

Typical Specifications for Synchronous Motor Control

Synchronous Motor Control for _____ (Application) Motors Shall Provide for

{Full Voltage
Reduced Voltage} Starting And Shall Be {Full Magnetic
Semi-Magnetic} (Reduced Voltage

Starting Shall Be Obtained By Means of {Autotransformers
Resistors
Reactors} And Shall Limit

The KVA Inrush to a Maximum of _____ per cent of Full Load KVA.) The Control

Panel Shall Be For {Isolated
Switchboard} Assembly And Shall Be of {Open Switchboard
Enclosed Cubicle}

Construction. It Shall Provide Overload, Under Voltage Protection And After Pulling

Out of Step Will {Automatically Resynchronize
Automatically Stop} The Motor.

Typical Specifications for Single Phase Motor Control

Control For Single Phase _____ (Fan, Pump, etc.) Motors Shall Consist of a

{Manual
Magnetic} Type {Across The Line
Reduced Voltage} Starter Providing Overload Protection (And Low

Voltage); And A Separate Safety Disconnecting Switch.

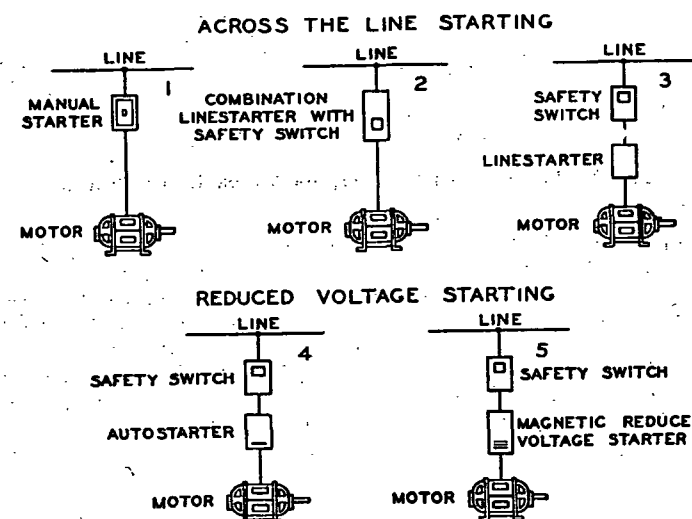
In larger ratings a linestarter is usually provided with either an additional safety switch or circuit breaker for disconnecting and short circuit protection. Reduced voltage starting may be either of manual or push button controlled magnetic type. In specifying this type of starter consideration should be given to the fact that starting torque of squirrel-cage motors varies as the square of the applied voltage. For example, a motor developing 100 lb-ft starting torque on full voltage would produce only 25 lb-ft torque on starting on half rated voltage. Fig. 11 illustrates recommended control practice for squirrel-cage motors. Typical specifications for squirrel-cage motor controls are shown on page 632.

Wound Rotor motors require control of both primary and secondary circuits. The primary* control may be the same as for squirrel-cage motors, manual or magnetic, at full voltage. Secondary* control provides means of varying secondary resistance for starting and speed control. The secondary controller should be specified for starting duty only or for speed regulating duty. Fig. 12 illustrates recommended control practice for wound rotor motors. Typical specifications for wound rotor motor control are shown on page 632.

*Refer to Glossary at end of chapter.

Synchronous motor starters should provide pull-out protection, automatic synchronization or automatic stopping of the motor after pull-out, and insurance of complete starting sequence, as well as overload and low voltage protection. The control may be either magnetic or semi-magnetic at full or reduced voltage. Semi-magnetic starters provide automatic field control but require hand operation for closing the line contactors to start and transfer to full voltage.

In applying reduced voltage starters to synchronous motors it should be remembered that, since these motors are started on damper windings and during the acceleration period function similarly to squirrel-cage motors, the starting torque varies as the square of the applied voltage.



Arrangements 2, 3, 4 and 5 provide automatic push-button starting.

FIG. 11. RECOMMENDED CONTROLS FOR SQUIRREL-CAGE MOTORS

Consideration should be given to insure development of sufficient motor torque to accelerate the load. Typical specifications for synchronous motor control are shown on page 634.

Multi-Speed control may be either manual or magnetic, and at full or reduced voltage. When using automatic magnetic control with two-, three-, and four-speed separate winding or consequent pole motors, control may be obtained from a remote point by means of a push button master switch. The various speeds of the motor are obtained from the master switch by simply depressing the correct push button. This is known as selective speed control. It is commonly used in the smaller theater installations where the fan and motor are located backstage and the speed control is located in the lobby.

Multi-speed motor controllers may be provided with compelling relays which make it necessary for the operator to press the first speed button before regulating the motor to the desired speed. This insures that the motor is always started at low speed before adjusting to a higher speed.