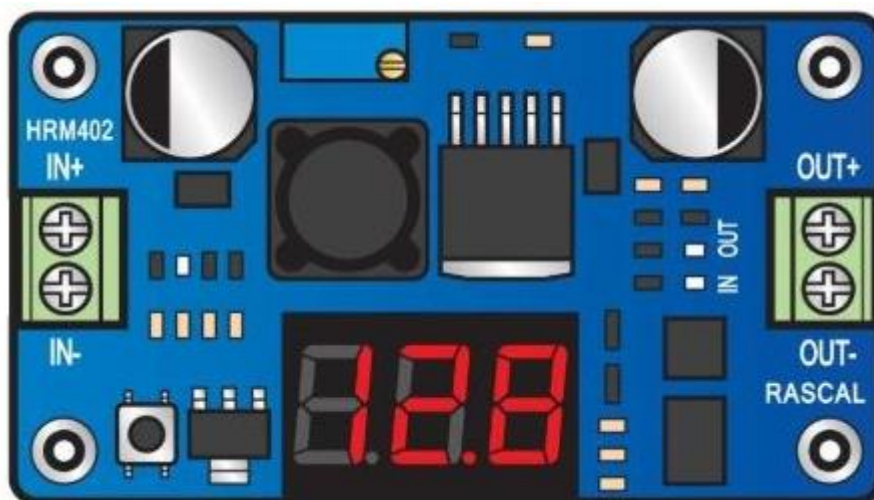
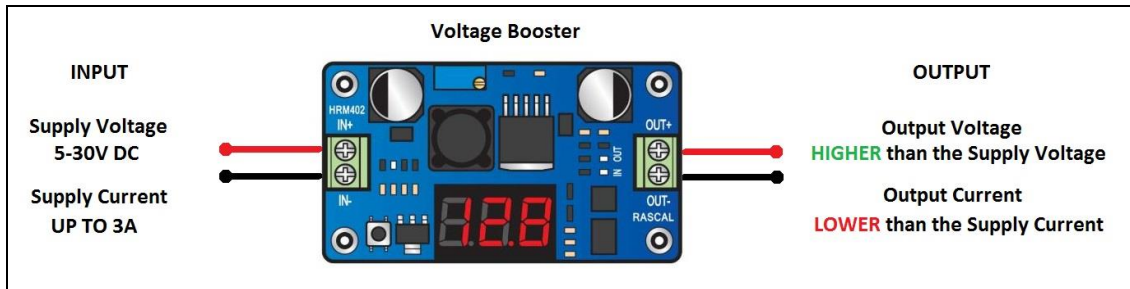


HRM402 DC-DC Voltage Booster With LED Display



Version 1.0



The HRM402 is a variable voltage booster. It can deliver a higher voltage output of 5-30v DC from a lower voltage input. It has an adjustable potentiometer to vary the output voltage and an LED voltmeter that can show either the input or output voltage, toggled by a simple push-button.

It may be used to:

- Increase the voltage from a temporary supply, e.g. a battery
- Address voltage drop on in a cable whereby a camera does not have sufficient power to work

Power Delivery and Booster Startup

This device is not capable of increasing the total power available so as the output voltage is increased there is a corresponding decrease in the available current and vice versa.

It takes its own power from the input supply so it is important to ensure that the input supply has a high enough rating to deliver sufficient power to the load and this device. If the supply voltage is too low or the current draw on the input power supply causes it to go into 'overload protection mode', the booster will not power up.

Cable Voltage Drop

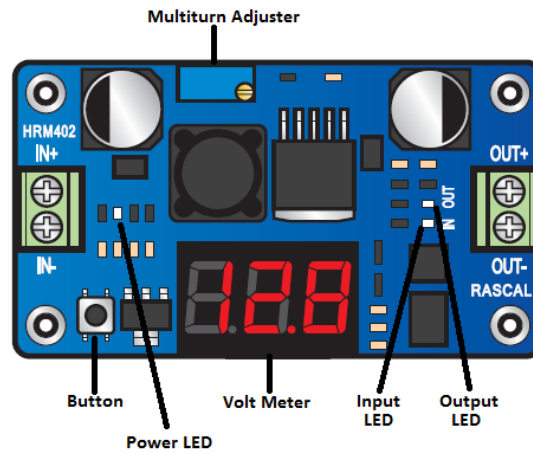
The voltage drop in a cable depends on the resistance of the cable and the amount of current drawn by the load. When installing the booster on the end of a cable run it will require more current to increase the voltage and keep the power the same. The downside of this is that we then have a bigger voltage drop we require even more current, this ends in a downward spiral of more current and higher voltage drop to the extent whereby the booster may stop working. As a guide at 12V with a 500mA load you can boost about 2V.

If you are trying to overcome voltage drop at 12V you may want to consider using a POW061 24V AC to 12V DC converter. With double the voltage the current is halved and hence the volt drop. The POW061 is very voltage tolerant and will output 12V with the input as low as 18V AC.

See TIP No 140 on the System Q website for a guide on cable and voltage drop.

www.systemq.com/pdf/techtips/Tip0140-How-to-fit-CCTV-How-to-combat-voltage-drop.pdf?pdf=tip140

Setting Up

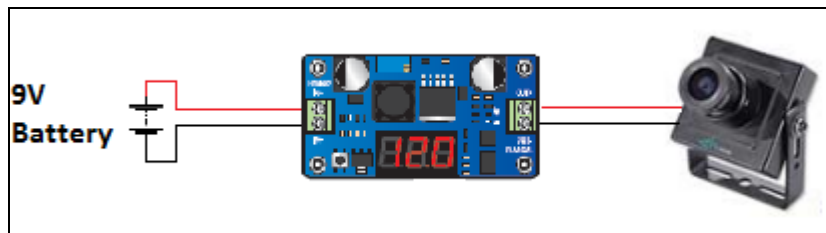


Important: do not attach your load until you have powered up your booster and set the output voltage to a safe voltage for your equipment.

1. Connect the power supply and turn on. The Power LED and OUT LED will light. The display will come on showing the output voltage.
2. Turn the small multi turn adjuster to set the output voltage. Clockwise to increase, anti-clockwise to decrease.
3. Turn off the power and connect your load.
4. Turn the power back on and all should be working.

Note: If you want to see the input voltage a short press of the button will toggle between the input and output. The blue IN and OUT LEDs indicate which is being displayed. A one second press of the button turns the display off if you no longer need to see it. If you have turned the display off then a short press of the button will turn it back on.

Using a booster to Increase the Supply Voltage



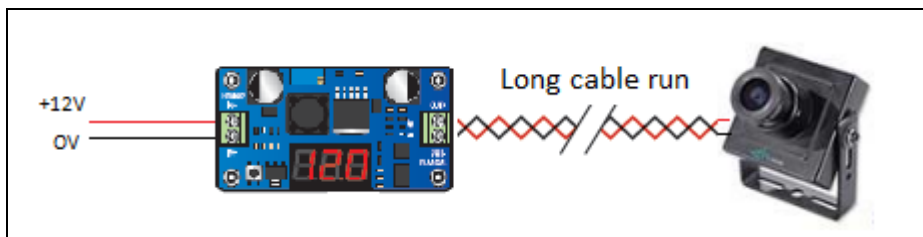
Probably the simplest use for the booster is to increase your power supply voltage if you do not have the correct voltage power supply or perhaps you want to use a battery for testing. Just make sure your power source can supply enough current.

Using a booster to overcome voltage drop.

The booster can be used to help when you have a voltage drop on a long cable run. Which end of the cable you can put the booster will depend on load that you are using and how much of a voltage drop that you have.

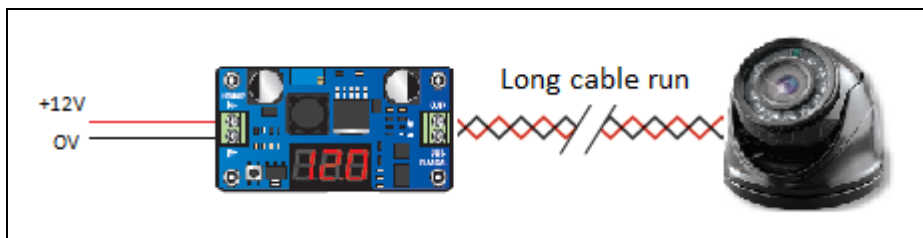
Adding the Booster at the power supply.

Constant Load



If the load is constant then this is very easy to set up just adjust the voltage until you get the correct voltage at your load. You will need to use a meter to measure the voltage at your load for this as the booster will show the voltage before the voltage drop in the cable.

Variable Load



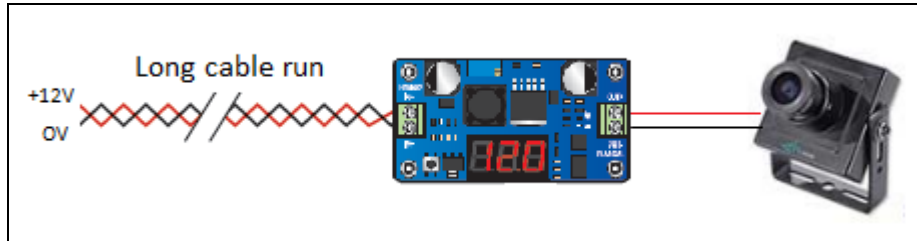
If the load varies such as a camera with IRs coming on and off then a little more care has to be taken as the voltage drop in the cable and hence the voltage at the load will also vary.

The best way to set this up is with the load at its lowest e.g. for a camera with infrared LEDs, IRs off (less current means less volt drop in the cable).

The voltage at the load will now be at its highest and can be set so that it does not exceed maximum voltage for your load.

You can now increase your load (turn the camera IRs on) and check that it is still working.

Adding the Booster at the load.



This will not work in all situations, for the booster to increase the voltage it has to draw more current and this will increase the voltage drop on the cable. If this voltage drop is too high then this will stop the booster working. In most circumstances you may only get a 1-2V gain (As a guide at 12V with a 500mA load you can boost about 2V and at 24V with a 200mA load you can boost about 3V).

Trouble Shooting

Symptom	Reason	Suggestion
Power LED glowing faintly, Voltage display is off or dim.	The input voltage is too low.	Check that the input to the booster does not drop below 5V at switch on.
	The output load is too high.	Try reducing the load if possible or if not try reducing the output voltage this will also reduce the current required.
	The start-up current is too high	Works when the load is disconnected and reconnected. Make sure your power supply can provide enough current for start-up. This will be slightly higher than the running current. If the power supply is OK then try larger cable between the power supply and the booster.
Power LED is off and no voltage display.	No power or output short circuit.	Check the input voltage is 5V or above

Note: You will find that the booster can cope with a bigger voltage drop if the load is applied after the booster is powered up. Check that the booster will work if you turn the power off and back on with the load connected. The higher start-up current when powered on with the load connected may stop the booster powering up correctly.

Specification

Input Voltage	5-30V DC
Input Current	Up to 3A continuous
Output Voltage	5-30V DC
Output Current	Dependent upon voltage setting and input current.
Protection	Input reverse voltage protection Output short circuit protection Output overcurrent protection Over temperature protection.
Operating temperature	- 30 ° C to + 70 ° C
Size	64mm x 35mm x 16mm
Mounting	4 x 3.0mm Ø holes

Examples**Voltage Boosting.**

Input		Output	
Voltage	Current	Voltage	Current
6V	950mA	9V	500mA
9V	170mA	12V	100mA
12V	2400mA	24V	1000mA

Voltage Drop.**An example of a variable load setup with calculations**

An IR camera running on 100m of RG59+2. Cable resistance 8.2 Ohms.

Voltage drop = resistance x current.

Camera with the IR on (current 400mA) the voltage drop on the cable will be about 3.3V (8.2 x 0.4).

Camera with the IR off (current 150mA) the voltage drop on the cable is reduced to about 1.2V (8.2 x 0.15).

The voltage difference at the camera when the IRs switch on and off will be 3.3-1.2 = 2.1V.

We set the booster so that the voltage stays within specification of the camera, this is usually 12V ±10% (10.8-13.2V).

To achieve this we can set the camera voltage with the IR off to 13V and still have 10.9V with the IR on, both within the voltage range of the camera.

Cable	Resistance per 100m core	Max Cable Length	Supply Current (mA) at 12V to supply 150/400 mA	Set Voltage at Camera (IR Off 150mA)	Voltage at Camera with IR on (400mA)
CAT5 Solid 1 pair	9 Ohm	50m	213 / 594	13.1V	10.85V
CAT5 + 2 Power	4.1 Ohm	110m	213 / 594	13.1V	10.8V
RG59 + 2 Power	4.1 Ohm	110m	213 / 594	13.1V	10.8V
Mini RG59 + 2 Power	3.9 Ohm	120m	215 / 596	13.1V	10.8V
PTZ Combo	3.3 Ohm	150m	217 / 604	13.2V	10.8V