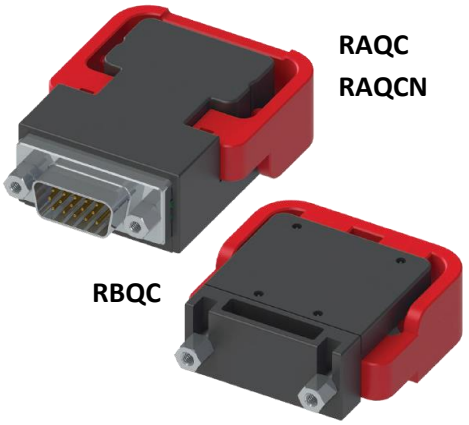
DESCRIPTION

Automatic recognition system of gripping tool (or EOAT) composed of a RFID reader RAQC (PNP version) or RAQCN (NPN version) and one or more memory TAGs RBQC.
Main characteristics:

- up to 255 identifiable tools with a single TAG;
- binary coding of tools by means of 8 digital output signals (24Vdc);
- digital input to counting tool cycles execution (stored in TAG memory);
- memorization of tool technical data and user data memory available.

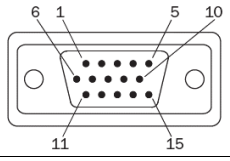


SPECIFICATIONS

	RAQC	RAQCN	RBQC
Frame	Polycarbonate, glass fibre reinforced		
Working distance	< 10 mm		
Working frequency	13.56 MHz		
Allowed temperature range	-20÷65°C		
Dimensions box	58 mm x 42 mm x 18 mm		45 mm x 42 mm x 15 mm
Weight	30 g		10 g
Electrical connection	DB 15 pins male (HD)		none
Environmental degree	IP40		IP67
Power supply	24 Vdc ± 10%, 0.15 Arms		none
Communication interface	RS232		none
Memory type	none		MIFARE DESFire EV2 4k
Output signals	10 digital (PNP)	10 digital (NPN)	none
Input signals	1 digital (PNP)	1 digital (NPN)	none
CE reference norm	EN 60950 2001, EN 300330-2 V1.3.1, EN 301489-1-3 V1.4.1		

ELECTRIC CONNECTIONS

Electric connection to the reader unit (RAQC or RBQC) is available by means of a 15 pins (high density) DB male connector according to the following schema.

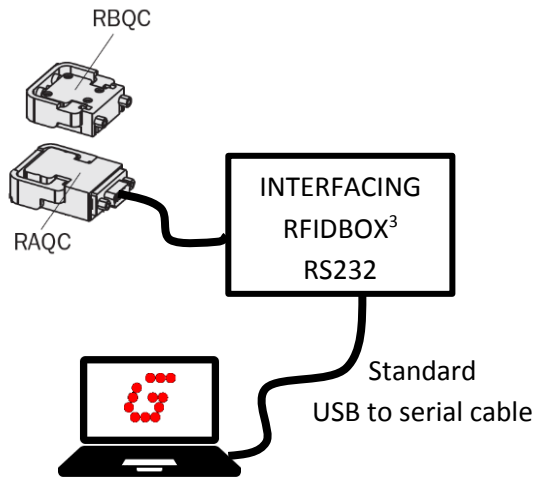


Pin #	Pin Name	Description
Pin 1	DO_1	Digital output #1 (bit 1 of the binary representation of tool ID) - LSb
Pin 2	DO_2	Digital output #2 (bit 2 of the binary representation of tool ID)
Pin 3	RS_TX	RS232 Tx signal (only for TAG configuration – optional use)
Pin 4	GND	Power Supply GND
Pin 5	RS_RX	RS232 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)

PRINCIPLE OF OPERATION

The primary context of application of the system is 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 EAOT may be equipped with a TAG memory component (RBQC). During the setup of the application any single TAG can be filled up with EAOT specific information (by using a smartphone with the dedicated APP[1] or a software PC[2] with a dedicated interfacing box) such as an identification number (ID), mass or geometrical proprieties and a part list. All these data are permanently stored into the TAG memory and some of them are eventually updated by the reader unit during normal operation. Whenever the reader approaches a specific TAG the binary representation of the TAG's ID is generated on 8 digital output pins (DO_1…DO_8) allowing the robot to verify the correspondence of the installed EOAT with the programmed task. A specific digital input signal (DI_Count) is also available to counting the number of cycles executed by the EOAT (i.e. signal coming from a sensorbox) allowing the implementation of predictive maintenance.

TAG interaction with smartphone



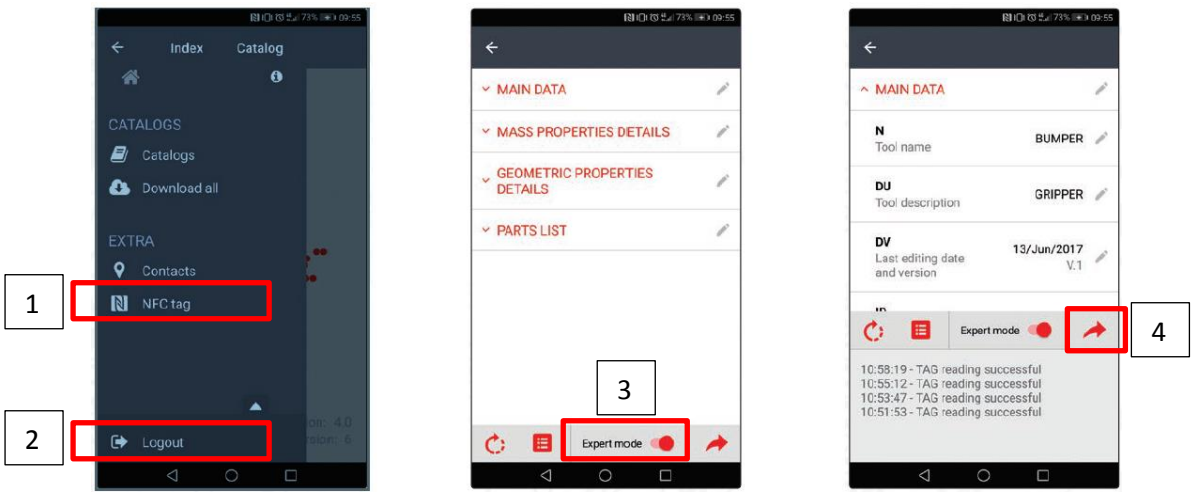
TAG interaction with PC application

DATA MEMORY OF THE TAG

The memory of the TAG is divided into several data groups and the following information can be stored into and retrieved from the TAG. Additional memory space is available upon request to store custom data.

- MAIN DATA (i.e. tool name and description, tool ID number, tool mass and overall dimensions, etc);
- MASS PROPERTIES (i.e. tool principal moments of inertia, tool centre of gravity coordinates, etc);
- GEOMETRIC PROPERTIES (i.e. geometric calibration parameters);
- PARTS LIST (i.e. up to 40 entries as parts list with editable description, quantity and edition).

APP PREVIEW

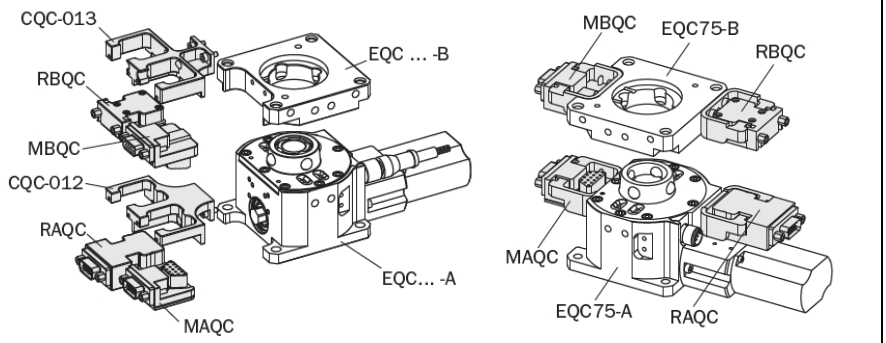


[1]Only smartphones with Android O.S. are currently supported. Download Gimatic APP for free from your Store to interact with the TAG (a registration of the APP might be necessary). [2]A dedicated Windows® based application can be downloaded for free from Gimatic website (www.gimatic.com). [3]Available as separate product.

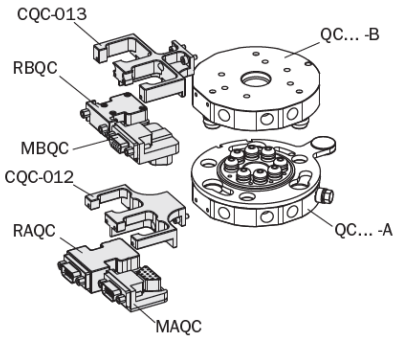
Once the APP has been downloaded and installed from the store, access NFCtag functionality (1) from main menu on the left. Eventually log-in (2) to access all the available RFID features of the APP. Anonymous users have read only access permissions to the MAIN DATA group. Registered users can access the Expert mode (3) with read and write permissions of all the data fields. It's also possible to import and export XML formatted files with an image of the data memory of the TAG to simplify data sharing between several users and between smartphone and PC based applications.

APPLICATION EXAMPLES

The following pictures show the application of the RFID system in association with two tool changers: the EQC-A/B (electric) and the QC (manual).

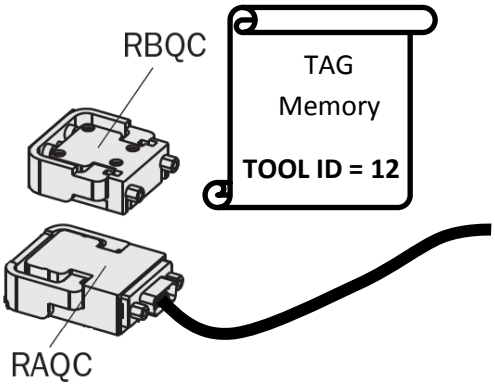


EQC with RFID system



QC with RFID system

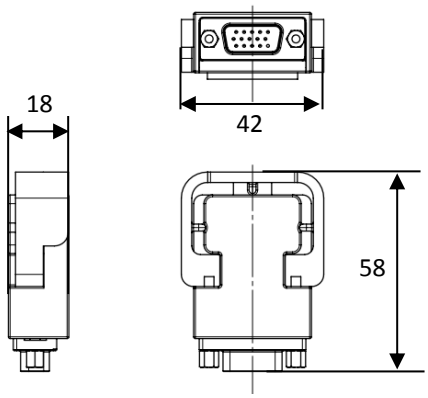
AUTOMATIC TOOL RECOGNITION EXAMPLE (RAQC – PNP OUTPUT TYPE)



DB 15 connector (DO pin # only)							
DO_1	DO_2	DO_3	DO_4	DO_5	DO_6	DO_7	DO_8
0	0	1	1	0	0	0	0
LOW	LOW	HIGH	HIGH	LOW	LOW	LOW	LOW

DIMENSIONAL DRAWINGS

RAQC/RAQCN



RBQC