

# EasyFuelPlus

## Mini RFN

### User Manual

## Revision History

Version	Description	Date	Author
1.00	First version	July 04, 2023	Hemy

## NOTICE

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## 1. Introduction

EasyFuelPlus (EFP) is an automated refueling system based on wireless communication between the system components.

The system utilizes 13.56MHz proximity technology for interfacing between the vehicle (equipped with passive RFID tag) and the refueling nozzle (equipped with Mini RFN unit), and longer-range UHF communication for wireless interfacing between the refueling nozzle to the EF Site Controller which is mounted at the site office.

The **Mini RFN** unit, together with the Passive Vehicle Tag, is OTI PetroSmart's latest addition to the EFP family which also includes:

- **EF-SC (Site Controller)**

The Site Controller is an RF transceiver, mounted on a pedestal or in the site office, serving as an interface between the EFP system and the station refueling control system. It operates at 433MHz or 902-928MHz frequency ranges, depending on the locally allocated frequency slots.

- **EF-VID (Vehicle IDentification) Vehicle Tag**

The VID is a microcontroller based in-vehicle device, that communicates with the Site Controller using a Window Mount Antenna. The Passive Tag in this case serves as an identifier of the fuel inlet, and whose serial number is mapped in the VID to create the association. The information stored in the VID may include more sophisticated data elements like the odometer and engine hour readings. The EF VID derives its power from the vehicle battery.

## 2. MiniRFN

### 2.1 Product Description

The MRFN (Mini RFN) is mounted on the refueling nozzle and serves as an interface between the refueled vehicle and the station SC (Site Controller). It facilitates controlled and secured refueling. It is a battery powered unit, comprising two different transceivers:

#### **RFID 13.56MHz Transceiver:**

Communicates with the Vehicle Passive Tag.

#### **SC UHF transceiver:**

Communicates with the refueling station SC.

All the transceivers operate under the control of a local microprocessor.

### 2.2 Product Features

- Bi-directional proximity 13.56MHz interface with Passive Vehicle Tags according to ISO15693 Vicinity Cards Standard.
- Long range UHF interface to the Site Controller.
- Tamperproof system to prevent its unauthorized removal from the nozzle.
- User defined LED indicator.
- Accelerometer used to detect removal from nozzle prior to refueling.
- Flexible, software configurable microprocessor based design.
- Compliance with FCC Section 15 Radio requirements.
- Compliance with IEC/EN60079-0 & IEC/EN60079-11 safety requirements for operation in Hazardous area.
- Operating temperature range -20° to +60°C (-4° to 140°F).
- Powered by replaceable Lithium battery unit.
- Quick and simple installation.



## 2.3 Operation Scenario

### Vehicle only with a Passive RFID Tag:

When the nozzle is inserted into the vehicle fueling inlet, the MRFN reads the relevant vehicle refueling data from the Passive RFID Vehicle Tag and transmits it together with its own identity data to the Site Controller.

Fuel is dispensed once the transaction is authorized. Fuel is dispensed as long as the MRFN detects the presence of the Passive RFID Vehicle Tag. If the nozzle is retracted from the refueling inlet, so that the RFID Vehicle Tag is not detected, the MRFN informs the system to stop dispensing fuel.

## 2.4 Technical specifications

■ **The MRFN is combined of two elements, Main MRFN body and a replaceable Battery pack.**

■ **Main MRFN body:**

- a. Mounted on the nozzle and secured to it with a dedicated metallic bracket.
- b. Two models which differ only regarding its SC transceiver frequency.
  - i. 434.3MHz - PN 10016622.
  - ii. 915MHz – PN 10016620
- c. RFID transceiver:
  - i. 13.56MHz RFID transceiver.
- d. Site Controller transceiver.
  - i. 434.3MHz or 915MHz (can optionally support any frequency between 902-928MHz).
  - ii. Transmission power: <10dBm.

■ **Battery pack**

- a. Replaceable battery pack.
  - i. Two models:
    1. With activation button. PN: 10016098.
    2. Without activation button. PN: 10016111
      - a. Activated by internal acceleration sensor.
      - ii. The battery pack itself is intrinsically safe and can be removed/replaced in the field without affecting the intrinsic safety of the MRFN w/o any limitations.
  - iii. Very easy replacement as secured in place with only two screws.

- b. Includes 3.6V Lithium battery, activation button, RGB Status LEDs, Buzzer and supported HW.
- c. Warnings of safe use:
  - i.  Use only for MRFN main body. PN10016622 (434MHz) or PN1001620 (915MHz).
  - ii.  Dispose of used batteries promptly according to local recycling or waste regulations.
  - iii.  WARNING: Fire, explosion and severe Burn hazard. Do not recharge, crush, disassemble, heat above (100°C/212°F) or incinerate.
  - iv.  there are no serviceable parts inside the equipment. Any attempt to repair and/or open the MRFN may affect the safety compliance of the device. Repair work is only permitted by the manufacturer or its representative.

## ■ **Operating environments:**

- a. IP68.
- b. Outdoors, refueling stations.
- c. Wet location – no limit.
- d. Operating ambient temperature: -20°C to +60°C.
- e. Maximum operating relative humidity: 100%
- f. Pollution degree – no specific limitations.
- g. Maximum operating altitude: 2000m.

## 2.5 Safety warnings:

### ■ Battery related warnings:

- a. See details in above clause.

### ■ Proper use of equipment:

- a. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

## 2.6 Standards compliance:

### ■ Safety:

- a. The MRFN is certified by UL to comply with all the relevant standards related hazardous locations – 60069-0, 60079-11, UL1238, and ordinary locations - **???Ishtiaq, please specify.**
- b. Hence the MRFN complies with all the relevant industrial requirements and standards for the EU, USA and Canada and otherinternational markets (e.g. CE compliance).

### ■ Radio/EMC:

- a. The MRFN was tested and certified to comply with the relevant international and US (FCC) Radio/EMC standards.

## FCC Warnings

### The FCC Wants You to Know

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 instructions, 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.

OTI has not approved any changes or modifications to this device by the user. Any changes or modifications could void the user's authority to operate the equipment.

ISED Warning (Modification statement)

OTI n'aprouve aucune modification apportée à l'appareil par l'utilisateur, quelle qu'en soit la nature. Tout changement ou modification peuvent annuler le droit d'utilisation de l'appareil par l'utilisateur.

This device is only authorized for use in a mobile application. At least 20 cm of separation distance between the (Product Name) device and the user's body must be maintained at all times.

La distance entre l'utilisateur et de produits ne devrait pas être inférieure à 20cm

## FCC Compliance Declaration (Mini RFN 900 model)

The Mini RFN 900 complies with Part 15, of the FCC Rules. Its operation is subject to the following two conditions:

This device may not cause harmful interference, and this device must accept any interference received, including interference that may cause undesired operation.

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-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.

#### Wireless notice

This device complies with FCC/ISED radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines and RSS-102 of the ISED radio frequency (RF) Exposure rules. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Le présent appareil est conforme à l'exposition aux radiations FCC / ISED définies pour un environnement non contrôlé et répond aux directives d'exposition de la fréquence de la FCC radiofréquence (RF) et RSS-102 de la fréquence radio (RF) ISED règles d'exposition. L'émetteur ne doit pas être colocalisé et fonctionner conjointement avec à autre antenne ou autre émetteur.

**FCC ID: JNX-OTI-MRFN900**

**IC: 6139A-MRFN900**

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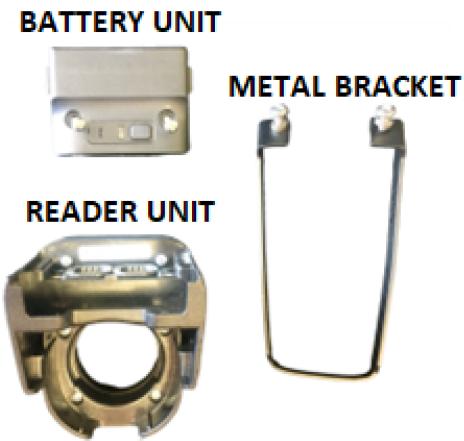
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### 3. Installation

#### 3.1 Mounting the Mini RFN

The components comprising the Mini RFN Unit are shown below. It should be noted that the Reader Unit is frequency specific (434/902-928MHz) and as such, the correct Reader Unit is to be selected for use depending on the allowed frequency bands at the country of intended operation.



The metal bracket is supplied with two M4 Screws and 2 x Nord Lock Washers for securing the Mini RFN Reader unit.

The Battery Pack is supplied with 2 x 3/16 Screws for securing it to the MRFN Reader unit.

#### Assembly Procedure (shown for an OPW7H Nozzle):

- Install the Metal Mounting Band around the trigger section of the nozzle:



- Insert the Mini RFN on the nozzle spout and slide it onto the metal part, after which the 2 x M4 with their Nordlock Washers are to be inserted into the thread and tightened with a star screwdriver.



- Mount the Battery Unit on the Reader Unit and fasten it using the 2 x 6/32" Screws.



- After tightening the Battery pack Unit Screws, the Red LED will start blinking for approximately 40-seconds after which the RFN is operational.



### 3.3 Initialization

For correct field operation, the MRFN needs to be configured with a few parameters associated with the specific installation. The most important parameter is its logical ID number associated with the specific nozzle it is mounted on. The configuration is performed utilizing a laptop in conjunction with a Smart Tag Issuing Unit.