INSTRUCTIONS FOR USE AND MAINTENANCE

NS34/1000/1250
SWITCH

NS1/1000/1250
SWITCH DISCONNECTOR

N/NH1/1000/1250
L.V. CIRCUIT BREAKER

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1. **INSPECTION ON RECEIPT**

Each circuit breaker is shipped in a carton containing also the fittings requested with the order. Contents are to be carefully examined on arrival. If damage has occurred, notify our factory within five days from the date of receipt.

2. **STORAGE**

A circuit breaker is to be kept in its carton in a dry room.

3. **INSTALLATION**

3.1 **Installation sites**

The open installation may be adopted only for dry non-dusty rooms and where the circuit breaker does not suffer blows. For dusty, moist, salty or corroding locations, enclosure or switchboard mounting is advised.

3.2 **Minimum distance [mm] (fig. 1)**

![Diagram](image)

- Earthed wall
- Earthed wall protected by a 3mm thick isolated sheet

4. **SWITCH-DISCONNECTORS TYPES NS1000, NS1250 AND SWITCHES TYPES NSa1000, NSa1250**

Switch-disconnectors and switches are derived as special version from circuit breakers types N/NH1000 and NH1250. They have the same overall dimensions as the circuit breakers from which they are derived.

5. **MAINTENANCE**

Before carrying out any servicing, open the circuit breaker and disconnect power to the circuit breaker (power circuit and auxiliary circuits).

Under normal operating conditions perform the following operations **once a year**. Under more severe conditions repeat them **every six months**:

- a) wipe off dirt and soot with a clean, dry rag
- b) clean the arc chute
- c) if necessary, clean the main contact surface with a fine file or emery cloth
- d) check the surfaces of the isolating contacts; clean with solvent
- e) check the condition of all connections; remove all traces of oxidation with fine emery cloth; clean with solvent; firmly tighten all screws and bolts

6. **WEIGHTS**

**N/NH1000**

- Fixed circuit breaker/switch-disconnector/switch with front terminals: 11.5/10.5/11.0 kg
- Fixed circuit breaker/switch-disconnector/switch with rear terminals: 21.0/20.0/20.5 kg
- Draw-out circuit breaker/switch-disconnector/switch with front/rear terminals: 25.5/26.5 kg

**N/NH1250**

- Fixed circuit breaker/switch-disconnector/switch with front terminals: 18.5/17.5/18.0 kg
- Fixed circuit breaker/switch-disconnector/switch with rear terminals: 21.0/20.0/20.5 kg
- Draw-out circuit breaker/switch-disconnector/switch with front/rear terminals: 25.5/26.5 kg
8.7 Auxiliary switches for indications: breaker open, closed or tripped (fig. 20)

1. Remove the circuit breaker cover.
2. Fit the switches to proper seat on the right side of thermomagnetic release block.
3. Introduce cables into duct (1). Break the diaphragm on the right side of the circuit breaker cover and introduce the cable duct (1).
4. For fitting the auxiliary switches for circuit breaker tripped indication, remove diaphragm (4) and the plug (2) from the end of bar, insert the new lever (3) and putty the diaphragm (4).
5. Refit the circuit breaker cover.
6. Check the electrical performance of auxiliary switches with the circuit breaker open, closed and tripped. Should performance not be correct, bend suitably lever (6) for circuit breaker closed or open and lever (5) for circuit breaker tripped indications.

The same operations are to be done for mounting the auxiliary switches on the left side of the circuit breaker.

8.8 Transparent protection (fig. 21)

1. Set transparent protection (1) on the circuit breaker (see fig. 21)
2. Put the three insulating nails (2) into the adequate holes on the transparent protection.

3.3 Installation position (fig. 2)

4. EL. CONNECTIONS

4.1 General

The connections must be performed careful; the contacts surface of the connections must be flat and clean. Any burrs, dents and traces can be the reason of remarkable partial warming.

Check the conditions of contact surfaces: burr, dents or oxidation traces are to be removed by a fine file or emery cloth, then clean carefully using a rag drenched with tricloroethylene.

- Copper conductor should be tin-plating, silver plating or nickel plating and coat with neutral grease (at least in the area of contact with the circuit breaker terminals).
- Aluminium conductor should be cleaned using a metallic brush and coat with neutral grease.
- In the case of cable connections it is advisable to use cable lugs (except the circuit breakers with direct cable connection).
- Tighten the screws and nuts with prescriptive torques (see 4.2)

4.2 Cable sections and tightening torques

<table>
<thead>
<tr>
<th>Connection</th>
<th>Width (mm)</th>
<th>Thickness (mm)</th>
<th>Tightening Torque (Nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front connection</td>
<td>45</td>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td>Min. Diameter</td>
<td>3x22</td>
<td>3x22</td>
<td></td>
</tr>
<tr>
<td>Cable front connection</td>
<td>45x10</td>
<td>45x10</td>
<td>25</td>
</tr>
<tr>
<td>Int. Diameter</td>
<td>4x18</td>
<td>4x18</td>
<td>25</td>
</tr>
<tr>
<td>Extended front connection</td>
<td>45x15</td>
<td></td>
<td>19</td>
</tr>
<tr>
<td>Int. Diameter</td>
<td>4x18</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>Rear flat bar</td>
<td>45</td>
<td>14</td>
<td>25</td>
</tr>
<tr>
<td>Width (mm)</td>
<td>45</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>Thickness (mm)</td>
<td>14</td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>Tightening Torque (Nm)</td>
<td>19</td>
<td></td>
<td>25</td>
</tr>
</tbody>
</table>
5. INSTALLATION

5.1 Fixed circuit breaker with front or cable terminals

1. Drill the sheet steel and door to the template shown on the figure 3.
2. Install the circuit breaker with the screws, washers and nuts supplied with the breaker itself. On the door install the door flange with the supplied screws and nuts.

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8.6 Auxiliary switches for indication: service position, isolated position (Fig. 18 and 19)

1. Draw the circuit breaker out of stationary portion.
2. To the stationary portion (1) mounting the isolate plate (2) and secure the switches for indication "service position" (3) with washers (4) and screws (5) – fig. 18, or on the isolate plate (8) secure switches for indication "isolated position" (7) with washers (10) and screws (11) shown on the figure 19.
3. Check the electrical performance of switches with the circuit breaker connected and isolated. Should performance not be correct, bend properly levers (6) for indication "service position", that is lever (9) for indication "isolated position".
8.5 Undervoltage release (fig. 16)

1. Remove the circuit breaker cover.
2. Accommodate the undervoltage release on its seat at the left side of thermomagnetic release block.
3. Introduce cables (1) into duct (2) (for 3-poles version) that is channel (3) into case (for 4-poles version).
4. Break the diaphragm on the left side of the circuit breaker cover (for 3-poles version) and introduce the duct (2).
5. Refit the circuit breaker cover.

8.5.1 Check the undervoltage release performance (fig. 17)

It must be impossible to close the circuit breaker begin the release not energized. Begin the circuit breaker closed, if the release is deenergized, the circuit breaker must trip.

Should performance not be correct, bend suitably lever (4) (fig. 17).

5.2 Fixed circuit breaker with rear terminals (fig. 4)

1. Drill the sheet steel and door to the template shown on the figure 4.
2. Install the circuit breaker with the screws, washers and nuts supplied with the breaker itself. On the door install the door flange with the supplied screws and nuts.
5.3 Draw-out circuit breaker with front or rear terminals (fig. 5 and 6)

1. Drill the sheet steel (channel), lateral carrier sides and door, shown on the figure 5 (6).
2. Draw the circuit breaker out of the stationary portion (see 6.2.1).
3. Fasten the stationary portion with guides on the sheet steel or channel, lateral carrier sides with screws and washers supplied with the circuit breaker.
4. Put the circuit breaker on guides (see 6.2.2).

Draw-out circuit breaker with front terminals

8.4 Shunt trip release (fig. 14)

1. Remove the circuit breaker cover.
2. Accommodate the shunt trip release on its seat at the left side of thermomagnetic release block.
3. Introduce cables (1) into duct (2) (for 3-poles version) that is channel (3) into case (for 4-poles version).
4. Break the diaphragm on the left side of the circuit breaker cover (for 3-poles version) and introduce the duct (2).
5. Refit the circuit breaker cover.

8.4.1 Check the shunt trip release performance (fig. 15)

It must be possible to close the circuit breaker begin the shunt trip release not energized. When the shunt trip is energized, the circuit breaker must trip cutting the feeding circuit trough limit switch (4).
Should performance not be correct, bend suitably lever (5) (fig. 15).
8.2.2 Motor operator – dimension drawing and holes drilling plan (fig. 12)

Fig. 12

8.3 Sealing screws (fig. 13)

1. Replace the standard screws with the special ones (1)
2. Thread a wire (2) into the holes of screws as shown on the figure 13 and seal.
5.3.1 Door flange for draw-out circuit breaker (fig. 7)

1. Drill the door (1) to the template shown on the figure 5 (6).
2. On the door secure the flange (2) and gasket (3) with screws (4) and nuts (5) (fig. 7).

6. MANIPULATION

6.1 Lever operating mechanism

The lever operating mechanism may be in three positions:

1. upwards: circuit breaker closed; indication "I"
2. downwards; circuit breaker open; indication "O"
3. intermediate; circuit breaker tripped

6.2 Draw-out insertion operations on a draw-out circuit breaker

Before operations "draw out" and "draw in" the circuit breaker must be in open position.

8.2 Motor operating mechanism

8.2.1 Operations (fig. 11)

a) Remote closing operation

1) Circuit-breaker in open position
   Turn the handgrip to closing position (or press the closing push-button); the motor starts and closes the circuit breaker.

2) Circuit-breaker in tripped position
   Turn the handgrip to opening position (or press the opening push-button); the motor starts and reloads. If the circuit breaker is equipped with "triped" indication, the reloading is shown by the disappearance of the indication itself. Then operate as instructed under point 1

   Note: When tripping is due to thermal releases, wait some minutes before resetting.

b) Remote opening operation

1) Motor controlled operation
   Turn the handgrip to opening position (or press the closing push-button); the motor starts and opens the circuit breaker.

c) Closing operation at site

   This operation is performed manually only in case of emergency such as energy failure, fault etc., by turning the shaft (1) with wrench (2) attached to the motor operating mechanism. The closing operation is shown by the white indicator to letter "I"

d) Opening operation at site may be performed in two ways:

1) by rotating the shaft (1) in anticlockwise with wrench (2). Indicator to letter "O" shows the opening operation

2) by pressing the red push-button (4) marked "O". This operates the trip bar and the circuit breaker trips instantaneously. Yellow indicator (3) shows the opening operation.
8.1.2 Mounting the rotary handle mechanism on the door (fig. 9 and 10)

1. Install the circuit breaker in the panel or enclosure taking care that the clearance between the door and the circuit breaker is that indicated on figure 10.
2. Drill the door to template of figure 10.
3. Secure the transmission group (5) with gasket (6) to the door with screws (7), split washers (8a) and washers (8b).
4. Fit the door flange (11) with screws (9) and washers (10).
5. Secure the handle (12) to shaft (13) with screw (15) and washer (16) then fit the screw plug (17).

When the circuit breaker is closed, the plate (18) enters the piece (2) slot and prevents the door from being opened.

6.2.1 Isolation and draw-out operations (fig. 8)

1. Fit the proper lever (1) taking care that forks (2) engage the stationary portion pins (3) and that the lever pins (4) enter proper holes (5) in the moving portion.
2. Push upwards-locking levers (6).
3. Push downwards the lever (1) till the circuit breaker is isolated.
4. Take lever (1) off.
5. Push locking levers (6) downwards and draw the breaker to draw-out position.
6. Push locking levers (6) upwards and take the moving portion off.

6.2.2 Insertion operation (fig. 8)

1. Push locking levers (6) upwards.
2. Introduce the moving portion guides (7) into those of stationary portion and push the circuit breaker till the first locked position.
3. Fit the proper lever (1) taking care that forks (2) engage the stationary portion pins (3) and that the lever pins (4) enter proper holes (5) in the moving portion.
4. Push locking levers (6) downwards.
5. Push upwards the lever (1) till levers (6) plunge. The circuit breaker is then inserted.
7. OVERCURRENT THERMOMAGNETIC RELEASES

7.1 Time-current curves

- R250-R500:
  - a) thermal release; cold state
  - b) thermal release; hot state
  - c) magnetic release; maximum setting value
  - d) magnetic release; minimum setting value
  - e) circuit breaker's breaking time

Note: Multiply (5-10)xI₁ valid for R250 to R630. Multiply for R800 is (3,9-7,8)xI₁, for R1000 is (3,15-6,3)xI₁, and for R1250 is (3-6)xI₁.

7.2 Rated and setting currents for thermomagnetic releases

<table>
<thead>
<tr>
<th>Release</th>
<th>I₁ (A)</th>
<th>Range of thermal releases adjustment depending on ambient temperature</th>
<th>El. mag. trip I₂=10xI₁</th>
<th>Mag. release only I₂=5xI₁</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>10°C</td>
<td>20°C</td>
<td>30°C</td>
</tr>
<tr>
<td>R 250</td>
<td>250</td>
<td>200</td>
<td>240</td>
<td>290</td>
</tr>
<tr>
<td>R 320</td>
<td>320</td>
<td>250</td>
<td>300</td>
<td>370</td>
</tr>
<tr>
<td>R 400</td>
<td>400</td>
<td>340</td>
<td>450</td>
<td>520</td>
</tr>
<tr>
<td>R 500</td>
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<td>590</td>
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<td>R 630</td>
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<td>870</td>
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<td>R 800</td>
<td>800</td>
<td>740</td>
<td>910</td>
<td>1070</td>
</tr>
<tr>
<td>R 1000</td>
<td>1000</td>
<td>910</td>
<td>1180</td>
<td>1460</td>
</tr>
<tr>
<td>R 1250</td>
<td>1250</td>
<td>1180</td>
<td>1595</td>
<td>2035</td>
</tr>
</tbody>
</table>

1) I₁ rated current of circuit breaker for pertinent type of release and temperature of environment.
2) Values valid for a.c. For d.c. multiply values by 1.5.

8. FITTINGS

8.1 Rotary handle mechanism

8.1.1 Mounting the parts of rotary handle on circuit breaker (fig. 9)

1. Remove the circuit breaker cover and replace the standard handle with the shorter one (1).
2. Re-fit the circuit breaker cover and screw up the screws.
3. Secure the piece (2) as shown on the figure 9, on the circuit breaker cover with screws (3) and washers (4).

Note: Above operations is not necessary if is ordered the circuit breaker with rotary handle (all parts mounted).