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Var-hour meters—Part 1: General measuring instrument

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Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law.

Consequently **JIS C 1263**:1995 was withdrawn and replaced with this Standard.

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JIS C 1263 consists of the following 2 parts under the general title “Var-hour meters”:

Part 1: General measuring instrument

Part 2: Measuring instruments used in transaction or certification

Var-hour meters—Part 1: General measuring instrument

Introduction

This Japanese Industrial Standard is established in order to specify the technical requirements needed for var-hour meters as general measuring instrument. Since this Standard does not include the requirements concerning the marking method, the var-hour meters cannot be given the marking as stipulated in Article 19 of the Industrial Standardization Law, which indicates their conformity to this Standard.

1 Scope

This Standard specifies the var-hour meters for general use, namely, var-hour meters used in combination with instrument transformers, var-hour meters for summation measurement of multi circuits of the current composing system, transmitter-incorporating var-hour meters, and transmitter-incorporating var-hour meters for summation measurement of multi circuits of the current composing system, in three-phase three-wire system and three-phase four-wire system circuits (hereafter referred to as “meters”). For meters provided with auxiliary devices, this Standard shall be applied to the var-hour meter units under such a condition that the auxiliary devices are attached.

This Standard applies the voltage and current with a waveform that is approximately sinusoidal.

This Standard is applied only to the meters equipped with the reversal preventing device or reverse measurement blocking device.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 1101 *Slotted head screws*

JIS B 1135 *Slotted head wood screws*

JIS C 1210 *General rules for electricity meters*

JIS C 1281 *Weather-proof performance of electricity meters*

JIS C 1736-1 *Instrument transformers for metering service—Part 1: General measuring instrument*

JIS C 4003 *Thermal evaluation and classification of electrical insulation*

JIS C 60068-2-6 *Environmental testing Part 2: Tests—Test Fc: Vibration (sinusoidal)*

JIS C 60068-2-27 *Basic environmental testing procedures Part 2: Tests, Test Ea and guidance: Shock*

3 Classification

3.1 Applicable circuits

The types of circuits used for multicircuit summation meters in the current composing system shall be the 2-circuit and 3-circuit types.

The only meters to be used for the above circuits shall be the meters of three-phase four-wire system, which are used in combination with current transformers.

3.2 System configuration

The classification of meters according to the system configuration shall be in accordance with table 1.

Table 1 System configuration and internal connection diagram

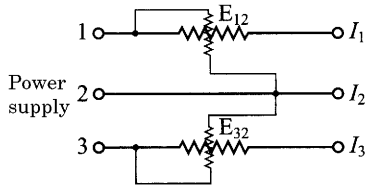
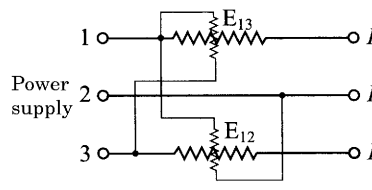
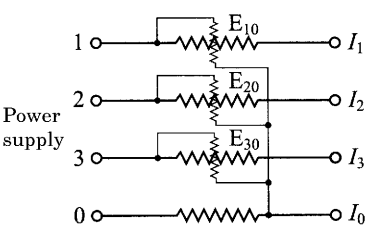
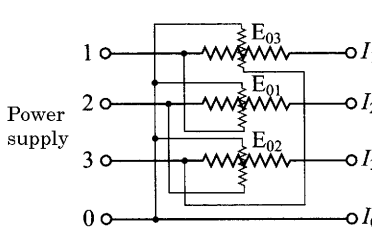
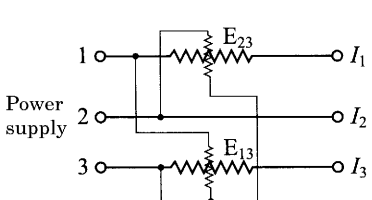
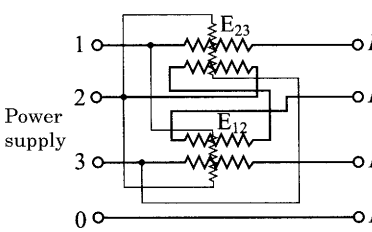
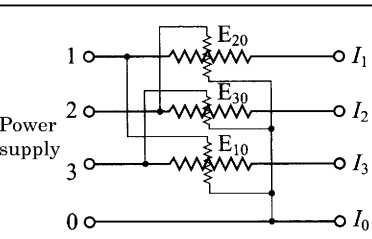
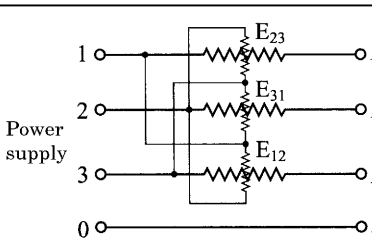
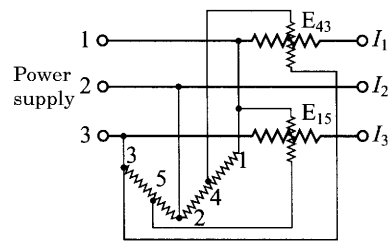
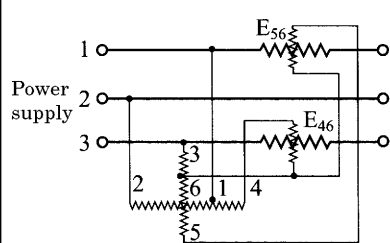
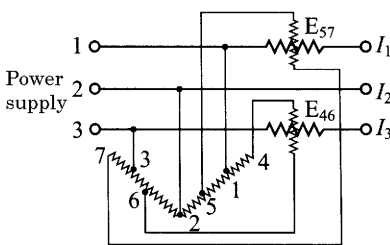
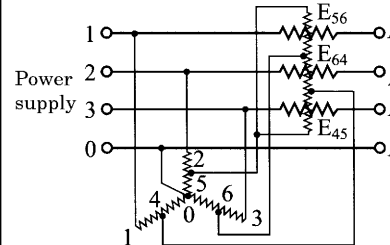
System symbol	Applicable circuit	Internal phase angle of element	Number of elements	Internal connection diagram	System symbol	Applicable circuit	Internal phase angle of element	Number of elements	Internal connection diagram
A-1	Three-phase three-wire system	180° (for lagging current) 0° (for leading current)	2		B-3	Three-phase three-wire system	120° (for lagging current) -60° (for leading current)	2	
A-2	Three-phase four-wire system	180° (for lagging current) 0° (for leading current)	3		B-4	Three-phase four-wire system	120° (for lagging current) -60° (for leading current)	3	
B-1	Three-phase three-wire system	60° (for lagging current) -120° (for leading current)	2		C-1	Three-phase three-wire system Three-phase four-wire system	90° (for lagging current) -90° (for leading current)	2	
B-2	Three-phase four-wire system	60° (for lagging current) -120° (for leading current)	3		C-2	Three-phase three-wire system Three-phase four-wire system	90° (for lagging current) -90° (for leading current)	3	

Table 1 (concluded)

System symbol	Applicable circuit	Internal phase angle of element	Number of elements	Internal connection diagram	System symbol	Applicable circuit	Internal phase angle of element	Number of elements	Internal connection diagram
C-3 (V-shaped)	Three-phase three-wire system	90° (for lagging current) -90° (for leading current)	2		C-5 (cross-shaped)	Three-phase three-wire system	90° (for lagging current) -90° (for leading current)	2	
C-4 (V with longer sides-shaped)	Three-phase three-wire system	90° (for lagging current) -90° (for leading current)	2		C-6 (Y-shaped)	Three-phase four-wire system	90° (for lagging current) -90° (for leading current)	3	
NOTE 1 The meters of System B and System C shall be used with balanced voltage and in designated phase sequence. NOTE 2 In this internal connection diagram, the resistance to be connected in series or in parallel to the voltage coil or current coil is omitted.									

3.3 Rated voltage, rated current, rated frequency and weather resistance

The classification of meters by the rated voltage, rated current, rated frequency and weather resistance shall be as given in table 2.

Table 2 Rated voltage, rated current, rated frequency and weather resistance

Classification		Rated voltage V	Rated current A	Rated frequency Hz	Weather resistance
Meters to be used in combination only with current transformer	Three-phase four-wire system	240	5	50 60	Normal weatherproof
Meters to be used in combination with voltage transformer and current transformer	Three-phase three-wire system	110			
	Three-phase four-wire system	$\frac{110}{\sqrt{3}}$ 110			
NOTE : The rated voltage of a meter refers to the voltage applied to a voltage circuit, and for the three-phase three-wire system, it refers to line-to-line voltage, and for the three-phase four-wire system, phase voltage.					

3.4 Meter constant

The classification of meters according to the meter constant is as given in table 3, with meter constant expressed by the number of revolutions per 1 kvarh.

Table 3 Meter constant

Unit: rev/kvarh

Phase and wire system	Meter constant
Three-phase three-wire system	1 000, 1 200, 2 400
Three-phase four-wire system	250, 400, 600, 1 000, 1 600, 2 400

3.5 Pulse constant

The classification of transmitter-incorporating meters by the pulse constant shall be the integral multiple of 100, and the pulse constant shall be expressed by the number of pulses generated by the transmitter per 1 kvarh.

4 Performance

4.1 General

The performance of meters shall be in accordance with the requirements specified in 4.2 to 4.8, and the performance requirements of normal weatherproof meters as specified in JIS C 1281.

4.2 Allowable limits of measurement error

When the meter is tested in accordance with 6.2.1, the measurement error shall not exceed the allowable limits specified in table 4 according to the load current.

The allowable limits of overall error shall be as specified in Annex A.

Table 4 Allowable limits of measurement error

Load current ^{a)} (% with respect to rated current)	Power factor ^{b)}	Allowable limits %
10 to 120	0	±2.5
20 to 120	0.866	±2.5
10	0.866	±3.0
Notes ^{a)} The allowable limits of measurement error at currents of power factor 0.866 other than the load current specified above shall be decided by interpolation. ^{b)} In this Standard, the tests at power factor 0 and 0.866 shall be performed in lagging current for the meters for lagging current and in leading current for the meters for leading current.		

4.3 Electrical performance

4.3.1 Starting current

When the meter is tested in accordance with **6.2.2 a)**, the rotor shall start and continue the rotation.

4.3.2 Creeping

When the meter is tested in accordance with **6.2.2 b)**, the rotor shall not make one or more revolutions.

4.3.3 Influence of self-heating

When the meter is tested in accordance with **6.2.2 c)**, the variation in error caused by self-heating shall not exceed the limits in table 5.

Table 5 Limits of variation in error due to self-heating

Time min	Power factor	Limit of variation in error %
0 to 30	0	1.0
	0.866	
30 to 120	0	0.5
	0.866	

4.3.4 Current characteristics

When the meter is tested in accordance with **6.2.2 d)**, the variation in error generated due to the change of load current shall not exceed the limit of 2.0 %.

4.3.5 Influence of unbalanced load

The influence of unbalanced load shall be as follows.

- a) When the meter is tested in accordance with **6.2.2 e) 1)**, the variation in error relative to the balanced load condition shall not exceed the allowable limits specified in table 6.
- b) When the meter is tested in accordance with **6.2.2 e) 2)**, the error shall not exceed the allowable limits given in table 6 according to the load current by the phase and wire system.

Table 6 Allowable limits

Phase and wire system	Load current (% with respect to rated current)	Power factor	Allowable limit of variation in error %	Allowable limit of error %
Three-phase three-wire system	8.7 to 100	0	3.0	±3.0
	17.3 to 100	0.866		
Three-phase four-wire system	15 to 100	0		
	30 to 100	0.866		

4.3.6 Temperature characteristics

When the meter is tested in accordance with **6.2.2 f)**, the variation in error generated due to the change of ambient temperature shall not exceed the limit of 1.0 %.

4.3.7 Voltage characteristics

When the meter is tested in accordance with **6.2.2 g)**, the variation in error generated due to the change of voltage shall not exceed the limit of 1.0 %.

4.3.8 Frequency characteristics

When the meter is tested in accordance with **6.2.2 h)**, the variation in error generated due to the change of frequency shall not exceed the limit of 2.0 %.

4.3.9 Power factor characteristics

When the meter is tested in accordance with **6.2.2 i)**, the variation in error generated due to the change of power factor shall not exceed the limit of 2.0 %.

4.3.10 Influence of external magnetic field

When the meter is tested in accordance with **6.2.2 j)**, the variation in error generated due to application of external magnetic field shall not exceed the limit of 1.0 %.

4.3.11 Apparent power loss of voltage circuit

When the meter is tested in accordance with **6.2.2 k)**, the apparent power loss of voltage circuit shall not exceed 10 VA in each element. For transmitter-incorporating meters, this limit value shall be 15 VA.

4.3.12 Apparent power loss of current circuit

When the meter is tested in accordance with **6.2.2 l)**, the apparent power loss of the current circuits shall not exceed 5 VA in each element.