This product should be recycled in accordance with local regulations. Contact local authorities for detailed information.

Do not dispose of the product as unsorted municipal waste.

This product may be returnable to the distributor for recycling. Contact your distributor for details.
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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 transmitter and disconnect power from the receiver before attempting any maintenance. This will prevent accidental operation of the controlled machinery.
- 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 transmitter or receiver enclosures. Do not use high-pressure equipment to clean the transmitter or receiver.
- Disconnect the receiver before welding on the machine. Failure to disconnect the receiver may cause destruction of or damage to the receiver.
- 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 transmitters. For instance, activating high-power communication radios close to transmitters can cause interference and “false” circuit activation.
- Do not key two-way radios while using the transmitter.
1.0 Warrior HHMS-9XW08 Transmitter

The Warrior HHMS-9XW08 transmitter is a compact transmitter that interfaces with all Warrior receivers. The HHMS-9XW08 has two standard green pushbuttons on the unit’s back side and eight multi-step actuators on its front. These eight actuators are performance-rated at 2.3 lbf (10.23 N) for more than two million operations and available in three different configurations:

- 2-Step: Dual redundant button, where the first and second steps are redundant.
- 3-Step: Features a redundant first step and distinctive second and third steps.
- Any-Step: Offers a “rumble” of seven steps for analog output and applications greater than three steps.

The transmitter’s vented enclosure is made of a high-impact polymer, designed to meet an ingress protection rating of “IP50” according to International Electrotechnical Commission (IEC) standard 60529. The unit has four diagnostic LEDs that indicate radio frequency (RF) transmit/receive, Battery status, A selection, and B selection, as well as four numbered configurable Auxiliary function LEDs. It also features an organic LED (OLED) display that indicates battery life, RF signal strength and RF link status.

Frequency Channel Hopping Direct Sequence Spread Spectrum (CH DSSS) wireless technology (at 900MHz @ 100mW) allows HHMS-9XW08 transmitters to create a robust link with MU-9X6E Warrior receivers in congested radio environments. These transmitters feature seamless association to receivers without having to open a machine-mounted receiver.

Handheld remote applications include overhead crane control – such as two-motion/two-speed, where it can include A/B transfer. The transmitter deactivates immediately following a high g-force event. Auto-Shutdown is also available through an inactivity timer. Both features are configurable.

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Note: Refer to the MU-9X6E receiver manual being used or specific project documentation for relay operation details.

Figure 2 is the label that is permanently attached to the unit’s back side. This label describes warnings and precautions that must be followed when using the transmitter.

Figure 2. Warrior HHMS-9XW08 Transmitter Warnings and Precautions

1.1 HHMS-9XW08 LEDs

The HHMS-9XW08 has eight red light-emitting diodes (LEDs) that indicate transmitter status and are also used for troubleshooting. Table 1 describes each LED.

Table 1. HHMS-9XW08 LEDs

<table>
<thead>
<tr>
<th>LED</th>
<th>Icon</th>
<th>Indication</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><img src="image" alt="Radio Frequency (RF)" /></td>
<td>Lit Solid Flashing</td>
<td>Transmitter searching for receiver or a button is being pressed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Transmitting and receiving messages</td>
</tr>
<tr>
<td></td>
<td><img src="image" alt="Battery" /></td>
<td>Off Flashing 1.25s Solid</td>
<td>Battery strength normal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Battery ≤6.6V</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Start of Auto Shutdown ≤6.1V</td>
</tr>
<tr>
<td>3</td>
<td><img src="image" alt="Selection" /></td>
<td>Off (unlit) On (lit solid)</td>
<td>A not selected</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A selected</td>
</tr>
<tr>
<td>4</td>
<td><img src="image" alt="Selection" /></td>
<td>Off (unlit) On (lit solid)</td>
<td>B not selected</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>B selected</td>
</tr>
<tr>
<td>AUX</td>
<td><img src="image" alt="1-4" /></td>
<td>Off (unlit) On (lit solid)</td>
<td>Configurable Auxiliary Functions.</td>
</tr>
</tbody>
</table>
## 1.2 HHMS-9XW08 OLED Display On-Screen Icons

Table 2. HHMS-9XW08 OLED Icons

<table>
<thead>
<tr>
<th>Icon</th>
<th>Indication</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="HHMS-9XW08_Icon.png" alt="Icon" /></td>
<td>Start-Up Message</td>
<td>Displays the programmed transmitter identity (ID) number.</td>
</tr>
<tr>
<td><img src="Battery_Life.png" alt="Icon" /></td>
<td>Battery Life</td>
<td>Indicates the amount of power left in the rechargeable LiPO battery.</td>
</tr>
<tr>
<td><img src="No_RCVR.png" alt="Icon" /></td>
<td>No Receiver (Open Link)</td>
<td>No receiver ID is stored in the transmitter’s memory. Transmitter will power down in five seconds.</td>
</tr>
<tr>
<td><img src="Flashing_Open_Link.png" alt="Icon" /></td>
<td>Flashing Open Link</td>
<td>Transmitter is establishing a link with the receiver.</td>
</tr>
<tr>
<td><img src="Solid_Closed_Linked_Chain.png" alt="Icon" /></td>
<td>Solid Closed Linked Chain</td>
<td>The radio frequency (RF) link is established with the receiver. (Press Start to pull in the MLC relays.)</td>
</tr>
<tr>
<td><img src="Receiver_ID_Link.png" alt="Icon" /></td>
<td>Receiver ID Link</td>
<td>Indicates that the receiver that the transmitter is linked to is the programmed receiver ID.</td>
</tr>
<tr>
<td><img src="Link_Quality_Indicator.png" alt="Icon" /></td>
<td>Link Quality Indicator</td>
<td>Four bars indicate the signal strength between the transmitter and the receiver.</td>
</tr>
<tr>
<td><img src="Maintenance_Mode.png" alt="Icon" /></td>
<td>Maintenance Mode</td>
<td>The transmitter is in Maintenance Mode. Press Start to exit Maintenance Mode.</td>
</tr>
<tr>
<td><img src="Association_Mode.png" alt="Icon" /></td>
<td>Association Mode</td>
<td>The transmitter is in Association Mode. Use actuators S9 and S10 to select/initialize.</td>
</tr>
<tr>
<td><img src="A_Select.png" alt="Icon" /></td>
<td>A Select</td>
<td>Indicates that the A Select relay is on.</td>
</tr>
<tr>
<td><img src="B_Select.png" alt="Icon" /></td>
<td>B Select</td>
<td>Indicates that the B Select relay is on.</td>
</tr>
<tr>
<td><img src="Transmitter_Reset_Mode.png" alt="Icon" /></td>
<td>Transmitter Reset Mode</td>
<td>While in Maintenance Mode, this icon displays when resetting the transmitter ID.</td>
</tr>
</tbody>
</table>
### 1.3 HHMS-9XW08 Battery Installation

A rechargeable Lithium Polymer (LiPO) battery pack powers HHMS-9XW08 transmitters. When installed and fully charged, the battery supplies power to the transmitter for 80 continuous operating hours. When installing the battery, be sure that the metallic battery contacts properly align with those inside the unit.

**To install the battery pack in the transmitter body:**

1. Pinch the clamps on each side of the battery in.
2. Slide the battery pack into the transmitter body until you hear a click.

**Note:** Make sure the battery contacts are positioned relative to the front right side of the transmitter.

**To charge the battery pack:**

1. Pinch the clamps on each side of the battery in.
2. Slide the battery pack into the battery charger, as illustrated in Figure 3. (Make sure the battery contacts are oriented correctly with those inside the charger.)
3. Plug the charger into a nearby wall socket.

The LED on the plug indicates charging status. (Solid Red = charging. Solid Green = charged. Maximum charging time = Five hours from zero charge.)
4. When the battery has finished charging, unplug the charger from the wall socket, remove the battery from the charger base, and insert it into the transmitter.

*Figure 3. HHMS-9XW08 Battery Installation*

### 1.4 HHMS-9XW08 Battery Warning and Shutdown

The HHMS-9XW08 will alert you if the remaining battery life is getting low or is too low for normal operation.

**LOW BATTERY**

The BATTERY LED flashes once per second, indicating a **LOW BATTERY** (6.6V or less) situation is present. Recharge the battery pack within five hours of the first low battery warning. The LED continues to flash either until the battery pack is charged or until the voltage level drops to 6.1V, when **Auto-Shutdown** occurs.

**Note:** The receiver LED quickly flashes three times, once per minute when transmitter low battery is indicated. The battery icon on the transmitter's OLED screen also indicates the level of available battery power.

**AUTO-SHUTDOWN**

At 6.1V, the BATTERY LED lights solid for approximately 1.25 seconds before the transmitter automatically shuts down.

Recharge the battery pack before using the transmitter again.

*Figure 4. HHMS-9XW08 Remote Low Battery Warning and Auto-Shutdown*
1.5 System Startup

1. Press the **Start** button on the rear of the transmitter.

![Image of Start button]

2. After the “Warrior SN” message briefly flashes:

![Image of Warrior SN message]

The LEDs on the left side flash in the following pattern:

![Image of flashing LEDs]

And the display indicates to push the **STOP** button/switch either down or up (depending on its current position). Follow the on-screen prompts.

![Image of STOP options]

3. Press the **STOP** button/switch down or up, depending on the on-screen prompts.

![Image of pressing STOP button]

This process tests the **STOP** switch contacts and must be done before the system starts.

✓ **Note:** You have two seconds to pull up the **STOP** button/switch before the unit shuts down. If it does, restart the process from Step 1.
4. When the connected link icon appears on the display (with receiver number displayed):

Press the Start button again to energize the crane by pulling in the receiver’s main line contact (MLC) relays.
2.0 Associate a Transmitter with a Receiver

Warrior HHMS-9XW08 transmitters are associated with their respective system receivers at the factory before the system is shipped. A receiver will only communicate with the transmitters it is associated with. Other Warrior HHMS-9XW08 transmitters can be associated with the receiver when necessary, either as additional spares or to replace damaged transmitters. Find specific Warrior receiver details in the following receiver’s manual:

U107.1.0 Warrior MU-X6E Receiver Manual
U104.6.0 Warrior MU-9X15 Receiver Manual

2.1 Associate an HHMS-9XW08 to a Warrior MU-9X6E Receiver

The system and any spare transmitters sold with the system will be associated with the radio receiver for first-come/first-serve operation before being shipped from Cervis, Inc. For any new spare transmitters, follow these steps to associate the new transmitter with the receiver:

✓ Note: Before attempting association, make sure that receiver S01 DIP Switch #8 in the desired receiver is set to the ON (1) position.

1. Follow start-up procedure steps 1–3 (see Section 1.5).
2. Once the B LED illuminates solid (left side of display):
Immediately press and release actuators S9 and S10.

**Note:** If the B LED goes out before you press the buttons, restart the process from Step 1.

3. The LEDs begin to scroll, indicating that the transmitter is in *Maintenance Mode*.

The OLED screen also displays the following icon:
4. Press and hold actuators S3 and S4 for five seconds.

5. LED A begins blinking; release actuators S3 and S4.

The OLED screen also displays the following icon:

The transmitter is now in Association Mode.
Once the transmitter enters Association mode, it begins scanning for nearby radio receivers to associate with. When it locates a receiver for association, the LED on that receiver begins to blink.

Select that receiver by pressing actuator S10, or bypass it by pressing actuator S9 (if you don’t want to use that receiver). Repeat this action until you find the correct receiver.

6. When the closed link icon appears on the display (with receiver number displayed):

Press the Start button to energize the crane by pulling in the receiver’s MLC.
## 3.0 HHMS-9XW08 Transmitter Specifications

### Table 3. HHMS-9XW08 Transmitter Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power</strong></td>
<td><strong>V&lt;sub&gt;in&lt;/sub&gt;</strong> +6V to +8.4V</td>
</tr>
<tr>
<td><strong>Source</strong></td>
<td>Rechargeable Lithium Ion Battery Pack</td>
</tr>
<tr>
<td><strong>Low Battery Warning</strong></td>
<td>6.6V – batteries should be immediately replaced</td>
</tr>
<tr>
<td><strong>Low Battery Shutdown</strong></td>
<td>6.1V – batteries must be replaced to operate</td>
</tr>
<tr>
<td><strong>Environment</strong></td>
<td><strong>Operating Temp</strong> -4°F to 140°F (-20°C to 60°C)</td>
</tr>
<tr>
<td></td>
<td><strong>Storage Temp</strong> -22°F to 158°F (-20°C to 70°C)</td>
</tr>
<tr>
<td></td>
<td><strong>Humidity</strong> 0–95% non-condensing</td>
</tr>
<tr>
<td><strong>Radio</strong></td>
<td><strong>Frequency</strong> 904–926 MHz @ 100mW</td>
</tr>
<tr>
<td></td>
<td><strong>License</strong> No license required</td>
</tr>
<tr>
<td></td>
<td><strong>Modulation</strong> DSSS</td>
</tr>
<tr>
<td></td>
<td><strong>Antenna</strong> Internal</td>
</tr>
<tr>
<td><strong>Enclosure</strong></td>
<td><strong>Dimensions</strong> 76.2mm x 220.98mm x 42.67mm</td>
</tr>
<tr>
<td></td>
<td>3.0” x 8.7” x 1.68”</td>
</tr>
<tr>
<td></td>
<td><strong>Weight</strong> 1.43 lb. / 650g</td>
</tr>
<tr>
<td></td>
<td><strong>Durability</strong> High Impact Polymer case Polycarbonate faceplate</td>
</tr>
<tr>
<td><strong>Indicators</strong></td>
<td><strong>(See Table 1)</strong></td>
</tr>
<tr>
<td><strong>Radio Frequency</strong></td>
<td>Indicates wireless communications (transmit/receive)</td>
</tr>
<tr>
<td><strong>Battery</strong></td>
<td>Indicates battery status</td>
</tr>
<tr>
<td><strong>A</strong></td>
<td>Indicates Crane A selected when lit</td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>Indicates Crane B selected when lit</td>
</tr>
<tr>
<td><strong>AUX 1–4</strong></td>
<td>Auxiliary Functions (configurable)</td>
</tr>
<tr>
<td><strong>Buttons</strong></td>
<td><strong>Two</strong> Two-step pushbuttons</td>
</tr>
<tr>
<td></td>
<td><strong>Eight</strong> Two-, Three- or Any-Step actuators</td>
</tr>
</tbody>
</table>
Appendix A: Exposure to Radio Frequency Energy

Warrior transmitters and machine units contain radio transceivers. When active, a transmitter sends out radio frequency (RF) energy through its internal antenna. Warrior transmitters and receivers comply with limits set by the United States Federal Communications Commission (FCC) for operating distance from human tissue.

Appendix B: RF Exposure Considerations

The radio module may be used in a variety of host applications falling into two general categories:

1. **Mobile** applications: Any operating locations where the transmitting equipment is not on a human body. In mobile applications, the host application is typically fixed to mobile equipment, with either an internal or external antenna.

2. **Portable** applications: Any operating locations where the transmitting equipment is located on the hand, arm, or other part of the human body. In portable applications, the equipment is either held in the hands of an operator or affixed to either a belt or harness on the torso.

Equipment containing the radio module was evaluated for RF exposure hazards by two approaches:

1. Maximum Permissible Exposure (MPE) for mobile applications.
2. Specific Absorption Rate (SAR) for portable applications.

Required separation distances are measured from the actual location of the radiating part of the antenna. An antenna may be inside the host application, affixed to the host application enclosure, or at the end of an optional extension coaxial cable.

**Mobile Applications**

Equipment must be located at least 20cm away from areas likely to be occupied by an unaware person.

**Transmitter Applications**

All operators of transmitter equipment with any type of antenna require proper equipment operation training, and such training must include RF exposure safety instructions. They are then considered to be “aware” persons once training is completed.

If the portable operating position is on the hand or arm, a 5mm separation is required between the radiating part of the antenna and nearby human tissue.

**Required Training**

All installers and operators of host applications that include an SRF310 FT module must be trained to use proper RF safety precautions as presented in this Appendix.
Appendix C: Agency Identification Label Locations

Figure 5. Agency Identification Label Locations

Note: The Agency ID label for all Warrior HHMS-9XW08 base units can be found in the position shown.