Easy Fuel Plus RF Nozzle User Manual

Confidential & Proprietary

Version 2.01

Revision History

Version	Description	Date	Author
1.00	First draft	2 April 2008	Avner
1.01	Added EF-VID support	3 April 2008	Avner
2.00	Major revision	18 March 2010	Avner
2.01	Minor revisions	23 March 2010	Avner & Hemy
2.01`	Minor revisions	14 April 2010	Hemy

NOTICE

FCC Compliance

This device (RF nozzle model EFP-RFN900) 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 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/TV technician for help.

Changes or modifications in this equipment, not expressly approved by the party responsible for compliance (On Track Innovations Ltd,) could void the user's authority to operate the equipment.

FCC ID: JNX-OTI-EFPRFN900

Responsible Party:
OTI America
Suite 105
111 Wood Ave. South
Iselin, NJ 08830, USA
Tel: +1-732-429-1900, Fax: +1-732-429-1960
info@otiamerica.com

Table of Contents

1 Introduction

EFP (EasyFuel Plus) 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 and the fuel dispenser and longer range UHF communication for wireless interfacing to the EF Site Controller which is mounted in the site office

The new RFN (RF Nozzle) unit, together with the new EF passive RFID vehicle tag, is OTI's latest addition to the EFP Family which also includes:

- **EF-SC (Site Controller)**
  The Site Controller is an RF transceiver, mounted 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, utilizing vicinity range receiver for reading the NID (Nozzle IDentification) signal and UHF transceiver for communication with the Site Controller. It communicates to the SC the combined information of the vehicle data and the nozzle ID so as to enable proper refueling control. The vehicle data may include more sophisticated data elements like the odometer reading. The EF VID derives its power from the vehicle battery.

- **NID (Nozzle IDentification)**
  The NID is a self-contained, battery operated, very low power 13.56MHz RF transmitter that slips over the fuel nozzle spout. The NID identifies the nozzle ID to the VID.

- **Passive RFID vehicle tag**
  The new passive RFID vehicle tag enables the RFN to read the vehicle basic ID information and to transfer the combined information of the vehicle and the nozzle ID data to the SC so as to enable proper refueling control. This way the use of VID may be avoided unless more sophisticated vehicle information is required as mentioned above.

2. EFP RF Nozzle

2.1 Product description

The RFN (RF Nozzle) is mounted on the refueling nozzle and serves as an interface between the refueled vehicle and the station SC (Site Controller) to facilitate controlled and secured refueling. It is a battery powered unit, comprising three different transceivers:
RFID 13.56MHz transceiver: Communicate with passive RFID vehicle tag.
NID 13.56MHz transmitter: Transmit the nozzle ID to the VID vehicle tag.
SC UHF transceiver: Communicate with the SC.
All the transceivers operate under the control of a local microprocessor.

2.2 Product Features

- Bi-directional proximity 13.56MHz interface with passive RFID vehicle tags according to ISO15693 Vicinity cards standard.
- Unidirectional proximity 13.56MHz interface to VID vehicles tags.
- Long range UHF interface to the Site Controller.
- Flexible, software configurable microprocessor based design.
- Compliance with FCC Section 15 Radio requirements.
- Compliance with IEC/EN60079-1 & 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.
- Quick and simple installation.

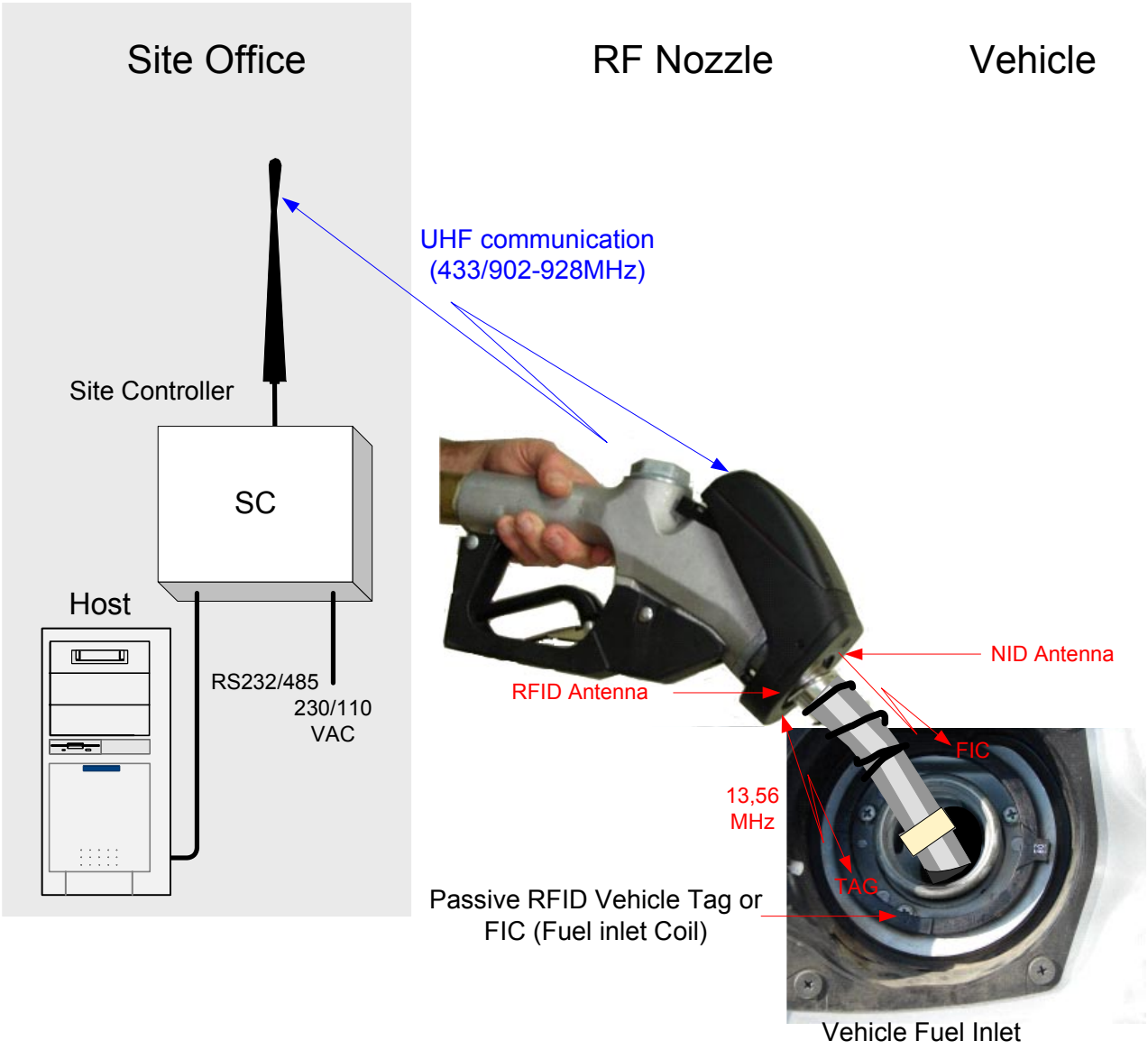

Figure 2-1: RF Nozzle System Block Diagram

2.3 Operational Scenarios

Vehicle with passive RFID tag:
When the nozzle is inserted into the vehicle refueling inlet the RFN reads data from the passive RFID vehicle tag and transmits it together with its own identity to the site controller. Fuel is dispensed once the transaction is authorized. Fuel is dispensed as long as the RF Nozzle detects the presence of the passive RFID tag. If the nozzle is retracted from the refueling inlet so that the RFID tag is not detected the RFN informs the system to stop dispensing fuel.

Vehicle with VID vehicle tag:
When the nozzle is inserted into the vehicle refueling inlet the RF nozzle periodically transmit its NID to the VID which transmits it together with its own identity to the site controller. Fuel is dispensed once the transaction is authorized. Fuel is dispensed as long as the VID detect the NID signal from the RFN (or the NID). If the nozzle is retracted from the refueling inlet so that the NID signal is not detected, the VID informs the system to stop dispensing fuel.

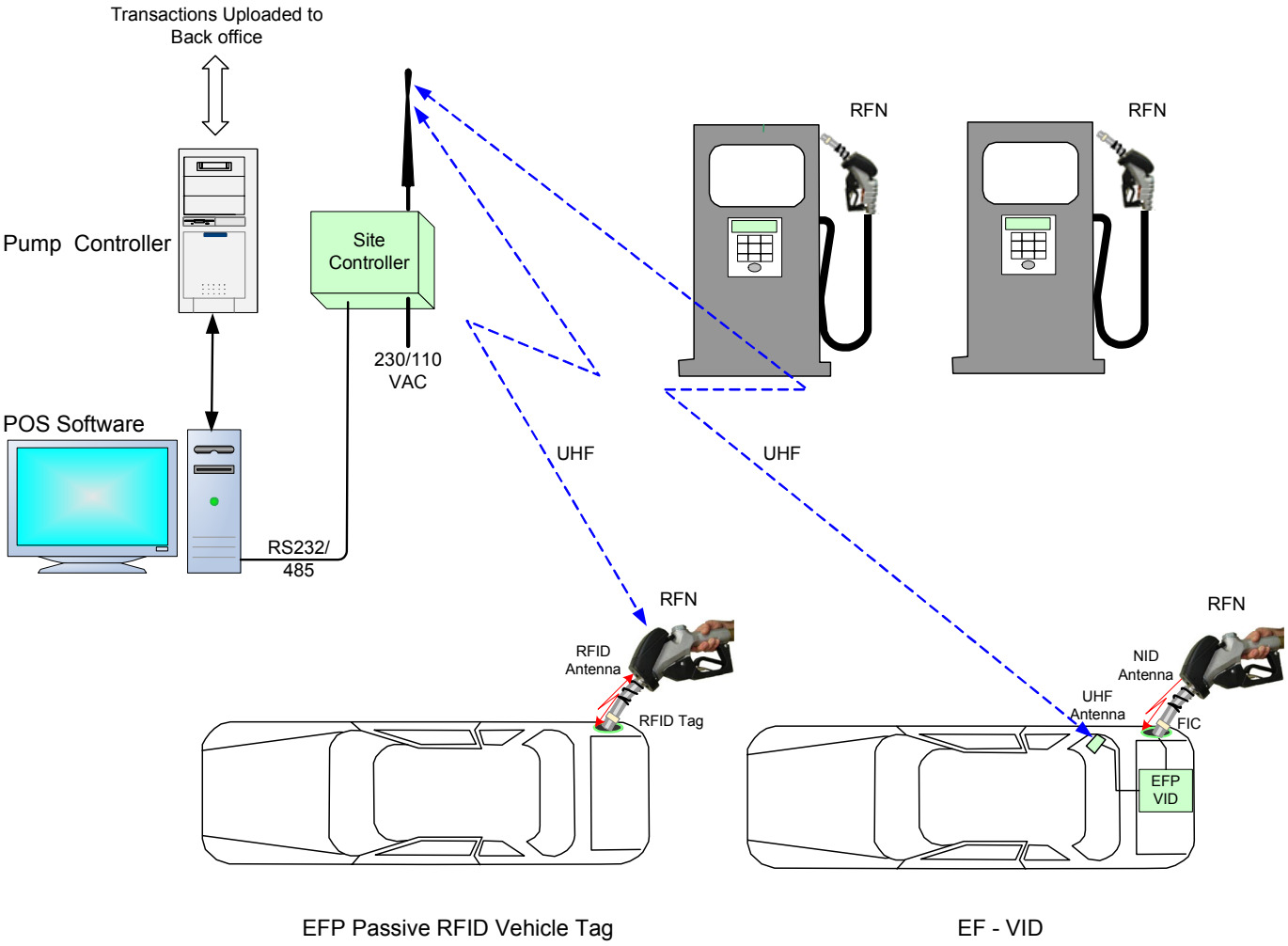

Figure 2-2: Data Communication Flow Options

3. Installation

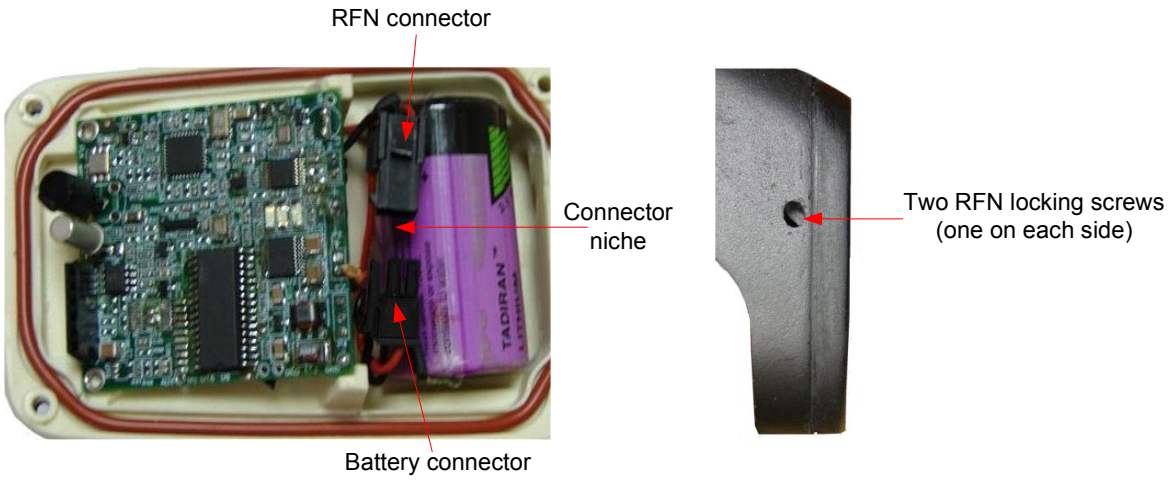

Figure 3-1: Installation

3.1 Battery Connection

The RFN unit is supplied with the battery connector disconnected. To connect the battery open the four cover screws, remove the RFN top cover and connect the battery connector to the RFN connector.
After connection stuff the connectors into the niche by the battery, return the RFN top cover and close the four cover screws.
Note: The male and the female parts of the two pin battery connectors are interlocked to avoid reverse connection. If mating is resisted - reverse direction and try again. To disconnect the battery make sure to press the lever on the battery connector before pulling the connectors apart.

3.2 Mounting

Insert the fuel nozzle spout through the RFN ring and saddle it on the fuel nozzle base. Use 2mm Allen key to close the two RFN locking screws and lock the RFN firmly in place.

3.3 Initialization

For proper field operation the RFN firmware needs to be configured with few parameters associated with the specific installation. The most important parameter is an ID number associated with the specific nozzle it is mounted on. The configuration is performed utilizing a special HHT (Hand Held Terminal) device. The detailed procedure is contained in the user manual of the HHT.