

Combined or seriesed Modules BB@, CC@, DD@, EE@, HH@

The above modules are factory seriesed Vega modules to increase the range of output voltages and currents that are available. Eg CC@ are 2 C modules seriesed together, where @ is the No. of turns. Factory fitted bussbars are used to facilitate this, or in the case of the twin output (HH@) module an onboard link is fitted. These combined modules need to be specified when a configuration is ordered.

When any module (1,1.5,2slot or twin) is specified to be connected in series, it is possible to specify faston (F) or screw (S) terminations.

The output voltage of two combined modules will be the sum of the output voltages.

For 1slot, 1.5slot and 2slot modules the output current of the two combined modules is the same as the current of one of the modules only (this applies to I_{max}, I_{shortcircuit}, I_{min}, and I_{nominal})
 For twin modules, the output current of the two combined output voltages will be the lower of the currents for the two outputs.

For 1slot, 1.5slot, 2slot modules, the 2 modules to be combined must be adjacent to each other in the configuration.

All modules must always comply with the normal Vega configuration rules.

Example 1 : Twin module H5/4 with voltages combined.

H5/4 module can be used to provide 48V nominal at 4.5Amps.

	V _{min}	V _{nom}	V _{max}	I _{max}
Output 1	16.2	24	28	4.5
Output 2	16.3	24	25	5
Combination	32.5	48	53	4.5

H5/4 is a twin module and will have a link fitted at manufacture to combine the voltages (see pictures).

The module description would become 48HH5/4 ("HH" indicates that the outputs are configured in series).

Note that the maximum current would be 4.5A, not 5A.

The suffix "F" for faston or "S" for screw can be added eg 48HH5/4F or 48HH5/4S.

HH5/4 Twin module with fastons



Example 2 : 1 slot C3 module with voltages combined.

2 x C3 modules can be combined to provide 20V nominal at 18Amps.

	Vmin	Vnom	Vmax	I _{max}
C3 module 1	9.1	10	16.2	18
C3 module 2	9.1	10	16.2	18
Combination	18.2	20	32.4	18

C3 is a single module and the combination will have a bussbar fitted at manufacture to combine the voltages (see pictures).

The module description would become 20CC3 ("CC" indicates that two modules are configured to sum the output voltages).

The suffix "F" for faston or "S" for screw can be added eg 20CC3F or 20CC3S.

CC3 with Faston Terminations



CC3 with Screw Terminations



Example 3 : 1.5 slot D4 module with voltages combined.

2 x D4 modules can be combined to provide 36V nominal at 18Amps.

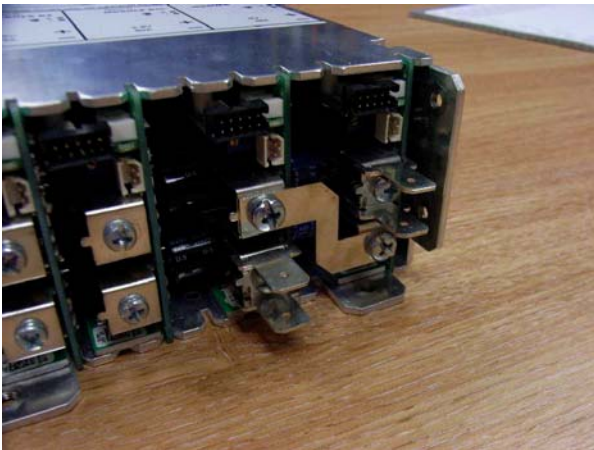
	Vmin	Vnom	Vmax	I _{max}
D4 module 1	14	18	21.5	18
D4 module 2	14	18	21.5	18
Combination	28	36	43	18

D4 is a single module and the combination will have a bussbar fitted at manufacture to combine the voltages (see pictures below).

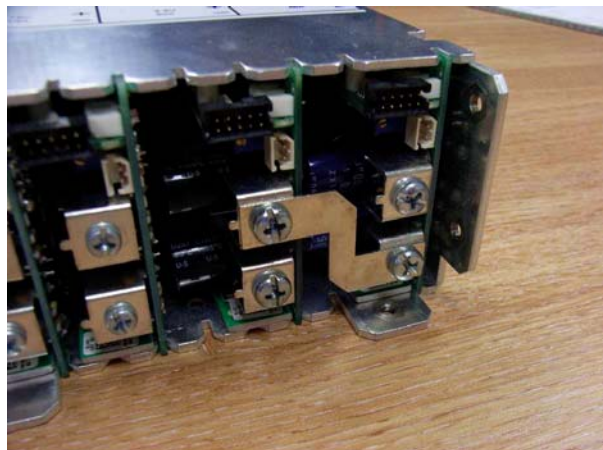
The module description would become 36DD4 ("DD" indicates that two modules are configured to sum the output voltages).

The suffix "F" for faston or "S" for screw can be added eg 36DD4F or 36DD4S.

DD4 with Faston Terminations



DD4 with Screw Terminations



Example 4 : 2 slot E2 module with voltages combined.

2 x E2 modules can be combined to provide 12V nominal at 55Amps.

	Vmin	Vnom	Vmax	I _{max}
E2 module 1	3.8	6	8	60
E2 module 2	3.8	6	8	60
Combination	7.6	12	16	55*

* The theoretical combined current of 60A is not actually achievable due to maximum transformer current limitation in the PSU.

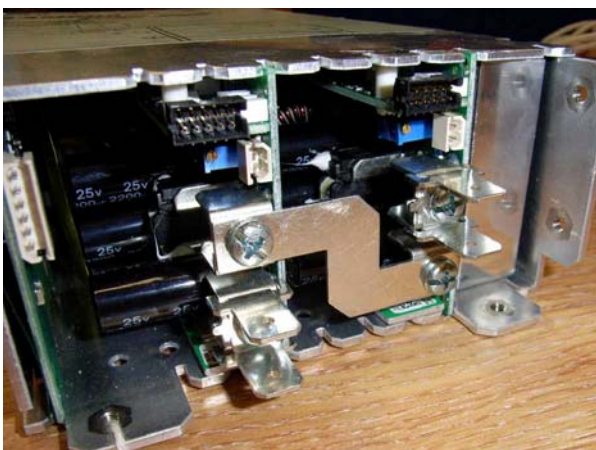
E2 is a 2 slot module and the combination of 2 x E2 modules will have a bussbar fitted at manufacture to combine the voltages (see pictures).

The module description would become 12EE2 ("EE" indicates that two modules are configured to sum the output voltages).

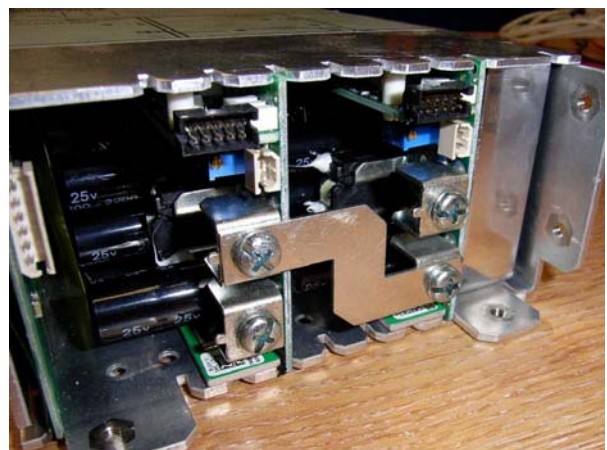
Note that in this case, the available output power from the module is greater than the available power the converter can provide. (12V x 55A = 660W). If this module combination was fitted to a 650W Vega converter, the maximum available power would be 650W, or 12V at 54.1Amps.

The suffix "F" for faston or "S" for screw can be added eg 12EE2F or 12EE2S.

EE2 with Faston Terminations



EE2 with Screw Terminations



Tables of Common module combinations.

This table shows the most commonly used series combinations that are available.

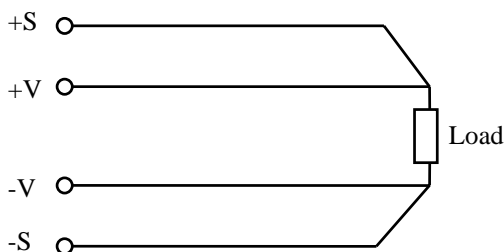
Module name	How done	Vmin	Vmax	I _{max}	Slots
BB4	B4 + B4	32.6	43	10	2
CC3	C3 + C3	18.2	32.4	18	2
CC5	C5 + C5	48.1	62	10	2
DD4	D4 + D4	28	43	18	3
DD5	D5 + D5	42	56	15	3
EE2	E2 + E2	7.6	16	55	4
EE4	E4 + E4	28	38	22.5	4
EE5L	E5L + E5L	40	48	18	4
EE5H	E5H + E5H	48	56	18	4
HH5/3	Both halves of H4/3	25.3	47.2	5	1
HH5/4	Both halves of H5/4	32.5	56	4	1
C5B4	C5 + B4	43	48	10	2

Remote Sense

Remote sense can be used to compensate for the drop in voltage along the load cables or for the drop in voltage across blocking diodes. It moves the point at which the voltage is sensed from the outputs of the power supply to some other point in the system, normally the load, or a backplane.

Always observe the following general rules for remote sense operation :-

Remote Sense connection and 1slot, 1.5slot, 2slot Combination Modules.



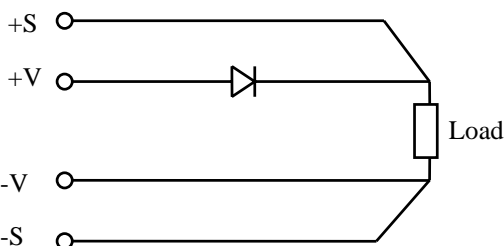
Ensure that the remote sense cables are TWISTED PAIRS.

PCB tracks for remote sense should be run back to back.

Ensure that the remote sense cables / tracks are as short as possible.

Ensure that the sense cables are not twisted together with the power cables.

PCB power tracks and remote sense tracks should be kept away from each other as far as is possible.



Do NOT fit components (resistor, inductor or diode) into remote sense lines. This will make the system unstable.

See the data sheets for each module to see the MAXIMUM voltage drop that remote sense can compensate for. Do not exceed this value (typically 0.75V, but varies for each module)

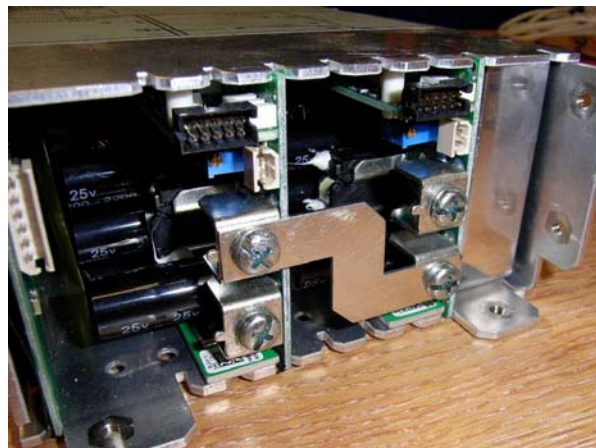
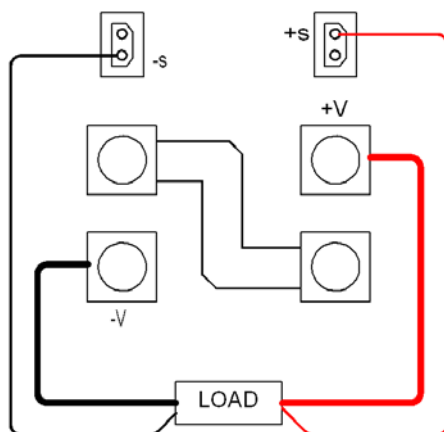
1slot, 1.5slot and 2slot modules have remote sense fitted as standard. When 2 modules of this type are combined, remote sense can still be used.

One of the combined modules has the +V power terminal. The same module has a 2pin molex with +S and -S pins. Connect the +S from the molex on this module to the +ve side of the load.



Mating connector information:
 Note: housing and pins supplied with each power supply.
 Housing: Molex 50-37-5023
 Crimp pin: Molex 08-70-1039
 Hand Crimp Tool: 11-26-0167 (Japan)
 Or 11-01-0194(Europe or USA)

The other module of the combination has to -V power terminal. That module also has a 2pin molex with +S and -S pins. Connect the -S from the molex on this module to the -ve side of the load.



Local Sense and Combination modules.

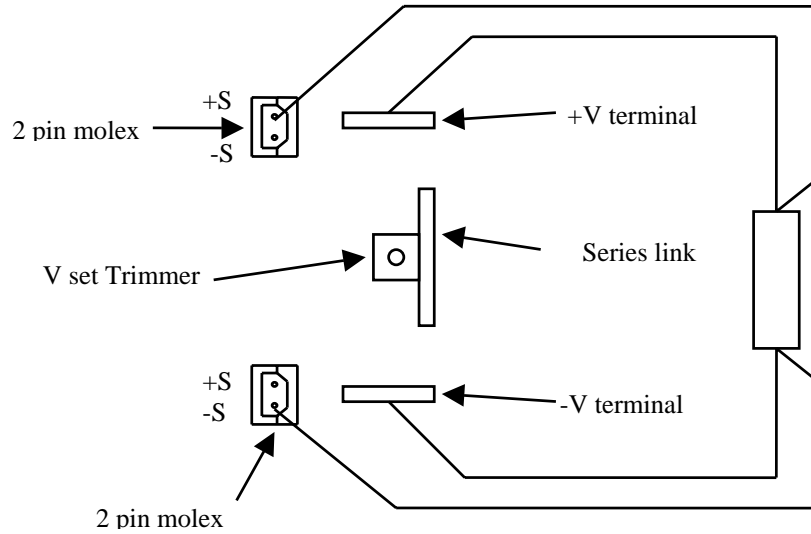
For local sense connection, it is not necessary to make any connections to the 2pin molex connectors. The only connections required are to the +V power terminal and the -V power terminal of the pair.

Remote Sense connection for twin output Combination Modules.

Twin output modules are not supplied with remote sense as standard. To have remote sense on a twin output module it is necessary to specify the "R" option. For example a twin output 12V single slot module with faston connections would be 12/12H3/3F as standard. To specify it with remote sense it would become 12/12H3/3FR (added R suffix)

When a twin output module is specified to have it's output combined, you can still specify the module to have remote sense "R" option. The module is specified as HH3/3 (not H3/3) to indicate the outputs are combined in series, the remainder of the description remains the same. For example, the module above could be specified with it's outputs combined to give 24V. The module would then become 24HH3/3FR. In other words, the "R" option must be specified at purchase if a combination module is to be used for remote sense.

A twin module connected as a combination module will have 2 off 2pin Molex connectors. The upper Molex connector is adjacent to to +V power output terminal. The lower 2pin Molex connector is adjacent to the -V power terminal. (See picture).



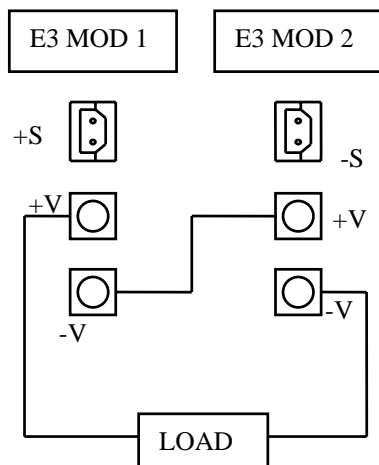
Connect +S from the top 2pin molex connector to +V of the load.
 Connect -S from the bottom 2pin molex connector to -V of the load.

Always comply with the general guidelines for remote sense connection as listed above.

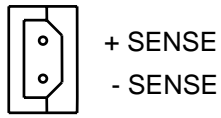
Series of Connection Vega Modules using cables.

To wire the modules in series, wire such that the +V of the next module connects to the -V of the previous module.

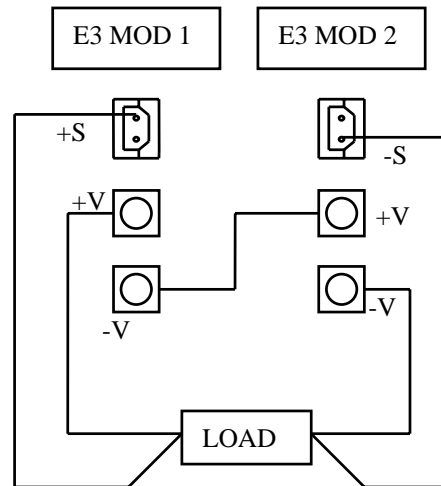
You cannot series modules to any higher than 60V without exceeding the limits for SELV (Safe Extra Low Voltage). If voltages higher than 60V are required then contact Lambda to discuss, there will be safety implications due to the SELV allowable output voltage being exceeded.



Series connection with remote sense is possible with any series combination of modules which have remote sense available.



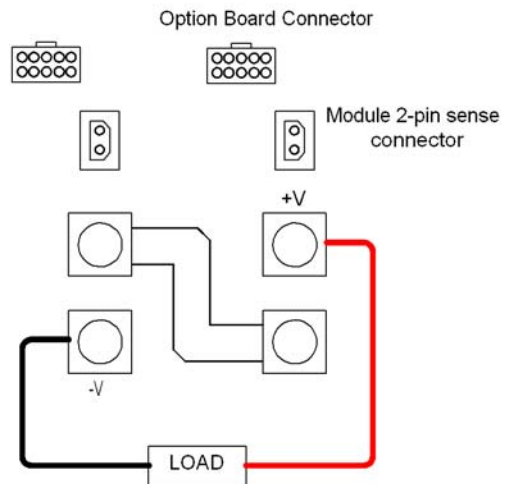
Housing = Molex 50-37-5023
Crimp pin = Molex 08-70-1039
Hand Crimp Tool = 11-26-0167



Using Options with Combination Modules.

Inhibit and Power Good Option : "N" Option.

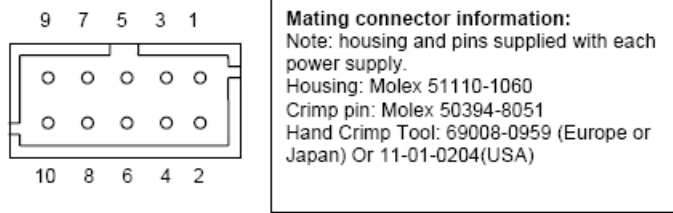
The "N" option is available on 1slot, 1.5slot and 2slot combination modules. When the "N" option is specified for a combination module, each module will have it's own option board fitted.



The available functions when the option is fitted are :-

- Module Good.
- Module Inhibit.
- Remote Sense (from the option board AND from the module 2pin sense connector fitted as standard)

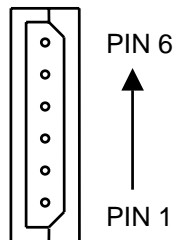
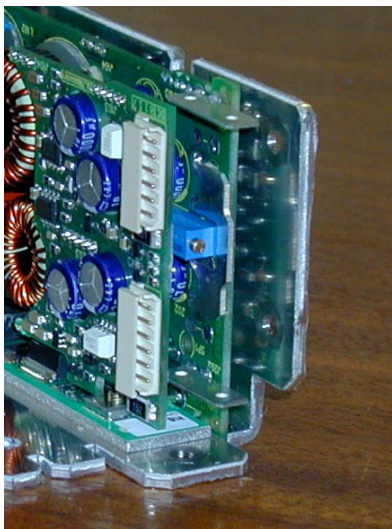
Each of the two option boards have the following pin out.



Viewed from rear of PSU

Pin No	Function
1	Module Inhibit +ve
2	Module Good emitter
3	+ve sense
4	Module Good collector
5	Starpoint parallel
6	Module Good collector
7	Starpoint parallel
8	Module Inhibit -ve.
9	-ve sense
10	Module Inhibit +ve

The "N" option is also available for a twin slot module :



Mating connector information:
 Note: housing and pins supplied with each power supply.
 Housing: Molex 50-37-5063
 Crimp pin: Molex 08-70-1039
 Hand Crimp Tool: 11-26-0167 (Japan)
 Or 11-01-0194(Europe or USA)

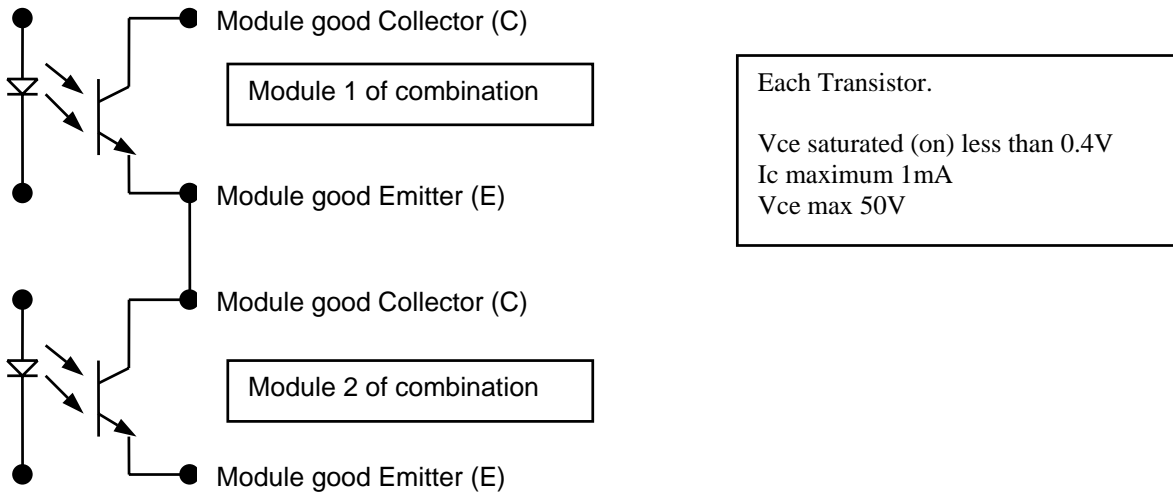
The pinouts are as follows for of the two molex connectors on the twin slot module:

Pin No	Function
1	Module inhibit -VE
2	Module inhibit +VE
3	Module good E
4	Module good C
5	-VE sense.
6	+VE sense.

The available functions when the option is fitted are Module Good, Module Inhibit, and Remote Sense.

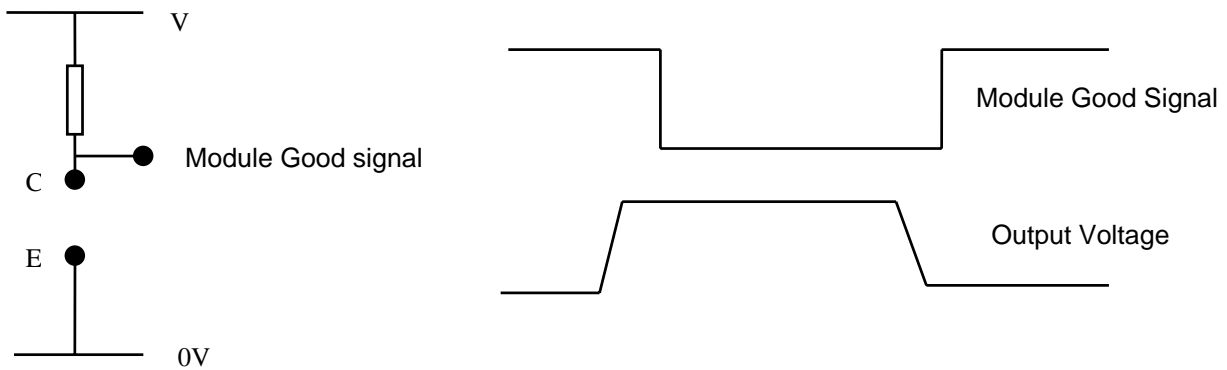
Module Good connection with combination modules.

Each option board fitted to each module in the combination has an opto isolated npn transistor which is ON when that module is good. Connect both transistors together in series so that both transistors will be ON when the module combination is good.

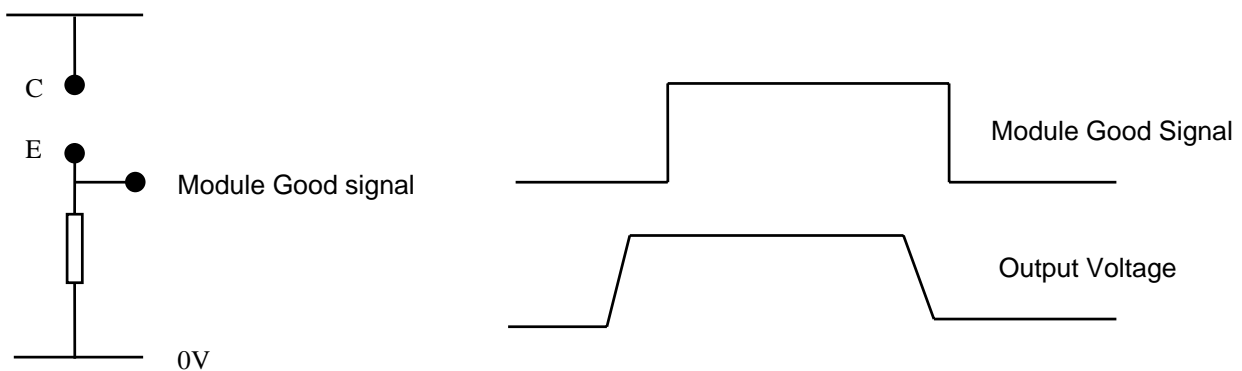


Both transistors ON = Module combination GOOD.
 On, or other, or both transistors OFF = Module combination BAD.

Low" when module good.

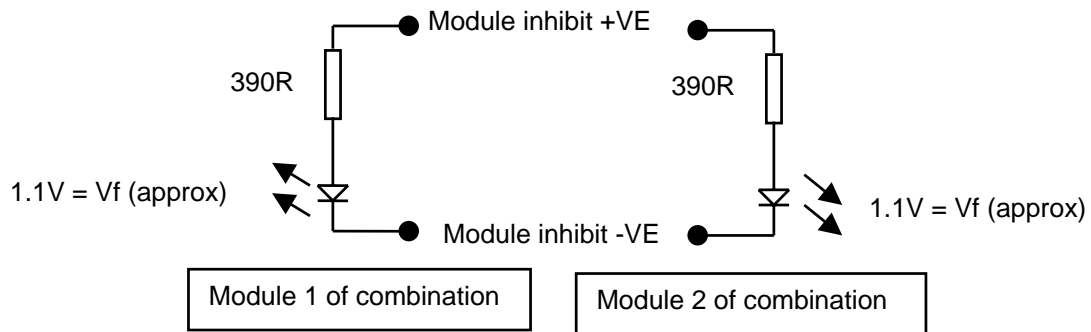


"High" when module good.



Inhibit Connection with combination modules.

Each option board fitted to each module in the combination has the diode of an opto isolated transistor in series with a 390ohm resistor.



Both options need to have the opto isolated diodes connected in parallel.

Applying 5V across the Module inhibit +VE and Module inhibit -VE, as shown, will inhibit the module combination. Do not apply >6V or damage may result. Current draw at 5V is approx 10mA. The 390ohm resistor is fitted internally to the module and is there so that no external resistor is required if the drive is from 5V.

It is also possible to use higher voltages than 5V to drive this arrangement. In that case, there should be additional external resistors to limit the current. Aim to keep the drive currents within the following limits.

- 1mA to 10mA = Module definitely inhibited.
- Less than 0.1mA = Module definitely not inhibited.
- Absolute maximum current 13mA.