

## DS2800 DC MILL-TYPE CONTACTORS

600 VOLTS MAXIMUM

11170BS, BT, BU, BV, BW, CA, CB, CC  
1172AV, AW, BA, BB, BC, BE, 1173N, P  
1174AH, AJ, AK, AL, AM, AN, 1175R, S

1170AQ, AR, AW, BE, 1177A, B  
Y100 THROUGH Y106 ALL FORMS  
Y120 THROUGH Y126 ALL FORMS

*Before any adjustments, servicing, parts replacement or any other act is performed requiring physical contact with the electrical working components or wiring of this equipment, the POWER SUPPLY MUST BE DISCONNECTED.*

### INTRODUCTION

These DS2800 contactors are single-pole, dc operated, mill-type with a maximum voltage rating of 600 volts. The current ratings are listed in Table I. Forms are available with and without blowout coils.

Forms without blowout coils are intended primarily for dynamic-braking duty. They have only make and carry ratings and must not be used to interrupt current.

**TABLE I  
CONTACTOR CURRENT RATINGS**

CONTACTOR FORM DS2800	POLE ARRANGEMENT	MAXIMUM CONTINUOUS AMPERES*
1170 Y100 Y120	1 N.O.	100
1172 Y101 Y121	1 N.O.	150
1173 Y105 Y25	1 N.C.	150
1174 Y102 Y22	1 N.O.	300
1175 Y106 Y126	1 N.C.	300
1176 Y103 Y123	1 N.O.	600
1177 Y104 Y124	1 N.O.	900

\* The ratings given are the maximum continuous amperes for one pole and are correct only for a no blowout pole or a pole with the highest rated blowout coil available with the contactor.

The DS28001170 through 1177 are unmounted contactors that can be assembled and adjusted by the user in accordance with these instructions. They are principally back-connected, although some forms are front connected. All forms must be mounted on an insulated panel.

The DS2800Y100 through Y106 are self-contained, front-connected contactors. All forms are completely assembled, adjusted, and tested at the factory. They are assembled on an insulated base of the dead-back type which can be mounted on either a steel or insulated panel.

The DS2800Y120 through Y126 are self-contained contactors. The upper connection to the blowout coil is back connected and the lower connection to the movable shunt may be either front or back connected. All forms are completely assembled, adjusted, and tested at the factory. They are assembled on an insulated base which can be mounted on either a steel or an insulated panel having a cutout that allows the back-connection terminals to protrude through the panel.

Contactors with dc magnets may be operated directly from a dc supply or through rectifiers from an ac supply. Whenever this type of connection scheme is employed, both the ac and dc sides of the rectifier must be opened simultaneously by use of an auxiliary contactor, so the main contactor will not experience a time-delay dropout because of coil discharge through the rectifier. Coils used with rectifiers are designed to allow for a drop in voltage due to rectification, and are different from coils of the same nominal voltage for dc supplies.

**CLEARANCES**

For proper contactor interruption, the following clearances must be maintained:

DS28001170, 1172, Y100, Y120, Y101, Y121 contactors - With the movable contact tip in its de-energized position, maintain a gap of 1/16 in. to 1/4 in. between the arcing horn and the movable contact tip (Fig. 2).

DS28001174, 1176, 1177, Y102, Y122, Y103, Y123, Y104, Y124 contactors - With the movable contact tip in its de-energized position, maintain a gap of 1/16 in. to 3/16 in. between the arcing horn and the movable contact tip (Fig. 3). A gap of 13/16 in. between the arcing horn and the burning strip mounted on the stationary contact bracket must also be maintained (Fig. 3).

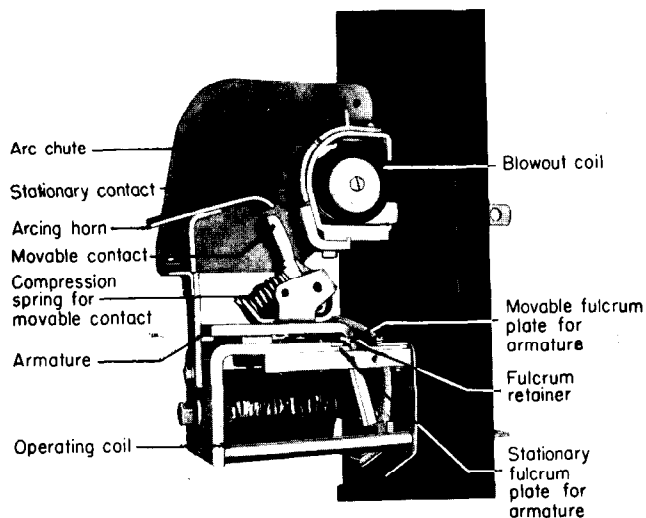


Fig. 1. Typical DS2800 dc mill-type contactor.

**INSTALLATION**

All contactors should be inspected for proper operation and clearances, as described below, when first installed and occasionally thereafter.

**MONTING**

When mounting DS28001170 through 1177 contactors, the following requirements must be maintained:

1. The rectangular fiber spacer for the bus-bar connection to the blowout coil should be mounted behind the panel to properly position this connection.
2. Since the frame assembly is electrically alive, the proper NEMA standard for electrical clearance and creepage to conducting parts and to ground must be maintained.

When a DS2800Y100 through Y106 is mounted on a steel panel, the sheet of insulation supplied with the contactor must be in place between the contactor sub-base and the main base or panel.

When a DS2800Y120 through Y126 is mounted on a steel panel, the cut-out required must be of such size that the proper NEMA standard for electrical clearance and creepage exists between the steel panel and all live parts on the back of the contactor base.

The movable contact, of all contactors, should pivot freely on the rocker bearing at the lower end of the contact and should strike the stationary contact squarely. The armature should pivot freely on its fulcrum when the contactor is energized and fully picked-up.

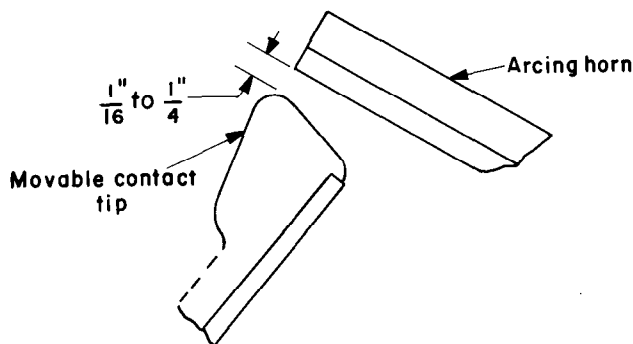


Fig. 2. Contactor clearances.

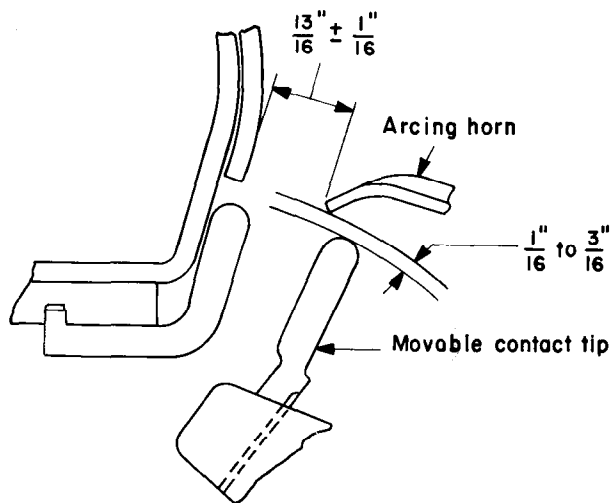


Fig. 3. Contact clearances

The arc chute should rest freely on the stationary contact bracket without interfering mechanically with any of the moving parts. With the movable contact in its energized position, a minimum gap of 0.06 in. must be maintained between the edges of the contact and the arc chute.

To obtain the maximum interruption rating of the electrical interlocks mounted on these contactors, an

air gap of 3/4 in. must be maintained between the open face of the interlock and any conducting part or ground.

When mounting any contactor described in these instructions, the NEMA standard for electrical clearances and creepages between all electrical live points (power connections, control connections, etc.) to conducting parts or to ground must be maintained.

The minimum arcing clearances, for forms of contactors containing blowout coils, are listed in Table II. These clearances must be maintained in front and above the contactor arc chute when the contactor is used in a 600-volt-maximum motor circuit.

**TABLE II**  
**CONTACTOR ARCING CLEARANCES**

CONTACTOR FORM DS2800	ENCLOSURE LINED WITH INSULATION	ENCLOSURE NOT LINED WITH INSULATION
1170 Y100 Y120	2 in.	3.5 in.
1172 Y101 Y121	2 in.	4 in.
1174 Y102 Y122	2.5 in.	5 in.
1176 Y103 Y123	3 in.	6 in.
1177 Y104 Y124	3.5 in.	6.5 in.

### PICKUP AND WIPE VOLTAGES

All contactors should pick up and fully wipe with cold coil as follows:

- Rectified ac control ... 70%\* of ac voltage
- Rectified ac control with holding resistor ... 75%\* of ac voltage
- DC control ... 63%† of coil voltage
- DC control with holding resistor ... 75%† of coil voltage

\* 85% with hot coil      † 80% with hot coil

### DESCRIPTION

#### CONTACTS

It is seldom necessary to clean the surfaces of the contacts, but if they should become unduly oxidized from unusual conditions such as very infrequent operation, they may be dressed with a medium flat file without removal from the contactor. Care should be taken not to gouge the surface of the contact and to maintain an even surface.

When the contacts have worn sufficiently to reduce the wipe to the values indicated in Table III, they should be replaced. To replace the contacts, remove the arc chute and, in the case of the normally open contactor, loosen the arcing horn slightly and push it to one side. Next, remove the cap screw holding the movable contact and shunt together. To remove the movable contact push the upper part of the contact toward the base and at the same time, pull it up and out of the contactor. This will raise the lower part of the contact off the fulcrum so that the contact can be removed easily.

If it should be necessary to remove the contact spring, the contact should first be removed in the manner described above.

To replace the contact, first make sure the spring is in position between the bracket and the shunt. Insert the lower end of the contact between the shunt and the bracket, and push in until the notch in the contact seats on the rocker bearing on the bracket. Position the top edge of the shunt against the shoulder on the back of the contact; insert the holding screw through the shunt and into the contact and tighten.

The stationary contact may be removed by loosening the holding screw a few turns. This contact has a slotted mounting hole, making it unnecessary to remove the screw entirely. To replace the contact, slide it into position against the bracket and tighten the holding screw.

### CONTACT FORCE

If for any reason it is necessary to check contact force (see Table III), pass a loop of fine wire around the movable contact as shown in Fig. 4. Pull on this with a spring balance held in such a direction that the line pull is approximately perpendicular to the contact surface on the movable contact. Initial contact force is indicated when the movable contact is just pulled away from its stop at the top of its supporting bracket. It is usually convenient to see this by placing a piece of paper between the contact and the stop, and pulling on the spring balance until this paper can just be withdrawn. Final contact force is indicated by energizing the magnet on normally open contactors, and pulling on the spring balance until the movable contact begins to leave contact with the stationary contact. Notice that in order to check final contact force with values given in the table, this test should be made with new contacts.

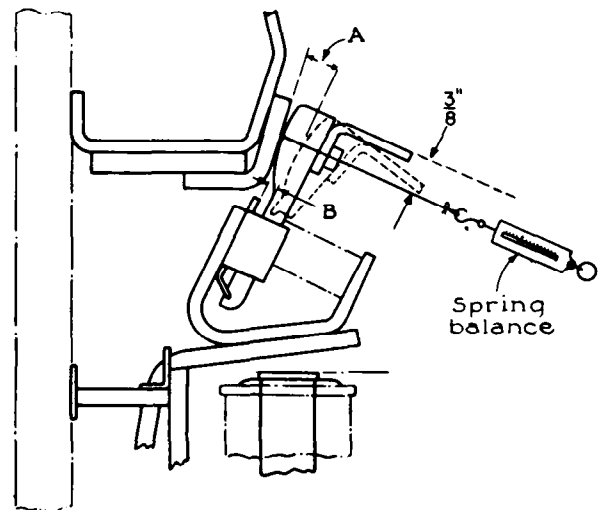


Fig. 4. Method of checking contact force.

**TABLE III  
CONTACT FORCE AND TIP WIPE**

CONTACTOR FORM	APPROXIMATE DIMENSIONS IN INCHES			CONTACT FORCE IN POUNDS (± 15%)	
	GAP A	B*	BW*	INITIAL	FINAL
DS28001170, Y100 & Y120	17/32	9/64	1/16	2-1/4	4
DS28001172, Y101 & Y121	5/8	1/8	1/16	3-1/4	6-1/2
DS28001173, Y105 & Y125	1/4	5/32	3/32	4	8
DS28001174, Y102 & Y122	23/32	7/32	7/64	6-1/2	13
DS28001175, Y106 & Y126	17/64	7/32	1/8	7-1/4	14-1/2
DS28001176, Y103 & Y123	27/32	9/32	1/8	13-1/2	27
DS28001177, Y104 & Y124	27/32	9/32	1/8	13-1/2	27

\* When B measures BW it is recommended that the contacts be renewed.

**ARC CHUTES**

The arc chute is entirely removable from the contactor. The arc chute is seated on the stationary contact bracket and between the pole pieces. On the larger size contactors, provision is made for securing the arc chute with a mounting screw.

Never operate the contactor with power on the contacts unless the arc chute is securely in place.

**COILS**

To change the main coil on any of these contactors, the cap screw holding the core to the frame should be removed. The core and coil can then be dropped out and the coil slipped off the core. Notice that the end of the core which is in contact with the frame is shouldered to assure that binding of the screw will not make it difficult to remove. In replacing the core, be sure that this shouldered section drops into the hole in the frame. On the normally closed contactors the frame is stepped to make it easy to slide the shouldered end of the core into the frame.

Coils for these contactors have one flange or boss with a square edge. This fits against the frame to prevent the coil from turning. The coil-retaining washer, used to keep the coil tight, is placed between the head of the core and the coil.

**ELECTRICAL INTERLOCKS**

Two designs of electrical interlocks have been furnished. The older type interlock was designated by numbers containing an X (such as X2 or X5) while the newer type is designated by letters (such as B or E).

**Old Type**

The older type of electrical interlock was used only on the DS28001170 through 1177 contactors. It uses a molded block to mount the movable contacts on the

contactor armature. The stationary element consists of two stud assemblies designed so that the contact tips can be changed from the normally open to the normally closed position without additional parts. The movable and stationary contacts must be reversed together when such a change is being made.

The normally closed electrical interlock should be adjusted so that it is always closed when the contactor is de-energized, even when the armature is moved sideways the maximum distance permitted by the armature retainer. Adjust both normally open and normally closed interlocks in accordance with Table IV and Fig. 5.

**TABLE IV  
INTERLOCK TIP DATA (OLD TYPE)**

DS2800 CONTACTOR FORMS	1170	1172	1173	1174	1175	1176	1177	
NORMALLY OPEN	TIP WIPE (A) IN INCHES	3/16	5/32	3/16	7/32	7/32	3/16	3/16
	TIP GAP (B) IN INCHES	1/16	7/64	1/8	11/64	1/8	7/32	7/32
NORMALLY CLOSED	TIP WIPE (A) IN INCHES	7/32	1/8	7/64	3/16	1/8	7/32	7/32
	TIP GAP (B) IN INCHES	3/32	3/32	3/16	3/16	13/16	3/16	3/16

**\*\* NOTE \*\***

Adjust lower interlock tip to gap "B", then adjust upper tip so that both make contact at the same time (within 1/64 in.).

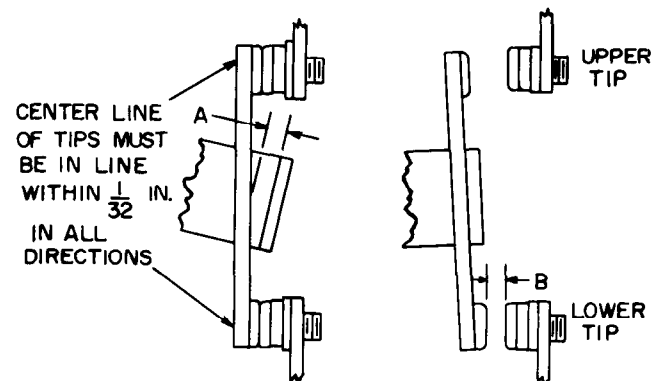


Fig. 5. Interlock tips (old type).

**New Type**

The new-type electrical interlock is used on all the Y100 and Y120 series contactors as well as 1170 series. It consists of a contact block having two electrical circuits. The internal parts can be rearranged to give different contact arrangements. Should this be necessary, the parts should be re-assembled in accordance with Figs. 6, 7 or 8. Spring ends must not protrude into

holes (A), slots (B), or keys (C), which serve as guides for the operating arm. See Fig. 6.

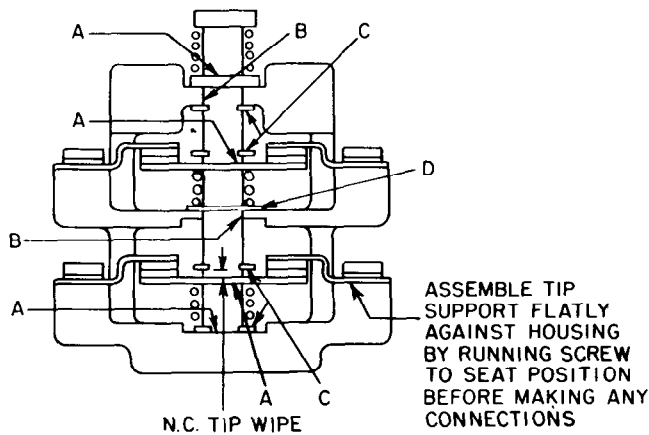


Fig. 6. Interlock block with normally closed contacts in unoperated position.

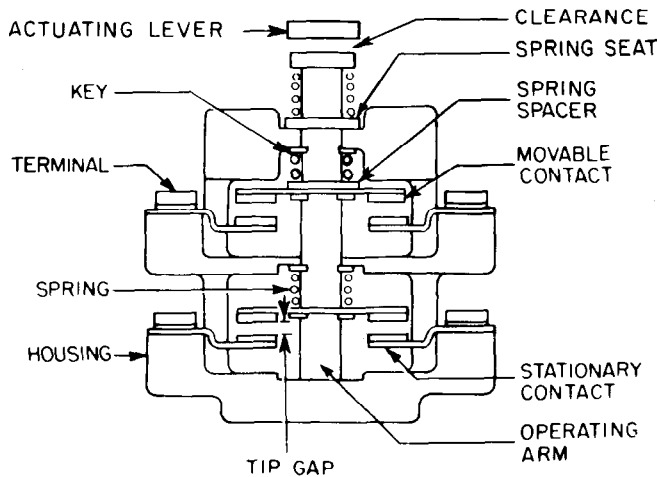


Fig. 7. Interlock block with normally open contacts in unoperated position.

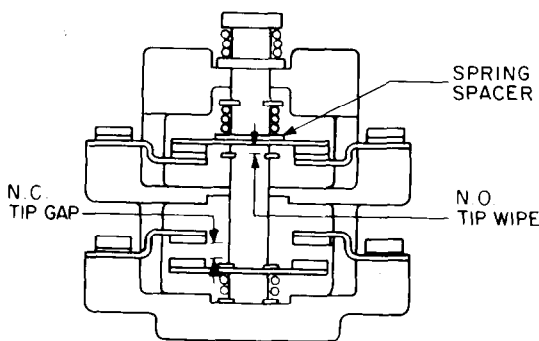


Fig. 8. Interlock block with one set of normally open contacts and one set of normally closed contacts in operated position.

Contact blocks with two normally closed circuits require a spring spacer, (D) in Fig. 6, to assure that the center spring is properly in place. Because of the circuit rearrangement feature, a spring spacer is supplied with all other two-circuit contact blocks, as shown in Figs. 7 and 8.

The interlock should be positioned on its bracket so that with the contactor in its energized position the operating arm (Fig. 8) should not bottom, and with the contactor in its de-energized position there should be some clearance between the operating arm and the actuator on the armature (see Fig. 7).

Tip gaps and wiper should be as shown in the following table. Replace the contact tips when the wiper reaches one-half the minimum specified.

TABLE V  
INTERLOCK TIP DATA (NEW TYPE)

	CONTACTS	MINIMUM
Not Operated	(N.O.) Tip Gap	5/64 in.
	(N.C.) Tip Wipe	3/64 in.
Operated	(N.O.) Tip Wipe	3/64 in.
	(N.C.) Tip Gap	5/64 in.

TABLE VI  
INTERLOCK RATINGS (In Amperes)

Number of Contacts	Carry	Make	Interrupt							
			DC Inductive*			AC**				
			125V	250V	600V	110V	220V	440V	600V	
One Set	10	60	1.8	0.5	0.2	6	3	1.5	1.2	
Two Sets in Series	10	60	4.0	1.2	0.35					

\* Non-inductive dc interrupting rating is 1.5 times inductive

\*\* Capable of interrupting inrush current of 60 amperes at 110 volts, 30 amperes at 220 volts, 15 amperes at 440 volts, and 12 amperes at 600 volts a limited number of times.

To remove the movable contacts lift the spring seat, tilt the operating arm forward, and lift out the entire movable contact assembly. Snap off the "U" shaped keys and slide the contacts off the operating arm. Care should be taken not to lose the operating spring during this operation.

To remove the stationary tip assembly, remove the terminal screw, then lift the contact tip off the housing. To replace the tip, press it onto the molded insert and run the terminal screw to its seat position. The shape of this contact assembly should not be changed by handling or during operation.

To change an interlock from normally open to normally closed, or vice-versa, disassemble the movable and stationary contacts in the manner described above, invert, and reassemble.

An interlock block having one normally open and one normally closed circuit must be assembled with the

normally closed contact on the bottom (see Fig. 8) or electrical creepage distances will not be maintained.

### MECHANICAL INTERLOCKS

Mechanical interlocks on a pair of contactors must keep one of the pair from making contact when the other is just making contact and both contactors have new contacts. When one contactor is completely closed, and the other open, there should be a slight amount of free motion of the interlock arm (approximately 1/16 inch). If adjustment is required, it can usually be made by means of clearance either at the screws holding the mechanical-interlock bracket to the contactors or at the stud on which the molded arm rotates. Adjustment can also be made by aligning the two contactor frames in the clearances of their mounting holes on the panel.

### NORMALLY CLOSED CONTACTORS

The above instructions apply to both the normally open and normally closed contactors. In addition, these precautions apply to the normally closed devices. The main operating spring should work freely without binding on its guides. Since the coils for the normally closed contactors are intermittently rated, they should not be energized more than 50 percent of the time, and not more than 15 minutes at one time. However, if a coil is energized only once every three hours or longer, it may be energized for 30 minutes at one time.

### RENEWAL PARTS

When ordering renewal parts, address the nearest General Electric sales office, specify the quantity required, and give the catalog numbers or describe the required parts in detail. Also be sure to give the complete nameplate rating of the equipment.

*These instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met during installation, operation, and maintenance. Should further information be desired or should particular problems arise that are not covered sufficiently for the purchaser's purpose, the matter should be referred to GE Drive Systems, Salem, Virginia, U.S.A.*