



**Solutions For Power**

**DEADFRONT DISTRIBUTION SWITCHBOARDS  
600V OR LESS**


***INSTALLATION OPERATION & MAINTENANCE  
MANUAL***

**American Midwest Power**

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## **LIMITED WARRANTY**

American Midwest Power warrants that the equipment delivered by it will be of the kind and quality described in the order or contract and will be free of defects in workmanship and material. Should any failure to conform to this warranty appear within one year after date of shipment, American Midwest Power shall, upon prompt notification, with the knowledge that the equipment has been stored, installed, operated and maintained in accordance with American Midwest Power recommendations and standard industry practice, correct such nonconformities, at its option, either by repairing any defective part or parts or by supplying a repaired or replacement part or parts F.O.B. factory. However, if American Midwest Power has installed the equipment or furnished field engineering services with respect to its installation, and if the Purchaser has not delayed the installation, the one-year shall run from the completion of the installation. The total warranty period shall not exceed 18 months from the date of shipment in any case.

In no event shall American Midwest Power be responsible for providing working access to the defect, including the removal, disassembly, replacement or reinstallation of any equipment, materials or structures to the extent necessary to permit American Midwest Power to perform its warranty obligations, or transportation costs to and from the American Midwest Power factory. The conditions of any tests shall be mutually agreed upon and American Midwest Power shall be notified of, and may be present at all tests that may be made.

The warranties set forth in this provision are exclusive and in lieu of all other warranties whether statutory, express or implied (including all warranties of merchantability and fitness for particular purpose and all warranties arising from course of dealing or usage of trade), except of title and against patent infringement. The remedies provided above are the Purchaser's sole remedies for any failure of American Midwest Power to comply with its obligations. Correction of any non-conformity in the manner and for the period of time provided above shall constitute fulfillment of all the liabilities of American Midwest Power whether the claims of the purchaser are based in contract, in tort (including negligence) or otherwise with respect to or arising out of the equipment furnished hereunder.

## **WARRANTY IMPLEMENTATIONS AND CONDITIONS**

On those occasions where service help is required, American Midwest Power should be notified at once through its Service Department. No charges or expenses should be incurred except as authorized by the Company, in writing. Making unauthorized corrections or doing unauthorized work voids this Warranty and renders reimbursement impossible.

The above in no way prejudices the right of American Midwest Power to correct, as stipulated in the Warranty, any problems that may occur in equipment manufactured by American Midwest Power.

## **HANDLING**

### **CARE IN HANDLING**

Handle the switchboard with care to avoid damaging the frame or painted finish. Dropping or jarring the switchboard can crack insulating components.

### **UPRIGHT POSITION**

The switchboard should be kept in an upright position at all times unless special arrangements have been made with AMP and the switchboard has been provided with extra shipping supports and or lay down bracing.

### **CONCEALED DAMAGE**

When receiving a shipboard delivery and prior to signing for it, unpack it sufficiently to inspect it thoroughly for concealed damage. If any damage is evident, note it with the shipper and file a freight claim.

### **SHIPPING SKID**

The switchboard should remain secured to the shipping skid to prevent distortion of the bottom of the frame during moving.

### **FORK LIFTING**

A forklift truck will offer the most convenient method of handling the switchboard. Balance the load carefully and use a safety strap when handling or moving switchboards with a forklift. Switchboards are provided with an open bottom, so care should be taken to ensure that the forks clear the rear bottom rails while sliding the forks under the switchboard. Verify that the handling equipment capacity is sufficient for the weight of the switchboard.

### **OVERHEAD HOISTING**

When provided with eye bolts, AMP switchboards are suitable to be lifted with an overhead hoist or crane.

### **RIGID SPREADERS AND SPANNER BARS**

Rigid spreaders or spanner bars are to be used to insure vertical lift on the eye bolts and lifting slings, and to avoid crushing or otherwise damaging the frame or its finish. Lifting bars on long lineups may require additional spreaders to reduce the horizontal compressive force.

### **UNEQUAL WEIGHT DISTRIBUTION**

Switchboard sections may have unequal weight distribution. Rigging lengths should be adjusted to compensate and maintain the switchboard in the upright position.

### **SAFETY HOOKS OR SHACKLES**

Do not pass ropes or cables through the lift holes in bars, angles, or channels. Use slings with safety hooks or shackles

## **STORAGE**

### **CLEAN AND DRY SPACE**

Switchboards that are not immediately installed and energized should be stored in a clean, dry space that has a uniform temperature to prevent condensation. Preferably, it should be stored in a climate controlled shelter and protected from dirt, fumes, water, and physical damage. Packaging should be left intact until the switchboard is located at the final installation location. Any

openings should be covered to protect the equipment against dust and other debris from entering the enclosure during the construction period.

### **OUTDOOR SWITCHBOARDS ARE NOT WEATHER RESISTANT UNTIL INSTALLED**

Outdoor switchboards are not weather resistant until completely and properly installed and should be treated exactly the same as indoor switchboards until after it is installed. (See sections below **“BOLT SECTIONS TOGETHER”** for additional information and requirements.)

### **UN-ENERGIZED SWITCHBOARDS SHOULD BE KEPT DRY**

All un-energized switchboards should be kept dry internally and externally.

## **INSTALLATION OF SWITCHBOARD**

### **LOCATION**

The switchboard should be located in an area suitable for its intended means and designation. Additional precautions may be necessary, during installation, to prevent moisture, or other contaminants from entering into the enclosure.

### **CLEARANCE FROM WALLS/WORKING CLEARANCE**

Clearance from walls to the rear or side of the switchboard (not rear or side accessible) shall be ¼” minimum. Switchboard vents shall be clear from obstructions of at least 6”. If vented on the side or rear of the enclosure, the switchboard must be spaced 6” minimum from the wall. Working clearances vary by voltage and specific application. Please consult the National Electric Code section 110.26.

### **CONDUIT RACEWAYS**

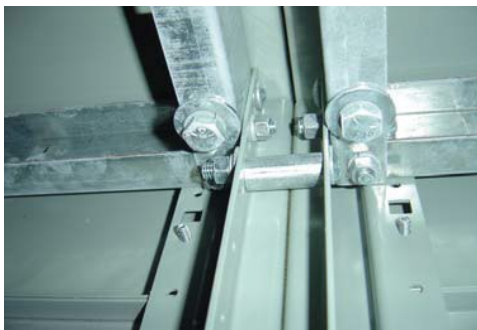
Locate the switchboard over the raceways or floor openings so as to provide cable bending space and clearances to energized parts or other obstructions.

### **BOLT SECTIONS TOGETHER**

Bolt adjoining switchboard section frames together front and back using the hardware and section spacers provided (**See Picture #1**). Please review the enclosed “As Built Drawing” that is shipped with the switchboard to ensure proper section arrangement.

If unit is a type 3R outdoor switchboard with multi sections install roof cap over shipping sections joints, sealing the roof joints at each shipping section. (**See Picture #2**)

**(Picture #1)** Typical  
(3x in the front 3x in back for  
each shipping section connection)

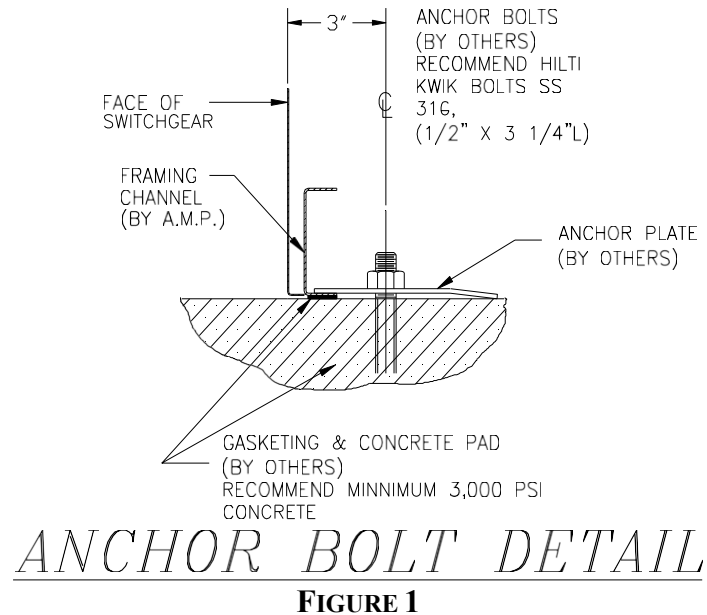


**(Picture #2)** Typical Roof cap  
(No Roof Cap) (W/ Roof Cap)



### LEVELING AND SECURING

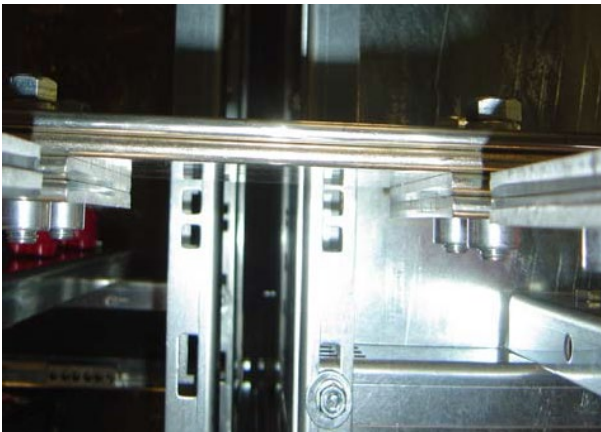
The switchboard should be installed level with the section frames bolted together. The switchboard should be anchored to the pad or floor as shown in Figure 1.



### SPLICE PLATES

Connect all through and ground bus at shipping breaks, using the splice bus and hardware supplied with the switchboard. The splice plates and hardware are shipped loose in a box usually located in the bottom of one on the switchboard sections. Most AMP switchboards utilize captive nuts on the back of the cross bus, so tightening is only required from the front usually. Mount bus links on face of cross bus (opposite side of captive nut **See Pictures #3 & #4.**) Follow the torque specifications listed in Tables 1-3.

**(Picture #3)**  
(Cross Bus Link)  
**CORRECT**



**(Picture #4)**  
(Cross Bus Backside do not install on this side)  
**WRONG** do not install links on top of captive nuts



### **INTERNAL CABLING & CABLING BETWEEN SECTIONS**

Factory supplied cable connections between sections may be utilized. Please refer to the “As Built Drawing” provided with the switchboard to identify correct termination locations for cross cable connections. If fine stand wire has been supplied for cross cable connections, the stripped ends should be wrapped in copper foil prior to installing in pressure terminal lugs. Terminations should be tightened to specifications listed in **Tables 1-3**.

### **GROUNDING AND BONDING**

AMP switchboards are provided with a continuous ground bus located at the bottom of each section. Ground the switchboard frame and any ground bus by means of an equipment grounding conductor having a size in accordance with section 250 of the National Electrical Code.

### **SERVICE ENTRANCE GROUNDING**

If the switchboard is labeled suitable for use as service entrance, a bonding jumper will be installed in the main section, bonding the neutral to the ground bus.

### **NEUTRAL DISCONNECTING LINK**

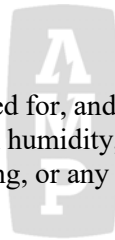
Do not connect any grounding conductors to the load side of any neutral disconnecting link or any sensor used for ground fault protection. Do not connect equipment grounding conductors directly to the grounded neutral bus.

### **UNUSED OPENINGS**

All unused openings in the switchboard enclosure should be securely closed prior to putting the switchboard into service.

### **SERVICE CONDITIONS**

Standard AMP switchboards are not intended for, and should not be used in locations that will be exposed to high ambient temperatures, high humidity, corrosive or explosive fumes and vapor, dust, standing water, vibration, jarring, tilting, or any other unusual service condition.



## **INSTALLATION OF CONDUIT AND CONDUCTORS**

### **PREVENT MOISTURE FROM ENTERING**

Conduits should be installed to prevent moisture/water from entering into the enclosure. Outdoor or slab on grade indoor switchboards with conduits entering from below through a pad or slab should be sealed between the pad and the conduit to prevent ground moisture for entering the enclosure.

### **CONDUCTOR LOCATIONS**

Please refer to the enclosed “As Built Drawing” to locate the acceptable cable and conduit areas for each section. Care should be taken to avoid structural members, and live parts. Cable ties should be utilized to secure conductors and prevent them from rubbing on structural members. Conductors should be located in the switchboard so that they will be free from physical damage and to avoid overheating. Conductors should not be located where they will interfere with any moving components.

### CABLE LASHING

AMP switchboards do not require cable lashing on services 85,000AIC and lower. For ratings higher than 85,000AIC, please refer to all labeling and drawings provided with the switchboard in regards to the requirement of lashing.

### PROPER WIRING METHODS

Refer to Article 300 of the National Electrical Code for proper wiring methods.

## BEFORE ENERGIZING

### TIGHTEN ELECTRICAL CONNECTIONS

Tighten all accessible electrical connections to the specifications provided in Tables 1-3. During transit mechanical pressure connections can vibrate and become loose.

**TABLE 1: TIGHTENING TORQUE FOR SCREWS (POUND-INCHES)**

WIRE SIZE INSTALLED IN CONNECTOR	SLOTTED HEAD # 10 OR LARGER-INCH (MM)		HEXAGONAL HEAD EXTERNAL DRIVE SOCKET WRENCH	
	SLOT WIDTH 0.047 (1.2) & LESS	SLOT WIDTH OVER 0.047 (1.2)	SPLIT BOLT CONNECTORS	OTHER CONNECTORS
	SLOT LENGTH 1/4 (6.4) & LESS	SLOT LENGTH OVER 1/4 (6.4)		
AWG 18 - 10	20	35	80	75
8	25	40	80	75
6, 4	35	45	165	110
3	35	50	275	150
2	40	50	275	150
1	-	50	275	150
1/0, 2/0	-	50	385	180
3/0, 4/0	-	50	500	250
MCM 250, 300, 350	-	50	650	325
400	-	50	825	325
500	-	50	825	375
600, 700, 750	-	50	1000	375
800, 900, 1000	-	50	1100	500
1250, 1500	-	-	1100	600
1750, 2000	-	-	1100	600

**TABLE 2: TORQUE - BOLT DIAMETER**

BOLT DIAMETER	TIGHTENING TORQUE
#8 (5/32")	15 INCH POUNDS
#10 (3/16")	20 INCH POUNDS
1/4"	7 FOOT POUNDS
5/16"	12 FOOT POUNDS
3/8"	20 FOOT POUNDS
7/16-1/2"	50 FOOT POUNDS
5/8"	95 FOOT POUNDS
3/4"	155 FOOT POUNDS

**TABLE 3: TORQUE - SOCKET HEAD SCREWS**

SOCKET SIZE (ACROSS FLATS) INCHES (MM)	TIGHTENING TORQUE POUND-INCHES (N-m)
1/8 (3.2)	45 (5.1)
5/32 (4.0)	100 (11.3)
3/16 (4.8)	120 (13.6)
7/32 (5.6)	150 (16.9)
1/4 (6.4)	200 (22.6)
5/16 (7.9)	275 (31.1)
3/8 (9.5)	375 (42.4)
1/2 (12.7)	500 (56.5)
9/16 (14.3)	600 (67.8)



### **INSULATION RESISTANCE TESTING**

Before ENERGIZING the equipment, Insulation Resistance Testing should be performed to insure there are NO SHORT CIRCUITS or GROUND FAULTS. If this testing is conducted with over-voltage source, be sure to disconnect any control transformers or other voltage sensitive equipment in the system to avoid damage. Follow industry accepted practices for performing this test.

### **BUS MOUNTING**

Check the integrity of all bus bar mountings and insulators. Make sure that insulators are not cracked and are free from damage.

### **ENCLOSURE**

Check the enclosure to make sure it has not been damaged in such a way the spacing between current carry components has been reduced.

### **OPERATING MECHANISMS**

Manually exercise all switches, circuit breakers and other operating mechanisms to make certain that they operate freely. Bolted pressure switches with GFI should not be opened manually. Please refer to the instruction manual provided with and attached to the bolted pressure switch behind the fuse door.

### **GROUND FAULT SYSTEMS**

If the switchboard has been provided with ground fault, field test the ground protection system in accordance to the instruction sheet provided with this information packet.

### **FOREIGN MATERIAL**

Remove all foreign material from inside the switchboard before closing the enclosure.

### **COVERS & DOORS**

Replace all covers, close all doors and make certain that no conductors are pinched and that all enclosure parts are properly aligned and tightened.

## **ENERGIZING**

### **QUALIFIED PERSONNEL**

Only qualified personnel should energize this equipment. Conditions caused by damage to this equipment or incorrect installation can result in serious personal injury and extreme damage.

### **NO LOAD ON SWITCHBOARD**

All devices should be turned off. There should be no load on the switchboard while it is being energized.

### **SEQUENCE OF ENERGIZING**

The switchboard should be energized in sequence starting with the main (or main device closest to source in six disconnect board), followed by feeder devices starting with those closest to main source and successively working away from the source.

## MAINTENANCE

### **DANGER – HAZARDOUS VOLTAGE**

Hazardous voltages in electrical equipment can cause severe injury or death. Do not remove covers, open doors, or work on equipment unless power has been turned off, and all circuits de-energized and disconnected. Disconnect, de-energize, lock-out and properly ground all circuits before working on this equipment. Use proper safety precautions when working on this equipment.

### **SAFETY**

Before any checking or maintenance of this switchboard can be performed the following must be observed: Only qualified personnel may operate, inspect or maintain this switchboard. It is the responsibility of the purchaser, installer or ultimate user to insure that warning signs are attached and to make sure that all access doors and operating handles are securely locked when the switchboard is left unattended by qualified persons, even momentarily.

All Safety codes, standards, and regulations as they may be applied to this type of equipment must be strictly adhered to. Before any adjustments, servicing, parts replacement or any other act is performed requiring any physical contact with the electrical components or wiring of this equipment, the power supply must be disconnected. Refer to *ANSI Standard Z 244.1: Personnel Protection – Lockout/Tag-out of Energy Sources Minimum Safety Requirements*

### **QUALIFIED PERSONNEL**

This switchboard should only be operated and maintained by qualified persons who are thoroughly trained and who understand the hazards involved. As with any electrical apparatus, the thorough knowledge of the engineering safety, inspection, and maintenance of this particular gear is mandatory. This manual does not provide sufficient instructions for inexperienced lineman or unqualified persons to do any maintenance or repair to this switchboard

### **SWITCHBOARD INSPECTION/MAINTENANCE**

Inspect and perform scheduled maintenance outlined herein at least once per year

### **CLEANING**

Clean any dirt and dust out of the switchboard using a soft brush, vacuum cleaner or lint free rags. Avoid blowing dust into circuit breakers and other components, by not using compressed air or blowers. If optional vent filter media is installed, recommend quarterly inspections and cleaning. Replace filter media as needed to maintain unrestricted air flow.

### **INSPECT ALL ELECTRICAL JOINTS AND TERMINALS**

Carefully visually inspect all electrical bus connections and terminals in the wiring to make sure that they are clean and secure. Look for signs of loose connections such as pitting or melting as well as discoloration or flaking of insulation. Loose connections should be cleaned and re-torqued to the specifications listed in Tables 1 - 3. Damaged parts should be replaced.

### **FUSE CLIP CONTACT PRESSURE**

Inspect fuse clips for contact pressure. If there is any sign of looseness, contact AMP for replacement of parts or switch.

### **CORRECT DEVICE RATINGS**

Check all circuit breakers, switches and fuses for correct amperage, voltage and interrupting ratings.

### **OPERATE DEVICES**

Exercise each circuit breaker and switch several times to ensure that all mechanisms operate properly and freely to their full on and off position. If an automatic transfer switch is installed in the switchboard, follow the maintenance instructions described in the separate instruction manual provided for that device

### **LUBRICATION**

In general most switches should not need to be re-lubricated, however if they do, only a clean, non-metallic, non-current carrying light grease such as petroleum jelly should be used. Do not lubricate molded case circuit breakers.

### **INSULATORS AND INSULATING MATERIAL**

Inspect all insulators and insulating material to ensure that it is not cracked or damaged in any way. Be sure to inspect cable insulation as well as insulating bus supports.

### **INTERIOR MOISTURE AND CONDENSATION**

Look for signs of previous moisture inside enclosure. Eliminate the source and also seal around bottom fed conduits to prevent ground moisture from entering enclosure. Make sure that all insulating material is thoroughly dry and clean. Any device or insulating material that has moisture damage should be replaced. Contact AMP for replacement.

### **SEVERE ELECTRICAL SHORT CIRCUIT**

Extreme mechanical forces will result from excessive currents during a short. The forces will cause distortion in the bus, thermal damage and metal deposits. Insulating bus supports can crack and break under these extreme mechanical forces. Contact AMP for correction or replacement.

### **GROUND FAULT PROTECTION**

Test the ground fault protection system (if provided) in accordance with the instructions provided on the front of the switchboard above the relay (if bolted pressure switch) or the separately provided manual (if circuit breaker).

