

# GEC Measurements

## Type YCGF

The type YCGF relay detects loss of field supply or reduction in the field current of synchronous generators beyond the stability limits of the machine.

Loss of field supply to a synchronous generator can be caused by a fault in the excitation circuits or by incorrect opening of the field circuit breaker. On loss of field, the machine operates as an induction generator excited by reactive power drawn from the system to which it is connected. This could result in instability of power in the system and overheating of the rotor, especially if the machine is of the cylindrical rotor type without damping windings in the pole faces.

The circular mho characteristic has its centre on the  $-X$  axis of the RX diagram and is offset from the origin. This offset is adjustable so that undesirable operation of the relay on power swings or loss of synchronism not accompanied by loss of field, is avoided. The diameter of the circle is also adjustable, independent of the offset.

To avoid mal-operation due to synchronising surges and transient conditions, the relay is used with a simple definite time delay relay type VAT11 and arranged to initiate alarm, tripping or load shedding if adverse field conditions persist longer than a safe period.

When used with generators designed for line charging which can operate at rotor angles in excess of  $90^\circ$ , the diameter of the circle characteristic must be set small. At this setting, the impedance locus of the machine, on loss of field, can enter and leave the relay circle characteristic at intervals depending mainly on load conditions prior to the fault. To ensure correct operation in these conditions, it is necessary to use a type VAT51 time delay relay. This arrangement is standard for turbo-alternator sets installed by the Central Electricity Generating Board.

### CONSTRUCTION AND OPERATION

The relay is basically a low inertia, high speed four pole induction cup unit of simple construction having operating, polarising and restraint coils.

With the relay connected as shown, the phase to neutral field impedance of the machine, in terms of secondary ohms, is measured. If the field supply fails, the locus of the machine terminal impedance moves inside the relay characteristic and the contacts close immediately.



### RATINGS

**Current:** 1 or 5 amps (C.T. secondary)  
at 50 or 60 Hz

**Voltage:** 110 volts (V.T. secondary) at 50 Hz  
115 volts (V.T. secondary) at 60 Hz

### SETTINGS

#### Circle diameter

1 amp rating: 25–250 ohms } adjustable in  
5 amp rating: 5–50 ohms } 5% steps

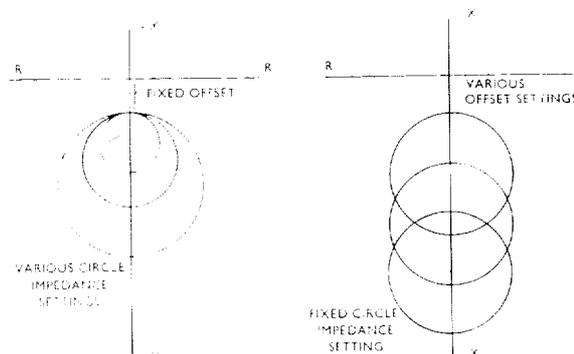
The value usually chosen is the direct axis synchronous reactance of the generator.

#### Offset

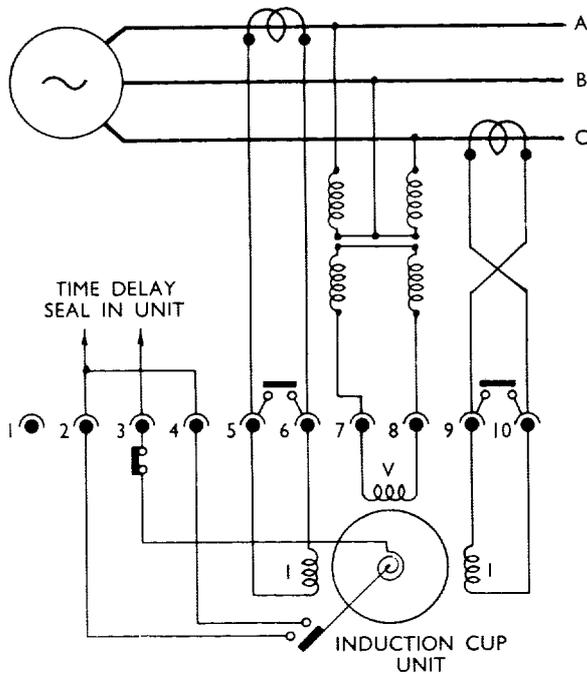
1 amp rating: 2.5–20 ohms adjustable in  
2.5 ohm steps

5 amp rating: 0.5–4 ohms adjustable in  
0.5 ohm steps

The value usually chosen is half the direct axis transient reactance of the generator.



Characteristics of type YCGF relay



Typical application and simplified internal circuit diagram

### BURDENS

Voltage circuit: 5.0–7.7 VA  
 Current circuit: 1.7–2.8 VA per phase } at 50 or 60 Hz

The burden depends on the relevant ohmic setting and the magnitude and phase angle of the load current.

### CONTACTS

A light duty normally open three-point contact is fitted to the induction cup unit and is rated to make, break and carry for 30 seconds, 10 watts inductive or 20 watts resistive with maxima of 250 volts and 5 amps d.c.

### INSULATION

The relay will withstand 2 kV, 50 Hz for 1 minute between all circuits not intended to be connected

together and between all live parts and earth. It will also withstand 1 kV, 50 Hz for 1 minute between normally open contacts.

### CASES

Relays are supplied in drawout cases designed for either flush or projecting mounting. Case wrappers are manufactured from hot dipped galvanised steel with a black pvc outer coating.

Relays comply with 56 day humidity requirements as specified in IEC68. Climatic category 20/50/56.

### CASE DIMENSIONS

Relay	Case	Maximum Overall Dimension		
		Height mm	Width mm	Depth* mm
YCGF and VAT11	1D	237	173	198
VAT51	2D	425	174	199

\*Add 21 mm for maximum length of M5 terminal screws.

Dimensioned drawings of case outlines, panel cut-outs and mounting details are available on request.

### INFORMATION REQUIRED WITH ORDER

- Current rating
- Supply frequency
- Case mounting
- Details of definite time delay

Our policy is one of continuous product development and the right is reserved to supply equipment which may vary slightly from that described.

## GEC Measurements

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