# HER040 Add-on box with Ethernet connectivity, two digital inputs and two digital outputs

**USER MANUAL**
Rev. 0.2

# REVISION HISTORY

| Rev. | Date | Details | Originated by |
|------|------|---------|---------------|
| 0.2 | 31 Oct 2008 | Fine tuned the AT commands in section 5.3 | Pierre-Emmanuel Surga |
| 0.1 | 29 Oct 2008 | Fixed schematics and temperature ranges | Pierre-Emmanuel Surga |
| 0 | 28 Oct 2008 | First issue | Pierre-Emmanuel Surga |

Besides, our company stresses the fact that the performance of the product as well as accessories depends not only on the proper conditions of use, but also on the environment around the places of use.

**Maestro Wireless Solutions Ltd.** assumes no liability for damage incurred directly or indirectly from errors, omissions or discrepancies between the modem and the manual.

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# SAFETY PRECAUTIONS

## *General*

- The user must operate the product according to the specifications described in this User Manual.

- Make sure the ratings and performance characteristics of the product are sufficient for the systems, machines and equipment.

## *Warnings*

- Do not attempt to unplug the product from the Main Unit when the latter is being supplied power.

- Do not attempt to disassemble, modify or repair the product. Any attempt to do so may result in malfunction or fire.

- Provide safety measures in external circuit to ensure safety in the system in case of abnormality occurs due to malfunction of the product or another external factor affecting the product's operation. Safety measures include but not limited to Emergency stop circuits, interlock circuits and limit circuits.

- The digital outputs may remain ON or OFF in case the OptoRelay is damaged. As a counter-measure for such problem, external safety measures must be provided to ensure safety in the system.

- Construct a control circuit so that the power supply for the I/O circuits does not come ON before power supply for the Heritage Main Unit.

- If there is risk of high voltage surge appearing on I/O circuits, then use a different power supply for the I/O circuits from the one for the Heritage Main Unit. The 2 power supplies will need to be isolated.

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# CHAPTER 1: Introduction

HER040 is an optional add-on box for the Maestro Heritage Main Unit (ordering code HER010). The functions of which are then extended by adding 2 digitals inputs and 2 digitals outputs to the system. The HER040 also extends the functionalities of the Main unit by providing 10/100BASE-T Ethernet connectivity.

## 1. Overview of HER040
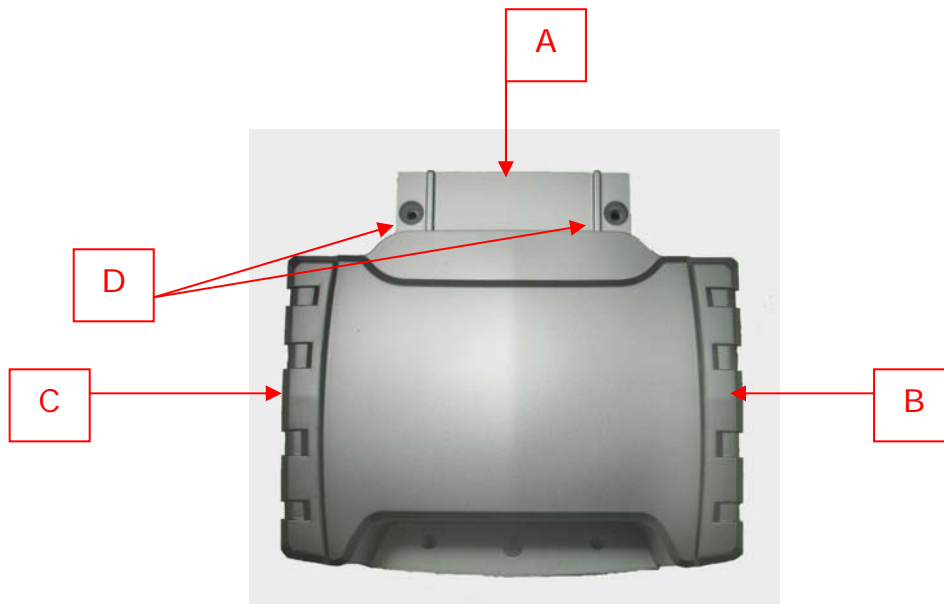
A. Expansion connector (to main unit)

B. Ethernet connector

C. I/O and configuration connector

D. Nuts for locking

## 2. I/O Characteristics

### a. Ethernet, connector

This is a standard 8P8C connector wired for Ethernet communication; it can accept any Ethernet cable.

### b. 14 pins connector

The HER040 14 pins connector is used for configuration, diagnostic and provides two inputs and outputs for custom applications.

| Pin | Type | Electrical | Note |
|-----|------|-----------|------|
| 1 | RS-232 TD | | Diagn. & config. |
| 2 | RS-232 DTR | | Diagn. & config. |
| 3 | RS-232 RTS | | Diagn. & config. |
| 4 | RS-232 RD | | Diagn. & config. |
| 5 | RS-232 DSR | | Diagn. & config. |
| 6 | RS-232 CTS | | Diagn. & config. |
| 7 | RS-232 GND | Ground | Diagn. & config. |
| 8 | Not connected | | |
| 9 | Opto-Coupler Input 1 | ON voltage = 5 to 32V DC | Polarity |
| 10 | Opto-Coupler Input 2 | ON voltage = 5 to 32V DC | Polarity |
| 11 | Opto-Coupler Input Common | Reference for input 1 and 2 | Polarity |
| 12 | Opto-relay Output 1 | 600mA max. 32V Max. | For driving relays |
| 13 | Opto-relay Output 2 | 600mA max. 32V Max. | For driving relays |
| 14 | Opto-relay Output Common | Reference for output 1 and 2 | |

# CHAPTER 2: Specifications

| Item | | |
|---|---|---|
| Enclosure | | PC/ABS plastic   UL-94V0 flammability |
| Input port | Type | Opto-Coupler x 2 |
| | ON voltage | 5Vdc min     32Vdc max |
| | OFF voltage | 0Vdc min     1.0Vdc max |
| Output port | Type | Opto-Relay x2 for driving relays |
| | Operating voltage | 32V DC Max |
| | Current carrying capacity (continuous) | 600mA max |
| Ethernet | Connector | Standard RJ45 |
| | LEDs | Green for connection status Yellow for RX/TX |
| Operating Temperature | | -40 to +85 deg C |
| Storage Temperature | | -40 to +85 deg C |
| Weight | | 75g |
| Overall Dimension | | 100(L)x75(W)x28(H)mm |

# CHAPTER 3:    Install HER040 on the Main Unit

## 1. Remove the dust cover on Main Unit (HER010)

This will expose the mounting slot; the connector pins can be seen inside the slot.



Dust Cover

## 2. Plug in the add-on

Align the connector end of HER040 and slide it into the mounting slot. The ribs on the connector end guide the sliding action. Push until the connector goes all the way in. The action is normally very smooth.

## 3. Fasten screws

Use the 2 screws sized M2x6 and 2 spring washers, supplied together with HER040, to secure the two units in position.



## 4. Fasten screws (when using DIN Rail Clip)

Use the 2 screws sized M2x10 and 2 spring washers, supplied together with DIN Rail Clip, to secure the two units in position. The screw threads are to go through 2 mounting holes on the Clip before fastening the two units.
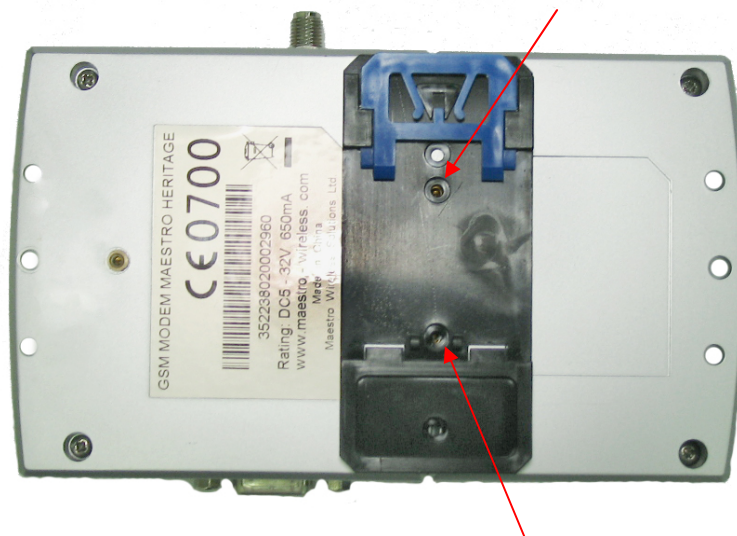
## 5. Install the SIM card

(please refer to HER010 Manual for more details)

 Use a ball pen or paper clip to press the SIM holder eject button. The SIM holder will come out a little. Then take out the SIM holder.

Note: DO NOT pull out the SIM holder without pushing the ejector.

Put the SIM card to the tray; make sure it has completely sat on the tray. Put the tray back into the slot.

## 6. Connect the external antenna (SMA type)

(please refer to HER010 Manual for more details)

Connect this to an external antenna with SMA male connector. Make sure the antenna is for the GSM 900/1800 or GSM 850 / 1900 frequency with impedance of 50ohm, and also connector is secured tightly.

Note: Please use antenna designed for GSM 900/1800 or GSM 850 / 1900 MHz operation. Incorrect antenna will affect communication and even damage the modem.



SMA male connector of antenna

Secure tightly
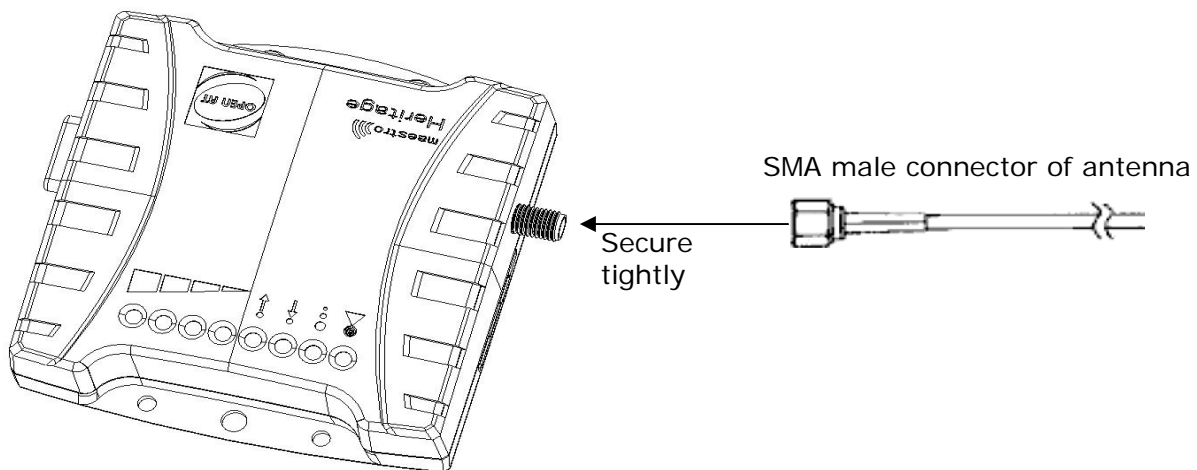
## 7. Connect the main unit to computer (optional)

(please refer to HER010 Manual for more details)

If you need to configure or diagnostic the Heritage main unit, you can use the RS232 cable to connect the modem's Sub-D connector to an external computer.

Connection example using RS232 cable:



| Heritage | Sub-D 9 pin | DB-9 | RS-232 Port of PC |
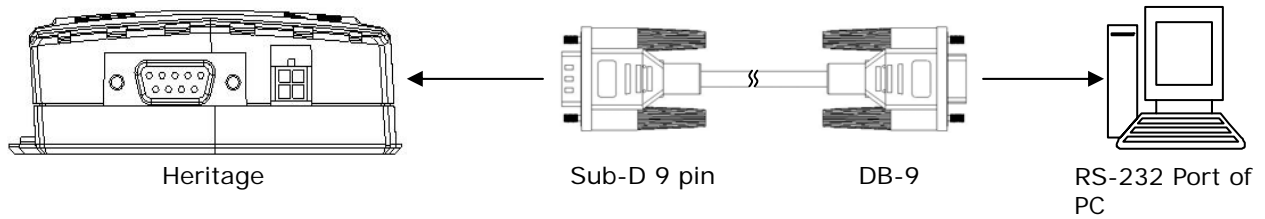
## 8. Connect the add-on board to computer (optional)

If you need to configure the HER040 add-on board, you can use the provided cable to connect the unit's 14 pins connector to a computer then refer to chapter 4 for software configuration.

The 14 pins connector is protected by a rubber cover. Remove the cover first; it will remain attached by its base so that you can not loose it; then plug-in the provided cable. Plug the other end of the cable to a host computer for configuration.

## 9. Connect the DC power supply

(please refer to HER010 Manual for more details)

Connect the open ending of the inducted power cord to a DC supply. Refer to the following for power supply requirement.

| Input voltage range | 5V – 32V |
|---|---|
| Rated current | 500 mA |



AC-DC Adaptor or battery

Solder wire
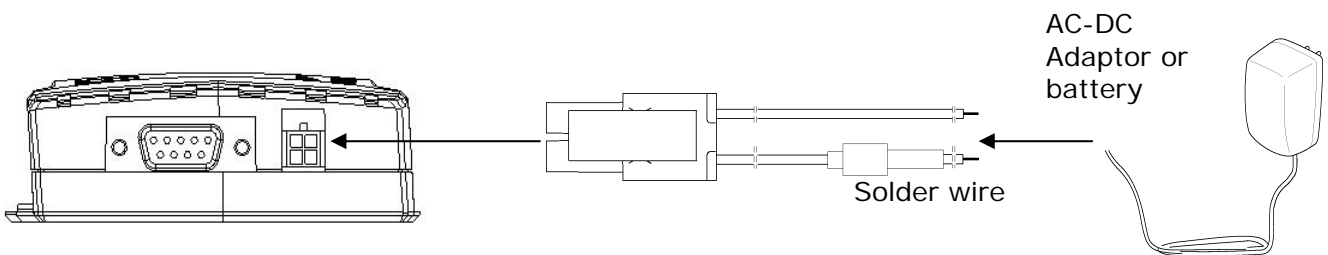
Connect the connector to the modem. The modem will turn on automatically.

The status indicator on the modem will be lit when power on. After a few seconds it will go flashing slowly.

## 10. Connect the Ethernet cable

You can use an Ethernet cable to connect the modem 8P8C socket to external controller/computer/machine/local network. Once both end of the cable are plugged, LEDs should turn on, on the modem connector.

## 11. Configure the HER010

In order to have HER040 work with the Heritage main unit, this last one has to be specifically configured. Make sure the HER010 is connected to a computer (using RS232 cable), than run a HyperTerminal (or any equivalent software) session on this computer, and connect to the modem using the following settings: `115200bps, 8 data bits, no parity, 1 stop bit, and hardware flow control,` then type the following command:

```
AT+HPLUGIN=4
```

That should return

```
OK
```

To check the good configuration, send the following command:

```
AT+HPLUGIN?
```

That should return

```
+HPLUGIN: 4
OK
```

# CHAPTER 4: SOFTWARE CONFIGURATION

## 1. HER040 Configuration software

The Ethernet add-on board is easily set-up using the provided software by Maestro Wireless Solutions. Before proceeding, please make sure the board has been set set-up as recommended in the previous chapter (i.e. both boxes assembled and secured; supply cable, antenna, Ethernet cable, 14 pins to DB9 cable plugged; SIM card inserted).

The configuration software being written in Java, the host computer needs to have Java installed. If this is not done yet, please download the latest version of Java on the website http://www.java.com/.

The software will first ask you to choose on which COM port is the board connected (make sure no software is already using the COM port), then will fetch the settings of the board and display them. Make the modifications required then save them, or just discard the changes to quit the software.



*First step is to choose the COM port connected to the HER040.*

*Then the software will present the parameters, which can be edited and saved.*
*Changes are only taken into account when the Save button is pressed.*

## 2. Settings

### a. Internet service provider and modem settings

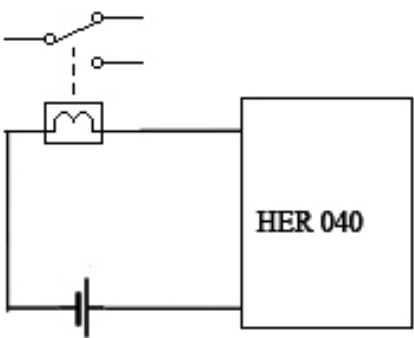| Parameter | Description | Default value |
|---|---|---|
| ISP User name | Set connection username, used to login onto your ISP | *Empty* |
| ISP Password | Sets connection password, used to login onto your ISP | *Empty* |

### b. Router settings

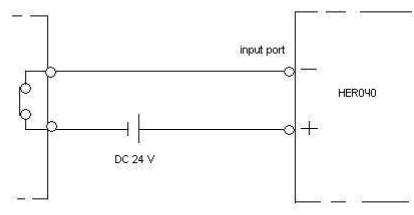| Parameter | Description | Default value |
|---|---|---|
| Default IP | Default IP for the HER040 on the LAN side. Set it to 0.0.0.0 if the address is to be resolved via an external DHCP server. | 192.168.0.1 |

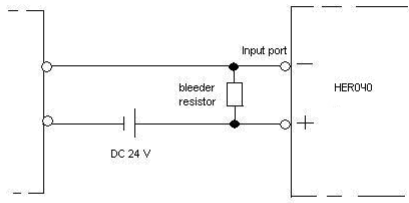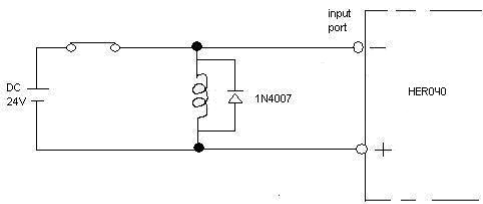| | | |
|---|---|---|
| DHCP Pool size | Sets number of addresses to be allocated in the IP pool of HER040 DHCP server. Range from 1 to 255; but if set to 0 the DHCP server will be deactivated | 10 |
| IP Gateway | Gateway IP address. If set to 0.0.0.0 and if the default IP is also set to 0.0.0.0, this address will be resolved via DHCP. | 192.168.0.1 |
| Subnet | Subnet mask address. If set to 0.0.0.0 and if the default IP is also set to 0.0.0.0, this mask will be resolved via DHCP | 255.255.255.0 |
| DNS server 1 | Primary DNS server | *Empty* |
| DNS server 2 | Secondary DNS server | *Empty* |

# CHAPTER 5: APPLICATION NOTES

## 1. Output Wiring

| Case | Circuit examples | Characteristics | Caution |
|------|------------------|-----------------|---------|
| 1 |  HER 040 | Use DC type mechanical relay to extend the output circuit for driving heavier load. | Relay is inductive. There is already a diode inside the board to protect against flyback voltage, so there is no need to add an external one . |

## 2. Input Wiring

| Case | Circuit examples | Characteristics | Caution |
|------|------------------|-----------------|---------|
| 1 |  input port HER040 DC 24 V | The input port is switched ON when a DC voltage between 5V to 32V is applied. | Voltage driving the input ports must be DC. Make sure the polarity is correct and voltage does not exceed 32V. |

| 2 |  | A leakage current can cause false ON inputs. This could happen when using sensors that have a small leakage in OFF state. | To prevent a false ON input, insert a bleeder resistor in the circuit to reduce the input impedance. |
|---|---|---|---|
| 3 |  | When connecting an inductive load to an input. | Connect a diode (e.g. 1N4007) in parallel with the load as shown to prevent flyback voltage from damaging the input port. |

## 3. Ethernet router

The HER040 box used with the Maestro Heritage can form a system that will act as GPRS/Edge router for an Ethernet LAN. Using such system, one can easily connect a computer, a machine or even a whole local network to Internet. This section summarizes the setup of the heritage unit with AT commands in order to have the gateway work.

*Note: these are just guidelines, please refer to HER010 manual for full detail of the commands*

We assume the following setup is done: assembling HER010 and HER040, SIM card installation; power supply, antenna, RS232 (to computer) and Ethernet cable connection.

Run a HyperTerminal (or any equivalent software) session on the computer connected with RS232, and connect to the modem using the following settings: `115200bps, 8 data bits, no parity, 1 stop bit, and hardware flow control.`

The HER040 is factory configured to act as a router. You now have to enter the APN parameters (that are provided by your phone operator). This is done by sending commands `AT+CGDCONT` through the RS232 link, as follow:

```
AT+HPLUGIN=4  (if you have not done that already)
AT+CGDCONT=1,"IP","internet"
```

*(Your operator can have different settings)*

Finally, reboot the modem. After initialisation the LEDs on the Ethernet connector should light on and the device connected should have access to Internet.

Should you have to input customs parameters for LAN (such as DHCP, subnet mask, default IP, DNS, etc.), please refer to chapter 4 of this document.