

HPS-200
HandyPort-Serial
User's Manual

2007. 04. 07
SYM-2200-2E
Version 1.0



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1. Introduction

The HPS-200 from HandyWave is a ready-to-use short-range wireless connectivity solution for industrial. It provides the most economic and powerful way of cable replacement for the serial communication systems including RS-232, RS-422, and RS-485.

1.1. Key Features

- Supports DIN-RAIL and Wall Mounting
- Supports Bluetooth Serial Port Profile and Generic Access Profile
- No need of external host and software
- Easy of installation and use
- Supports configuration of the local device
- Supports configuration of the remote device via Over-the-Air
- Easy of maintenance
- Supports up to 100 meter (Line of Sight)
- Supports RS-232, RS-422, and RS-485
- Supports Point-to-Point and Point-to-Multipoint Topology

1.2. Key Specifications

- Standard: Bluetooth Specification Version 1.2 and/or above
- Operation Frequency: 2.4GHz ISM Band
- Transmitted Power: Max 20 / Typical 16dBm (Class 1)
- Received Sensitivity: More than -80dBm
- Power Supply: DC +5 ~ +30V
- Current Consumption: Up to 200mA at DC 5V
- Operation Temperature: -20 ~ 60 °C
- Dimension: 52.5mm (W) x 86.0mm (D) x 58.0mm (H)
- Baud Rate: 1.2, 2.4, 4.8, 9.6, 19.2, 38.4, 57.6, and 115.2Kbps
- Antenna Interface: SMA Female
- Signal Interface: 14 Terminals and screws

1.3. Contents

- HPS 2 EA
- Antenna 2 EA
- A Quick Start Guide

1.4. Record of changes

Table 1-1 Record of changes

| Revision | Date | Reason for change |
|----------|--------------|---|
| 1.0 | 2007. 04. 07 | Original publication of user's manual (HandyWave reference SYM-2200-2E) |

1.5. Acronyms and Definitions

Table 1-2 Acronyms and Definitions

| Acronym | Definition |
|---------|------------------------------------|
| ANT | Antenna |
| CTS | Clear to Send |
| dBm | Decibels relative to 1mW |
| DC | Direct Current |
| DSR | Data Set Ready |
| DTR | Data Terminal Ready |
| GND | Signal Ground |
| HPS | HandyPort-Serial |
| ISM | Industrial, Scientific and Medical |
| LNK | Link |
| OPR | Operation |
| OTA | Over the Air |
| RF | Radio Frequency |
| RST | Reset |
| RTS | Request To Send |
| RxD | Received Data |
| TxD | Transmitted Data |

1.6. References

1. HPS-200 Data Sheet, SYD-2200-1E, Version 1.0, 2007. 03. 22., HandyWave
2. How to use 7 Data Bits in HandyPort, AN-2010-12E, 2006. 06. 02., HandyWave

2. Hardware Setup

This chapter describes the general specifications and hardware of HPS-200.

2.1. General Specifications

The Table 2-1 shows the general specifications of HPS-200.

Table 2-1 General Specifications

| Electrical Characteristics | | |
|-----------------------------------|--|---------------------------------|
| Rating | Min | Max |
| Storage Temperature | -40°C | +100°C |
| Operating Temperature | -20°C | +60°C |
| Supply Voltage: Power | +5V | +30V |
| Current Consumption | N/A | 200mA |
| Interface | | |
| Signal Interface | RS-232, RS-422 or RS-485 via 14 Terminals and screws | |
| Baud Rate | Up to 115.2kbps Supports 1.2/2.4/4.8/9.6/19.2/38.4/57.6/115.2kbps | |
| Signals | RS-232 | TxD, RxD, GND, RTS/DTR, CTS/DSR |
| | RS-422 | TX+, TX-, RX+, RX-, GND |
| | RS-485 | TRX+, TRX-, EoR+, EoR-, GND |
| Antenna Interface | SMA Female | |
| Mounting Interface | DIN rail or Wall Mounting (Optional) | |
| RF Characteristics | | |
| Standard | Bluetooth Specification Version 1.2 and/or above | |
| Frequency | 2.400 ~ 2.4835GHz | |
| Hopping | 1,600/Sec, 1MHz Channel Space | |
| Modulation | GFSK and/or PSK | |
| Tx. Power | Max 20 / Typical 16dBm (Class 1) | |
| Rx. Sensitivity | More than -80dBm | |
| Coverage | Up to 100 M with supplied antenna (Line of Sight) | |
| Others | | |
| Topology | Point-to-Point and Point-to-Multipoint | |
| Dimension | 52.5mm (W) x 86.0mm (D) x 58.0mm (H) | |

2.2. Package Information

The Table 2-2 shows the package information of HPS-200.

Table 2-2 Package Information

| Items | Description | | | Figure |
|----------------------------|---|------------------|--------------------------------|-------------|
| ANT | An antenna port (SMA Female) | | | |
| OPR/LNK (LED) | OPR: Shall be on as it's powered on. LNK: on – connected, off – not connected, flashing per second – when it's in setup mode | | | |
| RS-232 RS-422 RS-485 | A Serial Selection Switch among RS-232, RS-422, and RS-485 | | | |
| RST | Configuration Button | | | |
| Pin # | Signal | Direction | Descriptions | |
| 1 | TxD | O ¹ | TxD for RS-232 | |
| 2 | RxD | I ² | RxD for RS-232 | |
| 3 | RTS/DTR | O | RTS/DTR for RS-232 | |
| 4 | CTS/DSR | I | CTS/DSR for RS-232 | |
| 5 | GND | Common | Signal Ground | |
| 6 | GND | Common | Power Ground | |
| 7 | Power | I | Power Supply | |
| 8 | TX+/TRX+ | I/O | TX+: RS-422 TRX+: RS-485 | |
| 9 | TX-/TRX- | I/O | TX-: RS-422 TRX-: RS-485 | |
| 10 | RX+ | I | RX+: RS-422 | |
| 11 | RX- | I | RX-: RS-422 | |
| 12 | GND | Common | Signal Ground | |
| 13 | EoR+ | O | End of Resistor ³ + | RS-485 Only |
| 14 | EoR- | I | End of Resistor – | RS-485 Only |

¹ O: Output

² I: Input

³ End of Resistor: If the HandyPort is required an end of resistor, you can make a loop between EoR+ and EoR-. It is only for RS-485.

2.2.1. Antenna Port

This is an antenna plug-in port. It is a SMA female type. Therefore, an antenna has to be a SMA male type.

2.2.2. Status Display LED (OPR/LNK)

There are OPR and LNK LEDs on HPS-200. The OPR (Operation) LED indicates the status of power. And the LNK (Link) LED indicates the status of RF and setup mode.

- OPR LED
 - On: Powered On
 - Off: Powered Off
- LNK LED
 - On (Steady): The RF link is on.
 - Off: The RF link is off.
 - Flashing per second: It is in the setup mode.

2.2.3. Serial Selection Switch (RS-232/RS-422/RS-485)

You can select a serial interface among the RS-232, RS-422, and RS-485 using the serial selection switch. It is a hardware switch. Therefore, it will be applied right away as soon as it is switched.

2.2.4. Configuration Button (RST)

To use the configuration button, the serial selection switch shall be in RS-232 and it is connected to the PC with a terminal emulator like HyperTerminal. You can change the configuration for HPS-200 using this button and command set.

2.3. Connection Overview for Power and Serial Interfaces

This section describes the pin assignment for power and serial interfaces.

2.3.1. Power

You shall supply power to use the HPS-200. The Table 2-3 shows the pin assignment and specifications for power.

Table 2-3 Pin Assignment of Power

| Pin # | Signal | Descriptions |
|-------|--------|------------------------------|
| 6 | GND | Power Ground |
| 7 | Power | Power Supply (DC +5V ~ +30V) |

2.3.2. RS-232

The HPS-200 supports TxD, RxD, RTS/DTR and CTS/DSR for RS-232 as shown in Table 2-4. To use RS-232, the serial selection switch shall be at RS-232.

Table 2-4 Pin Assignment of RS-232

| Items | Location | | | Figure |
|--------|----------|-----------|--------------|--------|
| Switch | RS-232 | | | |
| Pin # | Signal | Direction | Remarks | |
| 1 | TxD | Output | | |
| 2 | RxD | Input | | |
| 3 | RTS/DTR | Output | flow control | |
| 4 | CTS/DSR | Input | | |
| 5 | GND | Common | | |

2.3.2.1. Flow Control Support

The HPS-200 supports two types of flow control. One is Hardware (RTS/CTS) that applies locally (between the HPS-200 and device that is connected to HPS-200). The other is DTR/DSR that applies end-to-end. To use a flow control, you have to configure the HPS-200 accordingly.

2.3.2.2. Connection Diagrams

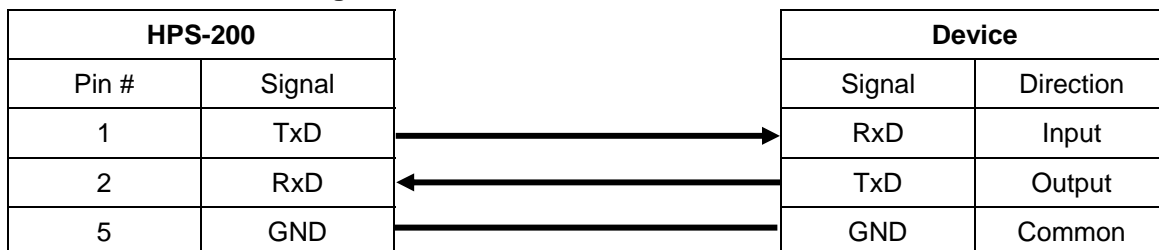


Figure 2-1 RS-232 Connection Diagram for No Flow Control

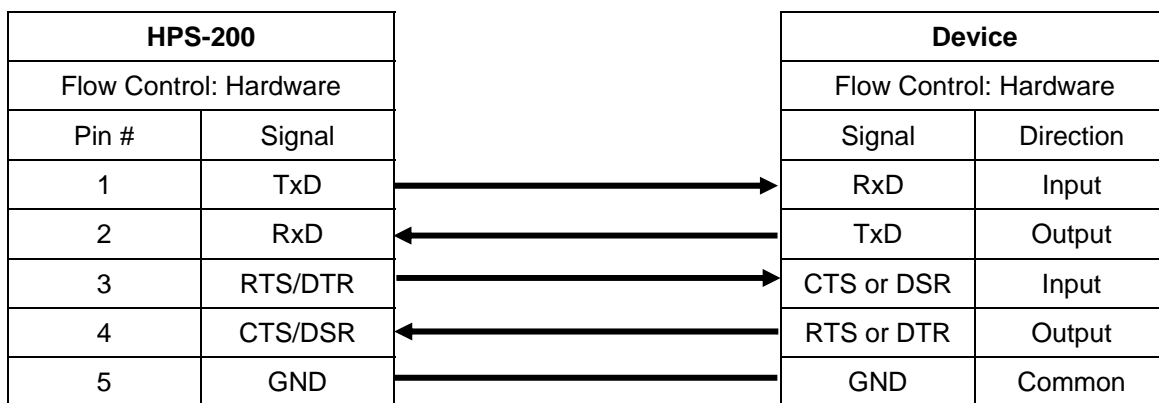


Figure 2-2 RS-232 Connection Diagram for Hardware Flow Control

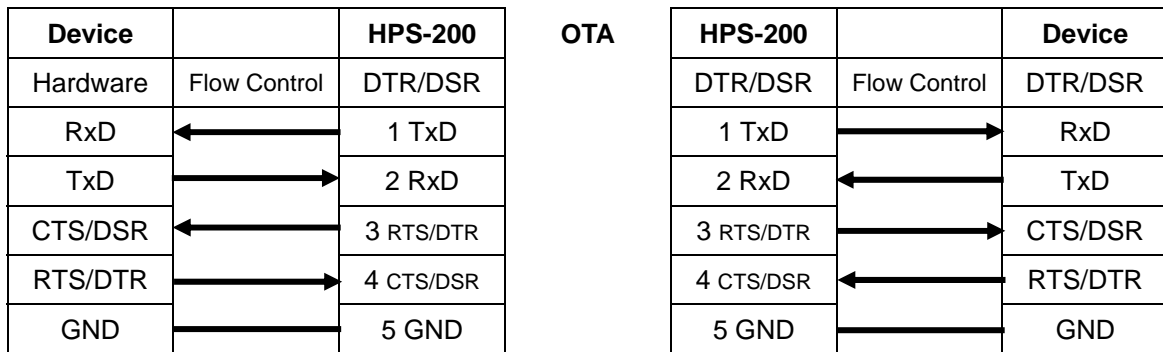


Figure 2-3 RS-232 Connection Diagram for End-to-End Flow Control

2.3.3. RS-422

The HPS-200 supports TX+, TX-, RX+, and RX- for RS-422 as shown in Table 2-5. To use RS-422, the serial selection switch shall be at RS-422.

Table 2-5 Pin Assignment of RS-422

| Items | Location | | | Figure |
|--------|----------|-----------|-------------|--------|
| Switch | RS-422 | | | |
| Pin # | Signal | Direction | Remarks | |
| 8 | TX+ | Output | | |
| 9 | TX- | Output | | |
| 10 | RX+ | Input | | |
| 11 | RX- | Input | | |
| 12 | GND | Common | If required | |

The Figure 2-4 shows an example of the RS-422 connection diagram. The ground signal is an option.

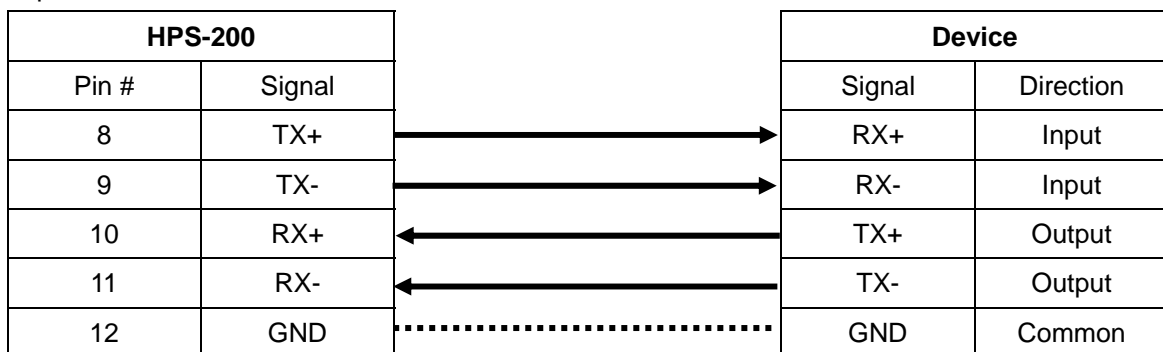


Figure 2-4 RS-422 Connection Diagram

2.3.4. RS-485

The HPS-200 supports TRX+, TRX-, EoR+, and EoR- for RS-485 as shown in Table 2-6. To use RS-485, the serial selection switch shall be at RS-485.

Table 2-6 Pin Assignment of RS-485

| Items | Location | | | Figure |
|--------|----------|-----------|------------------------------------|--------|
| Switch | RS-485 | | | |
| Pin # | Signal | Direction | Remarks | |
| 8 | TRX+ | I/O | | |
| 9 | TRX- | I/O | | |
| 12 | GND | Common | If required | |
| 13 | EoR+ | Output | Please see the below. ⁴ | |
| 14 | EoR- | Input | | |

The Figure 2-5 shows an example of the RS-485 connection diagram. The ground signal is an option. And if your device has an end of resistor, you don't need to make a jumper between EoR+ and EoR- at the HPS-200.

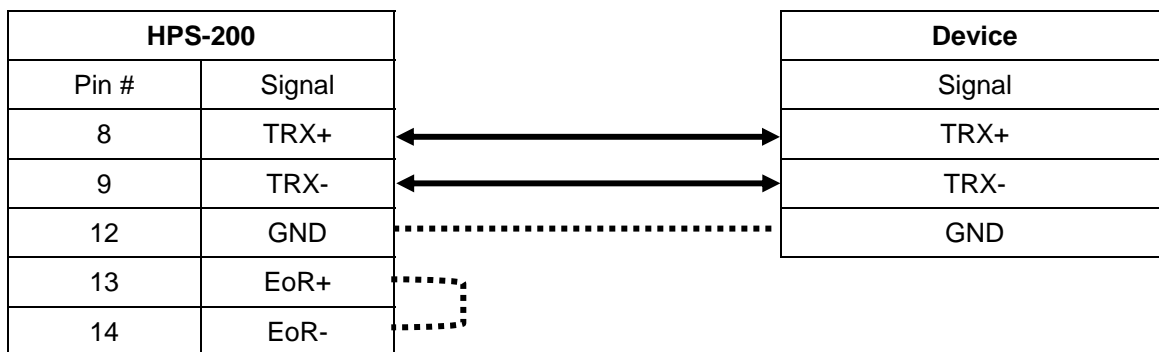


Figure 2-5 RS-485 Connection Diagram

⁴ EoR (End of Resistor): If the HandyPort is required an end of resistor, you can make a loop between EoR+ and EoR-. It is only for RS-485.

2.4. Mounting Method

The HPS-200 has a built-in DIN rail interface for mounting. And it supports the wall mounting optionally by wall mounting feet as shown in Figure 2-6.

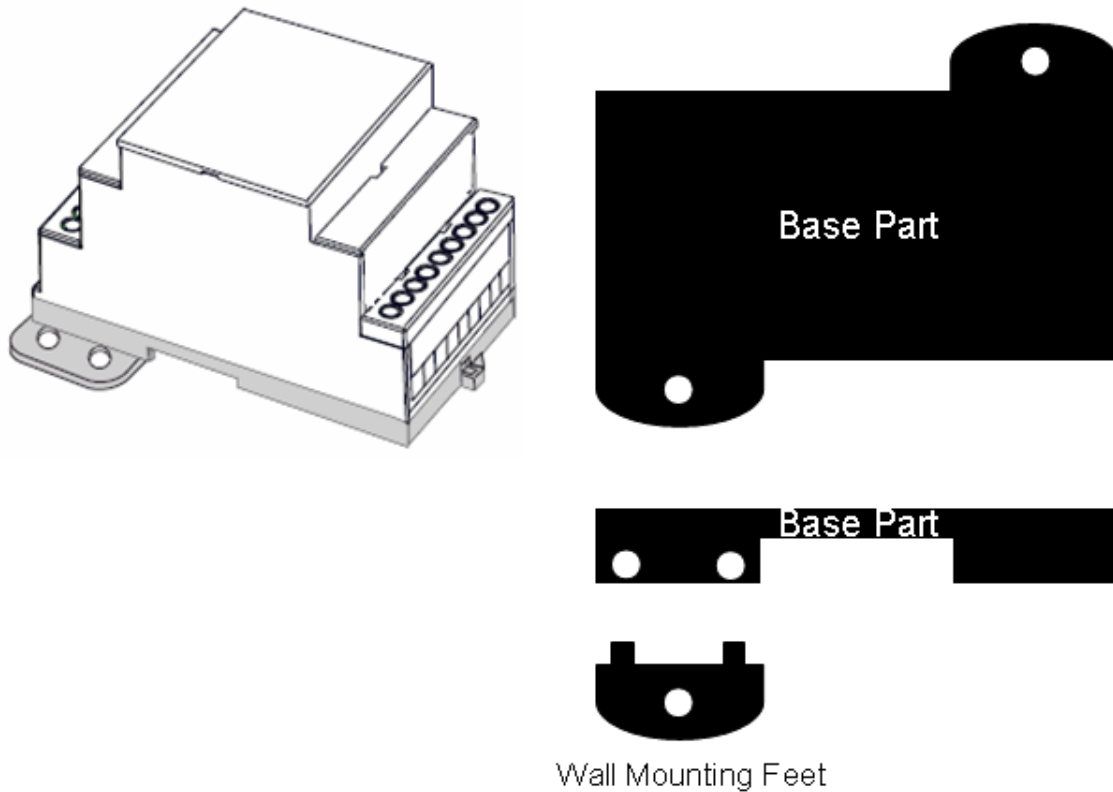


Figure 2-6 Wall Mounting Feet

2.5. Quick Installation Guide

- Step 1: Assemble a provided antenna to the antenna port on the HandyPort.
- Step 2: Select a serial interface using the serial selection switch on the HandyPort.
- Step 3: Make connections using 14 terminals and screws for power and serial interface.
- Step 4: Configure the HandyPort, if necessary.

No text.

3. Configuration Changing

This chapter describes how to change the configuration of HandyPort and its command set.

To change the configuration for the HandyPort, the serial selection switch shall be at RS-232. And you shall make a connection between the HandyPort and your PC with the RS-232 interface. You may use HyperTerminal or similar terminal emulator to change the configuration for HandyPort.

3.1. HyperTerminal Settings

- COM Port Settings: 9600 8-N-1, Flow Control: None (Factory Settings for HandyPort)
- Emulation: VT100

3.2. Switch Location

To configure the HandyPort, the serial selection switch shall be at RS-232 as shown in Figure 3-1.

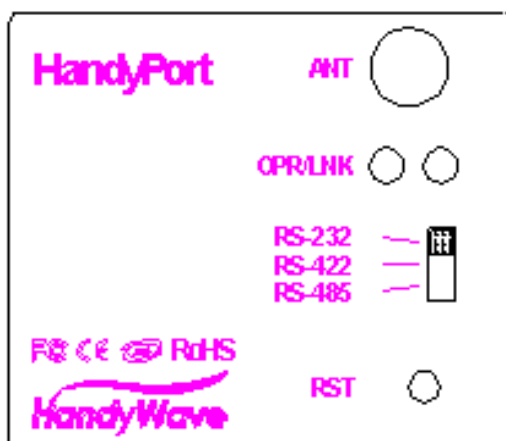


Figure 3-1 Location of Serial Selection Switch for Configuration

3.3. Start Configurations

Step 1: Make a RS-232 connection between the PC and HandyPort. And supply power for HandyPort.

Step 2: Open a Hyper Terminal at the PC and set it up.

Step 3: Push the RST button on HandyPort. If you enter the configuration mode successfully, LNK LED will be flashing every second.

Step 4: Hit the <Enter> key, 5 second later.

Step 5: Change the configuration of HandyPort with commands, if necessary.

3.4. Usage Printing

If you are in the configuration mode, type “?<Enter>” for listing commands. If you want to know the usage of specific command, type “[command]<Enter>”. All commands and parameters are case sensitive. Therefore, you have to use the capital letter for commands and parameters.

3.5. End Configurations

After finishing the configuration, you have to execute a command “X” to apply changes and exit the configuration mode.

3.6. Frequently Used Commands

The Table 3-1 is the list of frequently used commands.

Table 3-1 Frequently Used Commands

| Command | Syntax | Description |
|---------|--------------|-------------------------------------|
| A | ABD_ADDR<CR> | Change the address of remote device |
| B | BBR[D]<CR> | Change the baud rate |
| F | FFC[D]<CR> | Change the flow control |
| M | MMode<CR> | Change the connection mode |
| P | PPA[D]<CR> | Change the parity bit |
| S | SST[D]<CR> | Change the stop bits |
| V | V | Display the device information |

3.7. Command Set

There are four command groups, that are the connection configuration, serial configuration, wait commands, and others group, for the HandyPort.

3.7.1. Connection Configuration

This group of commands is used for changing the connection configuration for HandyPort. The commands are as shown in Table 3-2.

Table 3-2 Connection Configuration Commands

| Item | Syntax | Description | Remarks |
|--------------------|--------------------------------|--|---|
| 1. Remote address | A Addr<CR> ⁵ | Set a remote device address for a wireless connection. | A local and remote BD_ADDR always need to be difference. |
| 2. COM port | C COMPort<CR> | Change a request serial port. | COMPort: '1' ~ '7' Only valid in connection mode 2. |
| 3. PIN code | E PIN<CR> | Authentication Off: hit <Enter> Authentication On: Type up to 11 characters | Paired adapters should have a same PIN code. |
| 4. Discovery mode | J E/D<CR> | Set the discovery mode. 'E': Enable 'D': Disable | Connection mode 1 only. Default: Enable |
| 5. Low Power Mode | K E/D<CR> | Set the low power mode. 'E': Enable 'D': Disable | Default: Disable |
| 6. Connection mode | M Mode<CR> | Set a connection mode. Mode: '0' – '3' Mode 0 & 2: Required a remote address. Mode 2: Required a serial port. | 0: 1:1 Mode 1: WAIT Mode 2: REGISTER and CONNECT Mode 3: WAIT Command Mode |
| 7. Friendly name | N Name<CR> | Set a friendly name up to 11 characters. | |
| 8. CoD | W CoD<CR> | Set the class of device. CoD: 6-Hex in ASCII | Default: "001F00" |

⁵ <CR>: Carriage Return (0x0D)

3.7.2. Serial Configuration

This group of commands is used for changing the serial configuration of HandyPort. The commands are as shown in Table 3-3.

There is a special parameter, 'D', for the serial configuration as an option. That is for changing the factory settings of serial configuration. And that is preventing from the remembering the serial settings for changing configuration.

There are two serial settings for HandyPort that are "COM Port" and "Factory Settings". The COM Port is the serial settings for data communication between the HandyPort and device. And the Factory Settings is the serial settings for HandyPort configuration. You can change those settings at once using the option 'D'.

The HandyPort supports 8 data bits only. But you can implement 7 data bits using the HandyPort. Please refer to the document number AN-2010-12E in details.

Table 3-3 Serial Configuration Commands

| Item | Syntax | Description | Remarks |
|-----------------|----------------------------------|--|--|
| 1. Baud rate | BBR [D] ⁶ <CR> | Change the baud rate. D (option): Change a factory setting ⁷ . | Baud Rate (BR) - 0: 1200, 1: 2400, 2: 4800, 3: 9600, 4: 19200, 5: 38400, 6: 57600, 7: 115200 |
| 2. Flow control | FFC [D]<CR> | Set the Flow control. D (option): Change a factory setting ⁸ . | FC - 0: None 1: Hardware ⁹ 2: DTR/DSR ¹⁰ |
| 3. Parity Bit | PPA [D]<CR> | Set the parity bit. D (option): Change a factory setting ¹¹ . | 0: None, 1: Odd 2: Even |
| 45. Stop Bit | SST [D]<CR> | Set the stop bit. D (option): Change a factory setting ¹² . | 0: 1 Stop, 1: 2 Stop |

⁶ [D]: An optional parameter. D – It will change the factory settings, too.

⁷ If you change the factory setting for baud rate, you have to remember it for the future use.

⁸ If you change a factory setting for flow control, you have to remember it for the future use.

⁹ This is a flow control between the HPS-200 and device (will not be passed it over the air).

¹⁰ This is a flow control for the end-to-end (will be passed it over the air).

¹¹ If you change a factory setting for parity bit, you have to remember it for the future use.

¹² If you change a factory setting for stop bit, you have to remember it for the future use.

3.7.3. WAIT Commands

This group of commands is used in WAIT command mode only. The commands are as shown in Table 3-4.

Table 3-4 Wait Commands

| Item | Syntax | Description | Remarks |
|-------------------------|------------------------|---|--|
| 1. Inquiry Timeout | G TO<CR> | Set the inquiry timeout. TO (timeout): ASCII '1' ~ "48" | Connection mode 3 only. Default: 10 sec. |
| 2. Max number of search | H NO<CR> | Set the max # response of inquiry. NO: ASCII '1' ~ "255" | Connection mode 3 only. Default: 10 |
| 3. Search device | I TO,NO[L]<CR> | Execute searching devices. TO: ASCII '0' ~ "48" NO: ASCII '0' ~ "255" L (option): Display the long form. | Connection mode 3 only. ;: ASCII 0x2C |
| 4. Connection Timeout | Q TO<CR> | Set the connection timeout. TO: ASCII '1' ~ "999" | Connection mode 3 only. Default: 10 sec. |
| 5. Connect | T Addr[,TO]<CR> | Try to make a connection. Addr: a remote address TO (option): ASCII '0' ~ "999" | Connection mode 3 only. ;: ASCII 0x2C Default Timeout: 10 sec. |
| 6. Cancel | U | Cancel the previous inquiry. | Connection mode 3 only. |

3.7.4. Others

This group of commands used for showing the current status and state, printing the usages, and rebooting the HandyPort to apply the changes. The commands are as shown in Table 3-5.

Table 3-5 Other Commands

| Item | Syntax | Description | Remarks |
|-----------|----------|--|--|
| 1. View | V | Display the device information | You can find out a software version. |
| 2. Exit | X | Apply changes. | Rebooting |
| 3. Status | Z | Display the status of state machine. | 'S': Idle / 'P': Pairing / 'C': Connecting / 'A': RF on / 'I': Inquiring |
| 4. Usage | ?[C]<CR> | Display the command list or usage. C: Command | |