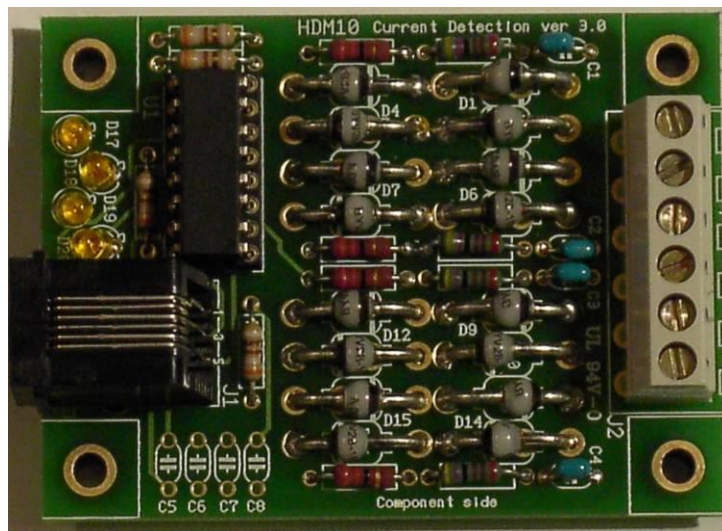


LOCOCD

for Analog and Digital layouts



HDM10

Liability disclaimer:

Use all items that can be bought and installation instructions that can be found on this site at your own risk. They have been developed for personal use, and I find them very useful. That is why I wish to share them with other model railroad hobbyists. All items and procedures have been tested and used on my own model railroad systems without causing any damage, but this does not necessarily imply that all modifications and procedures will work in any and all environments or systems. I cannot take any responsibility when items or procedures are used under different circumstances. Always use your own judgement and common sense!

Current sensor module

In a digital layout are current sensors the best way to detected trains in a section. Even if trains are standing still there is always a decoder or lamp or LED that consume some current that is been possible to detect. Sections can be make by electric isolated rails each digital powered thru his own current detector.

This is a simple and good working current detection for digital trains. It can be connected to LocoIO, marklin S88, Viessmann 5217, Uhlenbrock 63350, Lenz LR101, ...

Select HDM10 module in LocoHDL as "Block detection Active Low" and with "block Detection delay" for the best effect.

Do not use HDM10 along with HDM14 due to voltage difference on rails.

Bill of materials:

D1 to D16 BYV28 or MUR405, MUR410, SUF30G, UF5400, UF5401, STTH302

R1, R3, R5, R7 4k7 Ω

R2, R4, R6, R8 22 Ω (* see remarks)

C1, C2, C3, C4 10nF

U1 ILQ620GB or TLP626-4 or PS2505-4

J1 RJ12 – 6 pins pin 1 = +5V
 pin 2 = feedback 1
 pin 3 = feedback 2
 pin 4 = feedback 3
 pin 5 = feedback 4
 pin 6 = ground

J2 6 pins connector pin 1 = normal not used
 ★ (* see remark "Current sensor connections")
 pin 2 = rail section 1
 pin 3 = rail section 2
 pin 4 = rail section 3
 pin 5 = rail section 4
 pin 6 = digital power

C5, C6, C7, C8 3n3F – 10nF (option) (** see remarks)

R9, R10, R11, R12 390 Ω (***) see remarks)

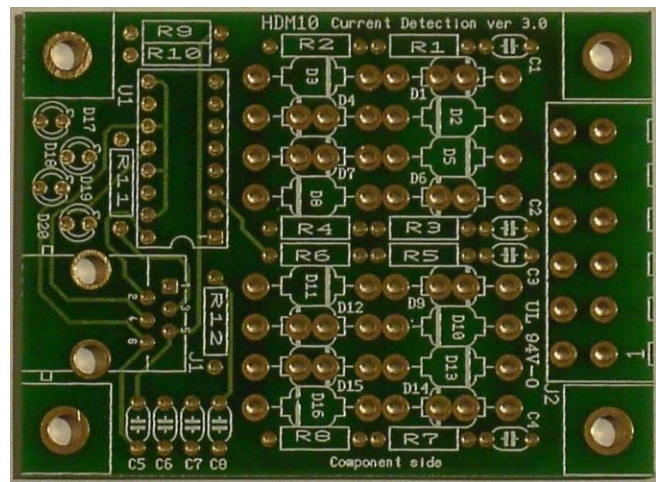
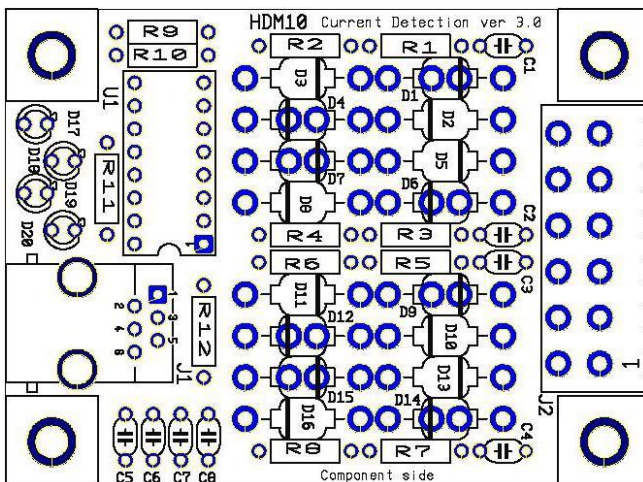
D17, D18, D19, D20 LED 3mm Yellow (***see remarks)

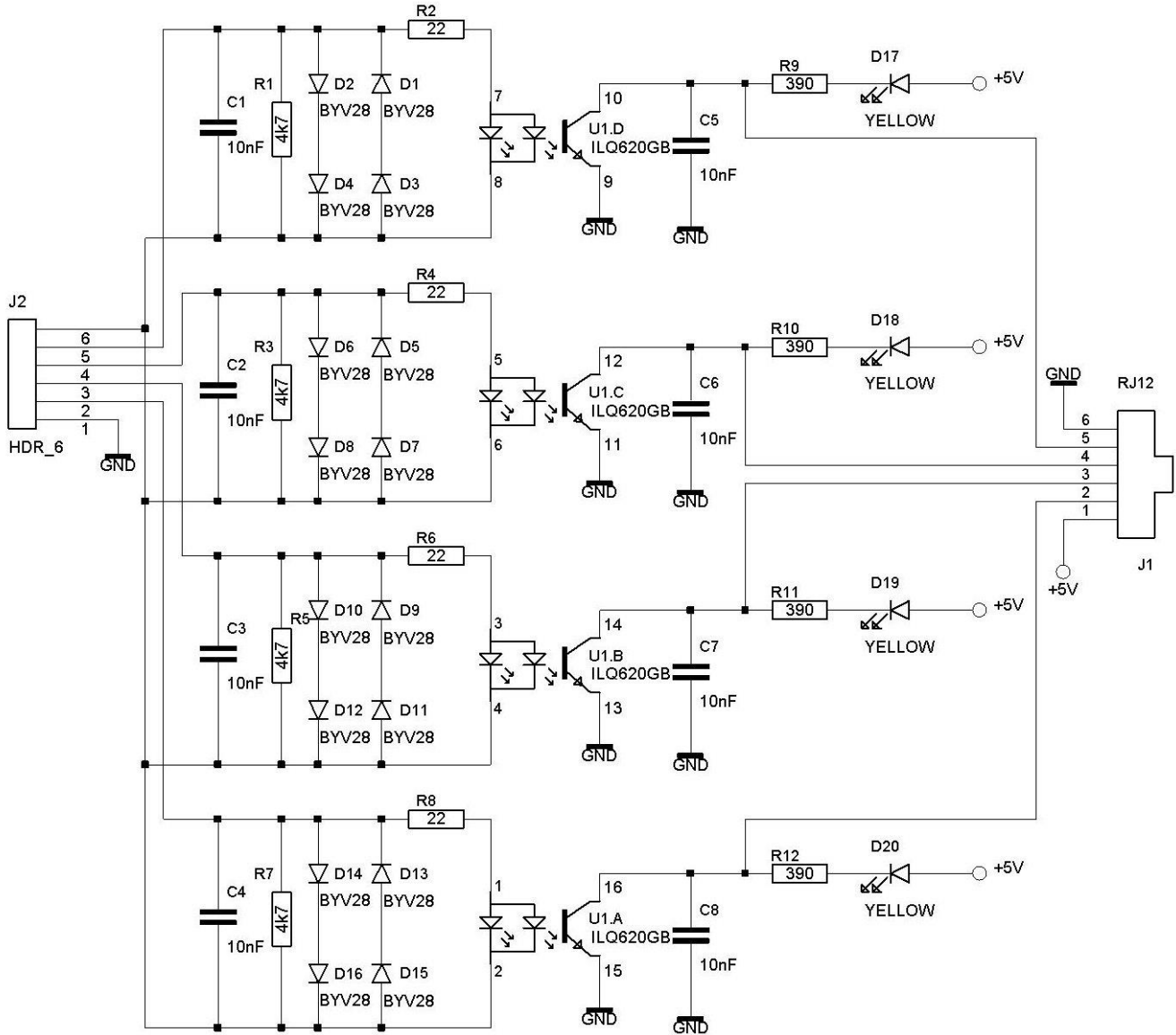
Remarks:

*The 22 Ω can change to 10 Ω for measure lower currents.

**The capacity option is only for connection to modules without debouncing.

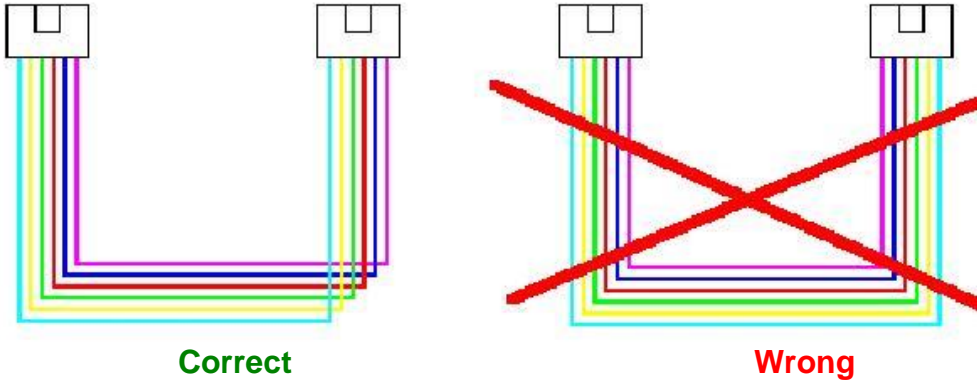
***The LED can be installed as option, as announcement of the occupying message.



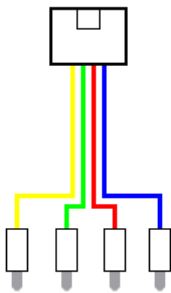


Current sensor connections:

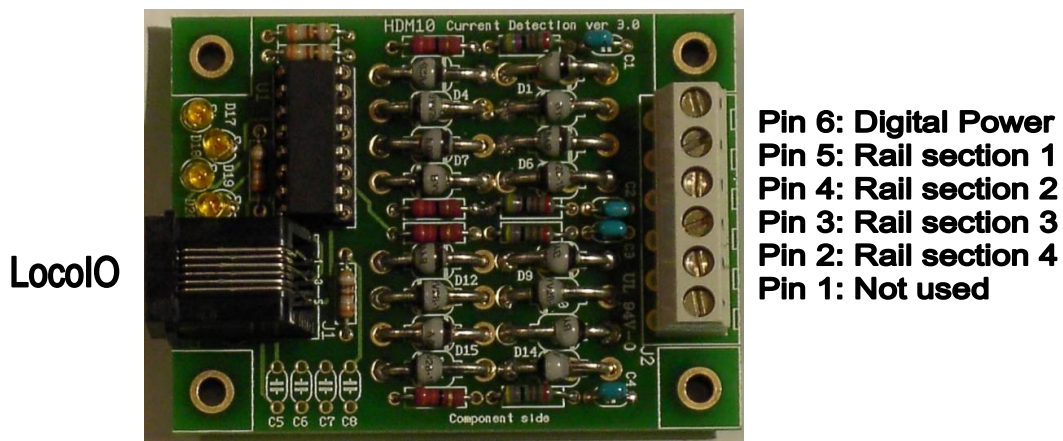
- Connection between current sensor and LocoIO
The length of the cables can be maximum 200 cm.



- Connection with marklin S88, Viessmann 5217, Uhlenbrock 63350, Lenz LR101, ...
The length of the cables can be maximum 200 cm.
 - * ! J2 pin 1 = connecting with ground (as the ground is not coming from LocoIO)
 - ! Because of lack of + 5V of the LocoIO, the LED do not work in this configuration.



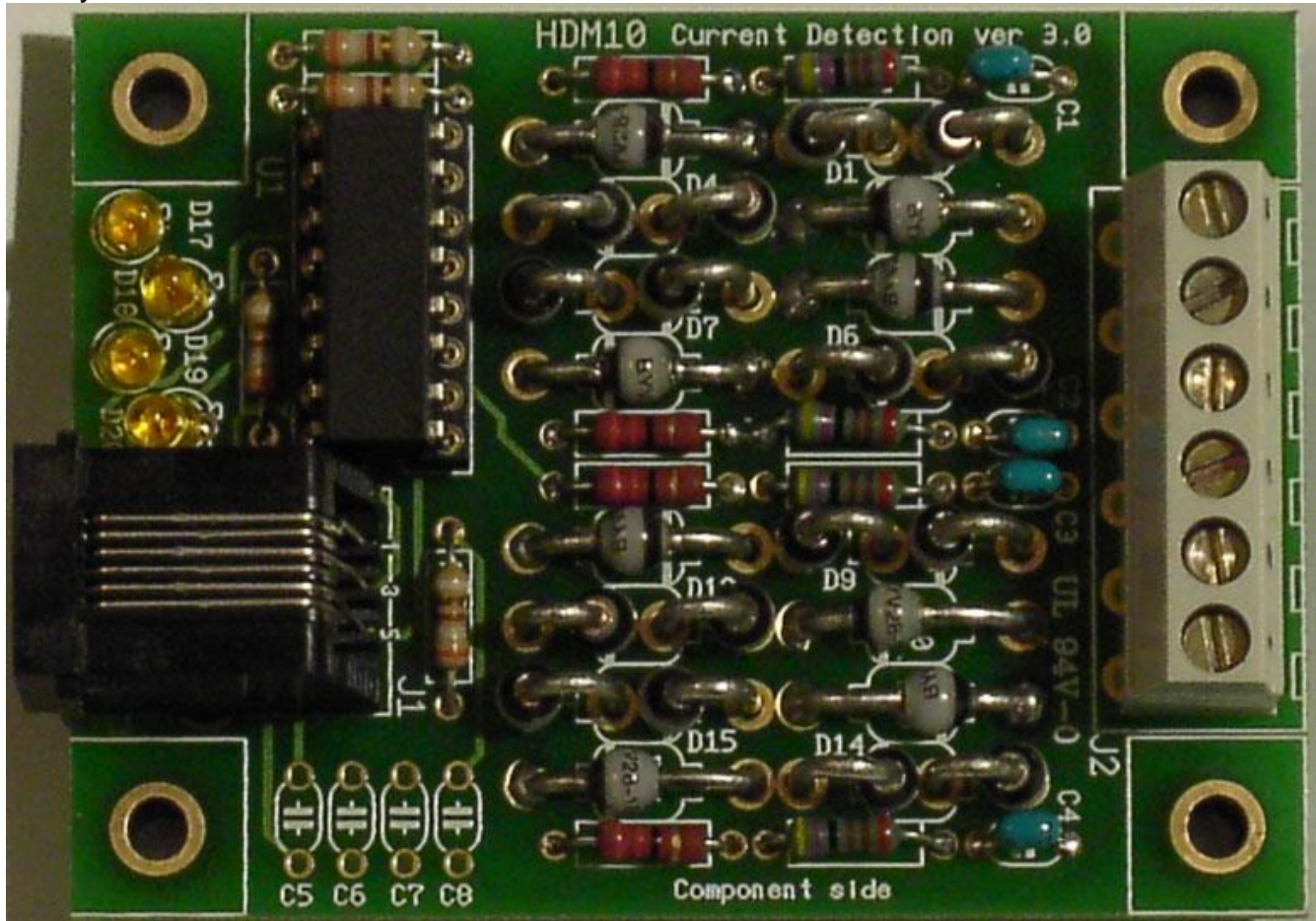
- The length of the cable between current sensor and rails preferably as short as possible, recommended maximum 100 cm. The wire 0,25 mm² or more.



HDM10 PCB changes for N-scale

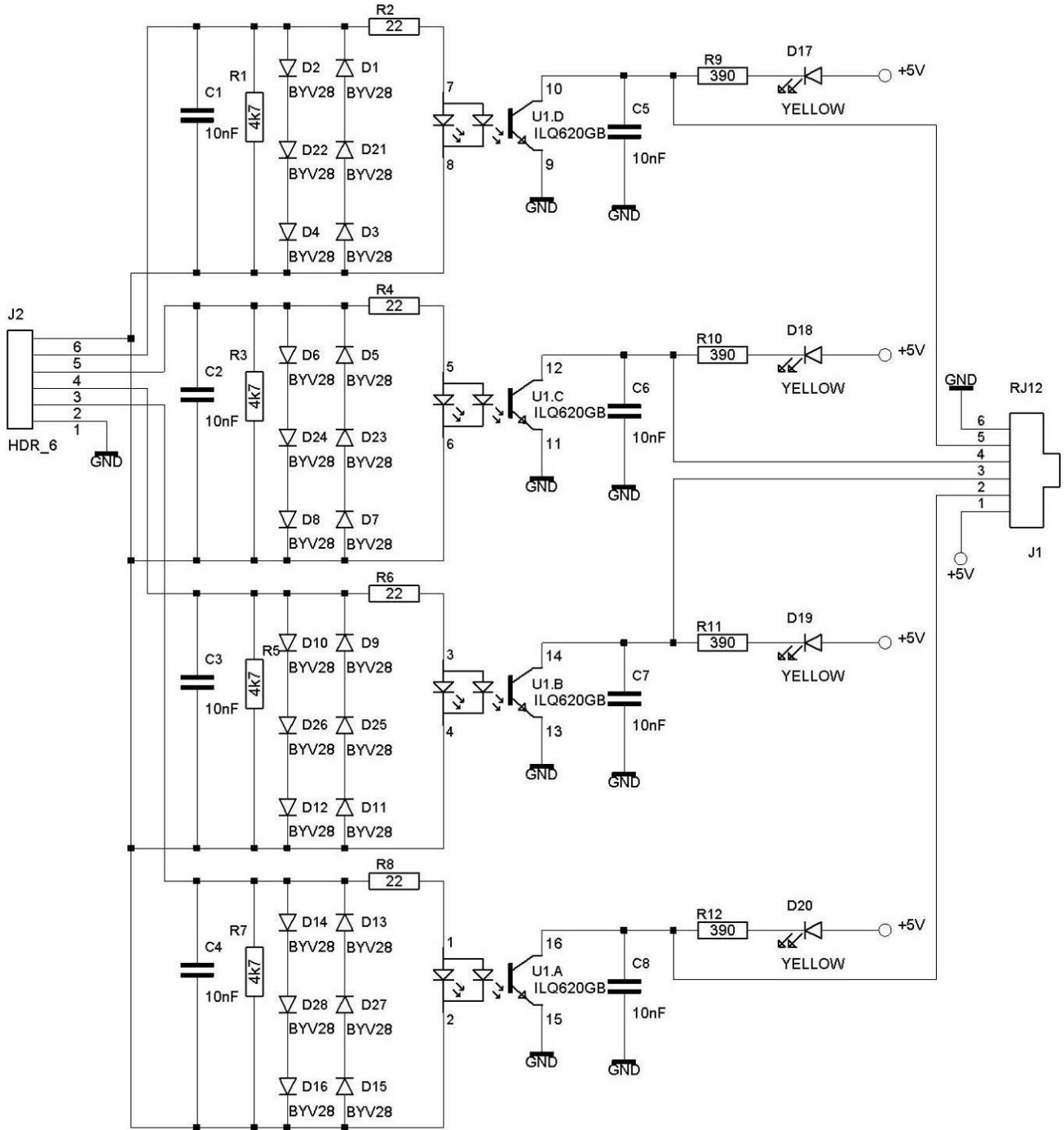
In N-scale is the detection not sensitive enough by the low current consuming decoders and motors. Therefore you can use follow modification.
Place two more diodes in each detection circuit.

Here you can see how to do on the PCB.



Bill of materials supplement:

D21, D23, D25, D27 BYV28 or MUR405, MUR410, SUF30G, UF5400, UF5401, STTH302



HDM10 PCB as universal input module

From the HDM10 pcb you can also make an universal voltage detection module. This can be used to detect both DC and AC voltages.

Bill of materials:

| | | |
|--------------------|--|--|
| R2, R4, R6, R8 | 1k8Ω | |
| U1 | ILQ620GB or TLP626-4 or PS2505-4 | |
| J1 | RJ12 – 6 pins | pin 1 = +5V pin 2 = feedback 1 pin 3 = feedback 2 pin 4 = feedback 3 pin 5 = feedback 4 pin 6 = ground |
| J2 | 6 pins connector | pin 1 = normal not used * (* see remark "Current sensor connections") pin 2 = Input 1 pin 3 = Input 2 pin 4 = Input 3 pin 5 = Input 4 pin 6 = Ground |
| C5, C6, C7, C8 | 3n3F – 10nF (option) (** see remarks) | |
| R9, R10, R11, R12 | 390Ω (optie) (***) see remarks) | |
| D17, D18, D19, D20 | LED 3mm Geel (optie) (***)see remarks) | |

Remarks:

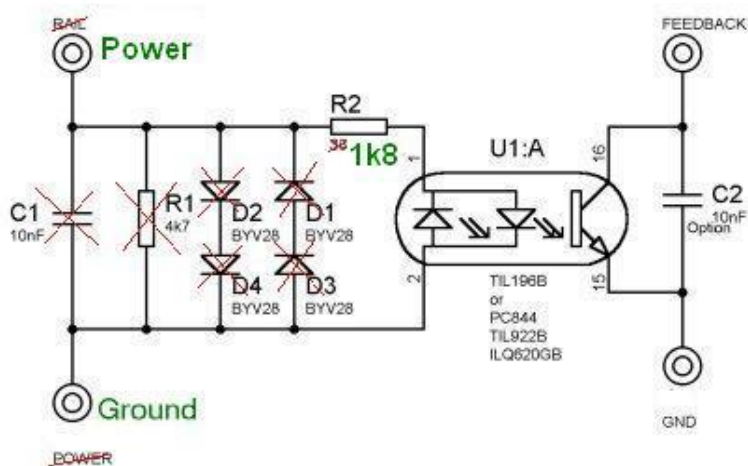
**The capacity option is only for connection to modules without debouncing.

***The LED can be installed as option, as announcement of the occupying message.

Remarks for voltage detection:

- The capacity option is only for connection to modules without debouncing.

The 1k8Ω resistor is for an input of approximately 12 -16V. The value depends of the input voltage. Take approximately ($100\Omega \cdot \text{input voltage}$).



HDM10 PCB as ground detection module

From the HDM10 pcb you can also make an ground detection module

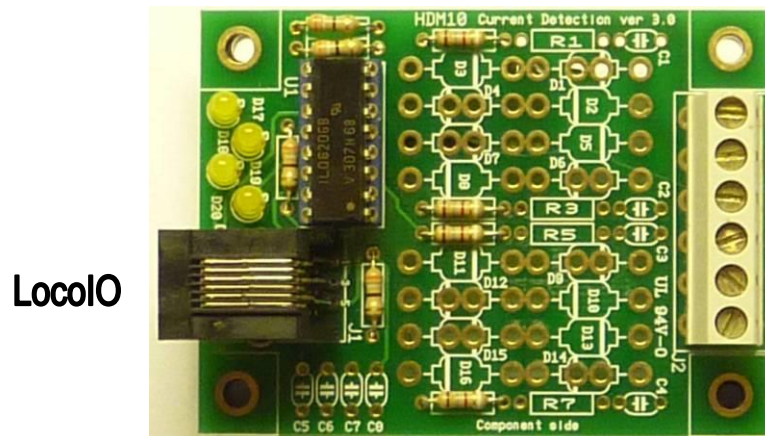
Bill of materials:

| | | |
|--------------------|--|--|
| R2, R4, R6, R8 | 1k8Ω | |
| U1 | ILQ620GB or TLP626-4 or PS2505-4 | |
| J1 | RJ12 – 6 pins | pin 1 = +5V pin 2 = feedback 1 pin 3 = feedback 2 pin 4 = feedback 3 pin 5 = feedback 4 pin 6 = ground |
| J2 | 6 pins connector | pin 1 = normal not used * (* see remark "Current sensor connections") pin 2 = Input 1 pin 3 = Input 2 pin 4 = Input 3 pin 5 = Input 4 pin 6 = 12-16V DC or AC with ground on rails |
| C5, C6, C7, C8 | 3n3F – 10nF (option) (** see remarks) | |
| R9, R10, R11, R12 | 390Ω (optie) (***) see remarks) | |
| D17, D18, D19, D20 | LED 3mm Geel (optie) (***)see remarks) | |

Remarks:

**The capacity option is only for connection to modules without debouncing.

***The LED can be installed as option, as announcement of the occupying message.



Pin 6: 12-16V DC or AC
Pin 5: Ground detection 4
Pin 4: Ground detection 3
Pin 3: Ground detection 2
Pin 2: Ground detection 1
Pin 1: not used