

# Maintenance Instructions and Connection Diagrams for S12 Single and S34 Three Phase Meters

S12



S34



## MOUNTING AND MECHANICAL CHECKS

All screws should be tightened in accordance with the recommended torque. After assembly and a routine check has been completed, the meter should be cleaned by dry, clean compressed air. Cleaned and repaired meters should be calibrated in accordance with instructions and requirements of the relevant authority. Care should be taken to avoid mixing individual parts, all repaired components should be installed in the original meter. The following assembly procedure should

take place when meters are in series: If an electromagnetic (voltage or current) is to be replaced it must be fixed and adjusted to the original gap. Top and lower bearings are partially inserted into the frame so that setting of the rotor is still possible. After the rotor is set, the lower bearing is inserted so the rotor disk is positioned in the middle of the driving and braking system air gap.

Clearance depends on the height of the setting of the worm gear to the rotor axis. The procedure is the same for meters fitted with a magnetic lower bearing. When mounting the register take care that worm gear engages the worm wheel. Position of the front plate is important and it should be parallel to meter cover. It is recommended that in its normal position the worm wheel fits into the worm gear  $1/3$  to  $1/2$  tooth height.

## CONNECTION DIAGRAMS S12 AND S34

DIAGRAM N<sup>0</sup>. S12 IVL SINGLE PHASE  
INTERNAL VOLTAGE LINK - 1 PHASE 2 WIRE  
WHOLE CURRENT

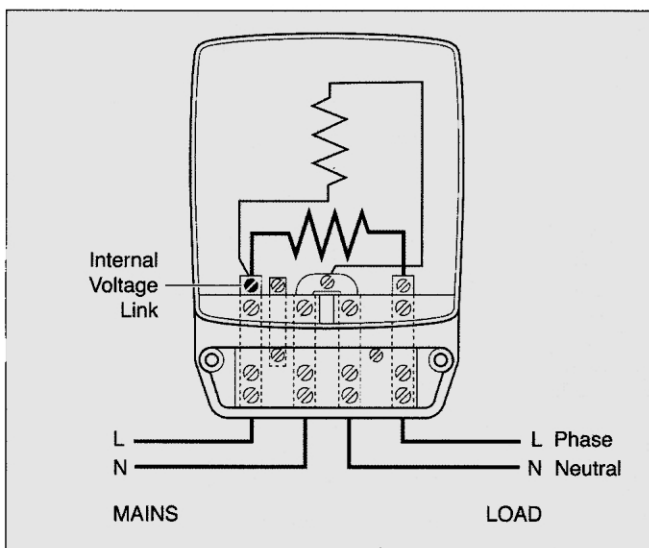


DIAGRAM N<sup>0</sup>. S12 EVL SINGLE PHASE  
EXTERNAL VOLTAGE LINK - 1 PHASE 2 WIRE  
WHOLE CURRENT

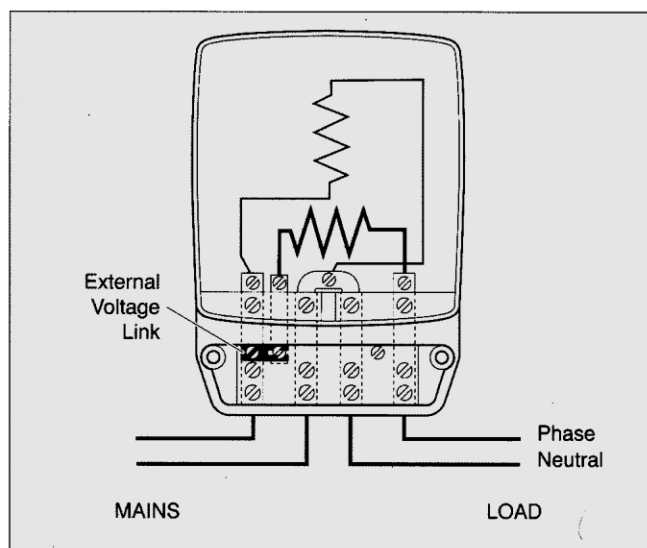


DIAGRAM N<sup>0</sup>. S34 IVL THREE PHASE  
INTERNAL VOLTAGE LINK - 3 PHASE 4 WIRE

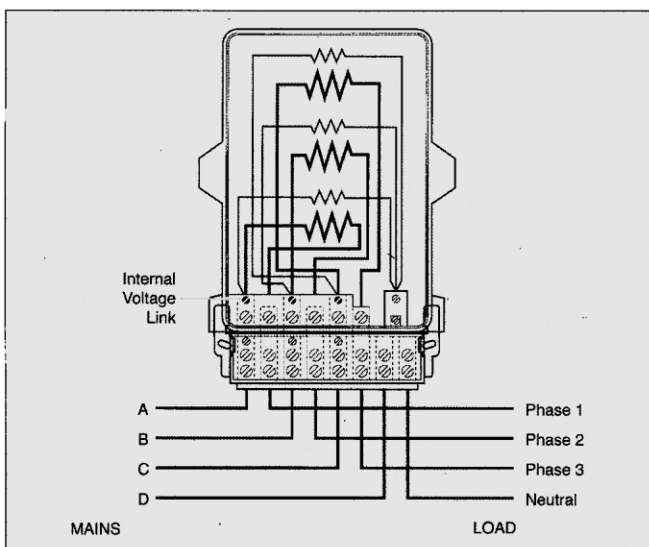
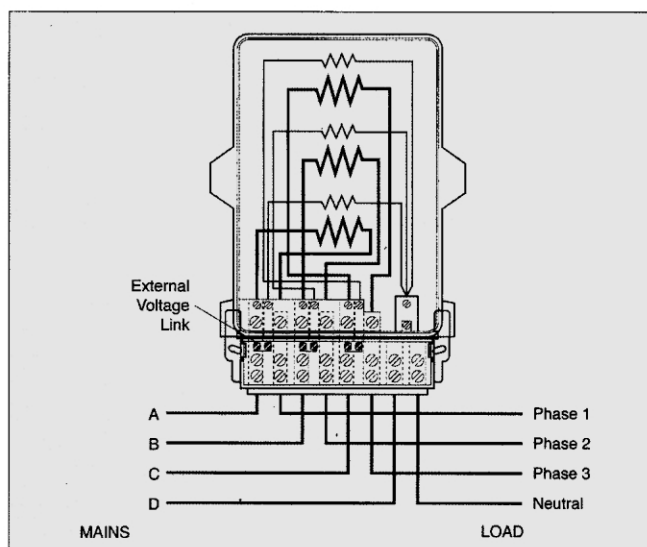


DIAGRAM N<sup>0</sup>. S34 EVL THREE PHASE  
EXTERNAL VOLTAGE LINK - 3 PHASE 4 WIRE



# MAINTENANCE INSTRUCTIONS

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## FOR S12 SINGLE PHASE AND S34 THREE PHASE METERS

*Validity: These instructions are valid for single rate tariff meters with magnetic bearings.*

### INTRODUCTION

During long periods of operation certain changes may appear in electric induction meters which may affect the accuracy of the meter. The meter is divided into three groups: Electrical, Mechanical and Magnetic. All these groups will need to be checked to maintain the accuracy of the meter.

### ACCURACY LIMITS

Electrical energy must be measured to prescribed accuracy limits throughout the working life of the meter. These limits can be affected by **Electrical Changes** caused by such things as rupture of insulation, short circuit between turns of voltage coil, overload through thermal ageing of insulants and short circuit between turns of current coil. **Mechanical Changes** can also occur such as wear of upper and lower bearing parts and register parts. Changes of **Magnetic Properties** can also occur, i.e. intensity, change of braking magnet and changes due to short circuit currents.

To ensure errors are kept to permissible tolerances as laid down by the relevant Standards Authority, it will be necessary for the electrical, mechanical and magnetic properties of the meter to be re-calibrated periodically by qualified personnel.

### GENERAL MAINTENANCE INSTRUCTIONS

The checking, repair and calibration of meters must be carried out in a controlled dust-free environment to protect delicate parts. Upper and lower bearings, registers and other recording devices should first be cleaned and then protected against contamination.

To avoid cross-contamination pre-cleaning should be carried out in a separate area to other repair work such as filing and rasping operations. Checking of meters will be more cost-effective if carried out in batches

and connected in series. Care should be taken to ensure they are all of the same type, voltage and current.

### PRE-CLEANING

Meters should be thoroughly cleaned before storage, manual or mechanical methods can be used providing the meters are cleaned in an upright position.

### PRE-CHECKING

It is recommended that 5% to 10% of the meters designated for inspection are randomly checked for errors. This will provide a sample of the overall condition of meters in the network.

### MAINTENANCE INSTRUCTIONS

It is recommended that inspection or repair is carried out in the following sequence.

- removal of seal
- removal of cover
- removal of front plate

Demounting of:

- register
- upper bearing
- lower bearing
- rotor

Further inspection and repair procedures are detailed in separate sections, however it should be noted that complete dismantling of individual assemblies should only be carried out when absolutely necessary i.e. to replace damaged or worn-out parts. If possible reassemble cleaned or repaired parts into the same meter from which they have been taken.

### CLEANING AND REPAIR

Metal cases are best cleaned with rotating brushes. If the metal covers, bases or terminal covers prove difficult to clean and the paint covering the metal has been penetrated leaving the metal visible, it will be necessary to repaint or re-varnish over this area. Brush and re-varnish rust marks as appropriate.

Meters manufactured from moulded insulating black material (Bakerlite) or clear thermoplastic may be either manually or mechanically cleaned with a suitable detergent. When cleaning, care should be taken to avoid scratching or chipping; cracked parts should always be replaced.

It is important to check the seal around the cover, this should be flexible, if there are signs that parts of the seal have hardened then the whole seal should be replaced.

Check the system including the driving and braking elements and the meter frame for damage, if rust is found on any component it should be removed with a fine brass wire brush or abrasive paper and then re-varnished taking care that the new varnish adheres to the old surface. When cleaning or repairing magnets, care should be taken to avoid metallic particles getting through the air gap.

Breakdown or weak contact of voltage or current circuits are checked with the appropriate test instrument, voltage coils should be individually checked for over heating and replaced if found to be faulty.

Electromagnets should not be repaired but replaced with a new sub-assembly.

Care should be taken to avoid moving the driving or braking elements which could affect the calibration, unless the replacement of individual parts is found to be necessary.

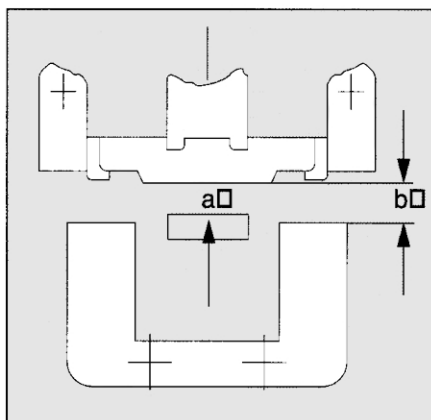
When replacing the driving or braking system parts particular attention must be paid to the position of the elements and air gaps. The re-assembled meter must have the same air gap clearances as previous. Set the gaps with feeler gauges.

The position of the voltage and current electromagnet is important and should be set symmetrically. It is recommended that at least one of the two driving system cores remains in the original position to ensure the electromagnet is adjusted to its existing state.

*Clearances for the S12 AND S34 meter should be set as follows:*

Meter	Gap a(mm)	b(mm)
S12	2.2 - 2.3	2.6 - 2.7
S34	2.4 - 2.5	2.5 - 2.6

When replacing parts in the measuring system it is important to avoid any damage to the plugs on the meter frame. These are vital in determining the size of the air gap.



When replacing the voltage coil, the existing (cut) short-circuit rings on the current core must be replaced, this enables a new coarse adjustment of the internal angle of calibration to be carried out.

The rotor should be checked for mechanical damage. Undisturbed light scanning will only be possible if the action is smooth and all surfaces clean. If the rotor shows a slight seating of the disk on the axis it should be replaced. The meter disk is cleaned with a brush moistened with benzine. Metal worm gears on the rotor axis can also be cleaned using a rotating brush moistened with benzine.

Thermoplastic worm gears generally need no cleaning, however these may also be cleaned with a suitable detergent if necessary; ensure they are thoroughly dried before re-assembly.

## LOWER MAGNETIC BEARING ASSEMBLY

The lower bearing assembly consists of two parts; an upper section which is fixed to the lower spindle and a lower section which is fixed to the bearing holder. The upper section consists of four parts - the spindle, the graphite sleeve, the fixing collar and the upper magnet. The locking collar secures the graphite sleeve and the magnet to the spindle.

The lower section also consists of four parts - the stainless steel pin, the locking collar, lower magnet and the brass bearing holder. The stainless steel pin is secured in the centre of the brass holder, the magnet is placed on the brass holder, the locking collar secures the whole lower section assembly. See Parts List (S12,S34 01.2001) for 'exploded' diagram.

## UPPER PIN BEARING ASSEMBLY

The upper bearing consists of two parts; the top part which consists of a stainless steel pin fitted in to a brass metal tube, and the upper spindle which houses the graphite sleeve in which the pin locates. See Parts List (S12,S34 01.2001) for 'exploded' diagram.

The stainless steel pins should be checked for wear or damage, the magnets should be free from any particles. The bearing assemblies can be checked and cleaned using clean, dry compressed air, or washed manually by brush in the appropriate purifier. The purifier should be completely clear of any sediment or any ferromagnetic or other particles. They may also be cleaned in an ultrasonic device

## SINGLE TARIFF REGISTERS BRAKING MAGNET

Single tariff registers are designed so that lubrication of the bearings is not necessary. Normally it is sufficient to remove dust by dry, clean compressed air. When excessive wear or dirt is evident, it is recommended to replace the register. It is advisable to insert the register into the same meter from which it has been taken.

The braking magnet does not need any special care. Take care of ferromagnetic particles coming into contact with the magnet and especially with the magnetic air gap (filings etc). If the magnet is damaged it should be substituted by a new one with the same number and dimensions of compensating plates.

## INSTALLATION AND MOUNTING

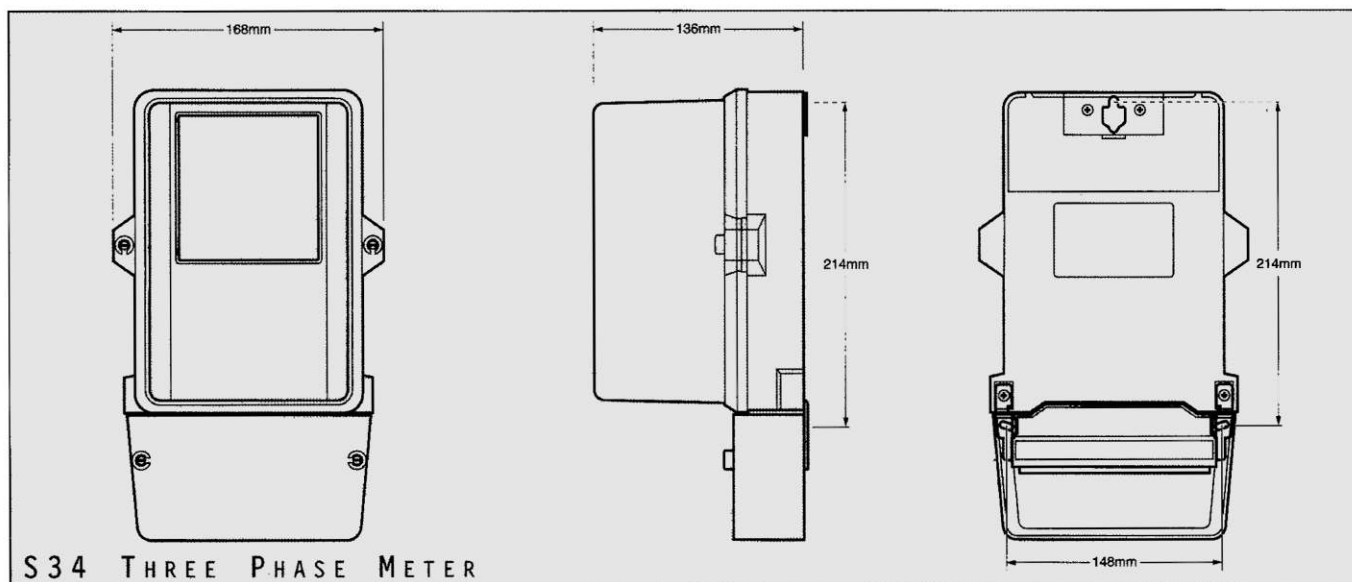
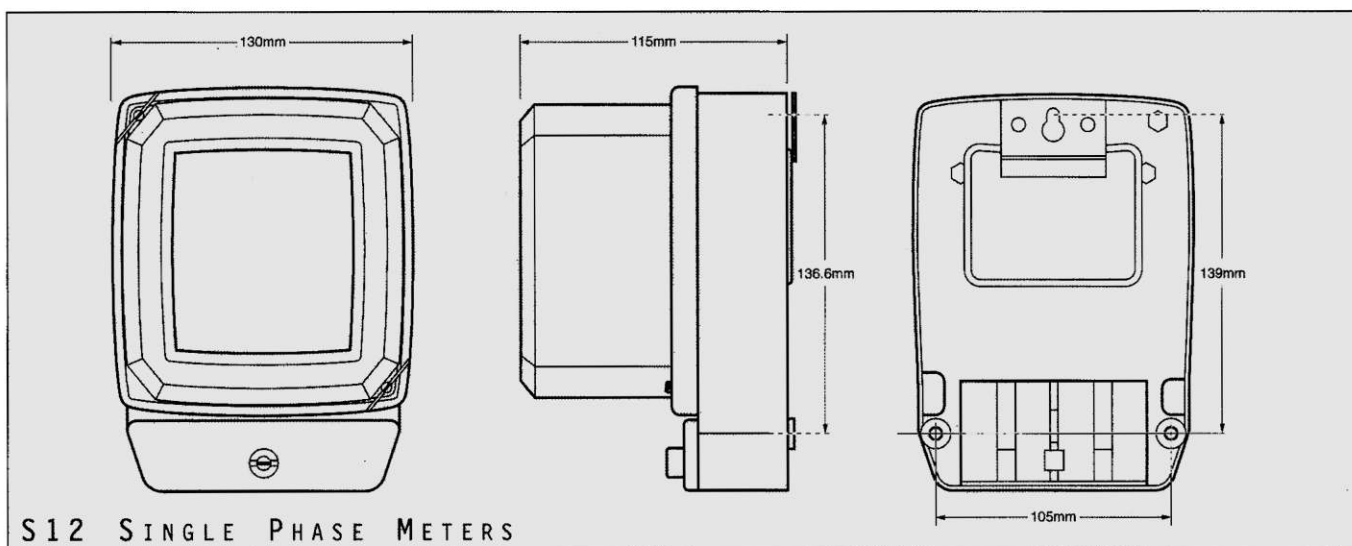
### S12 SINGLE PHASE METER AND S34 THREE PHASE METER

#### Location

The Meter should be mounted in a dry dirt-free environment away from heat sources and very high electric fields.

#### Mounting

The meter should be mounted in a vertical plane and secured using the fixing positions provided.



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