



**PG-2H12JS and PG-9H12JS**  
**Pistol Grip Handheld Remote**  
**User Manual**

U070.6.0

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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. Le fonctionnement est soumis aux deux conditions suivantes : (1) cet appareil ne doit pas causer d'interférences, et (2) cet appareil doit accepter toute interférence, y compris les interférences susceptibles de causer un fonctionnement non désiré de l'appareil.*

## 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

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 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.

## Table of Contents

List of Figures .....	i
List of Tables.....	i
Manual Conventions .....	ii
Cervis, Inc. Safety Precautions.....	1
1.0 Smart PG-2H12JS and PG-9H12JS Handheld Remote .....	1
1.1 Handheld Features .....	3
1.2 Standard Switches, Joystick, and Trigger Identification.....	3
1.3 Optional Umbilical CANbus Connector .....	4
1.4 Standard Remote Switches .....	5
1.5 Remote LEDs .....	5
2.0 PG-xH12JS Pistol Grip Battery Installation.....	6
3.0 Typical PG-xH12JS Pistol Grip Associate Mode .....	7
4.0 PG-xH12JS Pistol Grip Operation.....	8
4.1 To Start And Stop The Pistol Grip Remote.....	8
4.2 Toggle Switch Operation .....	8
4.3 Typical Joystick and Trigger Operation.....	8
4.4 PG-xH12JS Proportional Joystick Adjustment .....	8
5.0 Smart Remote Control Specifications.....	9
Appendix A: Exposure to Radio Frequency Energy .....	10
Appendix B: Agency Identification Label Locations.....	10
Appendix C: PG-xH12JS Family of Smart Handheld Remotes .....	10
Appendix D: Declaration of Conformity .....	11

## List of Figures

Figure 1. Smart PG-xH12JS Handheld Remote Control Unit Example.....	2
Figure 2. Top Plate Switches, Joysticks, and Trigger Layout.....	3
Figure 3. Umbilical Connector and CANbus Wiring.....	4
Figure 4. Pistol Grip Battery Installation .....	6
Figure 5. Switch Actuation for Associate Mode .....	7
Figure 6. Agency Identification Label Locations.....	10

## List of Tables

Table 1. Standard Remote Switches.....	5
Table 2. Handheld Remote LEDs .....	5
Table 3. PG-2H12JS and PG-9H12JS Pistol-Grip Specifications .....	9
Table 4. PG-xH12JS Family of Pistol Grip Handheld Remotes .....	10

## Manual Conventions

**Section and Chapter Numbers**—like 1.0 and 1.1 respectively—may be referred to as **Headings** throughout this manual.

**Figure Captions** are centered beneath the referenced figure.

**Table Captions** are left justified just above the tables.

✓ **Note:** Notes pertaining to the use of the device, function, switch, system, etc. are used to alert the user to information that is useful, instructive, or informative.

### Caution!



**Caution Statements** indicate action instructions or user information that demands attention. Failure to recognize the statements of a Caution may be detrimental or may cause harm to the operator, system equipment, or personnel that may be in the area. It is **critical** for the user/operator to pay attention to a Caution.

## **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.**
- ✓ **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 either by detaching the 12-pin cables from the base unit connectors 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 radio 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. Activating 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.**

## 1.0 SmaRT PG-2H12JS and PG-9H12JS Handheld Remote

✓ **Note:** Frequency of operation for a SmaRT handheld remote will be in the 2.4 GHz or 900 MHz range. The first number in the name of the system or device indicates the frequency of operation. For instance, a SmaRT pistol grip handheld remote in this document will either be PG-2H12JS or PG-9H12JS, where a 2 indicates 2.4 GHz and 9 indicates 900 MHz frequency of operation. As such, reference to the handheld remote, base unit, or system in this manual may use x rather than a 2 or 9 in the name to indicate the frequency of operation.

The SmaRT PG-xH12JS is designed for traditional and non-traditional mobile applications. Capable of activating and deactivating the input/outputs of SmaRT base units, the ergonomic layout of the handheld remote provides for comfortable remote operation of the SmaRT system.

Using channel-hopping direct sequence spread spectrum (DSSS) wireless technology at system-dependent 2.4 GHz or 900 MHz frequency range to communicate, the SmaRT PG-xH12JS handheld remote provides a robust link with a base unit in congested radio environments. The handheld remote allows seamless association with a SmaRT base unit without the need to open the enclosure of either unit. The rugged, weatherproof handheld enclosure allows the unit to operate worry free in harsh weather conditions.

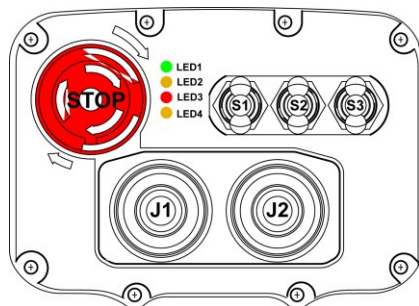
*Figure 1. SmaRT PG-xH12JS Handheld Remote Control Unit Example*

## 1.1 Handheld Features

- Channel-Hopping Direct Sequence Spread Spectrum (DSSS) technology at 2.4 GHz or 900 MHz
- Direct-line-of-sight operation
- Two dual- or single-axis joystick controls
- Weatherproof design
- Custom control programming available
- Optional umbilical CAN Bus operation
- Critical low voltage auto-shutdown
- Rugged high-impact polymer/polycarbonate/aluminum enclosure
- Magnets integrated into the handle for convenient attachment to ferrous metal surfaces helps avoid misplacing the handheld remote
- Operates at 1.6 – 3.2 VDC (four “AA” cell batteries) with nominal battery life of ≈100 hours
- Three toggle multiple function controls
- Oversized Machine Stop
- Controls a full line of SmaRT base units
- Low voltage warning LED indication
- Variable inactivity time-out
- Four status and diagnostic LED indicators
- Four status and diagnostic LED indicators
- Spring return trigger for digital or proportional control

## 1.2 Standard Switches, Joystick, and Trigger Identification

The standard PG-xH12JS has three toggle switches, two single- or dual-axis joysticks, a machine stop button, and a spring-return trigger. Units configured for CAN Bus communications have an umbilical port at the base of the handheld remote handle as shown in Figure 3.



**Joystick Details**

Y+

X-

X+

Spring-Return Trigger

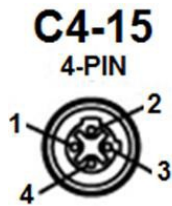
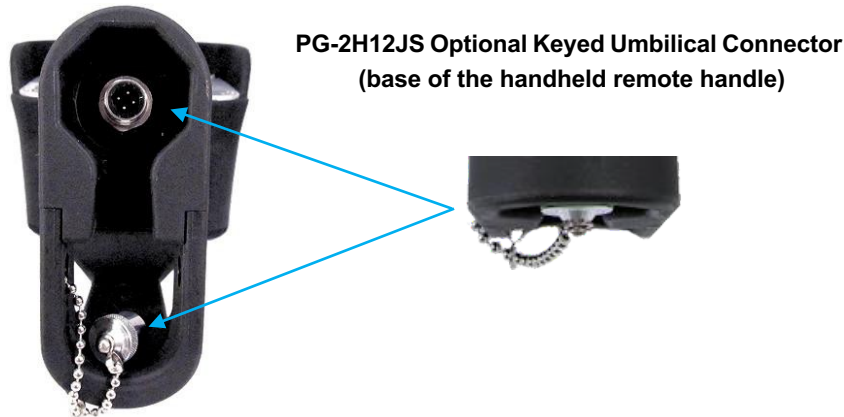
Y-

Magnets

*Figure 2. Top Plate Switches, Joysticks, and Trigger Layout*

## 1.3 Optional Umbilical CANbus Connector

The PG-xH12JS option affords the opportunity to connect to the base unit using an umbilical cable as a backup. The keyed CANbus connector is located at the base of the handheld remote handle. When not in use, the connector is protected by an aluminum cap that is attached to the handle by a chain to keep it from being misplaced when removed for use as illustrated below. Cervis, Inc. offers a selection of umbilical wiring harnesses fit for use with the PG-xH12JS handheld remote. For details, please contact your Cervis, Inc. representative.



Cervis	
<u>Wiring Harness</u>	
1 - UMB PWR	RED/BLK
2 - CAN H	RED/WHT
3 - CAN L	RED
4 - COMMON	GREEN



**Base Unit**  
**Connections**

Please refer to UMB connection information provided for your specific base unit.

*Figure 3. Umbilical Connector and CANbus Wiring*



## 1.4 Standard Remote Switches


*Table 1. Standard Remote Switches*

Switch/Button	Typical Function	Description	Default
<b>S1 UP</b>	Output Control	3-position momentary or latch	Center (no command)
<b>S1 DOWN</b>	Output Control		
<b>S2 UP</b>	Output Control	3-position momentary or latch	Center (no command)
<b>S2 DOWN</b>	Output Control		
<b>S3 UP</b>	Output Control	3-position momentary or latch	Center (no command)
<b>S3 DOWN</b>	Output Control		
<b>PB1 Down</b>	Machine Stop Handheld Disabled	2-position maintained Spring-loaded mushroom style Depress to stop (disable) CW twist to release (enable)	Down (unit off)
<b>PB1 Up</b>	Handheld Enabled		
<b>J1 +Y</b>	Proportional Output Control	Dual-axis open gated joystick	Center (no command)
<b>J1 -Y</b>	Proportional Output Control		
<b>J1 +X</b>	Proportional Output Control	Dual-axis open gated joystick	Center (no command)
<b>J1 -X</b>	Proportional Output Control		
<b>J2 +Y</b>	Proportional Output Control	Dual-axis open gated joystick	Center (no command)
<b>J2 -Y</b>	Proportional Output Control		
<b>J2 +X</b>	Proportional Output Control	Dual-axis open gated joystick	Center (no command)
<b>J2 -X</b>	Proportional Output Control		
<b>Trigger</b>	Joystick Enable Switch Enable Proportion Control	Spring-loaded return to full extension	Extended (no command)

## 1.5 Remote LEDs

The standard PG-xH12JS handheld remote has four LEDs that are used to relay operating status and for troubleshooting diagnostics if needed.

*Table 2. Handheld Remote LEDs*

LED	Color	Indication	Meaning
<b>TX</b>	Green	Blinking Solid	Transmitting, no switch active Transmitting, switch active
<b>RX</b>	Amber	Blinking Solid	Receiving, no output of interest active Receiving, output of interest active
<b>ER</b>	Red	Lit	Indicates error with belt pack remote Indicates that the system is not enabled
	Amber	Lit	Low battery indication

Although the LEDs are shown in Table 2—and in the previous faceplate illustrations are shown in color—the actual color LEDs are protected by the faceplate and label and will only illuminate in color when active. The areas of the label covering the LEDs are transparent, allowing the LEDs to be observed when lit and used for status and for diagnostic troubleshooting.

## 2.0 PG-xH12JS Pistol Grip Battery Installation

✓ **Note:** PG-xH12JS Pistol Grip remotes are shipped from Cervis, Inc. with a set of four fresh type “AA” alkaline batteries separate from the pistol grip. These batteries must be installed prior to using the handheld remote.

This SmarT handheld unit is powered by four size “AA” cell batteries. The battery compartment—located on the back of the pistol grip, as shown in Figure 4—is sealed with a cover attached to the unit by four Phillips screws sufficiently tightened to compress an O-ring to seal out moisture. The battery compartment is accessed by loosening the screws enough, which remain attached to the cover, and removing the cover. 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:

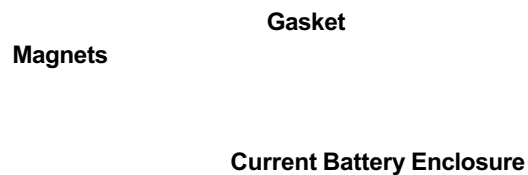
1. Loosen the four Phillips battery compartment cover screws on the rear of the remote and lift the cover from the handheld.
2. Install (or replace with) four fresh size “AA” batteries. Determine which type of battery enclosure is used. Observe the proper polarity by positioning the batteries as shown in Figure 4.
3. Replace the compartment cover and tighten the four Phillips screws. Do not over-tighten these screws, *but make sure they are tight enough to properly seal the gasket.*

### 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.**

Legacy Pistol Grip  
Battery Array  
 (prior to March 2013)



**Figure 4. Pistol Grip Battery Installation**

✓ **Note:** Tighten cover screws enough to compress the sealing gasket. Do not over-tighten the screws!

### 3.0 Typical PG-xH12JS Pistol Grip Associate Mode

✓ **Note:** All remote control system remotes and base units are associated — communication links are established — before they are shipped from Cervis, Inc. It is not normally necessary to associate your system when it arrives. But, there are circumstances when it may become necessary to establish the communications link between the remote and the base unit while in the field. Associate Mode allows this.

The Associate mode is used to establish the communication link between the pistol grip remote and the base unit. There must be a clear line of site between the handheld and the base unit, and both units must initially be powered down (OFF) to begin the Association procedure. Turn off the pistol grip remote by depressing the oversized Machine Stop button. Safely power down the base unit by removing the power source from the unit.

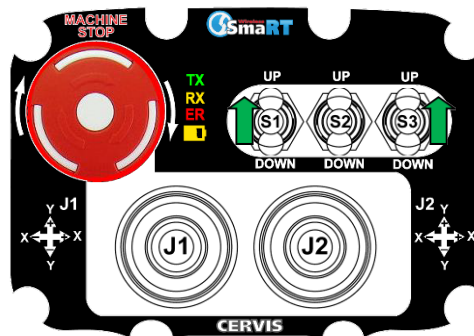
**Caution!** *To prevent inadvertent movement of the machine, be sure to remove power from the base unit before attempting to enter Associate mode.*



#### Typical Associate PG-xH12JS Remote to Base Unit (See Figure 5)

1. Stand near to the base unit with the pistol-grip remote OFF and power removed from the base unit (disconnect the wiring harness or remove the source power from the circuit).
2. Release the STOP button on the handheld by twisting it clockwise. The button will pop up.
3. Push and hold switch S1 UP and then immediately push and hold switch S3 UP. All four LEDs light solid.
4. Observe the LEDs. When RX goes OFF, power up the base unit. When the RX LED blinks, release S1 and S3.

A successful association is indicated when LEDs TX and RX are rapidly blinking while the Battery and Error LEDs are unlit.




**Figure 5. Switch Actuation for Associate Mode**

✓ **Note:** The Associate example above is an excerpt from Cervis, Inc. SpecSheet S157. Be aware that particular systems may demand a different Associate switch instruction set. Refer to your Engineered System Manual (ESM), Engineered System Diagram (ESD), or Engineered Application-Specific Supplement (EASS) document that came with your system.

## 4.0 PG-xH12JS Pistol Grip Operation

The PG-xH12JS pistol grip remote control is ready to operation when the batteries are installed and the unit is Associated to the base unit. The system is associated if the TX and RX LEDs of the pistol grip remote and base unit are rapidly blinking while the remote and the base unit are powered.

### 4.1 To Start And Stop The Pistol Grip Remote

1. Twist the Machine Stop button clockwise . The spring-loaded button snaps into the UP position thus enabling the handheld remote for use.
2. Activate S1 toggle switch (see Note below). Initial activation of the chosen switch *will not* engage operation of its mated base unit output. Activation of any output controlling switch thereafter—once the handheld is active—*will control* the switch-matched function.

✓ **Note:** *In many systems, the toggle switch used to activate the pistol grip remote is S1, but the activation switch may be application-dependent – in which case you will have to refer to the ESM, ESD, or EASS document sent with the system.*

3. Push the large red Machine Stop button down to stop operation of the base unit outputs and disable the handheld remote.

### 4.2 Toggle Switch Operation

Toggle switches S1, S2, and S3 are three-position toggles with the center position as neutral (inactive). Up (+) and Down (–) positions command output control.

### 4.3 Typical Joystick and Trigger Operation

Typical joystick operation is proportional control for the X-axis and Y-axis activation. The joysticks can also be programmed to act as digital output signals to the system base unit.

Typical trigger operation is that of proportional control along with the use of a joystick. The pistol grip trigger configuration depends upon its designated use for the particular system in which the handheld remote is used. It can be programmed to act as:

- an Enable, where it must be engaged to allow a function or functions to be performed by the joysticks or toggle switch function controls.
- a pulse-width modulation (PWM), where the position of the trigger is gauged to provide a particular position-signal command for the base unit to react to for accurate machine control.
- a standard Digital control (On, Off).

### 4.4 PG-xH12JS Proportional Joystick Adjustment

Adjust Mode depends on the particular base unit of the system in which the PG-xH12JS is used. Refer to the ESM or EASS that is sent with the system for the particular steps used to adjust PWM controls for the system.

## 5.0 Smart Remote Control Specifications

Table 3. PG-2H12JS and PG-9H12JS Pistol-Grip Specifications

Item	Description
<b>Power</b>	<b>V<sub>in</sub></b> +1.6 V to +3.2 VDC
	<b>Batteries</b> Four "AA" cell
	<b>Battery Life</b> ≈ 100 hours (nominal)
	<b>Low V Shutdown</b> 1.6 VDC
	<b>Auto-shutdown</b> variable, ten-minute default
<b>Environment</b>	<b>Operating Temp</b> –20° C to 55° C (–4° F to 131° F)
	<b>Storage Temp</b> –40° C to 55° C (–40° F to 131° F)
	<b>Humidity</b> 0 to 100%
<b>Radio</b>	<b>Frequency</b> 2405–2480 MHz @ 100 mW (PG-2H12JS) 906–924 MHz @ 10 mW (PG-9H12JS)
	<b>License</b> None required
	<b>Modulation</b> Channel-Hopping DSSS
	<b>Antenna</b> Internal
<b>Enclosure</b>	<b>Dimensions</b> mm: 230.6 x 133.9 x 146.9 inch: 9.1 x 5.3 x 5.8
	<b>Total Weight</b> ≈3 lbs (≈1.36 kg)
	<b>Durability</b> High Impact Polymer case
	<b>Faceplate</b> Aluminum or Polycarbonate
<b>Indicators (4 LEDs)</b>	<b>TX (Green)</b> Blinking – transmitting, no switch active Solid – transmitting, switch active
	<b>RX (Amber)</b> Blinking – receiving, no output of interest active
	<b>ERR (Red)</b> Solid – Indicates error with handheld remote Flashing – Switch conflict Switch held by user when turned on
	<b>BATT (Amber)</b> Flashing – Low battery indication
<b>Control Switches</b>	<b>Three Toggles</b> Three-position, center-detent push-to-operate switches, momentary or latch
	<b>One Trigger</b> Proportional controller, joystick enable, or digital
	<b>Two Joysticks</b> Single or dual-axis
	<b>One Stop</b> Oversized two-position maintained button

## Appendix A: Exposure to Radio Frequency Energy

SmaRT handheld remote units contain radio transceivers. When active, a handheld remote sends out radio frequency (RF) energy through its internal antenna. The SmaRT handheld remote complies with limits set by the United States Federal Communications Commission (FCC) for operating distance from human tissue.

## Appendix B: Agency Identification Label Locations

✓ **Note:** The pistol grip unit agency ID label position is identical for all pistol grip remote units, including both 900 MHz and 2.4 GHz units.

*Figure 6. Agency Identification Label Locations*

## Appendix C: PG-xH12JS Family of SmaRT Handheld Remotes

All PG-xH12JS handheld remotes use four AA alkaline batteries for power; have four handle-embedded magnets, a dedicated Stop button, three 3-position toggle switches, dual axes joysticks, and proportional trigger control. The following table defines various other features applicable to the models listed.

**Table 4. PG-xH12JS Family of Pistol Grip Handheld Remotes**

Model Name	Freq.	RF Power	Umbilical Connector	CAN Capable
PG-9H12JS	900 MHz	10 mW	No	No
PG-9H12JS-UMB	900 MHz	10 mW	Yes	Yes
PG-2H12JS	2.4 GHz	100 mW	No	No
PG-2H12JS-UMB	2.4 GHz	100 mW	Yes	Yes

Appendix D: Declaration of Conformity



Declaration of Conformity

EU DECLARATION OF CONFORMITY

**Manufacturer:** Structured Mining Systems, Inc.  
 (d.b.a. Cervis, Inc.)  
 170 Thorn Hill Road  
 Warrendale, PA 15086 USA  
 Telephone No. (724) 741-9000

**Date:** February 14, 2018

This declaration of conformity is issued under the sole responsibility of the manufacturer. The undersigned hereby declares, on behalf of Structured Mining Systems, Inc. (d.b.a. Cervis, Inc.) of Warrendale, Pennsylvania, that the below referenced list of Industrial (ISM) radio equipment products, to which this declaration relates, is in conformity with the provision of the following European Union harmonization legislation:

- Council Directive 1999/5/EC (R&TTE)
- Council Directive 2006/95/EC (Low Voltage)
- Council Directive 2004/108/EC (Electromagnetic Compatibility)
- Council Recommendation 1999/519/EC (Human Exposure to Electromagnetic Fields)

Relevant Harmonized Standards or Other Technical Specifications:

- ETSI EN 300 328 v1.7.1:2006
- ETSI EN 301 489-17 v2.2.1:2012
- IEC 60950-1 Ed 2.2; 2013-05-28
- BS EN 62311:2008
- ETSI EN 301 489-1 v1.9.2:2011
- BS EN 62209-2:2010

The technical documentation is maintained at the corporate headquarters of Structured Mining Systems, Inc. (d.b.a. Cervis, Inc.), 170 Thorn Hill Road, Warrendale, PA.

**Products:** (see other sections/areas of the product user manual for product images, accessories, components, and software, which allow the radio equipment to operate as intended)

<u>MODEL NUMBER</u>	<u>PART NUMBER</u>	<u>BATCH OR SERIAL NUMBER RANGE</u>
PG-2H10JS	07128570	_____ to _____
PG-2H10JS-UMB	07128571	_____ to _____
PG-2H12JS	07129570	_____ to _____
PG-2H12JS-UMB	07129571	_____ to _____
PG-2H14	07125570	_____ to _____
PG-2H14-UMB	07125571	_____ to _____
PG-2H14-DIS	07125572	_____ to _____
PG-2H14-DIS-UMB	07125573	_____ to _____

*Anthony M. Di Tommaso*

Anthony M. Di Tommaso  
 Director of Product Development, Quality, & Finance

February 14, 2018

Date

