

User manual for Helvest® Flex AB400 board

1. General product presentation

1.1 AB400 train detection feedback module

The AB400 board is a module that detects the location of trains on up to 4 sections of track, using current-absorption technology: this means that it detects where the train is based on where, on the track, it picks up current.

This is a layout module for the HP100 motherboard. It must be plugged into the 'layout' connectors of the HP100 board and is automatically recognised by it. To insert the module, switch off the HP100 board's power supply, ensure that the connectors are aligned, and apply light pressure until the module is fully inserted into the slot.

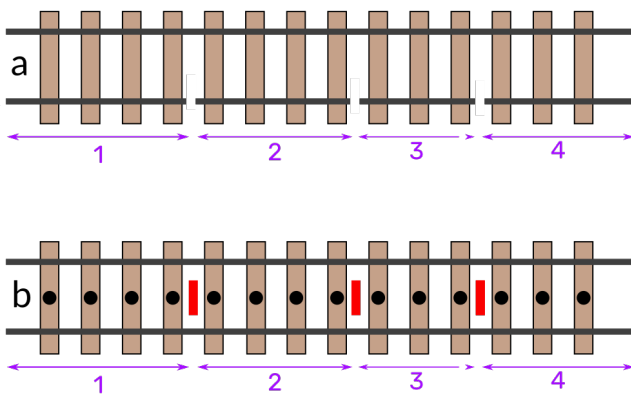
1.2 Preparation of sections

In order to identify whether the train is on a certain track or in a certain position, the corresponding tracks must first be electrically separated.

To section the tracks, proceed as follows:

- Conventional "two-rail" power supply: interrupt only one of the two rails, either by using insulated joints, or simply by cutting so that the rail sections are electrically insulated (figure 1A).
- "Three-rail" supply systems: with appropriate insulation (red in the drawing) interrupt the central conductor in the sections of interest (figure 1B)

Fig. 1



1.3 Electrical connections

All the following operations must be performed with the power switched off.

The HP100 motherboard must be powered with any voltage from 7 to 20V AC, or 7 to 16V DC. A digital bus such as DCC is also suitable, although for large layouts this is not recommended (fig. 2)

A 'net' module suitable for data transmission must be mounted on the HP100, such as the MVnet MV100 module or other modules that will be available in the future.

Fig. 3 shows the AB400 connectors in detail. In connector (1), indicated with COM, must be inserted the wire common to all sections, coming from the booster or the digital control unit. In figure 2 this wire is shown in black. Connector (2) has the contacts for the four block sections, numbered 1 to 4: these wires must go to the sectioned rails, also shown 1 to 4 in figure 2.

The unsectioned rail (marked with the red wire in fig. 2) is to be connected directly to the control unit or booster.

The track sections where presence is to be detected can be either digital or analogue.

After connecting the tracks as in fig.2, before setting up the board on MVnet, power up the decoder and the layout and run a train on the connected block sections. The yellow LEDs in positions 3 and 4 light up as the train runs.

Fig. 2

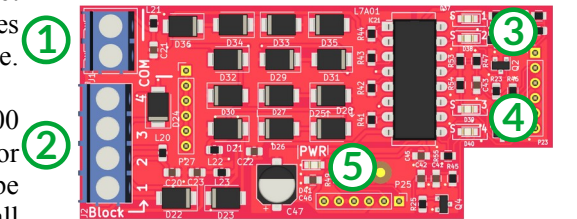
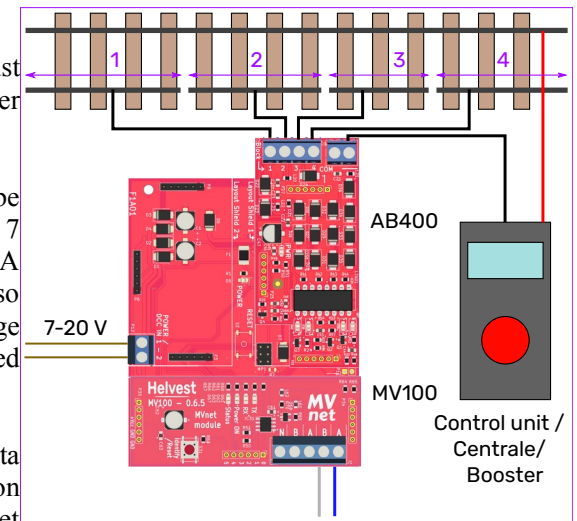


Fig. 3

WARNING: It is imperative to connect on the same AB400 module wires coming from the same control unit, or the same booster.

Connecting wires from different control units, or from different boosters, on the same AB400 module may damage the control unit or the booster itself. This rule of not connecting different digital sources together applies to any connection, even without presence detection modules.

1.4 Mounting the board on the layout

Next to the AB400 module, any other layout module can be installed: e.g. a module for switches, for signals, a second AB400 module to control a total of 8 sections, etc. The complete board must be mounted so that it does NOT touch any element during operation. In particular, it must not come into contact with any metal material.

For temporary installations, it can be placed on a non-flammable insulating surface (plastic, glass, ceramic floor, etc.).

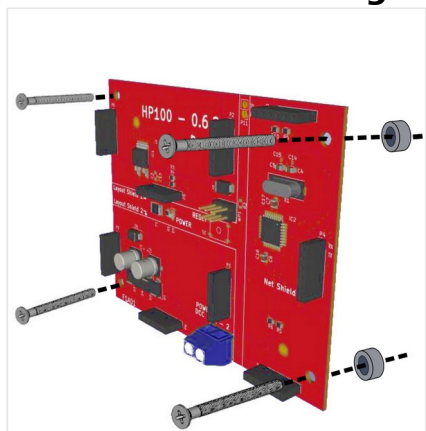
For fixed layouts, it is recommended to mount it by screwing the HP100 onto a wooden surface with the screws and spacers provided. (figure). This must be done before inserting the AB400 module (if additional boards have already been inserted, they can be removed gently without any problems).

2. BOARD OPERATION

2.1 Normal operation

Once all connections have been made, power the board. The green LED no. (5) (fig. 3) indicates that the power supply is correct.

Fig. 4



The LEDs at positions no. (3) and (4), numbered 1 to 4, indicate the presence in the 4 sections of the board. If there are no locomotives or vehicles drawing current, the lights must be switched off.

By placing a locomotive or a current-consuming vehicle (such as an illuminated car, a car with tail lights, etc.) on the corresponding track section, the LED lights up.

Train presence data is sent to the network via the MVnet module. This data can be processed by the computer or other boards as required.

2.2 Current flow and protection

Each section holds a maximum absorption of 2A, which is plenty for common model railway applications.

In the event of a short circuit, the control unit itself or the power supply unit takes care of disconnecting the current.

WARNING: Never power the track with devices that are not short-circuit protected! This rule is independent of the use of the AB400 module.

In any system, supplying power to the track with non-short-circuit-protected devices can seriously damage your rolling stock and all connected equipment, as well as present a fire risk.

2.3 Train detection

These sensors operate in both analogue and digital mode, and detect the presence of the train in real time on the relevant section by noticing if a device is drawing current on that section: a locomotive engine or its lights, or simply the decoder if the locomotive is digital. In digital operation, the decoder is detected even if no other devices are active (so even a stationary locomotive with its lights off).

Passenger cars or freight wagons are detected if they are equipped with something that draws current, such as tail lights, interior lighting, or a decoder.

In the event of problems, such as some vehicles becoming uncoupled while running or if the locomotive stops due to a lack of electrical contact, it is important that the situation is also detected by the sensors.

For this reason, it is advisable to always protect both ends of the train, so that the tail vehicle, if it is not illuminated or does not have its lights on, is also detected.

For this purpose, it is sufficient to equip the tail vehicle with a resistor on one axle, which makes contact between the two wheels (fig. 5). We recommend a resistor value of around 5 kΩ. In this way, there is minimal current draw at both ends of the train in any situation, and the train is protected at both ends, the locomotive motor (M) on one side and the resistor (R) on the other (fig. 6).

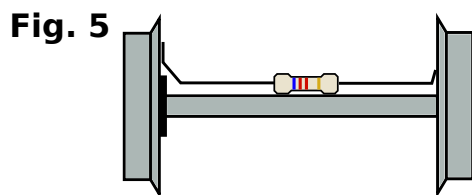


Fig. 5

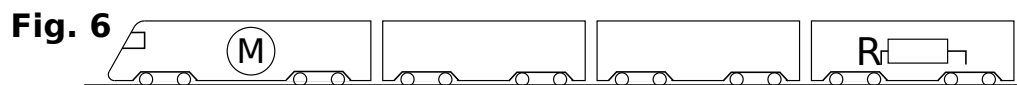


Fig. 6

For three-rail systems, it is not possible to take over the last car with an arrangement as described in fig. 5. The last car must be equipped with a pickup shoe and some device that draws current (tail lights, decoder, interior lighting, etc.).

3 . Troubleshooting

To solve power supply/connection issues etc., see motherboard troubleshooting.

Problem	Possible causes
The module is switched on but does not respond, and the power LEDs remain off.	If the HP100 board is powered (green LED on HP100 is on), the module is incorrectly inserted. Check for correct insertion. The board is in contact with metal parts.
The module is switched on, the power LEDs are on, but the trains in the corresponding sections do not move.	Check the correct connection of the block sections, which must be done as in figure 2. Check that the wires make correct contact in the terminals (they have been stripped well and the screws are tight). Check that the track contacts are clean. If there is a short-circuit: Make sure that you have not mixed wires from different control panels or boosters on the same AB400.
The module is switched on, the power LEDs are lit, the trains in the corresponding sections move, but the yellow LEDs registering presence do not light up.	Check the correct connection of the block sections, which must be done as in figure 2.

5. TECHNICAL SPECIFICATIONS

Board type:	track occupancy detection module with current absorption technology for HP100 motherboard
Input power supply for logic circuit:	5V DC, supplied by motherboard
Signalling LEDs:	voltage presence, occupancy of block sections.
Working temperature:	0 °C - 40 °C
Dimensions	80 x 35 mm

Firmware HP100 >4.0

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