



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

USER MANUAL Rev. 0.5

REVISION HISTORY

Rev.	Date	Details	Originated by
0.5	17 Sept 2009	Revisions in AT commands due to Wavecom new firmware	Pierre-Emmanuel Surga
0.4	13 March 2009	Added port forwarding support	Pierre-Emmanuel Surga
0.3	17 Dec 2008	Reviewed the setup instructions to make them simpler	Frank Tang Pierre-Emmanuel Surga
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

This manual is written without any warranty.

Maestro Wireless Solutions Ltd. reserves the right to modify or improve the product and its accessories which can also be withdrawn without prior notice.

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 (see application note at the end of this document for details).

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.

CHAPTER 1: Introduction

HER040 is an optional add-on box to the Maestro Heritage Main Unit (ordering code HER010), that adds 10/100BASE-T Ethernet connectivity to this unit, to expand the functions.

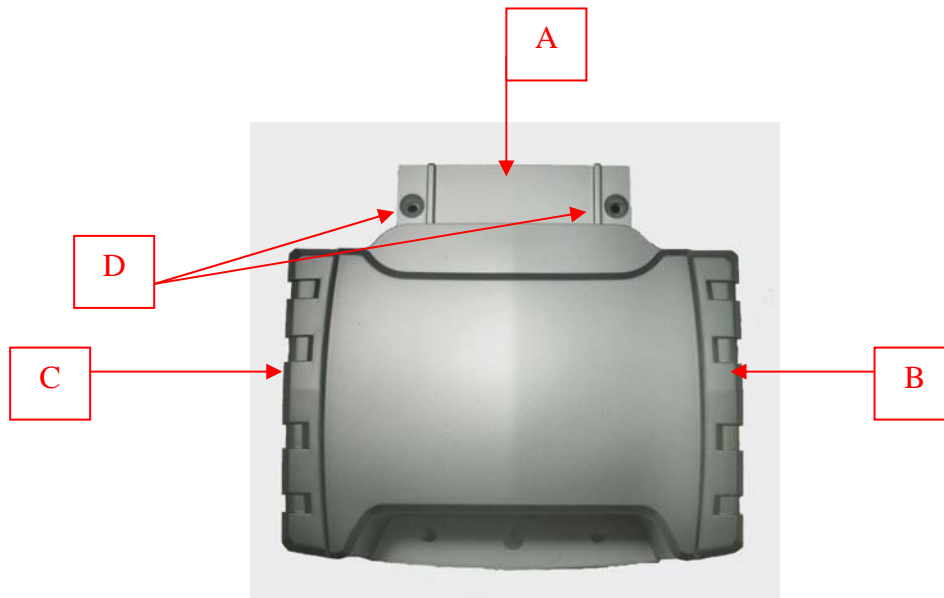
HER040 is ex-factory configured as a GPRS Ethernet Router, an application whose general use is to add Internet access to a cabled Ethernet local network of M2M equipment/devices in field.

HER040 can be software-configured for other applications such as a Serial to Ethernet bridge. Two digital outputs and two digital inputs also allow functions such as remote sensing and control to be added in

The procedures of setting parameters described in this document apply to HER040 that is to be used as a GPRS Ethernet Router.

Configuration for other applications and the way to set up parameters for those applications will be discussed in future application notes.

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

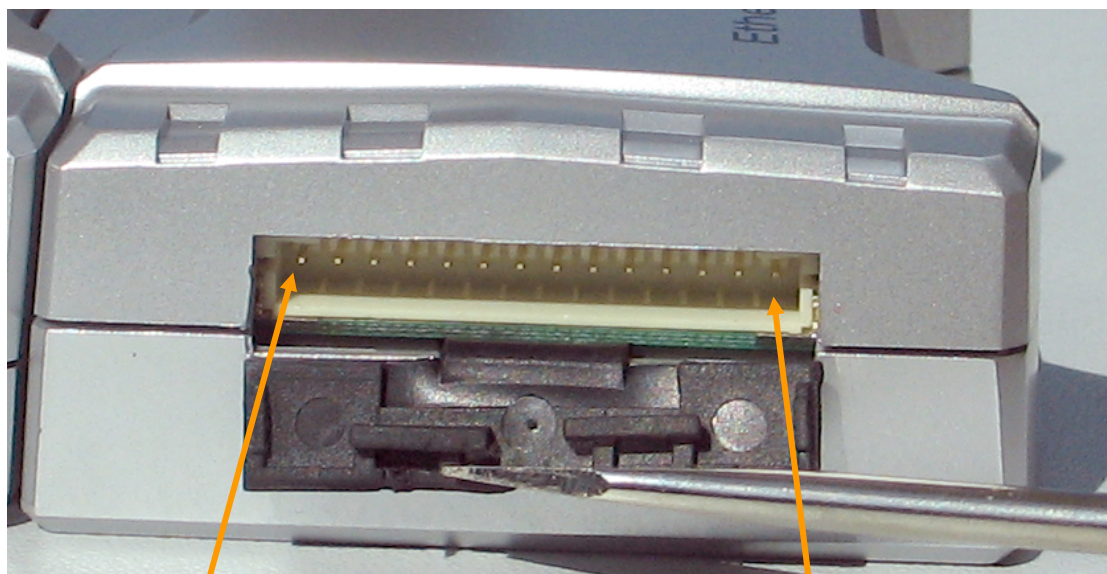
a. Ethernet, connector

This is a standard 8P8C connector wired for Ethernet communication; it can accept standard 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		Diagnostic & configuration
2	RS-232 DTR		Diagnostic & configuration
3	RS-232 RTS		Diagnostic & configuration
4	RS-232 RD		Diagnostic & configuration
5	RS-232 DSR		Diagnostic & configuration
6	RS-232 CTS		Diagnostic & configuration
7	RS-232 GND	Ground	Diagnostic & configuration
8	Not connected		
9	Opto Input 1	ON voltage = 5 to 32V DC	+ Polarity
10	Opto Input 2	ON voltage = 5 to 32V DC	+ Polarity
11	Opto Input Common	Reference for input 1 and 2	- Polarity
12	Output 1 driving relay	600mA max. 32V Max.	+ Polarity
13	Output 2 driving relay	600mA max. 32V Max.	+ Polarity
14	Output Common	Reference for output 1 and 2	- Polarity



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Pin 1

Pin 14

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	Transistor output 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 Tx/Rx activity
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.



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 HERO40, 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.

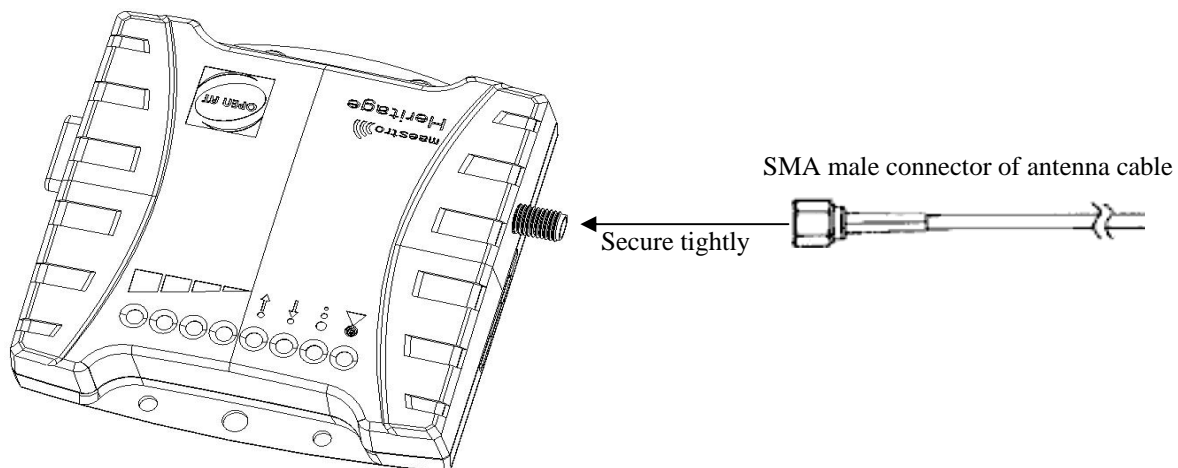
Put the SIM card to the tray; make sure it has completely sat on the tray. Put the tray back into the slot.

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.

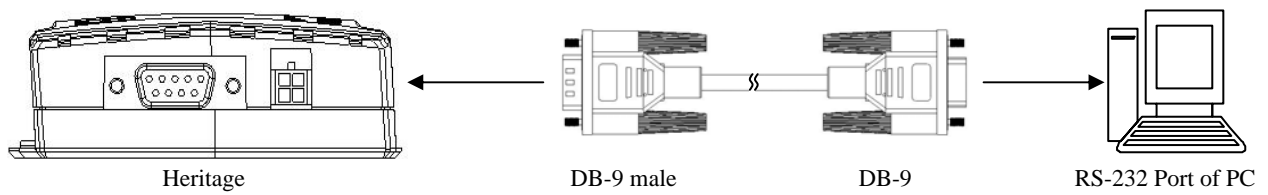


7. Connect the main unit to computer (optional)

(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:



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.

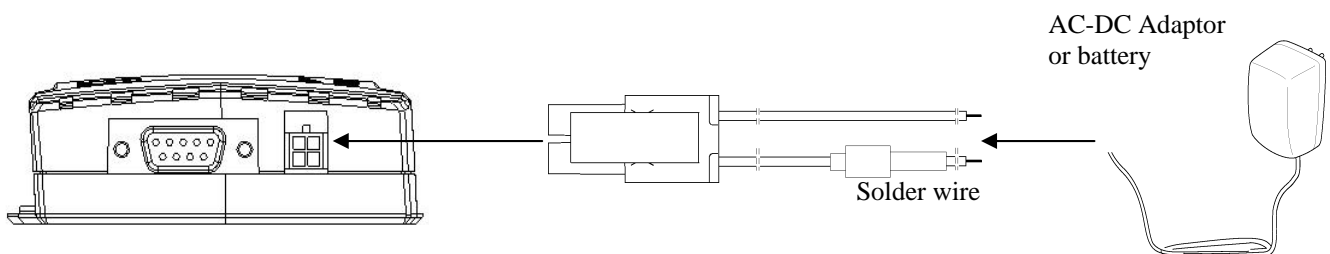
The 14 pins connector is protected by a rubber cover. Remove the cover first; it will remain attached by its base so that you can not loose it; then plug-in the provided cable. Plug the other end of the cable to a host computer for configuration.

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





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.

CHAPTER 4: SETTING UP A GPRS ROUTER

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

HER040 is ex-factory configured as a GPRS Ethernet Router with the following settings:

DHCP Server on HER040	Enabled
Gateway IP address	192.168.0.1
Subnet mask	255.255.255.0
Maximum number DHCP client	10
DNS Server IP address	Obtained from GPRS network
GPRS login Username	blank
GPRS login Password	blank
Port forwarding	No rule set

If these settings match with your application, there is no need to configure HER040 at all; please continue with section 1 of this chapter. Otherwise, please go to section 2 of this Chapter.

1. No need to change configuration of HER040

The next step is to configure the HER010 and also to enter the APN.

1. Run a HyperTerminal (or any equivalent software) session on the computer with RS232 port, and connect it with a modem cable to HER010's RS232 port using the following settings: 115200bps, 8 data bits, no parity, 1 stop bit, and hardware flow control.

2. The HeritageSoft must be of Version 091h or above. Send Command `AT+VAFV` to check the version number. It should reply `HERITAGE_091h_OAT425_32 Dec 3 200817:43:40` or higher version number.

If HeritageSoft is of the right version, carry on with the following steps.

Otherwise, upgrade the Heritage Soft to Version 091h or above.
For procedures of upgrading the HeritageSoft on HER010, please refer to relevant document from Maestro Wireless Solutions Ltd.

3. If you use Wavecom firmware R71 or newer, type the following commands to activate the HER040:

```
AT+WIOM=0,"GPIO32" (this command may return an error, just go ahead)
AT+WIOM=4
```

(you can know your Wavecom firmware with the `ATI3` command)

4. Send Command `AT+U2IPR=1` to set the internal baud rate as 230,400 bps. It should reply `OK`

5. Send Command `AT+CGDCONT=1,"IP","XXXXXX"` where XXXXXX is the APN (for example, `AT+CGDCONT=1,"IP","internet"`). It should reply `OK`

(APN is provided by your GPRS operator)

6. Send Command `AT+HPLUGIN=4` to set operating conditions for HER040. It should reply `OK`. After initialisation, the LEDs on the Ethernet connector should light on and the device connected should have access to Internet.

2. Need to change configuration of HER040

If the ex-factory GPRS Router configuration of HER040 mentioned in Part 2 of this Chapter do not match with your application, then you need to configure the HER040.

The first step to configure HER040 is to put HER010 in engineering set-up mode. This is done like this:

1. Run a HyperTerminal (or any equivalent software) session on the computer with RS232 port, and connect it with a modem cable to HER010's RS232 port using the following settings: 115200bps, 8 data bits, no parity, 1 stop bit, and hardware flow control.

2. The HeritageSoft must be of Version 091h or above

Send Command `AT+VAFV` to check the version number. It should reply `HERITAGE_091h_OAT425_32 Dec 3 200817:43:40` or higher version number

If HeritageSoft is of the right version, carry on with the following steps. Otherwise, upgrade the Heritage Soft to 091h or above.

For procedures of upgrading the HeritageSoft on HER010, please refer to relevant document from Maestro Wireless Solutions Ltd.

3. Send Command `AT+HPLUGIN=0` to put HER010 in set up mode. It

should reply OK

4. If you are using Wavecom firmware 663g or older, send Command `AT+WIOM=32,1,1` to power up the HER040. It should reply OK. If you are using R71 or newer, type `AT+WIOM=1,"GPIO32",1,1` then `AT+WIOM=4` instead. Both should return OK.
(you can know your Wavecom firmware with the `ATI3` command)

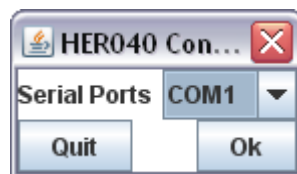
Once that is done, HER040 is easily set-up using the provided software by Maestro Wireless Solutions.

Before proceeding, please connect using the dedicated configuration cable (ordered from Maestro Wireless Solutions under reference ALL-CA13), 14-pin connector side to the configuration port of HER040; DB9 connector side to RS232 port of your computer (you may remove the RS232 serial cable that you used to configure the HER010, it is not needed for this step).

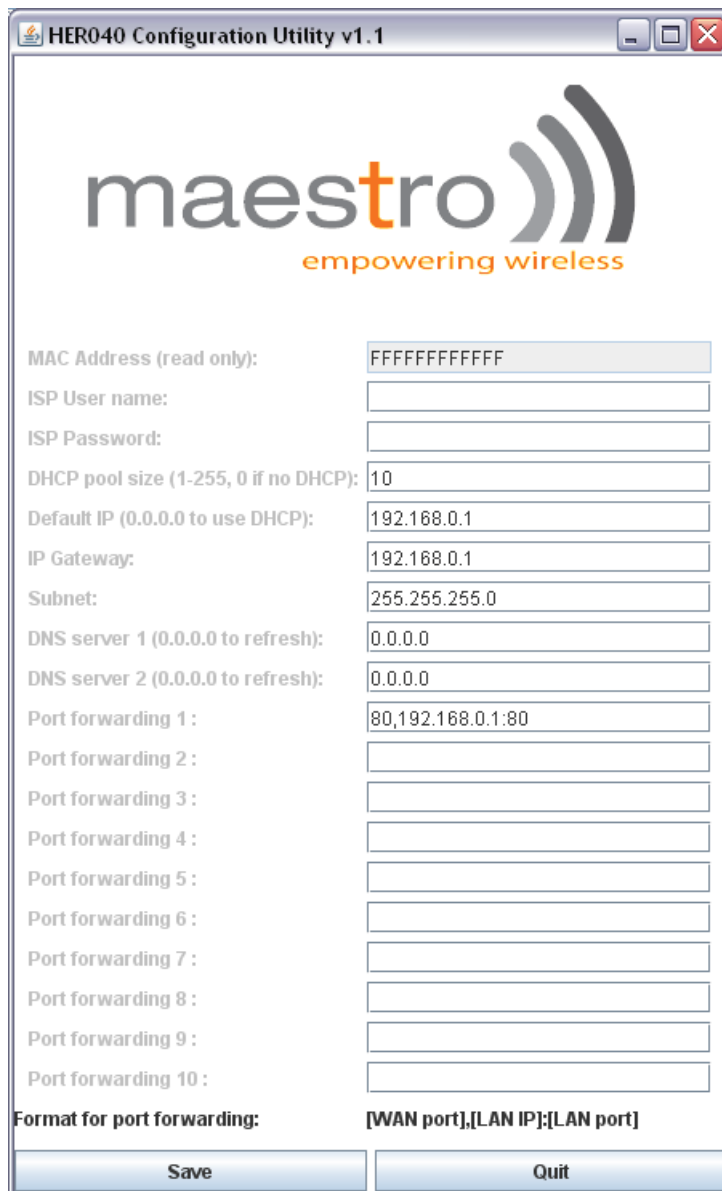
Unplug the Ethernet cable from HER040.

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.



MAC Address (read only):	FFFFFFFFFFFF
ISP User name:	
ISP Password:	
DHCP pool size (1-255, 0 if no DHCP):	10
Default IP (0.0.0.0 to use DHCP):	192.168.0.1
IP Gateway:	192.168.0.1
Subnet:	255.255.255.0
DNS server 1 (0.0.0.0 to refresh):	0.0.0.0
DNS server 2 (0.0.0.0 to refresh):	0.0.0.0
Port forwarding 1 :	80,192.168.0.1:80
Port forwarding 2 :	
Port forwarding 3 :	
Port forwarding 4 :	
Port forwarding 5 :	
Port forwarding 6 :	
Port forwarding 7 :	
Port forwarding 8 :	
Port forwarding 9 :	
Port forwarding 10 :	
Format for port forwarding:	[WAN port],[LAN IP]:[LAN port]

Save Quit

*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.*

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
Port forwarding 1 to 10	Port forwarding rules, in the format [Wan port],[IP address]:[LAN port]	Empty

The next step is to configure the HER010 and also to enter the APN.

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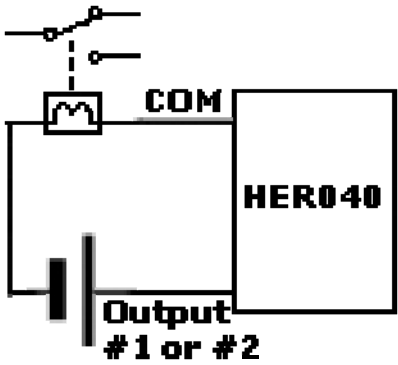
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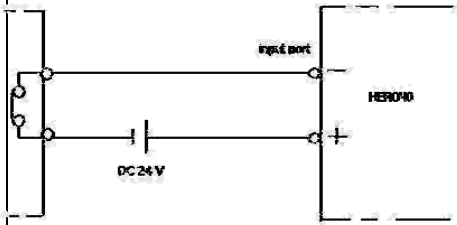
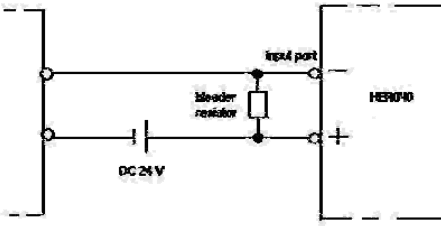
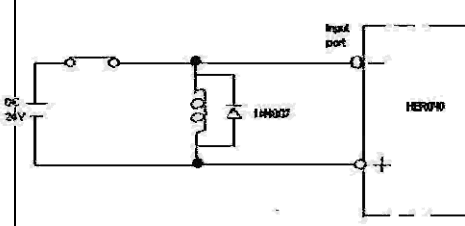
CHAPTER 5: WIRING OF INPUTS / OUTPUTS

The functions of the I/Os are reserved for future enhancement of the HeritageSoft or dedicated industrial control software. The following is an application note for wiring I/Os

1. Output Wiring

Case	Circuit examples	Characteristics	Caution
1	 <p>The diagram shows a DC power source (represented by a battery symbol) connected to a mechanical relay. The relay is labeled 'COM' and 'HER040'. The output is labeled 'Output #1 or #2'.</p>	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		<p>The input port is switched ON when a DC voltage between 5V to 32V is applied.</p>	<p>Voltage driving the input ports must be DC. Make sure the polarity is correct and voltage does not exceed 32V.</p>
2		<p>A leakage current can cause false ON inputs. This could happen when using sensors that have a small leakage in OFF state.</p>	<p>To prevent a false ON input, insert a bleeder resistor in the circuit to reduce the input impedance.</p>
3		<p>When connecting an inductive load to an input.</p>	<p>Connect a diode (e.g. 1N4007) in parallel with the load as shown to prevent flyback voltage from damaging the input port.</p>