INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

Life-Line* CONTROL

MAGNETIC PART WINDING MOTOR STARTERS

Time Limit Acceleration

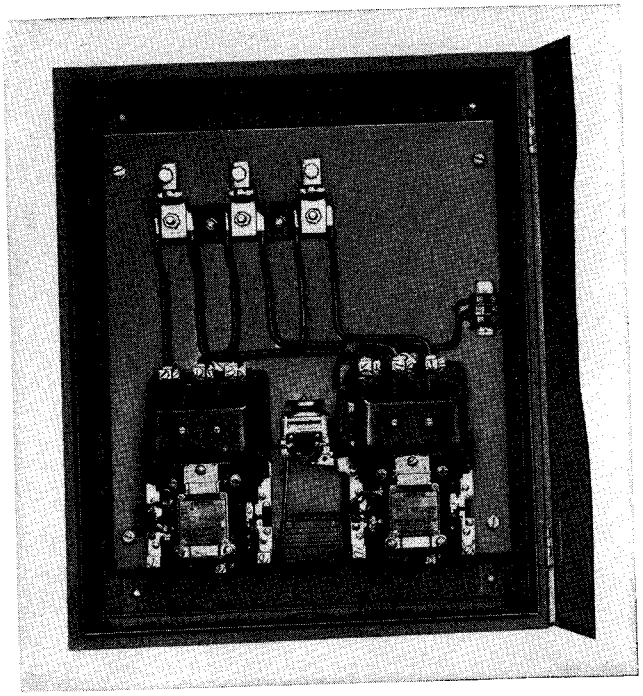

FIG. 1. Class 17-700NS4 Part Winding Motor Starter

MAGNETIC PART WINDING MOTOR STARTERS to which this leaflet applies are listed with their apparatus class numbers in Table No. 1 below.

Table No. 1

APPARATUS CLASS NO.†	DESCRIPTION
17-700	Non Reversing
17-703	Class 17-700 with Built-in Non-fusible De-ion* Disconnect Switch
17-704	Class 17-700 with Built-in Fusible De-ion Disconnect Switch
17-706	Class 17-700 with Built-in De-ion Circuit Breaker
17-710	Reversing Non Plugging
17-713	Class 17-710 with Built-in Non-fusible De-ion Disconnect Switch
17-714	Class 17-710 with Built-in Fusible De-ion Disconnect Switch
17-716	Class 17-710 with Built-in De-ion Circuit Breaker

† For interpretation of class number code, see page 3 of Westinghouse Price List 11-020.

This leaflet has been prepared for guidance in the installation, operation, maintenance and adjustment of standard magnetic part winding motor starters. The standard three-phase Class 17-700 starter is used as an illustration. This information may also be used to advantage for special and non-standard designs which differ from the standard only in minor electrical or mechanical modifications.

Note: This leaflet, together with the leaflets shipped with the starter, and the specific diagram of connections should be carefully studied before attempting to install, adjust, operate or service the equipment and its devices. See "Reference" column and footnote in Table No. 2, page 3, for list of leaflets giving detailed instructions for the individual devices, and general instructions covering unpacking, handling, storing, installation and maintenance.

Starting Method. Part winding starting is a simple scheme for starting motors with less line disturbance and lamp flicker than would result if these motors were line-started. The starting sequence first applies voltage to part of the motor windings, usually about half of the total active conductors. After a time delay preset on the timing relay, the remaining windings are energized. In some cases the motor will accelerate to a fairly high speed on the first part of the winding and the final inrush current will be appreciably less than would be obtained with line-starting. If the load torque requirements are such that the motor cannot accelerate to a reasonably high speed with only the first part of the winding energized, then the final inrush current may be almost as large as would be obtained with line-starting. However, the line disturbance and lamp flicker may still be appreciably less than would be obtained with line-starting because the ***change*** in current is less and generator or feeder regulators are given time to respond to the initial inrush.

NEW INFORMATION

* Trade-Mark

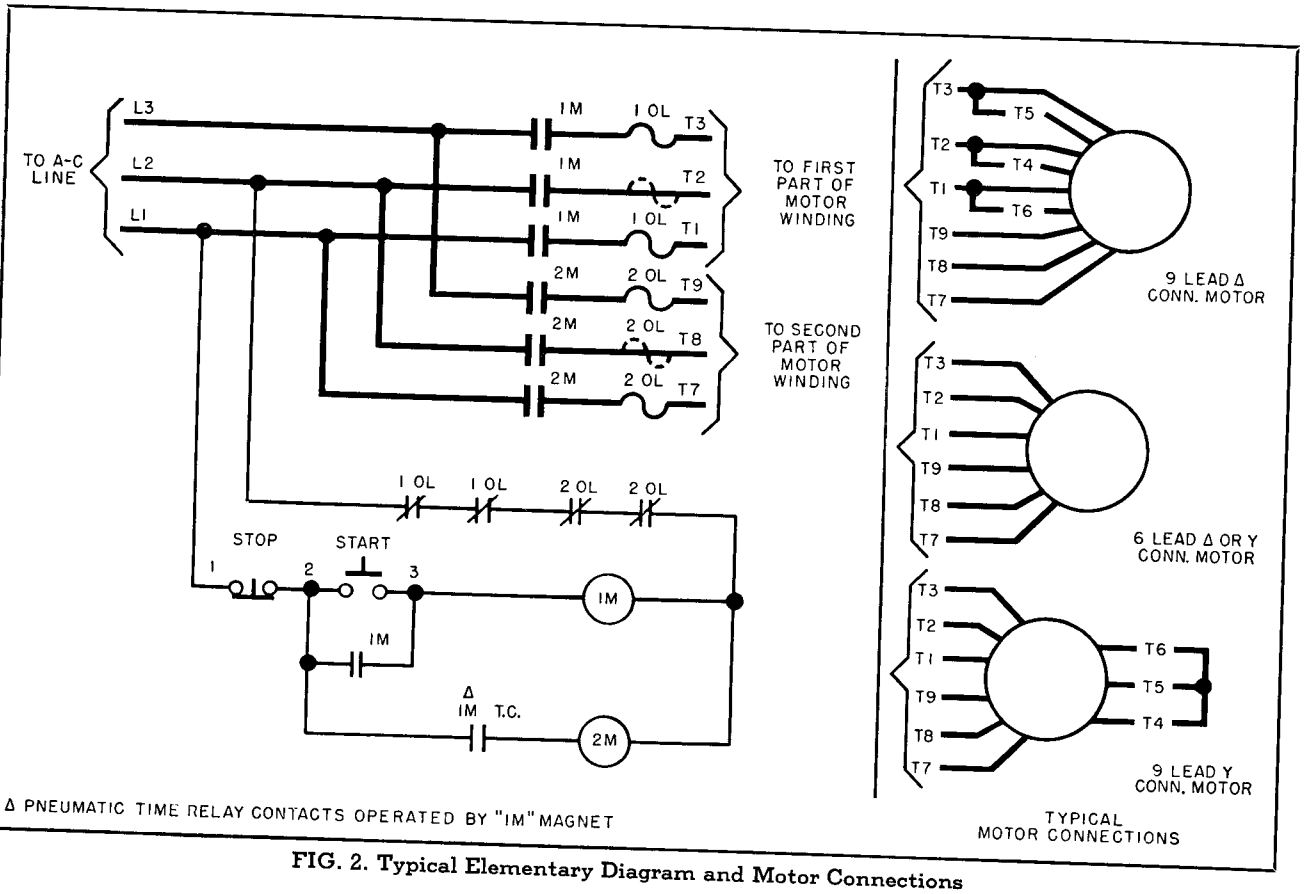

FIG. 2. Typical Elementary Diagram and Motor Connections

Standard dual voltage motors are often used for part winding starting.

DESCRIPTION AND INSTALLATION

The standard basic starter includes two contactors each complete with overload relays, a timing relay, interposing relays when required, and the necessary connection, wiring, and terminal details. Interposing relays are not supplied on the standard size 3 and 4 starters. One contactor and set of overload relays (diagram designation 1M) supplies full voltage to the first part of the motor winding when the starter pilot device (pushbutton or master switch) is first operated to start the motor. The timing period is started when this contactor closes. At the end of the preset time delay, the second contactor energizes the remaining motor windings through its set of overload relays.

Short-Circuit Protection. Unless the starter is provided with built-in line fuses or circuit breaker, the customer should protect the starter against short circuits by one of these methods:

1. Fuses rated at not more than four times rated motor current.

2. Inverse time limit circuit breaker set at not more than four times rated motor current.

Overload Protection. An overload on either part of the motor winding during starting or running will stop the motor. Before putting the starter into service, check the overload heater marking with compressor manufacturer's recommendations. If the overload relay has an optional reset feature, select the type of reset action desired and adjust the relay accordingly. For details on mounting heaters and optional reset adjustment, refer to the specific relay leaflet listed in the "Reference" column of Table No. 2.

Connections. See specific controller and motor diagrams for specific connection details. Typical elementary diagram and standard motor connections are shown in Fig. 2. Optional pushbutton and master switch connections are shown in Fig. 3. When making connections, insert the bared cable or wire into the connector so it is squeezed between the back of the tang and the collar when the fastener is tightened.

Electrical Interlocks. Additional electrical interlocks for customer sequence interlocking may often be added. See specific device leaflet and specific controller diagram for details. Note that Type AMB relay used on size 3 and 4 controllers prevents addition of the left-hand outboard inter-

Table No. 2. CLASS 17-700 PART WINDING STARTERS

Application, Heater Selection, and Instruction Literature Guide

Note: Read headings. Then select horizontal line for motor type and horsepower. Find starter class, heater selection and literature references in some horizontal line.

APPLICATION			HEATER SELECTION					REFERENCE
			TO SELECT					
			HEATERS FOR					
FOR MOTOR	IM Contactor Must Interrupt Approx. 60 to 80% of Motor Full Voltage Locked Rotor Current	Standard Starter NEMA I Enclosed Class Number	Contactor and Overload Relay Diagram Designation	Function	Multiply Motor Total Full Load Line Current By	And Use This Value as Full Load Motor Current in Heater		INSTRUCTION LITERATURE†
						Table	Instructions	Individual Device Instructions
Standard Wye Connected Dual Voltage and Westinghouse Special 6 Lead Part Winding	*See Nameplate for Ratings Each contactor must carry approx. 50% of motor full load current.	17-700 NS3	1M	Start Run	½ =0.5	26.3	I.S. 10702-A	Heaters.....I.S. 10702-A NR Contactor....I.L. 17-825-1 AMB Relay.....I.L. 15-827-15 MW31 Relay.....I.L. 10707 L-60 Intlk.....I.L. 10708
			2M	Run	½ =0.5			
		17-700 NS4	1M	Start Run	½ =0.5	27.4	I.S. 10706	Heaters.....I.S. 10706 NR Contactor....I.L. 17-825-1 AMB Relay.....I.L. 15-827-15 MW41 Relay.....I.L. 10707 L-60 Intlk.....I.L. 10708
			2M	Run	½ =0.5			
		17-700 NS5	1M	Start Run	½ =0.5	26.5	I.S. 10799	Heaters.....I.S. 10799 NF Contactor....I.L. 17-825-2 AM Relay.....I.L. 10234-B MW51 Relay.....I.L. 15-827-10 L-60 Intlk.....I.L. 15-829-2
			2M	Run	½ =0.5			
Standard Delta Connected Dual Voltage	*See Starter Nameplate for Ratings IM contactor must carry approx. 75% of motor full load current.	17-700 NS3	1M	Start Run	$\frac{2\sqrt{7}}{7}$ =0.756	26.3	I.S. 10702-A	Heaters.....I.S. 10702-A NR Contactor....I.L. 17-825-1 AMB Relay.....I.L. 15-827-15 MW31 Relay.....I.L. 10707 L-60 Intlk.....I.L. 10708
			2M	Run	$\frac{\sqrt{3}}{6}$ =0.289			
		17-700 NS4	1M	Start Run	$\frac{2\sqrt{7}}{7}$ =0.756	27.4	I.S. 10706	Heaters.....I.S. 10706 NR Contactor....I.L. 17-825-1 AMB Relay.....I.L. 15-827-15 MW41 Relay.....I.L.10707 L-60 Intlk.....I.L. 10708
			2M	Run	$\frac{\sqrt{3}}{6}$ =0.289			
		17-700 NS5	1M	Start Run	$\frac{2\sqrt{7}}{7}$ =0.756	26.5	I.S. 10799	Heaters.....I.S. 10799 NF Contactor....I.L. 17-825-2 AM Relay.....I.L. 10234-B MW51 Relay.....I.L. 15-827-10 L-60 Intlk.....I.L. 15-829-2
			2M	Run	$\frac{\sqrt{3}}{6}$ =0.289			

* Application must always be such that contactor and relay continuous currents will not exceed 8-hour rating.

† For general instructions covering unpacking, handling, storing, installation and maintenance, see I.L. 1477-D, I.L. 4332, I.L. 7001-1, I.L. 7000-2 and MB-1781-G.

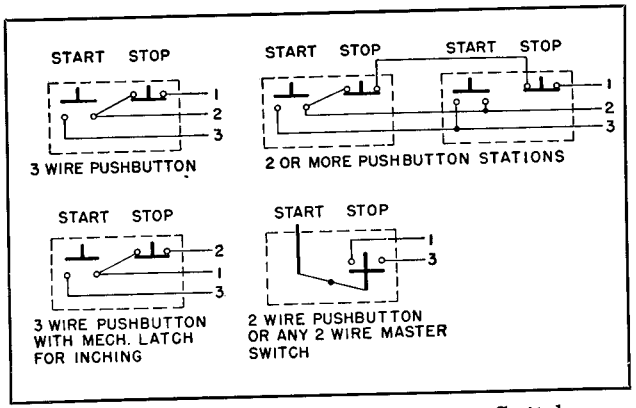

FIG. 3. Optional Connections to Master Switches

lock on the "1M" start-run contactor and the right-hand outboard interlock on the "2M" run contactor.

TESTS AND ADJUSTMENTS

The general and specific device leaflets and diagram should all be available to and followed by the installation and starting-up personnel before making the following tests and adjustments.

1. Make a careful check of the controller with all motor leads disconnected to insure that the equipment is in good operating condition. In particular, check the following:

a. Does controller go through complete sequence properly?

b. Trip overload relay. Does it remove equipment from the line?

c. Does the timing relay operate properly to energize the run contactor after a definite preset time? Factory setting for this relay is 2 seconds.

d. Does the pushbutton station (or other master switch) operate to control the equipment as expected?

2. After tests as above, make temporary motor connections and make further tests and adjustments as follows:

a. Check direction of rotation of motor and correct if necessary.

b. Observe overload relay operation. Relay should not trip starter off at rated motor load.

3. After above tests and adjustments are completed, motor leads may be permanently connected and insulated if necessary.

MAINTENANCE

In operating, servicing and adjusting the equipment, the attendant should consult the diagram and the general and specific device instruction leaflets, and particularly remember the following points:

1. Warning. All circuits should be de-energized and disconnecting devices locked open when working on equipment.

2. The equipment should be kept clean at all times.

3. Periodic inspection of all equipment should be made to insure that all apparatus is kept in working condition.

4. Contacts becoming badly worn should be replaced before they cause failure. Proper spring pressure should be maintained at all times.

5. Insulating oil (used in oil switches, hazardous location and circuit breaker type starters) should be periodically checked and reconditioned or changed when necessary. See Westinghouse Instruction Book 44-820-1A for detailed instructions on care of insulating oils.

6. Do not oil contactor bearings.

7. Do not use emery paper around electrical apparatus. Sandpaper or file only when necessary, and use care to avoid damaging insulation by metal particles.

8. Keep all connections tight; particular attention should be given overload relay heater connections, to keep them clean and tight.

Trouble Checking.

1. If control fuses blow, check carefully for shorted or damaged coils or wires; repair equipment and replace fuse.

2. If motor fails to accelerate properly:

a. Check a-c line for low voltage or single-phase conditions.

b. Check load and motor bearings for overload, excessive friction, or blocking.

3. If overload relay trips:

a. Check a-c line for low voltage or single-phase condition.

b. Check motor and load for overload, excessive friction, or blocking.

c. Check condition of heater connections. Clean and tighten if necessary.

d. Check ambient temperature at relay when relay trips. Heaters may have been selected for a lower ambient than actually exists. See heater data and overload relay instruction leaflet in Table No. 2.

e. Carefully inspect relay, control, motor, and load for any abnormal condition. Correct such condition before restarting.

f. Reset relay and attempt new start, carefully observing operation of equipment, motor, and load.

4. If starter fails to go through starting sequence completely, check interlock contacts, connections, and operation of the devices.

5. Each equipment is designed and supplied for a particular voltage, frequency, horsepower, and type of motor. Before applying starter on other voltage, frequency, motor type or horsepower rating, check the application with the nearest Westinghouse Sales Office.

Likewise, if any major repairs become necessary, contact the Sales Office for recommendations.

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