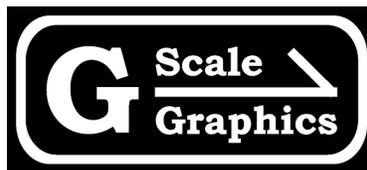
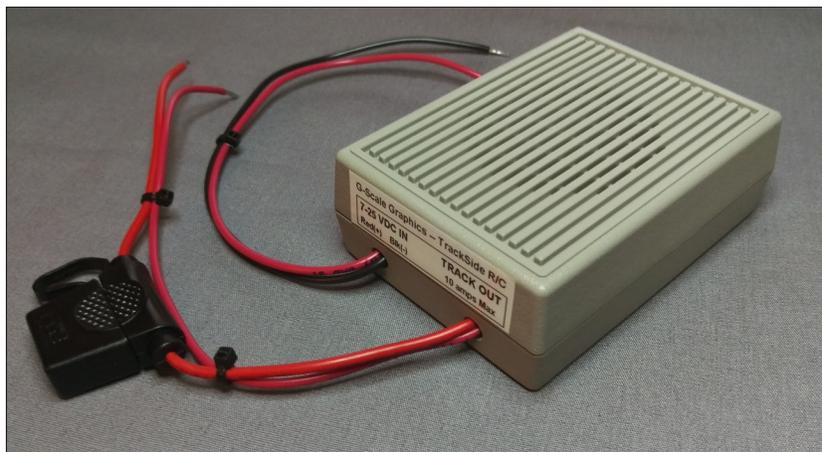


RailBoss 4

Trackside R/C

The Next Generation of
2.4GHz R/C
for Large Scale Trains
Operation and Installation Manual



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Overview

RailBoss 4 - Trackside R/C (Radio Control)

is an electronic speed control designed for remote control of track powered large scale trains. The pocket sized transmitter allows you to control and follow your trains anywhere, without being tied down to a "control panel".

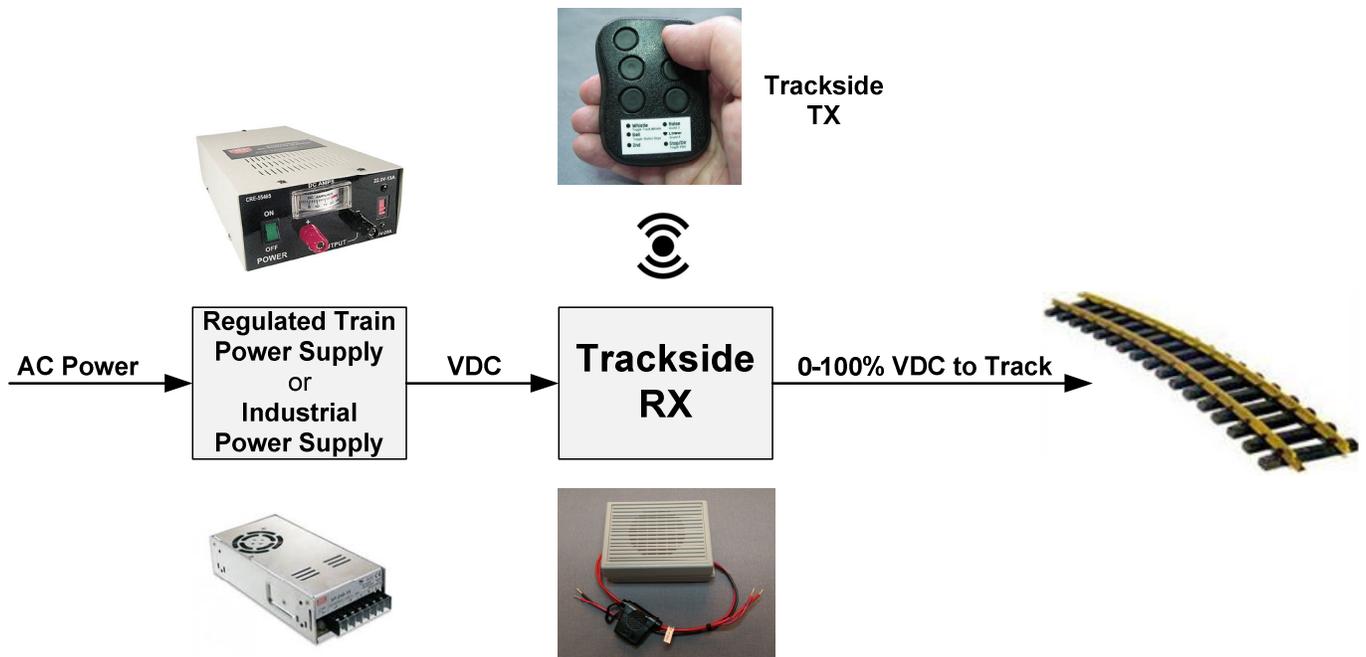
A regulated DC power supply (e.g. 24V, 10A) supplies power to the Trackside R/C unit, which then throttles the voltage to the track via radio control.

The pocket sized TX (Transmitter) controls the Trackside base station via 2.4GHZ DSSS radio signals.

- No modifications to locomotives required
- Pocket sized transmitter
- Precise speed control
- Up to 10 amps of track power
- User programmable

The Trackside base station can pass up to 10 amps of current from the power supply to your track. That is more than enough to handle one or more locomotives pulling a full train. Typical current draw for one locomotive motor is 1 to 1.5 amps.

User programmable options give you control over operating parameters, without the need for a computer.



Wiring Diagram

The Radio System

The **Trackside R/C** uses a new high-tech 2.4GHZ system designed for industrial use. The range is excellent, up to 250 ft. Best reception will be obtained with line-of-sight between the Trackside base station and the TX. Raising the RX above ground level may improve reception, if needed.

Each Trackside base station “learns” its transmitter and will only respond to that transmitter and no others. Multiple **Trackside R/C** systems can be used in the same location to run multiple loops of track, without interference. There are no channels or frequency selections to worry about.

The 6-button handheld transmitter uses long lasting replaceable batteries. There is no on/off switch. It is always ready to use, and only transmits while a button is pressed.



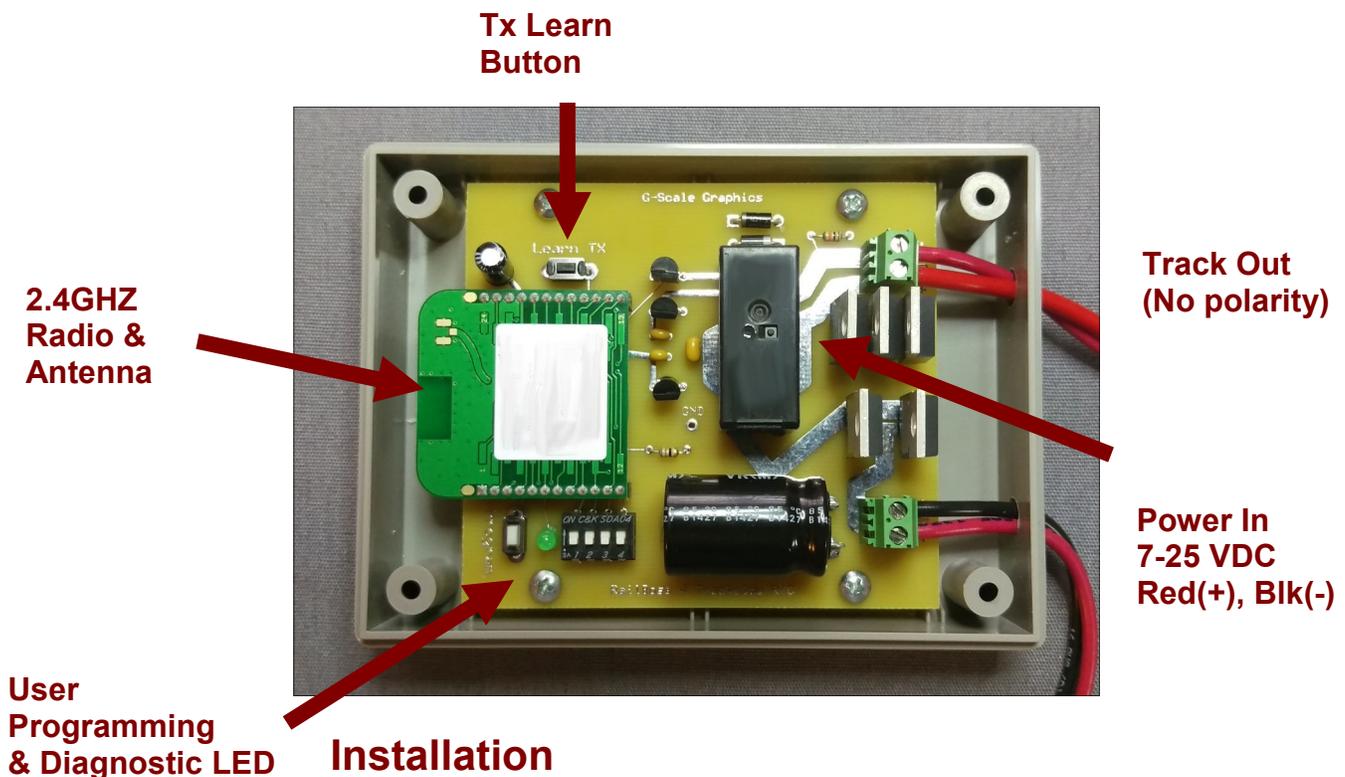
The TrackSide R/C Control Board

The **Trackside base station** houses a circuit board, which is a combination control board and radio transceiver. Transmitter commands control a powerful (and silent) PWM (pulse width modulation) motor driver designed to allow nice slow prototypical speed control of your locomotive. Adding momentum to the throttle enhances the prototypical operation. Momentum is fully programmable, and can be turned on and off via the transmitter to assist with switching operations. (Toggle Rate)

Trackside R/C operates over a wide range of DC input voltage (7-25V). The power input is protected from damage due to reverse polarity, it just won't operate until the polarity is correct.

A DIP switch, push-button and LED provide simple user programming.

The integrated 2.4GHZ radio receiver and antenna provide excellent operating range.



The **Trackside base station** can be mounted anywhere between the power supply and the track. All wiring (power supply to **Trackside base station** , and **Trackside base station** to track, should be as short as possible to minimize voltage drops. For long runs, wire gauge should be at least 16 gauge or better. 12 gauge Landscape wiring works well.

The **Trackside base station** wires are not terminated, just tinned, for you to make connections as needed in your setup. Final connections can be made using wire nuts, crimp terminals, or soldering.

Power Input

Connect 7 to 25 VDC to the Red and Black wires. Reverse polarity will not cause damage, but the control will not operate. Red is Plus (+), Black is Minus (-). The **Trackside base station** will not function below 7vdc input. When proper power is supplied, a small green LED inside the box will be visible (ON) through the ventilated cover.



Warning! Most train “Power Packs” with a knob on them (e.g. the MRC 6200) are very poor power sources. Their “DC” output is unregulated and unfiltered. The large AC component of their output may cause damage to the Trackside R/C electronics. If you can measure more than 1 volt AC on the “DC” output of your power pack, it is not suitable!

It is assumed that power to the system will be switched on/off at the power supply.

Any DC power supply with a regulated output between 7 and 25 VDC will work. The greater the voltage, the faster your top speed will be. There is nothing special about power supplies made specifically for trains, other than they may have some built-in meters. Industrial power supplies are much cheaper and smaller.



**Meanwell Industrial Power Supply
SP-240-24**

Some common fixed output train supplies:

Crest (Aristo-Craft), Elite Dual, 22V/13.8V, 13A/20A, CRE55465, \$206

Crest (Aristo-Craft), Elite Single, 24V, 15A, CRE55468, \$242

Aristo-Craft, Ultima, 18-21V, 10A, ART-5460, obsolete

Industrial Switching Power Supply:

Meanwell, 15V, 10A, RSP-150-15 (good for steam)

Meanwell, 24V, 10A, SP-240-24 (good for diesels)

and many other models by Meanwell, most under \$50

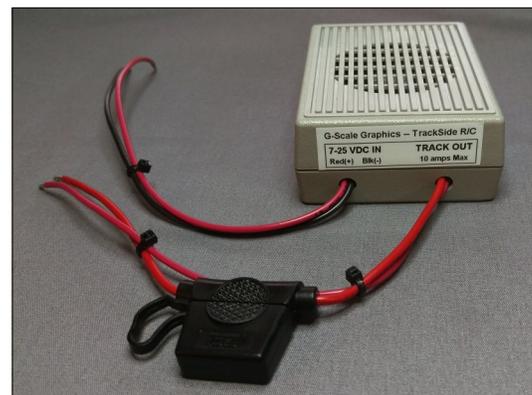
Must supply your own AC cord/connection to the terminal block.

Track Output

A maximum of 7 amps continuous current (10 amps peak) is available from the board. An in-line 7.5 amp automotive fuse is located in black plastic case of the output wiring. If you have a derailment or other catastrophe causing a short on your track, it is highly likely that this fuse will blow.

Keep the ventilation holes in the cover of the box open.

At power-up the track output will provide a voltage to the track that is positive on the output wire containing the in-line fuse, and negative on the other. This is intended to be the forward direction of the locomotive. If it is not, just swap the track output wires.



Transmitter / Receiver Setup

There are no channels or frequencies to worry about. The receiver "Learns" the transmitter and will respond to no others. Your receiver has already learned the transmitter it shipped with at the factory. So no setup should be required.

In the event you need to re-learn your TX, you will need to remove the cover on the **Trackside base station**. Remove the black rubber feet on the bottom of the box for access to the cover screws.

To re-learn, press the Learn button on the **TrackSide R/C** board. The LED will start blinking. Press the Stop key on the transmitter until the LED stops blinking. They are now linked together.

The transmitter battery is accessible by removing the 3 screws on the back. Pressing any key on the transmitter should cause the **Trackside base station** LED to blink off. If it doesn't check the transmitter battery.



Operation

Power-Up

At power-up, the locomotive will be stopped, ready to proceed forward. Momentum is off (fast rate).

Setting Direction

Press Forward or Reverse as desired to change direction while locomotive is stopped (will not function while in motion). The direction will power up per User Programming parameter 1. Normal power-up is "forward".

Setting Speed

The Faster and Slower buttons will change the speed setting. Momentary presses for small speed changes, or hold the button down to ramp speed up or down. Min and Max Speed settings are set in Throttle Programming mode. The default settings are Min Speed = 0% battery voltage, and Max Speed = 100% battery voltage.

Saved Running Speed

Set the speed of your loco to your normal running speed. To save it, press 2nd, then Slower buttons. Now any time you want to recall that speed, including from a dead stop, just press 2nd, then Faster buttons. The loco will accelerate (or decelerate) at the current momentum rate.

Momentum/Fast Rate

"Momentum" is a delayed response to a change in speed setting. This simulates the slow response of a heavy train. Toggle the rate from fast to momentum, and vice versa, by pressing "2nd, Stop". Use the fast rate for a quicker response during switching moves. Momentum refers to the user programmed throttle momentum set by parameter 0 (see User Programming).

Emergency Stops

Holding the Stop button while running will make a quick stop, but not instantaneous. This avoids gear damage due to the real momentum of the train.

Throttle Programming Min and Max speeds

You can program the min and max throttle speeds (voltage). Most motors require more than 0 volts to get moving, so if you set the min speed just slightly less than what it takes to make the loco move, you will eliminate the delay in getting the loco moving. Max speed setting is useful for setting a safe maximum speed to avoid derailments when children are operating the loco.

To enter throttle programming mode, hold the 2nd key, Slower, and Stop buttons down until the LED in the **Trackside base station** starts flashing at a fast rate. You will now have full speed control from 0 to 100% battery voltage.

To set min speed, use the Faster button to just barely get the loco moving. Then use the Slower button to just Stop it. Press Reverse to save the min speed (Speed must be less than 50% battery voltage).

To set max speed, use the Faster and Slower buttons to run the loco at the desired speed. Press Forward to save the max speed setting (Speed must be greater than 50% battery voltage).

To return to default throttle settings (min speed = 0% voltage, max speed = 100% voltage), press the 2nd key to save the default settings.

Press the Stop button to save the setting and exit throttle programming mode. LED will stop flashing. Note: Only one setting, either Min or Max can be set at one time. Exit to save, then re-enter for the second setting.

Trackside R/C Transmitter Commands

Single Key Function

2nd Key function

Examples:

Press "Stop" key once to Stop.

Press the "2nd Key", followed by the
"Stop" key to Toggle Rate.

Forward - Press momentarily to change direction to forward.
(see note below)

Reverse - Press momentarily to change direction to reverse.

Faster - Press momentarily to bump speed up. Hold down to
ramp speed up.

Slower - Press momentarily to bump speed down. Hold
down to ramp speed down.

Stop - Press momentarily or hold to perform a Quick Stop while running.

2nd - Press momentarily, followed by another key to perform the secondary function.

2nd, Forward - not assigned

2nd, Reverse - not assigned

2nd, Faster - Recall the saved running speed.

2nd, Slower - Save the current running speed.

2nd, Stop - Toggle the momentum rate; either fast for switching or slow per User Parameter 0 for prototypical speed changes.

Throttle Programming -

Enter Throttle Programming mode by holding down the **2nd, Slower, and Stop buttons** until the LED inside the Trackside base station starts flashing.

Use Faster/Slower Buttons to control speed (0 to 100%)

Press Forward to set the Max Speed (must be greater than 50%)

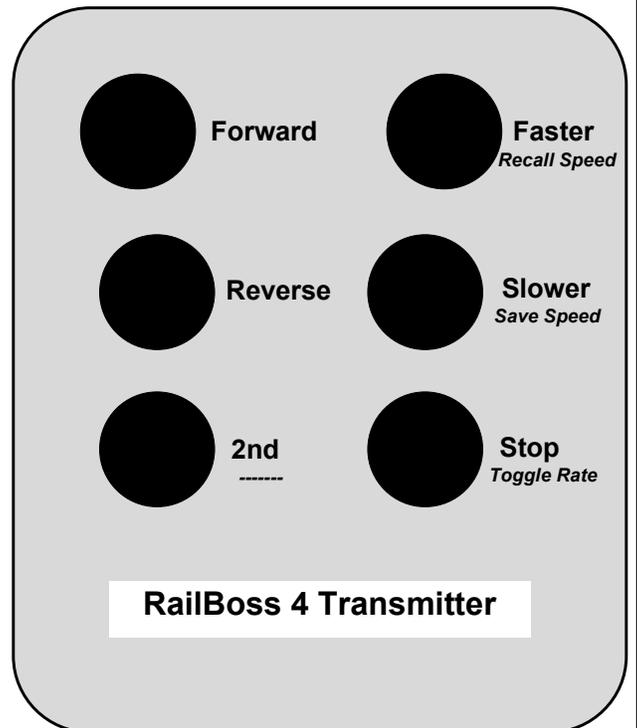
Press Reverse to set the Min Speed (must be less than 50%)

Press 2nd to reset throttle to full range (0 to 100%)

Press Stop button to exit and save changes at any time. LED will stop flashing.

Learn TX - Press the Learn button on the circuit board inside the Trackside box. LED will start flashing. Then press Stop on the transmitter. LED will stop flashing.

Note: Forward and Reverse won't function while loco is in motion. Direction of locomotive travel is relative to the way you place your loco on the track. Place your locomotive on the track in the direction it will normally travel. When the Trackside is first powered up, "Forward" will be selected. If your loco runs backwards, you can either reverse the wires to the track, or change User Parameter 1.



Trouble Shooting

- Nothing seems to be working ...
Check the fuse.

Pressing any button on the transmitter should cause the TrackSide LED to blink off. If not, check the transmitter battery. It should be 2.8V or greater (3.0V for a new battery).

Check the power. The TrackSide LED should be ON. You should measure between 7 and 25 volts DC applied to power input wires (Red +, Blk -).

- The transmitter doesn't work at all.
Did the receiver successfully "Learn" the transmitter?
Open the transmitter case and make sure the battery and green module are both fully seated.
The battery should measure at least 2.8 volts (3.0 volts nominal).
Replace the battery with a CR2032 coin cell battery.
- Erratic throttle behavior? Reset throttle to default full range values using throttle programming procedure (See Throttle Programming).
- The loco doesn't start moving until I hold the Faster button for a long time.
The voltage is ramping from 0 volts to that required to move the loco. You can eliminate this dead time by programming the Min Speed setting to a higher value. (See Throttle Programming).
- The loco starts moving as soon as I turn it on.
Program the Min Speed setting to a lower value.
- The locos runs in reverse at power up.
Reverse the wires at the track output.
- The loco won't run as fast as I like even though I keep trying to increase the speed setting ...
Maximum speed is determined by your power supply voltage or the Max Speed setting. You need more voltage or you may need to restore the default throttle programming settings.
- I can't change direction with the loco stopped.
While the loco may be stopped, the track voltage still isn't close enough to zero volts to allow the direction change. Setting the min speed (See Throttle Programming) will fix this. However, if you run more than one loco on your track the min speed setting may vary from loco to loco. The easiest solution is to just get into the habit of pressing the Stop button to insure voltage goes to zero.

User Programming via the DIP Switch & Push Button

Some of the operating parameters of the **Trackside base station** can be modified to meet your individual needs. No programming is necessary to get your system up and running, only to modify it, if so desired.

User configurable parameters can be programmed using the 2-position DIP switch, the on-board push-button next to the DIP switch, and on-board LED. The DIP switch selects the parameter to be programmed, and the LED flashes the currently selected option. See the programming chart following this discussion for specific instructions.

Parameter 0

Throttle Momentum

This parameter sets the amount of momentum applied to the throttle when the momentum function is turned ON. "Momentum" is the length of time it takes to accelerate or decelerate while holding down the Faster or Slower buttons.

Parameter 1

Direction Control

Loco normally runs in the forward direction at power-up. Set this for reverse at power up.

Parameter 2-16

Not assigned

Option	Parameter 0 - Throttle Momentum
1	20 secs 0 to 100% Slowest
2	15 secs
3	10 secs
4	6 secs Fastest

Option	Parameter 1 - Motor Direction
1	Normal - Powers up in Forward
2	Reverse - Powers up in Reverse

Factory setting

Enter Programming Mode

Hold the button (next to the DIP switch) down on the TrackSide board until the LED goes out. Release the button. The LED will begin flashing the option code of the selected parameter.

Select Parameter

Select the parameter you wish to view or program using the DIP switch. (the white square indicates position of the switch; e.g. for parameter 0, all switches are in the down or off position).

View Current Option Code

The LED will repeatedly flash the option code for the currently selected parameter; e.g. two flashes followed by a pause indicate option 2.

Change the Option Code

Momentarily press the push-button during the pause to advance the option to the next higher number, until you get the desired number of flashes.

Save the Option Code

During the pause between code flashes, press and hold down the push-button for about 4 seconds until the LED goes off. Upon release, the LED should stay on solid. This saves the option code and exits User Programming. The new option will now be active.

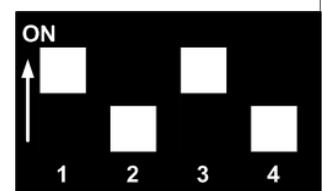
Exit Programming Mode

To exit programming mode without saving any changes, turn off TrackSide power.

The DIP switch sets a binary number. Each switch, when turned on, has a different value. When added together, they give you the parameter number. **But don't worry! All you need to do is look at the pictures to set the switch accordingly.**

Switch position 1 has a value of 1
 Switch position 2 has a value of 2
 Switch position 3 has a value of 4
 Switch position 4 has a value of 8

DIP Switch



TrackSide R/C - Hardware Specifications

Board Revision "New"

Mechanical

Enclosure

4.37" X 3.25" X 1.5"
High Impact ABS, Grey

Wiring

User Connections: 16 AWG, tinned leads for wire nut or solder connections
Fuse Holder for 7.5 amp ATC type automotive fuse

TrackSide Printed Circuit Board

Physical Size: PCB – 3.1" X 2.8", Max component height – 0.8".
Internal Connections: Screw clamp terminal strips accept individual wires, 20 to 16 AWG.
Antenna: The rounded portion of the PCB that sticks out slightly

RailBoss 4 TrackSide Transmitters

2.4GHZ radio with internal antenna: 3 1/4" X 2 1/2" contoured case.

Electrical

Power Input (Terminals IN +,-)

7VDC min to 25VDC max, less than 1V p-p ripple.
Reverse polarity protection (prevents damage, but will not operate)

Power Consumption (PCB only, no motor load, no lights)

Forward motor direction: 33 ma
Reverse motor direction: 102 ma

Track Output (Terminals OUT, No polarity)

7 amps max, continuous, at 100% duty cycle, over the full input voltage range (7-25V)
7.5 amp (max) automotive blade fuse, type ATC-7.5
PWM (Pulse Width Modulated), 20 KHZ
Polarity reversal via relay contacts
Max amplitude: Input voltage minus driver loss
Max voltage loss across driver: < 0.4V @ 1.0A, < 1.5V @ 10A

Radio Rx and Tx

FCC,IC,CE certified and approved. IEEE 802.15.4.
2.4GHZ, Direct Sequence Spread Spectrum, motor noise and interference tolerant, built-in antenna.
Range: Up to 400 ft.
TX battery: CR2032 coin cell

Warranty - 12 months from date of purchase. Post warranty repairs can be made for a modest fee.