

§ Wide Angle *METER* § L Series



L-65C



L-80C



L-110C

L series are wide-angle meters. The series have three types, 110mm angle, 80mm angle and 65mm angle, and the series are in conformity with JIS C 1103 in panel cut-out size.

With long and stepped scales, L series are easy to read and the reading error is small. Also the series are highly reliable meters by adopting the most suitable operational principle in accordance with the measuring object, thus meet the JIS C 1102-1~9 standards adequately (IEC 60051-1 compliance).

For usage in excessive environmental conditions, special treatments such as cold resistance and tropical specifications are implemented to improve the reliability. The series are most suitable for equipment for exportation to frigid / tropical zone.

FEATURES

- ▶ **High** quality, high reliability oriented design.
- ▶ **Pivot** support system is adopted.
- ▶ **65mm** angle type is most suitable for congested equipment.
- ▶ **By** adopting transducer based on electronic technology, more variety is extended.
- ▶ **Meter** made of incombustible material is available by designation.

§ Wide Angle *METER* § L Series

1. TYPE CODE DESIGNATION

■ WIDE ANGLE METER

(1) L – (2) (3) $\frac{C}{D}$ (4) – (5)

(1) Operational principle

DC current / voltage	Permanent magnet moving coil	M
DC receiving indicator	Permanent magnet moving coil	X
AC receiving indicator	Rectifier	Y
AC current / voltage	Moving iron	S
AC current / voltage	Rectifier / RMS value rectifier	C
AC watt meter	Transducer	W
Var meter (unbalanced)	Transducer	WV
Power factor (balanced)	Rectifier	PB
Power factor (unbalanced)	Transducer	P
Frequency meter	Transducer	A
Synchroscope detector	Transducer	D
Power flow power factor meter (3-phase) (unbalanced)	Transducer	FPD
Thermocouple type thermometer	Permanent magnet moving coil	H
Thermocouple type thermometer	Transducer	HT
Revolution indicator	Rectifier	V

(2) Size

Wide angle meter	110×110	110
	80×80	80
	65×65	65

(3) Structure

Transducer all-in-one type	N
Separate or no attachment	None

(4) Special specifications

For SCR	H
Cycle control	C

(5) Kind of circuit

Single phase	12
Single phase 3-wire	13
3-phase 3-wire	33
3-phase 4-wire	34

2. COMMON STANDARD SPECIFICATIONS

ITEM	SPECIFICATIONS
Standard	JIS C 1102 : 2007 Direct Acting Indicating Analogue Electrical Measuring Instruments
	JIS C 1103 Dimensions of Electrical Indicating Instruments for Switchboards
	IEC 60051-1 compliance
Class	Refer to [List of L series].
Support method	Pivot system
Deflection angle	250° (SL : 240°; DL, FPD : 360°)
Length of scale	L-110C : 200mm (SL : 194mm)
	L-80C : 143mm (SL : 135mm)
	L-65C : 107mm (SL : 103mm)
Scale plate color	White
Pointer	Lancet-shaped (black)

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ITEM		SPECIFICATIONS
Installation position		Vertical ()
Material of installation panel		Iron plate or non-iron plate
Thickness of installation panel		10mm (SL-80C, L-65C 6mm)
Color of cover		Black (munsell N1.5); dark blue (munsell 7.5BG 4/1.5)
Material of cover		Methacrylate resin (Antistatic treatment)
Insulation resistance	Between electrical circuit and outer case	50MΩ or more at DC500V
Voltage test		AC3320V, 5 seconds
About safety requirements	Standard	JIS C1010-1
	Insulation	Between electrical circuit and outer case: basic insulation
	Service space	Indoor use (cubicle etc.)
	Height	2000m
	Pollution degree	Pollution Degree 2
	Measurement Category	CAT
Max. circuit voltage		600V (Ammeter)
Operating temperature & humidity		-10~ + 55 (daily average temperature 40), 25~85%RH
Storage temperature range		-20~ + 70

3. **COMMON SPECIAL SPECIFICATIONS** (Please specify.)

ITEM		SPECIFICATIONS
Scale	Color line	Red, green, yellow (Specify, please.)
	Extension scale	CL: 3-time extension; SL: from 2 to 5 times extension.
	Color zone(belt)	Red, green, yellow (Specify, please.)
	Dual scale	Please specify.
	Dual printing	Please specify.
	Max. division	110 angle:100 division, 80 angle:75 division, 65 angle:60 division
	Special symbol	Please specify.
Vibration resistant structure	Vibration	2-10Hz; amplitude: 15mm p-p; 10~55Hz, 29.4m/s ²
	Shock	147m/s ² , 30 times
Tropical specification	Anticorrosive treatment. "FOR TROPICS" indication	
Pointer	Rod-shaped (multiple scale)	
Management pointer	Lancet-shaped (red)	
Installation position	Horizontal, slope installation (angle by specification); not for DL.	
Flame-retardant material	Cover: polycarbonate resin	
Protection circuit of meter	Overcurrent	Specify please the required tolerance dose.
	Overvoltage	Specify please the required tolerance dose.
For SCR control waveform	AC ammeter / voltmeter, frequency meter	
For cycle control	AC ammeter / voltmeter (rectifiate type)	
Test report	Specify please the frequency applied and the quantity of report.	
Others	For special frequency, partially extended scale etc., please consult with us.	

4. STANDARD SCALE DIVISION

Max. scale value (10's power of integer)		1	1.5	2	2.5	3	4	5	6	7.5	8	9
Kind	L-110C, L-110NC	50	75	40	50	60	40	50	60	37.5	40	45
	L-80C, L-80NC	50	30	40	50	60	40	50	60	37.5	40	45
	L-65C	20	30	20	25	30	20	25	30	15	16	18

5. A LIST OF L SERIES

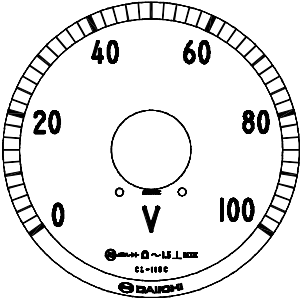
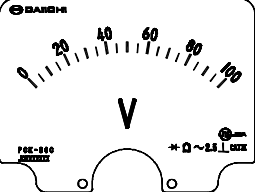
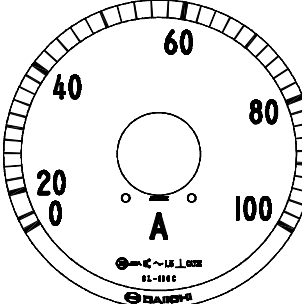
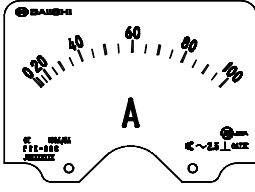
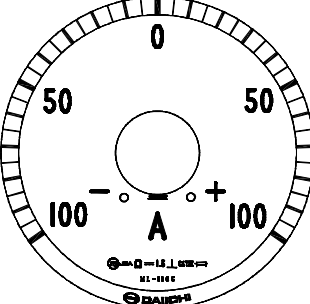
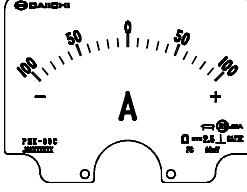
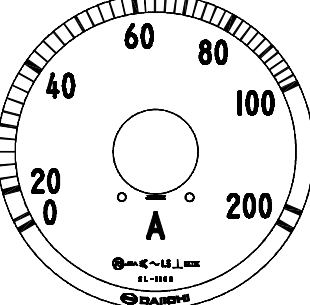
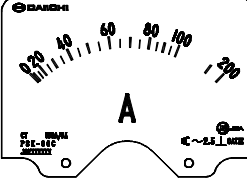
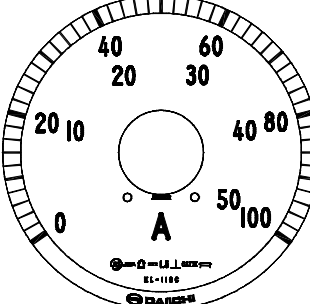
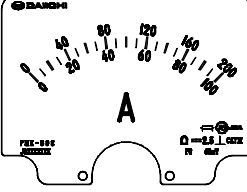
KIND		L-110(N)C/D			L-80(N)C			L-65C			
JIS MARK		KW-3a			KW-6			-			
Product	Operational principle	Type code	Class	Weight (kg)	Type code	Class	Weight (kg)	Type code	Class	Weight (kg)	
DC ammeter	Moving coil	ML-110C	1.5	0.5	ML-80C	1.5	0.4	ML-65C	2.5	0.3	
DC voltmeter		ML-110C	1.5	0.5	ML-80C	1.5	0.4	ML-65C	2.5	0.3	
DC receiving indicator	Moving coil	XL-110C	1.5	0.5	XL-80C	1.5	0.4	XL-65C	2.5	0.3	
AC receiving indicator	Rectifier	YL-110C	1.5	0.6	YL-80C	1.5	0.5	YL-65C	2.5	0.3	
AC ammeter	Moving iron	SL-110C	1.5	0.35	SL-80C	1.5	0.3	SL-65C	2.5	0.2	
AC voltmeter		SL-110C	1.5	0.5	SL-80C	1.5	0.45	SL-65C	2.5	0.2	
AC ammeter	Transducer	CL-110NC	1.5	0.5	CL-80NC	1.5	0.5	-	-	-	
	Rectifier	CL-110C	1.5	0.5	CL-80C	1.5	0.5	CL-65C	2.5	0.3	
AC voltmeter	Transducer	CL-110NC	1.5	0.5	CL-80NC	1.5	0.5	-	-	-	
	Rectifier	CL-110C	1.5	0.5	CL-80C	1.5	0.5	CL-65C	2.5	0.3	
Watt meter	1 phase	Transducer	WL-110NC-12	1.5	0.6	WL-80C-12	1.5	0.8	WL-65C-12	2.5	0.8
	1 phase 3-wire		WL-110NC-13	1.5	0.6	WL-80C-13	1.5	0.8	WL-65C-13	2.5	1.1
	3-phase		WL-110NC-33	1.5	0.6	WL-80C-33	1.5	0.8	WL-65C-33	2.5	1.1
	3-phase 4-wire		WL-110NC-34	1.5	0.6	WL-80C-34	1.5	0.8	WL-65C-34	2.5	1.1
Var meter	1 phase	Transducer	WVL-110NC-12	1.5	0.6	WVL-80C-12	1.5	0.8	WVL-65C-12	2.5	0.8
	3-phase		WVL-110NC-33	1.5	0.6	WVL-80C-33	1.5	0.8	WVL-65C-33	2.5	1.1
	3-phase 4-wire		WVL-110NC-34	1.5	0.6	WVL-80C-34	1.5	0.8	WVL-65C-34	2.5	1.1
Power factor meter	1 phase	Transducer	PL-110NC-12	5.0	0.6	PL-80NC-12	5.0	0.5	PL-65C-12	5.0	0.8
	3-phase (balanced)	Rectifier	PBL-110NC-33	5.0	0.6	PBL-80NC-33	5.0	0.5	PBL-65C-33	5.0	0.8
	3-phase (unbalanced)	Transducer	PL-110NC-33	5.0	0.6	PL-80C-33	5.0	0.8	PL-65C-33	5.0	1.1
	3-phase 4-wire (unbalanced)		PL-110NC-34	5.0	0.7	PL-80C-34	5.0	0.8	PL-65C-34	5.0	1.4
Frequency meter		Transducer	AL-110NC	0.5 (1.0)	0.6	AL-80NC	0.5 (1.0)	0.4	AL-65C	1.0	0.7
Synchro-scope meter	1 phase	Transducer	DL-110ND-12	2.5	0.6	-	-	-	-	-	
	3-phase		DL-110ND-33		0.6	-	-	-	-	-	
Power flow power factor meter	3-phase	Transducer	FPDL-110D-33	5.0	1.6	-	-	-	-	-	

6. PURCHASE SPECIFICATIONS

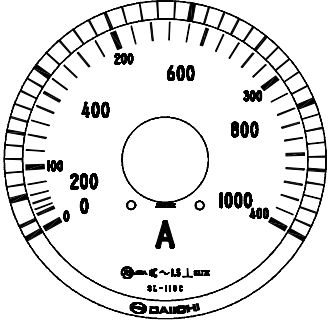
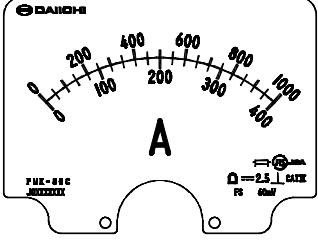
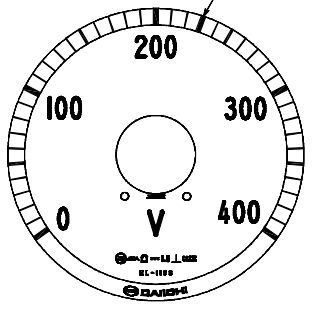
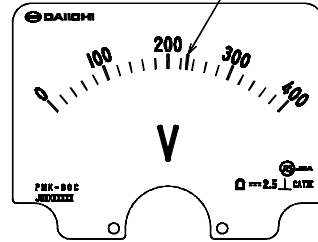
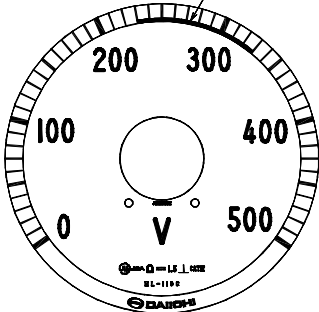
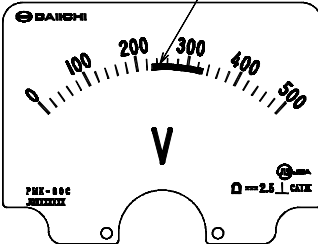
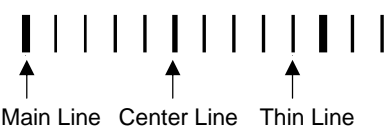
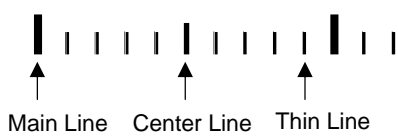
- 1) Type name 2) Rating (Max. scale / input) *1
- 3) Quantity 4) Options (See common special specifications)
- 5) Test report (Specify please frequency and quantity of report if you need it)
- 6) Auxiliary supply (in the case of FPDL-110C-33 with Aux. supply)

*1: See the list of [standard characteristic max. scale value] for the max. scale value of watt and var meter.
As for power factor meter, specify frequency according to the specification table.

EX. SCALE

Scale Specification	Wide Angle Meter Ex.: L-110C	Square Shape Meter Ex.: PK-80C
<p>Standard Scale</p> <p>Scale digit: Black Scale line : Black Unit mark : Black Scale division : Refer to standard lancet shape pointer division</p>		
<p>Moving iron type can be left out the lower value part of scale Scale division : Refer to standard lancet shape pointer division</p>		
<p>± Scale Meter (Both Side Deflect Meter)</p> <p>Scale digit: Black Scale line : Black Unit mark : Black</p>		
<p>Extend Scale (2-Fold Extend)</p> <p>Scale digit: Black ; Extend part: Red Scale line : Black ; Extend part: Red Unit mark : Black</p>		
<p>Single Scale Double Seal Meter</p> <p>Scale digit: Black Scale line : Black Unit mark : Black Standard place a seal of scale figure : Higher value will display at inside & smaller value will display at outside</p>		

EX. SCALE

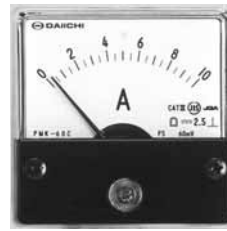
Scale Specification	Wide Angle Meter Ex.: L-110C	Square Shape Meter Ex.: PK-80C
<p>Double Scale Double Seal</p> <p>Scale digit: Black Scale line : Black Unit mark : Black Scale division : Refer to standard lancet shape pointer division Standard place a seal of scale figure : Higher value will display at outside & smaller value will display at inside For wide angle meter : Higher value will display at inside & smaller value will display at outside</p>		
<p>Coloring Scale (Color Line)</p> <p>Scale color line : Red, Yellow, Green Possible combine the color line & color figure to use for double scale</p>		
<p>Color Belt</p> <p>Color Belt : Red, Yellow, Green</p>		
<p>Scale line and Scale figure</p> <p>1) Type of scale line Scale figure will print at main line Please refer to standard lancet shape pointer division & standard knife shape pointer division</p> <p>2) Figure of scale : Max. 4-digit (9999) If 10000 is exceed, unit will be change like 6.6kV or use multiple like $36 \times 1000 \text{min}^{-1}$</p> <p>3) Please have a consultation with us if scale division is different with standard division (odd scale) Please specify for Max. division</p> <p>4) Display 「0」 will be left out if the scale figure after decimal point is Zero. (like scale figure 1 as below)</p> <p>5) Display 「0」 will be left out if the scale figure before decimal point is Zero. (like scale figure 0.5 as below)</p> <p>Ex. : For range value 1.5</p> <p>Wide Angle Meter Scale will display by 「1.0」 for wide angle meter (except BRL & RL series)</p> <p>Square Share Meter BRL & RL series is same scale as square share meter</p>		

§ Wide Angle METER §

STANDARD DIVISION OF LANCET-SHAPED POINTER



L series



PK series

MODEL	L-65C PK-60C, 80C, 100C LK-8C, 10C BRL-110CH Instant Meter		RL-80C PK-120C LK-12C F-10	
MAX. SCALE VALUE	SCALE DIVISION DIAGRAM	DIV.	SCALE DIVISION DIAGRAM	DIV.
1		20		20
1.5		30		30
2		20		40
2.5		25		25
3		30		30
4		20		40
5		25		25
6		30		30
7.5		15		37.5
8		16		40
9		18		45

§ Wide Angle METER §



LK series



F series



F series

MODEL	RL-110C BRL-110CH Utility meter		F-15, 17 Note) 4-digit scale of 2T is not manufacturable. L-110C L-80C EL-110C		
	MAX. SCALE VALUE	SCALE DIVISION DIAGRAM	DIV.	SCALE DIVISION DIAGRAM	DIV.
1	*2 0 2 4 6 8 10		50	*2 0 2 4 6 8 10	50
1.5	0 5 10 15		30	*8 0 5 10 15	75
2	*2 0 5 10 15 20		40	0 5 10 15 20	40
2.5	*4 0 5 10 15 20 25		50	0 5 10 15 20 25	50
3	0 10 20 30		30	*8 0 5 10 15 20 25 30	60
4	*2 0 10 20 30 40		40	0 10 20 30 40	40
5	*4 0 10 20 30 40 50		50	0 10 20 30 40 50	50
6	0 20 40 60		30	*8 0 10 20 30 40 50 60	60
7.5	0 20 40 60 75		37.5	I-110 & I-80: 37.5 DIVISION *9 0 20 40 60 75	75
8	0 20 40 60 80		40	0 20 40 60 80	40
9	0 30 60 90		45	*5 0 20 40 60 80 90	45

§ Wide Angle METER §

STANDARD DIVISION OF KNIFE-EDGE POINTER

MODEL	PK-60C, 80C, 100C LK- 8C, 10C FK- 5C,		PK-120C LK- 12C FK- 7C		
	MAX. SCALE VALUE	SCALE DIVISION DIAGRAM	DIV.	SCALE DIVISION DIAGRAM	DIV.
1	0 2 4 6 8 10		50	0 2 4 6 8 10	50
1.5	0 5 10 15		30	0 2 4 6 8 10 12 14 15	75
2	0 5 10 15 20		40	0 5 10 15 20	40
2.5	0 5 10 15 20 25		50	0 5 10 15 20 25	50
3	0 10 20 30		30	0 5 10 15 20 25 30	60
4	0 10 20 30 40		40	0 10 20 30 40	80
5	0 10 20 30 40 50		50	0 10 20 30 40 50	50
6	0 20 40 60		30	0 10 20 30 40 50 60	60
7.5	0 20 60 60 75		37.5	0 20 40 60 75	75
8	0 20 40 60 80		40	0 20 40 60 80	80
9	0 30 60 90		45	0 30 60 90	45

- ▶ Division line part of is omitted for moving iron type meter.
- ▶ For scale extended meter, red color line and numbers of extended part.
- ▶ Have a consultation with us for +/- meter, notation of max. scale value, multiple scale meter, etc.
- ▶ *1, becomes 15 divisions for scale extended ammeter PK-60C, PK-80C and LK-8C.
- ▶ *2, becomes 20 divisions for scale extended ammeter PK-120C, LK-12C, F-10, 15, 17, RL-80C and RL-110C.
- ▶ *3, becomes 15 divisions for scale extended ammeter PK-120C, LK-12C, F-10, 15, 17 and RL-80C.
- ▶ *4, becomes 25 divisions for scale extended ammeter RL-110C.
- ▶ *5, seal numbers: 0, 30, 60, 90 for type meter F-15, and 17.
- ▶ *6, becomes 16 divisions for scale extended ammeter PK-120C, LK-12C, F-10, RL-80C.
- ▶ *7, becomes 18 divisions for scale extended ammeter PK-120C, LK-12C, F-10, RL-80C.
- ▶ *8, becomes 30 divisions for scale extended ammeter F-15, 17.
- ▶ *9, becomes 37.5 divisions for scale extended ammeter F-15, 17.