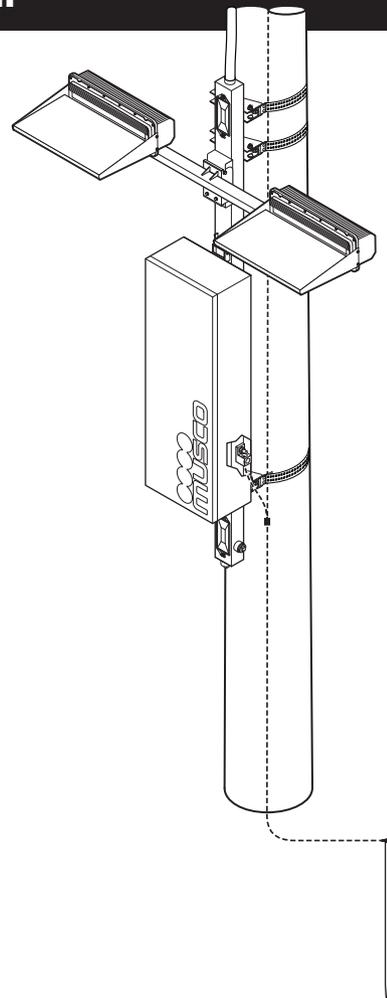
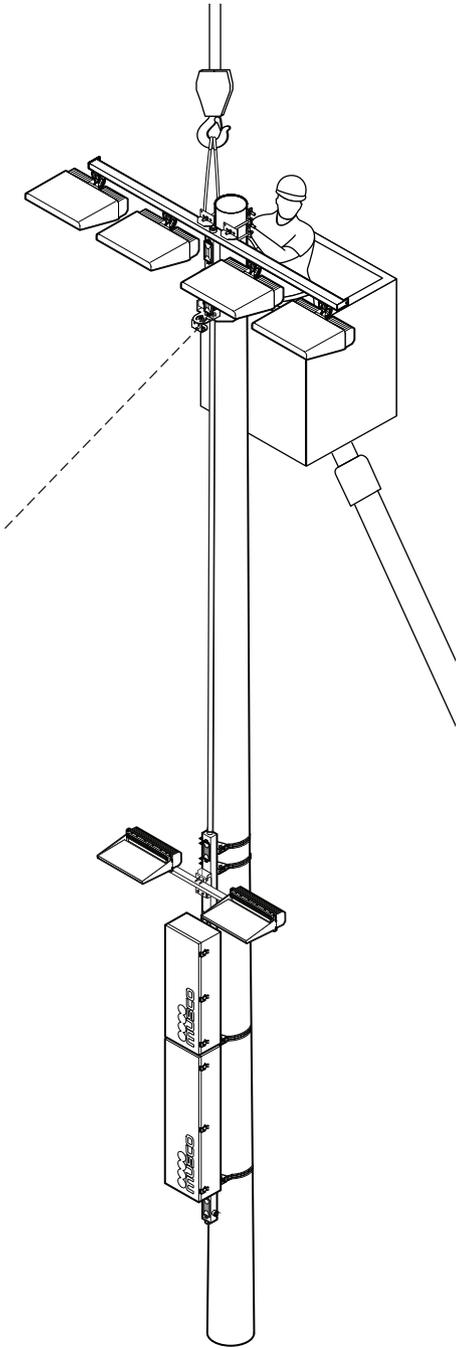


Installation Instructions: **SportsCluster®** Lighting System



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Supplemental Instructions for Optional Features or Special Situations

Provided with your project as needed

Auxiliary Bracket	D
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Installation Instructions: SportsCluster® Lighting System

Before You Begin

Safety Information

Electrical Safety Guidelines

Use extreme caution near overhead power lines or underground utilities. Observe all safety precautions for high-voltage equipment. Only qualified personnel may perform wiring. Follow all applicable building and electrical codes.

General Safety Guidelines

Follow proper safety procedures during installation. Installers must wear the appropriate personal protective equipment including:

- Hard hat
- Steel-toed shoes
- Fall protection
- Leather work gloves
- Eye protection

Locate all underground utilities prior to digging.

All tools and equipment supplied by Musco are designed for specific use as described in these instructions. Do not use them in any other manner. Do not alter structural members in any way, such as bend, weld, or drill, without prior authorization from Musco.

Luminaires generate up to 2.6 mA per driver on the equipment grounding conductor and are designed to meet leakage current requirements per IEC 61347-1.

The luminaires should be positioned so that prolonged staring into the luminaire at a distance closer than 12–37 m (40–121 ft) is not expected, per IEC/TR 62778. See table.

Luminaire	Distance
TLC-LED-400	24 m (79 ft)
TLC-LED-550	24 m (79 ft)
TLC-BT-575	20 m (65 ft)
TLC-LED-600	24 m (79 ft)
TLC-LED-900	24 m (79 ft)
TLC-LED-900NB	no minimum

Luminaire	Distance
TLC-LED-1200	37 m (121 ft)
TLC-LED-1400NB	37 m (121 ft)
TLC-LED-1500	37 m (121 ft)
TLC-RGBW	15 m (49 ft)
TLC-RGBU	12 m (40 ft)

About These Instructions

These instructions outline basic assembly procedures for the SportsCluster® lighting system. They are not a comprehensive guide to all possible situations. Direct any questions to your local Musco representative or call +1-800-825-6020 or +1-641-676-2309.

Throughout this manual note these important symbols:

-  The safety alert symbol alerts you of situations that require care and caution to avoid serious personal injury.
-  The go-to arrow indicates a branch in a procedure for special situations. In case of optional equipment, the instructions may be in another document.
-  The stop and check symbol signals you to stop and verify conditions before proceeding.
-  The tip symbol points out advice that makes installation easier.
-  The contact Musco symbol appears in special situations where you may need to contact Musco for further information.
-  The recycle symbol identifies recyclable materials.

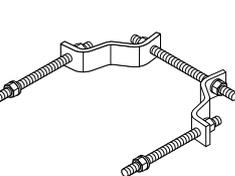
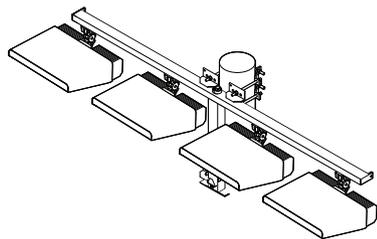
Installation Instructions: SportsCluster® Lighting System

Before You Begin

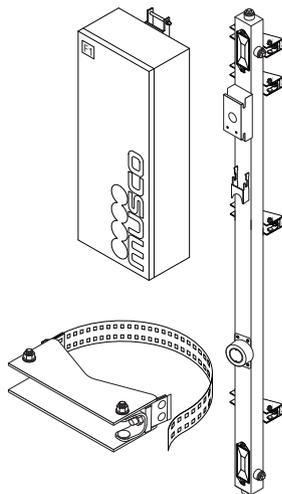
Standard Tools/Supplies

Contractor/installer supplies	Function	Page
Hammer, pry-bar, banding cutters	Unloading equipment	5
Measuring tape, 25 ft (7.5 m)	Identifying brackets and straps, locating components at proper height on pole	7, 8, 9, 16
Torque wrench	Torquing pole clamping hardware	10
Sockets: 3/8, 7/16, 1/2, 9/16 in standard and deepwell	Torquing pole clamping hardware and luminaire retaining cable stops	10,15
Screwdrivers, standard and Phillips	Landing power, tightening enclosure hub screws	11, 31, 32
Marker	Marking hanger bracket mounting locations on pole	9
Paint, chalk, flags	Marking aiming points on field	21
Measuring tape, 300 ft (90 m)	Locating aiming points on field	21
1 1/8 in open-end torque wrench or torque wrench with 1 5/16 in crows-foot	Torquing pole clamping hardware, torque nuts	22, 25
1 3/8 in open-end wrench	Tightening pole clamping hardware	17–20, 22, 25
Stepped drill, hole saw, or die set	Cutting conduit entryways	29
Conduit, fittings, clamps, etc.	Conduit and supplies as needed for wiring routing	29
Electrical fish tape	Pulling conductors	30, 31
Main power disconnect and distribution panels	Power to lighting system	31
Electricians pliers		31
Grounding electrode and driving sleeve*	Pole lightning ground	32, 33
Grounding conductor, AL to CU splice (if required), saddle clamp, bonding jumper, exothermic weld kit*	Pole lightning ground	32, 33
Shovel	Excavating grounding electrode	32, 33
Musco supplies	Function	Page
Snips	Cutting steel strapping	10
1/2, 9/16 in offset combination wrench	Tightening strap hardware	10, 11, 32
7/16 in ratcheting combination wrench	Tightening luminaire captive bolts	15, 31
5 mm hex key	Landing primary feed wires on 125 A disconnect switch	31
3/16 in hex key	Ground bar	31, 32
5/16 in hex key	Grounding lug	30, 33
Wago brand LEVER-NUTS® wire connector	Connecting pole harness	30
Equipment needed	Function	Page
Load-rated crane and rigging	Unloading, lifting crossarm assembly	5, 22, 24
Aerial work platform	Attaching crossarm assembly to pole and other aerial work	22, 24
10 ft (3 m) stepladder or small line truck	Attaching enclosures and enclosure wiring	9, 27–33

Components of SportsCluster® Lighting System



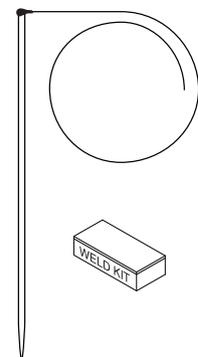
Poletop luminaire assembly and mounting hardware



Electrical components enclosure and mounting hardware



Wire harness (contractor supplied)*



Lightning ground equipment (contractor supplied)*

* May be supplied by Musco.



Installation Instructions: SportsCluster® Lighting System

Before You Begin

Unloading Instructions

A typical shipment includes electrical components enclosures, poletop luminaire assemblies, luminaire cartons, attachment hardware, and may include wire harnesses. Unload and uncrate equipment. Stage for assembly placing all matched components and hardware at the proper pole location as noted on *Field Aiming Diagram*.

Tools/Materials Needed

- Crane or forklift
- Hammer
- Pry bar
- Banding cutters

As you unload, do the following:

- Check bill of lading to verify you have all materials.
- Inspect all materials for shipping damage.
- Store all lighting equipment in a dry location or cover with tarp until ready to install.



If you need additional information, contact your local Musco representative.



Please recycle.

Luminaires, hardware, and other components are shipped in recyclable cardboard packaging.

Electrical System Requirements

While portions of the SportsCluster® lighting system can be assembled by non-professionals, a qualified electrician must handle the electrical supply installation and hook-up in accordance with national, state, and local codes. Your electrician should review this information before installation begins.

The electrician is generally required to provide these items:

- Service entrance
- Main power disconnect and distribution panel(s)
- Supply wiring and insulated equipment grounding conductors
- Lightning grounding conductor and electrode, one per pole

Ensure supply wiring is rated for 90°C. Review the label inside the electrical components enclosure door and *Control System Summary* for voltage and phase requirements. All entrance hubs must be rated NEMA 3R (IP54) or better.

Other features that may affect the wiring supply requirements for this project include:

- Lighting contactor cabinets — refer to the supplemental installation instructions and the *Musco Control System Summary*.
- Control-Link® control system — refer to the supplemental installation instructions and *Musco Control System Summary*.

Always dispose of electronic waste in accordance with all applicable laws and regulations.

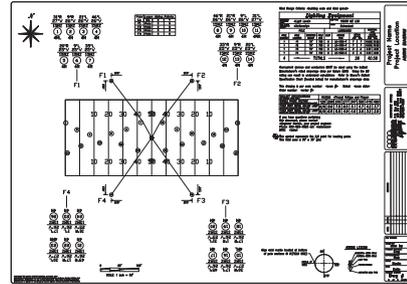
Before You Begin

Documents We Provide

Field Aiming Diagram

The *Field Aiming Diagram* is your map for locating all poles on your project. It gives this information:

- Pole IDs, locations, and heights
- Luminaire IDs
- Field origin for coordinate measuring
- Aiming points for each pole
- Poletop luminaire assembly mounting height
- Full load current for each luminaire



Control System Summary

Projects with a control system include a *Control System Summary*. It gives this information:

- Control system diagram and details
- Contactors and cabinets
- Lighting circuits
- Voltage, phase, and frequency
- Full load current for each circuit



Electrical Components Enclosure and BallTracker® Luminaire

Overview

The electrical components enclosure is factory-wired and tested. It contains essential electrical components of the lighting system in an accessible location. It is ideally mounted on the pole about 10 ft (3 m) above grade to discourage tampering. You may mount it in another accessible location, however limitations on conductor length and size apply.

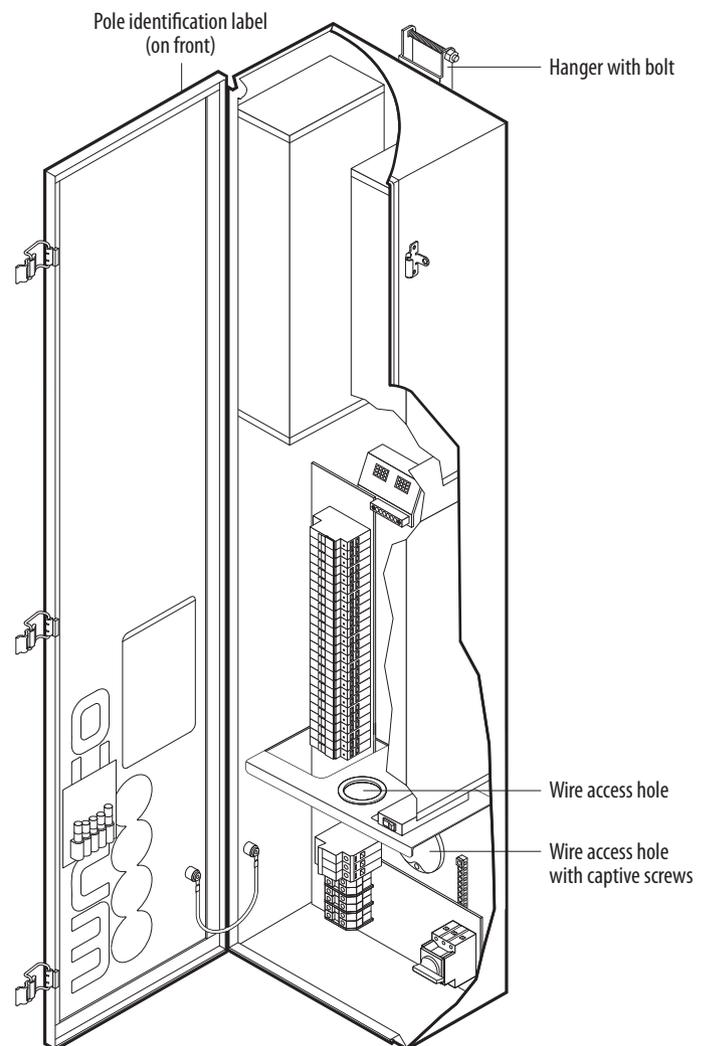
Tools/Materials Needed

Musco Supplied

- ½ and ⅝ in offset combination wrenches
- Snips
- Field Aiming Diagram*

Contractor Supplied

- Torque wrench with ½ and ⅝ in sockets
- Large Phillips-head screwdriver
- Measuring tape
- Marker
- 10 ft (3 m) stepladder or small line truck



Electrical Components Enclosure and BallTracker® Luminaire



Verify pole ID on electrical components enclosure matches pole location on *Field Aiming Diagram*.

Assembly Procedure



Caution
Electrical components enclosures are heavy.

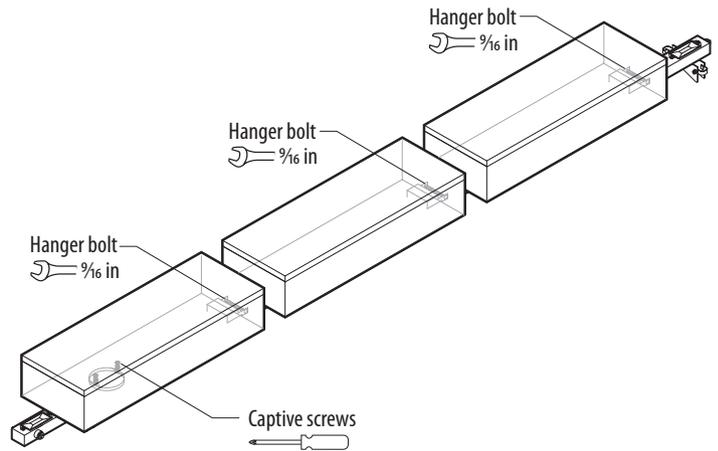
Electrical components enclosure may weigh up to 65 lb (30 kg). Lift carefully with two people to avoid injury.

1

Mount bottom enclosure on tube. Align wire access hole with hub. Tighten captive screw using Phillips-head screwdriver. Tighten hanger bolt with $\frac{1}{16}$ in wrench.

2

Mount middle and/or top enclosures. Align access hole with hub and slide box onto hanger bracket. Tighten hanger bolt with $\frac{1}{16}$ in wrench.



Electrical Components Enclosure and BallTracker® Luminaire

3 If pole includes a BallTracker® luminaire, attach bracket using $\frac{3}{4}$ in socket and torque wrench. Tighten captive bolts to 40 ft•lb (54 N•m).



Ensure crossarm wire harness is not pinched between mating plates.

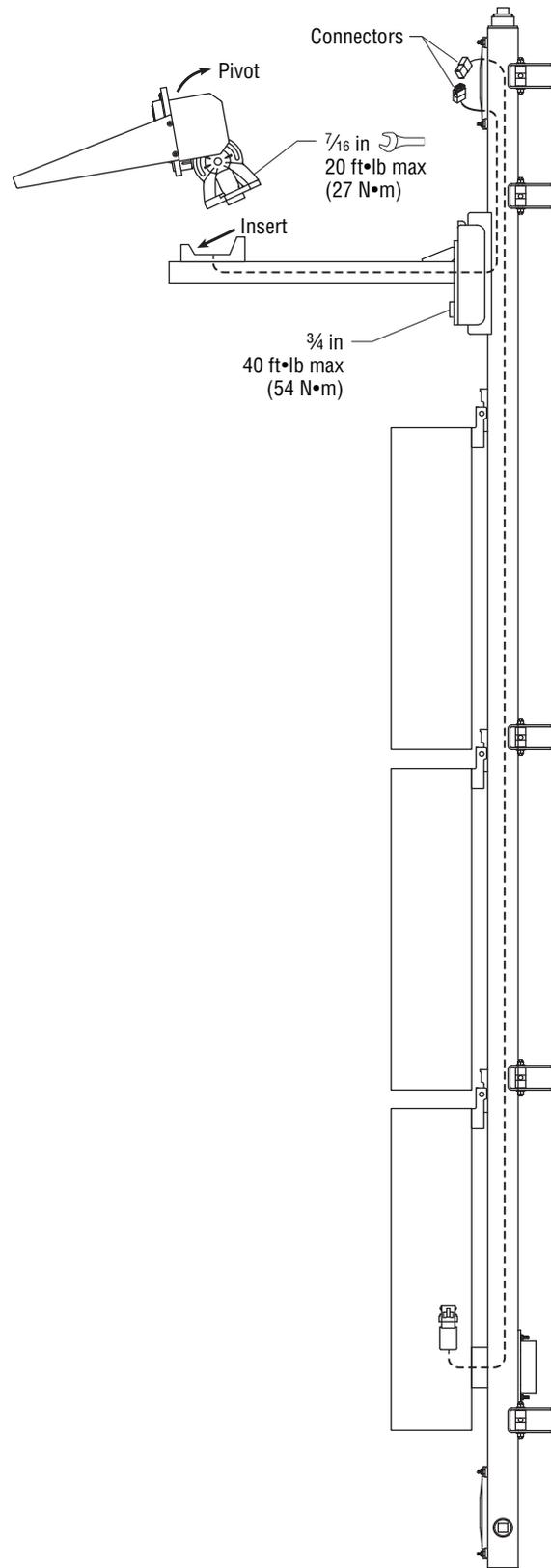
4 Attach luminaire using $\frac{7}{16}$ in wrench. Tighten captive screws until fully tight. Do not exceed 20 ft•lb (27 N•m).

5 Pull BallTracker® wire harness through tube.

Feed bottom of harness into enclosure hub. Ensure protective sleeve extends through access hub and tuck harnesses behind subpanel.

6 Attach support grips at top handhole.

7 Mate quick-connectors at poletop and inside electrical components enclosure(s). Match driver/luminaire IDs.



Electrical Components Enclosure and BallTracker® Luminaire



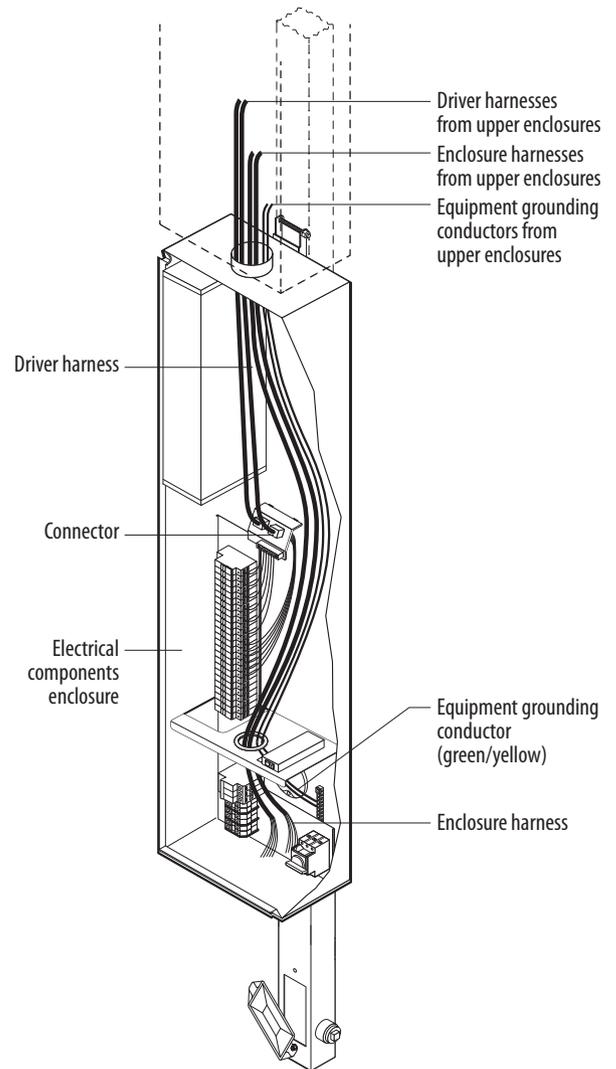
Only qualified personnel may perform wiring. Route wires as shown, but leave the final connections for your electrician.

8

Route driver harnesses from top and middle enclosures to bottom enclosure and plug into connector mounted in bracket.

9

Route equipment grounding conductor and enclosure harnesses from top and middle enclosures to bottom enclosure.



Electrical Components Enclosure and BallTracker® Luminaire



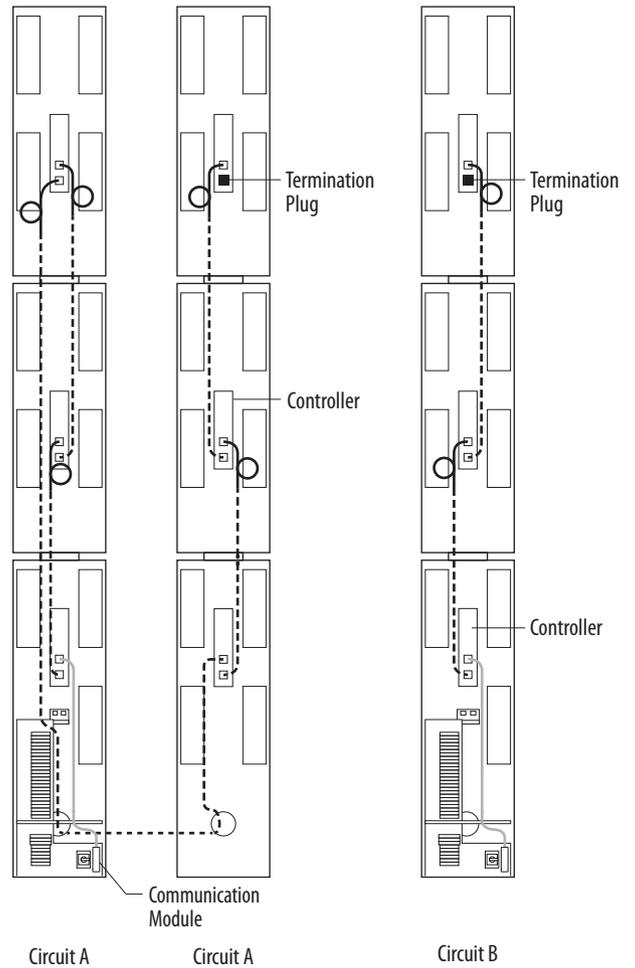
Skip Step 10–11 if controller not present

10

Pull communication cables down from top and middle boxes and plug into controller in enclosure below as shown.

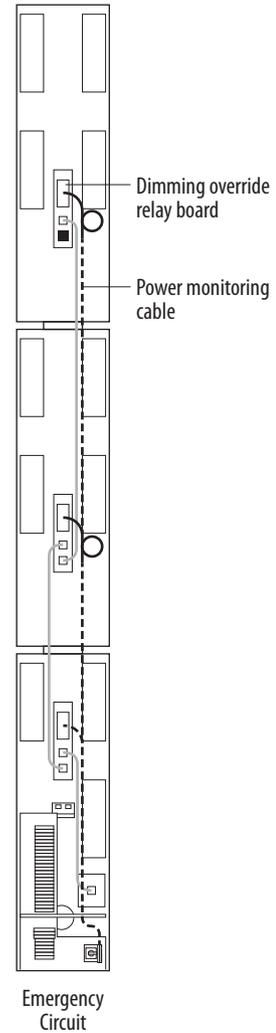


Connections between stacks must be done after stacks are mounted on the pole.



Electrical Components Enclosure and BallTracker® Luminaire

-  Skip Step 11 if emergency egress lighting dimming override relay board is not present.
- 11** Pull power monitoring cable from dimming override relay board in top and middle enclosures down to bottom enclosure and land black wire on terminal block M1 and blue/white wire on terminal block M2.



Electrical Components Enclosure and BallTracker® Luminaire

Installation Procedure



Verify pole ID on electrical components enclosure matches pole location on *Field Aiming Diagram*.

1

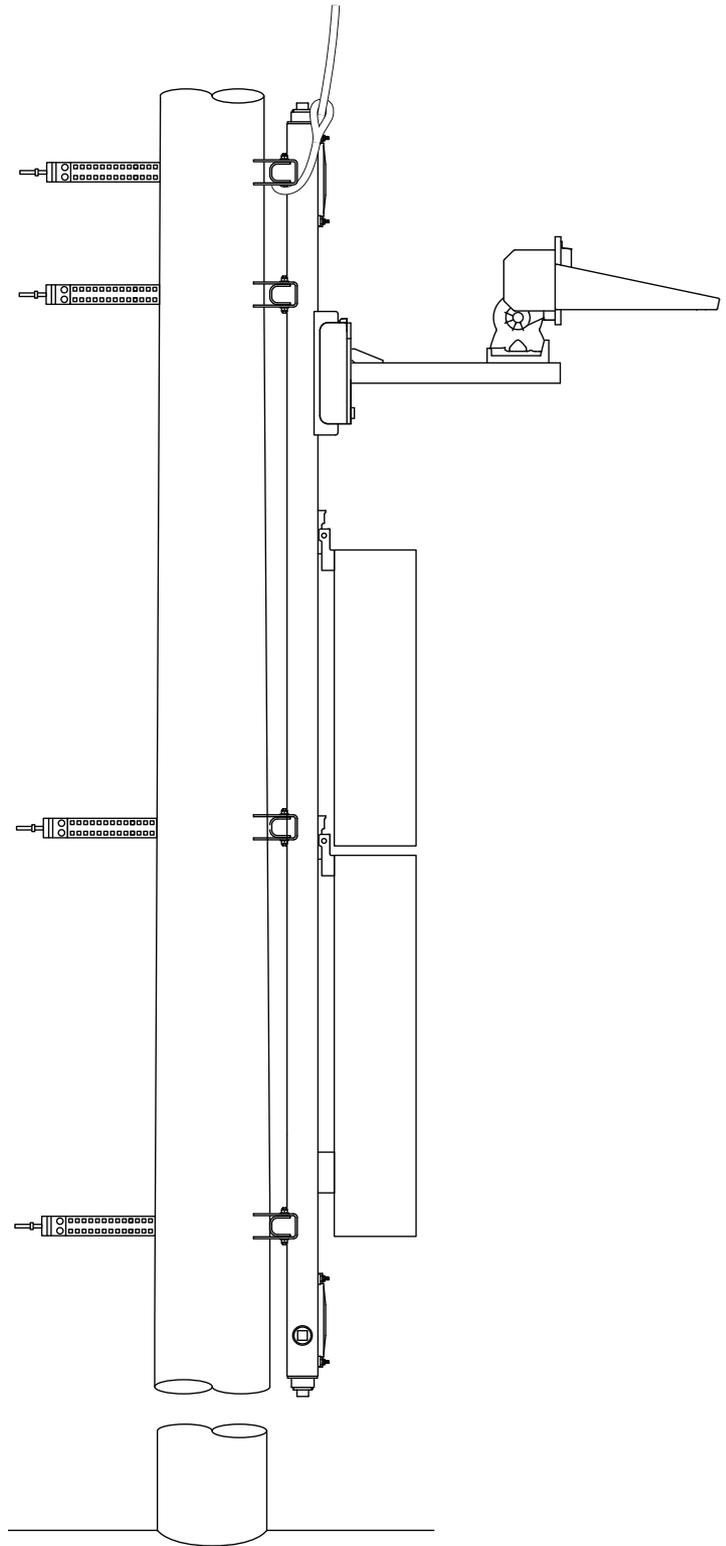
Sling enclosure stack under the welded arm for strapping connections (not under the BallTracker® luminaire crossarm) and lift enclosure stack.

2

Using the enclosure stack ID located on top of the enclosures, determine orientation of assembly. An orientation of "0" indicates the enclosures face the field. Position bottom enclosure hub at 10 ft (3m) above grade.



BallTracker® luminaires should face the field.



Electrical Components Enclosure and BallTracker® Luminaire

3 Cut straps to required length. Pull tight around pole and trim excess within 1 in (25 mm) of strap bracket. Cut across square holes, not between them.

4 Attach brackets to pole. Torque $\frac{5}{16}$ in strap bracket hardware A to 12 ft•lb (16 N•m) using $\frac{1}{2}$ in socket and torque wrench. Torque all $\frac{3}{8}$ in tensioning nuts B to 20 ft•lb (27 N•m) using $\frac{5}{16}$ in socket and torque wrench.

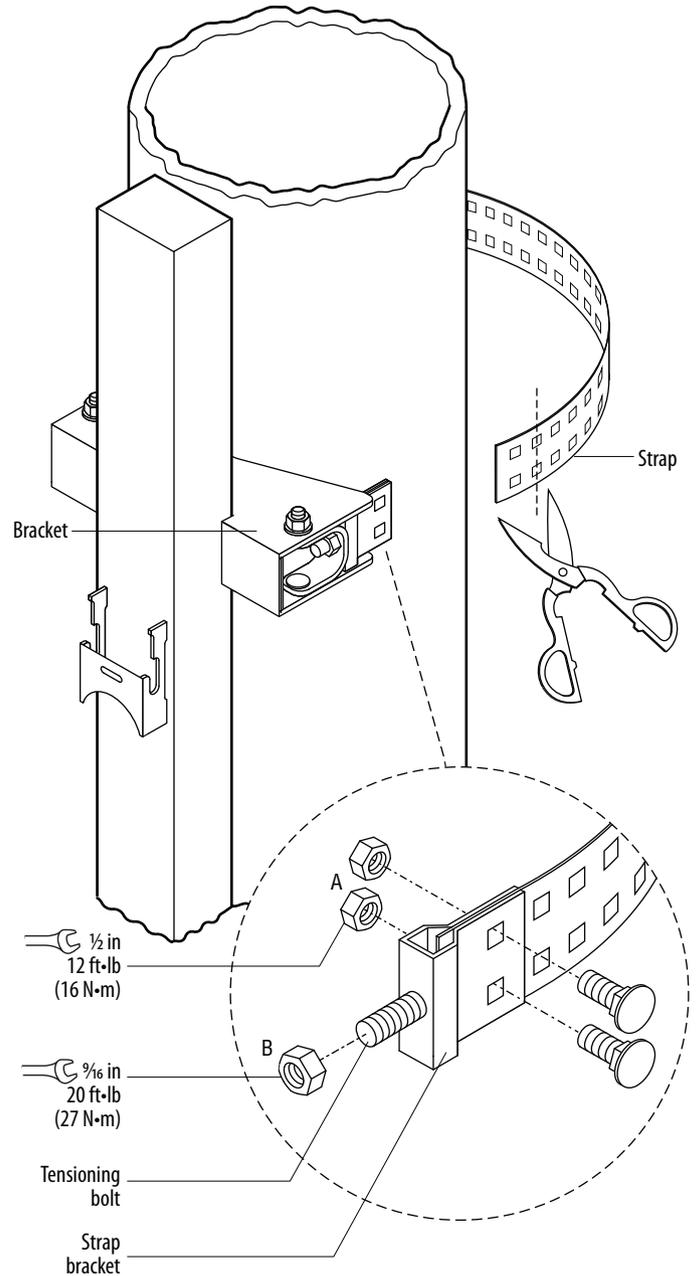


Caution
Falling equipment hazard

Ensure you meet torque values specified on all tensioning hardware.

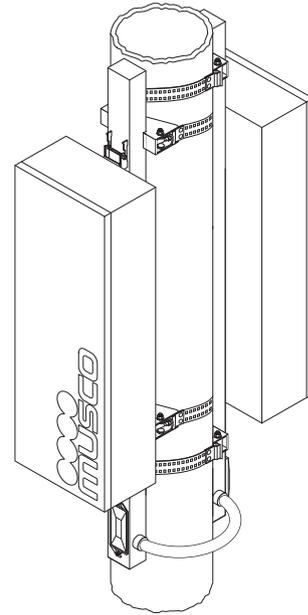


If tensioning bolt is fully seated and strap is not yet tight, trim strap at next set of holes and repeat step 4.



Electrical Components Enclosure and BallTracker® Luminaire

- 5** Repeat steps 3 and 4 for back-to-back or multiple stacks.



- 6** Use 1¼ in hubs provided to run flex conduit between electrical component enclosure stacks.

Electrical Components Enclosure and BallTracker® Luminaire

7 Route the conduit down the pole to the electrical components enclosure with wireless radio.

8 Cut the entry hole into side of enclosure above wireless radio.

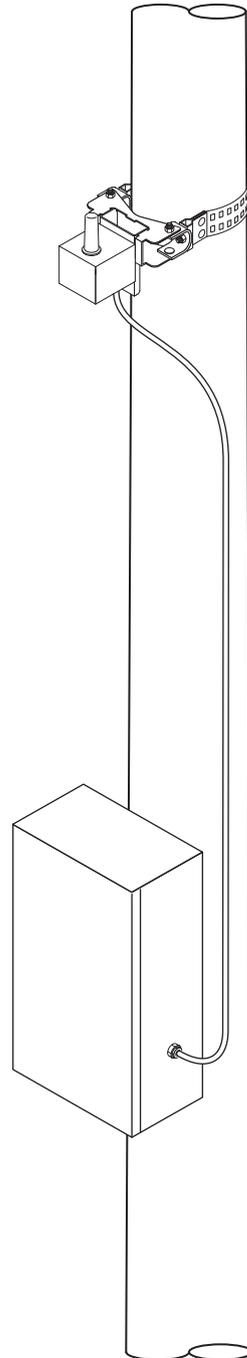


**Caution
Equipment Damage**

Protect equipment from metal shavings.

9 Route coaxial cable through hole and secure conduit to enclosure using provided liquid tight connector.

10 Install the coaxial cable on the wireless radio located in the electrical components enclosure.



Luminaire Attachment

Overview

The luminaire assembly conveniently allows mounting of luminaires on the pole as a unit. Luminaires are factory built and shipped in individual cartons. Luminaires are factory aimed and ready for installation to poletop luminaire assembly. Do not disassemble.

Tools/Materials Needed

Musco Supplied

- ☐ 7/16 in ratcheting combination wrench

Contractor Supplied

- ☐ Torque wrench with 7/16 in socket

Note: Leave luminaires in box until ready to assemble. Keep protective cover on luminaire until ready to attach to crossarm. Do not leave luminaires unassembled from crossarm in wet conditions.

Assembly Procedure

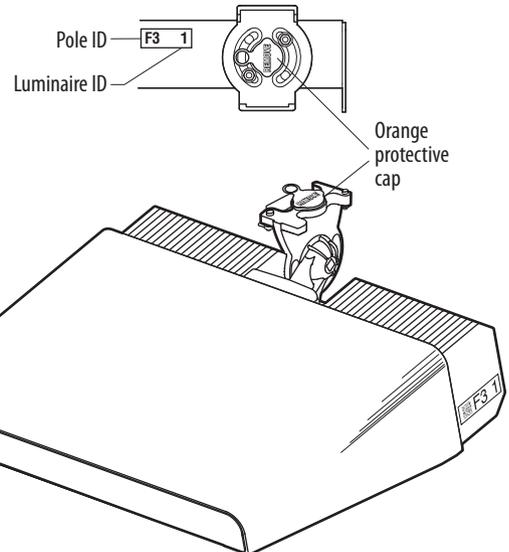


Verify pole ID on luminaire cartons matches pole and location on *Field Aiming Diagram*.

1

Remove and discard orange protective caps from luminaire knuckle and mounting plate that cover electrical connections. Do not remove orange tag around captive bolts.

Note: The luminaire style may vary from what is shown.



Luminaire Attachment

- Match luminaire ID to crossarm and install luminaire onto mounting plate. Insert knuckle into mounting plate and pivot into position.

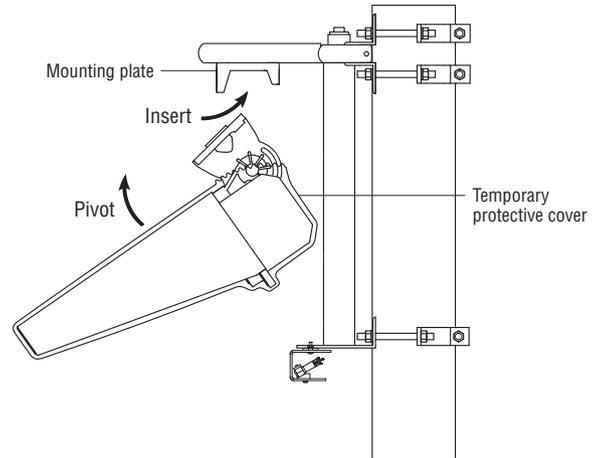
Note: The luminaire style may vary from what is shown.

Luminaire	Weight
TLC-LED-400	40 lb (18 kg)
TLC-LED-550	25 lb (11 kg)
TLC-BT-575	34 lb (15 kg)
TLC-LED-600	40 lb (18 kg)
TLC-LED-900	40 lb (18 kg)
TLC-LED-900NB	114 lb (52 kg)
TLC-LED-1200	45 lb (20 kg)
TLC-LED-1400NB	106 lb (48 kg)
TLC-LED-1500	67 lb (30 kg)
TLC-RGB-U	20 lb (9 kg)
TLC-RGBW	40 lb (18 kg)

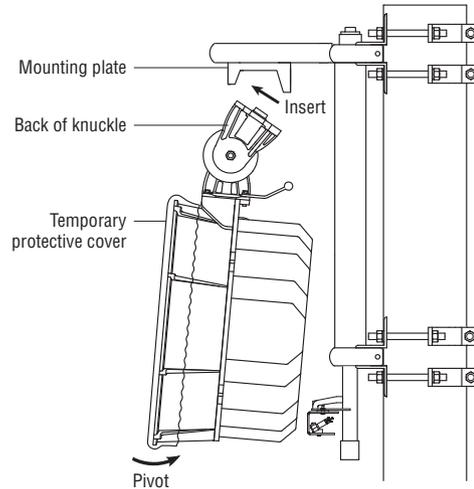


Caution
Luminaire may be heavy.

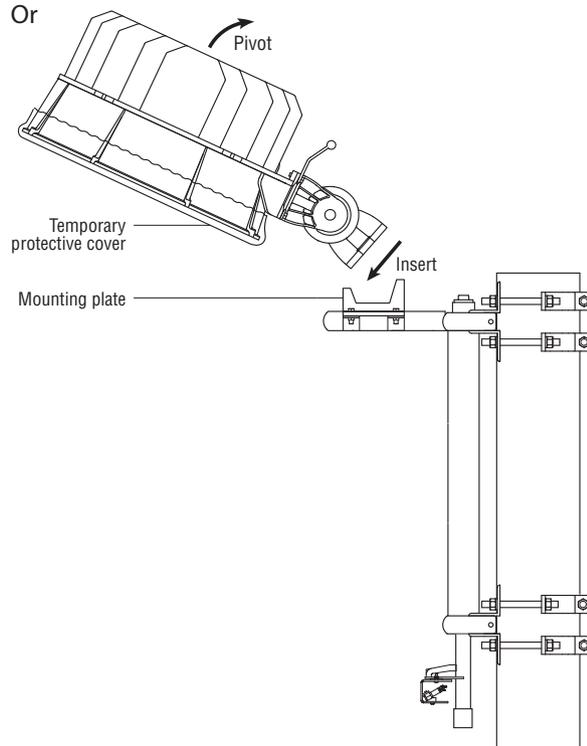
Lift carefully with two people to avoid injury.



Or



Or



Luminaire Attachment

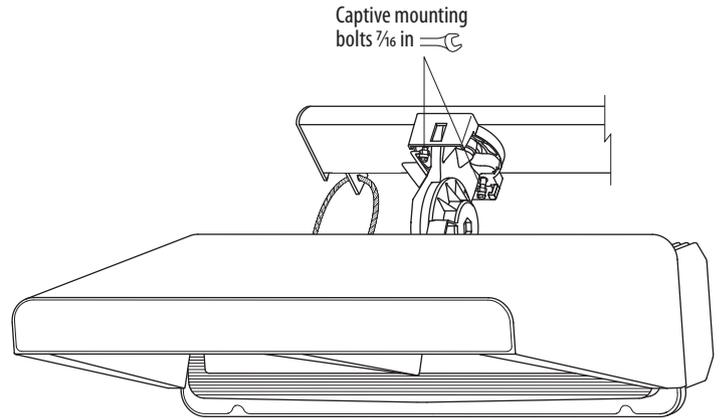
- 3** Tighten captive mounting bolts. Orange tag will break loose before all bolts are fully tight — continue tightening. Torque must not exceed 20 ft•lb (27 N•m). To avoid overtightening, use provided $\frac{7}{16}$ in combination wrench.



Warning

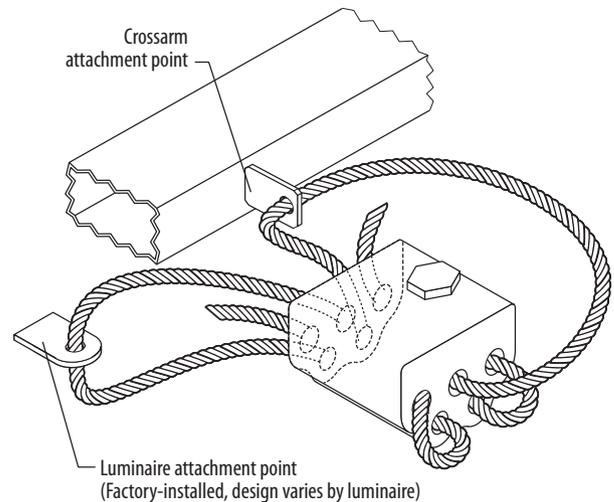
Luminaire may fall if bolts are not tight.

Do not remove tag before tightening bolts.



- 4** Attach luminaire retaining cable (if present). Route luminaire cable through crossarm anchor point, through luminaire block, and back through the block under the set screw. Luminaire attachment point will vary per luminaire design.

- 5** Using $\frac{7}{16}$ in socket and torque wrench, tighten cable set screw to 60 in•lb (6.8 N•m).



If pole has auxiliary equipment, refer to *Installation Instructions: Auxiliary Bracket*.

Installation Instructions: SportsCluster® Lighting System

Poletop Luminaire Assembly

Overview

All luminaires are factory aimed to their exact position on the field. To ensure proper poletop luminaire assembly alignment, a simple-to-use alignment beam completes the precision field aiming. The alignment beam is attached in the factory to one poletop luminaire assembly on each pole.

Tools/Materials Needed

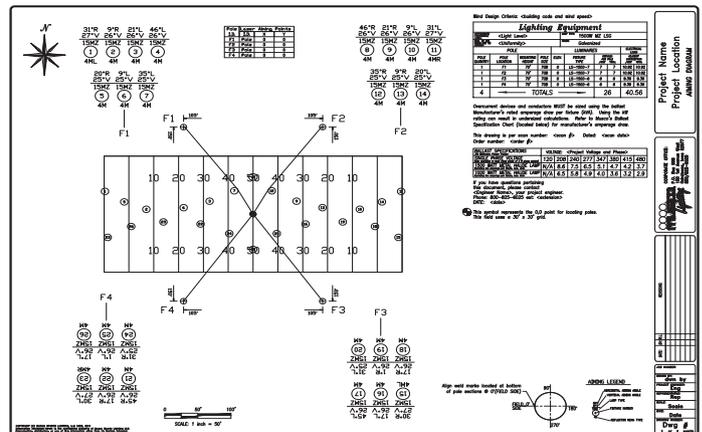
Contractor Supplied

- $\frac{15}{16}$ in open-end torque wrench or torque wrench with $\frac{15}{16}$ in crows-foot
- $\frac{15}{16}$ in open-end wrench
- Chalk or flags to mark aiming points on field
- Measuring tape

Installation Procedure

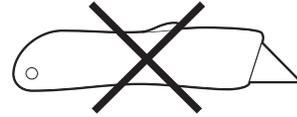
1 Plot and mark aiming point(s) on field. Refer to *Field Aiming Diagram*.

 If assembling pole on ground, ensure all pole clamping hardware is torqued to 80 ft•lb (108 N•m) using $\frac{15}{16}$ in open-end torque wrench before lifting pole (see step 5). Instead of turning luminaire assembly, turn pole to align with aiming point. Do not remove plastic wrap from luminaires until ready to lift the pole.

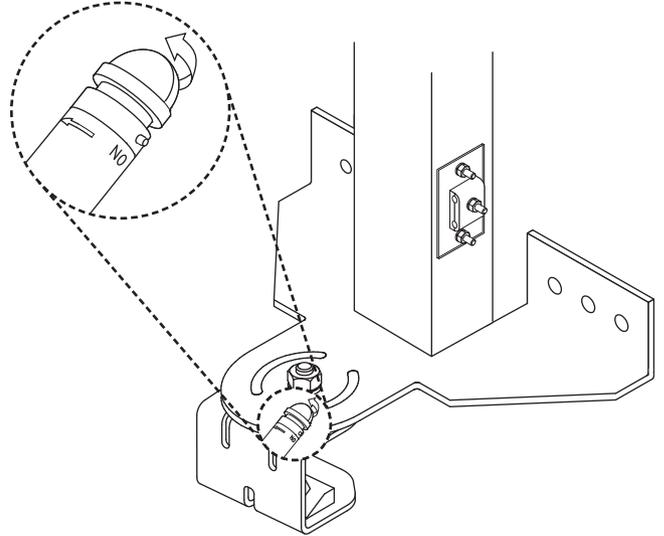


Poletop Luminaire Assembly

2 Remove plastic wrap from luminaires. Do not use knife.

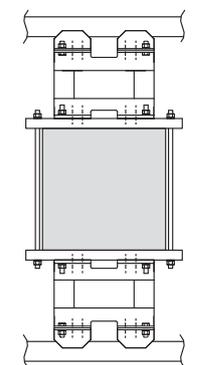
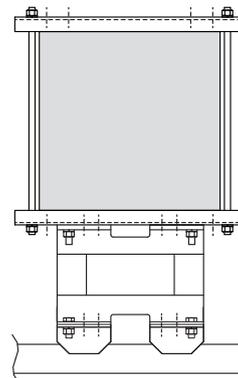
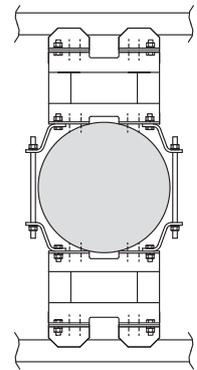
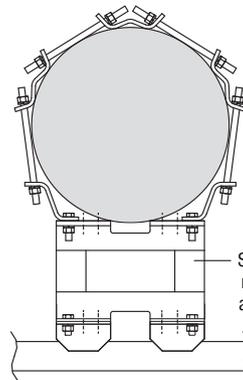


3 Turn on pole alignment beam



Front side crossarms

Front / Back crossarms



Mounting hardware for each poletop assembly will be packaged and labeled with the pole ID.

Hardware configuration will vary by pole size, shape, and crossarm configuration.

See example configurations for more detail.

Poletop Luminaire Assembly

- 4 Attach luminaire assembly to pole using provided pole clamping hardware in package labeled with the pole ID.

Hardware configuration varies with pole diameter. See sample configurations below.

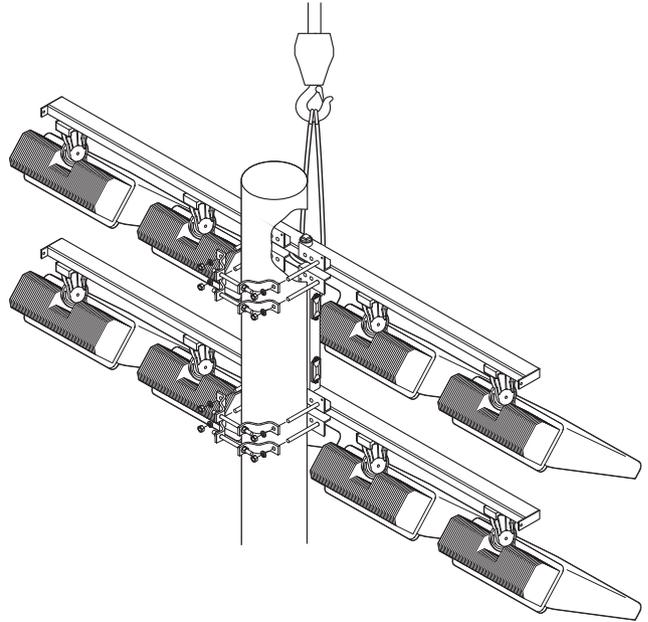
If pole is already standing, sling and lift luminaire assembly to poletop location.



Warning

Hazard of falling personnel and materials

Use separate lifting equipment for assemblers and materials. Sling luminaire assembly properly and do not release from suspension until all pole clamping hardware is installed and torqued.



Poletop Luminaire Assembly

5

Aim luminaire assembly using alignment beam. Device projects a narrow vertical beam of light that is only visible when you are aligned with it. This step requires two people.

Person A: Stand on field aiming point and look at pole alignment device. It is attached to a luminaire. Walk parallel to crossarms until you see beam. Signal person B to rotate luminaire assembly left or right until beam aligns with aiming point. Beam may be visible, however when pole is aligned, you will see a bright flash as you stand directly on aiming point.

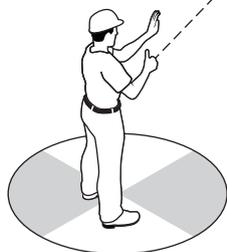
Person B: Following direction from person A, rotate luminaire assembly left or right until it is aligned.



Warning

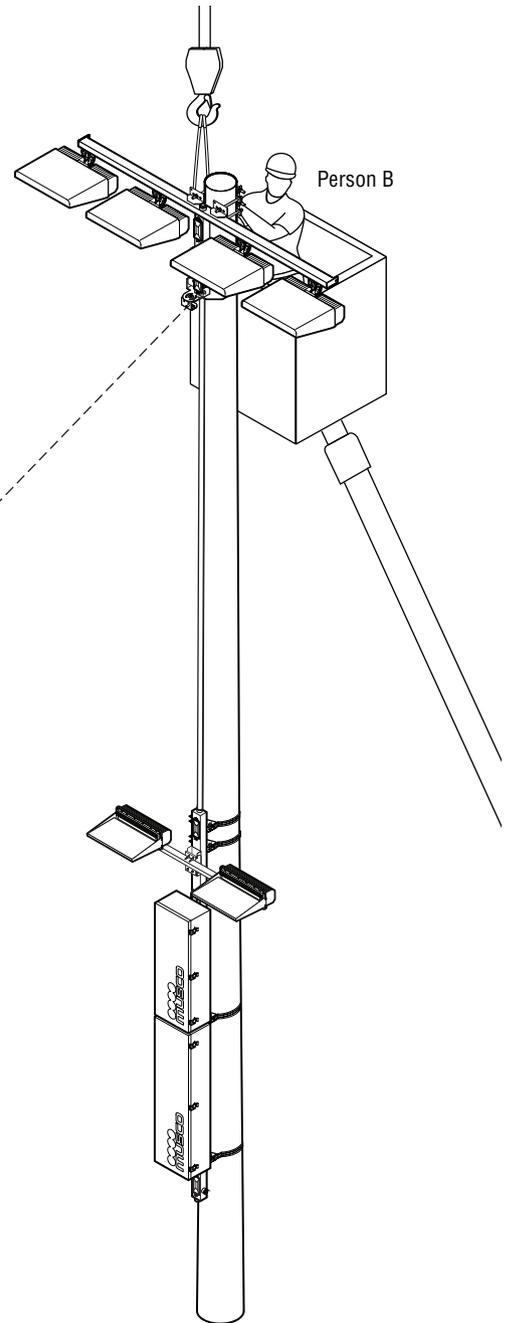
Falling material hazard

If erecting pole with luminaire assembly attached, do not attach rigging to luminaire assembly. Follow pole supplier instructions for lifting.



Aiming point

Person A



Warning

Laser radiation hazard

Pole alignment beam is safe for viewing at a distance of three feet (one meter) or more. Do not look into beam from closer than three feet (one meter). Do not use binoculars, camera, or telescope to view beam from any distance. Locator beam is a class 2M laser device. Wavelength: 635-660 nm, Laser power for classification: <math><1\text{ mW}</math> continuous, divergence: <math><1.5\text{ mrad}</math> x 1 rad. Using alignment beam in a manner other than as described here may result in hazardous exposure. Do not modify, dismantle, or attempt to repair.

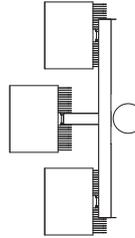
Poletop Luminaire Assembly

- 6** Tighten pole clamping hardware. Torque all nuts to 80 ft•lb (108 N•m) using $\frac{15}{16}$ in open-end torque wrench.

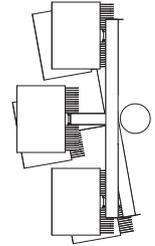


If assembling multiple poletop luminaire assemblies at same orientation ensure crossarms are aligned with crossarms above and below.

Correct

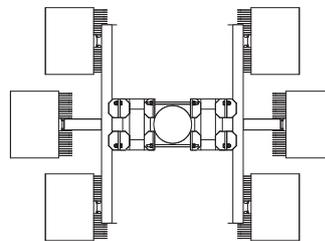


Incorrect

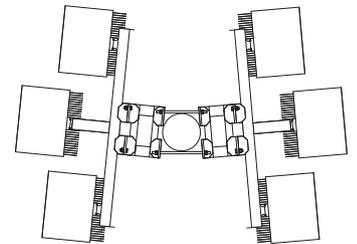


If assembling back-to-back poletop luminaire assemblies ensure crossarms are parallel.

Correct



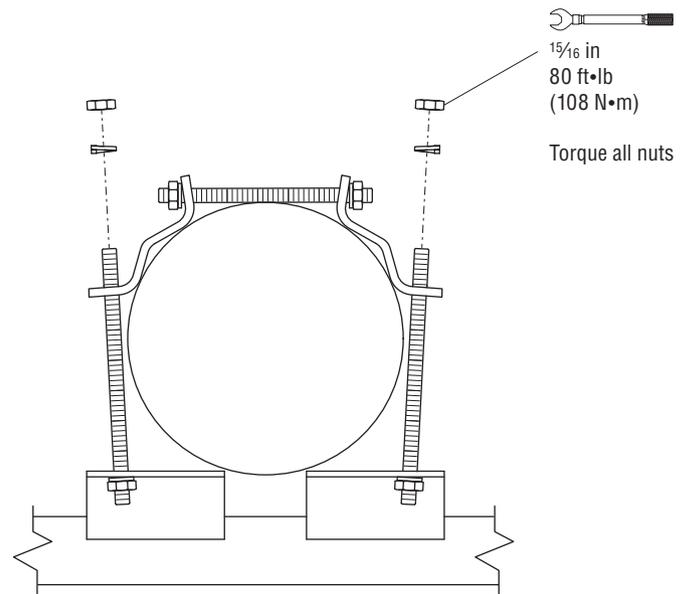
Incorrect



Ensure back-to-back crossarms remain parallel while tightening.

7

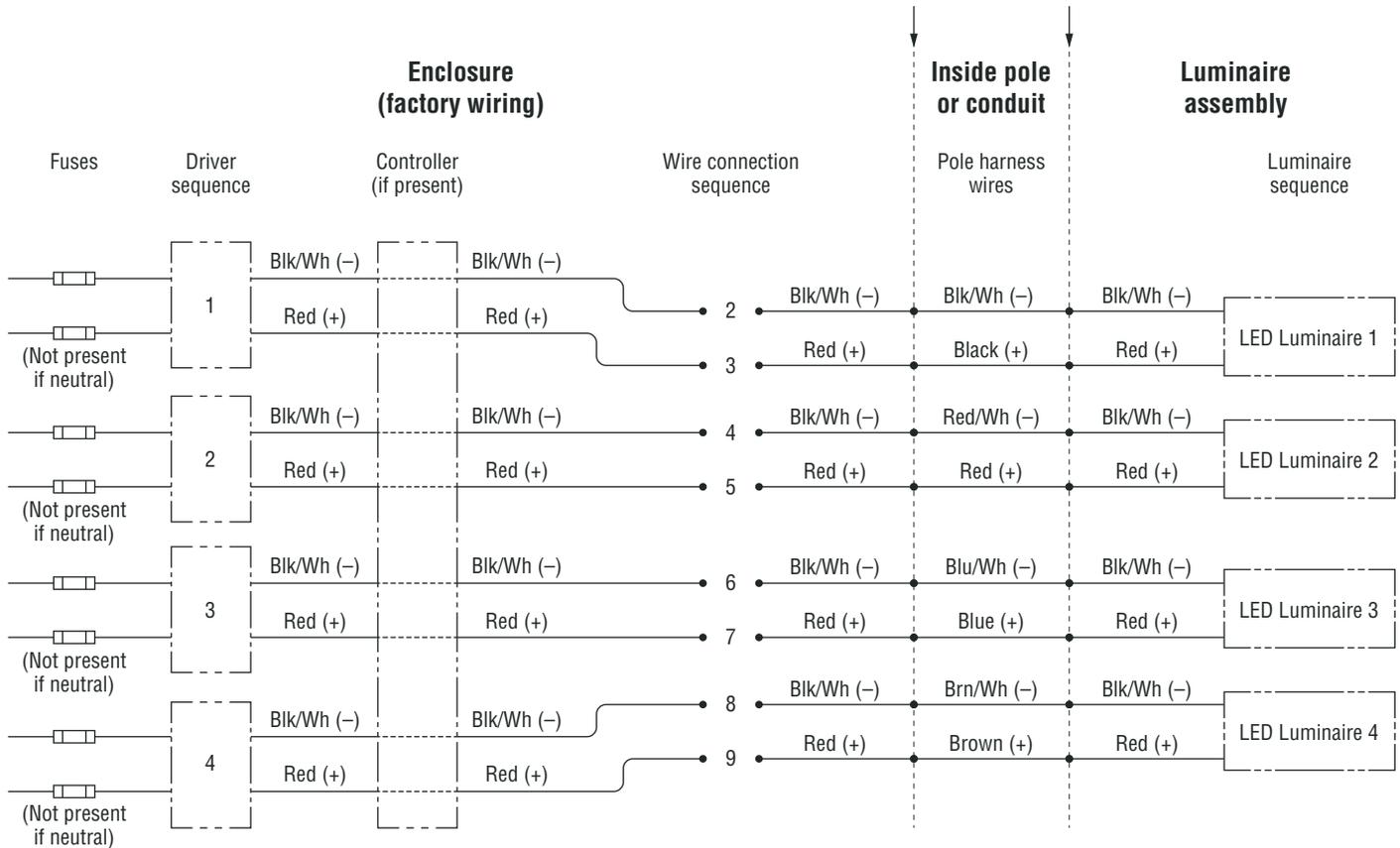
After all hardware is torqued and poletop luminaire assembly is secure, release rigging.



Wiring

Overview and System Diagram

A qualified electrician must install supply wiring for each lighting circuit and install harness between electrical components enclosure and crossarm assemblies. Depending on configuration, Musco may supply factory-built pole harness(es), and/or disconnect switch(es) in the electrical components enclosure. Each electrical components enclosure may contain up to four drivers. Each driver may power up to two luminaires.



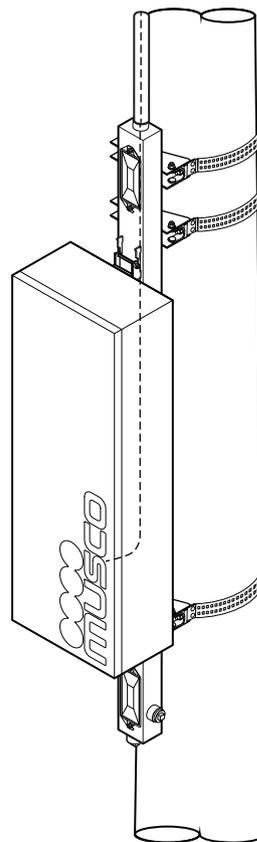
Notes:

1. Pole harness wire color indicated if provided by Musco.
2. Enclosure factory wiring may be different than shown above. One pair of wires per luminaire is required in pole harness.

Wiring

Installation Procedure

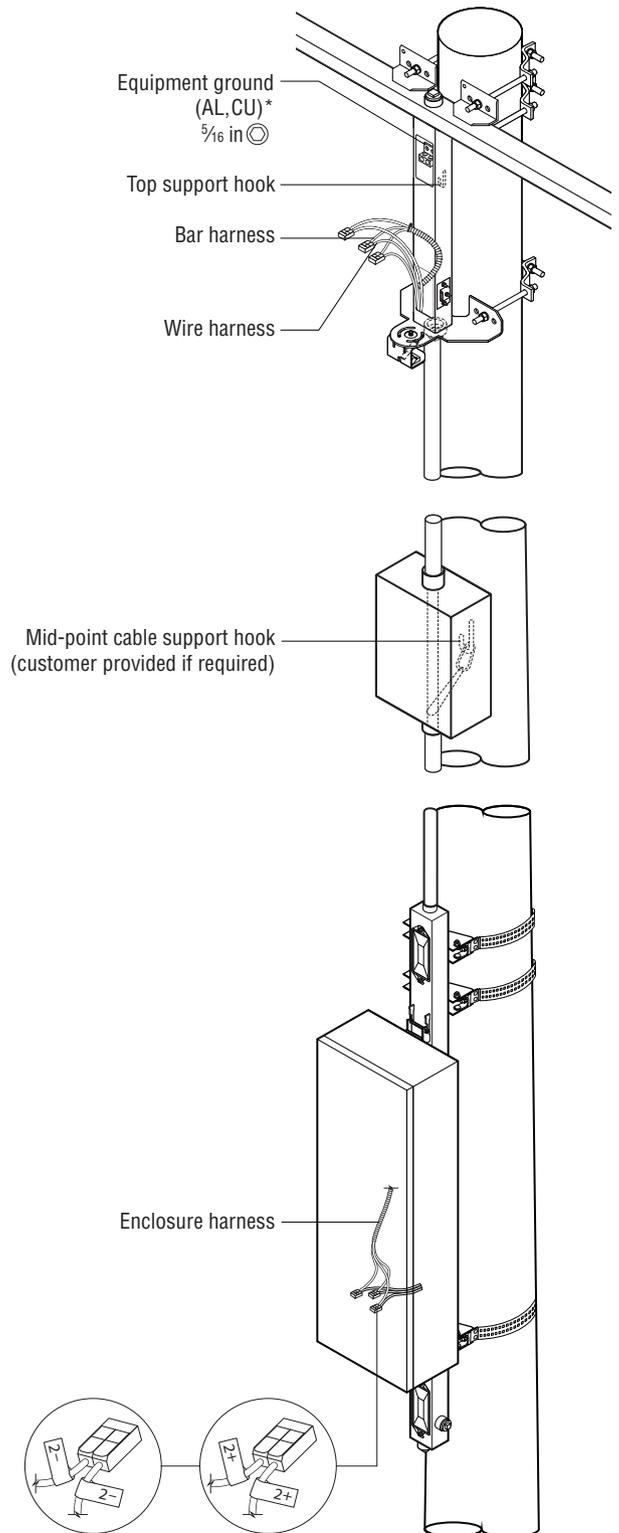
- 1 Install conduit as needed for supply and/or luminaire wiring. Route wiring through hub in back of enclosure.



Installation Instructions: SportsCluster® Lighting System

Wiring

-  Verify pole ID on wire harness matches pole location on *Field Aiming Diagram*.
 - 2** Fish all pole wire harnesses between poletop and appropriate electrical components enclosure(s).
 - 3** Attach support grips at poletop and midpole (if required due to pole height).
 - 4** Trim wire harness to length (if required).
 - 5** Connect pole harness at poletop and inside electrical components enclosure(s). Match luminaire ID and wire polarity per each wire label. Use the Musco-provided LEVER-NUTS® wire connectors.
-  Use electrical tape to ensure LEVER-NUTS® levers stay secure and don't snag on surrounding wires.

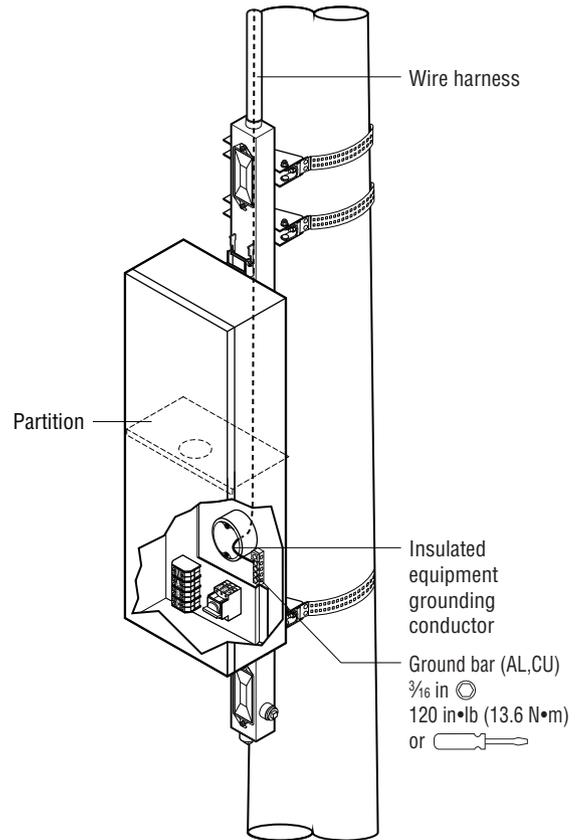


* Aluminum (AL), Copper (CU)

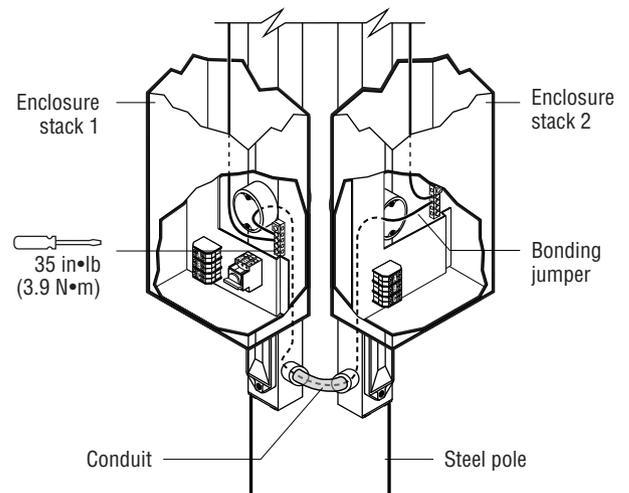
Wiring

6 Using $\frac{3}{16}$ in hex wrench, connect equipment ground wire in wire harness to ground bar inside electrical components enclosure.

 Musco *Control System Summary* or *Field Aiming Diagram* provides electrical loading information needed to size wire and switchgear. Musco provides instructions for installing Control-Link® control system or lighting contactor cabinet when these items are part of your project.



7 Connect equipment grounding conductors (green/yellow) from each upper enclosure to equipment ground bar in bottom enclosure. If pole has multiple stacks, connect bonding jumper from stack with circuit disconnect. Tighten lugs using $\frac{3}{16}$ in hex key.



Installation Instructions: SportsCluster® Lighting System

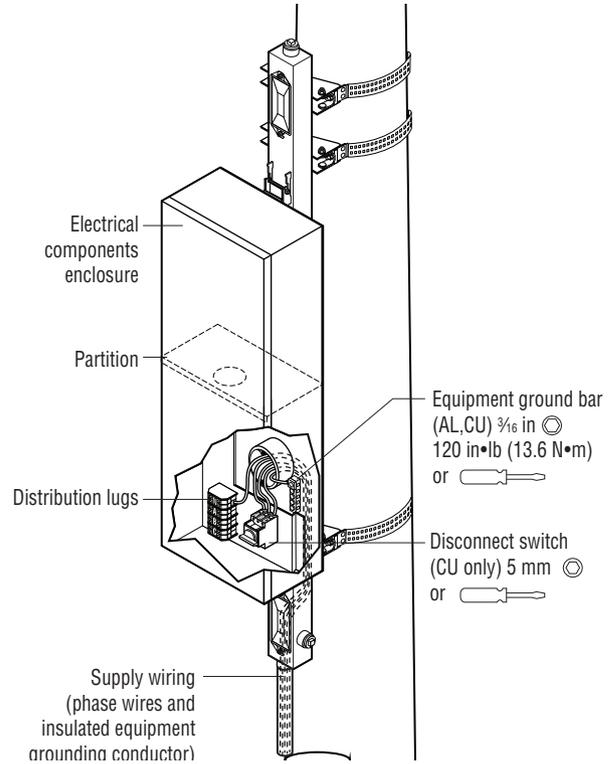
Wiring

8 Pull supply wiring into enclosure below partition.
Poles with multiple circuits have multiple disconnect switches, generally in separate enclosures.

9 Land insulated equipment grounding conductor from supply on ground bar.



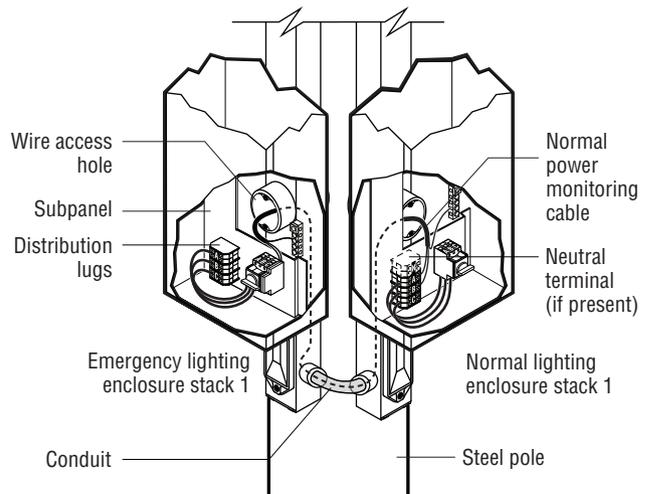
Disconnect is rated for copper wire only. Contact Musco for adaptor or use UL-listed adaptor for aluminum wire.



Skip Step 10 if no emergency lighting circuit present.

10

Route cable for normal power to adjacent enclosure stack. Connect black wire and blue/white wire to any two active terminals A, B, C, or neutral, if present, and green wire to ground bar.



Lightning Ground

Installation Procedure

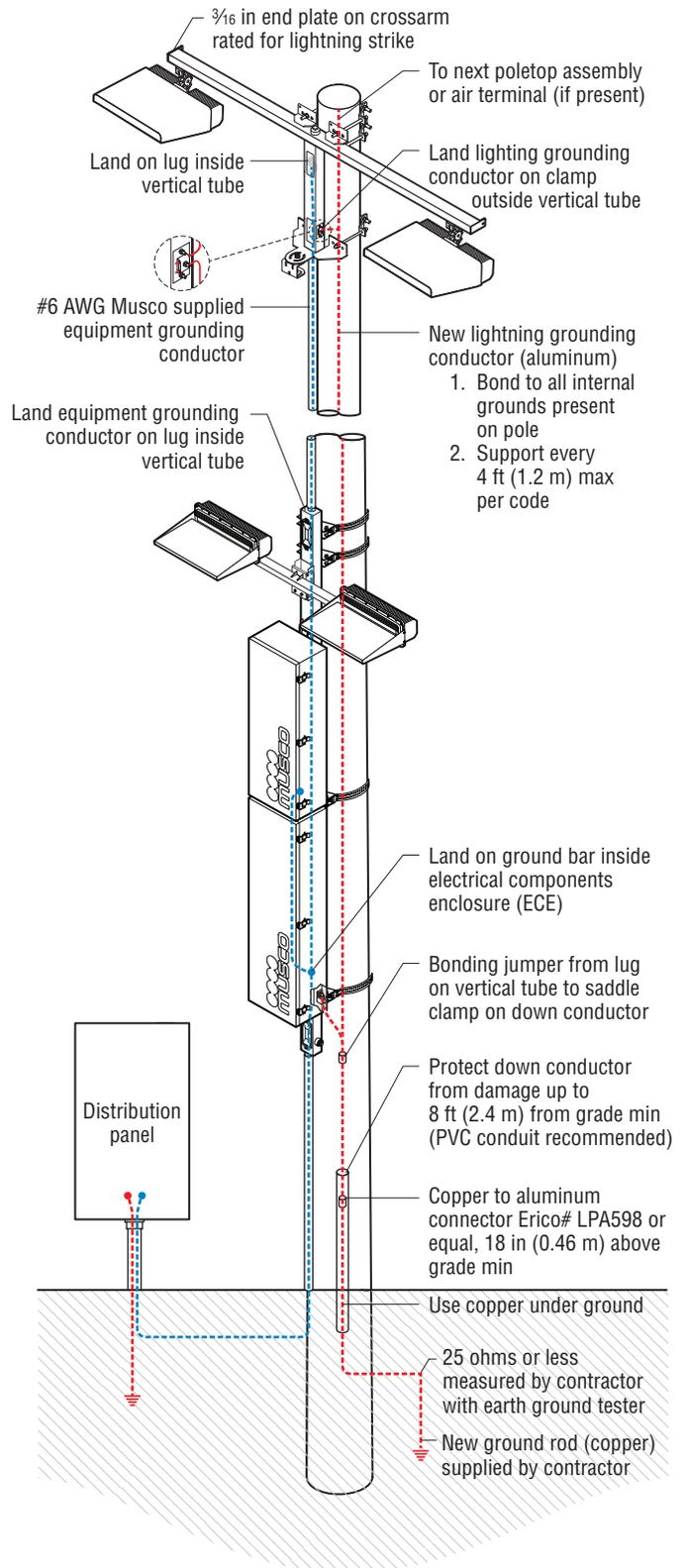
- 1** Installer needs to ensure grounding meets minimum standards required by code.
- 2** All existing poles are required to be supplied with a new lightning grounding conductor for lightning protection. See *Lightning Grounding Conductor Sizing* below.

Concrete and wood poles: full length down conductor from poletop to grounding electrode.

Steel poles: down conductor from bottom of steel to grounding electrode.
- 3** Support external grounding conductor every 4 ft (1.2 m) max.

Protect from damage 8 ft (2.4 m) from grade. PVC conduit recommended.

When routing below grade, do not allow conductor to dip below top of grounding electrode.
- 4** If concrete pole, bond existing internal ground to new ground conductor at all available locations (per code requirements.)
- 5** Ensure all components of the lighting system are bonded to **both** the lightning ground (shown in red) and the equipment grounding conductor (shown in blue). See *Bonding Jumper Sizing* below.
- 6** Excavate location near pole to depth of at least 2 ft (0.6 m). Drive grounding electrode into ground. In case of shallow bedrock or obstruction, you may drive electrode at 45° or shallower angle.
- 7** Use driving sleeve to prevent deforming end of electrode. Trim any deformed portion for proper exothermic fusion-welding.
- 7** Bond conductor to electrode using exothermic fusion-welding kit with ignitor and brush. Follow instructions inside kit.
- 8** Ground resistance must be 25 ohms or less and verified by a 3-point test with an earth ground tester.



Lightning Ground

Lightning Grounding Conductor Sizing

Attach to external lightning grounding lug (rated for aluminum only) or to internal lightning grounding lug (dual-rated).

Mounting Height	Bare Stranded Aluminum ¹	Bare Stranded Copper ²
Up to 75 ft (23 m)	1/0 AWG (cross-sectional area of 53.5 mm ²)	2 AWG (cross-sectional area of 33.6 mm ²)
Over 75 ft (23 m)	4/0 AWG (cross-sectional area of 107.2 mm ²)	2/0 AWG (cross-sectional area of 67.4 mm ²)

1. Copper grounding conductor required for underground connection to grounding electrode. Use properly rated AL to CU connector.
2. If using copper for lightning, supply copper to aluminum adapters for clamps (rated for aluminum only).

Bonding Jumper Sizing

Length	Bare Aluminum	Bare Copper
< 6 ft (1.8 m)	4 AWG (cross-sectional area of 21.2 mm ²)	6 AWG (cross-sectional area of 13.2 mm ²)



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Musco SportsCluster® product referenced or shown may be protected by one or more of the following patents. United States Patent(s): D794244, D841854, D841855, D841856, D873462, D880035, D882141, D882850, D882860, D892375, D892376, 7956556, 8300219, 8508152, 8575866, 9066401, 9781780, 10267491, 10344948, 10356886, 10378732, 10549384. Benelux Patent(s): 8754601, 8754701, 8754801, 8799001, 8799101, 8799201, 8799301, 8799401, 8799501, 8853501, 8853601. China Patents for Design 中国外观设计专利: ZL201830262493.5, ZL201830262495.4, ZL201830262588.7, ZL201930115887.2, ZL201930115888.7, ZL201930115891.9, ZL201930116074.5, ZL201930116087.2, ZL201930116089.1, ZL202030157575.0. Germany Patent(s): 4020181004500001, 4020181004510001, 4020181004520001, 4020191003430001-0004, 4020191003440001, 4020191003450001-0004, 4020191003460001-0004, 4020191003470001-0004, 4020191003480001, 4020201004190001, 4020201004210001. Republic of Korea Patent(s): 301014229, 301014230, 301014231, 301037776, 3010377830001-0004, 3010377880001-0004, 301037795, 3010377960001-0004, 3010378020001-0004, 301110351, 301110358, 301110362. United Arab Emirates Patent(s): 5678, 5679, 5680, 5984, 5985, 5986, 5987, 5988, 5989. United Kingdom Patent(s): 6032011, 6032022, 6032023, 6056943, 6056944, 6056945, 6056946, 6056947, 6056948, 6088584, 6088586, 6088587. U.S. and foreign patents pending. [Pat_059M]