BU-9H16AF-8F-8V-RS Base Unit

User Manual

DN: U064.1-SmaRT_BU-9H16AF-8F-8V-RS

FCC Statements

15.19 – Two Part Warning

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference and

(2) This device must accept any interference received, including interference that may cause undesired operation.

15.21 – Unauthorized Modification

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

15.105(b) – Note:

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

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

Industry Canada Statement

This device complies with Canadian RSS-210.

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

Cervis, Inc.

Visit our Web site at: www.cervisinc.com

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Definitions/Notes

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

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

Disassociation
The process of up-pairing a handheld from a base units ID memory.

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

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

SmaRT Base Unit
I/O unit to which the controlled machine is connected. SmaRT base units communicate with each other and SmaRT handheld, console, and pistol-grip remote controllers.

SmaRT 9nn Remote Control System
SmaRT system consisting of one or more SmaRT base units and from one to eight SmaRT remote control units. The systems operate in either the 900MHz range and has inputs/outputs or data communications.

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

TX/RX
Transmit/Receive

Related Documents

System related Cervis, Inc. Engineered System Approval document

Appropriate SmaRT remote control user manual

Documentation provided by Cervis on delivery

Contact Cervis, Inc. 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 result in equipment failure, loss of authority to operate the equipment, and personal injury.***
- ✓ ***Use and maintain proper wiring. Follow equipment manufacturer instructions. Improper, loose, and frayed wiring can cause system failure, equipment damage, and intermittent operation.***
- ✓ ***Changes or modifications made to equipment not expressly approved by the manufacturer will void the warranty.***
- ✓ ***Owner/operators of the equipment must abide by all applicable Federal, State, and Local laws concerning installation and operation of the equipment. Failure to comply could result in penalties and could void user authority to operate the equipment.***
- ✓ ***Make sure that the machinery and surrounding area is clear before operating. Do not activate the remote control system until certain that it is safe to do so.***
- ✓ ***Turn off the handheld remote and remove power from the base unit before attempting any maintenance. This will prevent accidental operation of the controlled machinery.***
- ✓ ***Power is removed from the Base Unit by detaching the 12-pin cable from the base unit connector 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 intentionally allow liquid to enter the handheld or base unit enclosures. Do not use high pressure equipment to clean the handheld remote or base unit.***
- ✓ ***Disconnect the radio base unit before welding on the machine. Failure to disconnect the base unit may result in destruction of or damage to the base unit.***
- ✓ ***Operate and store units only within the specified operation and storage temperatures defined in this document.***

CAUTION

Push-To-Operate means that the outputs under control should only change states when the appropriate button or switch of the remote is pressed or positioned, and then only for the duration of time that particular output button is pressed. Any unexpected motion that occurs when pressing the output control buttons of a remote must be investigated.

Immediately stop operation should a jerkiness of motion occur while constantly pressing an output control. Check the base unit diagnostic LEDs for any indication of a problem.

Be aware that even if the diagnostic LEDs of the handheld remote and base unit do not indicate a problem, one may be present and further troubleshooting steps may be needed.

If the problem is found, do not operate the SmaRT System until the problem is resolved.

1.0 BU-9H16AF-8F-8V-RS Base Unit

Figure 1. SmaRT BU-9H16AF-8F-8V-RS-INT Base Unit

The SmaRT™ BU-9H16AF-8F-8V-RS features sixteen FET, high side switching outputs or switch-to-ground digital inputs. The versatile, programmable digital inputs/outputs can be customized by Cervis to fit specific user applications. The BU-9H16AF-8F-8V-RS accepts a broad range of input power with operating voltages ranging from +10VDC to +30VDC. The wiring harness consists of two uniquely keyed connectors for P1 and P2 of the base unit that when properly wired to controlled devices effectively eliminates the risk of cross connections. The rugged weatherproof enclosure allows the unit to operate worry free in harsh weather conditions.

The base unit provides a robust communication link with up to eight SmaRT remotes in congested radio environments using Direct Sequence Spread Spectrum (DSSS) wireless technology at 900MHz . Base units and remotes feature seamless association without the need to open the enclosures. There is a variety of available SmaRT remote control units to choose from, several of which are shown in Figure 2.

Features

- Eight solid-state FET outputs/inputs
- 900MHz Direct Sequence Spread Spectrum technology
- Dual uniquely keyed connectors for ease of wiring
- Diagnostic LEDs
- +10 to +30VDC power
- Compact design
- Rugged, weatherproof construction
- Communicates with up to eight SmaRT remotes

2.0 SmaRT BU-9H16AF-8F-8V-RS in SmaRT Remote Control Systems

The basic standard SmaRT Remote Control System consists of at least one SmaRT base unit, a SmaRT remote control unit, and the wiring harness that is used to connect the base unit to the controlled apparatus. A single base unit is capable of communicating with multiple SmaRT remotes. Available is a variety of compatible remotes including: PTO-906, PTO-904, and PTO-902; PG-914 and other pistol-grip remotes; OO-918 and DO-918 18-button handheld remotes; and a wide assortment of SmaRT Console Remotes. For a full list of compatible SmaRT remote controllers, please contact your Cervis Sales representative.

Communications between the BU-9H16AF-8F-8V-RS base unit and the remotes are established at the factory using an association process, which can also be easily performed on site when necessary using the SmaRT remote without opening the enclosure of either device. Association processes for each remote control unit are described in detail in each SmaRT remote manual, Cervis Engineering SpecSheets, and the documentation provided to you with your system.

Figure 2. SmaRT BU-9H16AF-8F-8V-RS with SmaRT Remote Control Units

2.1 BU-9H16AF-8F-8V-RS Base Unit Installation

CAUTION

Make sure the machine to which the base unit is to be installed is disabled during installation.

Base Units subjected to the elements must be vertically installed. Cervis recommends installing all base unit top-side UP (vertical)

Use the configuration diagrams supplied by Cervis as a guide when mounting the base unit and connecting the wiring harnesses. Dimensions for drilling mounting holes are shown in Figure 3 and Figure 4. Field wiring connections are shown in Figure 6 below.

2.1.1 SmaRT BU-9H16AF-8F-8V-RS-INT

Make sure the unit is mounted so that there is a clear, unobstructed line of sight to minimize the chance of communications problems. See Figure 3 for mounting dimensions.

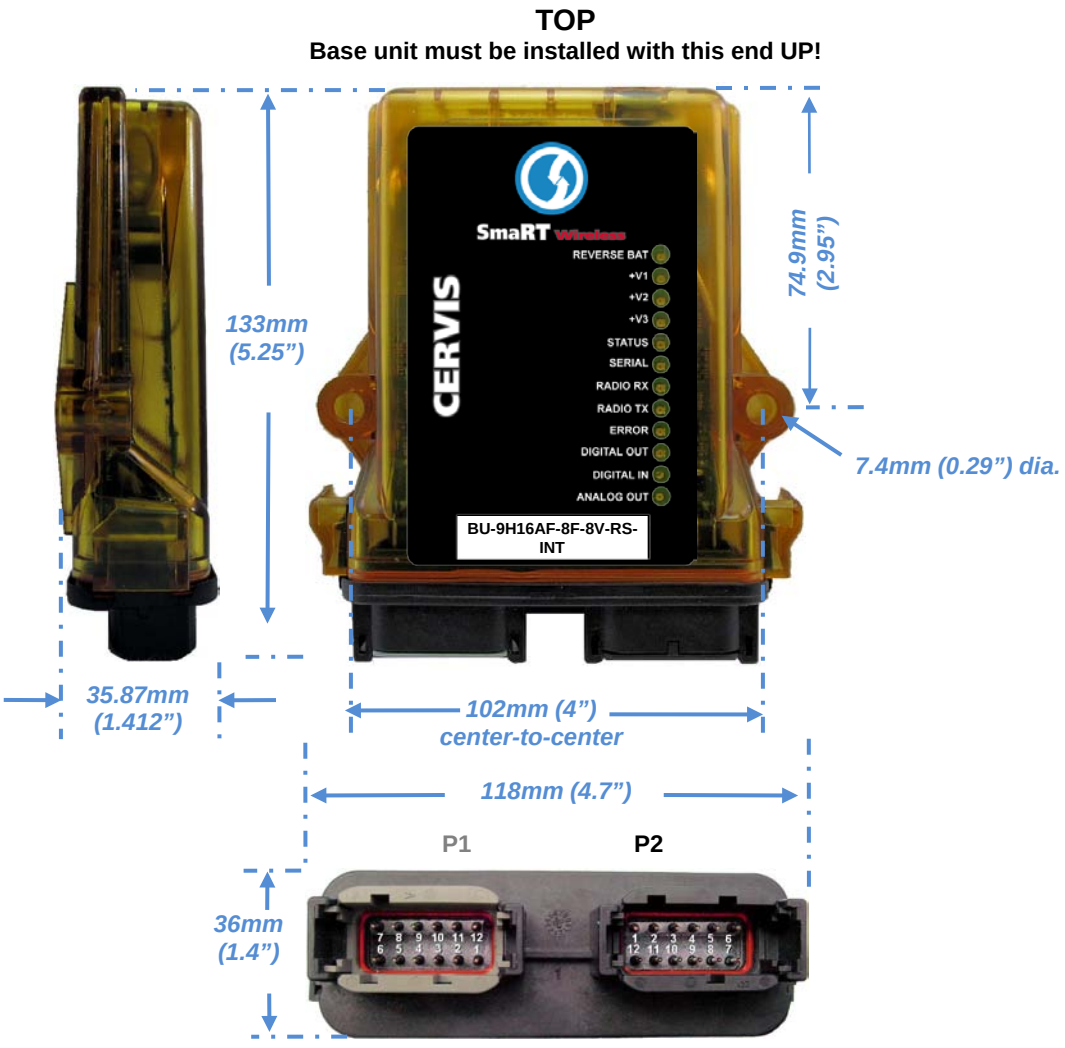

Figure 3. SmaRT BU-9H16AF-8F-8V-RS-INT Mounting Dimensions

2.1.2 SmaRT BU-9H16AF-8F-8V-RS-EXT

Additional space must be considered for the base unit external antenna when mounting the BU-9H16AF-8F-8V-RS-EXT. Make sure the unit is mounted so that there is a clear, unobstructed line of sight to minimize communications problems. See Figure 4 for mounting dimensions. For optional antenna extensions, please refer to Heading 4.0, *Available Options*. Installation of an extension antenna kit—J5-07 3ft. extension in our example—is shown in Figure 5.

✓ ***Note:*** *The SmaRT BU-9H15AF-EXT external antenna is hinged with 0° and 90° detents so that the antenna can be set at an 0° or 90° angle. Angles between 0° or 90° can be achieved, but they are not firmly set and may be prone to move during equipment use.*

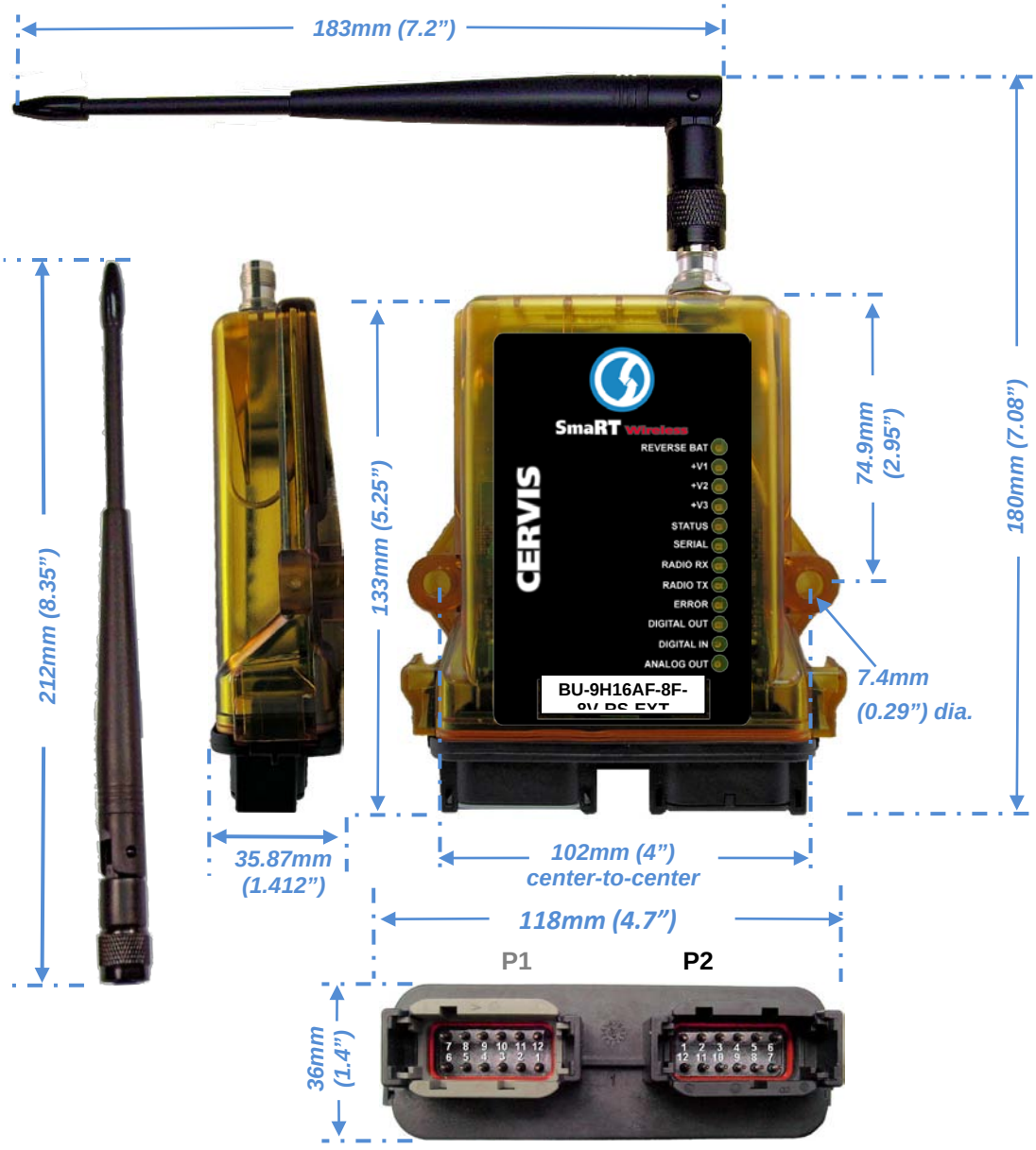

Figure 4. SmaRT BU-9H16AF-8F-8V-RS-EXT Mounting Dimensions

2.1.3 Optional Antenna Extension Kit Installation

Make sure the antenna is located in clear line-of-sight of the remote.

1. **Loosen and remove extension cable nut to allow the antenna ferrule to push through a mounting hole (user discretion).**
2. **Rethread the nut to secure the ferrule to the device.**
3. **Attach cable extension to the BU-9H16AF-8F-8V-RS-EXT.**
4. **Attach the antenna to the extension ferrule.**

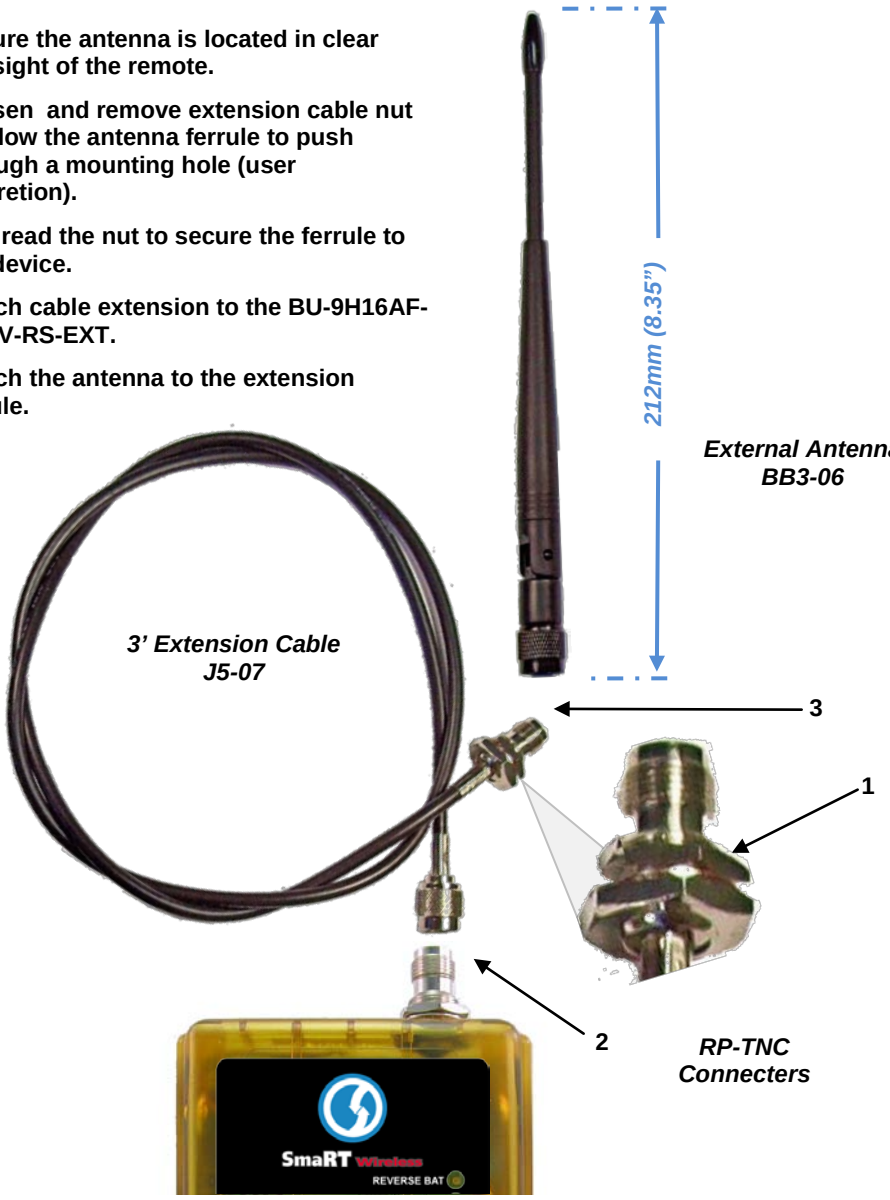

Figure 5. Antenna Extension Kit Installation

2.1.4 SmaRT BU-9H16AF-8F-8V-RS Wiring

Use the configuration diagrams supplied by Cervis as a guide when connecting the wiring harness P1 and P2 connections. Table 1 is a simplified wiring guide for two typical types of Cervis wiring harnesses. P1 Grey connector BB6-01 (HN-1001) and P2 black connector BB7-03 (HN-1002), each 12-wire cables, are numbered—marked from 1 to 11—with the last wire Yellow/Green. BB7-04 (HN-1005) uses 24 bundled, uniquely colored wires that relate and separate to the Grey P1 and Black P2 connectors. See Table 2 for particular harness options.

Figure 6 is a simplified field wiring chart that indicates generic P1 and P2 wiring.

Table 1. BU-9H16AF P1 and P2 Cable Wiring

Pin	BB6-01 BB7-04	Signal Name
P1:1	1 Red	VDC+ (VBAT+)
P1:2	2 Org	VDC+ (VBAT+)
P1:3	3 Wht	DIO 6
P1:4	4 Grn	DIO 8
P1:5	5 Blu	AIO 4
P1:6	6 Red-Wht	AIO 2
P1:7	7 Grn-Wht	AIO 1
P1:8	8 Blue-Wht	AIO 3
P1:9	9 Blk-Wht	DIO 7
P1:10	10 Red-Grn	DIO 5
P1:11	11 Org-Grn	VCC– (VBAT–)
P1:12	Ylw-Grn Black	VCC– (VBAT–)

Pin	BB7-03 BB7-04	Signal Name
P2:1	1 Red-Blk	DIO 3
P2:2	2 Org-Blk	DIO 4
P2:3	3 Wht-Blk	DIO 2
P2:4	4 Grn-Blk	AIO 5
P2:5	5 Blue-Blk	AIO 7
P2:6	6 Wht-Red	CANH/232 IN (RX)
P2:7	7 Red-Wht-Blk	CANL/232 OUT (TX)
P2:8	8 Blk-Wht-Red	AIO 8
P2:9	9 Wht-Blk-Red	AIO 6
P2:10	10 Blue-Red	DIO 1
P2:11	11 Org-Red	VCC– (VBAT–)
P2:12	Ylw/Grn Blk-Red	VCC– (VBAT–)

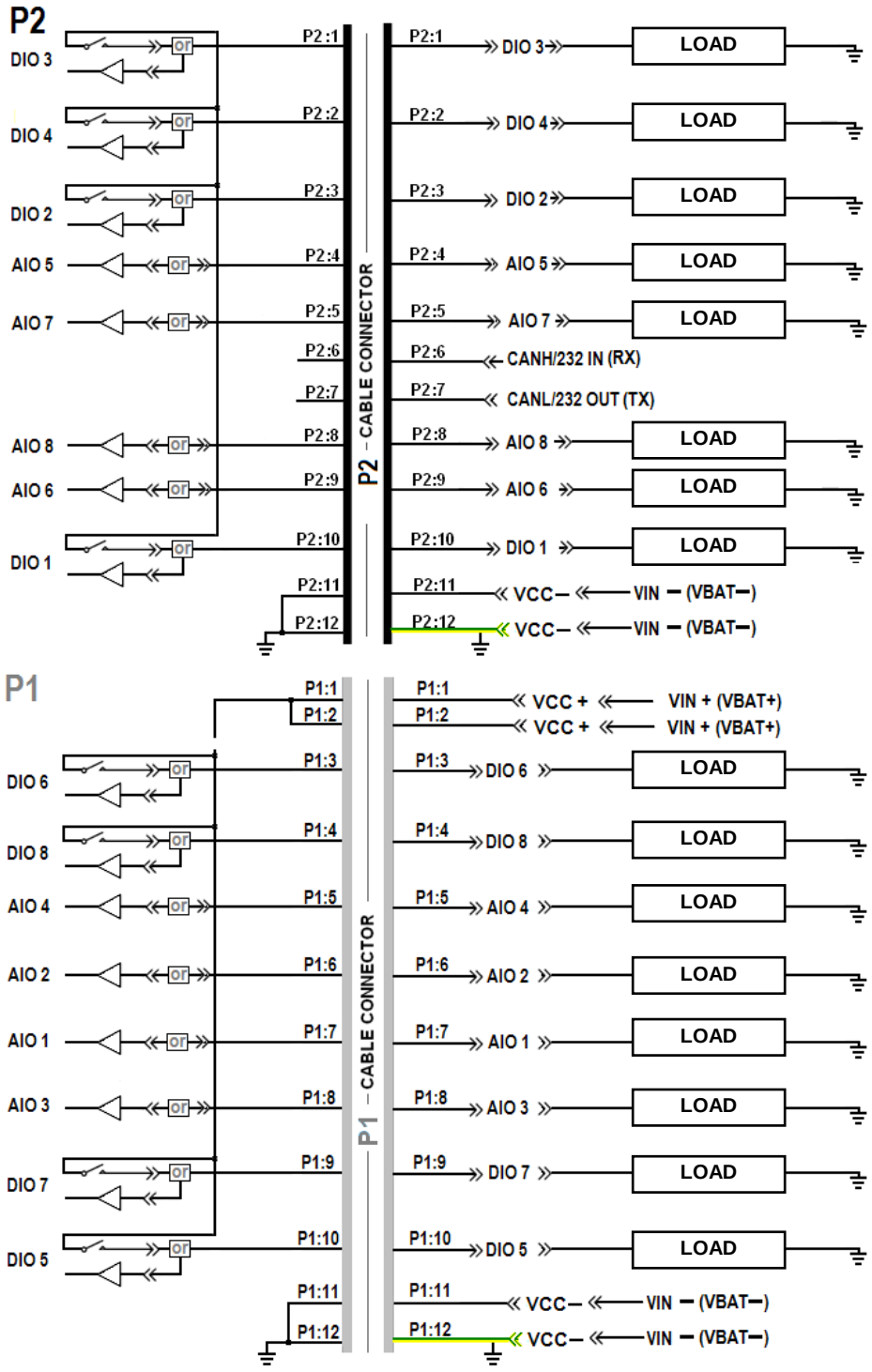

Figure 6. BU-9H16AF-8F-8V-RS P1 and P2 Field Wiring

3.0 Associate Mode

Communication between the SmaRT BU-9H16AF-8F-8V-RS and SmaRT remotes is established for systems before shipped from Cervis. There may be occasions when the communication link between remote and base unit will have to be established in the field. Access to and the exact button or switch sequencing for the remote used while in Associate mode will vary depending on the type of SmaRT remote with which the base unit is to communicate. Please reference the appropriate SmaRT remote control manual, Cervis Engineering SpecSheet, or individual instructions provided by Cervis with your system for the proper Associate Mode details.

CAUTION

Prevent inadvertent movement of the machine while establishing the communication link between SmaRT base units and remote controls.
Always remove power from base units by disconnecting P1 and P2 before attempting to Associate the remote to the base unit.

4.0 Available Options

The following are some of the options available for the BU-9H16AF-8F-8V-RS-INT and BU-9H16AF-8F-8V-RS-EXT base units. For custom configuration of your particular base unit and system, please consult with your Cervis Inc. sales representative.

Table 2. Available Options

Part Number	Description
BB6-01	HN-1001 (gray) 12-conductor cable harness, 36 inches in length
BB7-03	HN-1002 (black) 12-conductor cable harness, 36 inches in length
BB7-04	HN-1005 24-conductor cable harness, 9 ft. length, black and grey connectors
BB3-06	900MHz external antenna
J5-07	3**ft.** antenna extension cable
J5-02	10ft. antenna extension cable
EXT-10-900	10ft. antenna cable (J5-02) and external antenna(BB3-06)
EXT-3-900	3ft. antenna cable (J5-07) and external antenna(BB3-06)

5.0 Specifications

Table 3. SmaRT BU-9H16AF-8F-8V-RS Specifications

Item	Description	
Power	**Vin**	+10 to +30VDC
Radio (disabled)	**Frequency**	906 – 924MHz or 2405-2480MHz (option)
	RF Power	10mW (max.)
	License	License Free
	Modulation	DSSS
	Antenna	Internal or External (option)
Environment	**Operating Temp**	-20°C to 55°C (-4°F to 131°F)
	Storage Temp	-40°C to 85°C (-40°F to 185°F)
	Humidity	0 to 100%
Indicators (12)	**Status**	WINK – Needs Upgrade SLOW – Normal FAST – No Association ON – Link Lost
	Serial	ON – Active
	Radio RX	ON – Active
	Radio TX	ON – Active
	Error	ON – Error
	Digital Out	ON – Active
	Digital In	ON – Active
	Analog Out	ON – Active
	+V1	ON – OK
	+V2	ON – OK
	+V3	ON – OK
	Rev Battery	ON – Fault
Enclosure	**Dimensions**	mm: 133 x 118 x 36 inch: 5.25 x 4.7 x 1.4
	Durability	High Impact Polymer
	Mounting Holes	mm: 7.4 dia. 102 center-to-center Inch: 0.29 dia. 4.00 center-to-center
Outputs/ Inputs	**Digital**	Eight FET—Open Drain
	Analog	Eight 0–16VDC
	Current	4A per channel 15A Max. @ 55°C
Umbilical Communications (optional)	**RS-232**	-RS
	CAN Bus	-CN

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