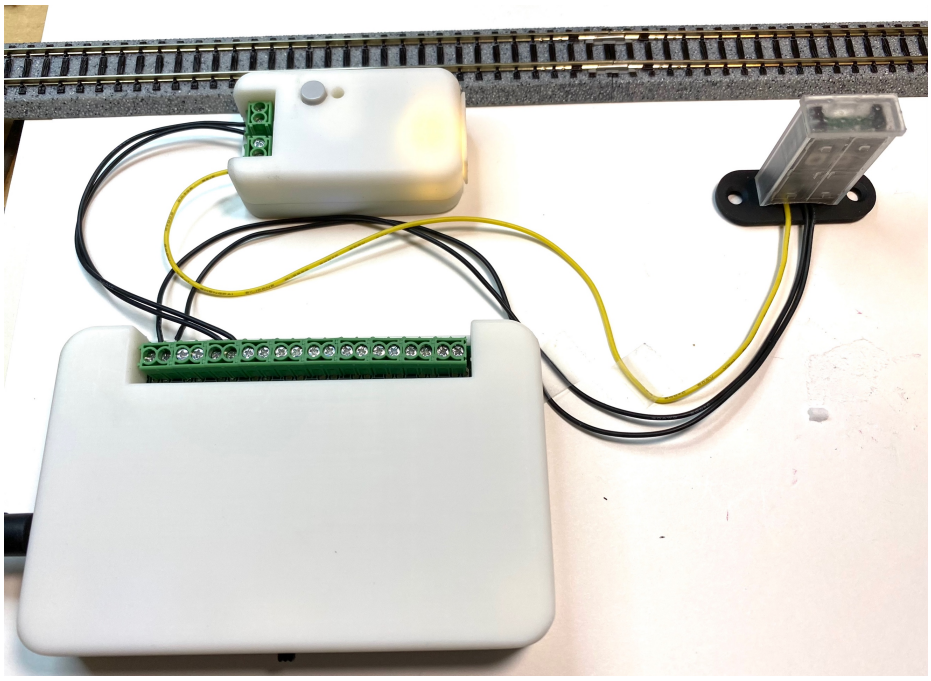
Model Train™ TECHNOLOGY

Signal Controller™

OPERATIONS MANUAL

Version 1.1b



INTRODUCTION

The Model Train Technology™ ***Signal Controller™*** provides an extremely simple plug-and-play system for lighting and animating layout block signals and RR Crossing Flashers.

After years of running block signaling from the computer via train software, I decided that for my 4x8’ demo layout I wanted a very simple system that gives the appearance of a much more sophisticated operation – without all the work. And I wanted a lot less wiring.

Our simplified system will provide great animation in just a few minutes of installation time, not days or years and at a fraction of the cost of elaborate CTC systems. And frankly, very few if any of the visitors to your layout will know the difference!

OVERVIEW

Each ***MTT Signal Controller*** (“***Controller”***) stands on its own and is triggered by a sensor, either under the track or mounted on the side of the track. Our ***Precision Detector™*** is a great choice since it is not based on IR (infrared) and is therefore not impacted by difficult lighting conditions. The ***Controller*** has an optional magnetic base and can be easily mounted upside-down under the layout so that the Controller can be removed easily when needed.

The ***Controller*** also has a built in DCC decoder that will allow your block signals change automatically when you switch a turnout or route. No software, computer or programming is necessary. And there is no complicated wiring.

When the ***Controller*** is tripped by a sensor it starts a display (aspect) cycle that begins with red. While the sensor shows occupied, the ***Controller*** will stay red. Once the block is cleared the ***Controller*** will start a change of light sequence based on one of the options shown below. The time between stages can be adjusted on the ***Controller.***

The ***Controller*** has three outputs that are synchronized to a behavior. You can adjust the brightness of each of the output individually. This lets you set the brightness appropriate to your layout. You can also individually adjust each of the different colored LEDS. The typical colors of the LEDS (Red, Yellow and Green) do not glow at the same brightness with the same voltage. The ***Controller*** allows you to adjust them to your liking. No resistors are needed!

The ***Controller*** allows you to set the speed by which Aspect (colors) shift from Red to Yellow to Green after the train has passed and the block is unoccupied. You can make it occur almost immediately, or you can set it up to 30 seconds. Each ***Controller*** has its own speed adjustment

The ***Controller*** has eight distinct behaviors that are set with the single push button. The time between stages is set with the screwdriver(provided) and trim screw. They are:

- Red, Green
- Red, Yellow, Green
- Red, Yellow, Yellow flash, Green
- R, R&Y, G&Y, Green
- R, R&Y, R&Y-Flash, G&Y-flash, Green

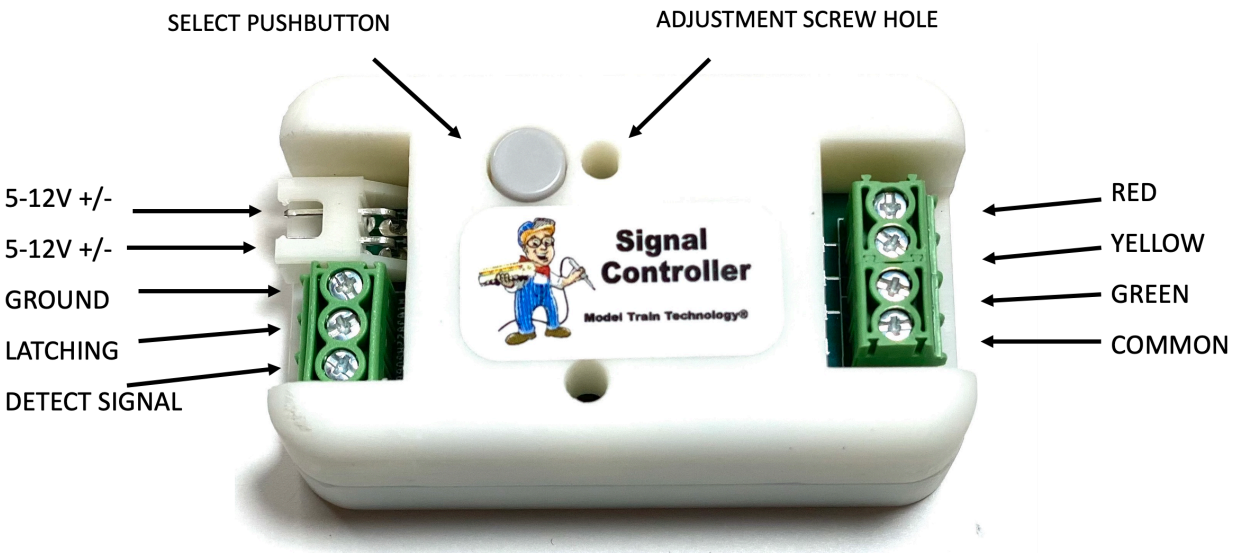
- Red, fade to Yellow, fade to Green
- Alternate flash Red & Green (speed adjustable) *
- Alternate flash R & G with fade (speed adjustable) *

**For use with gate crossings*.

There are two types of controller. One type is for LEDs and the other is for Fiber Cable lit block signals. Functionally, they operate identically. Shown on page 11 is our ***MTT Power Module*** and our ***Precision Detector™*** connected to the ***Controller***. Two wires power the ***Controller*** and a single trigger wire connects the detector to the ***Controller***.

The ***Controller*** can light two LED block signals each with three 2-5v LEDS. The Fiber version normally will light a single block signal in HO, but you can put two N Scale .50mm fibers into a special two-cable fiber pin. Thus, you can have two 3-light N scale fiber signal block controlled by a single controller. Fiber block signals lights are available in O/S with an G scale version available soon.

SETUP AND OPERATION



The Controller setup is simple. Connect to a 5-12VDC power source (or DCC power) to the topmost JST terminals as shown above. Connect your Signal LEDs as shown on the right. The LEDs can be common Cathode or Common Anode. Common Cathode means the COMMON is negative (usually the black wire, but not always). Common Anode means the COMMON is VCC+, or POSITIVE voltages and usually a red wire.

The Detect Signal input is an OPEN DRAIN (GROUND) connection. That means that the signal it's looking for is a ***digital LOW***.

If you use our ***MTT Power Module*** to power your detectors and the ***Controller*** you only need the single yellow SIGNAL wire to connect the trigger wire.

If you have another kind of sensor system you can either have them share the same power supply or use the GROUND terminal. You may also “short” the ground and the signal to create the same result. In other words, a simple mechanical switch between SIGNAL and GROUND will trip the Controller. Very simple.

SELECTING A SIGNAL BEHAVIOR (ASPECTS)

You push the pushbutton the number times need to select and option according to the table below. Once you stop pushing the button the Controller will wait 2 seconds and then all the LEDs will turn off. One second later the green signal LED will blink the number count matching the button pushes, except for one button push which is the brightness adjustment mode.

PUSHES	SIGNAL BEHAVIOR
2	Red, Green
3	Red, Yellow, Green
4	Red, Yellow, Yellow flash, Green
5	R, R&Y, G&Y, Green
6	R, R&Y, R&Y-Flash, G&Y-flash, Green
7	Red, fade to Yellow, fade to Green
8	Alternate flash Red & Green (speed adjustable) *
9	Alternate flash R & G with fade (speed adjustable) *

The default setting is 3.

SELECTING THE BEHAVIOR SPEED

The behavior speed adjustment screw is inside the Controller. You access it with the provided 2mm screwdriver. Gently turn the screw inside from zero to about 300 degrees. It does not turn 360 degrees. Left or counterclockwise is faster (less time between stages), right or clockwise increases the time between stages. You can make the adjustment at any time since the Controller reads the setting at the beginning of each detector trip event.

SETTING THE BIGHTNESS (LED & FIBER)

Setting the brightness for each output is accomplished through a series of SINGLE pushes to the select button. In an idle state, with no triggers active, press the select button once. This will START the sequence to adjust ALL the LED outputs one at a time.

After the first press all the LEDs will light, and the RED led will be ***active*** for the adjustment. You may not see any visible change. Gently Insert the screwdriver into the adjustment screw hole and turn the insider screw clockwise and counterclockwise to reach the desired brightness for the red LED.

When you are happy with the setting, press the select button - once. This will save the Red LED setting; the Red LED will blink and cycle the adjustment to the Yellow LED. Adjust as needed. Then press the button once again. The Yellow LED will blink and then set the mode

for adjustment to the Green LED. Once you are set with the Green LED brightness setting, press the select button one final time.

After the final press, all three LEDs will flash and turn off. After that and depending on the behavior setting, one of two things will happen:

1. If you have set behavior between 2 and 7, the Green LED will light, and the system will be ready to receive a Block Occupied trip signal.

2. If you have selected either behavior 8 or 9, which are the crossing gate alternate flash modes, all the LEDs will remain off until a block occupied trip signal is received.

NOTE: after you have adjusted the brightness, remember to RE-SET the adjustment screw to the timeout setting you want. Most of the time when you set the brightness of the LEDs the adjustment screw will be toward the "high" side, meaning all the way clockwise. This is also the LONGER time setting for the aspect changes.

CROSSING GATE LIGHT SETTINGS

The speed of the alternate flashing can be adjusted by turning the speed adjustment screw. It adjusts the time between stages just as before but in this case, it is the speed of the back and forth of the two output ports (red and green). There is no timeout delay option for the Alternate Flashing modes. Instead, you use the timeout function on the ***Precision Sensor*** (or other sensing system) to decide when to turn off the alternate flashing LEDs.

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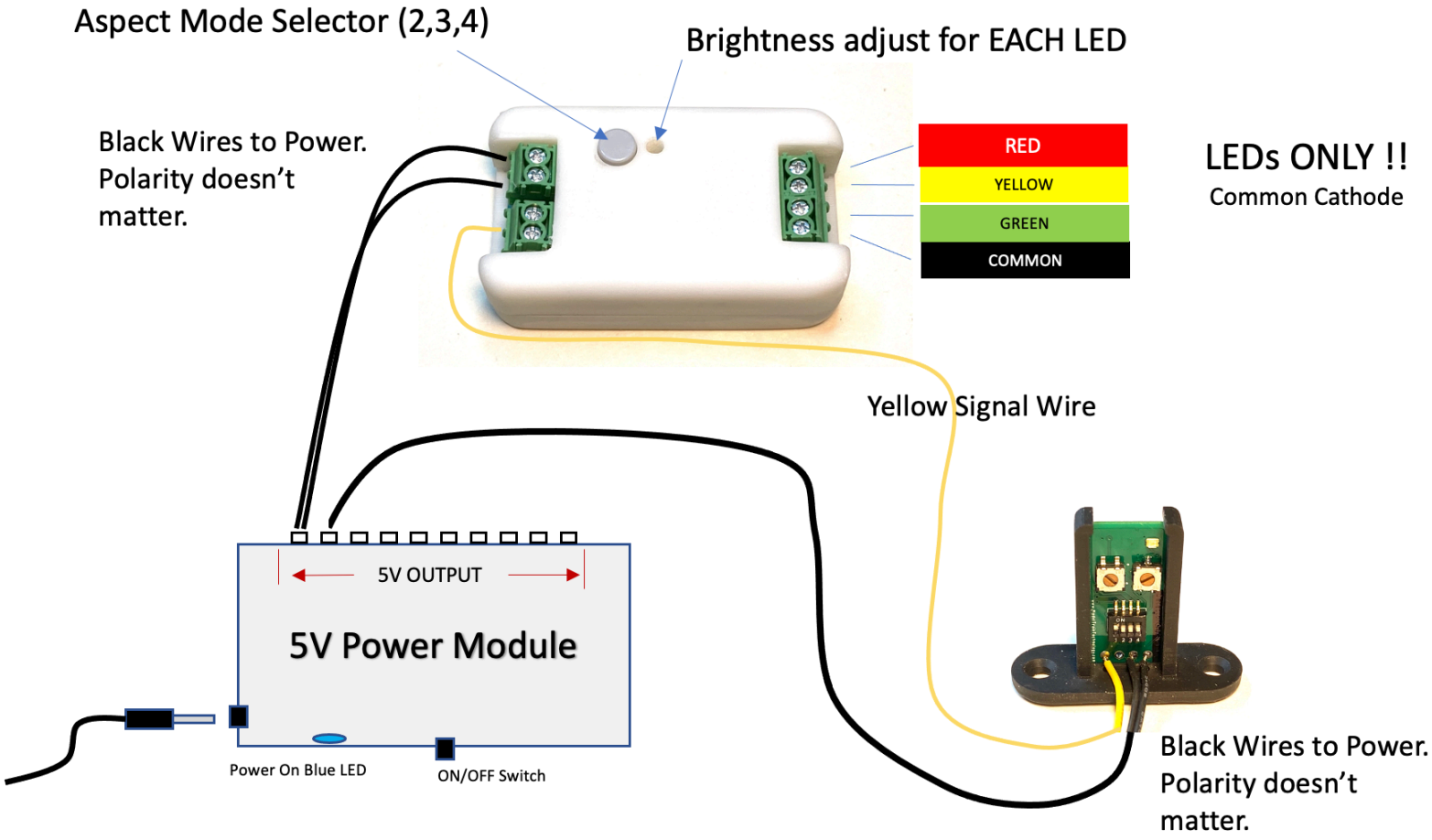
MTT Precision Detector™
LED SIGNAL CONTROLLER HOOKUP



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MTT Precision Detector™

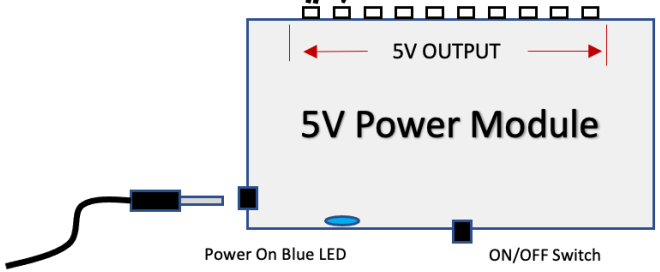
FIBER SIGNAL CONTROLLER HOOKUP

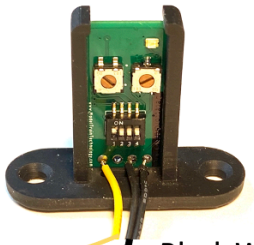
Fiber Output Light is WHITE
Block Signal Lens are colored

Black Wires to Power.
Polarity doesn't
matter.

Select Fiber Pin
Size
(.50,.75,1.00,1.50mm)

Yellow Signal Wire





Black Wires to Power.
Polarity doesn't
matter.

DCC OPERATIONS

The ***Controller*** can respond DCC Accessory messages just like your turnout controllers. You can set the ***Controller*** to the SAME address as a turnout so that when you change the turnout, the ***Controller*** automatically changes the color of the signal. You can also configure several Controllers to the same switch address so that multiple but different signal lights will light according to your layout design. Since ***routes*** are a combination of turnout commands, the ***Controller*** can align the signal lights accordingly.

By default, and industry standard, the ***Controller*** DCC address is set to 3. You can change it to any valid accessory switch address between 1 and 2044. When the ***Controller*** receives a DCC turnout command (thrown or closed) that matches the ***Controller*** address, it will activate the trip function of the ***Controller*** and start the aspect animation.

- Closed means that the siding is closed, and the switch aligns with the Main Line – meaning the switch should be straight.

- Thrown means that the switch is set to divert the train to the siding or wherever else it might go, but not straight.

  The ***Controller*** uses the THROWN direction as a tripped condition.

  Since there are only two conditions for a turnout, it makes the most sense to set the ***Controller*** to 2 aspect mode – Red and Green only.

  If you find that the Thrown and Closed states are backward to the way you want to display the signal, simply reverse the wires and/or fiber cable connections to the ***Controller.***

To operate the ***Controller*** with DCC you must power and connect your DCC rails A & B to the ***Controller***. For small and medium sized layouts this should not be a problem since the ***Controller*** and LED require about 30ma each to run. For larger layouts or layouts with a lot of signals connected to you DCC track we suggest you create a separate Booster zone. This way, no current will be taken away from the rails to run the engines.

SETTING THE CONTROLLER ADDRESS

With the Controller in the non-tripped state, press and hold the select button for about 10 seconds.

Within 1 second of beginning to press the button, all the signal lights will go out. Usually, it's just the green light that goes out since it's the only one on.

Continue to hold the select button until the light comes back on. Then release the button.

The green light and the blue power light will begin to flash on and off. This indicates that the ***Controller*** is ready to accept a new address.

To set a new address, select the Accessory/Turnout number that you want to use on your DCC hand controller. This can be a number from 1-2044. Using your DCC hand controller, enter the number and then press the appropriate command to set a CLOSED or THROWN switch event. Either Closed or Thrown will work. This will be slightly different depending on the brand of DCC system that you are using.

To exit setting the address mode WITHOUT changing it, press the select button once. The Controller will return to its ready state.

As soon as you select CLOSED or THROWN, the ***Controller*** will flash 4 times and the lights will go off. The ***Controller*** is now set to the new address.

Lastly, the ***Controller*** will enter the unoccupied/un-triggered state which usually means that the green light will go on.

While DCC is connected and active, DCC commands will override the input signal and latching functions. In other words, you can use detectors OR DCC to trigger the *Controller* but not at the same time.

ELECTRONICS AND STATIC ELECTRICITY

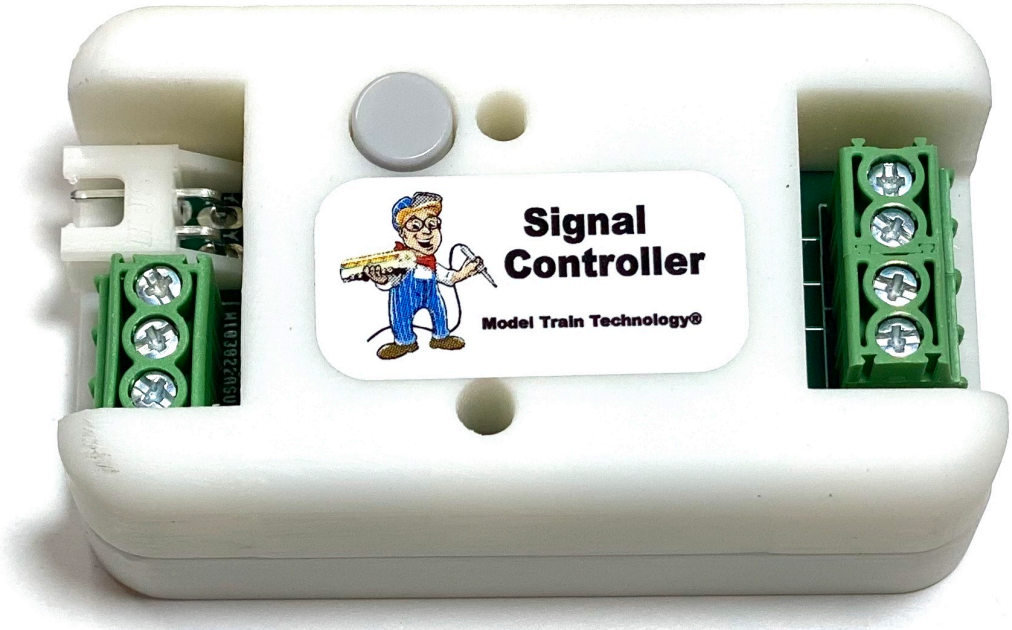
The ***MTT PRECISION DETECTOR™ - Trackside*** circuit board and components are exposed when the cover is off. Static electricity can cause component failure. Scuffing along a carpet and then touching one of the component connectors can cause a static spark. These components are fairly rugged – some designed for the automotive industry. Just be mindful of the risk. The current on the board will not harm you if the board is powered as per the instructions.

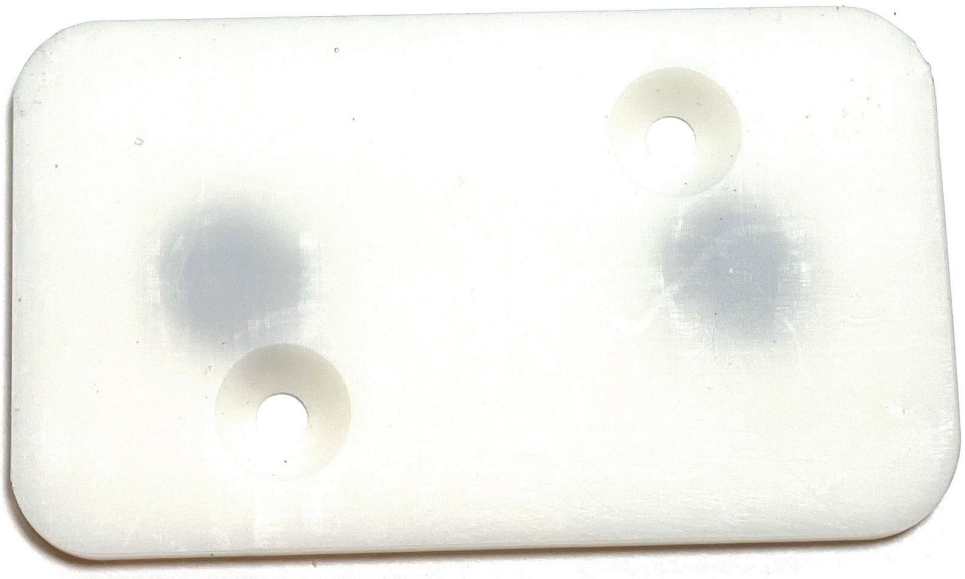
ONE YEAR MANUFACTURER WARRANTY: We warrant this product to be free from defects in workmanship and materials, under normal residential use and conditions, for a period of one (1) year for the original invoice date. Shipping and handling fees are to be paid for by the customer.

LIMITATION OF LIABILITY

UNDER NO CIRCUMSTANCE SHALL COMPANY OR ITS AFFILIATES, PARTNERS, SUPPLIERS OR LICENSORS BE LIABLE FOR ANY INDIRECT, INCIDENTAL, CONSEQUENCIAL, SPECIAL OR EXEMPLARY DAMAGES ARRISING OUT OF OR IN CONNECTION WITH YOUR USE, OR INABILITY TO USE THE PRODUCT, WHETHER OR NOT THE DAMAGES WERE FORESEEABLE AND WHETHER OR NOT COMPANY WAS ADVISED OF THE POSSIBLITY OF SUCH DAMAGES. WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, COMPANY'S AGGREGATE LIABILITY TO YOU SHALL NOT EXCEED THE AMOUNT OF THE PRODUCT. THE FOREGOING LIMITATION WILL APPLY EVEN IF THE ABOVE STATED REMEDY FAILS OF ITS ESSENTIAL PURPOSE.

Signal Controller and Magnetic Bracket





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