Fault Location and Repairs to AC Motors

The tables below indicate the characteristics and fault diagnoses for ac motors.

Possible Faults on Single-phase Induction and Capacitor Types Motors

Symptoms	Possible Causes	Tests and/or Rectification
Reduced speed of slip-ring motor.	• Rotor starter not fully operated. • Slip rings not short-circuited. • Voltage drops on cables to rotor starter.	• Overhaul protective gear to ensure correct operation. • Use slip-ring short-circuiting gear. • Fit rotor starter nearer motor, or use larger rotor circuit cables.
Reduced speed of all motors.	• Mechanical or electrical overload. • Low volts or frequency. • Open circuit in rotor.	

Overheated bearing or noisy operation.	Bearing or mechanical defects.	
General overheating of case.	• Faulty ventilation, mechanical or electrical overload. • Rotor core not fully in stator tunnel. • Open circuit in one of two parallel stator circuits. • Short circuit on auxiliary stator winding. • Short circuit on centrifugal switch or relay. • Centrifugal switch or relay sticking closed. • Reversed section of stator windings.	• Reassemble motor correctly. • Overhaul switch or relay and check operation.

	• Prolonged or too frequent starting.	
Motor will not start	• Faulty supply or control circuit. • Overload or low starting torque. • Open circuit or reversed coils on stator winding. • Open circuit on slip-ring rotor circuit. • Centrifugal switch or relay sticking open.	
Fuses or overcurrent trips operate at the start.	• Overload • Reversed phase of stator winding. • Premature operation of protective gear. • Short circuit or earth fault on stator	

	circuit. • Short circuit or earth fault on rotor circuit.	

Possible Faults on Polyphase Induction Motors

Symptoms	Possible Causes	Tests and/or Rectification
Reduced speed of slip-ring motor.	• Rotor starter not fully operated. • Slip rings not short-circuited. • Voltage drops on cables to rotor starter.	• Overhaul protective gear to ensure correct operation. • Use slip-ring short-circuiting gear. • Fit rotor nearer motor, or use larger rotor circuit cables.
Overheating and over-labouring, two phases of star-connected stator or one phase of delta winding hotter than the	• Single phasing owing to open-circuited supply line. • Open circuit in one phase of	

rest.	stator circuit.	
Fluctuating stator current.	Open circuit in rotor circuit.	
Reduced speed.	• Mechanical overload, low volts or low frequency. • Open circuit in rotor circuit.	
Humming of squirrel-cage motor.	Loose joints in rotor conductors.	
Motor will not start	• Faulty supply or control gear. • Overload or low starting torque. • Open circuit in one stator phase. • Reversed phase of stator winding. • Open circuit in rotor circuit.	
Fuses or overcurrent trips operate at start.	• Overload • Reversed phase of	

	stator winding. • Short circuit or earth fault or stator circuit. • Short circuit or earth fault on rotor circuit. • Premature operation of protective gear.	

Possible Faults on Synchronous Motors

Symptoms	**Possible Causes**	**Tests and/or Rectification**
Motor fails to synchronize.	• External field resistance too high. • Open circuit in field circuit. • No excitation.	• Adjusts field-regulating resistor. • Faulty exciter
Fuses or overcurrent trips operate at start.	• Overload. • Short circuit or earth fault on armature. • Low starting	

	voltage. • Open circuit in one armature phase.	
Motor will not start.	• Faulty supply or control gear. • Low starting voltage. • Overload. • Open circuit in one armature phase.	Adjust tappings on transformer.
Motor runs fast.	High frequency.	
Motor runs low.	Low frequency.	
Motor pulls out of synchronism.	• Overload. • External field resistance too high. • Open circuit in field circuit. • No excitation.	• Adjust field-regulating resistor. • Faulty exciter.
Vibration	• Faulty supply. • Open circuit in one armature phase.	
Overheating	• Overload • Faulty ventilation. • High voltage.	

	• Short circuit, open circuit or earth fault on armature. • Incorrect field strength. • Unequal pole strength. • Unequal air gap.	• Adjust field-regulating resistor. • Test field coils.