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# North American Charging Station Technical Manual CGSL21AF1C



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P/N X7507850100

Version 2.0

06/01/2020



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# Table of Contents

<b>Chapter: 1</b>	<b>Safety Information . . . . .</b>	<b>2</b>
	Safety Symbols . . . . .	2
<b>Chapter: 2</b>	<b>Model Descriptions and Specifications . . . . .</b>	<b>3</b>
<b>Chapter: 3</b>	<b>Charging Station Components . . . . .</b>	<b>3</b>
<b>Chapter: 4</b>	<b>Installation Requirements . . . . .</b>	<b>3</b>
	Required Tools . . . . .	3
	AC Power Supply Wiring . . . . .	3
	Installation Offsets . . . . .	4
<b>Chapter: 5</b>	<b>Charging Station Installation Procedure . . . . .</b>	<b>4</b>
	Peripheral Wire Installation . . . . .	4
	14 AWG AC Wire Installation . . . . .	5
	Securing the Base . . . . .	6
<b>Chapter: 6</b>	<b>Powering ON . . . . .</b>	<b>7</b>
	LED Indicators . . . . .	7
<b>Chapter: 7</b>	<b>Maintenance Procedures . . . . .</b>	<b>8</b>
	Cold Weather Storage (as installed) . . . . .	8
	Cold Weather Storage or Moving (removed from installation) . . . . .	8
<b>Chapter: 8</b>	<b>Ball Drop Relay Kit, P/N 99988801819 . . . . .</b>	<b>10</b>
	Installation . . . . .	10
	Relay Cable Assembly to Charging Station . . . . .	12
<b>Chapter: 9</b>	<b>Ball Drop Relay and Busy Signal Relay - SW1 DIP Switch Settings . . .</b>	<b>13</b>
<b>Chapter: 10</b>	<b>Dimensions . . . . .</b>	<b>14</b>
	Mower Configuration . . . . .	14
	Range Picker Configuration . . . . .	15

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The robot has been designed to high safety standards. Risk is always possible. Read and understand all safety information.

Genuine ECHO Robotics parts are available only from an authorized ECHO Robotics Dealer. Always supply a model and serial number when purchasing parts and assemblies. Only use an authorized ECHO Robotics Dealer for service procedures.

This equipment has been tested and found to comply with the limits of a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

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## Safety Information

Throughout this manual and on the product itself, you will find safety alerts and helpful, informational messages preceded by symbols or key words. The following is an explanation of those symbols and key words and what they mean to you.

### **DANGER**

The safety alert symbol accompanied by the word “DANGER” calls attention to an act or condition which WILL lead to serious personal injury or death if not avoided.

### **WARNING**

The safety alert symbol accompanied by the word “WARNING” calls attention to an act or condition which CAN lead to serious personal injury or death if not avoided.
















### **CAUTION**

The safety alert symbol accompanied by the word “CAUTION” calls attention to an act or condition which may lead to minor or moderate personal injury if not avoided.

### **NOTICE**

The enclosed message provides information necessary for the protection of the unit.

## Safety Symbols

	Safety and Information Label
	Caution: The robot can be dangerous if misused.
	Never place hands or feet under the robot while it is powered ON.
	Beware of projectiles.
	Keep animals away from the robot.
	Water cleaning with high pressure jet systems can cause damage.
	The robot is protected by an access code.
	Read the technical manual before using the robot.
	Press the STOP button and wait for the cutting disc to stop rotation before handling the robot.
	Always keep a safe distance from the robot when it is powered ON and the cutting discs are rotating.
	Do not ride on the robot.
	Keep bystanders away from the robot.
	Wear protective gloves when handling the robot.
	The robot is equipped with an anti-theft system.
	General Prohibition Symbol This symbol means the specific action shown is prohibited. Ignoring this symbol can result in damage to property and serious or fatal injury.

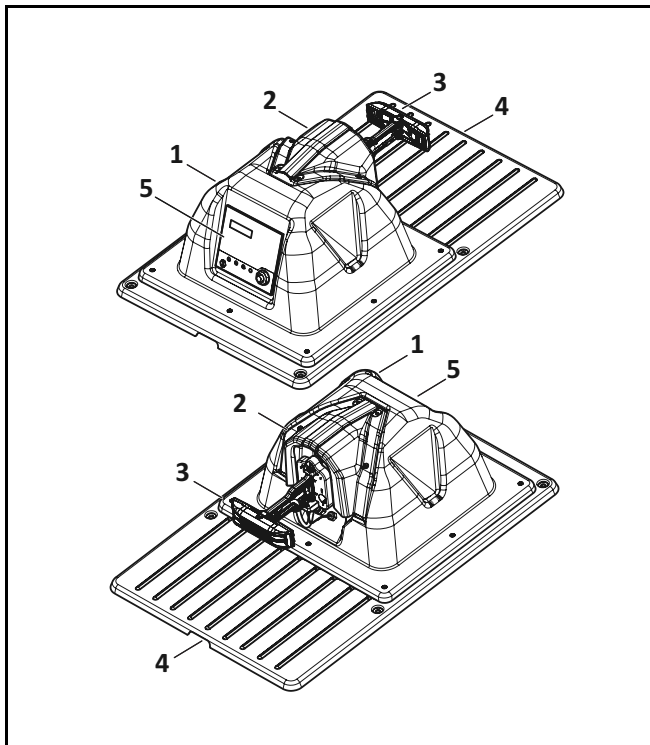
## Model Descriptions and Specifications

Model	Description
CGSL21AF1C	Supports the Station Loop peripheral wire and two Field Zone peripheral wires.

Specifications (all models)	
Operating Temperature	32 to 122 °F (0 to 50° C)
Input	120 VAC - 60 Hz (360 W maximum)
Charge Outputs	32 VDC (320 W maximum)
Output Circuits	Class 2

All North American charging station models are rated for intermittent use. The charging station is designed to have a controlled output that will charge the battery but does not keep continuous charging power available on the charging contacts.

## Charging Station Components



- 1 – Enclosure top
- 2 – Debris cover
- 3 – Charging arm
- 4 – Enclosure base
- 5 – Input panel / Serial number location

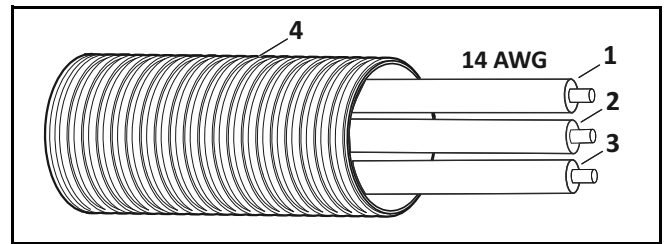
## Required Tools

8 mm Deep-well Socket / Driver	Tape Measure
3 mm Flat-Blade Screwdriver	Hammer
#1 Phillips Screwdriver	Slip-Joint Pliers
Adjustable Wrench	T-27 Torx® Driver (included with charging station)
Wire Strippers	

## AC Power Supply Wiring

Use 14 AWG electrical wire and 0.5 in. diameter liquid-tight electrical conduit for AC power into the charging station.

**NOTE:** Wire and conduit are not included with the charging station.



- 1 – Ground (green)
- 2 – Neutral (white)
- 3 – Line (black)
- 4 – Liquid-tight electrical conduit

## Charging Station Installation Procedure

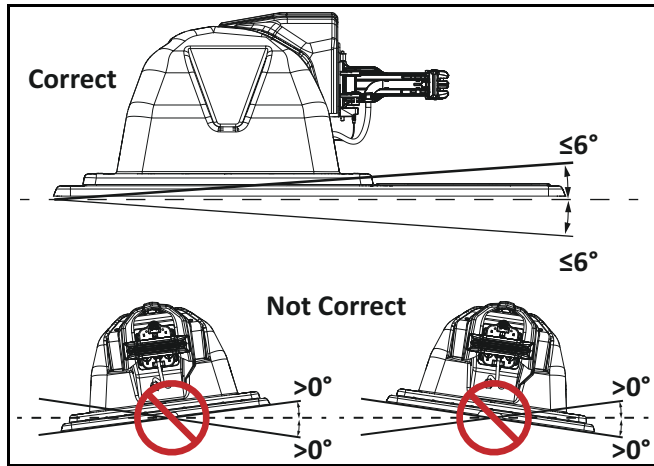
This is a basic installation procedure. Each installation varies by application. Consult your authorized ECHO Robotics dealer for specific questions.

**IMPORTANT:** Do not bend, warp, or crack the base during installation.

### Installation Requirements

- 1) Develop an installation plan and a map of the site.
- 2) Identify a location for installing the AC power supply, Station Loop peripheral wire(s), and Field Zone peripheral wire(s).
- 3) Install the charging station on flat ground where flooding or water accumulation will not occur.

## Installation Offsets



If the entire field is on a slope, install the charging station on a flat portion at the top. The robot has no brake when it is in charge mode and can slide away from the charging arm contacts if the longitudinal slope is greater than zero degrees ( $0^\circ$ ).

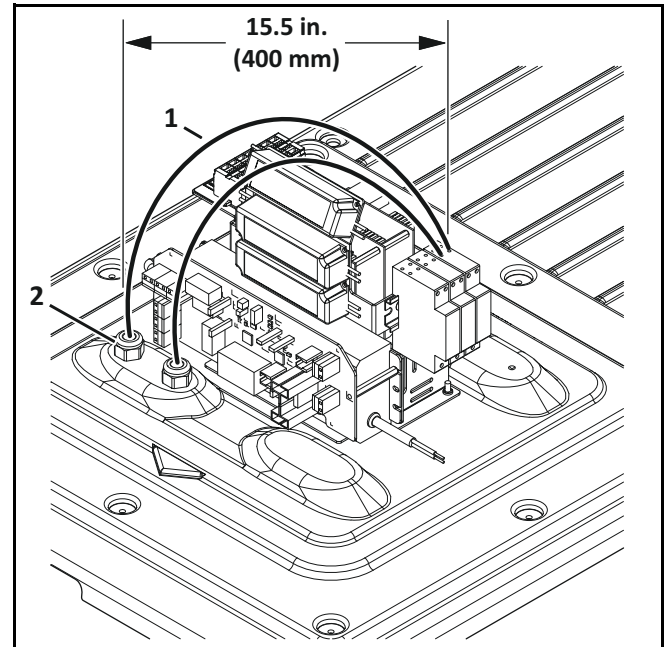
## Charging Station Installation Procedure

This is a basic installation procedure. Each installation varies by application. Consult your authorized ECHO Robotics dealer for specific questions.

**IMPORTANT:** Do not bend, warp, or crack the base during installation.

## Peripheral Wire Installation

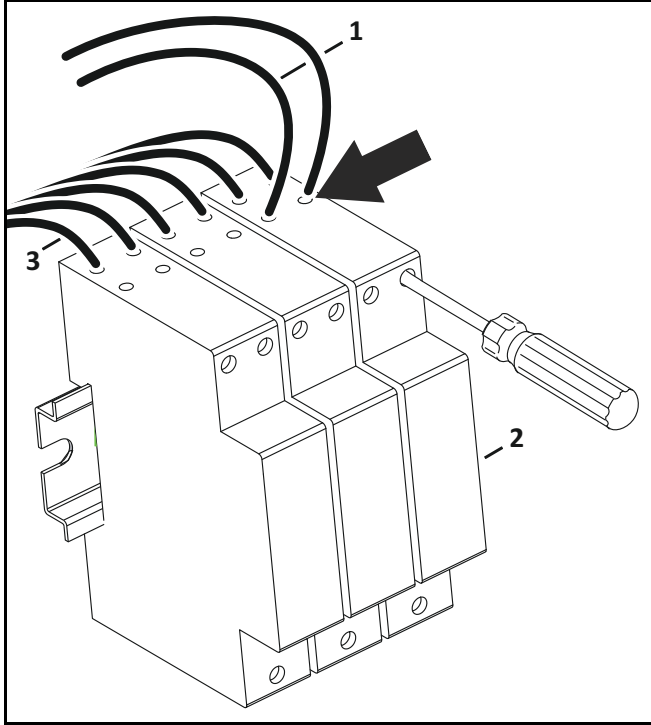
- 1) Route all peripheral wires under the base and up through a cord grip. Allow a minimum length of 15.5 in. (400 mm) of each wire inside the enclosure top. Provide excess wire under the base for future repositioning.



- 1 – Peripheral wire
- 2 – Cord grip

- 2) Hand-tighten the cord grips.

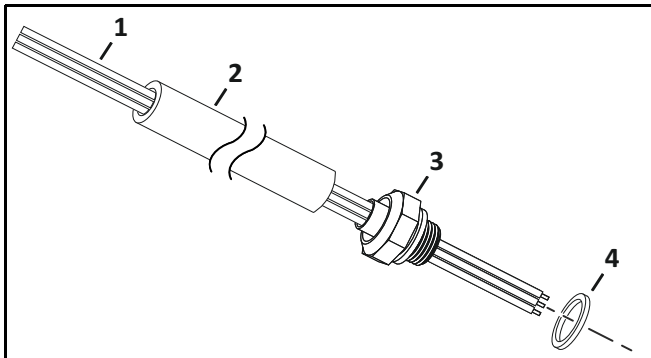
- 3) Loosen the surge protector(s) terminal screws and insert the ends of the wires into the surge protector(s) at the locations shown. Securely tighten the terminal screws.



- 1 – Peripheral wire
- 2 – Surge protector
- 3 – Power wires (factory-assembled to surge protector(s))

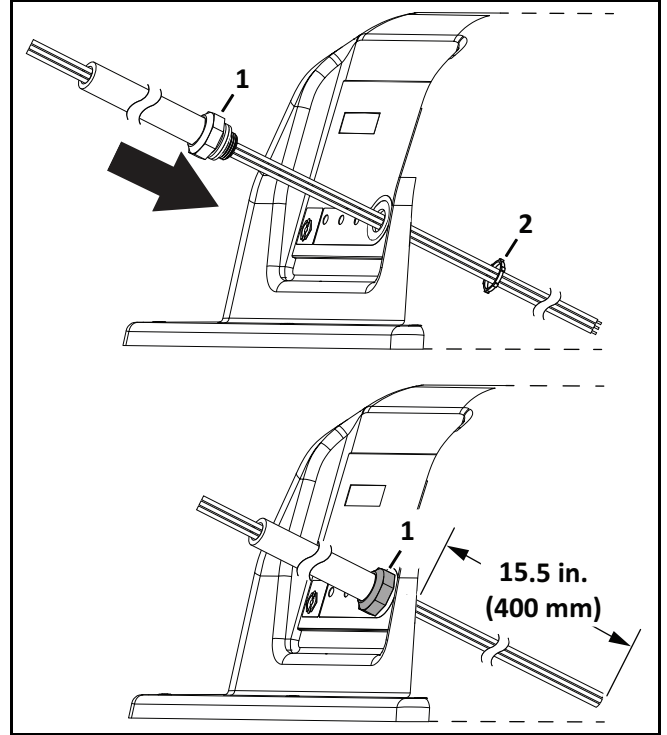
### 14 AWG AC Wire Installation

- 1) Pull the wires through the conduit and the connector. Place the seal on the threaded side of the connector.



- 1 – 14 AWG AC wires
- 2 – Liquid-tight conduit
- 3 – Conduit connector
- 4 – Seal

- 2) Place the connector into the input panel. Assemble the nut (from inside of panel) onto the connector. Allow 15.5 in. (400 mm) of wire on the inside of the enclosure top.

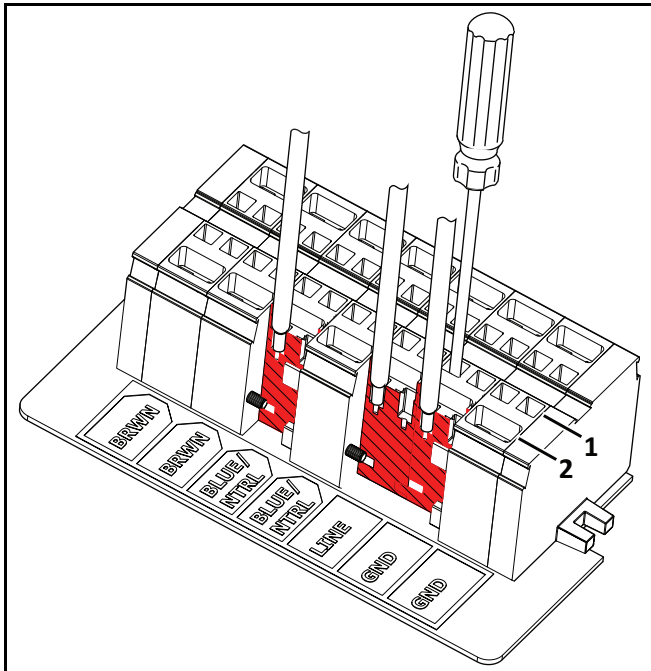


- 1 – Conduit connector
- 2 – Nut

- 3) Remove 0.5 in. (11 mm) of insulation from the end of each wire.

- 4) Install each wire into the terminal block.

Insert a flat-blade screwdriver into the small opening of the terminal block directly behind the wire and pry the spring contact open. Only install one wire per large terminal block opening. The stripped ends of the wire (or stray strands of wire) must remain on the inside of the terminal block.

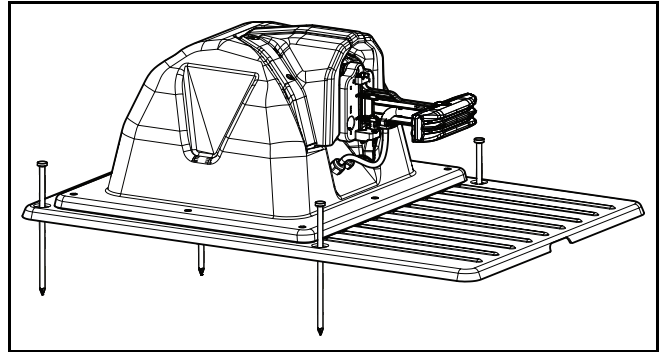


1 – Small terminal block openings  
2 – Large terminal block openings

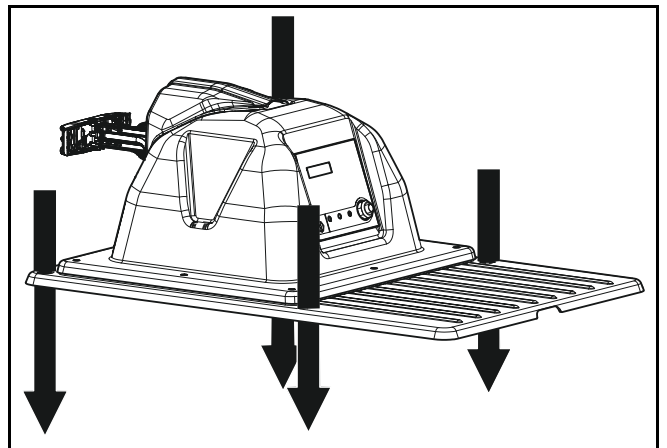
- 5) Remove the screwdriver. Firmly pull each wire to verify a secure connection.

### Securing the Base

**Mower application only:** Remove underground hazards below the charging station. Use a hammer to install the four landscaping spikes to secure the base to the ground.



**Range Picker application only:** Use the appropriate size and type of fastener to secure the charging station to the foundation of the ball collection system.





## Powering ON

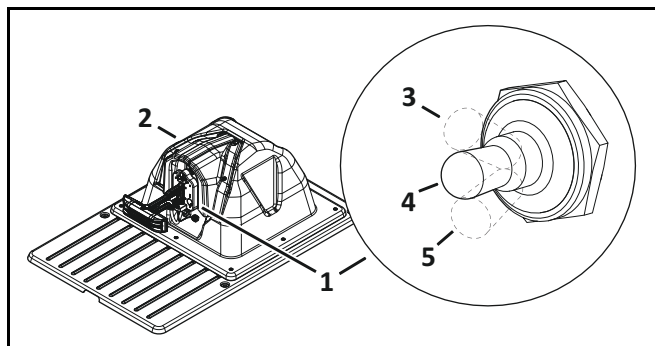
The power switch is located under the debris cover.

Move the power switch to the ON position to energize the DC output of the charging station and the peripheral wires.

**NOTE:** When the power switch is in the ON position, the TEST LED will not illuminate.

Move the power switch to the OFF position to turn off the DC output. Move the power switch to the TEST position to energize the DC output of the charging station to the peripheral wire(s).

**NOTE:** When the power switch is in the TEST position, the TEST LED will illuminate.



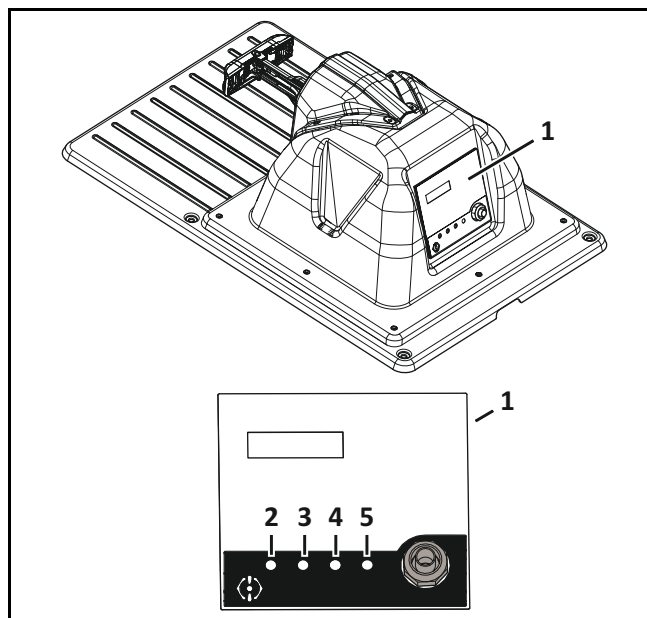
- 1 – Power switch
- 2 – Debris cover
- 3 – ON position
- 4 – OFF position
- 5 – TEST position

## LED Indicators

There are four LED indicators located on the input panel.

**IMPORTANT:** If an LED is not illuminated, AC power may still be present.

TEST LED	Illuminates green when AC power is present and the power switch is in the TEST position.
SL (Station Loop) LED	Blinks green when the station loop peripheral wire is correctly connected, blinks red when an issue is detected.
Z1 (Field Zone 1) LED	Blinks green when Field Zone 1 peripheral wire is correctly connected, blinks red when an issue is detected.
Z2 (Field Zone 2) LED	Blinks green when Field Zone 2 peripheral wire is correctly connected, blinks red when an issue is detected.



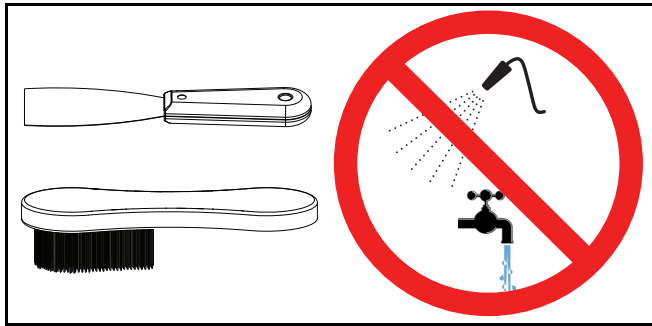
- 1 – Input panel
- 2 – TEST LED
- 3 – SL (Station Loop) LED
- 4 – Z1 (Field Zone 1) LED
- 5 – Z2 (Field Zone 2) LED

## Maintenance Procedures

During periods of wet weather, perform inspection and cleaning on a regular basis.

- 1) Remove robot from charging station (if required).
- 2) Visually inspect the unit, replace damaged components.
- 3) Check all electrical connectors, reconnect if necessary.
- 4) Use a plastic scraper, nylon brush, compressed air, or a damp cloth to clean dirt, grass, sticks, or obstructions.

NOTE: Do not use a high-pressure washer or running water for cleaning. **Never use solvents.**

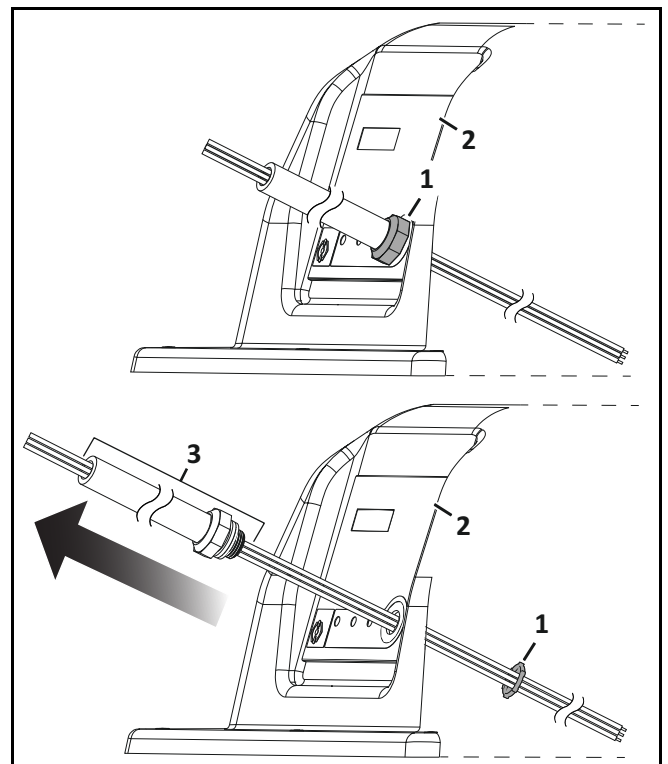


## Cold Weather Storage (as installed)

- 1) Move the power switch to the OFF position.
- 2) Turn off AC power at the mains.
- 3) Cover the charging station with a non-conductive, waterproof barrier.

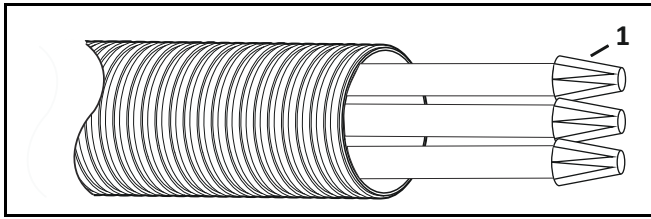
## Cold Weather Storage or Moving (removed from installation)

- 1) Move the power switch to the OFF position.
- 2) Turn off AC power at the mains.
- 3) Remove the M5 nuts (8X) from the base of the enclosure top. Save the nuts for reassembly.
- 4) Remove the AC wires (neutral-white, line-black, ground-green) from the terminal block.
- 5) Loosen the conduit connector lock nut (located on inside of input panel). Pull conduit, connector, and AC wires out of the input panel.



- 1 – Lock nut  
2 – Input panel  
3 – Conduit, connector, AC wires

- 6) Assemble a wire nut to the end of each wire. Safely secure the wires and the liquid-tight conduit.



1 – Wire nut

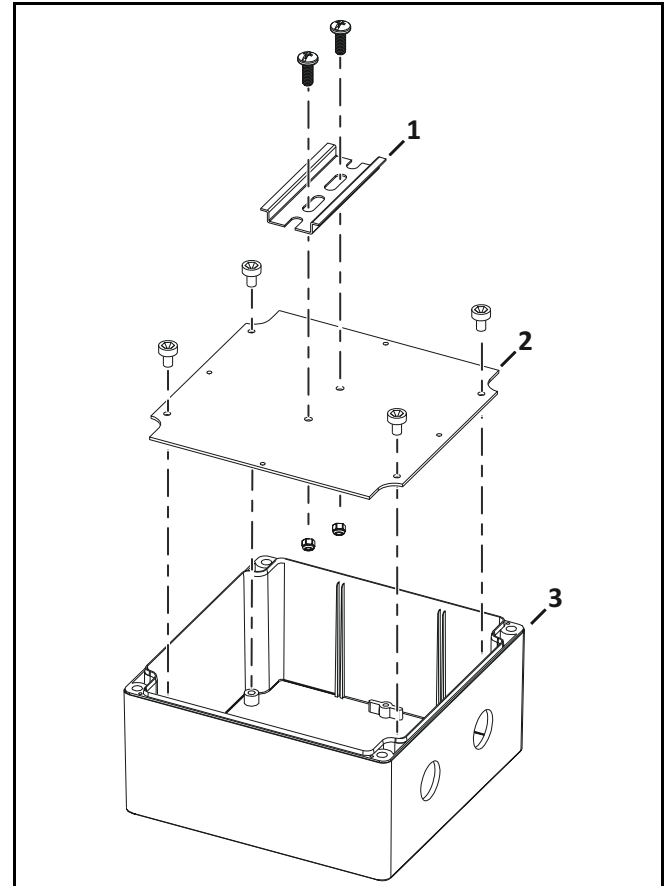
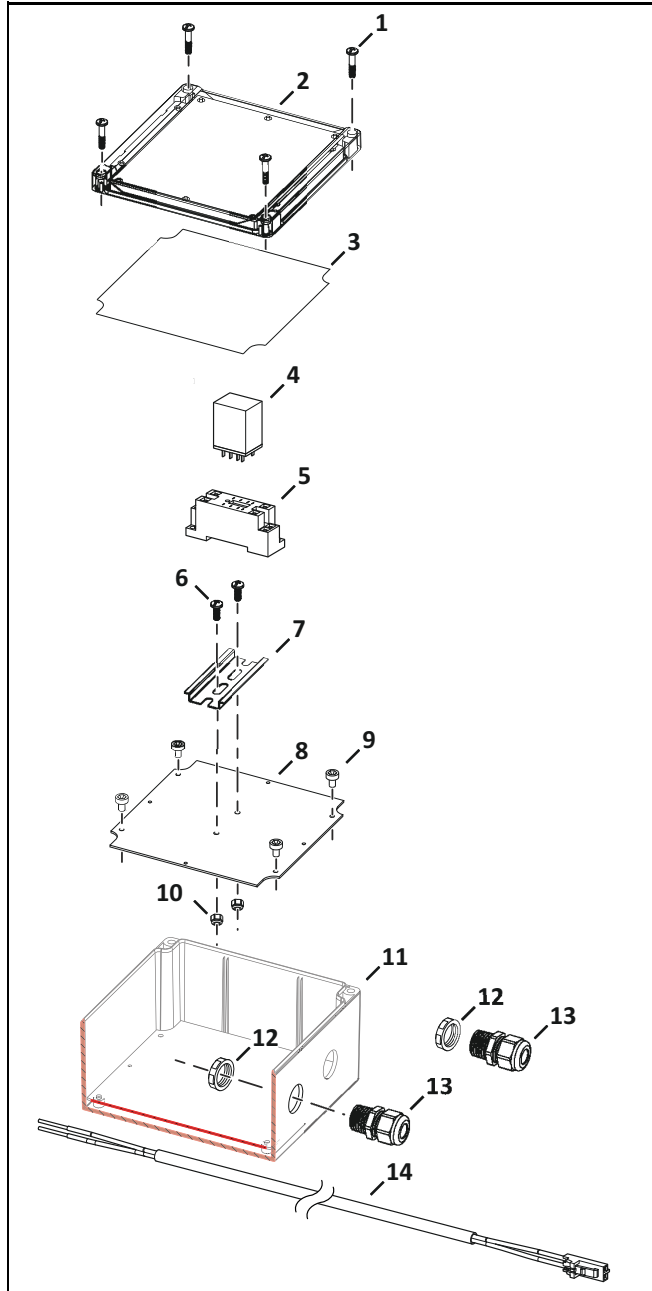
- 7) Label the peripheral wires based on type (SL, Z1 and Z2), loosen the cord grip and remove the wires from the station. It is recommended to cap the wires and place a cone over them to protect them from damage.
- 8) Remove the landscaping spikes at the charger enclosure base and store the charging station in a safe place.

# Ball Drop Relay Kit, P/N 99988801819

This kit is an optional accessory, it is not included with the charging station.

## Installation

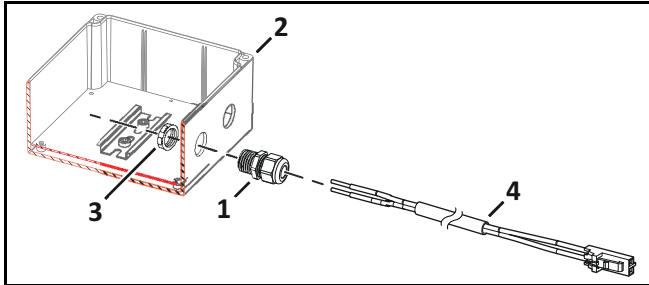
- 1) Remove the cover from the relay box.
- 2) Assemble the DIN rail to the backing plate. Install the backing plate inside the relay box.



- 1 – DIN rail
- 2 – Backing plate
- 3 – Relay box

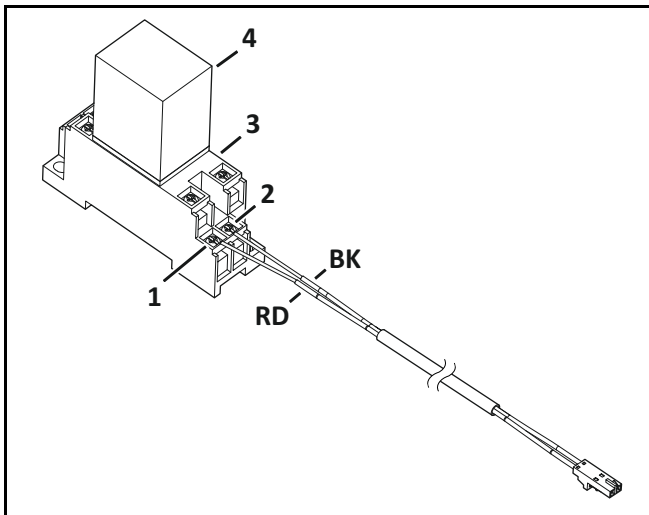
- |                    |                                   |
|--------------------|-----------------------------------|
| 1 – Cover screw    | 8 – Backing plate                 |
| 2 – Cover          | 9 – Backing plate screw           |
| 3 – Cover gasket   | 10 – DIN rail nut                 |
| 4 – Relay          | 11 – Relay box                    |
| 5 – Relay block    | 12 – Grommet nut                  |
| 6 – DIN rail screw | 13 – Grommet                      |
| 7 – DIN rail       | 14 – Relay cable - 10 ft. (3.0 m) |

- 3) Install the cord grip into the relay box using the provided cord grip nut. Route the relay cable through the cord grip. Hand-tighten the cord grip.



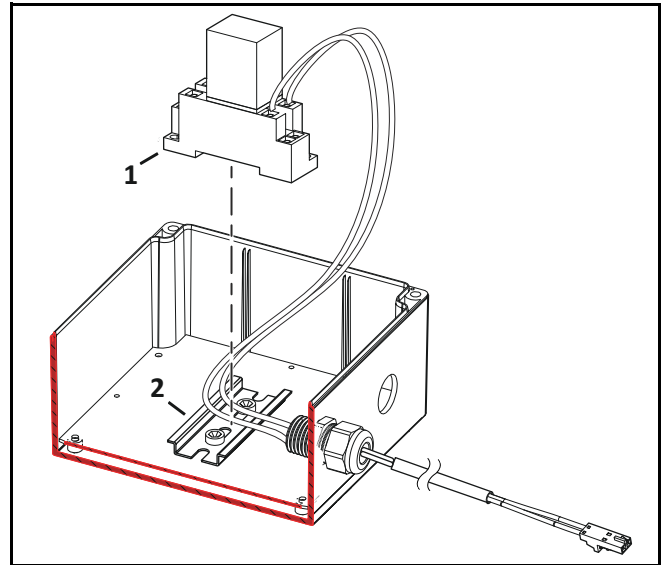
- 1 – Cord grip  
2 – Relay box  
3 – Cord grip nut  
4 – Relay cable

- 4) Use a #1 Phillips screwdriver, connect the red (RD) wire to terminal 14, connect the black wire to terminal 13.



- 1 – Red wire - terminal 14  
2 – Black wire - terminal 13  
3 – Relay block  
4 – Relay

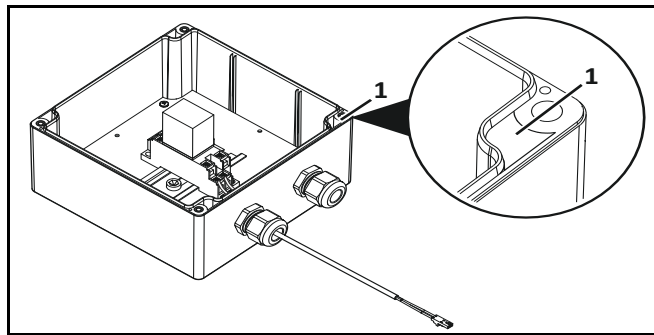
- 5) Assemble the relay to the DIN rail (cut-away view of relay box shown).



- 1 – Relay  
2 – DIN rail

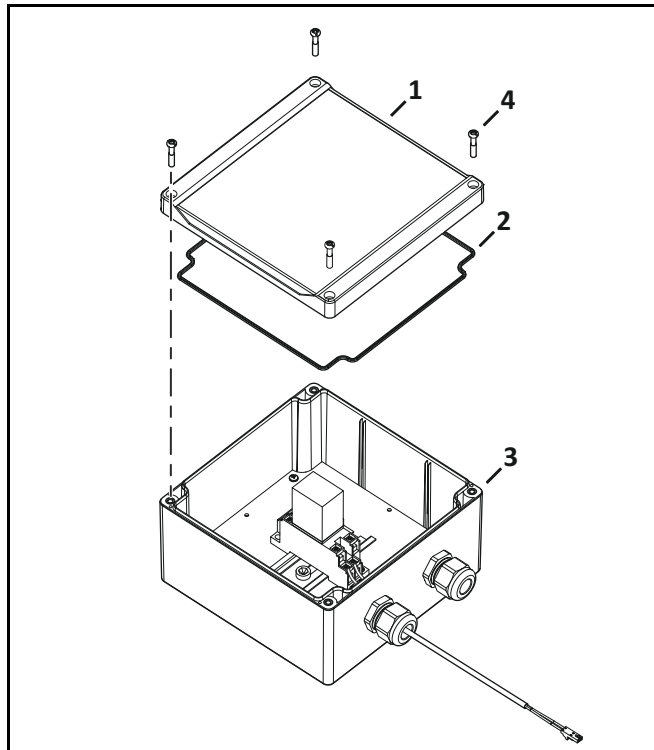
- 6) Use a water-tight cord grip (not included) to secure wiring from the remaining ½ in. NPT opening in the relay box to any external equipment (e.g. golf ball transfer system).
- 7) Use an adjustable wrench or slip-joint pliers to securely tighten the cord grip. This will secure the cable and create a water-tight seal.

- 8) Place the mounting fasteners (not included) in the relay box mounting holes. Mount the relay box to the final location.



1 – Relay box mounting hole

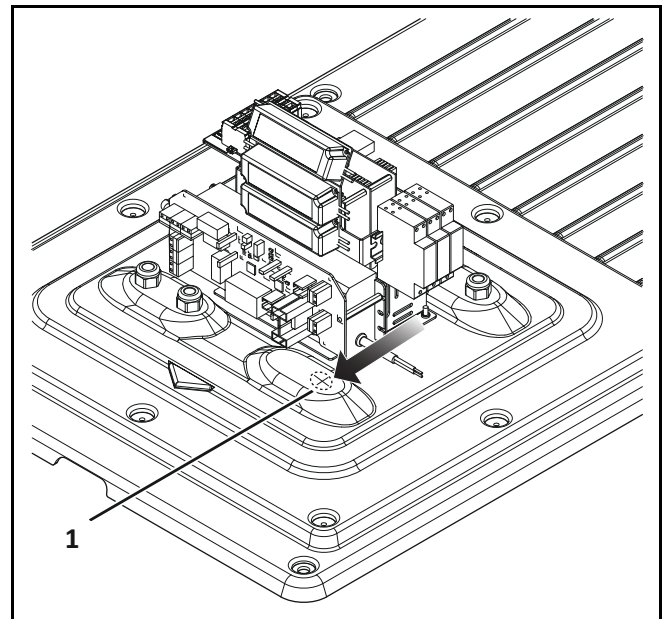
- 9) Place the gasket and cover on the relay box. Assemble the cover screws (4X).



1 – Cover  
 2 – Gasket  
 3 – Relay box  
 4 – Cover screw

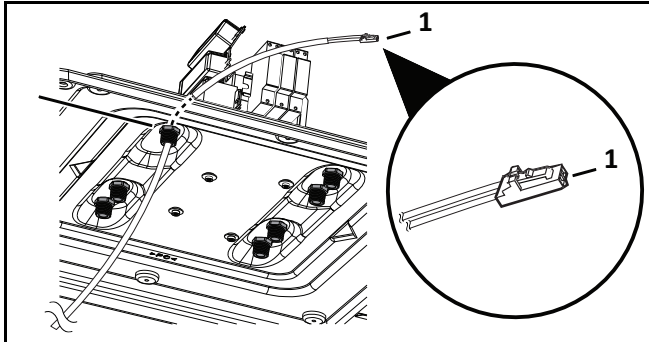
### Relay Cable Assembly to Charging Station

- 1) Move the charging station power switch to the OFF position.
- 2) Turn off AC power at the mains.
- 3) Remove the M5 nuts (8X) from the base of the enclosure top and save for reassembly.
- 4) Remove the enclosure top.
- 5) Specific applications may require the mounting of an additional cord grip. Drill one 7/8 in. (22 mm) hole for the cord grip in the base at the location shown. Assemble the cord grip to the base using the supplied cord grip nut.



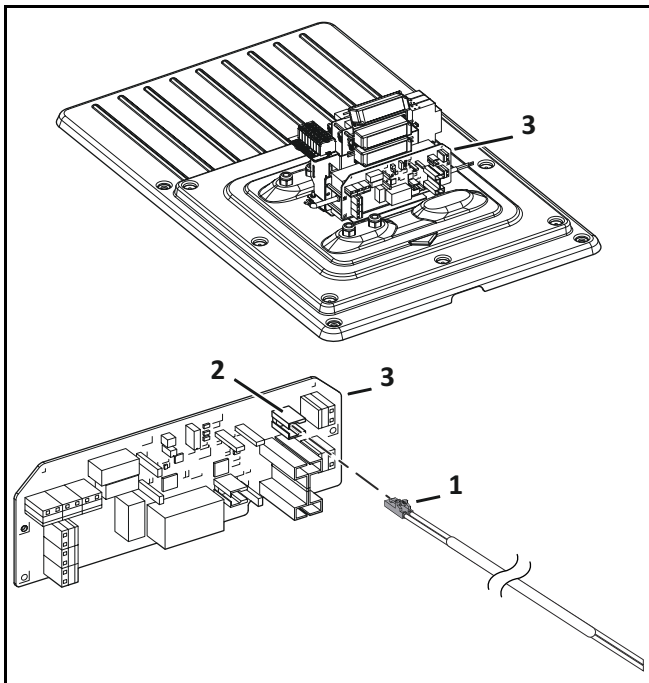
1 – Hole location (7/8 in. [22 mm])

- 6) Route the relay cable under the base and through the cord grip as shown. Allow a minimum of 15.5 in. (400 mm) of cable inside the enclosure top. Hand-tighten the cord grip.



1 – Relay cable  
2 – Cord grip

- 7) Assemble the 2-pin connector from the relay cable to the J12 connector on the power control board.



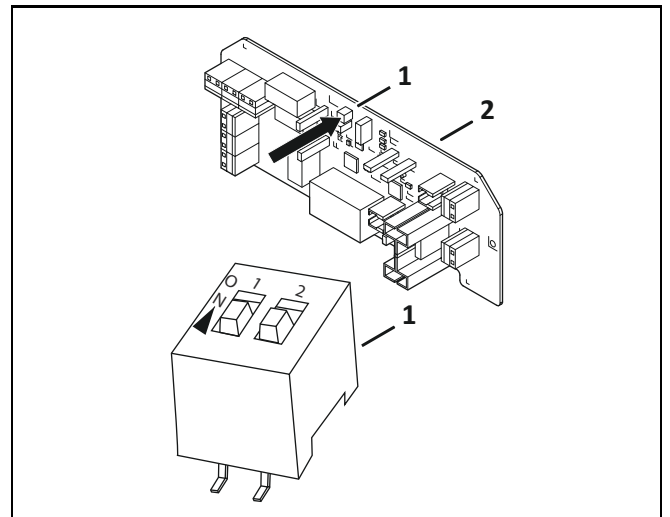
1 – 2-Pin connector (from BDR relay cable)  
2 – J12 connector  
3 – Power control board

- 8) Use an adjustable wrench or slip-joint pliers to securely tighten the cord grip. This will secure the cable and create a water-tight seal.

- 9) Align the holes in the enclosure top with the holes in base. Place the enclosure top onto the base (ensure no wires are pinched or pulled).
- 10) Assemble and securely tighten the M5 nuts (8X).

## Ball Drop Relay and Busy Signal Relay - SW1 DIP Switch Settings

The SW1 DIP switch is located on the power control board.



1 – SW1 DIP switch  
2 – Power control board

### Position 1 - Enable / Disable

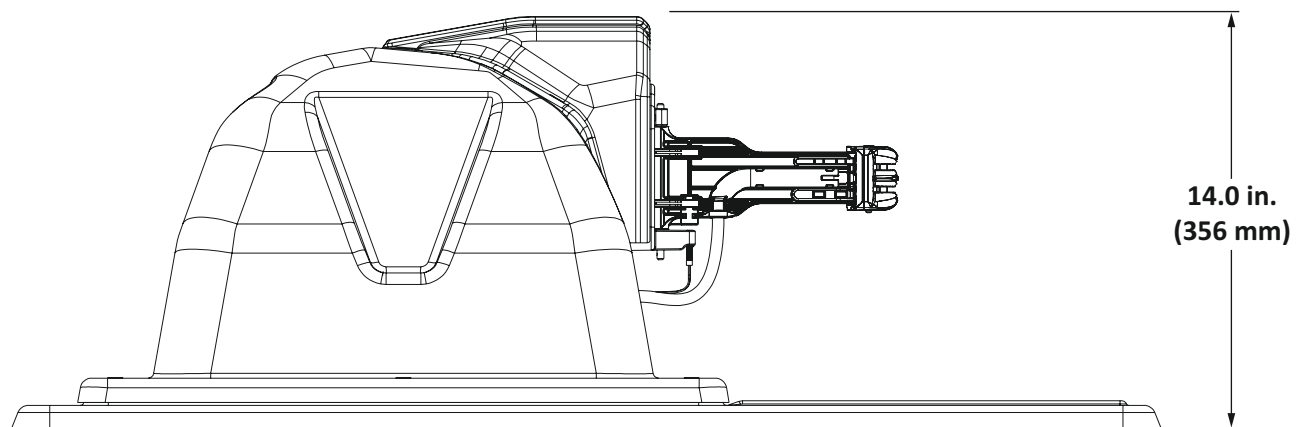
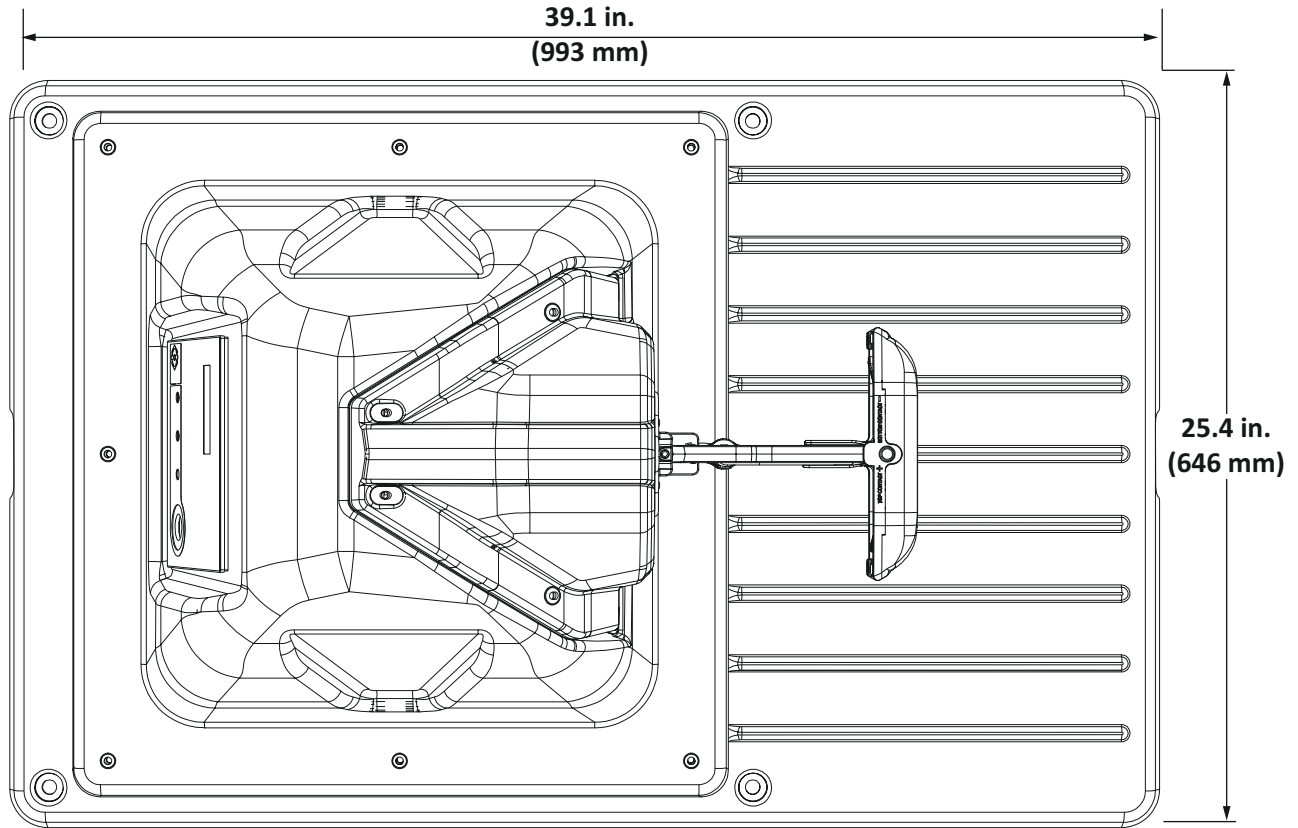
- ON - Enables Ball Drop Relay and Busy Signal Relay functions
- OFF - Disables Ball Drop Relay and Busy Signal Relay functions

### Position 2 - Timing

- ON - Ball Drop Relay timer is set to three minutes. It will activate the relay in as soon as the charging arm on the charging station is deflected. The relay will stay active for three minutes whether the charging arm stays deflected or not. If the charging arm is deflected again within three minutes, the timer will restart.
- OFF - The ball drop relay will only be active when the arm is deflected.

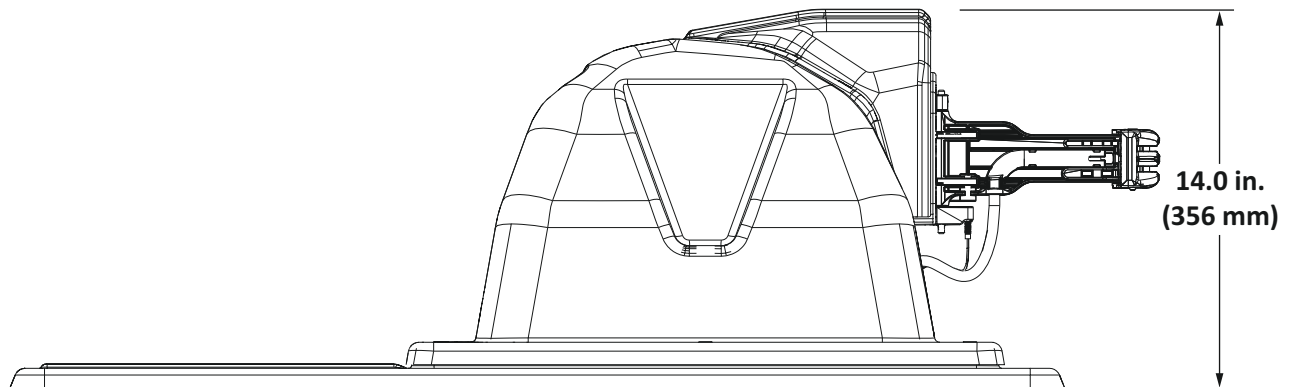
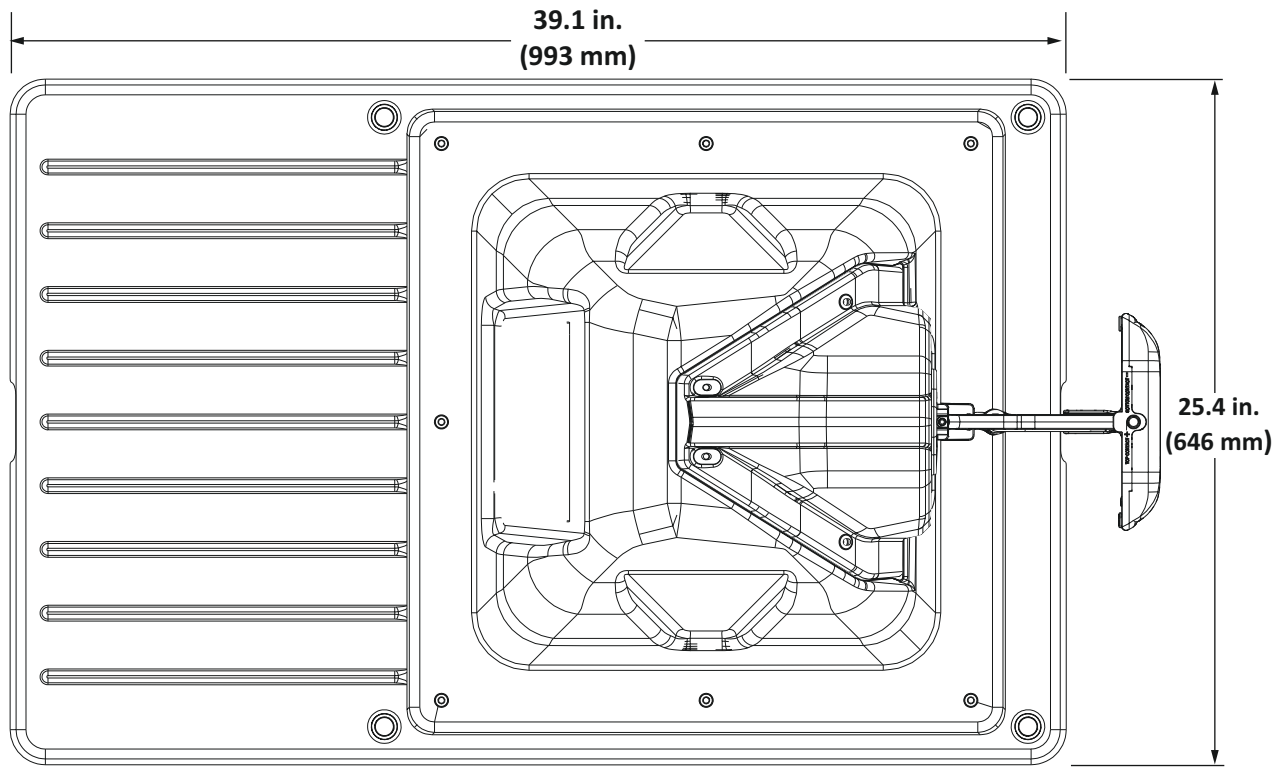
# Dimensions

## Mower Configuration





## Range Picker Configuration

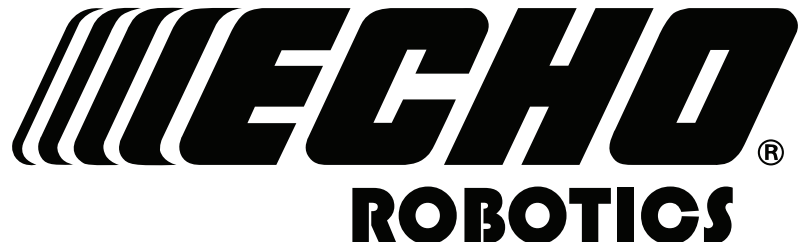


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## Notes

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## Notes



 **WARNING**

Cancer and Reproductive Harm

[www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

**ECHO Incorporated**  
400 Oakwood Road  
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