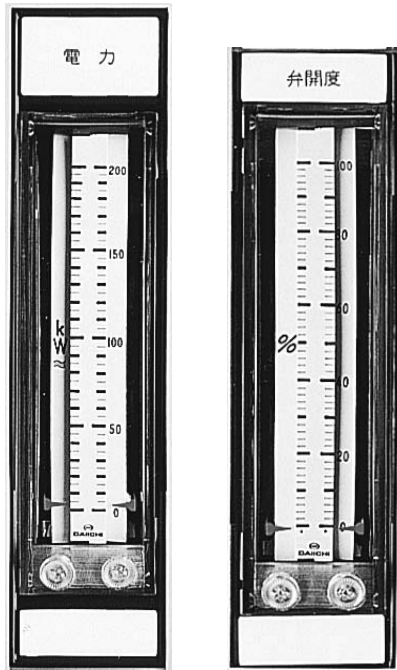


EDGEWISE INSTRUMENT - F SERIES



F-17-2T

F-15-2T

OUTLINE

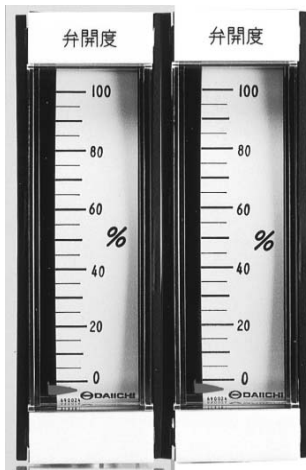
Regarding the various kinds of modern process control system and electronic equipment, miniaturization of the instrument panel, low power consumption with improvement of safety, reliability pointing for the resource saving and energy saves. In addition, according to requirement from human engineering, product designs have been much improved.

Concerning the electrical indicating meter widely required of better space factor and complete function as man-machine interfaces as well as the improvement of quality and reliability.

Edgewise type instrument (F Series) can respond to a request from user and be used with high reliability, since it has been developed based on the long time experiences of our company as an expertise and specialist manufacturer of the indicating meters.

FEATURES

- ▶ High quality and high performance meter.
 - ▶ Flanged type.
 - ▶ Meter can be attached or removed from front of panel.
 - ▶ Thin type and multiple attached on panel is possible
 - ▶ 2 pieces of meter element can be built-in (2 pointer type).
- Most suitable for comparative measuring (F-17, 15 only)
- ▶ Name plates were attached on the top and bottom of the meter, so it is possible to indicate the measurement point tag No. etc.
 - ▶ When precise indication is needed the meter can be fine adjustment from rear part.
 - ▶ Received indicator scale of physical value can be manufactured.
 - ▶ Adopting transducer with electronics technology can be chosen the optimum ones from midst of the abundant type for use.
 - ▶ Meter with Incombustible material can be manufactured as specify.



F-10-1T

Edgewise Instrument - F Series

TYPE CODE DESIGNATION

(1) F - (2) - (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 | Transducer |

(2) Shape

| Mark | Edgewise Instrument |
|------|---------------------|
| 17 | 170 × 40 |
| 15 | 150 × 40 |
| 10 | 100 × 30 |

(3) Meter Mounting Direction

| Mark | Mounting Direction |
|------|---------------------------|
| 1T | 1 pointer vertical type |
| 1Y | 1 pointer horizontal type |
| 2T | 2-pointer vertical type |
| 2Y | 2-pointer horizontal type |

(4) Kind of Circuit

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

Edgewise Instrument - F Series

COMMON STANDARD SPECIFICATIONS

| ITEM | SPECIFICATION | |
|---|--|--|
| Standard | JIS1102:2007 [Electric Indicating Meter Direct Acting Type] Compliant IEC 60051-1 Compliant | |
| Class | Refer to [List of F Series] | |
| Support system | Pivot system (Part of system is Taut band) | |
| Swing angle of meter | 45° | |
| Dimensions meter from front | F-17: 170×40mm F-15: 150×40mm F-10: 100×30mm | |
| Length of scale | F-17, 15: 90mm F-10: 66mm | |
| Color of scale plate | White | |
| Pointer | Triangle (Red) | |
| Installation posture | Vertical type, Horizontal type | |
| Material panel | Iron & non-iron plate | |
| Thickness panel | 7mm or less | |
| Color of cover (Color of the collar frame F-series) | F-17, 15 | Black (Munsell N1.5), Dark blue (Munsell 7.5BG 4/1.5) |
| | F-10 | Black (Munsell N1.5) |
| Material of case (Material of the mounting frame F-series) | Aluminum die-cast (For F-17, 15 only) Fixing frame for F-10 is integral construction with base ABS resin. | |
| 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 | CAT III |
| | Max. circuit voltage | 600V (Ammeter) |
| Operated temperature/ Humidity limit | -10~55°C, Average day temperature 40°C or less, 25~85% RH (Reference ambient temperature 45°C for steel ship rules) | |
| 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 |
|----------------------------|----|-----|----|-----|----|----|----|----|------|----|----|
| F-17, F-15 | 50 | 75 | 40 | 50 | 60 | 40 | 50 | 60 | 75 | 40 | 45 |
| F-10 | 20 | 30 | 40 | 25 | 30 | 40 | 25 | 30 | 37.5 | 40 | 45 |

Edgewise Instrument - F Series

COMMON SPECIAL SPECIFICATIONS (Please Specify)

| ITEM | | SPECIFICATION |
|-----------------------------|---------------------|--|
| Scale | Color line | Red, Green, Blue, Yellow (please specify) |
| | Extend scale | CF: 2~5-time extend |
| | Color area (bar) | Red, Green, Blue, Yellow (please specify) |
| | Double scale | Please specify |
| | Double seal | Please specify |
| | Max. scale division | F-17,15:100 division ; F-10:75 division |
| | Special mark | Please specify |
| Tropical specification | | Rust preventative, 「FOR TROPICS」 will display at the name plate |
| Pointer | | Rod shape (black), combine use with multiple scale etc. |
| Control pointer | | Lancet shape (red), 2 control pointer also possible to manufacture (red×2) |
| Installation posture | | Horizontal, or Inclined (specify the angle) |
| Material of flame retardant | | Cover Polycarbonate resin |
| For SCR control waves use | | AC current, AC voltage, wattmeter, reactive power, frequency |
| For cycle control use | | AC current, AC voltage (Rectifier Type) |
| Test report | | Specify the useful frequency and number copies of report require |
| Scale (single item) | | Please specify |
| Terminal cover | | Please consultation with us |
| Others | | Please consultation with us for special frequency |

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 or var meter, please refer to List of Standard Max. Scale Value.
Please specify frequency of the power factor meter according to the specification.

Edgewise Instrument - F Series

LIST OF FK SERIES

| MODEL | | F - 17 | | F - 15 | | F - 10 | | |
|------------------------|-----------------------------|------------|-------------|---------|-------------|---------|-------------|-----|
| Product | Principle | Type | Class | Type | Class | Type | Class | |
| DC Ammeter | Moving coil | MF-17-□ | 1.0 | MF-15-□ | 1.0 | MF-10-□ | 2.5 | |
| DC Voltmeter | | MF-17-□ | 1.0 | MF-15-□ | 1.0 | MF-10-□ | 2.5 | |
| DC Receiving Indicator | Moving coil | XF-17-□ | 1.0 | XF-15-□ | 1.0 | XF-10-□ | 2.5 | |
| AC Receiving Indicator | Rectifier | YF-17-□ | 1.5 | YF-15-□ | 1.5 | YF-10-□ | 2.5 | |
| AC Ammeter | Rectifier | CF-17-□ | 1.5 | CF-15-□ | 1.5 | CF-10-□ | 2.5 | |
| AC Voltmeter | | CF-17-□ | 1.5 | CF-15-□ | 1.5 | CF-10-□ | 2.5 | |
| Watt Meter | Single phase | Transducer | WF-17-□-12 | 1.5 | WF-15-□-12 | 1.5 | WF-10-□-12 | 2.5 |
| | Single phase 3-wire | | WF-17-□-13 | 1.5 | WF-15-□-13 | 1.5 | WF-10-□-13 | 2.5 |
| | 3 phase | | WF-17-□-33 | 1.5 | WF-15-□-33 | 1.5 | WF-10-□-33 | 2.5 |
| | 3 phase 4-wire | | WF-17-□-34 | 1.5 | WF-15-□-34 | 1.5 | WF-10-□-34 | 2.5 |
| Var Meter | Single phase | Transducer | WVF-17-□-12 | 1.5 | WVF-15-□-12 | 1.5 | WVF-10-□-12 | 2.5 |
| | 3 phase (unbalanced) | | WVF-17-□-33 | 1.5 | WVF-15-□-33 | 1.5 | WVF-10-□-33 | 2.5 |
| | 3 phase 4-wire | | WVF-17-□-34 | 1.5 | WVF-15-□-34 | 1.5 | WVF-10-□-34 | 2.5 |
| Power Factor Meter | Single phase | Transducer | PF-17-□-12 | 5.0 | PF-15-□-12 | 5.0 | PF-10-□-12 | 5.0 |
| | 3 phase (balanced) | | PBF-17-□-33 | | PBF-15-□-33 | | PBF-10-□-33 | |
| | 3 phase (unbalanced) | | PF-17-□-33 | | PF-15-□-33 | | PF-10-□-33 | |
| | 3 phase 4-wire (balanced) | | PBF-17-□-34 | | PBF-15-□-34 | | PBF-10-□-34 | |
| | 3 phase 4-wire (unbalanced) | | PF-17C-□-34 | | PF-15-□-34 | | PF-10-□-34 | |
| Frequency Meter | Transducer | AF-17-□ | 1.0 | AF-15-□ | 1.0 | AF-10-□ | 1.0 | |

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

DC Ammeter (Moving Coil Type) - MF

AMMETER

| Max. Scale Value | Approx. Internal Resistance or Voltage Drop | | Accessory |
|------------------------|---|-------|-----------|
| | MF-17, 15 | MF-10 | |
| 100μA | 4kΩ | 550Ω | — |
| 200μA | 1.8kΩ | 450Ω | |
| 500μA | 510Ω | 66Ω | |
| 1mA | 160Ω | 48Ω | |
| 2mA | 81Ω | 7.2Ω | |
| 5mA | 12Ω | 12Ω | |
| 10mA | 6Ω | 2Ω | |
| 20mA | 3Ω | 1.7Ω | |
| 30mA~500mA | 60mV | | |
| 1A~10kA ⁽¹⁾ | 60mV | | |

► Meter up to 1Ω will manufacture when lead wire resistance value 0.07Ω is exceeds. Please specify.

Lead Wire Resistance Value

| Cross Section (mm ²) | Annealed Copper (Ω/m) | Remarks |
|----------------------------------|-----------------------|-------------------------------------|
| 1.25 | 0.0165 | JIS C 3317 (HIV) JIS C 3307 (IV) |
| 2.0 | 0.00924 | |
| 3.5 | 0.00520 | Twist wire |

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

► Meter both deflection also can be manufacture.

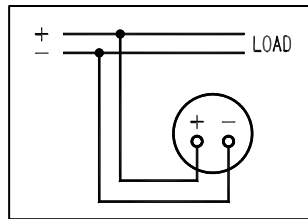
Note:

⁽¹⁾ When 1A is exceeds, shunt will external to meter 60mV.

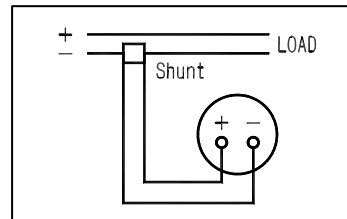
Meter 50mV, 100mV also can be manufacture.

⁽²⁾ Lead wire of shunt is not attached. Standard lead wire resistance is 0.07Ω (1.25mm²)

Connection Diagram

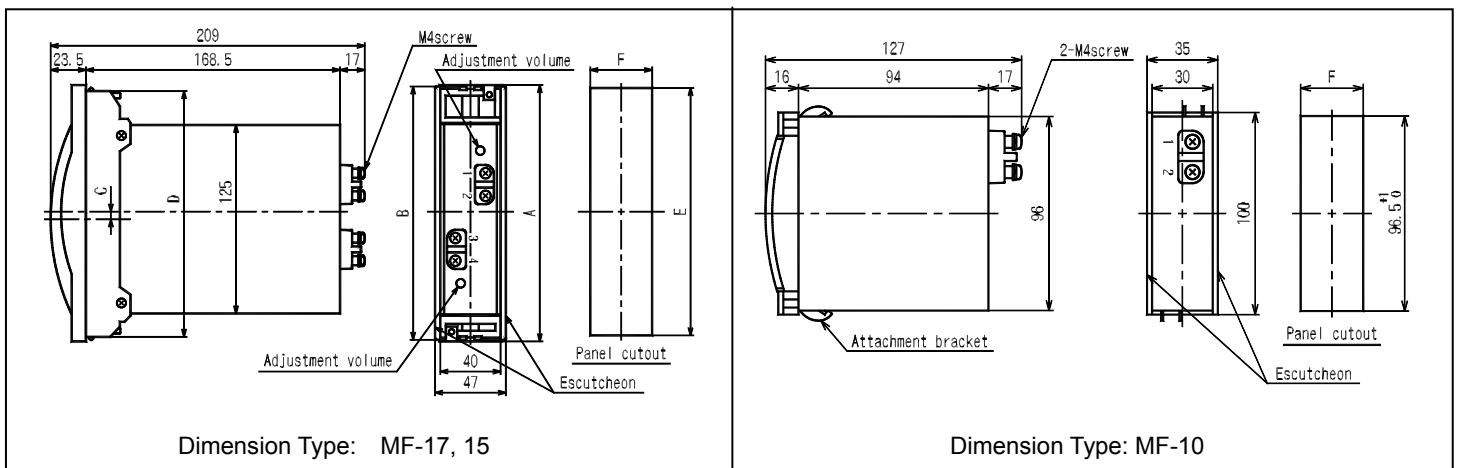


Ammeter



Ammeter external with Shunt

Dimensions



Dimension Type: MF-17, 15

Dimension Type: MF-10

| Type | A | B | C | D | E | F | | Weight (g) | |
|-------|-----|-----|---|-----|-----------|----------------------------------|--|------------|-----------|
| | | | | | | 1 unit | 2-unit or above | 1 pointer | 2-pointer |
| MF-17 | 168 | 170 | 4 | 163 | 164 ± 0.5 | 41 ⁺¹ / ₋₀ | (41 × n) ⁺¹ / ₋₀ | 400 | 500 |
| MF-15 | 148 | 150 | 0 | 145 | 146 ± 0.5 | 41 ⁺¹ / ₋₀ | (41 × n) ⁺¹ / ₋₀ | 400 | 500 |
| MF-10 | — | | | | | 31 ⁺¹ / ₋₀ | (30 × n) ⁺¹ / ₋₀ + 1 | 160 | |

Please assemble the meter in the center of the panel if you need continuous assemble.
Or please contact and discuss with us if you need to continuous assemble more than 10 units.

* n = unit of meter

DC Voltmeter (Moving Coil Type) - MF

VOLTMETER

| Max. Scale Value | Approx. Internal Resistance or Voltage Drop | Accessory |
|--|---|-----------------|
| | MF-17, 15, 10 | |
| 50mV~900mV | 4mA | — |
| 1V~600V ⁽¹⁾ | 1mA | |
| 750V/1mA ⁽²⁾ ? 25kV/1mA | 1mA | Series resistor |

Note:

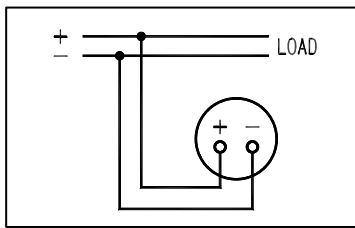
⁽¹⁾ Internal resistance until 5kΩ/V will be manufacture when voltmeter 1V is exceeds.

⁽²⁾ When 600V is exceeds, series resistor will external to meter 1mA.

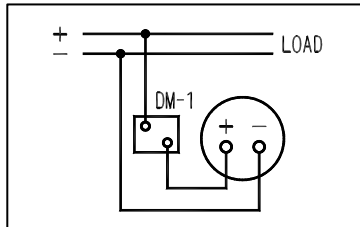
▶ Meter both deflection also can be manufacture.

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

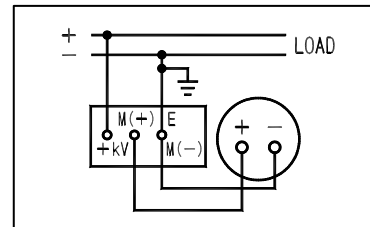
Connection Diagram



Voltmeter

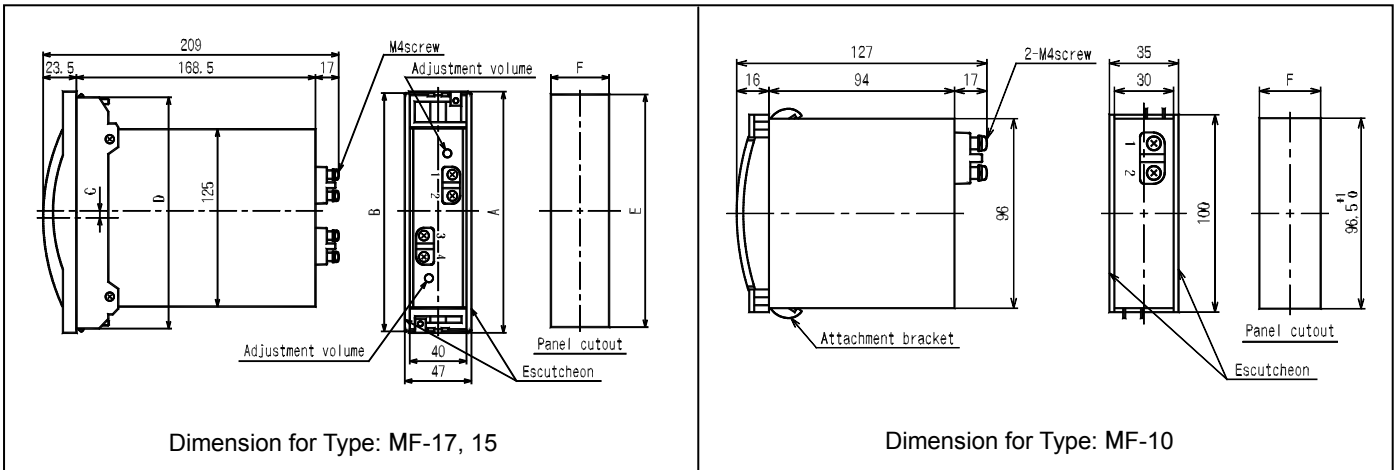


Voltmeter external with Series resistor (DM-1)



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

Dimensions



Dimension for Type: MF-17, 15

Dimension for Type: MF-10

| Type | A | B | C | D | E | F | | Weight (g) | | |
|-------|-----|-----|---|-----|---------|--------------------------------|------------------------------------|------------|-----------|--|
| | | | | | | 1 unit | 2-unit or above | 1 pointer | 2-pointer | |
| MF-17 | 168 | 170 | 4 | 163 | 164±0.5 | 41 ⁺¹ ₋₀ | (41×n) ⁺¹ ₋₀ | 400 | 500 | |
| MF-15 | 148 | 150 | 0 | 145 | 146±0.5 | 41 ⁺¹ ₋₀ | (41×n) ⁺¹ ₋₀ | 400 | 500 | |
| MF-10 | — | | | | | 31 ⁺¹ ₋₀ | (30×n) ⁺¹ ₋₀ | +1 | 160 | |

Please assemble the meter in the center of the panel if you need continuous assemble.
Or please contact and discuss with us if you need to continuous assemble more than 10 units.

* n = unit of meter

DC Receiving Indicator Meter (Moving Coil Type) - XF

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% **Input electric quantity DC 3V**

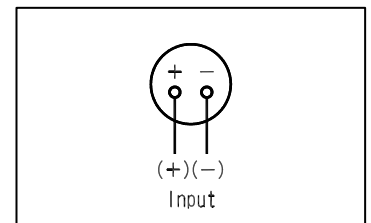
Scale value 0~2MPa **Input electric quantity DC 4~20mA**

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

DC RECEIVING INDICATOR

| Max scale value meter specific | Internal Resistance Overview | | Max. scale value meter specific | Consumption Current |
|--------------------------------|------------------------------|--------------|---------------------------------|---------------------|
| | XF-17, 15 | XF-10 | | XF-17, 15, 10 |
| 100 μ A | 4k Ω | 550 Ω | 1V | 1mA ⁽²⁾ |
| 500 μ A | 510 Ω | 66 Ω | 2V | |
| 1mA | 160 Ω | 48 Ω | 1~5V ⁽¹⁾ | |
| 2mA | 81 Ω | 7.2 Ω | 5V | |
| 5mA | 12 Ω | 12 Ω | 10V | |
| 10mA | 6 Ω | 2 Ω | 15V | |
| 16mA | 3.8 Ω | 1.7 Ω | 20V | |
| 20mA | 3 Ω | 1.7 Ω | 50V | |
| 4~20mA ⁽¹⁾ | 3.8 Ω | 1.7 Ω | ? | |
| 10~50mA ⁽¹⁾ | 1.5 Ω | 1.5 Ω | 300V | |

Connection Diagram



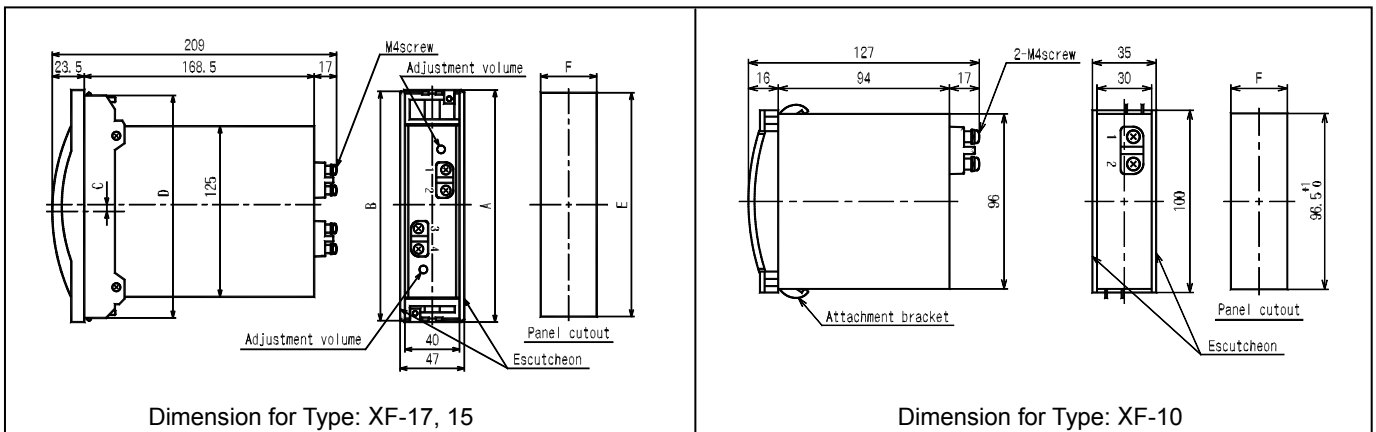
DC Receiving Indicator

Note:

- ⁽¹⁾ 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 in input.
- ⁽²⁾ Consumption current for VR internal meter is 1mA.

► Meter both deflection also can be manufacture.

Dimensions



| Type | A | B | C | D | E | F | | Weight (g) | |
|-------|-----|-----|---|-----|---------------|-----------------|----------------------------------|------------|-----------|
| | | | | | | 1 unit | 2-unit or above | 1 pointer | 2-pointer |
| XF-17 | 168 | 170 | 4 | 163 | 164 ± 0.5 | 41 $^{+1}_{-0}$ | (41 $\times n$) $^{+1}_{-0}$ | 400 | 500 |
| XF-15 | 148 | 150 | 0 | 145 | 146 ± 0.5 | 41 $^{+1}_{-0}$ | (41 $\times n$) $^{+1}_{-0}$ | 400 | 500 |
| XF-10 | — | | | | | 31 $^{+1}_{-0}$ | (30 $\times n$) $^{+1}_{-0}$ +1 | 160 | |

Please assemble the meter in the center of the panel if you need continuous assemble.
Or please contact and discuss with us if you need to continuous assemble more than 10 units.

* n = unit of meter

AC Receiving Indicator Meter (Rectifier Type) - YF

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:

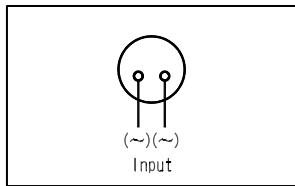
- Scale value 100%** **Input electric quantity DC 3V**
- Scale value 0~2 MPa** **Input electric quantity DC 4~20mA**

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

AC AMMETER

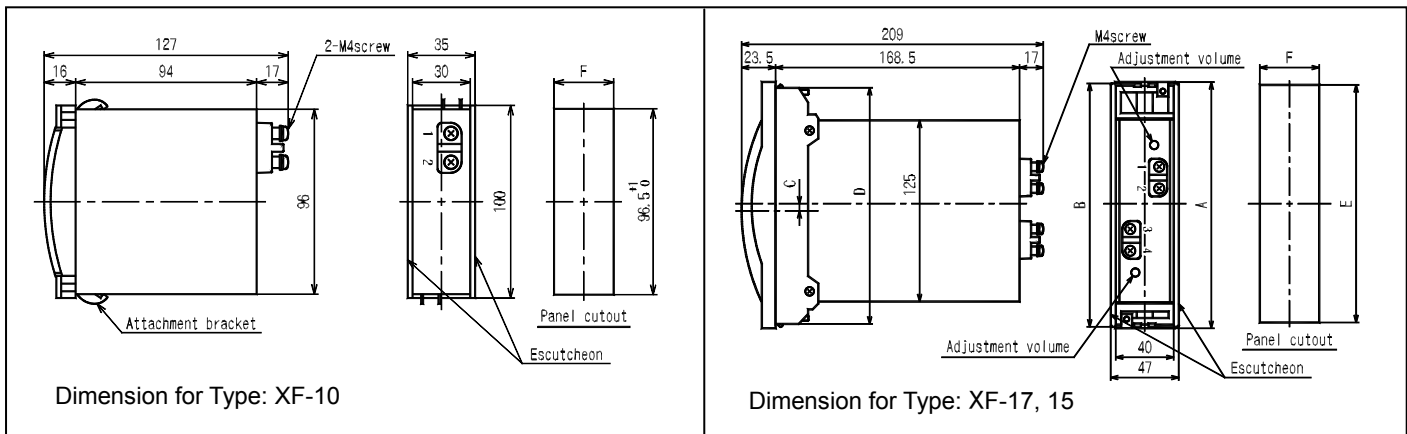
| Max. scale value meter specific | Internal Resistance or Consumption VA | Max. scale value meter specific | Consumption Current | |
|---------------------------------|---------------------------------------|---------------------------------|---------------------|-------|
| | YF-17, 15, 10 | | YF-17, 15 | YF-10 |
| 200 μ A | 4k Ω | 3V | 1.5mA | 1mA |
| 500 μ A | 1.5k Ω | ~ | | |
| 1mA | 800 Ω | 25V | 1mA | |
| 2mA | 500 Ω | 30V | | |
| 5mA | 300 Ω | ~ | | |
| 10mA | 0.5VA | 300V | | |
| 20mA | | | | |

Connection Diagram



AC Receiving Indicator

Dimensions



| Type | A | B | C | D | E | F | | Weight (g) | |
|-------|-----|-----|---|-----|---------------|--------------------------------|---|------------|-----------|
| | | | | | | 1 unit | 2-unit or above | 1 pointer | 2-pointer |
| YF-17 | 168 | 170 | 4 | 163 | 164 \pm 0.5 | 41 ⁺¹ ₋₀ | (41 \times n) ⁺¹ ₋₀ | 400 | 500 |
| YF-15 | 148 | 150 | 0 | 145 | 146 \pm 0.5 | 41 ⁺¹ ₋₀ | (41 \times n) ⁺¹ ₋₀ | 400 | 500 |
| YF-10 | — | | | | | 31 ⁺¹ ₋₀ | (30 \times n) ⁺¹ ₋₀ | 160 | |

Please assemble the meter in the center of the panel if you need continuous assemble.
Or please contact and discuss with us if you need to continuous assemble more than 10 units.

* n = unit of meter

AC Ammeter (Rectifier Type) - CF

AMMETER

| Max. Scale Value | Approx. Internal Resistance or Consumption VA | Accessory |
|-----------------------------|---|--------------------|
| | CF-17, 15, 10 | |
| 200μA | 4.5kΩ | — |
| 500μA | 1.5kΩ | |
| 1mA | 800Ω | |
| 2mA | 500Ω | |
| 5mA ⁽²⁾ | 300Ω | |
| 10mA ~ 300mA ⁽²⁾ | 0.5VA | |
| 350mA ~ 10A | 1VA | MR-CTN (CF-17, 15) |
| 15A ~ 30A | 1VA | MR-CTN |
| 35A ~ 100A ⁽¹⁾ | 1VA | MR-CTN |

Note:

⁽¹⁾ When 100A or 600V circuit voltage is exceeds, please external current transformer (CT) to meter 5A (0.1A, 1A).

⁽²⁾ External overcurrent protection to ammeter 300mA 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 Wareform Meter

Please use cycle control for cycle control wareform type. (Type Name: CTF-□-□, External with AT-62MEC)

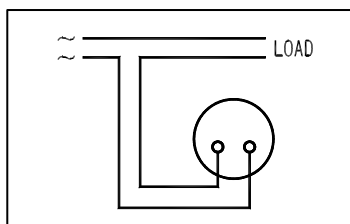
For Distorted Wareform Meter (Approx. RMS value rectifier menthod)

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

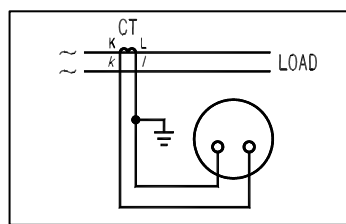
Please use approx. RMS value rectifier method for third harmonics mixed with waveform and SCR waveform.

(Type Name: CTF-□-□, External with AT-62ME)

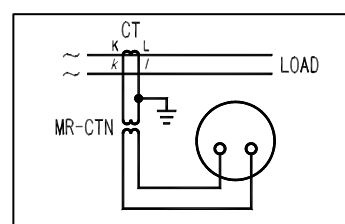
Connection Diagram



Ammeter



Ammeter with CT or MR-CTN



Ammeter with CT and MR-CTN

| Current (A) | d |
|-------------|-------|
| 30~70 | Φ 6.5 |
| 75~100 | Φ 8.5 |

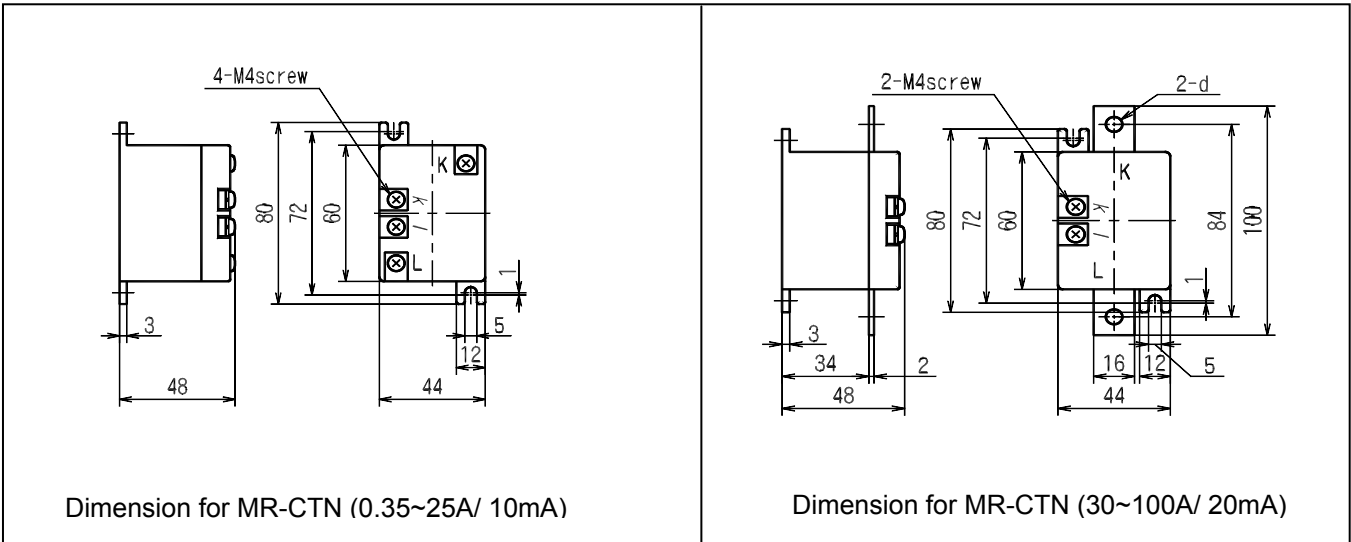
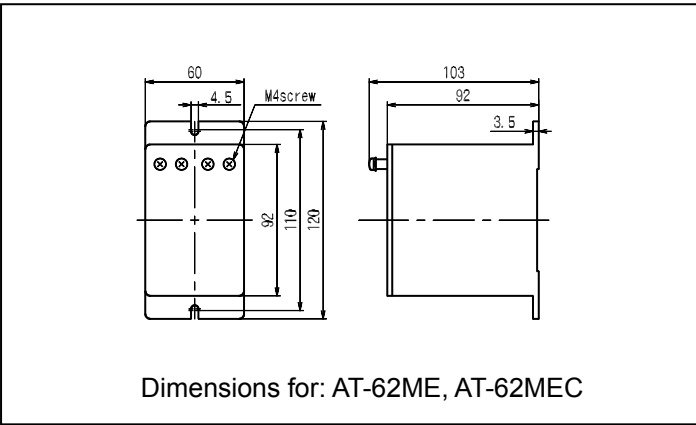
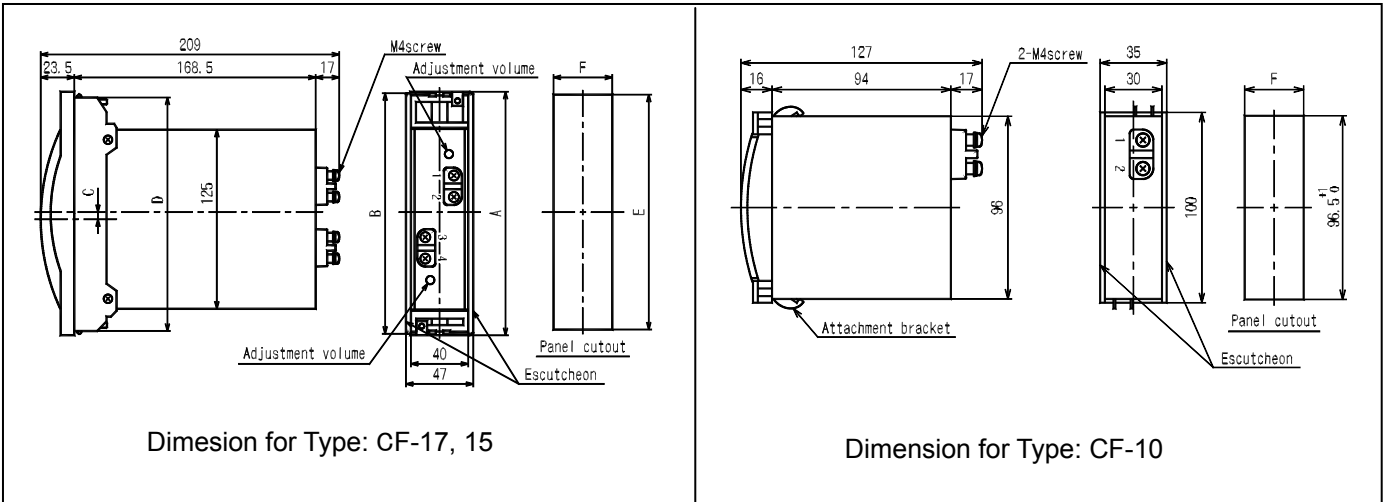
| Type | A | B | C | D | E | F | | Weight (g) | |
|-------|-----|-----|---|-----|-----------|----------------------------------|--|------------|-----------|
| | | | | | | 1 unit | 2-unit or above | 1 pointer | 2-pointer |
| CF-17 | 168 | 170 | 4 | 163 | 164 ± 0.5 | 41 ⁺¹ / ₋₀ | (41 × n) ⁺¹ / ₋₀ | 400 | 500 |
| CF-15 | 148 | 150 | 0 | 145 | 146 ± 0.5 | 41 ⁺¹ / ₋₀ | (41 × n) ⁺¹ / ₋₀ | 400 | 500 |

Please assemble the meter in the center of the panel if you need continuous assemble.
Or please contact and discuss with us if you need to continuous assemble more than 10 units.

* n = unit of meter

AC Ammeter (Rectifier Type) - CF

Dimension



Voltmeter (Rectifier Type) - CF

VOLTMETER

| Max. Scale Value | Consumption Current | Accessory |
|--------------------------|---------------------|-----------------|
| | CF-17, 15, 10 | |
| 3V~25V | 1mA | — |
| 30V~600V | 1mA | |
| 750V~25kV ⁽¹⁾ | 1mA | Series resistor |

Note:

⁽¹⁾ When 600V is exceeded, series resistance will external to meter 1mA.
Please refer the size on Instrument accessory separately sheet.

▶ For high-frequency ware, can be manufacture until 10kHz, please specify it.

For Cycle Control Wareform Meter

Please use cycle control for cycle control wareform type.

Type Name: CTF-□-□, External with VT-62MEC.

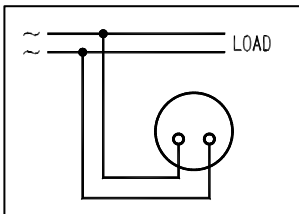
For Distorted Wareform Meter (Approx. RMS value rectifier menthod)

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

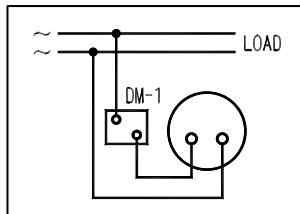
Please use approx. RMS value rectifier method for third harmonics mixed with waveform and SCR waveform.

Type Name: CTF-□, External with VT-62ME

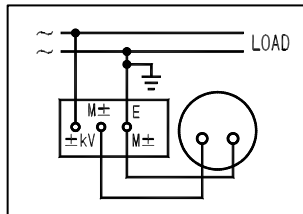
Connection Diagram



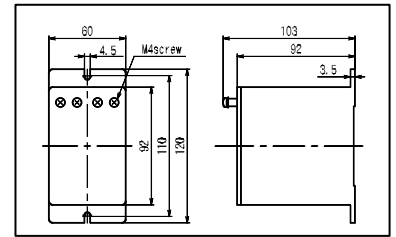
Voltmeter



Voltmeter external with series resistor (DM-1)

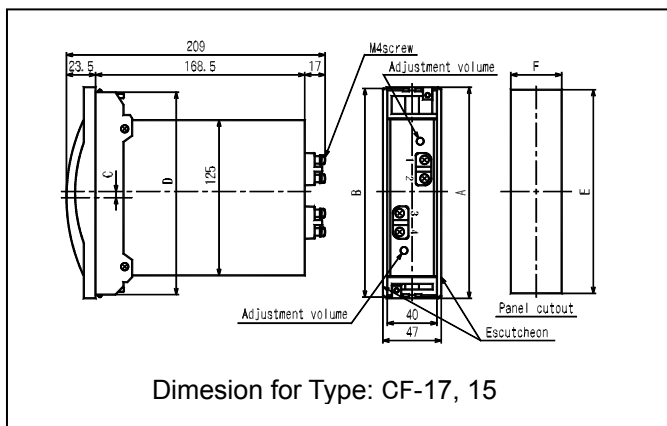


Voltmete external with series resistor (DM-2~25)

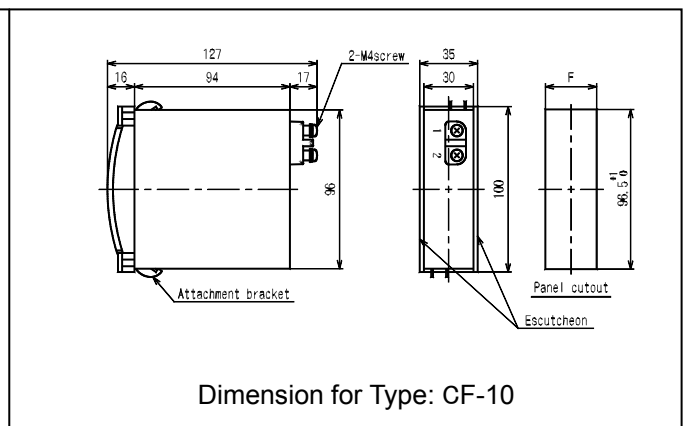


Dimensions for:
VT-62ME, VT-62MEC

Dimensions



Dimension for Type: CF-17, 15



Dimension for Type: CF-10

| Type | A | B | C | D | E | F | | Weight (g) | |
|-------|-----|-----|---|-----|-----------|----------------------------------|--|------------|-----------|
| | | | | | | 1 unit | 2-unit or above | 1 pointer | 2-pointer |
| CF-17 | 168 | 170 | 4 | 163 | 164 ± 0.5 | 41 ⁺¹ / ₋₀ | (41 × n) ⁺¹ / ₋₀ | 400 | 500 |
| CF-15 | 148 | 150 | 0 | 145 | 146 ± 0.5 | 41 ⁺¹ / ₋₀ | (41 × n) ⁺¹ / ₋₀ | 400 | 500 |

Please assemble the meter in the center of the panel if you need continuous assemble.
Or please contact and discuss with us if you need to continuous assemble more than 10 units.

* n = unit of meter

Watt-hour Meter (Transducer Type) - WTF

WATTHOUR METER (External with Transducer Type) ⁽¹⁾

| Application | Type | Rating ⁽²⁾ | Consumption VA | | Accessory (Transducer) |
|-------------------------------|------------|------------------------------------|------------------------------------|----------------------------------|------------------------|
| | | | Voltage side | Current side | |
| Single phase | WF-17-□-12 | 110V, 5A(1A) 220V, 5A(1A) | 2VA 3.5VA | 1VA 1VA | WT-62M-12 |
| | 15-□-12 | | | | |
| | 10-□-12 | | | | |
| Single phase 3-wire | WF-17-□-13 | 110V, 5A(1A) | Each phase 2VA | Each phase 1VA | WT-83M-13 |
| | 15-□-13 | | | | |
| | 10-□-13 | | | | |
| 3 phase | WF-17-□-33 | 110V, 5A(1A) 220V, 5A(1A) | Each phase 2VA Each phase 3.5VA | Each phase 1VA Each phase 1VA | WT-83M-33 |
| | 15-□-33 | | | | |
| | 10-□-33 | | | | |
| 3 phase 4-wire ⁽³⁾ | WF-17-□-34 | 110/√3V, 5A(1A) 220/√3V, 5A(1A) | Each phase 1.5VA Each phase 3VA | Each phase 1VA Each phase 1VA | WT-83M-34 |
| | 15-□-34 | | | | |
| | 10-□-34 | | | | |

Note:

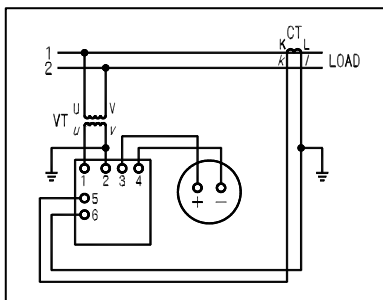
- ⁽¹⁾ Please refer to (page 17) for Manufacture limit and Max.scale value.
- ⁽²⁾ When above rating is exceeds, please external CT or VT respectively to meter 110V, 5A(1A).
Usable voltage range: 110V: 90~130V; 220V: 180~260V
- ⁽³⁾ 3 phase 4-wire is voltage balanced.

► For high-frequency ware, please specify the frequency.

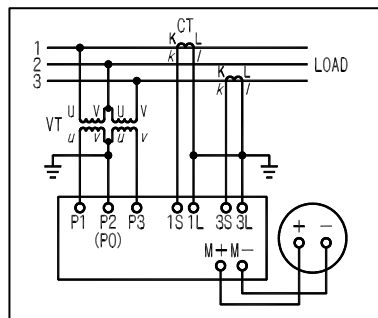
For SCR Control Waveform

Type Name: WF-□H-□-□ Aux. power is necessary. (3 phase 4-wire can not be manufacture)

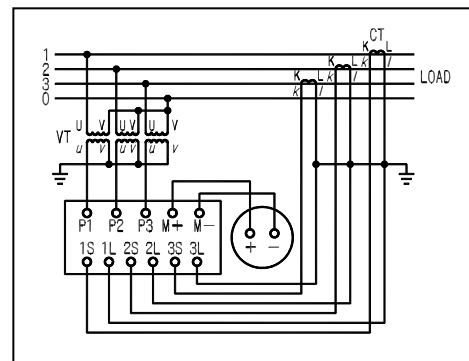
Connection Diagram



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

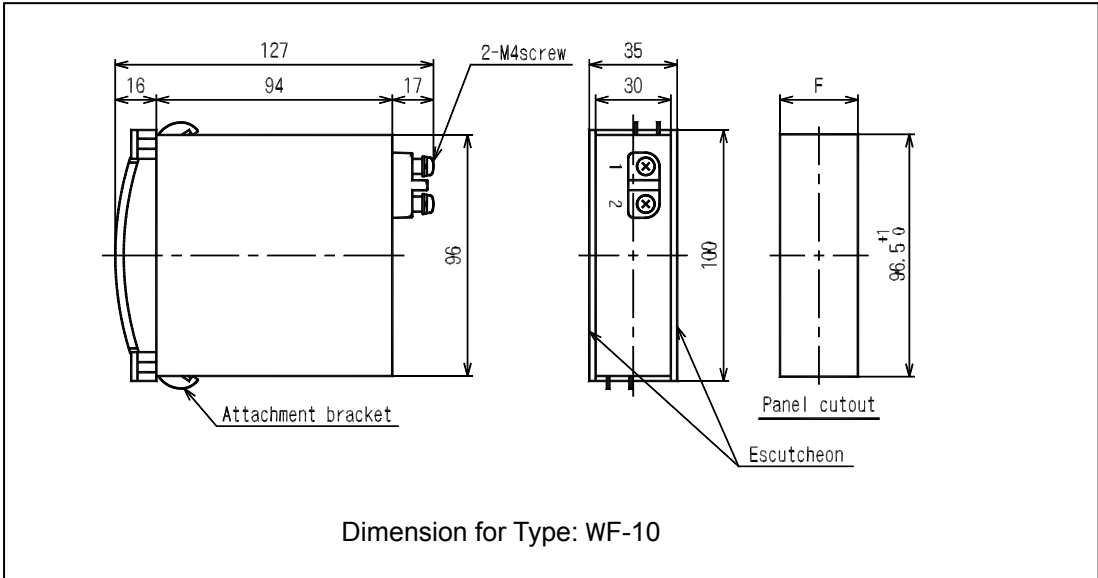
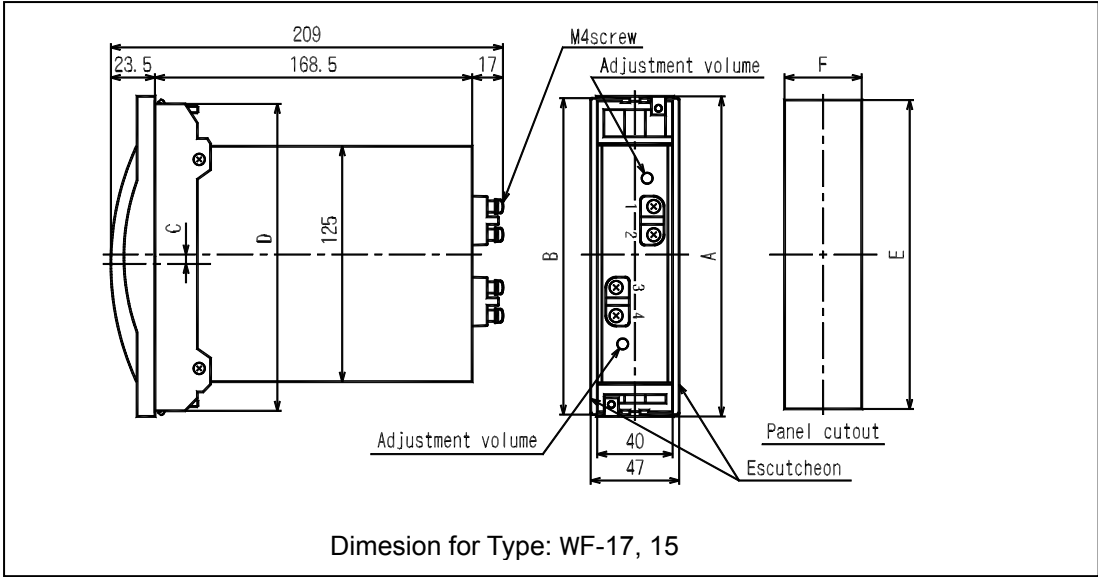
| Type | A | B | C | D | E | F | | Weight (g) | |
|-------|-----|-----|---|-----|---------|----------------------------------|--------------------------------------|------------|------------|
| | | | | | | 1 unit | 2-unit or above | 1 pointer | 2-pointer |
| WF-17 | 168 | 170 | 4 | 163 | 164±0.5 | 41 ⁺¹ / ₋₀ | (41×n) ⁺¹ / ₋₀ | Below 1260 | Below 2230 |
| WF-15 | 148 | 150 | 0 | 145 | 146±0.5 | 41 ⁺¹ / ₋₀ | (41×n) ⁺¹ / ₋₀ | Below 1260 | Below 2230 |

Please assemble the meter in the center of the panel if you need continuous assemble.
Or please contact and discuss with us if you need to continuous assemble more than 10 units.

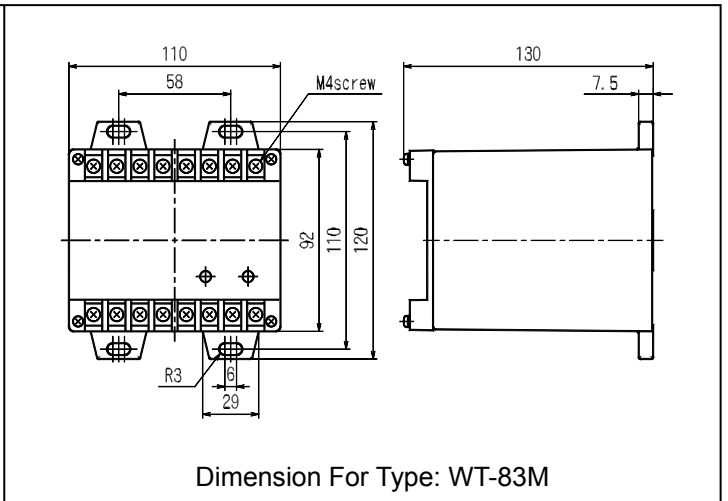
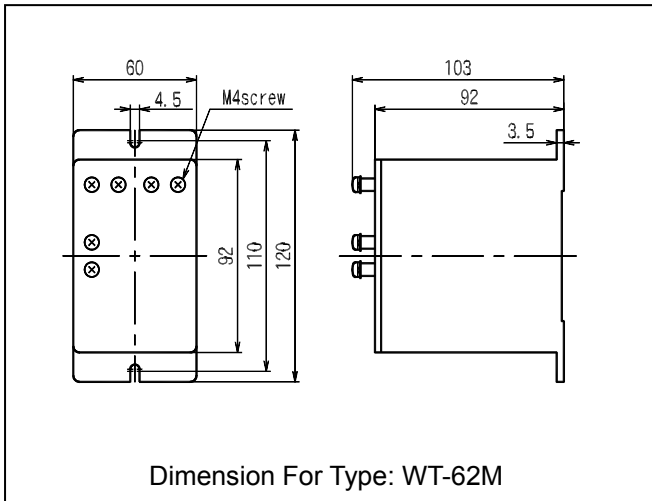
* n = unit of meter

Watt-hour Meter (Transducer Type) - WTF

Dimensions



Dimensions For Accessory (Transducer)



Var Meter (Transducer Type) - WVTF

VAR METER (External with Transducer Type) ⁽¹⁾

| Application | Type | Rating ⁽²⁾ | Consumption VA | | Accessory (Transducer) |
|--|-----------------------------------|------------------------------|--------------------------------------|--------------------------------------|------------------------|
| | | | Voltage side | Current side | |
| Single phase ⁽³⁾ | WVF-17-□-12 15-□-12 10-□-12 | 110V, 5A(1A) 220V, 5A(1A) | 3.5VA 3.5VA | 1.5VA 1.5VA | WVT-62M-12 |
| 3 phase (unbalanced) ⁽³⁾⁽⁴⁾ | WVF-17-□-33 15-□-33 10-□-33 | 110V, 5A(1A) 220V, 5A(1A) | Each phase 3.5VA Each phase 3.5VA | Each phase 1.5VA Each phase 1.5VA | WVT-83M-33 |
| 3 phase 4-wire ⁽⁴⁾⁽⁵⁾ | WVF-17-□-34 15-□-34 10-□-34 | 110V, 5A(1A) 220V, 5A(1A) | Each phase 3.5VA Each phase 3.5VA | Each phase 1.5VA Each phase 1.5VA | WVT-83M-34 |

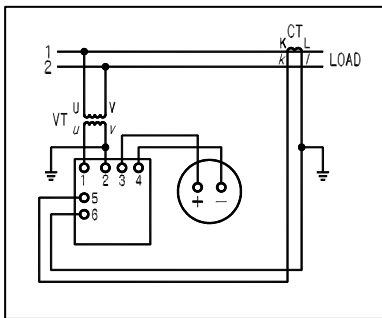
Note:

- ⁽¹⁾ Please refer to (page 17) for Manufacture limit and Max. scale value.
Standard scale: Lead □ var ~ 0 ~ Lag □ var
- ⁽²⁾ When above rating is exceeds, please external CT or VT respectively to meter 110V, 5A(1A).
Usable voltage range: 110V: 90~130V; 220V: 180~260V
- ⁽³⁾ Please specify the frequency (50Hz or 60Hz) for single phase circuit and 3 phase unbalanced circuit.
- ⁽⁴⁾ Please use 3 phase, 3 phase 4-wire in positive phase sequence.
- ⁽⁵⁾ 3 phase 4-wire is voltage balanced.

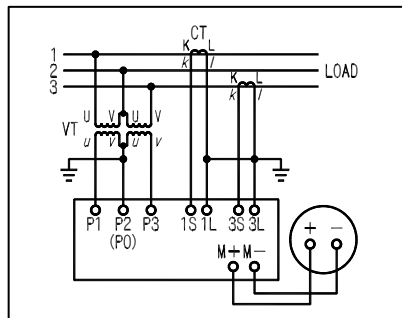
For SCR Control Waveform

Type Name: WVF-□H-□-□ Aux. power is necessary. (3 phase 4-wire can not be manufacture)

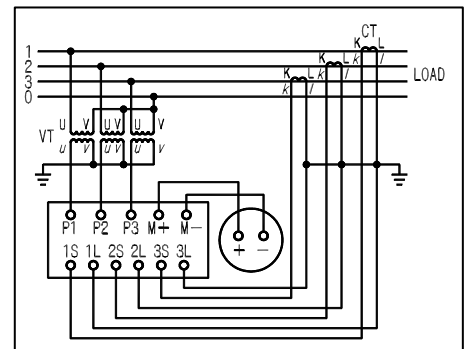
Connection Diagram



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



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



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

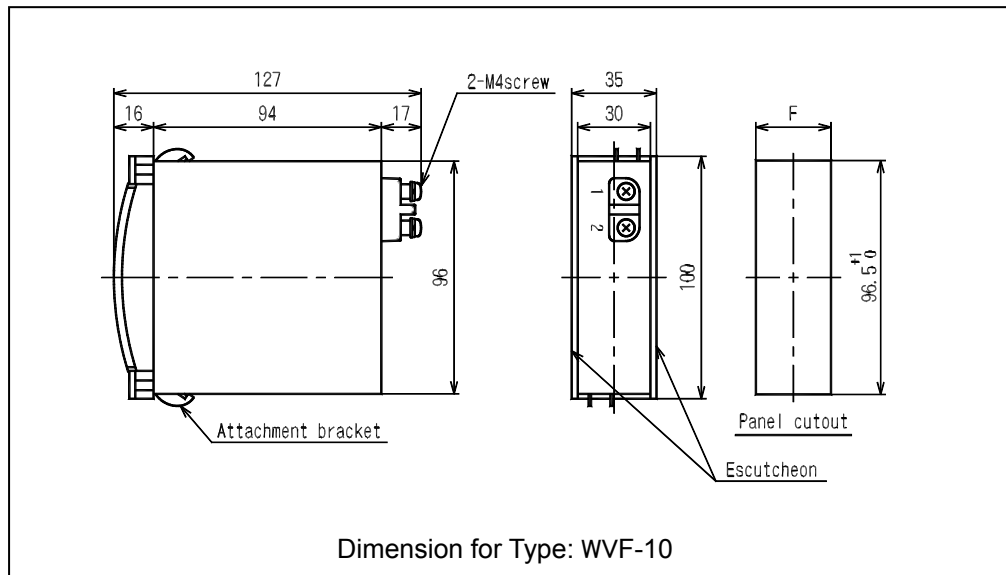
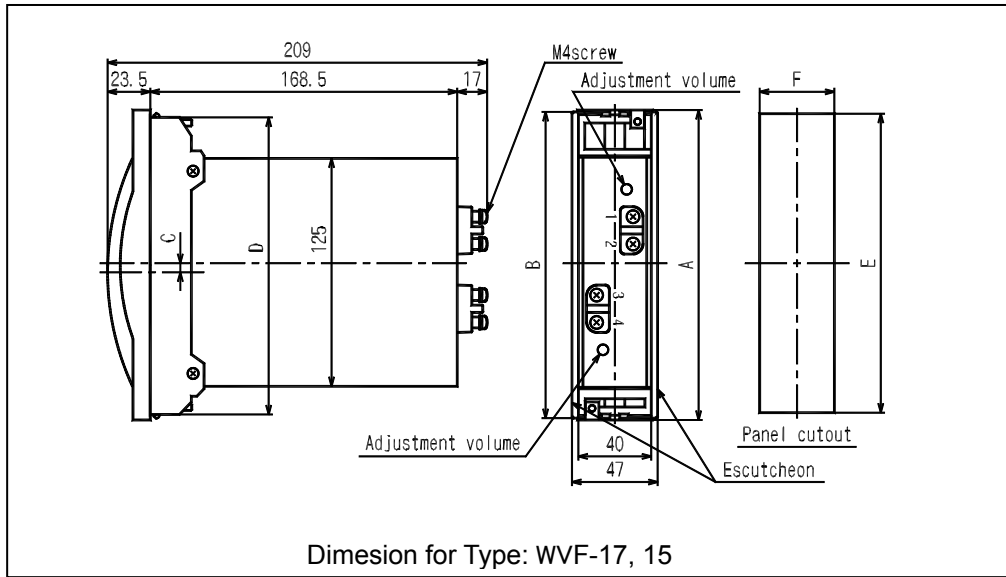
| Type | A | B | C | D | E | F | | Weight (g) | |
|--------|-----|-----|---|-----|-----------|----------------------------------|--|------------|------------|
| | | | | | | 1 unit | 2-unit or above | 1 pointer | 2-pointer |
| WVF-17 | 168 | 170 | 4 | 163 | 164 ± 0.5 | 41 ⁺¹ / ₋₀ | (41 × n) ⁺¹ / ₋₀ | Below 1260 | Below 2230 |
| WVF-15 | 148 | 150 | 0 | 145 | 146 ± 0.5 | 41 ⁺¹ / ₋₀ | (41 × n) ⁺¹ / ₋₀ | Below 1260 | Below 2230 |

Please assemble the meter in the center of the panel if you need continuous assemble.
Or please contact and discuss with us if you need to continuous assemble more than 10 units.

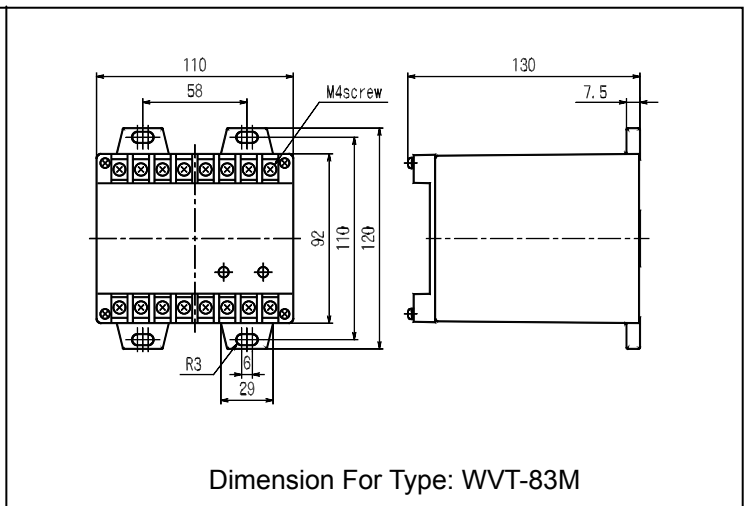
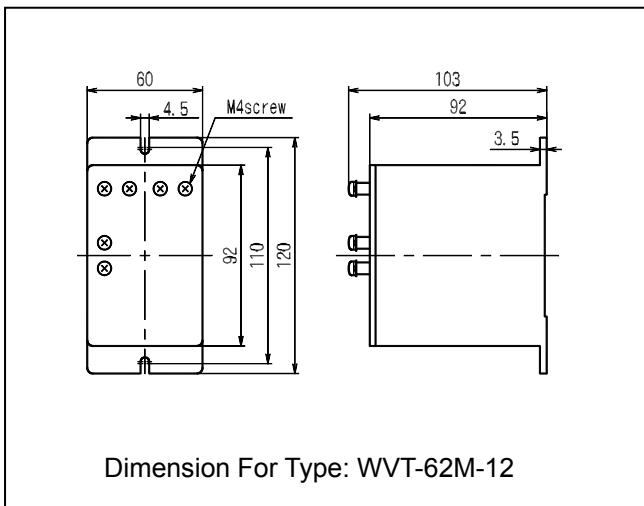
* n = unit of meter

Watt-hour Meter & Var Meter (Transducer Type) - WVTF

Dimensions



Dimensions For Accessory (Transducer)



Watt-hour Meter & Var Meter (Transducer Type) - WTF / WVTF

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:

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

| Type Name | Rating | | | Manufacturable Intrinsic Range | |
|---------------------|--------------|---------|---------|--------------------------------|---------------------------|
| | | | | Watt-hour 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) |

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) - PTF

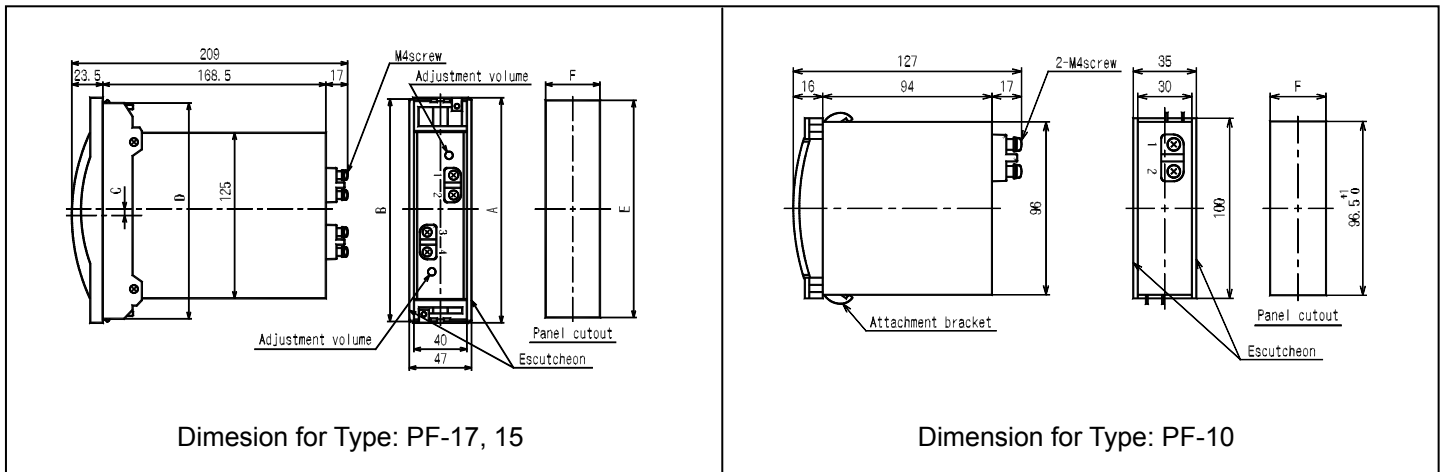
POWER FACTOR METER ⁽¹⁾

| Application | Type | Rating ^{(2) (3)} | Consumption VA | | Accessory (Transducer) |
|--|--------------------|---------------------------|----------------|----------------|--------------------------|
| | | | Voltage side | Current side | |
| Single phase | PF-17-□-12 | 110V, 5A(1A) | 1VA | 1VA | PT-62M-12 |
| | 15-□-12 10-□-12 | 220V, 5A(1A) | 2VA | 2VA | |
| 3 phase (balanced) | PBF-17-□-33 | 110V, 5A(1A) | Each phase 1VA | Each phase 1VA | PBT-62M-33 |
| | 15-□-33 10-□-33 | 220V, 5A(1A) | Each phase 2VA | Each phase 2VA | |
| 3 phase (unbalanced) ⁽⁴⁾ | PF-17-□-33 | 110V, 5A(1A) | Each phase 1VA | Each phase 1VA | PT-63M-33 ⁽⁵⁾ |
| | 15-□-33 10-□-33 | 220V, 5A(1A) | Each phase 1VA | Each phase 2VA | |
| 3 phase 4-wire (balanced) | PBF-17-□-34 | 110V, 5A(1A) | Each phase 1VA | Each phase 1VA | PBT-62M-34 |
| | 15-□-34 10-□-34 | 220V, 5A(1A) | Each phase 2VA | Each phase 2VA | |
| 3 phase 4-wire (unbalanced) ⁽⁴⁾ | PF-17-□-34 | 110V, 5A(1A) | Each phase 1VA | Each phase 1VA | PT-64M-34 ⁽⁵⁾ |
| | 15-□-34 10-□-34 | 220V, 5A(1A) | Each phase 2VA | Each phase 2VA | |

Note:

- ⁽¹⁾ Standard Scale: Lead0.5~1~Lag0.5. Scale for 3 phase 3-wire balance only: Lead0~1~Lag0. (Effective measuring range: Lead0.3~1~Lag0.3 also can be manufacture)
Please specify frequency (50Hz or 60Hz) all type except 3 phase balanced circuit.
- ⁽²⁾ When above rating is exceeds, please external CT or VT respectively to meter 110V, 5A(1A).
Usable voltage range: 110V: 90~130V; 220V: 180~260V
Please use in positive phase sequence.
- ⁽³⁾ Guaranteed allowance is over than 1/5 of the rated current.
- ⁽⁴⁾ 3 phase (unbalanced), 3 phase 4-wire (unbalanced) is voltage balanced.
- ⁽⁵⁾ Refer to next page for the connection diagram.

Dimension



* n = unit of meter

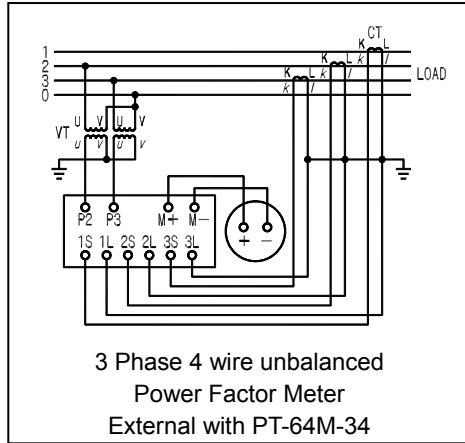
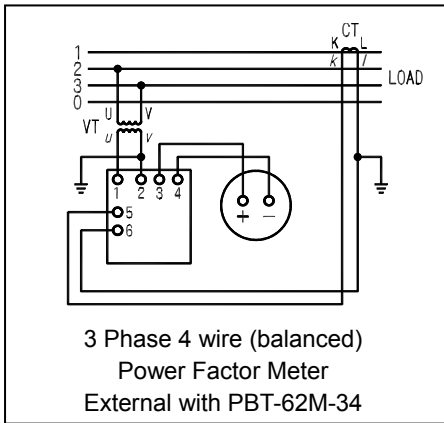
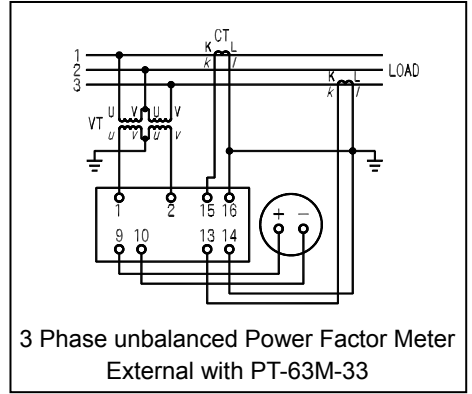
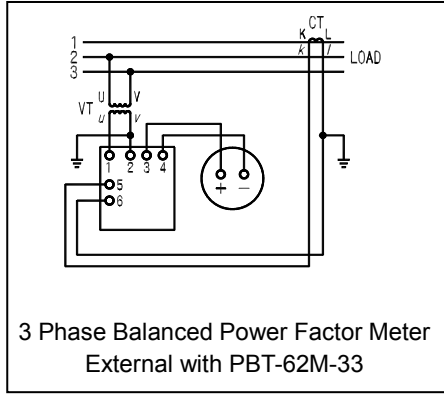
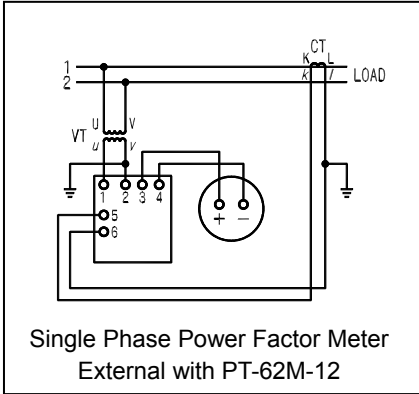
| Type | A | B | C | D | E | F | |
|-------|-----|-----|---|-----|-----------|--------------------------------|--------------------------------------|
| | | | | | | 1 unit | 2-unit or above |
| PF-17 | 168 | 170 | 4 | 163 | 164 ± 0.5 | 41 ⁺¹ ₋₀ | (41 × n) ⁺¹ ₋₀ |
| PF-15 | 148 | 150 | 0 | 145 | 146 ± 0.5 | 41 ⁺¹ ₋₀ | (41 × n) ⁺¹ ₋₀ |

| Type | Weight (g) | |
|-------|------------|------------|
| | 1 pointer | 2-pointer |
| PF-17 | Below 1200 | Below 2100 |
| PF-15 | Below 1200 | Below 2100 |
| PF-10 | Below 960 | |

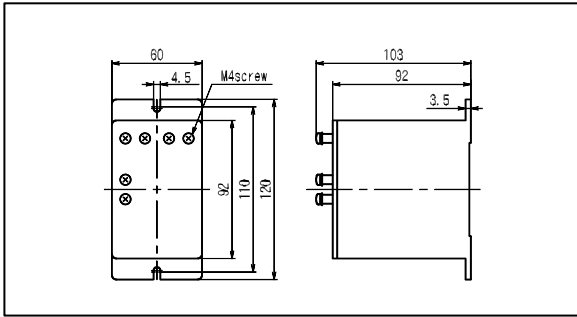
Please assemble the meter in the center of the panel if you need continuous assemble.
Or please contact and discuss with us if you need to continuous assemble more than 10 units.

Power Factor Meter (Transducer Type) - PTF

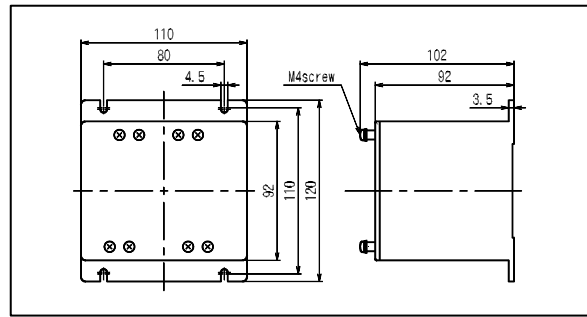
Connection Diagram (If make a mistake on phase sequence, it becomes error)



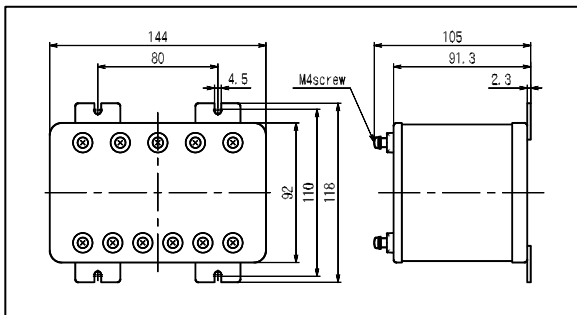
Dimension



P(B)T-62M-□



PT-63M-33



PT-64M-34

Frequency Meter (Transducer Type) - AF

| Rated Voltage | Measurement Range | Consumption VA | Accessory (Transducer) | Voltage Change Range |
|---------------------|---|----------------|---------------------------|----------------------|
| | | AF-17, 15, 10 | | |
| 110V ⁽²⁾ | 45~55Hz 55~65Hz 45~65Hz 350~450Hz ⁽¹⁾ | 1.7VA | FT-62M | 90~130V |
| 220V ⁽²⁾ | 45~55Hz 55~65Hz 45~65Hz 350~450Hz ⁽¹⁾ | 2.5VA | FT-62M | 180~260V |

Note:

⁽¹⁾ Special frequency measurement range also can be manufacture (up until 1000Hz)

⁽²⁾ Usable voltage range: 110V: 90~130V; 220V: 180~260V

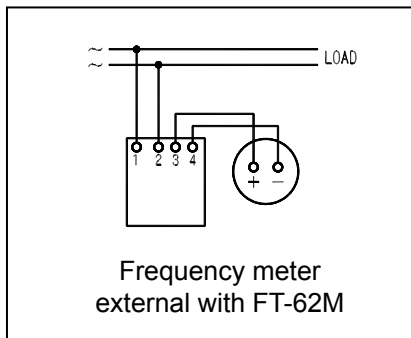
Please contact with us for manufacture the above rated voltage and voltage change range.

For SCR Waveform Meter

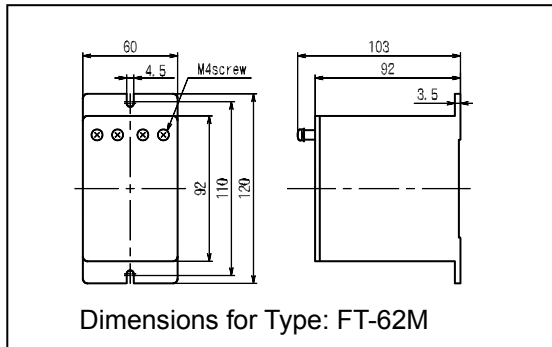
Meter SCR waveform input (Distortion waveform) also can be manufacture.

Type name: AF-□H-□-□

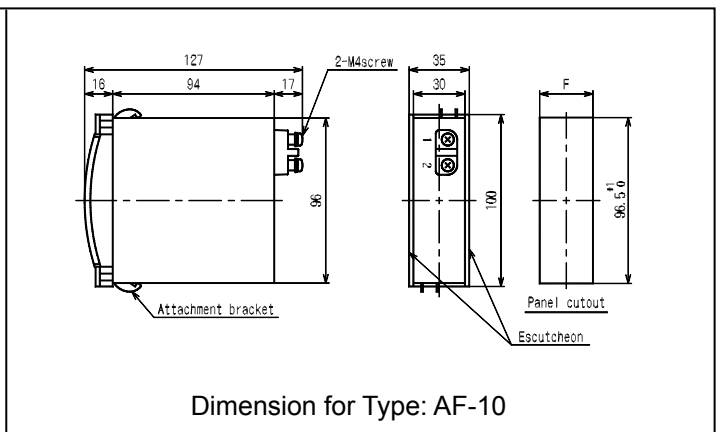
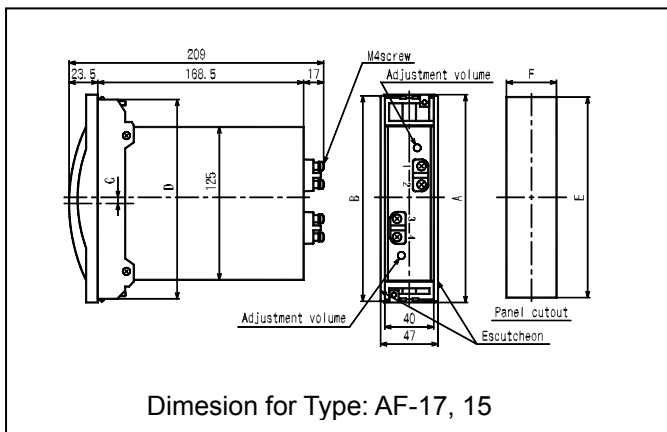
Connection Diagram



Dimensions



Dimensions



* n = unit of meter

| Type | A | B | C | D | E | F | |
|-------|-----|-----|---|-----|-----------|--------------------------------|--|
| | | | | | | 1 unit | 2-unit or above |
| AF-17 | 168 | 170 | 4 | 163 | 164 ± 0.5 | 41 ⁺¹ ₋₀ | (41.1 × n) ⁺¹ ₋₀ |
| AF-15 | 148 | 150 | 0 | 145 | 146 ± 0.5 | 41 ⁺¹ ₋₀ | (41.1 × n) ⁺¹ ₋₀ |

| Type | Weight (g) | |
|-------|------------|-----------|
| | 1 pointer | 2-pointer |
| AF-17 | 800 | 1100 |
| AF-15 | 800 | 1100 |
| AF-10 | 560 | / |

Please assemble the meter in the center of the panel if you need continuous assemble.
Or please contact and discuss with us if you need to continuous assemble more than 10 units.

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

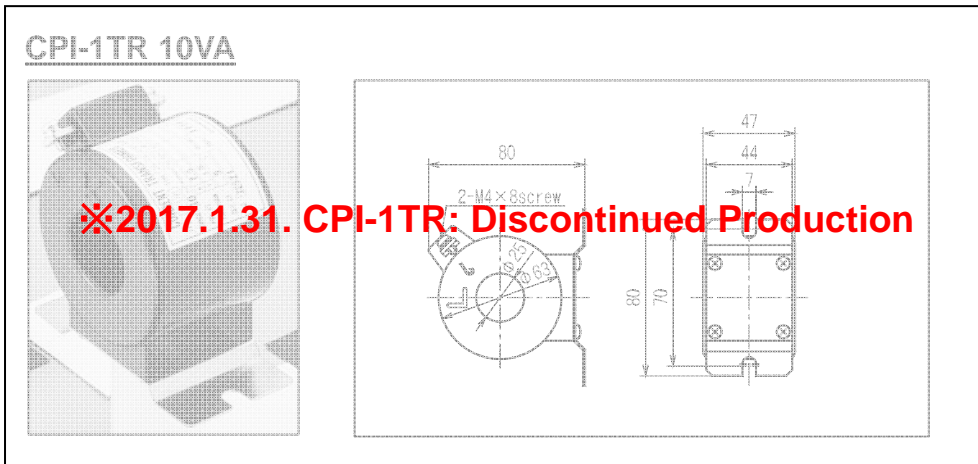
| Max. circuit voltage (V) | Construction | Insulated system | Type Name | Primary current (A) | Secondary current (A) | Rated burden (VA) | Class | Frequency (Hz) | AC Withstand voltage | weight (kg) |
|--------------------------|--------------|-------------------|-----------|---------------------|-----------------------|-------------------|-------|----------------|----------------------|-------------|
| 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 |
| Below 460 | | | | | | 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)

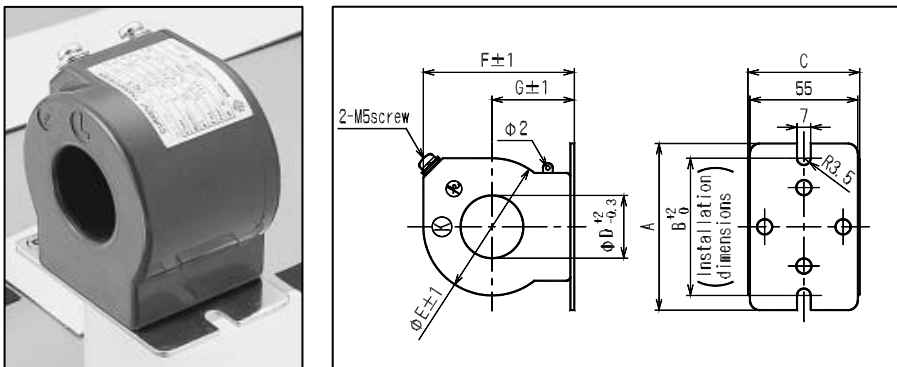
Circle Window Type (Below 1,150V)

| 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 | 5 | 15 | | | | |
| | CR2-40 | *T | - | - | - | 10 | 8 | 7 | 5 | 4 | 4 | 4 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 5 | 40 | | | | |

* T = Number of primary conductor penetration.



CR2 - 5

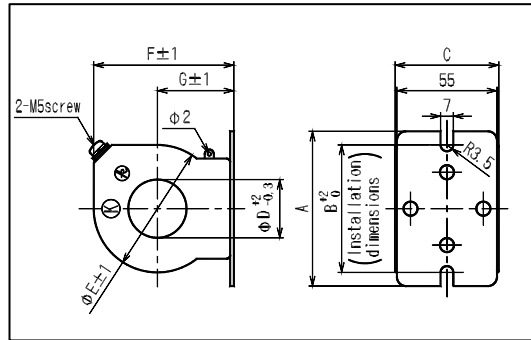


| Primary Current (A) | A | B | C | ΦD | ΦE | F | G |
|---------------------|-----|----|----|----|----|----|----|
| 10~200 | 85 | 70 | 57 | 23 | 61 | 70 | 37 |
| 240~400 | 85 | 70 | 55 | 32 | 70 | 77 | 42 |
| 500~750 | 100 | 85 | 57 | 50 | 86 | 93 | 50 |

Current Transformers (CT)

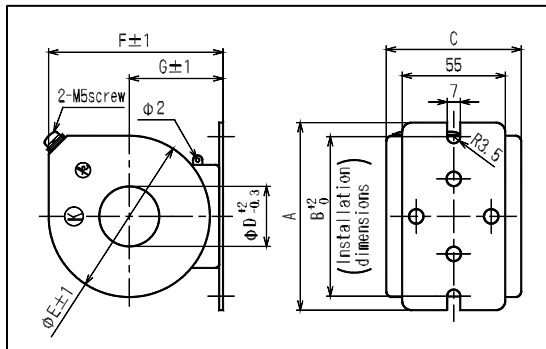
Circle Window Type (Below 1,150V)

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 |

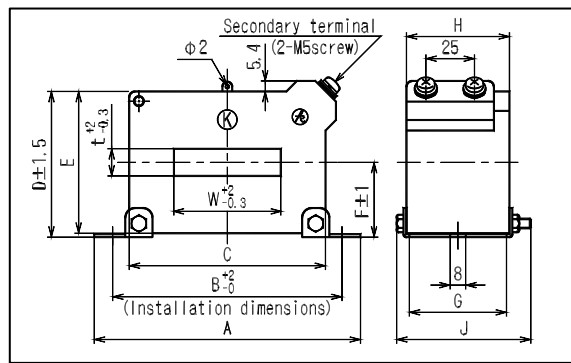
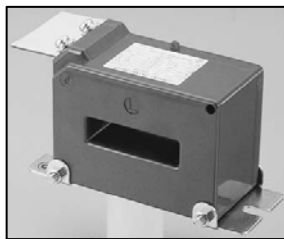
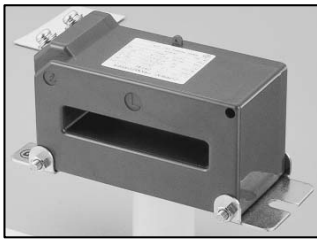
Current Transformers (CT)

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)

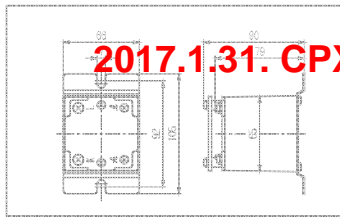
CS1-15, CS1-40



Primary Winding Type

CPX-15

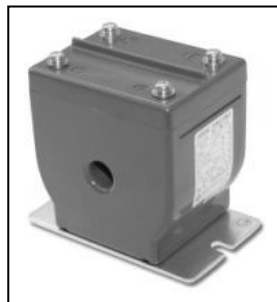
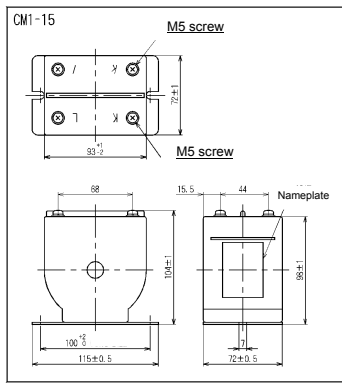
| Insulated System | Type Name | Primary Current (A) | Secondary Current (A) | Rated Burden (VA) |
|------------------|-----------|---------------------|-----------------------|-------------------|
| ABS resin | CPX-15 | 5, 10, 15, 20, 30 | 5 | 15 |



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

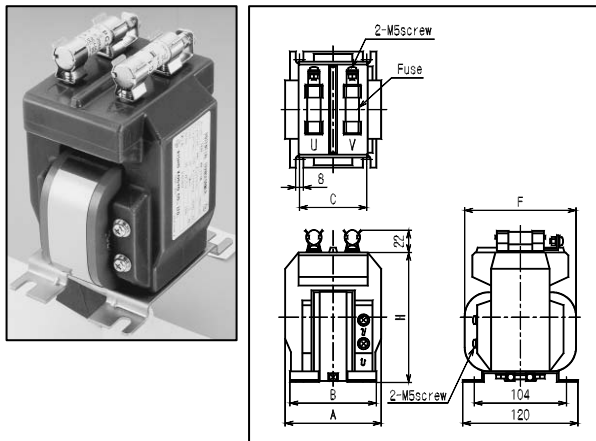
| Type Name | Max. Circuit Voltage (V) | Primary Voltage (V) | Secondary Voltage (V) | Rated Burden (VA) | Dimension (mm) | | | | | |
|-----------|--------------------------|---------------------|-----------------------|-------------------|----------------|-----|-----|----|-----|-----------------|
| | | | | | 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

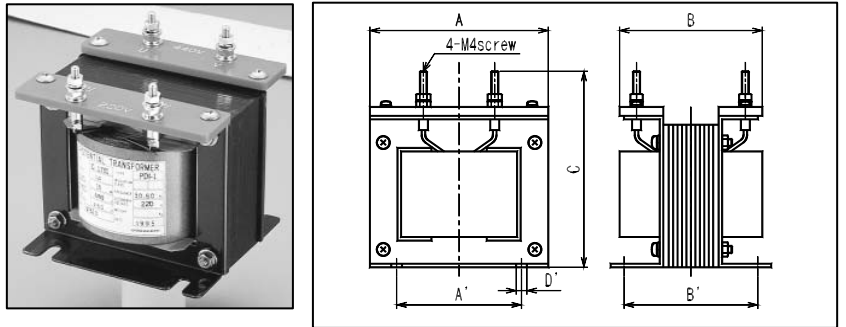
2) Epoxy Resin Mould

| 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.

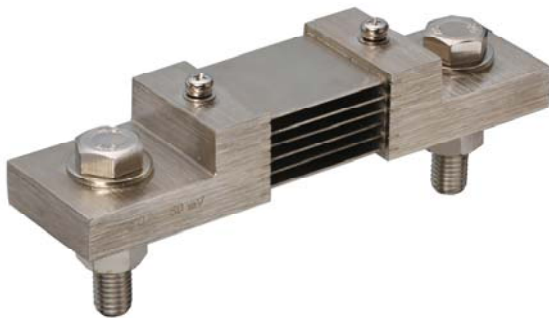
Class: 1.0

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.

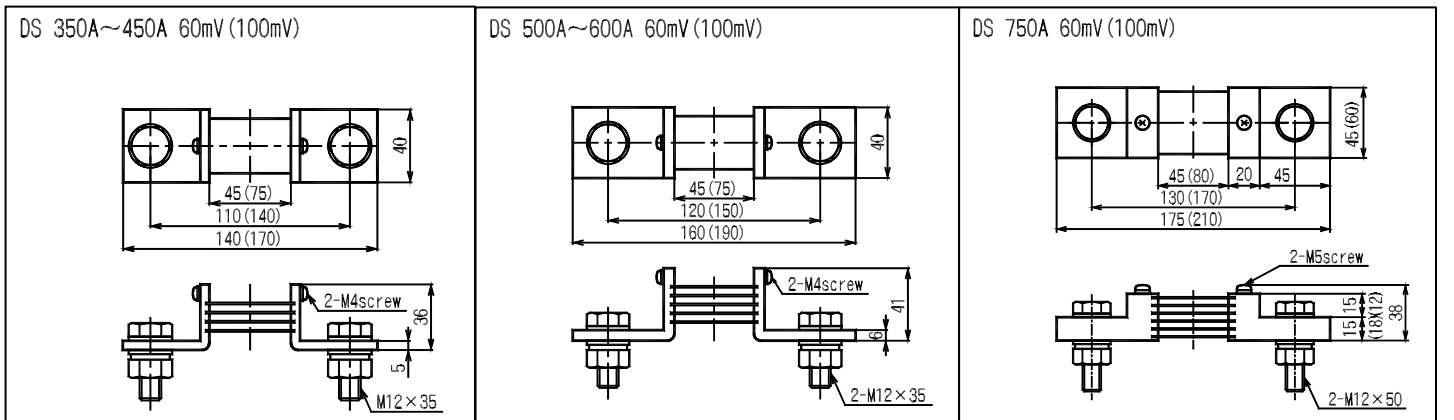
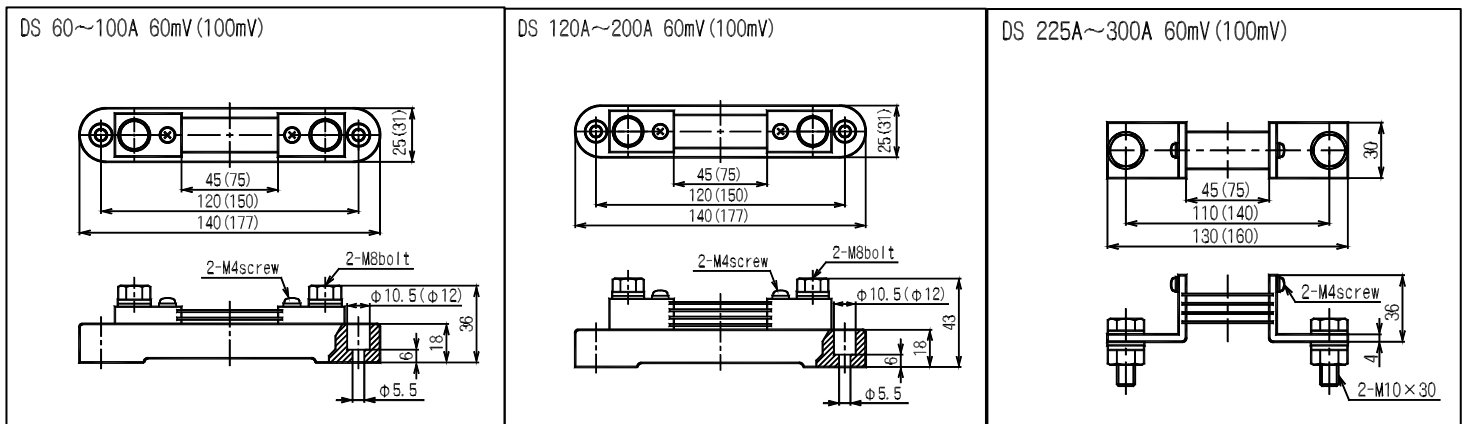
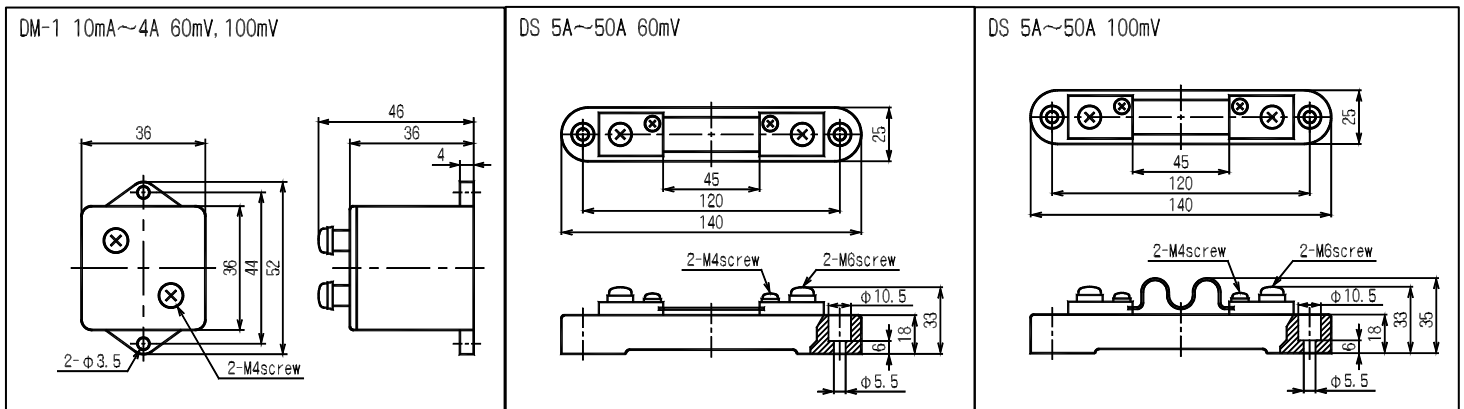
▶ DM-2~25 will built-in the measures against open resistor.



DC SHUNTS

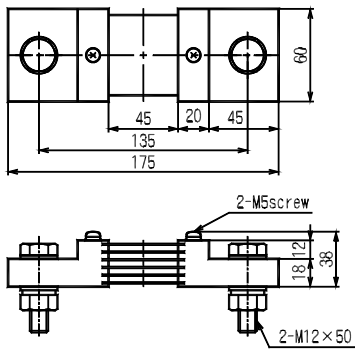
For DC Shunts

- ◆ 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.

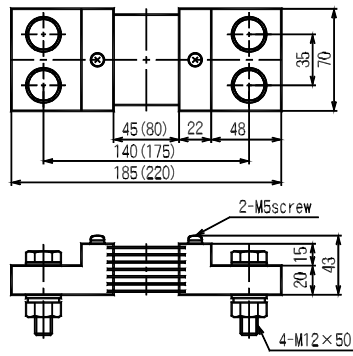


DS SHUNTS

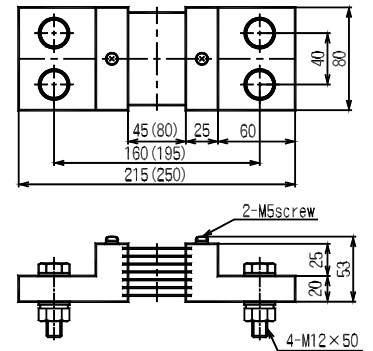
DS 1000A 60mV



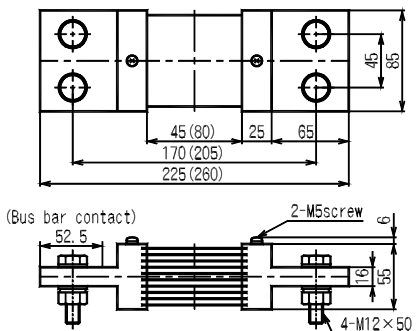
DS 1500A 60mV (1000A 100mV)



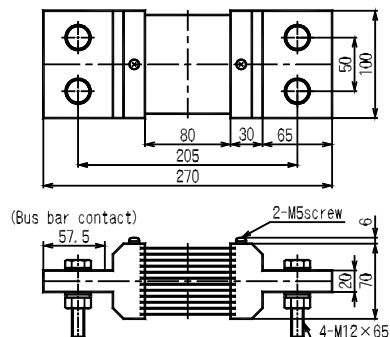
DS 2000A 60mV (1500A 100mV)



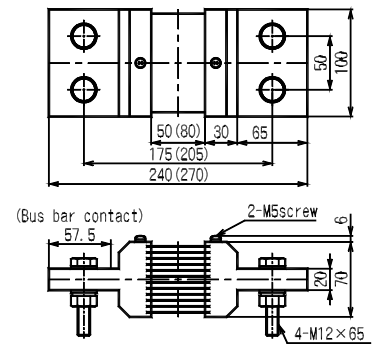
DS 2500A 60mV (2000A 100mV)



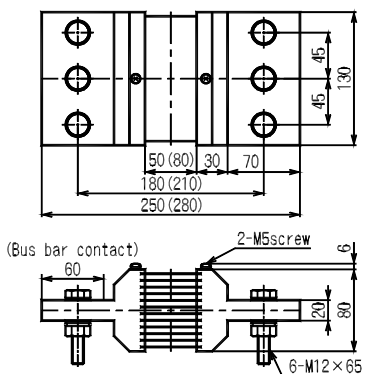
DS 2500A 100mV



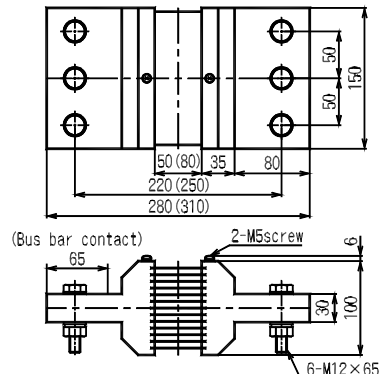
DS 3000A 60mV (100mV)



DS 4000A 60mV (100mV)



DS 5000A 60mV (100mV)

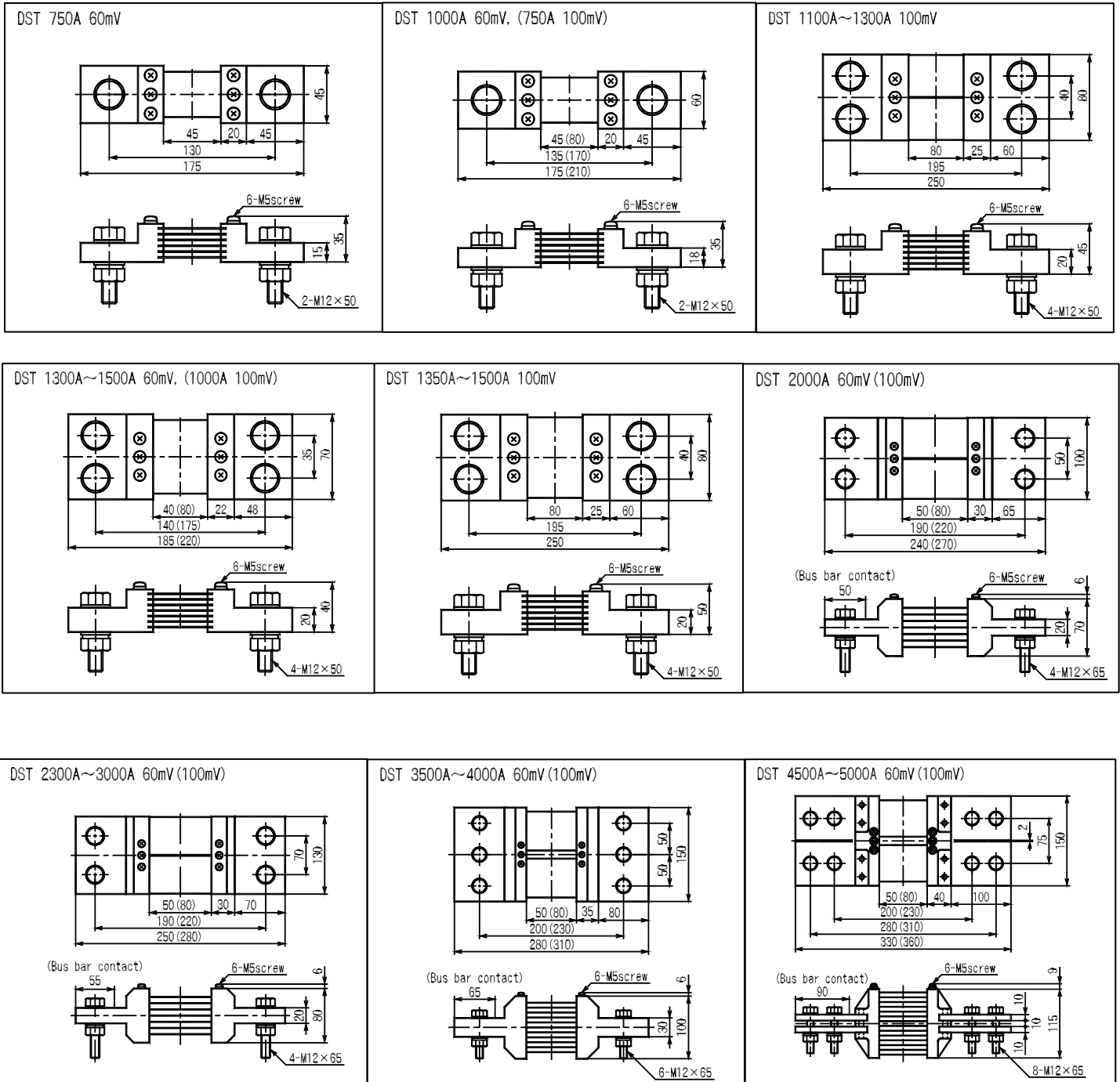


- ◆ Please consultation with us when 5000A is exceeding.
- ◆ Please inform us if the load resistance value is less than 900A (by our indication meter type name)
- ◆ Please specify the item as below when make order
 - 1) Type Name
 - 2) Input (A)/ output (mV)
 - 3) Option (with or without shunt stand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

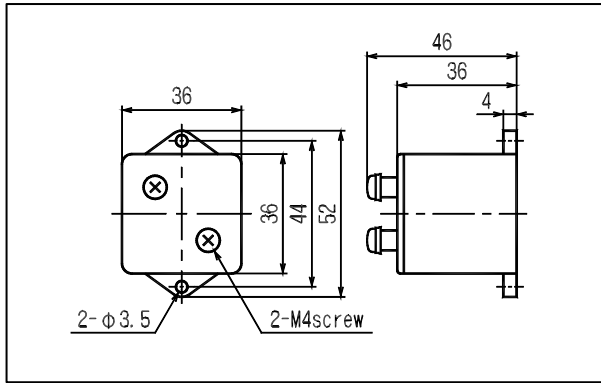


- ◆ Please consultation with us when 5000A is exceeded.

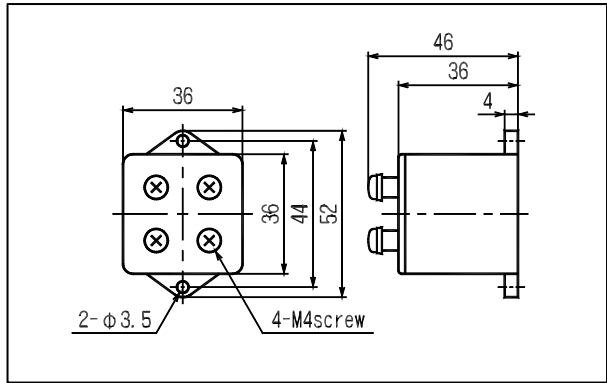
RESISTOR SERIES

External with Resistor Series

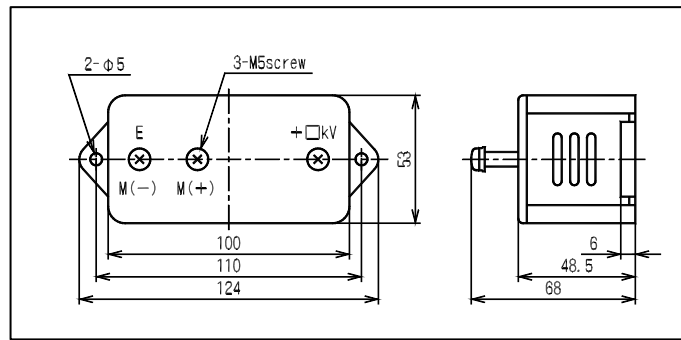
DM – 1 (Below 1000V)



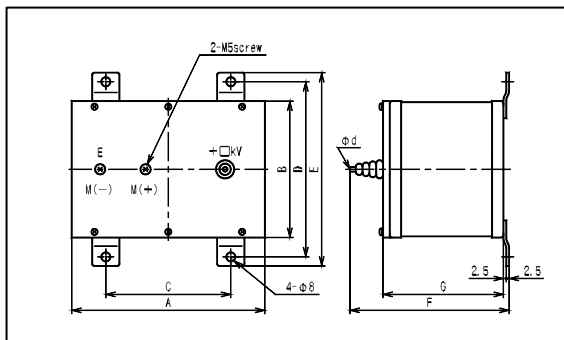
DM – 1T (Rectifier built in)



DM – 2 (Below 2500V)



DM – 5, 10, 15, 20, 25 (5~25kV)

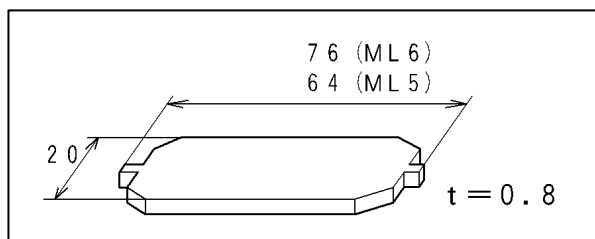


| Type Name | Rated | A | B | C | D | E | F | G | d |
|-----------|-------|-----|-----|-----|-----|-----|-----|-----|---|
| DM – 5 | 5000V | 170 | 120 | 110 | 154 | 170 | 140 | 106 | 4 |
| DM – 10 | 10kV | 220 | 160 | 140 | 194 | 210 | 140 | 106 | 4 |
| DM – 15 | 15kV | 290 | 210 | 200 | 248 | 264 | 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

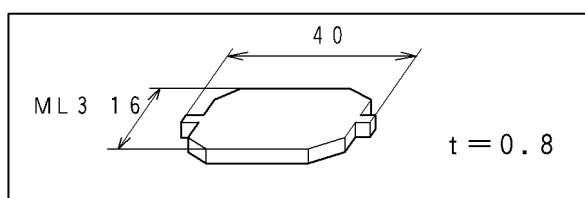
Terminal Cover for Type ML- 6 and ML- 5



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



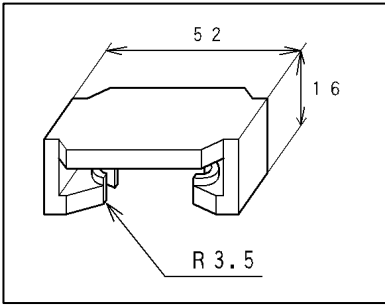
Set into terminal block

| 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 ⁽¹⁾ | 1 | 1 |
| WVL-80C-12, 33, 34 Attach with transducer | | - | 1 |
| | WVT-53MC-12 | 1 | - |
| | WVT-53MC-33 | 1 | 1 |
| | WVT-53MC-34 ⁽²⁾ | 1 | 1 |
| PL-80C-33, 34 Attach with transducer | | - | 1 |
| | PT-53MC-33, 34 | 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.

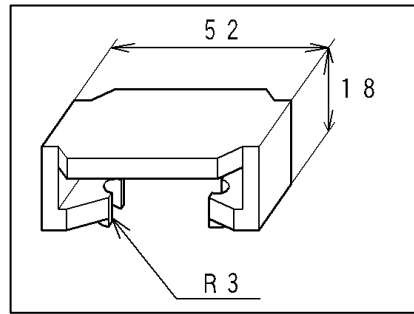
2. TERMINAL COVER FOR TYPE WIDE ANGLE L SERIES

Terminal Cover For Type SL



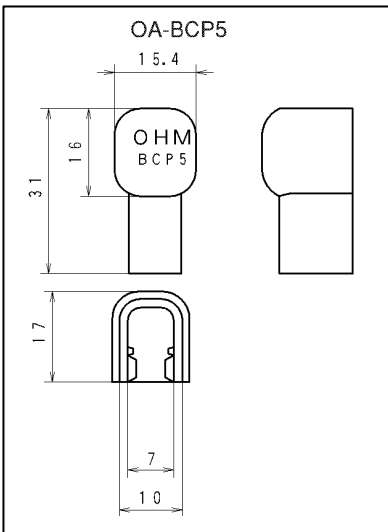
Set into terminal block

Terminal Cover For Narrow Angle

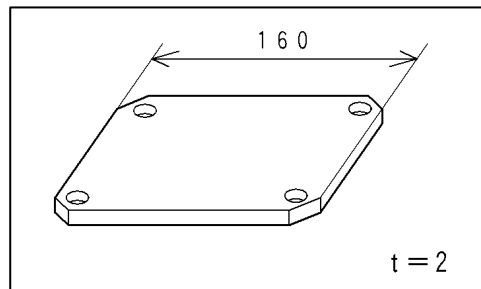


| Type Name | Units Required | |
|-----------|-------------------|-----------------------------|
| | SL terminal cover | Narrow-angle terminal cover |
| SL-110C | 1 | - |
| SL-80C | 1 | - |
| L-65C | - | 1 |

3. TERMINAL COVER FOR TYPE WIDE ANGLE L SERIES



Set into terminal fitting



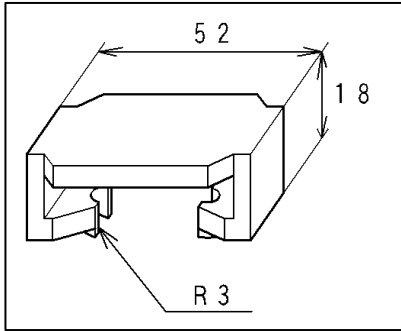
Multiplier covers for single phase
Synchroscope meter (Cover: DMD-50)
Lock screw on pillar.

| 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.

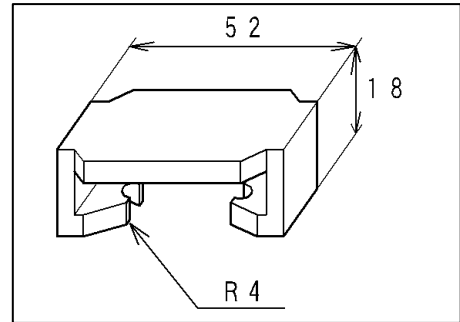
4. TERMINAL COVER FOR TYPE NARROW ANGLE METER COMMON

Narrow Angle Terminal Cover



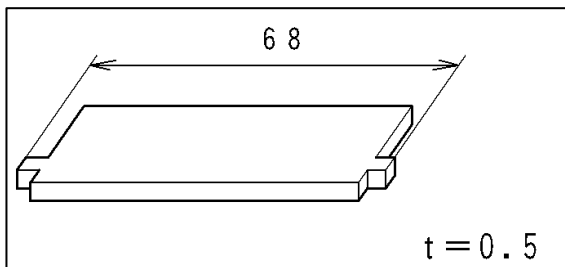
Set into terminal fitting

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) | DC Current / Voltage | M | 2pcs terminal cover is necessarily for P D-96 Series 2 Pointers type 1 | |
| L K-12C/ 10C/ 8C (Except 12C, 10C, 8C) | DC Receiving Indicator Meter | X | | |
| P D-96 (Except P D-96N) | AC Receiving Indicator Meter | Y | | |
| F K-7/ 5 | AC Current / Voltage | S | | |
| FAK-7C/ 5C | AC Current / Voltage | C | | |
| PAD-96 | 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

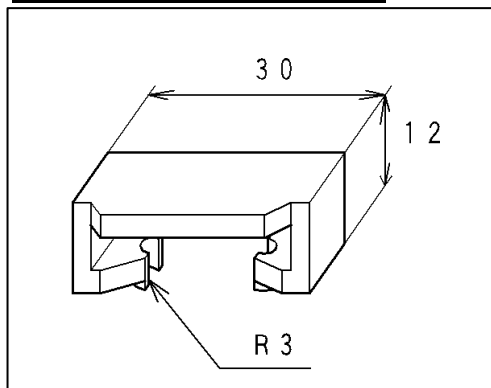


Set into terminal block

| 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

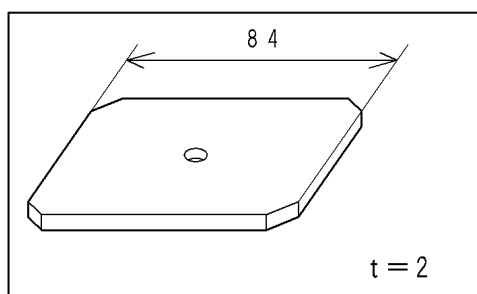


Use specify terminal cover or
OA-BCP3 for attachment transducer

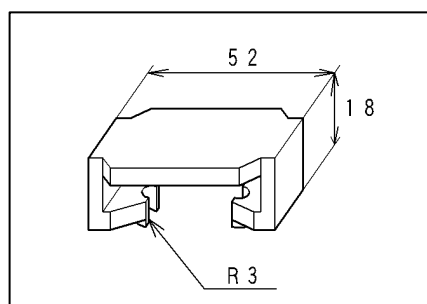
| Type Name | Measurement Element | Mark | Units Required | |
|----------------------------|------------------------------|------|----------------|------------|
| | | | 1 Pointers | 2 Pointers |
| F - 17 F - 15 F - 10 | DC Current/ Voltage | M | 1 | 2 |
| | DC Receiving Indicator Meter | X | 1 | 2 |
| | 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



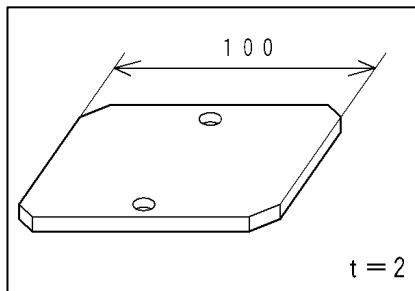
Please use nut to lock the meter stud.

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

Use specify terminal cover or OA-BCP3 for attachment transducer

8. TERMINAL COVER FOR TYPE EL SE

Terminal Cover For Type EL

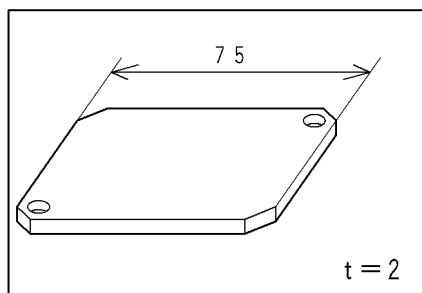


Lock screw on pillar.

| 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



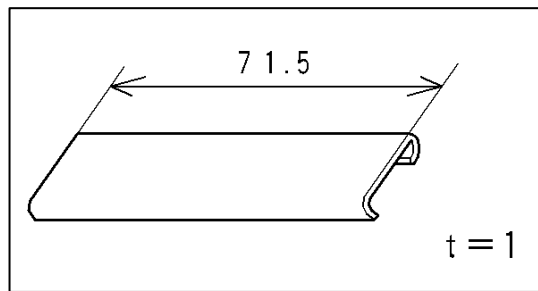
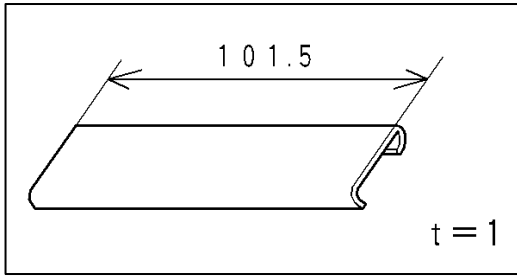
Lock screw on pillar.

| 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

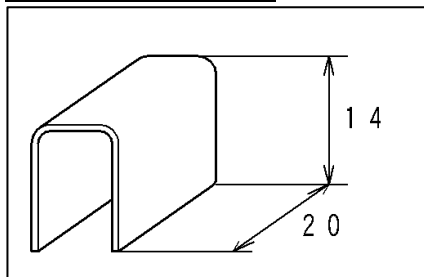


| Type Name | Measurement Element | Mark | Terminal Cover For EF Series |
|------------------|------------------------------|------|------------------------------|
| | | | Units Required |
| EF - 17 | DC Current/ Voltage | M | 1 |
| EF - 15 | DC Receiving Indicator Meter | X | |
| | AC Receiving Indicator 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



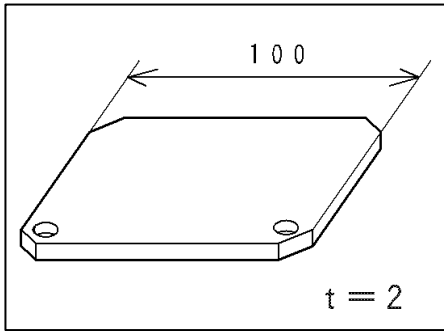
Set into terminal fitting

| 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

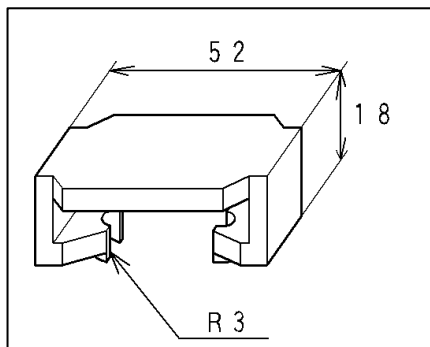


Lock by screw

| 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

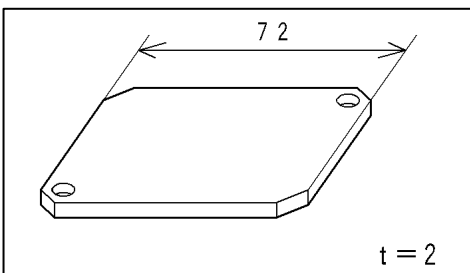
13. TERMINAL COVER FOR MAX. DEMAND AMMETER



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 |

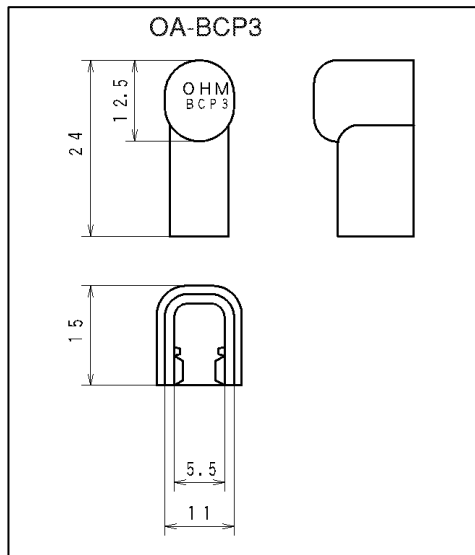
14. TERMINAL COVER FOR AUXILIARY CT



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

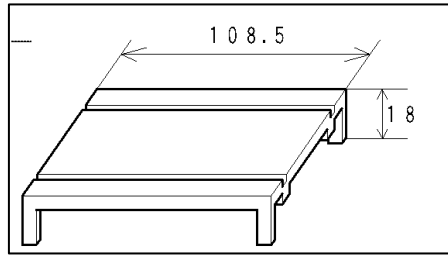
Please use accessory CT cover for Accessory CT, MR-CTN.

15. ATTACHMENT TRANSDUCER TERMINAL COVER



Set into terminal fitting

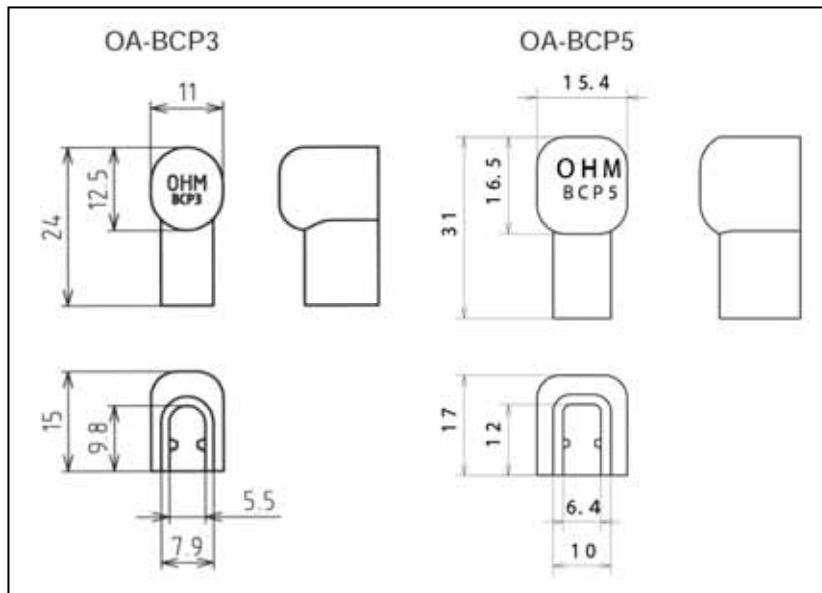
Terminal Cover for T-83M



| 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

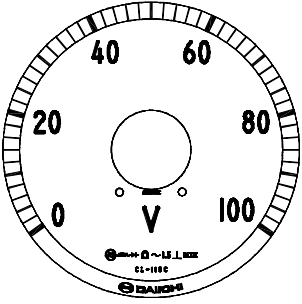
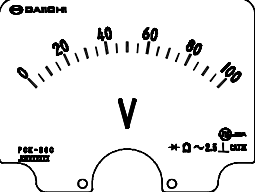
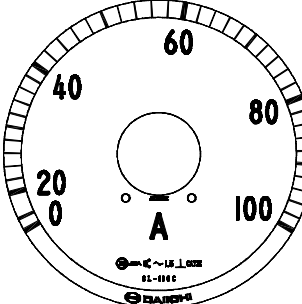
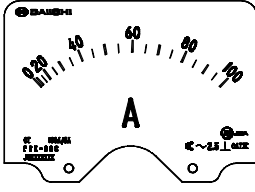
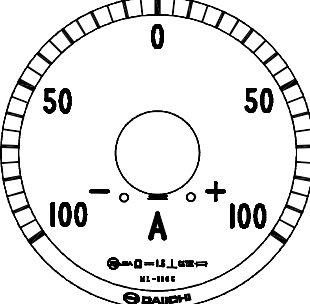
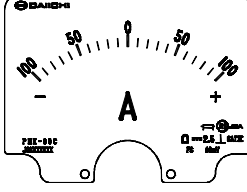
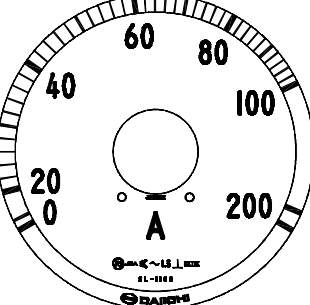
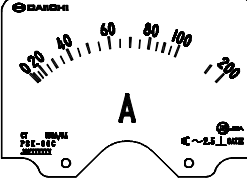
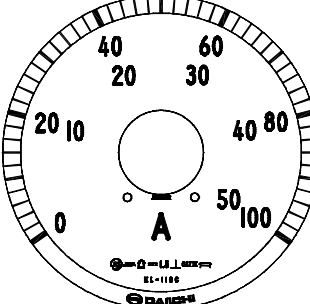
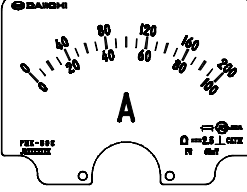
16. SERIES RESISTOR TERMINAL COVER



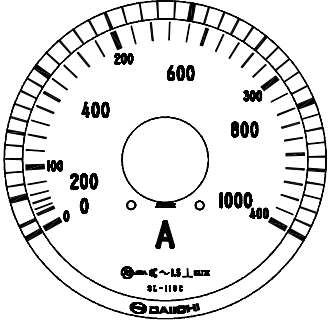
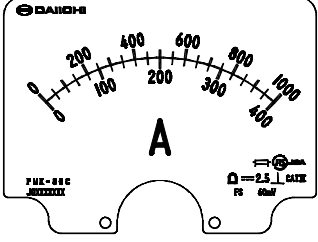
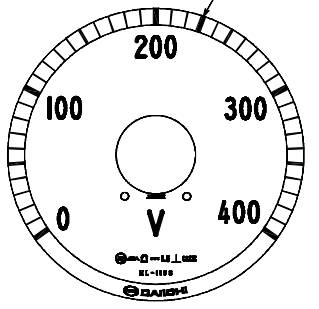
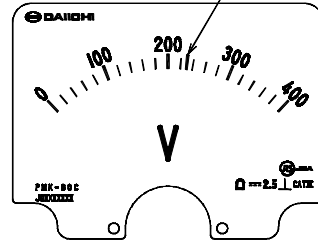
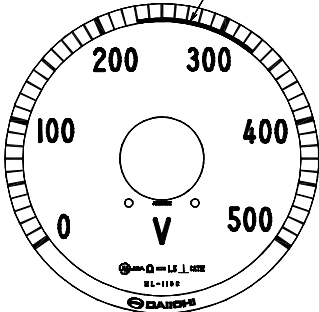
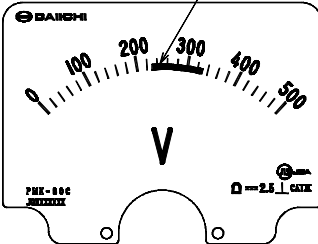
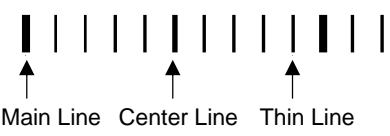
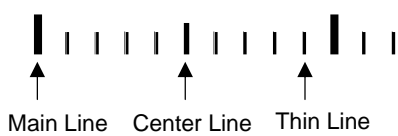
Set into terminal fitting

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

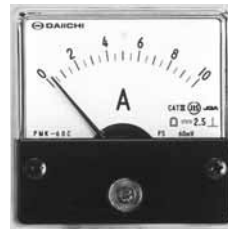


§ Wide Angle METER §

STANDARD DIVISION OF LANCET-SHAPED POINTER



L series



PK series

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

§ Wide Angle METER §



LK series



F series



F series

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

§ Wide Angle METER §

STANDARD DIVISION OF KNIFE-EDGE POINTER

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

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