

Instructions for Eaton's AMPGARD® NEMA 3R motor control center



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Read and understand all the markings, labels, and instructions before attempting installation, operation, or maintenance of this equipment.

This equipment must be installed and serviced only by qualified electrical personnel. Retain this document for future use.



Powering Business Worldwide

⚠ WARNING**HAZARD OF ELECTRICAL SHOCK OR BURN.****THE EQUIPMENT MUST BE OPERATED WITHIN ITS NAMEPLATE RATINGS.****OPERATING THE EQUIPMENT OUTSIDE OF ITS RATINGS MAY CAUSE FAILURE RESULTING IN PROPERTY DAMAGE, SEVERE PERSONAL INJURY, OR DEATH.****ALL APPLICABLE SAFETY CODES, SAFETY STANDARDS, AND SAFETY REGULATIONS MUST BE STRICTLY ADHERED TO WHEN INSTALLING, OPERATING, OR MAINTAINING THIS EQUIPMENT.****⚠ WARNING****SAFETY WARNINGS****READ AND UNDERSTAND THESE INSTRUCTIONS BEFORE ATTEMPTING INSTALLATION, OPERATION, OR MAINTENANCE OF THE EQUIPMENT.**

- **OBSERVE NATIONAL ELECTRICAL CODE (NEC), OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA), AND LOCAL PROCEDURES AND STANDARDS. THIS INCLUDES VISUAL INSPECTIONS WHILE THE DOOR IS OPEN, MAKING ANY ADJUSTMENTS INSIDE OR OUTSIDE THE ENCLOSURE, PERFORMING MAINTENANCE, AND/OR INSTALLING REPLACEMENT PARTS.**
- **THE END USER IS RESPONSIBLE FOR CONFORMING TO ALL APPLICABLE CODE REQUIREMENTS WITH RESPECT TO GROUNDING THE EQUIPMENT.**
- **ENSURE THAT YOU ARE WEARING PROPER PERSONAL PROTECTIVE EQUIPMENT (PPE) TO SAFEGUARD YOURSELF AGAINST THE HAZARDS PRESENT DUE TO MEDIUM VOLTAGE PROXIMITY.**
- **DISCONNECT ALL LOW VOLTAGE AND MEDIUM VOLTAGE POWER SOURCES BEFORE STARTING ANY WORK ON THE EQUIPMENT PER OSHA AND LOCKOUT PROCEDURES.**
- **VERIFY THAT THE VOLTAGE HAS BEEN REMOVED.**
- **DISCONNECT THE ISOLATION SWITCH BY USING THE HANDLE. NEVER LEAVE THE ISOLATION SWITCH IN AN INTERMEDIATE POSITION. ALWAYS MOVE THE HANDLE TO THE FULLY OPEN OR FULLY CLOSED POSITION.**
- **USE ADEQUATE FALL PROTECTION WHEN WORKING ABOVE GROUND LEVEL.**

Section 1: Introduction**1.1 Purpose**

The purpose of this instruction booklet is to address typical considerations for the application and installation of the rain proof enclosure. Included in this are:

- Equipment ratings;
- Receiving, handling, and storing the equipment; and
- Physical constraints of the job site.

The purpose of NEMA 3R enclosure is to provide protection to AMPGARD® products in the outdoor locations. It is a rain proof enclosure which will provide protection to enclosed gear.

The performance of this equipment is greatly influenced by the installation conditions, protective scheme, grounding method, and the actions of the operator. Application of AMPGARD equipment does not supersede the requirement of adequate PPE.

This instruction booklet does not purport to cover all possible contingencies, variations, and details that may arise during installation, operation, or maintenance of this equipment. If further information is desired regarding this product, contact your local Eaton sales office.

1.2 Strategy

NEMA 3R enclosure is required in various applications such as water and wastewater, agriculture, mining, minerals, oil, and gas to provide protection to enclosed gear. For various configurations of medium voltage motor control centers, NEMA 3R enclosure with widths of 20, 26, 32, 44, and 48 inches are available.

Also, the incoming line with the capability to connect with a medium voltage switch gear and a transformer is available.

1.3 Identification

A rating nameplate is located on the door of each unit. Listed on this name plate is the factory's general order number. This number should be given to the Eaton sales office if a question should arise concerning the equipment or if the renewal parts are required.

Refer to **Figure 1** for the typical location of the rating nameplates.



Figure 1. Rating nameplate on the door.

1.4 Ratings

Table 1. Enclosure rating: NEMA 3R.

Configuration description	Number of contactors	Contactor interrupting capacity -3 phase symmetrical		Amperes per contactor	Amperes total
		E1 -kA	E2-kA		
2- High	2	8.5	50 @ 7.2 kV	95 (top) 375 (bottom)	470
2- High	2	8.5	50 @ 7.2 kV	340 (top) 340 (bottom)	680
1- High	1	8.5	50 @ 7.2 kV	400 (top)	400
1- High	1	8.5	50 @ 7.2 kV	400 (bottom)	400
1- High (800 A starter)	1	8.5	50 @ 7.2 kV	653	653

1.5 Product description

NEMA 3R enclosure stands on a sturdy base. The base is fixed to the ground with four foundation bolts. It facilitates to keep the flood water from entering the structure and if some water tends to enter the structure, it can easily drain out. It also provides access for the low voltage and medium voltage cable entry. The side covers are securely assembled to the base, starter or incoming line weld cell, and the roof. Various designs of side covers are made available to connect with various adjoining structures.

The slanted roof provides a slope for the rainwater to run down the enclosure. Filter and screen in the roof assembly provide a path for hot air to exit the enclosure with minimum ingress of rainwater.

The full height door of the enclosure is hinged to the side cover. The three-point latch helps to secure the door at roof, side cover, and base. The latch handle has the provision for a padlock. Wind latch on the door facilitates opening of the door up to an angle of 97 degrees. Neoprene gasket on the door provides protection against dirt and water.



Figure 2. Front view.



Figure 3. Front view with full height doors open.



Figure 5. View showing the three-point and wind latch.

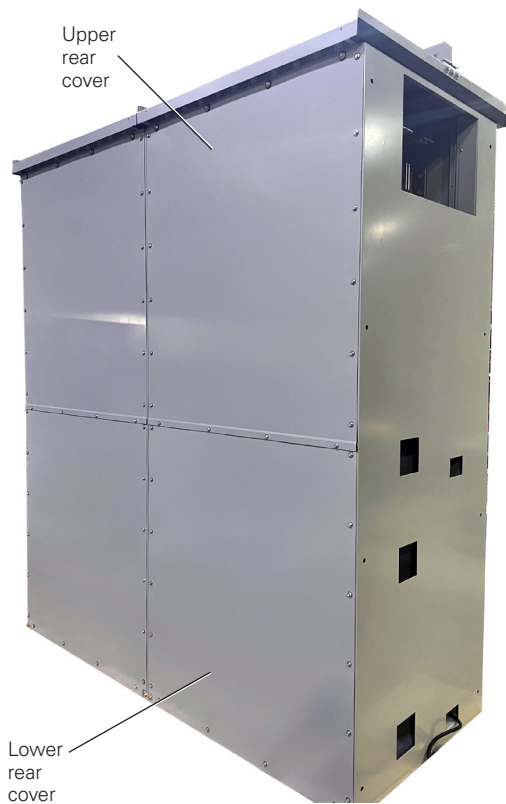


Figure 4. Rear view showing the rear cover.

1.7 Main bus

The main bus enclosure is mounted on top of the 80-inch tall vertical sections. Main bus enclosure may consist of a 1,000 A, 1,200 A, 2,000 A, or 3,000 A rated main bus and/or 1,000 A rated variable frequency drive (VFD) bus. The standard bus is uninsulated and can be silver or tin plated. Option of insulated bus is available. The main bus enclosure in a starter section may include vertical bus drops to connect to the starter(s). The main bus enclosure in an incoming line section may include vertical bus drops to connect the incoming line cables.

Only bottom entry cables option is available.

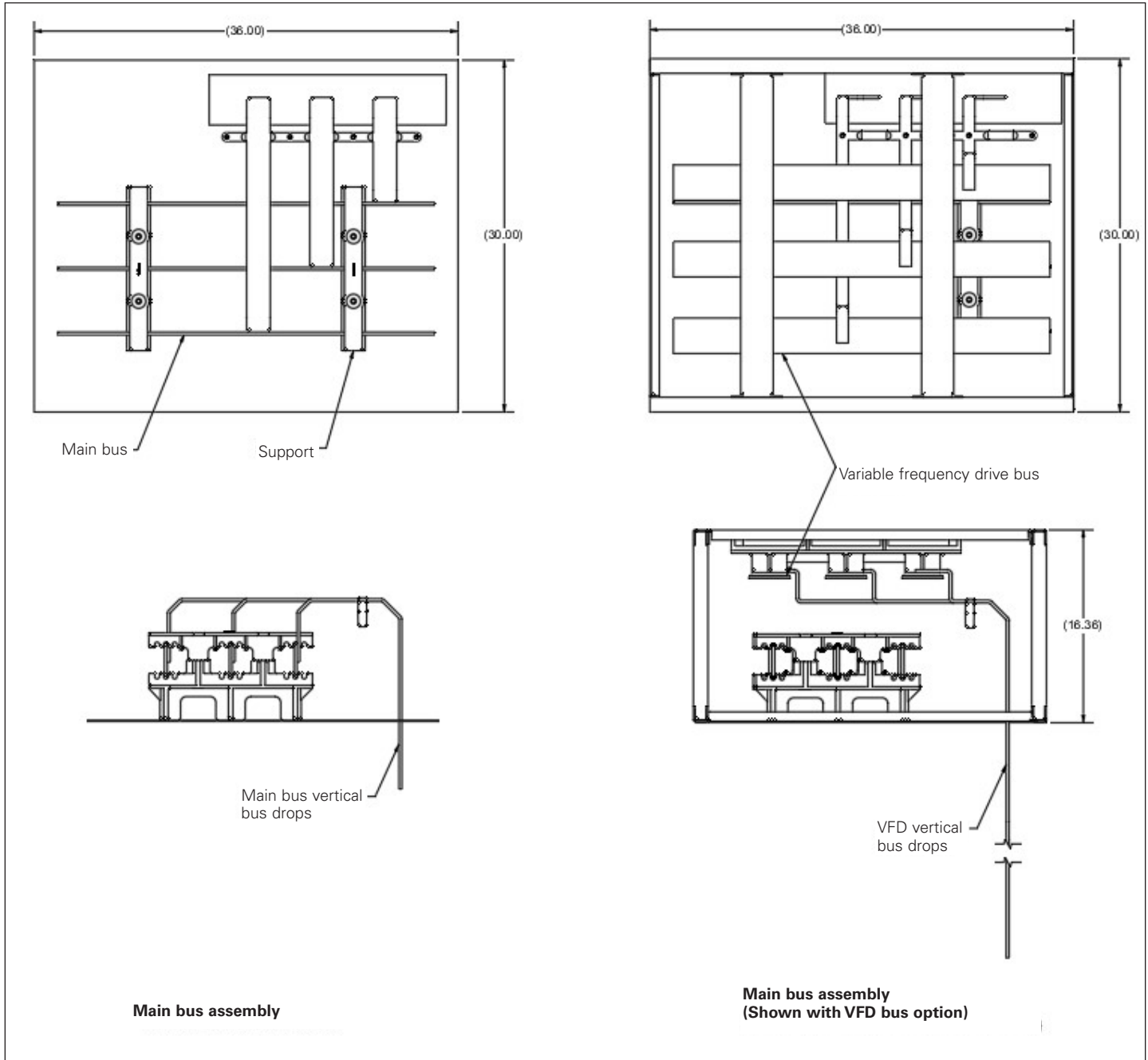
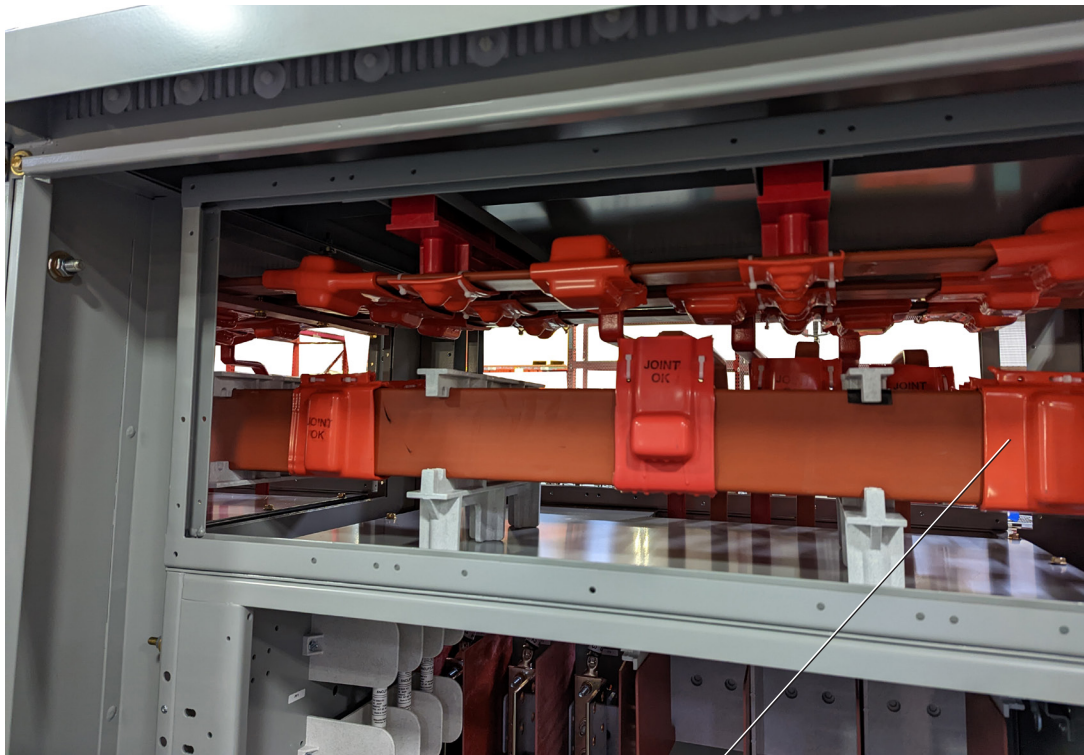


Figure 6. Main bus assembly.

1.8 Bus splicing

Connect the bus bars using the splice plate provided with the equipment. Tighten the bolts to 20 ft-lb (27 N m).



Access to the bus compartment from front to connect the busbars with splice plates.

Figure 7. Front view of bus splicing in main bus assembly.



Access to the bus compartment from rear side to connect the busbars with splice plates.

Figure 8. Rear view of bus splicing in main bus assembly.

1.9 Modifications to equipment

Any modifications to the equipment outside of the assembly instructions in Eaton documentation may compromise compliance with UL standard. Please contact the factory with any related questions.

1.10 Documentation reference

Any modifications to the equipment outside of the assembly instructions in Eaton documentation may compromise compliance with UL standard. Please contact the factory with any related questions.

IB48041: AMPGARD® 400A Motor Starters;

IB48043: AMPGARD® 800A Motor Starters; and

IB020003: AMPGARD® RVSS Soft Starters.

For further information on installation and application, refer to the applicable technical data, publications, and/or industry standards. Download Eaton electronic information from www.eaton.com/AMPGARD.

1.11 Eaton contact information

For the location of your nearest Eaton sales office or distributor, call toll-free 1-800-525-2000 or log onto www.eaton.com/AMPGARD. Eaton Services and Systems (EESS) can be reached at 1-800-498-2678.

⚠ CAUTION

THE OUTDOOR RATING OF THE EQUIPMENT IS ONLY VALID WHEN ALL THE COVERS AND DOORS ARE PROPERLY SECURED OVER THE ENTIRE LENGTH OF ANY GIVEN LINEUP.

WHEN WORKING ON MEDIUM VOLTAGE EQUIPMENT, PERSONNEL MUST WEAR APPROPRIATE PPE.

⚠ CAUTION

BEFORE ENERGIZING THE EQUIPMENT ENSURE THAT:

- THE EQUIPMENT IS SECURED ON A TRUE AND LEVEL SURFACE.
- CONFIRM THAT ALL THE HARDWARE IS IN PLACE AND TORQUED PER SPECIFIED VALUES.
- CONFIRM NO TOOLS OR OBJECTS ARE LEFT INSIDE THE ENCLOSURE.
- CONFIRM ALL COVERS, DEVICES, DOORS, PANELS ETC. ARE SECURED.

Section 2: Receiving, handling, and storing

2.1 Receiving

The equipment is shipped assembled in shipping sections/splits. Depending on the length of the lineup, it may be necessary to ship the equipment in several shipping sections/splits to facilitate handling. Each shipping section/split is shipped bolted to a wooden skid and covered with protective material.

A box(s) labeled "Installation Parts or Ship Loose Parts" is also included. This box contains the packing list. The packing list identifies all cartons and skids. Each carton and skid are labeled with the shop order number and a shipping weight. Only accept items from the shipping carrier if all the items described on the packing list have been received. If the equipment has been damaged, file a claim as soon as possible with the carrier and notify the nearest Eaton representative.

2.2 Handling

The unit is equipped with insulated components for medium voltage and must be protected against damage during handling. The controller should always remain upright. Exercise extreme care during any movement and placement operations to prevent dropping or unintentional rolling or tipping. The preferred method of lifting and maneuvering the shipping sections/splits into their final position is with an overhead crane. Lifting angle of appropriate length is bolted to the top of each shipping section. Lifting clip assemblies are used to bolt the angle to the roof of enclosure units. Attach a 2-leg sling with hooks to the lifting angle to lift or move the sections. Do not allow the angle between the lifting cables and vertical to exceed 45 degrees. If a crane is not available, shipping sections/splits/skids can be moved by use of rollers. However, safeguards need to be put in place to assure that the equipment is not deformed during maneuvering.

Each controller is properly adjusted at the factory before shipment. However, vibration and mechanical stresses imposed by transit and installation can adversely affect mechanical interlocks. Therefore, a final inspection is essential before energizing.

Note: The assembly will tilt at a slight angle due to the variation in the center of gravity.

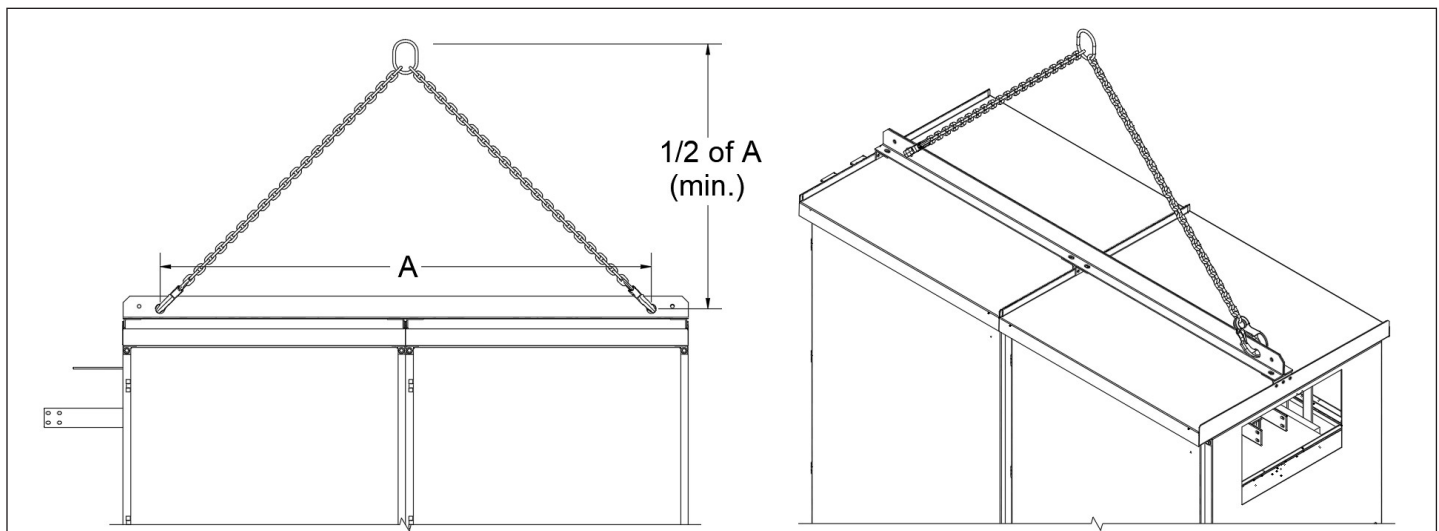


Figure 9. Location of lifting angles.

Table 2. Typical section weights.

Equipment type	Actual starter width	Full structure width	Main bus rating	Typical structure weight
	in. (mm)	in. (mm)	Amperes	lbs (kg)
400 A starter/ feeder	36 (914)	44 [1118]	1,000	2,644 [1199]
			1,200	2,662 [1207]
			2,000	2,696 [1223]
			3,000	2,761 [1252]
800 A starter/ feeder	36 (914)	44 [1118]	1,000	2,758 [1251]
			1,200	2,789 [1265]
			2,000	2,823 [1280]
			3,000	2,888 [1310]
Incoming line	18 (457)	26 [660]	1,000	1,387 [629]
			1,200	1,395 [633]
			2,000	1,419 [644]
			3,000	1,471 [667]
	18 (457) with throat	26 [660]	1,000	1,445 [655]
			1,200	1,453 [659]
			2,000	1,477 [670]
			3,000	1,529 [693]
	24 (610)	32 [813]	1,000	1,608 [729]
			1,200	1,318 [598]
			2,000	1,342 [609]
			3,000	1,390 [630]
4 in. transition line	4 (102)	4 (102)	-	63 (29)

2.3 Storing equipment

Equipment contains insulating materials, electrical contacts, and operating mechanisms which must be protected against dirt, moisture, dust, foreign materials, corrosive atmospheres, and extreme temperature changes.

If it is necessary to store the equipment before installation, it would be advisable to place the equipment indoors in a controlled environment on a true and level surface to reduce strain and distortion in the equipment.

WARNING

WARNING FOR OUTDOOR STORAGE

IN THE EVENT OF STORING THE EQUIPMENT OUTDOORS, ENSURE THAT THE EQUIPMENT STAYS COVERED SO THAT WATER DOES NOT ENTER THE GAP BETWEEN TWO UNITS WITHOUT THE RAIN CAP. ALSO, USE SPACE HEATERS TO AVOID CONDENSATION IN THE ENCLOSURE.

Section 3: Installation

3.1 Procedure of bolting the enclosure to ground

Refer to the following figures and tables for information.

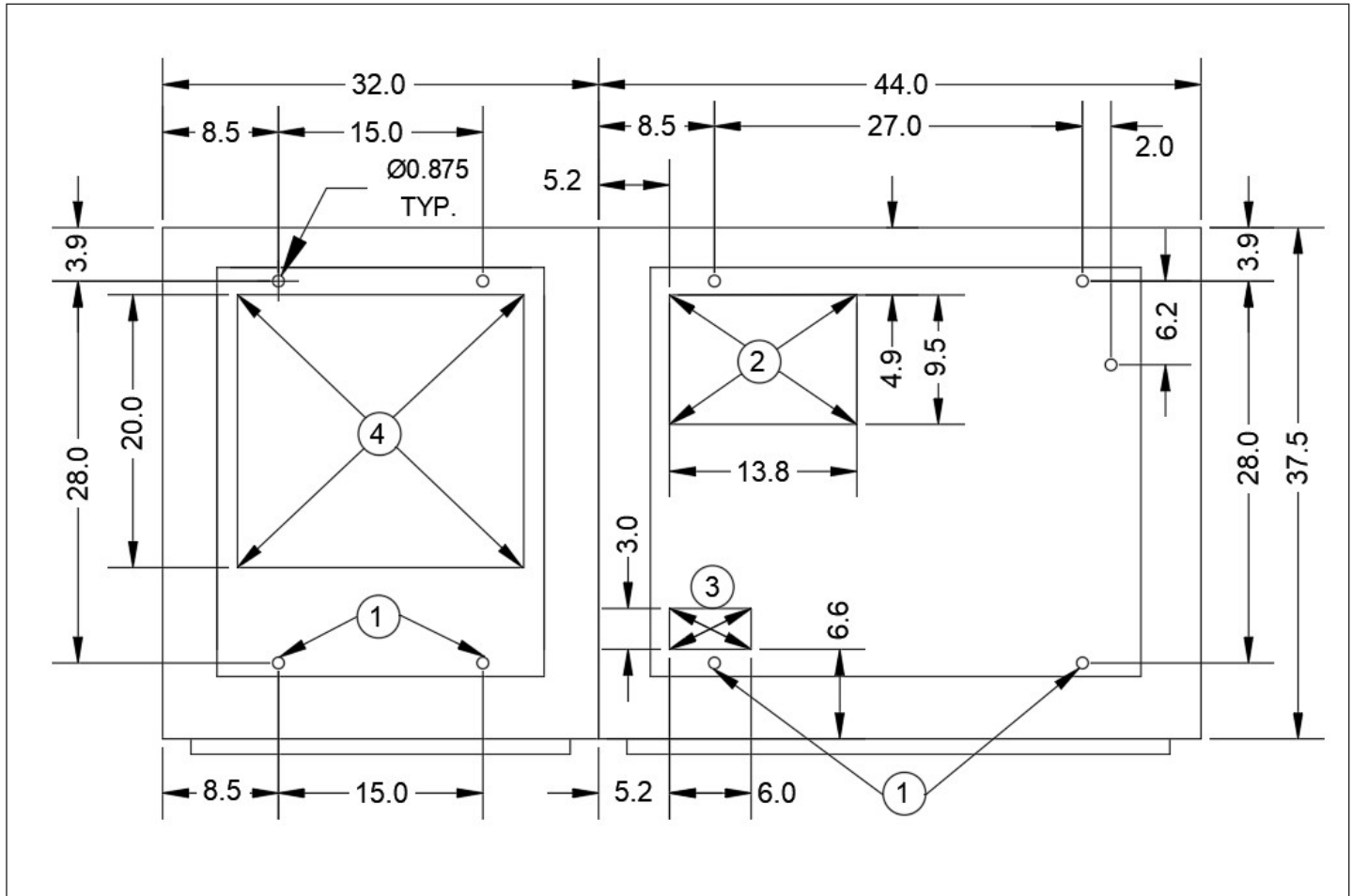


Figure 10. Footprint and lag-down bolt locations.

- ① These are the locations of 0.88-inch (25.4 mm) diameter mounting holes for securing the equipment enclosure to a finished foundation. Use 0.50-inch (12 mm) diameter SAE Grade 5 hardware tightened to 70 ft-lb (94 N m) is recommended.

Use of other post-installed mechanical anchor systems, bonded/adhesive type systems, pre-installed cast-in-place systems such as shear lugs, L-bolts and J-bolts, or plug welding the equipment vertical section at the mounting hole locations to cast-in-place structural steel materials or to a steel house foundation is sole responsibility of others. Alternative mounting systems must have equal or greater average ultimate tensile and shear load capabilities as SAE Grade 5 hardware. In addition to the load capabilities of the mounting system, the bearing strength and bearing surface area at each unit vertical section mounting hole location must be considered. Consult a licensed structural or civil engineer prior to selecting a mounting system if a system other than that recommended is preferred.

- ② This is a medium-voltage cable conduit entry location when entering from the floor. See shop order floor plan for recommended conduit locations. Conduit projection must not exceed 2.00 inches (50.8 mm).
- ③ Location of low-voltage control conduit wiring opening. Conduits are limited to a projection of 1.00 inch (25.4 mm) above the finished floor. Maximum conduit size is 1.25 inches (31.8 mm).
- ④ This is a medium-voltage cable conduit entry location in an incoming line vertical section when entering from the floor. See shop order floor plan for recommended conduit locations. Conduit projection must not exceed 2.00 inches (50.8 mm).

3.2 Procedure of coupling of two units together

AMPGARD product enclosed in NEMA 3R enclosure can be close coupled to another gear or incoming line in a single lineup.

Follow the instructions below for coupling of the product enclosed in NEMA 3 enclosure.

1. Position the units adjacent to each other. Ensure the two structures are level relative to each other and are mated together firmly.

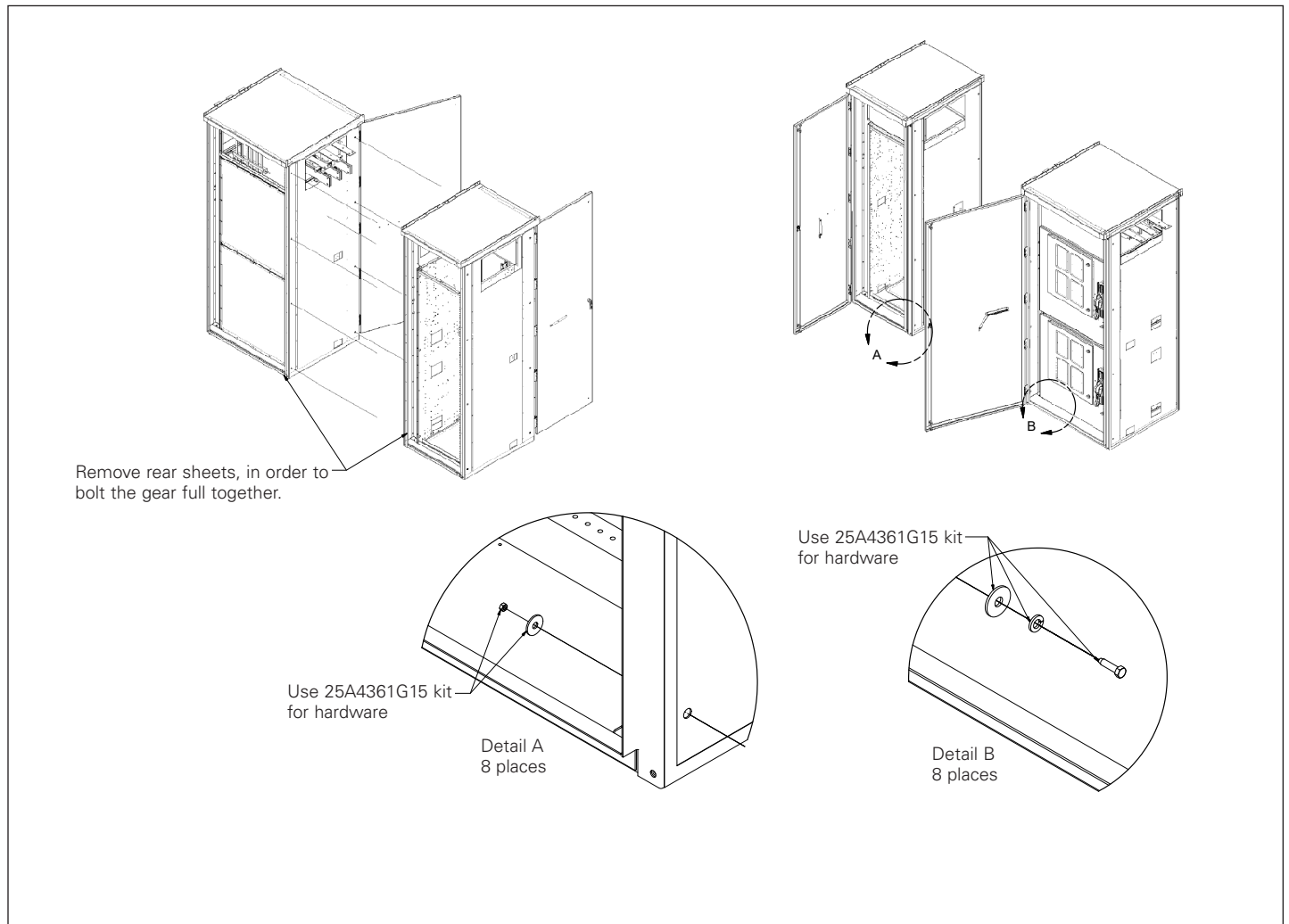


Figure 11. Coupling of two units together.

2. Fix the units to each other with the help of 8 coupling holes on side covers.
3. Install 1/2" hardware with lock washers and 1/2" extra-wide (1.5" O.D.) feeder washers into each of the threaded holes, 8 places total.
4. Fix the rain cap on the roof. Use the mid rain cap for units in the centre of the line up. Use the end rain cap at the end of the line up.

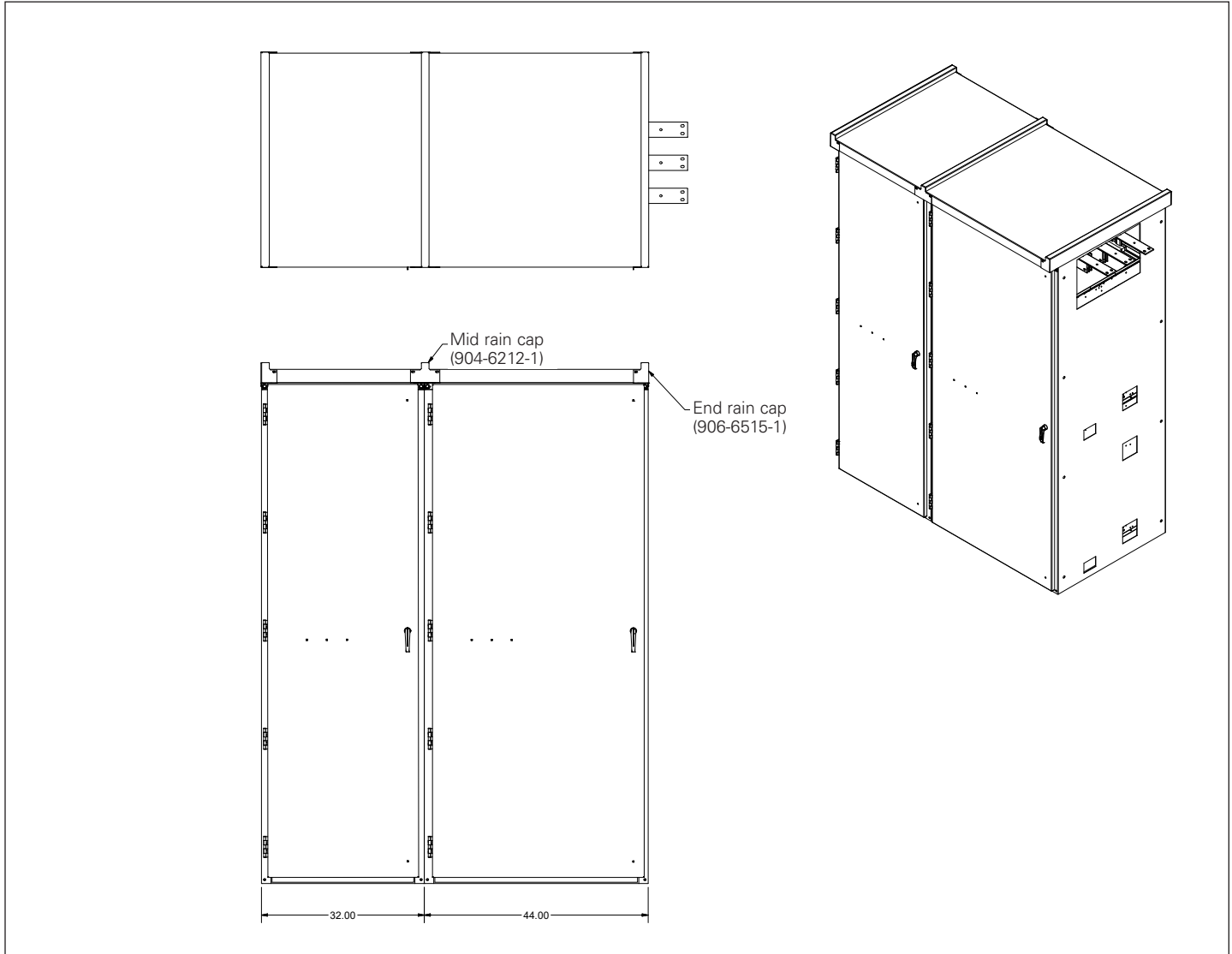


Figure 12. 44W starter coupled with incoming line.

Note: Remove the lifting angles from top of the units and discard them.

Section 4: Common configurations

Following configurations of the units can be considered.

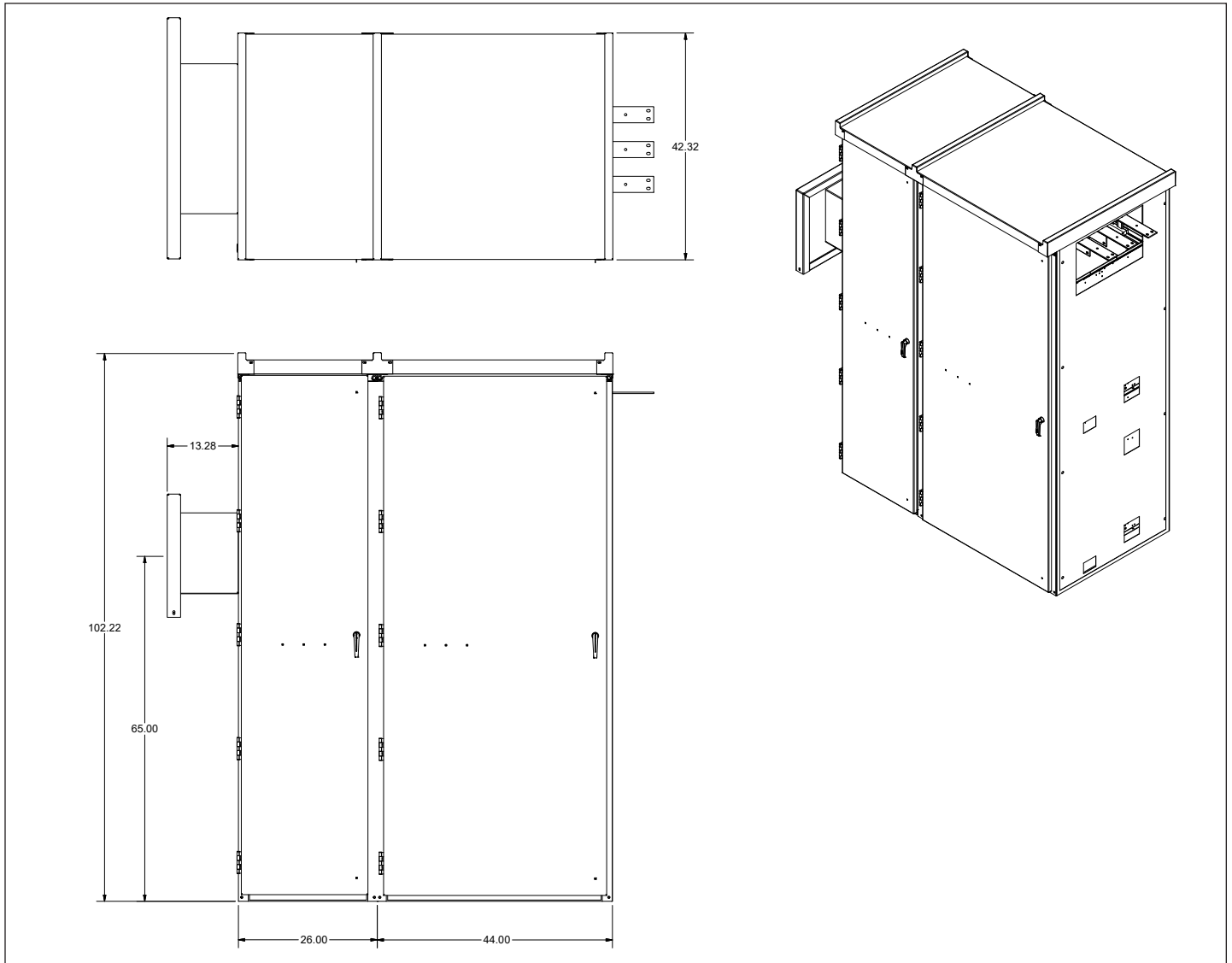


Figure 13. Incoming line with throat connection + main unit (26-inch width incoming unit + 44-inch width gear).

4.1 Procedure of coupling incoming line with throat connection with adjacent transformer/switchgear

Follow the instructions below for coupling incoming line with throat connection with transformer/adjacent switchgear.

1. Remove the sealing ring (marked in **Figure 13**) from the throat assembly of incoming line.
2. Position the incoming line and transformer/switchgear adjacent to each other. Ensure the two structures are level relative to each other and are mated together firmly.
3. Bolt the throat assembly with the transformer/switchgear.
4. Place the sealing ring on the throat after the assembly is completed.

Section 5: Inspection and maintenance

If any self-tapping screws are stripped out, install a ¼-20 nut with locking hardware on the backside of the screw and torque. Periodically inspect the air filter in the roof, if present, and replace if soiled or clogged.

Section 6: Renewal parts

When ordering renewal or spare parts, include as much information as possible. In many cases, the style number of the new part can be obtained from identification on the old part. Always include a description of the part. Specify the rating, structure number, and shop order number, located on the nameplate of each section.

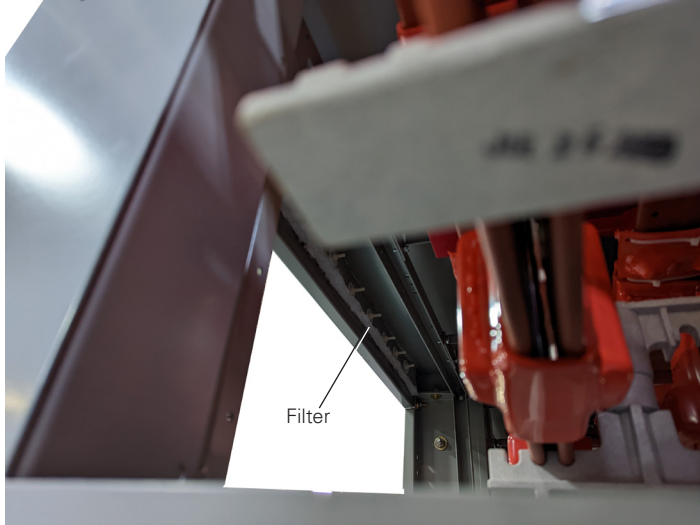


Figure 14. Filter in the roof.

Notes:

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