



## **BU-2CAN**

**Manual**

**U134.0.0**

### 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:

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. The 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.
- Consult the dealer or an experienced radio/TV technician for help.

### 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.*

### 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.

### IC 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 (e.i.r.p.) is not more than that necessary for successful communication.**

*Partie 1 : Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.*

**Part 2: This radio transmitter (LOBSRF-305/309) 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-305/309) 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.*

Este equipamento opera em caráter secundário, isto é, não tem direito a proteção contra interferência prejudicial, mesmo de estações do mesmo tipo, e não pode causar interferência a sistemas operando em caráter primário.

The above RoHS statements apply only to 2.4 GHz devices.

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Cervis, Inc. reserves the right to change this manual or edit, delete, or modify any information without prior notification.

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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 handheld remote and remove power from the base unit before attempting any maintenance. This will prevent accidental operation of the controlled machinery.*
- ✓ *Power can be removed from the base unit by detaching the 12-pin cable from the base unit connector P1, 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 unit.*
- ✓ *Keep high-energy radio frequency (RF) devices away from handheld remotes. Activating high-power communication radios, for instance, in close proximity to the handheld remotes can cause interference and “false” circuit activation.*
- ✓ *Operate and store units only within the specified operation and storage temperatures defined in this document’s Specifications section.*
- ✓ *Abide by the recommendations in Appendix A, Exposure to Radio Frequency Energy.*
- ✓ *If the machine that the radio system is applied to has a safety circuit (stop button, crash bar, etc.), you must ensure that the safety circuit is still fully functional after the radio system is wired in before commissioning the machine.*

## Definitions/Notes

### **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.

### **Dissociate**

SmaRT dissolution method using a series of specific remote unit button presses to erase all established communication links between handhelds and a base unit.

### **DSSS**

Direct Sequence Spread Spectrum; an advanced wireless communication technology.

## **SmaRT Handheld Remote Control Units**

### **PTO**

Push to Operate: With a handheld unit, activation occurs with the press of any button; command broadcast then ensues. After the button is released, deactivation occurs after some period of inactivity (i.e. 3 s). If any button is pressed before the handheld turns off, the handheld remains on until the period of inactivity expires. The command associated with a button is broadcast only while that button is being pressed. A command can trigger either a momentary action or a latching action. A momentary action is where the output stays on only as long as the button is pressed. A latching action is where pressing and releasing the button causes an output to activate and remain active until a button – either the same or another - is pressed and released.

### **DO**

Dual Operation: Where one of the six buttons is configured to function as both the “power on” button and “power off” button. Typically, the action of this button is immediate, but if the “power off” feature is configured such that the button must be held for several seconds before the handheld shuts down, it may also serve as a command button.

### **OO**

On Button, Off Button: Where one button turns the handheld on and a different button turns it off. Once the unit is turned on, the On button can be used to issue commands. Typically, the Off function is immediate, but as in the DO configuration, this button can issue commands if turning the handheld off is accomplished by holding the Off button for a short period.

**PG** – Pistol Grip: Handheld remote that has a handle with a trigger with which the operator can hold the remote and use the trigger to enable functions or provide proportional control commands to the base unit outputs.

**CB** – Console Box: Remote control unit that can be handheld or attached to a belt or harness for convenience.

**MCB** – Mini Console Box: Compact remote control unit that is easily held or attached to a belt or harness for convenience.

### **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/RX**

Transmit/Receive

### **CAN TX/RX**

Transmit/Receive over Control Area Network (CAN Bus).



## 1.0 SmaRT BU-2CAN Base Unit

The BU-2CAN base units are the machine mounted units of a SmaRT Remote Control System. A basic SmaRT control system consists of at least one Smart wireless remote portable unit (aka handheld), a base unit, and the wiring harness that connects the base unit to the controlled apparatus. A single base unit can communicate with up to eight individual SmaRT handheld remote units, depending on remote control type. The rugged construction, compact size, and multiple output/input versatility allow SmaRT Systems to be used for many applications that require remote operation. A BU-2CAN base unit module can be configured for 900 MHz (BU-2CAN-9X) or 2.4 GHz (BU-2CAN-2H) remote control systems.



*Figure 1 BU-2CAN External and Internal Antenna Base Units*

### Features

- Rugged, compact weatherproof high-impact polymer enclosures
- Operating Temp:  $-40^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$  to  $+158^{\circ}\text{F}$ )
- Storage Temp:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$  to  $+185^{\circ}\text{F}$ )
- License-free frequency bands
- Direct Sequence Spread Spectrum Technology provides a generous line-of-sight communication range up to 300 m (1000 ft.) when using the external antenna.
- 900 MHz @ 100 mW or 2.4 GHz @ 100 mW operating power
- +9 to +36 VDC Input Power
- 2 CAN Ports, available with optional internal termination<sup>1</sup>
- 1 RS-232 Port
- Five bi-color status/diagnostic LEDs
- Single connector interface for ease of wiring
- Internal or external antenna option

<sup>1</sup> BU-2CAN units are internally terminated at 120  $\Omega$ . Termination can be removed at the factory.

## 2.0 BU-2CAN Base Unit

The SmaRT BU-2CAN base unit features two CAN serial ports and one RS-232 serial port. It accepts an input power operating voltage range from +9 to +36 VDC. The base unit provides a robust link with a handheld remote in congested radio environments using Channel-Hopping Direct Sequence Spread Spectrum (DSSS) wireless technology broadcasting 900 MHz @ 100 mW and 2.4 GHz @ 100 mW.

SmaRT base units feature seamless association to a SmaRT handheld remote control unit without the need to open either the remote or base unit case. All controlled apparatus connections to the base unit are made using a single wiring harness cable.

The compact base unit enclosure is constructed of rugged, heavy duty high-impact polymer. Low voltage DC power to the unit, bi-directional CAN communication, and output signals are conducted through the heavy duty 12-pin connector (Figure 2). The 12 conductor, flying lead wiring harness (Figure 6) attaches to connector P1, providing quick and easy installation.

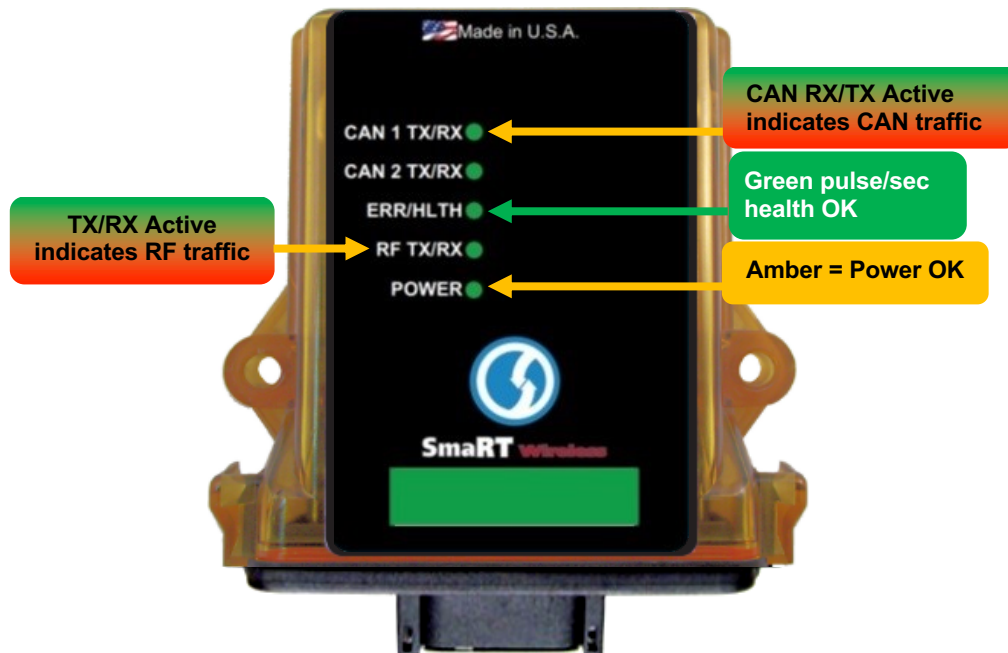


P1 Connector. P1 PIN Numbers are enhanced here for ease of identification.

*Figure 2 BU-2CAN P1 Twelve (12) Pin Connector*


The unit has five bi-color status/diagnostic LEDs that are used to determine the state of the unit. Figure 3 illustrates the LEDs and indications.

*Figure 3 BU-2CAN Status LEDs*



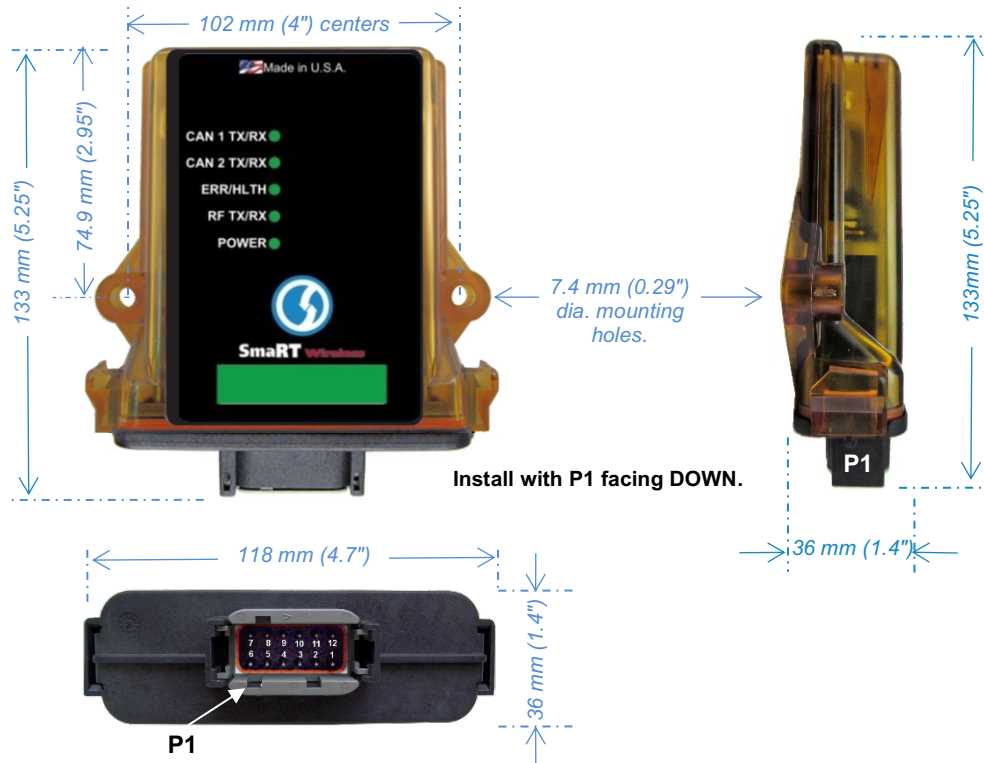


## 2.1 Base Unit Installation

**Caution**  *Disable the machine on which the base unit is to be attached before installation.*

Use the configuration diagrams supplied by Cervis, Inc. to guide you in mounting the base unit and connecting your wiring harness. Base unit mounting is left much to your discretion with the following guidelines:

- Make sure that the configuration diagrams supplied with the system are available. Keep them where they can be easily accessed when needed.
- Make sure the wiring harness (12-pin connector cable) is at hand.
- Mount the receiver away from any intense radio or electric disturbance sources.
- Mount the unit where you have enough room for your wiring harness connections.
- Mount the unit away from intense heat sources, such as an engine or hydraulic pump.
- Allow enough room to disconnect the wiring harness connector from P1 (to remove power from the base unit, troubleshoot, etc.) when necessary.
- Make sure that negative VDC (–VDC) is directly connected to the power supply negative terminal. Use this connection as the common for all inputs and outputs. Do not use “frame ground” as a return path for loads or as the negative power connection to the base unit.
- Make sure that the mount is secure.
- Install the unit with P1 facing downward to keep water from entering the unit.
- In instances where there is an external antenna, connect the external antenna only as recommended by Cervis, Inc. with parts recommended by Cervis, Inc. (See Table 5 and Appendix A.) Under no circumstances can a signal amplifier be used!



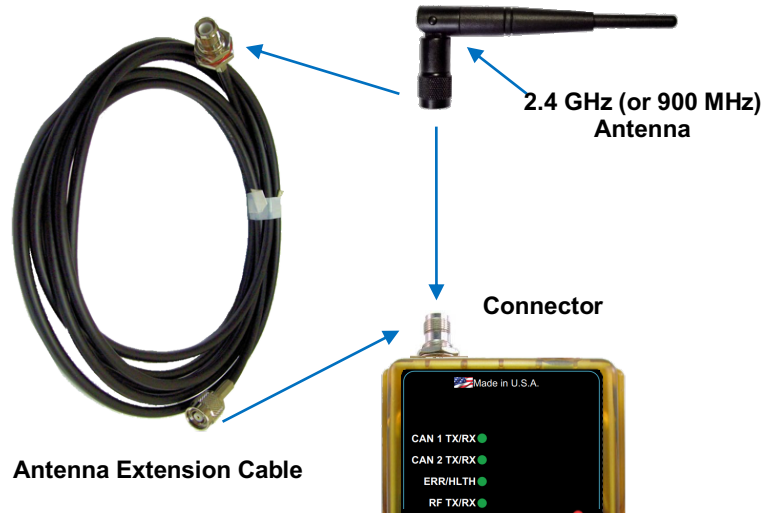
**Figure 4 Base Unit Installation Dimensions**

## 2.2 Base Unit Power

Power is supplied to the base unit through the harness cable. The cable attaches to the base unit P1 connector. Power can be removed from the base unit by disconnecting the 12-pin cable connector from the base unit P1 socket. To remove the cable connector from P1, pinch the latching ears of the connector (Figure 6) and pull the connector away from the unit.

## 2.3 Base Unit External Antenna

A base unit external antenna attaches to the base unit using the connector shown in Figure 5. Extensions and extension kits are available. For optimal performance, use the antenna supplied by Cervis, Inc. Be aware that there is an antenna specifically designed for the frequency range your base unit is designed to work on, either 900MHz or 2.4GHz. Although they use the same style connector, they are not interchangeable. Replacement antennas must match the band that the base unit is configured for to ensure proper range and operation. See Table 5 for detailed information.



*Figure 5 BU-2CAN with External Antenna and Extension Cable*

## 2.4 Base Unit Cable and Field Wiring

✓ **Note:** *Harness cable wires are individually marked on each wire's insulator. Connect negative VDC (-VDC) directly to the power supply negative terminal. Do not use "frame ground" to power the base unit or as the common connection (or "return path") for output loads.*

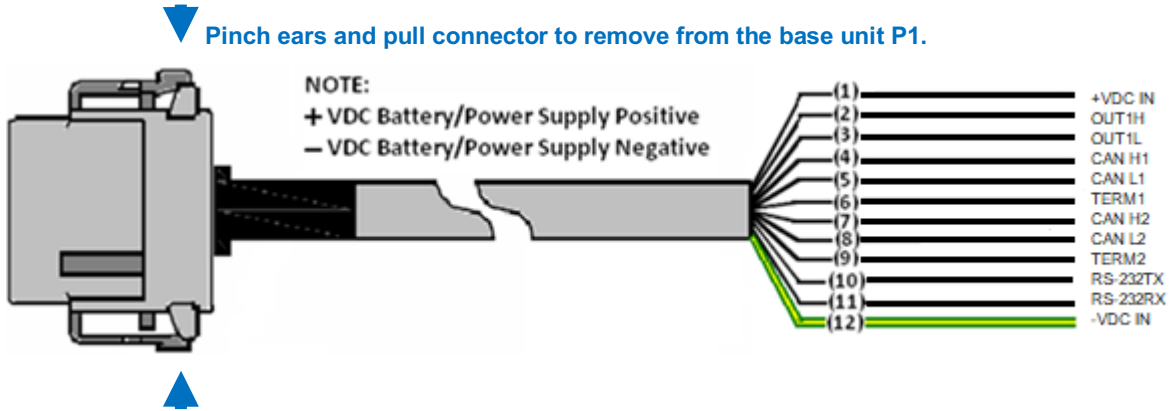


Figure 6 HN-1001 Wiring Harness Cable

Table 1 BU-2CAN Variant Wiring Table

Pin	Signal Name	Function
P1:1	+VDC IN	Input power
P1:2	OUT1H	Configurable output port used in conjunction with OUT1L
P1:3	OUT1L	Configurable output port used in conjunction with OUT1H
P1:4	CAN H1	CAN Bus 1 High
P1:5	CAN L1	CAN Bus 1 Low
P1:6	TERM1	Connect to CAN L1 to connect the internal 120Ω termination resistor, if the internal termination is not already in place.
P1:7	CAN H2	CAN Bus 2 High
P1:8	CAN L2	CAN Bus 2 Low
P1:9	TERM2	Connect to CAN L2 to connect the internal 120Ω termination resistor, if the internal termination is not already in place.
P1:10	RS-232TX	Serial port communication line used for custom programming
P1:11	RS-232RX	Serial port communication line used for custom programming
P1:12	-VDC IN	Input power return ("ground")

### Caution



**To protect against short circuits, make sure the ends of all unused wires are insulated when making your connections.**

## 3.0 BU-2CAN Operation

### Initial Use Instructions

- You must have a clear line of sight to and be within range of the base unit while operating a SmaRT wireless remote.
- Each BU-2CAN typically can establish communication links with as many as eight different SmaRT PTO, DO, OO, pistol-grip, CB, and MCB remotes; or, with another SmaRT base unit.
- Verify that the HN-1001 harness connections to the controlled device(s) are correct and that the wiring harness is firmly plugged into the BU-2CAN base unit P1.
- When necessary to remove power from the BU-2CAN, disconnect the wiring harness connector from base unit P1 or remove the power source from the harness connections.
- Make sure that each CAN bus network is properly terminated.

✓ **Note:** *BU-2CAN units are internally terminated at 120  $\Omega$ . Termination can be removed at the factory.*

## BU-2CAN LED Configuration

*Table 2 BU-2CAN LED Description*

BU LED Description		
LED	Activity	LED Indication
PWR	Solid Red	No Power to Radio Module No Power to CAN Port 1
	Solid Green	No Power to Microcontroller No Power to CAN Port 2
	Solid Amber	Normal Power to All Circuits
RF	Flashing Red	RF Transmission No RF Reception
	Green	RF Reception No RF Transmission
	Flashing Amber	RF Bi-directional Communication
Health	Flashing Red	Temperature Exceeded
	Flashing Green	Flash 1/s – normal
AUX 1	Flashing Red	CAN TX on Port 1 No CAN RX on Port 1
	Flashing Green	No CAN TX on Port 1 CAN RX on Port 1
	Flashing Amber	CAN Bi-directional Communication
AUX 2	Flashing Red	CAN TX on Port 2 No CAN RX on Port 2
	Flashing Green	No CAN TX on Port 2 CAN RX on Port 2
	Flashing Amber	CAN Bi-directional Communication

✓ **Note:** Activation of both the red and green elements in the same LED will result in amber light.

**Table 3 Base Unit LED Troubleshooting**

Indication	Cause	Interpretation – Recommendation
<b>Power LED not active</b>	Is input power present?	Check input power polarity.
<b>Power LED Red or Green</b>	Indicates an internal component failure.	Contact Cervis, Inc. service department.
<b>CAN RX/TX not active</b>	Electrical signals not activating the LEDs.	<ul style="list-style-type: none"> <li>✓ Is the system using CAN?</li> <li>✓ Is the CAN termination set properly?</li> <li>✓ Is the CAN wiring connected properly?</li> <li>✓ Are other nodes on the CAN bus operating properly?</li> </ul>
<b>RF TX/RX not active</b>		<ul style="list-style-type: none"> <li>✓ Is the system using RF?</li> <li>✓ Check for obstructions preventing line-of-sight transmission.</li> <li>✓ Check that the handheld remote is active.</li> </ul> Re-associate the handheld remote to the base unit.
<b>Health LED rapidly blinking Amber</b>	Indicates an internal problem.	Contact Cervis, Inc. service department.
<b>Health LED blinking Red</b>	Over-temperature indicated.	Contact Cervis, Inc. service department.

## 4.0 BU-2CAN Base Unit Specifications

*Table 4 BU-2CAN Base Unit Specifications*

Item	Description	
Power	<b>V<sub>in</sub></b>	+9 to +36 VDC
	<b>Operating Power</b>	1 W nominal
Environment	<b>Operating Temp</b>	-40° C to 70° C (-40° F to 158° F)
	<b>Storage Temp</b>	-40° C to 85° C (-40° F to 185° F)
	<b>Humidity</b>	0 to 100%
	<b>Vibration/Shock</b>	IEC60068-2-6 10 Hz to 150 Hz @ 1.0 g peak acceleration 10.0 g peak shock acceleration
Radio	<b>Frequency</b>	2405–2480 MHz @ 100 mW 906–924 MHz @ 100 mW
	<b>License</b>	No license required
	<b>Modulation</b>	DSSS
	<b>Antenna</b>	Internal or External
Enclosure	<b>Dimensions</b>	133 mm x 119 mm x 36 mm (5.24" x 4.69" x 1.42")
	<b>Weight</b>	0.24 kg. (8 oz.)
	<b>Durability</b>	High Impact Polymer
	<b>Mounting Holes</b>	7.4 mm (0.29") diameter 102 mm (4") center to center
Indicators	<b>CAN 1 TX/RX</b>	TX=red; RX=green; Flashes upon event
	<b>CAN 2 TX/RX</b>	TX=red; RX=green; Flashes upon event
	<b>ERR/HLTH</b>	Error = red; Normal = green, blinking 1x/s
	<b>RF TX/RX</b>	TX=red; RX=green; Flashes upon event
	<b>POWER</b>	Normal = amber; red or green = power error
Communication Ports	<b>CAN</b>	2 250 kbps, SAE J1939 HLP (CAN Open available)
	<b>RS-232</b>	1 115 kbps, 8-N-1, no flow control character spacing delay > 2 ms

✓ **Note:** BU-2CAN units are internally terminated at 120 Ω. Termination can be removed at the factory and then reapplied through a connection in the harness.



## 5.0 BU-2CAN Antenna and Cable List

*Table 5 Compatible BU-2CAN External Antenna Details*

Part	Cervis BIN
2.4 GHz Swivel Antenna, +3dBi	BB3-07
900 MHz Swivel Antenna, +3dBi	BB3-06
3 ft. antenna extension cable	J5-07
10 ft. antenna extension cable	J5-02
10 ft. antenna cable (J5-02) and external antenna (BB3-06)	EXT-10-900
3 ft. antenna cable (J5-07) and external antenna (BB3-06)	EXT-3-900

✓ **Note:** Only use the antenna recommended by Cervis, Inc. with the SmaRT base unit.

*Table 6 Compatible BU-2CAN P1 Cable*

Item	Part #	Wiring Harness
P1 Cable	BB6-01	HN-1001

## 6.0 SmARt BU-2CAN Base Unit Variations

*Table 7 SmARt BU-2CAN Base Unit Variations*

Model	Input Power	Operating Frequency	RF Power	CAN Ports	Antenna Type	Outputs	RS-232 Port	P/N
BU-2CAN-2H-INT	9-36 VDC	2.4 GHz	100 mW	2	Internal	None	1	20101501
BU-2CAN-2H-EXT	9-36 VDC	2.4 GHz	100 mW	2	External	None	1	20101502
BU-2CAN-9X-INT	9-36 VDC	900 MHz	100 mW	2	Internal	None	1	20101511
BU-2CAN-9X-EXT	9-36 VDC	900 MHz	100 mW	2	External	None	1	20101512

## Appendix A: Exposure to Radio Frequency Energy

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

## Appendix B: Agency Identification Label Locations

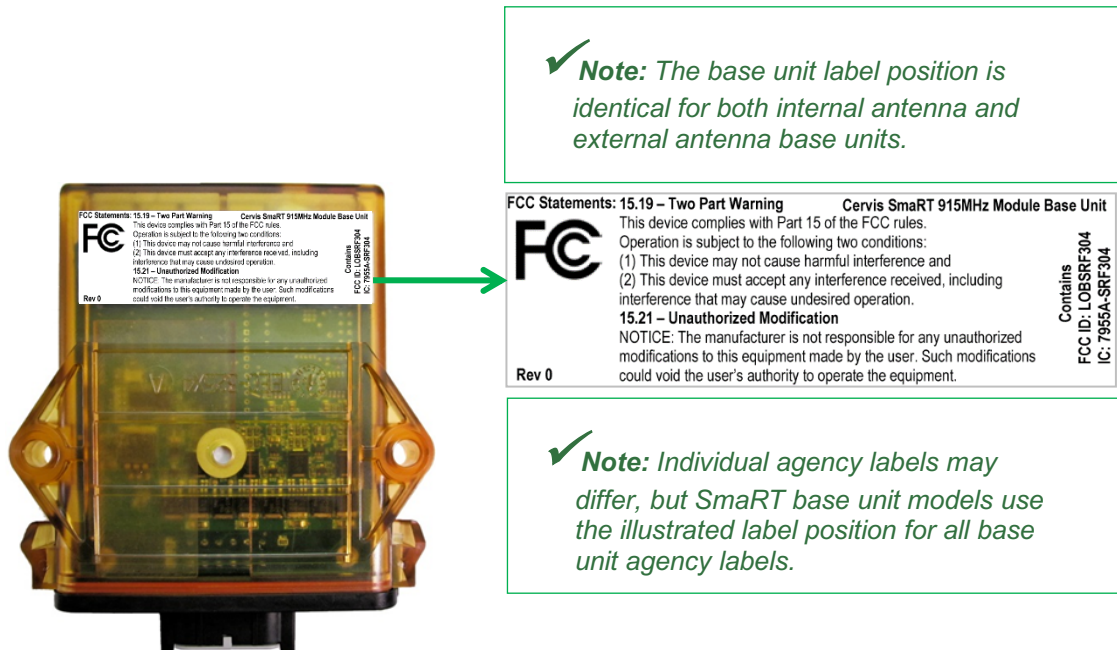


Figure 7 Agency Identification Label Locations

## Appendix C: Typical Handheld to Base Unit Communication

When ordered as a system, handheld remote and base unit communications are established at Cervis, Inc. before shipping. However, if it is necessary to establish or re-establish communication between a remote and a base unit at some point then the Associate procedure is used to do this.

A standard SmaRT System consists of one handheld remote and one base unit. Each base unit can communicate with up to eight handheld remotes. Each handheld must first establish a communications link with the base unit before the base unit will recognize the handheld unit. This process is called “Association.”

In some cases, it may become necessary to break the communication link between the handheld and the base unit. This process is called “Dissociation.” *Be aware that when a handheld is dissociated from a base unit, all communication links to that base unit are erased from the base unit memory!* For instance, a particular base unit is associated to Handheld Remotes 1 through 5. Remote 2 dissociates—breaks the communication link—from the base unit. All five handheld remotes are removed from the base unit memory. The Associate procedure must be used by any handheld that now needs to control that base unit.

Each style of handheld uses a similar method of association and dissociation, however, there can be specific nuances to each procedure which relates to how the handheld operates. The HH style handhelds typically use buttons B1 and B2 for association, whereas PG and CB style remotes use toggle switches and MCB style handhelds use a pushbutton and a toggle switch. The common thing among these processes is that Association and Dissociation can only be done at the moment the handheld powers up, so the controls that are related to the procedure must include a way to power the handheld on. Once the handheld is placed into association or dissociation mode, it begins to send a specific signal which is formatted to trigger association or dissociation in the base unit.

In that same vein, the base unit must also “see” the associate or dissociate signal now when it powers up. There is a two second window when the base unit initializes itself before going into normal operation mode. One of the first tasks that the base unit performs during this time is to look for an associate or dissociate signal. If the base unit does not receive either signal, it continues to perform diagnostics to ensure proper operation (which takes up the remainder of the two seconds), then proceeds to move to the normal operating state.

If the base unit does see an associate or dissociate signal, it goes into a special mode where it verifies the received signals and performs a series of transmissions which allow the transference of information pertaining to the task at hand.

If the signal is an associate signal, the handheld will send its identifying data and data related to how it will operate in normal mode. The base unit then sends its identifying data and, depending on the system’s traits, configuration information which can change some of the handhelds’ characteristics so it will seamlessly integrate with the base unit.

If the signal is a dissociate signal, the base unit will erase all data related to the identifying information of all its previously associated handhelds. This means that if a base unit that has 8 associated handhelds (the maximum number of associates) and any handheld which is configured to work with that base unit sends a successful dissociate message, all the previously associated handhelds will no longer be able to communicate with the base unit until the associate procedure is performed on each one to link them again. Likewise, the handheld, which was used to dissociate, will also erase any associated base unit information stored in its memory. This allows the system to work from a “clean slate,” which can be useful in certain circumstances.

