# AIU3 Installation Manual

RESEARCH CONCEPTS INC.
9501 Dice Lane
Lenexa, Kansas 66215 USA
VOICE: (913) 422-0210 FAX: (913) 422-0211
www.researchconcepts.com support@researchconcepts.com
Contents subject to change

# Revision History

| DATE | MODIFICATION | REVISION | INITIALS |
|---|---|---|---|
| 4 APR 2016 | Initial Release | A | RLE |
| 5 MAY 2017 | Added resolver connections | B | RLE |

## Contents

# 1 Introduction

The Research Concepts AIU3 is a dual speed interface box designed to interface between a Research Concepts RC2500 or RC4500, and an earth station antenna with 3-Phase AC motors. The environmental specifications for the AIU3 is shown in Table 1. The input power and voltage ratings, as well as the output power and voltage ratings for each AIU3 are located on a label on the inside of the enclosure door. Please adhere to all power ratings listed during installation. The mechanical dimensions and mounting information can be found in Section 2; step-by-step electrical connection instructions can be found in Section 3, and annual maintenance information can be found in Section 4. A full system schematic will be included at the end of the manual.

| *Specification* | |
|---|---|
| Operational Temperature | -10°C to +50°C (14°F to 122°F) |
| w/ Optional Heater | -40°C to +50°C (-40°F to 122°F) |
| Storage Temperature | -40°C to +60°C (-40°F to 149°F) |
| Ambient Humidity | 95%RH or less (non-condensing) |
| Maximum Altitude (above sea level) | 1000m (3281 Feet) |
| | Derate 1% per 100m to 3000m |

**Table 1: Environmental Specifications**

# 2 Mechanical

## 2.2 Enclosure Basic Dimensions

The enclosure for the AIU3 consists of a NEMA 4 enclosure that has a hinged door and mounting flanges on the top and bottom. Basic dimensions are provided in Figure 1.

An AIU3 can be directly wall- mounted or mounted to a uni-strut frame with the four mounting flanges welded to the back of the housing. The mounting flanges shown in Figure 1 can accept 3/8" diameter bolts (not included).

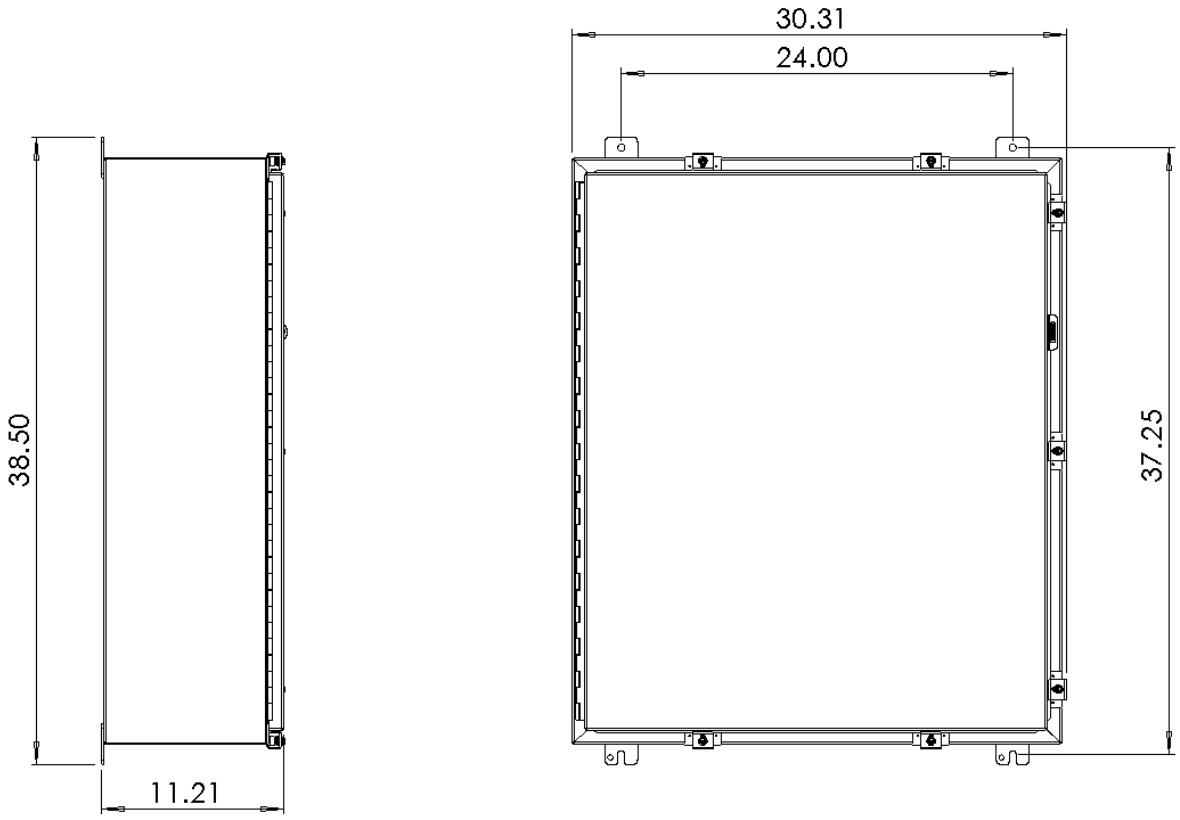


**Figure 1: External Dimensions (Inches)**

The AIU3 can be ordered with an optional floor stand kit that allows the NEMA 4 enclosure to be mounted to the antenna pad, as shown in Figure 2.

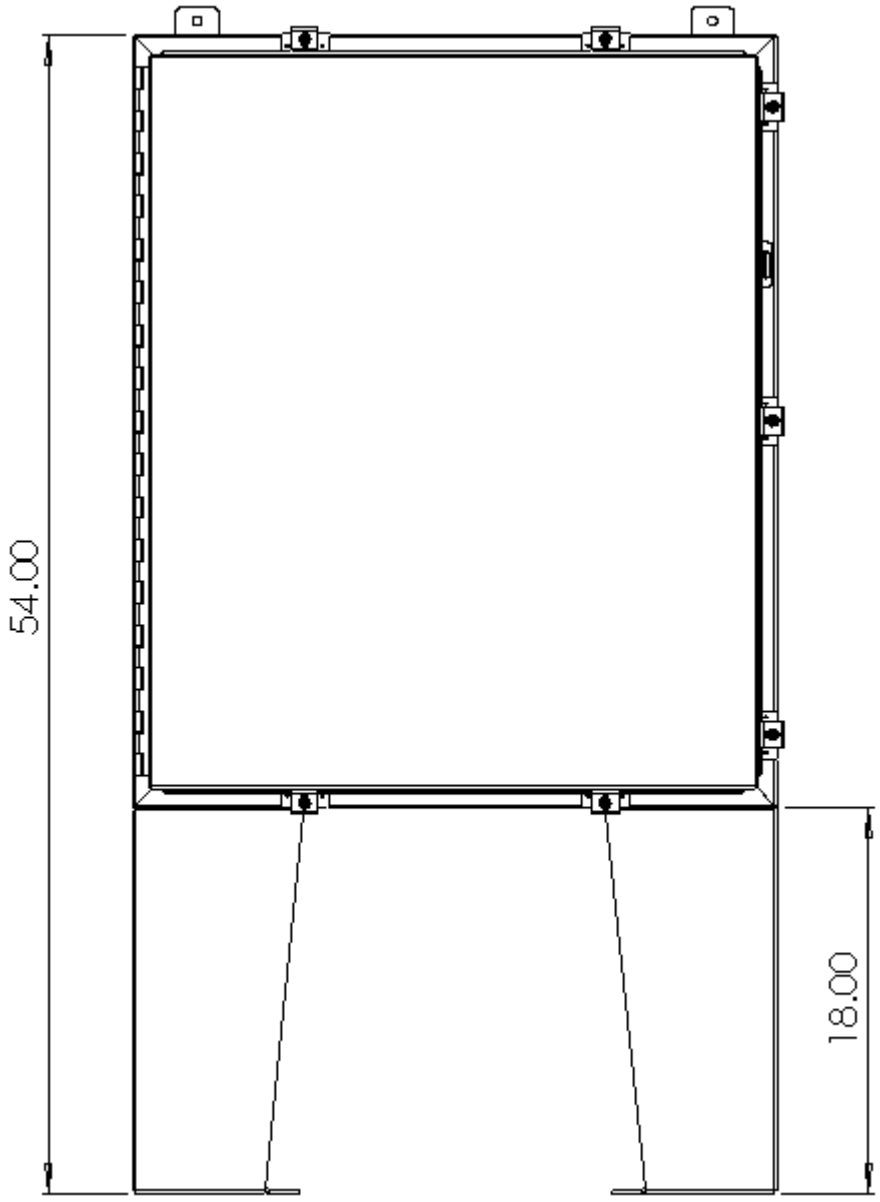


**Figure 2: Dimensions with Floor Stand (Inches)**

The hardware to mount the enclosure to the floor stand kit will be included if the option is ordered. The hardware required to attach the floor stand kit to the antenna pad is not included.

## 2.3 ACU and Antenna Cable Locations

The bottom panel of the AIU3 is drilled to accommodate cabling to the antenna and an RC2500 or RC4500. The pattern shown in Figure 3 is the default hole pattern. Custom drill patterns, and undrilled enclosures are available upon request.

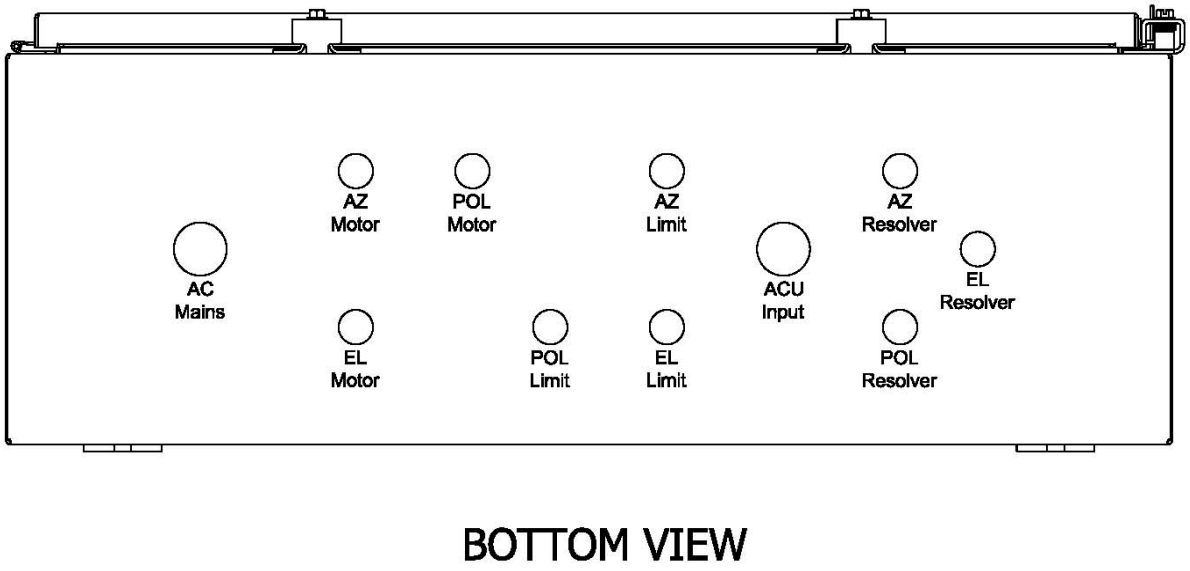


**Figure 3: Standard AIU3 Drill Pattern**

The "AC Mains" and "ACU Input" holes are 1.36" diameter clearance holes for 1" NPT fittings. The remaining 9 holes are 0.886" diameter clearance holes for ½" NPT fittings. The default configuration will include plugs to seal each hole for shipment. The holes can be optionally ordered with conduit connectors or liquid tight cable glands.

# 3 Electrical

All components listed in the electrical wiring instructions are identified using the component identifiers shown in Figure 4. Due to variance in configurations, some components shown may not appear in your interface box. The numbering on each terminal block will progress from left to right.

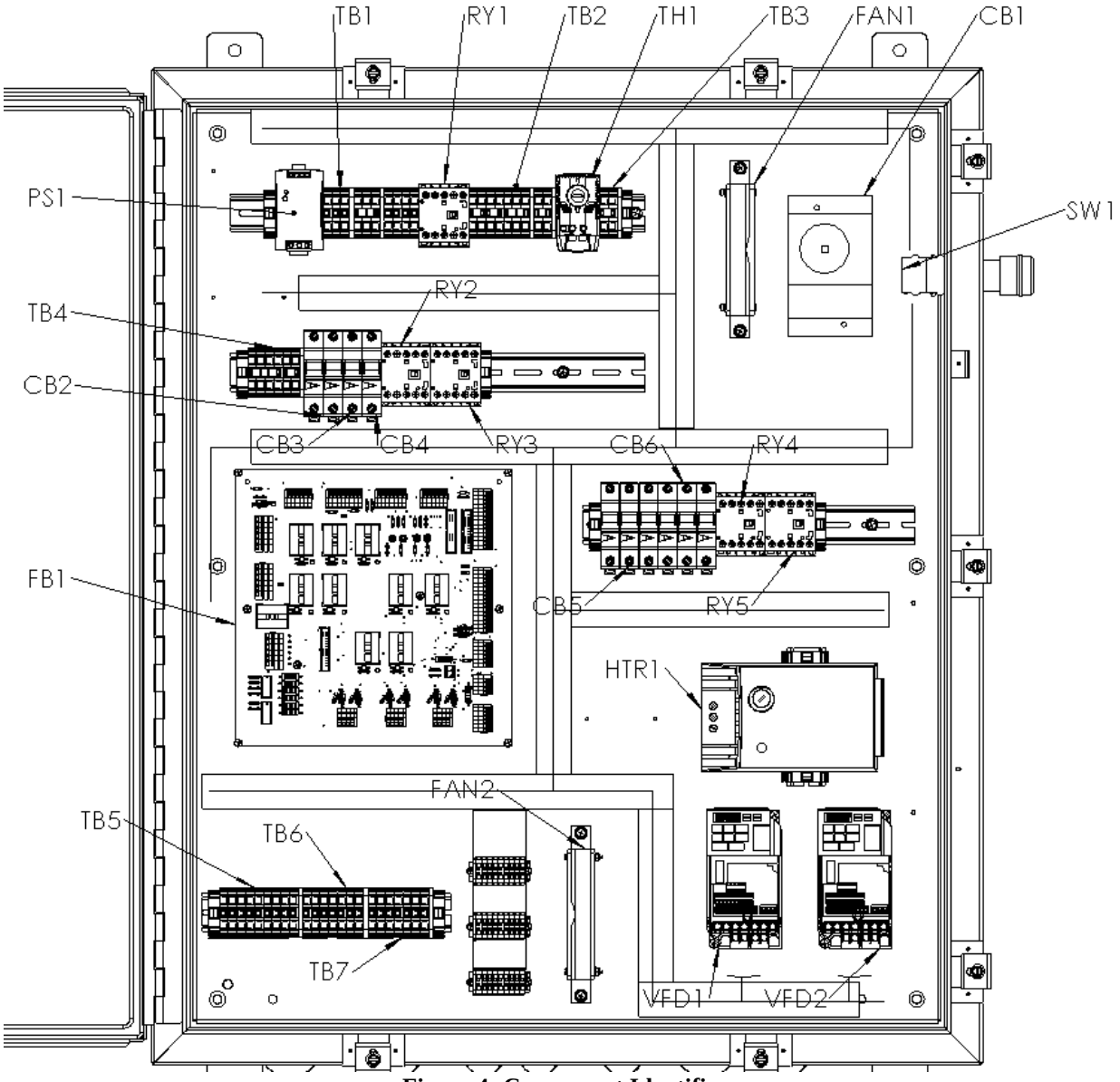


**Figure 4: Component Identifiers**

## 3.1 ACU Control Wiring

The AIU3 requires a 25 conductor cable from the ACU to properly control and monitor the antenna. The landing location of the ACU control wiring inside the AIU3 are shown in Figure 5. A schematic of standard wiring between an RC2500 or RC4500 and an AIU3 is shown in Figure 6. A tabular form of the connections is shown in Table 2 and Table 3. All wire colors are based on using Belden 9937 cable. The RCI part number for this cable is CBL-25_22 and is available for order with the AIU3. The recommended strip length for the wires landing in the AIU3 is ¼".

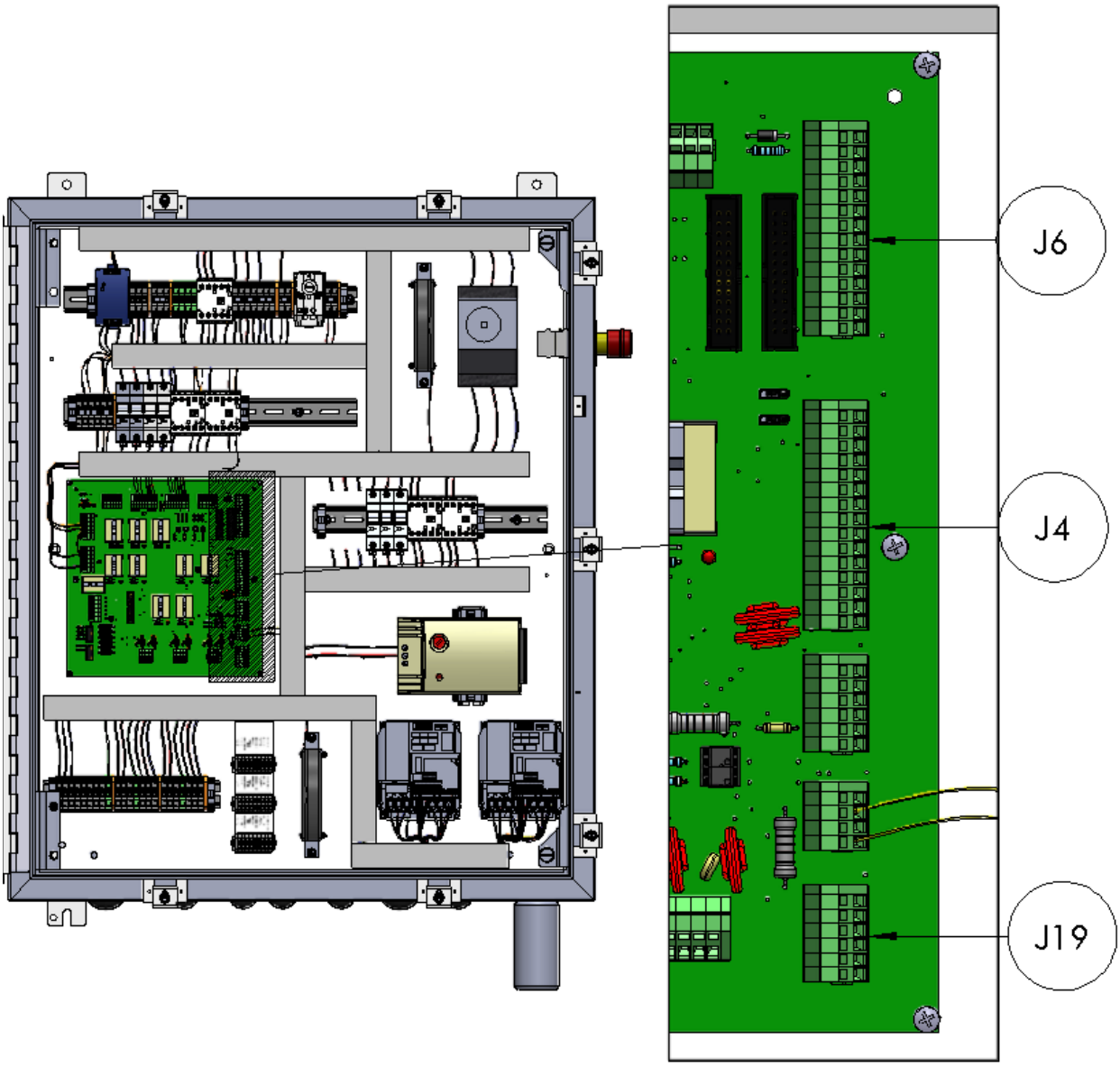


**Figure 5: ACU Connection Locations**

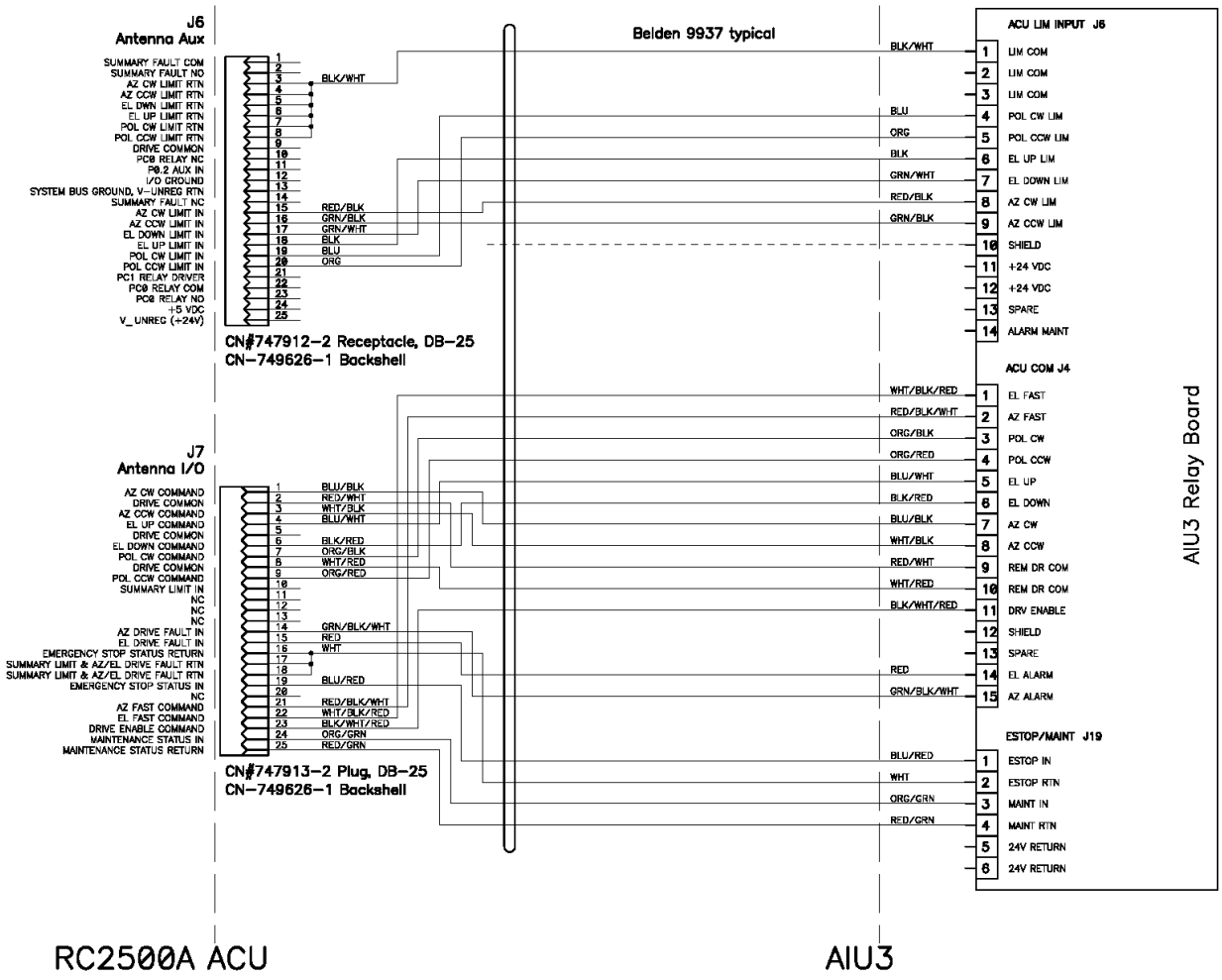


**Figure 6: ACU to AIU3 Connections**

| *Signal* | *RC2500 Connection Point* | *Wire Color* | *AIU3 Connection Point* |
|---|---|---|---|
| AZ CW Lim Rtn | J6:3 | Black/White | FB1:J6:1 |
| AZ CCW Lim Rtn | J6:4 | Jumper to J6:3 | NC |
| EL Down Lim Rtn | J6:5 | Jumper to J6:4 | NC |
| EL Up Lim Rtn | J6:6 | Jumper to J6:5 | NC |
| POL CW Lim Rtn | J6:7 | Jumper to J6:6 | NC |
| POL CCW Lim Rtn | J6:8 | Jumper to J6:7 | NC |
| AZ CW Lim In | J6:15 | Red/Black | FB1:J6:8 |
| AZ CCW Lim Rtn | J6:16 | Green/Black | FB1:J6:9 |
| EL Down Lim Rtn | J6:17 | Green/White | FB1:J6:7 |
| EL Up Lim Rtn | J6:18 | Black | FB1:J6:6 |
| POL CW Lim Rtn | J6:19 | Blue | FB1:J6:4 |
| POL CCW Lim Rtn | J6:20 | Orange | FB1:J6:5 |
| Shield | NC | Shield | FB1:J6:10 |

**Table 2: J6 Connections**

| *Signal* | *RC2500 Connection Point* | *Wire Color* | *AIU3 Connection Point* |
|---|---|---|---|
| AZ CW Command | J7:1 | Blue/Black | FB1:J4:7 |
| Drive Common | J7:2 | Red/White | FB1:J4:9 |
| AZ CCW Command | J7:3 | White/Black | FB1:J4:8 |
| EL Up Command | J7:4 | Blue/White | FB1:J4:5 |
| EL Down Command | J7:6 | Black/Red | FB1:J4:6 |
| POL CW Command | J7:7 | Orange/Black | FB1:J4:3 |
| Drive Common | J7:8 | White/Red | FB1:J4:10 |
| POL CCW Command | J7:9 | Orange/Red | FB1:J4:4 |
| AZ Drive Fault In | J7:14 | Green/Black/White | FB1:J4:15 |
| EL Drive Fault In | J7:15 | Red | FB1:J4:14 |
| E-Stop Status Rtn | J7:16 | White | FB1:J19:2 |
| AZ/EL Drive Fault Rtn | J7:17 | Jumper to J7:16 | NC |
| AZ/EL Drive Fault Rtn | J7:18 | Jumper to J7:17 | NC |
| E-Stop Status In | J7:19 | Blue/Red | FB1:J19:1 |
| AZ Fast Command | J7:21 | Red/Black/White | FB1:J4:2 |
| EL Fast Command | J7:22 | White/Black/Red | FB1:J4:1 |
| Drive Enable | J7:23 | Black/White/Red | FB1:J4:11 |
| Maintenance Status In | J7:24 | Orange/Green | FB1:J19:3 |
| Maintenance Status Rtn | J7:25 | Red/Green | FB1:J19:4 |

**Table 3: J7 Connections**

## 3.2 Resolver Wiring

### 3.2.1 Resolver to AIU

The AIU3 will include junction blocks as a landing point for the cables coming from the AZ/EL/POL resolvers. The location of the junction blocks inside of the AIU3 are shown in Figure 7.

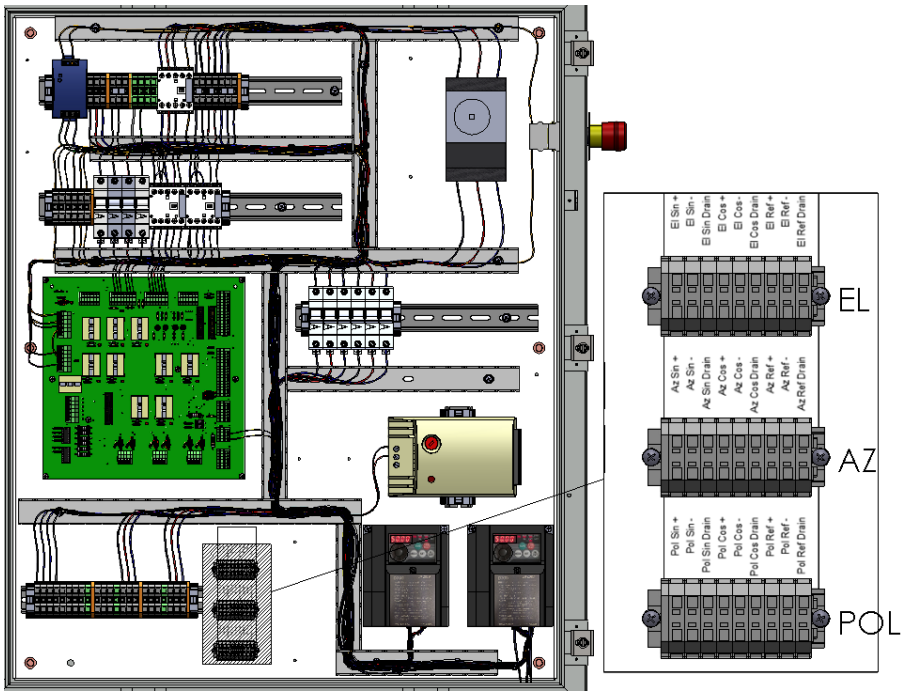


**Figure 7: Resolver Junction Blocks**

The connections from each resolver to the junction blocks are shown in Table 4. Wire colors shown are based on Belden 8777 cable. The RCI part number for this cable is CBL-3X2_22STP1 and is available for order with the AIU3.

**Note:Ensure that the shield wires do not make any connections to the metal inside the AIU.**

| *Signal* | *Resolver Wire Color* | *Belden 8777 Wire Color* | *Terminal Block Connection* |
|---|---|---|---|
| Sin + | Yellow | Green Foil/White | Sin + |
| Sin - | Blue | Green Foil/Black | Sin - |
| Sin Drain | N/A | Green Foil/Shield | Sin Drain |
| Cos + | Red | Red Foil/Red | Cos + |
| Cos - | Black | Red Foil/Black | Cos - |
| Cos Drain | N/A | Red Foil/Shield | Cos Drain |
| Ref + | Red/White | Blue Foil/Green | Ref + |
| Ref - | Yellow/White | Blue Foil/Black | Ref - |
| Ref Drain | N/A | Blue Foil/Shield | Ref Drain |

**Table 4: AIU Resolver Connections**

### 3.2.2 AIU to Controller

The AIU3 will include junction blocks as a landing point for the resolver cable coming from the ACU. The location of the junction blocks inside of the AIU3 are shown in Figure 7.

The connections from the ACU to the junction blocks are shown in Table 5. Wire colors shown are based on Belden 8777 cable. The RCI part number for this cable is CBL-3X2_22STP1 and is available for order with the AIU3.

**Note:Ensure that the shield wires do not make any connections to the metal inside the AIU.**

| *Signal* | *Terminal Block Connection* | *Belden 8777 Wire Color* | *ACU DB9 Connection* |
|---|---|---|---|
| Sin + | Sin + | Green Foil/White | 5 |
| Sin - | Sin - | Green Foil/Black | 3 |
| Sin Drain | Sin Drain | Green Foil/Shield | 7 |
| Cos + | Cos + | Red Foil/Red | 9 |
| Cos - | Cos - | Red Foil/Black | 4 |
| Cos Drain | Cos Drain | Red Foil/Shield | 6 |
| Ref + | Ref + | Blue Foil/Green | 2 |
| Ref - | Ref - | Blue Foil/Black | 8 |
| Ref Drain | Ref Drain | Blue Foil/Shield | 1 |

**Table 5: AIU Resolver Connections**

## 3.3 Limit Switch Wiring

The AIU3 requires 1 normally closed contact at each limit for Azimuth, Elevation and Polarization. The landing location of the limit switch wires inside of the AIU3 are shown in Figure 8. A schematic of standard wiring between the limit switches and AIU3 is shown in Figure 9. All wire colors are based on using Alpha 2404C cable. The RCI part number for this cable is CBL-4_22SHLDUV and is available for order with the AIU3. The recommended strip length for the wires landing in the AIU3 is ¼".

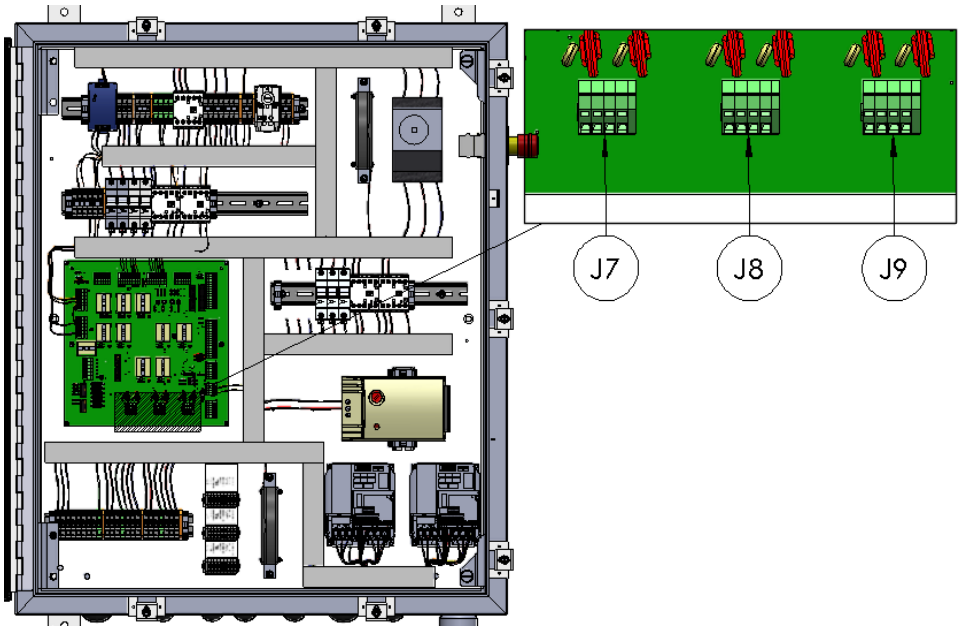


**Figure 8: Limit Switch Locations**

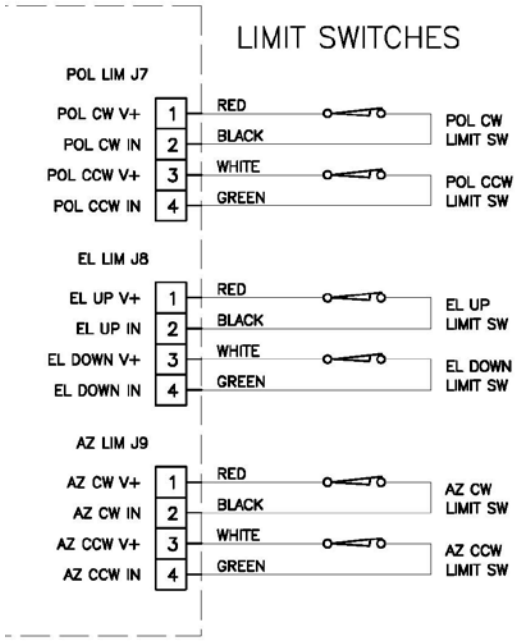


**Figure 9: Limit Switch Connections**

## 3.4 Elevation and Azimuth Motor Wiring

The AIU3 is designed to drive 3 phase AC motors for Elevation and Azimuth. The AIU3 will be configured for the proper voltage and power of each motor when ordered. The landing location of the motor wires inside of the AIU3 are shown in Figure 10.

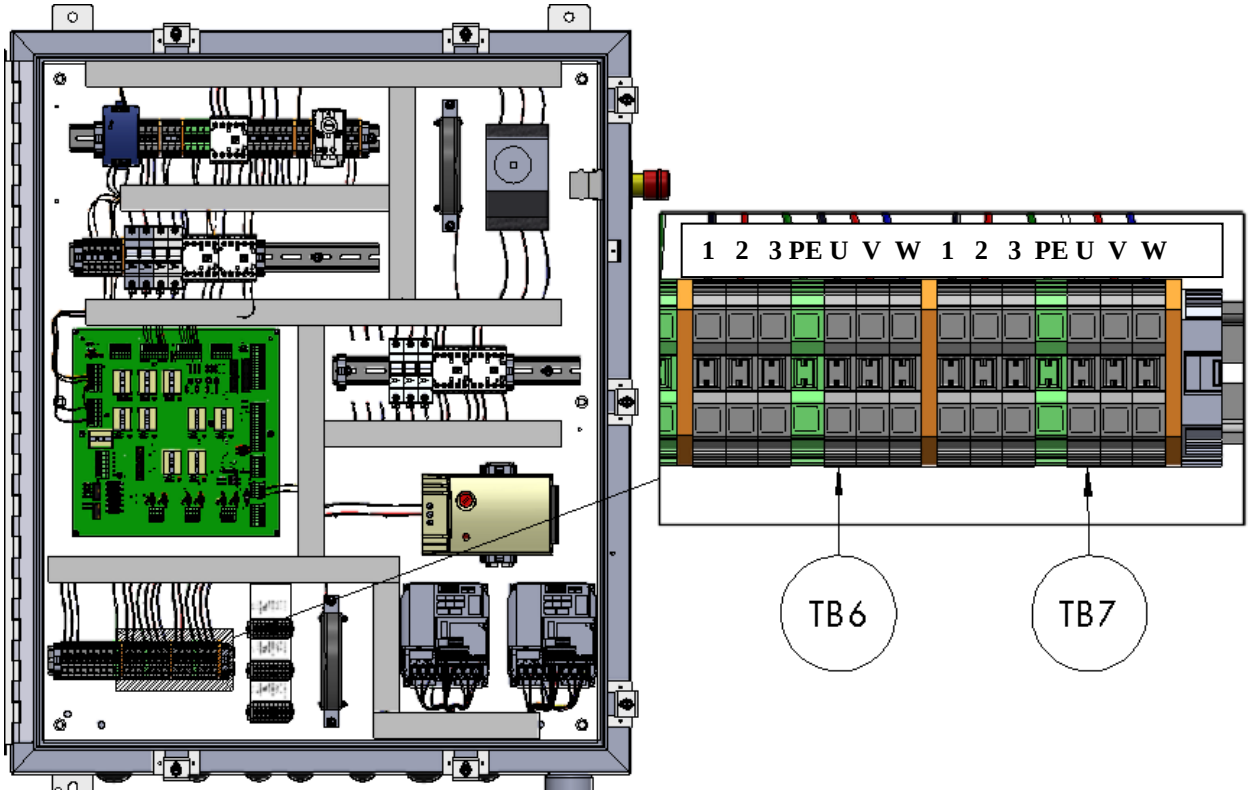


**Figure 10: Elevation and Azimuth Motor Wire Locations**

Table 6 shows the connections for the Elevation motor and Table 7 shows the connections for the Azimuth motor.

| *Signal* | *Terminal* |
|---|---|
| Phase 1 (U,T1) | TB6:U |
| Phase 2 (V,T2) | TB6:V |
| Phase 3 (W,T3) | TB6:W |
| Motor Ground | TB6:PE |

**Table 6: Elevation Motor Wires**

| *Signal* | *Terminal* |
|---|---|
| Phase 1 (U,T1) | TB7:U |
| Phase 2 (V,T2) | TB7:V |
| Phase 3 (W,T3) | TB7:W |
| Motor Ground | TB7:PE |

**Table 7: Azimuth Motor Wires**

## 3.5 Polarization Motor Wiring

The AIU3 can be configured to work with a wide range a polarization motors. The AIU3 will be properly configured for the antenna Polarization motor specified by the customer. Figure 11 shows the landing location of the Polarization motor wires. For detailed connection information, please consult the schematic at the end of the installation manual.

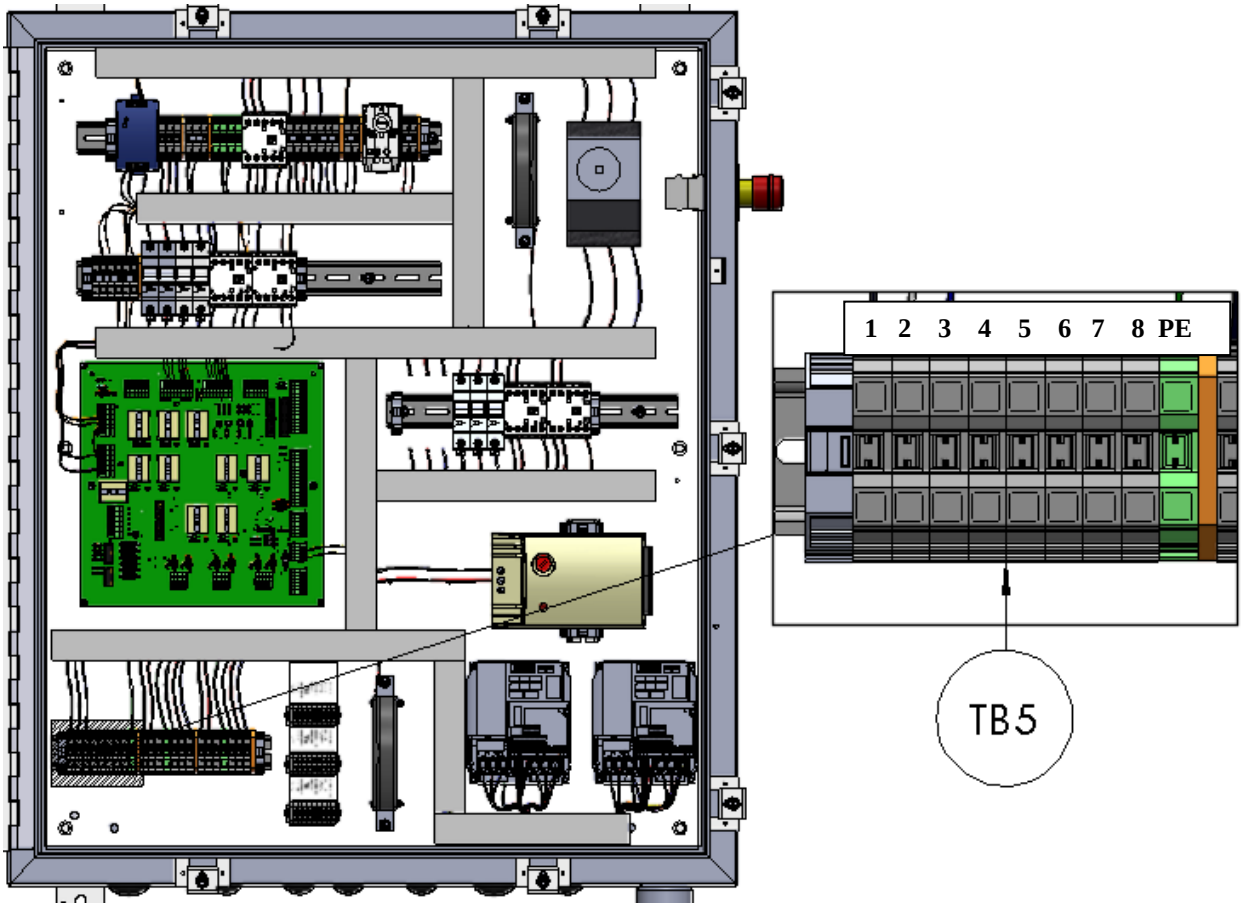


**Figure 11: Polarization Motor Wire Location**

## 3.6 Elevation and Azimuth Brake Wiring

If specified during the ordering process, the AIU3 will come equipped with the proper hardware to actuate brakes for Elevation and Azimuth. The landing locations for the Elevation brake (TB6) and Azimuth brake (TB7) are shown in Figure 12. The AIU3 can be configure for a wide range of brake options, so it is important to consult the schematic at the end of the installation manual for detailed information on how to properly wire the brakes.

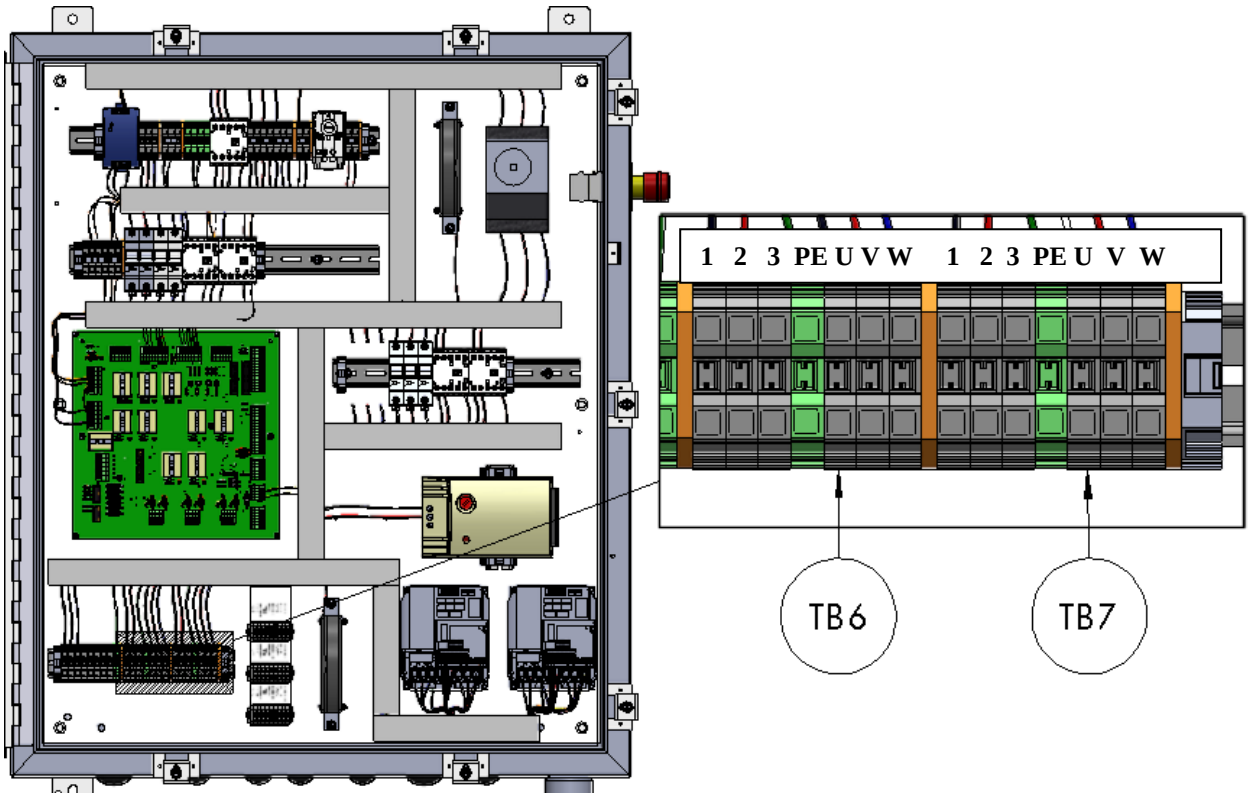


**Figure 12: Elevation and Azimuth Brake Locations**

## 3.7 AC Input Wiring

The AIU3 is setup to operate using a 3 phase AC input, with a neutral and potential earth connection. The AIU3 will be configured to operate with the proper voltage specified during ordering. The landing location of the AC input power is shown in Figure 13. Table 8 shows the connections for the AC input wiring.

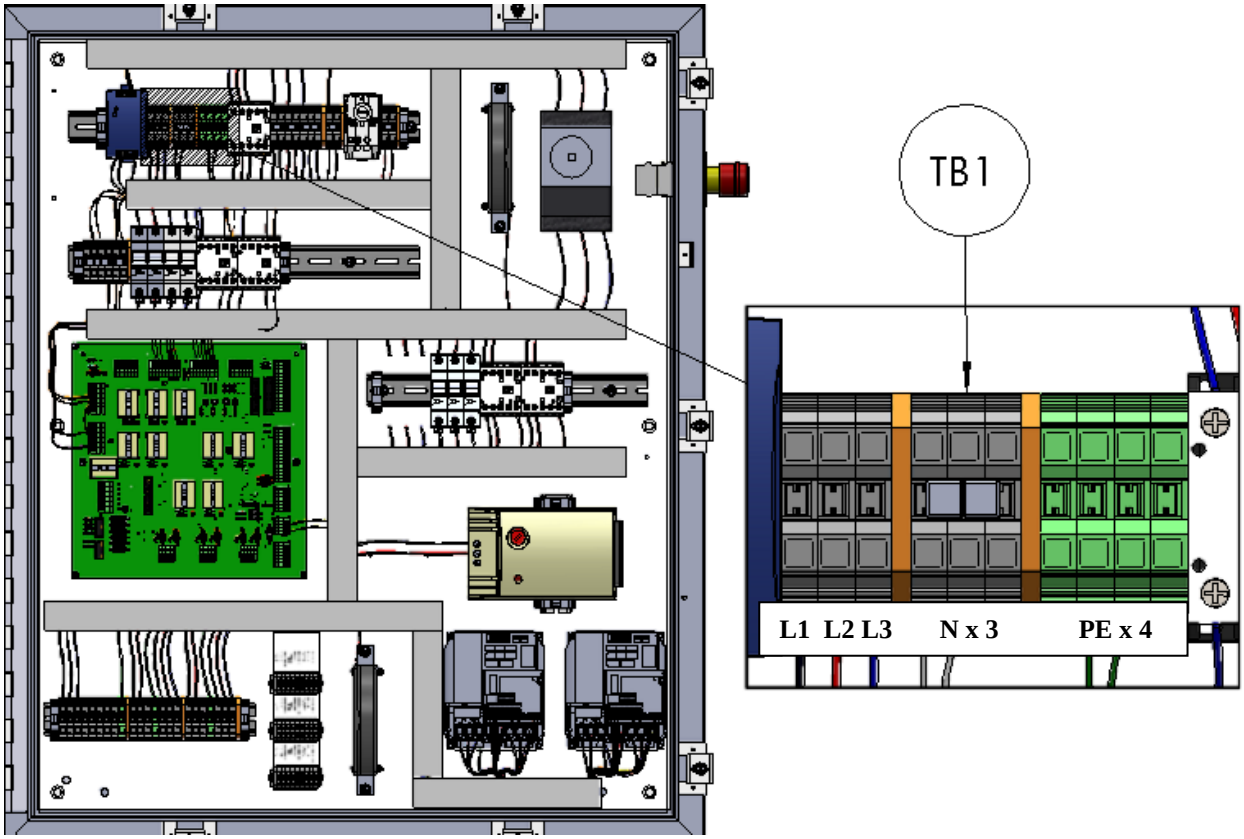


**Figure 13: AC Input Wiring**

| *Signal* | *Terminal* |
|---|---|
| Phase 1 (L1) | TB1:L1 |
| Phase 2 (L2) | TB1:L2 |
| Phase 3 (L3) | TB1:L3 |
| Neutral | TB1:N |
| Potential Earth | TB1:PE |

**Table 8: AC Input Wires**

# 4 Annual Maintenance

- Inspect the inside of the enclosure for dirt and signs of water ingress.
- Inspect all wires and components for signs of excessive heat.
- Ensure that all liquid tight cable clamps or conduit connections are tightened correctly.
- If desiccant is used, replace the bag/canister.

# 5 Service

Refer to the schematic supplied with the AIU3 for part numbers of each component. For technical support or to purchase replacement components, contact Research Concepts using the phone number between the hours of 8AM and 5PM Central Time Monday through Friday. For help outside of normal business hours, please e-mail support@researchconcepts.com and a technician will respond as they become available.

# 6 Warranty Statement

Research Concepts, Inc.(RCI) warrants to the original purchaser, this product shall be free from defects in material and workmanship for one year, unless expressed otherwise, from the date of the original purchase.

During the warranty period, RCI will provide, free of charge, both parts and labor necessary to correct such defects.

To obtain such a warranty service, the original purchaser must:

1) Notify RCI as soon as possible after discovery of a possible defect, of:
   a) the model and serial number
   b) identify the date of purchase
   c) Provide a detailed description of the problem, including details on the electrical connection to associated equipment and list of such equipment, and circumstances when problem arose.
2) If shipment to RCI is required, a Return Material Authorization number (RMA#) is required prior to shipment.
3) Deliver the product to RCI, or ship the same in its original container or equivalent, fully insured and shipping charges prepaid. Any duties and taxes incurred will the responsibility of the original purchaser. For assistance on international shipping, please contact RCI.
4) After repair, RCI will provide ground shipping to any location in the continuous 48 US states. Express shipping and shipping outside of the continuous 48 US states will be the responsibility of the customer.

Correct maintenance, repair, and use are important to obtain proper performance from this product. Therefore, read the instruction manual carefully and completely. This warranty does not apply to any defect that RCI determines is due to:

- Improper maintenance or repair, including the installation of parts or accessories that do not conform to the quality and specifications of the original parts.
- Misuse, abuse, neglect, or improper installation including disregard for installation of backup or safety override equipment.
- Accidental or intentional damage.
- Lightning or acts of God.

There are no additional implied warranties.

The foregoing constitutes RCI's entire obligation with respect to this product, and the original purchaser and any user or owner shall have no other remedy and no claim for incidental or consequential damages. Some states do not allow limitations or exclusions of incidental or consequential damages, so the above limitation and exclusion may not apply to you. This warranty gives you specific legal rights and you may also have other rights which may vary from state to state.

RCI retains the right to make changes to these specifications any time, without notice.

# 7 AIU3 Configuration Worksheet

**Input Voltage**

What is the site voltage? _____
How many phases? _____
Is there a separate Neutral? (Yes/No) _____
Is there a separate Ground? (Yes/No) _____

**Elevation Motor**

What is the motor voltage? _____
How many phases? _____
What is the power rating? (HP or kW) _____
Does the motor require brakes? (Yes/No) _____
If Yes:
What is the voltage for the brakes? _____
If AC Voltage, how many phases? _____
What is the current required? _____

**Azimuth Motor**

What is the motor voltage? _____
What is the power rating? (HP or kW) _____
Does the motor require brakes? (Yes/No) _____
If Yes:
What is the voltage for the brakes? _____
If AC Voltage, how many phases? _____
What is the current required? _____

**Polarization Motor**

Does the antenna have a Polarization Motor? (Yes/No) _____
If Yes:
What is the voltage? _____
AC or DC? _____
For AC motors, how many phases? _____
What is the maximum current draw? _____
Are starting components required? (Yes/No) _____
If Yes:
What are the values and/or part numbers of the components?
_____
_____
_____
_____