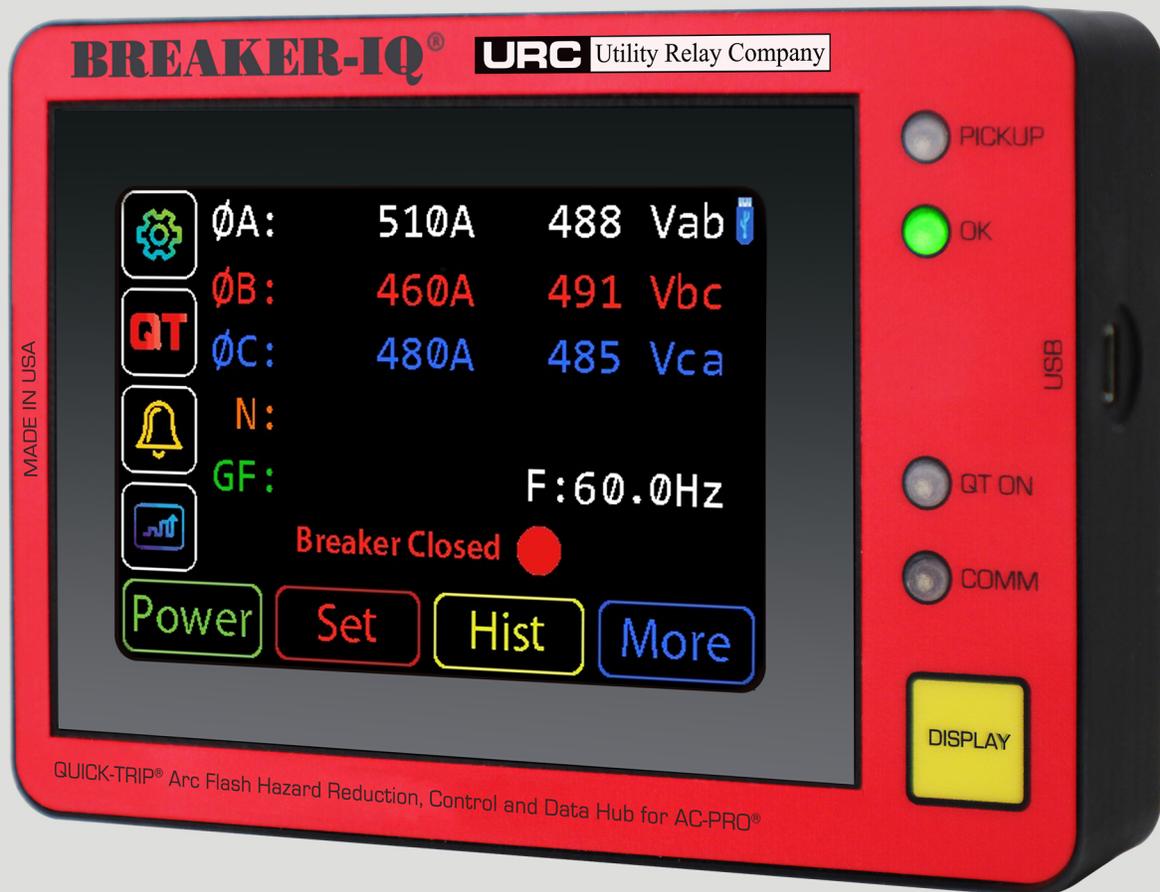


# INSTRUCTION MANUAL

Manual v1.00

# BREAKER-IQ<sup>®</sup>



## QUICK-TRIP<sup>®</sup> Arc Flash Hazard Reduction Control and Data Hub for AC-PRO<sup>®</sup>

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## 1.0 Introduction and Product Overview

The Breaker-IQ is a door or panel mounted display product exclusively designed for use with AC-PRO-II® trip units. It allows easy access to low voltage circuit breaker information and control without exposing the user to the electrical hazards present when opening/accessing the breaker compartment doors/covers. In addition, Breaker-IQ® offers additional functions, features, and controls which increase safety, productivity, and provide valuable data.

Breaker-IQ features:

- Color touchscreen
- Indication LEDs
- Displays all trip unit information
  - Metering: Current, Voltage\*, Power\*, Energy\*
  - View Settings (read-only)
  - Trip data, Alarms, etc.
- Quick-Trip® Arc Flash Hazard Reduction
- Breaker control
  - Delayed Trip and Delayed Close\*\*
- Display of AC-PRO-II Waveform capture
- Wireless communications
- Historical data storage and display
- USB communications
- Breaker position indication
- Security Code (last 4 digits of Breaker-IQ serial number) for actions and configuration
- Field-upgradable firmware (more features coming)

\*AC-PRO-II with VDM® required for Voltage, Power & Energy

\*\*Close coil, close relay, and power required.

## 2.0 Front View



Figure 1: Front View with main screen

## 2.1 Touchscreen Display

The 3.5" color touchscreen display is normally locked from touch actions and in screen saver mode. When the yellow "Display" button is pressed, this exits the screen saver, unlocks the touchscreen and the display brightens to the user-set brightness level (set in Display Settings).

### 2.1.1 Screen Saver

In order to preserve the display screen, after there is no user activity for the User session timeout period (set in Display Settings, default 120 seconds), the display dims and returns to screen saver mode. The screen saver will either display the main screen (currents & voltage), or it will display the Alarm or Quick-Trip screen saver if applicable.

The screen saver simply hides the side and bottom buttons and shifts the display around the screen. See below.



Figure 2: Screen saver (main screen)

## 2.2 LEDs

These three (3) LEDs operate exclusively based on each status from the connected trip unit:

- **Pickup (Red):** On if trip unit protective function is in pickup mode and timing toward a trip
- **OK (Green):** flashes when connected to a trip unit that has an "OK" Self Test status.
- **Quick-Trip LED (Red or Blue):** On if the connected trip unit is in Quick-Trip (ERMS) mode. The user can set the color of this LED to be Red or Blue.

The **Wireless LED (Blue)** operates based on Breaker-IQ internal wireless radio. See Wireless communications section in this manual.

The Breaker-IQ must be powered for the LEDs to operate correctly. However, the Quick-Trip LED will operate as long as the AC-PRO-II is powered.

### 2.3 “Display” button

The yellow “Display” button is used for the following:

- Start a user session: exits screen saver, enables touchscreen functionality and brightens the display to the set brightness level.
- Exits from the present screen and returns to the AC-PRO-II Main screen.
- Functions as the “Review” button when connected to AC-PRO.
- If Breaker-IQ is not powered, pressing the Display button will cause AC-PRO-II to turn on its battery, allowing verification of the Quick-Trip mode (Breaker-IQ QT LED will illuminate from AC-PRO-II battery power).

### 2.4 Side Mini-USB Port

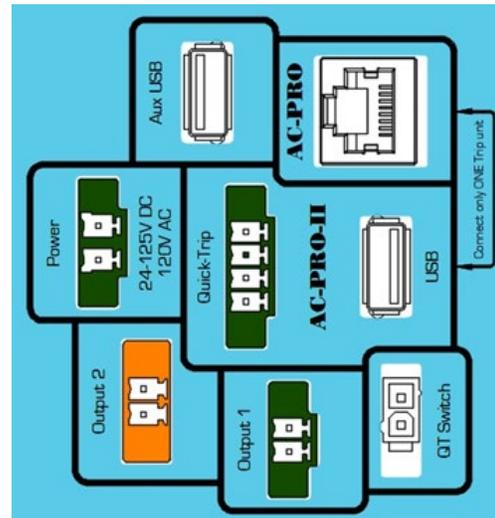
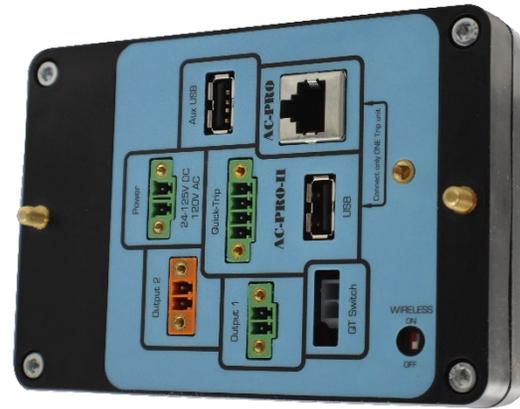
The side mini-USB port can be used for the following:

- “Pass-through” connection to AC-PRO-II (using Windows PC with InfoPro-AC software)
- Connection to Breaker-IQ only, for firmware upgrade.
- Temporary USB power connection



**Figure 3: Side mini-USB port**

### 3.0 Rear View



**Figure 4: Rear View**

#### 3.1 Power Connection

The power connection is required. The Breaker-IQ accepts a 120VAC input or a 24-125VDC power input. The Breaker-IQ ships with the power input terminal block plug in the connector. The customer/installer is responsible for providing the power connection. The connector accepts #14-#30 AWG wires. When the Breaker-IQ is powered, it can output power to AC-PRO-II via its AC-PRO-II USB port.

#### 3.2 AC-PRO-II® Connections

Two (2) connectors (USB and a 4-conductor (4/C) Quick-Trip connector) are dedicated and utilized for a connection to AC-PRO-II. These connections shall only be made to AC-PRO-II and with a cable supplied by URC. The Breaker-IQ includes a cable retention clip that physically secures the USB cable connection. The USB cable is for communications and trip unit power. The 4/C cable is for Quick-Trip. Only cables supplied by URC shall be used.

### 3.2.1 AC-PRO-II® to Breaker-IQ cable

The standard 60-inch cable assembly consists of a USB cable with compact right angle connectors on each end, and a 4-conductor Quick-Trip cable with a right-angle connector on the Breaker-IQ end. The cables are bundled with split-mesh sleeving and tied to such that the cables and connectors can cleanly be plugged in on each end.



Figure 5: AC-PRO-II to Breaker-IQ cable

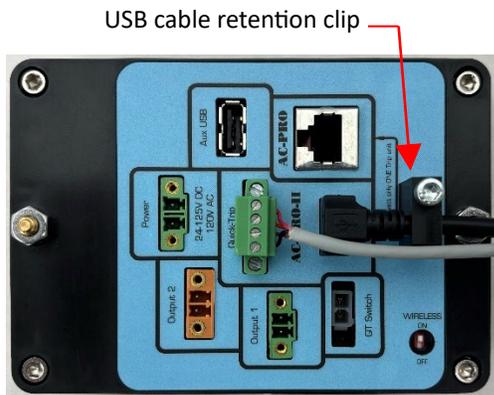


Figure 6: USB + 4/C connections at Breaker-IQ

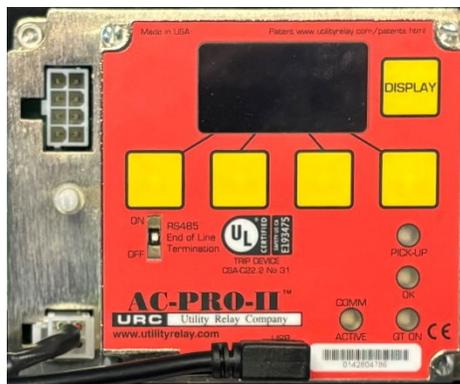


Figure 7: USB + 4/C connection at AC-PRO-II

### 3.3 Threaded Mounting Posts

The Breaker-IQ includes threaded mounting posts molded into the case for panel mounting. In addition, the mating lock washers and nuts are included. See the Installation section of this manual for more information.

### 3.4 Quick-Trip® Switch Connection

The QT-switch input connected is exclusively for a connection to an optional QT-Switch supplied by URC. The optional QT-switch includes 22mm padlockable switch, with a 12-inch 2-conductor cable and connector that mates to the Breaker-IQ “QT-switch” connection.



Figure 8: QT-Switch

Note: The QT-Switch protrudes into the cubicle or panel that it is mounted on. Refer to Section 4 for installation information. URC also offers a surface-mount QT-Switch in a 1-gang enclosure. Contact URC for additional information.

#### 3.4.1 Alternate (QT2-switch) Connection

If a QT2-switch was already installed, it can still be utilized. If this is the case, the only connection between the AC-PRO-II and Breaker-IQ is the USB cable. In this arrangement, the 4/C cable for Quick-Trip connects directly between the AC-PRO-II and the QT2-switch.



Figure 9: QT2-Switch

### 3.5 Output Connections

The Output 1 (green) and Output 2 (orange) connections are for optional programmable output features, such as Remote Quick-Trip Indication, sending a Close Breaker command, or sending an Alarm signal. The Breaker-IQ ships with screw terminal block plugs in both of the output connectors. The customer/installer is responsible for field wiring to these outputs. The outputs are rated for 24-125VAC/DC, 0.2A. If the “load” (e.g. close coil) exceeds these ratings, an additional relay must be used. (an additional relay is required for Close Breaker applications). URC can supply or recommend these additional relays.

### 3.6 Aux USB Port

The Aux USB port is available for use with future features, such as data storage (AC-PRO-II trending data for current, voltage, and power) and for future accessory devices. In addition, the Aux USB port may be used for temporary power from a USB battery pack.

### 3.7 AC-PRO® Connection

Though Breaker-IQ was designed for AC-PRO-II, it can be connected to AC-PRO (limited functionality). The Breaker-IQ includes one RJ45 connection exclusively for AC-PRO.

#### 3.7.1 AC-PRO to Breaker-IQ cable

The 8-conductor cable with RJ-45 connectors can be purchased separately from URC.



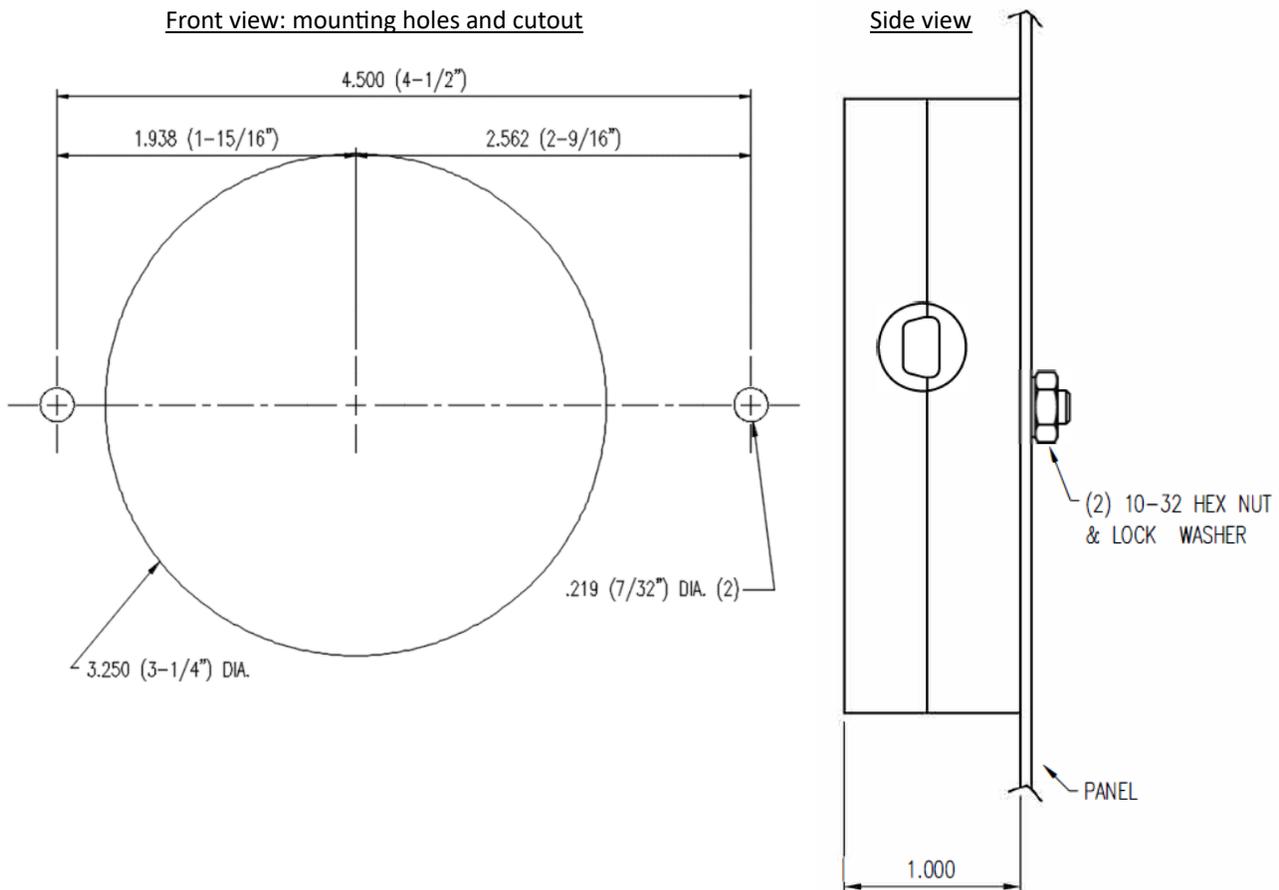
**Figure 10: AC-PRO to Breaker-IQ cable**

## 4.0 Installation

### 4.1 Installation instructions and Items Included

Included in the standard kit: Breaker-IQ unit, mounting hex nuts & washers, 5-foot cable for AC-PRO-II, and this Instruction Manual. Terminal block plugs for power, output #1, output #2, the USB cable clip and connector covers are already plugged into the unit connectors when it ships.

1. Review the dimensions below and the dimensions in the Specifications section of this manual.
2. Find a suitable location on the cubicle door and mark the location of the three (3) holes using the dimensions below. Ensure that the Breaker-IQ connectors, cable clip, cables etc. will not interfere with the breaker, racking, or other devices. Example: check for interference when the breaker is in the disconnect position in the cubicle with the door closed. Refer to Section 4.4 for additional information about the Breaker-IQ location and distance from the breaker.
3. Drill two (2) 7/32" mounting holes.
4. Drill or punch the 3.25" round connector cutout with a 3.25" hole saw or an 82mm (3.23") punch.
5. Attach the Breaker-IQ to the front of the cubicle door using the two (2) supplied 10-32 hex nuts and #10 lock washers. (Threaded mounting studs/posts are molded into the Breaker-IQ).
6. Before final mounting, set the rear wireless ON/OFF switch to the required position. (Only place the switch in the OFF position if wireless communication is prohibited and circuitry will be disabled).
7. Route the cables so they do not interfere with the opening or closing of the cubicle door or with the racking of the breaker between connect and disconnect positions. Use the included cable ties and holders to hold the cable in position.
8. Make the electrical connections as shown in Section 4.2 and per the requirements of Section 4.3.
9. When connecting the AC-PRO-II cable, use the USB cable clip for the USB cable only. See photo in Figure 6.



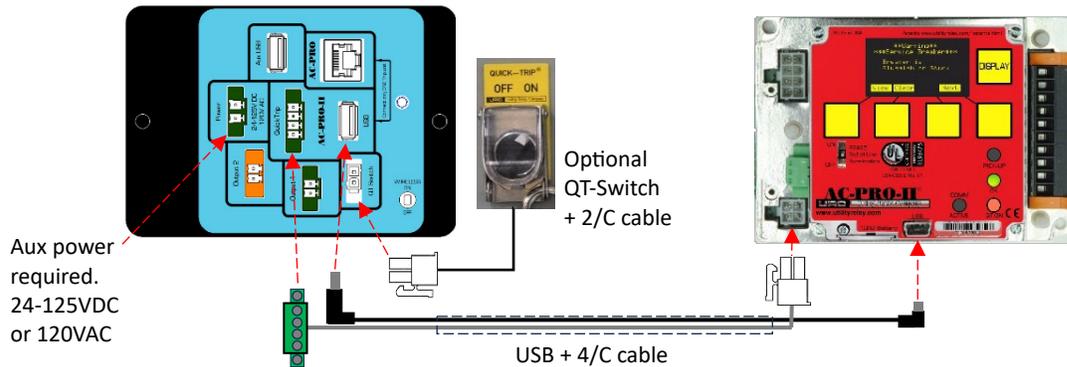
**Figure 11: Mounting & Cutout drawing**

### 4.2 Electrical Connections and Diagrams

An AC or DC power connection to Breaker-IQ is required, see Section 4.3.

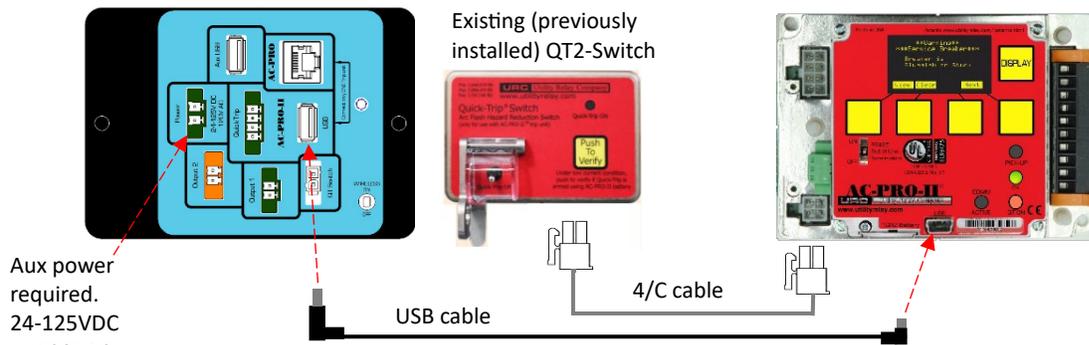
The cable for connecting Breaker-IQ to AC-PRO-II consists of two (2) sets of connections: a USB connection is used for communication and for providing power from the Breaker-IQ to the AC-PRO-II; and a 4-conductor (4/C) cable for Quick-Trip® circuit wiring.

Note: the optional QT-Switch is available if a physical lockable switch is required. Otherwise, Quick-Trip feature (mode) can be changed using the touchscreen.

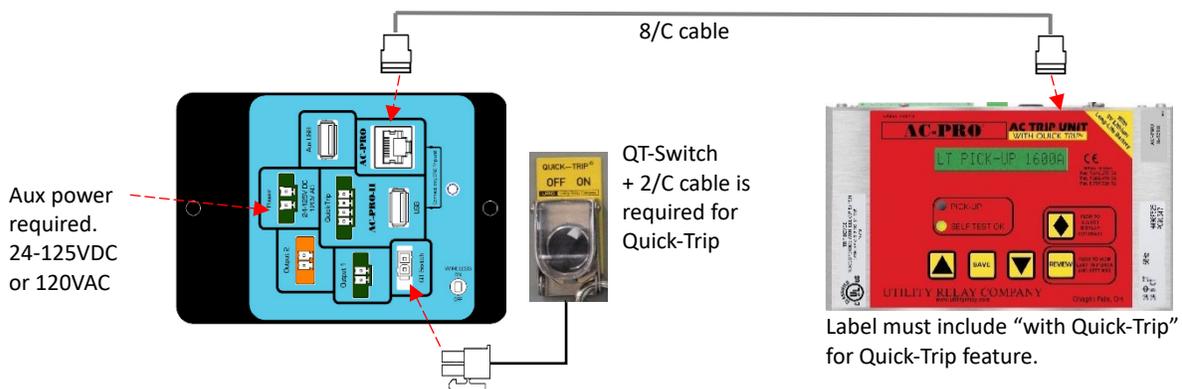


**Figure 12: AC-PRO-II standard connections**

Alternately, if a QT2-switch is already installed, it can still be used. See below.

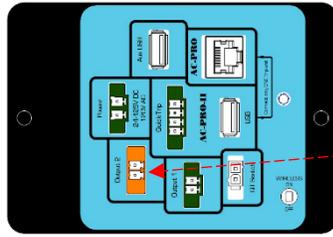


**Figure 13: AC-PRO-II Alt. connection - QT2-switch**



**Figure 14: AC-PRO connections**

Breaker-IQ power and trip unit connections are required but not shown in this example.



Output 2 must be programmed for "Close breaker" function

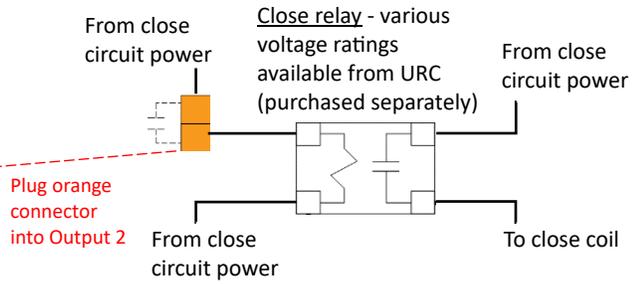


Figure 15: Close breaker wiring basic diagram

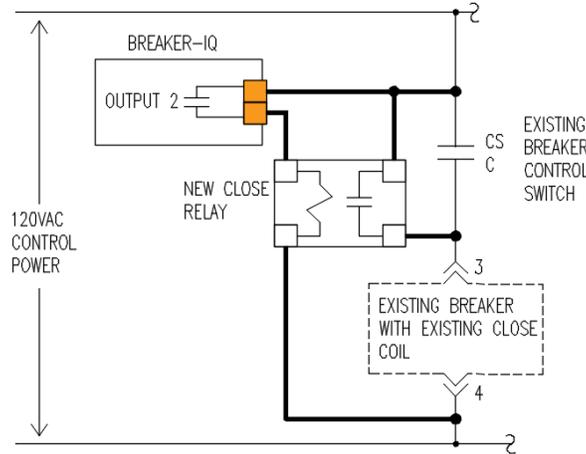


Figure 16: Close breaker wiring diagram example (DS breaker)

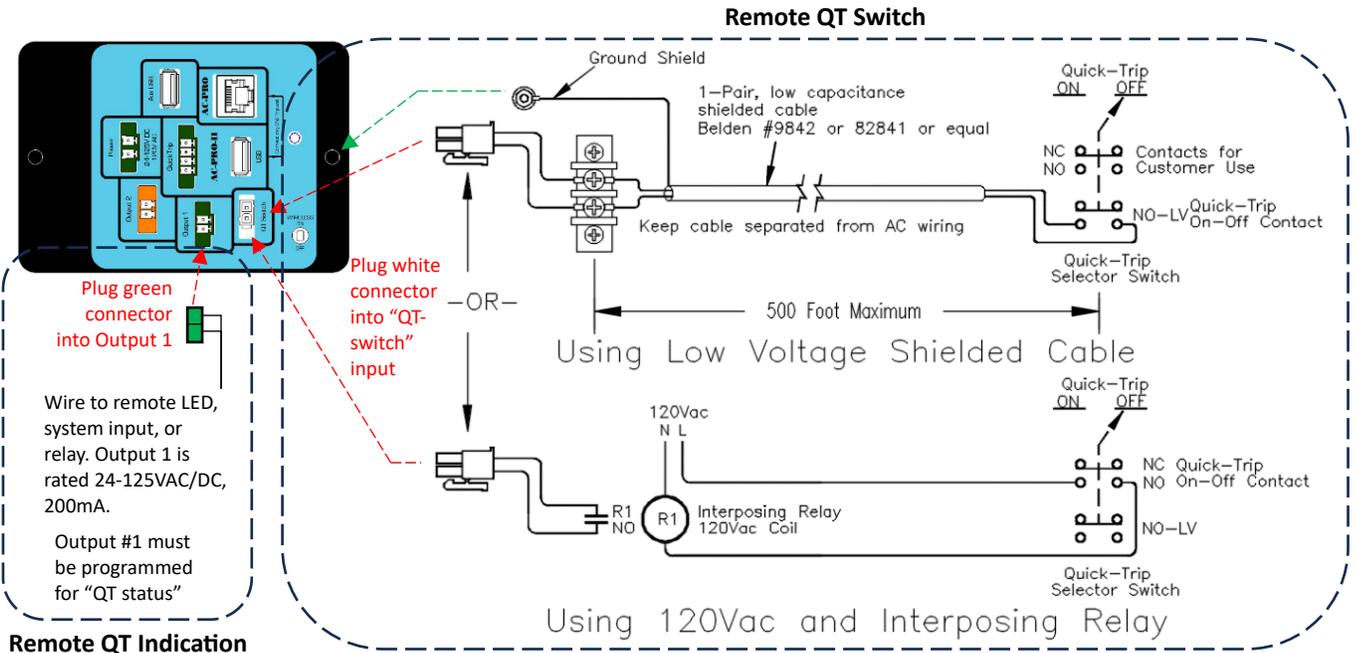


Figure 17: Remote QT switch and indication example diagram

### 4.3 Power Source

The Breaker-IQ must be supplied with a permanent power source. The source can be 120VAC or 24-125VDC.

If supplying an external power source is not possible it may be possible to install a 480:120V transformer on the breaker to supply power to the Breaker-IQ. URC can supply these control power transformer (CPT) kits. Contact URC for more information.

The Breaker-IQ can be connected to temporary USB power via the rear Aux USB port or to the side mini-USB port. If power only (without any URC USB communication) is supplied to either of these USB ports, then the Breaker-IQ will automatically disconnect power after a period of inactivity.

### 4.4 Location and Distance from Breaker

The Breaker-IQ is intended to be installed on the switchgear door, immediately adjacent to the circuit breaker trip unit. The standard cable length is 60 inches (5 feet). Additional lengths up to 15 feet are available to order.

The maximum cable length in between the Breaker-IQ and the circuit breaker trip unit is 100 feet. For lengths over 15 feet, an optional cable extension kit must be utilized. These kits can be purchased from URC. Contact URC for additional information.

### 4.5 QT-Switch Installation (optional)

1. Determine a suitable location for the QT-Switch. Note that the standard QT-Switch contact block extends approximately 1-3/4" behind the cubicle door/panel. Ensure that the location selected does not interfere with any other equipment, for example a drawout breaker that is in the disconnect position. If a suitable location cannot be determined, URC offers a surface-mount QT-Switch in a 1-gang metallic enclosure.
2. Use a 22mm switch knock-out punch to make a hole in the cubicle door for the selector switch. The selector switch should be located near the Breaker-IQ.
3. Attach the QT-Switch, padlock attachment and contact blocks to the cubicle door.
4. Plug the cable from the QT-Switch into the back of the Breaker-IQ.

### 5.0 Screen Navigation

The Breaker-IQ user interface allows navigation of trip units using same familiar user interface of the trip unit it is connected to. In addition, the Breaker-IQ offers additional screens for its own features and configuration.

The Breaker-IQ touchscreen is normally locked. To unlock the touchscreen, press the yellow "Display" pushbutton on the bottom left of the front panel. Touch control will be active until the user session (idle) timeout period expires. See the Display Settings section of this manual for additional information about the "user session".

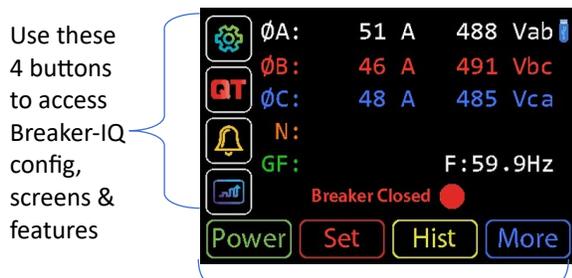
To execute actions or make configuration changes, successful entry of the Security Code is required. The code is the last four (4) digits of the Breaker-IQ serial number. See Section 6.1 for additional information.

### 5.1 Screen Navigation with AC-PRO-II®

When connected to AC-PRO-II, the Breaker-IQ emulates the AC-PRO-II user interface and experience. The following figure shows the main screen, in which the four buttons on the bottom “Power”, “Set” (Settings (READ-ONLY)), “Hist” (Trip History), and “More” are the same main four buttons available in the AC-PRO-II trip unit user interface. See the AC-PRO-II Screens Map in this section. To view the latest screens and screen details, see the AC-PRO-II Instruction Manual.

[http://www.utilityrelay.com/Side\\_Bar/Instruction\\_Manuals.html](http://www.utilityrelay.com/Side_Bar/Instruction_Manuals.html)

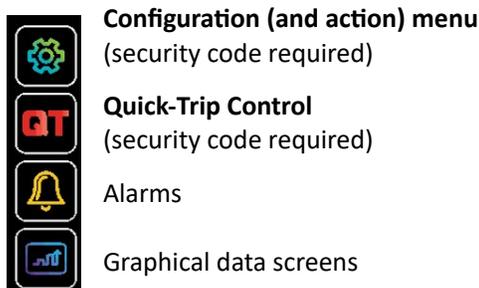
Also in the figure below, the four buttons on the left side allow navigation of Breaker-IQ screens and features.



Use these 4 buttons to access Breaker-IQ config, screens & features

Use these buttons to navigate “AC-PRO-II screens” (same user experience as AC-PRO-II)

**Figure 18: Main screen (AC-PRO-II connected)**

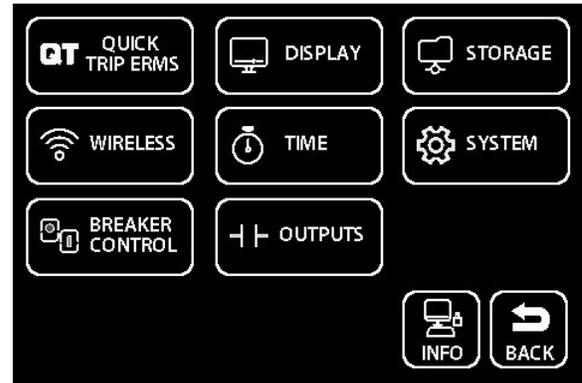


**Figure 19: Main screen buttons (AC-PRO-II connected)**

#### 5.1.1 Breaker Position

The main screen also displays the breaker (**Open** or **Closed**) position if it can be determined. If the connected trip unit’s limit switch setting is set to “52a” or “52b”, with AC-Pro-II firmware version 1.7 (Oct 2015) or newer, and a limit switch is installed on the breaker, then the Breaker-IQ can display the breaker position. Or, if current is flowing the Breaker-IQ considers the breaker closed.

When connected to AC-PRO-II®, tapping the  (Configuration menu) button leads to the Security Code screen (if not already entered during the present user session) and then the following menu, which provides access to Breaker-IQ configuration and features:



**Figure 20: Configuration menu (AC-PRO-II connected)**

### 5.1.2 Metered values

Breaker-IQ displays the following AC-PRO-II values:

- RMS Currents: Ia, Ib, Ic, In, Ig
- RMS Voltages\*:
  - Vab, Vbc, Vca (AC-PRO-II v2 FW and newer)
  - Vbn, Vbn, Vcn (AC-PRO-II v1 FW)
- Power\*:
  - Real Power (KW)
  - Apparent Power (KVA)
  - Power Factor (PF)
  - Real Power Demand (KWD):  
(AC-PRO-II v4 FW and newer)
    - last period and peak period  
(period can be adjusted using Breaker-IQ)
  - Apparent Power Demand (KVAD):  
(AC-PRO-II v4 FW and newer)
    - last period and peak period  
(period can be adjusted using Breaker-IQ)
- Energy\*:
  - Total Real Energy usage (KWHr)
  - Total Apparent Energy usage (KVAHr)
  - Values can be reset using Breaker-IQ

\*AC-PRO-II with VDM required for Voltage, Power, Energy features

### 5.1.3 Data Refresh Rates

The Breaker-IQ automatically retrieves data from AC-PRO-II at the following approximate rates:

- Metered values:** refresh every 1-2 seconds
- Breaker position:** refresh every 1-2 seconds
- Settings (read only):** refresh every 10 seconds or less
- Trip History:** refreshes every 1-2 seconds

When connected to AC-PRO-II®, the main screen displays the “Power”, “Set” (Settings), “Hist” (Trip History), and “More” buttons. These buttons allow navigation to most AC-PRO-II screens on the Breaker-IQ screen. See the figure below for an example of the screen navigation map. Actual screens will depend on the firmware version of the connected AC-PRO-II.

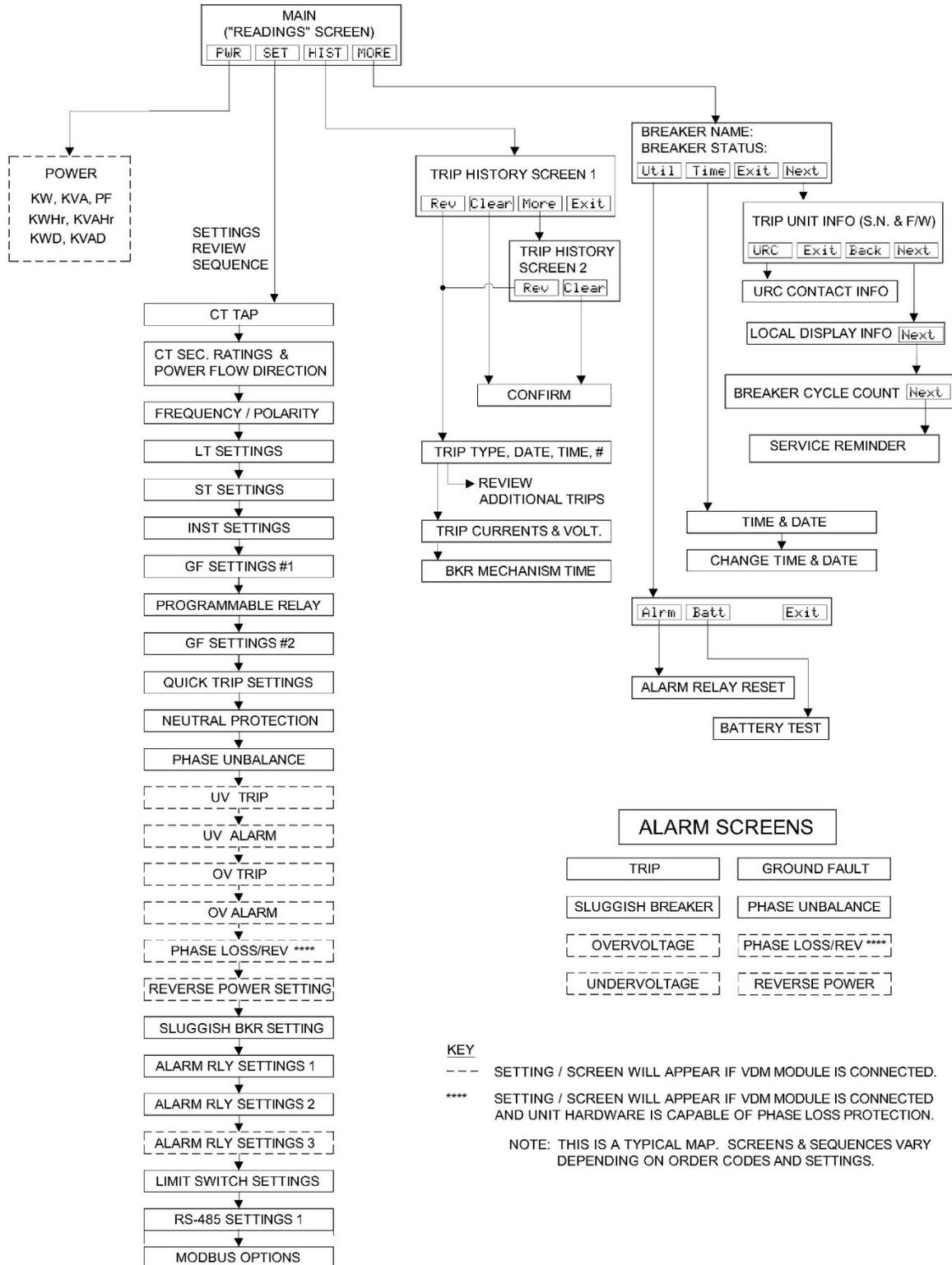


Figure 21: AC-PRO-II® screens map on Breaker-IQ

## 5.2 Screen Navigation with AC-PRO®

Though the Breaker-IQ was designed for AC-PRO-II, it can be used with AC-PRO trip units (limited functionality). When connected to the AC-PRO, the Breaker-IQ is limited to emulating the user interface of the AC-PRO. This includes displaying a single line (16 characters) of information from AC-PRO. This allows viewing of Settings, Last Trip data, trip counts, and other alarms. These screens are navigated using the Display/Review button to make a forward-pass through AC-PRO screens.



Figure 22: Main screen (AC-PRO connected)

When connected to the AC-PRO, tapping the  (Configuration menu) button leads to the following menu (after Security Code entry):

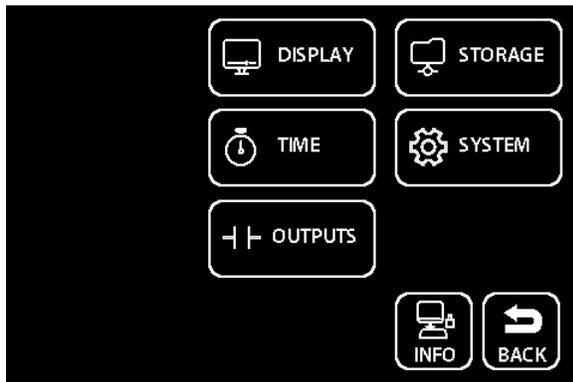


Figure 23: Configuration menu (AC-PRO connected)

The following Breaker-IQ features are NOT available with (legacy) AC-PRO trip units:

- Quick-Trip touchscreen control
- Breaker Control
- Wireless Communications
- Programmable Output #2
- Data trending

## 5.3 Screen Navigation Without Trip Unit Connection

If a trip unit is not connected to BREAKER-IQ, the “Check cables” screen is displayed. The configuration menu  can still be accessed, but the Breaker Control menu item is hidden.



Figure 24: Check cables screen

## 6.0 Operations and Features

### 6.1 Security Code

The Security Code is required to execute commands and change any Breaker-IQ settings / configuration. The Security Code entry screen will automatically appear when required. Once the security code has been successfully entered, it does not need to be entered again during that user session. If the user session times out (no user activity), the Breaker-IQ screen saver will appear, and subsequent actions will require entry of the Security Code. See the display settings section of this manual for more information about the user session timeout.

The Security Code is the last four digits of the Breaker-IQ serial number. The Breaker-IQ serial number is a 10-digit number. It can be viewed on the serial number label or on the “Info” screen.

The following items require the Security Code:

- Change Quick-Trip ON/OFF state
- Trip and Close Breaker
- Change any Breaker-IQ configuration settings such as wireless, outputs, display settings, etc.

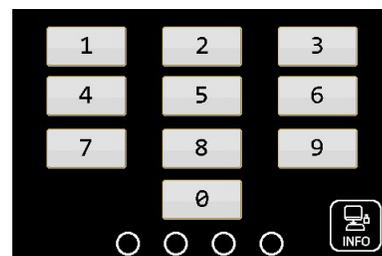


Figure 25: Security Code screen

## 6.2 Quick-Trip® Arc Flash Reduction (ERMS)

Quick-Trip system is a manually controlled Arc Flash Reduction system, more generally known as an Energy Reducing Maintenance Switch (ERMS). It can be used to reduce trip times when turned on, and allows selective coordination when turned off. For more information about the Quick-Trip system, see [www.utilityrelay.com](http://www.utilityrelay.com).

### 6.2.1 Quick-Trip Control

The Breaker-IQ can be used to control the Quick-Trip On/Off mode. This control can be accomplished in several ways:

- Touchscreen control (Security Code required).
- Optional physical pad-lockable QT-Switch is available from URC.
- Existing QT2-switch (if already installed)
- Remote QT-switch
- InfoPro-AC software connection to USB port

**IMPORTANT:** For operational consistency, use of only one method is strongly recommended.

The Quick-Trip screen is accessible from the main

screen  button or from the configuration menu

 button. Both paths require Security Code entry. (last 4 digits of Breaker-IQ serial number).



Figure 26: QUICK-TRIP screen

#### To Change the Quick-Trip (QT) State:

Tap the ON or OFF touchscreen buttons. If the Security code has already been entered successfully during the present user session, then the Security code screen will be displayed, and the QT state will change immediately. If the Security code was not yet entered successfully during the present user session, then the Security code screen will appear and once it is entered successfully, the QT state will change.

**IMPORTANT:** the operator must confirm the Breaker-IQ Quick-Trip (QT) LED is ON. This positively indicates that the connected trip unit is in Quick-Trip mode.

### 6.2.2 Quick-Trip Indication

The Breaker-IQ provides positive indication of the Quick-Trip (QT) state of the connected trip unit. The Breaker-IQ provides this indication via a dedicated Quick-Trip LED, which can be programmed to be Red or Blue. In addition, the Breaker-IQ will display a flashing “Quick-Trip ON” screen.



Figure 27: QUICK-TRIP flashing (splash) screen

The Breaker-IQ can be programmed and wired to send a QT ON signal to a remote LED or system, using one of its programmable output contacts.



Figure 28: QUICK-TRIP LED color screen

### 6.2.3 Remote QT Control and Indication

With additional customer field wiring, the Breaker-IQ is capable of Quick-Trip control and indication from/at a remote location.

See the Installation section of this manual for an example diagram showing Remote Quick-Trip connections.

**NOTE:** If the QT2-Switch is used, then v4 or later AC-PRO-II firmware must be present for Breaker-IQ touchscreen control of Quick-Trip mode.

### 6.3 Breaker Control

Breaker-IQ® is capable of initiating a manual Trip and manual Close command, including a user-set time delay (0-30 seconds) if the command is initiated by the user at the front panel. This time delay allows the user to safely move away from the breaker before it operates.

When at the main screen, tap the Configuration

menu button . The Security Code entry screen will appear (unless the Security Code has already been successfully entered during the same user session). Once the code is successfully entered, tap

the  button.

The following screen will be displayed.



Figure 29: Breaker Control screen

Note: The Trip and Close buttons will be displayed or hidden, depending on the breaker position, the Breaker-IQ settings, and the trip unit settings.

#### 6.3.1 Delayed Trip

**The Trip command** trips the breaker via a signal to the trip actuator. This occurs via a USB communications command from Breaker-IQ to AC-PRO-II. The breaker must be closed for the Trip command to be practical or available. In addition, the Actuator circuit must be complete (not open) for the command to be available.

For these trips, trip data is recorded, including date/time, RMS values, and breaker mechanism time. Recording of the breaker mechanism time is part of URC's **Sluggish Breaker Detection**® feature. These trips are logged as "Safe-T-Trip" trip type. When the trip command is executed, all other Breaker-IQ communications will cease while the handshake and command between the Breaker-IQ and AC-PRO-II is executed. This includes LED status.

##### To execute a delayed trip command:

1. Navigate to the Breaker Control screen (shown in previous section of this manual).
2. Use the  and  buttons to select the desired delay (to allow for walking a safe distance away). The delay range is 0-30 seconds.
3. Tap the  button.
4. Ensure all safety precautions are taken and confirm you want to Trip the breaker by tapping "Yes". (see screenshot in this section).
5. The delay countdown will begin. (see screenshot in this section) Walk away to a safe location.

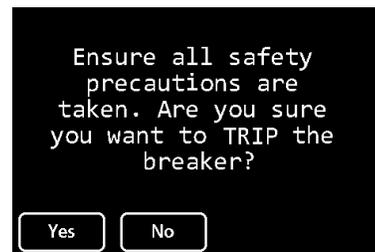


Figure 30: Delayed Trip screens

### 6.3.2 Delayed Close

The **Close command** sends a signal to the existing breaker close coil (or spring release). This can be accomplished in two different ways:

**Option 1: Breaker-IQ Output 2 is wired into the close circuit:** In this option, the Breaker-IQ outputs a signal that is wired to a close relay and then wired to the close circuit in the switchgear.

This option may be preferred in applications where breaker control power is available on or near the switchgear door, since the new wiring into the close circuit occurs in the switchgear.

See the Installation section of this manual for wiring diagrams showing Breaker-IQ wired into the close circuit. See the Outputs and Settings section of this manual for settings instructions. (Output 2 must be programmed for “Close Bkr”.)

Contact URC for close relay options.

**Option 2: AC-PRO-II is wired into the close circuit:**

In this option, the Breaker-IQ sends a communications command via USB to the AC-PRO-II. The AC-PRO-II must have v4 firmware or later, must be wired into the close circuit on the breaker, and must be and programmed accordingly.

This option may be preferred in applications where the customer prefers the new close circuit wiring to occur on the breaker.

See the AC-PRO-II Instruction manual for an example wiring diagram of AC-PRO-II wired into the close circuit, and for related AC-PRO-II settings.

[https://utilityrelay.com/PDFs/Product\\_Manuals/I-AC-PRO-II.pdf](https://utilityrelay.com/PDFs/Product_Manuals/I-AC-PRO-II.pdf)

Contact URC for close relay options.

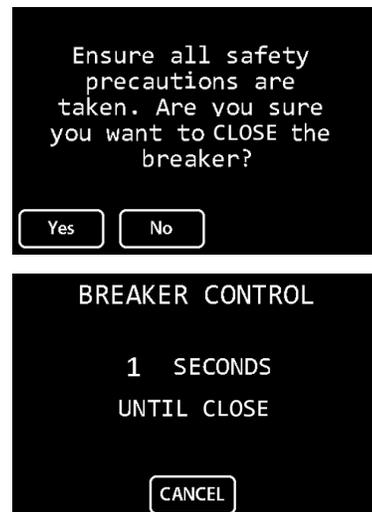
Notes:

1. If both the AC-PRO-II and Breaker-IQ are programmed for the Close breaker feature, then the signal is sent via Breaker-IQ.

To execute a successful close operation, the breaker must be equipped with a close coil, must have close control voltage present, and the close circuit must be wired properly through the AC-PRO-II or the Breaker-IQ. In addition, the breaker must be open and either the trip unit OR the Breaker-IQ settings must be programmed properly.

**To execute a delayed close command:**

1. Navigate to the Breaker Control screen (shown in the previous section of this manual).
2. Use the  and  buttons to select the desired delay (to allow for walking a safe distance away). The delay range is 0-30 seconds.
3. Tap the  button.
4. Ensure all safety precautions are taken and confirm you want to Close the breaker by tapping “Yes”. (see screenshot in this section).
5. The delay countdown will begin. Walk away to a safe location.



**Figure 31: Delayed Close screens**

## 6.4 Graphical Data Screens

The Breaker-IQ® is capable of displaying trip history waveforms and on-demand waveforms that are stored in the AC-PRO-II.

To access these screens, from the Main screen, press

the  button. After pressing, two additional buttons will appear in a popout menu:

 Trip History with Waveforms button

 On-demand Waveforms button

On these screens, the following buttons are incorporated.

 Back / Exit

 Switch between Dark and Light background

 Switch to Neutral (In) Current waveform ("Ig" if AC-PRO-II is set to Ground Return)

 Switch to Phase (Ip) Current waveforms

 Switch to Voltage (V) waveforms (available when AC-PRO-II with VDM connected)

 Goto previous trip (on Trip History screen)

 Goto next trip (on Trip History screen)

### 6.4.1 Trip History

The Breaker-IQ is capable of displaying all of the AC-PRO-II Trip History data including waveforms.

- The AC-PRO-II saves five (5) cycles of waveform data from the last eight (8) trip events. (1 cycle pre-trip, 4 cycles post-trip)
- The data is saved to AC-PRO-II non-volatile memory.
- Current waveforms and RMS values
- Voltage waveforms and RMS values (AC-PRO-II with VDM required).
- Date / Timestamp
- Breaker mechanism times

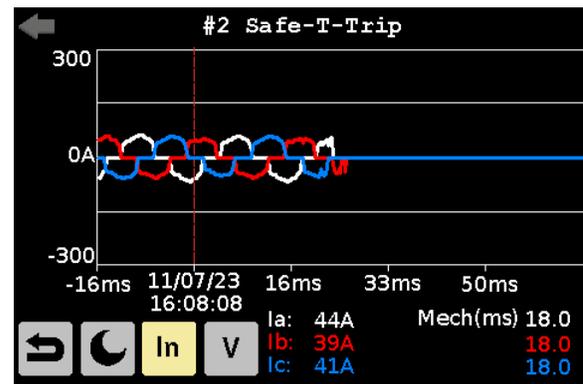


Figure 32: Trip History current waveforms

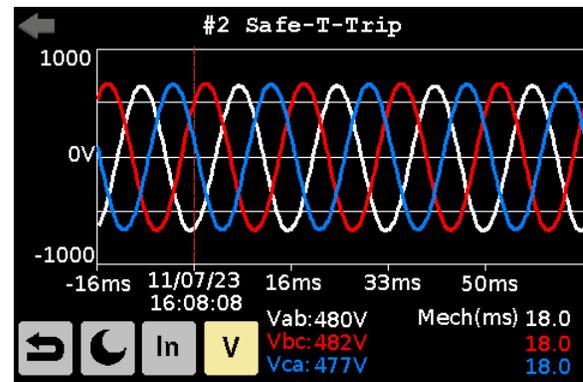


Figure 33: Trip History voltage waveforms

### 6.4.2 Waveforms (on-demand)

The Breaker-IQ® is also capable of initiating and displaying “on-demand” waveform capture from AC-PRO-II.

- The AC-PRO-II saves five (5) cycles of “on-demand” waveform data.
- The data is saved to AC-PRO-II non-volatile memory.
- Current waveforms and RMS values
- Voltage waveforms and RMS values (AC-PRO-II with VDM required).
- Date / Timestamp

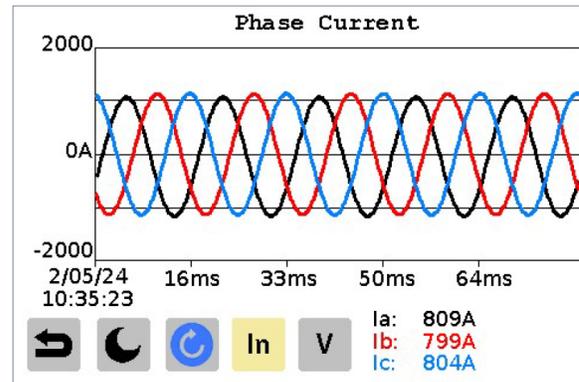


Figure 36: On-demand current waveforms with light background

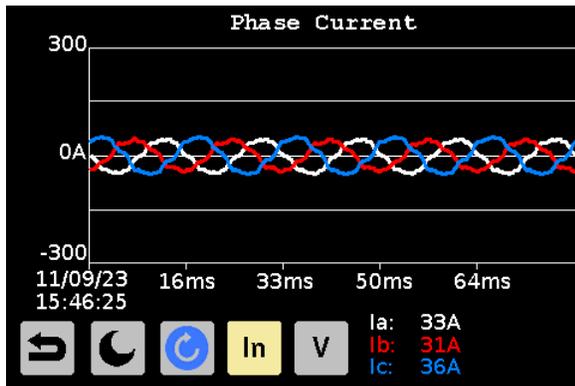


Figure 34: On-demand current waveforms

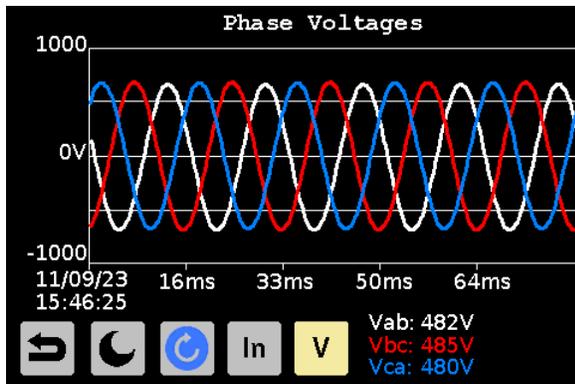


Figure 35: On-demand voltage waveforms

## 6.5 Wireless Comm & Settings

The BREAKER-IQ® is capable of Wireless communications with a Windows PC with a URC Wireless dongle and URC InfoPro-AC software application.

When the connection is established and authenticated, InfoPro-AC software is capable of all functions (same functions as USB cable connection).

For wireless communication to be active, the Wireless (circuitry) switch on the back of the unit must be ON, and the user must enable wireless communication using the front screen and buttons.

Establishing a wireless connection is a secure process, including generation and entry of unique 6-digit PIN. The unique PIN is randomly generated each time per industry standard security methods. In addition, in the process of enabling the wireless feature, the user sets a **“Timeout”** (idle timeout) setting each time a wireless session is started. The idle timer starts when communication is not occurring. The idle timer is reset when communication occurs. If the timer reaches the user set “timeout”, the radio will be disabled (Mode switches to OFF).

The **wireless (circuitry) switch on the back** of the BREAKER-IQ allows the wireless radio circuitry to be switched “ON” or “OFF”. The switch is not accessible after the BREAKER-IQ is installed.

**When the switch is in the “ON” position**, it simply means the feature is capable of being turned ON by the user: The radio is “OFF”, unless the user enables the feature using the front screen and buttons. (when the radio is actually ON, the (blue) Wireless LED will flash).

**When the switch in the “OFF” position:** The radio circuitry is disabled and the feature is not accessible using the front screen and buttons.

URC recommends installing the BREAKER-IQ with the wireless switch “ON”, unless the facility does not permit such features.

The **Wireless (blue) LED** flashes “fast” (multiple flashes per second) when the unit is “advertising” or “pairing”. This occurs when the radio is on, but the BREAKER-IQ is not yet connected to anything, or was disconnected.

The LED flashes “slow” (about 0.5 sec ON, 0.5 sec OFF) when a secure connection is established.

A **USB Wireless dongle** is available from URC. This device can be used to allow a Windows PC to wirelessly communicate with BREAKER-IQ.



**USB Wireless dongle  
(available from URC)**

### Wireless security notes:

The BREAKER-IQ is designed for “Secured Connection Only Mode” (“Secure Mode 1” with “Security Level 4”) meaning all incoming and outgoing traffic involves authenticated connections and encryption. Any device trying to connect that doesn’t support secure connections is disconnected.

Presently, pairing is required every time a connection is established. The user must be at the Breaker-IQ to view the PIN.

Wireless communications will cease (Mode will automatically switch to OFF) if URC communications does not occur for a certain period of time (idle timeout – described elsewhere in this section). In addition, there are several means of disconnecting and/or disabling wireless communications as described elsewhere in this Section.

The next page includes instructions for establishing a wireless connection with BREAKER-IQ.



**Figure 37: Wireless Comm configuration screen**

1. Prior to visiting the breaker location, install InfoPro-AC version 5.2 or later on your PC. [www.utilityrelay.com/downloads](http://www.utilityrelay.com/downloads)
2. When at the Breaker-IQ “Main Screen”, press the  button and then the Wireless button. (successful Security Code entry will be required if it wasn’t already during this user session).
3. Press the Edit button to allow changing settings.
4. Turn the Wireless Mode to ON.
5. Set the Idle Timeout delay using the Up & Down buttons. The idle Timeout can be set between 5 – 60 minutes, in 1-minute steps.
6. After pressing enter, the Wireless (blue) LED flashes fast, indicating it is in “advertising/pairing” mode.
7. Ensure URC USB Wireless dongle is plugged into a USB port on your Windows PC.
8. Open InfoPro-AC software on your PC.
9. Ensure you are near the Breaker-IQ. The steps below will require viewing the trip unit screen and time will be limited for security reasons.
10. Select “Wireless” from the Device Menu. A list of available (“advertising”) URC devices will be displayed.
11. Select the Breaker-IQ you want to connect to.
12. The Breaker-IQ will receive the connection request and will display a 6-digit PIN, which will be active for 30 seconds.
13. Enter the PIN into the prompt window in InfoPro-AC software.
14. The Breaker-IQ should display “Connected”. The wireless (blue) LED should now flash “slowly”. InfoPro software should now communicate with the Breaker-IQ and display information from the connected trip unit.
15. The connection can be terminated by several means: browsing to the Wireless Comm screen and changing the Mode to OFF, or closing InfoPro-AC software, or removing the USB dongle, or walking away (move device out of range) and allowing the idle timeout to occur and automatically switch the Mode to OFF.

## 6.6 Alarms & status information

The Breaker-IQ is capable of displaying AC-PRO-II alarms. In addition, the user can clear any “manually reset” AC-PRO-II alarm conditions using the Breaker-IQ.

When an alarm condition occurs, the Breaker-IQ screen will display a flashing “splash screen”. When a splash screen is displayed, press the yellow (physical) “Display” button in the lower right corner of the unit. At that point, the user can browse to additional information if it is available. In addition, if the condition is a type that can be reset by the user, the option to reset it will be offered.



**Figure 38: Flashing Splash screen examples**

If an alarm condition is present and has not been reset, the  button will flash when at the main screen. Pressing the bell button will lead to one of the following screens.



**Figure 39: Alarm screen examples**

List of conditions that will appear regardless of AC-PRO-II user settings:

- Breaker Tripped (manual reset)
- Actuator Open (auto reset)
- Internal Error (auto reset)

List of conditions that will appear as splash screens or alarm screens, which depend on AC-PRO-II version and AC-PRO-II user settings:

- Service Due (manual reset)
- Sluggish Breaker (manual reset)
- LT Pickup alarm (auto reset)
- Phase Current Unbalance alarm (manual reset)
- Ground Fault alarm (manual reset)
- UnderVoltage alarm (manual reset)
- OverVoltage alarm (manual reset)
- Phase Loss/Reverse alarm (auto reset)
- Reverse Power alarm (manual reset)

“manual” = reset by user

“auto” = trip unit resets when condition no longer present

See the AC-PRO-II Instruction manual for a full list of possible AC-PRO-II alarms, as well as a breakdown of alarm conditions that are automatically reset when the condition goes away, and conditions that must be manually reset by the user.

Note: If an AC-PRO-II is connected to Breaker-IQ for the first time, it is possible that a trip alarm (status condition) from a previous trip may still be present. Simply reset the trip alarm using the Breaker-IQ.

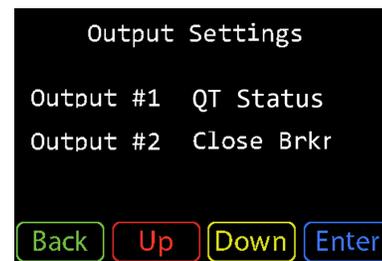
## 6.7 Outputs & Settings

The Outputs screen can be accessed from the Configuration Menu. See Figure 20. Successful Security Code entry (last 4 digits of Breaker-IQ serial number) is required to access Output settings.

See the specifications section for output ratings.

Output #1 can be set to operate for the following conditions/options: [AC-PRO-II Alarms] or [QT Status (operates if Quick-Trip is ON)] or [OFF]

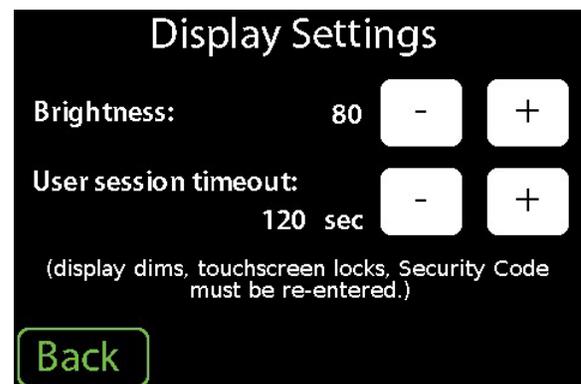
Output #2 can be set to operate for the following conditions/options: [AC-PRO-II Alarms] or [QT Status (operates if Quick-Trip is ON)] or [OFF]



**Figure 40: Outputs settings**

## 6.8 Display Settings

The Display Settings screen can be accessed from the Configuration Menu.



**Figure 41: Display settings**

### 6.8.1 Brightness

The Breaker-IQ screen brightness level can be set between 20 – 100. The default setting is 80. The setting value is in steps of 5.

When the user session times out, the unit enters screen saver mode. If no alarms are present and Quick-Trip (Arc Flash Reduction mode) is OFF, the screen dims to a brightness level of 20, to preserve the display backlight.

### 6.8.2 User Session timeout

The user session timeout setting can be set between 30 - 300 seconds. The default setting is 120 seconds. Setting option is in 30 second steps. (30, 60, 90, etc).

When the user presses the yellow Display button on the bottom right corner of the front panel, the user session begins, and the touchscreen will become unlocked. A countdown timer begins to run in the background. After the user session begins, any user activity (e.g. touchscreen press, or Display button press) resets and restarts the user session countdown timer. If no user activity occurs and the timer reaches zero, the user session has ended. The unit will go into screen saver mode, and the touchscreen will be locked. The Security Code will need to be re-entered for subsequent user sessions.

### 6.9 Storage

The Storage screen is accessible from the Configuration menu (Security Code required). The Breaker-IQ can accept a USB flash storage device in the (rear) Aux USB port. For the initial release of Breaker-IQ, the data storage functionality is limited to saving logs for factory support if necessary. In the future, additional storage features will be offered.

The following screen displays the storage device status. The "Remove" button should be pressed before removing the USB storage device.

If the Breaker-IQ shipped with a USB flash drive plugged into the rear Aux USB port, then it should remain plugged in unless being temporarily removed for data transfer.



Figure 42: Storage settings



Figure 43: Storage removal

### 6.10 Date & Time

The Breaker-IQ syncs up to the connected trip unit's date & time. In addition, the Breaker-IQ can be used to set the trip unit date & time.



Figure 44: Time and Date screen



Figure 45: Time and date entry screen

### 6.11 System

The System screen can be accessed from the Configuration menu. See Figure 20. Successful Security Code entry (last 4 digits of Breaker-IQ serial number) is required to access the System screen. This screen offers the ability to reset the USB connection to the trip unit or Reboot the Breaker-IQ (without opening the cubicle door) if needed for troubleshooting resolution.

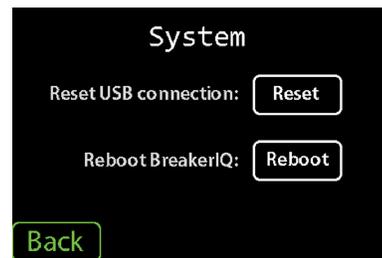
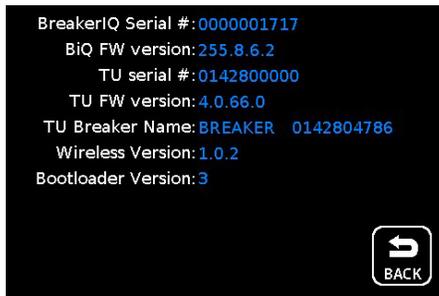


Figure 46: System screen

## 6.12 Information screen

The information screen displays the following information.



*Figure 47: Info screen*

## 6.13 Firmware

### 6.13.1 Breaker-IQ® firmware

The Breaker-IQ firmware can be updated in the field using a Windows PC, URC's InfoPro-AC software, and a mini-USB cable. Contact URC for additional information.

### 6.13.2 AC-PRO-II® firmware

Breaker-IQ is compatible with all released versions of AC-PRO-II firmware.

URC recommends utilizing AC-PRO-II v4.0 firmware or newer if possible.

### 6.13.3 AC-PRO® firmware

Breaker-IQ was designed and tested to be compatible with AC-PRO firmware v5.25 and later.

## 7.0 InfoPro-AC Software

InfoPro-AC software for Windows PCs can be used with Breaker-IQ for the following:

- Pass-through communication to AC-PRO-II
- Breaker-IQ firmware update

Breaker-IQ was designed and tested to be compatible with InfoPro-AC software v5.2.x and later.

For more information about InfoPro-AC, see <https://utilityrelay.com/products/InfoPro>.

### 7.1 Pass-thru Communication to AC-PRO-II®

To utilize your Windows PC with InfoPro-AC software to connect to AC-PRO-II (via Breaker-IQ), utilize a mini-USB cable to connect to the side mini-USB port on Breaker-IQ. The software should connect virtually directly to AC-PRO-II.

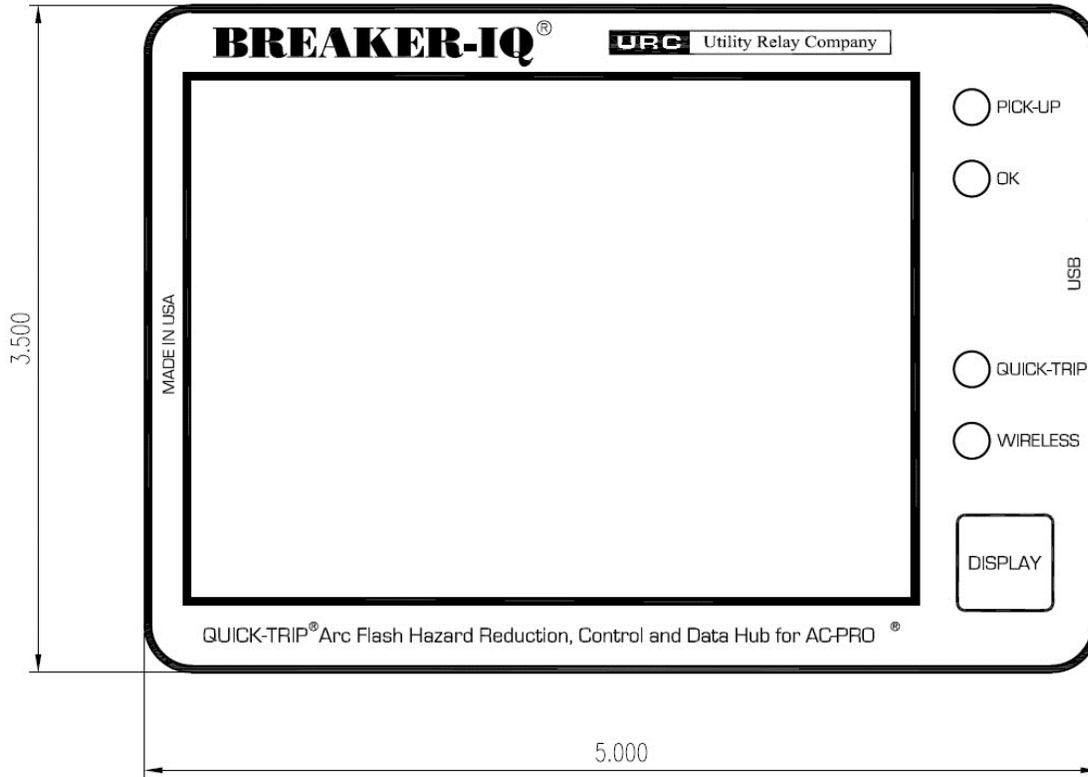
## 7.2 Breaker-IQ® Firmware update

InfoPro-AC software can be used to update Breaker-IQ firmware. Contact URC for firmware update information and instructions.

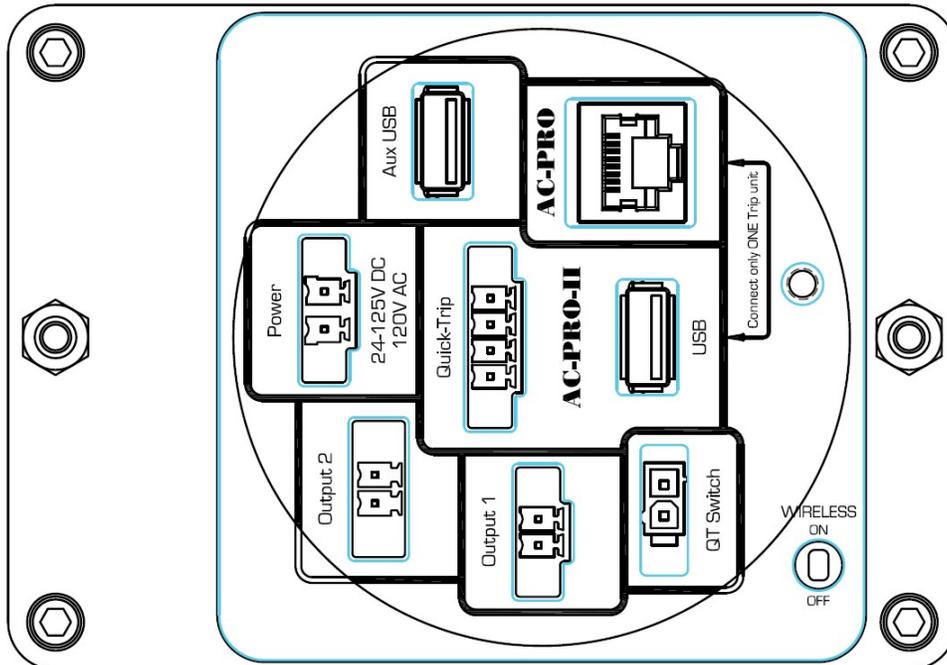
**8.0 Specifications**

**8.1 Drawings and Dimensions**

Dimensions are in inches.



**Figure 48: Front View drawing**



**Figure 49: Rear view drawing**

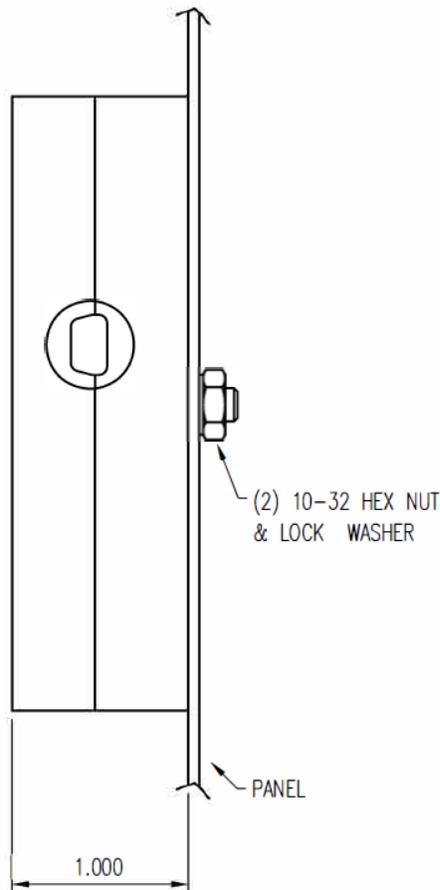


Figure 50: Side view drawing

## 8.2 Tests

The Breaker-IQ was tested by an independent laboratory and found in compliance with the following standards:

IEEE C37.90.1, Surge Withstand  
 IEEE C37.90.2, RF Susceptibility  
 IEC 61000-4-2, Electrostatic Discharge Immunity  
 IEC 61000-4-3, RF Immunity  
 IEC 61000-4-4, Fast Transient  
 IEC 61000-4-5, Surge Immunity  
 IEC 61000-4-6, Conducted Immunity  
 EN/CISPR 55011, Radiated Emissions  
 FCC Part 15 subpart B, class A

The Breaker-IQ has the CE Mark.

## 8.3 Power input

Power is required.  
 Voltages: 24 – 125VDC, 120VAC, 50/60Hz  
 Power: 6VA

## 8.4 Outputs

The two (2) programmable outputs (#1 and #2) have the following ratings:

Voltage: 24-125VAC/DC  
 Current: 200mA

## 9.0 Troubleshooting

If the Breaker-IQ is experiencing issues with the connected trip unit, perform these checks/steps:

- Reset USB connection. See “System” section of this manual for instructions.
- Reboot Breaker-IQ. See “System” section of this manual for instructions.
- Check USB cable connection
- Check 4-conductor Quick-Trip Cable connection
- Check power source to Breaker-IQ

If an AC-PRO-II is connected to Breaker-IQ for the first time, it is possible that a trip alarm (status condition) from a previous trip may still be present. Simply reset the trip alarm using the Breaker-IQ. Contact URC for more information.

Utility Relay Company  
 10100 Queens Way  
 Chagrin Falls, OH 44023  
[www.utilityrelay.com](http://www.utilityrelay.com)  
 Phone 888-289-2864

For latest version, visit:

[http://www.utilityrelay.com/Side\\_Bar/Instruction\\_Manuals.html](http://www.utilityrelay.com/Side_Bar/Instruction_Manuals.html)









UTILITYRELAY.COM



I-BREAKER-IQ

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