Bluetooth HART® Modem (HM-BT-BAT-ER) User Manual

Introduction

The Bluetooth HART Modem (HM-BT-BAT-ER) provides the physical connection required for software to communicate with wired HART devices/networks.

As such PCs / Laptops / Tablets / Smartphones using OSs of Windows, Windows CE, Android and Linux can communicate with wired HART devices/networks via wireless Bluetooth technology. For device using Apple iOS you will need our HM-BLE HART Modem instead.

Once the HART side is connected, HART software can then configure / monitor / document / etc. HART devices from up to 83 meters away.

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Installation

Step 1) Turn on the Bluetooth Modem
Press the power button on the Bluetooth Modem, the green "Power" LED will illuminate if there is sufficient charge in the battery. If the "Power" LED does not illuminate, see the section on recharging the modem. The modem does not need to be connected to the HART device/network at this stage.

Note: Steps 2 through to 5 below summarise establishing a Bluetooth connection from your PC/Laptop/Tablet/Smartphone to the Bluetooth HART Modem. The details of how to do this will vary depending on your PC/Laptop/Tablet/Smartphone and its operating system. Consequently, if you are unsure you should refer to your devices instructions. However, typically there is a Bluetooth icon ( ) on the system tray that can be right/double clicked to access Bluetooth setup and the functions referred to below. Steps 2, 3, 4 and 5 are typically only needed the first time you use the Bluetooth HART Modem, thereafter you just need steps 1 and 6.

Step 2) Ensure your PC/Laptop/Tablet/Smartphone has Bluetooth enabled and turned on
See the note above about referring to your devices instructions on how to do this. However typically a Blue Bluetooth icon ( ) on the system tray is displayed if Bluetooth is on and enabled. If the Bluetooth icon is grey, or not visible, this may indicate Bluetooth is not currently enabled.

Step 3) "Pair" the Bluetooth Modem to your PC/Laptop/Tablet/Smartphone
If you have not previously "Paired" the Bluetooth HART Modem to your device, you will need to do so. See the note above about referring to your devices instructions, and the note below about Multiple HM-BT-BAT-ER Modems (below). Typically your device will give you the option to Pair/Add/Find/Survey a Bluetooth device. **Some devices may prompt for a "Passcode", if so enter "1234" (without the quotes).**

Multiple HM-BT-BAT-ER Modems
When several modems are in the same area, the discovery process needs to be repeated.
The modems will appear as "HART Modem (1)", "HART Modem (2)", etc. Where the number indicates the order in which the modems established a connection to your device. It may require trial and error to determine which modem is connected to the desired HART network.

Step 4) Confirm the Bluetooth modem is connected to your PC/Laptop/Tablet/Smartphone
See the note above about referring to your devices instructions, and the note above about Multiple HM-BT-BAT-ER Modems. Typically the option to Show/Manage Bluetooth devices will show connected devices and you should see the "HART Modem" listed as "Connected".

Step 5) Note the COM Port number given to the Bluetooth HART Modem
See the note above about referring to your devices instructions. Typically, double clicking on the "HART Modem" when it is shown as "Connected" (Stage 4 above) will show the services your device has allocated to the HART Modem. You should see the Serial Port number (or COM Port number) assigned to the "HART Modem". The service may be listed as "AMP-SPP". If your device has assigned two COM Port numbers to "HART Modem", the one listed as "Outgoing Port" is the number you need to note.

Step 6) Configure your HART Communicator application software
You now need to tell your HART configuration application software which serial (COM) port it should use, i.e. the port number you noted in stage 5. Details on how to do this will be specific to the software you have chosen to use. Typically, you open your application software, and then go to "Settings" -

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"Communication Settings" and tell it to use the Serial/COM port number you noted in stage 5. The HM-BT-BAT-ER looks like a normal RS232 HART Modem to the application software.

You are also invited to try our HART Communicator software free for 10 days, for the windows version please see http://www.hart-expert.co.uk/online-shop/hart-communicator-software-free-10-day-trial-windows-pcs for the Android version please see http://www.hart-expert.co.uk/online-shop/hart-communicator-software-free-10-day-trial-android

Step 7) Connect the leads of the Bluetooth HART Modem to a HART device/network
The modem can be connected in one of two ways: across the loop load resistor (A – B) or across the HART transmitter terminals (C – D). See the relevant Figure 1a, 1b or 1c below.
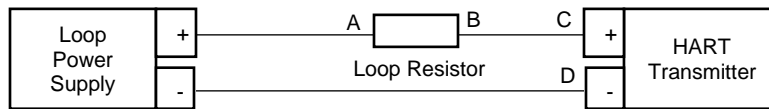

Figure 1a. Loop Powered HART Transmitter Connection
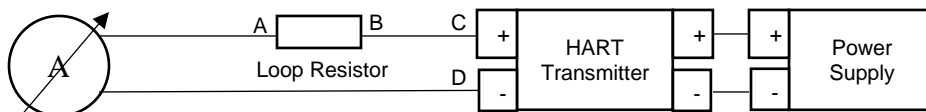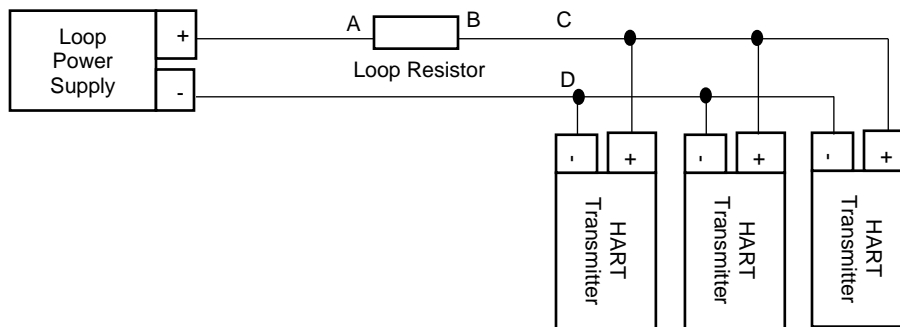

Figure 1b. 4-Wire HART Transmitter Connection

Figure 1c. Multi-drop HART Transmitter Connection

Step 8) Power your HART device/network
No external power sources are required for the HART Modem (HM-BT-BAT-ER) as it is powered from its internal rechargeable Li-ion battery. As shown in Figures 1a, 1b and 1c (above) the HART device should be powered as per the manufacturer's instructions.

Step 9) Connection Test Software (Optional Step)
Two software programs are provided on the installation CD to test that you can communicate with your HART device(s). "HM Test" is for Windows devices and "HM Test CE" is for Pocket PC (Windows CE) devices. If you are using our Android application the modem test function is built into the app.

"HM Test" can also be downloaded from http://www.hart-expert.co.uk/wp-content/uploads/HART_Modem_Test_Windows.zip, and "HM Test CE" from http://www.hart-expert.co.uk/wp-content/uploads/HART_Modem_Test_Windows_CE.zip

HM Test
Launch the program HM Test from the CD or from the installed icon. Click the "Set COM Port" button and select the COM port number that you noted in step 5. Then select "Poll HART Network" to connect to a HART device. The program sends HART Command 0 to determine what transmitters are connected to the loop. The "Status" box will indicate successful (or otherwise) communication to the HART device. If the test failed click the button "COM Troubleshooter" for help, or consult the following "Troubleshooting" section of this manual.

HM Test CE
1. Use the ActiveSync utility to load this program on to your Pocket PC device
2. Start "File Explorer".
3. Navigate to the "My Device" directory.
4. Tap "HM Test CE" to launch the program.
5. Tap "Poll" to search for a HART device on the network. The program sends HART Command 0 to determine what transmitters are connected to the loop. The "Status" box will indicate successful operation of the HM-BT-BAT-ER in your system. Consult the "Troubleshooting" section of this manual if test failure.

Recharging the Modem
The modem uses a built in rechargeable Lithium Ion battery. When needed it can be recharged by connecting the modem to a powered USB port using a mini USB to USB cable (one is included for you). The time it takes to recharge will depend on the maximum power output of the USB port it is connected to, however approximately 1 hour is typical.

While actively charging the "Charge On" LED will illuminate, when completely charged the LED will turn off. When the battery is almost full the "Charge On" LED may blink. If the "Charge Error" LED illuminates, disconnect the Bluetooth modem and allow it to cool down. The normal cause for "Charge Error" is an excessively hot battery. If when you connect the modem the "Charge On" led blinks once and then stays off, your modem is already fully charged.

Rechargeable Lithium Ion batteries are very reliable so long as they are not abused. They maintain charge very well, after 1 year of storage they typically have 75% of the charge remaining. Hence you can use and recharge them without worries associated with many other battery technologies, e.g. Lithium Ion batteries do not suffer from battery memory. As an engineer you may be interested in how to optimise battery life/performance, if so all the normal recommendations for lithium batteries (Li-Ion, Li-Po) apply:

1) Do not expose to flames or excessive heat (>85 deg.c)

2) Do not charge by any method other than that described above
3) Lithium Batteries do not have a "memory" therefore they can be partially used and partially charged at any time, in fact they prefer partial charge/discharge. Unlike NiCad batteries, you do not need to fully discharge and then fully charge Lithium based rechargeables. **Lithium batteries have a longer life if you only partially discharge them.**
4) Do not leave Lithium batteries permanently plugged in on a trickle or standby charge. Once they are charged disconnect them from the power source.
5) Store away from heat sources. A cool room (10 – 20 deg.c) is ideal, but do not store Lithium batteries at fridge or freezer temperatures!
6) Do not leave lithium batteries fully discharged for long periods of time (weeks/months). If they are fully discharged they should be recharged as soon as possible.

Troubleshooting

Problem: Cannot not communicate

Verify the following:

1. COM port number set in the HART Communicator application is the HM-BT-BAT-ER COM port number noted in Step 5
2. Loop power supply is on
3. Loop resistance is between 250 ohms and 1Kohms
4. Loop current is within HART limits
5. If multi drop configuration, all transmitters in loop have unique addresses
6. HM-BT-BAT-ER connections are across loop resistor or across transmitter terminals (step 7)
7. Battery is charged
8. Modem power switch is on and "Power" LED is illuminated
9. Perform the "Discovery" procedure again and verify a connection can be made
10. If using the Linksys USBBT100, verify the Linksys Bluetooth driver is installed and not the Windows Bluetooth driver. There is a known issue with the Linksys install and Windows XP SP2. Go to www.linksys.com and search for "USBBT100" for details

Problem: Communication is unreliable

Verify the following:

1. You are within radio range of the master transmitter, for Class 1 devices = 83 meters unobstructed, for Class 2 devices = 10 meters unobstructed. HM-BT-BAT-ER is a Class 1 Bluetooth device, check what class your PC/Laptop/Tablet/Smartphone is. For 83m both devices must be Class 1
2. Vary the orientation of the master transmitter or the HM-BT-BAT-ER to improve radio link strength
3. Battery is charged
4. HART connections made before power turned on
5. HART Transmitter is not in Burst mode. Communications can occur in Burst mode, but more retries will be necessary for success
6. In some applications, a connection can be lost, which looks like a communication lock-up. Perform the "Pair" process again to re-establish the link without the need to restart your application

Problem: Will not communicate with Cornerstone
Perform the following:
1. In directory "CSCONFIG/DB", open file "CSLOCAL.INI"
2. Search for "[RDLS2]" without the quotes
3. Change "Debug=0" to "Debug=8", again without the quotes
4. Save the file

<u>Warranty</u>
The HM-BT-BAT-ER is warranted for 1 year for materials and workmanship. Contact HART Expert Ltd (UK) or ProComSol Ltd (USA) if having trouble. In the unlikely event that you will need to return a modem for a repair/replacement, an RMA (Return Material Authorization) number from HART Expert or ProComSol is required for all returned items.

<u>Notice of FCC Compliance</u>
This product contains a radio module that has been tested and found to comply with the FCC Part15 Rules. These limits are designed to provide reasonable protection against harmful interference in approved installations. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. Modifications or changes to this equipment not expressly approved by ProComSol, Ltd may void the user's authority to operate this equipment.

Contains Transmitter Module FCC ID: X3ZBTMOD1

Specifications:

Enclosure & Cables

Material	High strength ABS Plastic
Dimensions	50mm x 70mm x 20mm
Total Unit Weight	170 g
HART Cable Length	1.2 m
HART Cable Connectors	Mini-Grabber

HART

Interface	Capacitive coupling
Output	600 mVpp
Leakage	< 10 uA
Connections	Across loop resistor or HART field device
Specifications	HART 4, HART 5, HART 6, HART 7, Physical Layer Spec HCF_SPEC-54

Computer/Tablet/Smart-Phone

Operating System	Windows, Pocket PC, Android and Linux are supported. For iOS devices you need to use our HM-BLE HART Modem instead.
Bluetooth	Bluetooth v2 compatible
Class	Class 1 (up to 83.8 meters), or Class 2 (up to 10 meters)*

* To be able to achieve the full Bluetooth range (83m) your PC/Laptop/Tablet/Smart-phone must also be Class 1. If it is a Class 2 Bluetooth device (up to 10m) you could upgrade it to Class 1 by either replacing its internal Bluetooth module or using an external Class 1 Bluetooth USB dongle.

Battery

Type	Rechargeable Li-Ion
Life	19 hours continuous use (perfect conditions), 14 hours typical

Environmental

Operating Temperature	0 deg.C to 50 deg.C
Storage Temperature	-40 deg.C to 85 deg.C
Humidity	0% to 99% (non-condensing)

Compliances

CE Certification	EN 61326 (EMC), Directive 2011/65/EU (RoHS)

Contact Information

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