Installation instructions for Series NRX INCOM communications adapter module

Instructions apply to:

![Series NRX, Type NF Frame](image1)
Series NRX, Type NF Frame
ANSI, UL1066, UL489/IEC IZMX16, IZM91

![Series NRX, Type RF Frame](image2)
Series NRX, Type RF Frame
IEC, IZMX40

⚠️ **WARNING**

1. ONLY QUALIFIED ELECTRICAL PERSONNEL SHOULD BE PERMITTED TO WORK ON THE EQUIPMENT.
2. ALWAYS DE-ENERGIZE PRIMARY AND SECONDARY CIRCUITS IF A CIRCUIT BREAKER CANNOT BE REMOVED TO A SAFE WORK LOCATION.
3. DRAWOUT CIRCUIT BREAKERS SHOULD BE LEVERED (RACKED) OUT TO THE DISCONNECT POSITION.
4. ALL CIRCUIT BREAKERS SHOULD BE SWITCHED TO THE OFF POSITION AND MECHANISM SPRINGS DISCHARGED. FAILURE TO FOLLOW THESE STEPS FOR ALL PROCEDURES DESCRIBED IN THIS INSTRUCTION LEAFLET COULD RESULT IN DEATH, BODILY INJURY, OR PROPERTY DAMAGE.

⚠️ **WARNING**

THE INSTRUCTIONS CONTAINED IN THIS IL AND ON PRODUCT LABELS HAVE TO BE FOLLOWED. OBSERVE THE FIVE SAFETY RULES:

- DISCONNECTING
- ENSURE THAT DEVICES CANNOT BE ACCIDENTALLY RESTARTED
- VERIFY ISOLATION FROM THE SUPPLY
- EARTHING AND SHORT-CIRCUITING
- COVERING OR PROVIDING BARRIERS TO ADJACENT LIVE PARTS

DISCONNECT THE EQUIPMENT FROM THE SUPPLY. USE ONLY AUTHORIZED SPARE PARTS IN THE REPAIR OF THE EQUIPMENT. THE SPECIFIED MAINTENANCE INTERVALS AS WELL AS THE INSTRUCTIONS FOR REPAIR AND EXCHANGE MUST BE STRICTLY ADHERED TO PREVENT INJURY TO PERSONNEL AND DAMAGE TO THE SWITCHBOARD.

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Section 1: General information

The Series NRX™ INCOM™ Communications Adapter Module (ICAM) (Figure 1) is an accessory that will operate as a communicating device in conjunction with a compatible Series NRX trip unit/breaker in a master communications network (Figure 2).

The INCOM network sends a burst of data as a 92–115.2 kHz carrier signal at a 9600 baud rate over twisted pair conductors to interconnect the many devices comprising the network. These bursts of data can be captured and used in a variety of ways depending upon the manner in which the master computer program is configured. For example, all the settings can be viewed via the master computer. Also, the data for the individual phase current values is available on the network. The software will select the appropriate data, decode it, and display it in a useful manner. Following an overcurrent trip operation, the cause of trip, the value, and the phase or ground current responsible for the trip are available on the network.
The INCOM communications adapter module is a slave device and as such requires a master device for control command initiation. Each INCOM communications adapter module provides:

- Circuit breaker Open/Close/Reset control
- Series NRX trip unit source/residual ground selection
- Flashing Status LED, indicating module has power
- INCOM communication Enable/Disable selection jumper for remote Open/Close control
- DIN rail mounting (11 mm H, 28 mm W DIN rail minimum requirement)
- Input power for module from 24 Vdc

The INCOM communications adapter module is designed to be installed, operated, and maintained by adequately trained people. These instructions do not cover all details or variations of the equipment for its storage, delivery, installation, checkout, safe operation, or maintenance.

If you have any questions or need additional information or instructions, please contact your local Eaton representative or visit www.eaton.com.

Section 2: Installation of INCOM communications adapter module

The following steps outline the installation procedure for an INCOM communications adapter module in a drawout circuit breaker configuration only. For fixed-mounted circuit breakers, a separate DIN rail mounting configuration is preferred. Consult the customer support center for additional information.

The following tools should be available:

- #T-15 Torx
- Small flat blade screwdriver

Notes: Many illustrations use the NF Frame circuit breaker for illustrative purposes only. The RF Frame circuit breaker is handled in a similar fashion.
For drawout circuit breakers, secondary terminal blocks as well as the INCOM communications adapter module are DIN rail mounted on the top front portion of the drawout cassette. The module is designed to install or replace the four terminal blocks (eight contacts in total) at secondary contacts 19 through 26 for both the NF and RF frames. Refer to the master connection diagram TD01301014E. For additional information relative to secondary terminal block installation and/or removal beyond that which is presented in this section, refer to IL01301037E.

Proceed with the following seven steps:

**Step 1:** Using a T-15 Torx, remove the four mounting screws holding the terminal block alignment bracket in place.

**Step 2:** Carefully slide the alignment bracket out from between any mounted terminal blocks, and put it aside with its mounting hardware for re-installment after the communications adapter module is connected to the DIN rail.

**Step 3:** Remove the terminal block in location 19/20 by inserting a small screwdriver in the recessed area in the top front of the terminal block as shown, and gently pry down to release and remove the block from the DIN rail.

**Step 4:** Repeat the same procedure performed in Step 3 to remove terminal blocks at locations 21/22, 23/24, and 25/26.

**Note:** The extra DIN rail mounting screw located in the space where the four terminal blocks were mounted may need to be removed to allow the unit's pogo pin ground connection to properly hit the metal DIN rail.
Step 5: Tilt the communications module forward to engage the upper part of the DIN rail, and then snap it back into the DIN rail for complete engagement.

Figure 7. Step 5

Step 6: Carefully slide the terminal block alignment bracket back into position. Before securing the bracket in place, inspect it from the bottom to ensure that the teeth on the bracket separate each individual terminal block. One installed terminal block should only be visible between two teeth when the alignment bracket is properly positioned. Secure the terminal block alignment bracket using the four screws previously removed. Hand tighten the four mounting screws.

Figure 8. Step 6

Step 7: A mounted communications module appears as shown and the installation procedure is complete. The module can now be wired with the information presented in Section 3.

Figure 9. Step 7

Section 3: Basic wiring rules

The following basic rules apply given a system consisting of a single daisy-chained main cable link between master and slave devices (Figure 2). For more complex considerations including star configurations, please refer to the INCOM wiring specification TD17513.

1. Recommended cable specifications:
   - Eaton cable catalog #IMPCABLE, Style #2A95705G01
   - Belden 9463 cable family
   - Identical Commscope or Quabbin cables

2. The maximum system capacity is 10,000 feet of communications cable and 1000 slave devices.

3. Non-terminated taps, up to 200 feet in length, off the main link are permitted, but add to the total cable length.

4. Make sure there is a twisted wire pair present that is intended for INCOM network use. Use shielded twisted pair wire to connect each slave device to the INCOM network, daisy-chain style. The polarity of the twisted pair is not important.

5. Ferrules for use in double connection point daisy-chain wiring are available. Weidmuller part 9004310000 (2–#18AWG).
Section 4: INCOM communications adapter module connections

**WARNING**

ALL APPLICABLE SAFETY CODES, SAFETY STANDARDS, AND SAFETY REGULATIONS MUST BE STRICTLY ADHERED TO WHEN INSTALLING, OPERATING, OR MAINTAINING THIS EQUIPMENT. FAILURE TO COMPLY COULD RESULT IN DEATH, BODILY INJURY, OR PROPERTY DAMAGE.

For installation specifics, refer to **Figure 11** and **Figure 12** on page 6 and page 7 respectively for wiring diagrams, as well as pin-out **Table 1** (power connections) and **Table 2** (INCOM connections) on this page.

**Table 1. Power Connector Pin-Outs**

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Input Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>24 Vdc +</td>
</tr>
<tr>
<td>2</td>
<td>24 Vdc -</td>
</tr>
<tr>
<td>3</td>
<td>Control signal common</td>
</tr>
<tr>
<td>4</td>
<td>Control open signal</td>
</tr>
<tr>
<td>5</td>
<td>Control close signal</td>
</tr>
</tbody>
</table>

Module power uses a 5-pin input connector. Power requirement is 24 Vdc, 10 watts.

**Table 2. INCOM Connector Pin-Outs**

<table>
<thead>
<tr>
<th>Pin Number</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>INCOM carrier network</td>
</tr>
<tr>
<td>2</td>
<td>INCOM carrier network</td>
</tr>
<tr>
<td>3</td>
<td>Shield</td>
</tr>
</tbody>
</table>

1. Connect shield wire to ground at master device end only. Interconnect shielding where devices are daisy-chained.

Section 5: Jumpers and indicator LEDs

Refer to **Figure 10** to become familiar with specific jumper and LED locations on the INCOM communications adapter module.

**MicroController LED (Status)**

This indicator will be flashing green whenever the module is powered up and when the microprocessor is executing instructions. When the Series NRX INCOM communications adapter module is connected to a Digitrip unit for the first time, this LED will alternately flash red and green to signal a learning process between both units. This automatic process will take approximately 15 seconds and occurs only once during the initial startup. The LED will also flash red if the module is not connected to, or unable to communicate with a Digitrip unit.

**INCOM control jumper**

This jumper provides the user with a means of enabling or disabling remote communication control commands to the Series NRX trip unit. With jumper placed in the ENABLE position, remote slave action commands, such as open and close, can be acted upon. With the jumper in the DISABLE position, commands will not be accepted.

**Source/residual ground selection jumper**

This jumper selects the protection configuration for Series NRX trip units with ground fault protection or ground fault alarm functionality. Consult Series NRX trip unit instructions (IL01301051E) for further information on ground sensing. This jumper is not applicable and does not function for non-ground fault style trip units.
The Series NRX communications module is a separate device that snaps into the DIN rail starting at location 19-26. (Removal of the four contact blocks is required.)

The trip unit auxiliary voltage is 24 Vdc ±10% and should be sourced from a reliable service, with 10 watt capability.

INCOM communication cable is a two conductor with shield type wire in "daisy chain" configuration. The recommended cable (Belden # 9643 or equivalent) has a twisted-pair of wires (#20 AWG stranded 7 x 28 conductors with PVC insulation) having an aluminum/mylar foil shield with drain wire. The polarity of the twisted-pair is not important. Ground the shield at the host computer (device).

Set the jumper on the module to enable or disable the remote open and close communication control commands, as desired.

When the communications module is employed and source ground or zero sequence ground sensing method is required, the ground fault function is enabled by this jumper.

Connectors are UL®/CSA® rated 300V, VDE rated 250V. Recommended: Weidmuller (BL 3.5/90/5BK) Orientation: 90° lead exit, but other lead orientations are possible. Wire gauge: #18 AWG/0.82 mm.

The final device in the daisy-chain configuration must have a 100 ohms termination resistor installed across terminals #1 and #2 on TB #2.

Figure 11. Series NRX INCOM Communication with Digitrip 520M
Section 6: Viewing/setting INCOM address

The Digitrip unit is used as the means to display and modify the programmed INCOM address setting of the ICAM module. All modules are shipped with a factory set default address of 4094. The allowable address range is 0001–4094. A trip unit containing a full display, such as the Digitrip 1150, will provide the ICAM settings in menu form. To set or view ICAM settings on a Digitrip 520M limited display, the following sequence is used.

To set or view the address, depress and hold the Reset/Battery Test button located on the front of the Digitrip unit for approximately 5 seconds until the address information is displayed. **This button must be held in continuously during the process.** The Digitrip unit display will then alternate between “SP00” (denoting the address display mode) and the programmed INCOM address value.

To select a new address, depress the trip unit Step button to increment the address value shown. Users may simultaneously depress and hold in the Step and Reset/Battery Test buttons for fast advance. The next setting will be displayed when the Reset/Battery Test button is released and then once again depressed.

Once the last setting (SP01) has been viewed and the Reset/Battery Test button has been released, the new INCOM address will be saved.

A block diagram of the setting sequence and programming options is shown in Figure 13. For the Digitrip INCOM communications adapter module, two communication settings are available and can be viewed as shown in Table 3.

![Figure 12](image_url)

**Figure 12. Spring release and shunt trip wiring as shown for optional communication close or open capability**

![Figure 13](image_url)

**Figure 13. Digitrip 520M Setting Sequence Programming Flow Chart**
Table 3. ICAM Communication Setting Ranges

<table>
<thead>
<tr>
<th>Setting Number</th>
<th>Allowable Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication address SP00</td>
<td>0001–4094</td>
</tr>
<tr>
<td>Baud rate SP01</td>
<td>01</td>
</tr>
</tbody>
</table>

1 For Series NRX INCOM communications adapter module, baud rate is fixed at 9600 baud and represented by a value of 01.

Section 7: Network communication protocols

The INCOM communication for the Series NRX INCOM communications adapter module is based on a master (PC, communicating trip unit, etc.)—slave (NRX INCOM communications adapter module) set of protocols.

For more comprehensive information on the NRX INCOM communications adapter module communication protocol, please see the following reference material:

IL 17384—Part A: INCOM Communications Standard

Section 8: Troubleshooting

The most common issues experienced with the installation of a Series NRX INCOM communications adapter module are addressed below. If you have additional questions or need further information and/or instructions, please contact your local Eaton representative or visit www.eaton.com.

Observation 1—Status LED not flashing

Action—Verify proper input power to module connectors.

Observation 2—Status LED flashing green, but module does not change state in response to master command requests

Action—Verify correct module address.

Action—Verify communication cable is connected correctly from master to module.
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