

UHF RFID System



BLUEBOX GEN2 ADVANT UHF



**RS232 / RS485 / Ethernet / ProfiBus /
Modbus/TCP**

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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:	Order Number:
Read / write UHF RFID device with integrated antenna. Serial RS232/RS485 communication interface.	5221U
Read / write UHF RFID device with integrated antenna. Ethernet 10-100M communication interface.	5222U
Read / write UHF RFID device with integrated antenna. ProfiBus communication interface.	5223U
Read / write UHF RFID device with integrated antenna. Serial RS232/RS485 communication interface.	5221U-S
Read / write UHF RFID device with integrated antenna. Ethernet 10-100M communication interface.	5222U-S
Read / write UHF RFID device with integrated antenna. ProfiBus communication interface.	5223U-S
Read / write UHF RFID device with integrated antenna. MODBUS/TCP communication interface.	5222U-MB-S
Read / write UHF RFID device with one external antenna. Serial RS232/RS485 communication interface.	5237U
Read / write UHF RFID device with one external antenna. Ethernet 10-100M communication interface.	5238U
Read / write UHF RFID device with one external antenna. ProfiBus communication interface.	5239U
Read / write UHF RFID device with one external antenna. Serial RS232/RS485 communication interface.	5237U-S
Read / write UHF RFID device with one external antenna. Ethernet 10-100M communication interface.	5238U-S



Description:

Read / write UHF RFID device with one external antenna. Profibus communication interface.

Read / write UHF RFID device with one external antenna. MODBUS/TCP communication interface.

Read / write UHF RFID device with up to four external antennas. Serial RS232/RS485 communication interface.

Read / write UHF RFID device with up to four external antennas. Ethernet 10-100M communication interface.

Read / write UHF RFID device with up to four external antennas. ProfiBus communication interface.

Read / write UHF RFID device with up to four external antennas. MODBUS/TCP communication interface.

Order Number:

5239U-S

5238U-MB-S

5231U

5232U

5233U

5232U-MB



Items 5221U, 5222U, 5223U, 5237U, 5238U and 5239U are obsolete items!

This manual is valid as of firmware version:

Order Number	Carrier	Front End
5221U-S	3.07	1.29M
5222U-S	3.07	1.29M
5223U-S	3.07	1.29M
5222U-MB-S	3.07	1.29M
5237U-S	3.07	1.29M
5238U-S	3.07	1.29M
5239U-S	3.07	1.29M
5238U-MB-S	3.07	1.29M
5231U	2.07	2.29Q
5232U	2.07	2.29Q

Order Number	Carrier	Front End
5233U	2.07	2.29Q
5232U-MB	2.07	2.29Q

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1 Introduction

The **BLUEBOX GEN2 ADVANT UHF** hereinafter named **BLUEBOX** is a read/write RFID device for industrial application that communicates with a 'host' system (typically a PC or a PLC) through a RS232/RS485 serial line (items 5221U, 5221U-S, 5237U, 5237U-S, 5231U) or through an 10-100M Ethernet connection (items 5222U, 5222U-S, 5238U, 5238U-S , 5232U) or through a ProfiBus connection (items 5223U, 5223U-S, 5239U, 5239U-S, 5233U) or through a MODBUS/TCP connection (items 5222U-MB-S, 5238U-MB-S, 5232U-MB). The **BLUEBOX** acts as a joint through a set of commands between the host system and the RFID tag/s (or transponder/s) present near the antenna/s. The same 'master/slave' protocol is used for the communication between the host system ('master') and the **BLUEBOX** ('slave'), independently of the kind of connection (point to point, multidrop net, Ethernet). An USB connection, working as Virtual COM, is also available and used as service interface port to configure the functional parameters and to update the firmware of the device, the 'BLUEBOX Show' software of the SDK is foreseen to explicate these operations. Furthermore the **BLUEBOX** is able to handle 2 channels of digital I/O; each channel can be used as output to drive a low side load or as input either driven by a 'PNP' output or by a 'clean' contact. Warning, when the I/O is used as input, do not use it also as output to avoid conflicts! The **BLUEBOX** is available with external RF antenna/s (1 antenna: items 5237U, 5238U, 5239U, 5237U-S, 5238U-S, 5239U-S, 5238U-MB-S, up to 4 antennas: items 5231U, 5232U, 5233U, 5232U-MB) or with integrated RF antenna inside the device (items 5221U, 5222U, 5223U, 5221U-S, 5222U-S, 5223U-S, 5222U-MB-S).

2 Technical Specifications

2.1 Electrical Features

2.1.1 Serial Version, 1 Internal Antenna (Item 5221U)

Power Supply	24Vdc \pm 10%
Power Ratings	15W @RFout=27dBm
Operating Frequency	840 MHz ... 960 MHz, software configurable
RF Output Power	Max 500mW (27dBm), software configurable 1 dB step
Antenna	Integrated
Reading Distance	4 mt ¹
Supported Transponders	ISO 18000-6C (EPC Class-1 Generation-2)
Communication Interface	Serial RS232 / RS485
Service Interface	USB Virtual COM
Digital Inputs/Outputs	2 optoisolated I/O, Voltage 24Vdc As input: max current 10mA As output: max current 500mA
Status Display	4 LEDs, Buzzer
Connections	M12 connections (Power supply, I/O, Serial RS232/RS485 interface, USB interface)

2.1.2 Serial Version, 1 Internal Antenna (Item 5221U-S)

Power Supply	24Vdc \pm 10%
Power Ratings	15W @RFout=27dBm
Operating Frequency	840 MHz ... 960 MHz, software configurable

¹ Reading distance depends on transponder type, antenna and environmental conditions.

RF Output Power	Max 500mW (27dBm), software configurable 1 dB step
RF Input Sensitivity	-51...-87dBm, software configurable 1 dB step
Antenna	Integrated
Reading Distance	4 mt ²
Supported Transponders	ISO 18000-6C (EPC Class-1 Generation-2)
Communication Interface	Serial RS232 / RS485
Service Interface	USB Virtual COM
Digital Inputs/Outputs	2 optoisolated I/O, Voltage 24Vdc As input: max current 10mA As output: max current 500mA
Status Display	4 LEDs, Buzzer
Connections	M12 connections (Power supply, I/O, Serial RS232/RS485 interface, USB interface)

2.1.3 Serial Version, 1 External Antenna (Item 5237U)

Power Supply	24Vdc \pm 10%
Power Ratings	15W @RFout=27dBm
Operating Frequency	840 MHz ... 960 MHz, software configurable
RF Output Power	Max 500mW (27), software configurable 1 dB step
Antenna	1 external
Antenna Connection	TNC female, 50 Ω
Reading Distance	8 mt ³
Supported Transponders	ISO 18000-6C (EPC Class-1 Generation-2)
Communication Interface	Serial RS232 / RS485
Service Interface	USB Virtual COM
Digital Inputs/Outputs	2 optoisolated I/O, Voltage 24Vdc As input: max current 10mA

² Reading distance depends on transponder type, antenna and environmental conditions.

³ Reading distance depends on transponder type, antenna and environmental conditions.

	As output: max current 500mA
Status Display	4 LEDs, Buzzer
Connections	M12 connections (Power supply, I/O, Serial RS232/RS485 interface, USB interface)

2.1.4 Serial Version, 1 External Antenna (Item 5237U-S)

Power Supply	24Vdc \pm 10%
Power Ratings	15W @RFout=27dBm
Operating Frequency	840 MHz ... 960 MHz, software configurable
RF Output Power	Max 500mW (27), software configurable 1 dB step
RF Input Sensitivity	-51...-87dBm, software configurable 1 dB step
Antenna	1 external
Antenna Connection	TNC female, 50 Ω
Reading Distance	8 mt ⁴
Supported Transponders	ISO 18000-6C (EPC Class-1 Generation-2)
Communication Interface	Serial RS232 / RS485
Service Interface	USB Virtual COM
Digital Inputs/Outputs	2 optoisolated I/O, Voltage 24Vdc As input: max current 10mA As output: max current 500mA
Status Display	4 LEDs, Buzzer
Connections	M12 connections (Power supply, I/O, Serial RS232/RS485 interface, USB interface)

2.1.5 Serial Version, up to 4 External Antennas (Item 5231U)

Power Supply	24Vdc \pm 10%
Power Ratings	15W @RFout=30dBm
Operating Frequency	840 MHz ... 960 MHz, software configurable

⁴ Reading distance depends on transponder type, antenna and environmental conditions.

RF Output Power	Max 1W (30dBm), software configurable 1 dB step
RF Input Sensitivity	-49...-85dBm, software configurable 1 dB step
Antenna	Up to 4 external
Antenna Connection	TNC female, 50 Ω
Reading Distance	10 mt ⁵
Supported Transponders	ISO 18000-6C (EPC Class-1 Generation-2)
Communication Interface	Serial RS232 / RS485
Service Interface	USB Virtual COM
Digital Inputs/Outputs	2 optoisolated I/O, Voltage 24Vdc As input: max current 10mA As output: max current 500mA
Status Display	8 LEDs, Buzzer
Connections	M12 connections (Power supply, I/O, Serial RS232/RS485 interface, USB interface)

2.1.6 Ethernet Version, 1 Internal Antenna (Item 5222U)

Power Supply	24Vdc \pm 10%
Power Ratings	15W @RFout=27dBm
Operating Frequency	840 MHz ... 960 MHz, software configurable
RF Output Power	Max 500mW (27dBm), software configurable 1 dB step
Antenna	Integrated
Reading Distance	4 mt ⁶
Supported Transponders	ISO 18000-6C (EPC Class-1 Generation-2)
Communication Interface	Ethernet 10/100M
Service Interface	USB Virtual COM
Digital Inputs/Outputs	2 optoisolated I/O, Voltage 24Vdc As input: max current 10mA

⁵ Reading distance depends on transponder type, antenna and environmental conditions.

⁶ Reading distance depends on transponder type, antenna and environmental conditions.

	As output: max current 500mA
Status Display	8 LEDs, Buzzer
Connections	M12 connections (Power supply, I/O, Ethernet 10/100M interface, USB interface)

2.1.7 Ethernet Version, 1 Internal Antenna (Item 5222U-S)

Power Supply	24Vdc \pm 10%
Power Ratings	15W @RFout=27dBm
Operating Frequency	840 MHz ... 960 MHz, software configurable
RF Output Power	Max 500mW (27dBm), software configurable 1 dB step
RF Input Sensitivity	-51...-87dBm, software configurable 1 dB step
Antenna	Integrated
Reading Distance	4 m ⁷
Supported Transponders	ISO 18000-6C (EPC Class-1 Generation-2)
Communication Interface	Ethernet 10/100M
Service Interface	USB Virtual COM
Digital Inputs/Outputs	2 optoisolated I/O, Voltage 24Vdc As input: max current 10mA As output: max current 500mA
Status Display	8 LEDs, Buzzer
Connections	M12 connections (Power supply, I/O, Ethernet 10/100M interface, USB interface)

2.1.8 Ethernet Version, 1 External Antenna (Item 5238U)

Power Supply	24Vdc \pm 10%
Power Ratings	15W @RFout=27dBm
Operating Frequency	840 MHz ... 960 MHz, software configurable

⁷ Reading distance depends on transponder type, antenna and environmental conditions.

RF Output Power	Max 500mW (27dBm), software configurable 1 dB step
Antenna	1 external
Antenna Connection	TNC female, 50 Ω
Reading Distance	8 mt ⁸
Supported Transponders	ISO 18000-6C (EPC Class-1 Generation-2)
Communication Interface	Ethernet 10/100M
Service Interface	USB Virtual COM
Digital Inputs/Outputs	2 optoisolated I/O, Voltage 24Vdc As input: max current 10mA As output: max current 500mA
Status Display	8 LEDs, Buzzer
Connections	M12 connections (Power supply, I/O, Ethernet 10/100M interface, USB interface)

2.1.9 Ethernet Version, 1 External Antenna (Item 5238U-S)

Power Supply	24Vdc \pm 10%
Power Ratings	15W @RFout=27dBm
Operating Frequency	840 MHz ... 960 MHz, software configurable
RF Output Power	Max 500mW (27dBm), software configurable 1 dB step
RF Input Sensitivity	-51...-87dBm, software configurable 1 dB step
Antenna	1 external
Antenna Connection	TNC female, 50 Ω
Reading Distance	8 mt ⁹
Supported Transponders	ISO 18000-6C (EPC Class-1 Generation-2)
Communication Interface	Ethernet 10/100M
Service Interface	USB Virtual COM

⁸ Reading distance depends on transponder type, antenna and environmental conditions.

⁹ Reading distance depends on transponder type, antenna and environmental conditions.

Digital Inputs/Outputs	2 optoisolated I/O, Voltage 24Vdc As input: max current 10mA As output: max current 500mA
Status Display	8 LEDs, Buzzer
Connections	M12 connections (Power supply, I/O, Ethernet 10/100M interface, USB interface)

2.1.10 Ethernet Version, up to 4 External Antennas (Item 5232U)

Power Supply	24Vdc \pm 10%
Power Ratings	15W @RFout=30dBm
Operating Frequency	840 MHz ... 960 MHz, software configurable
RF Output Power	Max 1W (30dBm), software configurable 1 dB step
RF Input Sensitivity	-49...-85dBm, software configurable 1 dB step
Antenna	Up to 4 external
Antenna Connection	TNC female, 50 Ω
Reading Distance	10 mt ¹⁰
Supported Transponders	ISO 18000-6C (EPC Class-1 Generation-2)
Communication Interface	Ethernet 10/100M
Service Interface	USB Virtual COM
Digital Inputs/Outputs	2 optoisolated I/O, Voltage 24Vdc As input: max current 10mA As output: max current 500mA
Status Display	12 LEDs, Buzzer
Connections	M12 connections (Power supply, I/O, Ethernet 10/100M interface, USB interface)

2.1.11 ProfiBus Version, 1 Internal Antenna (Item 5223U)

Power Supply	24Vdc \pm 10%
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¹⁰ Reading distance depends on transponder type, antenna and environmental conditions.

Power Ratings	15W @RFout=30dBm
Operating Frequency	840 MHz ... 960 MHz, software configurable
RF Output Power	Max 500mW (27dBm), software configurable 1 dB step
Antenna	Integrated
Reading Distance	4 mt ¹¹
Supported Transponders	ISO 18000-6C (EPC Class-1 Generation-2)
Communication Interface	Profibus
Service Interface	USB Virtual COM
Digital Inputs/Outputs	2 optoisolated I/O, Voltage 24Vdc As input: max current 10mA As output: max current 500mA
Status Display	8 LEDs, Buzzer
Connections	M12 connections (Power supply, I/O, Profibus interface, USB interface)

2.1.12 Profibus Version, 1 External Antenna (Item 5223U-S)

Power Supply	24Vdc \pm 10%
Power Ratings	15W @RFout=30dBm
Operating Frequency	840 MHz ... 960 MHz, software configurable
RF Output Power	Max 500mW (27dBm), software configurable 1 dB step
RF Input Sensitivity	-51...-87dBm, software configurable 1 dB step
Antenna	Integrated
Reading Distance	4 mt ¹²
Supported Transponders	ISO 18000-6C (EPC Class-1 Generation-2)
Communication Interface	Profibus
Service Interface	USB Virtual COM

¹¹ Reading distance depends on transponder type, antenna and environmental conditions.

¹² Reading distance depends on transponder type, antenna and environmental conditions.

Digital Inputs/Outputs	2 optoisolated I/O, Voltage 24Vdc As input: max current 10mA As output: max current 500mA
Status Display	8 LEDs, Buzzer
Connections	M12 connections (Power supply, I/O, ProfiBus interface, USB interface)

2.1.13 ProfiBus Version, 1 External Antenna (Item 5239U)

Power Supply	24Vdc \pm 10%
Power Ratings	15W @RFout=30dBm
Operating Frequency	840 MHz ... 960 MHz, software configurable
RF Output Power	Max 500mW (27dBm), software configurable 1 dB step
Antenna	1 external
Antenna Connection	TNC female, 50 Ω
Reading Distance	8 mt ¹³
Supported Transponders	ISO 18000-6C (EPC Class-1 Generation-2)
Communication Interface	ProfiBus
Service Interface	USB Virtual COM
Digital Inputs/Outputs	2 optoisolated I/O, Voltage 24Vdc As input: max current 10mA As output: max current 500mA
Status Display	8 LEDs, Buzzer
Connections	M12 connections (Power supply, I/O, ProfiBus interface, USB interface)

2.1.14 ProfiBus Version, 1 External Antenna (Item 5239U-S)

Power Supply	24Vdc \pm 10%
Power Ratings	15W @RFout=30dBm
Operating Frequency	840 MHz ... 960 MHz, software configurable

¹³ Reading distance depends on transponder type, antenna and environmental conditions.

RF Output Power	Max 500mW (27dBm), software configurable 1 dB step
RF Input Sensitivity	-51...-87dBm, software configurable 1 dB step
Antenna	1 external
Antenna Connection	TNC female, 50 Ω
Reading Distance	8 mt ¹⁴
Supported Transponders	ISO 18000-6C (EPC Class-1 Generation-2)
Communication Interface	Profibus
Service Interface	USB Virtual COM
Digital Inputs/Outputs	2 optoisolated I/O, Voltage 24Vdc As input: max current 10mA As output: max current 500mA
Status Display	8 LEDs, Buzzer
Connections	M12 connections (Power supply, I/O, Profibus interface, USB interface)

2.1.15 Profibus Version, up to 4 External Antennas (Item 5233U)

Power Supply	24Vdc \pm 10%
Power Ratings	15W @RFout=30dBm
Operating Frequency	840 MHz ... 960 MHz, software configurable
RF Output Power	Max 1W (30dBm), software configurable 1 dB step
RF Input Sensitivity	-49...-85dBm, software configurable 1 dB step
Antenna	Up to 4 external
Antenna Connection	TNC female, 50 Ω
Reading Distance	10 mt ¹⁵
Supported Transponders	ISO 18000-6C (EPC Class-1 Generation-2)
Communication Interface	Profibus

¹⁴ Reading distance depends on transponder type, antenna and environmental conditions.

¹⁵ Reading distance depends on transponder type, antenna and environmental conditions.

Service Interface	USB Virtual COM
Digital Inputs/Outputs	2 optoisolated I/O, Voltage 24Vdc As input: max current 10mA As output: max current 500mA
Status Display	12 LEDs, Buzzer
Connections	M12 connections (Power supply, I/O, ProfiBus interface, USB interface)

2.1.16 MODBUS/TCP Version, 1 Internal Antenna (Item 5222U-MB-S)

Power Supply	24Vdc \pm 10%
Power Ratings	15W @RFout=27dBm
Operating Frequency	840 MHz ... 960 MHz, software configurable
RF Output Power	Max 500mW (27dBm), software configurable 1 dB step
RF Input Sensitivity	-51...-87dBm, software configurable 1 dB step
Antenna	Integrated
Reading Distance	4 mt ¹⁶
Supported Transponders	ISO 18000-6C (EPC Class-1 Generation-2)
Communication Interface	MODBUS/TCP
Service Interface	USB Virtual COM
Digital Inputs/Outputs	2 optoisolated I/O, Voltage 24Vdc As input: max current 10mA As output: max current 500mA
Status Display	8 LEDs, Buzzer
Connections	M12 connections (Power supply, I/O, MODBUS/TCP interface, USB interface)

2.1.17 MODBUS/TCP Version, 1 External Antenna (Item 5238U-MB-S)

Power Supply	24Vdc \pm 10%
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¹⁶ Reading distance depends on transponder type, antenna and environmental conditions.

Power Ratings	15W @RFout=27dBm
Operating Frequency	840 MHz ... 960 MHz, software configurable
RF Output Power	Max 500mW (27dBm), software configurable 1 dB step
RF Input Sensitivity	-51...-87dBm, software configurable 1 dB step
Antenna	1 external
Antenna Connection	TNC female, 50 Ω
Reading Distance	8 mt ¹⁷
Supported Transponders	ISO 18000-6C (EPC Class-1 Generation-2)
Communication Interface	MODBUS/TCP
Service Interface	USB Virtual COM
Digital Inputs/Outputs	2 optoisolated I/O, Voltage 24Vdc As input: max current 10mA As output: max current 500mA
Status Display	8 LEDs, Buzzer
Connections	M12 connections (Power supply, I/O, MODBUS/TCP interface, USB interface)

2.1.18 MODBUS/TCP Version, up to 4 External Antennas (Item 5232U-MB)

Power Supply	24Vdc \pm 10%
Power Ratings	15W @RFout=30dBm
Operating Frequency	840 MHz ... 960 MHz, software configurable
RF Output Power	Max 1W (30dBm), software configurable 1 dB step
RF Input Sensitivity	-49...-85dBm, software configurable 1 dB step
Antenna	Up to 4 external
Antenna Connection	TNC female, 50 Ω
Reading Distance	10 mt ¹⁸

¹⁷ Reading distance depends on transponder type, antenna and environmental conditions.

¹⁸ Reading distance depends on transponder type, antenna and environmental conditions.

Supported Transponders	ISO 18000-6C (EPC Class-1 Generation-2)
Communication Interface	MODBUS/TCP
Service Interface	USB Virtual COM
Digital Inputs/Outputs	2 optoisolated I/O, Voltage 24Vdc As input: max current 10mA As output: max current 500mA
Status Display	12 LEDs, Buzzer
Connections	M12 connections (Power supply, I/O, MODBUS/TCP interface, USB interface)

2.2 Mechanical Features

Dimensions	110 x 140 x 62 mm
Material	PC
Protection Class	IP67

2.3 Environmental Conditions

Operating Temperature	-20°C ... +55°C
Storage Temperature	-40°C ... +85°C
Humidity	Up to 95%, non condensing

2.4 Reading Performance Tests

The table below shows the minimum RF channel allocation time with different inventory modes with no tags and with 1 tag in front of the antenna. The test has been done using a 4dBi gain circular antenna with output power of 27dBm and a tag at a distance of 0.5mt from the antenna.

Inventory Mode	Time with No Tag	Time with 1 Tag
Fast Multi Tag	15ms	23ms
Fast Single Tag	15ms	18ms
Standard Multi Tag	15ms	25ms

Standard Single Tag

15ms

20ms

3 Operating Features

In 'continuous' mode the **BLUEBOX** is characterized by the coexistence of 2 'parallel' and asynchronous activities: the tag identification (inventory) 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 tags or that is empty indicating the absence of tags. Due to synchronization and filtering reasons, the buffer is handled for each identified tag by a parameter defined as 'hold time' (same as 'filter time' defined below, to be set in the range of 0 ... 99 seconds or 0 ... 99 minutes, default value 1 second) and allows to extend 'artificially' the presence of the tag after it leaves the antenna's influence area; this behavior is observable looking at the yellow led status that is 'on' indicating the presence of tags and also through the activation of the relay nr 1 (if its 'automatic' management is enabled by the flag defined in the general parameters). Through the command 'data request' it is possible to get the data contained in the buffer (tag/s ID/s and optionally tag/s type/s, reading antenna and gate crossing direction in 'gate mode'); the indication of the reading antenna can be enabled/disabled through a flag defined in the general parameters.

The **BLUEBOX** handles also a 1000 elements FIFO queue which is combined with the 'filter time' general parameter (to be set in a range of 0 ... 99 seconds or 0 ... 99 minutes, default value 1 second) that prevents the queue saturation in case of a tag 'continuous' presence. When a tag is identified, the **BLUEBOX** verifies if it belongs to the list of read tags. If the tag do not belong to the list (it is defined as 'new'), its code will be inserted in the queue, a filter time assigned to the tag will be started and the buzzer will be activated for 0.5 seconds (if its 'automatic' management is enabled by the flag defined in the general parameters). Otherwise (the tag belong to the list of read tags), the **BLUEBOX** verifies if the relative filter time is expired. In this case (the filter time is expired), the tag is defined as 'new' and will be processed as described above, otherwise only the relative 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 (tag ID and optionally tag type, reading antenna and gate crossing direction in 'gate mode') and unload it; the indication of the reading antenna can be enabled/disabled through a flag defined in the general parameters.

In 'continuous' mode the **BLUEBOX** can be configured to obtain the behavior of a 'spontaneous' reader that will send a message on the RS232 serial line and Ethernet line. This feature is enabled (on) / disabled (off) using a flag in the general configuration of the reader

Two subsets of the 'continuous' mode are also defined:

- 'Trigger' mode: the activation and deactivation of the 'continuous' mode is triggered with inputs. The trigger could be level sensitive or edge sensitive

depending on the 'extension time' setting (to be set in a range of 0 ... 99 seconds or 0 ... 99 minutes, default value 0 seconds).

- 'Gate' mode: the activation of the 'continuous' mode is triggered with the activation of an input. The deactivation of the 'continuous' mode is triggered with the activation of the other input but, the activation of the 'continuous' mode could also be extended with the 'extension time' (to be set in a range of 0 ... 99 seconds or 0 ... 99 minutes, default value 0 seconds). The crossing of the gate is managed with a maximum crossing 'gate time' (to be set in a range of 0 ... 99 seconds or 0 ... 99 minutes, default value 0 seconds) which deactivates the 'continuous' mode in case of no successful crossing of the gate within this time. Only with a successful crossing of the gate data (tag ID and gate crossing direction and optionally tag type and reading antenna) are save in buffer and FIFO.

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.

Two 'test' mode are also defined:

- 'RF Reading' test: in 'continuous' mode allows the user to easily and quickly test the read range of the reader with fast beeping (100ms) the buzzer (the buzzer must be connected to output 2) for every identified tag. This 'test' mode is stored in non volatile memory and its status is kept at every reader restart and until it is disabled.
- 'RF Power' test: allows the user to easily and quickly test the minimum RF output power needed to read a tag in a fixed position. The reader sweeps from the minimum RF output power to maximum RF output power or until it finds a tag, increasing the RF power of 1 dB every 500ms with fixed Q selection algorithm and Q=0. It is an 'on request' function which temporarily suspends the 'continuous' mode.

The **BLUEBOX** with up to 4 external antennas (items 5231U, 5232U, 5233U, 5232U-MB) integrates an auto antenna tuning feature which allows the usage of the reader in many different environments and configurations. The auto antenna tuning is done at every power on and during normal operations of the reader.



Items 5221U, 5222U, 5223U, 5237U, 5238U and 5239U are not covered by this section! See B5U020xxxE and B5U021xxxE manuals operating features and configuration details.

3.1 General Parameters

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

Parameter	Description	Range	Default
Device Address	Device address of the reader.	000 ... 255	255
Baud Rate	Communication baud rate on RS232 / RS485 interface.	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200	19200
Data Bits	Data bits on RS232 / RS485 interface.	7, 8	8
Stop Bits	Stop bits on RS232 / RS485 interface.	1, 2	1
Parity	Parity on RS232 / RS485 interface.	None, even, odd	None
Filter Time	Reading and tag queue management filter time. 0 setting is internally overwritten with 1 second.	0 ... 99 seconds 0 ... 99 minutes	1 sec
Buzzer Management	Buzzer management on 'new tag' event.	Disabled, enabled	Enabled
Output 1 Management	Output 1 management on 'new tag' event.	Disabled, enabled	Disabled
Reading Antenna Information	Reading antenna information.	Disabled, enabled	Disabled
Transponder Type Information	Transponder type information.	Disabled, enabled	Disabled
'Spontaneous' Mode	'Spontaneous' message activation/deactivation.	Disabled, enabled	Disabled
Trigger 'Continuous' Mode with Inputs	'Continuous' mode activation/deactivation management with inputs. See the Input/Output parameters for more details.	Disabled, enabled	Disabled
'Continuous' Mode	'Continuous' mode activation/deactivation. If activated overrides the trigger 'continuous' mode with inputs setting.	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 with default values are:

1	2	3	4	5	6	7
Device Address	Serial1	Serial2	0x00	0x00	Filter Time	Flags
0xFF	0x48	0x10	0x00	0x00	0x01	0x80

Where:

Parameter	Description
Device Address	Device address of the reader (0x00 ... 0xFF).
Serial1	RS232/RS485 communication settings. <ul style="list-style-type: none"> High nibble: baud rate: <ul style="list-style-type: none"> 0x0: 1200 bps; 0x1: 2400 bps; 0x2: 4800 bps; 0x3: 9600 bps; 0x4: 19200 bps; 0x5: 38400 bps; 0x6: 57600 bps; 0x7: 115200 bps. Low nibble: data bits: <ul style="list-style-type: none"> 0x7: 7 bits; 0x8: 8 bits.
Serial2	RS232/RS485 communication settings. <ul style="list-style-type: none"> High nibble: stop bits: <ul style="list-style-type: none"> 0x1: 1 bits; 0x2: 2 bits. Low nibble: parity: <ul style="list-style-type: none"> 0x0: None; 0x1: Even; 0x2: Odd.
Filter Time	Reading management filter time (0 setting is internally overwritten with 1 second): <ul style="list-style-type: none"> Decimal 0 ... 99 for time in seconds (0 ... 99 seconds); Decimal 100 ... 199 for time in minutes (0 ... 99 minutes).
Flags	Flags. Single bits are dedicated to disable (0 value) or enable (1 value) functions: <ul style="list-style-type: none"> Bit 7: Automatic buzzer management; Bit 6: Automatic output 1 management; Bit 5: Reading antenna information in Data Request, Queue Request and Inventory commands;

Parameter	Description
	<ul style="list-style-type: none"> • Bit 4: Transponder type information in Data Request and Queue Request commands; • Bit 3: To enable the 'spontaneous' mode; • Bit 2: Trigger 'continuous' mode with inputs (see the I/O parameters); • Bit 1: Not used; • Bit 0: To disable the 'continuous' mode.

3.2 Configuration Parameters

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

3.2.1 Ethernet

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

Parameter	Description	Range	Default
IP Address	IP address.	-	192.168.4.200
Port	TCP communication port.	0 ... 65535	3000
Subnet	Subnet mask.	-	255.255.255.0
Gateway	Gateway address.	-	0.0.0.0

The Ethernet parameters are stored in configuration page nr. 0x80 and are managed through the 'Read Configuration Parameters' and 'Write Configuration Parameters' commands as described in protocol technical manuals where the parameters 1...14 fields and default values are:

1	2	3	4	5	6	7
IP0	IP1	IP2	IP3	PortH	PortL	Subnet0
0xC0	0xA8	0x04	0xC8	0x0B	0xB8	0xFF

8	9	10	11	12	13	14
Subnet1	Subnet2	Subnet3	Gateway0	Gateway1	Gateway2	Gateway3
0xFF	0xFF	0x00	0x00	0x00	0x00	0x00

Where:

Parameter	Description
IP0 ... IP3	IP address.
PortH	TCP communication port. MSB.
PortL	TCP communication port. LSB.
Subnet0 ... Subnet3	Subnet mask.
Gateway0 ... Gateway3	Gateway address.



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



In case of MODBUS/TCP communication interface (items 5222U-MB-S, 5238U-MB-S, 5232U-MB) the TCP communication port is internally fixed to 502 which is the TCP communication port of the MODBUS/TCP communication protocol.

3.2.2 ProfiBus

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

Parameter	Description	Range	Default
ProfiBus Address	The address of the reader in the ProfiBus network.	1 ... 126	126
ProfiBus Buffer Length	The ProfiBus IN/OUT buffer size in bytes.	8, 12, 16, 20, 32, 64	16

The ProfiBus parameters are stored in configuration page nr. 0x03 and are managed through the 'Read Configuration Parameters' and 'Write Configuration Parameters' commands as described in protocol technical manuals are the parameters 1...7 fields with default values are:

1	2	3	4	5	6	7
ProfiBus Address	ProfiBus Buffer Length	0x00	0x00	0x00	0x00	0x00
0x7E	0x02	0x00	0x00	0x00	0x00	0x00

Where:

Parameter	Description
ProfiBus Address	The address of the reader in the ProfiBus network (0x01 ... 0x7E).
ProfiBus Bufer Length	The ProfiBus IN/OUT buffer size in bytes: <ul style="list-style-type: none"> • 0x00: 8 bytes • 0x01: 12 bytes • 0x02: 16 bytes • 0x03: 20 bytes • 0x04: 32 bytes • 0x05: 64 bytes



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

3.2.3 Input/Output

Hereinafter the configurable input/iutput parameters of the **BLUEBOX**.

Parameter	Description	Range	Default
Input 1 Mode	Input 1 activation / deactivation mode of the 'continuous' mode in 'trigger' mode.	0, 1, 2	1
Input 2 Mode	Input 2 activation / deactivation mode of the 'continuous' mode in 'trigger' mode.	0, 1, 2	0
Extension Time	'Continuous' mode activation/deactivation management with inputs extension time. <ul style="list-style-type: none"> • In 'trigger' mode, if =0 the trigger is level sensitive, otherwise it is edge sensitive and this time defines the 'continuous' mode activation time extension. • In 'gate' mode it defines the 'continuous' mode activation time 	0 ... 99 seconds 0 ... 99 minutes	0

Parameter	Description	Range	Default
	extension after the crossing of the gate.		
Gate Time	Maximum gate crossing time. If =0 the 'gate' mode is disabled, otherwise it is the maximum gate crossing time.	0 ... 99 seconds 0 ... 99 minutes	0
Debounce Time	The inputs debounce time. If =0 a minimum bounce time of 50ms is internally set.	0.00 ... 0.99 seconds 0.0 ... 9.9 seconds	0

Where the input mode range means

- 0: Disabled;
- 1: ON -> Activate antennas; OFF -> Deactivate antennas;
- 2: OFF -> Activate antennas; ON -> Deactivate antennas;

The input 1 and 2 modes combination allowed are

Input 1 Mode	Input 2 Mode
ON -> Activate antennas; OFF -> Deactivate antennas	Disabled
OFF -> Activate antennas; ON -> Deactivate antennas	Disabled
Disabled	ON -> Activate antennas; OFF -> Deactivate antennas
Disabled	OFF -> Activate antenna 1 & 2; ON -> Deactivate antenna 1 & 2

The input/output parameters are stored in configuration page nr. 0x05 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
Input1 Mode	Input2 Mode	Extension Time	Gate Time	Debounce Time	0x00	0x00
0x01	0x00	0x00	0x00	0x00	0x00	0x00

Where:

Parameter	Description
Input1 Mode	Input 1 activation / deactivation mode of the 'continuous' mode in 'trigger' mode: <ul style="list-style-type: none"> 0x00: Disabled 0x01: ON -> Activate antennas; OFF -> Deactivate antennas 0x02: OFF -> Activate antennas; ON -> Deactivate antennas
Input2 Mode	Input 2 activation / deactivation mode of the 'continuous' mode in 'trigger' mode: <ul style="list-style-type: none"> 0x00: Disabled 0x01: ON -> Activate antennas; OFF -> Deactivate antennas 0x02: OFF -> Activate antennas; ON -> Deactivate antennas
Extension Time	'Continuous' mode activation/deactivation management with inputs extension time. <ul style="list-style-type: none"> In 'trigger' mode, if =0 the trigger is level sensitive, otherwise it is edge sensitive and this time defines the 'continuous' mode activation time extension. In 'gate' mode it defines the 'continuous' mode activation time extension after the crossing of the gate. And the values allowed are: <ul style="list-style-type: none"> Decimal 0 ... 99 for time in seconds (0 ... 99 seconds); Decimal 100 ... 199 for time in minutes (0 ... 99 minutes).
Gate Time	The maximum gate crossing time. If =0 the 'gate' mode is disabled, otherwise it is the maximum gate crossing time: <ul style="list-style-type: none"> Decimal 0 ... 99 for time in seconds (0 ... 99 seconds); Decimal 100 ... 199 for time in minutes (0 ... 99 minutes).
Debounce Time	The inputs anti-bounce time. If =0 a minimum bounce time of 50ms is internally set. <ul style="list-style-type: none"> Decimal 0 ... 99 for time in mseconds (0 ... 990 mseconds) Decimal 100 ... 199 for time in seconds (0.0 ... 9.9 seconds)



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

3.2.4 RF and EPC C1G2 (Class-1 Generation-2)

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

Parameter	Description	Range	Default
RF Region	RF geographical region.	Europe (ETSI compliant region), North America (FCC compliant region)	Europe (ETSI compliant region)

Parameter	Description	Range	Default
RF Output Power	RF output power in dBm.	(See the technical specifications section)	20 dBm
RF Input Sensitivity	RF input sensitivity in dBm.	(See the technical specifications section)	-76 dBm
RF Channel	RF channel. Channel 0 stands for default settings of the selected region: <ul style="list-style-type: none"> Europe (ETSI): FHSS on 4 channels (1, 4, 7, 10) in 865.7 – 867.5 MHz, 600kHz span. North America (FCC): FHSS on 50 channels (1 ... 50) in 902.75 – 927.25MHz, 500kHz span. 	0 ... 10 (ETSI) 0 ... 50 (FCC)	0
Antenna 1 Activation	Activation of antenna 1.	Disabled, enabled	Enabled
Antenna 2 Activation	Activation of antenna 2 (for devices with up to 4 antennas).	Disabled, enabled	Disabled
Antenna 3 Activation	Activation of antenna 3 (for devices with up to 4 antennas).	Disabled, enabled	Disabled
Antenna 4 Activation	Activation of antenna 4 (for devices with up to 4 antennas).	Disabled, enabled	Disabled
RF Channel Allocation Time	The maximum period of consecutive transmission on the same RF channel. 0 stands for default settings of the selected region: <ul style="list-style-type: none"> Europe (ETSI): 4 secs in 'continuous' mode, no allocation time in 'continuous' mode triggered by input. North America (FCC): 0.4 secs. 	0.00 ... 0.99 seconds 0 ... 99 seconds	0
RF Channel Pause Time	The minimum time between two consecutive transmissions in the same RF channel. 0 stands for default settings of the selected region: <ul style="list-style-type: none"> Europe (ETSI): 100 ms in 'continuous' mode, no pause time in 'continuous' mode triggered by input. North America (FCC): no pause time. 	0.00 ... 0.99 seconds 0 ... 99 seconds	0
RF Chip Standby Mode	Activation / deactivation of the standby mode of the RF chip during RF off conditions to reduce power consumption and temperature increase.	Disabled, enabled	Enabled

List of region frequencies:

RF Channel	Europe (ETSI compliant region) [MHz]	North America (FCC compliant region) [MHz]
1	865.7	902.75
2	865.9	903.25
3	866.1	903.75
4	866.3	904.25
5	866.5	904.75
6	866.7	905.25
7	866.9	905.75
8	867.1	906.25
9	867.3	906.75
10	867.5	907.25
11		907.75
12		908.25
13		908.75
14		909.25
15		909.75
16		910.25
17		910.75
18		911.25
19		911.75
20		912.25
21		912.75
22		913.25
23		913.75
24		914.25
25		914.75
26		915.25
27		915.75
28		916.25
29		916.75

RF Channel	Europe (ETSI compliant region) [MHz]	North America (FCC compliant region) [MHz]
30		917.25
31		917.75
32		918.25
33		918.75
34		919.25
35		919.75
36		920.25
37		920.75
38		921.25
39		921.75
40		922.25
41		922.75
42		923.25
43		923.75
44		924.25
45		924.75
46		925.25
47		925.75
48		926.25
49		926.75
50		927.25

Hereinafter a cross-table between RF channel internal numeration and ETSI numeration according with EN 302208-1.

Internal RF Channel	ETSI EN 302208-1 RF Channel
1	4
2	5
3	6
4	7

Internal RF Channel	ETSI EN 302208-1 RF Channel
5	8
6	9
7	10
8	11
9	12
10	13



According to ETSI EN 302208-1 only channels 4, 7, 10 and 13 (internal numerated as 1, 4, 7 and 10) could be used at high power! Other RF channels are present only for test purposes and should not be used in normal operation!



According to integrated antenna specifications only Europe (ETSI) region could be set in readers with EU integrated antenna (items 522xU[-MB]-S).

Hereinafter the configurable EPC C1G2 (Class-1 Generation-2) parameters of the **BLUEBOX**.

Parameter	Description	Range	Default
Inventory Mode	How the reader does an inventory in 'continuous' mode.	Fast Multi Tag, Fast Single Tag, Standard Multi Tag, Standard Single Tag	Standard Multi Tag
Link Frequency	Link Frequency as defined in EPC Class 1 Generation 2 protocol.	40, 160, 256, 320, 640 kHz	160 kHz
Bit Coding	Bit coding as defined in EPC Class 1 Generation 2 protocol.	FM0, Miller 2, Miller 4, Miller 8	Miller 2
Q Selection Algorithm	The Q selection algorithm used for setting the slot-counter parameter as defined in EPC Class 1 Generation 2 protocol.	Dynamic Fixed	Dynamic
Q Value	The Q value used in fixed Q selection algorithm or the starting Q value used in dynamic Q selection algorithm as defined in EPC Class 1 Generation 2 protocol.	0 ... 15	3

Parameter	Description	Range	Default
Q Initial	The minimum allowed Q value in dynamic Q algorithm mode.	0 ... 15	0
Q Final	The maximum allowed Q value in dynamic Q algorithm mode.	0 ... 15	4
Q Adjust Rounds	The maximum Q adjust rounds in dynamic Q algorithm mode.	0 ... 5	3
Inventory Cycles	The inventory cycles in inventory command.	0 ... 5	3
Search Mode	How the reader singulates (select) tags in 'continuous' mode.	Dual Target, Single Target	Dual Target
Session	The session used as defined in EPC Class 1 Generation 2 protocol.	S0, S1, S2, S3	S0
Target	The target used as defined in EPC Class 1 Generation 2 protocol.	A, B	A
EPC size	The size of the recognized EPC in bytes. 0 means all EPC sizes,	0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62	0
ReadAfterDetect Info Activation	Activation of the ReadAfterDetect mode in 'continuous' mode.	None, TID, Custom	None
ReadAfterDetect Password	The password to be used to access to tag's memory in ReadAfterDetect mode (Inventory Mode = Standard Single/Multi Tag with Custom Info). Use a '0' password if the access password is not requested.	0x00 0x00 0x00 0x00 ... 0xFF 0xFF 0xFF 0xFF	0x00 0x00 0x00 0x00
ReadAfterDetect Bank	The tag's memory bank to access in ReadAfterDetect mode (Inventory Mode = Standard Single/Multi Tag with Custom Info).	Reserved, TID, User	Reserved
ReadAfterDetect Address	The tag's memory start address to access in the specified memory bank in ReadAfterDetect mode (Inventory Mode = Standard Single/Multi Tag with Custom Info).	0x00 0x00 0x00 0x00 ... 0xFF 0xFF 0xFF 0xFF	0x00 0x00 0x00 0x00
ReadAfterDetect Length	The number of tag's memory blocks (2-bytes length) to access in the specified memory bank in ReadAfterDetect mode (Inventory Mode = Standard Single/Multi Tag with Custom Info). In case of Reserved or User bank selected 0 means no tag's memory block	0 ... 255	0

Parameter	Description	Range	Default
	access, in case of TID bank selected 0 means auto-length (class identifier, manufacturer identifier, serial number).		
ReadAfterDetect EPC Bank Info	The EPC bank info to include in the tag's ID in ReadAfterDetect mode (Inventory Mode = Standard Single/Multi Tag with Custom Info).	PC, EPC, CRC	PC, EPC, CRC

The RF and EPC C1G2 (Class-1 Generation-2) parameters are stored in configuration pages nr. 0x01, 0x02, 0x04 and 0x82 and are managed through the 'Read Configuration Parameters' and 'Write Configuration Parameters' commands as described in protocol technical manuals.

The parameters 1...7 fields with default values are of page 0x01 are:

1	2	3	4	5	6	7
RF Input Sensitivity	Flags	0x00	0x00	0x00	0x00	0x00
0x4C	0x00	0x00	0x00	0x00	0x00	0x00

Where:

Parameter	Description
RF Input Sensitivity	Absolute value of the RF input sensitivity (see the technical specifications section for the possible values).
Flags	Flags. Single bits are dedicated to disable (0 value) or enable (1 value) functions: <ul style="list-style-type: none"> • Bit 7: Not used; • Bit 6: Not used • Bit 5: Not used; • Bit 4: Not used; • Bit 3: Not used; • Bit 2: Not used • Bit 1: Not used; • Bit 0: To disable the RF chip standby mode.

The parameters 1...7 fields with default values of page 0x02 are:

1	2	3	4	5	6	7
RF Region	RF Output Power	RF Channel	Antennas Activation	EPC C1G2	RF Maximum Allocation Time	RF Minimum Pause Time
0x02	0x14	0x00	0x01	0x30	0x00	0x00

Where:

Parameter	Description
RF Region	RF geographical region: <ul style="list-style-type: none"> 0x01: North America (FCC compliant); 0x02: Europe (ETSI compliant).
RF Output Power	RF output power (see the technical specifications section for the possible values).
RF Channel	RF channel. Channel 0 stands for default settings of the selected region: <ul style="list-style-type: none"> Europe (ETSI): FHSS on 4 channels (1, 4, 7, 10) in 865.7 – 867.5 MHz, 600kHz span. North America (FCC): FHSS on 50 channels (1 ... 50) in 902.75 – 927.25MHz, 500kHz span. The allowed values are 0x00 ... 0x0A if ETSI compliant region is selected and 0x00 ... 0x32 if FCC compliant region is selected.
Antennas Activation	A byte whose bits are dedicated to disable (0 value) or enable (1 value) the antennas to use: <ul style="list-style-type: none"> Bit 7: Not used. Bit 6: Not used. Bit 5: Not used. Bit 4: Not used. Bit 3: Antenna 4 (for devices with up to 4 antennas). Bit 2: Antenna 3 (for devices with up to 4 antennas). Bit 1: Antenna 2 (for devices with up to 4 antennas). Bit 0: Antenna 1.
EPC C1G2	A byte whose bits are dedicated to manage Q value and session/target parameters: <ul style="list-style-type: none"> Bit 7 ... bit 4: Q value in fixed Q selection algorithm or starting Q value in dynamic Q selection algorithm, as defined EPC Class 1 Generation 2 protocol (0x0=0 ... 0xF=15); Bit 3 ... bit 2: Session as defined in EPC Class 1 Generation 2 protocol (00b=S0, 01b=S1, 10b=S2, 11b=S3); Bit 1: Q selection algorithm (0=dynamic, 1=fixed); Bit 0: Target as defined in EPC Class 1 Generation 2 protocol (0=A, 1=B).
RF Maximum Allocation Time	The maximum period of consecutive transmission on the same RF channel. 0 stands for default settings of the selected region: <ul style="list-style-type: none"> Europe (ETSI): 4 secs in 'continuous' mode, no allocation time in 'continuous' mode triggered by input.

Parameter	Description
	<ul style="list-style-type: none"> North America (FCC): 0.4 secs. The allowed values are: <ul style="list-style-type: none"> Decimal 0 ... 99 for time in mseconds (0 ... 990 mseconds); Decimal 100 ... 199 for time in seconds (0 ... 99 seconds).
RF Minimum Pause Time	The minimum time between two consecutive transmission in the same RF channel. 0 stands for default settings of the selected region: <ul style="list-style-type: none"> Europe (ETSI): 100 ms, in 'continuous' mode, no pause time in 'continuous' mode triggered by input. North America (FCC): no pause time. The allowed values are: <ul style="list-style-type: none"> Decimal 0 ... 99 for time in mseconds (0 ... 990 mseconds); Decimal 100 ... 199 for time in seconds (0 ... 99 seconds).

The parameters 1...7 fields with default values of page 0x04 are:

1	2	3	4	5	6	7
Inventory Mode	Link Frequency	Bit Coding	0x00	EPC Size	0x00	0x00
0x02	0x02	0x01	0x00	0x00	0x00	0x00

Where:

Parameter	Description
Inventory Mode	A byte whose bits are dedicated to manage the inventory mode, the search mode and the ReadAfterDetect info activation parameters: <ul style="list-style-type: none"> Bit 7: Not used. Bit 6: Search mode (how the reader singulates tags in 'continuous' mode): <ul style="list-style-type: none"> 0b: Dual Target (the reader singulates tags in both A and B states). 1b: Single Target (the reader singulates only tags that are in A state). Bit 5: Activation of the ReadAfterDetect with custom info as defined in ReadAfterDetect Password, Bank, Address, Length and EPC Info parameters (0b=OFF, 1b=ON). Bit 4: Activation of the ReadAfterDetect with auto TID info (0b=OFF, 1b=ON). Bit 3 ... bit 0: Inventory mode (how the reader does an inventory in 'continuous' mode): <ul style="list-style-type: none"> 0x0: Fast Multi Tag: Inventory mode that does not take the tag to the Opened but to the Acknowledged state. This inventory mode is not as secure as the standard mode, but it is faster. 0x1: Fast Single Tag: The same inventory mode like the Fast Multi Tag, but with the slot count of 1. This has the effect that no anticollision procedure is performed. 0x2: Standard Multi Tag: Inventory mode like defined in the EPC C1G2 standard.

Parameter	Description																				
	<div><div><ul style="list-style-type: none">0x4: Standard Single Tag: The same inventory mode like the Standard Multi Tag, but with the slot count of 1. This has the effect that no anticollision procedure is performed.</div><div>Allowed values are:</div><table><thead><tr><th>Inventory Mode</th><th>ReadAfterDetect with Custom Info</th><th>ReadAfterDetect with Auto TID</th><th>Search Mode</th></tr></thead><tbody><tr><td>Fast Multi Tag, Fast Single Tag</td><td>Disabled</td><td>Disabled</td><td>Dual Target, Single Target</td></tr><tr><td>Standard Multi Tag, Standard Single Tag</td><td>Disabled</td><td>Disabled</td><td>Dual Target, Single Target</td></tr><tr><td>Standard Multi Tag, Standard Single Tag</td><td>Disabled</td><td>Enabled</td><td>Dual Target, Single Target</td></tr><tr><td>Standard Multi Tag, Standard Single Tag</td><td>Enabled</td><td>Disabled</td><td>Dual Target, Single Target</td></tr></tbody></table></div>	Inventory Mode	ReadAfterDetect with Custom Info	ReadAfterDetect with Auto TID	Search Mode	Fast Multi Tag, Fast Single Tag	Disabled	Disabled	Dual Target, Single Target	Standard Multi Tag, Standard Single Tag	Disabled	Disabled	Dual Target, Single Target	Standard Multi Tag, Standard Single Tag	Disabled	Enabled	Dual Target, Single Target	Standard Multi Tag, Standard Single Tag	Enabled	Disabled	Dual Target, Single Target
Inventory Mode	ReadAfterDetect with Custom Info	ReadAfterDetect with Auto TID	Search Mode																		
Fast Multi Tag, Fast Single Tag	Disabled	Disabled	Dual Target, Single Target																		
Standard Multi Tag, Standard Single Tag	Disabled	Disabled	Dual Target, Single Target																		
Standard Multi Tag, Standard Single Tag	Disabled	Enabled	Dual Target, Single Target																		
Standard Multi Tag, Standard Single Tag	Enabled	Disabled	Dual Target, Single Target																		
Link Frequency	<div>Link Frequency:<ul style="list-style-type: none">0x00: 40 kHz;0x02: 160 kHz;0x04: 256 kHz;0x05: 320 kHz;0x06: 640 kHz.</div>																				
Bit Coding	<div><div>Bit coding:<ul style="list-style-type: none">0x00: FM0;0x01: Miller 2;0x02: Milller 4;0x03: Miller 8.</div><div>Allowed values are:</div><table><thead><tr><th>Link Frequency</th><th>Bit Coding</th></tr></thead><tbody><tr><td>40 kHz</td><td>FM0, Miller 2, Miller 4, Miller 8</td></tr><tr><td>160 kHz</td><td>FM0, Miller 2, Miller 4, Miller 8</td></tr><tr><td>256 kHz</td><td>Miller 4, Miller 8</td></tr><tr><td>320 kHz</td><td>Miller 4, Miller 8</td></tr><tr><td>640 kHz</td><td>Miller 4, Miller 8</td></tr></tbody></table><div>DRM (Dense Reader Mode):</div><table><thead><tr><th>Link Frequency</th><th>Bit Coding</th></tr></thead><tbody><tr><td>256 kHz</td><td>Miller 4, Miller 8</td></tr><tr><td>320 kHz</td><td>Miller 4, Miller 8</td></tr></tbody></table></div>	Link Frequency	Bit Coding	40 kHz	FM0, Miller 2, Miller 4, Miller 8	160 kHz	FM0, Miller 2, Miller 4, Miller 8	256 kHz	Miller 4, Miller 8	320 kHz	Miller 4, Miller 8	640 kHz	Miller 4, Miller 8	Link Frequency	Bit Coding	256 kHz	Miller 4, Miller 8	320 kHz	Miller 4, Miller 8		
Link Frequency	Bit Coding																				
40 kHz	FM0, Miller 2, Miller 4, Miller 8																				
160 kHz	FM0, Miller 2, Miller 4, Miller 8																				
256 kHz	Miller 4, Miller 8																				
320 kHz	Miller 4, Miller 8																				
640 kHz	Miller 4, Miller 8																				
Link Frequency	Bit Coding																				
256 kHz	Miller 4, Miller 8																				
320 kHz	Miller 4, Miller 8																				
EPC Size	The size of the recognized EPC in bytes. 0 means all EPC sizes.																				

The parameters 1...14 fields with default values of page 0x82 are:

1	2	3	4	5	6	7
ReadAfterDetect Password0	ReadAfterDetect Password1	ReadAfterDetect Password2	ReadAfterDetect Password3	ReadAfterDetect Bank	ReadAfterDetect Address0	ReadAfterDetect Address1
0x00	0x00	0x00	0x00	0x00	0x00	0x00

8	9	10	11	12	13	14
ReadAfterDetect Address2	ReadAfterDetect Address3	ReadAfterDetect Length	ReadAfterDetect EPC Bank Info	Q	Q Adjust Rounds	Inventory Cycles
0x00	0x00	0x00	0x03	0x00	0x00	0x00

Where:

Parameter	Description
ReadAfterDetect Password0 ReadAfterDetect Password3	The password to be used to access to tag's memory in ReadAfterDetect mode. Use a '0' password if the access password is not requested.
ReadAfterDetect Bank	The tag's memory bank to access in ReadAfterDetect mode: <ul style="list-style-type: none"> 0x00: Reserved; 0x02: TID; 0x03: User.
ReadAfterDetect Address0 ... ReadAfterDetect Address3	The tag's memory start address to access in the specified memory bank in ReadAfterDetect mode.
ReadAfterDetect Length	The number of tag's memory blocks (2-bytes length) to access in the specified memory bank in ReadAfterDetect mode. In case of Reserved or User bank selected, 0 means no tag's memory block access; in case of TID bank selected, 0 means auto-length (class identifier, manufacturer identifier, serial number).
ReadAfterDetect EPC Bank Info	The EPC bank info to include in the tag's ID in ReadAfterDetect mode. A byte whose bits are dedicated to disable (0 value) or enable (1 value) functions: <ul style="list-style-type: none"> Bit 7: Not used; Bit 6: Not used; Bit 5: Not used; Bit 4: Not used; Bit 3: Not used; Bit 2: CRC field; Bit 1: EPC field; Bit 0: PC field.

Parameter	Description
Q	Minimum and maximum Q value to be used in dynamic Q selection algorithm: <ul style="list-style-type: none"> High nibble: minimum Q value (0x0 ... 0xF); Low nibble: maximum Q value (0x0 ... 0xF).
Q Adjust Rounds	Maximum Q adjust rounds in dynamic Q selection algorithm.
Inventory Cycles	The inventory cycles in inventory command.



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

3.2.5 Dynamic Power Management

Hereinafter the configurable dynamic power management parameters of the **BLUEBOX**.

Parametro	Descrizione	Range	Default
Mode	How the reader manages the power in 'continuous' mode.	Off, Up, Up/down	Off
Power Step	The power step in dynamic power management mode activated.	1 ... 5 dB 10 ... 500 mW	1 dB
Time Step	The time step in dynamic power management mode activated.	0.1 ... 9.9 seconds	1.0 sec

The dynamic power management parameters are stored in configuration page nr. 0x07 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
Mode	Power Step	Time Step	0x00	0x00	0x00	0x00
0x00	0x01	0x0A	0x00	0x00	0x00	0x00

Where:

Parameter	Description
Mode	Dynamic power management activation / deactivation in 'continuous' mode: <ul style="list-style-type: none"> • 0x00: Off; • 0x01: Up, only increase power by power step every time step; • 0x02: Up / Down, increase power and then decrease it by power step every time step.
Power Step	Power step: <ul style="list-style-type: none"> • 0x01 ... 0x05 for power step in dB (1 ... 5 dB); • 0x81 ... 0xB2 for power step in mW x 10 (10 ... 500 mW).
Time Step	Time step: <ul style="list-style-type: none"> • Decimal 1 ... 99 for time in ms x 100 (0.1 ... 9.9 seconds).



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

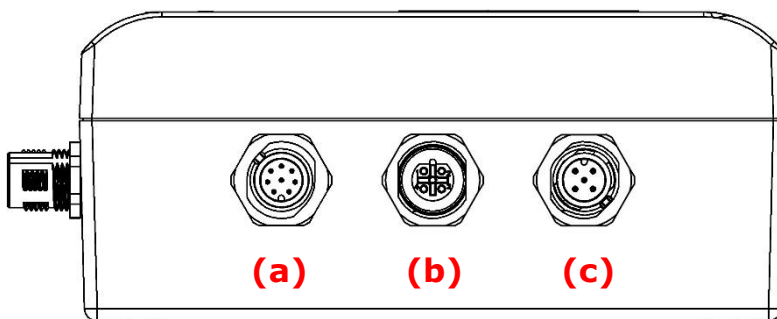
3.3 Device Status

The information about the current status of the **BLUEBOX** shall be read with the 'Read Device Status' command as described in protocol technical manuals where the status bytes 1 and 2 have the following meaning.

Status Byte	Description
Status Byte 1	Byte whose bits have the following meaning: <ul style="list-style-type: none"> • Bit 7: Not used • Bit 6: Not used; • Bit 5: RF status (0=off, 1=on) • Bit 4: 'Continuous' mode (1=enabled) • Bit 3: Not used • Bit 2: Not used • Bit 1: Output 2 status (1=activated) • Bit 0: Output 1 status (1=activated)
Status Byte 2	Byte whose bits have the following meaning: <ul style="list-style-type: none"> • Bit 7: Not used • Bit 6: Not used • Bit 5: Not used • Bit 4: Not used • Bit 3: Not used • Bit 2: Not used

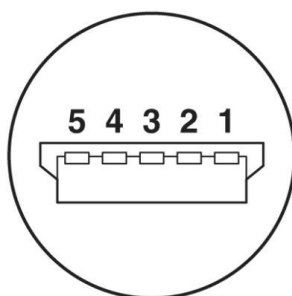
Status Byte	Description
	<ul style="list-style-type: none"> • Bit 1: Input 2 status (1=activated) • Bit 0: Input 1 status (1=activated)

4 Connections



BLUEBOX is designed and developed to allow installation and maintenance experts to perform all power supply, communication and interfacing I/O connections without the need to open the device; for this purpose on the front side of the **BLUEBOX** are placed three M12 connectors (marked in the above picture by letters "a", "b" and "c") whose type and pinout, variable depending on the model of used device, are illustrated in the following paragraphs.

On the left side of the **BLUEBOX** is placed a mini USB type B port for service purpose and future implementations.

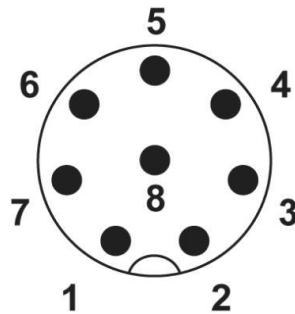


Mini USB B

Pin	No	Min	Typical	Max	Description
+5V BUS	1				+5 Vdc
USB D-	2				USB Data-
USB D+	3				USB Data+
ID	4				-
GND	5				Ground

4.1 Serial Version (Items 5221U, 5221U-S, 5237U, 5237U-S, 5231U)

(a) Serial interface



8-poles M12 A-coded male connector

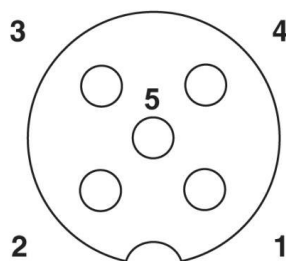
Pin	No	Min	Typical	Max	Description
RS485 RT+	1				RS485 connection (positive)
RS485 RT-	2				RS485 connection (negative)
RS485 TERM. RT-	3				RS485 term. resistor (RT-) To short with pin 2 if needed
RS232 Rx	4				RS232 connection (from host)
RS232 GND	5				RS232 connection (reference)
RS232 Tx	6				RS232 connection (to host)
RS485 TERM. RT+	7				RS485 term. resistor (RT+) To short with pin 1 if needed
GND	8				GND (same as pin 5)

Hereinafter a cross reference table between connection pin number and the color of the wires of a standard open ended cable.

Pin	No	Wire Cable Color
RS485 RT+	1	White
RS485 RT-	2	Brown
RS485 TERM. RT-	3	Green
RS232 Rx	4	Yellow

Pin	No	Wire Cable Color
RS232 GND	5	Grey
RS232 Tx	6	Pink
RS485 TERM. RT+	7	Blue
GND	8	Red

(b) I/O interface:



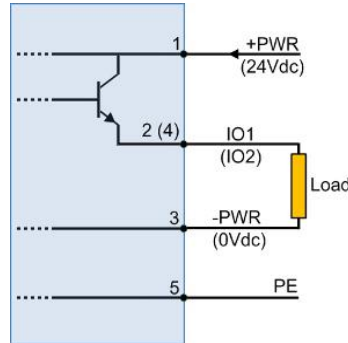
5-poles M12 A-coded female connector

Pin	No	Min	Typical	Max	Description
IO Vin	1	18Vdc	24Vdc	36Vdc	Input / Output power supply (24Vdc)
IO1	2				Input 1 / Output 1
IO Gnd	3				Input / Output reference (0Vdc)
IO2	4				Input 2 / Output 2
PE	5				Protection Earth

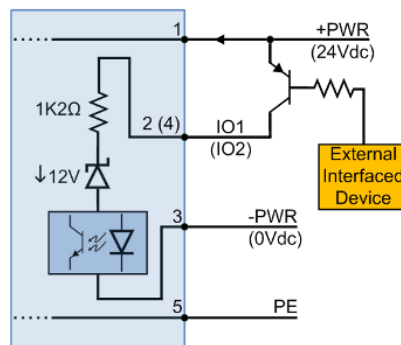
Hereinafter a cross reference table between connection pin number and the color of the wires of a standard open ended cable.

Pin	No	Wire Cable Color
IO Vin	1	Brown
IO1	2	White
IO Gnd	3	Blue
IO2	4	Black
PE	5	Grey

If IOx is used as output, the load has to be connected between Output pin 2 (channel 1) or Output pin 4 (channel 2) and -PWR pin 3; max applicable current is 500mA.

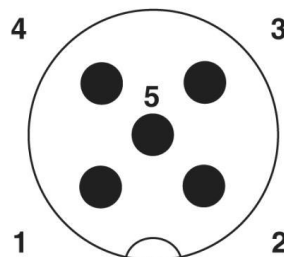


If IOx is used as input, a clean contact or PNP transistor has to be connected between +PWR pin 1 and Input pin 2 (channel 1) or Input pin 4 (channel 2); max applicable current is 10mA.



When the I/O is used as input, do not use it also as output to avoid conflicts!

(c) Power supply interface:



5-poles M12 A-coded male connector

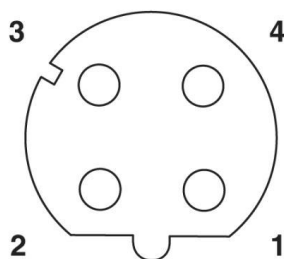
Pin	No	Min	Typical	Max	Descrizione
+ PWR	1	18Vdc	24Vdc	36Vdc	DC power supply
N.C.	2				Not connected
- PWR	3				DC power supply return path
N.C.	4				Not connected
PE	5				Protected Earth

Hereinafter a cross reference table between connection pin number and the color of the wires of a standard open ended cable.

Pin	No	Wire Cable Color
+ PWR	1	Brown
N.C.	2	White
- PWR	3	Blue
N.C.	4	Black
PE	5	Grey

4.2 Ethernet Version (Items 5222U, 5222U-S, 5238U, 5238U-S, 5232U)

a) Ethernet interface:

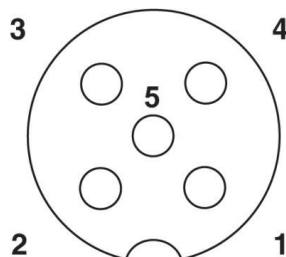


4-poles M12 D-coded female connector

Pin	No	Min	Typical	Max	Description
TX+	1				Transmit data +
RX+	2				Receive data +
TX-	3				Transmit data -

Pin	No	Min	Typical	Max	Description
RX-	4				Receive data -

(b) I/O interface:



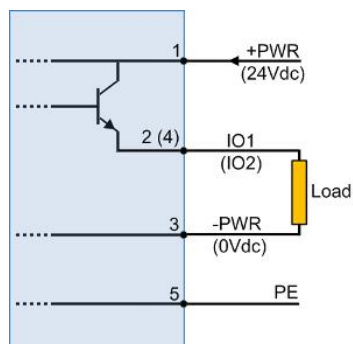
5-poles M12 A-coded female connector

Pin	No	Min	Typical	Max	Description
IO Vin	1	18Vdc	24Vdc	36Vdc	Input / Output power supply (24Vdc)
IO1	2				Input 1 / Output 1
IO Gnd	3				Input / Output reference (0Vdc)
IO2	4				Input 2 / Output 2
PE	5				Protection Earth

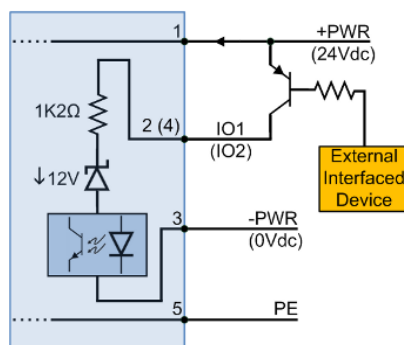
Hereinafter a cross reference table between connection pin number and the color of the wires of a standard open ended cable.

Pin	No	Wire Cable Color
IO Vin	1	Brown
IO1	2	White
IO Gnd	3	Blue
IO2	4	Black
PE	5	Grey

If IOx is used as output, the load has to be connected between Output pin 2 (channel 1) or Output pin 4 (channel 2) and –PWR pin 3; max applicable current is 500mA.

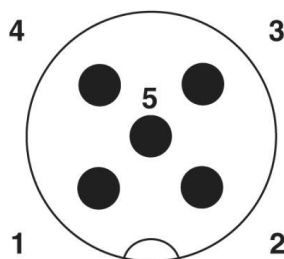


If IOx is used as input, a clean contact or PNP transistor has to be connected between +PWR pin 1 and Input pin 2 (channel 1) or Input pin 4 (channel 2); max applicable current is 10mA.



When the I/O is used as input, do not use it also as output to avoid conflicts!

(c) Power supply interface:



5-poles M12 A-coded male connector

Pin	No	Min	Typical	Max	Description
+ PWR	1	18Vdc	24Vdc	36Vdc	DC power supply

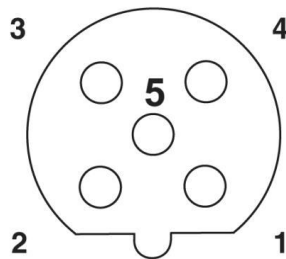
Pin	No	Min	Typical	Max	Description
N.C.	2				Not connected
- PWR	3				DC power supply return path
N.C.	4				Not connected
PE	5				Protected Earth

Hereinafter a cross reference table between connection pin number and the color of the wires of a standard open ended cable.

Pin	No	Wire Cable Color
+ PWR	1	Brown
N.C.	2	White
- PWR	3	Blue
N.C.	4	Black
PE	5	Grey

4.3 ProfiBus Version (Items 5223U, 5223U-S, 5239U, 5239U-S, 5233U)

(a) ProfiBus interface:



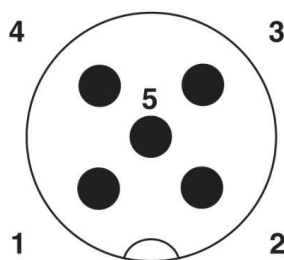
5-poles M12 B-coded female connector

Pin	No	Min	Typical	Max	Description
+5V BUS	1				+5Vdc
BUS-B	2				
GND BUS	3				GND
BUS-A	4				

Pin	No	Min	Typical	Max	Description
PE	5				Protection Earth

(b) Not present.

(c) Power supply and I/O interface:



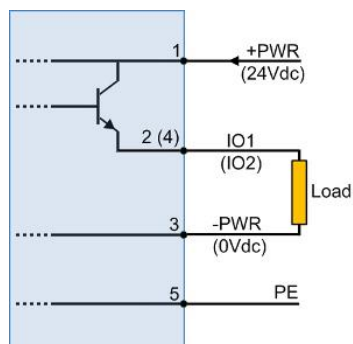
5-poles M12 A-coded male connector

Pin	No	Min	Typical	Max	Description
+ PWR	1	18Vdc	24Vdc	36Vdc	DC power supply
IO1	2				Input 1 / Output 1
- PWR	3				DC power supply return path
IO2	4				Input 2 / Output 2
PE	5				Protected Earth

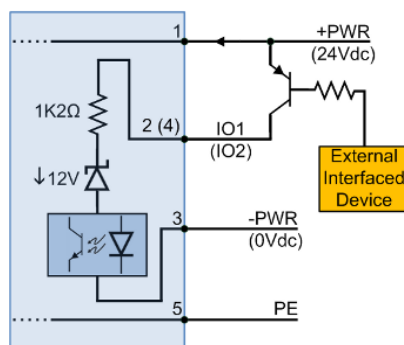
Hereinafter a cross reference table between connection pin number and the color of the wires of a standard open ended cable.

Pin	No	Wire Cable Color
+ PWR	1	Brown
IO1	2	White
- PWR	3	Blue
IO2	4	Black
PE	5	Grey

If IOx is used as output, the load has to be connected between Output pin 2 (channel 1) or Output pin 4 (channel 2) and –PWR pin 3; max applicable current is 500mA.



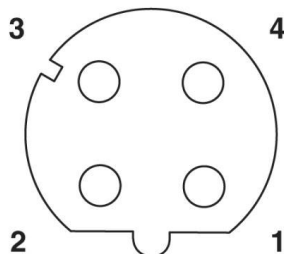
If IOx is used as input, a clean contact or PNP transistor has to be connected between +PWR pin 1 and Input pin 2 (channel 1) or Input pin 4 (channel 2); max applicable current is 10mA.



When the I/O is used as input, do not use it also as output to avoid conflicts!

4.4 MODBUS/TCP Version (Items 5222U-MB-S, 5238U-MB-S, 5232U-MB)

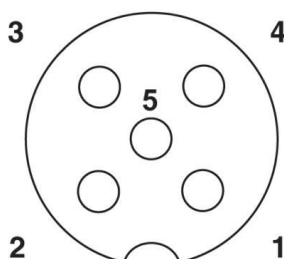
a) MODBUS/TCP interface:



4-poles M12 D-coded female connector

Pin	No	Min	Typical	Max	Description
TX+	1				Transmit data +
RX+	2				Receive data +
TX-	3				Transmit data -
RX-	4				Receive data -

(b) I/O interface:



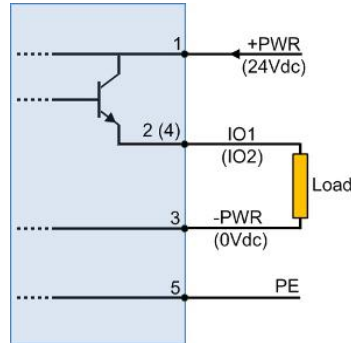
5-poles M12 A-coded female connector

Pin	No	Min	Typical	Max	Description
IO Vin	1	18Vdc	24Vdc	36Vdc	Input / Output power supply (24Vdc)
IO1	2				Input 1 / Output 1
IO Gnd	3				Input / Output reference (0Vdc)
IO2	4				Input 2 / Output 2
PE	5				Protection Earth

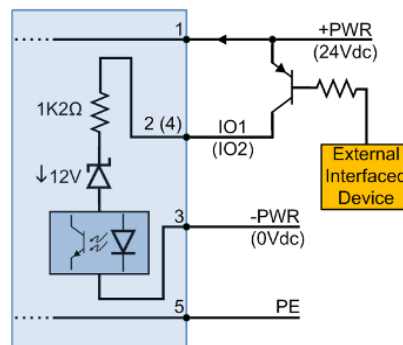
Hereinafter a cross reference table between connection pin number and the color of the wires of a standard open ended cable.

Pin	No	Wire Cable Color
IO Vin	1	Brown
IO1	2	White
IO Gnd	3	Blue
IO2	4	Black
PE	5	Grey

If IOx is used as output, the load has to be connected between Output pin 2 (channel 1) or Output pin 4 (channel 2) and –PWR pin 3; max applicable current is 500mA.

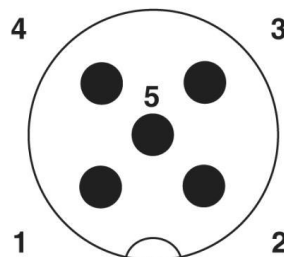


If IOx is used as input, a clean contact or PNP transistor has to be connected between +PWR pin 1 and Input pin 2 (channel 1) or Input pin 4 (channel 2); max applicable current is 10mA.



When the I/O is used as input, do not use it also as output to avoid conflicts!

(c) Power supply interface:



5-poles M12 A-coded male connector

Pin	No	Min	Typical	Max	Description
+ PWR	1	18Vdc	24Vdc	36Vdc	DC power supply
N.C.	2				Not connected
- PWR	3				DC power supply return path
N.C.	4				Not connected
PE	5				Protected Earth

Hereinafter a cross reference table between connection pin number and the color of the wires of a standard open ended cable.

Pin	No	Wire Cable Color
+ PWR	1	Brown
N.C.	2	White
- PWR	3	Blue
N.C.	4	Black
PE	5	Grey

5 Antennas

The **BLUEBOX** is available with internal antenna directly integrated on the device cover (items 5221U, 5222U, 5223U, 5221U-S, 5222U-S, 5223U-S and 5222U-MB-S). Alternatively the **BLUEBOX** (items 5237U, 5238U, 5239U, 5237U-S, 5238U-S, 5239U-S and 5238U-MB-S) is equipped with a connector for an external antenna that is available in various models (items 902xU and 922xU) or four connectors for up to four external antennas (items 5231U, 5232U, 5233U and 5232U-MB).

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.

In case of **BLUEBOX** with external antennas the maximum RF output power must be calculated considering the radiating power limits defined in the region of usage.

In Europe region radiating power limits are described in relation to dipole antenna and ERP (Efficient Radiating Power) is used as a measure. The maximum RF output power is defined by the antenna gain, the half power beam width and the cable attenuation on the reader - antenna connection. For antennas with a half power beam width of up to 70° a power of $P_{ERP,max} = 2W$ ERP is allowed. For other half power beam widths a reduced power of $P_{ERP,max} = 0.5W$ ERP. The maximum RF output power is defined as:

$$P_{C,max} = P_{ERP,max} - G_{IC} + 5.15 + C_L$$

Where:

$P_{C,max}$	Maximum RF output power in dBm
$P_{ERP,max}$	Maximum ERP power of the antenna in dBm
G_{IC}	Circular antenna gain in dBic
C_L	Cable loss in dB

In North America region radiating power limits are described in relation to isotropic antenna and EIRP (Efficient Isotropic Radiating Power) is used as a measure. The maximum RF output power is defined by the antenna gain, the half power beam width and the cable attenuation on the reader - antenna

connection. A power of $P_{\text{EIRP,max}} = 4\text{W}$ EIRP is allowed. The maximum RF output power is defined as:

$$P_{\text{C,max}} = P_{\text{EIRP,max}} - G_{\text{IC}} - 2.15 + 5.15 + C_{\text{L}}$$

Where:

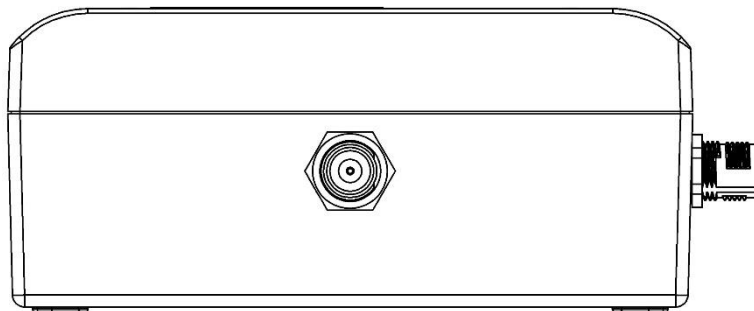
$P_{\text{C,max}}$	Maximum RF output power in dBm
$P_{\text{ERP,max}}$	Maximum ERP power of the antenna in dBm
G_{IC}	Circular antenna gain in dBic
C_{L}	Cable loss in dB

5.1 Internal Antenna (Items 5221U, 5222U, 5223U, 5221U-S, 5222U-S, 5223U-S, 5222U-MB-S)

The reader with external antenna has a maximum reading distance of about 4 mt.

5.2 1 External Antenna (Items 5237U, 5238U, 5239U, 5237U-S, 5238U-S, 5239U-S, 5238U-MB-S)

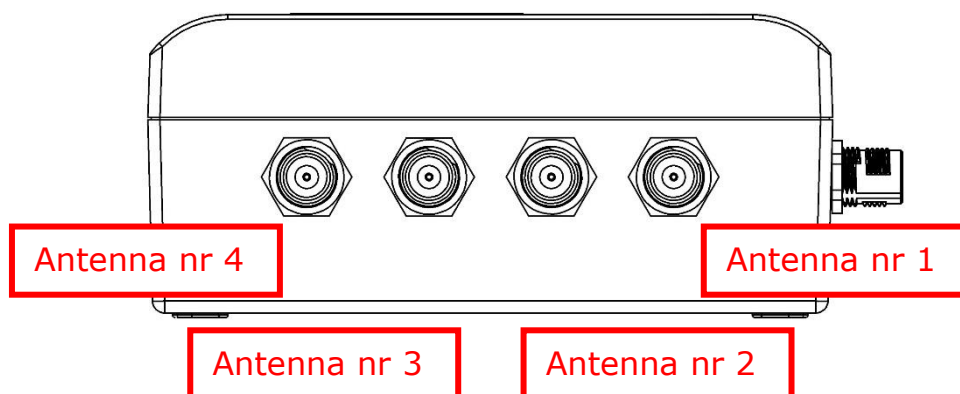
The reader with external antenna has a maximum reading distance of about 8 mt.



BLUEBOX 1 external antenna version.

5.3 Up to 4 External Antennas (Items 5231U, 5232U, 5233U, 5232U-MB)

The reader with external antenna has a maximum reading distance of about 10 mt.














BLUEBOX 4 external antennas version.



6 Status Indications

At the top of **BLUEBOX** are placed LEDs that show to the user about current activities and device status. The available LEDs depend on the **BLUEBOX** version: their meaning is described in the following paragraphs.

Buzzer: The buzzer is activated for 0.5 seconds at the end of the initialization phase. During normal operation, if the 'automatic' management of the buzzer is enabled by the flag defined in the general parameters, the buzzer is activated for 0.5 seconds at every identification of a 'new' tag.













6.1 Serial Version, 1 Internal or External Antenna (Items 5221U, 5221U-S, 5237U, 5237U-S)

















LED	Color	State	Meaning
SYSTEM	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> System running
	 (red)	On	<ul style="list-style-type: none"> System error System initialization
	 (orange)	On	<ul style="list-style-type: none"> System upgrade
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect
HOST	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> No HOST connection
	 (green)	On	<ul style="list-style-type: none"> HOST connection
	 (red)	On	<ul style="list-style-type: none"> System initialization
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect System upgrade
ANT	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> Antenna active, no tag detected
	 (green)	Flashing cyclic with 1Hz	<ul style="list-style-type: none"> Antenna not active
	 (green)	On	<ul style="list-style-type: none"> Antenna active, tag detected

LED	Color	State	Meaning
	 (red)	On	<ul style="list-style-type: none"> Antenna error System initialization
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect System upgrade

6.2














Serial Version, up to 4 External Antennas (Item 5231U)




LED	Color	State	Meaning
SYSTEM	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> System running
	 (red)	On	<ul style="list-style-type: none"> System error System initialization
	 (orange)	On	<ul style="list-style-type: none"> System upgrade
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect
HOST	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> No HOST connection
	 (green)	On	<ul style="list-style-type: none"> HOST connection
	 (red)	On	<ul style="list-style-type: none"> System initialization
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect System upgrade
ANT1	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> Antenna 1 active, no tag detected
	 (green)	Flashing cyclic with 1Hz	<ul style="list-style-type: none"> Antenna 1 not active
	 (green)	On	<ul style="list-style-type: none"> Antenna 1 active, tag detected
	 (red)	On	<ul style="list-style-type: none"> Antenna 1 error System initialization

LED	Color	State	Meaning
ANT2	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect System upgrade
	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> Antenna 2 active, no tag detected
	 (green)	Flashing cyclic with 1Hz	<ul style="list-style-type: none"> Antenna 2 not active
	 (green)	On	<ul style="list-style-type: none"> Antenna 2 active, tag detected
	 (red)	On	<ul style="list-style-type: none"> Antenna 2 error System initialization
ANT3	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect System upgrade
	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> Antenna 3 active, no tag detected
	 (green)	Flashing cyclic with 1Hz	<ul style="list-style-type: none"> Antenna 3 not active
	 (green)	On	<ul style="list-style-type: none"> Antenna 3 active, tag detected
	 (red)	On	<ul style="list-style-type: none"> Antenna 3 error System initialization
ANT4	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect System upgrade
	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> Antenna 4 active, no tag detected
	 (green)	Flashing cyclic with 1Hz	<ul style="list-style-type: none"> Antenna 4 not active
	 (green)	On	<ul style="list-style-type: none"> Antenna 4 active, tag detected
	 (red)	On	<ul style="list-style-type: none"> Antenna 4 error System initialization
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing













LED	Color	State	Meaning
			<ul style="list-style-type: none"> Hardware defect System upgrade

















6.3 Ethernet Version, 1 Internal or External Antenna (Items 5222U, 5222U-S, 5238U, 5238U-S)




LED	Color	State	Meaning
SYSTEM	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> System running
	 (red)	On	<ul style="list-style-type: none"> System error System initialization
	 (orange)	On	<ul style="list-style-type: none"> System upgrade
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect
HOST	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> No HOST connection
	 (green)	On	<ul style="list-style-type: none"> HOST connection
	 (red)	On	<ul style="list-style-type: none"> System initialization
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect System upgrade
ANT	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> Antenna active, no tag detected
	 (green)	Flashing cyclic with 1Hz	<ul style="list-style-type: none"> Antenna not active
	 (green)	On	<ul style="list-style-type: none"> Antenna active, tag detected
	 (red)	On	<ul style="list-style-type: none"> Antenna error System initialization
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect System upgrade

LED	Color	State	Meaning
ETH	 (green)	On	<ul style="list-style-type: none"> Link, a connection to the Ethernet exists
	 (red)	Flashing	<ul style="list-style-type: none"> Activity, the device sends/receives Ethernet frames
	 (off)	Off	<ul style="list-style-type: none"> Ethernet connection is missing Hardware defect












6.4 Ethernet Version, up to 4 External Antennas (Item 5232U)








LED	Color	State	Meaning
SYSTEM	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> System running
	 (red)	On	<ul style="list-style-type: none"> System error System initialization
	 (orange)	On	<ul style="list-style-type: none"> System upgrade
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect
HOST	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> No HOST connection
	 (green)	On	<ul style="list-style-type: none"> HOST connection
	 (red)	On	<ul style="list-style-type: none"> System initialization
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect System upgrade
ANT1	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> Antenna 1 active, no tag detected
	 (green)	Flashing cyclic with 1Hz	<ul style="list-style-type: none"> Antenna 1 not active
	 (green)	On	<ul style="list-style-type: none"> Antenna 1 active, tag detected
	 (red)	On	<ul style="list-style-type: none"> Antenna 1 error System initialization

LED	Color	State	Meaning
ANT2	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect System upgrade
	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> Antenna 2 active, no tag detected
	 (green)	Flashing cyclic with 1Hz	<ul style="list-style-type: none"> Antenna 2 not active
	 (green)	On	<ul style="list-style-type: none"> Antenna 2 active, tag detected
	 (red)	On	<ul style="list-style-type: none"> Antenna 2 error System initialization
ANT3	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect System upgrade
	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> Antenna 3 active, no tag detected
	 (green)	Flashing cyclic with 1Hz	<ul style="list-style-type: none"> Antenna 3 not active
	 (green)	On	<ul style="list-style-type: none"> Antenna 3 active, tag detected
	 (red)	On	<ul style="list-style-type: none"> Antenna 3 error System initialization
ANT4	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect System upgrade
	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> Antenna 4 active, no tag detected
	 (green)	Flashing cyclic with 1Hz	<ul style="list-style-type: none"> Antenna 4 not active
	 (green)	On	<ul style="list-style-type: none"> Antenna 4 active, tag detected
	 (red)	On	<ul style="list-style-type: none"> Antenna 4 error System initialization
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing









LED	Color	State	Meaning
ETH	 (green)	On	<ul style="list-style-type: none"> Link, a connection to the Ethernet exists
	 (red)	Flashing	<ul style="list-style-type: none"> Activity, the device sends/receives Ethernet frames
	 (off)	Off	<ul style="list-style-type: none"> Ethernet connection is missing Hardware defect
















6.5 ProfiBus Version, 1 Internal or External Antenna (Items 5223U, 5223U-S, 5239U, 5239U-S)











LED	Color	State	Meaning
SYSTEM	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> System running
	 (red)	On	<ul style="list-style-type: none"> System error System initialization
	 (orange)	On	<ul style="list-style-type: none"> System upgrade
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect
HOST	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> No HOST connection
	 (green)	On	<ul style="list-style-type: none"> HOST connection
	 (red)	On	<ul style="list-style-type: none"> System initialization
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect System upgrade
ANT	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> Antenna active, no tag detected
	 (green)	Flashing cyclic with 1Hz	<ul style="list-style-type: none"> Antenna not active
	 (green)	On	<ul style="list-style-type: none"> Antenna active, tag detected

LED	Color	State	Meaning
	 (red)	On	<ul style="list-style-type: none"> Antenna error System initialization
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect System upgrade
STS0	 (green)	On	<ul style="list-style-type: none"> Cyclic communication
	 (red)	Flash 1:3	<ul style="list-style-type: none"> No communication Connection error
	 (red)	Flash 1:1	<ul style="list-style-type: none"> Not Configured
	 (off)	Off	<ul style="list-style-type: none"> Connection is missing Hardware defect
STS1	 (off)	Off	<ul style="list-style-type: none"> Not used






6.6 ProfiBus Version, up to 4 External Antennas (Item 5233U)


















LED	Color	State	Meaning
SYSTEM	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> System running
	 (red)	On	<ul style="list-style-type: none"> System error System initialization
	 (orange)	On	<ul style="list-style-type: none"> System upgrade
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect
HOST	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> No HOST connection
	 (green)	On	<ul style="list-style-type: none"> HOST connection
	 (red)	On	<ul style="list-style-type: none"> System initialization
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect


LED	Color	State	Meaning
			<ul style="list-style-type: none"> System upgrade
ANT1	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> Antenna 1 active, no tag detected
	 (green)	Flashing cyclic with 1Hz	<ul style="list-style-type: none"> Antenna 1 not active
	 (green)	On	<ul style="list-style-type: none"> Antenna 1 active, tag detected
	 (red)	On	<ul style="list-style-type: none"> Antenna 1 error System initialization
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect System upgrade
ANT2	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> Antenna 2 active, no tag detected
	 (green)	Flashing cyclic with 1Hz	<ul style="list-style-type: none"> Antenna 2 not active
	 (green)	On	<ul style="list-style-type: none"> Antenna 2 active, tag detected
	 (red)	On	<ul style="list-style-type: none"> Antenna 2 error System initialization
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect System upgrade
ANT3	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> Antenna 3 active, no tag detected
	 (green)	Flashing cyclic with 1Hz	<ul style="list-style-type: none"> Antenna 3 not active
	 (green)	On	<ul style="list-style-type: none"> Antenna 3 active, tag detected
	 (red)	On	<ul style="list-style-type: none"> Antenna 3 error System initialization
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect System upgrade

LED	Color	State	Meaning
ANT4	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> Antenna 4 active, no tag detected
	 (green)	Flashing cyclic with 1Hz	<ul style="list-style-type: none"> Antenna 4 not active
	 (green)	On	<ul style="list-style-type: none"> Antenna 4 active, tag detected
	 (red)	On	<ul style="list-style-type: none"> Antenna 4 error System initialization
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect System upgrade
STS0	 (green)	On	<ul style="list-style-type: none"> Cyclic communication
	 (red)	Flash 1:3	<ul style="list-style-type: none"> No communication Connection error
	 (red)	Flash 1:1	<ul style="list-style-type: none"> Not Configured
	 (off)	Off	<ul style="list-style-type: none"> Connection is missing Hardware defect
STS1	 (off)	Off	<ul style="list-style-type: none"> Not used














6.7 MODBUS/TCP Version, 1 Internal or External Antenna (5222U-MB-S, 5238U-MB-S)

















LED	Color	State	Meaning
SYSTEM	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> System running
	 (red)	On	<ul style="list-style-type: none"> System error System initialization
	 (orange)	On	<ul style="list-style-type: none"> System upgrade
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect
HOST	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> No HOST connection










LED	Color	State	Meaning
	 (green)	On	<ul style="list-style-type: none"> HOST connection
	 (red)	On	<ul style="list-style-type: none"> System initialization
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect System upgrade
ANT	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> Antenna active, no tag detected
	 (green)	Flashing cyclic with 1Hz	<ul style="list-style-type: none"> Antenna not active
	 (green)	On	<ul style="list-style-type: none"> Antenna active, tag detected
	 (red)	On	<ul style="list-style-type: none"> Antenna error System initialization
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect System upgrade
ETH	 (green)	On	<ul style="list-style-type: none"> Link, a connection to the Ethernet exists
	 (red)	Flashing	<ul style="list-style-type: none"> Activity, the device sends/receives Ethernet frames
	 (off)	Off	<ul style="list-style-type: none"> Ethernet connection is missing Hardware defect
STS0	 (green)	Flashing cyclic with 1Hz	<ul style="list-style-type: none"> Connection ready but not config. yet
	 (green)	Flashing cyclic with 5Hz	<ul style="list-style-type: none"> Connection waiting for comm.
	 (green)	On	<ul style="list-style-type: none"> Connection established
	 (off)	Off	<ul style="list-style-type: none"> Connection not ready Hardware defect
STS1	 (red)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> System error
	 (red)	On	<ul style="list-style-type: none"> Communication error

LED	Color	State	Meaning
	 (off)	Off	<ul style="list-style-type: none"> No communication error Hardware defect

6.8 MODBUS/TCP Version, up to 4 External Antennas (Item 5232U-MB)

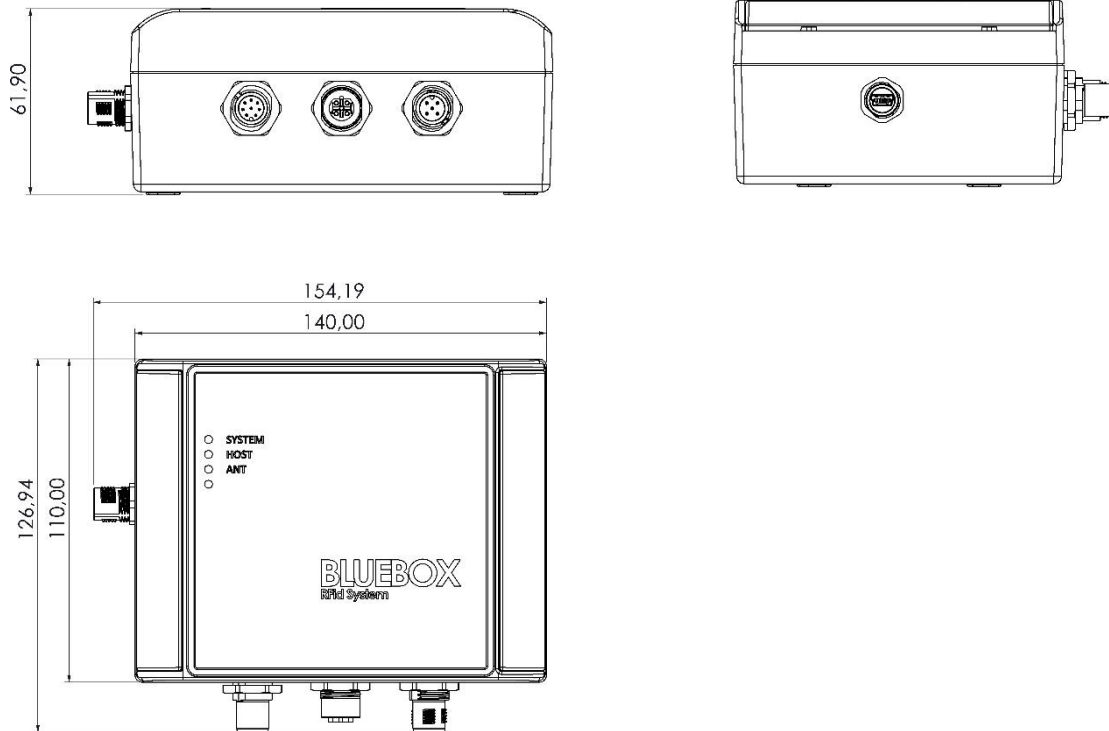
LED	Color	State	Meaning
SYSTEM	 (green)	Flashing cyclic with 1Hz	<ul style="list-style-type: none"> System running
	 (red)	On	<ul style="list-style-type: none"> System error System initialization
	 (orange)	On	<ul style="list-style-type: none"> System upgrade
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect
HOST	 (green)	Flashing cyclic with 1Hz	<ul style="list-style-type: none"> No HOST connection
	 (green)	On	<ul style="list-style-type: none"> HOST connection
	 (red)	On	<ul style="list-style-type: none"> System initialization
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect System upgrade
ANT1	 (green)	Flashing cyclic with 1Hz	<ul style="list-style-type: none"> Antenna 1 active, no tag detected
	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> Antenna 1 not active
	 (green)	On	<ul style="list-style-type: none"> Antenna 1 active, tag detected
	 (red)	On	<ul style="list-style-type: none"> Antenna 1 error System initialization
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect System upgrade

LED	Color	State	Meaning
ANT2	 (green)	Flashing cyclic with 1Hz	<ul style="list-style-type: none"> Antenna 2 active, no tag detected
	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> Antenna 2 not active
	 (green)	On	<ul style="list-style-type: none"> Antenna 2 active, tag detected
	 (red)	On	<ul style="list-style-type: none"> Antenna 2 error System initialization
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect System upgrade
ANT3	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> Antenna 3 active, no tag detected
	 (green)	Flashing cyclic with 1Hz	<ul style="list-style-type: none"> Antenna 3 not active
	 (green)	On	<ul style="list-style-type: none"> Antenna 3 active, tag detected
	 (red)	On	<ul style="list-style-type: none"> Antenna 3 error System initialization
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect System upgrade
ANT4	 (green)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> Antenna 4 active, no tag detected
	 (green)	Flashing cyclic with 1Hz	<ul style="list-style-type: none"> Antenna 4 not active
	 (green)	On	<ul style="list-style-type: none"> Antenna 4 active, tag detected
	 (red)	On	<ul style="list-style-type: none"> Antenna 4 error System initialization
	 (off)	Off	<ul style="list-style-type: none"> Power supply for the device is missing Hardware defect System upgrade
ETH	 (green)	On	<ul style="list-style-type: none"> Link, a connection to the Ethernet exists

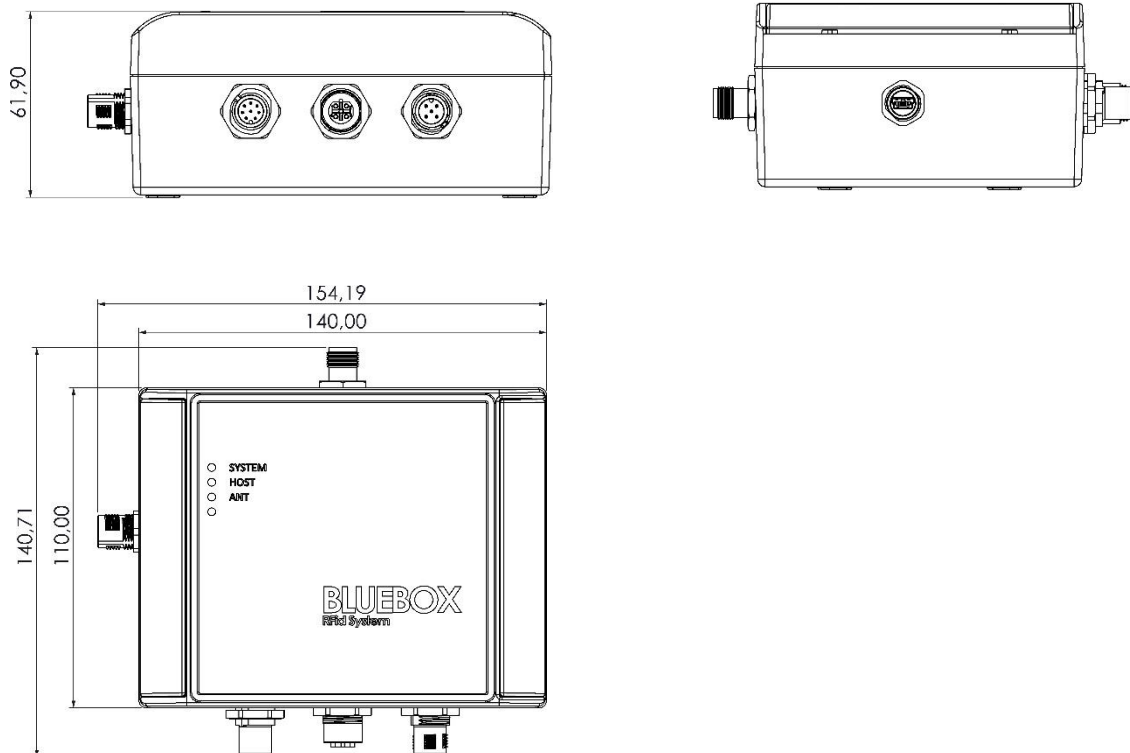
LED	Color	State	Meaning
	 (red)	Flashing	<ul style="list-style-type: none"> Activity, the device sends/receives Ethernet frames
	 (off)	Off	<ul style="list-style-type: none"> Ethernet connection is missing Hardware defect
STS0	 (green)	Flashing cyclic with 1Hz	<ul style="list-style-type: none"> Connection ready but not config. yet
	 (green)	Flashing cyclic with 5Hz	<ul style="list-style-type: none"> Connection waiting for comm.
	 (green)	On	<ul style="list-style-type: none"> Connection established
	 (off)	Off	<ul style="list-style-type: none"> Connection not ready Hardware defect
STS1	 (red)	Flashing cyclic with 2Hz	<ul style="list-style-type: none"> System error
	 (red)	On	<ul style="list-style-type: none"> Communication error
	 (off)	Off	<ul style="list-style-type: none"> No communication error Hardware defect

7 Mechanical Drawings

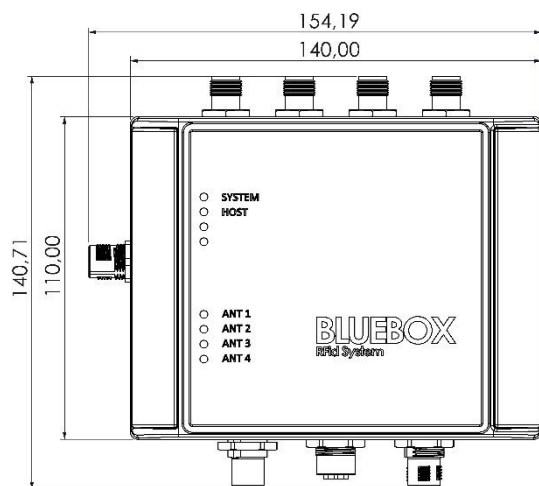
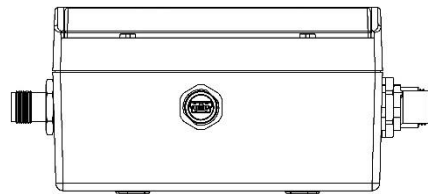
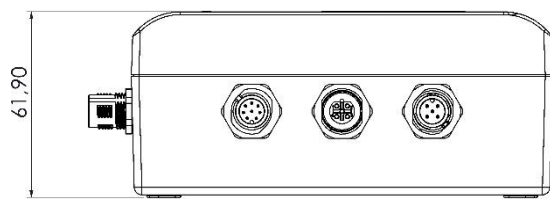
5221U, 5221U-S:



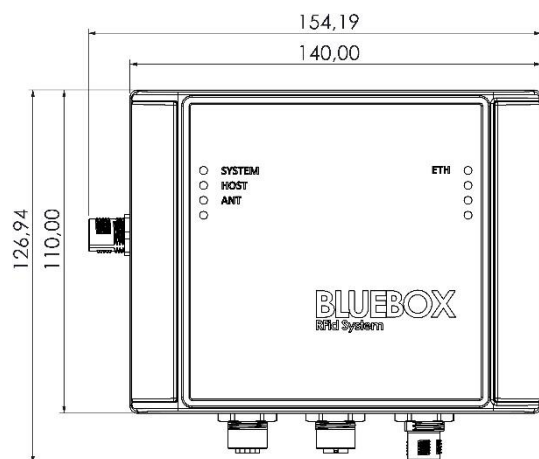
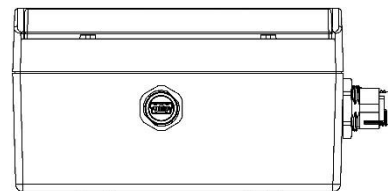
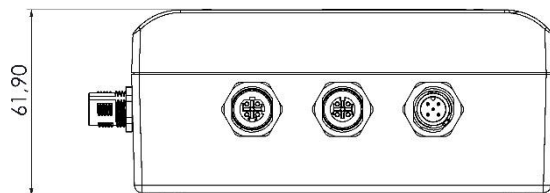
5237U, 5237U-S:



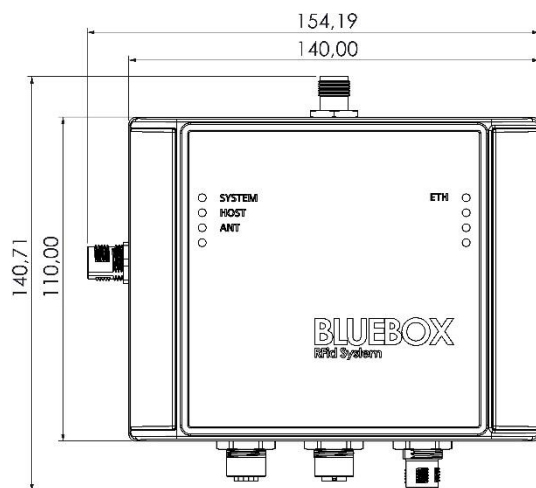
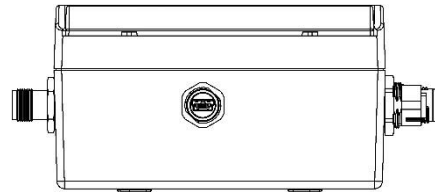
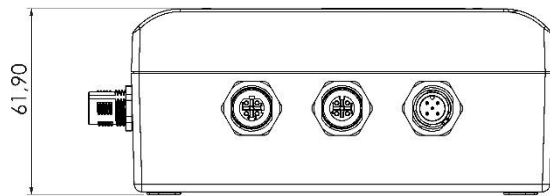
5231U:



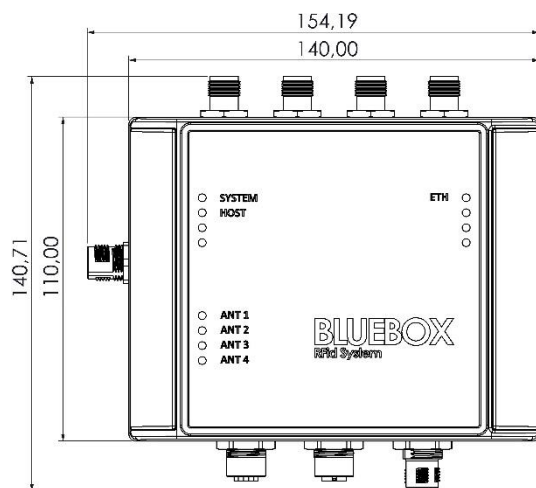
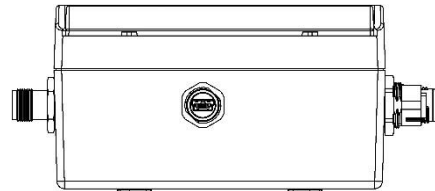
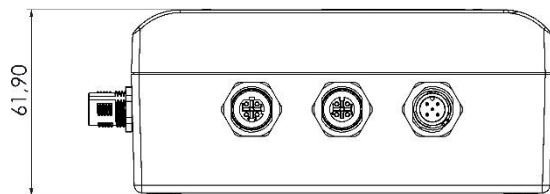
5222U, 5222U-S:



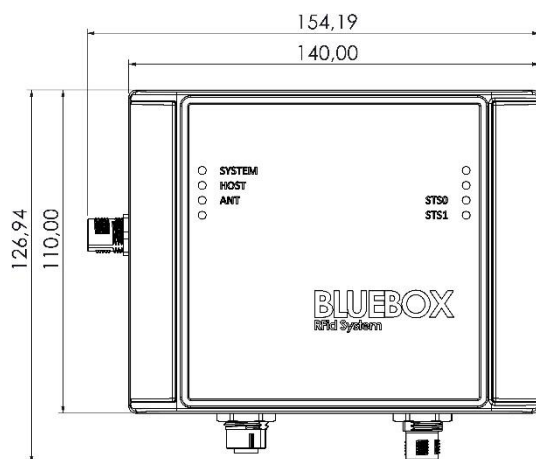
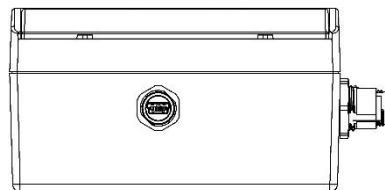
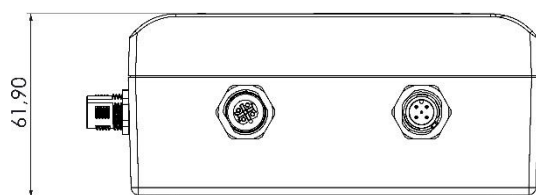
5238U, 5238U-S:



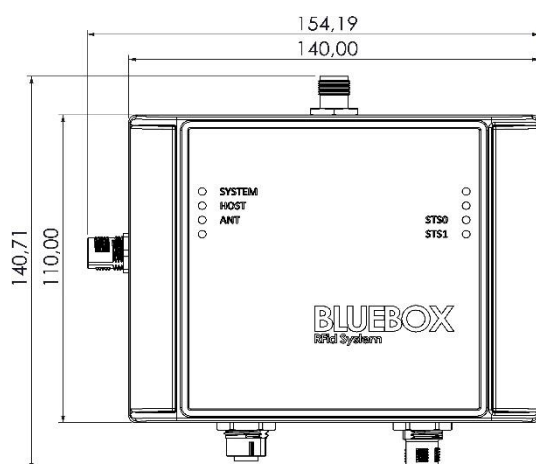
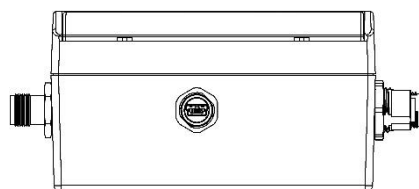
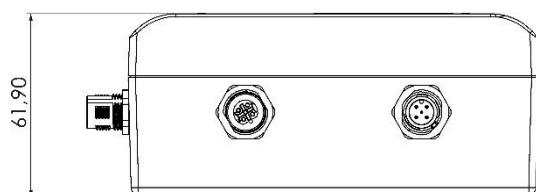
5232U:



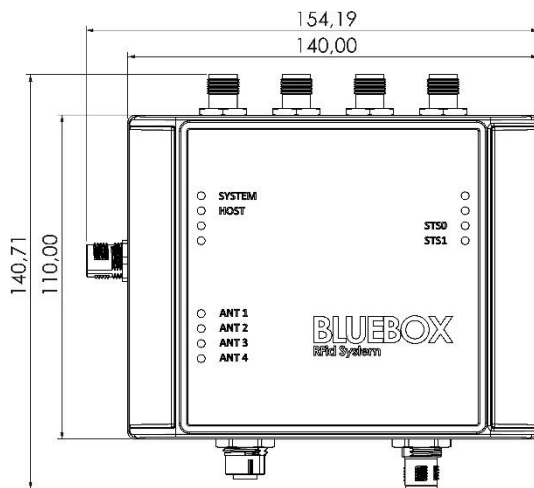
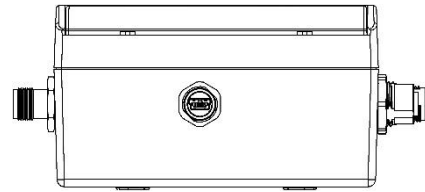
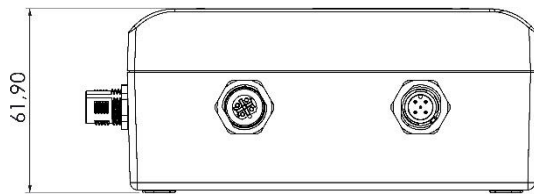
5223U, 5223U-S:



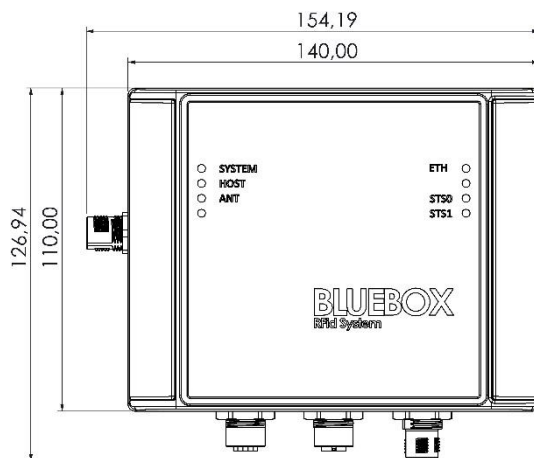
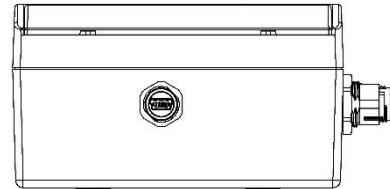
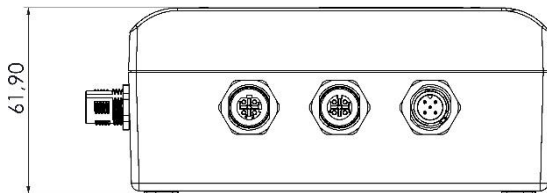
5239U, 5239U-S:



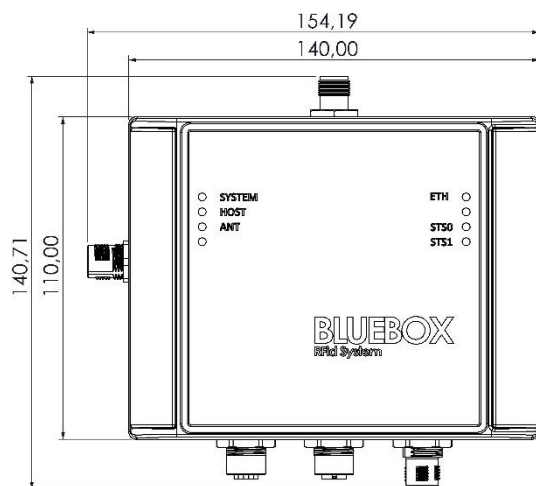
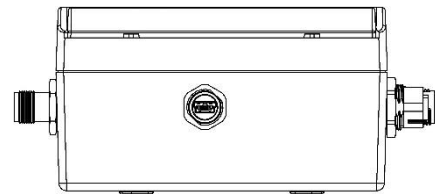
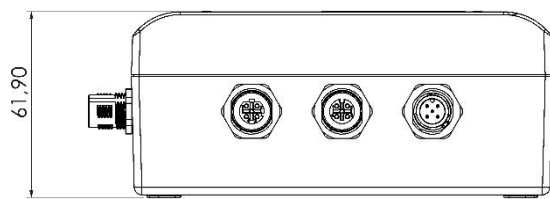
5233U:



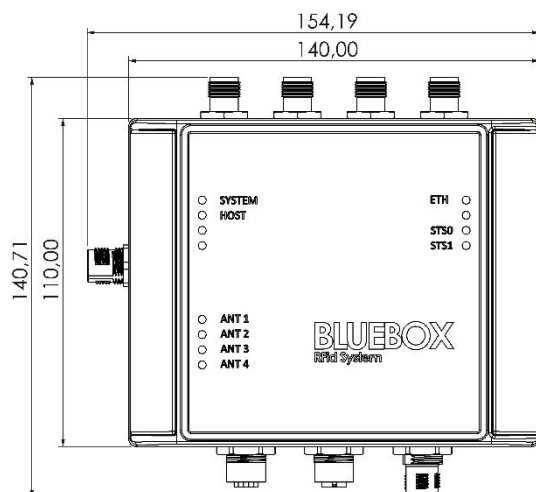
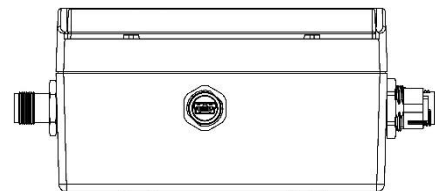
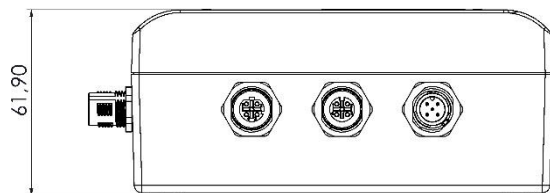
5222U-MB-S:



5238U-MB-S:



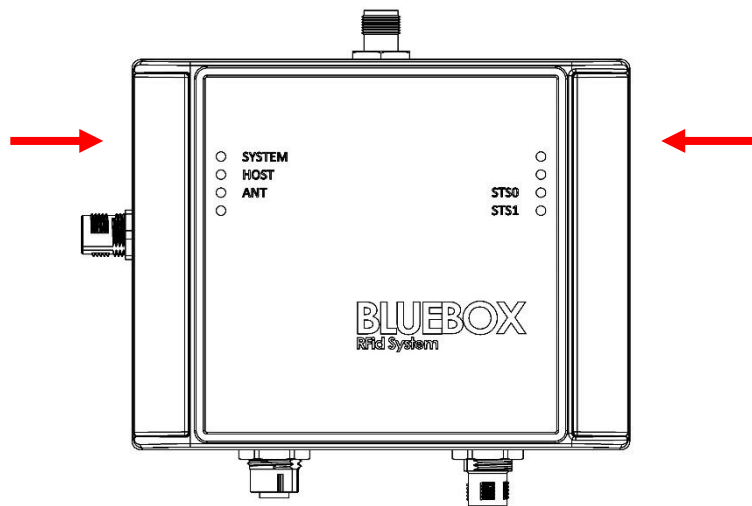
5232U-MB:



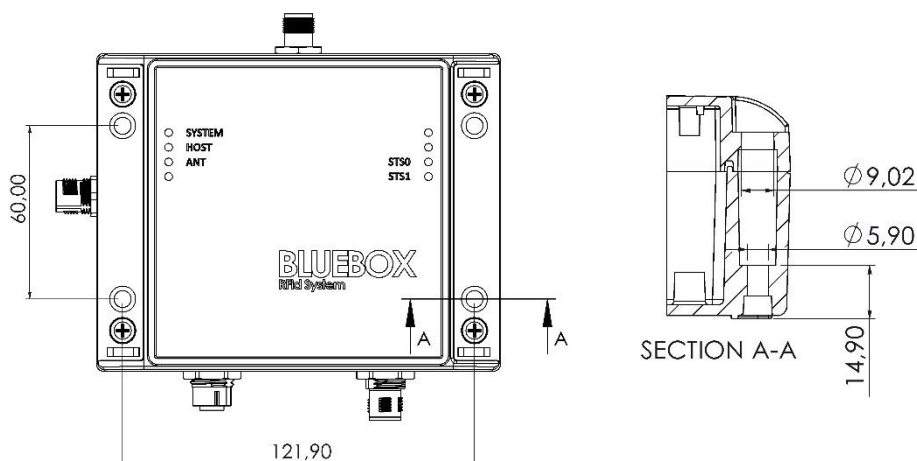
Alle dimensions in mm.

8 Installation

To install the **BLUEBOX**, it is necessary to remove the lateral hinges of the enclosure (highlighted with red arrows in the image below).



Fix the enclosure to a support (wall, column, ..) using the 4 holes (already provided within the enclosure) and choosing suitable screws.



All dimensions in mm.



The drawing is related to 5239U and 5239U-S but the fixing holes dimensions are the same for all the items.

9 Document Revision History

Date	Revision	Description
28/07/14	1.04	First release.
23/04/15	1.05	<p>Added the ordering codes of the new 1 internal / external antenna readers 5221U-S, 5222U-S, 5223U-S, 5237U-S, 5238U-S and 5239U-S in the whole document.</p> <p>Minor corrections in the whole document.</p> <p>Corrected the max RF power and the reading distance of the 1 internal / external antenna readers in section 2.</p> <p>Corrections in the LEDs behavior in section 5.</p> <p>Added the mechanical drawings section (section 6).</p> <p>Added the installation section (section 7).</p>
24/09/15	1.06	<p>Replaced the table of the ordering codes in section 1.</p> <p>Added the RF input sensitivity in electrical features tables in section 2.</p>
15/06/16	1.07	Replaced cross reference table between connection pin number and the color of the wires of a standard open ended cable in sections 5.1, 5.2, 5.3, 5.4, 5.5 and 5.6.
02/09/16	1.08	<p>Added the reader's firmware versions object of this manual.</p> <p>Changes in the technical specification formatting (section 2).</p> <p>Added the operating features and description of the configurable parameters (section 3).</p> <p>Added the .gsd file as appendix C and moved the .inf file in appendix B and the driver installation on Windows 8 OS description in appendix D.</p> <p>Added the regions of operation in appendix A.</p>
30/09/16	1.09	<p>Updated the reader's firmware versions object of this manual.</p> <p>Added Q selection algorithm, Q initial, Q final, Q adjust rounds and inventory cycles parameters in EPC C1G2 configuration (section 3.2.4).</p>
04/08/17	1.10	<p>Added the reader's firmware versions object of this manual.</p> <p>Added the test modes description and auto antenna tuning description in operating features section.</p> <p>Corrections in operating features section.</p> <p>Added the RF chip standby mode in RF parameters.</p>

Date	Revision	Description
		<p>Added the ReadAfterDetect with custom info activation in EPC C1G2 parameters.</p> <p>Added the ReadAfterDetect with auto TID info activation in EPC C1G2 parameters.</p> <p>Added the search mode in EPC C1G2 parameters.</p> <p>Update the inventory mode range in EPC C1G2 parameters.</p> <p>Added a warning to changed configuration parameters that become effective only after a device reset.</p> <p>Added a warning in integrated antenna readers RF configuration.</p> <p>Added the device status section.</p> <p>Added external antenna with maximum RF output power calculation description.</p> <p>Corrections in connections sections.</p> <p>Corrections in status indication section.</p>
18/09/17	1.11	<p>Updated the reader's firmware versions object of this manual.</p> <p>Added the readers with MODBUS/TCP interface (items 5222U-MB-S, 5238U-MB-S, 5232U-MB) to this manual.</p> <p>Corrections in the general and configuration parameters.</p> <p>Corrections in the status indications.</p>

A. Regions of Operation

The **BLUEBOX** reader has been designed to work in various regions with differing frequency requirements. This document covers operation in North America and Europe.



In each region, the reader is not locked to only operate in the specific frequencies listed in the respective frequency plan tables shown in next paragraphs. The user is responsible to correctly use the **BLUEBOX** in the relative region.

A.1. Operation in North America

The FCC specifies frequency hopping across the North American spectrum allocated to UHF RFID (902–928 MHz, with hopping occurring between 902.75–927.25 MHz in 500 KHz steps). This specification states that no listen-before-talk is performed, the maximum continuous transmit time on a channel is 0.4 seconds.

RF Channel	Frequency [MHz]
1	902.75
2	903.25
3	903.75
...	...
49	926.75
50	927.25

A.2. Operation in Europe

For European operation, the **BLUEBOX** reader supports the frequency plan listed in the table below and is compliant with the ratified ETSI EN 302-208 specification V.1.4.1. This specification states that no listen-before-talk is performed, the maximum continuous transmit time on a channel is four seconds, and the reader enforces the 100 ms off time before reusing the same channel. In some applications (i.e. conveyor systems) it may be necessary for interrogators to transmit while tags are not present. To accommodate such requirements, the device shall include within interrogators a means to minimize

the overall length of transmission commensurate with the application. This may include the provision of trigger mechanisms within interrogators to initiate transmissions.

RF Channel	Frequency [MHz]
4	865.7
7	866.3
10	866.9
14	867.5

B. '.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"

C. '.gsd' File

```
;*****
;***
;***      Filename: HIL_0a12.GSD (c) 2007      ***
;***      GSD file version 1.000 from  10.12.2007      ***
;***                                           ***
;*****
;
;ATTENTION:
;=====
;Changes in this file can cause configuration or communication problems.
;This file is compatible to the firmware of the device.
;
;Changes
;=====
;10.12.07   V1.000   R. Hornung
;-  created

#Profibus_DP

GSD_Revision      = 5
Vendor_Name       = "Hilscher GmbH"
Model_Name        = "NETX DP/DPS"
Revision          = "Version 1.000"
Ident_Number      = 0x0A12
Protocol_Ident    = 0
Station_Type      = 0
Hardware_Release  = "Version 1.000"
Software_Release  = "Version 2.000"
Implementation_Type = "netX"
9.6_supp          = 1
19.2_supp         = 1
45.45_supp        = 1
93.75_supp        = 1
187.5_supp        = 1
500_supp          = 1
1.5M_supp         = 1
3M_supp           = 1
```


6M_supp	= 1
12M_supp	= 1
MaxTsdr_9.6	= 60
MaxTsdr_19.2	= 60
MaxTsdr_45.45	= 60
MaxTsdr_93.75	= 60
MaxTsdr_187.5	= 60
MaxTsdr_500	= 100
MaxTsdr_1.5M	= 150
MaxTsdr_3M	= 250
MaxTsdr_6M	= 450
MaxTsdr_12M	= 800
Redundancy	= 0
Repeater_Ctrl_Sig	= 2
24V_Pins	= 0
Freeze_Mode_supp	= 1
Sync_Mode_supp	= 1
Auto_Baud_supp	= 1
Set_Slave_Add_supp	= 0
Min_Slave_Intervall	= 6
Modular_Station	= 1
Max_Module	= 24
Max_Input_Len	= 244
Max_Output_Len	= 244
Max_Data_Len	= 488
Max_Diag_Data_Len	= 244
Max_User_Prm_Data_Len	= 5
Slave_Family	= 0
DPV1_Slave	= 1
DPV1_Data_Types	= 0
C1_Read_Write_supp	= 1
C1_Max_Data_Len	= 240
C1_Response_Timeout	= 100
C2_Read_Write_supp	= 1
C2_Max_Count_Channels	= 1
C2_Max_Data_Len	= 240

C2_Response_Timeout = 100
Max_Initiate_PDU_Length = 244

Extra_Alarm_SAP_supp = 0
Alarm_Sequence_Mode_Count = 32
Alarm_Type_Mode_supp = 1

Diagnostic_Alarm_supp = 1
Process_Alarm_supp = 1
Pull_Plug_Alarm_supp = 1
Status_Alarm_supp = 1
Update_Alarm_supp = 1
Manufacturer_Specific_Alarm_supp = 1

Ident_Maintenance_supp = 1

Bitmap_Device = "CIFXDPSR"
Bitmap_Diag = "CIFXDPSD"
Bitmap_SF = "CIFXDPSS"

PrmText = 1
Text(0) = "Disable"
Text(1) = "Enable"
EndPrmText

PrmText = 2
Text(0) = "OFF"
Text(1) = "ON"
EndPrmText

PrmText = 3
Text(0) = "1 alarm of each type"
Text(1) = "2 alarms in total"
Text(2) = "4 alarms in total"
Text(3) = "8 alarms in total"
Text(4) = "12 alarms in total"
Text(5) = "16 alarms in total"
Text(6) = "24 alarms in total"
Text(7) = "32 alarms in total"

EndPrmText

PrmText = 4

Text(0) = "reserved"

EndPrmText

ExtUserPrmData = 1 "DPV1"

Bit(7) 0 0-1

Prm_Text_Ref = 1

EndExtUserPrmData

ExtUserPrmData = 2 "Fail Safe"

Bit(6) 0 0-1

Prm_Text_Ref = 2

EndExtUserPrmData

ExtUserPrmData = 3 "Pull Plug Alarm"

Bit(7) 0 0-1

Prm_Text_Ref = 2

EndExtUserPrmData

ExtUserPrmData = 4 "Process Alarm"

Bit(6) 0 0-1

Prm_Text_Ref = 2

EndExtUserPrmData

ExtUserPrmData = 5 "Diagnostic Alarm"

Bit(5) 0 0-1

Prm_Text_Ref = 2

EndExtUserPrmData

ExtUserPrmData = 6 "Manufacturer Specific Alarm"

Bit(4) 0 0-1

Prm_Text_Ref = 2

EndExtUserPrmData

ExtUserPrmData = 7 "Status Alarm"

Bit(3) 0 0-1

Prm_Text_Ref = 2

EndExtUserPrmData

```
ExtUserPrmData = 8 "Update Alarm"
Bit(2) 0 0-1
Prm_Text_Ref = 2
EndExtUserPrmData
```

```
ExtUserPrmData = 9 "Alarm Mode"
BitArea(0-2) 0 0-7
Prm_Text_Ref = 3
EndExtUserPrmData
```

```
ExtUserPrmData = 10 "reserved"
BitArea(0-2) 0 0-7
Prm_Text_Ref = 4
EndExtUserPrmData
```

```
ExtUserPrmData = 11 "reserved"
BitArea(0-2) 0 0-7
Prm_Text_Ref = 4
EndExtUserPrmData
```

```
Ext_User_Prm_Data_Ref(0) = 1
Ext_User_Prm_Data_Ref(0) = 2
Ext_User_Prm_Data_Ref(1) = 3
Ext_User_Prm_Data_Ref(1) = 4
Ext_User_Prm_Data_Ref(1) = 5
Ext_User_Prm_Data_Ref(1) = 6
Ext_User_Prm_Data_Ref(1) = 7
Ext_User_Prm_Data_Ref(1) = 8
Ext_User_Prm_Data_Ref(2) = 9
Ext_User_Prm_Data_Ref(3) = 10
Ext_User_Prm_Data_Ref(4) = 11
```

```
;*****
;***                blank space                ***
;*****
Module = "blank space" 0x00
0
```

EndModule

```
;*****
;***          1 Byte Input/Output          ***
;*****
```

Module = "1 Byte In" 0x90

1

EndModule

Module = "1 Byte Out" 0xA0

2

EndModule

```
;*****
;***          1 Word Input/Output          ***
;*****
```

Module = "1 Word In" 0xD0

3

EndModule

Module = "1 Word Out" 0xE0

4

EndModule

```
;*****
;***          2 Byte Input/Output          ***
;*****
```

Module = "2 Bytes In" 0x91

5

EndModule

Module = "2 Bytes Out" 0xA1

6

EndModule

```
;*****
;***          2 Word Input/Output          ***
;*****
```

Module = "2 Words In" 0xD1

7

EndModule

Module = "2 Words Out" 0xE1

8

EndModule

```
;*****
;***          3 Byte Input/Output          ***
;*****
```

Module = "3 Bytes In" 0x92

9

EndModule

Module = "3 Bytes Out" 0xA2

10

EndModule

```
;*****
;***          3 Word Input/Output          ***
;*****
```

Module = "3 Words In" 0xD2

11

EndModule

Module = "3 Words Out" 0xE2

12

EndModule

```
;*****
;***          4 Byte Input/Output          ***
;*****
```

Module = "4 Bytes In" 0x93

13

EndModule

Module = "4 Bytes Out" 0xA3

14

EndModule

```
;*****
;***          4 Word Input/Output          ***
;*****
```

Module = "4 Words In" 0xD3

15

EndModule

Module = "4 Words Out" 0xE3

16

EndModule

```
;*****
;***          8 Byte Input/Output          ***
;*****
```

Module = "8 Bytes In" 0x97

17

EndModule

Module = "8 Bytes Out" 0xA7

18

EndModule

```
;*****
;***          8 Word Input/Output          ***
;*****
```

Module = "8 Words In" 0xD7

19

EndModule

Module = "8 Words Out" 0xE7

20

EndModule

```
;*****
;***          12 Byte Input/Output         ***
;*****
```

Module = "12 Bytes In" 0x9B

21

EndModule

Module = "12 Bytes Out" 0xAB

22

EndModule

```
;*****
;***          12 Word Input/Output         ***
;*****
```

Module = "12 Words In" 0xDB

23

EndModule

Module = "12 Words Out" 0xEB

24

EndModule

```
;*****
;***          16 Byte Input/Output          ***
;*****
Module = "16 Bytes In"  0x9F
```

25

EndModule

```
Module = "16 Bytes Out" 0xAF
```

26

EndModule

```
;*****
;***          16 Word Input/Output          ***
;*****
Module = "16 Words In"  0xDF
```

27

EndModule

```
Module = "16 Words Out" 0xEF
```

28

EndModule

```
;*****
;***          20 Byte Input/Output          ***
;*****
Module = "20 Bytes In"  0x40,0x93
```

29

EndModule

```
Module = "20 Bytes Out" 0x80,0x93
```

30

EndModule

```
;*****
;***          20 Word Input/Output          ***
;*****
Module = "20 Words In"  0x40,0xD3
```

31

EndModule

```
Module = "20 Words Out" 0x80,0xD3
```


32

EndModule

```
;*****
;***          32 Byte Input/Output          ***
;*****
Module = "32 Bytes In"  0x40,0x9F
```

33

EndModule

```
Module = "32 Bytes Out" 0x80,0x9F
```

34

EndModule

```
;*****
;***          32 Word Input/Output          ***
;*****
Module = "32 Words In"  0x40,0xDF
```

35

EndModule

```
Module = "32 Words Out" 0x80,0xDF
```

36

EndModule

```
;*****
;***          64 Byte Input/Output          ***
;*****
Module = "64 Bytes In"  0x40,0xBF
```

37

EndModule

```
Module = "64 Bytes Out" 0x80,0xBF
```

38

EndModule

```
;*****
;***          64 Word Input/Output          ***
;*****
Module = "64 Words In"  0x40,0xFF
```

39

EndModule

Module = "64 Words Out" 0x80,0xFF

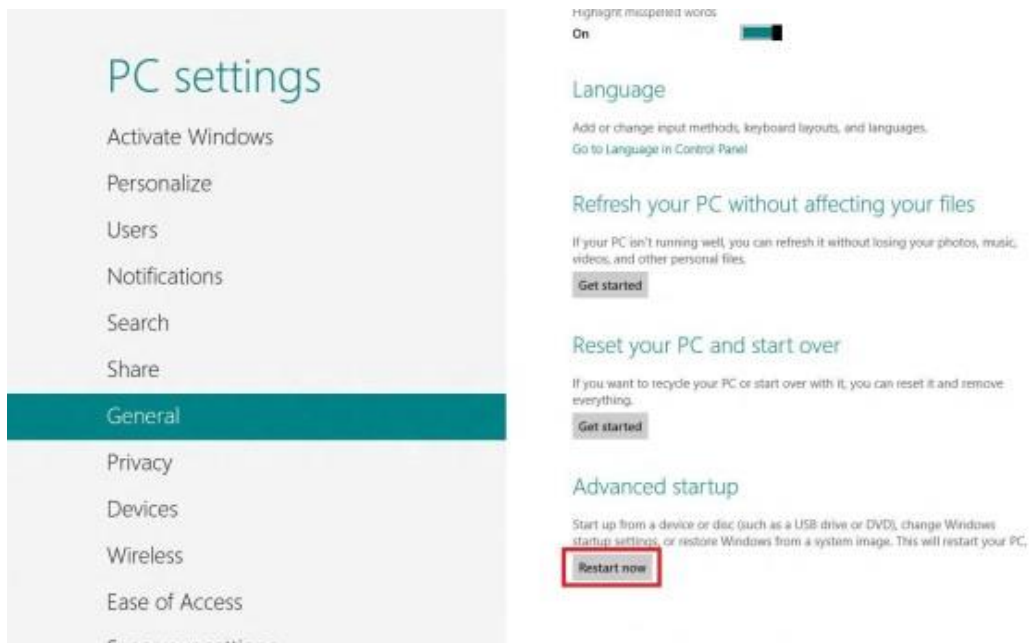
40

EndModule

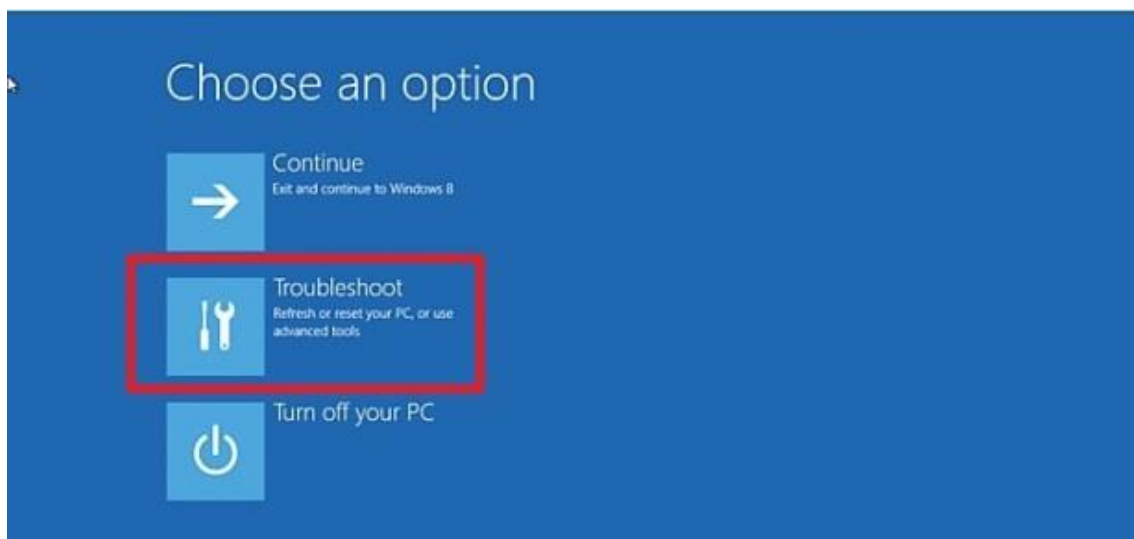
D. Driver Install on Windows 8 OS

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**":



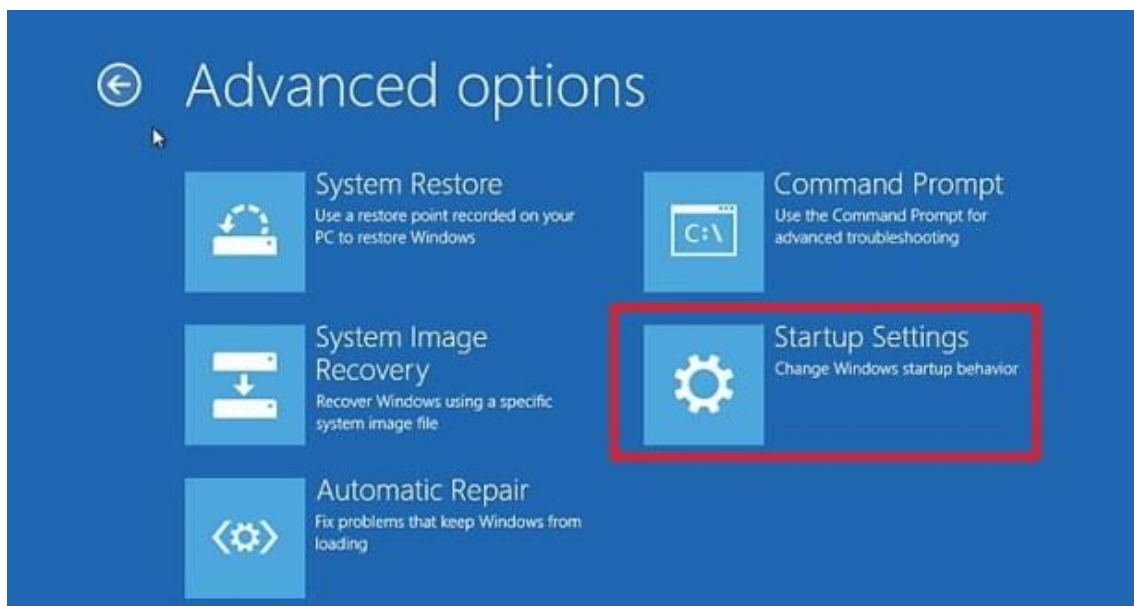
- 4) After that, Click on "**Troubleshoot**":



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



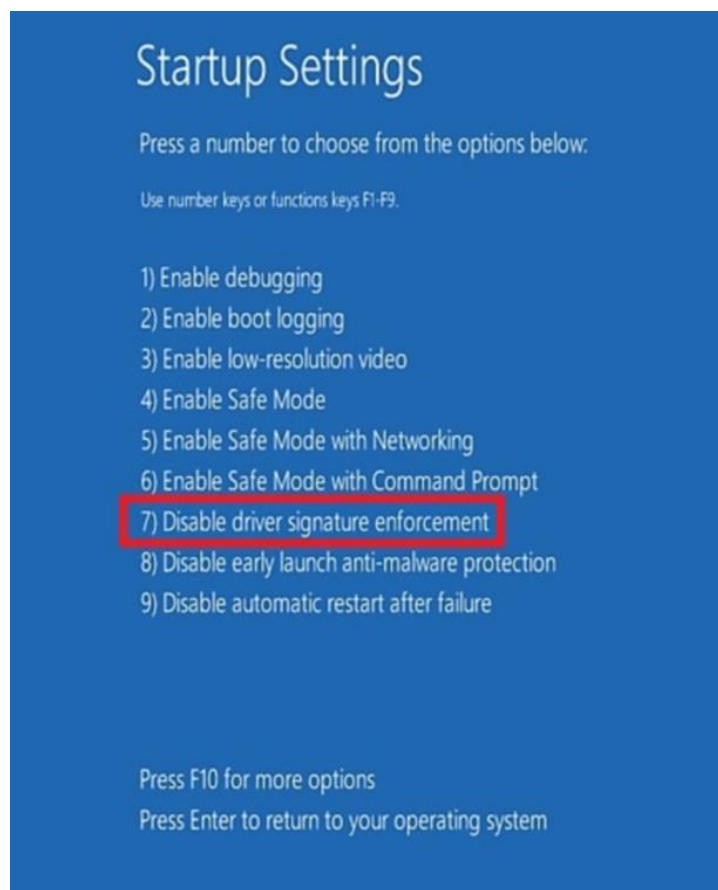
6) Then click on "**Startup Settings**":



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"**:

