CERVIS

Wireless SmaRT™

HH-x18

User Manual

U132.0.0

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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 https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/radiation/safety-code-6-health-canada-radiofrequency-exposure-guidelines-environmental-workplace-health-health-canada.html.

Le présent appareil est conforme à la norme CNR-210 d'Industrie Canada.

L'installateur de cet équipement radio doit s'assurer que l'antenne est située ou orientée de façon à ne pas émettre un champ RF dépassant les limites de Santé Canada pour la population générale; consulter le Code de sécurité 6, disponible sur le site Web de Santé Canada https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/radiation/safety-code-6-health-canada-radiofrequency-exposure-guidelines-environmental-workplace-health-health-canada.html.

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.

Industry Canada Unlicensed Devices EIRP Statements for Removable Antennas

Part 1: Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that necessary for successful communication.

Partie 1 : Conformément à la réglementation d'Industrie Canada, cet émetteur radio ne peut fonctionner qu'avec une antenne dont le type et le gain maximal (ou inférieur) sont approuvés pour l'émetteur par Industrie Canada. Pour réduire les interférences radioélectriques potentielles avec d'autres utilisateurs, le type d'antenne et son gain doivent être choisis de telle sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne soit pas supérieure à celle nécessaire pour une communication réussie.

Part 2: This radio transmitter (LOBSRF-305) has been approved by Industry Canada to operate with the antenna type listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Partie 2 : Cet émetteur radio (LOBSRF-305) a été approuvé par Industrie Canada pour fonctionner avec le type d'antenne indiqué ci-dessous avec le gain maximal admissible et l'impédance d'antenne requise pour chaque type d'antenne indiqué. Il est strictement interdit d'utiliser avec cet appareil un type d'antenne ne figurant pas dans cette liste ou ayant un gain supérieur au gain maximum indiqué pour ce type.

Cervis, Inc.

Visit our Web site at: **www.cervisinc.com**

Table of Content

List of Figures

List of Tables

Definitions/Notes

Associate/Association
Mode whereby SmaRT handhelds and base units are paired for operation (identities [ID's] exchanged). This mode is used to commission spare handhelds or base units.

Dissociation
The process of decommisioning a handheld from a base unit's identity memory.

DSSS
Direct Sequence Spread Spectrum; an advanced wireless communication technology.

Latch
Command broadcast while a switch is placed in position or when a button is pressed. The command ends when the switch is repositioned or when the button is released. Or, in some cases, when the button is pressed again.

Line of Sight (aka Direct-Line-of-Sight)
Term used to describe radio frequency (RF) communication where the pathway between the units is clear of physical obstacles such as walls, earth, and other obstructions.

PTO
Push-to-Operate: Command broadcast only while a button is depressed. The command ends when the button is released.

SmaRT Base Unit
Input/output (I/O) unit that the controlled machine is connected to. SmaRT base units communicate with each other and SmaRT handheld, console, and 18-button handheld remote controllers.

TX/RX
Transmit/Receive

Contact us with questions during installation or troubleshooting at (724) 741-9000

Cervis, Inc. Safety Precautions

- ✓ *Read and follow all instructions.*

- ✓ *Failure to abide by Safety Precautions may cause 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.*

- ✓ *Equipment owner/operators must abide by all applicable Federal, State, and Local laws concerning equipment installation and operation. 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.*

- ✓ *Remove power from the base unit by detaching the 12-pin cables from the base unit connectors P1 and P2, or 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 base unit before welding on the machine. Failure to disconnect the base unit may cause destruction of or damage to the base unit.*

- ✓ *Operate and store units only within the specified operation and storage temperatures defined in this document's specifications.*

- ✓ *Keep high-energy radio frequency (RF) devices away from handheld remotes. Activation of high-power communication radios, for instance, in close proximity to handheld remotes can cause interference and "false" circuit activation.*

- ✓ *Do not key two-way radios while using the handheld remote.*

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The following applies only to SmaRT HH-x18 Handheld remote control systems.

RoHS Compliance Statement

Cervis, Inc. complies with the requirements of *Restriction of Hazardous Substances (RoHS) 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
Phone: 724.741.9000
Fax: 724.741.9001

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 according to local regulations. Contact local authorities for detailed information.
- ✓ This product may be returnable to the distributor for recycling. Contact your distributor for details.

1.0   SmaRT HH-x18 Portable Unit

The SmaRT HH-x18 portable unit is designed for traditional and non-traditional industrial remote control applications in conjunction with a variety of base units. The ergonomic layout of the handheld remote provides for comfortable operation in many environments.

Using direct sequence spread spectrum wireless technology at 900 MHz (9X) or 2.4 GHz (2H), the HH-x18 (replace x with 9X or 2H) provides a robust link to a base unit in congested radio environments. The handheld remote allows seamless association to a base unit without the need to open the case of either unit.

The rugged weatherproof handheld enclosure – complete with a boot for additional protection – allows the unit to operate worry free in harsh environments.

The OO-x18 handheld remote has a dedicated ON button and an OFF button. The remaining sixteen buttons are assigned to and used to control the base unit outputs.

Figure 1 SmaRT HH-x18 Handheld Remote Control Units

1.1 Handheld Features

- Uses direct sequence spread spectrum technology (DSSS) at 900 MHz or 2.4 GHz
- Color graphic organic light emitting diode (OLED) display option
- Single or dual On and Off button
- Eight LED indicators
- Low voltage warning LED indication and critical low voltage auto-shutdown
- Rugged high impact polymer/polycarbon/stainless steel enclosure
- Removable bumper option
- Operates at 3.0-6.0 VDC (uses four "AA" cell batteries)

1.2   SmaRT HH-x18 Handheld Battery Installation

The handheld remote operates between 3.0 to 6.0 VDC powered by four factory supplied 1.5 V "AA" cell batteries. Cervis, Inc. recommends having fresh spare batteries on hand at all times that the system is in use.

✔ *Note: The battery cover is designed so that the four screws holding the battery cover in place are "captive" to the cover. Although not easily removed from the cover itself, be aware that if the screws are over-loosened while opening the battery compartment, they can be completely removed, increasing the risk of loss. All four screws must be installed to maintain a tight seal.*

1. Place the remote face down, and remove the four screws holding the battery cover in place. Remove the battery cover.
2. Remove the discharged batteries and properly dispose according to local regulations.
3. Plug each fresh battery into a terminal cradle observing proper polarity. The interior of the cradle shows polarity markings for each terminal (Figure 2). Make sure the batteries are firmly seated in the cradle.
4. Replace the battery cover. Secure the cover with the four screws. Make sure they are tightened enough to compress the seal, but be careful not to over-tighten.

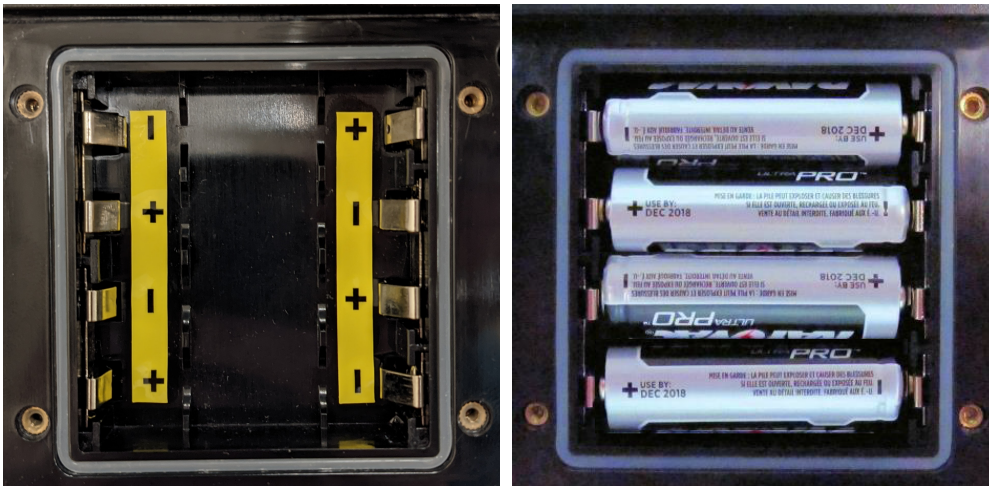

Figure 2 HH-x18 Handheld Battery Compartment

CAUTION
⚠
Observe proper polarity when placing batteries into the cradle. Improper battery placement can cause excessive heat, battery explosion, injury to the operator, and damage to the remote.

✔ *Note: Cervis, Inc. recommends removing the batteries from the handheld remote when it is going to be stored for any extended length of time.*

1.3 Low Battery Warning

When low voltage is sensed at approximately 3.2 V, the BATT LED will begin to flash approximately once per second indicating a low battery warning. Messages are still being received, and the handheld can still be used, but it is recommended that a fresh set of four AA batteries should be installed as soon as possible.

1.4 Low Battery Auto-Shutdown

When the handheld battery voltage reaches 3.0 V, the unit will deactivate. The four AA batteries must be replaced before the handheld remote can be used.

2.0 SmaRT HH-x18 Operation

2.1 SmaRT OO-x18 Operation

Turn ON the Unit

Power the remote ON (button 1) by pressing the Green-and-White **ON** button .

Turn OFF the Unit

Turned OFF (button 3) the remote by pressing and holding the Red-and-White **OFF** button for about 3 seconds.

Buttons 1 through 18

Buttons 1 through 18 are used to control the base unit. These buttons are typically mapped to specific base unit outputs.

2.2 SmaRT DO-x18 Operation

Turn ON the Unit

When the unit is off, the remote is *turned ON* by pressing the **ON/OFF** button (button 1).

Turn OFF the Unit

When the unit is on, the remote is *turned OFF* by pressing and holding the **ON/OFF** button (button 1) for about 3 seconds.

Buttons 1 through 18

Buttons 1 through 18 are used for control of the base unit outputs. These buttons are typically mapped to specific base unit outputs.

Figure 3 OO-x18 Handheld Buttons (left), DO-x18 Handheld Buttons (right)

3.0 Associate Mode

In the steps below, specific references are made to buttons. For where the buttons are located reference Figure 3.

3.1 Association

Use the Associate Mode to establish the communications link between the HH-x18 handheld remote and base unit on a 1-to-1 basis. There must be a clear line of sight between the handheld and the base unit to associate, and both units must be OFF (powered down). Turn off the HH-x18 by pressing the OFF button. Safely power down the SmaRT base unit by removing the power source from the unit.

> **CAUTION**
> ⚠
>
> *To prevent inadvertent machine movement, be sure to remove power from the base unit before attempting to enter Associate Mode.*

Observe LED states while performing the following Association:

1. Remove power from the base unit, and make sure the handheld is turned off.
2. Stand near the base unit's antenna (if the base unit has an internal antenna, stand near the base unit) with the handheld in clear line-of-sight.
3. Press and hold **button 2**, then press and hold the **ON** button. The left side LEDs will activate for one second.
4. Wait until the TX LED starts blinking and the ERR LED turns on solid. Then power on the base unit.
5. If association is successful, all LEDs will activate. **Button 2** and the **ON** button can now be released.

3.2 Dissociation

Use the Dissociate Mode to break the communication link between the HH-x18 handheld remote and base unit on a 1-to-1 basis. There must be a clear line of sight between the handheld and the base unit to dissociate, and both units must be OFF (powered down). Turn off the HH-x18 by pressing the OFF button. Safely power down the SmaRT base unit by removing the power source from the unit.

> **CAUTION**
> ⚠
>
> *To prevent inadvertent machine movement, be sure to remove power from the base unit before attempting to enter Dissociate Mode.*

Observe LED states while performing the following Dissociation:

1. Remove power from the base unit, and make sure the handheld turned off.
2. Stand near the base unit's antenna (if the base unit has an internal antenna, stand near the base unit) with the handheld in clear line-of-sight.
3. Press and hold **button 3** (DO) or the **OFF** button (OO), then press and hold the **ON** button. The left side LEDs will activate for one second.
4. Wait until the TX LED starts blinking and the BATT LED turns on solid. Then power on the base unit.

5. If dissociation is successful, all LEDs will activate. **Button 3** (DO) or the **OFF** button (OO) and the **ON** button can now be released.

4.0   HH-x18 Menu Adjustments (Display Version Only)

Handheld units with a display option feature a 128x96 graphic OLED screen. Specific menu adjustments are available in the display. In the steps below, specific references are made to buttons. For where the buttons are located reference Figure 3.

4.1   Menu Adjustment Mode

1. To enter Menu Adjustment Mode, press and hold buttons ON and OFF (OO version) or ON and button 3 (DO version) for 3 seconds.

2. Screen will transition to show FCC ID and HH ID.

3. Press Button 2 to transition screens.

4. Screens rotate in order FCC ID & HH ID, Display Brightness adjustment, HH Timeout modification, Display Screen Brightness Timeout.

5. Press Button 1 to save and exit from the Adjustment Menu.

4.1.1   Screen Brightness Adjustment

1. Press and release Button 2 until the display says "Bright Level".

2. Pressing and releasing Button 12 will increase the brightness by 1 count until max. At max no change happens. Range is between 0 and 15.

3. Pressing and releasing Button 15 will decrease the brightness by 1 count until off. When off pressing and releasing button 15 has no effect.

4.1.2   Handheld Timeout Adjustment

1. Press and release Button 1 until the display says "Timeout Min: XX"

2. Pressing and releasing Button 12 will increase the timeout by 1 count, or by the next count. When infinite, timeout will roll over to 1 minute.

3. Pressing and releasing Button 15 will decrease the timeout by 1 count, or by the next count. When 1 minute, timeout will roll over to infinite.

4. Timeout values are 1 – 10, 15, 20, 30, or infinite. Display will represent current value.

4.1.3   Screen Backlight Timeout Adjustment

1. Press and release Button 2 until the display says "Light TO Sec: XX"

2. Pressing and releasing Button 12 will increase the timeout by 1 count. When 30s, timeout will roll over to 1 second.

3. Pressing and releasing Button 15 will decrease the timeout by 1 count. When 1s, timeout will roll over to 30 seconds.

4. Timeout values are 1 – 30 seconds. Display will represent current value.

5.0 Specifications

Table 1 SmaRT HH-x18 Specifications

Item	Description	
Power	**V$_{in}$**	+3.0 to +6.0 VDC
	Batteries	Four "AA" cell
	Battery Life	70 hours
	Auto-shutdown	10' of button inactivity
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**	906–924 MHz 2405–2480 MHz
	900MHz RF Power	100 mW
	2.4GHz RF Power	100 mW
	License	License-free
	Modulation	DSSS
	Antenna	Internal
Enclosure	**Dimensions**	9⅛" x 3⅛" x 1¼" (231.8 mm x 79.4 mm x 31.8mm)
	Total Weight	15.2 oz. (430.9 gr.)
	Durability	High impact polymer case Polycarbonate faceplate Stainless steel faceplate
Indicators (8)	**LEDs**	
	TX (Green LED 1)	Blinking – transmitting, no switch active
		Solid – button press, switch active
	RX (Amber LED 2)	Blinking – receiving
	ERR	Application specific
	BATT	See Section 3.0
	5	Application specific
	6	Application specific
	7	Application specific
	8	Application specific
Pushbuttons (18)	**Style**	Latching or Momentary
	Button Life	5 million operations (typical)