Safety information

Dangerous voltages can occur on the connectors, even though the auxiliary voltage has been disconnected. Non-observance can result in death, personal injury or substantial property damage.
Only a competent electrician is allowed to carry out the electrical installation. National and local electrical safety regulations must always be followed.
The frame of the IED has to be carefully earthed.

Whenever changes are made in the IED, measures should be taken to avoid inadvertent tripping.
The IED contains components which are sensitive to electrostatic discharge. Unnecessary touching of electronic components must therefore be avoided.
The frame of the IED must be carefully earthed.

Powering up the IED

Connecting power supply
Connection diagrams are delivered on the IED Connectivity package DVD as part of the product delivery. The latest versions of the connection diagrams can be downloaded from http://www.abb.com/relion > select your IED > then connection diagrams from the download section on the right side of the webpage.

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Type</th>
<th>Connect IED's auxiliary voltage to terminals to</th>
</tr>
</thead>
<tbody>
<tr>
<td>110-250</td>
<td>VDC</td>
<td>X420-1 and X420-3, with the positive lead to terminal X420-3</td>
</tr>
<tr>
<td>100-240</td>
<td>VAC</td>
<td>X420-1 and X420-3, with the positive lead to terminal X420-3</td>
</tr>
<tr>
<td>48-125</td>
<td>VDC</td>
<td>X420-1 and X420-2, with the positive lead to terminal X420-2</td>
</tr>
<tr>
<td>24-30</td>
<td>VDC</td>
<td>X420-2 and X420-3, with the positive lead to terminal X420-2</td>
</tr>
</tbody>
</table>

Connect the power supply to connector X420. The connectors X420 and X319 are the same size; make sure that you do not accidentally connect the power supply to connector X319.

Verifying voltage requirements
Check the rated auxiliary voltage values on a label on the right side of the IED.
Energizing the IED

1. Check all connections to external devices to ensure proper installation.
2. Energize the IED.
   - Within 90 seconds of energizing the IED, the main menu should appear on the LCD and the green Ready LED is lit with a steady light. If the green Ready LED continues to flash after pickup, the IED has detected an internal error.
3. Use the local HMI to verify that the IED is functioning properly. You can see the device status in the following menus:
   - Main menu/Diagnostics/Internal events, or Main menu/Diagnostics/IED status/General

LHMI overview
<table>
<thead>
<tr>
<th></th>
<th>Function buttons</th>
<th>Executing the defined function: OFF, menu shortcut or binary control</th>
</tr>
</thead>
</table>
| 2 | Relay protection indicator LEDs | Normal-LED (green):  
- Off: Auxiliary supply voltage is disconnected  
- On: Normal operation  
- Flashing: Internal fault has occurred  
Pickup-LED (yellow):  
- Off: normal operation  
- On: a protection function has picked up and an indication message is displayed  
  - If several protection functions Pickup within a short time, the last Pickup is indicated on the display  
  - Flashing: a flashing yellow LED has a higher priority than a steady yellow LED. The IED is in test mode and protection functions are blocked  
  - The indication disappears when the IED is no longer in test mode and blocking is removed  
Trip-LED (red):  
- Off: normal operation  
- On: a protection function tripped and an indication message is displayed. The trip indication is latching and must be reset via communication or by pressing (11) |
| 3 | Display | Default view can be selected from e.g. single line diagram (SLD), measurement, events.  
- The menu path is shown at the top of the display  
- The scroll bar is located on the right-hand side of the display (use the up/down arrows to scroll through the display)  
- The status bar is shown at the bottom the display |
| 4 | Alarm status LEDs | Can be programmed for alarming and indication with latching and/or flashing features in 3 colors  
- Off: Normal operation. All activation signals are off  
- On:  
  - Follow-S sequence: The activation signal is on  
  - LatchedColl-S sequence: The activation signal is on, or it is off but the indication has not been acknowledged  
  - LatchedAck-F-S sequence: The indication has been acknowledged, but the activation signal is still on  
  - LatchedAck-S-F sequence: The activation signal is on, or it is off but the indication has not been acknowledged  
  - LatchedReset-S sequence: The activation signal is on, or it is off but the indication has not been acknowledged  
- Flashing:  
  - Follow-F sequence: The activation signal is on  
  - LatchedAck-F-S sequence: The activation signal is on, or it is off but the indication has not been acknowledged  
  - LatchedAck-S-F sequence: The indication has been acknowledged, but the activation signal is still on |
| 5 | Object control buttons | Close: closing the object. The LED indicates the current object state  
Open: opening the object. The LED indicates the current object state |
| 6 | Escape / Cancel | Used for cancelling actions and leaving setting mode without saving the values. Returns back to menu |
| 7 | Navigation buttons | Left = go back, Right = go further, Up = scroll up, Down = scroll down. Up/down can also be used when selecting controllable objects like breakers and switches in single line diagram. |
| 8 | Enter | Entering to parameter setting mode and confirming new values or selection in dialogs |
| 9 | Authorization | If authorization is used you can log in or log out using this button |
| 10 | Multipage | Opening alarm panel and selecting alarm page from the view |
| 11 | Clear | Activating the Clear/Reset view |
| 12 | Menu | Switch views in between the main menu and default view |
| 13 | Help | View help menu |
| 14 | R/L | Changing the control position (remote or local) of the device  
- R LED is lit: remote control is enabled and local control disabled  
- L LED is list: local control is enabled and remote control disabled  
- Both off: both control positions are disabled |
| 15 | Front communication port | RJ-45 connector (10/100 BASE-TX) |
| 16 | Uplink LED | A green LED is lit when a RJ-45 cable is successfully connected to the port |
| 17 | Not in use | |
Menu structure

<table>
<thead>
<tr>
<th>Main menu</th>
<th>Submenu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>Single line diagram</td>
</tr>
<tr>
<td></td>
<td>Commands</td>
</tr>
<tr>
<td>Events</td>
<td>Record dependent</td>
</tr>
<tr>
<td>Measurements</td>
<td>Analog primary values</td>
</tr>
<tr>
<td></td>
<td>Analog secondary values</td>
</tr>
<tr>
<td></td>
<td>Monitoring</td>
</tr>
<tr>
<td></td>
<td>Metering</td>
</tr>
<tr>
<td>Disturbance records</td>
<td>Record dependent</td>
</tr>
<tr>
<td>Settings</td>
<td>Active setting group</td>
</tr>
<tr>
<td></td>
<td>IED Settings</td>
</tr>
<tr>
<td>Configuration</td>
<td>Time</td>
</tr>
<tr>
<td></td>
<td>Power system</td>
</tr>
<tr>
<td></td>
<td>Communication</td>
</tr>
<tr>
<td></td>
<td>Analog modules</td>
</tr>
<tr>
<td></td>
<td>I/O modules</td>
</tr>
<tr>
<td></td>
<td>HMI</td>
</tr>
<tr>
<td></td>
<td>Reconfigure HW modules</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>Internal events</td>
</tr>
<tr>
<td></td>
<td>IED status</td>
</tr>
<tr>
<td>Tests</td>
<td>IED test mode</td>
</tr>
<tr>
<td></td>
<td>Function test modes</td>
</tr>
<tr>
<td></td>
<td>Function status</td>
</tr>
<tr>
<td></td>
<td>Binary input values</td>
</tr>
<tr>
<td></td>
<td>Binary output values</td>
</tr>
<tr>
<td></td>
<td>LED test</td>
</tr>
<tr>
<td>Clear</td>
<td>Forcing</td>
</tr>
<tr>
<td>Clear</td>
<td>Clear CB cond. indicators</td>
</tr>
<tr>
<td>Clear</td>
<td>Clear counters</td>
</tr>
<tr>
<td>Clear</td>
<td>Clear disturbances</td>
</tr>
<tr>
<td>Clear</td>
<td>Clear energy meas</td>
</tr>
<tr>
<td>Clear</td>
<td>Clear LEDs</td>
</tr>
<tr>
<td>Clear</td>
<td>Clear lockouts</td>
</tr>
<tr>
<td>Clear</td>
<td>Clear internal event list</td>
</tr>
<tr>
<td>Clear</td>
<td>Clear process event list</td>
</tr>
<tr>
<td>Clear</td>
<td>Clear thermal value</td>
</tr>
<tr>
<td>Clear</td>
<td>SelfSupervision</td>
</tr>
<tr>
<td>Languages</td>
<td>LocalHMI Language</td>
</tr>
</tbody>
</table>

Display panels

Configuring the function buttons and alarms, and creating single-line diagrams are each done with PCM600.

Function buttons
Press any function button to view the function button panel.
- To activate a menu shortcut, press a function button
To activate a control signal, press and hold down the button for 0.5 seconds

Alarm LEDs
Active alarms are indicated by the alarm LEDs and the LED in the Multipage button.
1. Press \( \text{Page} \) to open the alarm view. Press \( \text{Page} \) again to switch between the three alarm pages.
2. Press \( \text{Page} \) or \( \text{Page} \) to browse alarms and \( \text{Page} \) to view more detailed information.

Single-line diagram
1. Select Main menu > Control > Single line diagram.
2. Select a page with \( \text{Page} \) or \( \text{Page} \) and an object with \( \text{Page} \) or \( \text{Page} \).
Switch objects can have additional icons that present the switch object states: \( \text{Page} \) (substituted) and \( \text{Page} \) (interlocked).
3. Press \( \text{Page} \) to select open or \( \text{Page} \) to select close the object, and then confirm the operation in the dialog box.
Using the local HMI

Accessing main menu and changing settings
1. Press \( \text{Quick Start Guide} \) to navigate between the main menu and default view.
2. Select **Main menu/Settings** and select a setting.
3. Press \( \) or \( \) to change the value of an active digit or character.
   - Numerical values have pre-defined steps by which the values change and smaller changes cannot be made.
4. Press \( \) or \( \) to move the cursor to another digit or character. If you are editing a string value:
   - To insert characters or space, press simultaneously \( \) and \( \).
   - To delete characters, press simultaneously \( \) and \( \).

Storing settings
After making changes to parameters they have to be stored to get them into use. Some parameter changes require IED restart to put them in effect.
1. Press \( \) to confirm any changes.
2. Press \( \) to move upwards in the menu tree or to enter the main menu.
3. To save the changes in non-volatile memory, select Yes and press \( \).

Changing the display contrast
To change the contrast, press simultaneously \( \) and \( \) or \( \). To permanently change the display contrast set the parameter **ContrastLevel** via **Main menu/Configuration/HMI/Screen/SCREEN:1**.

Checking the serial number and other IED information
1. Select **Main menu/Diagnostics/IED Status/Product identifiers**.
2. Select a submenu with \( \) or \( \), and press \( \) to enter the submenu.
3. Browse the information with \( \) or \( \).

Changing the language
1. Select **Main menu/Languages/LANGUAGE:1** and press \( \).
2. Change the language using \( \) or \( \).
3. Press \( \) to confirm the selection.
4. Commit the changes.

Changing the time
1. Select **Main menu/Configuration/Time/System time/ SYSTEMTIME:1**.
2. Press \( \) to confirm the change.

Changing the default view
1. Select **Main menu/Configuration/HMI/Screen/SCREEN:1** and press \( \).
2. Change the default view with \( \) or \( \).
3. Press \( \) to confirm the selection.

Checking I/O status
1. Select **Main menu/Tests/I/O modules**.
2. Navigate to the board with the actual I/O to be checked.

Viewing measured and calculated values
1. Select **Main menu/Measurements**.
2. Scroll the list of the IED’s basic measurements with \( \) and \( \).

Viewing disturbance records
1. Select **Main menu/Disturbance records**.
2. Browse the records with \( \) and \( \), and confirm selection with \( \).
3. Browse the detail categories with \( \) and \( \), and confirm selection with \( \) to view items under it.

Viewing events
1. Select **Main menu/Events**.
2. Press \( \) to open the event list. Events are shown grouped by date. Time, channel, signal name and value of the event are shown.
3. Press \( \) or \( \) to scroll the view.

Clearing events and indications
1. Press \( \) to activate the clear view.
2. Select the item to be cleared with \( \) or \( \).
3. Press \( \), select OK to confirm the selection and press \( \) to confirm the selection.

Reading internal fault information
To view the message associated with a fault, select **Main menu/Diagnostics/Internal events**.
To check the current status of internal fault signals, select **Main menu/Diagnostics/IED status**.

Restoring factory settings
**Warning!** All parameter settings are overwritten with the default values.

Note: If disabled, the Maintenance Menu must be re-enabled with the AUTHMAN function before restoring factory settings.
1. Switch off the power supply to the IED and leave it off for one minute.
2. Switch on the power supply to the IED and press and hold down \( \) and \( \) until the Maintenance Menu appears on the LHMI (this takes around 20–60s).
3. Navigate down and select Recovery Menu and press \( \).
   Enter PIN code 8282 and press \( \).
4. Select Revert to IED defaults and press \( \).
5. Select OK and press \( \).
6. Press \( \) to continue.

The IED restores the factory settings and restarts. Restoring can take several minutes.
Examples of local HMI

Main menu

Control with single line diagram for operating breakers

Configuration for communication options

Diagnostics and retrieving the version data
Setting for selecting active setting group

Setting of setting group 1 distance zone 1

Setting of other protection functions

Tests with different options