austin insulators inc

*Installation Instructions for*

# A-E01D1

## Austin E-Cap Series
## Isolation Transformer

Dual Winding Multi-Voltage

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## AUSTIN ISOLATION TRANSFORMER
## E-CAP A-E01D1

### PLEASE READ THESE INSTRUCTIONS CAREFULLY BEFORE INSTALLING ANY LIGHTING TRANSFORMER, WHETHER ON A NEW INSTALLATION, OR AS A REPLACEMENT UNIT

The Austin E-Cap Isolation Transformer is intended for use on LF to HF radio masts, antennas and towers with low to moderate RF potential. When installed in an open environment, the permissible RF potential between primary and secondary sides must be less than the wet flashover figures given below.

For operation under wet, dusty or insect infested conditions the maximum permissible voltage will depend on the amount of rain, etc., the frequency of occurrence and the acceptability of occasional arc overs and level of drip corona. Under heavy rain conditions, excessive drip corona may occur before arc over. It is unlikely that satisfactory operation in an exposed location will be achieved above the following levels:

| CAPACITY RATING: VA | NOMINAL OUTPUT VOLTAGE | AC VOLTAGE FREQUENCY | RF FLASHOVER WET- SEA LEVEL |
|---|---|---|---|
| 170 | 115 / 230 | 50 / 60 Hz | 14 KV Peak |

### CAUTION

**Before beginning any installation, repairs or adjustments, Make sure the following conditions are met!**

1. Ensure the RF Transmitter is off.
2. Ensure the tower or mast is grounded.
3. Ensure that the supply power wires are not "live".
4. Check that the tower lighting circuit is not faulty.
5. Ensure the lighting load does not exceed the transformer capacity rating.
6. Ensure that the primary protective circuit meets following specifications.

## Primary Protective Circuit

Where incandescent lighting is used, a circuit breaker is not recommended unless it has been chosen to have the required delayed action to withstand the inrush current to the tower lighting equipment. A fuse will provide ideal protection and has the inherent thermal delay to deal with the inrush current when activated.

Towers that employ LED, neon or xenon lighting will not be affected by inrush currents to the same degree.

Whether a fuse or circuit breaker is chosen, its operating current should be approximately 35 per cent above the normal operating current for the lamp load in use. The maximum recommended fuse rating for the A-E01D1 is 4 amps.

Transformers are sometimes damaged due to choosing the incorrect protective circuit. Though there is some flux leakage resulting from the isolated nature of the primary and secondary windings, the self-regulation design of the transformer makes the windings susceptible to over-heating and damage if the full load rating is exceeded. The safest operation is assured if the primary current is measured under normal load conditions and a fuse chosen with a rating approximately 35 percent above this operating current.

## Installation -Mounting

**WARNING:** DO NOT ATTEMPT TO TURN OR ADJUST THE PIPE NIPPLES THAT ARE MOLDED INTO THE TRANSFORMER BODY. APPLYING EXCESSIVE FORCE TO THE FITTINGS WILL BREAK THE SEALS AND ALLOW WATER TO ENTER.

The E-Cap transformers are shipped in tri-wall cartons. When removing the transformer from its carton, do not attempt to lift it out by grasping the spark gap arms or the wiring harnesses. Carefully lift the transformer by supporting the body of the unit.

Do not lay the transformer body on its 'sides' which would pinch the wiring against the ends of the pipe fittings. Do not lay the transformer body on its 'front' surface with the spark gap downward, as this could bend the spark gap support arms.

The transformer body may be positioned on its back or upside down and resting on it's top while fittings and wiring are installed.

The E-Cap transformers are designed to be mounted vertically using a single steel post.

This mounting post may be one of the following types:

A steel post having an outside diameter of 1 3/8” (1.375”)
A steel pipe having an inside diameter of 1”
A standard steel pipe having an outside diameter of 30 to 35 mm.

The mounting flange in the base of the A-E01D1 will fit over any of these mounting posts without the need for threads or other preparation. A set-screw is provided to lock the transformer in position.

## **Installation - Mounting** cont.

The E-Cap should be situated so that the bottom of the transformer is approximately level with the base of the mast or tower it services. In any event, Austin recommends the E-Cap module be high enough above grade or the surrounding ground level to avert any possibility of contact with water. The transformer must be mounted at a sufficient distance from the tower or mast to prevent any arc-over or corona, especially during inclement weather.

The spark gap spacing on the A-E01D1 has been set at the factory. No further adjustment should be necessary. The spark gap balls should be approximately 2" or 5 cm from the body of the transformer, and approximately 1 1/2" or 3.5 cm apart. If the transformer has been subjected to extremely rough handling during transport the spark gap may require adjustment. Refer to Appendix II for instructions on Transformer Adjustments.

### **Installation -Bonding**

The Primary or Input side of the transformer should be grounded by three different means.

1. Power supply conduit ground.

The transformer has been designed to be connected to the main electrical supply and the tower lighting by means of a metal electrical conduit. This may take the form of a rigid pipe or flexible metallic conduit with a watertight covering. In either case, the installer should ensure the conduit is installed in accordance with the manufacturers instructions and local electrical codes.

2. Power supply ground conductor.

A separate electrical conductor must be included in the power supply conduit for the purposes of grounding. It should be connected to the interior of the transformer junction box by means of the supplied grounding screw. The other end should be connected to a ground point in the main electrical supply box in accordance with local regulations.

3. Exterior Grounding Stud

A threaded stud with accompanying hardware has been supplied for bonding the primary side of the transformer with a good mechanical and electrical connection to the antenna ground system. This stud is located on the lower spark gap arm mounting collar, and points downward near the base of the unit. It is designed to accommodate a ground strap terminal with a 3/8" or 1 cm hole. All bonding connections should be made as short and direct as possible.

**Installation - Bonding** cont.

The Secondary or Output side of the transformer relies on two methods to remain bonded to the mast or tower.

1. Austin Insulators recommends using a rigid metal or flexible metallic conduit with a watertight covering to connect the output of the secondary transformer windings to the lighting junction box on the mast or tower. The installer must be sure the conduit is installed in accordance with the conduit manufacturers instructions and local electrical codes.

2. A separate ground braid wire is included with the secondary power output wires. If a junction box is used on the output side of the transformer, this ground braid should be connected to the interior of the box by means of the supplied grounding screw. In either case, a separate electrical conductor wire must pass through the conduit and be connected to the approved ground point in the tower lighting junction box.

**Installation - Wiring**

In order to ensure that no substantial radio frequency potential exists between the secondary winding and its outer shield, special noise squelching circuits have been built into the E-Cap transformer series. These circuits provide a path to dissipate any static charge or RF interference that might be induced in the secondary power circuit. These EMI and capacitance devices will provide a cleaner power output without affecting the electrical or performance characteristics of the transformer.

The tower lighting circuit should be run through a continuous metallic conduit that is well bonded to the mast. This will greatly assist in reducing electro-magnetic interference.
The primary power should also be brought to the transformer from the main power supply through conduit or metallic covered cable which is bonded to the antenna ground system.

The grounding braid and electrical conductors mentioned previously are critical to the safe and reliable operation of the E-Cap transformer. If all installation procedures are adhered to, the bonding and filtering will provide adequate protection against stray RF pick-up and electrical noise.

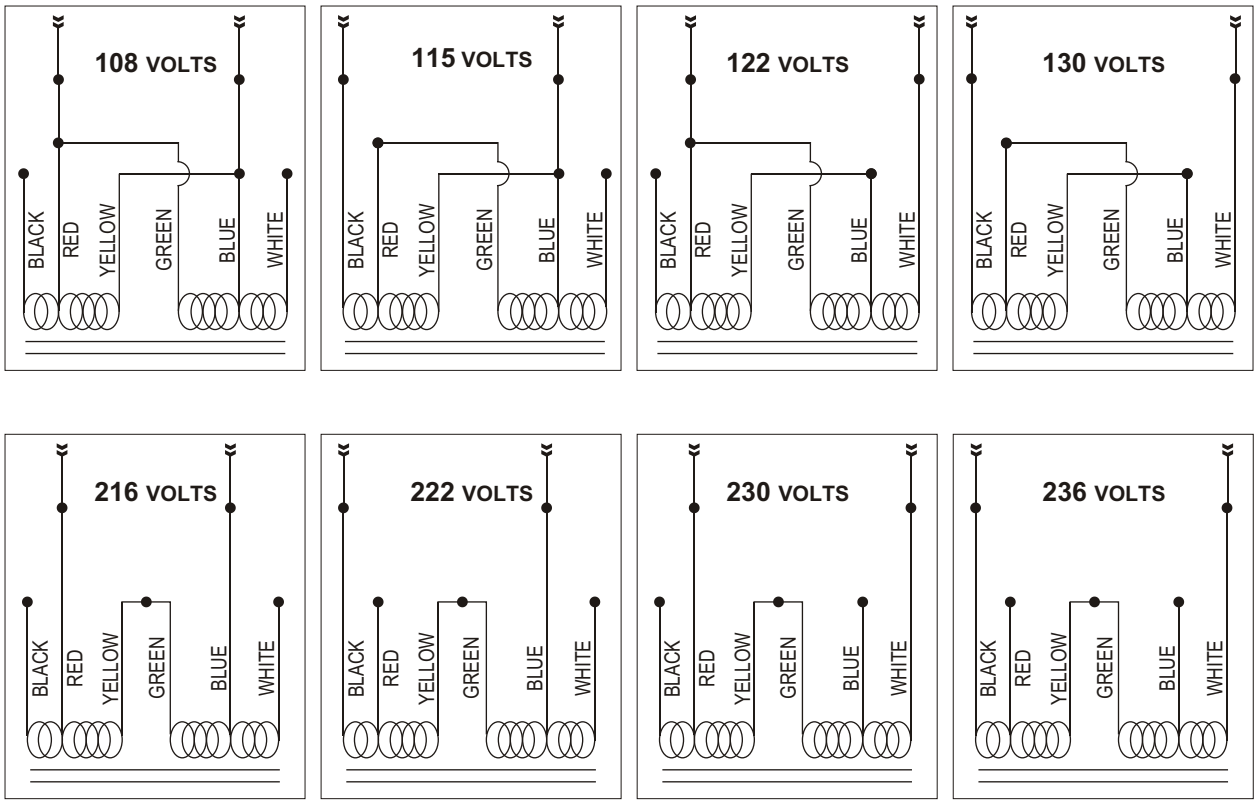
## Installation - Primary Connections

Two sets of primary windings are provided on the transformer. Portions of these windings can be connected in series for use with a nominal 230 volt source, or in parallel for use with a nominal 115 volt power source. Due to the arrangement of voltage adjustment taps, caution must be used in making the parallel connections.

The section of the primary windings connected to the Red and Yellow wires, and the Green and Blue wires are balanced, and can be connected in parallel as shown below. The outer portions of the primary windings connected to the Black and White wires are not identical, and have been designed to give greater flexibility when voltage adjustments are required. The diagrams below illustrate the various combinations that may be used with either voltage range.

The output on the secondary side of the transformer has been designed to be either 115 volts or 230 volts. However, if a slightly higher output voltage is necessary, the primary voltage taps may be used to increase the output of the transformer. For example, if 120 volts output is required, a 115 volt supply may be connected to the 108 volt taps on the primary side. Use caution when making these adjustments.

PRIMARY INPUT CONNECTIONS FOR VARIOUS SUPPLY VOLTAGES



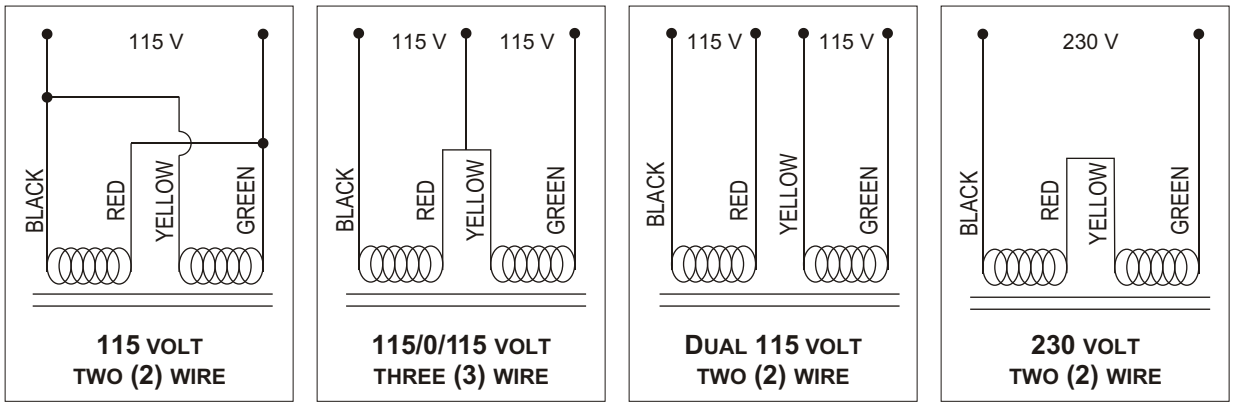

All the wire connections ***including*** the unused wires, should be well insulated with approved connectors, then double-insulated with electrical tape.

## Installation -Secondary Connections

Two identical secondary windings are provided on each transformer. These can be connected in series or in parallel, or used as individual windings. Each of the two secondary windings is designed to carry half the rated KVAoutput of the transformer.

The secondary windings may be connected in parallel for 115 volt output, or wired in series for use in 230 volt applications.

The diagrams below illustrate the possible combinations of output connections. The output voltage and configuration will be determined by the requirements of the tower lighting system. Refer to the lighting manual and specifications before connecting the output of the A-E01D1 to the tower lighting.




**Secondary Wiring Configurations for 115 and 230 volt output**

All the wire connections should be well insulated with approved connectors, then double-insulated with electrical tape.

## APPENDIX I
### Troubleshooting Guide

| PROBLEM | POSSIBLE CAUSE | RESOLUTION |
|---|---|---|
| High amperage draw with no load present | Possible short circuit in the secondary junction box. Windings are connected incorrectly for input voltage. | Check all wires and connections for shorts and exposed conductors. Test supply voltage level and consult wiring diagrams on page 6 for proper connections. |
| Output voltage is very low. | Secondary connection does not match the primary connection. | Test the supply voltage to the transformer primary. Consult wiring diagrams on page 6 and 7 to be sure output matches the input connections. |
| Output voltage is slightly higher or lower than expected. | No load on the secondary, or the load exceeds the transformer ratings. | Test the voltage and amperage load on the secondary and compare it to the primary input. |
| | Incorrect Primary taps have been used. | Use the following chart to ensure the output falls within the guidelines for transformer use. |
| Primary input voltage is present. No output on secondary. | Possible connection problems. Windings are out of phase. | Consult wiring diagrams on page 6 and 7 for proper connections of the Primary and Secondary windings. The wire colors must be hooked up correctly for the transformer to operate. |

### Charts for Output Voltages at Various VA Loads

In order for the E-Cap series of transformers to achieve maximum isolation, some magnetic de-coupling is inevitable. The following charts show the voltage shift as the lighting load increases.

| 115 Volts Input | |
|---|---|
| Volts Out | VA Out |
| 121 | 0 |
| 120 | 36 |
| 119 | 63 |
| 117 | 99 |
| 112 | 160 |

| 230 Volts Input | |
|---|---|
| Volts Out | VA Out |
| 240 | 0 |
| 235 | 50 |
| 232 | 92 |
| 226 | 135 |
| 220 | 155 |

NOTE: When using any sort of meter to test the E-Cap windings, please remember the built-in filter system may affect the readings to some slight degree.

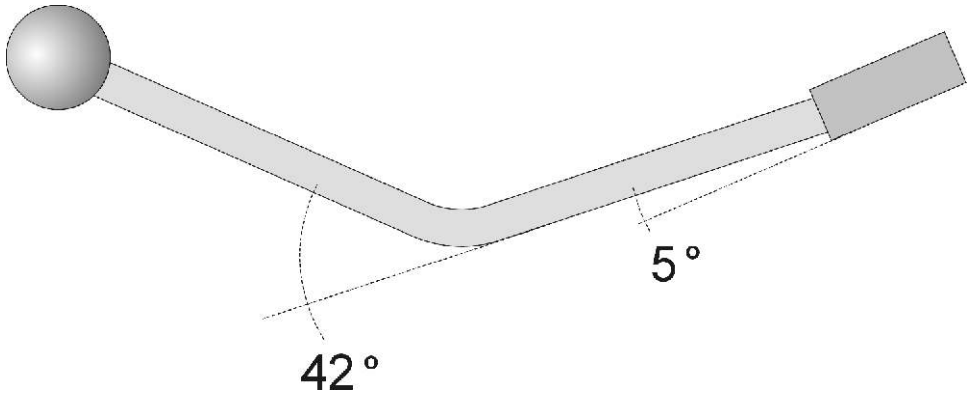
## APPENDIX II
### Spark Gap Alignment

The spark gap on the E-Cap A-E01D1 is preset at the factory and should not require adjustment. If the transformer has suffered damage in shipment and the gap ball support arms have been bent it will be necessary to re-align the spark gap.

**ATTENTION:** Under no circumstances should you attempt to bend the support arms while they are attached to the transformer body.

1. Disconnect any wires in the junction boxes.
2. Remove the junction boxes from the pipe fittings in the transformer body. Do **NOT** apply excessive force to the pipe fittings or attempt to remove them from the transformer. They are permanently molded into the casing.
3. Locate and loosen the set screw in the arm mounting collar.
4. Slide the arm assembly off the pipe fitting.
5. Consult the diagram to check the proper angles for the support arm. If the angle from the collar to the arm is not correct, place the collar in a vice and carefully bend the rod to the proper angle. If the bend in the arm is not correct, place one side of the rod in the vice and carefully bend the other side to the proper angle.
6. Check the arm angles and shape to see if it matches the diagram.

7. Reinstall the arm assembly. **NOTE:** There is a notch in the corner of the transformer body that allows the rod to lock into place as it passes the corner. Be sure the rod is fit into this notch to prevent misalignment of the spark gap.
8. Tighten the set screw to keep the arm in position.
9. Reinstall the junction boxes, being careful not to cut or damage the transformer wiring. **NOTE:** Do not apply excessive force to the junction boxes or any other fittings you may connect to the transformer. Use Teflon tape on the pipe threads to maintain a watertight seal without using undue force.



## Maintenance

The surface of the transformer should be kept reasonably free of dirt build-up to help prevent premature arc-overs and corona. The surface of the transformer is not affected by arcing, flashovers or other electrical phenomenon, and will not burn or 'track'.

If the transformer body is scratched during installation there is no need to touch-up the surface. The E-Cap casings will not rust, chip or absorb water.

After several years in full sunlight and extremes of weather, a slight “chalking” of the surface may occur.

***Please observe standard safety procedure for transformer repair and maintenance.***

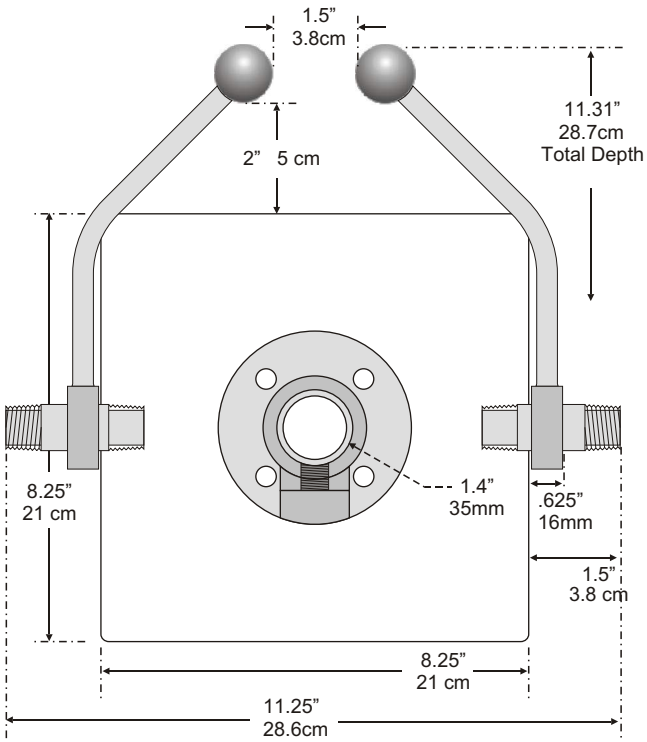
Using a fine steel wool or other mild abrasive, gently rub down surface of the transformer to remove the 'chalk' build-up. Wash the casing with a mild detergent, and treat with any commercially available exterior wax product.

This procedure will help to maintain the RF withstand rating of the transformer, and ensure that the E-Cap A-E01D1 will operate reliably for many more years to come.

No other maintenance procedures should be necessary.

The E-Cap transformers are designed to provide many years of trouble-free service. If they are installed and used in accordance with these instructions you may expect faithful and reliable operation.

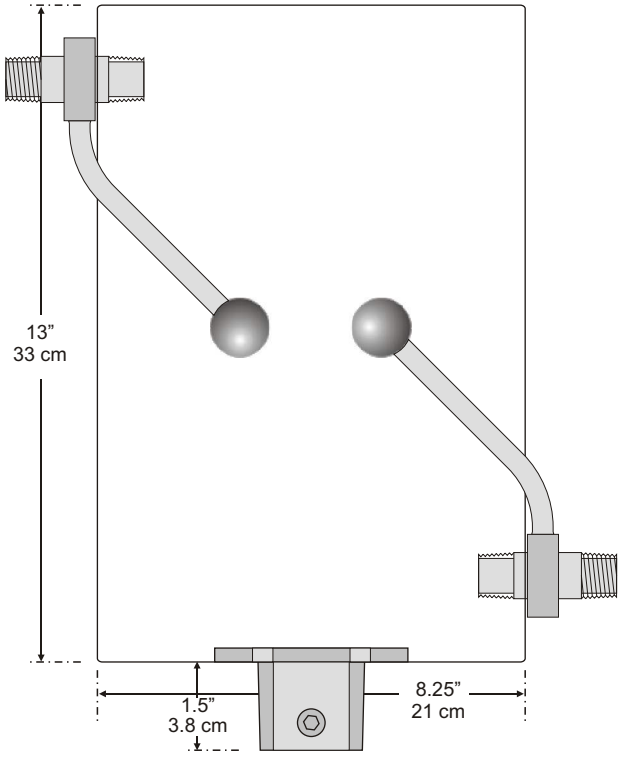
# Physical Diagrams & Dimensions for the E-Cap A-E01D1




**Transformer Footprint viewed from the bottom.**

Spark gap dimensions shown are approximate, and may vary by 0.25" or 6mm.

Mounting flange will accommodate pipe size from 30 to 35mm or 1.31" to 1.4".




**Transformer Profile viewed from "front" spark gap side**