

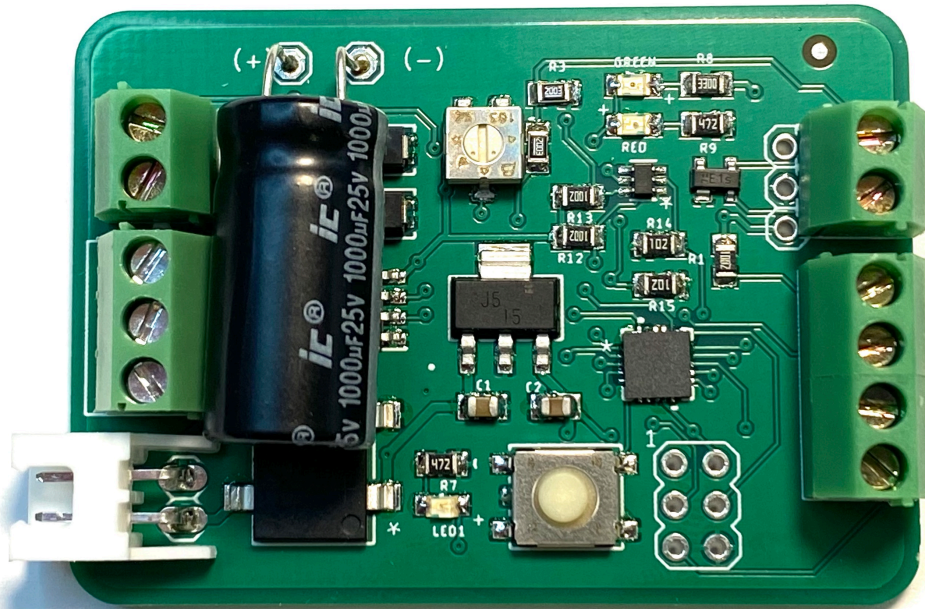


Model Train[™]
TECHNOLOGY

SMART Switch[™]

OPERATIONS MANUAL

Version 1.2a

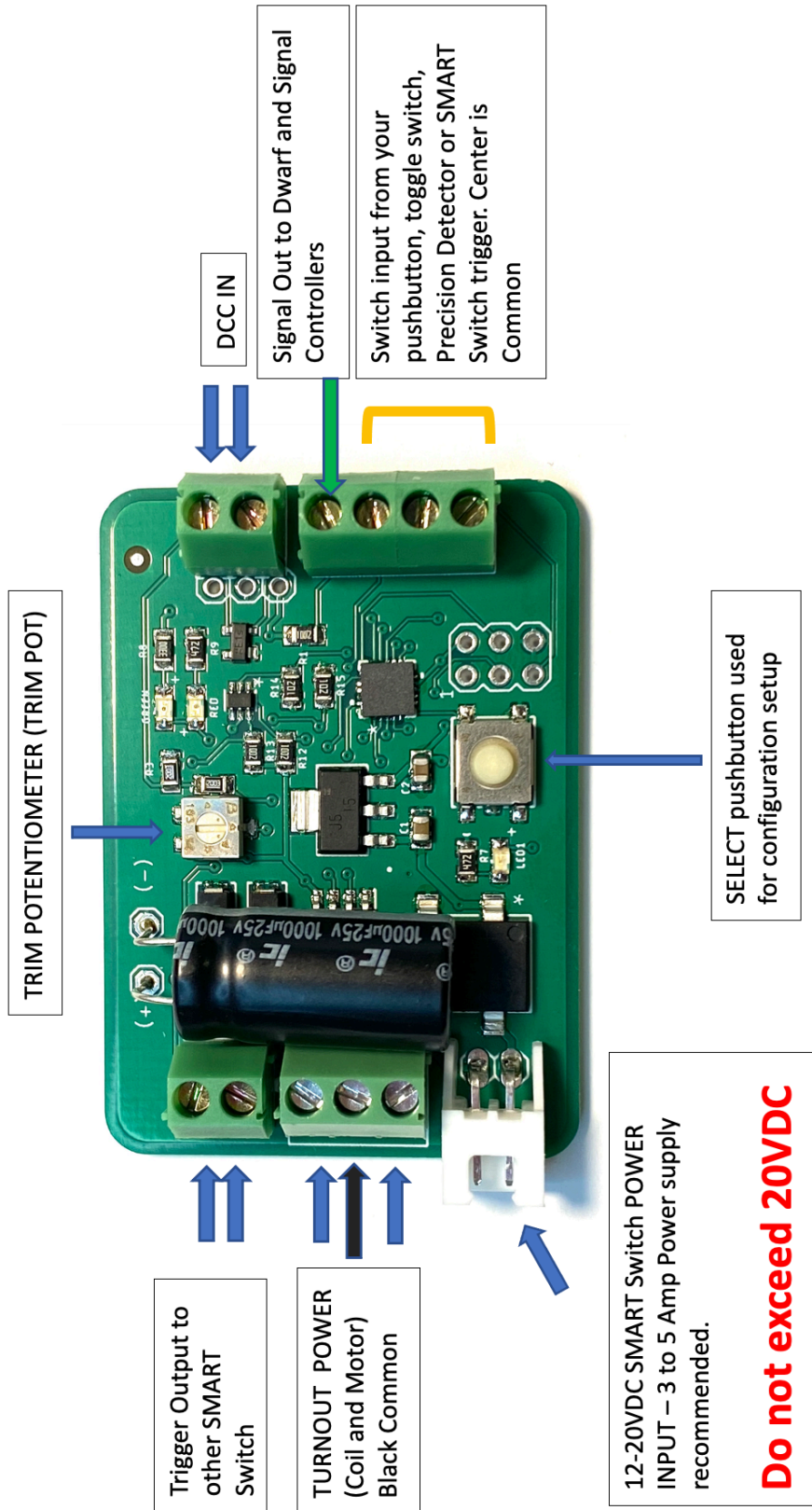


Patents Pending

OVERVIEW

The **SMART Switch™** is designed to do the following things:

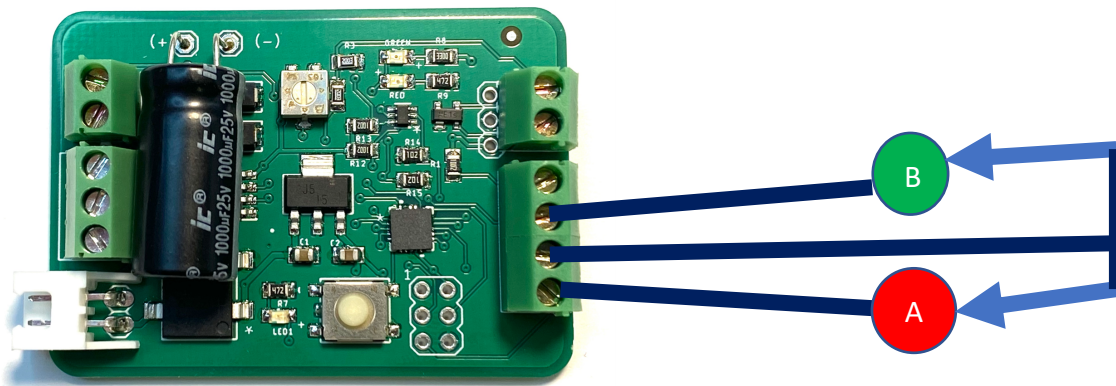
1. Replace the Atlas-type slide-and-press or Kato coil turnout switch with any of the following:
 - Single pushbutton
 - Two push buttons
 - All types of toggle switches (not necessarily spring center)
2. Create and track the state of the switch and remembers the turnout position after the power is shut off.
3. Activate any of the Model Train Technology Signal/Dwarf Controllers and automatically show the correct turnout position when power is turned on.
4. Trigger Another SMART Switch™ for automatic Routing
5. Activate relays to kill power to approach tracks that are not aligned with the turnout.
6. Power and switch motorized turnouts like Tortoise with all the same features.
7. Simultaneously allow DCC commands to turn turnouts.
8. Allow Model Train Technology Precision Detectors to activate any turnout.



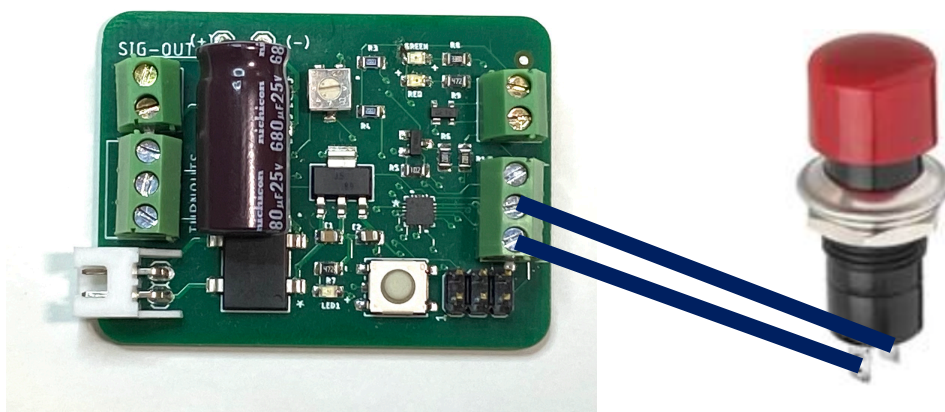
CONNECTING SWITCHES TO THE SMART SWITCH

As shown below there are three terminals that can be used to connect to your mechanical switches. You will use either two or three of the terminals depending on the type of switch and switch behavior you want.

Two Pushbutton or Toggle Switch:



One Pushbutton:



Don't worry about pressing the buttons too fast or both buttons simultaneously, or in the case of the toggle, leaving it in one position or the other (non-center spring type). The SMART Switch™ takes care of the internal logic regarding all of this and prevent the coil for overheating or staying connected.

To set the SMART Switch™ into two button mode, press the SELECT button twice. The blue LED will blink.

To set the SMART Switch™ in to Single button push mode, press the SELECT button three times.

CHOOSING THE TYPE OF MACHINE (COIL OR MOTOR)

The SMART Switch™ supports both COIL and Motorized turnout machines.

4 – COIL TYPE – Press the SELECT button 4 times to choose COIL base turnout machines. (100ms pulse adjustable to 200ms)

5 – MOTOY TYPE – Press the SELECT Button 5 times to choose MOTOR type turnout machines. (1 second drive adjustable to 2 seconds)

ADJUSTING THE COIL OR MOTOR SWITCHING TIME

You can adjust the time it takes the COIL or Motor to turn the turnout. In the case of COIL, the default pulse is 100ms (1/10 of a second). This is enough for most situations. Leave the TRIM POT turned to the left (fully counterclockwise). You can increase the time by up to an additional 100ms by turning the TRIP POT to the right. Fully to the right (clockwise) will yield a total of 200ms.

The same approach is true for the Motorized turnout machine. The default is 1 second. You can add up to 1 additional second in small increments by turning the TRIM POT to the right (clockwise) for a total of up to 2 seconds. You want to adjust this time so that the motor just makes it to the “other side” and doesn’t bounce. This is a little different than some other approaches where there is a little current running to the motor even after it’s made its travel. It only takes one or two cycles to get this set properly.

There is a small delay built into the SMART Switch™ after each switch action to help prevent damage to either the coil or motor type turnout.

Therefore, if you try to press the thrown/closed commands too fast, the SMART Switch™ won’t let you. That is on purpose.

CONNECTING PRECISION DETECTORS

To use *Precision Detectors* to automatically switch the turnouts do the following:

- a. Make sure that the SMART Switch™ and Precision Detectors (PD) are using the same power supply.
- b. Connect the YELLOW signal wire from each Precision Detector (PD) to either A or B switch input. The common (middle terminal) is not needed.

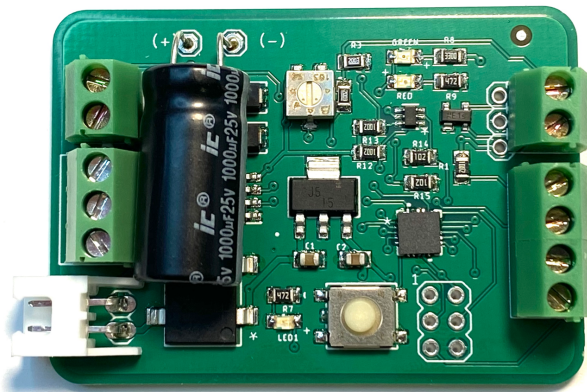
How it works: When a train trips the Precision Detector the occupied signal is sent via the yellow signal wire to the SMART Switch™ (A or B) input. This turns the turnout. The PD will HOLD the turnout position via the SMART Switch™ while a train is still in view of the first PD. If the other PD tries to change the turnout, not nothing will happen until the FIRST PD is clear. Since you will want a little time after the first PD is cleared BEFORE the turn out is RELEASED, you can adjust the TIMEOUT on the first PD to wait. Once the train has cleared the first PD AND the timeout has expired, then the SMART Switch™ will release the switch and allow the second PD to activate the turnout, presumably in the opposite direction.

ADDING ANIMATION AND TRAIN CONTROL

You can add an MTT Relay to each side of the turnout such that when the first train grabs the turn out via the signal from the PD, it can ALSO kill the track power for the OTHER entrance track to the turnout,

stopping the train. When the first train is clear it can release both the turnout AND the relay and give power back to train #2. If you set this up for both sides of the turnout you create a safe zone so trains cannot proceed through the turnout unless the switch is in their direction. As you will see next, you can connect our Signal Controllers to the SMART Switch™ so that the Block and or Turnout Dwarf signals align with what going on.

ADDING SIGNALING

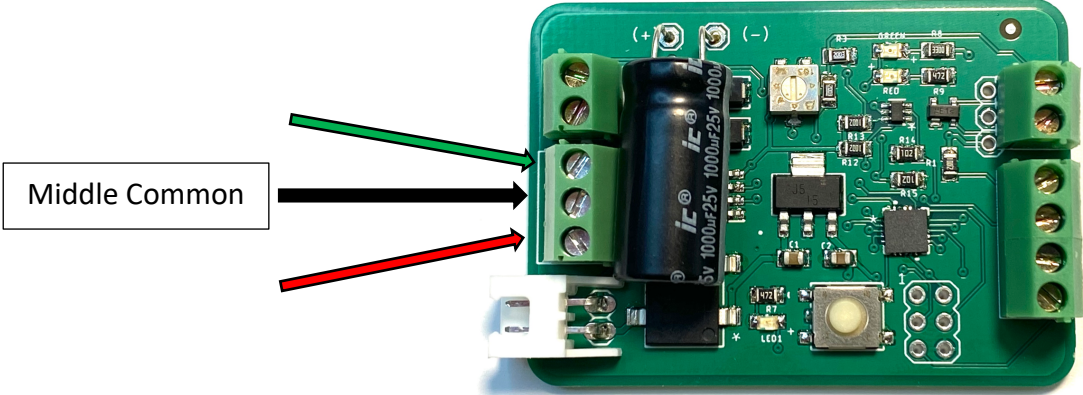


Connect this SIGNAL OUT to the DETECT IN on a Signal or Dwarf Controller or Detector Relay.

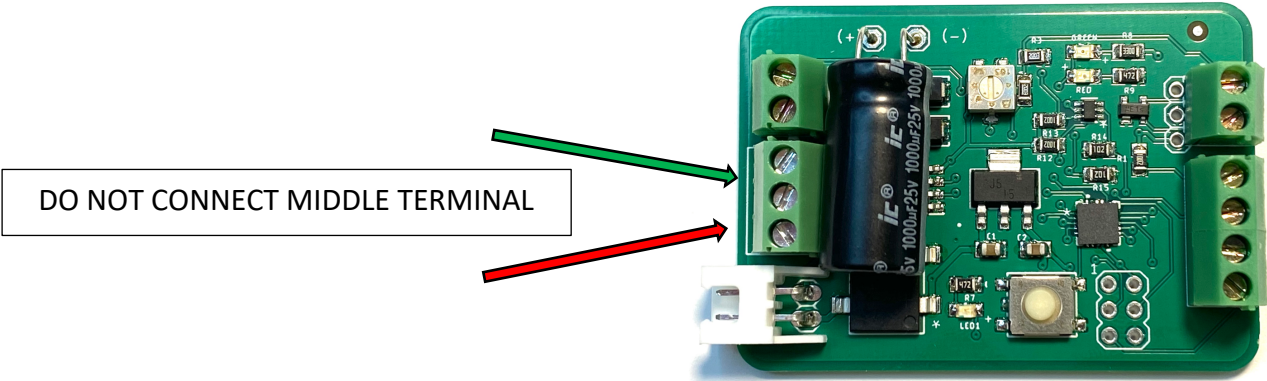
In some cases, you may want the signal output from the SMART Switch™ to be reversed while keep the push button and turnout functions intact. Using the SELECT button press 7 times to REVERSE the logic of the output. This is a toggle so you can press seven times again to revert to standard mode.

CONNECTING TO THE TURNOUT MACHINE

For turnout machines that have three wires, connect as show below with the middle terminal connected to the middle terminal of the turnout machine connections.



For KATO-type coil machines and for Tortoise® and other motorized turnout machines, use only the two outer connections and leave the middle terminal disconnected.



SETTING THE *SMART Switch™* DCC ADDRESS

The default DCC address = 1

Press and hold the select button for about 10 seconds. Within 1 second of beginning to press the button, the blue LED light will go out.

Continue to hold the select button until the light comes back on. Then release the button. The blue power light will begin to flash on and off. This indicates that the *SMART Switch™* is ready to accept a new address.

To set a new address, select the Accessory/Turnout/Switch 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. How you do 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 *SMART Switch™* will return to its ready state.

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

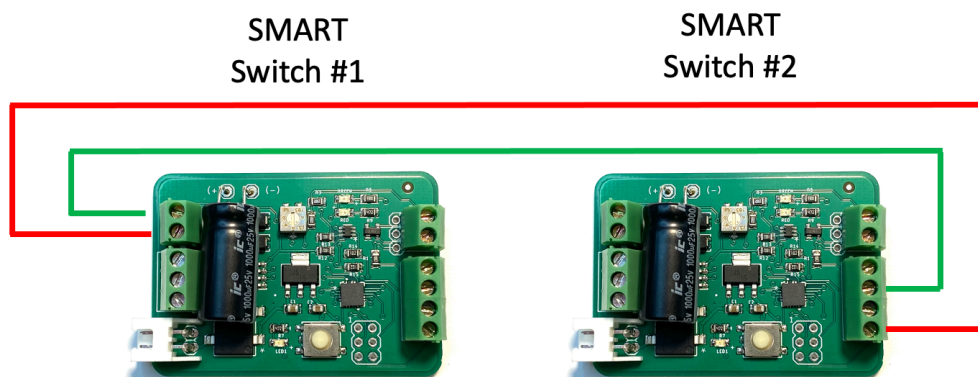
You can switch the turnout either by a connected mechanical switch or via DCC. There is a small delay after each turnout action that is built into the *SMART Switch™* to help protect the coil and motors of the turnout machines.

CASCADING SMART Switches FOR ROUTING

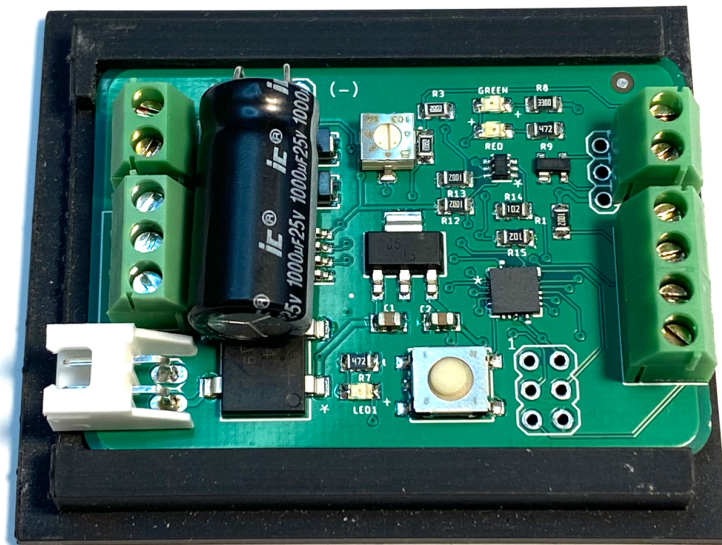
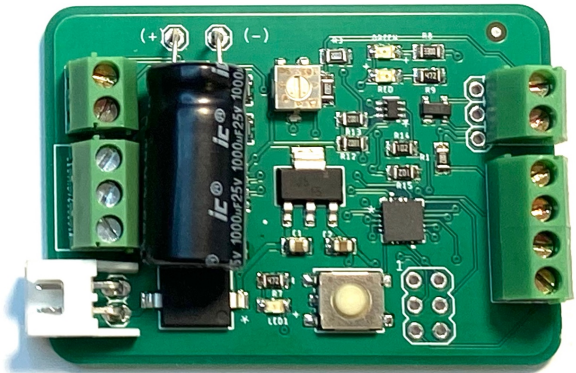
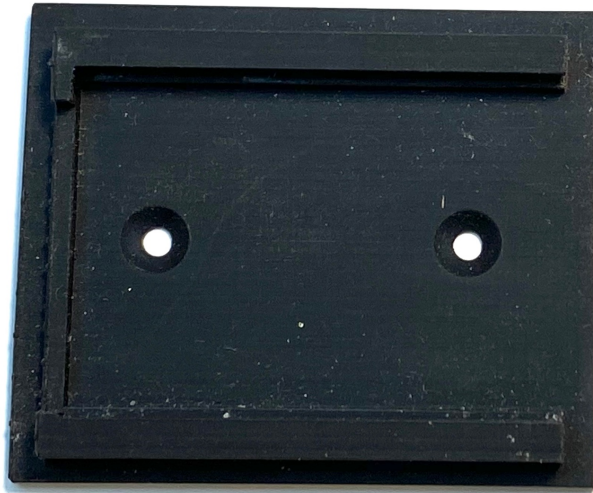
SMART Switches have two outputs that mirror the action of the active switch. This allows you to have one turnout **SMART Switch™** change the next turnout to match the routing and prevent derailments. You can cascade as many **SMART Switches** as you like, and you can mix and match Coil and Motor type turnouts in the cascade. After each **SMART Switch™** moves it's connected turnout, it then sends the signal for the next **SMART Switch**. Therefore, there will be a slight delay as each turnout is turned in sequence. This prevents any unwanted drain on the power supply as only one switch is turned at a time.

As you will note, the signals are fed into the same terminals that your pushbutton or other switch are connected to on the **SMART switch**. The signal out is a momentary (300ms) so once the signal has been completed you have access to use the button as well. This also true if you are using DCC to control one or more of the turnouts via **SMART Switches**. You don't need to connect both sides of the switch if you only need the switch to react in a single direction/route.

Here is a diagram showing the hookup:



SMART Switch™ with mounting Bracket (included):



ELECTRONICS AND STATIC ELECTRICITY

The ***MTT PRECISION DETECTOR™ - Trackside*** circuit board and components are exposed when the cover is off. Electricity can be dangerous. 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 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 and operated 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, CONSEQUENTIAL, SPECIAL OR EXEMPLARY DAMAGES ARISING 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 POSSIBILITY 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.



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