Application  — Automatic high speed grounding switches are generally used for circuit protection that would otherwise require costly circuit breakers. The most popular application is protection of transformers in circuits having enough impedance to limit low side fault currents to values below trip settings of source breakers. The automatic high speed grounding switch imposes a deliberate ground fault on the high side, which forces the source breaker to open.

In order to isolate the transformer from the feeder after a fault, it is customary to place a disconnect switch on the feeder between the grounding switch and the source breaker. In applications where quick service restoration is not a factor, a manually operated disconnect and a manually reset grounding switch can offer substantial savings in equipment costs.

The trip circuit for the Type HRR is generally provided by differential relays at the transformer; however, special applications may indicate other arrangements. The HRR will trip at the direction of any relay, so its control is as flexible as its relaying system.

The operating times of the HRR vary from a minimum of five cycles at 14.4 kV through a maximum of 18 cycles for column mounted 161 kV models. See the data table on page 4.
HRR
CONSTRUCTION

1. **Switch Blade** — Tubular aluminum.
2. **Jaw Contacts** — Formed bus copper contact leaves are backed up by precompressed, stainless steel coil springs. The jaw contact housing and blade tip are cast bronze. The jaw assembly is flaired to guide the fast moving blade into the contacts.
3. **Spring** — The HRR is operated by a stainless steel coil spring. An aluminum cover protects it from sleet, snow, and airborne dirt. See detail in figure 4.

4. **Auxiliary Switch** — Fully enclosed by a cast aluminum housing, the auxiliary switch is isolated from environmental damage. See figure 5.
5. **Grounding** — The HRR is grounded to the base by a flexible, tinned copper shunt.
6. **Insulators** — NEMA post or cap and pin as specified.
7. **Hookstick Reset Arm** — Aluminum tubing with a cast bronze hookstick eye.
8. **Mounting** — See specifications on page 4.

The HRR is easily disengaged from the contacts and reset with a hookstick. As the sketches at right show, the blade is attached to the operating shaft with a crank arm, allowing good mechanical advantage against contact and power spring forces when opening.

**FIGURE 2**
Type HRR 69 kV. Model shown is pedestal mounted. Other mounting schemes include: column base, pipe column, station girder. It can be connected to a line, station bus, air switch terminal (saving insulator costs), or to any other conductor by means of a jumper.

**FIGURE 3**
Power Spring Detail — Shown here with the cover removed, a stainless steel coil spring powers the HRR.

Until released by the trip solenoid, a simple toggle latch locks the HRR open. Vibration or environmental forces cannot cause accidental ground switch closings.

Nylon bearings are used on all operating shaft and latch mechanism pivot points.

Auxiliary Switch Detail — A four-pole auxiliary switch, with two “A” and “B” contacts, is standard equipment. Since the trip solenoid is not suitable for continuous duty, two poles of the auxiliary switch are used to disconnect it when the grounding switch is closed.

If additional auxiliary switch poles are required, up to 14 may be specified upon ordering as an extra cost option (Refer to the factory).

Regardless of how many poles the HRR’s auxiliary switch is equipped with, it is readily accessible, and may be easily adjusted to any combination of “A” or “B” contacts in the field.

MOUNTING AND TESTING

The grounding switch lends itself to application on most station and line arrangements. It can be mounted on the face of a column, on a pedestal especially provided, on a pipe column, or on a station girder. It can be connected to a line, station bus, air switch terminal, or to any other conductor by means of a jumper. This means that the HRR can be located close enough to the ground to be opened by a hookstick and be accessible for testing. A high speed grounding switch may stand exposed for years without operating but when called upon must perform with complete dependability. It follows, therefore, that it should be inspected periodically to be sure it is mechanically and electrically operable.

The best way to check a switch of this type is to trip it electrically. Obviously, it should have means for isolating so that it may be tested without closing on an energized circuit. A disconnecting switch should be placed between the grounding switch and the circuit to which it is connected so that it may be disconnected and tested without interrupting service. A hookstick operated switch is commonly used for this purpose but a group operated switch may be used above 69 kV.
**FIGURE 6**
14.4 - 46 KV

**FIGURE 7**
69 KV

**FIGURE 8**
115 - 161 KV

**FIGURE 9**
—Lally Column Mounting
115 - 161 KV

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**RATINGS**

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<th>Catalog Number</th>
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**STANDARD MOUNTING**

**LALLY COLUMN MOUNTING***

**VOLTAGE RANGES AVAILABLE FOR TRIPPING**

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<tr>
<td>115 AC</td>
<td>95-125</td>
<td>230 AC</td>
<td>190-250</td>
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*When ordering the special lally column mounting as shown in Figure 9, the pipe size diameter should be specified. If it is to be mounted on a wide flange column, contact the factory for correct mounting hole spacing. Bus size and material (copper or aluminum) should also be specified.

**Times shown are for new switches, tripped at rated voltage. For minimum voltage tripping, add 3 cycles.***