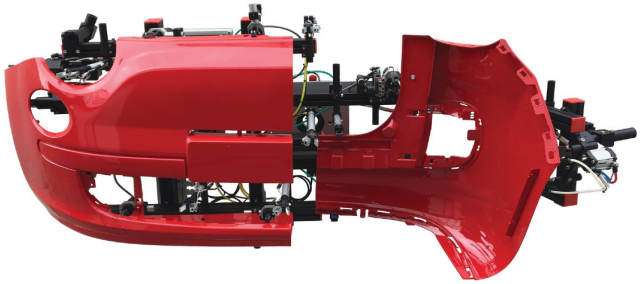
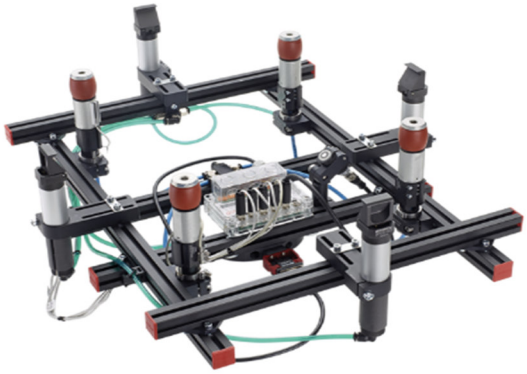
GIMATIC

A business of BARNES GROUP INC





RFID TECHNOLOGY

01/2020

SUMMARY

1. RFID COMPONENTS

RBQC (2 pieces)

RAQC (1 piece)

RS 232 CONVERTER (1 piece)

RQCBOX (1 piece)

RRAQC/CRAQC ADAPTER CABLE (1 piece)

2. INTRODUCTION

Gimatic provides solutions for the automatic handling of components. Usually to this purpose a robot is used in combination with several EOATs(End Of The Arm Tools) anyone dedicated to a specific operation.

In a similar application the robot wrist may be equipped with a reader unit (RAQC/RAQCN) and any EOAT may be equipped with a TAG memory component (RBQC).

The memory TAG (RBQC) can hold several information like:

- MAIN DATA(i.e. tool name and description, tool ID number, tool mass and overall dimensions, link intranet to EOAT related documentation, etc);
- MASS PROPERTIES(i.e. tool principal moment of inertia, tool centre of gravity coordinates, etc);
- GEOMETRIC PROPERTIES(i.e. geometric calibration parameters);
- PART LIST(i.e. up to 40 entries as part list with editable description, quantity and edition);

Every TAG is identified by an UID number that is univocal for each tag. All these data can be checked and read directly from the tag using Gimatic Mobile App(*Figure 1*) or a Gimatic PC software (*Figure 2*) and consulted later on using the Gimatic Web Service platform(*Figure 3*).

Figure 1

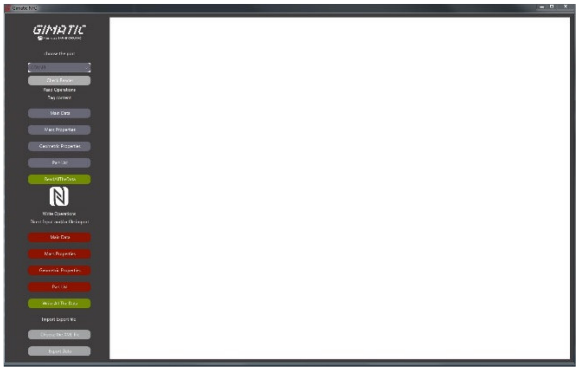


Figure 2

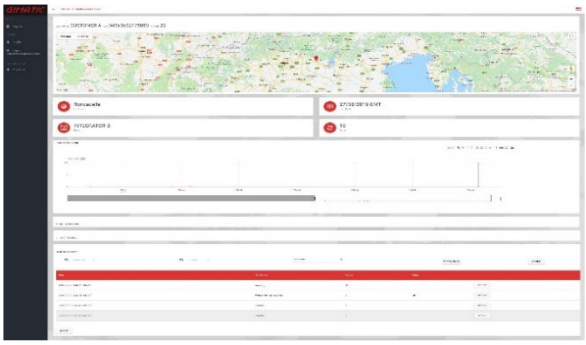


Figure 3

3. GIMATIC MOBILE APPLICATION

The application allows the reading and writing of data from/to a memory TAG(RBQC) using a smartphone. A smartphone with Android system and NFC reader is required. It's possible to download the Gimatic application from Play Store download link is availably in the QR code below(*Figure 4*).

Figure 4

Log In

The user can log in into the application with specific username, password and accepting the privacy policy, *(Figure 5).* The log in is necessary for writing information into the TAG and reading all the data stored in the TAG. The costumer must ask reference subsidiary for password and username.

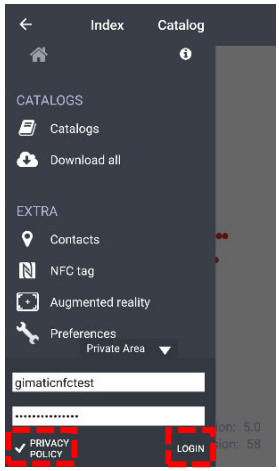


Figure 5

Reading and Writing

The procedures to read and write the tag are described below:

- Activate the NFC functionality on the smartphone (please refer to the specific user manual of the smartphone)and click on *'NFC tag'* (*Figure 6).*

- Place RBQC on the back of the smartphone (where NFC reader is placed) and move RBQC slowly until will appears '*TAG reading successful' (Figure 7).* Then *'MAIN DATA'* can be analyzed. In the upper right part of the screen there is an icon the three points ⋮ and by clicking on it the *'Enable expert mode'* text will appear. By checking this option, the full list of data and parameters becomes visible and editable. Please note that the *'Enable expert mode'* option is not accessible without a correct log in and in this case the reading of the *'MAIN DATA'* section in the only possible operation.

- Once the expert mode has been enabled, all the parameters can be overwritten by clicking on the pen icon (example: the EOAT ID number is editable), as shown in (*Figure 8)*. To confirm the change and to write the new parameters into the tag, the *'APPLY'* button must be pressed*,* in the upper right part of the screen *(Figure 9)*, holding the TAG in the position of reading action. When the update is completed, the application returns to the main screen. To be sure that the operation was performed successfully, please read again the same RBQC to check the new values of the parameters.

- Every time a TAG is read by the application, if the smartphone is connected to the Internet, a data packet is sent automatically to the Gimatic Cloud. It is also possible to send an extra packet manually, clicking on the wrench icon, *(Figure 10)* and then on the red button in the lower right part of the screen, (*Figure 11).* With this function, the user can send to the could some text messages to a communicate maintenance action among a predefined set, the possible choices are: preventive maintenance, component breakdown, component wear, regulation/calibration and configuration. In addition, it is possible to write some notes. This information can be sent also if the expert mode is disabled.

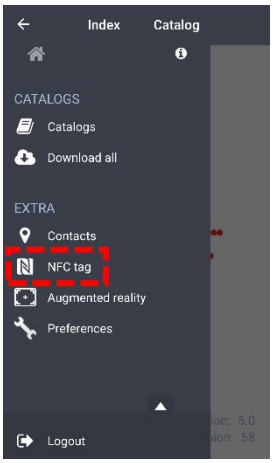


Figure 6

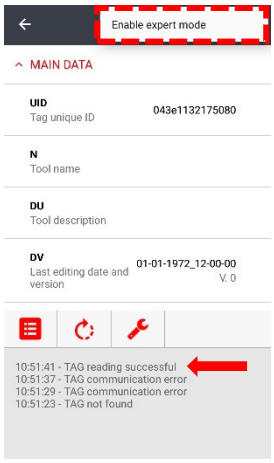


Figure 7

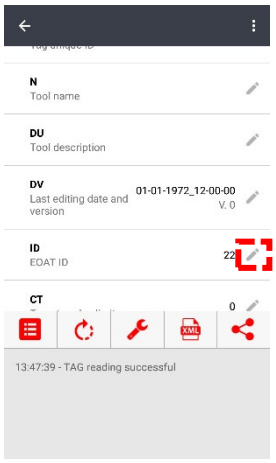


Figure 8

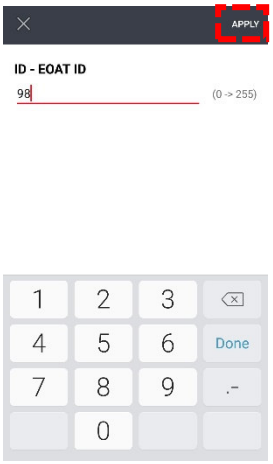


Figure 9

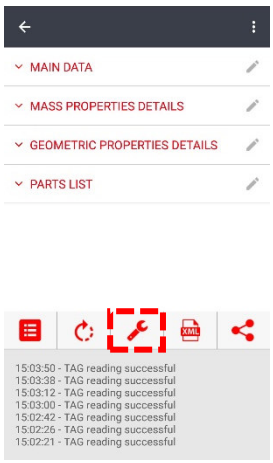


Figure 10

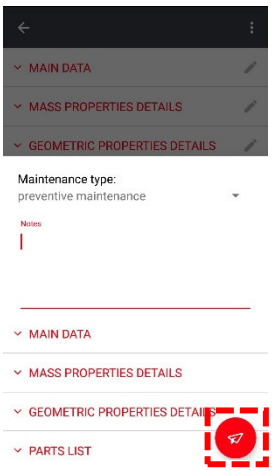


Figure 11

The icons present between the drop-down menu and the display for the messages indicate:

- possibility to close the message display;
- force the reading action;
- send messages manually;
- export a .xml file, containing all the information regarding the tag.

4. GIMATIC PC SOFTWARE

A generic computer or laptop with Windows operating system can be interfaced with a RAQC/RAQCN unit using the RQCBOX accessory and a USB RS232 serial cable. The Gimatic PC software allows the reading and writing of data from/to a memory TAG(RBQC).

Installation

The Gimatic PC software can be downloaded from http://www.gimatic.com/download/utility.
Please follow the included installation instruction document.
Execute the installation file with administration rights:

- GimaticSetup.exe (for 64 bits systems)
- GimaticSetup32.exe (for 32 bits systems)

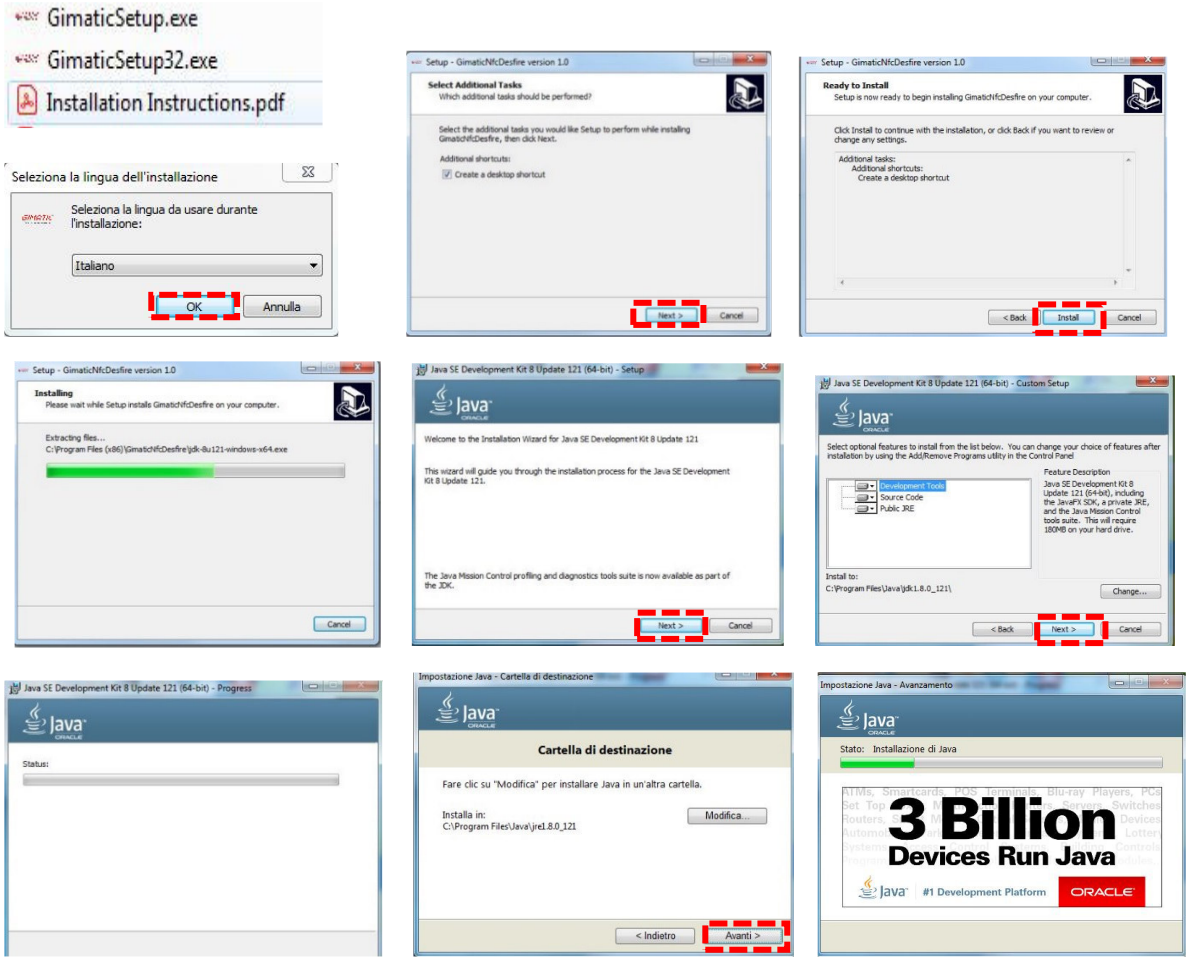


Figure 12

RQCBOX Setup

The RQCBOX is provided in PNP configuration. This section describes the PNP/NPN configuration of the RQCBOX that must be done according to the reader type.

- Unscrew the screws on the 2 sides and on the cover as shown in the attached pictures

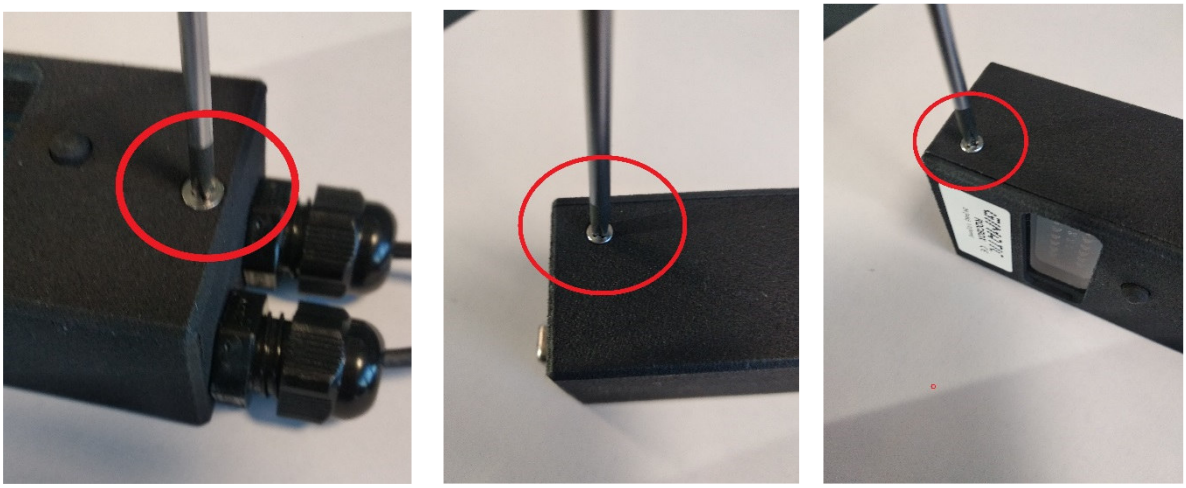


Figure 13

- Set the desired configuration like in the attached pictures

PNP Configuration

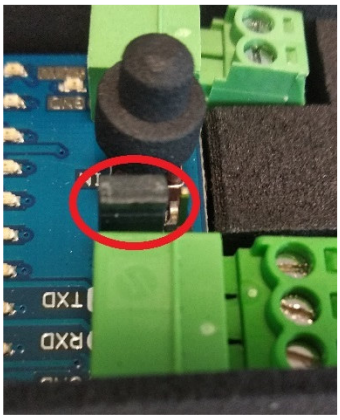


Figure 14

NPN Configuration

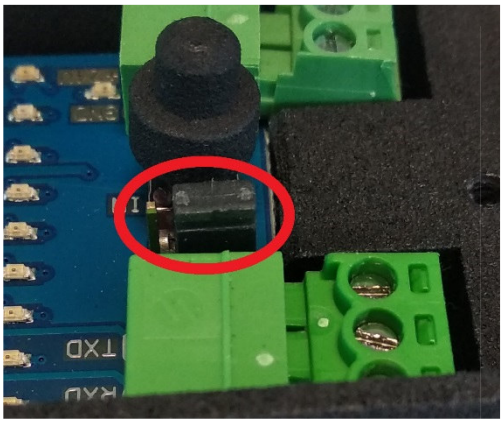


Figure 15

- Place the cover and tighten the screws

PC connection with different readers

- RAQC/RAQCN connection

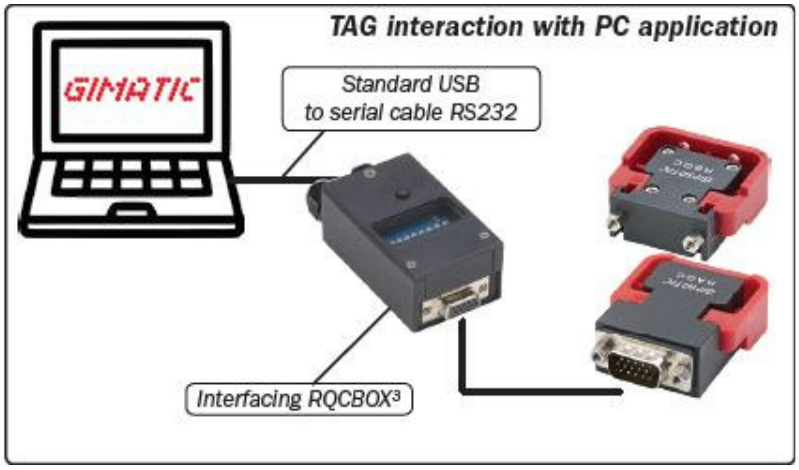


Figure 16

- CRAQC/CRAQCN connection

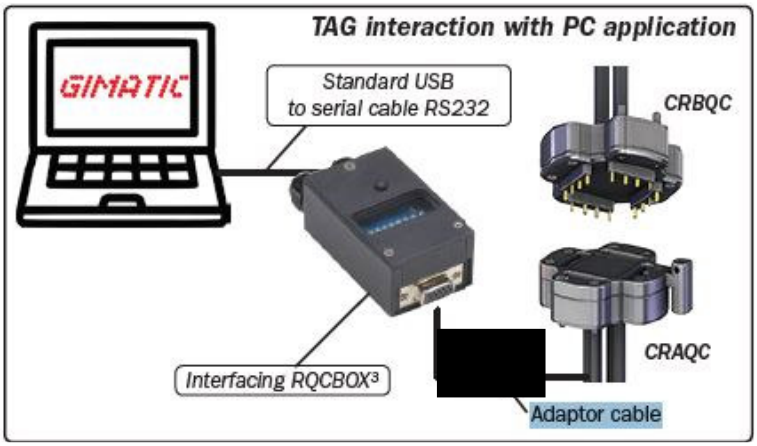


Figure 17

- RRAQC/RRAQCN connection

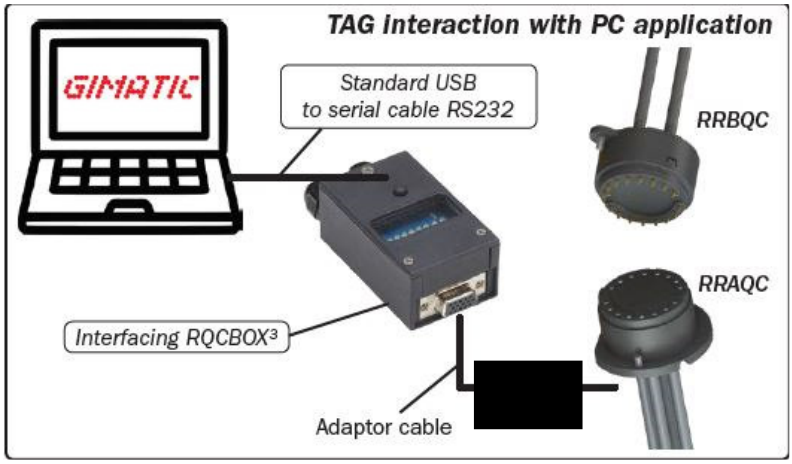


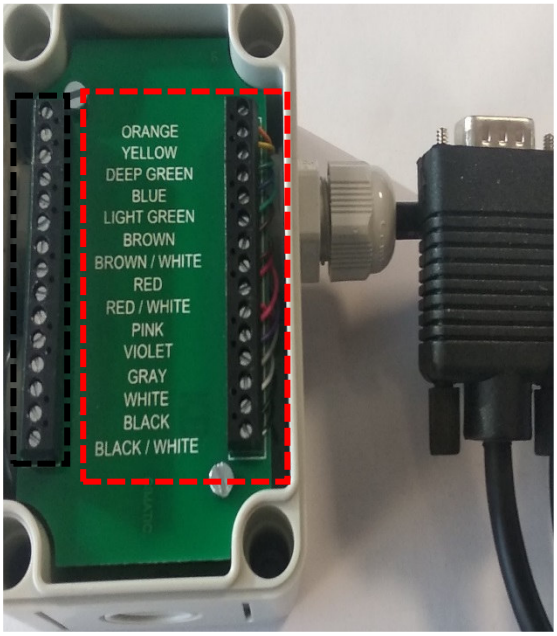
Figure 18

- Adaptor cable wiring description (for CRAQC and RRAQC readers only)

Connection pinout

RFID DEVICE	COLORS ADAPTOR CABLE	PIN NAME
YELLOW (CABLE 4)	ORANGE	DO_1
PINK (CABLE 4)	YELLOW	DO_2
GREEN (CABLE 3)	DEEP GREEN	RS_TX
RED + YELLOW (CABLE 3)	BLUE	GND
PINK (CABLE 3)	LIGHT GREEN	RS_RX
GRAY (CABLE 3)	BROWN	24 Vdc
BROWN (CABLE 3)	BROWN/WHITE	DO_Count
GREEN (CABLE 4)	RED	D03
WHITE (CABLE 3)	RED/WHITE	DO_Fault
BLUE (CABLE 4)	PINK	DO_4
WHITE (CABLE 4)	VIOLET	DO_5
BROWN (CABLE 4)	GRAY	DO_6
RED (CABLE 4)	WHITE	DO_7
GRAY (CABLE 4)	BLACK	DO8
BLUE (CABLE 3)	BLACK/WHITE	DI_COUNT

Adaptor cable connection card



Pin #	Pin Name	Description
Pin 1	DO_1	Digital output #1 (bit 1 of the binary representation of tool ID) - LSb
Pin 2	DO_2	Digital output #2 (bit 2 of the binary representation of tool ID)
Pin 3	RS_TX	RS232 Tx signal (only for TAG configuration – optional use)
Pin 4	GND	Power Supply GND
Pin 5	RS_RX	RS232 Rx signal (only for TAG configuration – optional use)
Pin 6	24 Vdc	Power Supply 24 Vdc
Pin 7	DO_Count	Digital output (maintenance alarm) (when set, tool executed the predefined number of working cycles
Pin 8	DO_3	Digital output #3 (bit 3 of the binary representation of tool ID)
Pin 9	DO_Fault	Digital output (fault condition)
Pin 10	DO_4	Digital output #4 (bit 4 of the binary representation of tool ID)
Pin 11	DO_5	Digital output #5 (bit 5 of the binary representation of tool ID)
Pin 12	DO_6	Digital output #6 (bit 6 of the binary representation of tool ID)
Pin 13	DO_7	Digital output #7 (bit 7 of the binary representation of tool ID)
Pin 14	DO_8	Digital output #8 (bit 8 of the binary representation of tool ID) - MSb
Pin 15	DI_Count	Digital input (cycle completed triggering signal) (the number of executed cycles is increased by one per any rising edge of this signal)

Please refer to the reader instruction document.

Reading/Writing

- Connect your Personal Computer with the RQCBOX and RAQC and check the RS232 converter recognition as shown in the image below (*Figure19*).The COM port can be different.

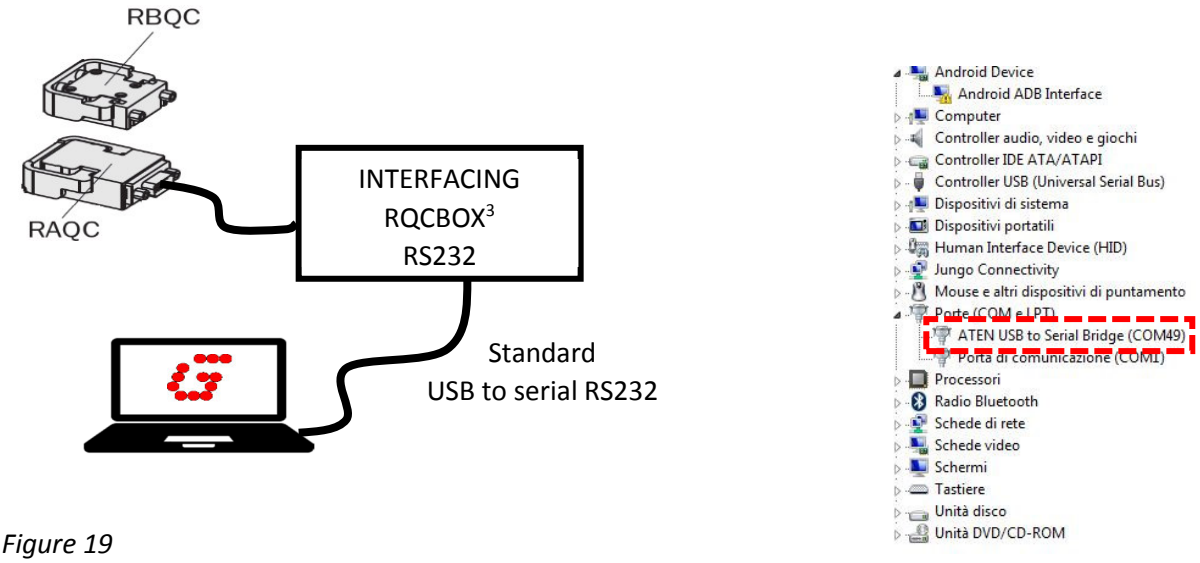


Figure 19

- Place the TAG (RBQC) and the reader (RAQC/RAQCN) as showed in below picture (*Figure 20*).

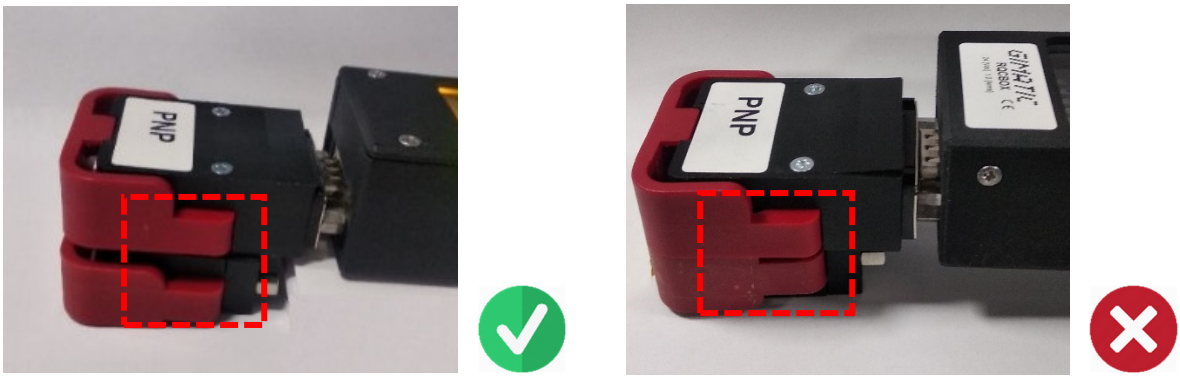
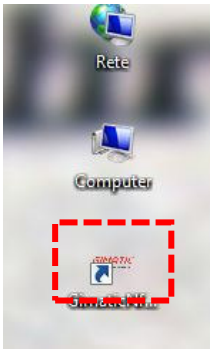


Figure 20

- Start the software PC application (*Figure21*)



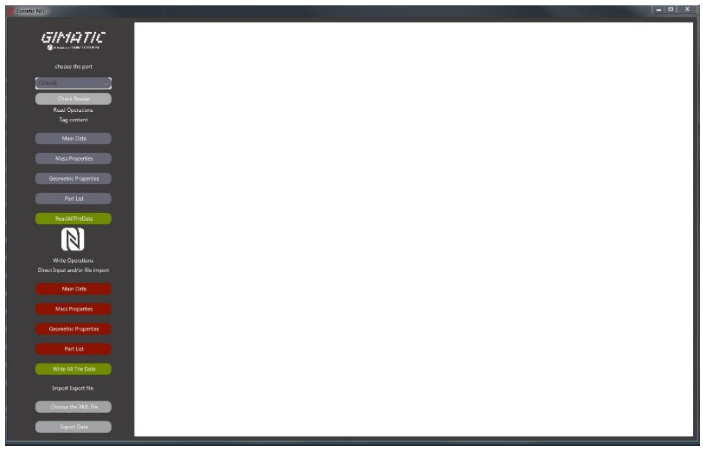


Figure 21

- Select the Serial ComPort of the RQCBOX (*Figure 22*).

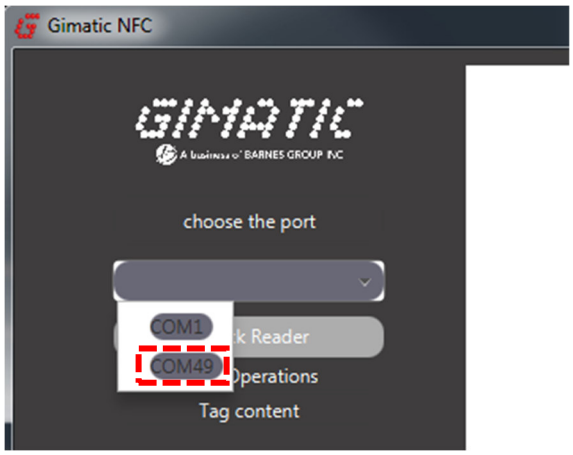


Figure 22

- Check the connection of the reader (*Figure 23*).

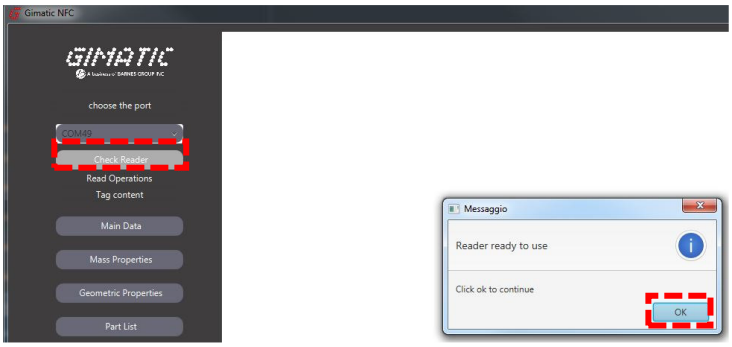


Figure 23

- The reading/writing layouts are sorted by categories as shown in the images below (*Figures 24,25*).

Read Categories

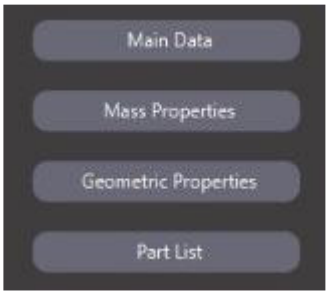


Figure 24

Write Categories

Figure 25

Reading Example

Select the desired category to be read, for example “Main Data” (1).Once the layout of the desired category is displayed on the right side of the application screen, the reading operation can be processed by clicking on the apposite button on the bottom of the screen(2) (*Figure 26*). Wait the waiting message to disappear once the operation has been completed.

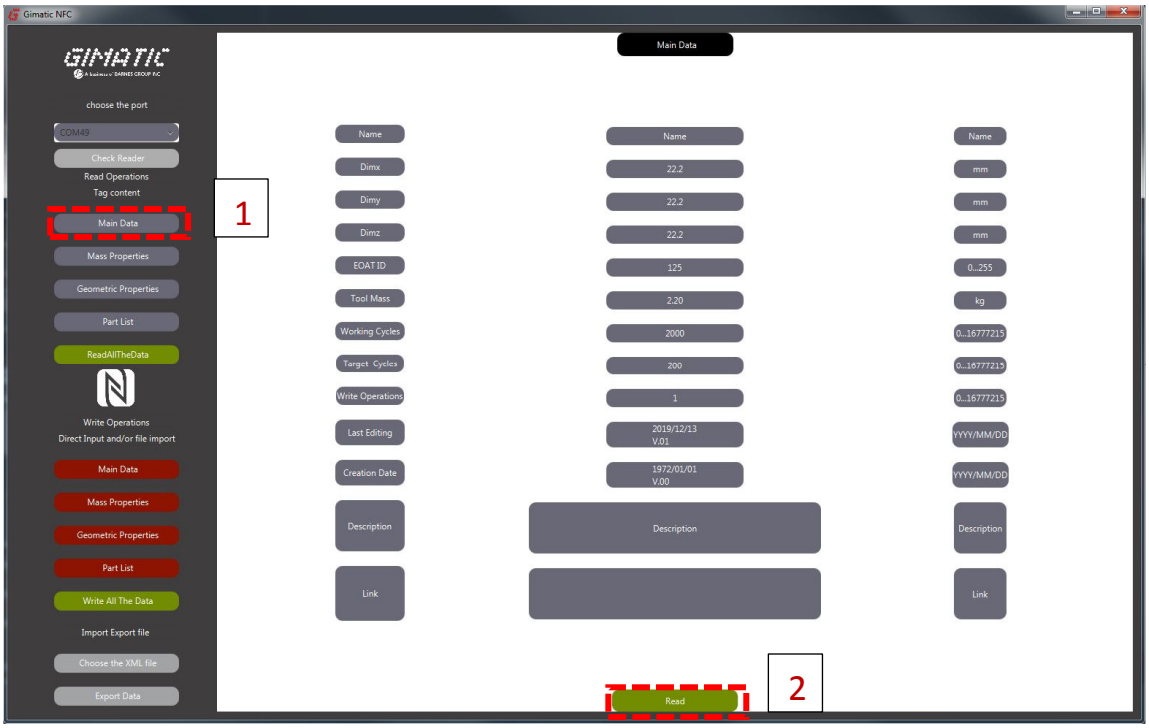


Figure 26

Writing

To access the writing operations a password is required: please send a request to: info@gimatic.com. The password is requested on the first writing session of each working session. In the following images the authentication session (*Figure27*) and the writing example (*Figure28*) are described.

Authentication Example

Select one of the writing categories (1), insert the password (2), click on the apposite button(3) (*Figure 27*).

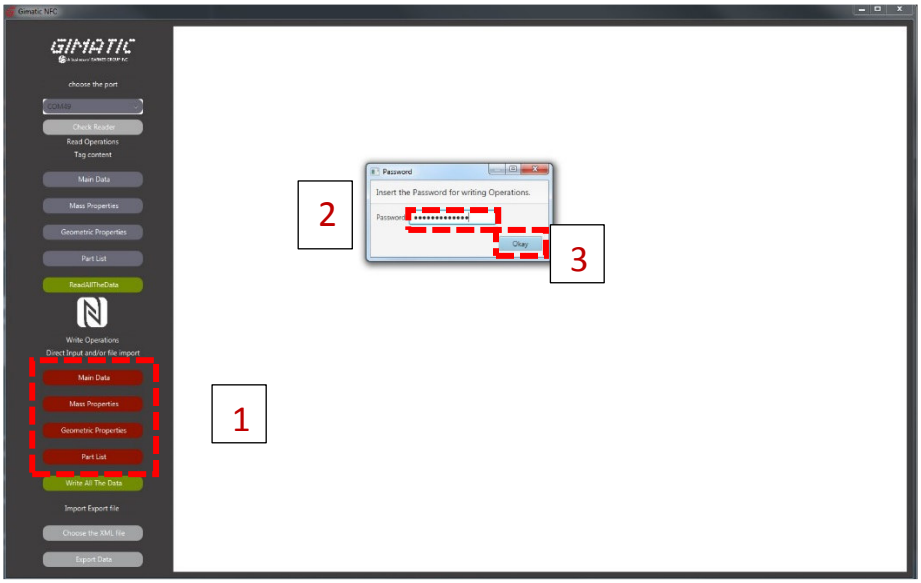


Figure 27

Writing

Select the desired writing layout, for example “Main Data”(1), insert the desired data to write(2), click on the write button(3) (*Figure 28*).

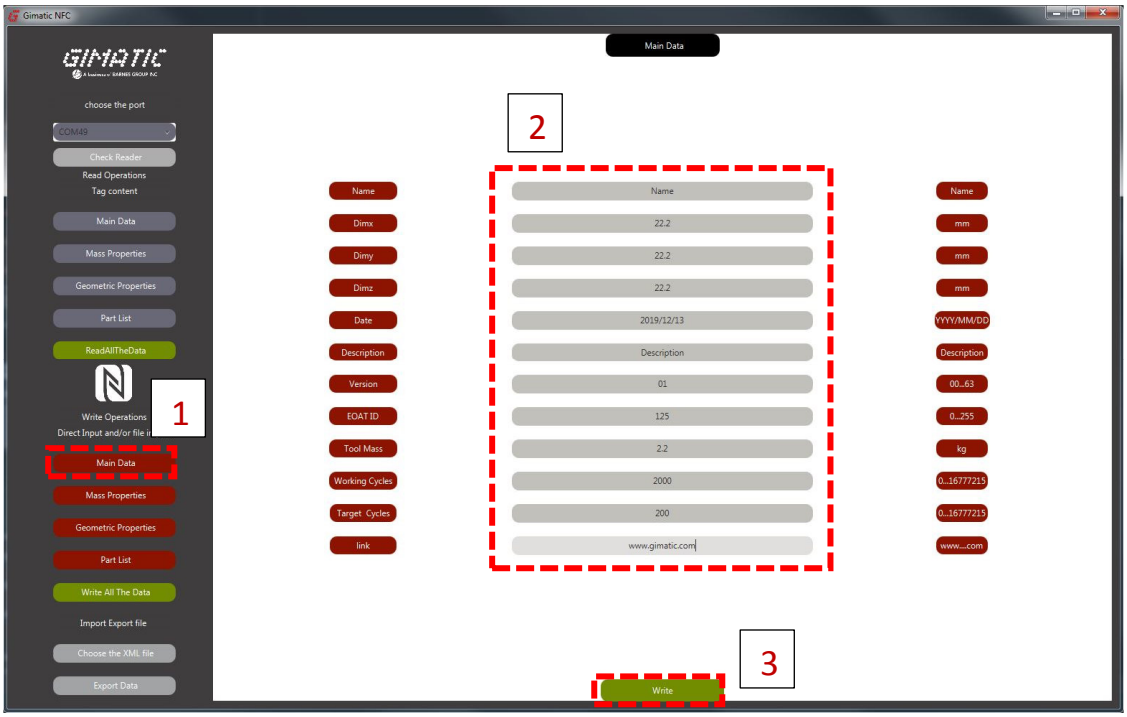


Figure 28

All in one operations

The read/write operations can be performed automatically for all the data of all the categories with the following buttons (*Figure29*).

Read All The Data (1)→ read all the tag and fill all the reading layouts with the data.

Write All The Data (2)→write all the data to the tag. All the write layouts must be filled with the desired data.

Because of the huge amount of data transferred using these buttons, the reading and writing of all the data may require long time. Wait the waiting message to disappear once the operation has been completed

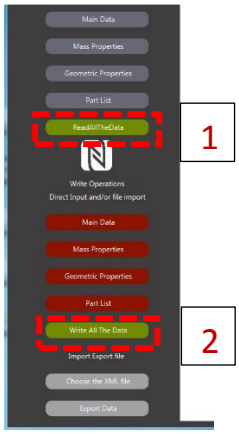


Figure 29

Import/Export operations

The Import Export operations are used for easy data exchange between SW PC and Android App. Generally the user export the xml file from one of the platform (PC or Android device) and send it to another user all over the world with email for example. The second user can read this file on the second platform and also write a second tag with the same data.
For the export operation all the data from the tag must be read. The reading operations can be done one by one using each reading layout or done in on shot with the read all the data action button(1). When all the data are read the user export the data using the Export Data button(4).

The import operation is made by using the Choose the Xml file button(3). This operation sort all the data from the xml file by categories and fill all the write layouts with the imported data. At this point the user can write a specific category on the specific writing layout or overwrite all the data on the tag. The write operation of the entire tag can be done one by one using each writing layout or done in one shot with the Write All The Data action button(2) (*Figure 30*). The XML file used by the applications cannot be generated by Excel but only from the applications themselves.

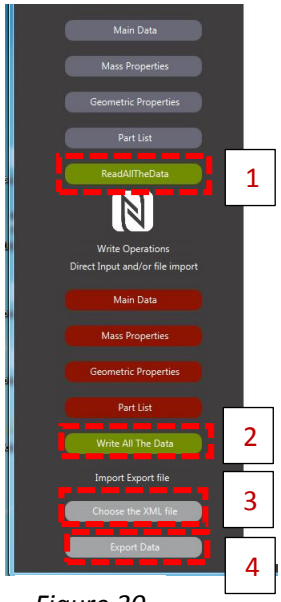


Figure 30

5.GIMATIC WEB SERVICE

The service is structured in order to make possible a vertical visualization, so who is on the top can see whoever is at a lower level. There is also the possibility, with a customization of the software, that the customers handle directly their own data without sharing them with Gimatic cloud.

Figure 31

As it showed in the figure above (Figure 31), the platform is structured in such a way that it could be have five different profiles:

- Subsidiary/Dealers
- Direct Customer
- Customer
- Integrator
- Contractor

Customer and Direct Customer have the same privileges, the only difference is that Customer must be linked with a Subsidiary or with a Dealer.

How to Create an Account

The Gimatic Web Service can be reached through Gimatic Website or using the link: https://webservice.gimatic.com. In any case, a page will appear, as showed below *(Figure 32)*, where log in or new registration is requested. Clicking on *Register*, a new tab becomes visible *(Figure 33)* and it allows to fill the details to proceed with registration. After that an email will be sent to the address indicated and must be clicked on *Activate Account* to complete the registration.

Figure 32

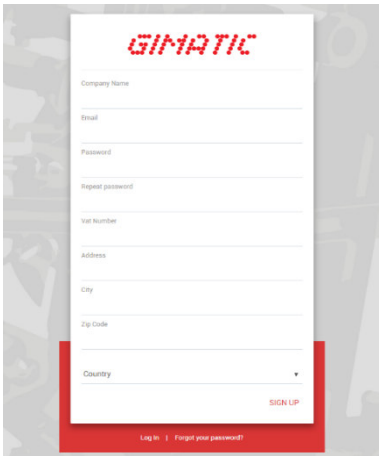


Figure 33

Web Service Main Page

Once logged in, the main page will appear *(Figure 34)*. It can be divided in three main areas:

- A: the map shows where the tags added by the COSTUMER A are localized. Clicking on the pen , near the customer name, it will open up the window showed in *Figure 35*, and there is the possibility to add integrators or contractors. If the basket is clicked on, the customer profile will be deleted. In the upper right of this section, there is the possibility to export the .xls file with all the information related to CUSTOMER A.
- B: the filters allow to find the desired tag assigned to CUSTOMER A.
- C: the tag list sets out all the tags, with some fast information like: UID, ID tag, last read, numbers of cycle and location. In the upper right there is the button that make it possible to assign a new tag.

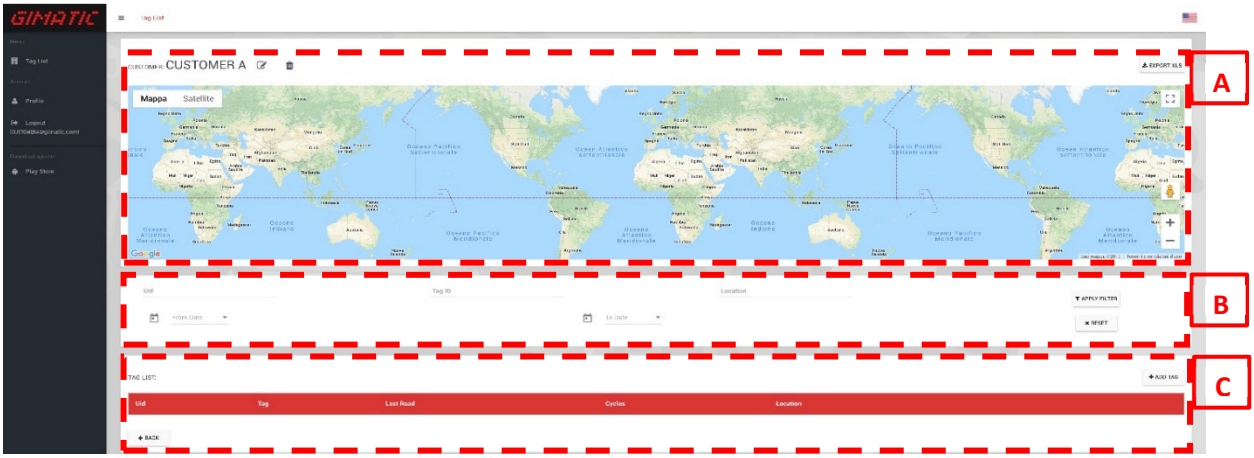


Figure 34

How to Add Contractors and Integrators to the Customer List

To enter a contractor or an integrator, as said before, shall be clicked on the pen near the customer name, the picture below *(Figure 35)* shows the window that will appear. In the section A there are details concerning the CUSTOMER A. The section B underline the list of contractors and integrators already added and there is the option to assign a contractor or an integrator to CUSTOMER A. Trying to add a contractor, a chart like *Figure 36* will be displayed and to complete the operation has to enter the contractor name and email. The contractor can't see the tag details assigned to himself, for these reasons it doesn't need and account. An integrator can check all the details of his tags. Therefore, the customer must enter email and password during the insertion of an integrator, like in *Figure 37*. The same credentials will be used by the integrator to perform the log in. Then the integrator will receive an email containing a link for the activation of the account (later on the integrator can eventually change his username and password).

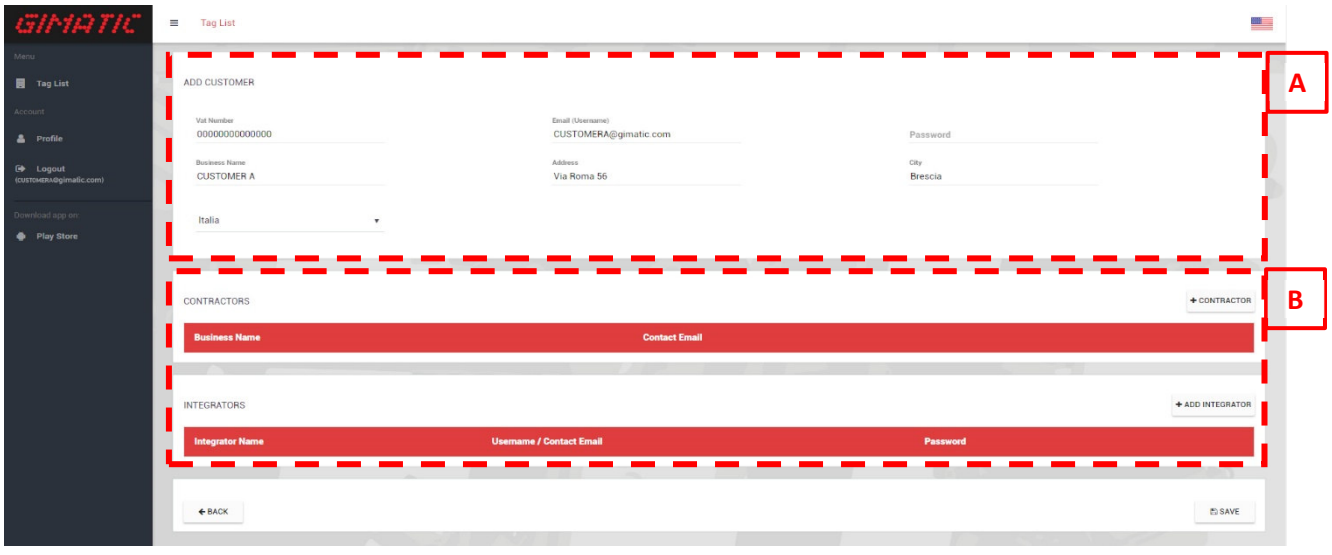


Figure 35

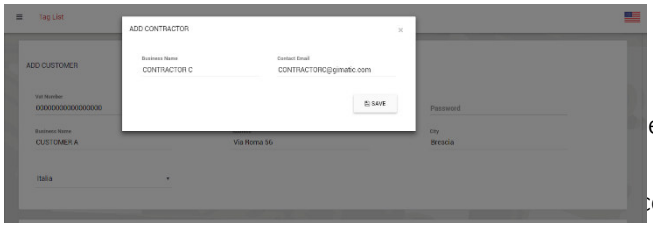


Figure 36

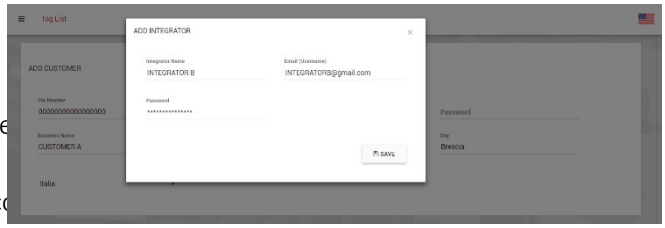


Figure 37

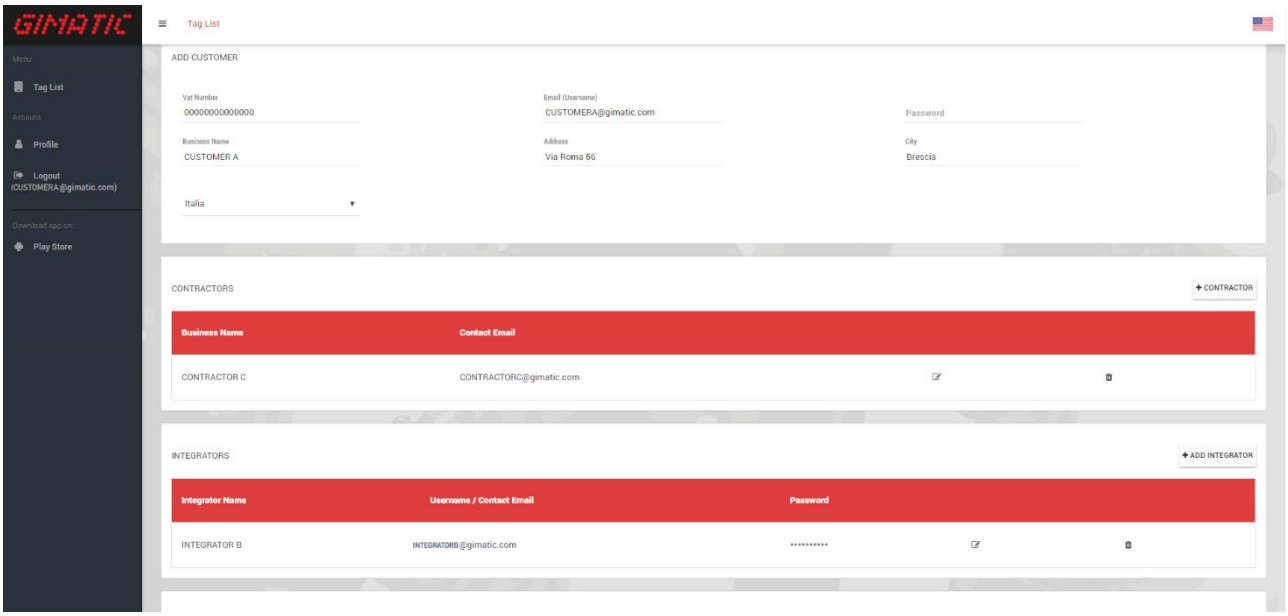


Figure 38

How to Assign a Tag to Contractors or Integrators

The next necessary step to configure the Web Service is to add a tag memory and to assign it to a user. As highlighted in *Figure 34*, at the end of the page there is the function + ADD TAG , it makes possible to assign the tag to a user (contractor or integrator). To complete the process, the UID tag number and the account name should be entered. The account can be introduced only if before it was created in the customer list. The UID tag number could be known looking into the .xml file, that could be exported from the mobile application (see chapter 3).The .xlm file is available only after the reading with mobile application. The UID number is a hexadecimal number composed by 14 digits.

Trying to assign a tag, it could occur two different errors. The first one *(Figure 39)* occurs if the tag has never been read by the mobile application, instead, the second one appears when the UID number entered has a different length from 14 digits *(Figure 40)*.

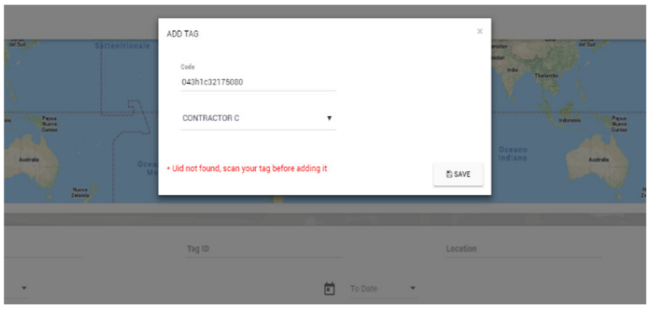


Figure 39

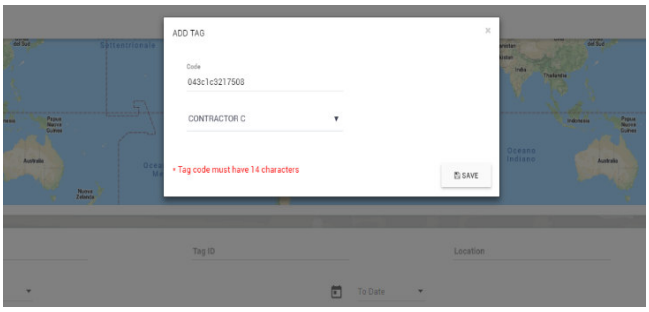


Figure 40

Tag Details

Coming back to the home page *(Figure 41)*, now, it shows the tag list with the information regarding the last reading and the tag geolocation is visible on the map. The information that can be seen in the tag list is:

- UID tag number;
- Tag: it represents the tag ID number. It may vary from 0 to 255 and it can be changed from mobile application (see chapter 3) or PC software;
- Last Read: it shows when was done the last reading;
- Cycles: number of EOAT cycles, they can be increased automatically;
- Location: last position from whom the tag is read. If the location is not indicated it means that the GPS mobile phone position wasn't active during the reading action therefore, the system can't recognize where the reading has been made.

Furthermore, there are three additional functions that are:

- DETAILS: clicking on it, it will appear another window as can be seen in *Figure 36*;
- Export XLS: it permits to see all the details in a .xls file;
- Unpair Tag: it gives the opportunity to unpair the tag from the user or to reassign the tag directly to another user.

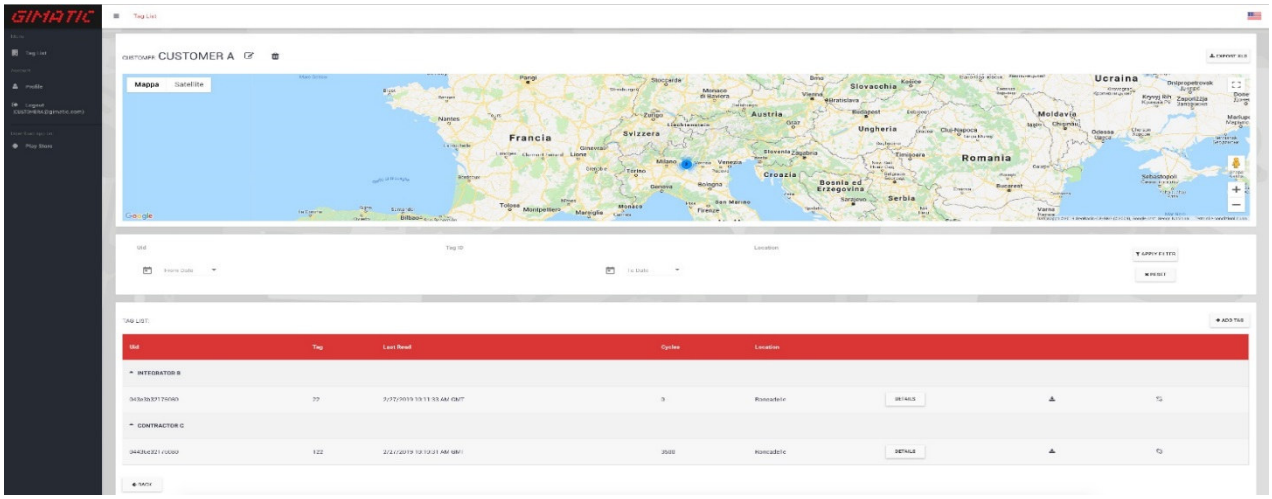


Figure 41

Opening the page concerning tag details, all the information about a specific tag is available, like geolocation, fast information, chart with cycles progress, bill of material and all the readings done *(Figure 42)*.

- A: tag geolocation;
- B: fast information regarding the last read;
- C: cycle progress, this chart shows the number of cycles performed by the EOAT connected to the RBQC. The graph is updated at every reading action. If a normal reading is carried out, a red point will be present on the chart. If there is a black point it means that was sent a maintenance action message;
- D: bill of material and last reading;
- E: reading history, it contains the literature regarding all the readings performed and they are listed showing date, operation, cycles and notes. In operation column there is the possibility to know what kind of action was done during the maintenance and if there is an attached note. In this case it is showed in *Notes* section with the mark icon and it can be read by clicking on *DETAILS*.

The permits for an integrator account are different from those of a customer. Indeed, the integrator can only see the tag's data assigned to him, in the same way explained before. The possibility to add some profile under an integrator is not provided.

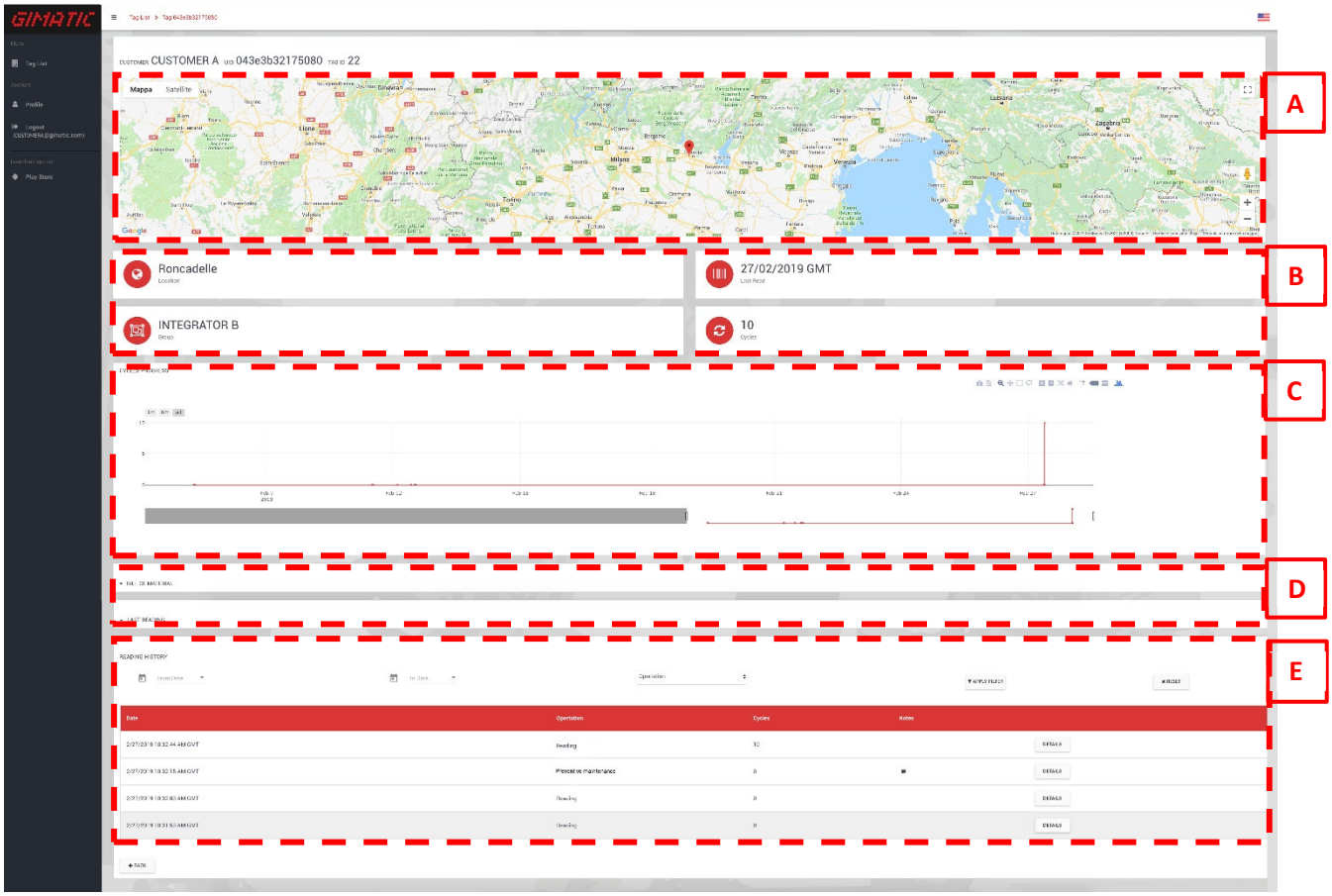


Figure 42