

POLYPHASE SURFACE
MOUNTED
METERS



TYPE:HX34

POLYPHASE ELECTRICITY METERS

DESCRIPTIONS

The high loads required in industrial, agricultural and certain domestic situations make the limited measuring range of single phase meters inadequate. Peaks created by the startup of high power appliances contrasts with the very low loads at weekends and holidays.

The new HX range of three phase energy meters have been specifically designed and manufactured to record accurately these new demands.

The 5-30 Amp meter can record small loads from 15 Watts up to 20KW and the 10-60 Amp meter can record from 60 Watts up to 40 KW. For loads above 100 Amps it is necessary to use a current transformer operated meter.

This too has an extended range to give high sensitivity at low loads.

The extended load ranges mean that meters have a longer service life, as they do not need to be changed to deal with increasing demand.

Additional features supporting long service life without any need of recalibration are: magnetic suspension lower bearing, low rotor speed, low weight of rotor light dial train, high stability of mechanical and magnetic components, permanence of calibration and enforced insulation.

Overall the HX extended long-range meters result in more accurate measurements and lower maintenance costs.



CONSTRUCTION

BASE AND COVER

The meters are supplied with a base and cover of moulded insulating black material (Bakelite) highly resistant to creep currents.

An optional clear polycarbonate cover is available. The meters are adapted for tropical conditions as non-hygroscopic and comply with the flame test given in BS 5685 Appendix B (clause 5.6).

A moulded rubber gasket acts as a seal between cover and case.

MEASURING ASSEMBLY

The meter driving elements rigidly mounted onto a robust aluminium alloy die cast frame which is secured by two screws to a metal plate fitted into the meter base. The aluminium frame also carries the permanent magnet and the rotor assembly.

WINDOW

The cover is provided with a glass window through which the meter register may be read and the rotor observed. The window is fixed in the cover by means of frame held in position by four fixing washers and is sealed by silicon.

TERMINAL COMPARTMENT

The terminal chamber is a moulded compartment made of Bakelite, into which nickel plated brass terminals are fitted for the main service cables and are secured by two screws in the meter base.

The voltage circuit can be disconnected from the current circuit in two ways:

- under the main meter cover by removing the voltage coil connection from current to voltage terminal or,
- under the terminal cover by removing the terminal links.

A separate terminal cover is provided to cover the terminals.

DRIVING SYSTEM

The tangential drives are fixed to an aluminium alloy frame, and consist of separate voltage and current coils. The voltage coil is wound onto a plastic frame, insulated with polyurethane, then PVC covered to give high breakdown resistance. The current electromagnet is synthetic resin insulated copper wire, again formed around a plastic frame. Both these plastic frames are made from high temperature and electrically resistant thermoplastic, adding additional insulation from the aluminium frame. Voltage and current coils can be easily replaced or have their air gaps adjusted on the frame.

MAGNETIC SUSPENSION

The temperature compensated magnetic bearing has two magnetic parts with equally polarised adjacent surfaces. Due to the mutually repelling forces between the two magnetic surfaces and the weight, the rotor magnet floats at a distance from the stator magnet.

The rotor sits in the upper magnetic housing which is interlocked into a larger chamber. At the bottom of the larger chamber is the stator magnet. The weight of the rotor gently forces the upper magnetic housing to lower until it is repelled by the stator magnet causing the rotor to float. (Jewel bearings available upon request).

BREAKING MAGNET

The magnet has U-shaped cubed of high coercivity Alnico-400 alloy, which reduce the influence of short circuit thrusts on the meter's measuring accuracy. There is a big improvement on the braking magnet. It is fixed with two screws onto the frame. This way can well prevent shock arising from transit. Therefore, it ensures the stability of meter performance. At the same time, it provides a wide range of adjustment, which can be easily and continuously done.

ROTOR SYSTEM

The rotor is constructed with two disks attached to a nickel plated brass shaft. At the top of the shaft there fits a nickel plated brass worm which drives the register. The bottom of the shaft locates in the top of the brass container for the encapsulated barium ferrite magnets. On special request 400,200, or 100 divisions may be printed on the circumference for stroboscopic testing. The rotor if fitted correctly can be replaced without effecting the accuracy of the meter.

On each disks, there is one hole, which are in straight line. These holes play a role as starting and creeping adjustments, which now can automatically adjust.

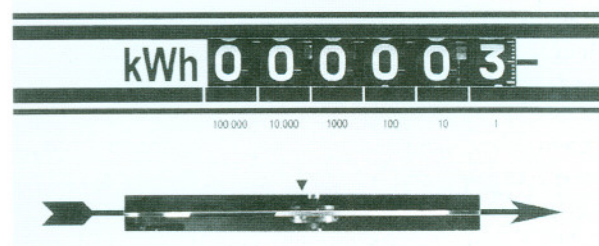
REVERSE RUNNING STOP

A device to prevent reverse running can be supplied on request.

The construction of the meter allows ready access and the components can be easily replaced correctly without affecting the meter accuracy.

ENERGY REGISTER

The registering mechanism is of the standard and well proven continuous wheel type incorporating six digits 6.5×4.5 mm with the periphery of the last drum divided into 100 sections. The registering mechanism is housed in an aluminium grid. A 7 digit or uni-directional register is available as an option. The register incorporates a location plate enabling the register to be placed on the meter without alteration in the depth of the meshing to the worm wheel. The worm wheel is made of brass and the register gears are also made of nickel plated brass with plastic inserts, these are then positioned on highly polished steel spindles.



TROPICALISATION

All components have been specially treated to protect against corrosion and steel laminates around the voltage cage have been electropainted.

REACTIVE ENERGY (VARHOUR) METERS

These meters are used for the integration of reactive power in three-phase systems.

Varhour meters are derived from watt-hour meters by means of artificial connection with 90 degrees phase displacement. These differ from active energy meters of corresponding types in internal connections of voltage coils while dimensions, characteristic load curves, special types and auxiliary devices are identical. These meters are accurate under all conditions of loading provided the system voltages are equal and symmetrical and the prescribed rotation has been kept. All reactive energy meters are provided with reverse running stops.

3 phase 3 wire. Two-element meters with an auxiliary voltage element to obtain an artificial neutral, for installation in three-wire systems.

3 phase 4 wire. Three-element meters for installation in three and four-wire systems.

MEASURING ASSEMBLY WITH ADJUSTMENT DEVICES

MEASURING ASSEMBLY

The measuring assembly of the Polyphase electricity meter provided with the following adjustment devices.

A. LOAD ADJUSTMENT

To alter the speed of rotation on load there is a fixed magnet, which now is much easier. Loosen the redhead screw and turn the brass plate. The range can be $\pm 4\%$.

B. LOW LOAD ADJUSTMENT

To adjust meter on low load, move control level B.

C. PHASE ADJUSTMENT(COARSE)

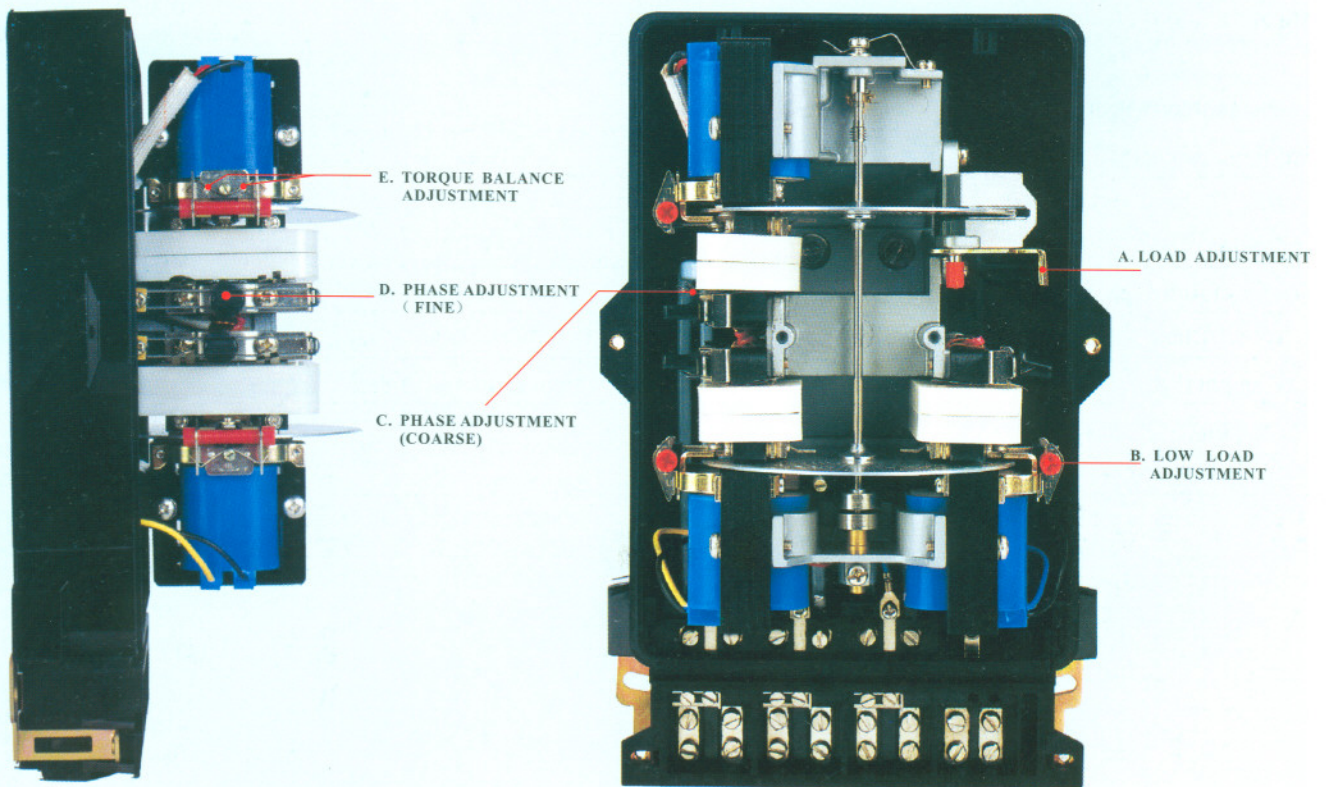
Control of the meters calibration at 0.5 power factor is obtained by means of: Coarse setting by cutting the short circuit rings on the current element C. One ring is $+1.0\%$.

D. PHASE ADJUSTMENT (FINE)

For fine setting adjustment level $D = \pm 2\%$ approx.

E. TORQUE BALANCE ADJUSTMENT

The torque balance adjustment is carried out by adjusting the two screws on each side of the low load adjustment level.



TECHNICAL DATA

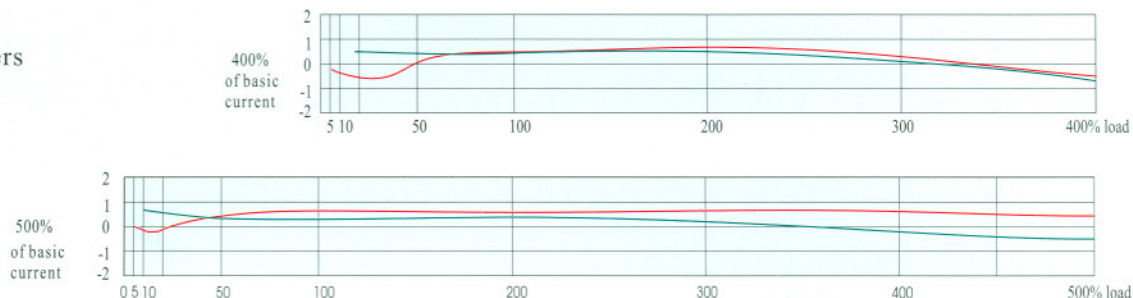
PERFORMANCE DATA VALID FOR ALL CURRENT RATINGS LISTED BELOW

Meter Type	HX34C		HX34D						
Type of Connection	Via Measuring Transformers		Direct Connection						
Current Loading (%I _b)	120		400			500		600	
Current Range (A)	1-1.2	5-6	10-40	15-60	20-80	10-50	20-100	5-30	10-60
Standard Reference Volt U _{ref} (V)	3X240/415								
Optional Reference Volt (V)	200-300								
Standard Frequency (Hz)	50								
Optional Frequency (Hz)	40-60								
Torque at U _{ref} , Load, f(10 ⁻⁵ Nm)	9.5								
Rated Rotor Speed (rev/min)	17.28	21.60	8.64	8.64	8.64	8.64	8.64	8.64	8.64
Self Consumption in 3x(W) Current Circuits at Load 3x(VA)	0.17VA								
Meter Constant at U _{ref} =240V (rev/kWh)	1440	360	72	48	36	72	72	144	72
Self Consumption in Voltage Circuits at U _{ref} 3x(W)	1.1W								
Starting Current (% Load)	0.5%I _b								
Temperature Coefficient (% /°C) In Temperature Range from -5 to +60°C	0.02								
Weight of Rotor (g)	55								
Accuracy Class	2.0								
Net Weight (kg)	3.665								
The VA Burden for Current Transformer Operated Meters	2.5VA								
Diameter of Terminal Holes (mm)	8								

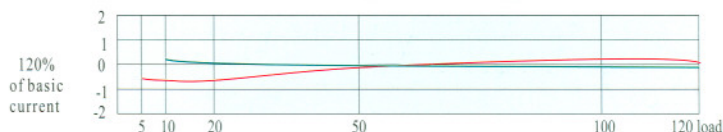
TYPICAL PERFORMANCE CHARACTERISTICS AT 50Hz

THE CHARACTERISTICS BELOW ARE FOR BASIC METERS. THE DIFFERENCES IN THESE CHARACTERISTICS FOR VARIOUS CURRENT RATINGS ARE NEGLIGIBLE, NO ADDITIONAL ERRORS OCCUR IN CAST OF THE TWO RATE VERSION.

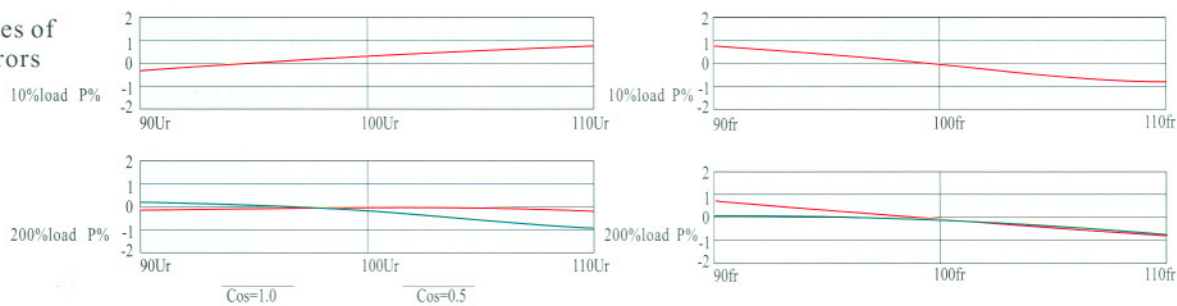
Load curves of whole current meters balanced loads



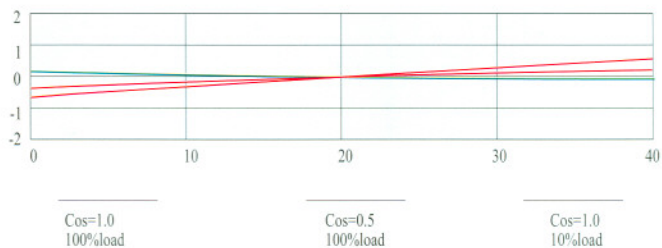
Load curves of transformer operated meters



Average values of additional errors

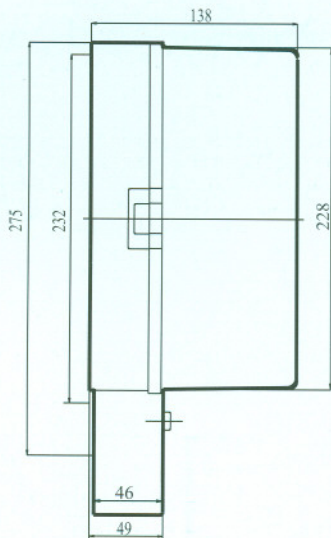
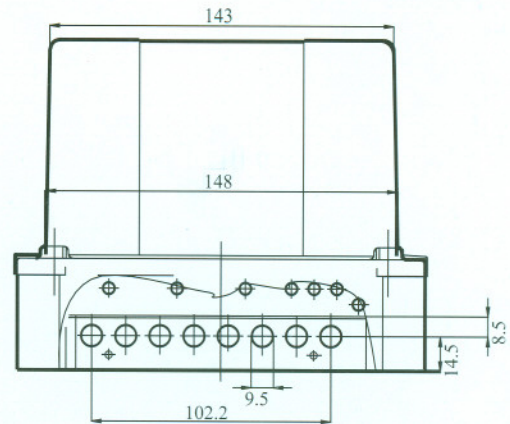
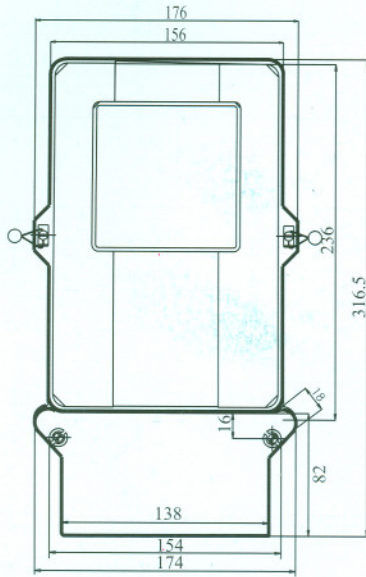


Error due to temperature variation



INSTALLATION

ASSEMBLING DATA FOR METER WITH BAKELITE COVER



PACKING SPECIFICATION

All meters are packed individually, pack size 11.3×81.5×73.0cm.

ORDER SPECIFICATIONS

1. Type of meter (meter ref) indicating all types of cover.
2. Description of meter.
3. Rated voltage, at 4-wire systems both phase to phase, and phase to neutral voltage.
4. Current range (basic current and maximum rated current). Frequency, when differing from 50Hz.
5. Type of register, number of digits and lowest value of digit.
6. With transformer-operated meters data of instrument transformers (current and voltage ratings).
7. Type and quantity of spare parts.
8. Type of shipment sea freight, air freight or road freight.
9. Indicating FOB, C & F or CIF.



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