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Broadcast Devices, Inc.

Technical Reference Manual

ACS-100-1/2 Antenna Switch Controller

Manufactured Exclusively for Electronics Research, Inc.

Chandler, Indiana

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I. Introduction

The ACS-100 Antenna Switch Control System family of controllers is designed to directly interface to all ERI R.F. switch products and can be interfaced to virtually any other R.F. switch products on the market. The ACS-100 is designed to connect to the switch assembly via a single plug in cable providing control, interlock and status of from one to up to four switch assemblies. Larger switching complexes can be accommodated by the use of additional slave chassis.

Basic Description of models:

The ACS-100-1 controls one - two position switch assembly.

Basic single switch controller for controlling up to two transmitters connected to up to two loads

The ACS-100-2 controls two – two position switch assemblies.

Controls two – two positions switch assemblies with a system mode based state machine. This allows single command ***simultaneous*** control of both switches when reconfiguration of the system requires both to be moved.
Note: This technical manual covers the installation, configuration and operation instructions for the ACS-100-1 and ACS-100-2 switch controllers.

II. Unpacking and Inspection

Carefully inspect the unit after unpacking and make certain that no damage has occurred during shipping. If damage is noted, contact the shipper immediately and file a claim for damages. Each unit is carefully packed and carries full insurance against damage. Inspect the packing list and make sure that the contents of the package match those described on the packing list.

III. Installation and Connections

Wiring Considerations:

The ACS-100 has the capability to totally automate the control of transmitters and switch operations with the touch of a button. The units have provision to turn transmitters off/on and provide interlock closures. Some applications may require separate transmitter of and on control in addition to interlock closures managing transmitter on/off functions. The contacts are provided for both. Some installations may call for interlock connections only to turn transmitters on and off. It is entirely up to the installer. The flexibility of both methods has been designed in to the ACS-100 series controllers.

Features of Operation:

Refer to ACS-100 REMOTE COMMAND/STATUS drawing in schematic section for the following discussion.

The ACS-100 is capable of automatic transmitter turn –on based on position of switch 1. This features allows the ACS-100 to turn on either or both transmitters when switch one is moved and the interlock path is re-established. Configuration of this feature is accomplished by shorting the appropriate connections on the TX ON configuration connector. When a jumper is installed, the transmitter on relay associated with that jumper will be momentarily energized when switch one is moved to that position.

Mode – N interlock inputs are provided on the REMOTE connector to assist in wiring the interlock string for each mode. Connect any interlock switches associated with each mode in series between the pin associated with that mode and a control/status common pin.

A. ACS-100-1/2 Install the unit in a suitable EIA rack enclosure.

As a safety precaution, never install a switch controller to a switch system that has radio frequency energy. present on it or where AC/DC control power is applied. This can be dangerous and can easily damage a switch!

1. Before applying power to the ACS-100-1 or to the switch assembly connect the supplied DB15 connector to the ERI motorized switch plug strip connector cable. To interface to other manufacturers switches contact the factory for availability of pre made cable assemblies. Please state manufacturer and model number when calling. The DB15 connection plugs into the ACS-100-1 "SW 1 I/O connector input on the rear of the unit. This connection is the only connection to the switch required except for electrical power. Control of the switch, position status and interlock control are all handled by this single cable. Additional switch position and/or interlock connections are available on the ERI plug strip connector.

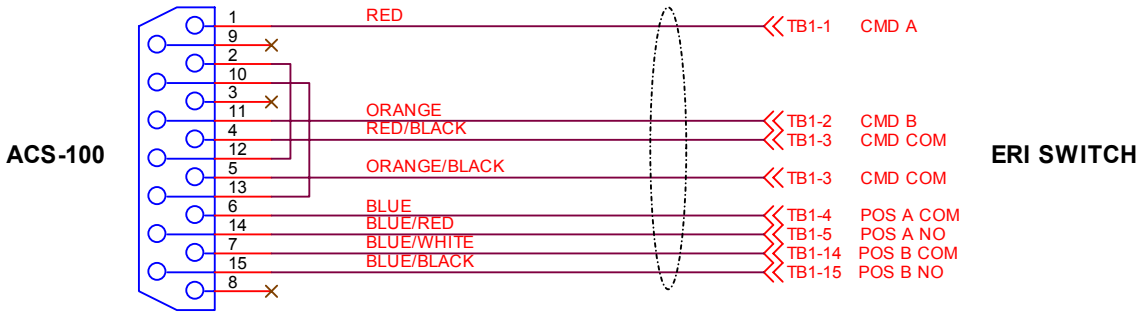
2. Next, apply power the ACS-100-1 and observe the front panel. If all connections are made properly and the switch is correctly seated in position A or B, the front panel display should indicate the present position of the switch assembly. If the switch assembly is not connected properly or is in the middle of its travel, the front panel will indicate "Check Switch". In this case check that the switch is seated properly by applying power. If the switch is in mid travel it will go to the position that the internal latching relay commands it to be in. Recheck the ACS-100-1 display for proper position indication. If the ACS-100-1 still shows "Check Switch" then the most probable cause is a defective interface cable or a problem with the switch electronics.

3. Make remote control, status and transmitter control connections to ACS-100-1 rear panel remote control connector according to tables below. Note that the common connection for command and status is ground. The interlock connections are dry contact relays with 24 VDC 3 Ampere contact ratings which can be interfaced to an external interlock as desired.

The Table below describes pin functionality for the rear panel DB-15 Switch Input Output Connectors. Use the diagrams supplied for connection information to the brand and model switch being interfaced to.

SW I/O DB-15 Table 1

Connector Pin#	Connector Pin Designation
1	Command A Output
2	Jumper to Pin 12
3	Not used
4	+12 VDC
5	+12 VDC
6	Position A Status Input
7	Position B Status Input
8	Not used
9	Not used
10	Jumper to Pin 13
11	Command B Output
12	Jumper to Pin 2
13	Jumper to Pin 10
14	Position A Status Command
15	Position B Status Command



SW I/O DB-15 Pin Out Diagram

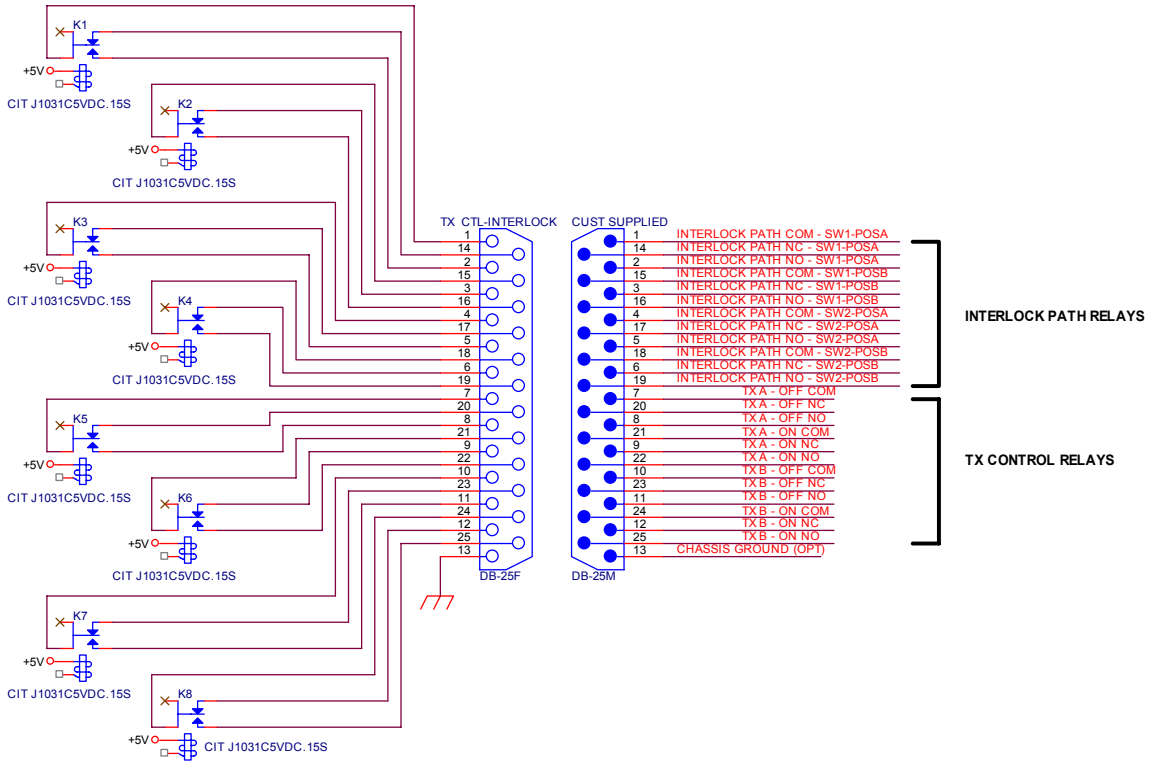
*** See Section VII. For other switch manufacture interfaces**

TX CTL/Interlock DB-25 Connector Table 2

Connector Pin#	Connector Pin Designation
1	Interlock PATH COM SW1-POS A
14	Interlock PATH NC SW1-POS A
2	Interlock PATH NO SW1-POS A
15	Interlock PATH COM SW1-POS B
3	Interlock PATH NC SW1-POS B
16	Interlock PATH NO SW1-POS B
4	Interlock PATH COM SW2-POS A *
17	Interlock PATH NC SW2-POS A *
5	Interlock PATH NO SW2-POS A *
18	Interlock PATH COM SW2-POS B *
6	Interlock PATH NC SW2-POS B *
19	Interlock PATH NO SW2-POS B *
7	TX A-OFF COM
20	TX A-OFF NC
8	TX A-OFF NO
21	TX A- ON COM
9	TX A-ON NC
22	TX A-ON NO
10	TX B-OFF COM
23	TX B-OFF NC
11	TX B-OFF NO
24	TX B-ON COM
12	TX B-ON NC
25	TX B-ON NO
13	CHASSIS GROUND

* ACS-100-2

Note that Position A Relay is energized for Position A “selected” (Common and NO connections are made)
And Position B Relay is energized for Position B “selected” (Common and NO connections are made)

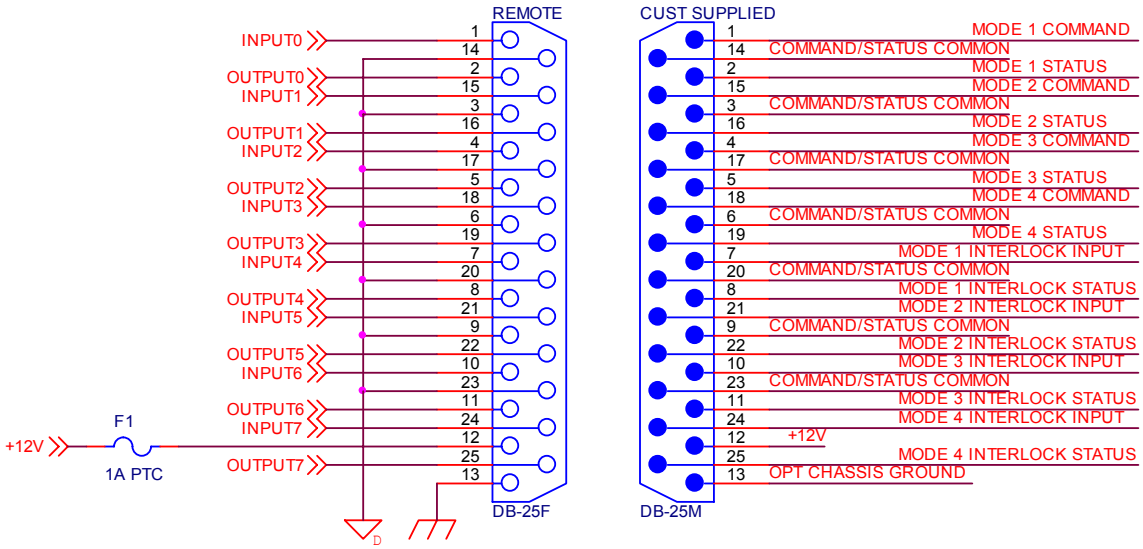


TX CTL/Interlock DB-25 Connector Pin Out Diagram

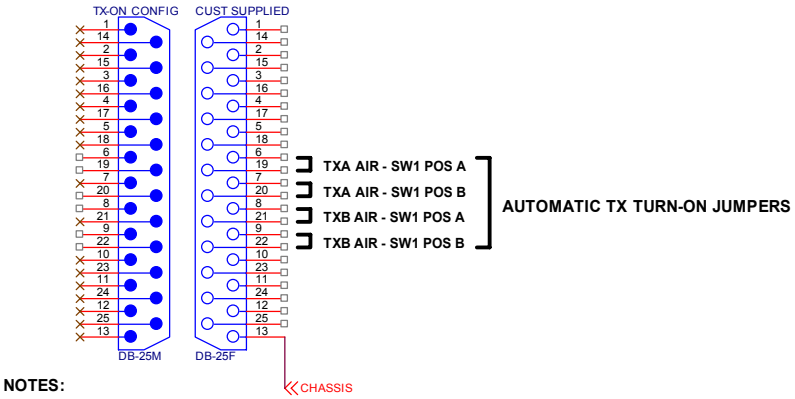
Remote/Status DB-25 Table 3 – Labeled "Remote" on rear of unit

Connector Pin#	Connector Pin Designation
1	Position A Command
2	Position A Status – Active Low
3	Control/Status Common – Digital Ground
8	Interlock Path B Status –Active Low
9	Status Common
15	Position B Command
16	Position B Status – Active Low
17	Status Common
19	Interlock Path A Status – Active Low
20	Status Common
25	Chassis Ground

The above pin designations are for the ACS-100-1 single switch version Refer to the diagram below for connections of modes 3 and 4 for an ACS-100-2 installation.



Remote Control/Status DB-25 Pin Out Diagram



MODE - SWITCH POSITION TABLE

MODE	SWITCH 1	SWITCH 2
1	POS A	POS A
2	POS B	POS A
3	POS A	POS B
4	POS B	POS B

NOTES:

1. **CONNECT MODE 1-4 INTERLOCK INPUTS TO COMMON IF NOT USED.**
2. **CONNECT AUTO TX TURN-ON JUMPER TO ENABLE TX-ON RELAY FOR SW1.**

TX-ON Configuration Programming Data: The ACS-100 will issue TX on commands automatically when the transmitter selected to the antenna position is selected with use of the above jumper table. This diagram includes connection data for the ACS-100-1 and ACS-100-2. For ACS-100-1 installations

4. Make connections for automatic transmitter turn on if desired according to the above table and connector diagram.

5. Check for proper remote control operation and status indication by exercising the remote Position A and B command closures.

6. Make R.F. connections as desired.

IV. Programming Features and Operation

The ACS-100-1 is pre programmed to for two position - single switch operations and requires no programming for standard operation. See the ACS-100-1 Functional Diagram in section VII diagrams section for a typical application example.

The ACS-100-2 can be programmed for a total of four modes of operation with the use of two four port switches. See the ACS-100-2 Functional Diagram in section VII diagrams section for a typical application example.

Basic Theory of Operation:

Upon front panel or remote control command the ACS-100 operation sequence is as follows:

1. Command from the CPU board is issued to the transmitter control/interlock board to issue both interlock open and TX off commands to both transmitters connected to the four port switch.
2. Approximately 2 seconds after these commands are issued the ACS-100 issues a switch command to the appropriate pin of the SW1 I/O interface connector.
3. Once the switch reaches its commanded position the ACS-100 receives new position information from the antenna switch via the SW1(2) I/O interface connectors and issues an interlock closure command and approximately 2 seconds later closes the chosen "Position relay" and then issues a TX On command to the transmitter feeding the on air position. There is a suggested wiring diagram to connect the position relays so that the interlock paths control the proper transmitter for the path it is feeding. The circuit shown is typical of what may be encountered in a typical installation. If no additional interlock connections are needed simply connect the respective transmitter interlock connection through the interlock relays K1, 2. The position relays K7, 8 can be used for position status if desired.

Note: If the 4 port switch fails to reach the commanded position due to mechanical or power failure, the ACS-100 will hold the interlock connections in the open position and will not issue a TX on command.

Front Panel /Remote Operation:

To select a mode simply press the desired mode button. The ACS-100-1 and ACS-100 both have four mode buttons. The ACS-100-1 has only two modes so Mode 1 and Mode 2 are repeated on the 3rd and 4th buttons respectively. The ACS-100-2 has four modes and modes 1 through 4 are selected from left to right.

When depressing a mode all interlock relays are opened (de energized). TX OFF commands if used are issued next. Next the attached switch will move to the desired position. The interlock relays are then closed (Re energized). Last the TX selected to the active load such as an antenna is commanded on if this connection is made.

Remote operation of the ACS-100 series functions identically to the front panel operation discussed above. Momentary closure to common of the appropriate pin on the remote connector will cause the ACS-100 to operate as described above.

V. Specifications

AC-100-1/2

Control Input	Momentary contact to ground
Control Output to Switch	Dry relay form C contact closure Contact Rating 24VDC @6 A.
Status Output	Open collector output – Active Low
Connector Control in/Status out	DB-25 Female
Connector Type Control to Switch	DB-15 Female
Interlock/TX Control	DB-25
RS-485 (Optional)	DB-9
Physical Specification	19” L X 1.75” H X 10” D – Standard EIA rack enclosure
Electrical Requirements	100-240 VAC 50-60 Hertz
Environmental	0 – 60 degrees C. non condensing atmosphere

VI. Warranty

Broadcast Devices, Inc. products manufactured for Electronics Research, Inc. are warranted against failure due to faulty materials or workmanship for a period of two years from the date of shipment to the ultimate user. The warranty covers repair or replacement of defective parts at the factory, provided the unit has been returned prepaid by the user. All shipments to the factory shall have affixed to the outside of the container an R. A. number obtained from the factory. The above warranty is void if the unit has been modified by the user outside of any recommendations from the factory or if the unit has been abused or operated outside of its electrical or environmental specifications. If customer conducted field tests suggest that the unit may be faulty, whether or not the unit is in warranty, a full report of the difficulty should be sent to Broadcast Devices, Inc. factory at Cortlandt Manor, New York. The office may suggest further tests or authorize return for factory evaluation.

Units sent to the factory should be well packed in the original packing if possible and shipped to Broadcast Devices, Inc. 2066 E. Main Street, Cortlandt Manor, NY 10567. Remember to affix the R.A. number to the outside of the carton. Any packages received without such R.A. number will be refused. Note: freight collect shipments will also be refused. When the unit has been received, inspected and tested, the customer will receive a report of the findings along with a quotation for recommended repairs, which are found falling outside of the standard warranty. Units returned for in-warranty repairs which are found not to be defective will be subject to an evaluation and handling charge. In-warranty units will be repaired at no charge and returned via prepaid freight.

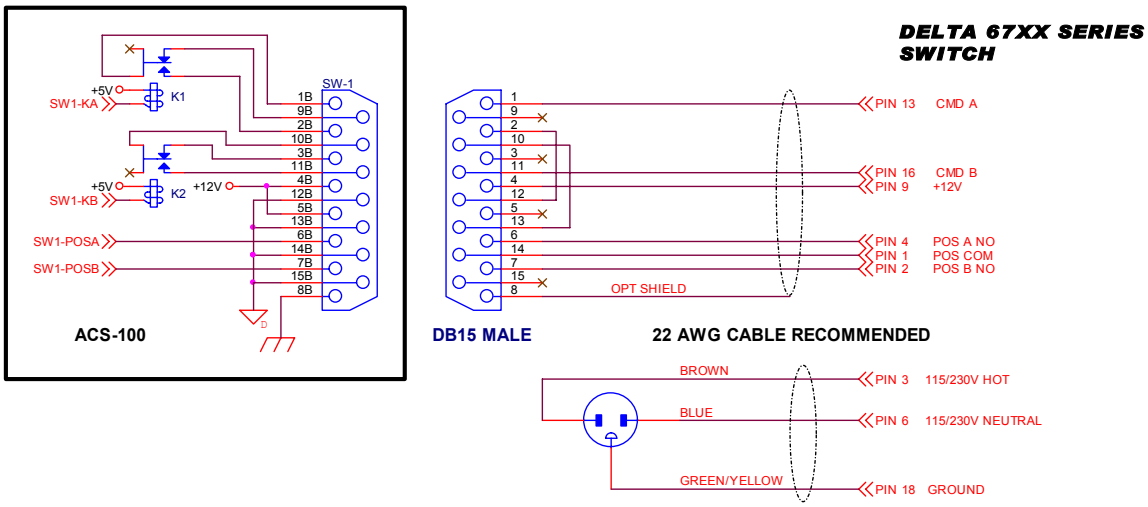
Out-of-warranty units needing repair require a purchase order and will be invoiced for parts, labor, and shipping charges.

When ordering replacement part, always specify A) Part number or Description, and Quantity; B) Date of Purchase, Where Purchased; C) Any Special Shipping Instructions. Always specify a street address, as shipping companies cannot deliver to a postal box.

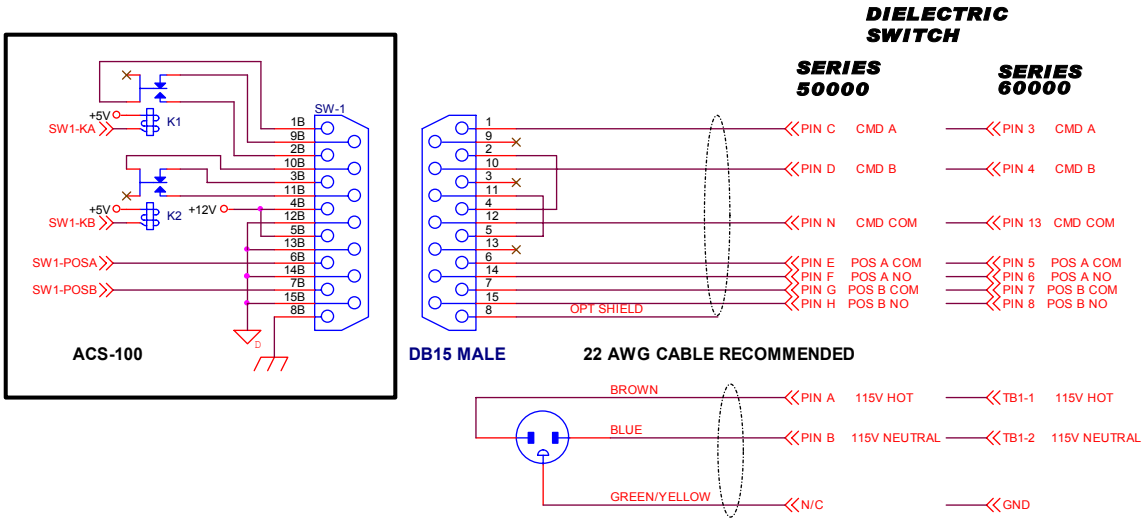
Broadcast Devices, Inc. is not responsible for any other manufacturer’s warranty on original equipment. Nor are we responsible for any failure, damage, or loss of property that may occur due to the installation or operation of our equipment outside of recommended specifications.

Broadcast Devices, Inc. may from time to time make changes to the materials used in the manufacture of its equipment and reserves the right to do so without further notice.

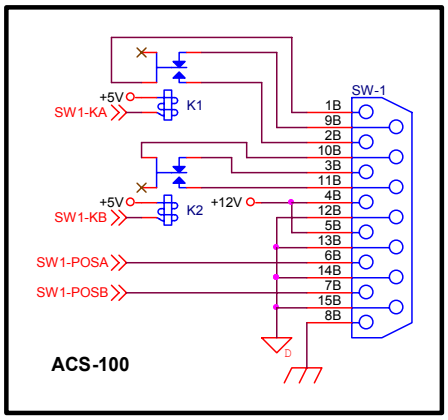
VII. Switch Interface Diagrams for Other Manufacture RF Switches

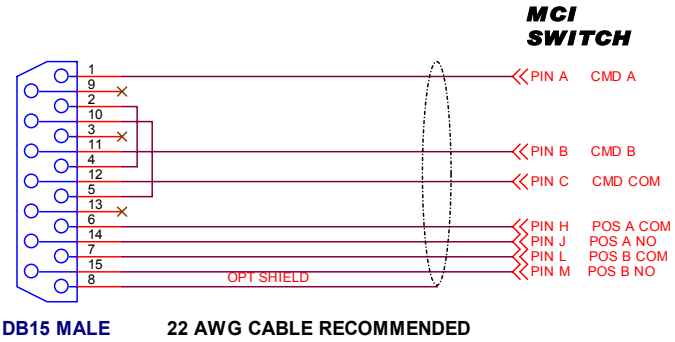


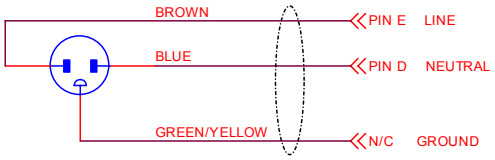
NOTE:
SWITCH MUST HAVE DELTA D42-87-1 12V RELAY KIT INSTALLED.



For proper switch operation of Dielectric switch products with the ERI ACS-100 requires 12 VDC control. Dielectric switches can be configured for 12 or 24 VDC command operation. For 50000/60000 Series switches order Dielectric P/N R0044587005 3PDT 12 VDC Coil. Some newer Dielectric switch products can accommodate 12 or 24 VDC command without modification. Contact Dielectric for further information. 1-207-655-4555







NOTES:

1. **CONNECTOR: MIL TYPE MS3102A2214P**
2. **SWITCH MUST HAVE K1 INSTALLED FOR 12VDC OPERATION.**
3. **K1 P/N: 7/8" & 3 1/8" SWITCHES: DS2E-ML2-DC12V - ALLIED 788-1057**
4. **K1 P/N: 4 1/16" & 6 1/8" SWITCHES: KUL11D15D-12 - ALLIED 886-0129**