

User Manual: Helvest® FleX ES400 module

1. General product presentation

1.1 Module for continuous supply actuators ES400

The ES400 module controls up to 4 pairs of lights (e.g. light-signal lights), small motors, uncouplers and similar accessories for model railway applications. This is a layout module for the HP100 motherboard. It needs to be plugged into the appropriate layout connectors on the HP100 board and it will be automatically detected by the motherboard.

This is a low-cost module that switches the lights on without any brightness adjustments or special effects. Each of the four outputs can control a single light in on/off mode, or a pair of lights that turn on alternately (such as the red and green light of a railway signal).

In Figure 1, the first two bulbs are an example of alternating lights connected to outputs "1A" and "1B". When the light "1A" is on (for example the red of a signal), the light "1B" is off (for example the green), and vice versa.

Still referring to the example in fig. 1, the light "2A" instead is a lamp in its own right (for example the lighting of a building) and then turns on and off independently of other lights.

To insert the module, turn off the HP100 power supply, make sure the connectors are aligned and press lightly until the module is fully inserted into the socket.

1.2 Main components of the board

(see fig. 2)

1 - Terminal for the common (+) channel of the signals or actuators.

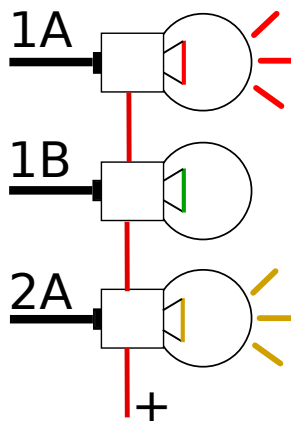
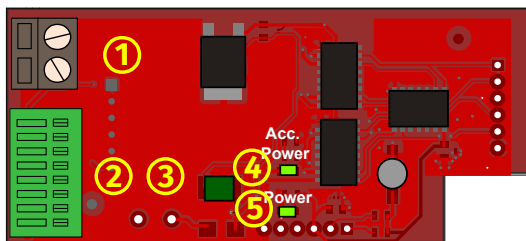


Fig. 6

Fig. 1

Fig. 2



- 2 - Terminals for powering each individual light or actuator (-)
- 3 - Footprint for separate power supply terminal (expert users)
- 4 - LED that indicates the power supply signals or drives
- 5 - LED that indicates the logical power supply.

1.3 Basic electrical connections

All of the following operations must be carried out with the power supply off.

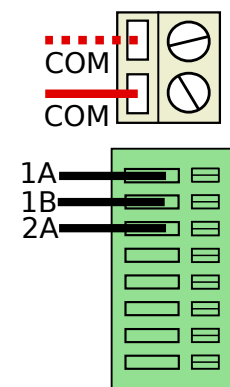
The module automatically supplies a DC voltage of 12V, coming from the HP100 card power supply. With some quick modifications the module can be adapted for separate power supply (see section 4 of the instructions).

The common pole (the one indicated with COM in figure 1) is the same for all lights and must be connected to terminal no. 1 (see figure 2). Both connections of the terminal can be used for this purpose.

The other pole of the lights to be activated must be connected to terminal block no. 2 (see fig. 2). The wires relating to two lights that switch on alternately (those named 1A and 1B in fig. 1) must be inserted into two outputs A and B marked by the same number (e.g.: 1A and 1B). A light that should not be alternated with another one, like the one indicated with 2A, should be inserted in an output (e.g.: 2A). In this case, do not insert anything in the output marked with the same number (i.e. do not connect anything in 2B). Figure 3 shows an example of these connections.

The module considers output A as the default output, i.e. when the module is switched on, the light or the device connected to that output is supplied. It is therefore advisable to connect to the outputs A the situations considered by default, i.e. corresponding to the one you want as the initial situation when the card is activated (for example, a light that must be normally on and is turned off only on command).

Fig. 3



On the contrary, the devices that you want to keep normally off (such as a buzzer or a light that you want to activate only when needed, or similar) must be connected to the type B outputs.

To connect the wire, peel it off about 5 mm, press the terminal block button with a small screwdriver and insert the wire into the corresponding hole.

The card can be used to power all types of motors, lights or other devices as long as the total absorption is less than the maximum that the card can power. This value depends on how the HP100 was powered.

If the HP100 is powered by DCC or 16V AC:
Maximum 300 mA (approx. 15-20 color LEDs simultaneously on)

If the HP100 is powered by 12 V DC:

Maximum 500 mA (approx. 25 color LEDs simultaneously on).

EXCEEDING THESE LIMITS CAN CAUSE MALFUNCTION IN THE BOARD AND OVERHEATING WITH THE RISK OF BURNS OR FIRE!

1.4 Connecting LEDs

If you wish to connect LEDs or LED-powered devices, please note that the "+" and "-" poles of the LEDs are not equivalent. The positive pole of the LED is the one with the longest terminal and must be connected to the "common" terminal, while the negative pole of the LED (shortest terminal) must be inserted into the desired output, with a resistance between the LED and the output, as shown in the figure.

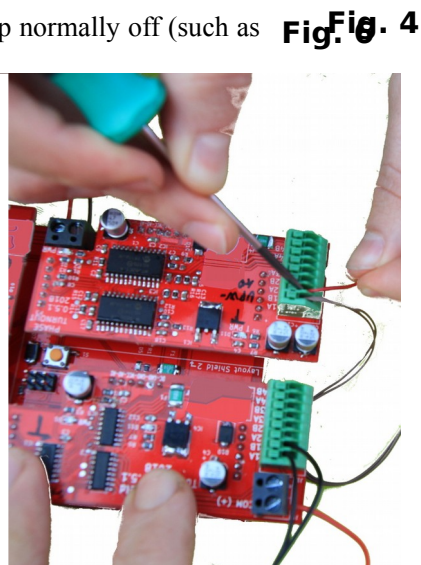


Fig. 4

The resistance value depends on the type of LED, and is often supplied by the device manufacturer. Usually it is around 1000 Ohm.

1.5 Mounting the board on the layout

The complete board must be mounted in such a way that it DOES NOT touch anything during operation. In particular, it must not come into contact with any metallic 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 on the structure by fixing the HP-100 on a wooden surface with the screws and spacers provided. (figure). This operation must be done before inserting the ES400 (if additional modules have already been inserted, they can be removed gently without problems).

2. CARD OPERATION

2.1 Normal operation

Once all connections have been made, power up the card. Green LEDs 4 and 5 (fig. 2) indicate that the power supply is correct.

When the module is switched on, it always activates output "A" regardless of the position it had when it was switched off.

2.2 Current absorption and protection

The module is suitable for most of the lights, actuators and small motors used in model railway applications. The maximum design limits are given in section 1.3. If these limits are exceeded, the module heats up. However, the module is protected to prevent damage and fire hazards and the module will switch off or reduce the power supply if necessary. If this happens, switch off the current and eliminate the cause of the overheating, being careful, because the surface can become quite hot. After the problem has been solved, the module restores its normal functionality in a few seconds.

Although protection will occur before the temperatures reached can become dangerous, in the event of an overload it is essential to avoid the contact between the

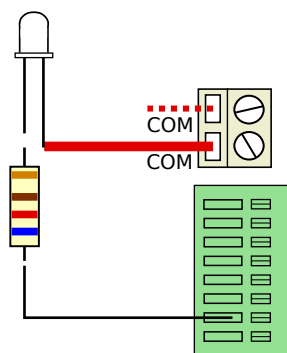


Fig. 5

module and flammable surfaces and not to touch the module before it has cooled down. **Fig. 6**

3 . TROUBLESHOOTING

To troubleshoot power/wiring issues, etc., see troubleshooting your motherboard.

Problem	Possible causes
The module is plugged in but does not respond, and the power LEDs remain off.	If the HP100 board is powered (green LED on the HP100 is lit), the module is inserted incorrectly. Check for correct insertion. The circuit board is in contact with metal parts.
Module is plugged in, power LEDs are lit, but one or more actuators do not work	Check that the accessories are properly connected and that the wires are correctly inserted into the connectors. There are problems with the address of the board. See troubleshooting the NET module. The accessory is not working properly. If necessary, try disconnecting it from the module and testing it with a separate power supply (battery or similar). The accessory you are trying to activate uses too much power, or the connected accessories together use too much power. Try disconnecting the accessories one by one until you find out which one is causing the problem.
The module works for a short time and then switches off.	The accessory you are trying to activate uses too much power, or the connected accessories together use too much power. Try disconnecting the accessories one by one until you find out which one is causing the problem.

If the described operations do not lead to any results, please contact your dealer or our service team.

4 . ADVANCED USE (for experienced users)

4.1 External power supply to the drives

If you prefer use an external power supply for your the accessories you can modify the module for that purpose. Normally accessories are powered with the voltage that powers the HP100 board, properly rectified.

The power supply must be DC, with a voltage between 12V and 16V and able to provide sufficient current to drive the motors. In any case, the voltage will be regulated to 12V by the power supply circuit of the card.

The operation implies an irreversible modification of the card, which causes the warranty to expire.

This modification can be made in cases of particular interest to the customer. In general, we recommend to supply the HP100 motherboard and the ES400 module with the same power supply and rather, if you want to supply a separate power supply from the digital signal, make the NET module independent.

To perform the modification, you need to:

- Cut the pin of connector P1, and that of connector P4.
 - Solder an S2A diode to pitch D10
 - solder a 2-pole terminal clamp with a 5 mm pitch to pad J4, corresponding to the word DC IN
 - Connect the external power supply to this terminal respecting the indicated polarity.
- With separate power supply working, LED no. 5 (PWR) indicates the presence of the logic power supply coming from the motherboard, and LED no. 4 (T PWR) indicates the presence of the power supply of the accessories.

WARNING:

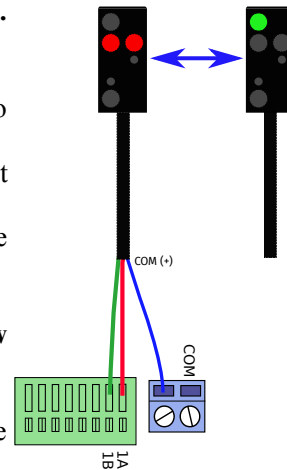
- this modification will invalidate the warranty and totally relieves the manufacturer of any responsibility for any malfunction of accessories or power supply.
- Incorrect or incomplete execution of the modification may result in damage or permanently compromise the module, the digital control unit or the connected accessories.

5. SOME EXAMPLES OF USES

5.1 Connecting a signal with red/green lights only (fig. 6)

1. Connect the "common" cable (must have "+" sign) to the screwed connector labeled "COM".
2. Connect the wire supplying the red light to an A output (1A, 2A, 3A etc.).
3. Connect the wire supplying the green light to the corresponding B output (1B, 2B, 3B etc.).

Fig. 6



5.2 Connecting a signal with only red/green+yellow lights (Fig. 7)

1. Connect the "common" cable (must be positive) to the screwed connector labeled "COM".
2. Connect the wire supplying the red light to an A output (1A, 2A, 3A etc.).
3. Connect the two wires supplying the yellow light and the green light to the corresponding output B (1B, 2B, 3B etc.).

Fig. 7

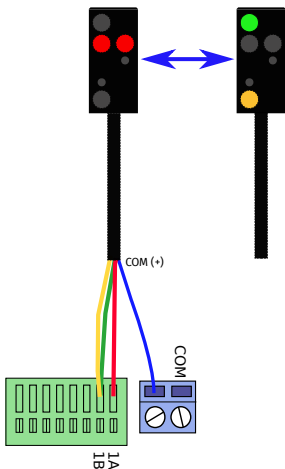
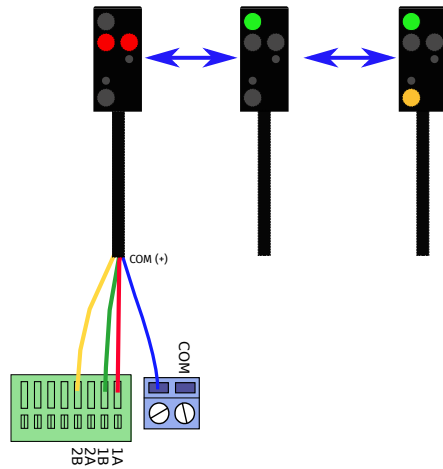


Fig. 8



5.3 Connecting a signal with red light, green light and an additional light (example, yellow) (Fig. 8)

1. Connect the "common" cable (must be positive) to the screwed connector labeled "COM".
2. Connect the wire supplying the red light to an A output (1A, 2A, 3A etc.).
3. Connect the wire supplying the green light to the corresponding output B (1B, 2B, 3B etc.).
4. Connect the wire supplying the yellow light to another output B (output A must be left unconnected).

6. TECHNICAL SPECIFICATIONS

Board Type: Power module for accessories requiring continuous power, for HP100 motherboard

Power supply: supplied by the motherboard. Optional external power supply, regulated to 12V.

Signalling LED: presence of voltage, presence of motor power supply.

Voltage supplied: 12V DC

Max. rated current: 500 mA with 12V DC power supply
300 mA with DCC power supply

Firmware HP100 >1.2

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