DC Ammeters

YM-206NDA

YM-8NDA

LM-110NDA

■Specifications

				Rectangular indicators						Wide-angle indicators	
				Y-2N Series			Y-N Series			L-N Series	
Size (width × height)			mm	64×60	85×75	100×85	82×82	102×102	122×122	80×80	110×110
Model name				YM-206NDA	YM-208NDA	YM-210NDA	YM-8NDA	YM-10NDA	YM-12NDA	LM-80NDA	LM-110NDA
Operation principle				Movable coil			Movable coil			Movable coil	
Accuracy (grade)				2.5			2.5		1.5	2.5	1.5
Scale length			(mm)	55	70	85	70	90	100	124	175
Weight			(kg)	0.07	0.1	0.1	0.1	0.15	0.3	0.3	0.4
Indicator rating and delivery period classification	Maximum scale value		Delivery period	Internal resistance (Ω) or voltage drop							
	Direct indicator Note 1	100μA	△	2000Ω			2000Ω		5000Ω	—	
		200μA	△	1200Ω			1200Ω		5000Ω	—	
		300μA	△	1000Ω			1000Ω		1550Ω	920Ω	
		500μA	△	730Ω			730Ω		780Ω	580Ω	
		1mA	○	200Ω			200Ω		250Ω	180Ω	
		3mA	○	70Ω			70Ω		85Ω	60Ω	
		5mA	○	8Ω			8Ω		50Ω	8Ω	
		10mA	○	2Ω			2Ω		25Ω	60mV	
		20mA	○	0.8Ω			0.8Ω		0.8Ω		
		50, 100mA 200, 500mA 1, 2, 5, 7.5A 10, 15, 20, 30A	○	60mV			60mV				
	Combined with shunt	1A~7500A	△	60mV, 100mV Note 2 (consumption current: approx. 20mA)			60mV, 100mV Note 2 (consumption current: approx. 20mA)			60mV, 100mV Note 2 (consumption current: approx. 5mA)	
Special specification	With lead wire adjustment resistor		○	Manufacturable			Manufacturable			Manufacturable	
Page with outer dimensions drawing				35			36			37	

Note 1. The operating circuit voltage is 300V or less with the Y-2N Series, and 600V or less with the Y-N Series and L-N Series.

Note 2. In the case of combined use with a shunt, refer to "DC Ammeter Combined with Shunt" on p.44, and specify the lead wire thickness and one-way length or round-trip resistance.

Delivery period classification

Symbol	◎Standard product	○Quasi-standard product	△Special product
Reference delivery period	Immediate delivery	Within 20 days	21 to 60 days

Remarks (1) In the case of a bidirectional deflection indicator, determine the specifications according to the following.
- Direct-rating models can be manufactured if the larger of the left and right scales is 30A or less.
- For combined use with a shunt, select a scale so that the sum of the absolute values of the indicator ratings is 60mV or more.

Example: In the case of a shunt with ratings of 100A and 60mV
Ammeter scale -50~0~+100A
Ammeter rating -30~0~+60mV
(Sum of absolute values=90mV≥60mV)

(2) Refer to "Receiving Indicators" on p.67 concerning zero-suppressed indicators.

(3) Please make sure to read the "Safety Precautions" (pp.5-8) and the "Selection Precautions" (p.9) to assist in selecting the model and use specifications suited to the application.

■Connection diagrams

Fig. 1 DC ammeter (direct) load

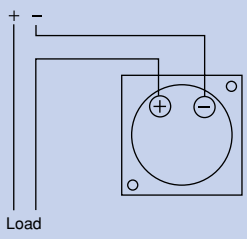
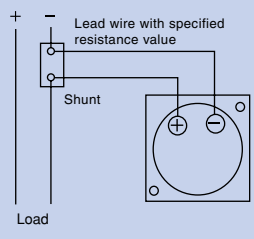


Fig. 2 DC ammeter (combined with shunt)



■Ordering method

The items in ☐ must be specified.

●Indicator combined with shunt

Model name	Indicator rating	Scale	Cover type	Shunt rating + required/not required	Thickness and length of lead wire + required/not-required	Special specifications	Number of units
YM-206NDA	60mV	0-200A	B	SHT 200A 60mV, required	lead wire 3.5mm² 3m, not required	Double scale, colored lines, etc.	10

With lead wire adjustment resistor: VR

●Direct indicators

Model name	Scale	Cover type	Special specifications	Number of units
YM-206NDA	0-20A	B	Double scale, colored lines, etc.	10

DC ammeter combined with shunt

For DC ammeters combined with a shunt, the measured value changes according to the resistance value of the lead wire. Thus, please refer to the following tables and specify the thickness and one-way length or round-trip resistance value of the lead wire connecting the indicator and the shunt.
The lead wire resistance value must be within the “maximum allowable value.”

●Table of maximum allowable values of lead wires for DC ammeters combined with shunts

DC ammeter combined with shunt			Maximum one-way length (m) in the case of a 2mm² lead wire (Mitsubishi Electric standard lead wire)	Maximum one-way length (m) in the case of a 3.5mm² lead wire
Model name	Indicator rating (mV)	Maximum allowable resistance value of lead wire (Ω)		
YM-206NDA, YM-208NDA YM-210NDA YM-8NDA, YM-10NDA	60 or more less than 75	0.72	39	69
	75 or more less than 100	1.55	84	149
	100 or more less than 150	2.37	128	227
	150 or more	4.02	217	384
YM-12NDA	60 or more less than 75	0.40	21	38
	75 or more less than 100	0.90	48	86
	100 or more less than 150	1.40	70	134
	150 or more	2.40	135	230
LM-80NDA LM-110NDA	60 or more less than 75	1.00	54	96
	75 or more less than 100	1.50	80	144
	100 or more less than 150	2.40	135	230
	150 or more	4.00	217	384

Remarks (1) In the case of a bidirectional deflection indicator, the indicator rating is the sum of the absolute values of the respective ratings.
(2) If a lead wire length exceeding the values in the above table is required, use a lead wire with a large cross-sectional area or use a shunt with a high rated voltage.

●Table of round-trip resistance values according to lead wire thicknesses and one-way lengths

One-way length / Cross-sectional area	Round-trip resistance value (Ω) (length: one-way)							Lead wire resistance (Ω/km)
	1m	2m	3m	4m	5m	10m	20m	
1.25mm²	0.033	0.066	0.099	0.132	0.165	0.330	0.660	16.5
2mm²	0.018	0.037	0.055	0.074	0.092	0.184	0.368	9.2
3.5mm²	0.010	0.021	0.031	0.042	0.052	0.104	0.208	5.2
5.5mm²	0.007	0.013	0.020	0.027	0.033	0.066	0.132	3.3

●Lead wires for shunt connection

Lead wires for connecting an indicator with a shunt can be manufactured according to specifications as accessories to the indicator.

The standard is: **two 2mm² - 2m (one-way) 1500V heat-resistant vinyl wires (blue) for electric equipment.**

Remarks (1) Only wires with a cross-sectional area of 2mm² are provided; other types of wires are to be prepared by the customer.

DC ammeter with lead wire adjustment resistor

If a DC ammeter combined with a shunt is to be arranged in advance with the lead wire length being indeterminate, use a DC ammeter with a lead wire adjustment resistor, which can be adjusted according to the lead wire resistance after installation of the indicator.

●Adjustment range of lead wire resistance

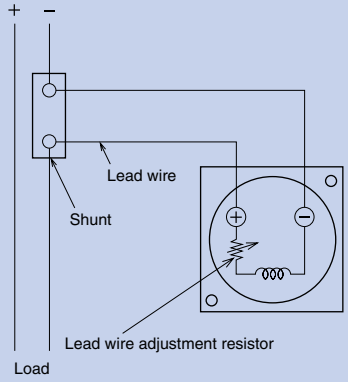
The lead wire resistance adjustment range is the same as the maximum allowable resistance value of lead wire in the “Table of maximum allowable values of lead wires.”

●Adjustment method

●Adjustment by voltage application

Disconnect the lead wires connected to the voltage terminals of the shunt, and adjust with the lead wire adjustment resistor so that the indicator deflects fully when a voltage corresponding to the indicator rating is applied to the respective ends of the lead wires.

DC ammeter with lead wire adjustment resistor



DC Ammeters

Accessories

Shunt for DC ammeter

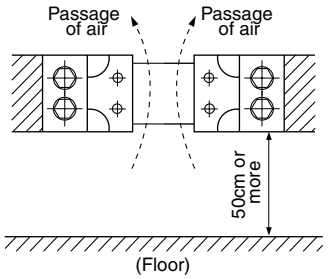
■Specifications

Accuracy	Grade 0.5 Percentage with respect to the rated voltage drop between voltage terminals or the shunt resistance value when the consumption current of the indicator is ignored.
Rated voltage	60mV (standard), 100mV (quasi-standard)
Rated current	1~7500A
Structure	Shunt with base for 150A or less, shunt without base for 200A or more.
Voltage test	3320VAC for 5s (applies only to shunts with base)
Insulation resistance	10MΩ or more at test voltage of 500V (applies only to shunts with base)

Remarks (1) For low-current shunts, the influence of the consumption current may be significant in some cases. If a shunt is ordered separately, it may be necessary to adjust the indicator that is used in combination with it.
(2) Shunts are designed for a temperature rise limit of 80°C at a current that is 80% of the rated current. For this reason, adequate care is required when tightening the bus lines in high-current, large-loss applications.
(3) Shunts with an insulating base can also be manufactured for rated currents greater than 150A and 600A or less.

■Rating selection and mounting

1. **Rating selection**
   For the shunt rating, select a current value with adequate allowance, taking into consideration that a shunt is a heat source. (As a general rule, use a shunt for values approximately 1.5 times or more of the continuous operating current.)
2. **Mounting attitude**
   Mount the shunt as shown in the diagram.
3. **Voltage terminals**
   Two voltage terminals are provided at one side block for shunts with a voltage of 2000A or more. In this case, use the diagonally positioned voltage terminal. (Error may increase by approximately 0.5% when the voltage terminals are used in parallel.)



Vertical mounting for best natural heat radiation

■Outer dimensions

Fig. 1 1~5A (60mV, 100mV)

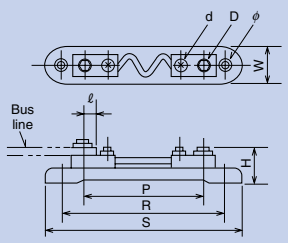


Fig. 2 10~150A (60mV, 100mV)

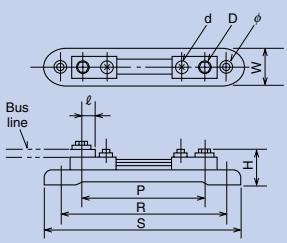


Fig. 3 200~300A (60mV, 100mV)

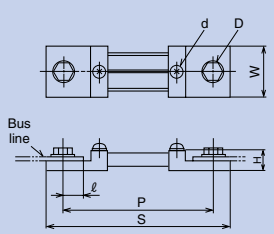


Fig. 4 400~1000A (60mV)
400~750A (100mV)

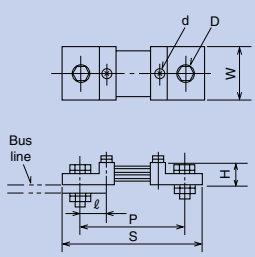


Fig. 5 1200~1500A (60mV)
1000~1500A (100mV)

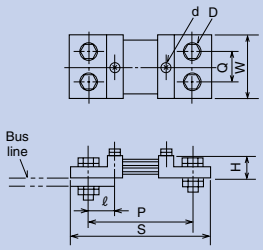


Fig. 6 2000~3000A (60mV, 100mV)

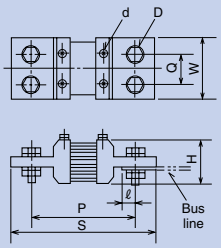
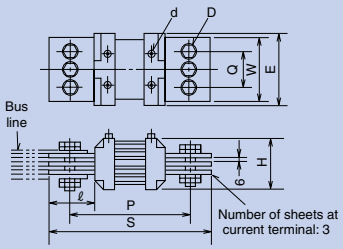


Fig. 7 4000~7500A (60mV, 100mV)



●Table of dimension variations (rated voltage: 60mV)

Rated current A	Rated voltage mV	Outer dimension drawing No.	Variable dimensions mm											Delivery period classification
			Interval between current terminals		Current terminal bolt	Voltage terminal screw	Block width	Shunt base mounting hole interval	Width of shunt (base)	Shunt base mounting hole diameter	Height	Total length	Contacting part length	
			P	Q	D	d	E	R	W	ϕ	H	S	ℓ	
1, 2, 3, 5	60	FIG. 1	85	—	M5	M4	—	120	26	4.5	25	140	10	◎
10, 15, 20, 25, 30	60	FIG. 2	85	—	M5	M4	—	120	26	4.5	25	140	10	◎
40, 50					M6									
60, 75, 100					M8					4.5	30			
150			110					150	30	5.5		175	15	
200	60	FIG. 3	110	—	M8	M4	—	—	33	—	15	135	15	◎
250						M5			38					
300					M12				43					
400	60	FIG. 4	115	—	M12	M5	—	—	45	—	20	155	35	◎
500													42.5	
600	60	FIG. 4	130	—	M12	M5	—	—	45	—	30	175	42.5	◎
750													45	
1000			135						60					
1200	60	FIG. 5	140	35	M12	M5	—	—	70	—	35	185	47	◎
1500													52.5	
2000	60	FIG. 6	175	45	M12	M5	—	—	85	—	55	230	30	◎
2500, 3000			180	50					100		70	240		△
4000	60	FIG. 7	180	90	M12	M5	150	—	150	—	80	250	70	△
5000			220								100	280	85	
6000			235				160				110	310	100	
7500												330		

●Table of dimension variations (rated voltage: 100mV)

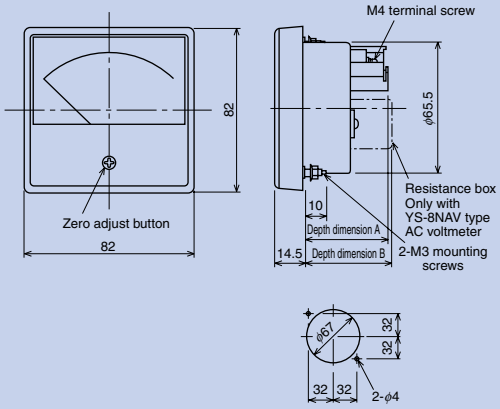
Rated current A	Rated voltage mV	Outer dimension drawing No.	Variable dimensions mm											Delivery period classification
			Interval between current terminals		Current terminal bolt	Voltage terminal screw	Block width	Shunt base mounting hole interval	Width of shunt (base)	Shunt base mounting hole diameter	Height	Total length	Contacting part length	
			P	Q	D	d	E	R	W	ϕ	H	S	ℓ	
1, 2, 3, 5	100	FIG. 1	85	—	M5	M4	—	120	26	4.5	25	140	10	△
10, 15, 20, 25, 30	100	FIG. 2	85	—	M5	M4	—	120	26	4.5	25	140	10	△
40, 50					M6						28			
60, 75, 100	100	FIG. 2	125	—	M8	M4	—	180	30	5.5	30	200	10	△
150											35			
200	100	FIG. 3	135	—	M8	M4	—	—	33	—	15	165	15	△
250						M5			36					
300					M12				43					
400	100	FIG. 4	145	—	M12	M5	—	—	45	—	20	185	35	△
500			165	—	M12	M5	—	—	45	—	30	210	42.5	△
600														
750			170	—	M12	M5	—	—	60	—	30	210	45	△
1000	100	FIG. 5	175	35	M12	M5	—	—	70	—	35	220	47	△
1200	100	FIG. 5												
1500			195	40					80		45	250	52.5	△
2000	100	FIG. 6	205	45	M12	M5	—	—	85	—	55	260	30	△
2500, 3000			210	50					100		70	270		
4000	100	FIG. 7	210	90	M12	M5	150	—	150	—	80	280	70	△
5000			250								100	310	85	
6000		FIG. 7	265		M12	M5	160		150		100	340	100	△
7500												360		

Delivery period classification

Symbol	◎Standard product	○Quasi-standard product	△Special product
Reference delivery period	Immediate delivery	Within 20 days	21 to 60 days

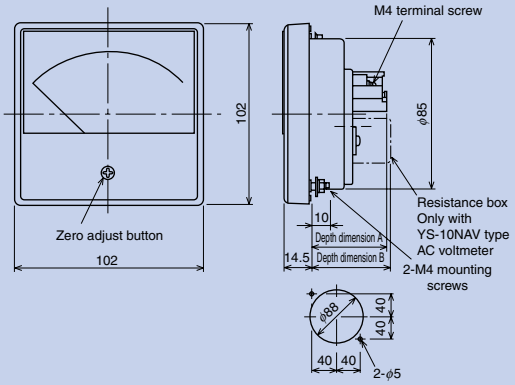
Rectangular indicators (Y-N Series)

FIG. 1 Y-8N



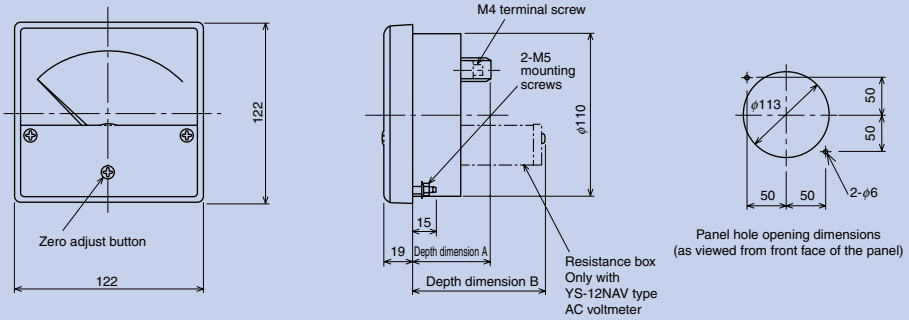
Panel hole opening dimensions
(as viewed from front face of the panel)

FIG. 2 Y-10N



Panel hole opening dimensions
(as viewed from front face of the panel)

FIG. 3 Y-12N



Panel hole opening dimensions
(as viewed from front face of the panel)

●Depth dimension details

Indicator type			Y-8N			Y-10N			Y-12N		
			Type name	A dimension	B dimension	Type name	A dimension	B dimension	Type name	A dimension	B dimension
DC	Ammeters		YM-8NDA	41	—	YM-10NDA	41	—	YM-12NDA	50	—
	Voltmeters		YM-8NDV	41	—	YM-10NDV	41	—	YM-12NDV	50	—
AC	Ammeters		YS-8NAA	41	—	YS-10NAA	41	—	YS-12NAA	50	—
		Uniform scale	YR-8NAA	41	—	YR-10NAA	41	—	YR-12NAA	50	—
	Voltmeters		YS-8NAV	41	43	YS-10NAV	41	43	YS-12NAV	50	85
		Uniform scale	YR-8NAV	41	—	YR-10NAV	41	—	YR-12NAV	50	—
	Wattmeters		YP-8NW	41	—	YP-10NW	41	—	YP-12NW	100	—
	Varmeters		YP-8NVAR	41	—	YP-10NVAR	41	—	YP-12NVAR	100	—
	Power-factor meters	Balanced	YP-8NPF	81	—	YP-10NPF	81	—	YP-12NPF	50 Note	—
		Unbalanced	YP-8NPFU	41	—	YP-10NPFU	41	—	YP-12NPFU	100	—
	Frequency meters		YP-8NF	81	—	YP-10NF	81	—	YP-12NF	50	—
	Receiving indicators	DC indicators	YM-8NRI	41	—	YM-10NRI	41	—	YM-12NRI	50	—
		AC indicators	YR-8NRI	41	—	YR-10NRI	41	—	YR-12NRI	50	—

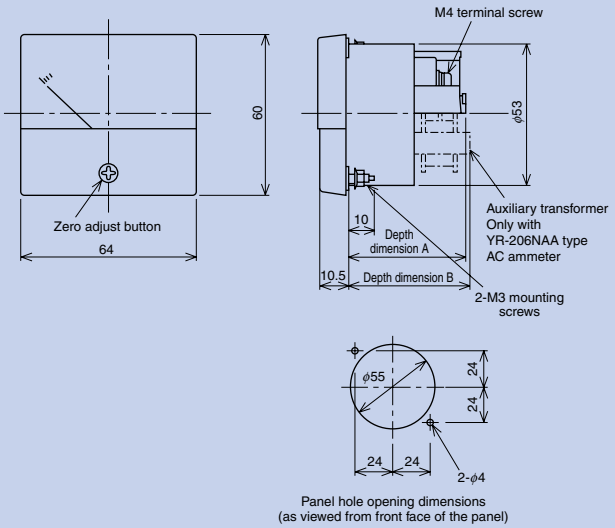
Note. 100mm in the case of a model for 1-phase 2-wire systems.

Outer Dimension Drawings

(Refer to the specification tables regarding models other than the Y-2N series, Y-N series, and L-N series.)

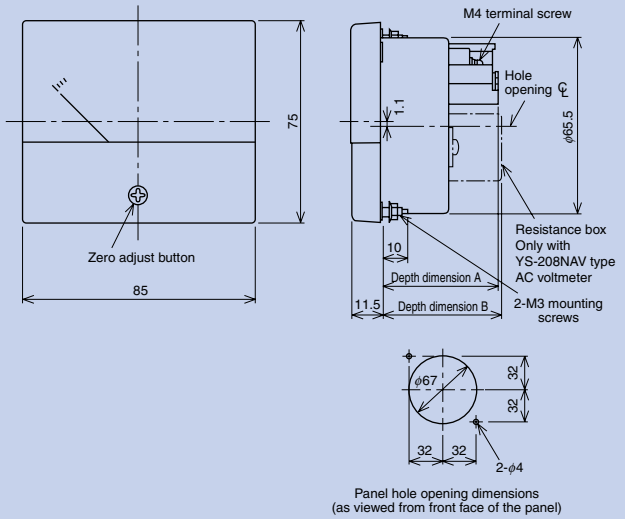
Rectangular indicators (Y-2N Series)

FIG. 1 Y-206N



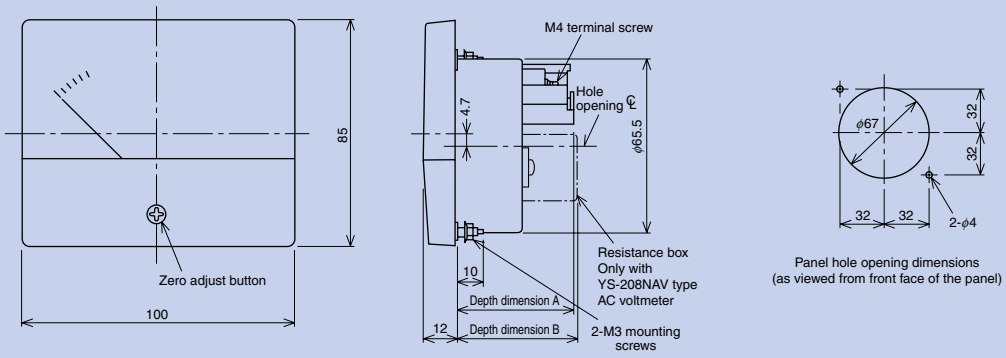
Panel hole opening dimensions (as viewed from front face of the panel)

FIG. 2 Y-208N



Panel hole opening dimensions (as viewed from front face of the panel)

FIG. 3 Y-210N



Panel hole opening dimensions (as viewed from front face of the panel)

●Depth dimension details

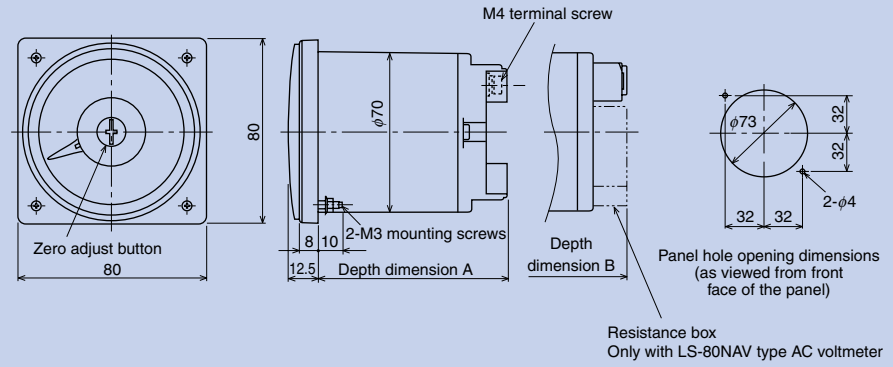
Indicator type			Y-206N			Y-208N			Y-210N		
			Type name	A dimension	B dimension	Type name	A dimension	B dimension	Type name	A dimension	B dimension
DC	Ammeters		YM-206NDA	43	—	YM-208NDA	43	—	YM-210NDA	43	—
	Voltmeters		YM-206NDV	43	—	YM-208NDV	43	—	YM-210NDV	43	—
AC	Ammeters		YS-206NAA	43	—	YS-208NAA	43	—	YS-210NAA	43	—
		Uniform scale	YR-206NAA	43	44	YR-208NAA	43	—	YR-210NAA	43	—
	Voltmeters		YS-206NAV	43	—	YS-208NAV	43	45	YS-210NAV	43	45
		Uniform scale	YR-206NAV	43	—	YR-208NAV	43	—	YR-210NAV	43	—
	Wattmeters		YP-206NW	43	—	YP-208NW	43	—	YP-210NW	43	—
	Varmeters		YP-206NVAR	43	—	YP-208NVAR	43	—	YP-210NVAR	43	—
	Power-factor meters	Balanced	YP-206NPF	43	—	YP-208NPF	43	—	YP-210NPF	43	—
		Unbalanced	YP-206NPFU	43	—	YP-208NPFU	43	—	YP-210NPFU	43	—
	Frequency meters		YP-206NF	83	—	YP-208NF	83	—	YP-210NF	83	—
	Receiving indicators	DC indicators	YM-206NRI	43	—	YM-208NRI	43	—	YM-210NRI	43	—
		AC indicators	YR-206NRI	43	—	YR-208NRI	43	—	YR-210NRI	43	—

Outer Dimensional Drawings

(Refer to the specification tables regarding models other than the Y-2N series, Y-N series, and L-N series.)

Wide-angle indicators (L-N Series)

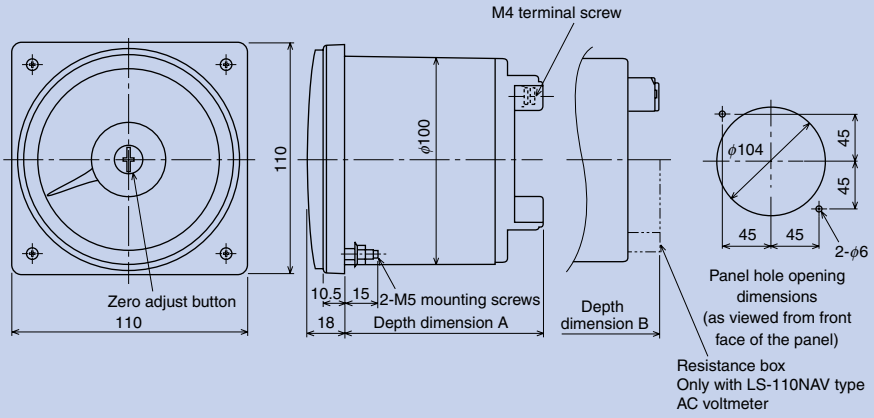
FIG. 1 L-80N



●Depth dimension details

Indicator type			L-80N Type name	A dimension	B dimension
DC	Ammeters		LM-80NDA	81	—
	Voltmeters		LM-80NDV	81	—
AC	Ammeters		LS-80NAA	—	81
		Uniform scale	LR-80NAA	81	—
	Voltmeters		LS-80NAV	—	81
		Uniform scale	LR-80NAV	81	—
	Wattmeters		LP-80NW	81	—
	Varmeters		LP-80NVAR	81	—
	Power-factor meters	Balanced	LP-80NPF	92	—
		Unbalance	LP-80NPFU	81	—
	Frequency meters		LP-80NF	92	—
Receiving indicators		DC indicators	LM-80NRI	81	—
		AC indicators	LR-80NRI	81	—

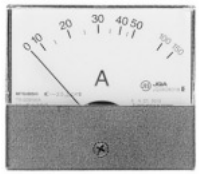
FIG. 2 L-110N



●Depth dimension details

Indicator type			L-110N Type name	A dimension	B dimension
DC	Ammeters		LM-110NDA	92	—
	Voltmeters		LM-110NDV	92	—
AC	Ammeters		LS-110NAA	—	92
		Uniform scale	LR-110NAA	92	—
	Voltmeters		LS-110NAV	—	92
		Uniform scale	LR-110NAV	92	—
	Wattmeters		LP-110NW	100	—
	Varmeters		LP-110NVAR	100	—
	Power-factor meters	Balanced	LP-110NPF	92	—
		Unbalance	LP-110NPFU	100	—
	Frequency meters		LP-110NF	92	—
Receiving indicators		DC indicators	LM-110NRI	92	—
		AC indicators	LR-110NRI	92	—

■Covers

Cover specification	Classification	Y-2N Series	Y-N Series	L-N Series
B design cover (Munsell N 1.5 semi-gloss)	◎			
G design cover (all transparent)	○			——
F design cover Note 1 (special color coating)	△			
Cover with red needle (can be manufactured for B, G, and F designs)	○			

Remarks The B design cover is standard specification. The G and F design covers and covers with red needles can be manufactured if required.
Note 1. When ordering the F-design cover, please use F as the cover code and specify the color coating. Munsell 7.5BG 4/1.5 will be used for orders with no color coating specified.

●Cover codes

Cover specifications	Without red needle	With red needle
B design	B	BR*1
G design	G	GR
F design	F	FR

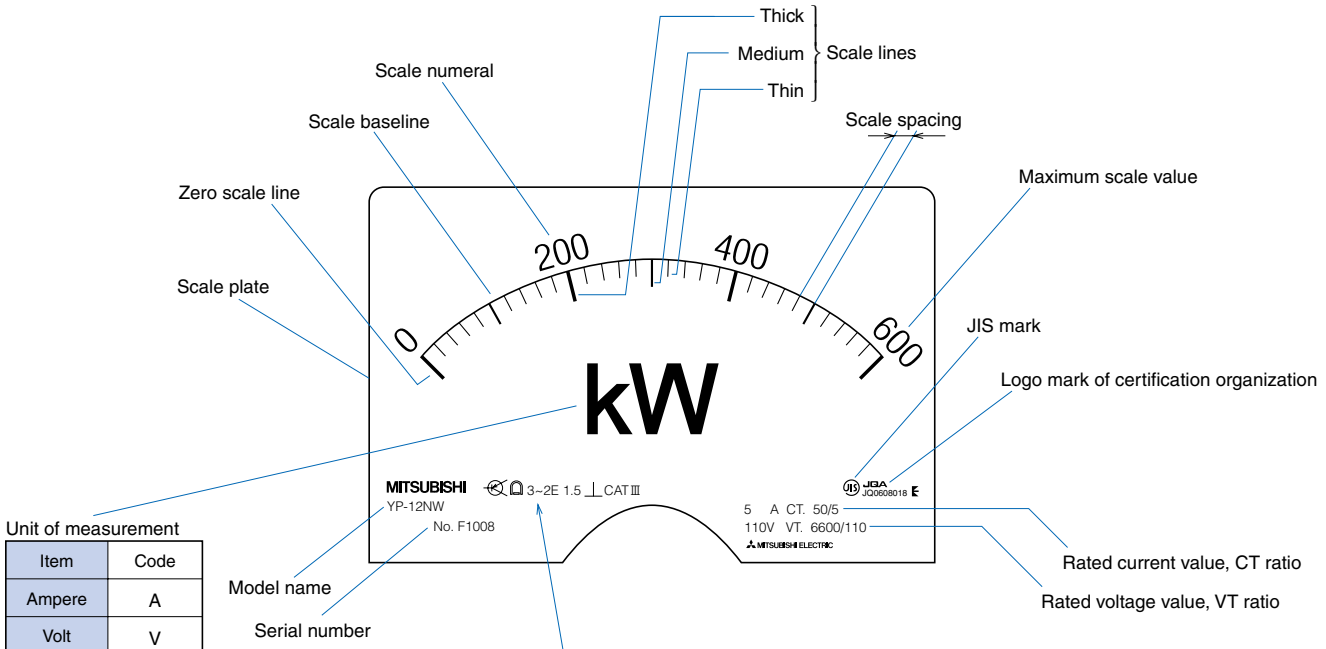
Remarks For the Y-N Series, a B cover with two red needles (BRR cover) can be manufactured depending on the model (please inquire for details).

●Accessories

Nuts for mounting screws are provided with all models. T-150 and other special accessories are indicated in the specification columns of the respective indicator types.

Common Specifications

■Scale plate components and items indicated



Item	Code
Ampere	A
Volt	V
Watt	W
Var	var
Power factor	cos ϕ or cos ψ
Hertz	Hz
Prefix	
Mega 10^6	M
Kilo 10^3	k
Milli 10^{-3}	m

3~2E 1.5 ⊥ CAT Ⅲ

Auxiliary symbols

Item	Symbol
Shunt	
Serial resistor	R
Accessory	

Operation principle

Item	Symbol
Permanent magnet/movable coil	
Movable iron core	
Bimetal	
Electronic device in measurement circuit	
Electronic device in auxiliary circuit	
Rectifier	

Type of measurement and number of elements measured

Item	Symbol
DC circuit	⎓
AC circuit	~
3-phase AC circuit	3~
Single element for 3-wire circuit	3~1E
Two elements for unbalanced load 3-wire circuit	3~2E
Two elements for unbalanced load 4-wire circuit	3N~2E
Three elements for unbalanced load 4-wire circuit	3N~3E

Accuracy class

Class index	Code
Class 0.5	0.5
Class 1	1
Class 1.5	1.5
Class 2.5	2.5
Class 5	5
Class 1.5 in the case where the base value corresponds to the span	|1.5|
Class 2.5 in the case where the base value corresponds to the span	|2.5|

Mounting attitude

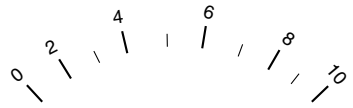
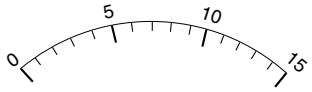
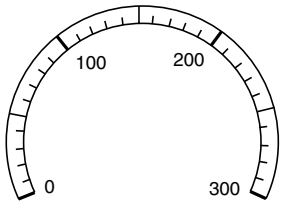
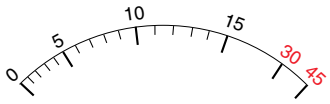
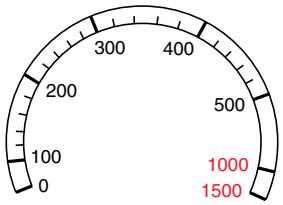
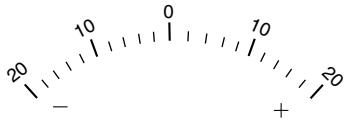
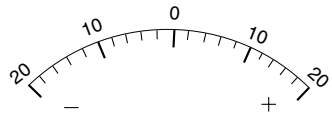
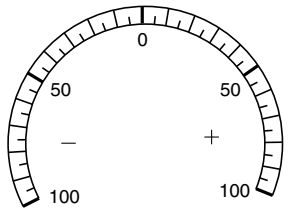
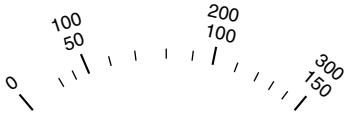
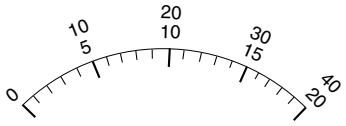
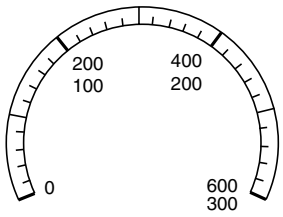
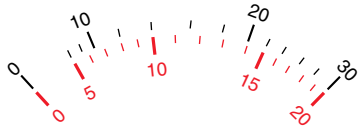
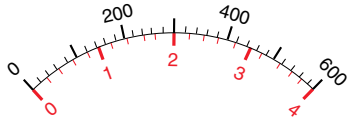
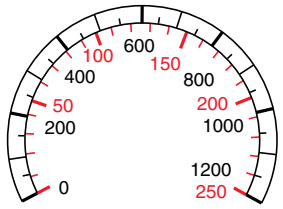
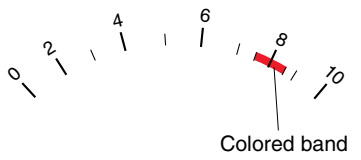
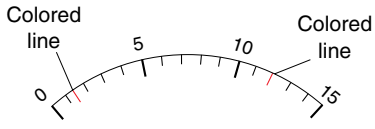
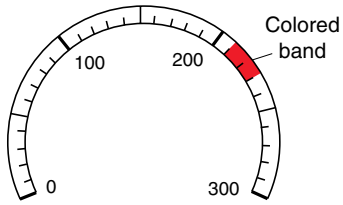
Item	Symbol
Instrument used with scale plate set vertically	⊥
Instrument used with scale plate set horizontally	⌐
Instrument used with scale plate set at a position inclined from the horizontal surface (example: 60°)	∠60°

Measurement category

Classification	Code
Measurement category Ⅲ	CAT Ⅲ

■Scale plate indications

The following tables show the scales, including numerals, colored lines, bands and colors, used as standard specifications.
Red, blue, green and yellow are used for the colored lines/bands.

	Y-2N Series	Y-N Series	L-N Series
Standard scale			
Expanded scale (expanded by 3 times)			
Positive/ Negative scale			
Single scale with double stamp			
Double scale with double stamp			
Colored lines Colored bands			

Remarks (1) See the “Standard Scale Diagrams” on pp.31 to 34 regarding the scale division with respect to the maximum scale value.
(2) Special scales can also be manufactured.