

# PICTURE FRAME SHAPE INSTRUMENT

## FK SERIES

### OUTLINE

FK series is a Picture Frame Shape Instruments meter, which only the scale part is in front of panel. This series have 2 types, FK-7 and FK-5.

FK series is one of measurement instrument suitable for electric and electronic equipment. Adoption with knife-edge pointer and it can also use with high accuracy mirror scale plate. In addition, this series meter is with superior quality, be fully satisfied with high reliability and also with standard JIS C 1102-1~9 (IEC 60051-1 matching) strong as vibrating and impulse.



FK - 5C



FK - 7C

### FEATURES

- ▶ High quality and high performance meter.
- ▶ Adopting transducer with electronics technology, more model product is expanding.
- ▶ Received indicator for physical value scale also can be manufacture.
- ▶ Meter with mirror knife-edge pointer also can be manufacture.
- ▶ Meter material is flame retardant.
- ▶ One-touch installation.

# Picture Frame Shape Instrument - FK Series

## TYPE CODE DESIGNATION

F (1) K - (2) C (3) - (4)

**(1)** Type of measurand

Mark	Measurand	Operation Principle
M	DC current, voltage	Permanent magnet moving coil
X	DC receiving indicator	Permanent magnet moving coil
Y	AC receiving indicator	Rectifier
C	AC current, voltage	Rectifier/ RMS value rectifier
W	AC power	Transducer
WVB	Reactive power (balanced)	Transducer
WV	Reactive power (unbalanced)	Transducer
PB	Power factor (balanced)	Transducer
P	Power factor (unbalanced)	Transducer
A	Frequency meter	Transducer

**(2)** Shape

Mark	Picture-Frame Shape Meter
7	127 × 73
5	100 × 57

**(3)** Special Specification

Mark	Specification
H	SCR
C	Cycle Control

**(4)** Kind of Circuit

Mark	Circuit
12	Single phase
13	Single phase 3-wire
33	Three phase 3-wire
34	Three phase 4-wire

\*Please specify this circuit for AC power, Reactive power & Power factor

# Picture Frame Shape Instrument - FK Series

## COMMON STANDARD SPECIFICATIONS

ITEM		SPECIFICATION	
Standard		JIS C 1102:2007 [Electric Indicating Meter Direct Acting Type]	
		IEC 60051-1 Compliant	
Class		Refer to [List of FK series]	
Support system		Taut band system	
Swing angle of meter		86°	
Dimensions meter from front		FK-7C: 127×73mm	
		FK-5C: 100×57mm	
Length of scale		FK-7: 87mm	
		FK-5: 72mm	
Color of scale plate		White	
Pointer		Knife-edge (Red)	
Installation posture		Vertical (⊥)	
Material panel		Iron & non-iron plate	
Thickness panel		4mm or less	
Color of cover		Black (Munsell N1.5)	
Material of case		Cover: Phenol resin (FK-7C), ABS resin (FK-5C)	
Insulation resistance		Between electric circuit and outer case	DC500V, 50MΩ or more
Voltage test		Between electric circuit and outer case	AC3320V, between 5sec.
Safety requirements	Standard	JIS C 1010-1	
	Insulation	Between electric circuit and outer case: Base of insulation	
	Use	For indoor use (Cubicle etc.)	
	High altitude	2000m or less	
	Pollution	Pollution level 2	
	Measure category	CATIII	
	Max. circuit voltage	600V (Ammeter)	
Operated temperature/ Humidity limit		-10~55°C, Average day temperature 40°C or less, 25~85%RH (Reference to steel ship rules ambient temperature 45°C)	
Storage temperature range		-20~70°C	

## STANDARD SCALE DIVISION

Max. scale value (10-time)		1	1.5	2	2.5	3	4	5	6	7.5	8	9
Type	FK-7C	50	75	40	50	60	80	50	60	75	80	45
	FK-5C	50	30	40	50	30	40	50	30	37.5	40	45

# Picture Frame Shape Instrument - FK Series

## COMMON SPECIAL SPECIFICATIONS (Please Specify)

ITEM		SPECIFICATION
Scale	Color line	Red, Green, Yellow (please specify)
	Extend scale	FCK: 2~5-time extend
	Color area (bar)	Red, Green, Yellow (please specify)
	Double scale	Please specify
	Double seal	Please specify
	Max. scale division	7-type:100 division; 5-type: 80 division
	Mirror	Please specify
	Special mark	Please specify
Vibration proof specification	Vibration	2~10Hz amplitude 15mm p-p 2~55Hz, 29.4m/s <sup>2</sup>
	Shock	147m/s <sup>2</sup> , 30-time
Tropical specification	Rust preventative 「FOR TROPICS」 will display at the name plate	
Pointer	Rod-shape (black) combine use with multiple scale etc.	
Control pointer	—	
Installation posture	Horizontal or Inclined (specify the angle)	
Flame-retardant materials	Cover	—
Protection circuit of meter	Overcurrent	Specify for necessary tolerated dose
	Overvoltage	
Part of extended scale	Voltmeter	Up to ±10%, ±20%, ±30% of central scale value 75% or more of scale length
	Ammeter	Up to 20% of upper limit value of effective measuring range 95% or more of scale length
		Up to 50% of upper limit value of effective measuring range 75% or more of scale length
For SCR control waves	AC current, AC voltage, Frequency	
For cycle control use	AC current, AC voltage (Rectifier Type)	
Scale (single item)	Not JIS mark	
Color of cover	Please specify	
Others	Please consultation with us for the special frequency	

## PURCHASE SPECIFICATIONS

### Item to Specify When Purchase

- 1).Type Name
- 2).Rated (Max. scale/ Input) \*1
- 3).Color of cover
- 4).Terminal cover (specify if require)
- 5).Units
- 6).Options (Refer to Common Special Specification)
- 7).Test report (specify useful frequency and number of copies require)

\*1. For max.scale value watt meter or var meter, please refer to List of Standard Max. Scale Value.  
Please specify frequency for power factor meter according to the specification.

## Picture Frame Shape Instrument - FK Series

### LIST OF FK SERIES

MODEL		FK - 7 C		FK - 5 C		
Product	Principle	Type	Class	Type	Class	
DC Ammeter	Moving coil	FMK-7C	1.5	FMK-5C	2.5	
DC Voltmeter		FMK-7C	1.5	FMK-5C	2.5	
DC Receiving Indicator	Moving coil	FXK-7C	1.5	FXX-5C	2.5	
AC Receiving Indicator	Rectifier	FYK-7C	1.5	FYK-5C	2.5	
AC Ammeter	Rectifier	FCK-7C	1.5	FCK-5C	2.5	
AC Voltmeter		FCK-7C	1.5	FCK-5C	2.5	
Watt Meter	Single phase	Transducer	FWK-7C-12	1.5	FWK-5C-12	2.5
	Single phase 3-wire		FWK-7C-13	1.5	FWK-5C-13	2.5
	3 phase		FWK-7C-33	1.5	FWK-5C-33	2.5
	3 phase 4-wire		FWK-7C-34	1.5	FWK-5C-34	2.5
Var Meter	Single phase	Transducer	FWVK-7C-12	1.5	FWVK-5C-12	2.5
	3 phase (balanced)		FWVBK-7C-33	1.5	FWVBK-5C-33	2.5
	3 phase (unbalanced)		FWVK-7C-33	1.5	FWVK-5C-33	2.5
	3 phase 4-wire		FWVK-7C-34	1.5	FWVK-5C-34	2.5
Power Factor Meter	Single phase	Transducer	FPK-7C-12	5.0	FPK-5C-12	5.0
	3 phase (balanced)		FPBK-7C-33		FPBK-5C-33	
	3 phase (unbalanced)		FPK-7C-33		FPK-5C-33	
	3 phase 4-wire (balanced)		FPBK-7C-34		FPBK-7C-34	
	3 phase 4-wire (unbalanced)		FPK-7C-34		FPK-5C-34	
Frequency Meter	Transducer	FAK-7C	1.0	FAK-5C	1.0	

► Keep in mind please, Transducer type meter does transitional indication at voltage input start.

# DC Ammeter (Moving Coil Type) - FMK

## AMMETER

Max. Scale Value	Approx. Internal Resistance or Voltage Drop	Accessory	
	FMK-7C, 5C		
25μA	2.26kΩ	-	
50μA	1.3kΩ		
100μA	1.1kΩ		
200μA	550Ω		
500μA	81Ω		
1mA	12Ω		
2mA	9.8Ω		
5mA	12Ω		
10mA	2.6Ω		
20mA	2.2Ω		
50mA~30A	60mV		
30A~10kA <sup>(1)</sup>	60mV		Shunt <sup>(2)</sup>

**Note:**

<sup>(1)</sup> When 30A is exceeds, shunt will external to meter 60mV. Meter 50mV, 100mV also can be manufacture.

<sup>(2)</sup> Lead wire of shunt is not attached. Standard lead wire resistance is 0.07Ω (1.25mm<sup>2</sup>)

▶ Up until 1Ω will manufacture when 0.07Ω is exceeds, please specify.

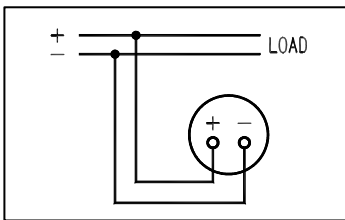
### Lead Wire Resistance value

Cross section (mm <sup>2</sup> )	Annealed Copper (Ω/m)	Remarks
1.25	0.0165	JIS C 3317 (HIV)
2.0	0.00924	JIS C 3307 (IV)
3.5	0.00520	Twist wire

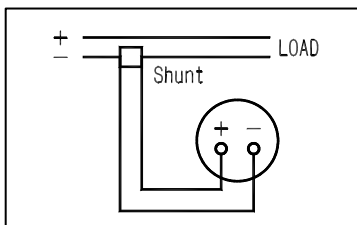
▶ Meter built-in adjustable resistor for external resistance corrective can be manufacture.

▶ Meter both deflection can be manufacture.

### Connection Diagram

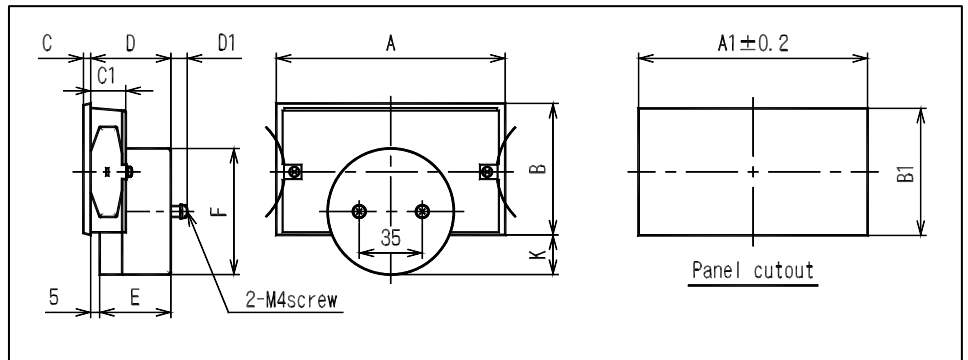


Ammeter



Ammeter external with Shunt

### Dimensions



Type	A	A1	B	B1	C	C1	D	D1	E	F	K	Weight (g)
FMK-7C	127	121	73	70.5 ± 0.2	4	19.5	45	10	40	70 Φ	22	320
FMK-5C	100	97	57	55 <sup>+0.2</sup> / <sub>-1.2</sub>	4	20	36	10	31	53 Φ	21.5	220

# DC Voltmeter (Moving Coil Type) - FMK

## VOLTMETER

Max. Scale Value	Approx. Internal Resistance or Voltage Drop	Accessory
	FMK-7C, 5C	
50mV~900mV	4mA	—
1V~300V <sup>(1)</sup>	1mA	
500V 600V <sup>(1)</sup>	1mA	
750V/1mA ~ 25V/1mA <sup>(2)</sup>	1mA	Series resistor

Note:

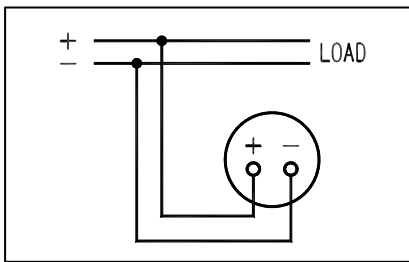
<sup>(1)</sup> Internal resistance up to 10kΩ/V will be manufacture when voltmeter 3V is exceeds.

<sup>(2)</sup> Series resistor will external to meter 1mA when 600V is exceeds.

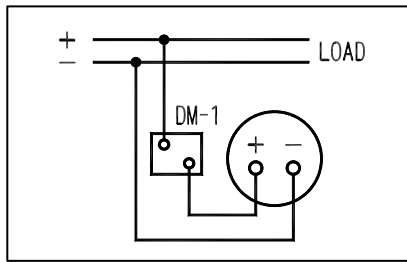
▶ Meter both deflection also can be manufacture.

▶ External overvoltage protection to voltmeter 500mV or more also can be manufacture.

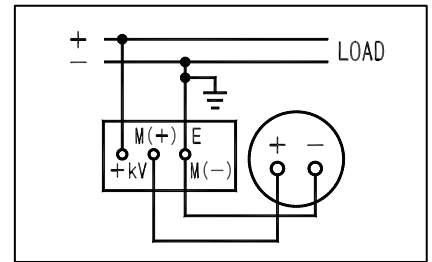
## Connection Diagram



Voltmeter

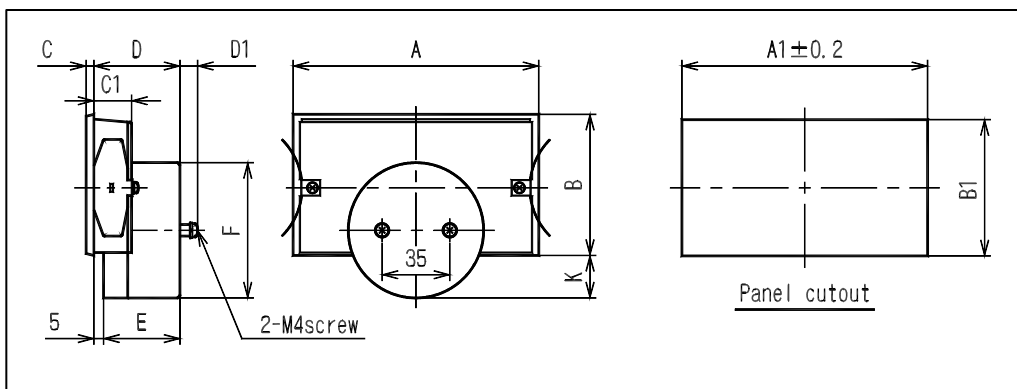


Voltmeter external with  
Series resistor (DM-1)



Voltmeter external with  
Series resistor (DM-2~25)

## Dimensions



Type	A	A1	B	B1	C	C1	D	D1	E	F	K	Weight (g)
FMK-7C	127	121	73	70.5 ±0.2	4	19.5	45	10	40	70 Φ	22	320
FMK-5C	100	97	57	55 <sup>+0.2</sup> <sub>-1.2</sub>	4	20	36	10	31	53 Φ	21.5	220

## DC Receiving Indicator Meter (Moving Coil Type) - FXK

Ammeter or voltmeter is a receiving indicator meter for received electrical signal from detector or transmitter, and measure the value of physical quantity, electric power, power factor and frequency. About the scale value and the electric input quantity, it can be manufactured by specify.

For example:

**Scale value 100%**                    **Electric input quantity DC 3V**  
**Scale Value 0~2MPa**                **Electric input quantity DC 4~20mA**

About voltage input, meter built-in adjustable resistor for resistance corrective (standard  $\pm 20\%$ ) also can be manufacture.

### DC RECEIVING INDICATOR

Electrical Input Quantity	Internal Resistance Overview	Electrical Input Quantity	Consumption Current
	FXK-7C, 5C		FXK-7C, 5C
100 $\mu$ A	1.1K $\Omega$	1V	1mA
500 $\mu$ A	81 $\Omega$	2V	"
1mA	12 $\Omega$	1~5V <sup>(1)</sup>	"
2mA	9.8 $\Omega$	5V	"
5mA	12 $\Omega$	10V	"
10mA	2.6 $\Omega$	20V	"
20mA	2.2 $\Omega$	50V	"
4~20mA <sup>(1)</sup>	2.2 $\Omega$	$\int$	"
10~50mA <sup>(1)</sup>	1.5 $\Omega$	300V	" <sup>(2)</sup>

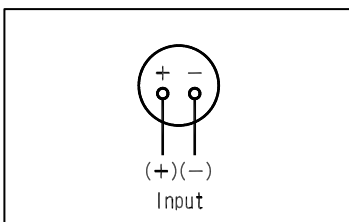
Note:

<sup>(1)</sup> The receiving indicator meter, received the bias sign with input electrical quantity DC1~5V and DC4~20mA, please adjust to Zero position when 1V, 4mA sign bias is input.

<sup>(2)</sup> Consumption current for VR internal meter is 1mA.

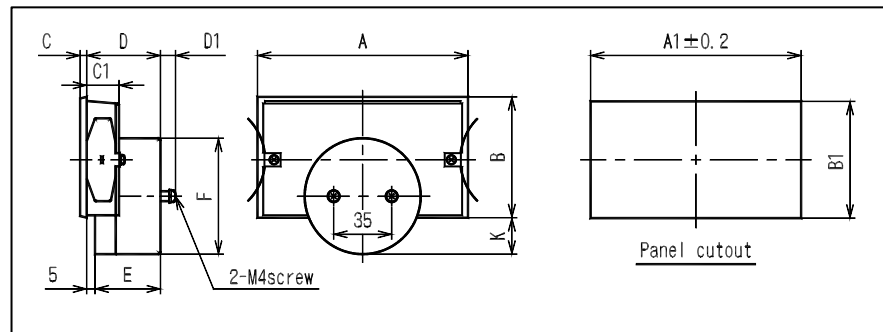
► Meter both deflection also can be manufacture.

### Connection Diagram



DC Receiving Indicator

### Dimensions



Type	A	A1	B	B1	C	C1	D	D1	E	F	K	Weight (g)
FXK-7C	127	121	73	70.5 $\pm 0.2$	4	19.5	45	10	40	70 $\Phi$	22	320
FXK-5C	100	97	57	55 <sup>+0.2</sup> <sub>-0.1</sub>	4	20	36	10	31	53 $\Phi$	21.5	260



## AC Receiving Indicator Meter (Rectifier Type) - FYK

Ammeter or voltmeter is a receiving indicator meter for received electrical signal from detector or transmitter, and measures the value of physical quantity, electric power, power factor and frequency. About the scale value and electric input quantity, it can be manufactured by specify.

For example:

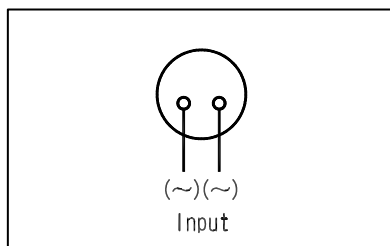
**Scale value 100%**                      **Input electric quantity DC 3V**  
**Scale Value 0~2MPa**                **Input electric quantity DC 4~20mA**

About voltage input, meter built-in adjustable resistor for resistance corrective (standard  $\pm 20\%$ ) also can be manufacture.

### AC AMMETER

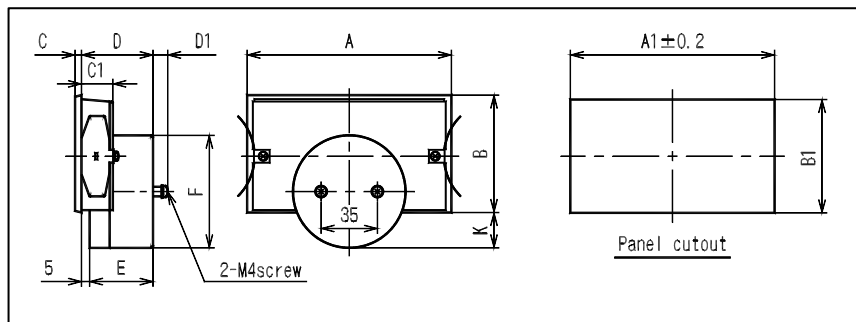
Electrical Input Quantity	Internal Resistance or Consumption VA.	Electrical Input Quantity	Consumption Current
	FYK-7C, 5C		FYK-7C, 5C
100 $\mu$ A	5k $\Omega$	3V	1mA
500 $\mu$ A	1.5k $\Omega$	$\int$	
1mA	800 $\Omega$	300V	
3mA	350 $\Omega$		
5mA	300 $\Omega$		
10mA	0.5VA		
20mA			

### Connection Diagram



AC Receiving Indicator

### Dimensions



Type	A	A1	B	B1	C	C1	D	D1	E	F	K	Weight (g)
FYK-7C	127	121	73	70.5 $\pm$ 0.2	4	19.5	45	10	40	70 $\Phi$	22	320
FYK-5C	100	97	57	55 $\begin{smallmatrix} +0.2 \\ -0.1 \end{smallmatrix}$	4	20	36	10	31	53 $\Phi$	21.5	260

# AC Ammeter (Rectifier Type) - FCK

## AMMETER

Max. Scale Value	Approx. Internal Resistance or Consumption VA	Accessory
	FCK-7C, 5C	
100μA	5kΩ	—
500μA	1.5kΩ	
1mA	800Ω	
3mA	350Ω	
5mA	300Ω	
10mA ~ 300mA <sup>(1)(2)</sup>	0.5VA	
350mA ~ 100A <sup>(1)</sup>	1VA	MR-CTN

Note:

<sup>(1)</sup> When 100A or 650V circuit voltage is exceeds, please external current transformer (CT) to meter 5A (0.1A, 1A).

<sup>(2)</sup> External overcurrent protection to ammeter 10mA or less also can be manufacture.

▶ Extended scale meter also can be manufacture. (External with AT-62M, input until 15A only.)

▶ For high frequency ware. Can be manufacture until 10 kHz. Please specify it.

### For Cycle Control Waveform Meter

Please use cycle control for cycle control waveform. (Type name: FCTK-□CC, external with AT-62MEC)

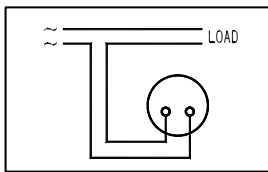
### For Distorted Waveform Meter (Approx. RMS value rectifier method)

Keep in mind please, that standard rectifier type will affected by waveform distortion.

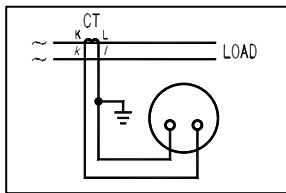
d Please use approx. RMS value rectifier method for third harmonics mixed waveform and SCR waveform

(Type: FCTK-□C, external with AT-62ME)

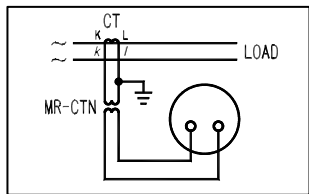
### Connection Diagram



Ammeter

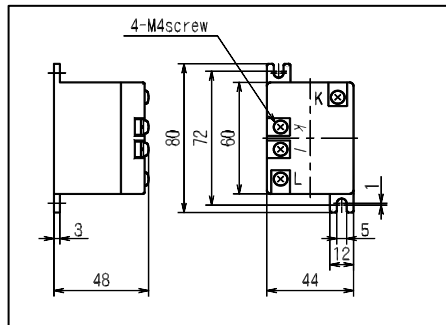
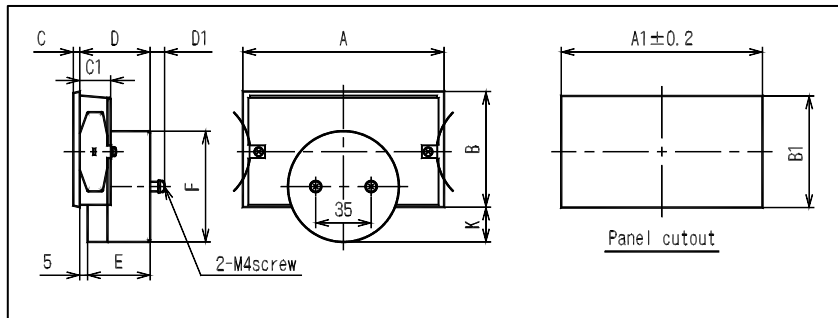


Ammeter with CT or MR-CTN

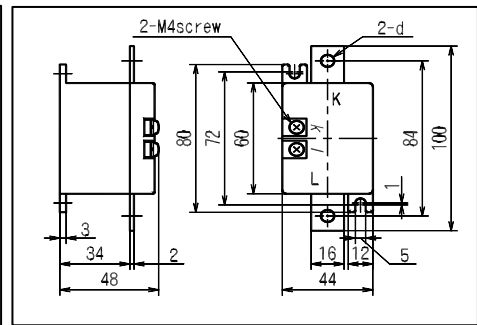


Ammeter with CT and MR-CTN

### Dimension



MR-CTN (0.35~25A/10mA)



MR-CTN (30~100A/20mA)

\* Please reference to next page for Dimensios AT-62ME, AT-62MEC & VT-62ME, VT-62MEC

Type	A	A1	B	B1	C	C1	D	D1	E	F	K	Weight (g)	Current (A)	d
FCK-7C	127	121	73	70.5 ±0.2	4	19.5	45	10	40	70 Φ	22	320	30~70	Φ 6.5
FCK-5C	100	97	57	55 <sup>+0.2</sup> <sub>-0.1</sub>	4	20	36	10	31	53 Φ	21.5	220	75~100	Φ 8.5

# Voltmeter (Rectifier Type) - FCK

## VOLTMETER

Max. Scale Value	Consumption Current	Accessory
	FCK-7C, 5C	
3V ~ 600V	1mA	—
750V <sup>(1)</sup> ~ 25kV	1mA	Series resistance

Note:

<sup>(1)</sup> When 600V is exceeded, series resistance will be external to meter 1mA.

Please refer to the size in Instrument accessory.

► For high frequency use. Can be manufactured until 10 kHz. Please specify it.

### For Cycle Control Waveform Meter

Please use cycle control for cycle control waveform. (Type name: FCTK-□CC, external with VT-62MEC)

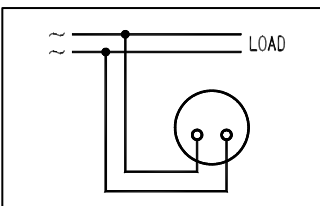
### For Distorted Waveform Meter (Approx. RMS value rectifier method)

Keep in mind please, that standard rectifier type will be affected by waveform distortion.

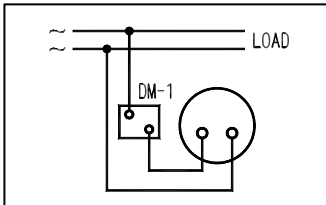
Please use approx. RMS value rectifier method for third harmonics mixed waveform and SCR waveform.

(Type: FCTK-□C, external with VT-62ME)

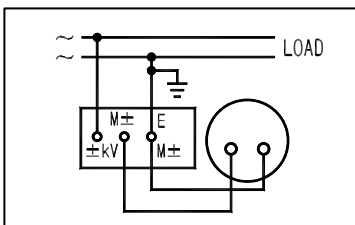
### Connection Diagram



Voltmeter

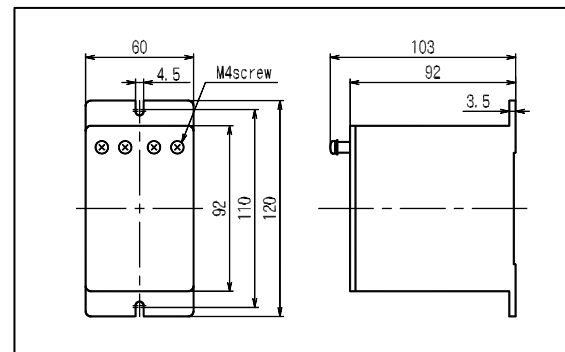
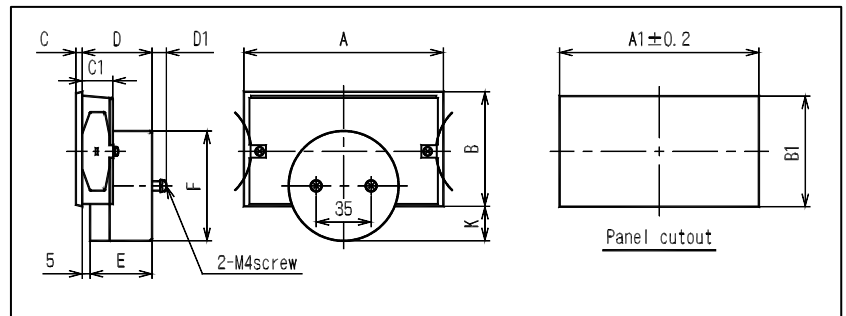


Voltmeter external series resistor (DM-1)



Voltmeter external series resistor (DM-2~25)

### Dimensions



Dimensions For Type:

AT-62ME, AT-62MEC, VT-62ME, VT-62MEC

Type	A	A1	B	B1	C	C1	D	D1	E	F	K	Weight (g)
FCK-7C	127	121	73	70.5 ± 0.2	4	19.5	45	10	40	70 Φ	22	320
FCK-5C	100	97	57	55 <sup>+0.2</sup> <sub>-0.1</sub>	4	20	36	10	31	53 Φ	21.5	220

# Watt-hour Meter (Transducer Type) - FWK

## WATTHOUR METER <sup>(1)</sup>

Application	Type	Rating <sup>(2)</sup>	Consumption VA		Accessory (Transducer)
			Voltage side	Current side	
Single phase	FWK-7C-12	110V, 5A(1A)	2VA	1VA	WT-62M-12
	5C-12	220V, 5A(1A)	3.5VA	1VA	
Single phase 3-wire	FWK-7C-13 5C-13	110V, 5A(1A)	Each phase 2VA	Each phase 1VA	WT-83M-13
3 phase	FWK-7C-33	110V, 5A(1A)	Each phase 2VA	Each phase 1VA	WT-83M-33
	5C-33	220V, 5A(1A)	Each phase 3.5VA	Each phase 1VA	
3 phase 4-wire <sup>(3)</sup>	FWK-7C-34	110/√3V, 5A(1A)	Each phase 1.5VA	Each phase 1VA	WT-83M-34
	5C-34	220/√3V, 5A(1A)	Each phase 3VA	Each phase 1VA	

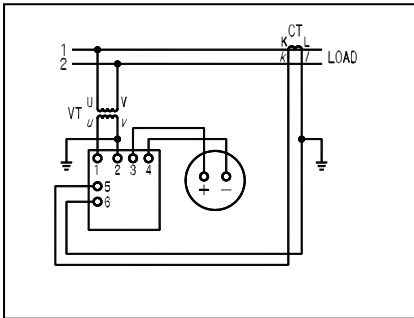
Note:

- <sup>(1)</sup> Please refer to Reference List (page 14) for manufactured limit and max. scale value.
  - <sup>(2)</sup> When above rating is exceeds, please external CT or VT respectively to meter 110V, 5A(1A).  
Useable voltage range: 110V: 90~130V, 220V: 180~260V.
  - <sup>(3)</sup> 3 phase 4-wire is voltage balanced.
- For high frequency ware use. Please specify the frequency.

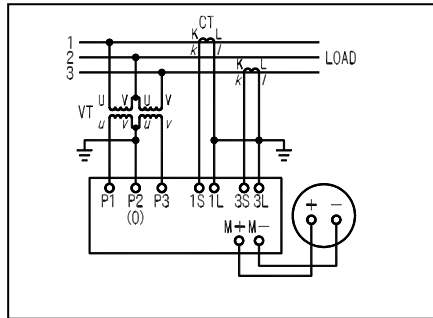
### For SCR Control Waveform

Type name: FWK-□CH-□, Aux. power is necessary. (3 phase 4-wire can not be manufacture)

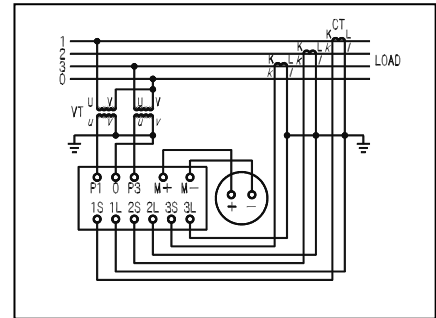
### Connection Diagram



Single phase watt-hour meter  
External with WT-62M-12

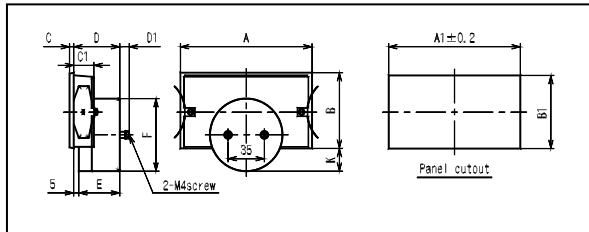


Single phase 3 wire / 3 phase watt-hour meter  
External with WT-83M-13/33

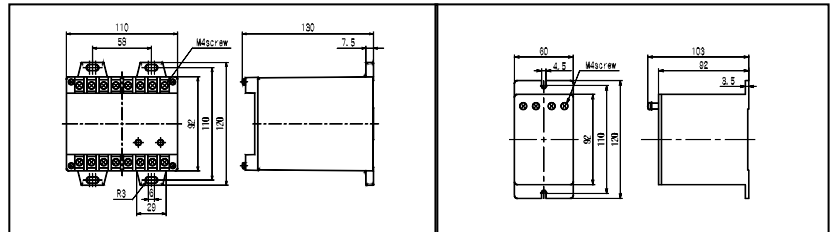


3 phase 4 wire watt-hour meter  
External with WT-83M-34

### Dimensions



### Dimensions Accessory (Transducer)



Dimension For Type: WT-83M

Dimension For Type: WT-62M

Type	A	A1	B	B1	C	C1	D	D1	E	F	K	Weight (g)
FWK-7C	127	121	73	70.5 ±0.2	4	19.5	45	10	40	70 Φ	22	Below 1180
FWK-5C	100	97	57	55 <sup>+0.2</sup> / <sub>-0.1</sub>	4	20	36	10	31	53 Φ	21.5	Below 1120

# Var Meter (Transducer Type) - FWVK

## VAR METER <sup>(1)</sup>

Application	Type	Rating <sup>(2)</sup>	Consumption VA		Accessory (Transducer)
			Voltage side	Current side	
Single phase <sup>(3)</sup>	FWVK-7C-12 5C-12	110V, 5A(1A)	3.5VA	1.5VA	WVT-62M-12
		220V, 5A(1A)	3.5VA	1.5VA	
3 phase <sup>(4)</sup> (balanced)	FWVBK-7C-33 5C-33	110V, 5A(1A)	Each phase 3.5VA	Each phase 1.5VA	WVBT-83M-33
		220V, 5A(1A)	Each phase 3.5VA	Each phase 1.5VA	
3 phase <sup>(4)</sup> (unbalanced)	FWVK-7C-33 5C-33	110V, 5A(1A)	Each phase 3.5VA	Each phase 1.5VA	WVT-83M-33
		220V, 5A(1A)	Each phase 3.5VA	Each phase 1.5VA	
3 phase <sup>(4)</sup> 4-wire <sup>(5)</sup>	FWVK-7C-34 5C-34	110V, 5A(1A)	Each phase 3.5VA	Each phase 1.5VA	WVT-83M-34
		220V, 5A(1A)	Each phase 3.5VA	Each phase 1.5VA	

Note:

<sup>(1)</sup> Please refer to Reference List (page 14) for manufactured limit and max. scale value.

Standard scale: Lead □ var ~ 0 ~ Lag □ var

<sup>(2)</sup> When above rating is exceeds, please external CT or VT respectively to meter 110V, 5A(1A).

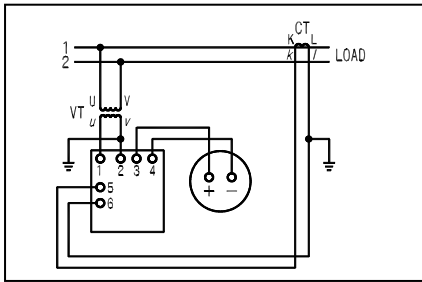
Useable voltage range: 110V: 90~130V, 220V: 180~260V.

<sup>(3)</sup> Please specify the frequency (50Hz or 60Hz) for single phase circuit.

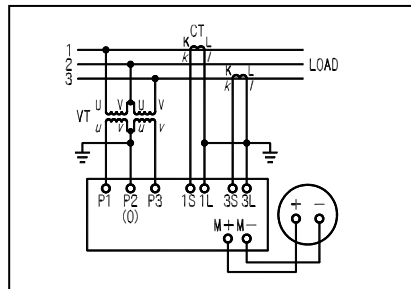
<sup>(4)</sup> Please use 3 phase, 3 phase 4-wire in positive phase sequence.

<sup>(5)</sup> 3 phase 4-wire is voltage balanced.

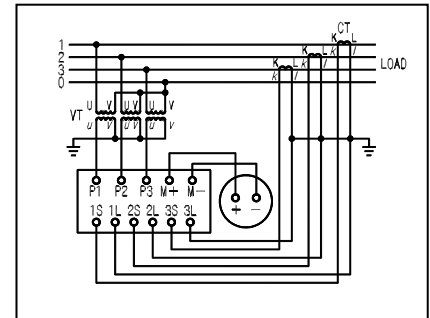
### Connection Diagram



Single phase var meter  
External with WVT-62M-12

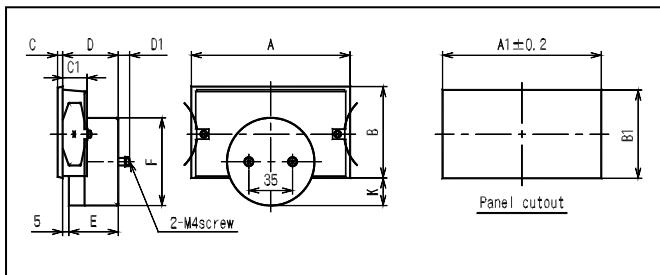


Single phase 3 wire / 3 phase var meter  
External with WVT, WVBT-83M-13/33

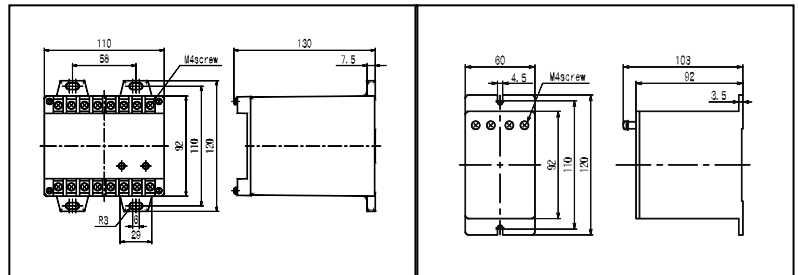


3 phase 4 wire var meter  
External with WVT-83M-34

### Dimensions



### Dimensions Accessory (Transducer)



Type: WVT-83M, WVBT-83M

Type: WVT-62M

Type	A	A1	B	B1	C	C1	D	D1	E	F	K	Weight (g)
FWV(B)K-7C	127	121	73	70.5 ± 0.2	4	19.5	45	10	40	70 Φ	22	Below 1180
FWV(B)K-5C	100	97	57	55 <sup>+0.2</sup> <sub>-0.1</sub>	4	20	36	10	31	53 Φ	21.5	Below 1120

# Wattour Meter & Var Meter (Transducer Type) - FWK / FWVK

## PRODUCIBLE INTRINSIC MAX. SCALE VALUE METER

Manufacturable range will be limited where intrinsic max. scale value is within the scope as shown in the list at below. But in the case, the meter used external CV or VT, max. scale value will be calculated as following formula:

$$\text{Max. scale value} = \frac{\text{Intrinsic Max. scale value}}{\text{VT ratio} \times \text{CT ratio}}$$

Type Name	Rating			Manufacturable Intrinsic Range
Single phase wattour meter	110V/5A (1A)			350~600W (var)
Single phase var meter	220V/5A (1A)			700~1200W (var)
Single phase 3-wire wattour meter	110V/5A (1A)			600~1200W (var)
3 phase wattour meter 3 phase var meter	110V/5A (1A)			600~1200W (var)
	220V/5A (1A)			1200~2400W (var)
3 phase 4-wire wattour meter 3 phase 4-wire var meter	Line	Phase	Current	—
	110V	110/√3V	5A (1A)	600~1200W (var)
	220V	220/√3V	5A (1A)	1200~2400W (var)

## REFERENCE LIST FOR STANDARD MAX. SCALE VALUE THREE PHASE WATTMETER

The following table is the standard of 3 phase wattmeter.

The following table also applies for 3 phase 4-wire wattmeter, single phase 3-wire wattmeter and var meter.

Standard for single phase wattmeter calculation : listed value × 1/2

Line vol. CT ratio	6600V (VT6600 / 110V)			3300V (VT3300 / 110V)			440V (VT440 / 110V)			220V			110V		
	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
5 / 5A	60	50	40	30	25	20	4	5	3	2	1.5	1.2	1	0.8	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

# Power Factor Meter (Transducer Type) - FPK

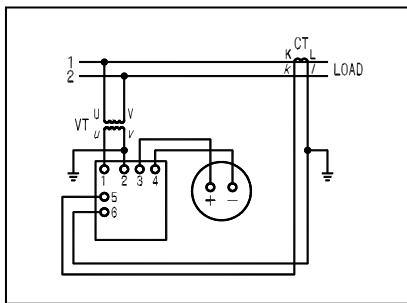
## POWER FACTOR METER <sup>(1)</sup>

Application	Type	Rating <sup>(2)</sup>	Consumption VA		Accessory (Transducer)
			Voltage side	Current side	
Single phase	FPK-7C-12 5C-12	110V, 5A(1A) 220V, 5A(1A)	1VA	1VA	PT-62M-12 <sup>(4)</sup>
			2VA	2VA	
3 phase (balanced)	FPBK-7C-33 5C-33	110V, 5A(1A) 220V, 5A(1A)	Each phase 1VA	Each phase 1VA	PBT-62M-33 <sup>(4)</sup>
			Each phase 2VA	Each phase 2VA	
3 phase (unbalanced)	FPK-7C-33 <sup>(3)</sup> 5C-33	110V, 5A(1A) 220V, 5A(1A)	Each phase 1VA	Each phase 1VA	PT-63M-33 <sup>(4)</sup>
			Each phase 1VA	Each phase 2VA	
3 phase 4-wire (balanced)	FPBK-7C-34 5C-34	110V, 5A(1A) 220V, 5A(1A)	Each phase 1VA	Each phase 1VA	PBT-62M-34 <sup>(4)</sup>
			Each phase 2VA	Each phase 2VA	
3 phase 4-wire (unbalanced)	FPK-7C-34 <sup>(3)</sup> 5C-34	110V, 5A (1A) 220V, 5A (1A)	Each phase 1VA	Each phase 1VA	PT-64M-34 <sup>(4)</sup>
			Each phase 2VA	Each phase 2VA	

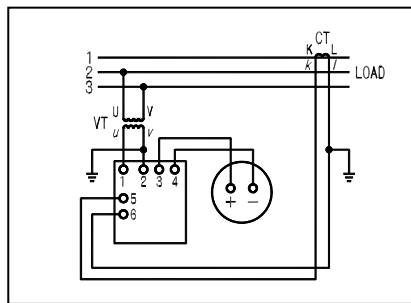
Note:

- <sup>(1)</sup> Standard scale: Lead0.5~1~Lag0.5. Scale for 3 phase 3-wire only: Lead0~1~Lag0  
(Effective measuring range: Lead0.3~1~Lag0.3 also can manufacture)  
Please specify frequency (50Hz or 60Hz) for all type except 3 phase balanced circuit.
- <sup>(2)</sup> When above rating is exceeds, please external CT or VT respectively to meter 110V, 5A (1A).  
Useble voltage range: 110V: 90~130V, 220V: 180~260V.  
Please use in positive phase sequence.
- <sup>(3)</sup> 3 phase (unbalanced), 3 phase 4-wire (unbalanced) is voltage balanced
- <sup>(4)</sup> Please refer to next page for dimension accessory (Transducer)

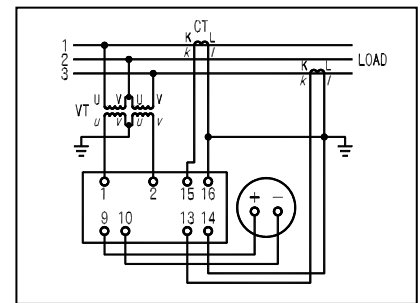
### Connection Diagram (If make a mistake on phase sequence, it becomes error)



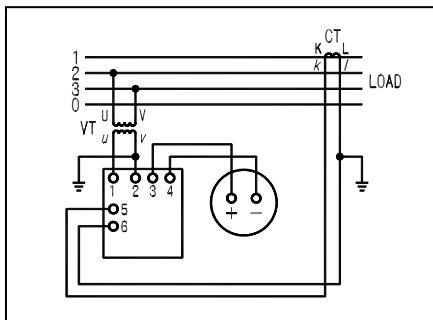
Single Phase Power Factor Meter  
External with PT-62M-12



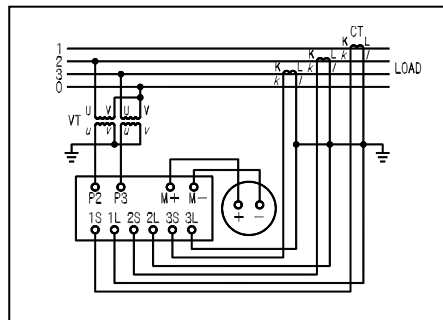
3 Phase Balanced Power Factor Meter  
External with PBT-62M-33



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



3 Phase 4 wire (balanced) Power Factor Meter  
External with PBT-62M-34



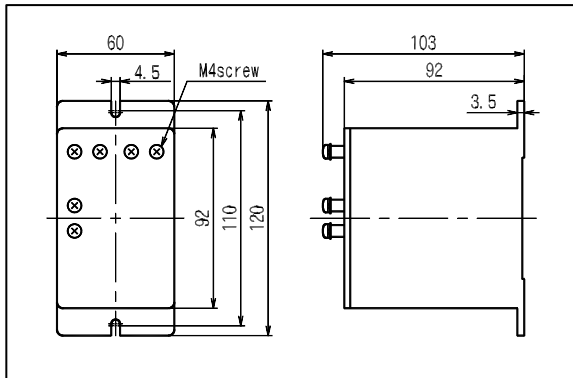
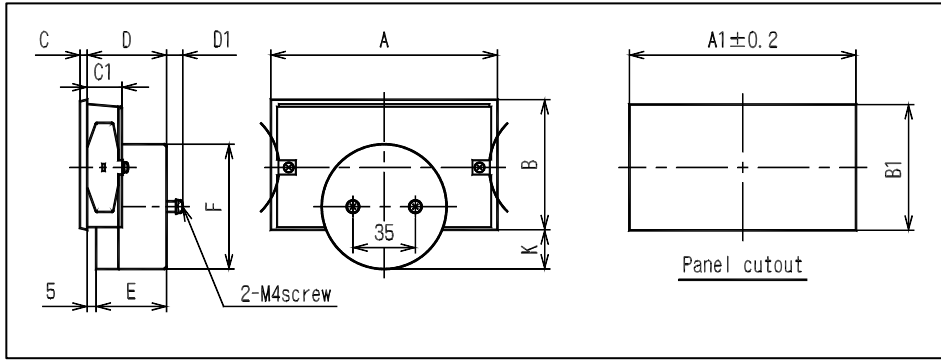
3 Phase 4 wire unbalanced Power Factor Meter  
External with PT-64M-34

Type		A	A1	B	B1	C	C1	D	D1	E	F	K
FPK-7C	FP(B)K-7C	127	121	73	70.5 ±0.2	4	19.5	45	10	40	70 Φ	22
FPK-5C	FP(B)K-5C	100	97	57	55 <sup>+0.2</sup> <sub>-0.1</sub>	4	20	36	10	31	53 Φ	21.5

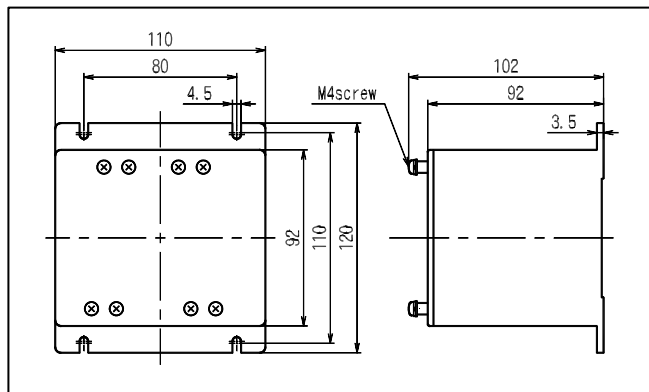
Type	Weight (g)
FPK-7C	Below 1120
FPK-5C	Below 1060

# Power Factor Meter (Transducer Type) - FPK

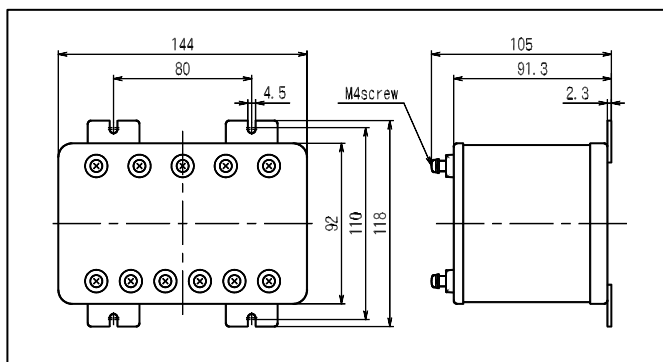
## Dimension



Dimension For Type: PT-62M, PBT-62M



Dimension For Type: PT-63M



Dimension For Type: PT-64M



# Frequency Meter (Transducer Type) - FAK

Rated Voltage	Measurement Range	Consumption VA	Accessory (Transducer)	Voltage Change Range
		FAK-7C, 5C		
110V <sup>(2)</sup>	45 ~ 55Hz 55 ~ 65Hz 45 ~ 65Hz 350 ~ 450Hz <sup>(1)</sup>	1.7VA	FT-62M	90 ~ 130V
220V <sup>(2)</sup>	45 ~ 55Hz 55 ~ 65Hz 45 ~ 65Hz 350 ~ 450Hz <sup>(1)</sup>	2.5VA	FT-62M	180 ~ 260V

Note:

<sup>(1)</sup> Special frequency measurement range also can manufacture (until 1000Hz)

<sup>(2)</sup> Useable voltage range: 110V: 90~130V, 220V: 180~260V.

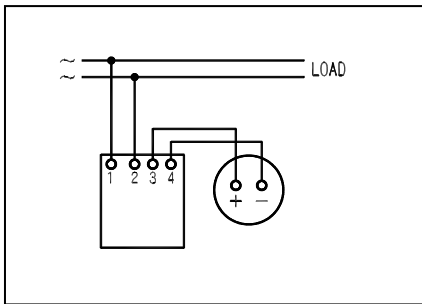
Please contact with us for manufacture above rated voltage or voltage change range.

## For SCR Wareform Meter

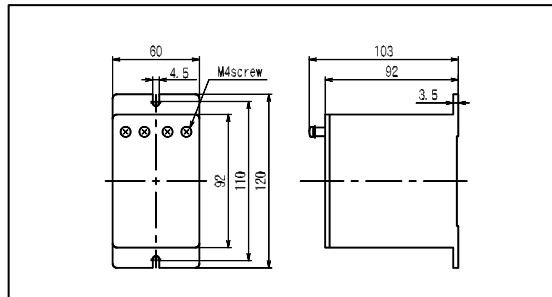
Meter SCR wareform input (Distortion wareform) also can manufacture.

Type Name: LAK-□CH

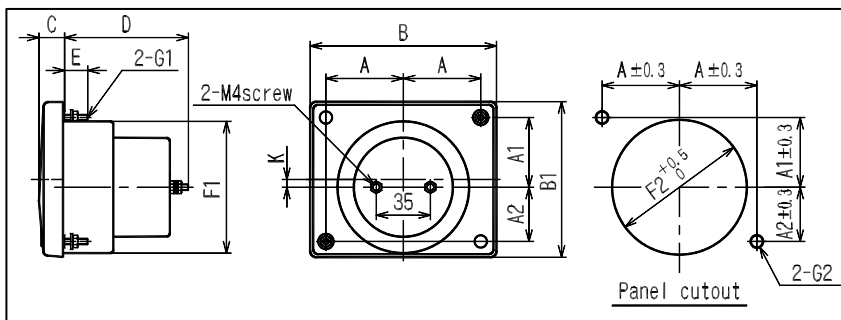
## Connection Diagram



## Dimensions for Type: FT-62M



## Dimensions



Type	A	A1	B	B1	C	C1	D	D1	E	F	K
FAK-7C	127	121	73	70.5 ±0.2	4	19.5	45	10	40	70 Φ	22
FAK-5C	100	97	57	55 <sup>+0.2</sup> <sub>-0.1</sub>	4	20	36	10	31	53 Φ	21.5

Type	Weight (g)
FAK-7C	720
FAK-5C	660

# 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.

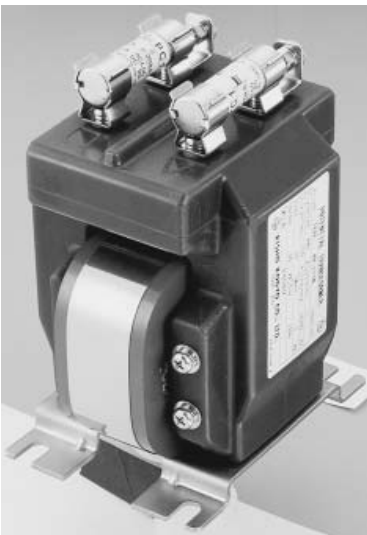
Compliance with:

JIS C-1731-1 Standard Instrument current transformer &

JED-1201 Standard Instrument voltage transformer.

Class: 1.0

Tolerance:  $\pm 1.0\%$



► 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	5	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

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

## List of Voltage Transformers

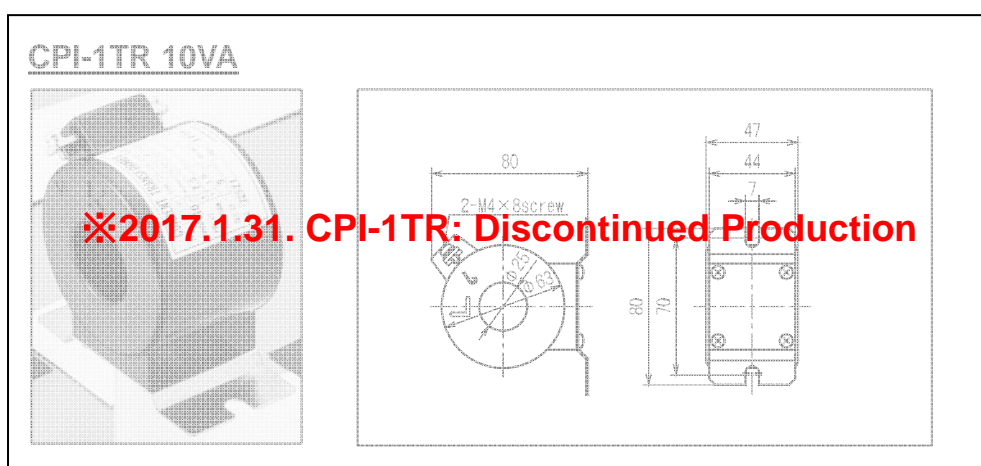
Max. circuit voltage (V)	Construction	Insulated system	Type Name	Primary current (A)	Secondary current (A)	Rated burden (VA)	Class	Frequency (Hz)	AC Withstand voltage	weight (kg)
Below 230	Winding Type	Dry opening type	PDI-1	220	110	15	1.0	50/60	2kV, 1 min	2.2
Below 460						50				3.6
						100				6.5
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	

# Current Transformers (CT)

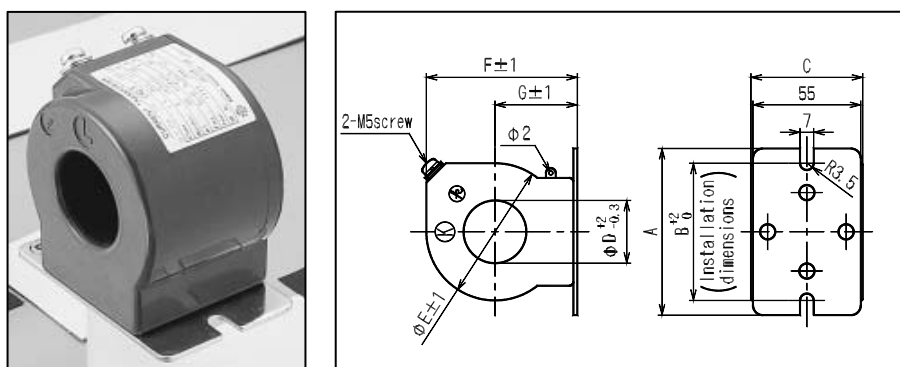
## Circle Window Type (Below 1,150V)

Insulated System	Type Name	Primary current (A)																				Secondary current (A)	Rated Burden (VA)					
		/	5	10	15	20	25	30	40	50	60	75	80	100	120	150	200	250	300	400	500			600	750			
ABS resin	CPI-1TR	*T	24	15	10	8	6	2017.1.31. CPI-1TR: Discontinued Production														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			

\* T = Number of primary conductor penetration.



## CR2 - 5

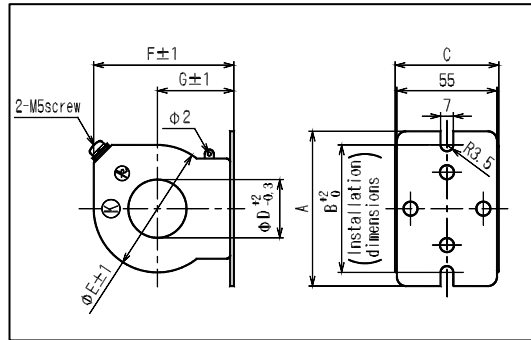


Primary Current (A)	A	B	C	ΦD	ΦE	F	G
10~200	85	70	57	23	61	70	37
240~400	85	70	55	32	70	77	42
500~750	100	85	57	50	86	93	50

# Current Transformers (CT)

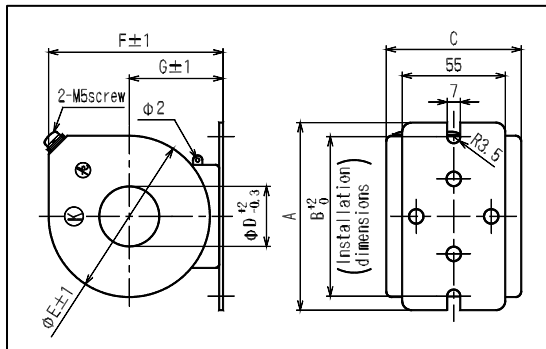
## Circle Window Type (Below 1,150V)

### 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

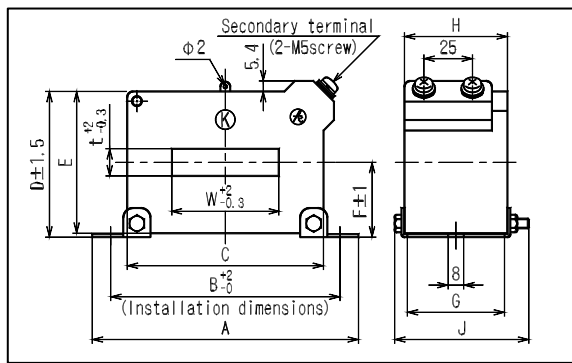
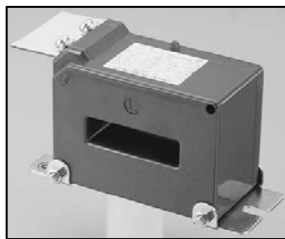
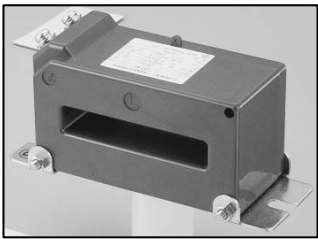
# Current Transformers (CT)

## 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)

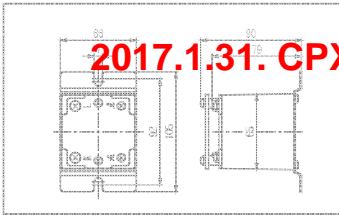
### CS1-15, CS1-40



### Primary Winding Type

#### CPX - 15

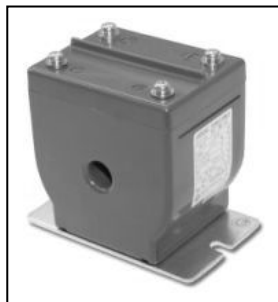
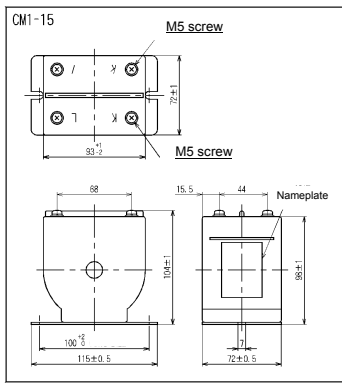
Insulated System	Type Name	Primary Current (A)	Secondary Current (A)	Rated Burden (VA)
ABS resin	CPX-15	5, 10, 15, 20, 30	5	15



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

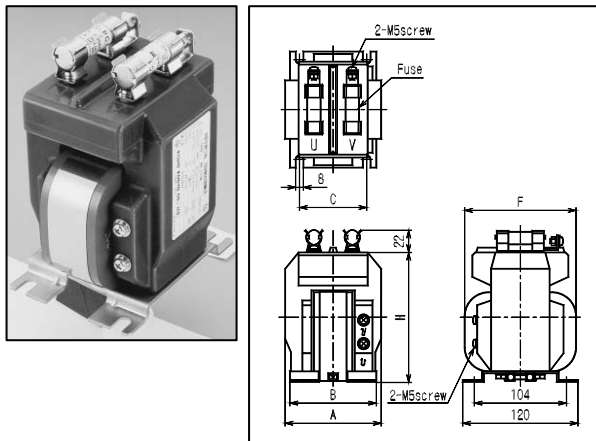
Type Name	Max. Circuit Voltage (V)	Primary Voltage (V)	Secondary Voltage (V)	Rated Burden (VA)	Dimension (mm)					
					A	B	C	A'	B'	D' (Attachment)
PDI - 1	230	220	110	15	100	90	110	70	75	6 × 15 cut
				50	120	100	125	74	85	7 × 15 cut
				100	135	130	140	84	105	7 × 15 cut
	460	440	110	15	100	90	110	70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

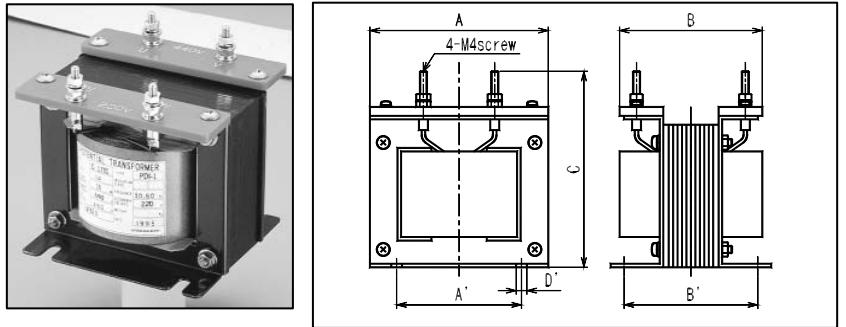
### 2) Epoxy Resin Mould

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

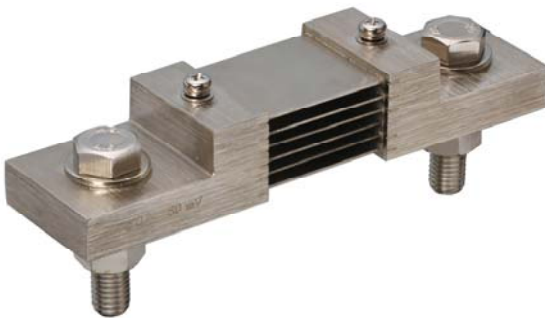


Shunt is possible to combine with mill voltmeter for measuring a large current.

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:  $\pm 1.0\%$
- ▶ 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.

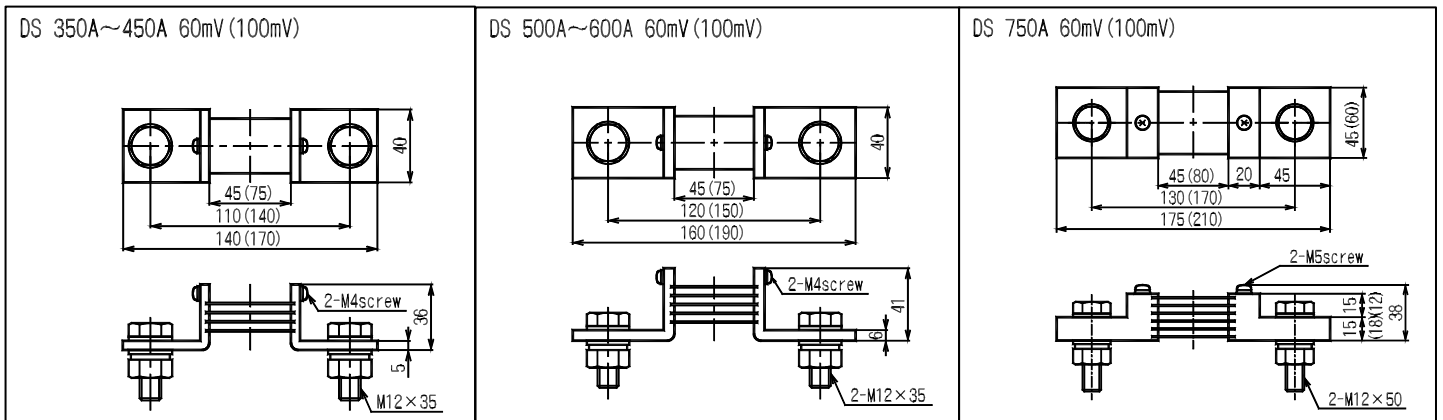
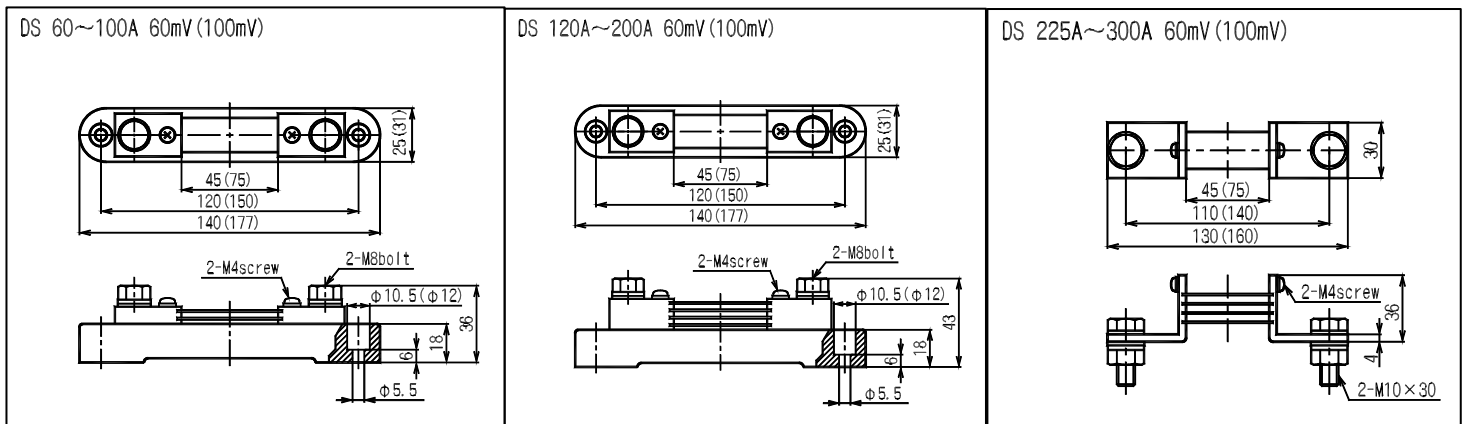
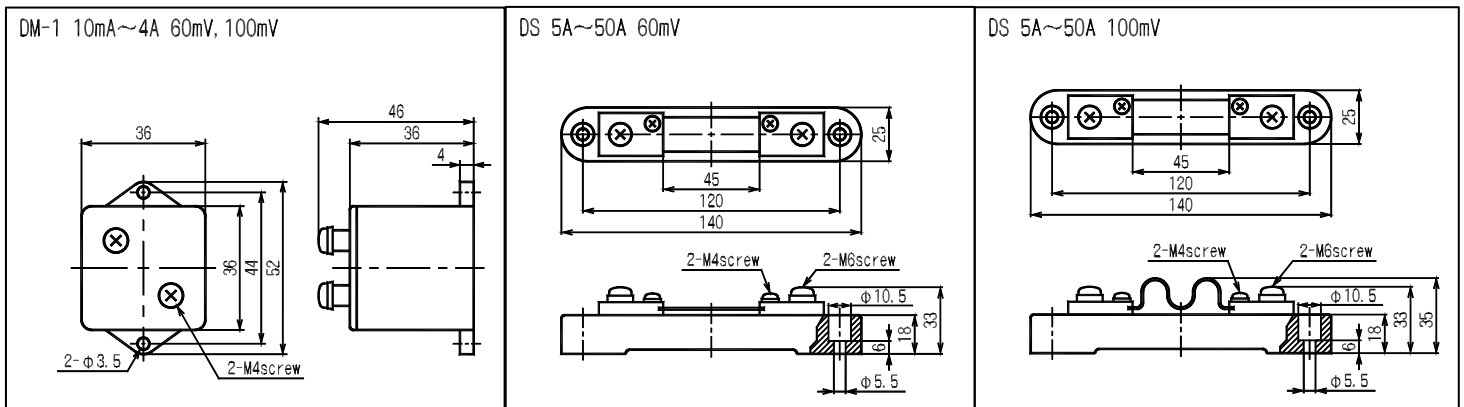




# DC SHUNTS

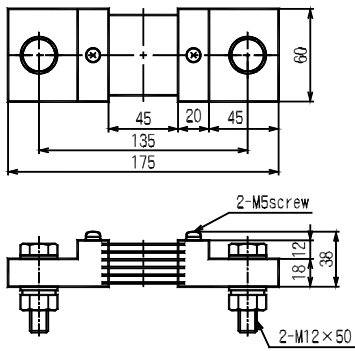
## For DC Shunts

- ◆ 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.

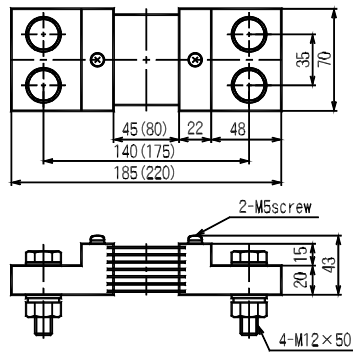


# DS SHUNTS

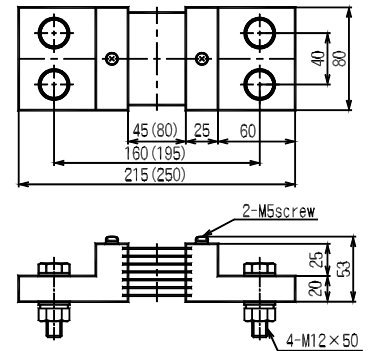
DS 1000A 60mV



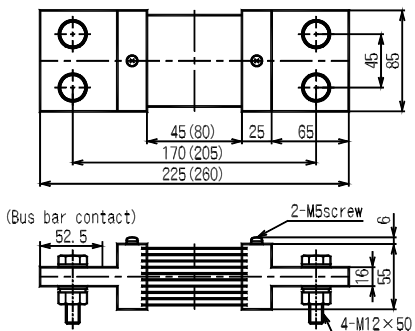
DS 1500A 60mV (1000A 100mV)



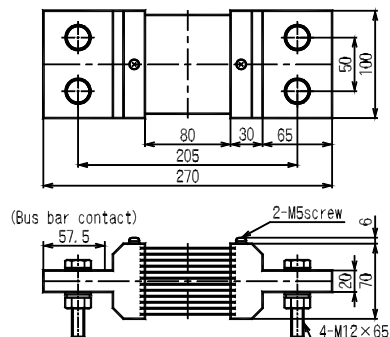
DS 2000A 60mV (1500A 100mV)



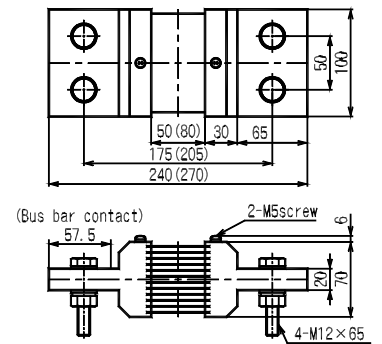
DS 2500A 60mV (2000A 100mV)



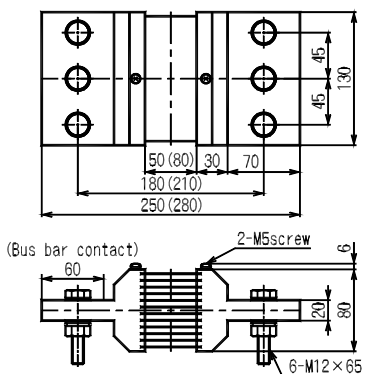
DS 2500A 100mV



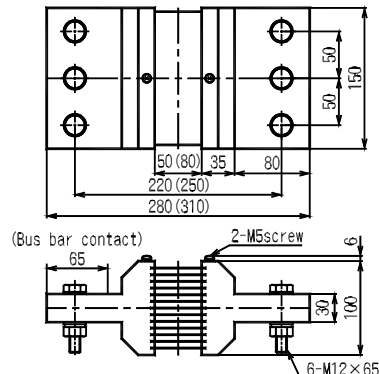
DS 3000A 60mV (100mV)



DS 4000A 60mV (100mV)



DS 5000A 60mV (100mV)

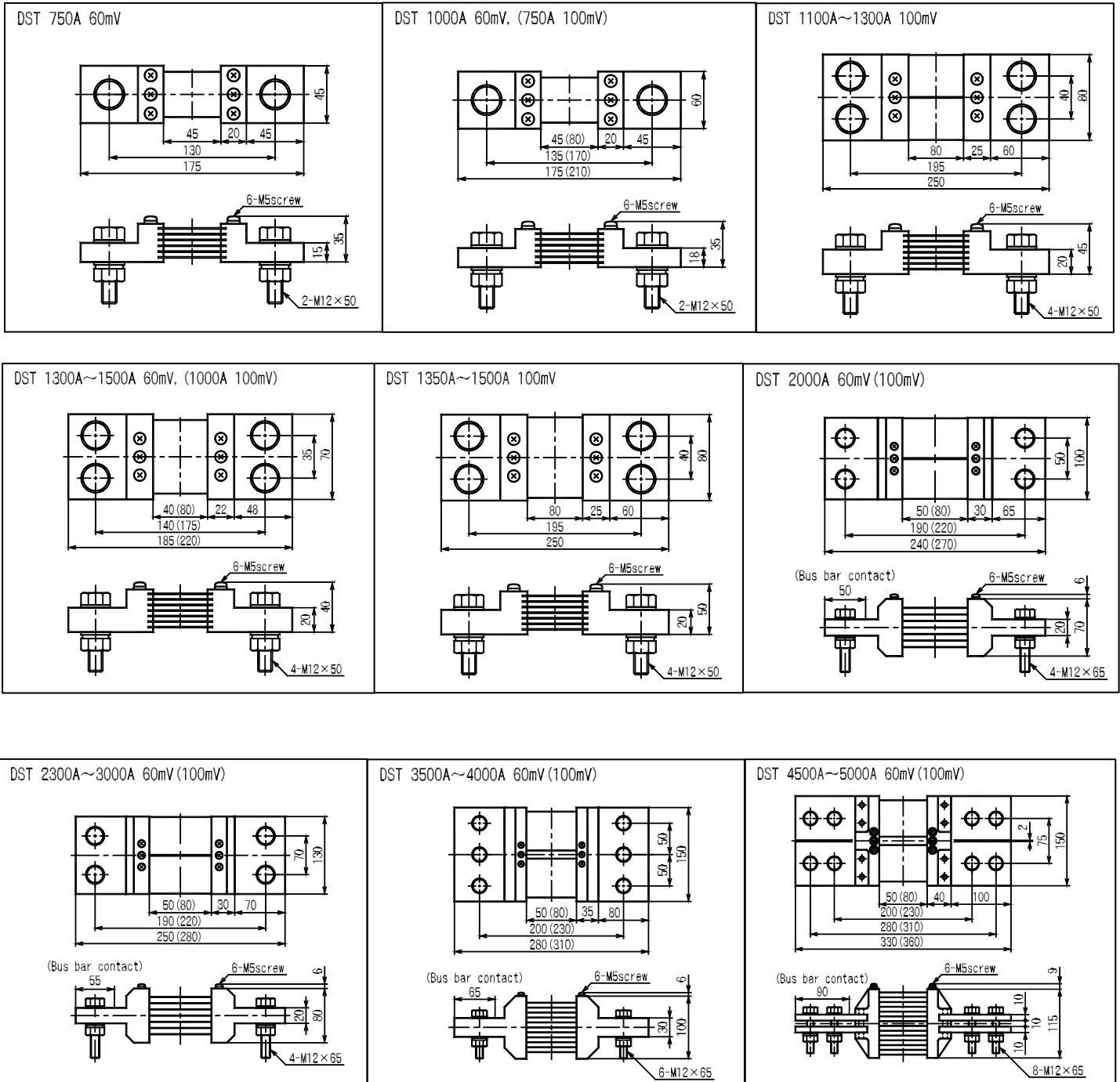


- ◆ Please consultation with us when 5000A is exceeding.
- ◆ Please inform us if the load resistance value is less than 900A (by our indication meter type name)
- ◆ Please specify the item as below when make order
  - 1) Type Name
  - 2) Input (A)/ output (mV)
  - 3) Option (with or without shunt stand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

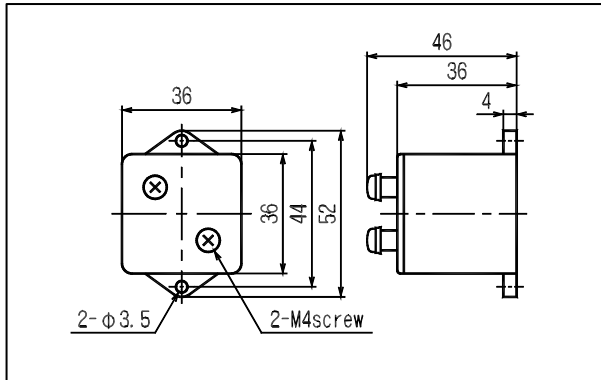


- ◆ Please consultation with us when 5000A is exceeded.

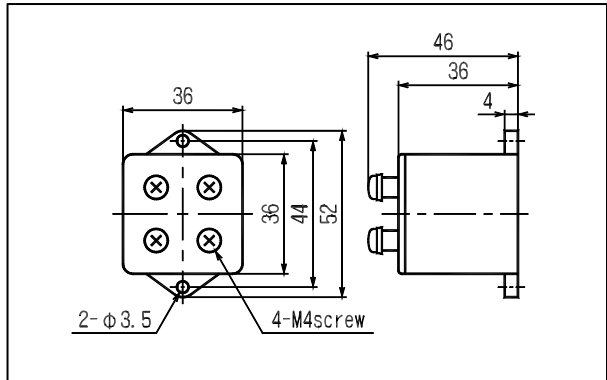
# RESISTOR SERIES

## External with Resistor Series

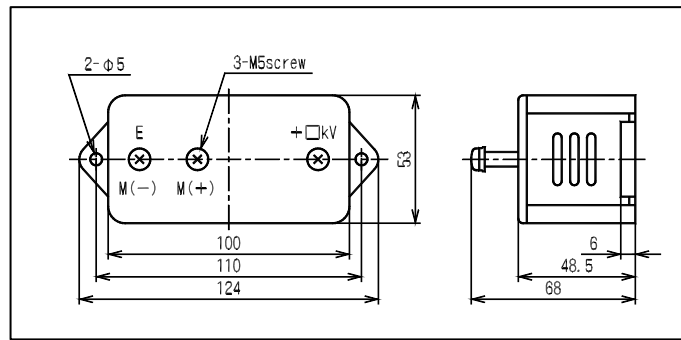
DM – 1 (Below 1000V)



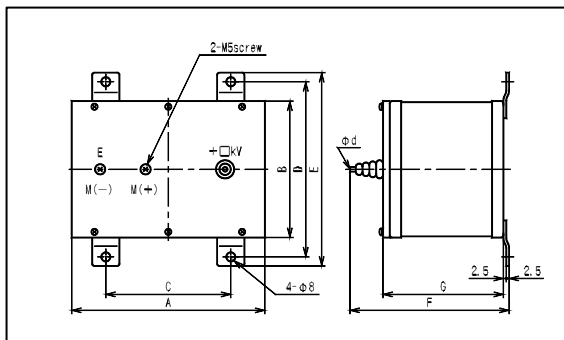
DM – 1T (Rectifier built in)



DM – 2 (Below 2500V)



DM – 5, 10, 15, 20, 25 (5~25kV)

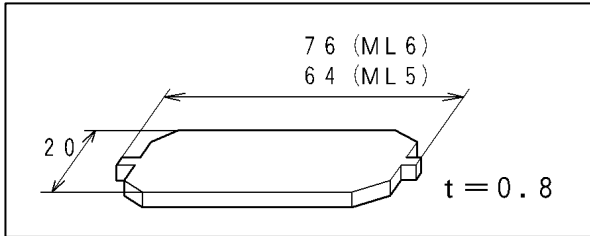


Type Name	Rated	A	B	C	D	E	F	G	d
DM – 5	5000V	170	120	110	154	170	140	106	4
DM – 10	10kV	220	160	140	194	210	140	106	4
DM – 15	15kV	290	210	200	248	264	190	146	5
DM – 20	20kV	390	260	300	294	310	220	176	5
DM – 25	25kV	500	330	400	356	372	280	236	5

# OPTIONS

## 1. TERMINAL COVER FOR TYPE WIDE ANGLE L SERIES

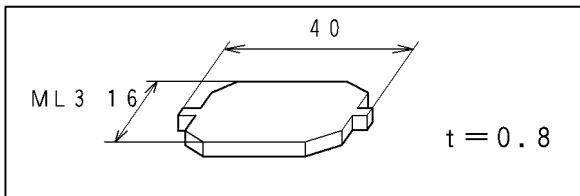
### Terminal Cover for Type ML- 6 and ML- 5



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



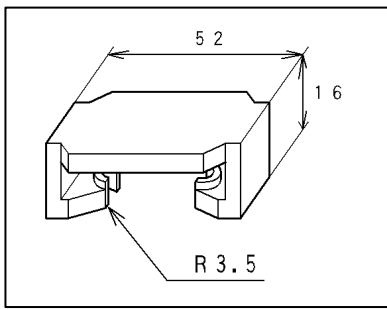
Set into terminal block

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
	WT-53MC-34 <sup>(1)</sup>	1	1
WVL-80C-12, 33, 34 Attach with transducer		-	1
	WVT-53MC-12	1	-
	WVT-53MC-33	1	1
	WVT-53MC-34 <sup>(2)</sup>	1	1
PL-80C-33, 34 Attach with transducer		-	1
	PT-53MC-33, 34	1	1

<sup>(1)</sup> For WT-53MC-34, use two OA-BCP3 made by OHM.  
<sup>(2)</sup> For WVT-53MC-34, use two OA-BCP3 made by OHM.

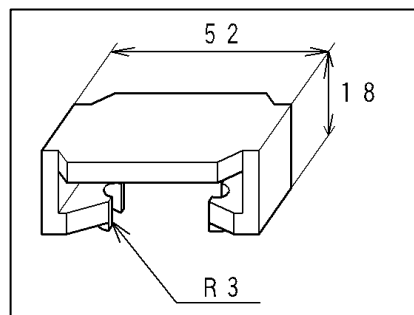
## 2. TERMINAL COVER FOR TYPE WIDE ANGLE L SERIES

### Terminal Cover For Type SL



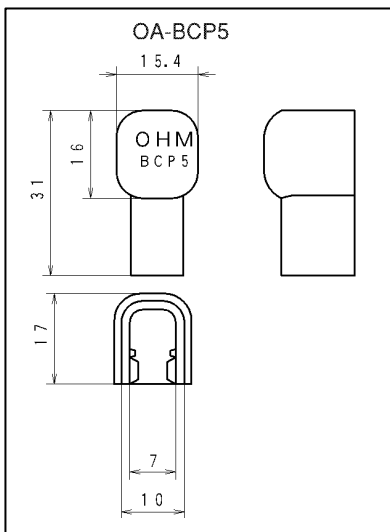
Set into terminal block

### Terminal Cover For Narrow Angle

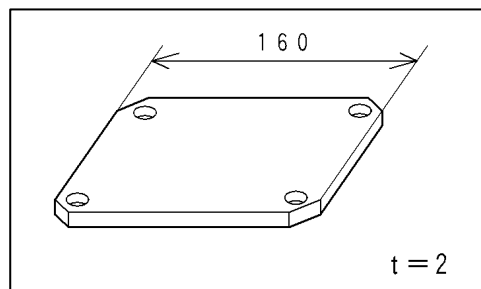


Type Name	Units Required	
	SL terminal cover	Narrow-angle terminal cover
SL-110C	1	-
SL-80C	1	-
L-65C	-	1

## 3. TERMINAL COVER FOR TYPE WIDE ANGLE L SERIES



Set into terminal fitting



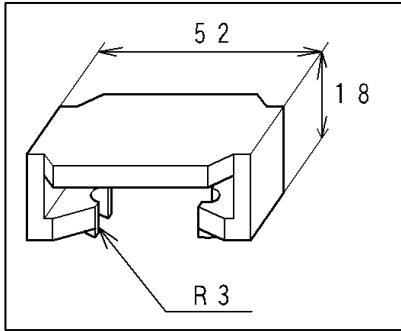
**Multiplier** covers for single phase  
Synchroscope meter (Cover: DMD-50)  
Lock screw on pillar.

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.

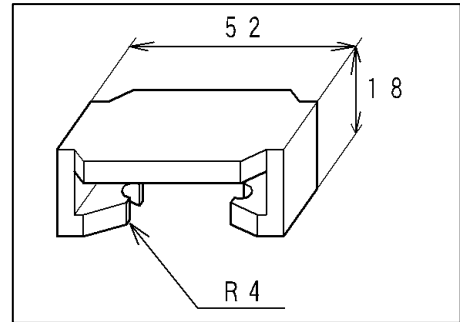
## 4. TERMINAL COVER FOR TYPE NARROW ANGLE METER COMMON

### Narrow Angle Terminal Cover



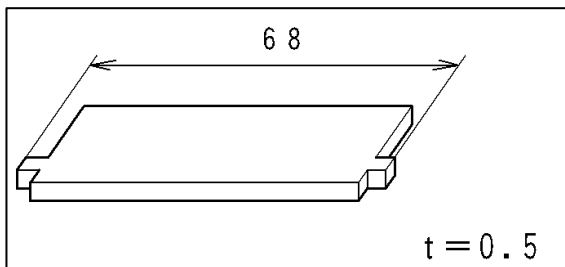
Set into terminal fitting

### 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	-
	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

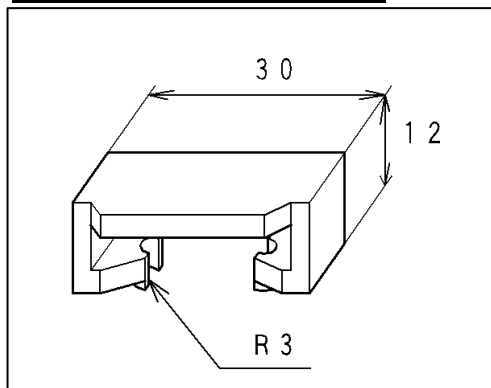


Set into terminal block

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

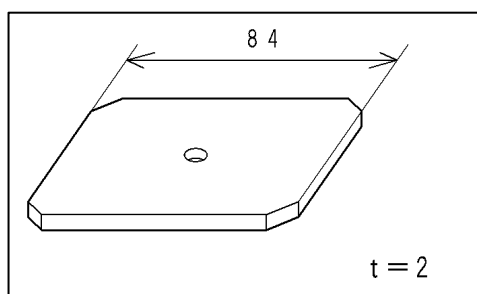


Use specify terminal cover or  
OA-BCP3 for attachment transducer

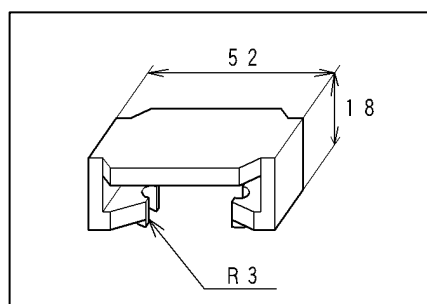
Type Name	Measurement Element	Mark	Units Required	
			1 Pointers	2 Pointers
F - 17 F - 15 F - 10	DC Current/ Voltage	M	1	2
	DC Receiving Indicator Meter	X	1	2
	AC Receiving Indicator Meter	Y		
	AC Current/ Voltage	C		
	AC Watthour Meter	W		
	AC Var Meter (balanced)	WVB		
	AC Var Meter (unbalanced)	WV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

## 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.

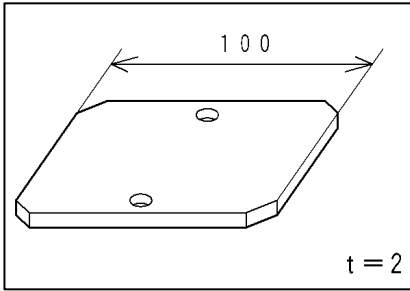
Type Name	Measurement Element	Mark	Unit Required		
			Terminal Cover PWD-96	Narrow Angle Terminal Cover	
				1 Pointer	2 Pointers
P D-96N-	Power	W	1	-	-
	Reactive Power	WV			
	Power Factor (balanced)	P			
	Power Factor (unbalanced)	PB			
P D-96- -	Power	W	-	1	1
	Reactive Power	WV			
	Power Factor (balanced)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

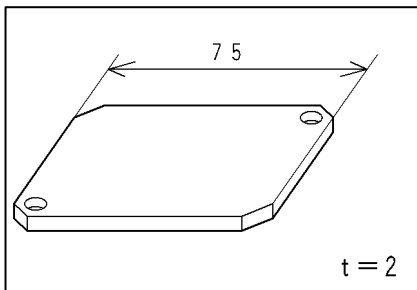


Lock screw on pillar.

Type Name	Measurement Element	Mark	Terminal Cover Type EL
			Units Required
Wide Angle Meter Relay EL-110C	DC Current/ Voltage	M	1
	DC Receiving Indicator Meter	X	
EP Series Normal Angle Meter Relay (All-in-one Type Relay Box) EP-100NC/ 120NC	AC Receiving Indicator Meter	Y	
	AC Current/ Voltage	S	
EK Series Normal Angle Meter Relay (All-in-one Type Relay Box) EK-12NC	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



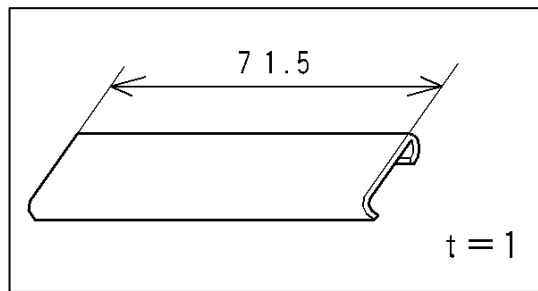
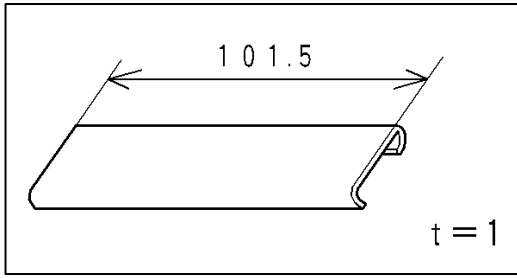
Lock screw on pillar.

Attached Relay Box	Terminal Cover Type DM – 61
Type Name	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 Serie

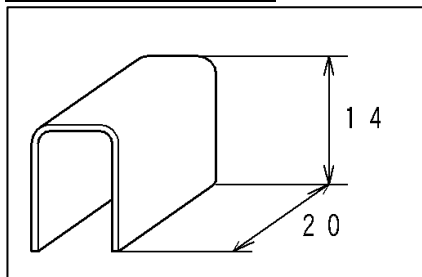


Type Name	Measurement Element	Mark	Terminal Cover For EF Series
			Units Required
EF - 17	DC Current/ Voltage	M	1
EF - 15	DC Receiving Indicator Meter	X	
	AC Receiving Indicator Meter	Y	
	AC Current/ Voltage	S	
	AC Current/ Voltage	C	
	AC Watthour Meter	W	
	AC Var Meter (balanced)	WVB	
	AC Var Meter (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



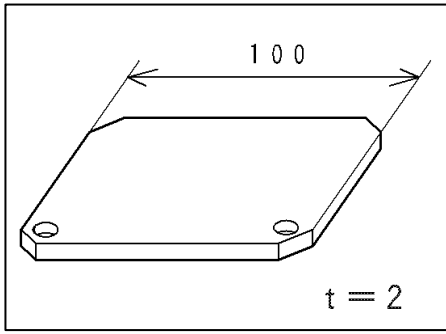
Set into terminal fitting

Type Name	Measurement Element	Mark	Terminal cover for MRL
Highest (Lowest) Indicator Meter	DC Current/ Voltage	M	2
	DC Receiving Indicator Meter	X	
	AC Receiving Indicator Meter	Y	
RL-110CH, 110CL, 110CHL	AC Current/ Voltage	S	2 addition for electromagnetism return 2 addition for Aux. Power Supply
	AC Current/ Voltage	C	
	AC Watthour Meter	W	
RL-80CH, 80CL, 80CHL	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

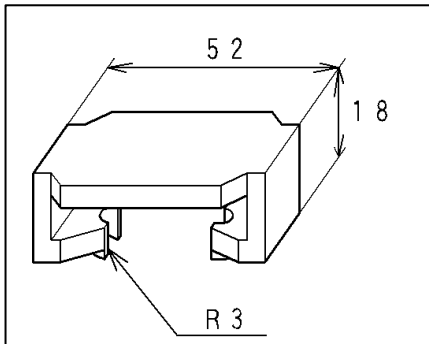


Lock by screw

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

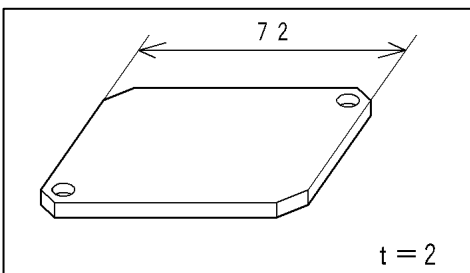
## 13. TERMINAL COVER FOR MAX. DEMAND AMMETER



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

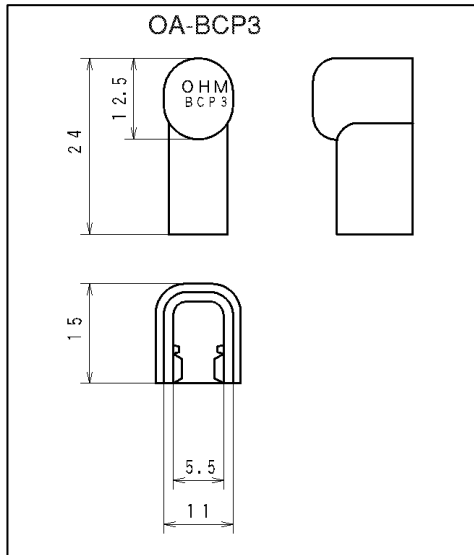
## 14. TERMINAL COVER FOR AUXILIARY CT



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

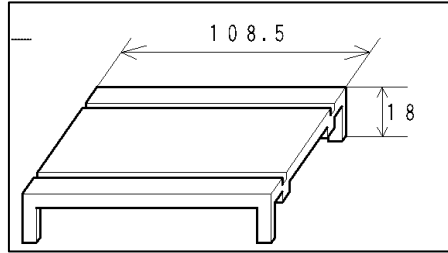
Please use accessory CT cover for Accessory CT, MR-CTN.

## 15. ATTACHMENT TRANSDUCER TERMINAL COVER



Set into terminal fitting

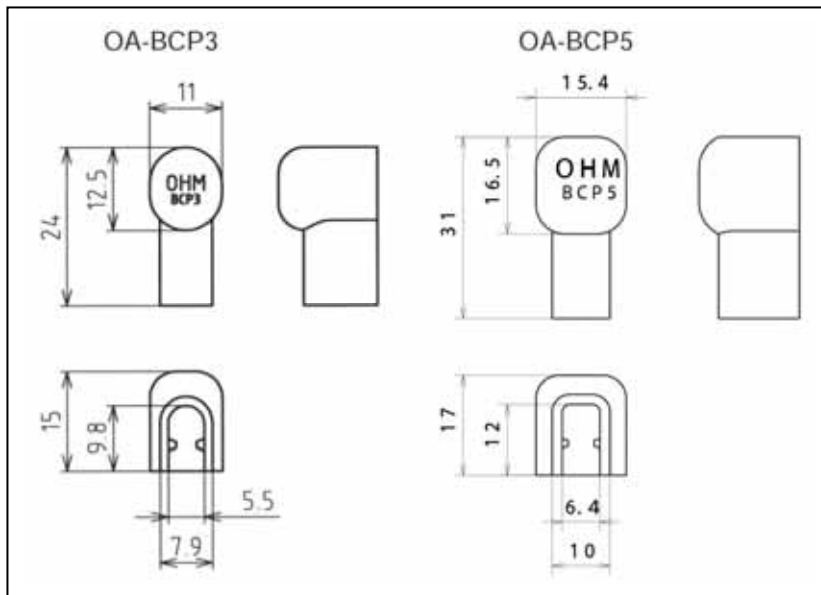
### Terminal Cover for T-83M



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

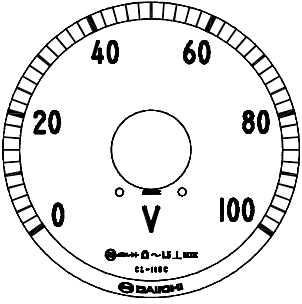
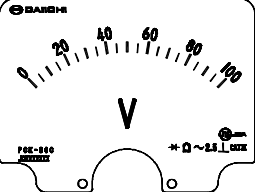
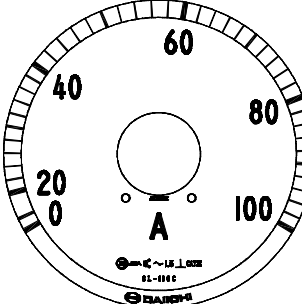
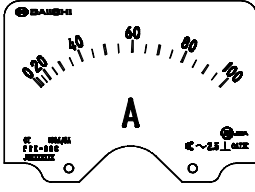
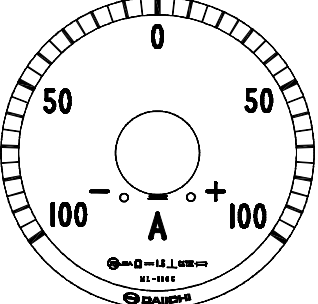
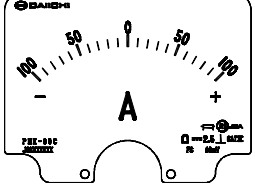
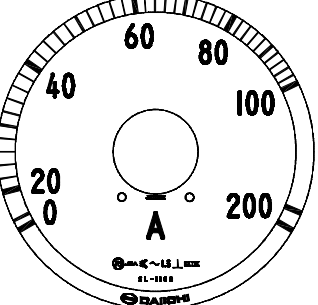
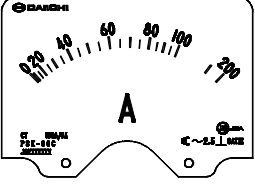
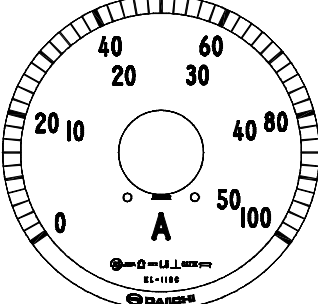
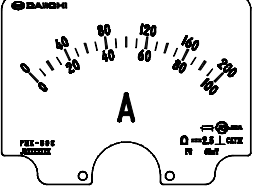
## 16. SERIES RESISTOR TERMINAL COVER



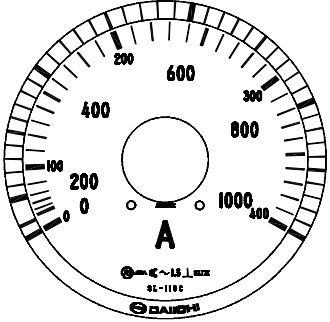
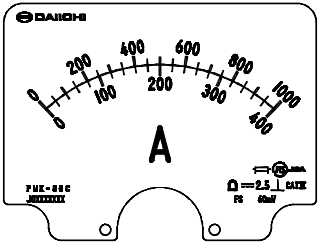
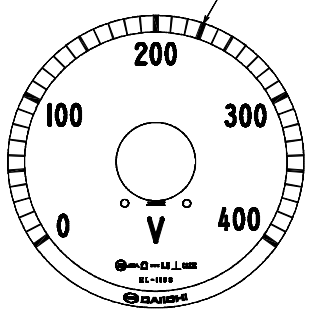
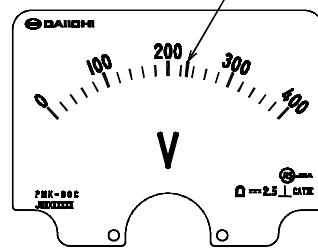
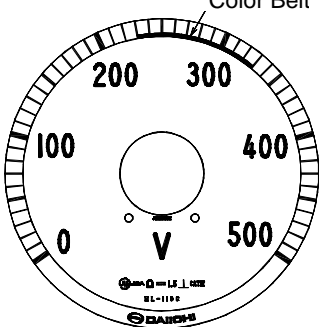
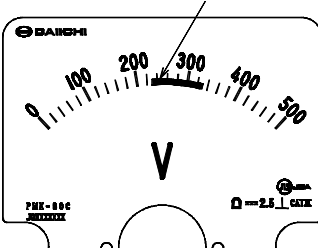
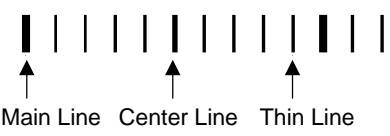
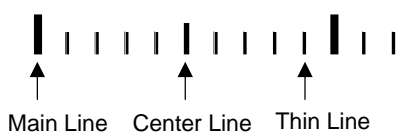
Set into terminal fitting

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
<b>Standard Scale</b> 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		
<b>± Scale Meter (Both Side Deflect Meter)</b> Scale digit: Black Scale line : Black Unit mark : Black		
<b>Extend Scale (2-Fold Extend)</b> Scale digit: Black ; Extend part: Red Scale line : Black ; Extend part: Red Unit mark : Black		
<b>Single Scale Double Seal Meter</b> 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

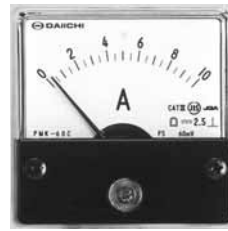
Scale Specification	Wide Angle Meter Ex.: L-110C	Square Shape Meter Ex.: PK-80C
<p><b>Double Scale Double Seal</b></p> <p>Scale digit: Black Scale line : Black Unit mark : Black Scale division : Refer to standard lancet shape pointer division Standard place a seal of scale figure : Higher value will display at outside &amp; smaller value will display at inside For wide angle meter : Higher value will display at inside &amp; smaller value will display at outside</p>		
<p><b>Coloring Scale (Color Line)</b></p> <p>Scale color line : Red, Yellow, Green Possible combine the color line &amp; color figure to use for double scale</p>		
<p><b>Color Belt</b></p> <p>Color Belt : Red, Yellow, Green</p>		
<p><b>Scale line and Scale figure</b></p> <p>1) Type of scale line Scale figure will print at main line Please refer to standard lancet shape pointer division &amp; 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 <math>36 \times 1000 \text{min}^{-1}</math></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 &amp; RL series)</p> <p>Square Share Meter BRL &amp; 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.