

KS

KOREAN INDUSTRIAL STANDARD

Maximum demand meters

KS C 1211 : 1978

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Ministry of Commerce, Industry and Energy

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the original standard in Korean is to be evidence.

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KS C 1211 : 1978
(Confirmed : In 1991)

Maximum demand meters

1. Applying scope ; This Korean Industrial Standard specifies maximum demand meters and two-circuits maximum demand meters used in combination with instrument transformers in three-phase 3-line circuits and three-phase 4-line circuits (hereinafter referred to as "transformer") or precision watt-hour meters attached with maximum demand watt-hour indicator, precision watt-hour meters attached with two-circuits maximum demand watt-hour indicator, special watt-hour meters attached with maximum demand watt-hour indicator and the parts of maximum demand meter in special precision watt-hour meters attached with two-circuits maximum demand watt-hour indicator (hereinafter referred to as "demand meter"). And for the demand meter with two-circuits, this Standard shall be applied in each of the circuits except for two-circuits balance. For meters equipped with measuring device or supplementary device, this Standard shall be applied in the condition that the part of demand meter is attached to them as much as possible. But for accumulated maximum demand meters and automatic maximum demand meters, this Standard shall not be applied.

Remarks 1. For driving part, the requirements of KS C 1201 and KS C 1209 or KS C 1210 shall be applied, besides this Standard.

2. The units and numerical values given { } in this Standard are in accordance with the international system of units and are appended for information.

3. Normative references to this Standard are given below.

KS A 0105 Units for metering and measuring and the usage

KS C 0903 Vibration test method for small type electric equipment

KS C 0905 Shock test method for small type electric devices

KS C 1201 General rules for watt-hour meters

KS C 1203 Weatherproof functions of watt-hour meters

KS C 1205 Pursing devices of watt-hour meters

KS C 1209 Precision watt-hour meters

KS C 1210 Special precision watt-hour meters

2. Standard temperature For this Standard, a temperature of 20°C shall be applied as the standard temperature.

3. Definition of terms The definitions of the main terms used in this Standard shall be as specified below, in addition to those stated in KS C 1201.

(1) Maximum demand meter Maximum demand meter means a meter to indicate maximum demand watt-hours, which is composed of maximum demand watt-hour indicator and driving part.

(2) Watt-hour meter attached with maximum demand watt-hour indicator Watt-hour meter attached with maximum demand watt-hour indicator means a meter to indicate watt-hours and maximum demand watt-hours, which is composed of the integrated constitution of measuring

device and maximum demand watt-hour indicator and driving part.

- (3) **Maximum demand watt-hour indicator** Maximum demand watt-hour indicator means a device to indicate maximum watt-hours, which is composed of indicating device and time limiting device.
- (4) **Driving part** Driving part means a series of tools to drive maximum demand watt-hour indicating device, included pulse generating device.
- (5) **Maximum demand electric power** Maximum demand electric power means the maximum value of the demand electric powers during the term of measuring.
- (6) **Demand electric power** Demand electric power means the average of electric powers in a defined time interval.
- (7) **Demand time limit** Demand time limit means the time interval according to (6).
- (8) **Voltage circuit** Voltage circuit means a circuit that supply voltage or the equivalent voltage is applied, and a part between the terminals of demand meter.
- (9) **Current circuit** Current circuit means a circuit in which passes loading current or the equivalent current passes, and a part between the terminals of demand meter.
- (10) **Total load** Total load means rated voltage, rated current, rated frequency and the load when power ratio is equal to 1. (which means the load of each circuit for 5A type of two circuits demand meter and total sum of the 2 circuits loads for (5 + 5)A type.)
- (11) **Indication error** Indication error of demand meter is expressed as the following equation, where demand power value is p and the corresponding true value of demand power is P_0 .

$$\text{Indication error} = \frac{P - P_0}{P_0} \times 100 \%$$

- (12) **Device error** The device error of demand meter means that subtracts the error of deriving part from the indication error of demand meter.

- (13) **Pulse constant** Pulse constant means the number of pulses per 1 kWh {3600kJ} in a pulse generating device.

Note 1 Wh = 3600 J

- (14) **Pulse coefficient error** The pulse coefficient error of pulse type demand meter means the intrinsic error u (%) per ± 1 pulse which generate by counting pulses.

Where coefficient value is n , pulse coefficient R is (pulse/kWh) {number/3600 kJ}, demand time limit is T (minute) and load power is P (kW),

$$u = \frac{100}{n} (\%)$$

$$= \frac{1}{P} \times \frac{60}{T} \times \frac{100}{R} (\%)$$

- (15) **Composed error** Composed error means an error which converter, instrument transformer and converter or instrument voltage converter affects the indication of demand meter, and that is combined by specific error and phase angle error.
- (16) **Indication error of total sum** Indication error of the total sum means a total sum error when demand meter and converter, demand and instrument transformer & converter or demand meter and instrument voltage converter are combined together, and which is expressed an algebraic sum of independent indication error of demand

4. Constitution type The type of demand meters shall conform to any one of those given in Table 1.

Table 1

Classification	Type symbol	Maximum demand meter	Type symbol	Watt-hour meter attached with maximum demand electric power indicator
Unified type	1A-1		1B-1	
Separated type	1A-2		1B-2	
	1A-3		1B-3	
Unified type	2A-1		2B-1	
Separated type	2A-2		2B-2	
	2A-3		2B-3	

Remarks 1. In the Table, ↓ signifies rotor, and | pulse generation device respectively.
2. When Wh is expressed in SI units, it shall be expressed by MJ.

5. Rated voltage, rated current, rated frequency and rated demand time limit The rated voltage, rated current, rated frequency and rated demand time limit of demand meter shall conform to Table 2.

Table 2

Classification		Rated voltage V	Rated current A	Rated current Hz	Rated demand time limit min.
Meter used in combination with converter only	three-phase 4-line	220	5	60	30
Meter used in combination with instrument transformer and converter	three-phase 3-line	110		60	15
	three-phase 4-line				

6. Constitution

6.1 Constitution The constitution of demand meter shall conform to KS C 1203 in principle, and others of the items which are specified below shall conform to KS C 1205.

6.2 Constitutional elements Whether the using circuit is balanced or unbalanced, demand meter shall be constituted by the required number of elements to measure electric power theoretically according to the number of circuits and the number of circuit lines.

6.3 Indication device The indication type of indication device shall be two kinds, single scale and decimal system scale.

Remarks In two circuits demand meter, there are two kinds of addition method, 5A type and (5+5)A type, and in single scale, the maximum scale value of (5+5)A type is two times greater than the maximum scale value in 5A type.

6.3.1. Single scale

(1) Scale

(a) the direction of scale shall conform to example of Figure 1.

(b) The distance from 0 scale to rated load indicating point shall be no less than 125mm.

Remarks The length of scale shall be expressed in the length of arc connecting the front end of the scale line of ruler.

(c) The maximum value of scale shall be standardized by 120% of the indicating value when loading the rated.

(d) The width of scale shall not be less than 0.6mm when it is measured by the distance between the centers of two scale lines which are adjacent to the terminal near to the rotating center of demand indication.

Remarks When the scale is more than 1.2mm, it shall be available to insert a supplementary scale in the medium.

(e) The length of scale line on ruler shall be 2 ~ 2.5mm, and the thickness of all the scales shall be on the basis of 0.15mm.

(f) Reading of each scale shall be 1, 2 and 5 or 10 of integer multiple for it, kW will be used as the unit of scale value, and it shall be specified on the scale plate according to the example in Figure 1.

Remarks In special case it shall be possible to use MW.

(g) On the scale part which expresses 35% of the rated power shall be attached symbol Δ according to the example in Figure 1.

(h) The scale plate shall have proper strength, and be attached firmly not to be biased against the rotating center of demand indicator.

(i) The painting and scale line on the scale plate shall not be decolored and faded easily.

(j) If a mirror is attached on the scale plate, it shall have good quality to reflect well and be attached on the most proper position firmly to read the demand indication.

(2) Demand Indicator

(a) The demand indicator shall be driven by the indicator driver certainly, and shall be constituted to stop the position definitely where the indicator driver turns back to 0 position.

(b) The demand indicator shall have proper strength not to become deformed, and whose constitution shall be stable against any shock or vibration from the outside.

(c) The demand indicator shall be polished in black by using a method not to become decolored, faded or flaked the coating.

(d) The length of demand indicator shall be such that its front end is within a range of 1mm on the front end of the scale line of the ruler, the width of needle end shall be 0.2mm.

(e) On the demand meter without an mirror surface the interval between the demand indicator and the scale plate shall not more than 3mm.

(3) Indicator Driver

(a) The indicator driver shall be constituted to operate correctly corresponding the changes of load in order to satisfy completely the demand indications, and simultaneously to turn back definitely replying to the operation of time limit device, when it shall not influence the demand indication in the least.

- (b) The indicator driver shall be polished in red by using a method not to become decolored, faded or flaked the coating.
- (c) The indicator driver shall have a proper strength and constitution that the demand indicator does not be displaced down to lower places passing over the indicator driver by recovering manipulation of the demand indication, vibration or shock.

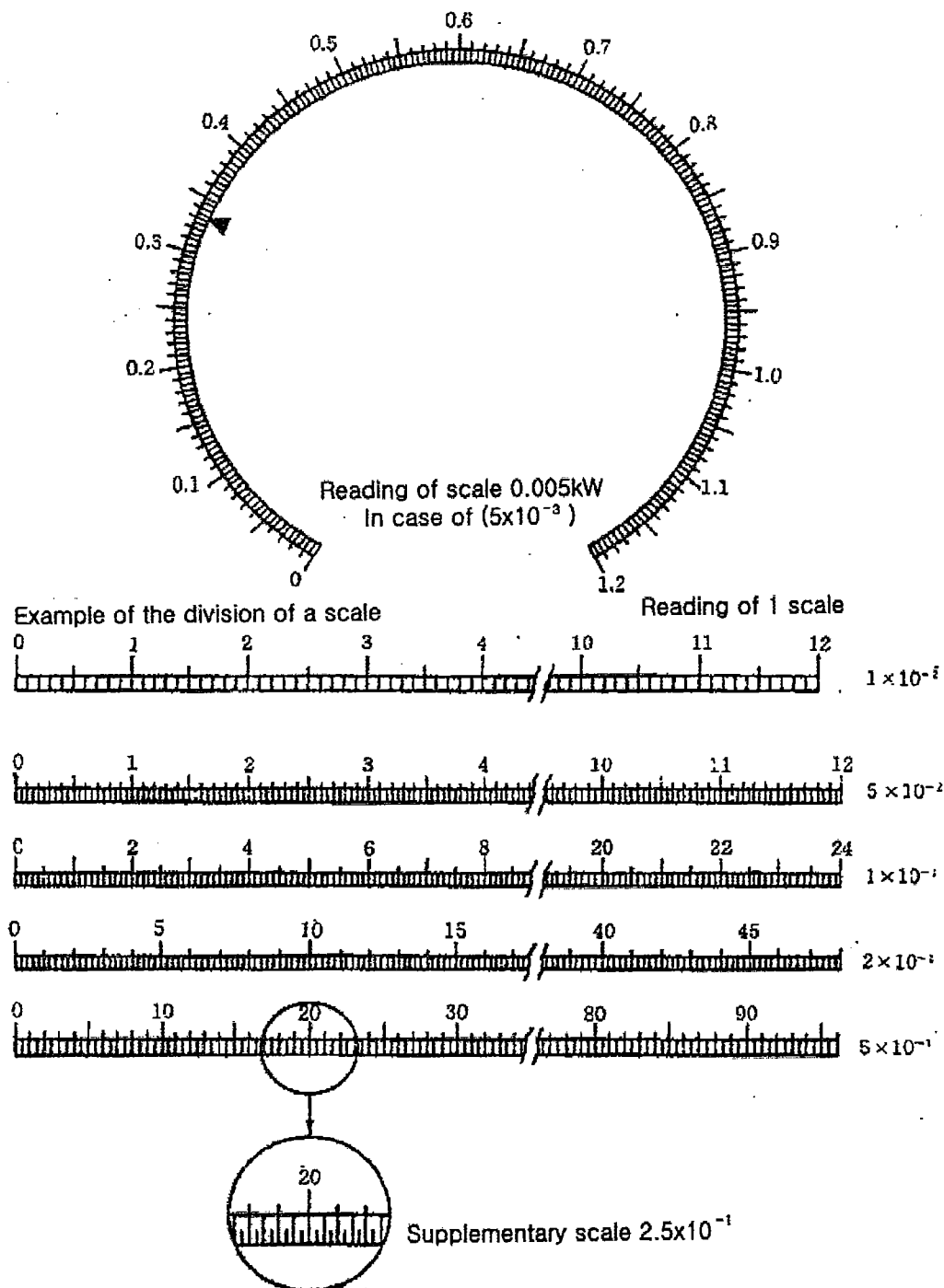


Figure 1. Example of scale format (In case of single scale)

6.3.2 Decimal scale

(1) Maximum demand watt-hour indicator

- (a) The maximum demand watt-hour indicator shall be driven by the demand index certainly, and shall be constituted to stop the position definitely when the demand index terminates at time limit and turns back to 0 place.
- (b) The demand indicator shall be constituted to have a proper strength and to be stable against any shock or vibration from the outside.
- (c) The maximum demand watt-hour indicator shall be manufactured by a method not to become decolored, faded or flaked the coating easily according to example in Figure 2, and distinguished from the demand index easily.
- (d) The measuring plate on maximum demand watt-hour indicator shall be constituted to read easily the indications, whose measuring unit shall be kW and specified on the measuring plate according to example in Figure 2.

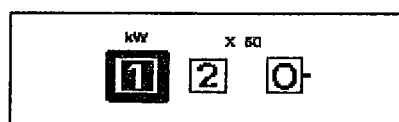
Remarks In special case it shall be possible to use MW.

- (e) The value difference of the minimum place figure on the numerical type measuring plate shall be accumulation type, and the needle type measuring plate shall be clockwise in the rotating direction of 1 place.
- (f) On the maximum demand watt-hour indicator, the number of rows of the measuring plate shall be equal to and more than 3, and the minimum place shall be constituted to be able to read less than 1/20 rotation.
- (g) The measuring plate having decimal places shall be to distinguish integer places and decimal places easily according to the example in Figure 2.

(2) Demand Index

- (a) The demand index shall be constituted to operate correctly corresponding to load changes, and simultaneously to drive the maximum demand watt-hour indicator completely and turn back to 0 place definitely according to the operation of the time limit device, when it shall not influence the maximum demand watt-hour indicator in the least.
- (b) The demand index shall be constituted properly not to influence the indications of the maximum demand watt-hour indicator by recover operation, vibration or shock of the maximum demand watt-hour indicator.
- (c) The demand index shall be arranged properly to read the maximum watt-hour indicator, whose proper place shall be polished in red by using a method not to become decolored, faded and flaked the coating easily, and to distinguish from the maximum demand watt-hour indicator easily.
- (d) The measuring plate of the demand index shall be attached a place showing well the indication device, and constituted to read easily, and whose measuring unit shall be equal to that of the maximum demand watt-power indicator.

(a) In case of 2 decimal places



(b) In case of 1 decimal place

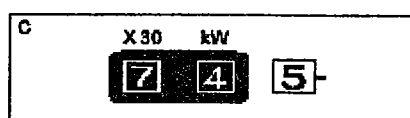


Figure 2-1 Numerical Type

(c) In case of without decimal place

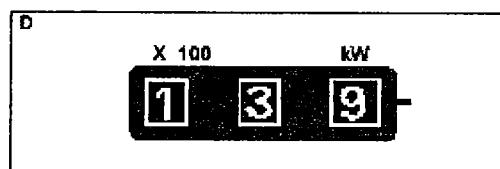
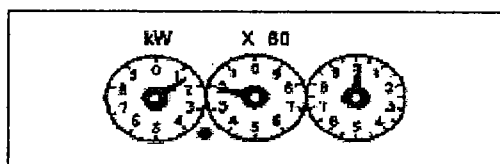
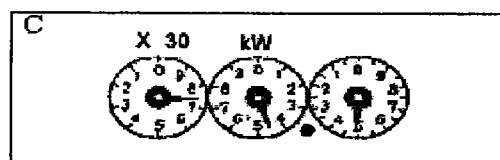


Figure 2-1 (Continued)

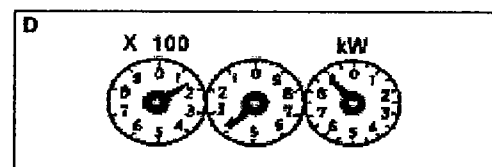
(a) In case of 2 decimal places



(b) In case of 1 decimal place



(c) In case of without decimal place



Remarks The indications on the decimal places, scale, and characters shall be colored by red.

Figure 2-2 Needle Type

6.3.3 Multiple and the value of each position on the indicating device (kW)

- (1) When the multiple is necessary in the indication of indicating device, the multiple shall be integer number and expressed at a place to show well. And when the multiple is 1/10 of the composed transformation ratio the character of D shall be expressed, and when the converter is a nominal converter with 3000V grade, C shall be expressed and with 6000V grade, C_s shall be expressed. (Refer to Figure 2).
- (2) When the multiple is 10 to the integer power, the multiples given in Table 3 shall be used according to a range of the rated load in the primary side of converter.

Table 3

Classification	Multiple
Less than 120	-
More than 120 and less than 1200	10
More than 1200 and less than 12000	100
It shall conform to the above in case of more than 12000.	