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Reader Manual

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System Overview

Petratec's Gas N Go is a state-of-the-art automatic refueling system designed to complete refueling transactions that are invisible and fully automated. This means that once a Gas N Go vehicle enters a gas station it is able to acquire all services required by the passengers without a visible transaction taking place.

Automatic refueling revolves around vehicle identification: authorizing a transaction on the basis of a non-equivocal identification of a specific vehicle with a specific account, within a payment and clearance system. Linking between billing information and a specific vehicle is the core achievement of automatic refueling, and the Gas N Go system in particular. Authentication of vehicle identity leads to unerring billing, completing the transaction before actual refueling even begins.

In order to ensure this unequivocal identification of vehicle information, cutting edge encryption and authentication technology is employed in reading two vehicle units simultaneously and communicating this data to IT infrastructures including billing systems and station management systems. These unique vehicle units pose the perfect link between a physical vehicle, its billing account, and, in some cases, vehicle

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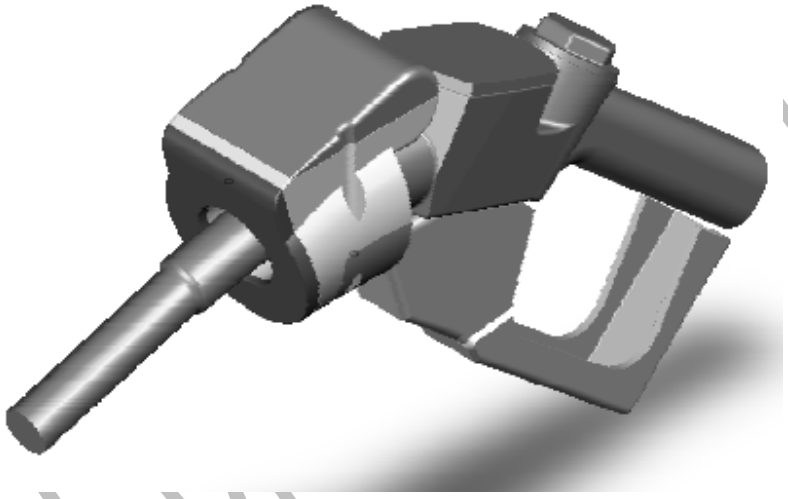
Gas N Go is designed for care-free installation and deployment. It poses no disruption whatsoever to forecourt activity and its installation in the vehicle units and on station hardware is both stress-free and completely wireless.

Reader

Figure I - Reader as Installed on Gas Pump Nozzle



Description

The Reader is a closed, sealed unit, never opened for maintenance or other reasons. A wireless transponder unit assembled onto the gas pump nozzle, its purpose is

to interrogate the Tag part of the vehicle Gas N Go unit, and communicate the vehicle data acquired from the Tag to the GSC. The GSC then unites this vehicle ID data with the data acquired from the second vehicle unit, the Meter, into a message to the station's IT infrastructures.

The Reader is constantly in communication with the GSC. Each Reader transmits to the GSC in a designated time. If this communication is severed, the GSC will automatically attempt to recover it. Any interruptions in reception are recorded.

Electric makeup

The Reader operates with a 3.6V internal power source – a primary lithium-thionyl choloride battery (Li-SOCI2). It comprises an electric PCB, and RFID printed antenna. The Reader is encased in a nylon 6/6 with 30% fiberglass reinforcement enclosure, which is hermitically sealed using ultrasonic welding.

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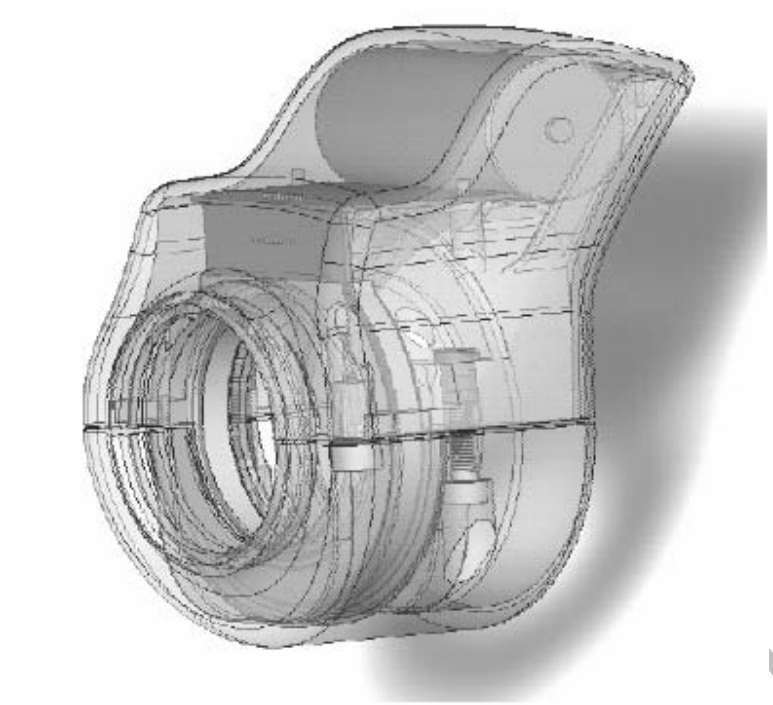

Figure II - Reader Electric Makeup

Station Forecourt Installation Procedure

Reader Configuration and Parameter Establishment

Once at the station, the GSC Real Time will, as part of standard installation, already be uploaded (at Gas N Go or customer lab) with customer's requirements and parameters. When preparing for station installation, the specific Readers which belong to that same station are already laid out, and their unique ID's are should be uploaded to the GSC PC files. The GSC Real Time then broadcasts to the Readers, downloading into

them the station's parameters. The station's fuel server and pump hardware control, and the GSC, map out the Readers according to nozzle location – so that the right Reader is interrogated by the GSC when a particular gas pump nozzle is lifted out of its cradle.

The Gas N Go system is designed for maximum flexibility: several generation Readers can work at the same time, and each singular Reader can be uploaded with any parameter values. These parameters determine, for instance, the time-out for attempting to read a Gas N Go Tag once a nozzle has been lifted, or any other operational preference defined by the customer or the company. The Gas N Go Reader's greatest advantage is that it is a *Tabula Rasa*. It may be configured by the GSC at will, and its simplicity enables great flexibility in station operation.

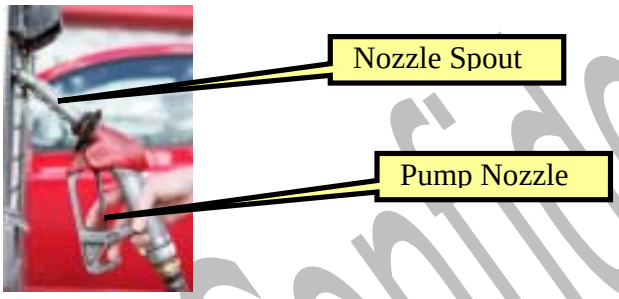

Figure III - Reader's location on the pump nozzle

The Reader is installed using two simple screws and a screwdriver! Reader assembly takes mere minutes, and there is no need for any activation procedure or preparation for installment. There is no need for long technician training, the mechanical installation is all there is to assembling a Reader onto the pump. Furthermore, the Reader

is designed for effortless installation no matter what the field conditions are – even run down station hardware or old nozzle models pose no obstacle to its installation.

Nozzle make and model are normally mapped out as part of the station preliminary survey. However, the Reader's basic enclosure accounts for the numerous mechanical variations of possible nozzle configurations – often one gas station will feature more than one type of nozzle. Old stations may have obsolete nozzle models as well as modern ones, and some nozzles may have to be replaced – removing a Reader and re-installing it on another type of nozzle.

The Reader comes in two parts, with an auxiliary set of mechanical adaptors or inserts made of polypropylene (see Figure IV). The Reader itself is made of one hermetically sealed enclosure part, containing the Reader electronics and operative battery, with the Reader's ring part exposed (though the actual antenna and electronics are covered in three sealed protective encasing layers). The other Reader part is the bottom cover of this ring part, which will be fastened with screws onto the Reader electronics part to form the complete enclosure. Before assembling these two parts together and inserting the screws, the appropriate PP inserts are chosen and placed within the Reader's electronics part.

Each set of inserts contains several pairs of these arcs, each set custom designed for a common nozzle make (for instance, OPW Vapor Recovery Insert Set, marked as #4 Inserts). Gas N Go deployment team then maps out the nozzle makes and determines

which set to use – the sets can also be "mixed and matched" to account for unpredicted nozzle spout sizes. Therefore, though the Reader enclosure is generic and cannot be mechanically changed (since sealed and very durable), these variable parts account for carefree installation without a long process of customized preparations for an individual station.

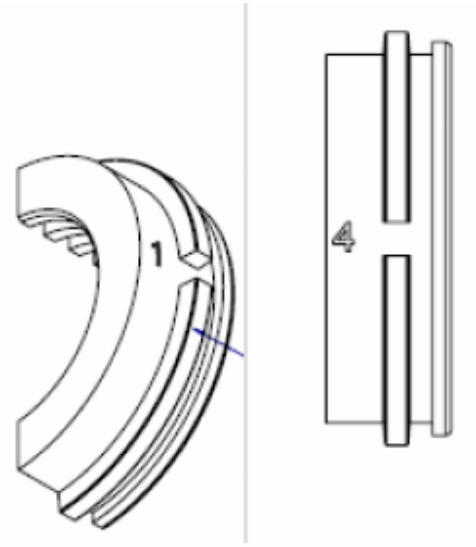

Figure IV - mechanical Polypropylene Inserts

The Reader has a tamper mechanism – a micro-switch sensitive to the detachment of the two Reader enclosure parts. The separation of these two parts indicates that the Reader may have been removed from its nozzle, and therefore, it enters a sort of freeze. This is instantaneously undone by replacing the enclosure parts, and broadcasting to the Reader from its station GSC.

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GSC and Reader Communication

Once installed, the Gas N Go system is autonomous. One of its core features is this autonomy – the system is designed to recover from any potential disruptions. Since Gas N Go is completely wireless, and all communication is done via wireless RF transmission, some events of information transmission loss are inevitable. A gas station environment is a very dynamic, constantly changing one. Heavy duty vehicles come and go, vehicles pull in and out of the station's forecourt, not to mention the crowd of people that move around the station's C-Store and isles. Therefore, stable communication is achieved but is constantly being compromised.

As this dynamic environment is a given factor, and the movement of vehicles and people cannot be controlled or monitored, and obviously cannot be predicted, it was essential for the Gas N Go system architecture to withstand these primary environmental conditions. Not only does the system take into account rough field conditions, but communication between the GSC and its Readers, and between the GSC and the various vehicle Meters is technologically advanced in order to overcome these obstacles.

Although designed to operate in these given field conditions, and though the Gas N Go offers superior technological developments overcoming these RF barriers, communication is bound to be occasionally severed. This is the Gas N Go system's true strength: 100% perfect communication is never possible technologically, given the ever-changing physical conditions. The only solution must take into account automatic, never failing recovery from these constant interferences.

Therefore, the Gas N Go system is designed to account for constant losses of communication. Once an interference in the communication between the GSC and the Readers is detected, a real-time recovery automatically takes place. Many reasons can be the cause of a momentary communication loss with the Readers, from a heavy duty vehicle obstructing line of sight communication (robust as it may be in comparison with other RF based communication systems), to a frequency occupying transmission of another source. But, the immediate recovery of communication ensues, as the GSC is especially designed to take these momentary, split-second communications losses into account as a standard operation condition.

As the GSC manages Reader communication with such a high resolution, refueling transactions will normally never be disrupted as a result of RF communication loss or external interference.

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Table of Abbreviations

Abbreviation	Stands For
GSC	Gas Station Communicator
RF	Radio Frequency
RFID	Radio Frequency Identification
ID	Identification
GUI	Graphic Users Interface
PP	Polypropylene
C-Store	Convenience Store
PCB	Printed Circuit Board
Tx	Transmit
Rx	Receive

*** Caution ***

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.

Changes of modifications not expressly approved by the party responsible for compliance could void the user ’s authority to operate the equipment.