



HH-xH10 Handheld Remote Manual

DN: U089.0.0-SmaRT_HH-xH10

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FCC Statements

15.19 – Two Part Warning

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.

15.21 – Unauthorized Modification

NOTICE: The manufacturer is not responsible for any unauthorized modifications to this equipment made by the user. Such modifications could void the user's authority to operate the equipment.

15.105(b) – Note:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Industry Canada Statement

This device complies with Canadian RSS-210.

The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's website www.hc-sc.gc.ca/rpb.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Industry Canada Statement

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

RoHS Compliance Statement

Cervis, Inc. complies with the requirements of **Restriction of Hazardous Substances (RoHS/WEEE) Specification** based on in-house practice and declaration of compliance from our vendors. For additional information concerning RoHS compliance, please contact Cervis, Inc. at:

CERVIS, Inc.

170 Thorn Hill Road • Warrendale, PA 15086

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This product may contain material that may be hazardous to human health and the environment. In compliance with EU Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE):

- ✓ Do not dispose of the product as unsorted municipal waste.
- ✓ This product should be recycled in accordance with local regulations. Contact local authorities for detailed information.
- ✓ This product may be returnable to the distributor for recycling. Contact your distributor for details.

Notes/Definitions

Associate

SmaRT configuration method using a series of specific remote unit button presses to establish a communication link between a SmaRT Handheld and a SmaRT Base Unit.

DSSS

Direct sequence spread spectrum; an advanced wireless communication technology.

Dissociate or Disassociate

Dissolution of established communication links between handhelds and a base units involved in the process.

Line of Sight (aka Direct-Line-of-Sight)

Type of communication between transceivers, or a transmitter and a receiver, where the pathway between the two units must be clear of obstacles.

TX

Transmit/Receive

Document Conventions

✓ **Note:** Notes are used to indicate points of interest or pertinent information.

CAUTION



Cautions are used to warn of serious consequences of actions or inactions that may result in injury, death, or serious damage to the equipment.

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Cervis Inc. Safety Precautions

- ✓ ***Read and follow all instructions.***
- ✓ ***Failure to abide by Safety Precautions may result in equipment failure, loss of authority to operate the equipment, and personal injury.***
- ✓ ***Use and maintain proper wiring. Follow equipment manufacturer instructions. Improper, loose, and frayed wiring can cause system failure, equipment damage, and intermittent operation.***
- ✓ ***Changes or modifications made to equipment not expressly approved by the manufacturer will void the warranty.***
- ✓ ***Owner/operators of the equipment must abide by all applicable Federal, State, and Local laws concerning installation and operation of the equipment. Failure to comply could result in penalties and could void user authority to operate the equipment.***
- ✓ ***Make sure that the machinery and surrounding area is clear before operating. Do not activate the remote control system until certain that it is safe to do so.***
- ✓ ***Turn off the handheld remote and remove power from the base unit before attempting any maintenance. This will prevent accidental operation of the controlled machinery.***
- ✓ ***Power can safely be removed from the handheld remote by removing the source power (batteries) from the unit.***
- ✓ ***Power can be removed from the Base Unit by removing the source power from the circuit.***
- ✓ ***Use a damp cloth to keep units clean. Remove mud, concrete, dirt, etc. after use to prevent obstructing or clogging the buttons, levers, wiring, and switches.***
- ✓ ***Do not allow liquid to enter the handheld or base unit enclosures. Do not use high pressure equipment to clean the handheld remote or base unit.***
- ✓ ***Disconnect the radio base unit before welding on the machine. Failure to disconnect the base unit may result in destruction of or damage to the base unit.***
- ✓ ***Operate and store units only within the specified operation and storage temperatures defined in Specifications of this document.***

1.0 SmaRT HH-xH10 Handheld Remote

Handheld Features

- ✓ License free 900MHz or 2.4GHz Direct Sequence Spread Spectrum Technology (DSSS)
- ✓ Direct-line-of-sight communications up to 1000 ft. (330m) range
- ✓ Powered by two AAA alkaline batteries
- ✓ Low Battery Warning and Low Battery Auto-Shutdown
- ✓ Discrete ON and OFF buttons
- ✓ Ten function buttons
- ✓ Diagnostic LED Indicators
- ✓ Rugged high-impact polymer enclosure, compact weatherproof design
- ✓ Removable rubber bumper and detachable lanyard or belt clip
- ✓ Operating temperature: -4°F to +131°F (-20°C to +55°C)

SmaRT wireless high-power HH-xH10 handheld remote control units are used to communicate with and control SmaRT base units operating in the 900MHz or 2.4GHz range. The HH-xH10 handheld remote has individual ON and OFF buttons and ten function control buttons. The handheld remote has an automatic shutdown timeout — a period of time after which the handheld remote turns itself off to conserve power if no function buttons are pushed.



Figure 1. HH-xH10 6-LED Handheld Remote Button Assignments

The HH-xH10 handheld can communicate to a wide variety of SmaRT base units using direct sequence spread spectrum (DSSS) wireless technology at 2.4GHz @ 100mW or 900MHz @ 10mW. A standard HH-xH10 can provide up to ten command functions, and up to twenty command functions with the dual use of the green button as both ON and Shift Functions. It provides a robust link with a base unit in congested radio environments. SmaRT handheld units feature seamless association to SmaRT base units without need to open either the handheld or base unit cases.

The weatherproof handheld enclosure is constructed of rugged high-impact plastic with a face plate securely sealed and attached by eight screws. It is further protected by a removable rubber bumper that covers the back and sides of the unit. A lanyard is available that can be attached to the unit through a recess on the bottom of the rubber bumper, or the unit can be ordered with a convenient belt clip.

The SmaRT HH-xH10 is powered by two (2) size AAA alkaline batteries and operates between 2.0VDC to 3.2VDC. Six visible status/diagnostic LEDs (see Figure 2) indicate transmit and receive activity, communications errors, and low battery warning. Two additional LEDs – A1 and A2 – provide for custom programmed auxiliary status indications.



Figure 2. Standard Ten button Example

Notice in Figure 2 that the 10-function pushbuttons are unassigned to specific SmaRT base unit outputs. This allows for maximum flexibility while programming to interface with the wide array of available SmaRT base units. An example of a custom programmed HH-xH10 is shown as the center unit in Figure 1.

HH-xH10 Remote Options

The HH-xH10 can be ordered with or without an belt clip. Table 1 lists the available models.

Table 1. HH-xH10 Remote Options

Model Name	Frequency	RF Power	Activation, Deactivation	Belt Clip
HH-9H10	900MHz	10mW	ON,OFF	NO
HH-9H10B	900MHz	10mW	ON,OFF	YES
HH-2H10	2.4GHz	100mW	ON,OFF	NO
HH-2H10B	2.4GHz	100mW	ON,OFF	YES

2.0 Handheld and Base Unit Communication

2.1 Associate Handheld to Base Unit

An HH-xH10 handheld remote must establish a communication link with a base unit before it can be used for control. An HH-xH10 remote as part of a system is associated to the system base unit before leaving Cervis, but it is possible to associate an HH-xH10 in the field to address a communication problem or to add or replace a handheld controller. The procedure to establish the link is called Associate. In situations where it is necessary to establish or re-establish handheld-to-base unit communications, the following steps are used:

1. Stand near to the base unit with the remote **OFF** and **power removed** from the base unit.
2. Push and hold **B1** and the **ON button**. All six LEDs light solid.
3. Observe the LEDs. When only the TX begins to blink, power up the base unit while continuing to hold B1 and ON.
4. When all six LEDs light solid, release both buttons.

A successful association results in the TX LED on the base unit flashing as messages are passed between the remote and the base unit. The SmaRT System is ready for use with that particular handheld remote.

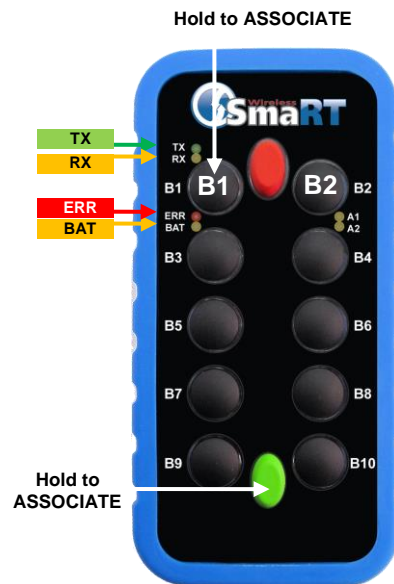


Figure 3. Associate an HH-xH10 Handheld to a Base Unit

2.2 Dissociate Handheld from Base Unit

In some circumstances it may become necessary to break the communication link, or dissociate a handheld and a base unit. The Dissociate procedure is almost identical to the Associate procedure, except the Dissociate button is used and held throughout the process instead of the Associate button.



Using the following steps will break all previously established handheld remote links.

1. Stand near to the base unit with the remote **OFF** and **power removed** from the base unit.
2. Push and hold **B2** and the **ON** button. All six LEDs light solid.
3. Observe the LEDs. When only the TX begins to blink, power up the base unit while continuing to hold B2 and ON.
4. When all six LEDs light solid, release both buttons.

Established links with base units are removed. A handheld remote must use the Associate Procedure (2.1) to re-establish a communication link with a base unit.

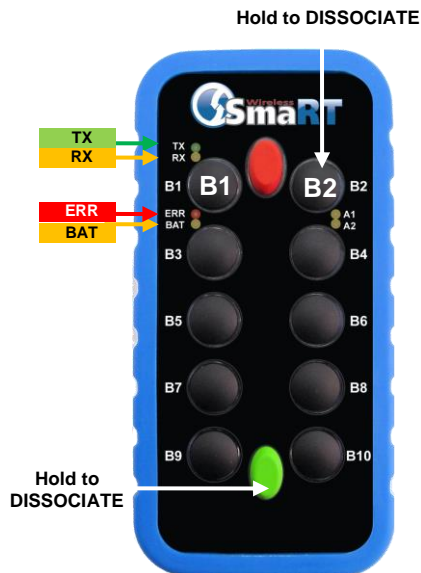


Figure 4. Dissociate an HH-xH10 Handheld from a Base Unit

3.0 Battery Installation or Change

SmaRT HH-xH10 handheld units are powered by two size AAA alkaline batteries. When installing batteries, be sure to observe proper polarity as marked on the inside of the compartment to avoid damaging the unit. To replace or install batteries in the handheld:

1. Loosen the four small Phillips screws from the Battery Compartment cover and lift the cover from the handheld. The screws remain attached to the cover.
2. If installing batteries in an empty battery compartment, install two fresh size AAA alkaline batteries. Be sure to position the batteries as shown in Figure 5 below.
3. If replacing expired batteries, remove the old batteries and install two fresh size AAA batteries. (Discard the used batteries in accordance to local regulations.) Be sure to position the batteries as shown in Figure 5 below.
4. Replace the compartment cover and tighten the four Phillips screws. These screws should not be over-tightened, but they should be tight enough to ensure the gasket provides a proper seal.

✓ **Note:** *Discard expired batteries in accordance with local regulations.*

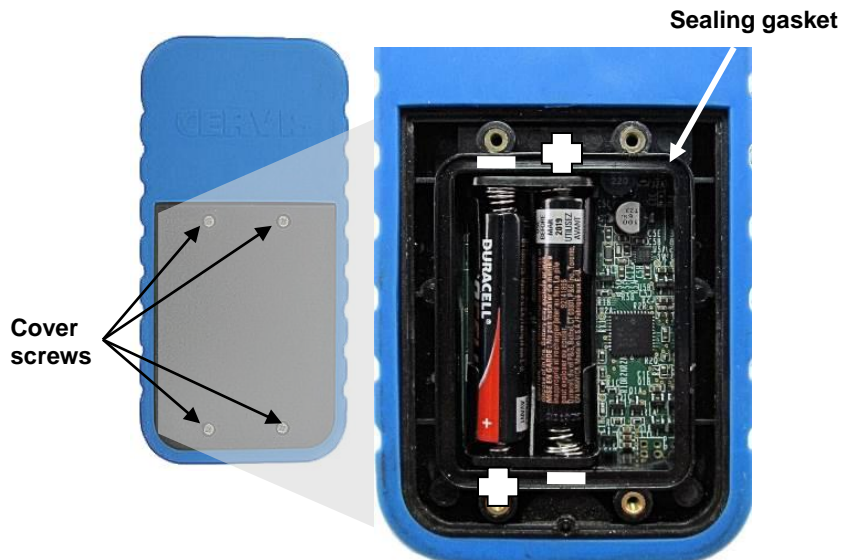


Figure 5. Handheld Battery Installation

✓ **Note:** *Cover screws must be tightened enough to ensure the sealing gasket is compressed. Do not over-tighten the screws.*

CAUTION



Be sure to observe proper polarity when placing batteries in the handheld battery compartment.

4.0 Using a Standard SmaRT Handheld Remote

Handheld control is achieved under the following conditions:

- Communication between the handheld and base unit must be established. If the handheld and base unit are not communicating while under power, the link must be established using the Associate Procedure (Heading 2.1).
- You must be in clear line of sight of the base unit while holding the handheld — usually within approximately 300m of the unit.

Usually each button is programmed for a particular assigned function or hardwired output driven by the base unit. The control may be momentary, where the command is active only while the button is engaged — or, it may be latched, where once pushed the output or function remains active when the button is released.



Figure 6. HH-xH10 Front Panel

The HH-xH10 handheld remote is powered by pushing and releasing the green On button at the bottom of the unit. The handheld will remain under power until the red Off button is pushed, or until the Inactivity timeout occurs, where no button activity is sensed for a programmed amount of time (default four [4] minutes). When the handheld is turned off and the base unit Safety Link is enabled, all base unit active functions are deactivated.

5.0 Low Battery Warning and Low Battery Auto-Shutdown

At 2.1VDC and below the Amber BATTERY LED will begin to flash approximately once per second to indicate a Low Battery Warning. Messages are still being transmitted, and the handheld can still be used, but it is recommended that a fresh set of two (2) AAA alkaline batteries should be installed as soon as possible.

At 2.0VDC the Amber BATTERY LED will turn on solid and the unit will begin a self powerdown. The associated device will receive a low battery powerdown message.

✓ **Note:** At 2.0VDC the BATTERY LED lights only for approximately 1.25 seconds. Be aware that this brief time can be easily missed by the handheld operator. Once the handheld auto-shuts down, the unit will not function properly until a fresh set of two (2) AAA alkaline batteries are installed.

LOW BATTERY

BATTERY LED begins flashing once per second indicating a LOW BATTERY (2.1V or less) situation is present. Two fresh AAA batteries should be replaced as soon as possible. The LED will continue to flash at one second intervals until the batteries are changed, or until the voltage level drops to 2.0V and Auto-Shutdown occurs.

AUTO-SHUTDOWN

At 2.0V, the BATTERY LED flashes briefly for approximately 1.25 seconds before the handheld remote automatically shuts down.

Two fresh AAA batteries must be installed before the handheld can be used again.



Figure 7. HH-xH10 Remote Low Battery Warning and Auto-Shutdown

6.0 Specifications

Table 2. *SmaRT HH-xH10 Handheld Specifications*

Item	Description	
Power	V_{in}	+2.1V to +3.2VDC
	Source	Two (2) AAA alkaline batteries
	Auto-shutdown	Four (4) minutes of button inactivity (default)
	Low Battery Warning	≈2.1V – batteries should be immediately replaced
	Low Battery Shutdown	≤2.0V – batteries must be replaced to operate
Environment	Operating Temp	-20°C to 55°C (-4°F to 131°F)
	Storage Temp	-40°C to 55°C (-40°F to 131°F)
	Humidity	0 to 100%
Radio	Frequency	906-924MHz @ 10mW
	RF Power	2405-2480MHz @ 100mW
	License	None required
	Modulation	DSSS
	Antenna	Internal
Enclosure	Dimensions	mm: 136.38 x 68.96 x 28.42 inches: 5.37 x 2.68 x 0.92
	Total Weight	200 gr./7.2 oz. (with lanyard or belt clip)
	Durability	High Impact Polymer case Polycarbonate faceplate Impact absorbing bumper
LED Indicators	TX (Green)	Transmit – Flashes when transmitting messages
	RX (Amber)	Receive – Flashes when receiving messages
	ER (Red)	Flashes when errors are detected
	BATTERY (Amber)	Blinks when low battery condition exists
	A1	Used when custom programmed
	A2	Used when custom programmed
Buttons	Twelve	Pushbuttons
	Number of Functions	Ten to twenty, program dependent

7.0 Spare Parts List

Table 3. Spare Parts List

Item	Cervis Bin Location
Protective Rubber Bumper	AA6-02
Lanyard	AA8-01B
Battery Cover with 4 Attached Screws	Call Cervis @ 724-741-9000
AAA 1.5V Alkaline Batteries (pk. 2)	AA6-03
Belt Clip	AA5-07
Replacement Antenna	Disallowed

Appendix A: Exposure to Radio Frequency Energy

SmaRT handheld remote units contain radio transceivers. A handheld remote emits radio frequency (RF) energy through its internal antenna while active.

For optimal performance and to ensure that human exposure to RF energy does not exceed the recommended guidelines, always follow these instruction and precautions: When using the handheld remote, hold the remote so that the top buttons are away from the body in the direction of the base unit. Keep the remote when in use at least 15mm (5/8 inch) away from the body, and only use carrying cases, belt clips, or holders that are approved by the Cervis, Inc.

Appendix B: Agency Identification Label Locations

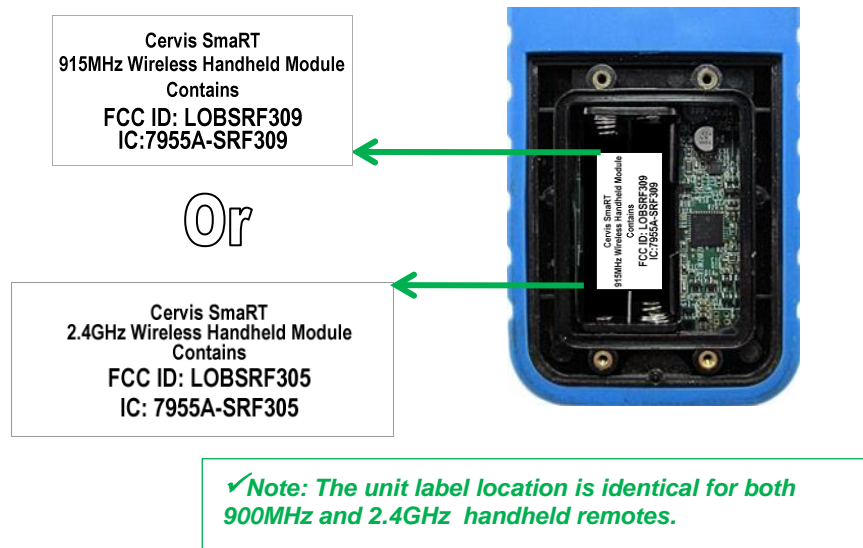


Figure 8. Agency Identification Label Locations

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