Type SX
Toggle Relay

WARNING

Before putting relays into service, remove all
blocking which may have been inserted for the
purpose of securing the parts during shipment,
maintain that all moving parts operate freely, in-
spect the contacts to see that they are clean and
close properly, and operate the relay to check the
settings and electrical connections.

1. APPLICATION

Type SX relay is a toggle type relay intended for aux-
iliary service where the relay contacts should change
position when the operate coil is energized and not re-
set until the reset coil is energized. An automatic time
delay on reset of 5 to 15 cycles may be obtained using
relays supplied with a telephone type relay unit (X).

In a typical application, the type SX relay is used to
provide selective reclosing. The breaker is instantan-
eously reclosed only after it is tripped by the carrier
or instantaneous trip relays. The typical connection of
this scheme is shown in Figure 10. The instantaneous
or carrier trip circuit is trip circuit No. 1 and energizes
the series operating coil of the type SX relay. This
closes the type SX relay contact to initiate reclosing.
All of the other trip circuit paths are combined in trip
circuit No. 2 which by-pass the type SX relay operat-
ing coil.

The type SX relay stays operated until the reset coil is
energized. After the reclosure is completed, a switch
on the breaker auxiliary contactor energizes the reset
coil for subsequent operation. Note that the 52x con-
tact (or equivalent) must be closed only during the
closing stroke of the breaker. 52a may be used if X
relay is included.

2. CONSTRUCTION

The SX toggle relay consists of a type SX toggle
unit, and a telephone type relay unit (when used).

2.1 Toggle Unit (SX)

The SX toggle unit consists of two electromagnets
with a common armature. One end of the armature
has two pins which rest in a groove in the molded
base. The other end of the armature is held in one
of two positions by means of a toggle spring which
produces the toggle action. The toggle spring is
protected during shipment by a removable lock pin
which limits the forward motion the armature. The
lock pin does not affect the normal operation of the
relay and may be left on after installation. The mov-
ing contacts are mounted at one end of the arma-
ture on either side.

3. OPERATION

When the SX-0 operation coil is energized the ar-
mature is toggled over closing the right hand con-
tacts, front view. These contacts will remain closed
until the reset coil, SX-R, is energized.

Relays supplied with a telephone relay unit (X) have
an automatic time-delayed reset feature. The opening
of the left-hand SX contacts de-energizes the
telephone relay (X). After approximately 10 cycles,
the (X) relay drops out, closing its back contact
which completes the SX-R coil circuit. A typical ap-

All possible contingencies which may arise during installation, operation or maintenance, and all details and
variations of this equipment do not purport to be covered by these instructions. If further information is desired
by purchaser regarding this particular installation, operation of maintenance of this equipment, the local ABB
representative should be contacted.
application is selective reclosing when a 52X contact is not available for resetting the relay.

4. CHARACTERISTICS

The type SX unit is supplied with DPDT contacts. It is available for 120 or 240 volts, 50 or 60 hertz (intermittent duty), and for 125 or 250 volts dc or for 1.5 or 10 amperes dc (continuous duty). The unit is supplied with the operating and reset coils in any combination of the above ratings as desired. The unit operates at 80 percent of its rated voltage or 90 percent of rated current. Contacts should not be used as a coil interrupting contact with the current coil.

Relays used for selective reclosing are usually provided with a 1 ampere operating coil having a 1 watt power consumption. This coil is used in order to keep the resistance in series with the trip coil to as low a value as possible.

The operating time of the type SX relay, when energized from a dc source through a resistance load and when using the 1 ampere coil, is approximately 0.027 seconds at rated current, 0.008 seconds at 300 percent and 0.005 at 2000 percent of rated current. At 2000 percent of rated current in a circuit having approximately the same ratio of inductance to resistance as a typical trip coil, the operating time is approximately 0.007 seconds.

The operating time when energized from a 120 volt 60 hertz source is less than 1 cycle. When energized from a 125 volt dc source, the operating time is less than 2 cycles.

Burden is 5.5 watts at rated voltage, 1 watt at rated current.

Dc contact rating is 625 watts interrupting capacity.
5. INSTALLATION

The relays should be mounted on switchboard panels or their equivalent in a location free from dirt, moisture, excessive vibration, and heat. Mount the relay vertically by means of the four mounting holes on the flange for semi-flush mounting or by means of the rear mounting stud or studs for projection mounting. Either a mounting stud or the mounting screws may be utilized for grounding the relay. The electrical connections may be made directly to the terminals by means of screws for steel panel mounting or to the terminal studs furnished with the relay for thick panel mounting. The terminal studs may be easily removed or inserted by locking two nuts on the stud and then turning the proper nut with a wrench.

For detailed FT Case information, refer to I.L. 41-076.

6. ADJUSTMENT AND MAINTENANCE

The proper adjustments to insure correct operation of this relay have been made at the factory and should not be disturbed after receipt by the customer. If the adjustments have been changed, the relay taken apart for repairs, or if it is desired to check the

adjustments at regular maintenance periods, the instructions below should be followed.

6.1 Acceptance Check

The following check is recommended to insure that the relay is in proper working order.

6.2 SX Toggle Unit

Calibration Check: If correctly adjusted, the unit will operate without chattering at 80 percent of rated voltage.

6.3 Telephone Relay (X)

Calibration Check: The telephone relay should pick-up at 80 percent of rated dc voltage.

The time delay on drop-out, should be 10 cycles as set at the factory before shipment.

6.4 Routine Maintenance

All relays should be inspected periodically and the operation should be checked at least once a year or at such other time intervals as may be dictated by experience to be suitable to the particular application.
All contacts should be periodically cleaned. A contact burnisher Style # 182A836H01 is recommended for this purpose. The use of abrasive material for cleaning contacts is not recommended because of the danger of embedding small particles in the face of the soft silver and thus impairing the contact.

6.5 Calibration

Use the following procedure for calibrating the relay if the relay has been taken apart for repairs or if the adjustments have been disturbed. This procedure should not be used unless it is apparent that the relay is not in proper working order (See "Acceptance Check").

6.5.1 SX Toggle Unit

If the SX Toggle Unit has been dismantled, it is necessary to check the toggle action and the contact follow after reassembling it. Set the gap between the lower pole pieces at 11/64". The contact follow should be set at .037". This may be obtained by adjusting the stationary contacts to just make when there is a .020" gap between the residual pin in the armature, and the upper pole pieces. The adjusting screw assembly should be pushed down until there is enough tension to cause the residual pin to rest against the pole piece. With the lock nut tightened, adjust the adjusting screw until there is equal toggle pressure on each side. This may be done mechanically with a gram gauge and should be 58 grams when measured between the rivets of the moving contact. This may also be done electrically by energizing the coils. The mechanical and electrical over-center balance usually does not coincide. Either one may be used.

6.5.2 Telephone Relay Unit (X)

If it is desired to change the time delay on dropout, this may be done by turning the residual screw in the armature. The approximate range of adjustment is 5 to 15 cycles.

7. RENEWAL PARTS

Repair work can be done most satisfactorily at the factory. However, interchangeable parts can be furnished to the customers who are equipped for doing repair work. When ordering parts always give the complete nameplate data.
Figure 4. Internal Schematic of the Type SX two unit Relay, current actuated operating coils, in Type FT-11 Case – for selective reclosing where phase and ground protection cannot have a common SX operate coil. (For relay with voltage type operating coils, the current test jacks and shorting switches associated with terminals 6, 7, 8 and 9 are omitted.)

Figure 5. Internal Schematic of the Type SX two unit Relay, voltage operated, with operating and reset coil circuits to independent terminals, in the Type FT-22 Case.

Figure 6. Internal Schematic of the Type SX Relay, with Independent 1 Make and 1 Break Contacts, in small glass case.

Figure 7. Internal Schematic of the Type SX Relay, with independent Make-Break contact and Reset Coil interrupting contact, in small glass projection case.
Figure 8. Internal Schematic of the Type SX Relay, voltage actuated operating and reset coil, with two independent Make or Break contacts, in small glass case.

Figure 9. Internal Schematic of the Type SX Relay, current actuated operating coil, with two independent Make contacts, in a small glass case.

Figure 10. Typical External Schematic forSelective Reclosing Using the Type SX Relay.

Figure 11. Internal Schematic of Type SX two unit - Double Pole Toggle Units - for Selective Reclosing in a double breaker scheme, in Type FT-11 Case.
Figure 12. Outline and Drilling Plan for the Type SX Relay in the Small Glass Projection Case
Figure 12. Outline and Drilling Plan for the Type SX Relay in the Type FT-11 Case.

Panel Drilling and Cutout for Semi-Flush Mtg.

Panel Drilling or Cutout for Protection Mtg. (Front View)

Terminal and Mtg. Details for Protection Mtg.

Dimensions in Inches
(Dimensions in Millimeters)
Figure 14. Outline and Drilling Plan for the Type SX two Unit Relay in the Type FT-22 Case.

* Denotes Change
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