DESCRIPTION • OPERATION • MAINTENANCE

INSTRUCTIONS

DC GENERAL PURPOSE NON-REVERSING TIMESTARTERS

Class 8522

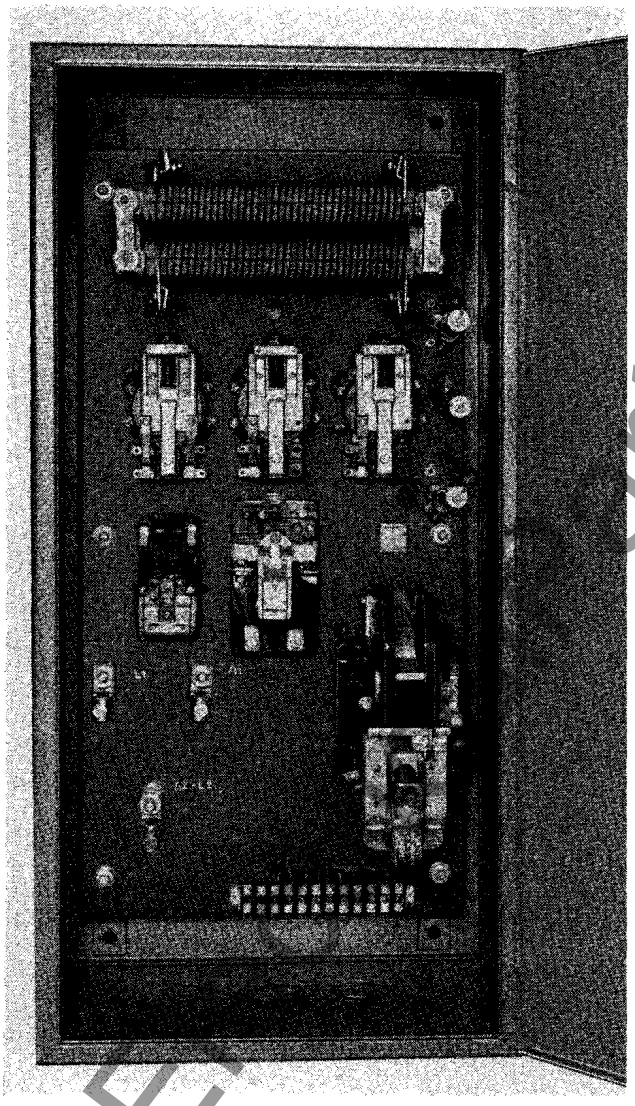


FIG. 1. Class 8522-B Starter for 50 Hp 230 Volts, Constant Speed, Non-Reversing Service Without Dynamic Braking.

GENERAL DESCRIPTION

This leaflet has been prepared for guidance in the installation, adjustment, operation, and maintenance of standard general purpose, non-reversing, DC Motor starters, of the following Westinghouse catalog classifications:

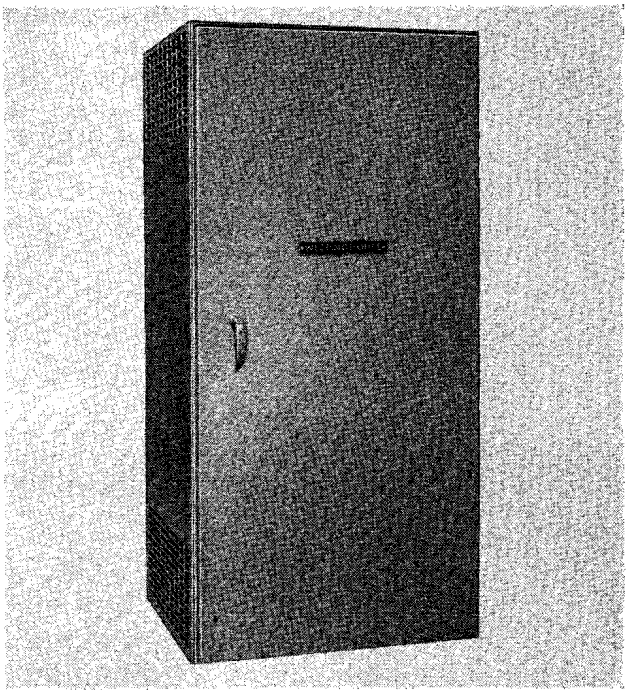
Class 8522-B—Constant Speed, without Dynamic Braking

Class 8522-C—Constant Speed, with Dynamic Braking.

Class 8522-E—Adjustable Speed, without Dynamic Braking

Class 8522-F—Adjustable Speed, with Dynamic Braking.

The typical standard starter consists of a line contactor, one or more accelerating devices, an overload relay, a set of starting resistors, necessary auxiliary relays, electrical interlocks and wiring details. Starters for adjustable speed motors include a field fluttering accelerating relay. Starters providing dynamic braking include a set of braking resistors and a normally closed contactor for setting up the braking circuit. The contactor sizes and the number of accelerating points are selected to suit the motor rating in line with NEMA standards. On NEMA sizes 1, 2 and 3, the line and braking contactors are combined in one device. On larger starters, the braking contactor and line contactor are separate devices.



Although this leaflet is primarily intended for, and is written around standard starters, it applies also to semi-standard, or modified, starters equipped with one or more optional features, a few examples of which, are as follows:

Field Loss Relay—a relay operated by a coil (or coils) in series with the motor shunt field, arranged to open the line contactor in case the shunt field current is interrupted or falls below a safe value.

Field Economizing Relay—a relay that operates to insert a resistance in series with, and thus prevent overheating of, the motor shunt field should it be energized during long periods of motor idleness.

Extra auxiliary interlocks or auxiliary relay, for sequence interlocking with other units or devices.

Field decelerating relay, a device similar to the field accelerating relay used on standard adjustable speed starters, except arranged to protect the motor during deceleration.

Standard Class 8522 starters are enclosed in NEMA Type 1 cabinets, but special cabinets to meet unusual conditions, are often supplied.

Limitations. The controller will operate satisfactorily with a motor whose rating and duty cycle correspond with that of the controller. Contactors will operate over a voltage range conforming with NEMA limitations. Class 8522 starters are equipped with resistors, class 135 or 136, which are rated for 10 seconds on out of each 80 seconds. Heavier duty cycles will overheat the resistors. Overload relay coils and heaters are selected for the average motor of the particular rating. Motors having a speed range, from full field speed to weak field speed, of more than two-to-one, will usually require class 8522 E or 8522 F starters. Below a two-to-one speed range, class 8522 B or 8522 C starters can usually be applied.

Disconnect Switch. It is good practice to install ahead of the starter, a fused switch or circuit breaker, for short circuit protection and as a means of disconnecting the starter and motor from the line. During periods of shut down, whether thru idleness or for purposes of inspection and repair, this switch should be open. This is especially true where the motor shunt field circuit is connected ahead of the starter, and is not designed for continuous excitation at full voltage with the motor standing idle.

Low-Voltage Protection Master Switch. The most usual type of master switch is the 3-wire, start-stop, low voltage protection push button shown in full lines on figures 2 and 3. "Low voltage Protection" applies to a scheme whose start button, or contact, closes momentarily and spring returns to its open position when manual pressure is removed. The contactor or control relay, closed in response to the momentary "start" contact, sets up its own holding circuit around the "start" contact. In case the holding device opens due to operation of the stop button, tripping of the overload relay or loss of voltage, it will not reclose until the operator again manually closes the "start" switch.

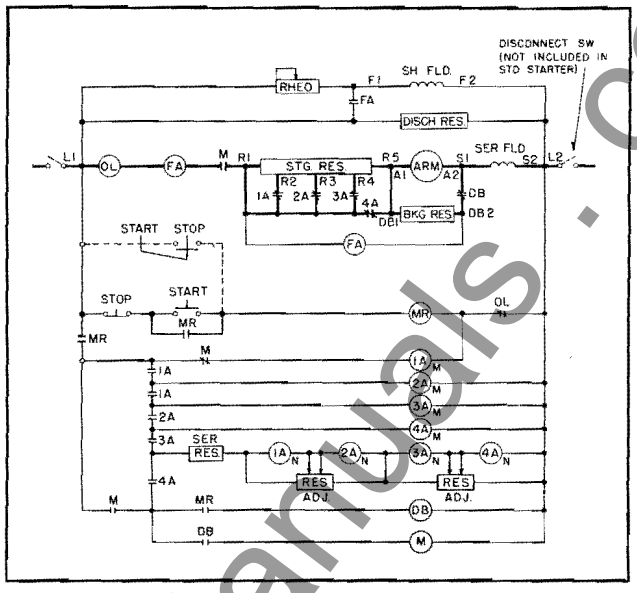


FIG. 2. Elementary Diagram for Typical Class 8522-F Timestarter with Five Point Acceleration. The Start-Stop LVP Pushbutton is Shown in Solid Lines.

Low-Voltage-Release Master Switch. The two-wire, maintained contact pushbutton shown in dotted lines, constitutes what is known as a low-voltage release type of master switch. The "start" contact, when once closed, remains closed until the "stop" button is manually operated. Upon loss of voltage, the contactors open, but they will reclose automatically when voltage is restored. Low voltage release master switches may be pushbuttons, pressure switches, thermostats, float switches, etc. They are usually applied to sump pumps, refrigerators and other drives that must maintain certain conditions in the absence of an operator. They should never be applied to machines where automatic restarting might be hazardous to equipment or personnel.

Overload Relay Reset. When a low-voltage-release master switch is used, the overload relay must be arranged to latch in its tripped position and remain tripped until manually reset. Otherwise, the motor would stop-start-stop-start and so on, in a destructive cycle.

Where a low-voltage-protection master switch is used, the overload relay can be arranged to reset automatically, because the motor cannot restart except by manually operating the "start" master switch.

Overload relays are usually Type MW through NEMA size 4 starters, and Type TI 2 on starters size 5 and larger, though they can be of any conventional type.

OPERATION

The elementary diagrams shown in Figures 2 and 3 are typical of Class 8522 starters. Figure 2 shows a 5-point, size 5, starter whose line and braking contactors are separate devices and whose accelerating timetactors are Type AQ. Figure 3 shows a 3-point, size 3 starter whose line and braking contacts are combined in a single device and whose accelerating timetactors are Type AQZ. The differences result from different requirements for small and large motors and from small differences in design of small and large components. Both diagrams apply to Class 8522-F starters, providing field accelerating relays and dynamic braking, and all devices are shown in their de-energized positions.

Referring to the diagrams in Figures 2 and 3, and assuming that the disconnect switch has been closed, no contactors are energized, and the motor is idle, but its shunt field is excited at a value determined by the setting of its field rheostat.

Pressing the start button energizes successively the main coils of the accelerating timetactors, which open to insert the entire starting resistance in series with the motor armature. Their auxiliary contacts close the line contactor as soon as the last timetactor has picked up, connecting the motor to the line in series with the starting resistor. On starters having dynamic braking contactor, the braking contacts must open before the line contactor can close.

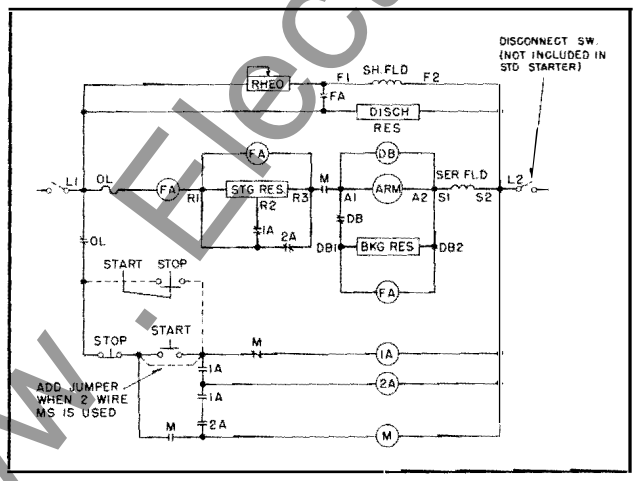


FIG. 3. Elementary Diagram for Typical Class 8522-F Timestarter with Three Point Acceleration. The Start-Stop LVP Pushbutton is Shown in Solid Lines.

As the line contactor closes, its interlock contacts provide a holding circuit and also de-energize the main winding of the first timetactor. This starts the timing sequence which successively cuts out portions of the starting resistance at definite time intervals until the motor is running across the line.

The time delay between the instant of de-energizing the main winding of each timetactor and its subsequent drop-out is adjustable. In Fig. 2, which shows the Type AQ timetactors, this adjustment is accomplished by changing the position of the sliding tap on a small resistor. Moving this tap in a direction to increase the amount of resistance in parallel with the neutralizing coil reduces the time of drop-out. Conversely, decreasing the resistance increases the time of drop-out. In Fig. 3, which shows Type AQZ timetactors having no neutralizing coils, adjustment is accomplished by changing the number of copper rings around the core. Adjustment of accelerating time is made on each starter at the factory, and for most applications no further adjustment is necessary. However, in the case of a high inertia load it may be desirable to increase the time, bearing in mind that increasing the length of the starting period decreases the number of starts that can be made in a given time, as explained under "Limitations".

The motor is stopped by pressing the stop button, which drops out the line contactor and automatically returns the control to its initial position. On dynamic braking controllers, this also de-energizes the braking contactor, allowing its contacts to close and connect the braking resistor across the motor armature.

In the case of adjustable speed starters, the field accelerating relay, "FA", provides full field for dynamic braking and during the accelerating period picks up and remains closed to provide full voltage on the motor field. As soon as the last timetactor has dropped out, the same relay becomes a field fluttering relay, automatically accelerating the motor to a speed determined by the setting of the field rheostat.

ADJUSTMENTS

For INSPECTION and adjustment of the component parts, refer to the instruction leaflet applying to the individual device. Following is a list of leaflets applying to typical devices:

IL-15800-M 010/110/210-1, Sizes 1 and 2, Type M Contactors, 1 Pole NO.

IL-15800-M 011/111/211-1, Sizes 1 & 2, Type M Contactors, 1 NO & 1 NC Main Contacts.

IL-15800-M 020/120/220-1, Sizes 1 & 2, 2-pole, Type M Contactors.

IL-10245-Size MM-310—Single pole NO contactors.

IL-10246-Size MM-311—Single pole NO & NC contactors.

IL-10250-Size MM-301—Single pole NC contactors.

IL-15800-1, Type M-Sizes 3-4-5-6-7, Spring closed contactors.

IL-15800-2, Type M-Sizes 3-4-5-6-7, Single Pole NO Contactors.

IL-15800-3, Type M-Sizes 8-9, Single Pole NO contactors.

IL-15827-3-AQZA, Type AQZ, Timetactors.

IL-15827-2-AQ, Type AQ, Timetactors.

IL-10707, Type MW, Overload Relay.

IL-3487, Type TI-2, Overload Relay.

IL-15827-11, Type AV Relay

IL-15827-4-AYC, Type AYC, Auxiliary Relay.

The above list does not necessarily include all devices that may be included in a modified starter.

Possible Sources of Trouble. If apparatus fails to operate properly, check the following:

1. Power Supply, Voltage failure, open disconnect switch, blown fuses.

2. Overload relay. Are its contacts closed?

3. Loose or wrong connections.

4. Poor contacts, due to wear, dirt, poor mechanical condition or low spring pressure.

5. Burned out operating coils.

6. Is starter being used as intended and within rated capacity?

There can be other causes of trouble, but the above are the most common. Experience will teach the operator what to look for and to expect. Some of the most difficult sources of trouble to locate, are caused by incorrect or loose connections. Contact between two points that should be insulated from each other may cause a short circuit or result in sneak circuits that may be baffling. Connections should be kept tight and wiring should be neat and as straight as possible. Do not allow starter cabinets to become cluttered with dirt and other foreign objects.

MAINTENANCE

In operating, servicing and adjusting the equipment, the attendant should consult the diagram and 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 apparatus is kept in good condition.

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

5. Do not oil contactor bearings.

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

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

For more detailed instructions for Inspection and Maintenance, see IL-7000-1.

WESTINGHOUSE ELECTRIC CORPORATION
BUFFALO PLANT • MOTOR AND CONTROL DIVISION • BUFFALO 5, N. Y.
Printed in U.S.A.