

## **125 kHz RFID System**



### **BLUEBOX ADVANT LF Desktop**



### **USB (Virtual COM, HID Keyboard)**

## Preface

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### **Safety Instructions / Warning - Read before start-up!**

- The device may only be used for the intended purpose designed by the manufacturer. The operation manual should be conveniently kept available at all times for each user.
- Unauthorized changes and the use of spare parts and additional devices that have not been sold or recommended by the manufacturer may cause fire, electric shocks or injuries. Such unauthorized measures shall exclude any liability by the manufacturer.
- The liability-prescriptions of the manufacturer in the issue valid at the time of purchase are valid for the device. The manufacturer shall not be held

legally responsible for inaccuracies, errors, or omissions in the manual or automatically set parameters for a device or for an incorrect application of a device.

- Repairs may be executed by the manufacturer only.
- Only qualified personnel should carry out installation, operation, and maintenance procedures.
- Use of the device and its installation must be in accordance with national legal requirements and local electrical codes.
- When working on devices the valid safety regulations must be observed.

This manual applies to the following devices:

**Description:**

Read / write 125 kHz RFID device with integrated antenna. USB (Virtual COM + HID Keyboard) communication interface.

**Order Number:**

3122L-I



and (from) firmware versions:

Order Number	Carrier	Front End
3122L-I	2.29	3.17d

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## 1 Introduction

The **BLUEBOX GEN2 DESKTOP LF** hereinafter named **BLUEBOX** is a read/write 125 kHz RFID device that communicates with a 'host' system (typically a PC) through an USB interface. The **BLUEBOX** acts as a joint through a set of commands between the host system and a RFID tag (or transponder) present near the antenna. A software driver (appendix C) must be installed at the 'host' (PC) level to allow the USB connection of the **BLUEBOX** to appear as a serial port (COM). It is also possible to configure the **BLUEBOX** to send a message as an HID Keyboard with Italian layout (keyboard emulation).

Hereinafter the list of the supported O.S.

- Windows XP SP3 32/64 bit
- Windows Vista 32/64 bit
- Windows 7 32/64 bit
- Windows 8/8.1 32/64 bit
- Windows 10 32/64 bit

## 2 Technical Specifications

### 2.1 Electrical Features

Power Supply	USB
Power Ratings	2.5W
Operating Frequency	125 kHz $\pm$ 2 kHz
Antenna	Integrated
Reading Distance	10 cm <sup>1</sup>
Supported Transponders	EM410x (UNIQUE), EM4x50 (TITAN) EM4305, T5557, HITAG 1, HITAG S, Q5
Communication Interface	USB Virtual COM, USB HID Keyboard
Status Display	4 LEDs
Connections	USB

### 2.2 Mechanical Features

Dimensions	145x75x35 mm
Material	PC
Protection Class	IP54

### 2.3 Environmental Conditions

Operating Temperature	-20°C ... +65°C
Storage Temperature	-40°C ... +85°C
Humidity	Up to 95%, non condensing

<sup>1</sup> Reading distance depends on transponder type, antenna and environmental conditions.

### 3 Operating Features

In 'continuous' mode the **BLUEBOX** is characterized by the coexistence of 2 'parallel' and asynchronous activities: the transponder identification and the communication with the 'host' system. The 'continuous' identification activity interacts with the communication activity through a buffer that contains the code of the last identified transponder or the 0 code that indicates the absence of a transponder. Due to synchronization and filtering reasons, the buffer is handled by a parameter defined as 'hold time' ( to be set in the range of 0 ... 99 seconds, default value 1 second) and allows to extend 'artificially' the presence of the transponder after it leaves the antenna's influence area; this behavior is observable looking at the 'ANT' LED status that is 'on' indicating the presence of a transponder. Through the command 'data request' it is possible to get the data contained in the buffer.

The **BLUEBOX** handles also a 31 elements FIFO queue which is combined with a 'filter time' parameter (to be set in a range of 0 ... 99 seconds, default value 1 second) that prevents the queue saturation in case of a transponder 'continuous' presence. When a transponder is identified, the **BLUEBOX** compares it to the previous read transponder. If the transponder is different (it is defined as 'new'), its code will be inserted in the queue and the filter time will be started. Otherwise (the transponder is the same of the previous read one), the **BLUEBOX** verifies if the filter time is expired. In this case (the filter time is expired), the transponder is defined as 'new' and will be processed as described above, otherwise only the filter time will be rearmed. Through the command 'queue data request' and the relative 'ack', it is possible to get the data contained in the queue and unload it.

In 'continuous' mode the **BLUEBOX** can be configured to obtain the behavior of a 'spontaneous' reader that will send a message on the USB Virtual COM line. This feature is enabled (on) / disabled (off) by the switch 2 of the dip switch SW1 or using a flag in the general configuration of the reader. It can be also configured to obtain the behavior of an HID Keyboard that will send a message as keyboard emulation. This feature is enabled (on) / disabled (off) by the switch 3 of the dip switch SW1 or using a flag in the general configuration of the reader.

The **BLUEBOX** allows the execution of 'on request' functions. During the execution of these functions, the 'continuous' identification activity will be suspended temporarily; the involved commands are relative to device configuration and tag read/write specific activities.

If not required, the 'continuous' identification activity can be disabled through a flag defined in the general parameters. In this case, the **BLUEBOX** will only execute the 'on request' commands already defined above.

### 3.1 General Parameters

Hereinafter the configurable general parameter of the **BLUEBOX**.

Parameter	Description	Range	Default
Network Address	Network address of the reader.	000 ... 255	255
Baud Rate	Communication baud rate on USB Virtual COM interface.	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200	19200
Data Bits	Data bits on USB Virtual COM interface.	7, 8	8
Stop Bits	Stop bits on USB Virtual COM interface.	1, 2	1
Parity	Parity on USB Virtual COM interface.	None, even, odd	None
Code	Nibble coding.	Normal, reverse	Normal
Hold Time	Reading management hold time.	0 ... 99 seconds	1 sec
Filter Time	Tag queue management filter time.	0 ... 99 seconds 0 ... 99 minutes	1 sec
'Spontaneous' Mode	Spontaneous message activation/deactivation (see the 'spontaneous' message parameters). It is OR'ed with the dip switch SW1-2 setting.	Disabled, enabled	Disabled
'Continuous' Mode	'Continuous' mode activation/deactivation.	Disabled, enabled	Enabled

The general parameters are managed through the 'Read General Parameters' and 'Write General Parameters' commands as described in protocol technical manuals where the parameters 1...7 fields and default values are:

1	2	3	4	5	6	7
Network Address	Serial1	Serial2	Hold Time	Standard	Filter Time	Flags
0xFF	0x48	0x10	0x01	0x03	0x01	0x00

Where:

Parameter	Description
Address	Network address of the reader (0x00 ... 0xFF).



Parameter	Description
Serial1	RS232/RS485 communication settings. <ul style="list-style-type: none"> <li>High nibble: baud rate:               <ul style="list-style-type: none"> <li>0x0: 1200 bps</li> <li>0x1: 2400 bps</li> <li>0x2: 4800 bps</li> <li>0x3: 9600 bps</li> <li>0x4: 19200 bps</li> <li>0x5: 38400 bps</li> <li>0x6: 57600 bps</li> <li>0x7: 115200 bps</li> </ul> </li> <li>Low nibble: data bits:               <ul style="list-style-type: none"> <li>0x7: 7 bits</li> <li>0x8: 8 bits</li> </ul> </li> </ul>
Serial2	RS232/RS485 communication settings. <ul style="list-style-type: none"> <li>High nibble: stop bits:               <ul style="list-style-type: none"> <li>0x1: 1 bits</li> <li>0x2: 2 bits</li> </ul> </li> <li>Low nibble: parity:               <ul style="list-style-type: none"> <li>0x0: None</li> <li>0x1: Even</li> <li>0x2: Odd</li> </ul> </li> </ul>
Hold Time	Reading management hold time: <ul style="list-style-type: none"> <li>Decimal 0 ... 99 for time in seconds (0 ... 99 seconds)</li> </ul>
Standard	Tag identification standard: <ul style="list-style-type: none"> <li>High nibble: nibble coding:               <ul style="list-style-type: none"> <li>0x0: Normal</li> <li>0x1: Reverse</li> </ul> </li> <li>Low nibble: 0x3</li> </ul>
Filter Time	Reading management filter time: <ul style="list-style-type: none"> <li>Decimal 0 ... 99 for time in seconds (0 ... 99 seconds)</li> <li>Decimal 100 ... 199 for time in minutes (0 ... 99 minutes)</li> </ul>
Flags	Flags. Single bits are dedicated to disable (0 value) or enable (1 value) functions: <ul style="list-style-type: none"> <li>Bit 7: Not used;</li> <li>Bit 6: Not used;</li> <li>Bit 5: Not used;</li> <li>Bit 4: Not used;</li> <li>Bit 3: To enable the 'spontaneous' mode (see the 'spontaneous message parameters');</li> <li>Bit 2: Not used;</li> <li>Bit 1: Not used;</li> <li>Bit 0: To disable the 'continuous' mode.</li> </ul>

## 3.2 Configuration Parameters

Hereinafter the configurable operational parameters of the **BLUEBOX**.

### 3.2.1 Keyboard Emulation

Hereinafter the configurable keyboard emulation parameters of the **BLUEBOX**.

Parameter	Description	Range	Default
Intrachar Time	The time between chars.	0 ... 990 ms 10 ms step	20 ms
End of Message	The end char added to the tag's code message.	NUL, CR, TAB	NUL
Start of Text	The start text char added to the tag's code message.	See description	NUL
End of Text	The end text char added to the tag's code message.	See description	NUL
Encoding	The tag's code encoding.	Standard, Kronotech K20	Standard
Message Index	The start position index in the tag's code message.	0 ... 255	0
Message Length	The length of the tag's code message (0 means all the message starting from the index).	0 ... 255	0

The keyboard emulation parameters are stored in configuration page nr. 0x06 and are managed through the 'Read Configuration Parameters' and 'Write Configuration Parameters' commands as described in protocol technical manuals where the parameters 1...7 fields and default values are:

1	2	3	4	5	6	7
Intrachar Time	End of Message	Encoding	Start of Text	End of Text	Message Index	Message Length
0x02	0x00	0x00	0x00	0x00	0x00	0x00

Where:

Parameter	Description
Intrachar Time	Time between chars in the range 0 (0x00) ... 990 (0x63) ms with 10 ms steps.
End of Message	The end of message char added to the tag's code message: <ul style="list-style-type: none"> <li>0x00: NUL (no end char);</li> </ul>

Parameter	Description
	<ul style="list-style-type: none"> <li>0x09: TAB (tabulation);</li> <li>0x0D: CR (carriage return).</li> </ul>
Encoding	The tag's code encoding: <ul style="list-style-type: none"> <li>0x00: Standard;</li> <li>0x01: Kronotech K20.</li> </ul>
Start of Text	The char added at the beginning of the tag's code message. It must be in the range 0x20...0x7D except values 0x27,0x3C,0x3E,0x60. Value 0x00 means no Start of Text char.
End of Text	The char added at the end of the tag's code message (before End of Message). It must be in the range 0x20...0x7D except values 0x27,0x3C,0x3E,0x60. Value 0x00 means no End of Text char.
Message Index	The start position index in the tag's code message except of Start of Text, End of Text and End of Message chars.
Message Length	The length of the tag's code message except of Start of Text, End of Text and End of Message chars. Value 0 means all the tag's code message starting from Message Index to the end of message.



The changed keyboard emulation parameters become effective only after a reset of the **BLUEBOX**. Reset the **BLUEBOX** using the 'Reset Device' command or via a hardware reset.

### 3.2.2 'Spontaneous' Message

Hereinafter the configurable 'spontaneous' message parameters of the **BLUEBOX**.

Parameter	Description	Range	Default
Message on Serial RS232 / RS485	'Spontaneous' message on Serial interface activation/deactivation.	Disabled, enabled	Enabled
Message on HID Keyboard	'Spontaneous' message on HID Keyboard interface activation/deactivation.	Disabled, enabled	Enabled

The 'spontaneous' message parameters are stored in configuration page nr. 0x09 and are managed through the 'Read Configuration Parameters' and 'Write Configuration Parameters' commands as described in protocol technical manuals where the parameters 1...7 fields with default values are:

1	2	3	4	5	6	7
---	---	---	---	---	---	---

0x00	Interface	0x00	0x00	0x00	0x00	0x00
0x00	0x00	0x00	0x00	0x00	0x00	0x00

Where:

Parameter	Description
Interface	<p>The interface where to send the 'spontaneous' message activation/deactivation. Single bits are dedicated to enable (0 value) or disable (1 value) an interface:</p> <ul style="list-style-type: none"> <li>• Bit 7: Not used;</li> <li>• Bit 6: Not used;</li> <li>• Bit 5: Not used;</li> <li>• Bit 4: Not used;</li> <li>• Bit 3: Not used;</li> <li>• Bit 2: HID keyboard;</li> <li>• Bit 1: Not used;</li> <li>• Bit 0: Serial RS232/RS485.</li> </ul>



The changed 'spontaneous' message parameters become effective only after a reset of the **BLUEBOX**. Reset the **BLUEBOX** using the 'Reset Device' command or via a hardware reset.

## 4 Keyboard Emulation

In 'continuous' mode, if the 'keyboard emulation' feature is set on (see dip switch settings in Hardware Settings paragraph and Operating Features), the **BLUEBOX** will send the following message on the USB HID keyboard line every time that it will find a 'new' tag.

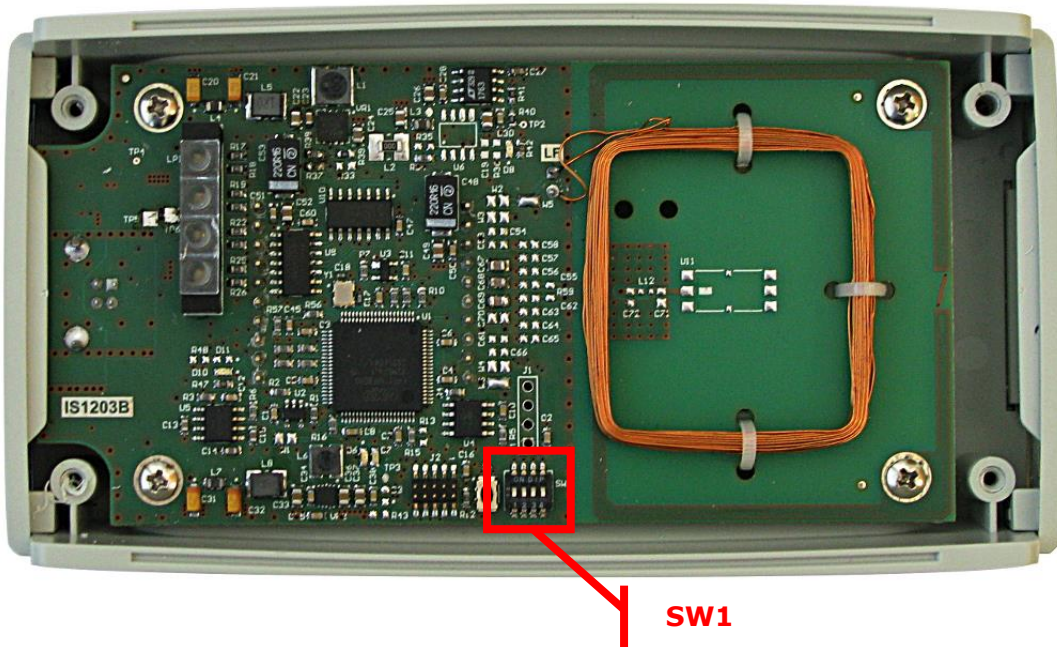
### 4.1 Standard Coding

**<starttext> <code s h> <code s+1 l> ... <code i h> <code i+1 l> ... <code n/2 h> <code n/2+1 l> <endtext> <endmessage>**

Where:

<b>&lt;starttext&gt;</b>	The char added at the beginning of the tag's code message (Start of Text field in keyboard configuration). It must be in the range 0x20...0x7D except values 0x27,0x3C,0x3E,0x60. Value 0x00 means no Start of Text char.
<b>s</b>	The start position (Message Index field in keyboard configuration).
<b>i</b>	s ... n/2 (n is the Message Length field in keyboard configuration).
<b>&lt;code i h&gt; &lt;code i l&gt;</b>	i-th byte of the UID of the identified tag. ASCII encoded byte.
<b>&lt;endtext&gt;</b>	The char added at the end of the tag's code message and before End of Message (End of Text field in keyboard configuration). It must be in the range 0x20...0x7D except values 0x27,0x3C,0x3E,0x60. Value 0x00 means no End of Text char.
<b>&lt;endmessage&gt;</b>	The end of message char added to the tag's code message (End of Message field in keyboard configuration): <ul style="list-style-type: none"> <li>• 0x00: NUL (no end char added);</li> <li>• 0x09: TAB (tabulation);</li> <li>• 0x0D: CR (carriage return).</li> </ul>

## 5 Hardware Settings
















### SW1

<b>Dip 1</b>	On: force 255, 19200, 8, n, 1.
<b>Dip 2</b>	On: enables 'spontaneous' mode on USB Virtual COM serial line.
<b>Dip 3</b>	On: enables 'keyboard emulation' mode on HID Keyboard line.
<b>Dip 4</b>	Not used.

## 6 Status Indications

At the top of **BLUEBOX** are placed LEDs which shows to the user about current activities and device status.

LED	Color	State	Meaning
SYSTEM	 (green)	Blinking	System running
	 (red)	On	System error (or system initialization)
	 (orange)	On	System upgrade
	 (off)	Off	Power supply for the device is missing or hardware defect
HOST	 (green)	Blinking	No HOST connection
	 (green)	On	HOST connection
	 (red)	On	System initialization
	 (off)	Off	Power supply for the device is missing or hardware defect (or system upgrade)
ANT	 (green)	Blinking	Antenna active, no tag detected
	 (green)	Slow Blink	Antenna not active
	 (green)	On	Antenna active, tag detected
	 (red)	On	Antenna error (or system initialization)
	 (off)	Off	Power supply for the device is missing or hardware defect (or system upgrade)

### LED state definition

State	Definition
On	The indicator is constantly on
Off	The indicator is constantly off
Blinking	The indicator turns on and off with a frequency of 2 Hz: on for 250 ms, followed by off for 250 ms
Slow Blink	The indicator turns on and off with a frequency of 1 Hz: on for 500 ms, followed by off for 500 ms

## 7 Antennas

The **BLUEBOX** is available with internal antenna directly integrated on the device cover (items 3122L-I).

The read range of an RFID system always depends on various factors like antenna size, transponder size, transponder IC type, orientation between transponder and reader antenna, position of the transponder versus the reader antenna, noise environment, metallic environment, etc. Therefore all data about read ranges can only be typical values measured under laboratory conditions. In real live applications the read range may differ from the data mentioned in the datasheet.

### 7.1 Integrated Antenna

The reader with integrated antenna has a maximum reading distance of about 100 mm measured between the **BLUEBOX** cover and a disk transponder with 50 mm diameter.



## 8 Document Revision History

Date	Revision	Description
02/05/14	1.00	First release.
03/06/14	1.01	Added the tag's code coding parameter in keyboard emulation configuration and management (sections 3, 4.2, 4.5 and 4.31).
23/06/14	1.02	Added the RFID front-end firmware release in the first page. Changed the power ratings in section 2. Corrected the 'hold time' and 'filter time' meaning in section 3.
14/07/14	1.04	Corrections in section 1. Added the list of the O.S. in section 1. Corrections in the technical specification table (section 2). Added the device reset command (section 4.1). Corrections in the operating features (section 3), added parameters in the general configuration page and related commands (sections 4.2 and 4.5). Added the .inf file as appendix C.
30/03/15	1.05	New firmware release reference in the first page. Corrections in section 1, USB Virtual COM and HID Keyboard are not mutual exclusive but the reader is managed as an USB Composite Device CDC + HID. Added 57600bps and 115200bps baudrate support in section 3.1, 4.2 and 4.5. Replaced the .inf file with the new version in appendix C. Added a driver installation guide on Windows 8 OS (appendix D).
15/07/15	1.06	Added the list of devices object of this manual in preface section. Corrections in the buffer/queue management description in section 3. Style corrections.
04/10/16	1.07	Updated the reader's firmware versions object of this manual. Changes in the technical specification formatting (section 2).

Date	Revision	Description
		Added the operating features and description of the configurable parameters (section 3). Deleted the supported transponder appendix. Deleted the nibble coding appendix.
10/01/17	1.08	Corrected the status display specification in electrical features table.
02/0817	1.09	Corrections in the operating features section. Added a warning to changed configuration parameters that become effective only after a device reset.
07/06/18	1.10	Updated the reader's firmware versions object of this manual. Added Start of Text and End of Text char in keyboard emulation and configuration parameters.
10/07/18	1.11	Updated the reader's firmware versions object of this manual. Added Message Index and Message Length fields in keyboard emulation and configuration parameters. Added the Decimal D-18 encoding in keyboard emulation and configuration parameters.

## A. .inf File

```
;-----  
; Communication Device Class driver installation file  
;-----  
  
[Version]  
Signature="$Windows NT$"  
Class=Ports  
ClassGuid={4D36E978-E325-11CE-BFC1-08002BE10318}  
Provider=%Mfc%  
DriverVer=27/03/2015,1.2.0.0  
  
[Manufacturer]  
%Mfc%=DeviceList,ntamd64  
  
[DeviceList]  
%BB2ADVANT%=Reader, USB\VID_28AD&PID_0000  
%BB2DESKTOP%=Reader, USB\VID_28AD&PID_0001  
%BB2DESKTOPv2%=Reader, USB\VID_28AD&PID_0003&MI_00  
  
[DeviceList.ntamd64]  
%BB2ADVANT%=Reader, USB\VID_28AD&PID_0000  
%BB2DESKTOP%=Reader, USB\VID_28AD&PID_0001  
%BB2DESKTOPv2%=Reader, USB\VID_28AD&PID_0003&MI_00  
  
;-----  
; Installation  
;-----  
  
[Reader]  
include=mdmcpq.inf  
CopyFiles=FakeModemCopyFileSection  
AddReg=Reader.AddReg  
  
[Reader.AddReg]  
HKR,,DevLoader,,*ntkern  
HKR,,NTMPDriver,,usbser.sys  
HKR,,EnumPropPages32,, "MsPorts.dll,SerialPortPropPageProvider"  
  
[Reader.Services]  
AddService=usbser, 0x00000002, DriverService  
  
[DriverService]  
DisplayName=%DRIVER.SVC%
```

```
ServiceType=1
StartType=3
ErrorControl=1
ServiceBinary=%12%\usbser.sys
```

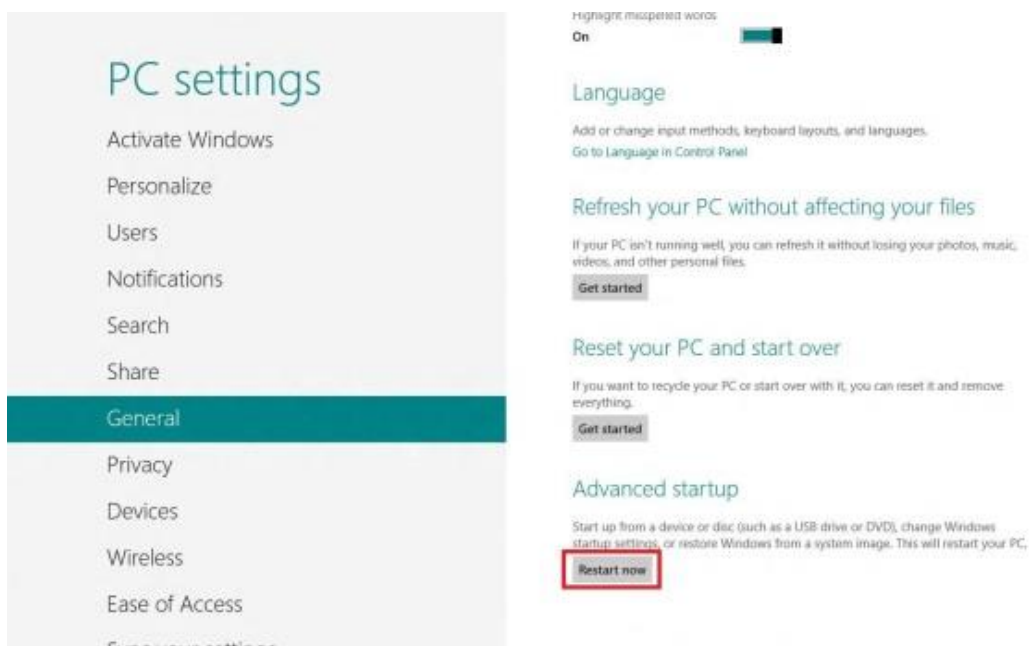
```
;-----
; String Definitions
;-----
```

```
[Strings]
Mfc          = "iDTRONIC GmbH & Soltec Soluzioni Tecnologiche Srl"
DRIVER.SVC   = "BLUEBOX Gen2 USB VCom Driver"
BB2ADVANT    = "BLUEBOX Gen2 ADVANT USB VCom Port"
BB2DESKTOP   = "BLUEBOX Gen2 DESKTOP USB VCom Port"
BB2DESKTOPv2 = "BLUEBOX Gen2 DESKTOP USB VCom Port"
```

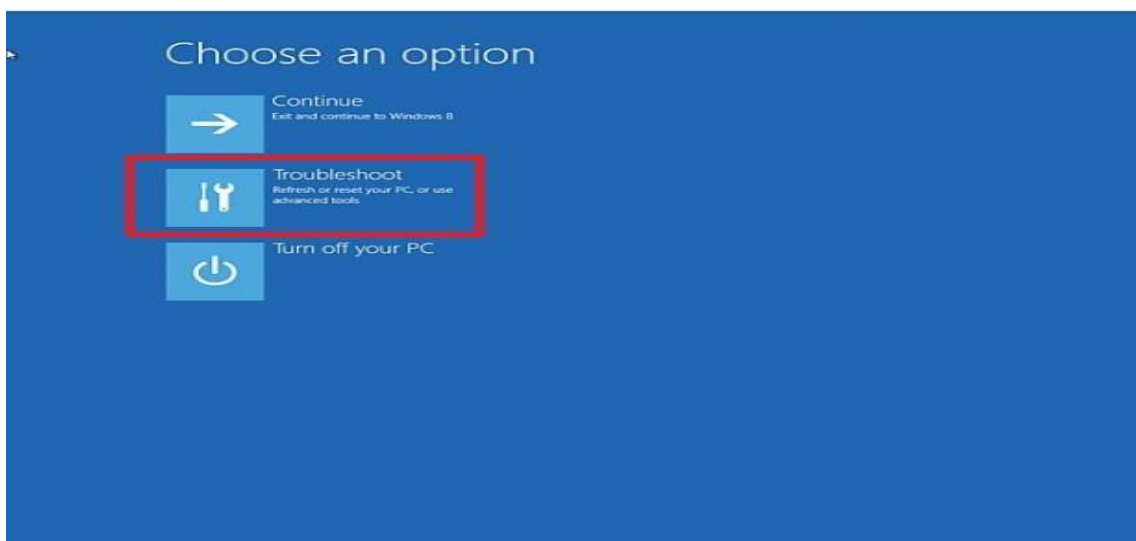
## B. Driver Install on Windows 8 OS

Windows 8 does not allow installing drivers that are not signed by Microsoft. Below is described how to de-activate the driver signing check.

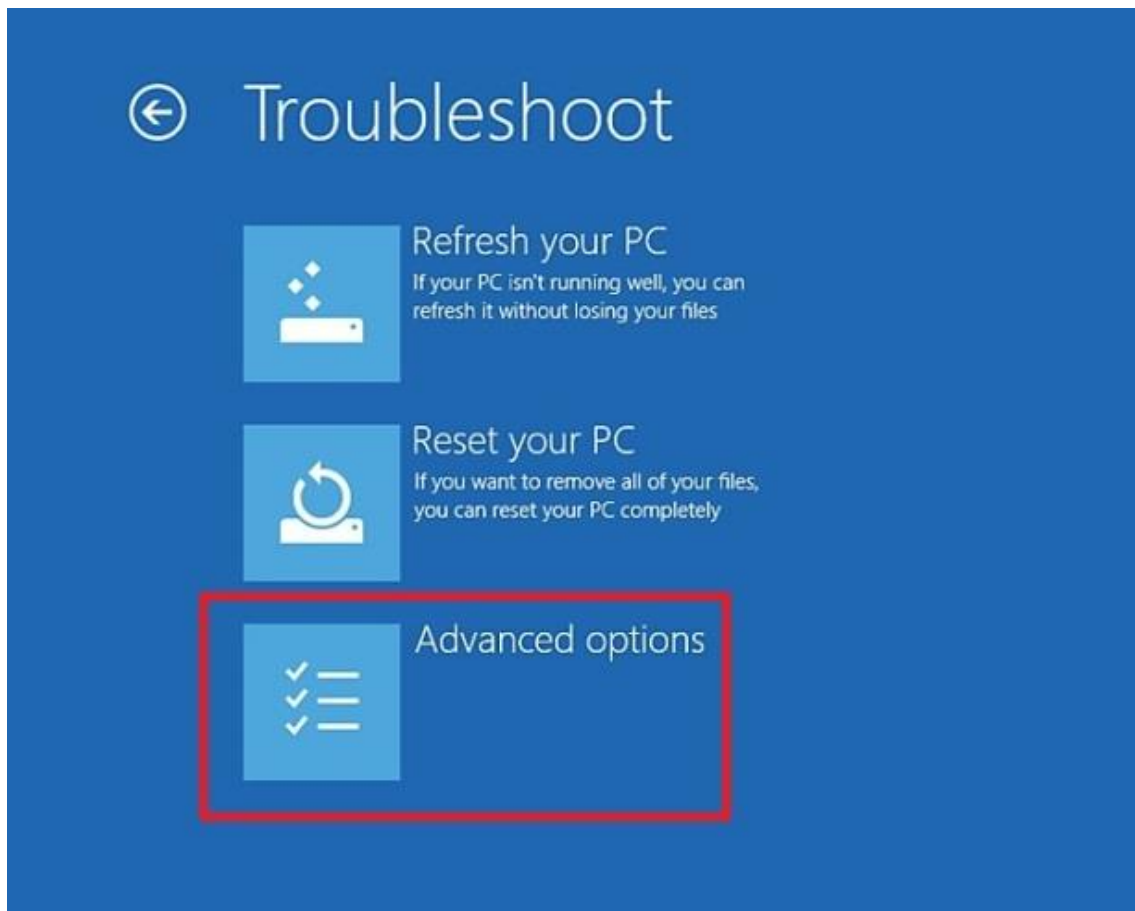
- 1) First, select "**Settings**" on the right side of your screen:
- 2) Select "**Change PC Settings**":
- 3) Navigate to "**General**" settings and then scroll down to "**Advanced Startup**". Click on "**Restart**":



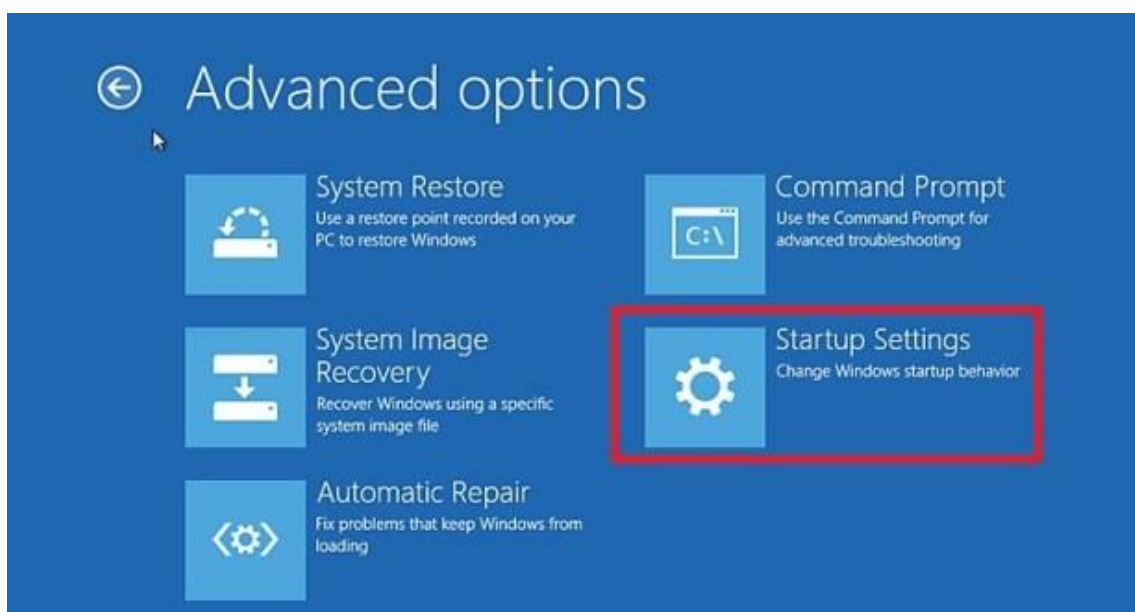
- 4) After that, Click on "**Troubleshoot**":



- 5) On the next screen, choose "**Advanced Options**":



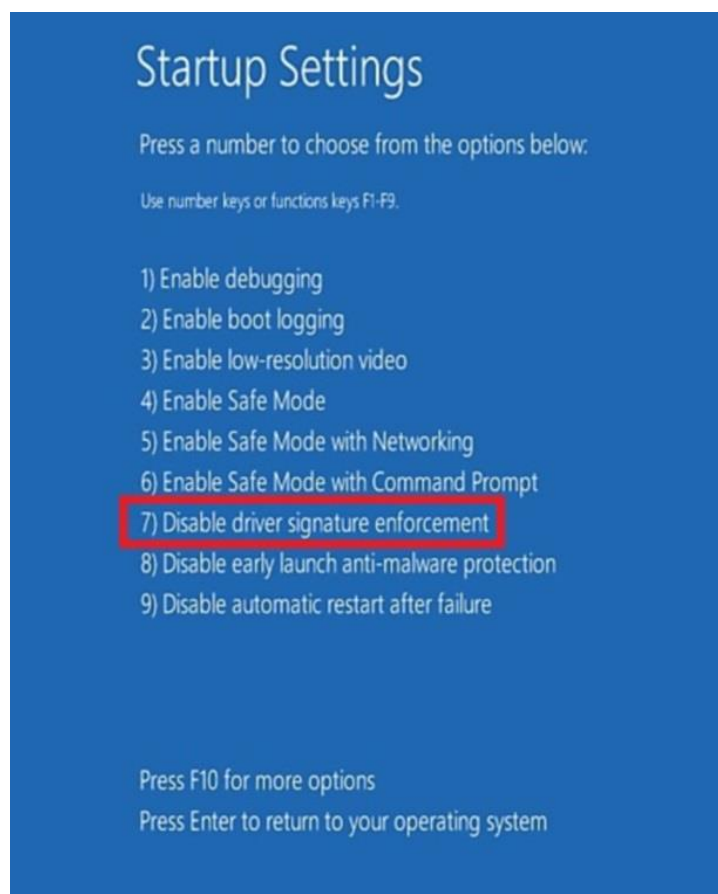
6) Then click on "**Startup Settings**":



7) Then click on the "**Restart**" button:



- 8) After your computer reboots, another screen will appear where you will be asked to press a number to choose an option. So press **7** or **F7**:



- 9) When you install the driver, this prompt will appear on screen. Select **"Install this driver software anyway"**:

