§ 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.

1. TYPE CODE DESIGNATION

■ WIDE ANGLE METER

(1) L – (2) (3) C or 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, FPDL : 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)

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	CATIII
	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** **PBL-65C-33**	5.0 5.0	0.8 0.8
	3-phase (balanced)	Rectifier	**PBL-110NC-33**	5.0	0.6	**PBL-80NC-33**	5.0	0.5	-	-	-
	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.

1. DC AMMETER

Maximum Scale Value	Approx. Internal Resistance or Voltage Drop		Attachment
	ML-110C, 80C	ML-65C	
200μA	1.6kΩ	1.6kΩ	-
1mA	185Ω	185Ω	
5mA	10Ω	12Ω	
20mA	2.5Ω	3Ω	
50mA~30A	50mV	60mV	-
30A~10kA	60mV		Shunt

► Any max. scale value exceeding 30A is dealt by a 60mV meter with an external shunt.

► A meter with a built-in adjustable resistor for external resistance correction can be manufactured.

► Shunt lead wire is not attached. The standard of lead wire resistance is 0.07Ω(1.25mm^2)

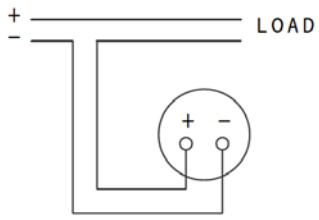
2. DC VOLTMETER

Maximum Scale Value	Approx. Consumption Current		Attachment
	ML-110C, 80C	ML-65C	
50mV~900mV	2mA	2mA	-
1V~600V	1mA	1mA	-
750V/1mA~25kV/1mA	1mA	1mA	Series resistor

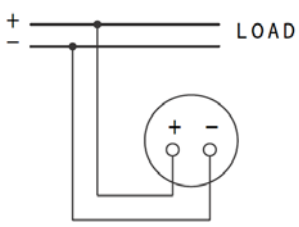
► Any maximum scale value exceeding 600V is dealt by a 1mA meter with series resistor.

■ CONNECTION DIAGRAM

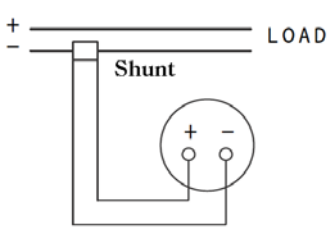
Ammeter



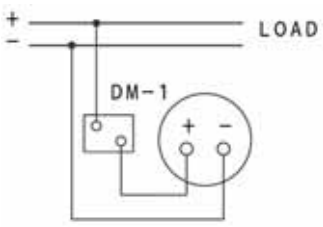
Voltmeter



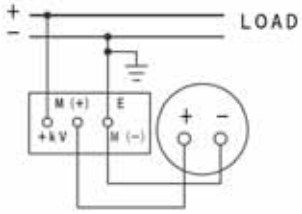
Ammeter with External Shunt



Voltmeter with External Series Resistor (DM-1)



Voltmeter with External Series Resistor (DM-2~25)



3. DC RECEIVING INDICATOR

A receiving indicator is an ammeter or a voltmeter that is used to receive electrical signal from a detector or a transmitter, and then measures and indicates various physical quantities, power, power factor, and frequency and so on.

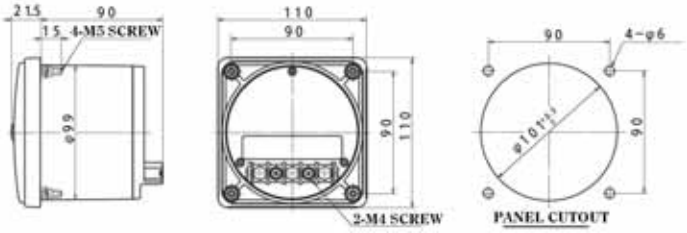
Volume Of Electrical Input	Approx. Internal Resistance		Volume Of Electrical Input	Consumption Current	
	XL-110C, XL- 80C	XL-65C		XL-110C, XL- 80C	XL-65C
200μA	1.6kΩ	1.6kΩ	1V		2mA
500μA	630Ω	630Ω	2V		2mA
1mA	185Ω	185Ω	1~5V		1mA
2mA	18Ω	18Ω	5V	1mA	1mA
5mA	10Ω	12Ω	10V		1mA
10mA	5Ω	6Ω	20V		1mA
20mA	2.5Ω	3Ω	50V	*	1mA
4~20mA	6Ω	6Ω	≀		1mA
10~50mA	12.5Ω	1.5Ω	300V		1mA

► **For** a receiving indicator that receives biased signal such as input DC1~5V, DC4~20mA, zero point adjustment is required when receiving such biased input.

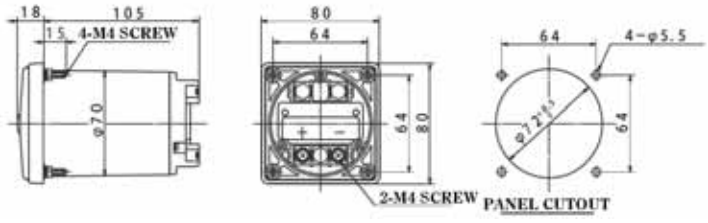
* Consumption current of VR built-in measuring is 2mA(XL-65C is 1mA)

■ DIMENSIONS

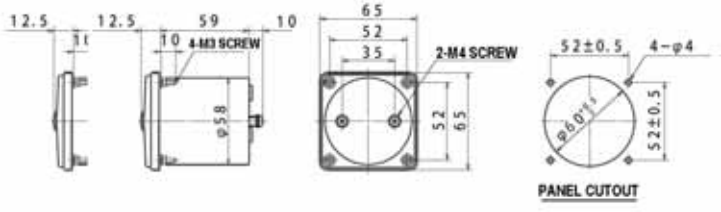
L-110C



L-80C

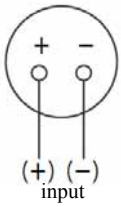


L-65C



■ CONNECTION DIAGRAM

DC Receiving Indicator



●A meter with bidirectionally swinging pointer can be manufactured.

1. AC AMMETER

Maximum Scale Value		Approx. Internal Resistance or Voltage Drop				Operational Principle
Normal scale	3-time extension	CL-110NC	CL-80NC	CL-110C, CL-80C	CL-65C	
1mA 10mA ~ 300mA	-	-	-	3V	1.5V 0.5VA	Rectifier type
0.5A 1A 5A 7.5A 10A 15A 20A 30A	1.5A 3A 15A 22.5A 30A - - -	0.4VA	0.4VA	-	1VA *	CL-110NC, 80NC are transducer type (RMS value rectifying method); CL-65C is rectifier type.
			-	-	1VA *	
5/5A ~ 10k/5A	15/5A ~ 30k/5A	0.4VA	0.4VA	-	1VA *	

► **When** the maximum scale value exceeds 30A or the circuit voltage exceeds 600V, use a 5A (1A) meter together with an external CT (current transformer).
*** MR-CTN** is attached to L-65C. AT-62M is attached in the case of scale extension.

► **Use** a cycle control type for cycle control waveform.
Type name: **CTL-110NCC** (in the case of input from301V to 600V with an attachment : T2-72), **CTL-80CC** (with attachment: AT-62MEC)

2. AC VOLTMETER

Maximum Scale Value	Operating Current or VA Consumption			Operational Principle
	CL-110NC, 80NC	CL-110C, 80C	CL-65C	
3V ~ 25V	-	3mA	1.1mA	CL-110NC, 80NC are transducer type (RMS value rectifying method); CL-110C, 80C, 65C are rectifier type.
30V ~ 100V	-	1.1mA		
150V 300V	0.8VA 1.8VA	-		
600V	-	0.7VA		
600V/150V ~ 500k/150V	0.8VA	-	-	

► **For** any maximum scale value exceeding 600V, please use a 150V meter together with an external transformer for meter. Series resistor method meter can be manufactured as well, have a consultation with us if you need it.

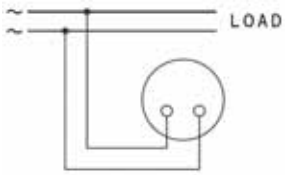
3. AC RECEIVING INDICATOR

A receiving indicator is an ammeter or a voltmeter that is used to receive electrical signal from a detector or a transmitter, and then measures and indicates various physical quantities, power, power factor, and frequency and so on.

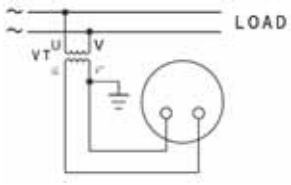
Volume of Electrical Input	Approx. Internal Resistance		Volume of Electrical Input	Consumption Current	
	YL-110C, YL-80C	YL-65C		YL-110C, YL-80C	YL-65C
500μA	6kΩ	3kΩ	3~6V	3.3mA	1.1mA
1mA	3kΩ	1.5kΩ	7.5~12V	3.15mA	
3mA	1kΩ	670Ω	15~25V	2.94mA	
5mA	600Ω	250Ω	30V	1.1mA	
10mA	300Ω	50Ω	≀		
20mA	150Ω	25Ω	300V		

■ CONNECTION DIAGRAM

Voltmeter



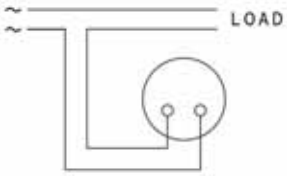
Voltmeter with **External VT**



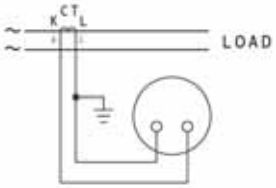
AC Receiving Indicator

input

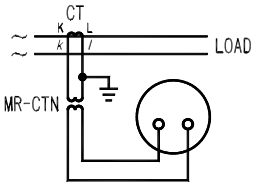
Ammeter



Ammeter with **External CT**

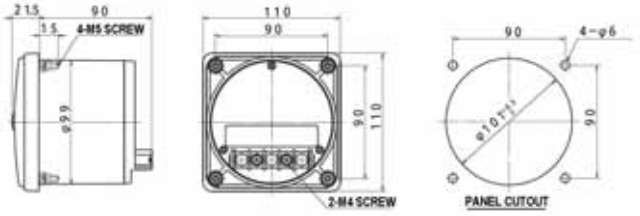


External MR-CTN

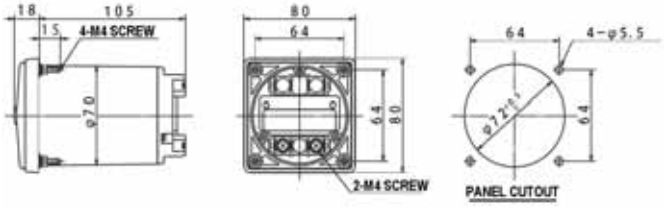


■ DIMENSIONS

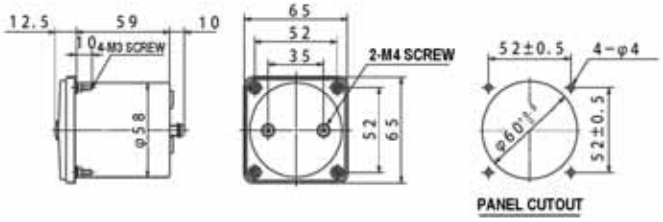
L-110C



L-80C



L-65C



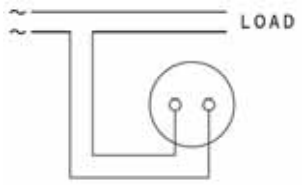
1. AMMETER

Normal Scale	Extended Scale				Approx. VA Consumption		
Max. scale value	2-time	3-time	4-time	5-time	SL-110C	SL-80C	SL-65C
100mA	200mA	300mA	400mA	500mA	3VA	3VA	3VA
500mA	1A	1.5A	2A	2.5A			
1A	2A	3A	4A	5A			
3A	6A	9A	12A	15A			
5A	10A	15A	20A	25A			
7.5A	15A	22.5A	30A	37.5A			
10A	20A	30A	40A	50A			
15A	30A	45A	60A	75A			
20A	40A	60A	80A	100A			
30A	60A	90A	120A	150A			
5/5A	10A	15A	20A	25A	3VA	3VA	3VA
~	~	~	~	~			
10kA/5A	20kA	30kA	40kA	50kA			

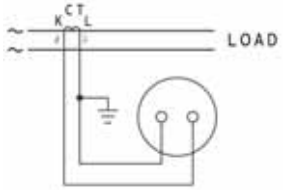
► **When** the maximum scale value exceeds 30A or the circuit voltage exceeds 600V, use a 5A (0.1A, 1A) meter together with an external CT (current transformer).
► **Meter** for SCR waveform input (distortion waveform) can be manufactured as well. (With H at the end of type name)
Type name: **SL-110CH**

■ CONNECTION DIAGRAM

Ammeter

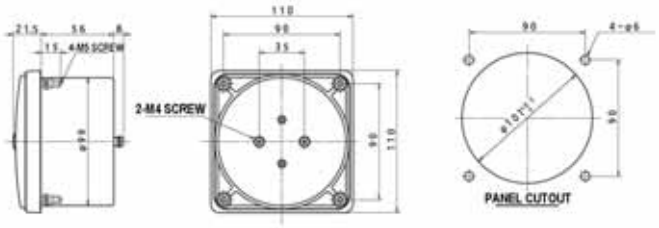


Ammeter with **External CT**

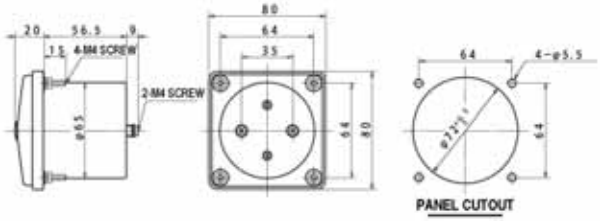


■ DIMENSIONS

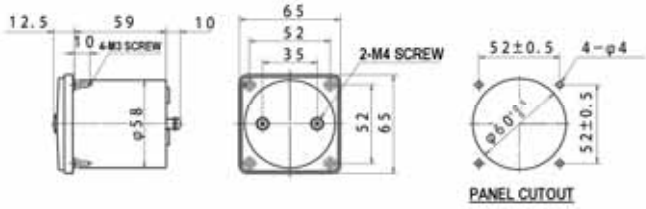
L-110C



L-80C



L-65C



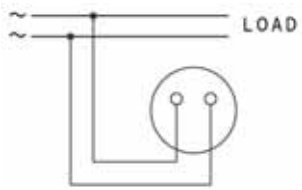
2. VOLTMETER

Max. ScaleValue	Approx. VA Consumption		Attachment (Series Resistor)
	SL-110C	SL-80C, 65C	
50V 100V 150V 300V 600V	8VA	8VA	SL-80C,SL-65C: DM-41
600/150V ～ 550k/150V	8VA	8VA	

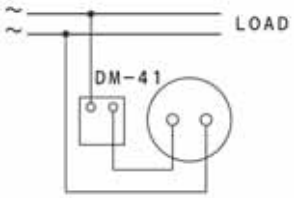
► **For** any max. scale value exceeding 600V, please use a 150V meter together with an external transformer for meter.
► **Meter** for SCR waveform input (distortion waveform) can be manufactured as well. (With H at the end of type name)
Type name: **SL-110CH**

■ CONNECTION DIAGRAM

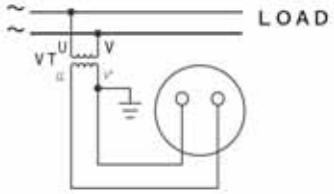
Voltmeter



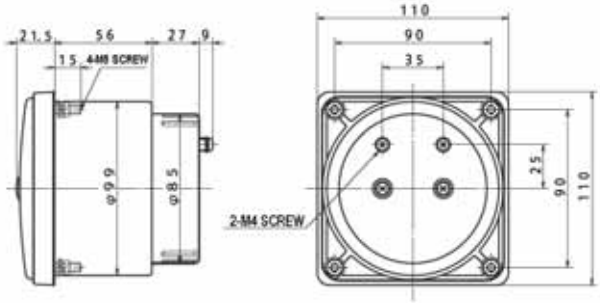
Voltmeter with **External Series Resistor**



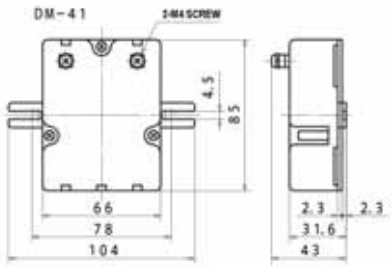
Voltmeter with **External VT**



■ DIMENSIONS



■ DIMENSIONS (DM-41)



FREQUENCY METER / POWER FACTOR METER (TRANSDUCER TYPE) **AL PL**

1. FREQUENCY METER

Rated Voltage	Measurement Range	Approx. VA Consumption		Attachment (transducer)
		AL-110NC, 80NC	AL-65C	
110V	45~55Hz 55~65Hz 45~65Hz* 350~450Hz*	1.5VA	1.7VA	AL-65C: FT-62M
220V	45~55Hz 55~65Hz 45~65Hz* 350~450Hz*	1.5VA	2.5VA	

* Class 1.0

► **Meter** of special frequency range can be manufactured as well (up to 1000Hz)

► **Meter** for SCR waveform input (distortion waveform) can be manufactured as well. (With H at the end of type name)
Type name: **AL-110CH**

► **Applicable** voltage range: 90~130V for 110V; 180~260V for 220V.

► **Rated** voltage and applicable voltage range other than those above can be manufactured. Have a consultation with us.

2. POWER FACTOR METER

Application	Type	Rating	Approx. VA Consumption		Attachment (transducer)	
			Voltage side	Current side	80C	65C
Single phase	**PL-110NC-12** **80NC-12** **65C-12**	110V, 5A(1A) 220V, 5A(1A)	0.6VA 1.2VA	0.9VA 0.9VA	-	PT-62M-12
3-phase (balanced)	**PBL-110NC33** **80NC33** **65C33**	110V, 5A(1A) 220V, 5A(1A)	0.6VA each phase 1.2VA each phase	0.9VA each phase 0.9VA each phase	-	PBT-62M-33
3-phase (unbalanced)	**PL-110NC-33** **80C-33** **65C-33**	110V, 5A(1A) 220V, 5A(1A)	1.9VA each phase 4.0VA each phase	1.1VA each phase 1.1VA each phase	PT-53MC-33	PT-63M-33
3-phase 4-wire (unbalanced)	**PL-110NC-34** **80C-34** **65C-34**	110/√3V,5A(1A) 220/√3V,5A(1A)	0.8VA each phase 2.5VA each phase	1.1VA each phase 1.1VA each phase	PT-53MC-34	PT-64M-33

► **Except** meter for balanced 3 phase circuit, specify please the frequency either 50Hz or 60Hz.

► **Standard** scale is Lead0.5~1~Lag0.5. Lead0~1~Lag0 (effective measuring range: Lead0.3~1~Lag0.3) is only available for 3-phase 3-wire.

► **In** the case of rating exceeding those above, use an 110V, 5A (1A) meter together with a CT or a VT respectively.

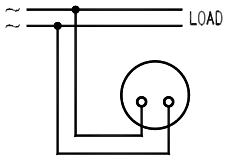
► **Applicable** voltage range: 90~130V for 110V; 180~260V for 220V.

► **Please** use the meter in positive phase sequence. (Sine waveform)

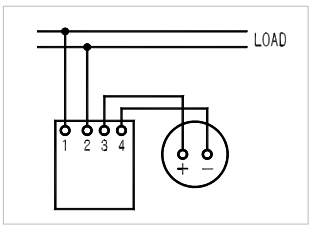
► **Voltage** side consumption VA of PL-65 is max. 2VA.

■ CONNECTION DIAGRAM

Frequency Meter

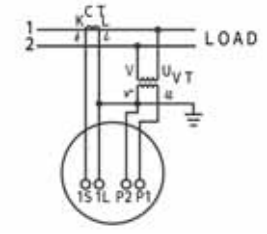


Frequency Meter with **External FT-62M**

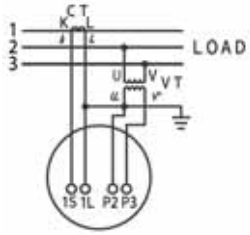


L-110C

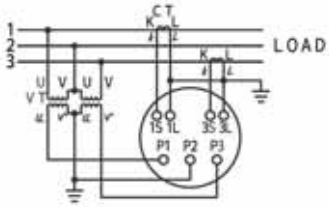
Single Phase Power Factor Meter



3-phase 3-wire
Power Factor Meter (balance)

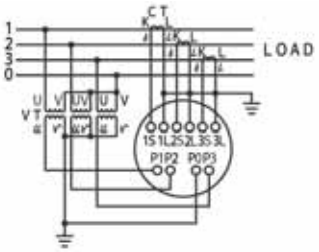


3-phase 3-wire
Power Factor Meter (unbalance)



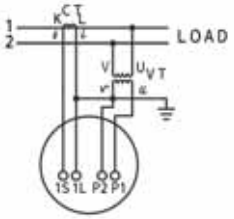
L-110C

3-phase 4-wire
Power Factor Meter

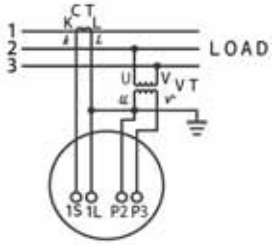


L-80C

Single Phase
Power Factor Meter

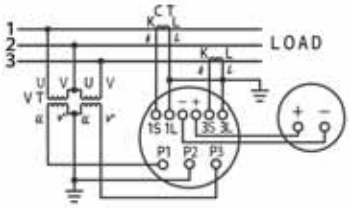


3-phase 3-wire
Power Factor Meter (unbalance)

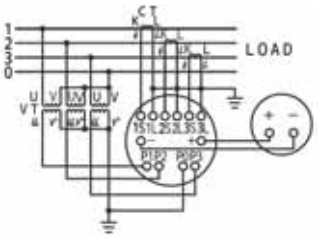


L-80C

3-phase 3-wire
Power Factor Meter (unbalance)
with External PT-53MC-33

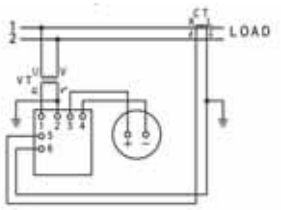


3-phase 4-wire
Power Factor Meter (unbalance)
with External PT-53MC-34



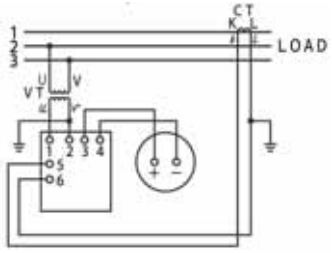
L-65C

Single Phase Power Factor Mete
External PT-62M-12

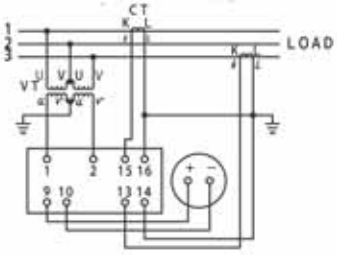


L-65C

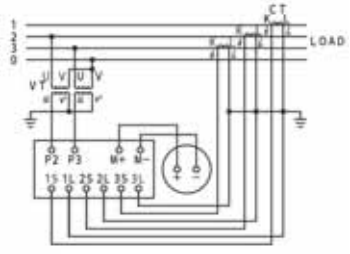
3-phase balanced balanced
Power Factor Meter
with External PBT-62M-33



3-phase balanced unbalanced
Power Factor Meter
with External PT-63M-33



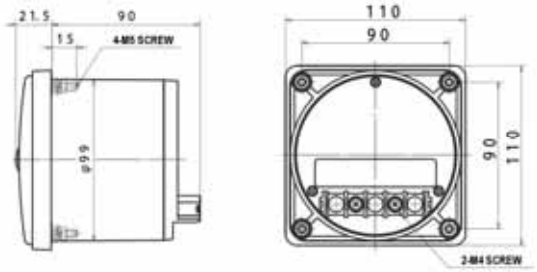
3-phase 4-wire unbalanced
Power Factor Meter
with External PT-64M-34



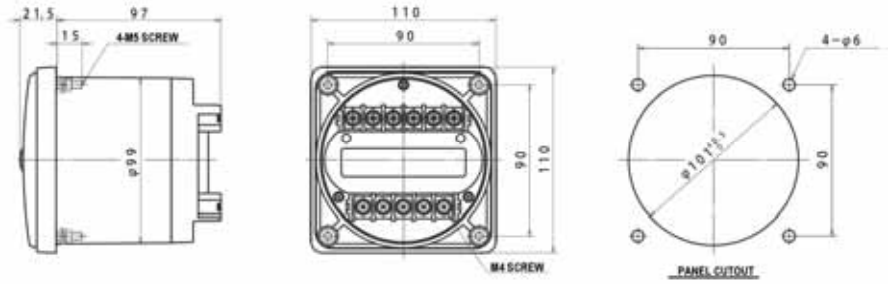
■ DIMENSIONS

L-110NC

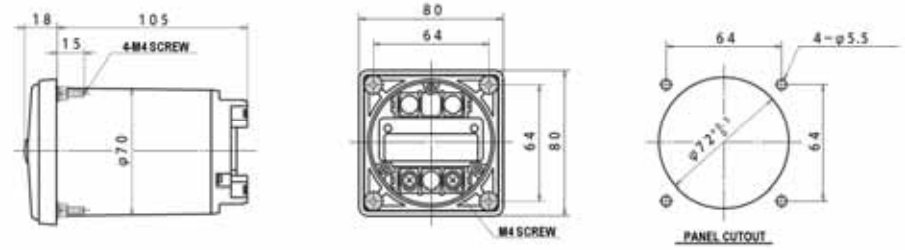
AL-110NC / PBL-110NC



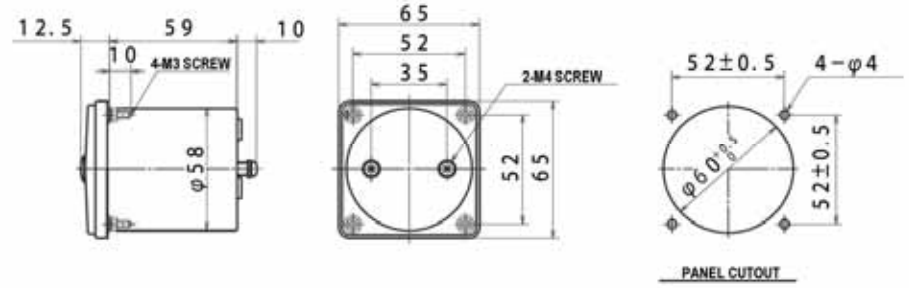
PL-110NC



L80C / L-80NC



L-65C



WATT METER / VAR METER (TRANSDUCER TYPE) **WL WVL**

1. WATT METER

Application	Type	Rating	Approx. VA Consumption		Attachmen (transducer)	
			Voltage side	Current side	80C	65C
Single phase	**WL-110NC-12** **80C-12** **65C-12**	110V, 5A(1A) 220V, 5A(1A)	1.7VA 3.7VA	0.5VA 0.5VA	WT-53MC-12	WT-62M-12
Single phase 3-wire	**WL-110NC-13** **80C-13** **65C-13**	110V, 5A(1A)	1.7VA each phase	0.5VA each phase	WT-53MC-13	WT-83M-13
3-phase 3-wire	**WL-110NC-33** **80C-33** **65C-33**	110V, 5A(1A) 220V, 5A(1A)	1.7VA each phase 3.7VA each phase	0.5VA each phase 0.5VA each phase	WT-53MC-33	WT-83M-33
3-phase 4-wire	**WL-110NC-34** **80C-34** **65C-34**	110/√3V, 5A(1A) 220/√3V, 5A(1A)	0.8VA each phase 2.5VA each phase	0.5VA each phase 0.5VA each phase	WT-53MC-34	WT-83M-34

► **3**-phase 4-wire is voltage balancing.
► **In** the case of rating exceeding those above, use an 110V, 5A (1A) meter together with a CT or a VT respectively.
► **Applicable** voltage range: 90~130V for 110V; 180~260V for 220V.

2. VAR METER

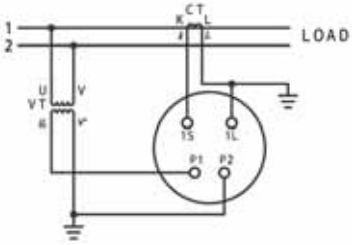
Application	Type	Rating	Approx. VA Consumption		Attachment (transduecer)	
			Voltage side	Current side	80C	65C
Single phase	**WVL-110NC-12** **80C-12** **65C-12**	110V,5A(1A) 220V,5A(1A)	1.7VA 1.4VA	0.5VA 0.5VA	WVT-53MC-12	WVT-62M-12
3-phase 3-wire	**WVL-110NC-33** **80C-33** **65C-33**	110V,5A(1A) 220V,5A(1A)	1.7VA each phase 3.7VA each phase	0.5VA each phase 0.5VA each phase	WVT-53MC-33	WVT-83M-33
3-phase 4-wire	**WVL-110NC-34** **80C-34** **65C-34**	110V,5A(1A) 220V,5A(1A)	1.7VA each phase 3.7VA each phase	0.5VA each phase 0.5VA each phase	WVT-53MC-34	WVT-83M-34

► **3**-phase 4-wire is voltage balancing.
► **Specify** please the frequency either 50Hz or 60Hz for a meter for single phase circuit.
► **The** scale of var meter is Lead□var~0~Lag□var.
► **In** the case of rating exceeding those above, use an 110V, 5A (1A) meter together with a CT or a VT respectively.
► **Applicable** voltage range: 90~130V for 110V; 180~260V for 220V.
► **3**-phase 3-wire and 3-phase 4-wire are voltage balanced, use in positive phase sequence, please.

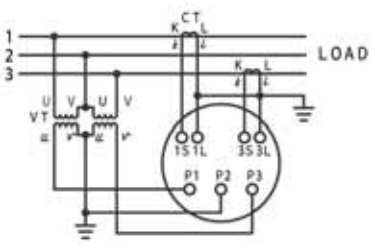
■ CONNECTION DIAGRAM

L-110NC

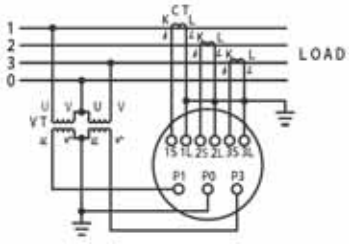
Single Phase Watt Meter / Var Meter



Single Phase 3-Wire &
3-phase 3-wire Watt Meter/ Var Meter

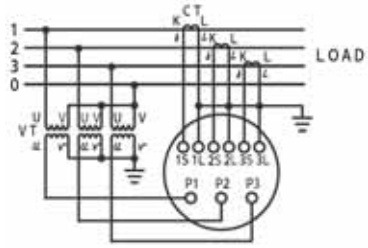


3-phase 4-wire Watt Meter



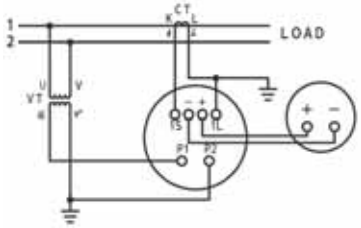
L-110NC

3-phase 4-wire Var Meter

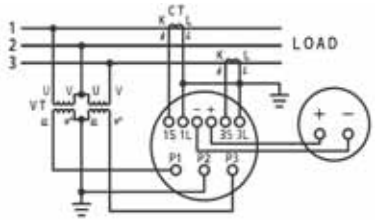


L-80C

Single Phase Watt Meter/ Var Meter with External WT (WVT)-53MC-12

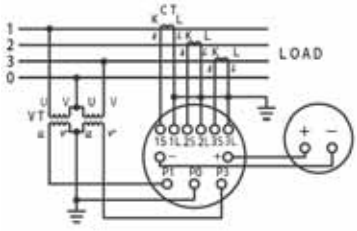


Single Phase 3-wire & 3-phase 3-wire Watt Meter/ Var Meter with External WT (WVT)-53MC-33

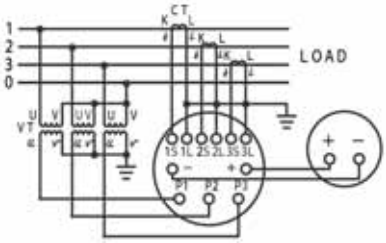


L-80C

3-phase 4-wire Watt Meter with External WT-53MC-34

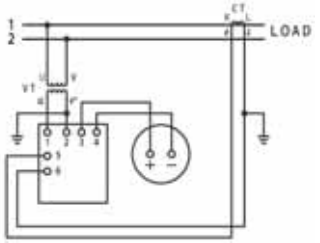


3-phase 4-wire Var Meter with External WVT-53MC-34



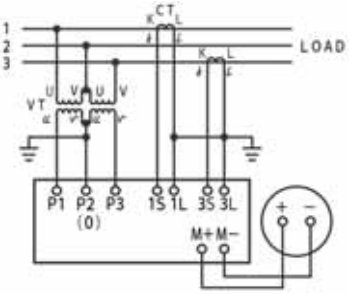
L-65C

Single Phase Watt Meter/ Var Meter with External WT (WVT)-62M-12

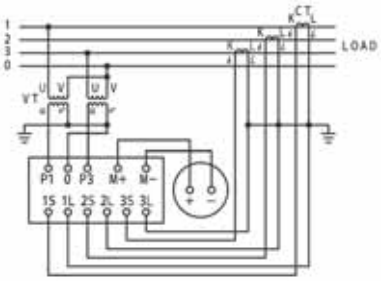


L-65C

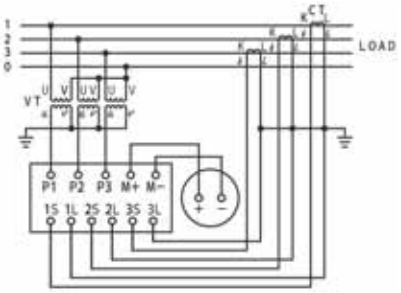
Single Phase 3-Wire Watt Meter/Var Meter, 3-phase Watt Meter/Var Meter with External WT (WVT)-83M-33



3-phase 4-wire Watt Meter with External WT-53MC-34

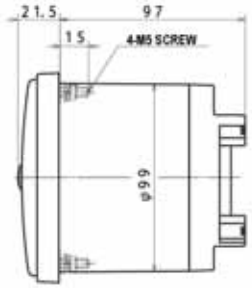


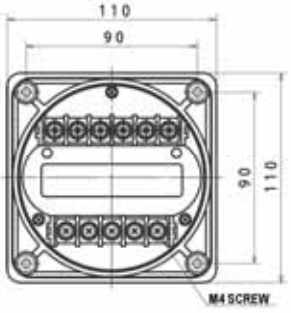
3-phase 4-wire Var Meter with EXTERNAL WVT-83M-34

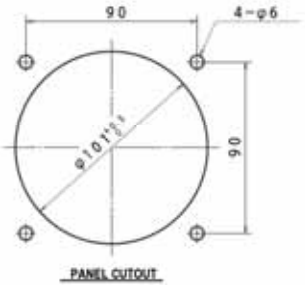


■ DIMENSIONS

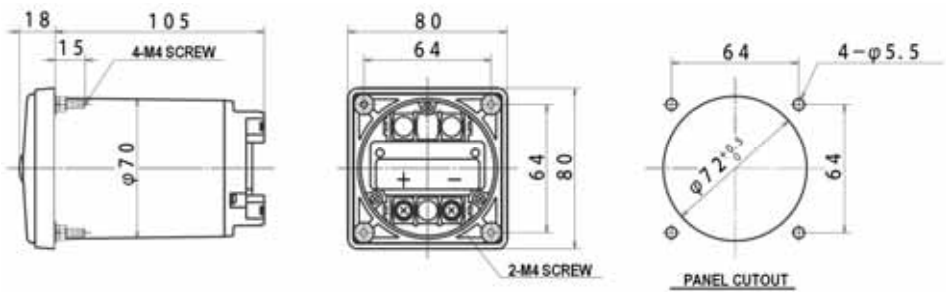
L-110NC



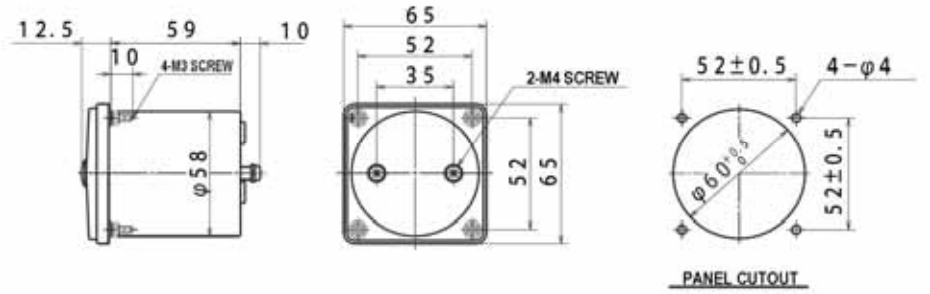




L-80C



L-65C



■ MANUFACTURABLE CHARACTERISTIC RANGE OF MAXIMUM SCALE VALUE

The characteristic ranges of maximum scale value listed in the table can be manufactured. However, in the case of a meter with external VT / CT, the characteristic ranges of maximum scale value can be calculated with the following formula.

$$\textbf{Characteristic range of maximum scale value} = \frac{\textbf{Maximum Scale Value}}{\textbf{(VT ratio} \times \textbf{CT ratio)}}$$

Circuit	Rating			Manufacturable Characteristic Range	
				Watt Meter	Var Meter
Single phase	110V, 5A(1A)			350~ 600W (70-120W)	350~ 600var (70-120var)
	220V, 5A(1A)			700~1200W (140-240W)	700~1200var (140-240var)
Single phase 3-wire	110V, 5A(1A)			600~1200W (120-240W)	-
3-phase 3-wire	110V, 5A(1A)			600~1200W (120-240W)	600~1200var (120-240var)
	220V, 5A(1A)			1200~2400W (240-480W)	1200~2400var (240-480var)
3-phase 4-wire	Line	Phase	Current	-	-
	110V	110/√3V	5A(1A)	600~1200W (120-240W)	600~1200var (120-240var)
	220V	220/√3V	5A(1A)	1200~2400W (240-480W)	1200~2400var (240-480var)

WATT METER / VAR METER (TRANSDUCER TYPE) **WL WVL**

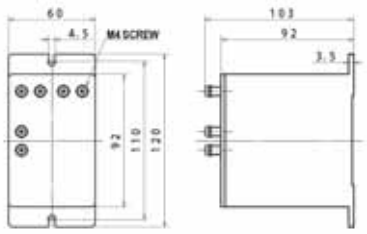
■ MAXIMUM SCALE VALUE OF 3 PHASE WATT METER

This table is the standard of 3-phase watt meter. 3-phase 4-wire and single-phase 3-wire watt meter, var meter are pursuant to this standard, too. Single phase watt meter values equal the values in the table multiplying 1/2.

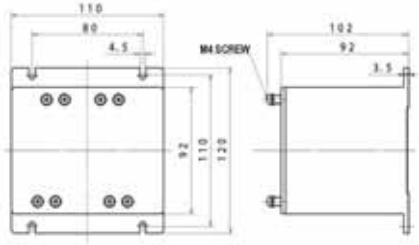
Line voltage / CT ratio	6600V (VT6600/110V)			3300V (VT3300/110V)			440V (VT440/110V)			220V			110V		
5/5A	kW 60	kW 50	kW 40	kW 30	kW 25	kW 20	kW 4	kW 5	kW 3	kW 2	kW 1.5	kW 1.2	kW 1	kW 0.8	kW 0.6
7.5/5A	90	75	60	45	40	30	6	5	4	3	2.5	2	1.5	1.2	1
10/5A	120	100	80	60	50	40	8	7.0	6	4	3	2.5	2	1.5	1.2
15/5A	200	150	120	100	75	60	12	10	8	6	5	4	3	2.5	2
20/5A	240	200	150	120	100	80	15	-	12	8	6	5	4	3	2.5
25/5A	300	250	200	150	120	100	20	-	15	10	8	7.5	5	4	3
30/5A	400	300	240	200	150	120	24	-	20	12	10	8	6	5	4
40/5A	480	400	300	240	200	150	30	-	24	15	12	10	8	7.5	5
50/5A	600	500	400	300	250	200	40	-	30	20	15	12	10	8	6
60/5A	750	600	480	400	300	240	48	-	40	24	-	20	12	10	8
75/5A	900	750	600	450	400	300	60	50	40	30	25	20	15	12	10
100/5A	1200	1000	800	600	500	400	80	75	60	40	30	25	20	15	12
150/5A	2000	1500	1200	1000	750	600	120	100	80	60	50	40	30	25	20
200/5A	2400	2000	1500	1200	1000	800	150	-	120	80	60	50	40	30	25
250/5A	3000	2500	2000	1500	1200	1000	200	-	150	100	80	75	50	40	30
300/5A	4000	3000	2400	2000	1500	1200	240	-	200	120	100	80	60	50	40
350/5A	4000	-	3000	2000	-	1500	300	250	200	150	120	100	75	60	50
400/5A	4800	4000	3000	2400	2000	1500	300	-	250	150	120	100	80	75	50
450/5A	6000	5000	4000	3000	2500	2000	400	300	250	200	150	120	100	75	60
500/5A	6000	5000	4000	3000	2500	2000	400	-	300	200	150	120	100	75	60
600/5A	7500	6000	4800	4000	3000	2400	500	-	400	240	-	200	120	100	70
750/5A	9000	7500	6000	4500	4000	3000	650	500	400	300	250	200	150	120	100
800/5A	10MW	8000	7500	5000	-	4000	700	600	500	300	250	200	150	120	100
1000/5A	12MW	10MW	8000	6000	5000	4000	800	750	600	400	300	250	200	150	120
1200/5A	15MW	12MW	10MW	7500	6000	5000	1000	800	750	500	400	300	250	200	150
1500/5A	20MW	15MW	12MW	10MW	7500	6000	1200	1000	800	600	500	400	300	250	200

■ DIMENSIONS OF ATTACHMENT TRANSDUCER

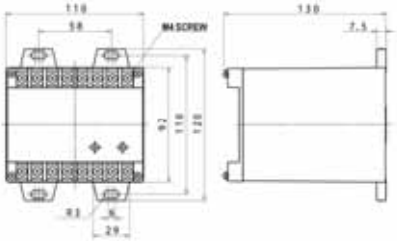
□T-62M□-□



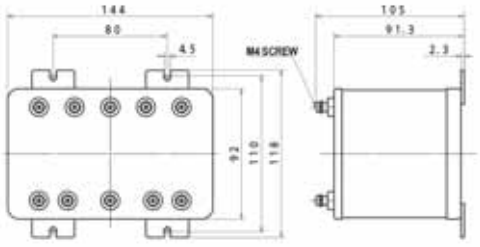
PT-63M-33



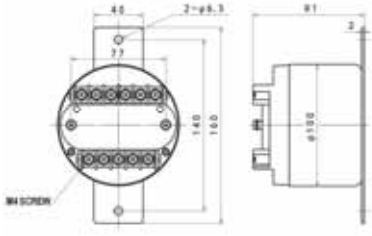
□T-83M-□



□T-64M-□



□T-53MC-□



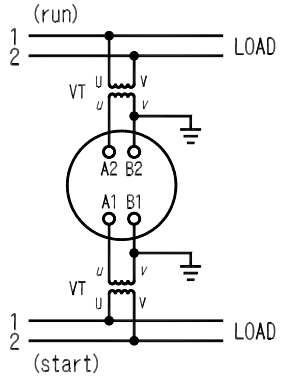
1. SYNCHROSCOPE METER

Method	Type	Rated Voltage	Rated Frequency	Approx. Consumption VA	
				Start side	Bus side
Single phase	**DL-110ND-12**	110V	Serve 50Hz & 60Hz	0.2VA	4.0VA
3-phase	**DL-110ND-33**	110V	Serve 50Hz & 60Hz	0.4VA each phase	4.0VA
		220V	Serve 50Hz & 60Hz	0.4VA each phase	4.0VA

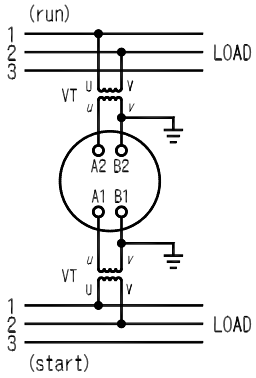
► In the case of rating exceeding those above, use an 110V meter together with an external CT.

■ CONNECTION DIAGRAM

Single Phase
DL-110ND-12

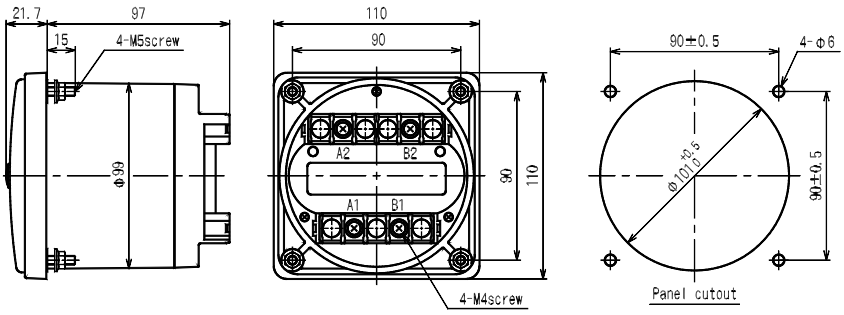


3-phase
DL-110ND-33



■ DIMENSIONS

Single phase **DL-110ND-12** 3-phase **DL-110ND-33**



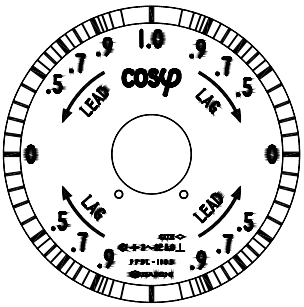
POWER FLOW 3 PHASE POWER FACTOR METER (TRANSDUCER TYPE) **FPDL**

1. POWER FACTOR METER

Method	Type	Rated Voltage	Rated Frequency	Auxiliary supply	Approx. Consumption VA		
					Voltage side	Current side	Aux.supply
3-phase	**FPDL-110D-33**	110V, 5A(1A)	50Hz	AC110V AC220V DC110V	P1-P2 6.5VA; 3.5VA for with aux.supply	1VA or less each	AC 3VA DC4.5VA In the case of with aux. supply
			60Hz				
		220V, 5A(1A)	50Hz				
			60Hz				

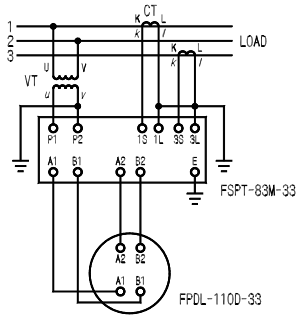
► **Specify** the frequency either 50Hz or 60Hz.
► **In** the case of rating exceeding those above, use a 110V, 5A (1A) meter together with a CT or a VT respectively.
► **Please** use the meter in positive phase sequence.
► **For s**tandard scale, upper part shows receiving power and under part shows power transmission. Please specify if using in the reverse case.

■ SCALE BOARD

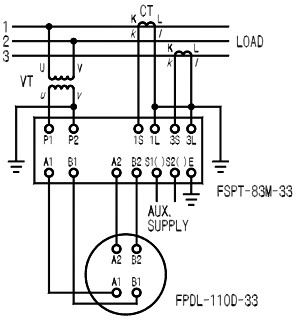


■ CONNECTION DIAGRAM

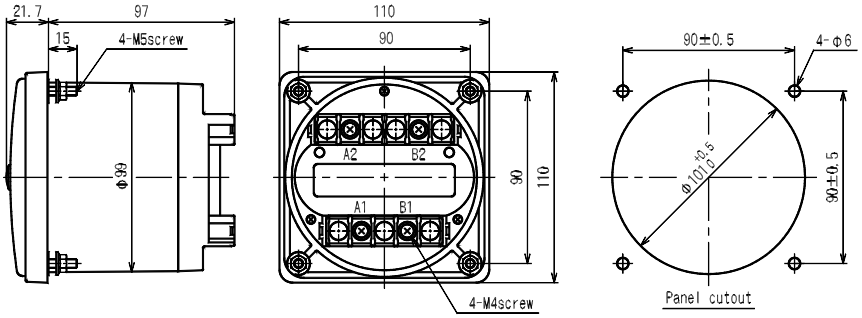
(1) Without Aux. Supply (Supplied by Input Voltage)



(2) With Aux. Supply

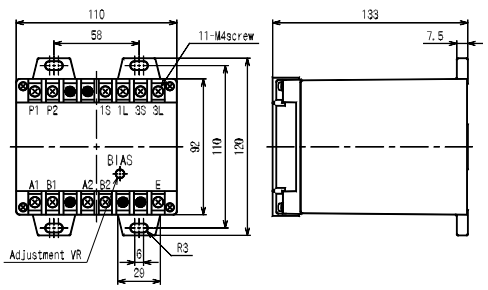


■ DIMENSIONS

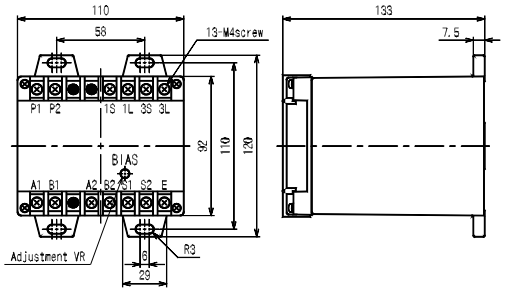


ATTACHMENT TRANSDUCER (FSPT-83M-33)

(1) Without Aux. Supply (Supplied by Input Voltage)



(2) With Aux. Supply



► **At** the time of installation, select a place with less mechanical shock, dust and corrosive gas, a place free from the affection of electromagnetic field of a heavy current bus or a saturable reactor nearby.

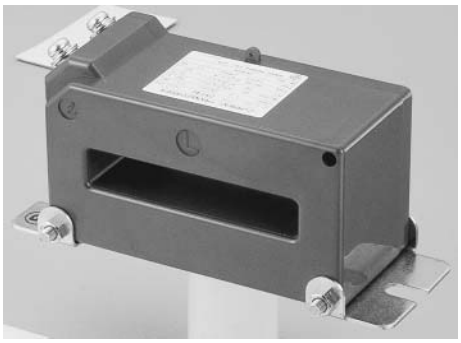
Instrument Accessory

Current Transformers (CT) & Voltage Transformers (VT)

It is possible to measure a large current by combine with 5A or 1A current transformer.

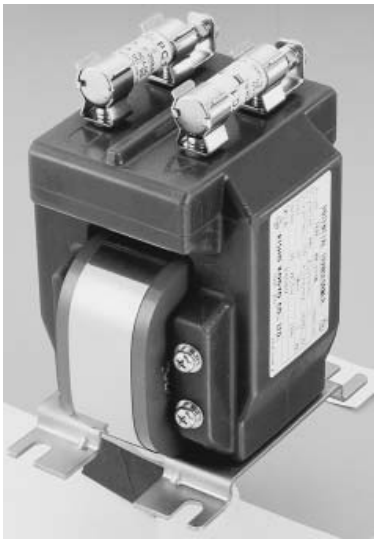
Circle Window Type & Square Window Type for use depending on the magnitude of the current.

It is possible to measure a large voltage by combine with 110V voltage transformer.



FEATURES

► High reliability & high performance current transformer.
Compliance with:
JIS C-1731-1 Standard Instrument current transformer &
JED-1201 Standard Instrument voltage transformer.
Class: 1.0
Tolerance:±1.0%



►Depend on the intended use, we have few selections for current transformer & voltage transformer like mold type or dry open type can be choice.

Specification List for Current Transformers (CT) & Voltage Transformers (VT)

Instrument Transformers

- JIS C 1731-1 standard for Current Transformer & JEC-1201 standard for Voltage Transformer
- Instrument transformer have few selections depend on the intended use like mold type or dry open type etc.
- Low voltage transformer wiring work is easy & compact.

List of Current Transformers

Max. circuit voltage (V)	Construction	Insulated system	Type Name	Primary current (A)	Secondary current (A)	Rated burden (VA)	Class	Frequency (Hz)	Over current (Times)	weight (kg)
Below 1,150	Circle Window	ABS resin	CPI–1TR	5~30	5	1	1.0	50/60	40	0.5
		Epoxy resin Mould ABS coated	CR2–5	10~750	5	5	1.0	50/60	40	0.8
			CR2–15	10~750	5	15	1.0	50/60	40	0.7
			CR2–40	20~750	5	40	1.0	50/60	40	0.9
	Square Window	Epoxy resin Mould ABS coated	CS1–15	200~750	5	15	1.0	50/60	40	1.2
			CS1–40	200~2,000	5	40	1.0	50/60	40	1.1
	Primary Winding	ABS resin	CPX–15	5~30	5	15	1.0	50/60	40	0.75
		Epoxy resin Mould ABS	CM1-15	5~30	* 5	15	1.0	50/60	40	1.8

※2017.1.31. CPI-1TR: Discontinued Production

※2017.1.31. CPX-15: Discontinued Production

- Product with mark * can be manufacture by secondary current 1A.

List of Voltage Transformers

Max. circuit voltage (V)	Construction	Insulated system	Type Name	Primary current (A)	Secondary current (A)	Rated burden (VA)	Class	Frequency (Hz)	AC Withstand voltage	weight (kg)
Below 230	Winding Type	Dry opening type	PDI–1	220	110	15	1.0	50/60	2kV, 1 min	2.2
						50				3.6
Below 460				440					3kV, 1 min	
						100				6.5
Below 460	With a fuse	Epoxy resin mould	RP–111N	220	110	50	1.0	50/60	2kV, 1 min	5.0
				440					3kV, 1 min	
			RP–112N	220	110	100	1.0	50/60	2kV, 1 min	6.0
				440					3kV, 1 min	
			RP–113N	220	110	200	1.0	50/60	2kV, 1 min	8.5
				440					3kV, 1min	

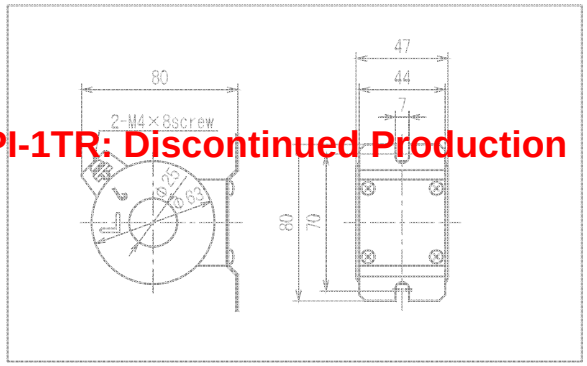
Circle Window Type (Below 1,150V)

Insulated System	Type Name	Primary current (A)																						Secondary current	Rated Burden
		/	5	10	15	20	25	30	40	50	60	75	80	100	120	150	200	250	300	400	500	600	750	(A)	(VA)
ABS resin	CPI-1TR	*T	24	15	10	8													1	-	-	-	-	5	10
Epoxy resin ABS coated	CR2-5	*T	-	10	8	5	4	4	3	2	2	2	-	1	1	1	1	1	1	1	1	1	1	5	5
	CR2-15	*T	-	15	10	10	6	5	5	3	4	2	3	2	2	1	1	1	1	1	1	1	1	5	15
	CR2-40	*T	-	-	-	10	8	7	5	4	4	4	3	2	2	2	1	1	1	1	1	1	1	5	40

※2017.1.31. CPI-1TR: Discontinued Production

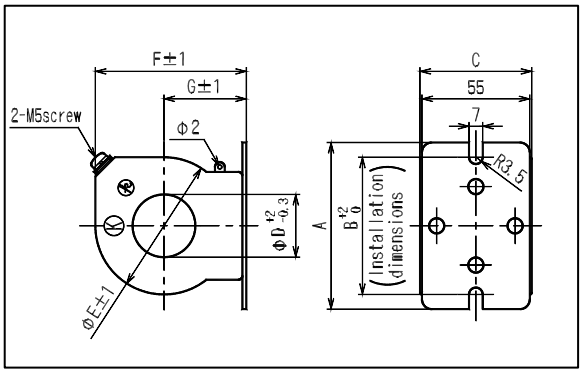
* T = Number of primary conductor penetration.

CPI-1TR 10VA



※2017.1.31. CPI-1TR: Discontinued Production

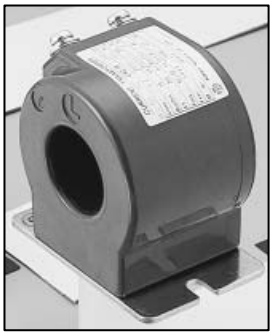
CR2 – 5

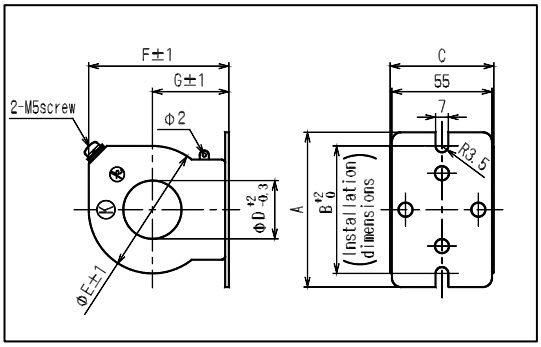


Primary Current (A)	A	B	C	ΦD	ΦE	F	G
10~200	85	70	57	23	61	70	37
240~400	85	70	55	32	70	77	42
500~750	100	85	57	50	86	93	50

Circle Window Type (Below 1,150V)

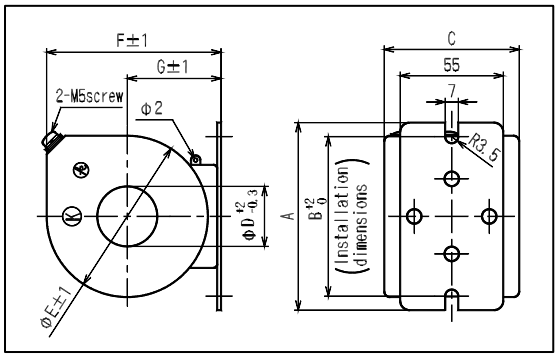
CR2 – 15





Primary Current (A)							A	B	C	ΦD	ΦE	F	G
10	15	25	30	50	75	150	100	85	57	25	76	83	45
60	80	120	240~400				85	70	55	32	70	77	42
20	40	100	200				100	85	55	32	70	77	42
500~750							100	85	57	50	86	93	50

CR2 – 40



Primary Current (A)	A	B	C	ΦD	ΦE	F	G
20~400	100	85	72	32	86	93	50
500~750	100	85	57	50	86	93	50

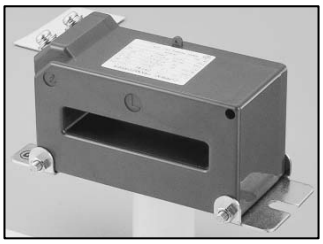
Current Transformers (CT)

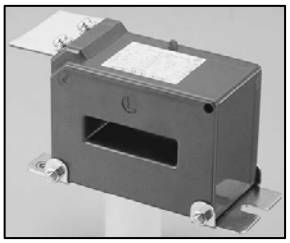
Square Window Type (Below 1,150V)

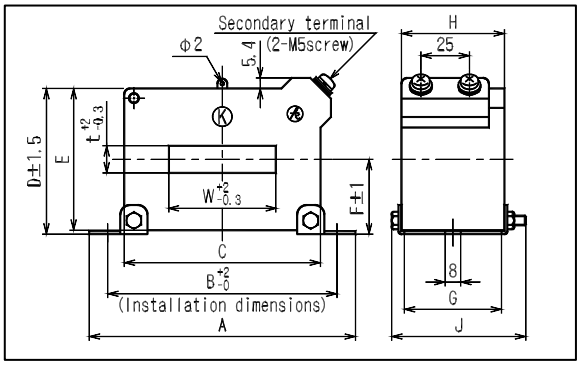
Insulated System	Type Name	Primary Current (A)	Secondary Current (A)	Rated Burden (VA)	A	B	C	D	E	F	G	H	J	W	t
Epoxy resin Mould ABS coated	CS1-15	200, 300, 400, 500	5	15	137	118	101	75	73	39	50	53	69	55	14
		600, 750			150	131	114	64	62	33	50	53	69	80	14
	CS1-40	200	5	40	163	144	130	107	104	55	65	68	84	55	14
		300,400,500			137	118	101	75	73	39	50	53	69	55	14
		600, 750			150	131	114	64	62	33	50	53	69	80	14
		1,000, 1,200, 1,500, 2,000			169	150	133	82	80	42	50	53	69	105	28

◆ Fitting metal for bus bar also available (Option onerous)

CS1–15, CS1–40





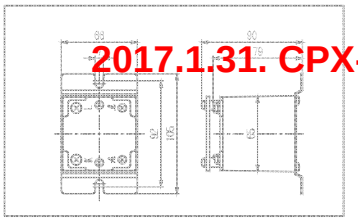


Primary Winding Type

CPX – 15

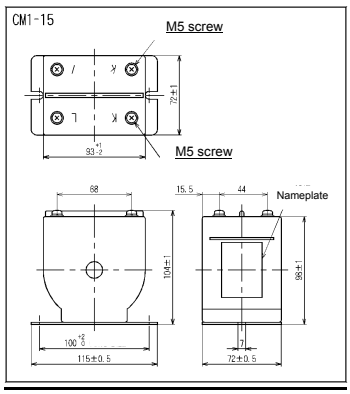
Insulated System	Type Name	Primary Current (A)	Secondary Current (A)	Rated Burden (VA)
ABS resin	CPX–15	5, 10, 15, 20, 30	5	15

2017.1.31. CPX-15: Discontinued Production



CM1-15

Insulated System	Type Name	Primary Current (A)	Secondary Current (A)	Rated Burden (VA)
Epoxy resin Mould ABS coated	CM1–15	5, 10, 15, 20, 30	5	15



Voltage Transformers (VT)

For low voltage Instrument use below 460V & 230V

1) Dry Open Type

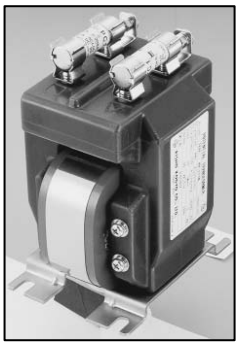
Type Name	Max. Circuit Voltage (V)	Primary Voltage (V)	Secondary Voltage (V)	Rated Burden (VA)	Dimension (mm)					
					A	B	C	A'	B'	D' (Attachment)
PDI – 1	230	220	110	15	100	90	110	70	75	6 × 15 cut
				50	120	100	125	74	85	7 × 15 cut
				100	135	130	140	84	105	7 × 15 cut
	460	440	110	15	100	90	110	70	75	6 × 15 cut
				50	120	100	125	74	85	7 × 15 cut
				100	135	130	140	84	105	7 × 15 cut

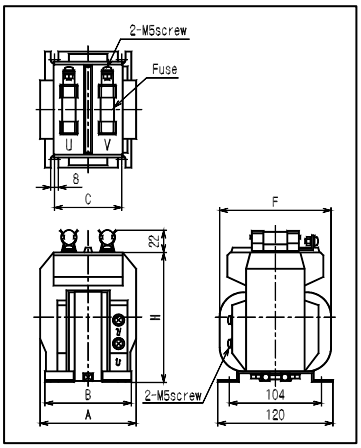
For below 460V

2) Epoxy Resin Mould

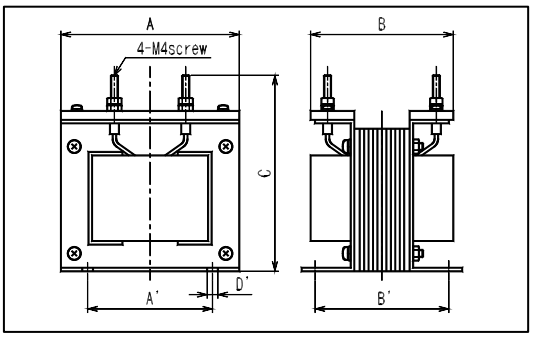
Type Name	Max. Circuit Voltage (V)	Primary Voltage (V)	Secondary Voltage (V)	Rated Burden (VA)	Dimension (mm)				
					A	B	C	F	H
RP-111N	460	220, 440	110	50	100	90	70	116	135
RP-112N				100	114	90	70	134	160
RP-113N				200	114	100	80	154	162

RP–111N, RP–112N, RP–113N





PDI–1



◆ **Item To Specify When make Purchase**

1) Type name
2) Primary current (voltage) / Secondary current (voltage)
3) Rated burden (VA)

Instrument Accessory

Direct Current Shunt & Resistor Series

SHUNT

Shunt is possible to combine with mill voltmeter for measuring a large current.

There are 2 types wire connection with insulating stand & bus bar connection can use depending on the magnitude of the current.

FEATURES

► High reliability & high performance shunt.
This product is compliance with:
JIS C-1721-1976 standard.
Class: 1.0
Tolerance: ±1.0%
►Continuous excitation current have set at 80% or less on the rated value.
► We have 2sets voltage terminal DSW type.
► Also have 3sets output terminal DST type for consideration of the heat dissipation and avoid rise in the temperature.

RESISTOR SERIES

External with resistor series is possible to combine with milliampere meter for measuring a large voltage.

FEATURES

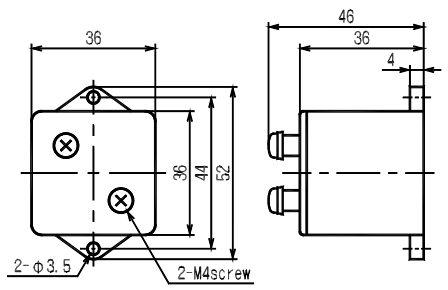
► High reliability & high performance resistor series.
► There are 7 types from DM-1 (750V) until DM-25 (25kV) can use depending on the magnitude of the voltage.
► DM-2～25 will built-in the measures against open resistor.

DC SHUNTS

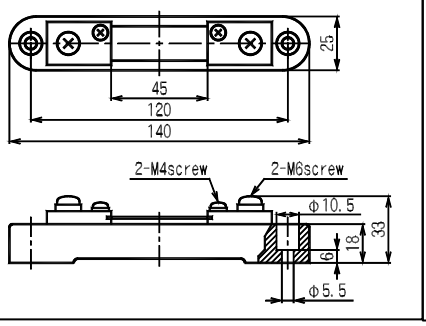
For DC Shunts

- Shunts type DS, DSW and DST is compliance with standard JIS (JIS C-1721-1976).
  Continuous excitation current is 80% or less of the range value.
  Please consultation with us when specification overload capacity or other is different.
- Standard for shunts terminal voltage is 60mV and 100mV, Please refer to diagram at below and specify it.
- Power consumption of shunt is (Current) X (Millivolt) which becomes larger in proportionality of the rated current.
- Please attach especially a large current shunt in consideration of radiation to make the minimize temperature rise of a resistor part.
- Please clamping enough the connection of the electric wire, so that contact resistance becomes small.
- Pay attention not to make a contact between current terminal and voltage terminal electrically to prevent error.

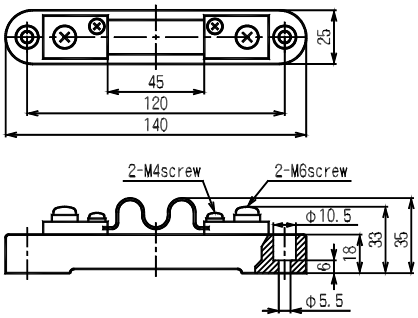
DM-1 10mA～4A 60mV, 100mV



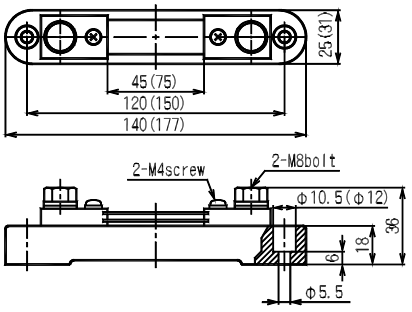
DS 5A～50A 60mV



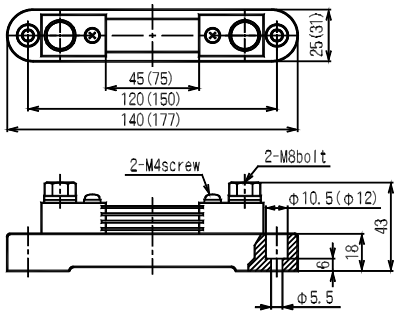
DS 5A～50A 100mV



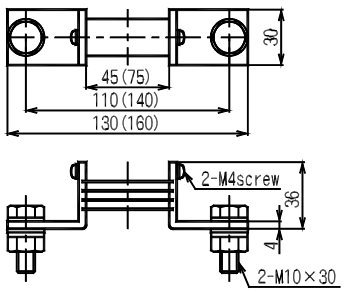
DS 60～100A 60mV (100mV)



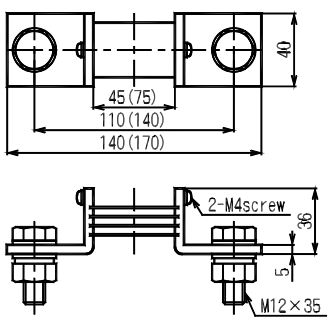
DS 120A～200A 60mV (100mV)



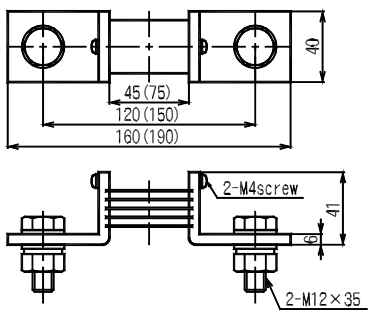
DS 225A～300A 60mV (100mV)



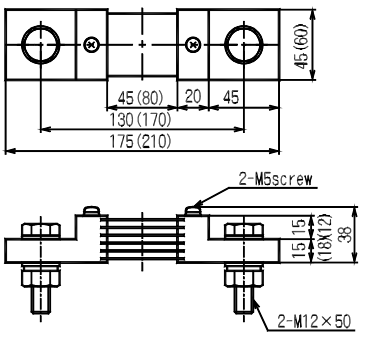
DS 350A～450A 60mV (100mV)



DS 500A～600A 60mV (100mV)

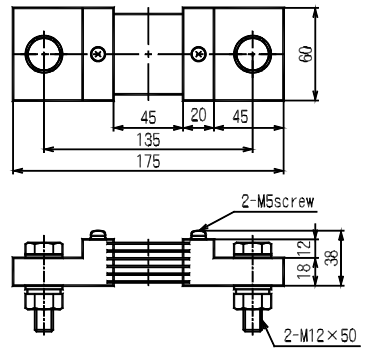


DS 750A 60mV (100mV)

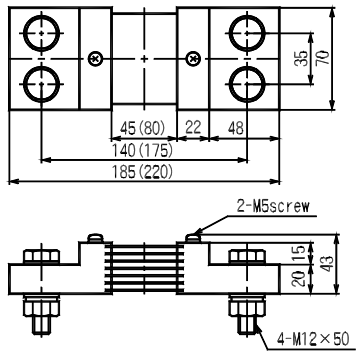


DS SHUNTS

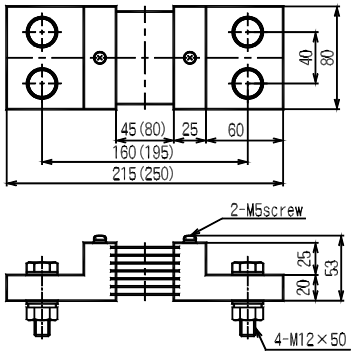
DS 1000A 60mV



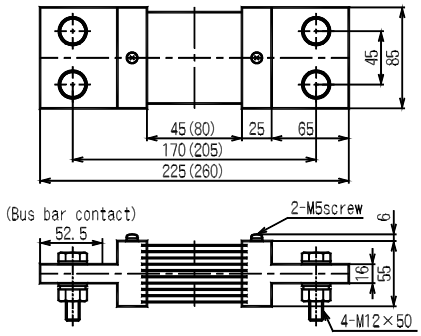
DS 1500A 60mV (1000A 100mV)



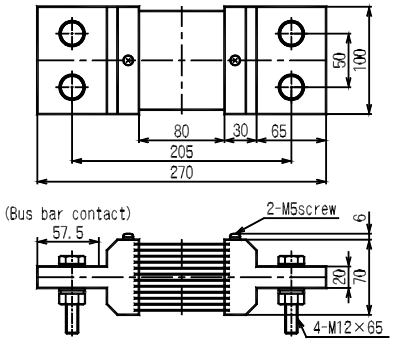
DS 2000A 60mV (1500A 100mV)



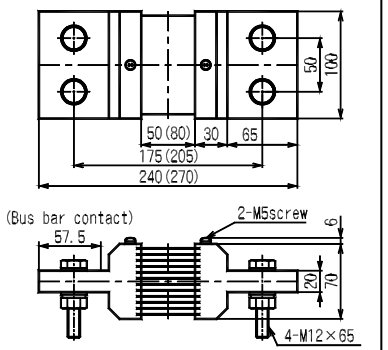
DS 2500A 60mV (2000A 100mV)



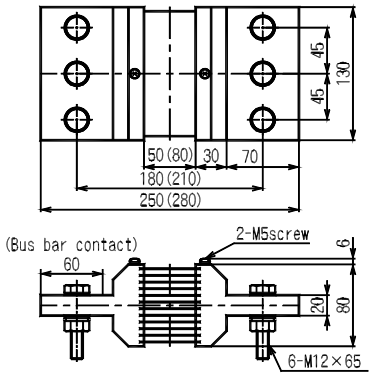
DS 2500A 100mV



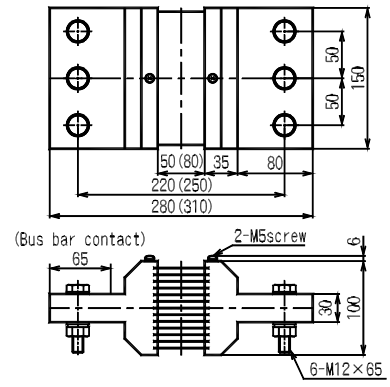
DS 3000A 60mV (100mV)



DS 4000A 60mV (100mV)



DS 5000A 60mV (100mV)



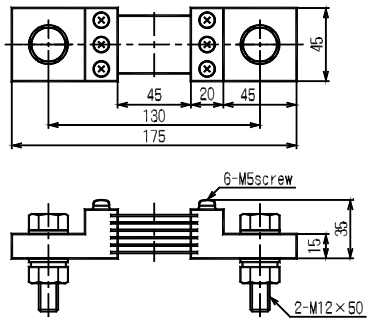
- Please consultation with us when 5000A is exceeding.
- Please inform us if the load resistance value is less then 900A (by our indication meter type name)
- Please specify the item as below when make order
  1) Type Name
  2) Input (A)/ output (mV)
  3) Option (with or without shunt stand etc.)

DS SHUNTS

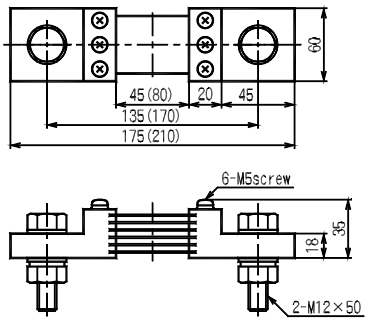
For DST Type Shunt

- Standard JIS C 1721-1976.
- Standard shunt terminal voltage is 60mV and 100mV, other voltage also can manufacture please request.
- There are 3 sets output terminal.
- Manufactured this product in consideration of the heat dissipation avoid rise in the temperature.

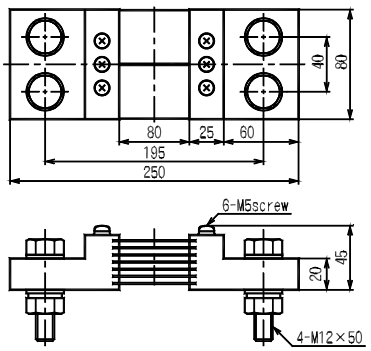
DST 750A 60mV



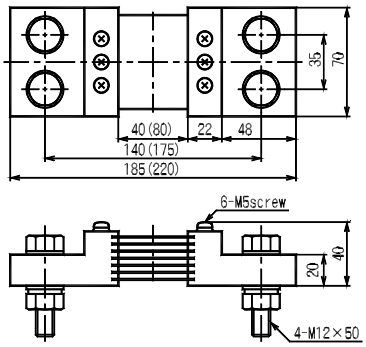
DST 1000A 60mV, (750A 100mV)



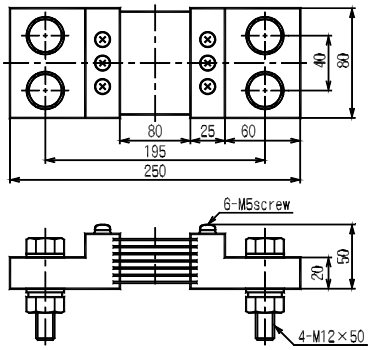
DST 1100A~1300A 100mV



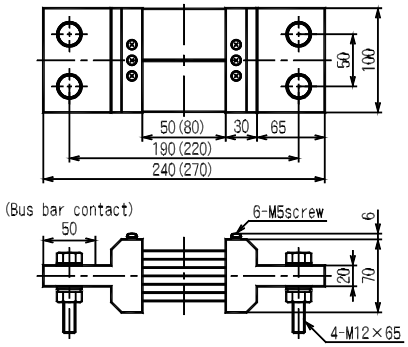
DST 1300A~1500A 60mV, (1000A 100mV)



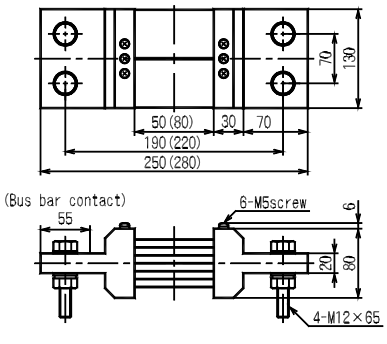
DST 1350A~1500A 100mV



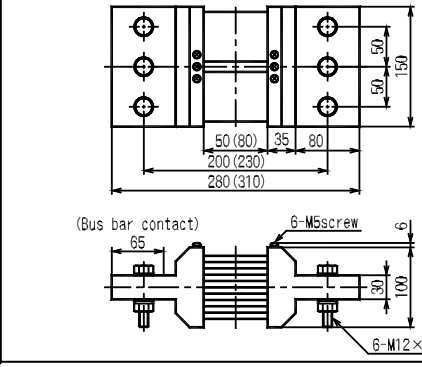
DST 2000A 60mV (100mV)



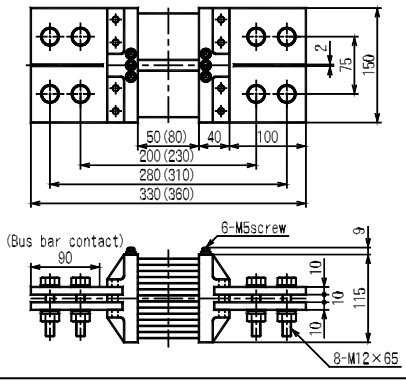
DST 2300A~3000A 60mV (100mV)



DST 3500A~4000A 60mV (100mV)



DST 4500A~5000A 60mV (100mV)

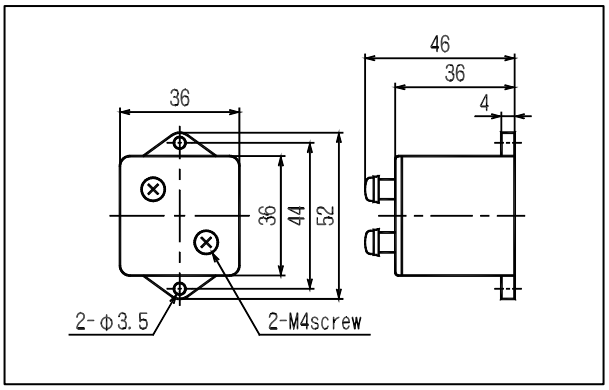


- Please consultation with us when 5000A is exceeded.

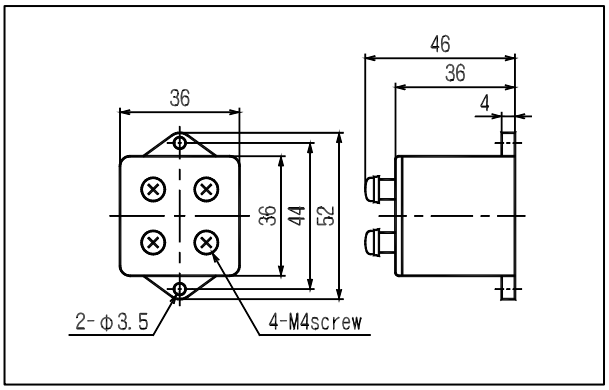
RESISTOR SERIES

External with Resistor Series

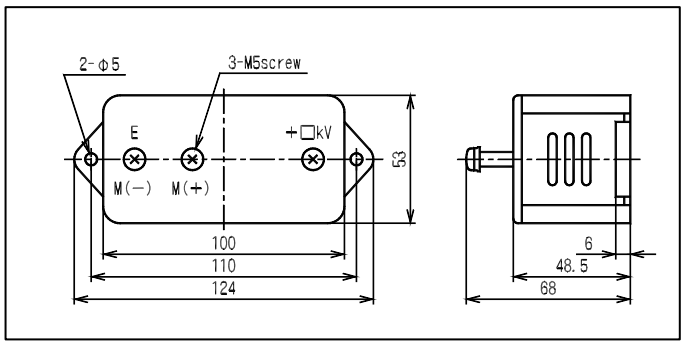
DM – 1 (Below 1000V)



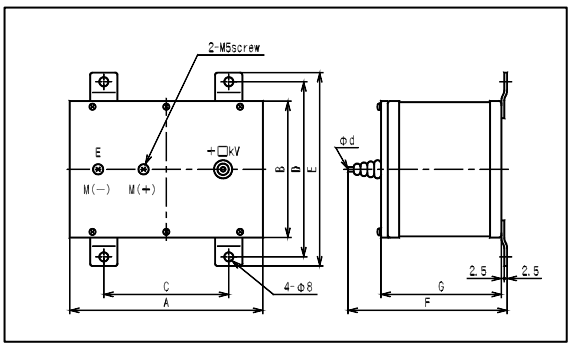
DM – 1T (Rectifier built in)



DM – 2 (Below 2500V)



DM – 5, 10, 15, 20, 25 (5～25kV)

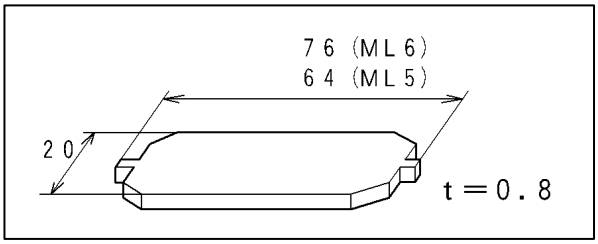


Type Name	Rated	A	B	C	D	E	F	G	d
DM – 5	5000V	170	120	110	154	170	140	106	4
DM – 10	10kV	220	160	140	194	210	140	106	4
DM – 15	15kV	290	210	200	248	264	190	146	5
DM – 20	20kV	390	260	300	294	310	220	176	5
DM – 25	25kV	500	330	400	356	372	280	236	5

OPTIONS

1. TERMINAL COVER FOR TYPE WIDE ANGLE L SERIES

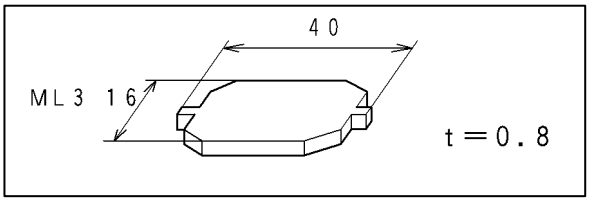
Terminal Cover for Type ML- 6 and ML- 5



Set into terminal block

Type Name	Units Required	
	ML-6	ML-5
ML-110C, YL-110C, XL-110C, CL-110C, AL-110C, PL-110NC-12, PBL-110NC-33, WL-110NC-12, WVL-110NC-12,	–	1
WL-110NC-33, 34 WVL-110NC-33, 34	1	1

Terminal Cover for Type ML- 3



Set into terminal block

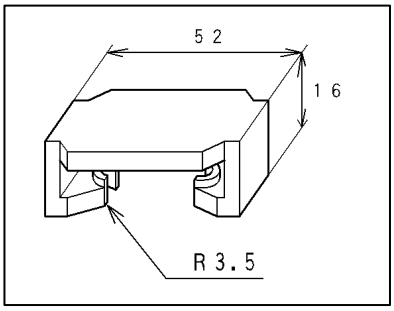
Type Name		Units Required		
		ML-6	ML-5	ML-3
ML-80C, YL-80C, XL-80C, CL-80C, AL-80C, PL-80C-12		–	–	1
WL-80C-12, 33, 34 Attach with transducer	WT-53MC-12	–	1	–
	WT-53MC-33	1	1	1
	WT-53MC-34 (1)	1	1	1
WVL-80C-12, 33, 34 Attach with transducer		–	–	1
	WVT-53MC-12	–	1	–
	WVT-53MC-33	1	1	1
	WVT-53MC-34 (2)	1	1	1
PL-80C-33, 34 Attach with transducer		–	–	1
	PT-53MC-33, 34	1	1	1

(1) For WT-53MC-34, use two OA-BCP3 made by OHM.

(2) For WVT-53MC-34, use two OA-BCP3 made by OHM.

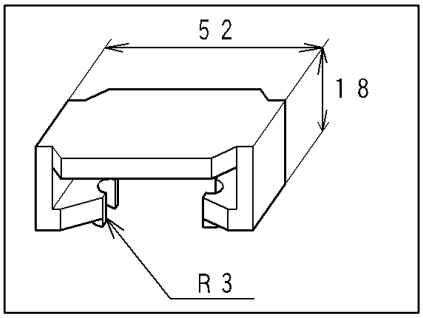
2. TERMINAL COVER FOR TYPE WIDE ANGLE L SERIES

Terminal Cover For Type SL



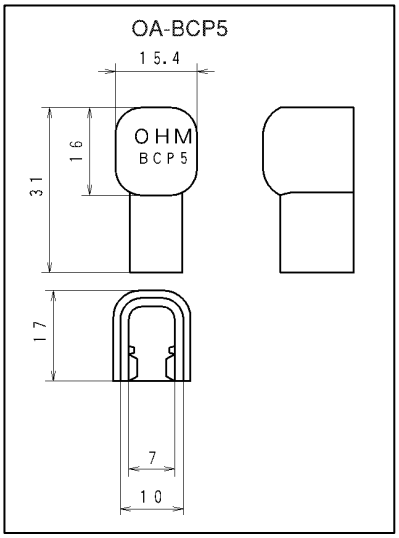
Set into terminal block

Terminal Cover For Narrow Angle

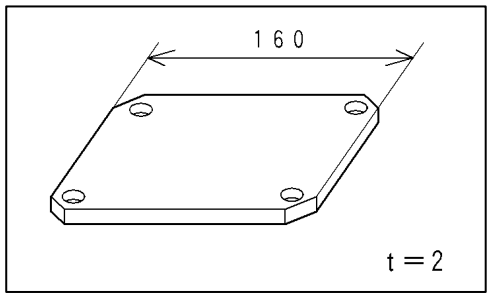


Type Name	Units Required	
	SL terminal cover	Narrow-angle terminal cover
SL-110C	1	-
SL-80C	1	-
□L-65C	-	1

3. TERMINAL COVER FOR TYPE WIDE ANGLE L SERIES



Set into terminal fitting



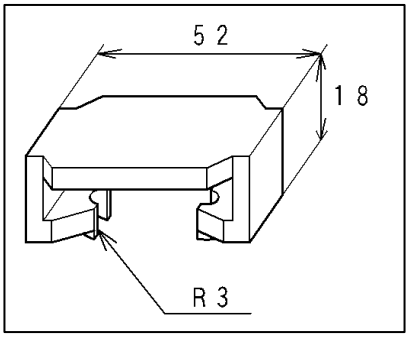
Multiplier covers for single phase Synchroscope meter (Cover: DMD-50)
Lock screw on pillar.

Type Name	Unit Required	
	OA-BCP5	Cover DMD-50
DL-110C-12	6	1
DL-110NC-33	5	-

***** Please specify cover DMD-50 when ordering. The meter shall be shipped with the cover fixed.

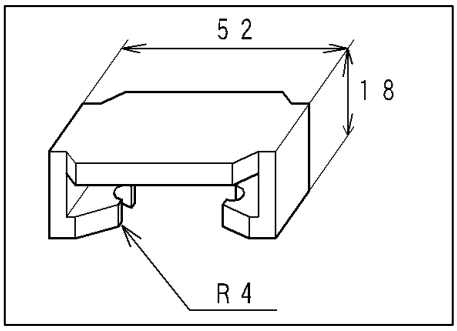
4. TERMINAL COVER FOR TYPE NARROW ANGLE METER COMMON

Narrow Angle Terminal Cover



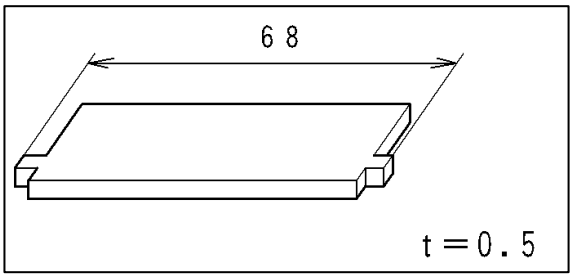
Set into terminal fitting

Hz Terminal Cover



Type Name	Measurement Element	Mark	Narrow Angle Terminal Cover	Hz Terminal Cover
			Units Required	
P□K-120C/ 100C/ 80C/ 60C (Except 120NC1, 100NC) L□K-12C/ 10C/ 8C (Except 12C, 10C, 8C) P□D-96 (Except P□D-96N) F□K-7/ 5 FAK-7C/ 5C PAD-96	DC Current / Voltage	M	2pcs terminal cover is necessarily for P□D-96 Series 2 Pointers type 1	-
	DC Receiving Indicator Meter	X		
	AC Receiving Indicator Meter	Y		
	AC Current / Voltage	S		
	AC Current / Voltage	C		
	AC Watthour Meter	W		
	AC Var Meter (balanced)	WVB		
	AC Var Meter (unbalanced)	WV		
	Power Factor (balanced)	PB		
	Power Factor (unbalanced)	P		
	Heat Electric Temperature	H		
	Heat Electric Temperature	HT		
	Revolutions (DC)	Z		
	Revolutions (AC)	V		
PAK-120C/ 100C/ 80C/ 60C LAK-12C/ 10C/ 8C/ 6C	Frequency	A	-	1

5. TERMINAL COVER FOR TYPE NARROW ANGLE PK/ LK INTERGRATED

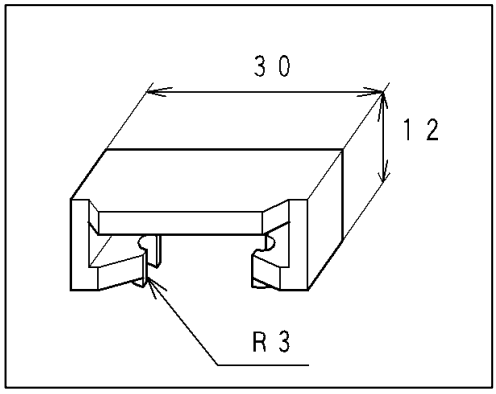


Set into terminal block

Meter Type	Units Required
	Kw Terminal Cover
P□K-□NC-□	1
L□K-□NC-□	

6. TERMINAL COVER FOR TYPE F SERIES

Terminal Cover For Type MF

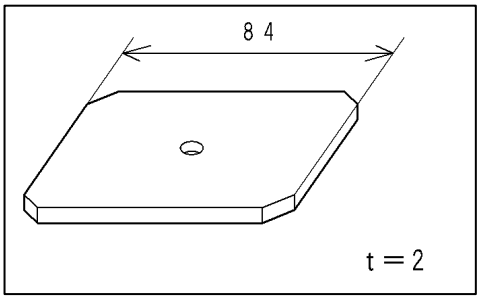


Type Name	Measurement Element	Mark	Units Required	
			1 Pointers	2 Pointers
□F – 17 □F – 15 □F – 10	DC Current/ Voltage	M	1	2
	DC Receiving Indicator Meter	X	1	2
	AC Receiving Indicator Meter	Y		
	AC Current/ Voltage	C		
	AC Watthour Meter	W		
	AC Var Meter (balanced)	WVB		
	AC Var Meter (unbalanced)	WV		
	Power Factor (balanced)	PB		
	Power Factor (unbalanced)	P		
	Frequency	A		
	Heat Electric Temperature	H		
	Heat Electric Temperature	HT		
	Revolutions (DC)	Z		
	Revolutions (AC)	V		

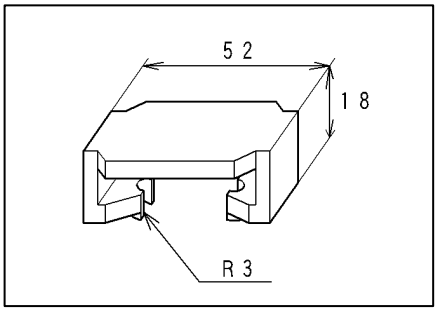
Use specify terminal cover or
OA-BCP3 for attachment transducer

7. TERMINAL COVER FOR TYPE PWD – 96

Terminal Cover For Tye PWD – 96



Narrow Angle Terminal Cover



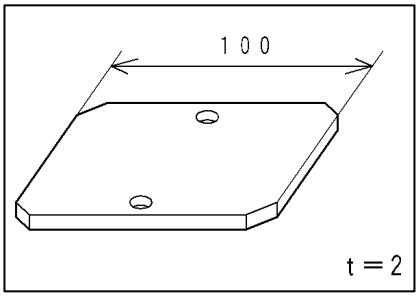
Please use nut to lock the meter stud.

Type Name	Measurement Element	Mark	Unit Required		
			Terminal Cover PWD-96	Narrow Angle Terminal Cover	
P□D-96N-□	Power	W	1	1 Pointer	2 Pointers
	Reactive Power	WV		-	-
	Power Factor (balanced)	P			
	Power Factor (unbalanced)	PB			
P□D-96-□-□	Power	W	-	1	1
	Reactive Power	WV			
	Power Factor (balanced)	P			
	Power Factor (unbalanced)	PB			

Use specify terminal cover or OA-BCP3 for attachment transducer

8. TERMINAL COVER FOR TYPE EL SE

Terminal Cover For Type EL

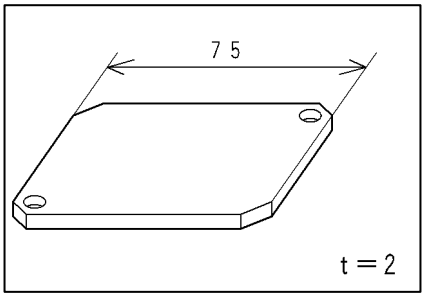


Lock screw on pillar.

Type Name	Measurement Element	Mark	Terminal Cover Type EL
			Units Required
Wide Angle Meter Relay □EL-110C EP Series Normal Angle Meter Relay (All-in-one Type Ralay Box) □EP-100NC/ 120NC EK Series Normal Angle Meter Relay (All-in-one Type Relay Box) □EK-12NC	DC Current/ Voltage	M	1
	DC Receiving Indicator Meter	X	
	AC Receiving Indicator Meter	Y	
	AC Current/ Voltage	S	
	AC Current/ Voltage	C	
	AC Watthour Meter	W	
	AC Var Meter (balanced)	WVB	
	AC Var Meter (unbalanced)	WV	
	Power Factor (balanced)	PB	
	Power Factor (unbalanced)	P	
	Frequency	A	
	Heat Electric Temperature	H	
	Heat Electric Temperature	HT	
	Revolutions (DC)	Z	
	Revolutions (AC)	V	

9. TERMINAL COVER FOR TYPE DM – 61

Terminal Cover For Type DM – 61



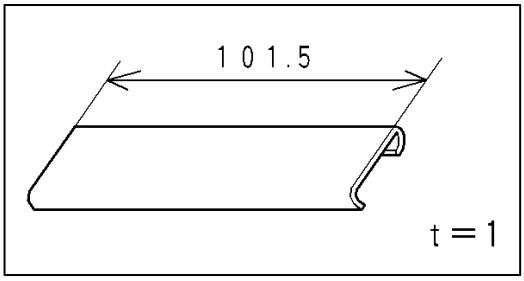
Lock screw on pillar.

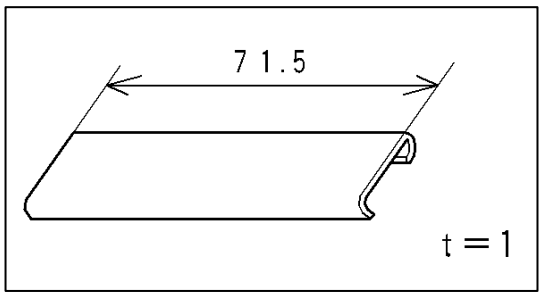
Attached Relay Box Type Name	Terminal Cover Type DM – 61
	Units Required
DM – 61	1

***** Please use EP/ EK series normal angle attached relay box for DM-61 terminal cover.

10. TERMINAL COVER FOR TYPE EF SERIES

Terminal Cover For EF Serise



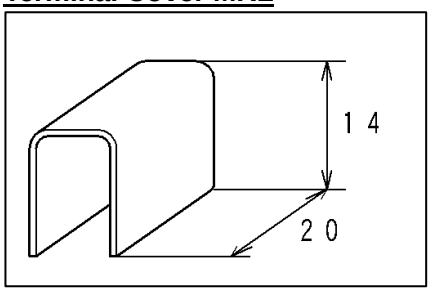


Type Name	Measurement Element	Mark	Terminal Cover For EF Series Units Required
□EF – 17 □EF – 15	DC Current/ Voltage	M	1
	DC Receiving Indicator Meter	X	
	AC Receiving Indicator Meter	Y	
	AC Current/ Voltage	S	
	AC Current/ Voltage	C	
	AC Watthour Meter	W	
	AC Var Meter (balanced)	WVB	
	AC Var Meter (unbalanced)	WV	
	Power Factor (balanced)	PB	
	Power Factor (unbalanced)	P	
	Frequency	A	
	Heat Electric Temperature	H	
	Heat Electric Temperature	HT	
	Revolutions (DC)	Z	
	Revolutions (AC)	V	

RTF – 15	-	1
RTF – 10	-	1

11. TERMINAL COVER FOR HIGHEST (LOWEST) INDICATOR METER

Terminal Cover MRL



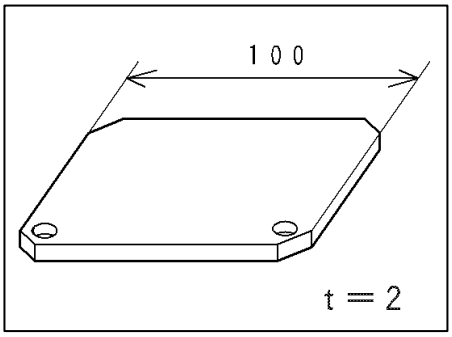
Set into terminal fitting

Type Name	Measurement Element	Mark	Terminal cover for MRL
Highest (Lowest) Indicator Meter □RL-110CH, 110CL, 110CHL □RL-80CH, 80CL, 80CHL	DC Current/ Voltage	M	2
	DC Receiving Indicator Meter	X	2 addition for electromagnetism return 2 addition for Aux. Power Supply
	AC Receiving Indicator Meter	Y	
	AC Current/ Voltage	S	
	AC Current/ Voltage	C	
	AC Watthour Meter	W	
	AC Var Meter (balanced)	WVB	
	AC Var Meter (unbalanced)	WV	
	Power Factor (balanced)	PB	
	Power Factor (unbalanced)	P	
	Frequency (Except PAK, LAK)	A	
	Heat Electric Temperature	H	
	Heat Electric Temperature	HT	
	Revolutions (DC)	Z	
	Revolutions (AC)	V	

* Please Use specify terminal cover or OA-BCP3 for attachment transducer

12. TERMINAL COVER FOR HIGHEST (LOWEST) INDICATOR (ALARM CONTACT)

Terminal Cover ERL

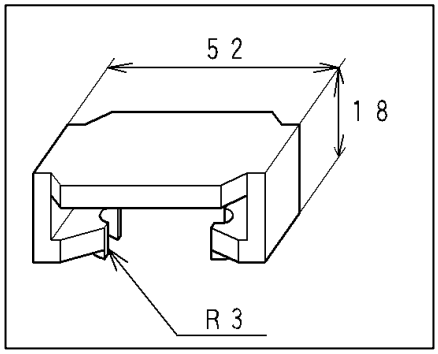


Lock by screw

Type Name	Measurement Element	Mark	Terminal cover for ERL
Highest (Lowest) Indicator Meter (Alarm Contact) □ERL-110C-H, 110C-L, 110C-HL	DC Current/ Voltage	M	1
	DC Receiving Indicator Meter	X	
	AC Receiving Indicator Meter	Y	
	AC Current/ Voltage	S	
	AC Current/ Voltage	C	
	AC Watthour Meter	W	
	AC Var Meter (balanced)	WVB	
	AC Var Meter (unbalanced)	WV	
	Power Factor (balanced)	PB	
	Power Factor (unbalanced)	P	
	Frequency (Except PAK, LAK)	A	
	Heat Electric Temperature	H	
	Heat Electric Temperature	HT	
	Revolutions (DC)	Z	
	Revolutions (AC)	V	

* Please Use specify terminal cover or OA-BCP3 for attachment transducer

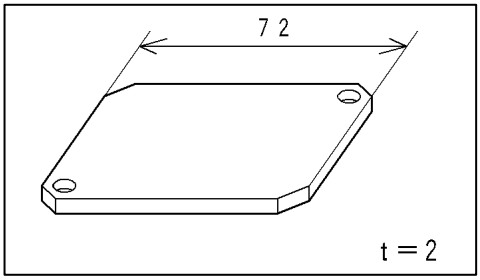
13. TERMINAL COVER FOR MAX. DEMAND AMMETER



Set into terminal fitting

Type Name	Terminal Cover For Narrow Angle
	Units Required
Max. Demand Ammeter BRL – 110CH	1
Max. Demand Ammeter (With warning contact)	2

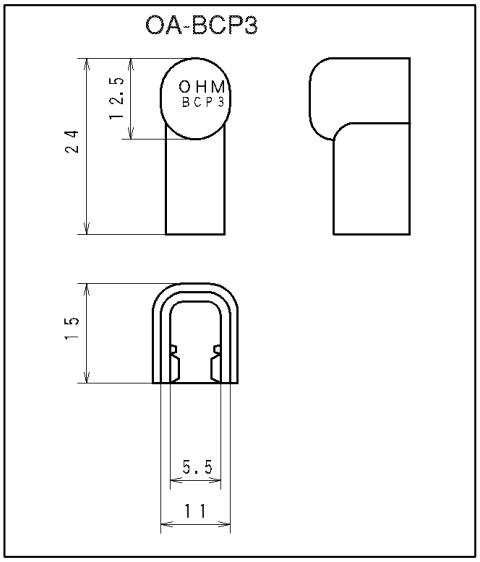
14. TERMINAL COVER FOR AUXILIARY CT



Accessory CT Type	Units Required
	Terminal Cover For MR-CTN
MR – CTN	1

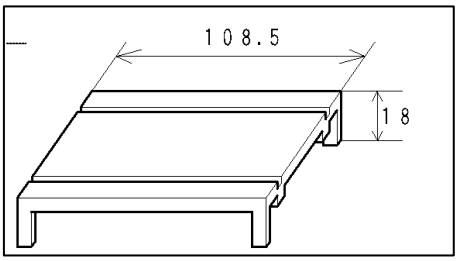
Please use accessory CT cover for Accessory CT, MR-CTN.

15. ATTACHMENT TRANSDUCER TERMINAL COVER



Set into terminal fitting

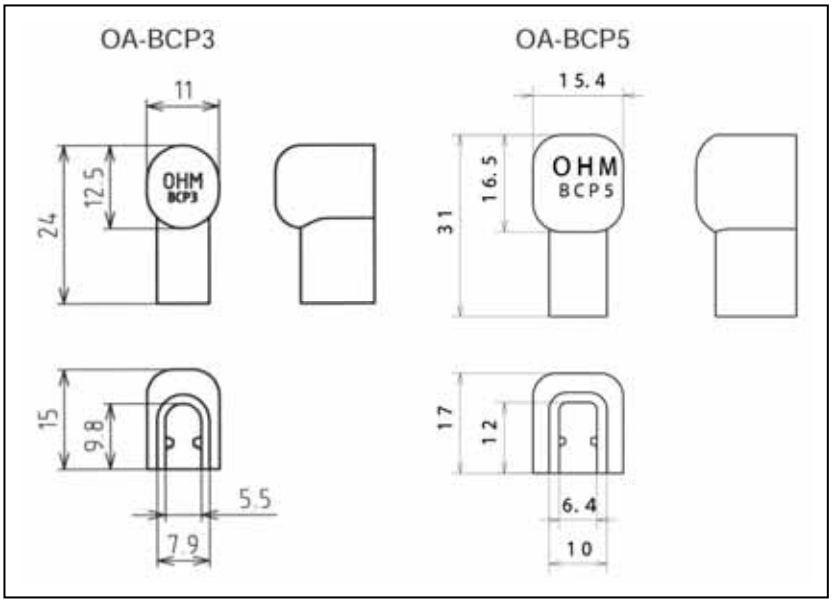
Terminal Cover for T-83M



Attachment Transducer	Units required	
	OA-BCP3	T-83 terminal cover
A(V)T-62M	4	-
W(WV, P, PB)T-62M	6	-
PT-63M	8	-
DM-63(H, L)	10	-
DM-63(HL, HH, LL)	16	-
W(WV, P, PB)T-64M-12	6	-
W(WV, P, PB)T-64M-34	11	-
PT-64M-34	10	-
□-T-83M-□	-	1

* Please Use specify terminal cover or OA-BCP3 for attachment transducer

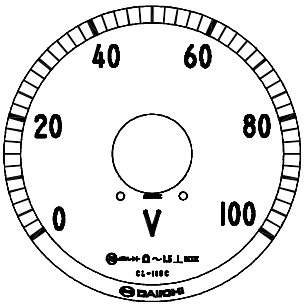
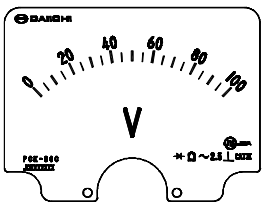
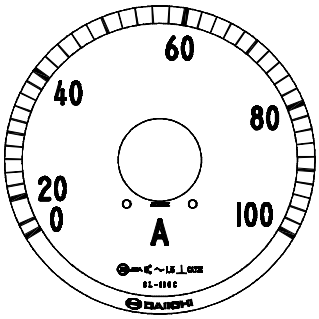
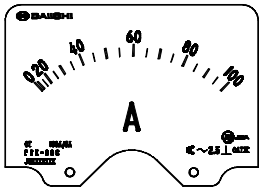
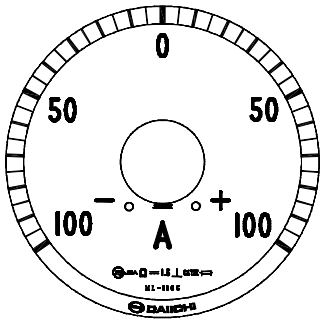
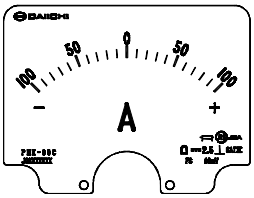
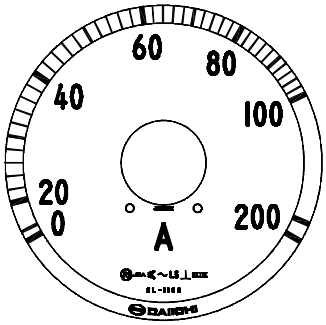
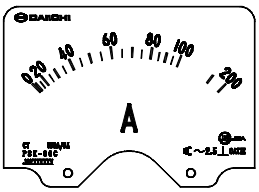
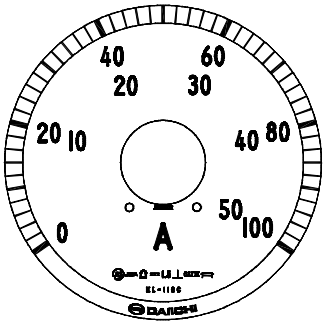
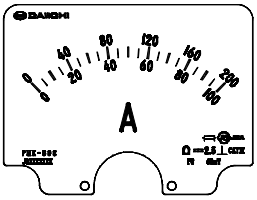
16. SERIES RESISTOR TERMINAL COVER



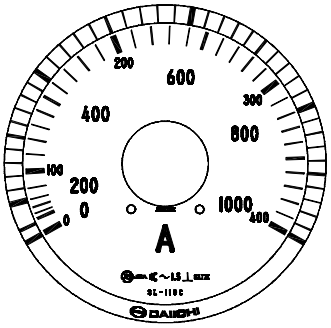
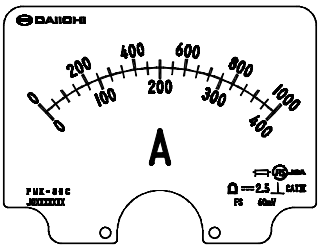
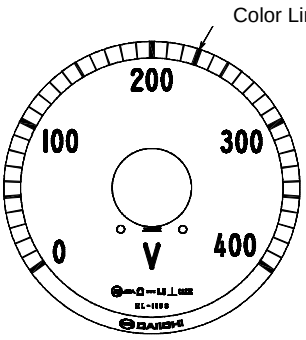
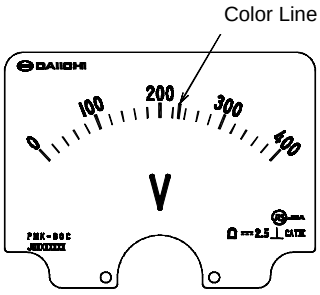
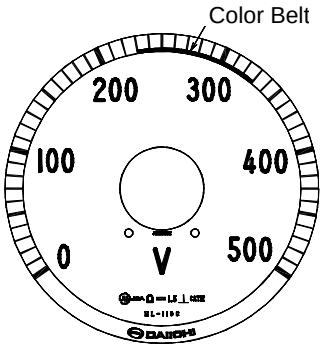
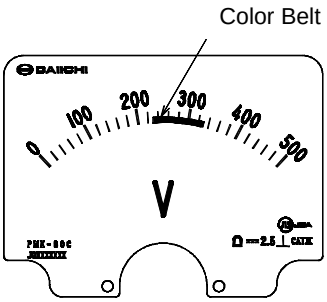
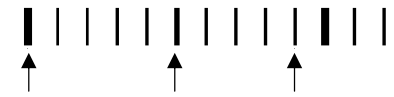
Set into terminal fitting

Type	Units Required	
	OA-BCP3	OA-BCP5
DM – 1	2	-
DM – 2	-	3
DM – 1T	4	-
DM – 41	-	2

EX. SCALE

Scale Specification	Wide Angle Meter Ex.: L-110C	Square Shape Meter Ex.: PK-80C
Standard Scale Scale digit: Black Scale line : Black Unit mark : Black Scale division : Refer to standard lancet shape pointer division		
Moving iron type can be left out the lower value part of scale Scale division : Refer to standard lancet shape pointer division		
± Scale Meter (Both Side Deflect Meter) Scale digit: Black Scale line : Black Unit mark : Black		
Extend Scale (2-Fold Extend) Scale digit: Black ; Extend part: Red Scale line : Black ; Extend part: Red Unit mark : Black		
Single Scale Double Seal Meter 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		

EX. SCALE

Scale Specification	Wide Angle Meter Ex.: L-110C	Square Shape Meter Ex.: PK-80C
Double Scale Double Seal 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		
Coloring Scale (Color Line) Scale color line : Red, Yellow, Green Possible combine the color line & color figure to use for double scale		
Color Belt Color Belt : Red, Yellow, Green		
Scale line and Scale figure 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		

2) Figure of scale : Max. 4-digit (9999)
If 10000 is exceed, unit will be change like 6.6kV or use multiple like 36× 1000min^{-1}

3) Please have a consultation with us if scale division is diffirent with standard division (odd scale)
Please specify for Max. division

4) Display「0」will be left out if the scale figure after decimal point is Zero. (like scale figure 1 as below)

5) Display「0」will be left out if the scale figure before decimal point is Zero. (like scale figure 0.5 as below)

Ex. : For range value 1.5

Wide Angle Meter
Scale will display by「1.0」for wide angle meter (except BRL & RL series)

Square Share Meter
BRL & RL series is same scale as square share meter

STANDARD DIVOSION 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	0 2 4 6 8 10	20	0 2 4 6 8 10	20
1.5	0 *1 5 10 15	30	0 5 10 15	30
2	0 5 10 15 20	20	0 *2 5 10 15 20	40
2.5	0 5 10 15 20 25	25	0 5 10 15 20 25	25
3	0 *1 10 20 30	30	0 10 20 30	30
4	0 10 20 30 40	20	0 *2 10 20 30 40	40
5	0 10 20 30 40 50	25	0 10 20 30 40 50	25
6	0 20 40 60	30	0 20 40 60	30
7.5	0 20 40 60 75	15	0 *3 20 40 60 75	37.5
8	0 20 40 60 80	16	0 *6 20 40 60 80	40
9	0 30 60 90	18	0 *7 30 60 90	45

§ Wide Angle METER §

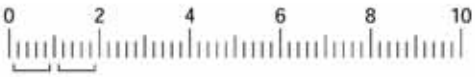
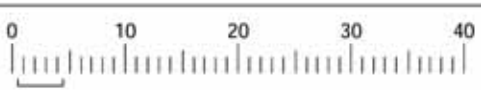
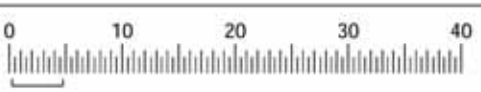
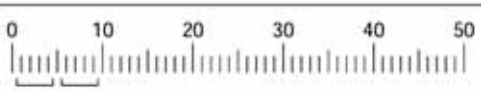
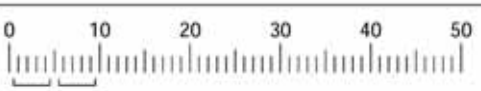
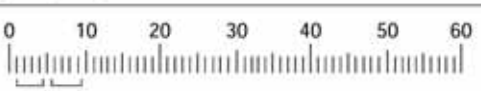
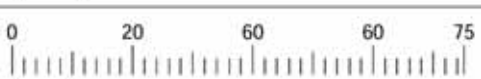
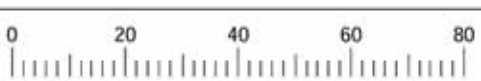
LK series

F series

F series

MODEL	RL−110C BRL−110CH **Utility meter**		F−15, 17 L−110C L−80C EL−110C Note) 4-digit scale of 2T is not manufacturable.	
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

STANDARD DIVOSION 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		50		50
1.5		30		75
2		40		40
2.5		50		50
3		30		60
4		40		80
5		50		50
6		30		60
7.5		37.5		75
8		40		80
9		45		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.