Wireless Emergency Stop

Hardware Manual

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	°C
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.

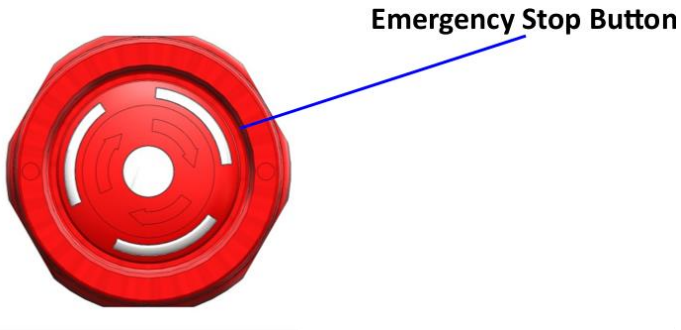

Figure 1 - WES-001 Top View

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.

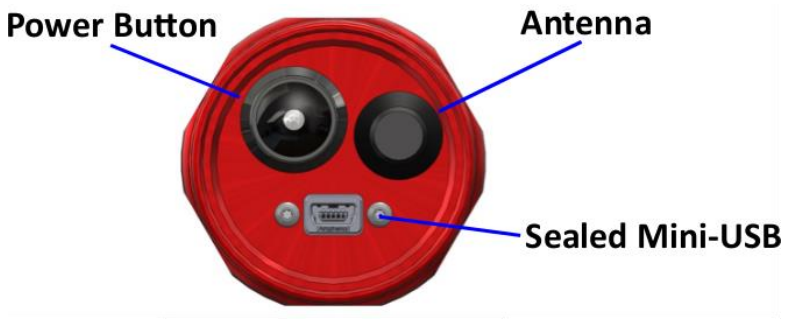

Figure 2 - WES-001 Bottom View

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.

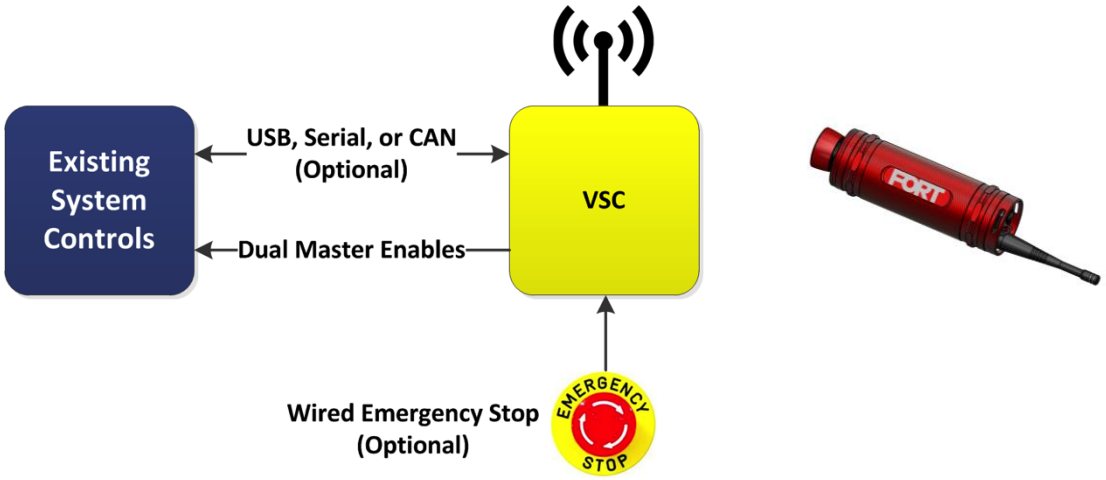

Figure 4 - Simple Receiver Integration

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

6. 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

7. 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/

8. Revision History

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

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FORT Wireless E-Stop Addendum

April, 2023

FCC

Caution: Changes or modifications not expressly approved by *the party responsible for compliance* could void the user's authority to operate the equipment.

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.

Note:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

RF Exposure Information

This portable device complies with FCC RF exposure limits for general population/uncontrolled exposure. To ensure compliance, only use authorized accessories and antenna types listed in this manual with this product. Use of accessories/antenna types other than those specified may result in RF exposure levels exceeding the FCC requirements for RF exposure.

ISED

This radio transmitter [IC: 29381-1000350] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

FORT Robotics

Le présent émetteur radio [IC: 29381-1000350] a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué pour tout type figurant sur la liste, sont strictement interdits pour l'exploitation de l'émetteur

Antenna type(s) which can be used with the transmitter

Manufacturer	Antenna Type	Model	Gain (dBi)	Impedance (Ω)
Linx Technologies Inc	¼ Wave Whip, Straight Antenna	ANT-868-CW-QW	1.6	50

This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's license-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique 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;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

RF Exposure Requirements

This portable device complies with ISED RF exposure limits for general population/uncontrolled exposure. To ensure compliance, only use authorized accessories and antenna types listed in this manual with this product. Use of accessories/antenna types other than those specified may result in RF exposure levels exceeding the ISED requirements for RF exposure.