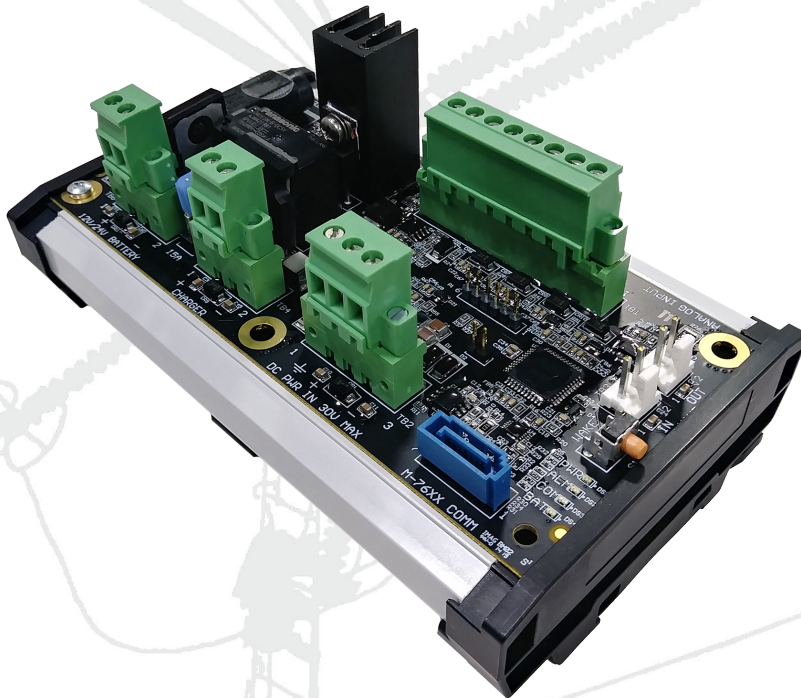


Analog to Digital Interface Module M-2035



- **Designed to interface with the M-7679 R-PAC.**
- **Allows the M-7679 R-PAC to monitor third party external power supplies and 12/24 V battery chargers.**
- **Provides four 0-30 Vdc Analog inputs. Using S-7600 IPScm communications software, these inputs can be monitored and configured with two level alarm settings per channel, and used in IPSlogic custom configurations.**
- **Monitor and test the battery system. Turns off the battery supply to enter sleep mode during power loss.**
- **Transient and reverse polarity protected**
- **Operates on DC power from 8 to 30 V**
- **Substation hardened -40° C to +85° C**
- **Conformal coated**



Introduction

The M-2035 Interface Module monitors power supplies and battery chargers used in Reclosers that have been retrofitted to operate with Beckwith Electric's M-7679 R-PAC system. This analog to digital interface measures voltage, current, and current direction which can be monitored with the same S-7600 IPScom communication software used with the recloser control. The interface module can be DIN rail mounted during installation of the M-7679 R-PAC and includes a SATA cable for easy hookup to the Aux I/O port in the recloser control. The module will accept 8 to 30 Vdc power from the existing power supply and batteries.

The module features essential indicator lights for battery and communication status plus on-board and remote manual wake-up pushbuttons to restore function after a power failure. Four extra analog to digital inputs are available for voltage measurements up to 30 Vdc. The module is able to periodically test the batteries by briefly disconnecting the charger with a high side switch and switching on a resistive load for five seconds.

Configurable DC Power Monitoring

Four analog inputs allow the user to remotely monitor DC voltages from 0 to 30 Vdc. Each input can be configured with two setpoints to report when voltage drops below the specified levels. The analog to digital converter is 12 bit and averaging is done over 128 samples to increase resolution to 16 bits. Analog metering data is updated every 64 ms.

Summary of Operation

- Installed between the battery and battery charger (with fuse protection for reverse polarity of charger or battery), the M-2035 measures battery voltage, charge and discharge current, detects AC power loss, and sends the measurements to the controller through the SATA communication interface.
- Continuously monitors charger voltage. Conducts scheduled battery load tests on 12 and 24 V battery configurations while automatically disconnecting and reconnecting the battery charger.
- During tests, module controls the battery load resistor via command from the M-7679 R-PAC so that when the load resistor is turned on, it disconnects the high side switch. Reconnects high side switch after load resistor is turned off. Does not turn on load resistor if loss of main power is detected.
- When running on battery power, the M-7679 R-PAC commands the M-2035 module to enter low power mode if the battery voltage drops below "Vmin Bat" setting, disconnecting the M-7679. Local or remote pushbutton provides "wakeup from sleep" functionality. When pressed, the pushbutton releases module from sleep and activates high side switch to reconnect the battery and power supply.
- While in the sleep mode, the M-2035 module wakes up every 5 seconds to measure voltage at Charger Input (TB4) to determine when main power returns. Provides "wakeup" functionality when main power is restored.

Turn-on/off Battery Load Test Command

Test frequency is user defined in the **Battery Charger** common setpoints in IPScom communication software. The M-7679 R-PAC issues the "Turn-on/off Battery Load Test" command to the M-2035 to test the battery capacity only when the charger is operating from the main power supply.

Battery Supply Off Command

When the battery voltage decreases to less than "Vmin Batt" ([Figure 1](#)) the battery supply to the M-7679 R-PAC will be turned off to protect the battery. The M-2035 remains connected to the battery. Discharging batteries below certain levels will shorten the life of or damage the battery. Threshold voltages can be edited in **IPScom/Common Setpoints/IED Power Supply/Battery Charger Monitor** screen.

Wakeup System Command

The Wakeup system command is initiated with local panel pushbutton, allowing the user to wake module from the Sleep Mode that was initiated by the Battery Supply Off command. The wakeup system command restores power to the unit for a user defined time period. If the main source power has not been restored, the Battery Supply Off command will be repeated. The loss of main power is determined by monitoring the battery current throughput polarity.

S-7600 IPScom Battery Charger Model Settings

Battery charger models are selected from the drop down list in **Common Setpoints/PSBC/Battery Charger**. Set the Battery Charger option to "Enable", then select M-2035, M-2035-EXT, or M-2035 Voltage Only based on the system application of the module.

- **M-2035** – allows the user to use the module as a battery charger monitor with voltage and current measurements plus voltage reporting of up to four external analog inputs. IPScom will also enable "M-2035 Analog Inputs" in the **Monitor** menu. This selection is used for most applications and includes the ability of the M-7679 R-PAC to automatically disconnect the batteries for load testing and back-up power protection using the module's high side switch.
- **M-2035-EXT** – allows the user to monitor only the four analog voltage inputs. IPScom will enable the **Monitor** menu item "M-2035 Analog Inputs". All other settings related to battery (Vmin Batt, Time to perform tests, etc), will be disabled.
- **M-2035 Voltage Only** – measures battery voltage and external voltage inputs without charge/discharge current measurement. IPScom will enable the **Monitor** menu item "M-2035 Analog Inputs". In this mode the M-7679 R-PAC control will monitor the battery voltage and will send the Battery Supply Off command to the M-2035 when voltage drops below the minimum battery voltage to turn OFF IED.

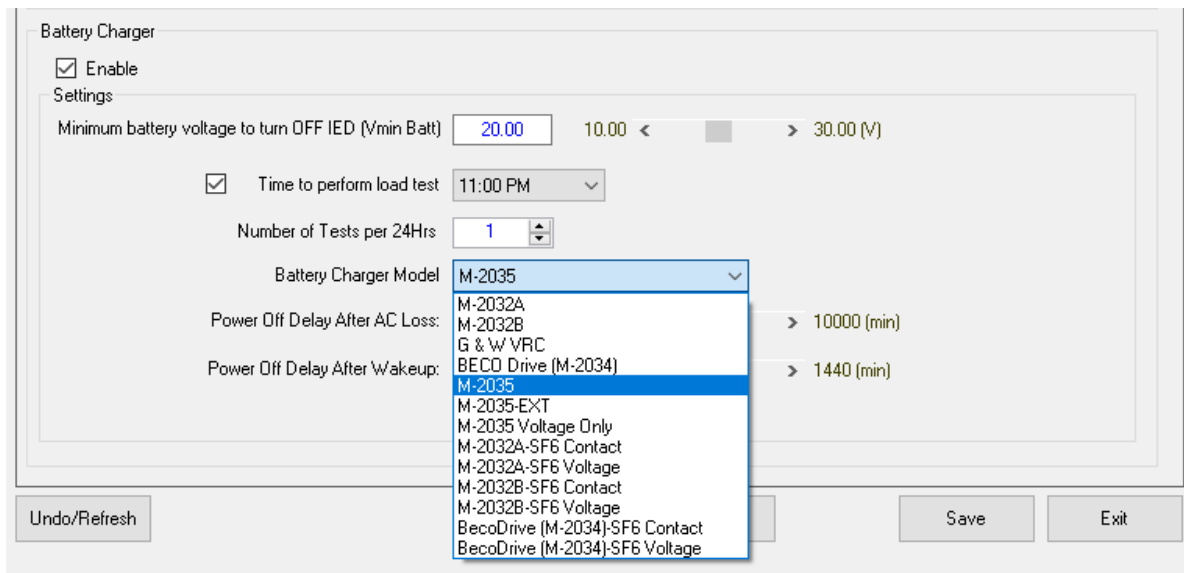


Figure 1 Battery Charger Models in Common Setpoints

Based on the Battery Charger Model selection, there are the settings for:

- Minimum battery voltage to turn OFF IED (M-2035, M-2035 Voltage Only)
- Enable/Disable and set time to perform Load Test (M-2035)
- Number of Tests per 24 Hrs (M-2035)
- Power Off Delay After AC Loss (M-2035)
- Power Off Delay After Wakeup (M-2035)

The IPScom software allows the user to remotely update the module firmware if needed. This is available in the **IPScom Utility/Hardware/Update M-2035 Firmware** menu selection.

Analog Inputs Threshold Setpoints

When any M-2035 Model is selected in the Battery Charger Model dropdown, a new setpoint selection is added to the **Common Setpoints** tab. The **M-2035 Analog Inputs** setpoints screen allows the user to set two voltage thresholds (0 to 30 Vdc) for each of the four analog inputs.

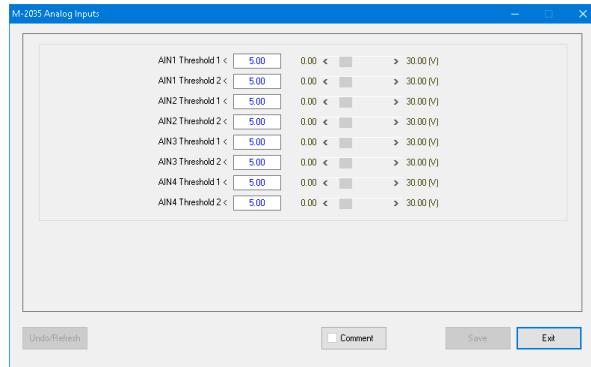


Figure 2 M-2035 Analog Inputs Threshold Setpoints Screen

Analog Inputs Monitoring

The **Monitor/M-2035 Analog Inputs** screen will display the thresholds setting and the measured voltage. When the measured voltage is below a threshold setting, the corresponding indicator will illuminate RED. The analog inputs accuracy is 0.2 V.

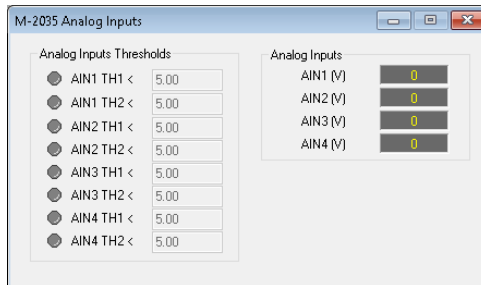


Figure 3 M-2035 Analog Inputs Monitoring Screen

Battery Charger Monitoring

To view battery status, battery load test alarms, and charging mode status, select **Monitor/Battery Charger Monitoring**.

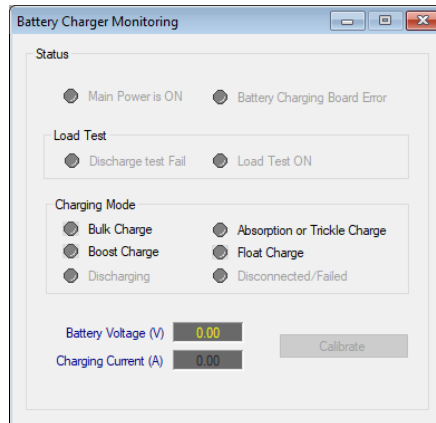


Figure 4 Battery Charger Monitoring Screen

Status parameters include indications of Main Power is ON and a Battery Charging Board Error alarm. In addition, the M-7679 control will periodically load test the batteries by subjecting them to an internal 1 A load for 5 seconds. See [Figure 1](#) for setting the interval between tests.

- **Discharge Test Fail** – If the battery voltage falls below "Vmin Bat" setting during a test, the "Discharge Test Fail" status light will be illuminated, and the BATTERY LED (if programmed) illuminates on the front panel. The Discharge Test Fail light remains illuminated until the next successful battery load test.
- **Load Test ON** – Indicates that a load test is currently running with high side switch disconnected.

Charging Mode functions are dependent on the **Battery Charger Model** setting to enable all the test functions:

- **Charging Mode** – The M-7679 and M-2035 monitor the battery charge/discharge current and battery voltage to display the current output mode of the battery charger.
- **Discharging** – When the power supply source is de-energized and the M-7679 is operating from battery power (measured current has reversed direction) the Discharging status light will be illuminated (red).
- **Disconnected/Failed** – When the battery presence test fails (performed every 15 minutes) or if the communication cable between the M-7679 and the M-2035 is unplugged or damaged, the Disconnect/Failed alarm will become active. The alarm will be cleared automatically when the battery presence test runs successfully and/or communication between the M-7679 and the M-2035 module is restored.

On-board Indicator LEDs

- LED 1 – Power on.
- LED 2 – Alarm(s) LED turns RED when active, green is not active.
- LED 3 – Communication activity flashes green. RED if there is no comm activity within last 10 seconds.
- LED 4 – Battery error indicated by RED flashing at one second interval.

Inputs

8 to 30 Vdc – Module Power

8 Vdc – Minimum Battery Operating Voltage

0 to 30 Vdc – Signal Monitoring

15 A fuse – Battery Reverse Polarity Protection

15 A fuse – Charger Reverse Polarity Protection

Transient Protected

Output

I²C Communications

Maximum 10 A – Charge Rate Pass Through for Batteries

Disposal and Recycling

Disposal of E-Waste for Beckwith Electric Products

The customer shall be responsible for and bear the cost of ensuring all governmental regulations within their jurisdiction are followed when disposing or recycling electronic equipment removed from a fixed installation.

Equipment may also be shipped back to Beckwith Electric for recycling or disposal. The customer is responsible for the shipping cost, and Beckwith Electric shall cover the recycling cost. Contact Beckwith Electric for an RMA # to return equipment for recycling.

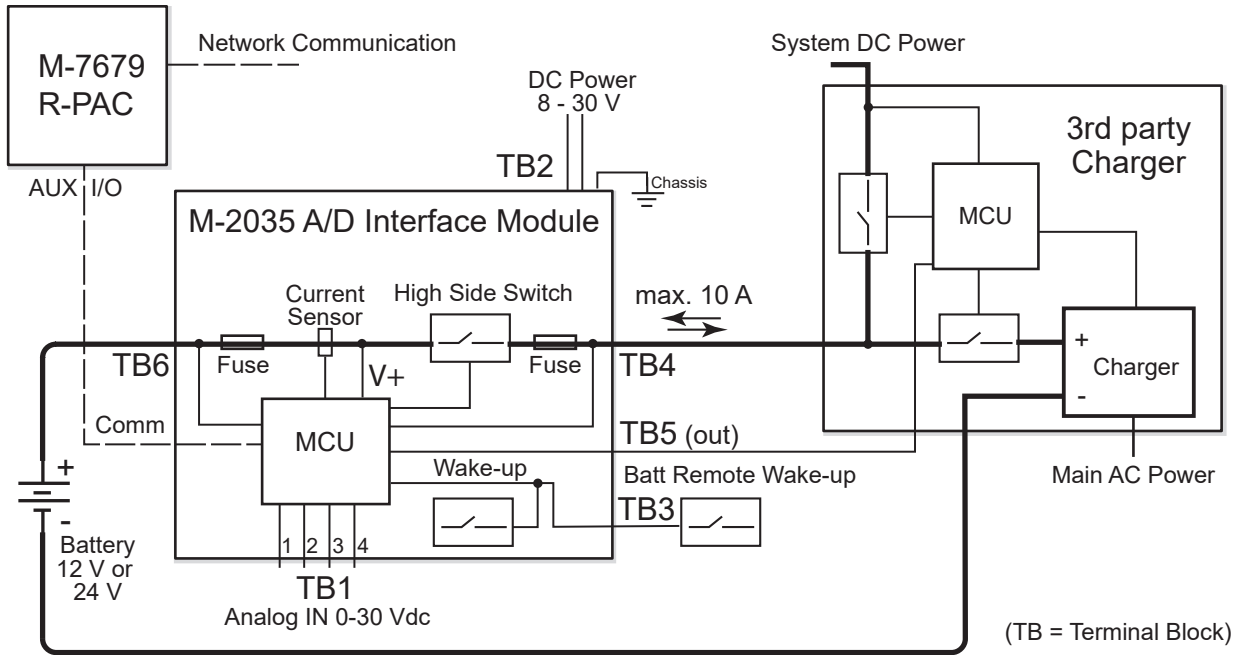


Figure 5 M-2035 Installation Block Diagram

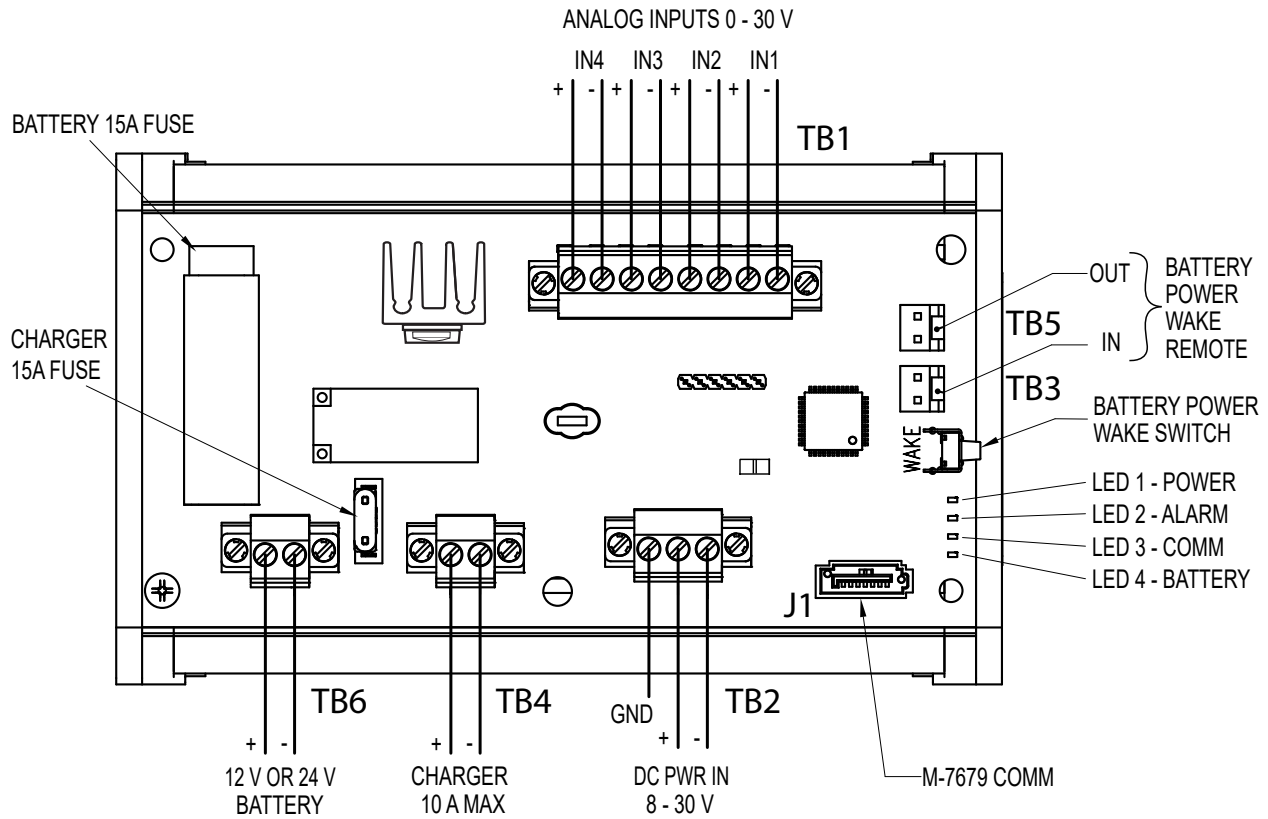


Figure 6 M-2035 External Connections

Physical

Size: 6.06" long x 3.63" wide x 2.75" high (15.39 cm x 9.22 cm x 6.99 cm)

Approximate Weight with cable: 0.6 lb (0.27 kg)

Warranty

The M-2035 is covered by a five year warranty from date of shipment.

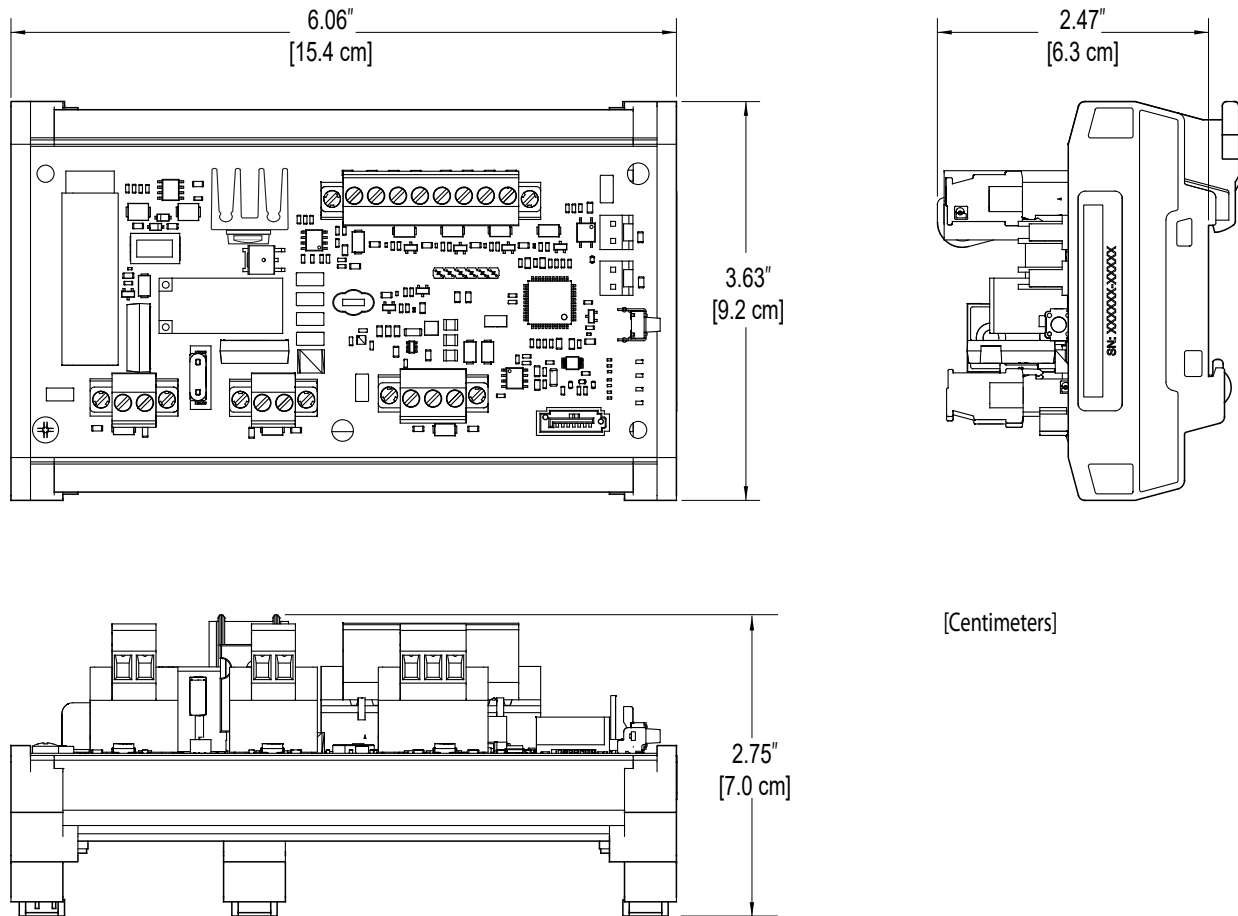


Figure 7 M-2035 Dimensions

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BECKWITH ELECTRIC

6190 118th Avenue North • Largo, Florida 33773-3724 U.S.A.

PHONE (727) 544-2326

beckwithelectricssupport@hubbell.com

www.beckwithelectric.com

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