

CADI SmartSense SmartNode

SMN-822W User Manual



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Regulatory Information

For customers in U.S.A and Canada

The SMN-822W (FCC ID: VPE-SMN-822W) 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.

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

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 of the device.

FCC RF Radiation Exposure Statement:

1. This Transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
2. For body worn operation, this device has been tested and meets FCC RF exposure guidelines. When used with an accessory that contains metal may not ensure compliance with FCC RF exposure guidelines.

You are cautioned that changes or modifications not expressly approved by the part responsible for compliance could void the user's authority to operate the equipment.

For customers in Europe

This equipment has been tested and found to comply with the limits set out in the R&TTE Directive.



Where you see this symbol on any of our electrical products or packaging in Europe, it means that at end of life the product or battery must be disposed of in accordance with any applicable laws or requirements for the separate disposal of electrical equipment or batteries.

Battery Precautions

- Keep batteries away from children.
- Do not swallow batteries.
- Do not throw batteries into water.
- Do not throw batteries into fire.
- Do not short circuit, recharge, over-discharge, puncture, incinerate, crush or expose to temperature above the temperature rate of the battery.
- Do not replace battery with incorrect type. Incorrect type of battery replacement may cause risk of exposure.
- Battery should be disposed according to the instructions.

Battery Fire and Explosion Hazard Standard

- **Fire and Explosion Condition:** Continuously exposed to above 100°C (212°F) caused by abnormal environmental condition. Drop contents of lithium metal to water.
- **Special Fire Fighting Procedures:** Do not use water, sand, carbon dioxide, or soda ash extinguisher. Wear protective breathing apparatus and protective garments.
- **Unusual Fire and Explosion Hazards:** Do not short circuit, recharge, over-discharge, puncture, incinerate, crush or expose to temperature above the temperature rate of the battery.

Battery Disposal Information

Disposal of battery have to comply with country stipulated policy.

- Proper Shipping Name: Used Lithium Batteries
- UN Number: UN3090
- Hazard Classification: Class 9(Miscellaneous)
- Packing Group : II
- Labels Required: Miscellaneous Hazardous Waste
- Disposal Code: D003
- Other: All lithium thionyl chloride batteries should be disposed of by a proper disposal facility.

Emergency First Aid Procedures if contact with Battery Leak

- **Eye Contact:** Flush with Running Water for at Least 15 Minutes. Hold eyelids apart. Seek immediate treatment.
- **Skin Contact:** Rinse with plenty of running water. If burns develop, seek medical treatment.
- **Inhalation:** Remove to fresh air. If necessary, administer oxygen and seek medical treatment.
- **Ingestion:** Find immediate medical treatment.

Product Information

- Product model: SMN-822W
- Product name: SmartNode
- Manufacturing site: 31 Ubi Road 1, #07-01A Aztech Building, Singapore 408694

Version Information

- This version is subject to change or upgrade without notice
- Version: A01
- Issue date: 26 August 2019

Declaration

Cadi Scientific Pte Ltd reserves the right to change the product described in this Operator's Manual. All information contained in this Operator's Manual is subject to change without notice.

1. about SMN-822W

1.1 Overview

This chapter contains information about the SMN-822W including safety. Please make sure you read this entire instruction manual prior to using the SMN-822W.

1.2 Introduction



Cadi's SmartNODE™ SMN-822W is part of Cadi's range of WIFI sensor that is used for monitoring the utilization of hand rub.

SMN-822W sensor is battery powered, designed to seamlessly fit with any existing hospital hand rub dispenser. SMN-822W is a pressure activated sensor.

With the integrated pressure sensor, SMN-822W only triggered to transmit unique LF ID when there is a press of force applied on the hand rub. It has minimum false triggering and thus deliver accountable compliance data in hand hygiene application. It enables compliance activity to be captured with no changes of workflow.

SMN-822W is equipped with location tracking capability. The location of hand rub can easily be located. With these features, hospital staff can effortlessly to maintain the hand rub solution level.

1.3 Safety

This section contains important safety information. You need to read and understand all warnings, cautions, and the operator's manual prior to using the SMN-822W.

1.3.2 Potential Adverse Event

There is no potential adverse event on using SMN-822W device.

1.3.2 Reported Adverse Event

There is no reported adverse event on using SMN-822W device.

2. Specifications

1	Power	1x A (3.6V) : Lithium Thionyl Chloride Battery (Non – Rechargeable)
2	Dimension	79(L) x 70(W) x26(H) mm
	Weight	158g (without fitting fixture)
3	Operating temperature	-10°C - 50°C
4	Storage & Transport temperature range	0°C - 30°C
5	WIFI	2.4GHz 802.11b/g/n compliant
	Frequency Band	Channel 1 – Channel 13 (CE) (2401 – 2483 MHz) Channel 1 – Channel 11 (FCC) (2412 – 2462 MHz)
	Transmit Power (ERP)	32mW
	Transmission Rate	Heartbeat motion condition: 10 minutes. static condition: 60 minutes. Transmit immediately if change of status/ location.
6	LF (Transmit and Receive)	125Khz
	Modulation	ASK
	Transmission Rate	Triggered by detection of pressure applied on strain gauge sensor.
7	IR(Receive)	Frequency: 38KHz
8	Interfaces	1 x Bi-Colour LEDs (Red and Green) 1 x Buzzer.
9	Sensors	• Accelerometer Sensor • Strain Gauge Sensor
10	Strain Gauge sensor	Maximum detection weigh: 5 Kg
11	Compliance	<u>CE</u> • ETSI EN 300 328 • ETSI EN 300 330 • ETSI EN 301 489 • EN 60601-1-2 • EN 62368-1 • CISPER32 • EN 62311 <u>FCC</u> • FCC Part 15 • FCC part 2.1091

3. Installations and Maintenance

The CADI SMN-822W should be installed and maintained only by authorized personnel.

3.1 Environment Requirement

The environment where CADI SMN-822W is used should be in accordance with the requirements specified in specification.

In addition, CADI SMN-822W should be used in an environment without excessive noise, dust, flammable or erosion substances. The device contains battery and it should not place near any heat source.

When transporting CADI SMN-822W from one place to another with difference in temperature, frosting may occur. If so, CADI SMN-822W should be turned ON only after frosting disappears.

3.2 Unpacking and Inspecting

CAUTION: Please use caution in opening the shipping box and try not to use sharp utility knives and such, as you risk cutting into yourself and/or product.

Every attempt is made to ensure your order is accurate and complete. However, to be sure that your order is correct, verify the contents of the box against your packing slip.

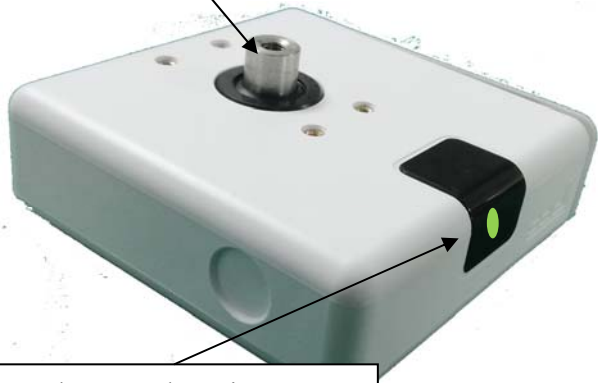
The CADI SMN-822W includes below accessories;

1. 1 x A Size 3.7V Lithium Battery
2. 1 x Weighing plate (optional)
3. 1 x Tightening plate (optional)

1. Carefully inspect each item as it is unpacked for any signs of damage that may have occurred during shipment.
2. Check the components according to the packing list.

4. Battery replacement instruction

	Pictures	Procedures
		Open the battery compartment by releasing the screw.
		Make sure the O-Ring still intact on the battery compartment as shown.
		Take out the battery and replace with a new battery

	Press the strain gauge sensing point. Press the weighing plate, if there is.  Make sure there is blinking LED	Check the response of device by pressing the strain gauge. Make sure green LED is blinking on the press on strain gauge.
	 Tightening with torque 3.0kgf.cm	Close and tighten the battery compartment. Make sure O-ring is always intact in the groove. Tighten the battery compartment with torque 3.0kgf.cm

5. Battery Status Indicator



Battery normal:

LED blinks green every 30 seconds.

Battery Low:

LED blinks Red every 5 seconds,

6. Applications



7. Technical Specifications

Overview

This chapter contains specifications for the SMN-822W and EMC information.

7.1 Electromagnetic Compatibility Requirements

WARNING: The SMN-822W should not be used adjacent or stacked with other equipment and, if necessary, observe its operation to verify its normal operation during use. Refer to the Electromagnetic Immunity information in this chapter.

CAUTION: The SMN-822W needs special precautions regarding Electromagnetic compatibility (EMC) and care should be taken in accordance to the EMC information provided in Chapter 7 of this document.

CAUTION: Use of portable and mobile RF communications equipment near the SMN-822W may affect its operation.

CAUTION: Equipment operating in close proximity may emit strong electromagnetic or radio frequency interference (RFI), which could affect the performance of this device. Turn power off to radio, cellular and other like equipment near the SMN-822W. Refer to the EMI tables in Chapter 5.

The above listed models are intended for use in the electromagnetic environment specified below. The customer or the user of the above listed models should assure that they are used in such an environment.		
Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR 11	Group 1	The above listed models use very low WIFI and LF RF energy. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations / flicker emissions IEC 61000-3-3	Complies	The above listed models are suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.

The above listed models are intended for use in the electromagnetic environment specified below. The customer or the user of the above listed models should assure that they are used in such an environment.

Enclosure Port

Immunity test	Test Condition	IEC 60601 Compliance level	Electromagnetic environment - guidance
Electrostatic discharge (ESD) IEC 61000-4-2	±8 kV Contact ± 2,4,8,15 kV Air	±8 kV Contact ± 15 kV Air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%. Criteria B
Radiated RF EM fields and Proximity fields from RF wireless communications equipment IEC 61000-4-3	10 V/m 80 MHz – 2,7 GHz 80% AM 1kHz	10 V/m 80 MHz – 2,7 GHz	Mains power quality should be that of a professional healthcare facility environment and Home healthcare environment. Criteria A
	385MHz (18Hz Pulse Modulation)	27 V/m	
	450MHz (FM+/-5KHz deviation 1kHz sine or 18Hz Pulse Modulation)	28 V/m	
	710MHz (217Hz PM)	9 V/m	
	745MHz (217Hz PM)	9 V/m	
	780MHz (217Hz PM)	9 V/m	
	810MHz (18Hz PM)	28 V/m	
	870MHz (18Hz PM)	28 V/m	
	930MHz (18Hz PM)	28 V/m	
	1720MHz (217Hz PM)	28 V/m	
	1845MHz (217Hz PM)	28 V/m	
	1970MHz (217Hz PM)	28 V/m	
	2450MHz (217Hz PM)	28 V/m	
	5240MHz (217Hz PM)	9 V/m	
	5500MHz (217Hz PM)	9 V/m	
	5785MHz (217Hz PM)	9 V/m	
RATED power frequency magnetic fields IEC 61000-4-8	50Hz or 60Hz	30 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment. Criteria A
Comment			

The above listed models are intended for use in the electromagnetic environment specified below. The customer or the user of the above listed models should assure that they are used in such an environment.			
Input AC power PORT			
Immunity test	Test Condition	IEC 60601 Compliance level	Electromagnetic environment - guidance
Electrical fast transient/bursts IEC 61000-4-4	± 2 kV 100kHz Repetition frequency	± 2 kV	Mains power quality should be that of a professional healthcare facility environment and Home healthcare environment. Criteria B
Surges IEC 61000-4-5	$\pm 0,5$ kV, ± 1 kV line(s) to line(s) $\pm 0,5$ kV, ± 1 kV , ± 2 kV line(s) to ground (a)	± 1 kV , Differential mode ± 2 kV Common mode	Mains power quality should be that of a professional healthcare facility environment and Home healthcare environment. Criteria B
Conducted RF induced by RF fields IEC 61000-4-6	10 Vrms 150 kHz - 80 MHz also ISM and Amateur Radio Bands c) 80% AM 1kHz	10 Vrms	Mains power quality should be that of a professional healthcare facility environment and Home healthcare environment. Criteria A
Voltage dips, short interruptions and voltage variations on power supply input lines IEC 61000-4-11	0% UT; 0°,45°,90°,135°,180°,225°,270°,315° 0% UT; 0° 0% UT; 70% 0% UT; 0%	0,5 Cycles 1Cycle 25/30 Cycles (50/60Hz) 250/300 Cycles (50/60Hz) (5s)	Mains power quality should be that of a professional healthcare facility environment and Home healthcare environment. If the user of the above listed models requires continued operation during power mains interruptions, it is recommended that the above listed models are powered from an uninterruptible power supply or battery. Criteria A (max. Mains voltage) Criteria B (min. Mains voltage) Criteria A (max. Mains voltage) Criteria B (min. Mains voltage) Criteria A (max. Mains voltage) Criteria B (min. Mains voltage) Criteria B (max. Mains voltage) Criteria B (min. Mains voltage)
Comment: a) Not applicable to CLASS II ME EQUIPMENT and ME SYSTEMS. b) The ISM (industrial, scientific and medical) bands between 0,15 MHz and 80 MHz are 6,765 MHz to 6,795 MHz; 13,553 MHz to 13,567 MHz; 26,957 MHz to 27,283 MHz; and 40,66 MHz to 40,70 MHz. The amateur radio bands between 0,15 MHz and 80 MHz are 1,8 MHz to 2,0 MHz, 3,5 MHz to 4,0 MHz, 5,3 MHz to 5,4 MHz, 7 MHz to 7,3 MHz, 10,1 MHz to 10,15 MHz, 14 MHz to 14,2 MHz, 18,07 MHz to 18,17 MHz, 21,0 MHz to 21,4 MHz, 24,89 MHz to 24,99 MHz, 28,0 MHz to 29,7 MHz and 50,0 MHz to 54,0 MHz.			

Guidance and manufacturer's declaration - electromagnetic immunity

The above listed models are intended for use in the electromagnetic environment specified below. The customer or the user of the above listed models should assure that they are used in such an environment.

Immunity Test	IEC 60601 Test Level	Compliance level	Electromagnetic environment - guidance
Conducted RF induced by RF fields IEC 61000-4-6 Radiated RF EM fields and Proximity fields from RF wireless communications equipment IEC 61000-4-3	3 Vrms 150 kHz - 80 MHz 6Vrms ISM and Amateur Radio Bands (c) 10 V/m 80 MHz – 2,7 GHz	10 Vrms 10 V/m	Portable and mobile RF communications equipment should not be used no closer to any part of the above listed models, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = 1,2\sqrt{P}$ $d = 1,2\sqrt{P}$ 80 MHz - 800 MHz $d = 2,3\sqrt{P}$ 800 MHz – 2,7 GHz Where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey should be less than the compliance level in each frequency range. (b) Interference may occur in the vicinity of equipment marked with the following symbol:

NOTE 1 At 80 MHz and 800 MHz, the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

- a) Field strengths from fixed transmitters such as base stations for radio (cellular/cordless) telephones, land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast, cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters an electromagnetic site survey should be considered. If the measured field strength in the location in which the above listed models are used, exceeds the applicable RF compliance level above, the above listed models should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the above listed models.
- b) Over the frequency range 150 kHz to 80 MHz, field strength should be less than 3 V/m.
- c) The ISM (industrial, scientific and medical) bands between 0,15 MHz and 80 MHz are 6,765 MHz to 6,795 MHz; 13,553 MHz to 13,567 MHz; 26,957 MHz to 27,283 MHz; and 40,66 MHz to 40,70 MHz. The amateur radio bands between 0,15 MHz and 80 MHz are 1,8 MHz to 2,0 MHz, 3,5 MHz to 4,0 MHz, 5,3 MHz to 5,4 MHz, 7 MHz to 7,3 MHz, 10,1 MHz to 10,15 MHz, 14 MHz to 14,2 MHz, 18,07 MHz to 18,17 MHz, 21,0 MHz to 21,4 MHz, 24,89 MHz to 24,99 MHz, 28,0 MHz to 29,7 MHz and 50,0 MHz to 54,0 MHz.

Recommended separation distances between portable and mobile RF communications equipment and the above listed models

The above listed models are intended for use in the electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the above listed models can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the above listed models as recommended below, according to the maximum output power of the communication equipment.

Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter		
	150 kHz to 80 MHz $d = 1.2\sqrt{P}$	80 MHz to 800 MHz $d = 1.2\sqrt{P}$	800 MHz to 2.5 GHz $d = 2.3\sqrt{P}$
0.01	0.12	0.12	0.23
0.1	0.38	0.38	0.73
1	1.2	1.2	2.3
10	3.8	3.8	7.3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in metres (m) can be determined using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1 At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 4 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.

Warning: Use of this equipment adjacent to or stacked with other equipment should be avoided because it could result in improper operation. If such use is necessary, this equipment and the other equipment should be observed to verify that they are operating normally.

Warning: Portable RF communications equipment (including peripherals such as antenna cables and external antennas) should be used no closer than 30 cm (12 inches) to any part of the ME Equipment or ME System, including cables specified by the manufacturer. Otherwise, degradation of the performance of this equipment could result.

7.2 IEC 60601-1-2 Compliance

7.2.1 Basic Safety

The basic safety is ensured, if it fulfils the safety requirements of the standard IEC 60601-1, especially the requirements against electric shock, mechanical hazards and hazards out of over temperatures.

7.2.2 Essential Performance

The equipment has no direct clinical function or essential performance according to IEC60601-1.

7.2.3 Intended Use

The device was developed to detect use of hand rub by sensing the pressure applied on the device. The device is operated according to the instructions and information provided by the manufacturer.

Performance reduction is according to the following criteria allowed. This has to be considered in the risk analysis of the ME Equipment or ME System.

Criteria A

The device withstands the test without damage or other disturbances, during and after the test the device works inside the specified limitations correctly. The basic safety is ensured continuously.

Criteria B

The device withstands the test without damage or other disturbances, after the test the device works inside the specified limitations correctly. The basic safety is ensured continuously.

Criteria C

A temporary malfunction is permitted, if the function itself restores or is recoverable by user intervention. The basic safety is ensured continuously

7.2.4 Intended Environment

Intended environments are the typical professional healthcare facility (Clinic, hospital) environment and Home healthcare (medical practice and household) environment.

WARNING: RF Interference - Known RF sources, such as cell phones, radio or TV stations, and two-way radios, may cause unexpected or adverse operation of this generator. Consult qualified personnel regarding system configuration.

WARNING: The generator should not be used adjacent to, or stacked with other equipment. If adjacent or stacked use is necessary, test the generator to verify normal operation. Refer to the Electromagnetic Immunity information in Chapter 5.

7.2.5 Standard

IEC 60601-1-2:2014 4th Edition (EN 60601-1-2: 2015)