Wireless Emergency Stop
Hardware Manual

FORT Robotics

Rugged Handheld Emergency Stop with SafetySense® Wireless

FORT's Wireless Emergency Stop (WES) is a handheld remote emergency stop designed from the ground up to enable the safe operation of remote and automated systems. It provides a rugged, ergonomic, and easy to understand system with a flexible receiver that both implement FORT's proprietary SafetySense® technology to ensure consistent and reliable control.

1. **Applications**
   - Emergency stop of remote, tele-operated, semi- or fully autonomous robotic systems where safety and usability are critical.
   - Control of fixed or mobile industrial systems requiring and reliable wireless emergency stop capabilities.

2. **Key Features (Wireless Emergency Stop – WES)**

   - SafetySense® Secure wireless communications with range of 1000+ ft
     - Frequency bands include 900 MHz, 2.4 GHz (other bands available)
   - 1000+ unique system addresses
   - 12 hour Lithium-Ion battery life for continuous use
   - Flexible USB charging interface
   - RP-SMA antenna connector (antenna included)
   - IP65 rated enclosure
   - Designed to meet MIL-STD-810 for ruggedness
   - -20°C to 60°C operation
   - Belt clip and lanyard options available

3. **SafetySense® Technology**

   SafetySense® Technology consists of major system-level technologies that work together to provide the integrator the ability to design systems with consistent and reliable remote operations.

   While the system is constantly monitoring its health, the remote also provides the operator with the ability to intervene. The Wireless Emergency Stop maintains constant, two-way communications with its paired receiver to guarantee that the emergency stop function is active if the button is pressed or communications are ever lost. This is critical for the safety of people and property in dangerous environments and sets SafetySense® enabled devices apart from their peers.

4. Specifications (Wireless Emergency Stop - WES)

The Wireless Emergency Stop (WES) is a highly ruggedized wireless remote emergency stop device. It implements FORT's SafetySense® system to provide reliable control of dangerous systems

4.1. Specifications

| Parameter	Minimum	Typical	Maximum	Unit
Operating Temperature	-20		+60	ºC
Charging Voltage	4.5	5	5.5	V
Charging Current			2.0	A
Battery Life		12		Hours
Ingress Protection	IP65			
Ruggedness	Designed to meet MIL-STD-810			
Weight		310		g
Radio Connector		RP-SMA		
Charging/Programming Connector		Sealed Mini USB with dust plug		
RF Transmit Power[1] (900MHz)			1	W
RF Transmit Power[1] (2.4GHz)			500	mW
RF Receive Sensitivity	-101			dBm
RF Spread Spectrum		FHSS		

Table 1 - Wireless Emergency Stop Specifications

Notes:
1 – Transmit power limited by local regulatory requirements. Maximum for use in EU is 100 mW. Please enquire for details.

4.2. Control Layout

The WES have a very simple control layout. The top the WES is dominated by a twist to unlock emergency stop button.


Emergency Stop Button
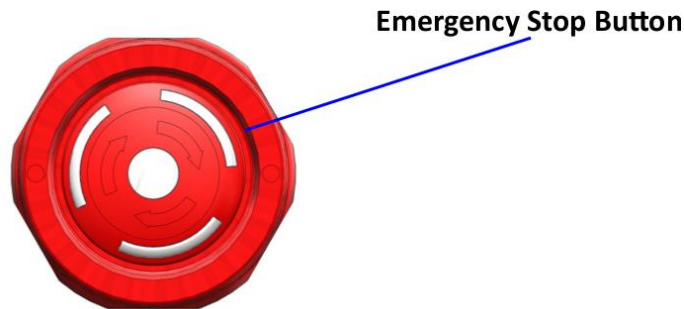
Figure 1 - WES-001 Top View

Red Emergency Stop LED Behavior	Description	Emergency Stop State
Solid Red	Emergency Stop button pressed Searching for network	Stopped
Red Blink Once Every Second	Connected with low signal strength	Operating
Red Blink Once Every Three Seconds	Connected with high signal strength	Operating
Fast Red Blink	Error connecting to system or in bootloader mode (if turned on with USB connected to a computer)	Stopped
Off	Powered off	Stopped

Table 2 - Emergency Stop LED Behavior

The bottom of the WES contains the mini-USB plug for charging and configuration, an RP-SMA antenna connector, and the power button.
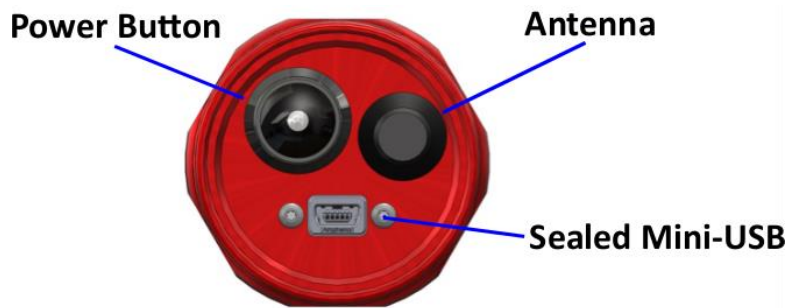
Figure 2 - WES-001 Bottom View

Green Power Button LED Behavior	Description
Solid Green	USB plugged in: Battery fully charged
Slow Green Blink	USB plugged in: Battery charging USB Unplugged: Battery below 20% charge
Fast Green Blink	USB Unplugged: Battery below 10% charge or in bootloader mode (if turned on with estop button in)
Off	Red Estop LED Off: WES off Red Estop LED On Solid or Blinking: WES searching for network

Table 3 – Power Button LED Behavior

4.3. Bootloader Mode

The WES supports firmware upgrades in the field. In order to support this feature, the WES can be placed into bootloader mode. In this mode the wireless link is not active, so it will not connect to the receiver (VSC). This mode is entered whenever the WES is powered on with the Emergency Stop button depressed. Contact FORT for more details and requirements for firmware upgrades.

4.4. Mechanical

Figure 3 - WES Mechanical Drawing

5. Installation

5.1. WES Wireless Integration

The WES is designed to be paired with any of FORT's Vehicle Safety Controllers (VSC). The VSC receiver provides dual enable outputs that are designed to be used to control any system that needs to be stopped remotely. It also has USB, serial, or CAN interfaces that can be used to integrate the system with other intelligent control systems to get status or configure the emergency stop system. An example of this type of integration is shown below.
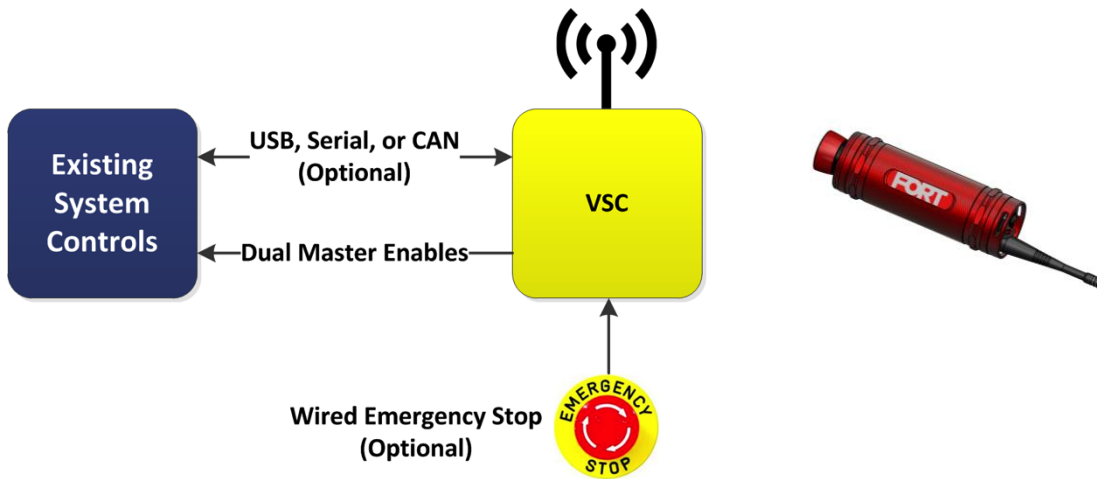
Figure 4 - Simple Receiver Integration

Detailed information on integration interfaces can be found in the system user manual and receiver data sheet.

6.　Regulatory Information

6.1. Power Output

The VSC-009-9XX is capable of transmitting at up to 1W. It is recommended that the transmit antenna be kept at least 23cm away from nearby persons to satisfy FCC RF exposure requirements.

The VSC-009-24XX is capable of transmitting at up to 500mW. The antenna used must provide a separation distance of at least 20cm from all persons and must not be co-located or operate in conjunction with any other antenna or transmitter.

6.2. FCC Notifications

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.

6.3. IC Notifications

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device many not cause interference, and (2) this device must accept any interference, including interference that many cause undesired operation of the device.

Ce dispositif est conforme aux norms permis-exemptes du Canada RSS d'industrie. L'opération est sujette aux deux conditions suivates: (1) ce dispositive peut ne pas l'interférence, et (2) ce dispositif doit accepter n'importe quelle interference, y compris l'interférence qui peut causer le fonctionnement peu desire du dispositif.

7. Ordering Information

Part Number	Description
WES-001-(F)	Wireless E-Stop (F) = Radio Selection 901 : 900MHz FHSS 2401 : 2.4GHz FHSS ** Inquire about other frequency bands and power settings **Other colors available. Contact for details**
Accessories:	
275-0002	Antenna: 900 MHz, RP-SMA male
275-003	Antenna: 2.4 GHz, RP-SMA male
100-0029	USB Cable: type A to mini-B, 3ft
270-0004	USB Power: type A connector, 10W
100-0111	WES Belt Clip: kit for self assembly
Accessory Kits:	
100-0111	Starter Kit: charger, installed belt clip, 900 MHz antenna
100-0141	Starter Kit: charger, installed belt clip, 2.4GHz antenna

Table 4 - WES Orderable Part Numbers

8. Limited Warranty

The End-User Agreement can be viewed here at https://fortrobotics.com/end-user-agreement/

The OEM Supply and License Agreement can be viewed here at https://fortrobotics.com/oem-agreement/

9. Revision History

Version	Date	Changes
A	3/1/2021	Initial Release
B	4/20/2021	Remove section on FMEDA

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