change to V)	OFF

- Only display elements of Input circuit number (For Ex.: In case of 1-input, only display on main monitor (Input 1), sub-monitors are non-display).
  Depending on Patterns, it is possible to change position of display, and do the setting of DC (W), (Wh) measurements.
  Pattern 1: Standard; Pattern 2~6: Specify and change the display position;
  Pattern 7~C: Specify (W) measurement; Pattern D~J: Specify (Wh) measurement.
  Units of sticky seal are selected when ordering (Ex. W, kW, Wh, kWh, etc.), and cannot be changed after purchased.

SAFETY PRECAUTIONS

To ensure safety, please follow carefully the below attentions. Manual instruction is enclosed in same box of product, please read it carefully before using and make sure that the manual instruction is read by end-user also.

■ Usage environment and conditions

Please ensure to use this product in a place that meets the following conditions.
In places that do not meet this conditions, it may cause malfunction and reduce the product life.

- Within the ambient temperature range of -10 to +55℃.
- Daily average temperature is not over 40℃.
- Humidity is 85% RH or less, and non-condensing.
- Free of dust, corrosive gas, salt and oily smoke.
  (Corrosive gas : SO_2 / H_2S, etc.)
- Product is not in direct contact with rain, water drops or sunlight.
- Altitude is 2000m or lower.
- If this product directly measures an inverter output of Cycle control, SCR phase angle control or PWM control, an error may occur due to its operation principle.

■ Outdoor use conditions

Please follow the below notices when using outside the panel:

- Please prevent this product from rain and water drops because this product is not waterproof and splash proof construction. (Protection class: IP40)
- Please avoid the place with much dust.
- Please do not install in the place where sunlight hits directly even though product is behind glass.
  Under the direct sunlight, screen of meter may get the high temperature and be deformed when over 80℃.
- If the average temperature of surrounding area is over 40℃, the product life span may be decrease.

■ Mounting

- Please use 2.0~2.5N.m of torque to tighten the flange nuts M5 when mounting.
- Please take care the LCD parts not to be shock to prevent the error and damage.

■ Connecting

- To ensure safety, connections should be performed by an electrical engineer qualified in wiring.
- Please use crimping terminals to connect.
- Please use 1.0~1.3N.m of torque for M4 screws and 0.5~0.6N.m of torque for M3 screws.
- Terminal cover is for avoiding electric shock, please use terminal cover after conducting connection.

■ Preparations before use

- This product must be set primary voltage, etc… correctly before use. Incorrect setting may result in wrong display.

■ Usage procedures

- Use this product within the rated range because if out of rated range, it may cause erroneous operation or malfunction.
- Please set the value correctly by reading Manual instruction carefully.

■ Handling at Time of Malfunction/Error

- If the product listed in this catalog malfunctions, cut off the power and input and stop using. Please contact Daiichi Electronics or our representatives.
- In case of stripping down or remodeling, please be noticed that it may be out of warranty.

■ About dew condensation

If the temperature and humidity change suddenly when this product is non-powered, the water drops by dew condensation may appear at inner side of display.
(The display filter may stick to LCD surface, and round or ellipse shape of patterns may appear)
This phenomenon does not cause any trouble. It will disappear when power supply is applied continuously for about 2 hours.

■ Maintenance and inspections

- Use a soft towel to clean the dirt on screen. If the dirt is too hard to clean, use a wet towel (squeezed by water with a little neutral soap).
- Please do not use the organic solvent, chemicals, cleaners, etc., for cleaning.
- Please inspect the product to check out the bellowing:
  (1) Damages on product
  (2) Display is error or not (Ex. display does not respond to input)
  (3) Screws on terminals are slack when mounting
  (4) Terminal parts have dust or not
  Please cut off the power during inspection.

■ Storage

In the long period of storage, please keep the product in a place that meets the following conditions.
In places that do not meet this conditions, it may cause malfunction and reduce the product life.

- Within the ambient temperature range of -20 to +70℃ (storage temperature).
- Daily average temperature 40 ℃ or lower.
- Free of dust, corrosive gas, salt and oily smoke.
- No shock and vibration.
- Altitude is 2000m or lower.
- Product is not in direct contact with rain, water drops or sunlight

During the storage period, do not connect with any wire of power, input/output and wrap the product in a vinyl pack.

■ Disposal

This product do not use nickel-cadmium batteries. Dispose them as industrial waste (non-burnable trash).

⚠ CAUTION ⚠ DANGER OF ELECTRIC SHOCK	Please refer to manual instruction for mounting and wiring, and should be performed by an electrical engineer. ● Please check the connection diagrams carefully before performing connections. Wrong connections may lead to machine faults and burn-out. ● Please avoid working with live wires because it may result in electric shock, malfunctions, gas and fire. ● Terminal cover is for avoiding electric shock, please use terminal cover after performing connections.