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Wiring Best Practices

Selecting, Planning, and Routing Wires

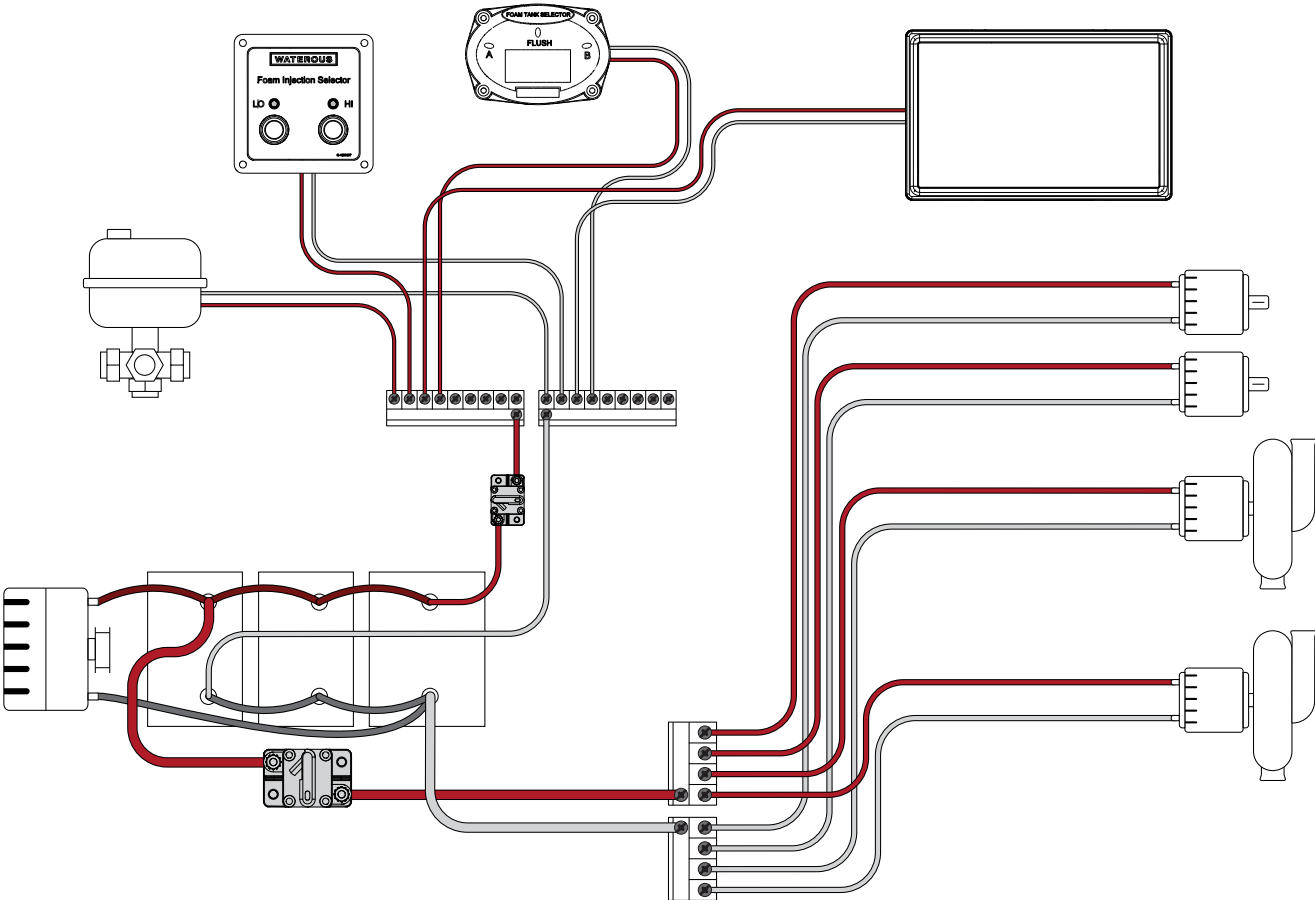


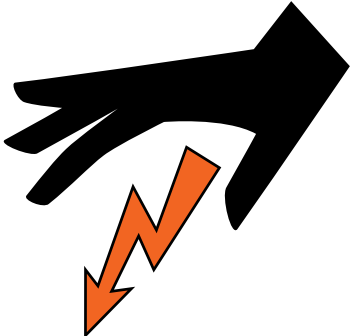
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Safety Precautions

- Read and understand all associated documentation before you begin any installation.
- Read and understand all the notices and safety precautions.
- Be aware that these instructions are only guidelines and are not meant to be definitive. Contact Waterous when you have questions about installing or operating the equipment.
- Do not install any equipment if you are not familiar with the tools and skills needed to safely perform required procedures—proper installation is the responsibility of the purchaser.
- Do not operate any equipment when safety guards are removed.
- Do not modify the equipment.

Safety Warning and Notice

! WARNING	
<p>High Current</p> <ul style="list-style-type: none"> • Current can cause serious injury or death. • Disconnect the power before servicing the electronic components. 	

NOTICE	
<p>High Current</p> <ul style="list-style-type: none"> • High current from welding or plasma cutting can damage components. • Disconnect all ground wire connections before applying high current. 	

Read and understand the following statements before continuing:

- *This equipment uses up to 400 amps to operate.*
- *Electrical current is dangerous and can cause serious injury or death.*
- *Do not attempt to connect the power source if you have not been trained and understand the safety practices needed to install devices requiring up to 400 amps to operate.*

Avoid damaging the electronic components. Disconnect the all ground wires before welding, plasma cutting, or conducting other high voltage or high current operations to the apparatus.

This document provides general wiring guide for installing electronic equipment to your apparatus. Do not use the information in this document to replace any instructions provided in the specific equipment installation manual. When reading this document, consider the following:

- The instructions may refer to options or equipment that you may not have purchased with your system.
- The illustrations used in this document are intended to illustrate concepts. Do not use illustrations to determine physical attributes, placement, or proportion.
- Any equipment described in this document is intended to be installed by a person or persons with the necessary skills and knowledge to perform the installation.
- Any equipment described in this document is intended to be operated by a person or persons with the basic knowledge of operating similar equipment.

This document is divided into the following sections:

SAFETY

This section describes some general safety precautions that you need to follow.

INTRODUCTION

This section is an overview of the document.

WIRE SELECTION

This section provides guidelines to wire selection.

WIRE ROUTING

This section provides guidelines to wire routing.

GROUNDING

This section provides guidelines to installing ground wires or strap.

Using this Document

Use the guidelines below when viewing this document.

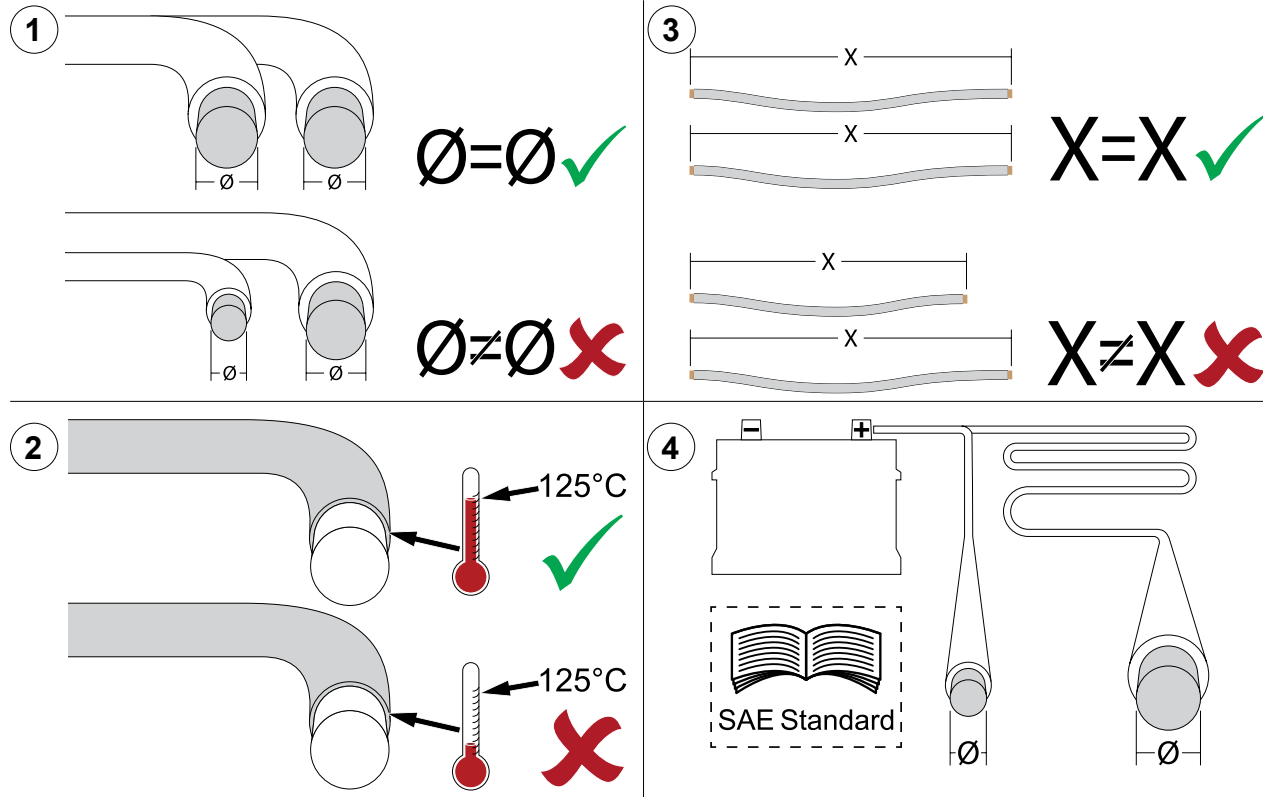
Viewing the Document Electronically

- View this document in landscape orientation.
- Use the table of contents to navigate directly to that section.
- Text **with this appearance** is linked to a reference.

Printing the Document

- The document is viewed best when printed in color.
- The *print on both sides* and *flip on long edge* features can provide the best results.
- Use a 3-ring binder to store the document.

Best Practices

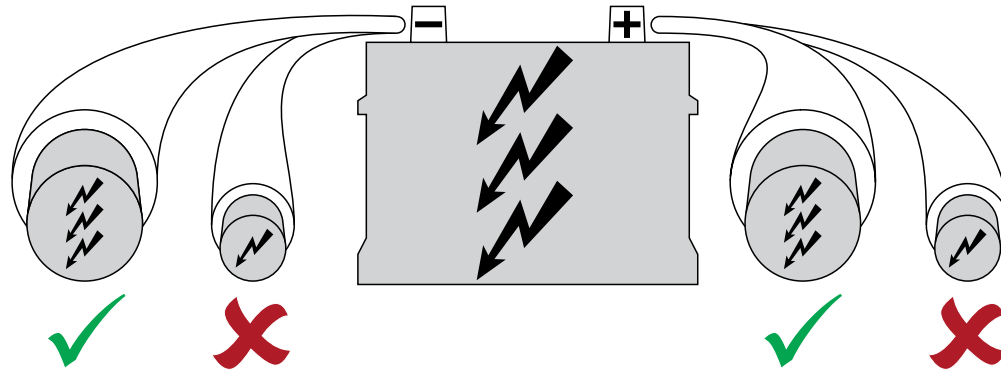


Use the following information, industry best practices, and common sense as a guide when selecting the power or ground wire. Proper wire selection is the responsibility of the installer. Contact your wire supplier for more information.

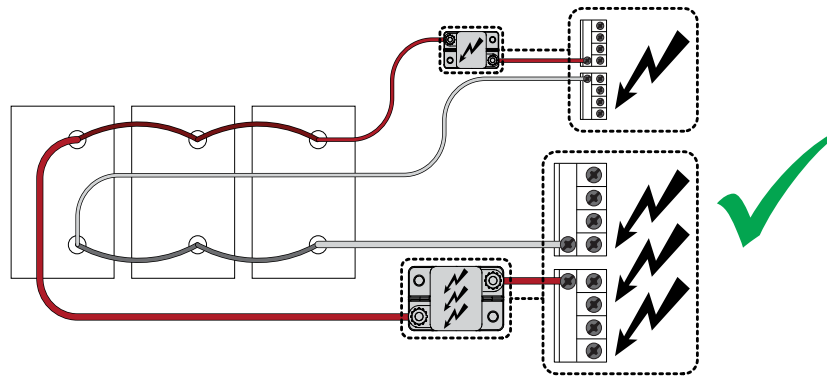
- 1 Use the same gauge for the power and ground wire.
- 2 Use wire with a jacket rating of 125°C or more.
- 3 Use the same length for the power wire as the ground wire.
- 4 Use the SAE wiring standard to select the appropriate wire gauge for the length of run and power rating. Refer to: **"Selecting the Wire Gauge and Length"** on page 8 for more information.

Working with Current

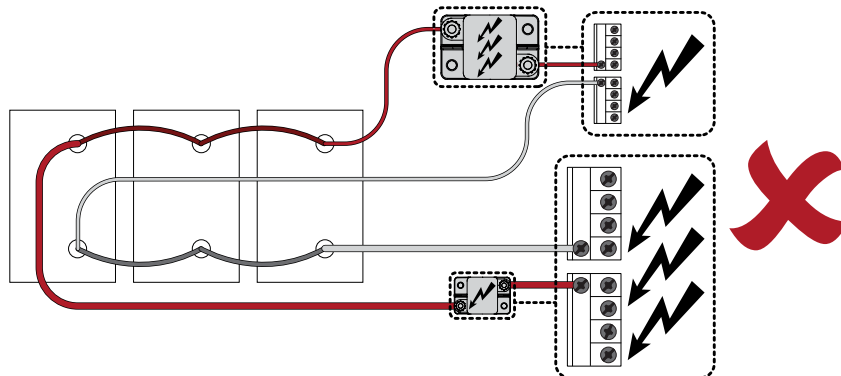
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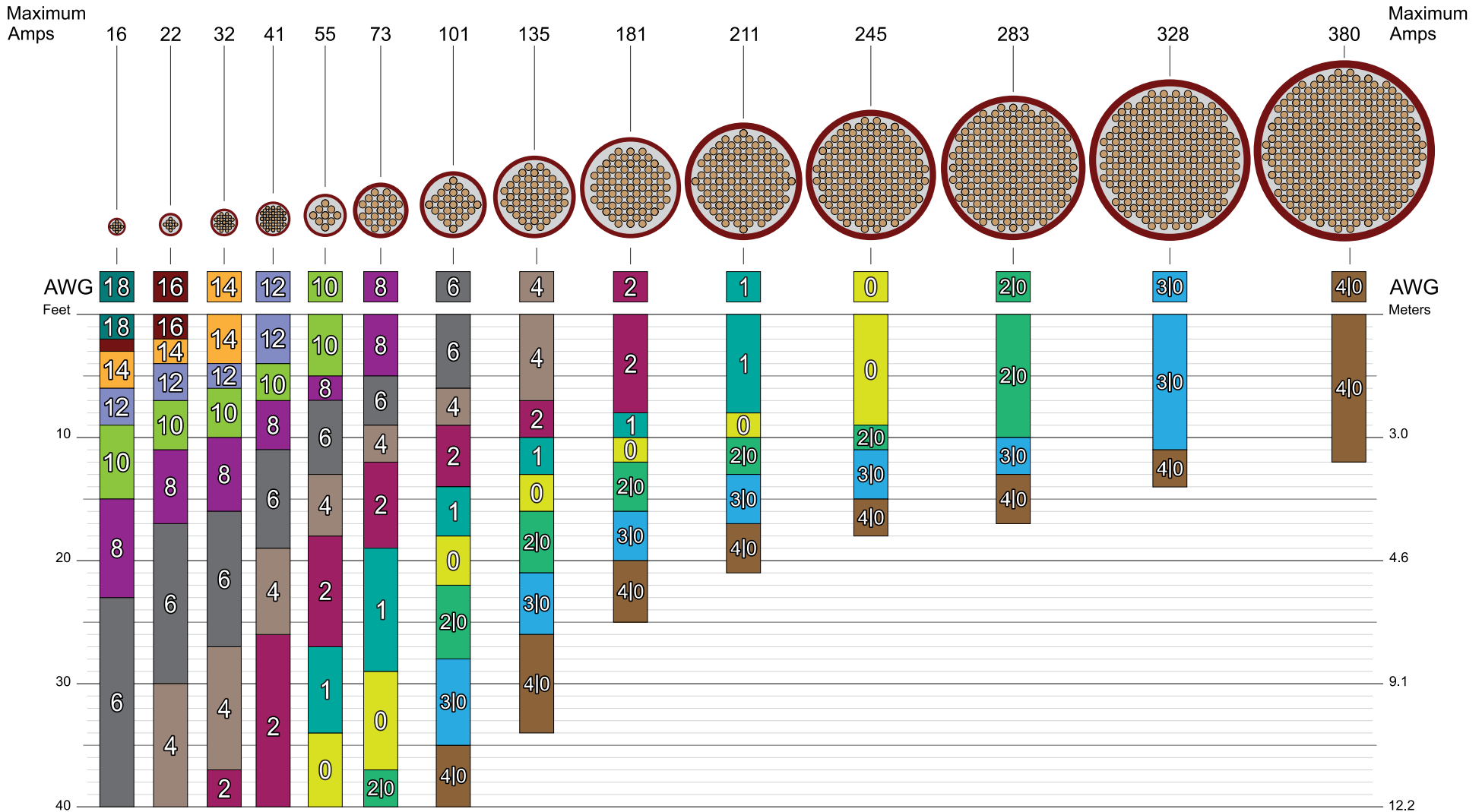
Use the following information as a guide when selecting power wires, ground wires, and circuit breakers. Proper wire selection is the responsibility of the installer. Contact your wire supplier for more information.

- 1 Use the appropriate gauge wire for the current used in your application.
- 2 Determine the maximum current used in the circuit and install the appropriate size circuit breaker.
- 3 Do not over or under size the circuit breaker.

Selecting the Wire Gauge and Length

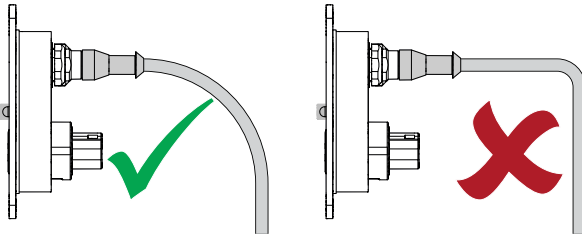
Determine the maximum amps in the circuit. Use the illustration as a guide to approximate the wire gauge, in American Wire Gauge (AWG), and the wire length, for the maximum amps. The final wire selection includes the environmental and operating conditions, application requirements, and wire characteristics. **Proper wire selection is the responsibility of the installer. Contact your wire supplier for more information.**

Note: The illustration is based on a wire with a PVC insulation, 30°C, and a 2% voltage drop at 12 V. The length is for 1 wire in a 2 wire set.

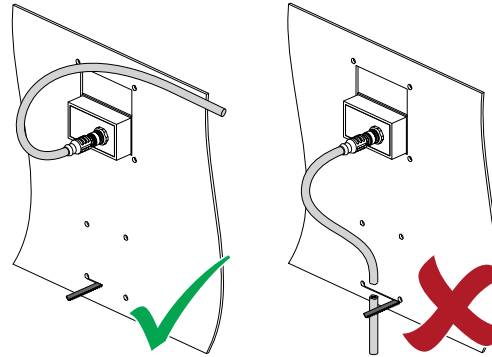


Wire Routing Guidelines

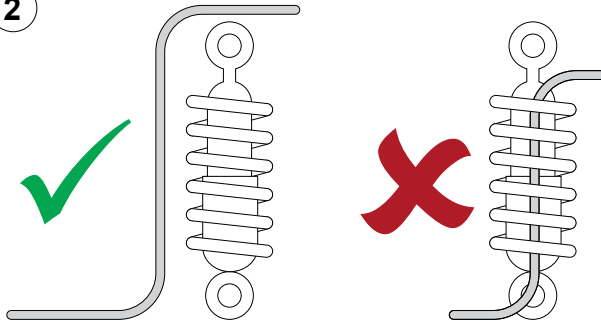
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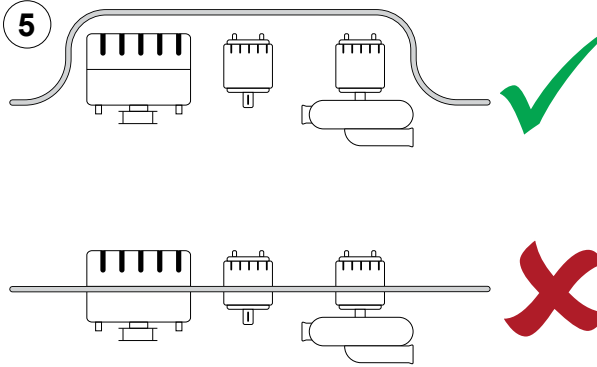
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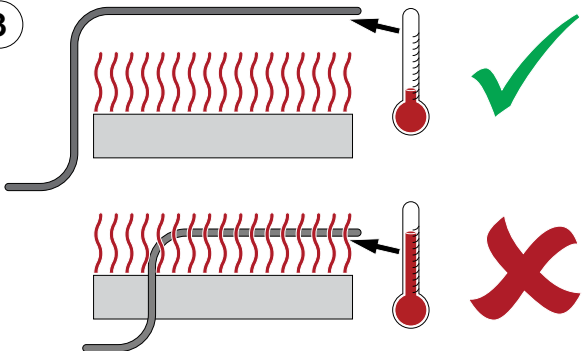
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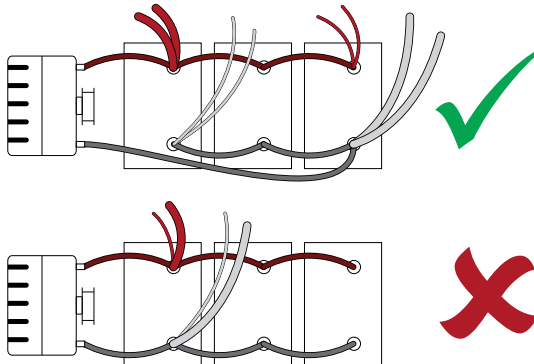
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Use the following information, industry best practices, and common sense as a guide when routing and securing the wiring. Proper wire installation is the responsibility of the installer. Contact Waterous for more information.

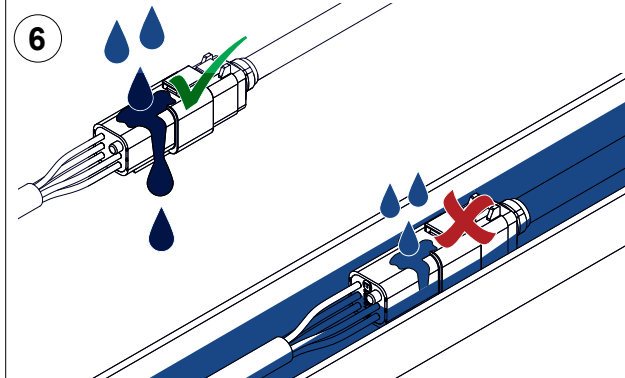
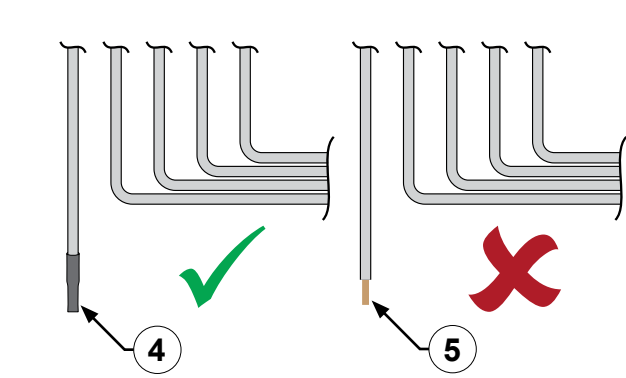
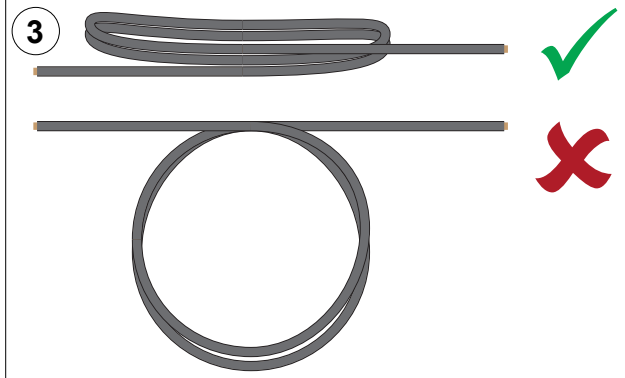
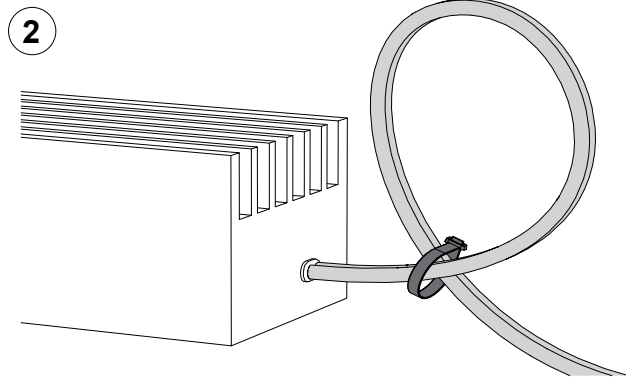
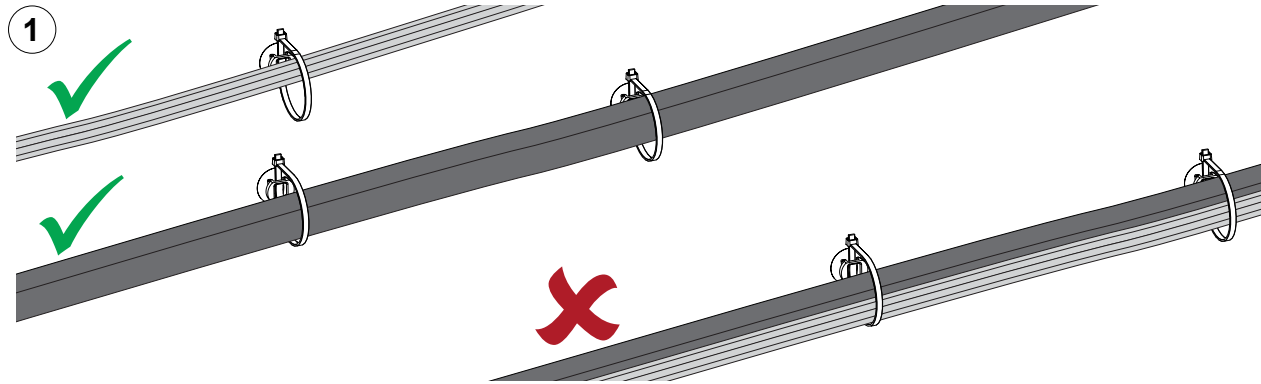
- 1 Do not create a small bend radius. Use the following formula as a guide:

$$\text{cable diameter} \times 10 = \text{bend radius}$$

Example: A cable diameter of 0.25 inch (6.35 mm) has a minimum bend radius of 2-1/2 inches (63.5 mm).

- 2 Do not route wires on to moving parts.
- 3 Do not route wires near an excessive heat source.
- 4 Do not route the wire where it is damaged during future installations.
- 5 Do not route the wire near high current components such as alternators, motors, or electric pumps.
- 6 Connect high current and low current components to a separate, and the most distant, terminal posts available.

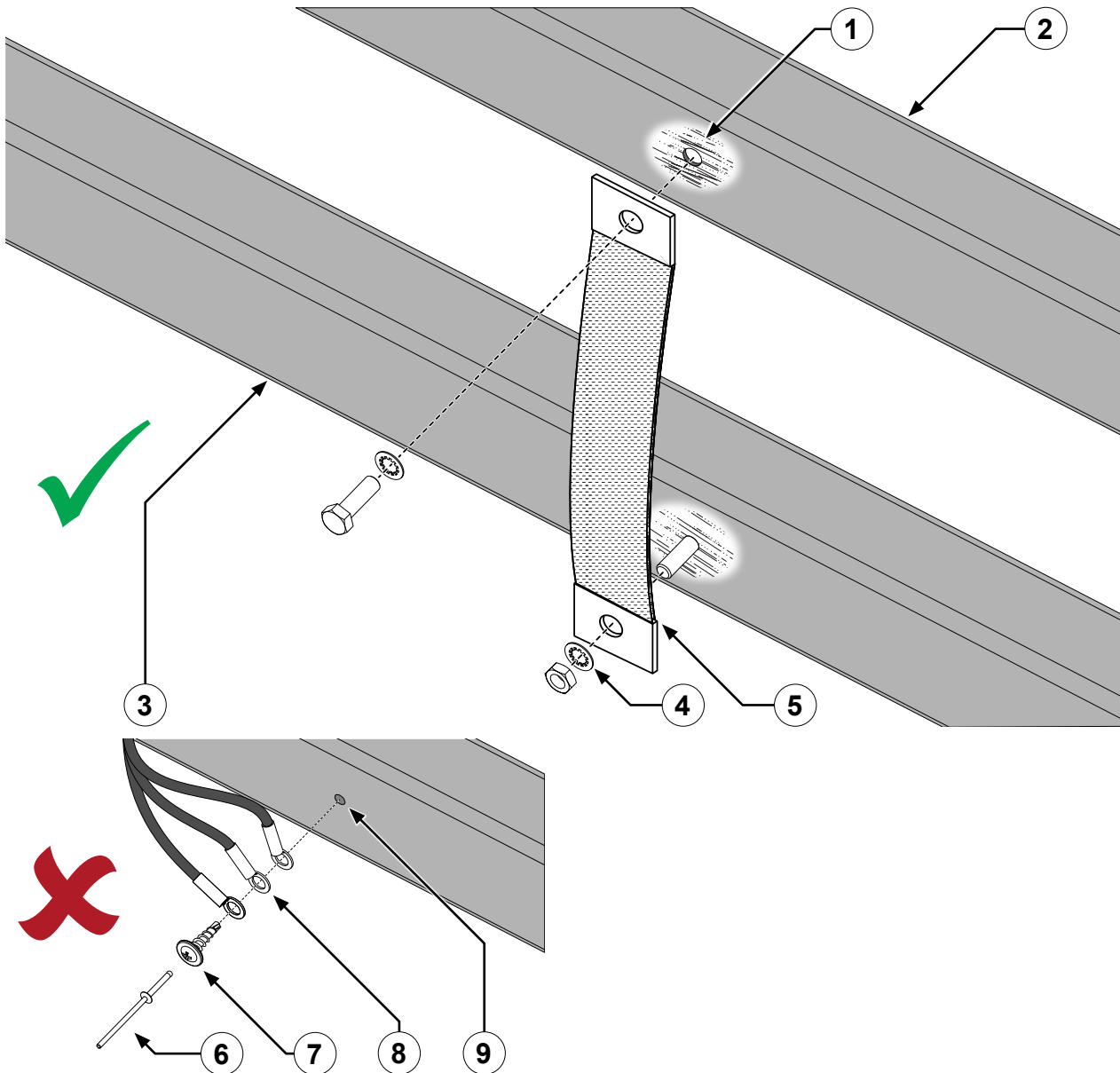
Wire Routing Guidelines—Continued



Use the following information, industry best practices, and common sense as a guide to routing to and securing the wiring. Proper equipment installation is the responsibility of the installer. Contact Waterous for more information.

- 1 Secure wires together to prevent chafing. Do not secure the power and the non-power wires together.
- 2 Create a strain relief by looping the wire and loosely securing the loop with a cable tie.
- 3 Bundle excess wire together and secure it with a cable tie. Do not exceed the bend radius. Do not loop the excess wire together.
- 4 Use an adhesive lined heat shrink, or a similar method, and seal the unused wires to prevent water intrusion and electrical shorting.
- 5 Do not leave unused wires exposed.
- 6 Do not route wires where liquid can pool around the connector. Make sure that liquid drains away from all connectors.

Installing the Ground Strap



Use the following information as a guide to installing the ground strap.

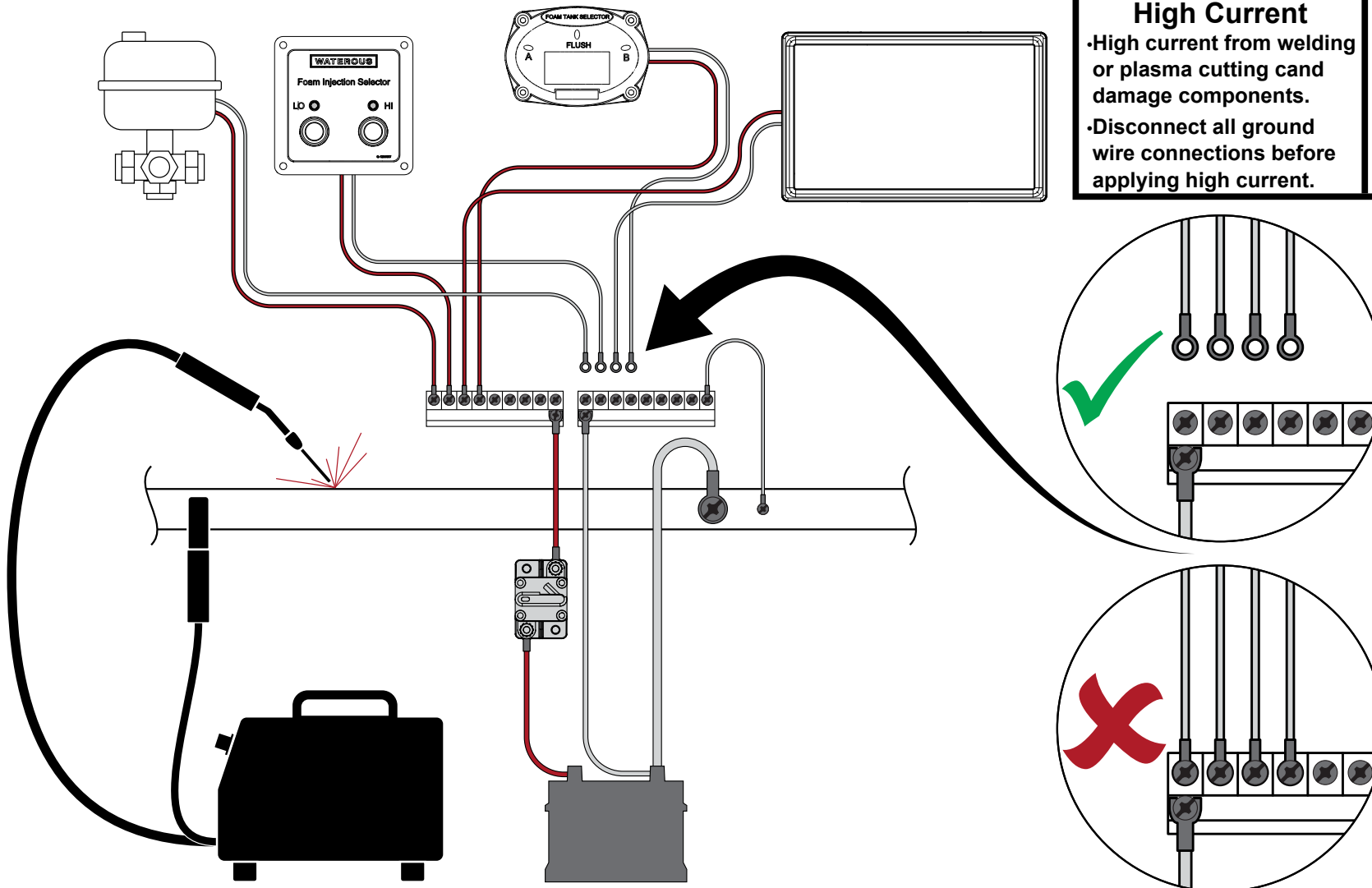
Note: Use a ground strap to connect the pump-house frame to the chassis frame and make sure that the chassis frame is directly connected to the battery.

Proper installation is the responsibility of the installer. Contact Waterous for more information.

- 1 Make sure the ground contact is clean and conductive. Remove any paint, sealant, or corrosion that inhibits continuity with the ground strap.
- 2 Pump house frame
- 3 Chassis frame
- 4 Use hardware with anti-corrosion and anti-rotation features.
- 5 Make sure the ground strap is appropriate for the power used in the application. A braided type ground strap is recommended
- 6 Do not use a rivet to secure the ground strap termination.
- 7 Do not use a sheet metal screw to secure the ground strap termination.
- 8 Do not combine more than 2 ground terminations together when using the wire-style ground.
- 9 Do not secure the ground termination to a painted surface.

Disconnecting the Ground Wires

Avoid damaging the electronic components by disconnecting all the ground wires before welding, plasma cutting, or conducting other high voltage or high current operations to the apparatus.



NOTICE

High Current

- High current from welding or plasma cutting can damage components.
- Disconnect all ground wire connections before applying high current.



WATEROUS

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