

125 kHz RFID System



BLUEBOX GEN2 ADVANT LF SHORT RANGE



RS232 / RS485 / Ethernet / ProfiBus

Preface

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Safety Instructions / Warning - Read before start-up!

- The device may only be used for the intended purpose designed by the manufacturer. The operation manual should be conveniently kept available at all times for each user.
- Unauthorized changes and the use of spare parts and additional devices that have not been sold or recommended by the manufacturer may cause fire, electric shocks or injuries. Such unauthorized measures shall exclude any liability by the manufacturer.
- The liability-prescriptions of the manufacturer in the issue valid at the time of purchase are valid for the device. The manufacturer shall not be held legally responsible for inaccuracies, errors, or omissions in the manual or automatically set parameters for a device or for an incorrect application of a device.
- Repairs may be executed by the manufacturer only.
- Only qualified personnel should carry out installation, operation, and maintenance procedures.
- Use of the device and its installation must be in accordance with national legal requirements and local electrical codes.
- When working on devices the valid safety regulations must be observed.



This manual applies to the following devices:

Description:	Order Number:
Read / write LF RFID device with integrated antenna. Serial RS232/RS485 communication interface.	5221L
Read / write LF RFID device with integrated antenna. Ethernet 10-100M communication interface.	5222L
Read / write LF RFID device with integrated antenna. ProfiBus communication interface.	5223L
Read / write LF RFID device with integrated antenna. MODBUS/TCP communication interface.	5222L-MB
Read / write LF RFID device with one external antenna. Serial RS232/RS485 communication interface.	5231L
Read / write LF RFID device with one external antenna. Ethernet 10-100M communication interface.	5232L
Read / write LF RFID device with one external antenna. ProfiBus communication interface.	5233L
Read / write LF RFID device with one external antenna. MODBUS/TCP communication interface.	5232L-MB
Read / write LF RFID device with two external antennas. Serial RS232/RS485 communication interface.	5241L
Read / write LF RFID device with two external antennas. Ethernet 10-100M communication interface.	5242L
Read / write LF RFID device with two external antennas. ProfiBus communication interface.	5243L
Read / write LF RFID device with two external antennas. MODBUS/TCP communication interface.	5242L-MB



This manual is valid as of firmware version:

Order Number	Carrier	Front End
5221L	2.07	3.17d
5222L	2.07	3.17d
5223L	2.07	3.17d
5222L-MB	2.07	3.17d
5231L	2.07	3.17d
5232L	2.07	3.17d
5233L	2.07	3.17d
5232L-MB	2.07	3.17d
5241L	2.07	3.17d
5242L	2.07	3.17d
5243L	2.07	3.17d
5242L-MB	2.07	3.17d

Hereinafter the ordering code detail:

5	2	2	1	L	-MB
Serie Industrial = 5	Family ADVANT = 2	Antenna Integrated = 2 1 External = 3 2 External = 4	Interface1 Serial = 1 Ethernet = 2 ProfiBus = 3	Frequency LF = L	Interface2 Interface1 = blank MODBUS/TCP = -MB

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1 Introduction

The **BLUEBOX GEN2 ADVANT LF** 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 5221L, 5231L, 5241L) or through an 10-100M Ethernet connection (items 5222L, 5232L, 5242L) or through a ProfiBus connection (items 5223L, 5233L, 5243L) or through a MODBUS/TCP connection (items 5222L-MB, 5232L-MB, 5242L-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 is used as service 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 5231L, 5232L, 5233L, 5232L-MB; 2 antennas: items 5241L, 5242L, 5243L, 5242L-MB) or with integrated RF antenna inside the device (items 5221L, 5222L, 5223L, 5222L-MB).

2 Technical Specifications

2.1 Electrical Features

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

Power Supply	24Vdc \pm 10%
Power Ratings	4W
Operating Frequency	125 kHz \pm 2 kHz
Antenna	Integrated
Reading Distance	15 cm ¹
Supported Transponders	EM410x (UNIQUE), EM4x50 (TITAN) EM4305, T5557, HITAG 1, HITAG 2, HITAG S, Q5
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 External Antenna (Item 5231L)

Power Supply	24Vdc \pm 10%
Power Ratings	4W
Operating Frequency	125 kHz \pm 2 kHz
Antenna	External

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

Antenna Connection	Lumberg series 0304
Reading Distance	30 cm ²
Supported Transponders	EM410x (UNIQUE), EM4x50 (TITAN) EM4305, T5557, HITAG 1, HITAG 2, HITAG S, Q5
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, 2 External Antennas (Item 5241L)

Power Supply	24Vdc \pm 10%
Power Ratings	4W
Operating Frequency	125 kHz \pm 2 kHz
Antenna	2 External
Antenna Connection	Lumberg series 0304
Reading Distance	30 cm ³
Supported Transponders	EM410x (UNIQUE), EM4x50 (TITAN) EM4305, T5557, HITAG 1, HITAG 2, HITAG S, Q5
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 Reading distance depends on transponder type, antenna and environmental conditions.

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

2.1.4 Ethernet Version, 1 Internal Antenna (Item 5222L)

Power Supply	24Vdc \pm 10%
Power Ratings	4W
Operating Frequency	125 kHz \pm 2 kHz
Antenna	Integrated
Reading Distance	15 cm ⁴
Supported Transponders	EM410x (UNIQUE), EM4x50 (TITAN) EM4305, T5557, HITAG 1, HITAG 2, HITAG S, Q5
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, I/O, Ethernet 10/100M interface, USB interface)

2.1.5 Ethernet Version, 1 External Antenna (Item 5232L)

Power Supply	24Vdc \pm 10%
Power Ratings	4W
Operating Frequency	125 kHz \pm 2 kHz
Antenna	External
Antenna Connection	Lumberg series 0304
Reading Distance	30 cm ⁵
Supported Transponders	EM410x (UNIQUE), EM4x50 (TITAN) EM4305, T5557, HITAG 1, HITAG 2, HITAG S, Q5
Communication Interface	Ethernet 10/100M
Service Interface	USB Virtual COM

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

⁵ 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, I/O, Ethernet 10/100M interface, USB interface)

2.1.6 Ethernet Version, 2 External Antennas (Item 5242L)

Electrical Features	
Power Supply	24Vdc \pm 10%
Power Ratings	4W
Operating Frequency	125 kHz \pm 2 kHz
Antenna	2 External
Antenna Connection	Lumberg series 0304
Reading Distance	30 cm ⁶
Supported Transponders	EM410x (UNIQUE), EM4x50 (TITAN) EM4305, T5557, HITAG 1, HITAG 2, HITAG S, Q5
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, I/O, Ethernet 10/100M interface, USB interface)

2.1.7 ProfiBus Version, 1 Internal Antenna (Item 5223L)

Power Supply	24Vdc \pm 10%
Power Ratings	4W

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

Operating Frequency	125 kHz \pm 2 kHz
Antenna	Integrated
Reading Distance	15 cm ⁷
Supported Transponders	EM410x (UNIQUE), EM4x50 (TITAN) EM4305, T5557, HITAG 1, HITAG 2, HITAG S, Q5
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, I/O, ProfiBus interface, USB interface)

2.1.8 ProfiBus Version, 1 External Antenna (Item 5233L)

Power Supply	24Vdc \pm 10%
Power Ratings	4W
Operating Frequency	125 kHz \pm 2 kHz
Antenna	External
Antenna Connection	Lumberg series 0304
Reading Distance	30 cm ⁸
Supported Transponders	EM410x (UNIQUE), EM4x50 (TITAN) EM4305, T5557, HITAG 1, HITAG 2, HITAG S, Q5
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

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

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

Connections	M12 connections (Power, I/O, ProfiBus interface, USB interface)
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2.1.9 ProfiBus Version, 2 External Antennas (Item 5243L)

Power Supply	18 ... 36 Vdc
Power Ratings	4W
Operating Frequency	125 kHz \pm 2 kHz
Antenna	2 External
Antenna Connection	Lumberg series 0304
Reading Distance	30 cm ⁹
Supported Transponders	EM410x (UNIQUE), EM4x50 (TITAN) EM4305, T5557, HITAG 1, HITAG 2, HITAG S, Q5
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, I/O, ProfiBus interface, USB interface)

2.1.10 MODBUS/TCP Version, 1 Internal Antenna (Item 5222L-MB)

Power Supply	24Vdc \pm 10%
Power Ratings	4W
Operating Frequency	125 kHz \pm 2 kHz
Antenna	Integrated
Reading Distance	15 cm ¹⁰
Supported Transponders	EM410x (UNIQUE), EM4x50 (TITAN) EM4305, T5557, HITAG 1, HITAG 2, HITAG S, Q5

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

¹⁰ Reading distance depends on transponder type, antenna and environmental conditions.

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, I/O, MODBUS/TCP interface, USB interface)

2.1.11 MODBUS/TCP Version, 1 External Antenna (Item 5232L)

Power Supply	24Vdc \pm 10%
Power Ratings	4W
Operating Frequency	125 kHz \pm 2 kHz
Antenna	External
Antenna Connection	Lumberg series 0304
Reading Distance	30 cm ¹¹
Supported Transponders	EM410x (UNIQUE), EM4x50 (TITAN) EM4305, T5557, HITAG 1, HITAG 2, HITAG S, Q5
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, I/O, MODBUS/TCP interface, USB interface)

2.1.12 MODBUS/TCP Version, 2 External Antennas (Item 5242L)

Electrical Features

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

Electrical Features	
Power Supply	24Vdc \pm 10%
Power Ratings	4W
Operating Frequency	125 kHz \pm 2 kHz
Antenna	2 External
Antenna Connection	Lumberg series 0304
Reading Distance	30 cm ¹²
Supported Transponders	EM410x (UNIQUE), EM4x50 (TITAN) EM4305, T5557, HITAG 1, HITAG 2, HITAG S, Q5
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, I/O, MODBUS/TCP interface, USB interface)

2.2 Mechanical Features

Dimensions	110 x 140 x 62 mm
Weight	700g
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

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

3 Operating Features

In 'continuous' mode the **BLUEBOX** is characterized by the coexistence of 2 'parallel' and asynchronous activities: the 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' (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 'ANT' LED status that is 'on' indicating the presence of tags and also through the activation of the output 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).

The **BLUEBOX** handles also a 31 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 unload it.

In 'continuous' mode the **BLUEBOX** can be configured to obtain the behavior of a 'spontaneous' reader that will send a message on the RS232/RS485 serial line (if available) and Ethernet line (if available). This feature is enabled (on) / disabled (off) using a flag in the general configuration of the reader.

- If configured and available an host can receive the 'spontaneous' message through the RS232/RS485 serial port. The 'spontaneous' message is sent only once and no ACK/NAK reply message is implemented, see the protocol manual for details. Do not use the 'spontaneous' message feature in a RS485 'multipoint' network to avoid communication errors due to unmanaged collisions on RS485 bus!
- If configured and available an host can connect the reader on the configured TCP server socket and wait for 'spontaneous' messages. The

'spontaneous' message is sent only once and no ACK/NAK reply message is implemented except of the normal TCP handshake mechanism, see the protocol manual for details.



In case of a 'spontaneous' message send error, due to a connection or communication error, no further attempts will be made and the tag will be discarded!

A subset of the 'continuous' mode is also defined:

- 'Trigger' mode: the activation and deactivation of the 'continuous' mode is triggered with inputs.

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

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

3.1 General Parameters

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

Parameter	Description	Range	Default
Device Address	Device address of the reader.	000 ... 255	255
Baud Rate	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
Nibble Coding	Nibble coding of the tag's code.	Normal, reverse	Normal
Hold Time	Reading management hold time.	0 ... 99 seconds	1 sec
Filter Time	Tag queue management filter time.	0 ... 99 seconds 0 ... 99 minutes	1 sec
Buzzer	Buzzer management on 'new tag' event.	Disabled,	Enabled

Parameter	Description	Range	Default
Management		enabled	
Output 1 Management	Output 1 management on 'new tag' event.	Disabled, enabled	Disabled
'Spontaneous' Mode	'Spontaneous' mode activation / deactivation.	Disabled, enabled	Disabled
Trigger 'Continuous' Mode with Inputs	'Continuous' mode activation/deactivation management with inputs. See the input/output parameters.	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 and default values are:

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

Parameter	Description
	<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
Hold Time	Reading management hold time: <ul style="list-style-type: none"> Decimal 0 ... 99 for time in seconds (0 ... 99 seconds)
Standard	Tag identification standard. <ul style="list-style-type: none"> High nibble: Tag's nibble coding: <ul style="list-style-type: none"> 0x0: Normal 0x1: Reverse Low nibble: 0x3.
Filter Time	Reading management filter 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)
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: Not used Bit 4: Not used Bit 3: To enable the 'spontaneous' mode Bit 2: Trigger 'continuous' mode with inputs (see the input/output parameters) Bit 1: Not used Bit 0: To disable the 'continuous' mode

3.2 Configuration Parameters

Hereinafter the configurable operational parameters of the **BLUEBOX**. Underlined configurable parameters become effective only after a reset of the **BLUEBOX**. Reset the **BLUEBOX** using the 'Reset Device' command or via an hardware reset.

3.2.1 Ethernet

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

Parameter	Description	Range	Default
<u>IP Address</u>	IP address.	IPv4	192.168.4.200
<u>Port</u>	TCP communication port.	0 ... 65535	3000
<u>Subnet</u>	Subnet mask.	IPv4	255.255.255.0
<u>Gateway</u>	Gateway address.	IPv4	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.



In case of MODBUS/TCP communication interface (items 5222L-MB, 5232L-MB, 5242L-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
<u>ProfiBus Address</u>	The address of the reader in the ProfiBus network.	1 ... 126	126
<u>ProfiBus Buffer Length</u>	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 where the parameters 1...7 fields and 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

3.2.3 Input/Output

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

Parameter	Description	Range	Default
<u>Input 1 Mode</u>	Input 1 activation / deactivation mode of the 'continuous' mode in 'trigger' mode.	0, 1, 2	1
<u>Input 2 Mode</u>	Input 2 activation / deactivation mode of the 'continuous' mode in 'trigger' mode.	0, 1, 2	0
<u>Debounce Time</u>	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 antennas; ON -> Deactivate antennas

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 and default values are:

1	2	3	4	5	6	7
Input1 Mode	Input2 Mode	0x00	0x00	Debounce Time	0x00	0x00
0x01	0x00	0x00	0x00	0x00	0x00	0x00

Where:

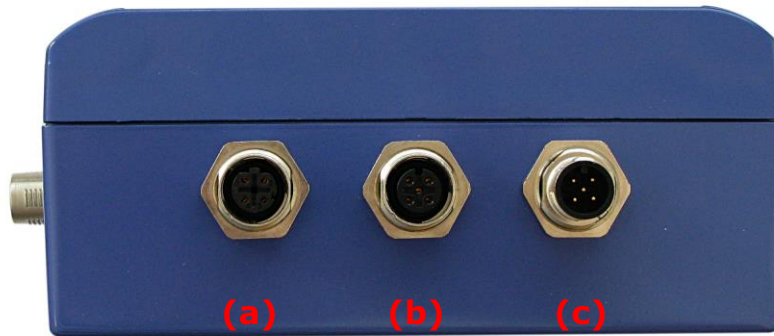
Parameter	Description
Input1 Mode	Input 1 activation / deactivation mode of the 'continuous' mode in 'trigger' mode: <ul style="list-style-type: none"> • 0x00: Disabled • 0x01: ON -> Activate antennas; OFF -> Deactivate antennas • 0x02: OFF -> Activate antennas; ON -> Deactivate antennas
Input2 Mode	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
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)

3.1 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.

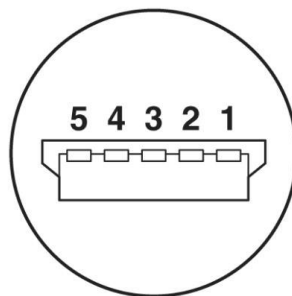
Status Byte	Description
Status Byte 1	Byte whose bits have the following meaning: <ul style="list-style-type: none"> • Bit 7: Not used • Bit 6: Not used; • Bit 5: RF status (0=off, 1=on) • Bit 4: 'Continuous' mode (1=enabled) • Bit 3: Not used • Bit 2: Not used • Bit 1: Output 2 status (1=activated)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

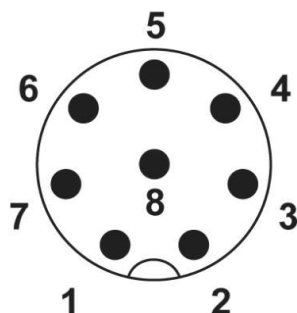


Mini USB B

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 5221L, 5231L, 5241L)

(a) Serial interface



8-poles M12 A-coded male connector

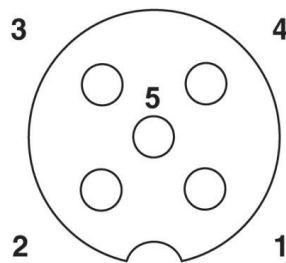
Pin	No	Min	Typical	Max	Description
RS485 RT+	1				RS485 connection (positive)
RS485 RT-	2				RS485 connection (negative)
RS485 TERM. RT-	3				RS485 term. resistor (RT-) To short with pin 2 if needed
RS232 Rx	4				RS232 connection (from host)
RS232 GND	5				RS232 connection (reference)
RS232 Tx	6				RS232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



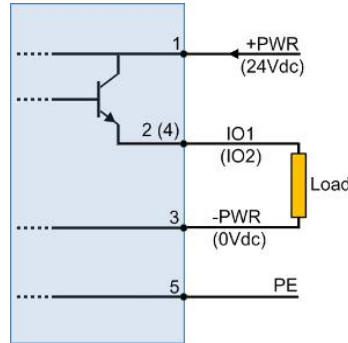
5-poles M12 A-coded female connector

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

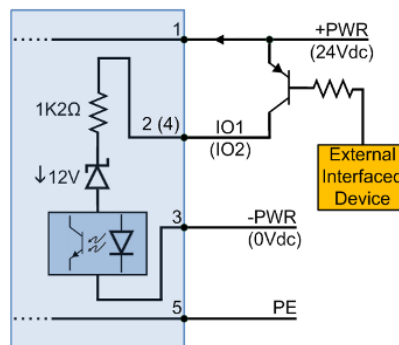
Hereinafter a cross reference table between connection pin number and the color of the wires of a standard open ended cable.

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.

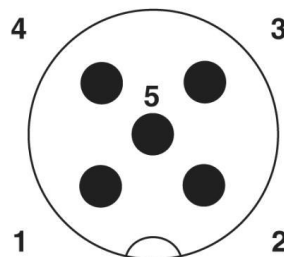


If IOx is used as input, a clean contact or PNP transistor has to be connected between +PWR pin 1 and Input pin 2 (channel 1) or Input pin 4 (channel 2); max applicable current is 10mA.



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

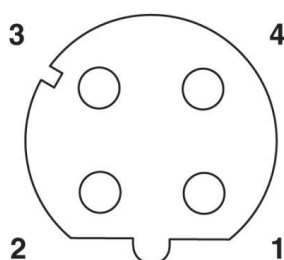
Pin	No	Min	Typical	Max	Descrizione
+ PWR	1	18Vdc	24Vdc	36Vdc	DC power supply
N.C.	2				Not connected
- PWR	3				DC power supply return path
N.C.	4				Not connected
PE	5				Protected Earth

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 5222L, 5232L, 5242L)

a) Ethernet interface:

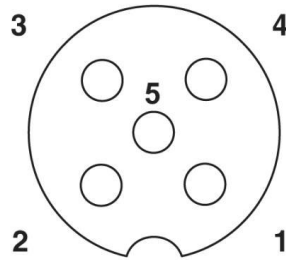


4-poles M12 D-coded female connector

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:



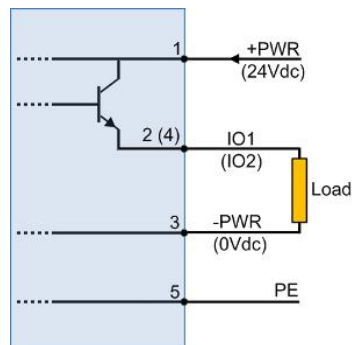
5-poles M12 A-coded female connector

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

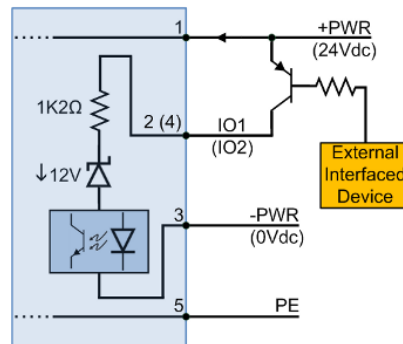
Hereinafter a cross reference table between connection pin number and the color of the wires of a standard open ended cable.

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.

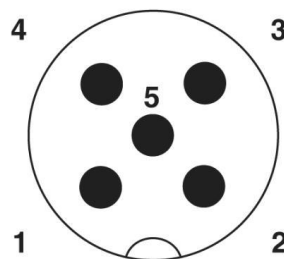


If IOx is used as input, a clean contact or PNP transistor has to be connected between +PWR pin 1 and Input pin 2 (channel 1) or Input pin 4 (channel 2); max applicable current is 10mA.



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

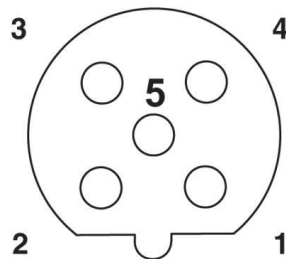
Pin	No	Min	Typical	Max	Description
N.C.	2				Not connected
- PWR	3				DC power supply return path
N.C.	4				Not connected
PE	5				Protected Earth

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 5223L, 5233L, 5243L)

(a) ProfiBus interface:



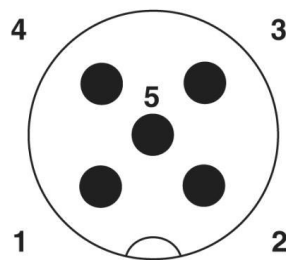
5-poles M12 B-coded female connector

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:



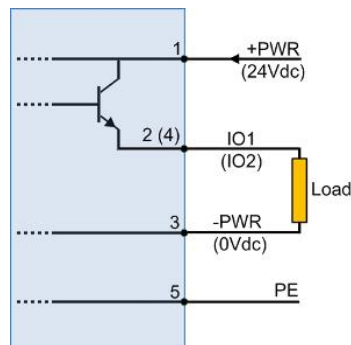
5-poles M12 A-coded male connector

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

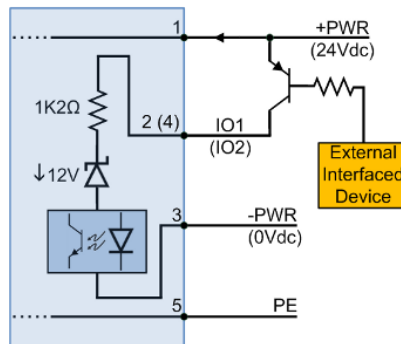
Hereinafter a cross reference table between connection pin number and the color of the wires of a standard open ended cable.

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.



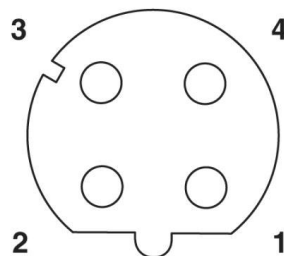
If IOx is used as input, a clean contact or PNP transistor has to be connected between +PWR pin 1 and Input pin 2 (channel 1) or Input pin 4 (channel 2); max applicable current is 10mA.



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

4.4 MODBUS/TCP Version (Items 5222L-MB, 5232L-MB, 5242L-MB)

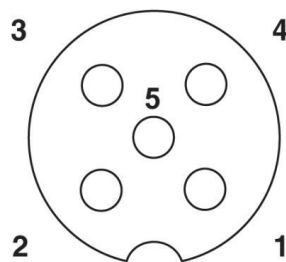
a) MODBUS/TCP interface:



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:



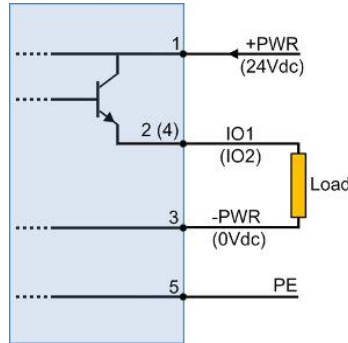
5-poles M12 A-coded female connector

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

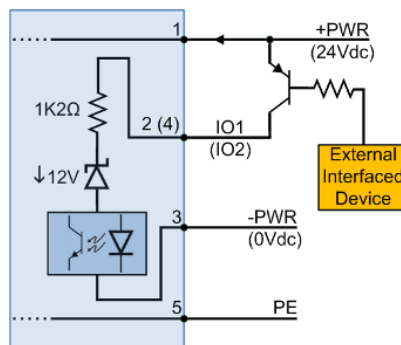
Hereinafter a cross reference table between connection pin number and the color of the wires of a standard open ended cable.

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.

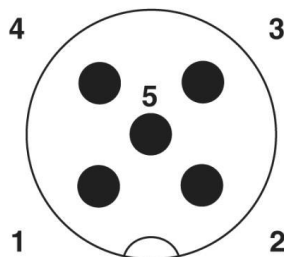


If IOx is used as input, a clean contact or PNP transistor has to be connected between +PWR pin 1 and Input pin 2 (channel 1) or Input pin 4 (channel 2); max applicable current is 10mA.



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 5221L, 5222L, 5223L and 5222L-MB). Alternatively the **BLUEBOX** (items 5231L, 5232L, 5233L and 5232L-MB) is equipped with a connector for an external antenna that is available in various models (items 902xL and 922xL) or two connectors for up to two external antennas (items 5241L, 5242L, 5243L and 5242L-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.

5.1 Integrated Antenna (5221L, 5222L, 5223L, 5222L-MB)

The reader with integrated antenna has a maximum reading distance of about 150 mm measured between the **BLUEBOX** cover and a disk transponder with 50 mm diameter.

5.2 1 External Antenna (5231L, 5232L, 5233L, 5232L-MB)

The reader with integrated antenna has a maximum reading distance of about 300 mm.



BLUEBOX 1 external antenna version.

5.3 2 External Antennas (5241L, 5242L, 5243L, 5242L-MB)

The reader with integrated antenna has a maximum reading distance of about 300 mm.



BLUEBOX 2 external antennas version.









6 Status Indications






At the top of **BLUEBOX** are placed LEDs which shows 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.

The **BLUEBOX** is also equipped with a signaling 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.
- During firmware upgrade procedure, the buzzer is activated for 0.25 seconds at the end of the file download in case of no file errors detected, otherwise 5 short beeps (0.15 seconds) shall signal an error










6.1 Serial Version, 1 Internal or External Antenna (5221L, 5231L)

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 • Sstem upgrade






LED	Color	State	Meaning
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












6.2 Serial Version, 2 External Antennas (5241L)

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





LED	Color	State	Meaning
	 (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

















6.3 Ethernet Version, 1 Internal or External Antenna (5222L, 5232L)


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














6.4 Ethernet Version, 2 External Antennas (5242L)






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

LED	Color	State	Meaning
			<ul style="list-style-type: none"> 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
	 (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
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












LED	Color	State	Meaning
	 (off)	Off	<ul style="list-style-type: none"> Ethernet connection is missing Hardware defect













6.5 ProfiBus Version, 1 Internal or External Antenna (5223L, 5233L)

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
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, 2 External Antennas (5243L)





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

LED	Color	State	Meaning
	 (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
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 (5222L-MB, 5232L-MB)


















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

LED	Color	State	Meaning
	 (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
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"> Etehrnet 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

LED	Color	State	Meaning
STS1	 (off)	Off	<ul style="list-style-type: none"> • Connection not ready • Hardware defect
	 (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

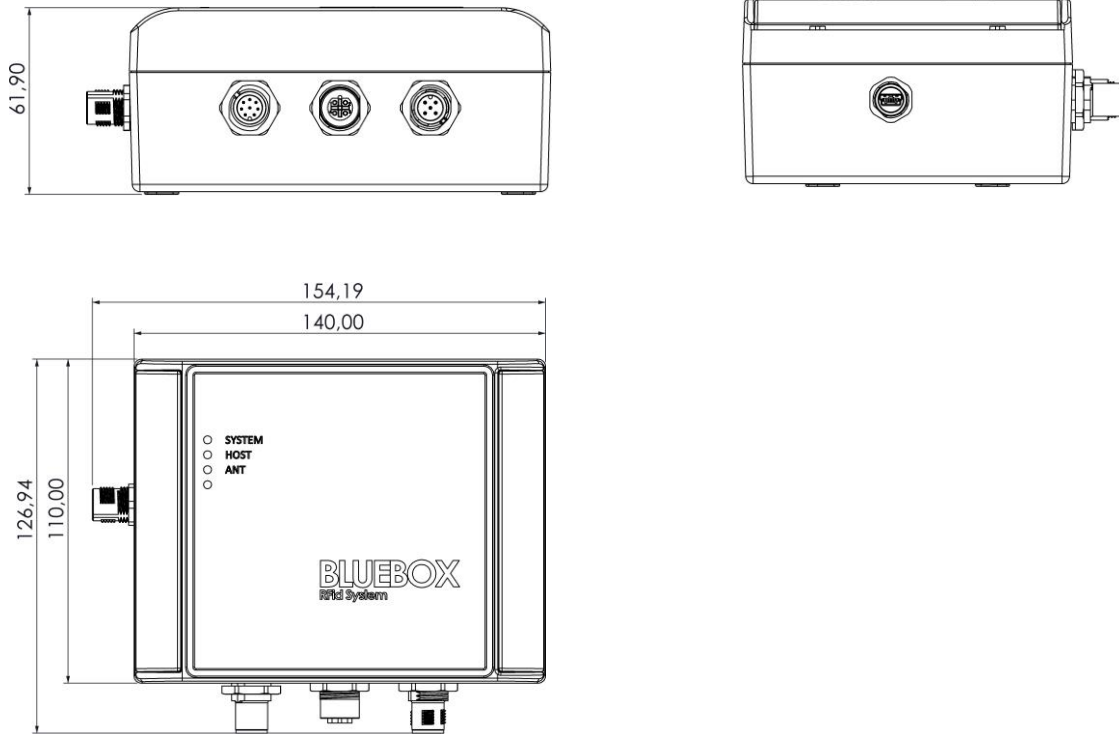
6.8 MODBUS/TCP Version, 2 External Antennas (5242L-MB)

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

LED	Color	State	Meaning
	 (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 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
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"> Etehrnet 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

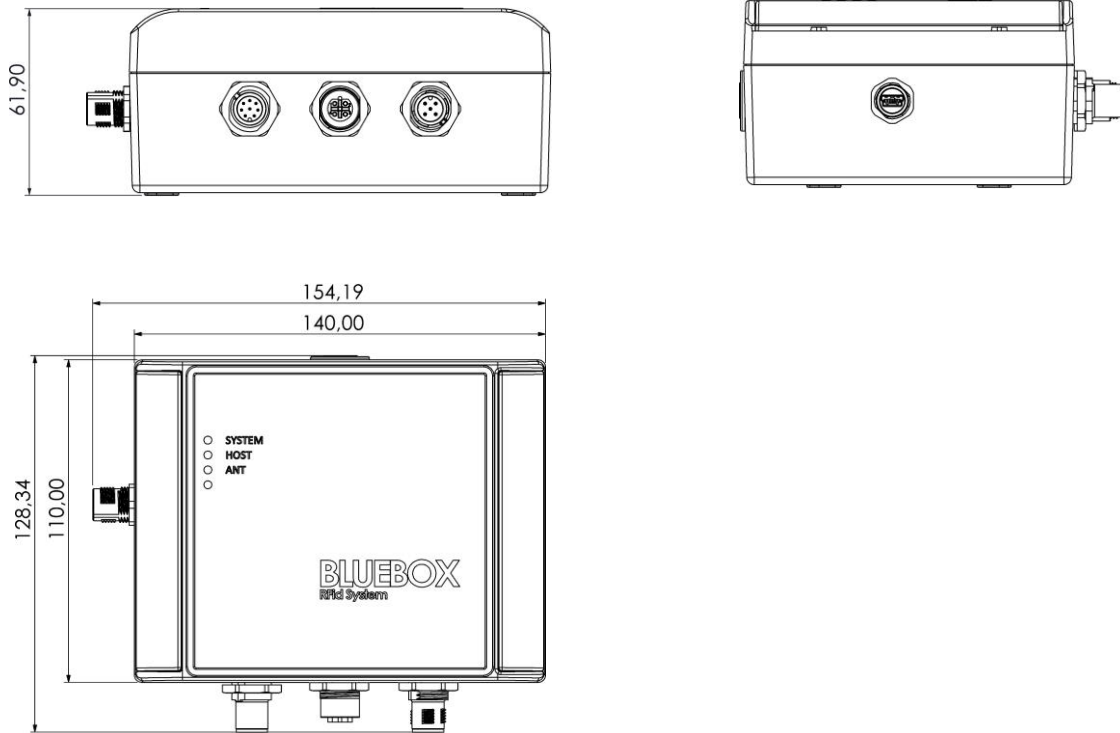
7 Mechanical Drawings

5221L:



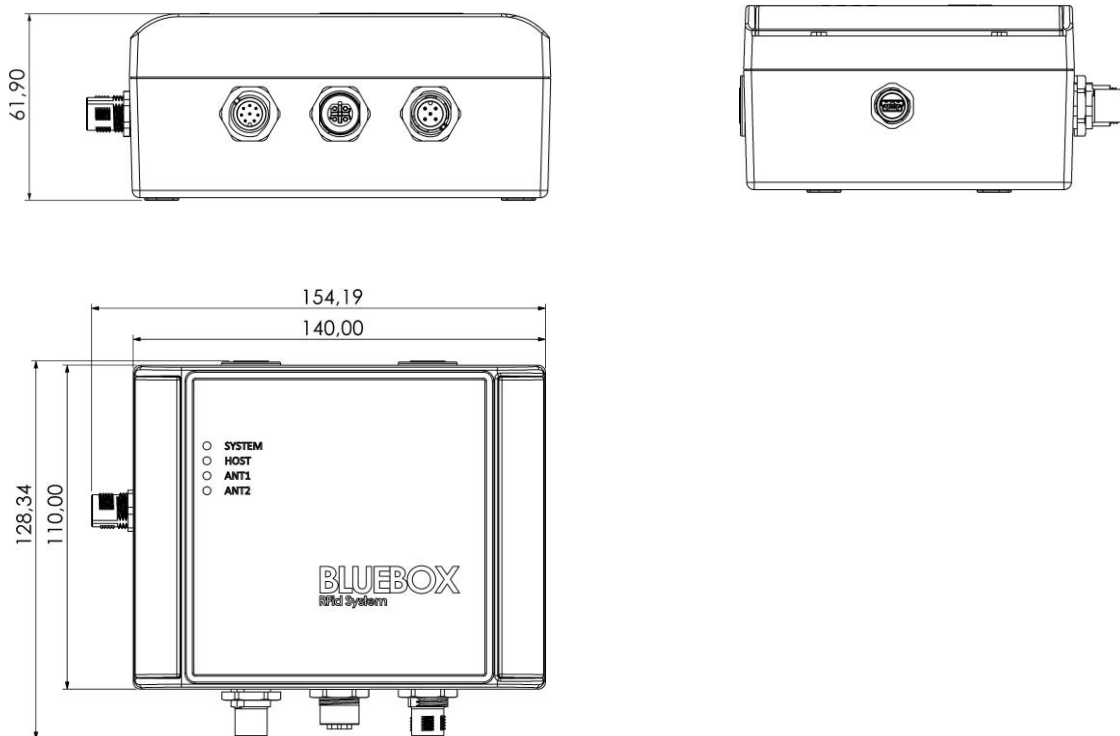
Dimensions in mm.

5231L:



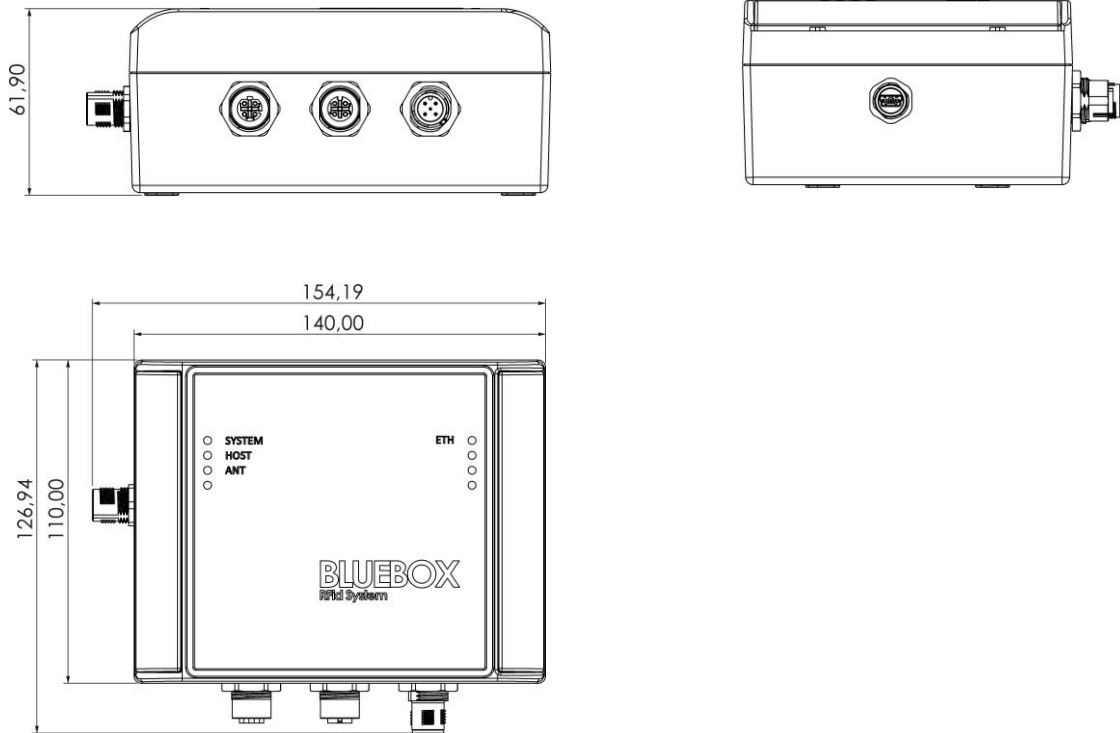
Dimensions in mm.

5241L:



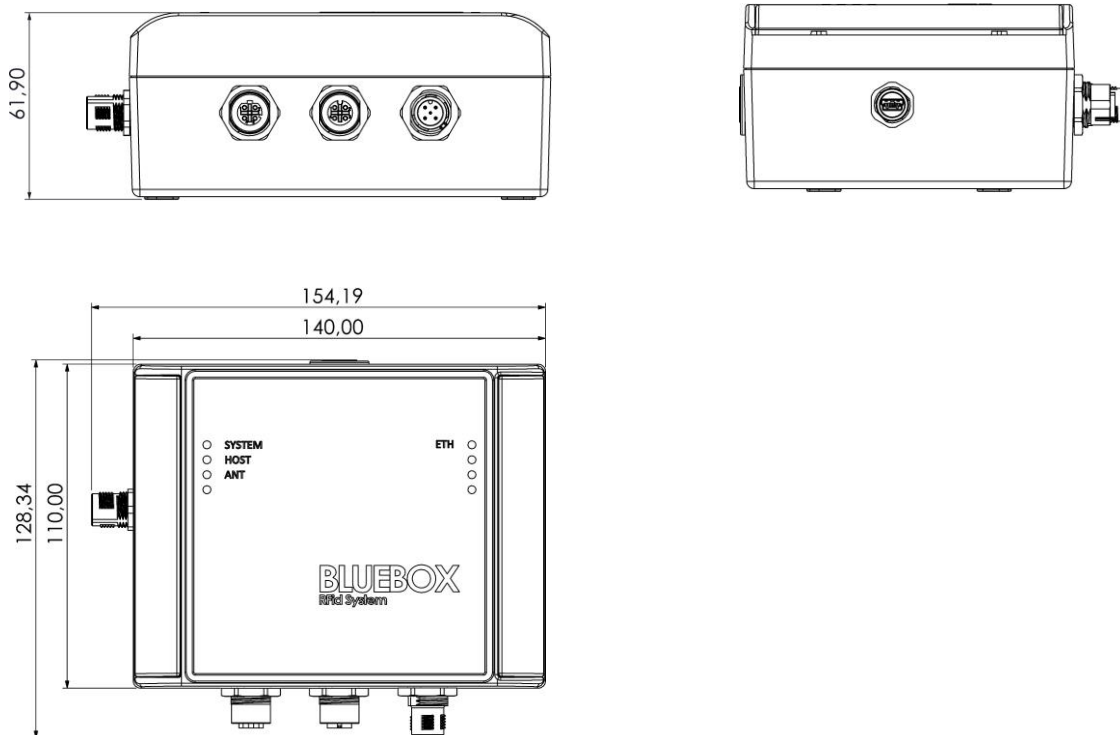
Dimensions in mm.

5222L:



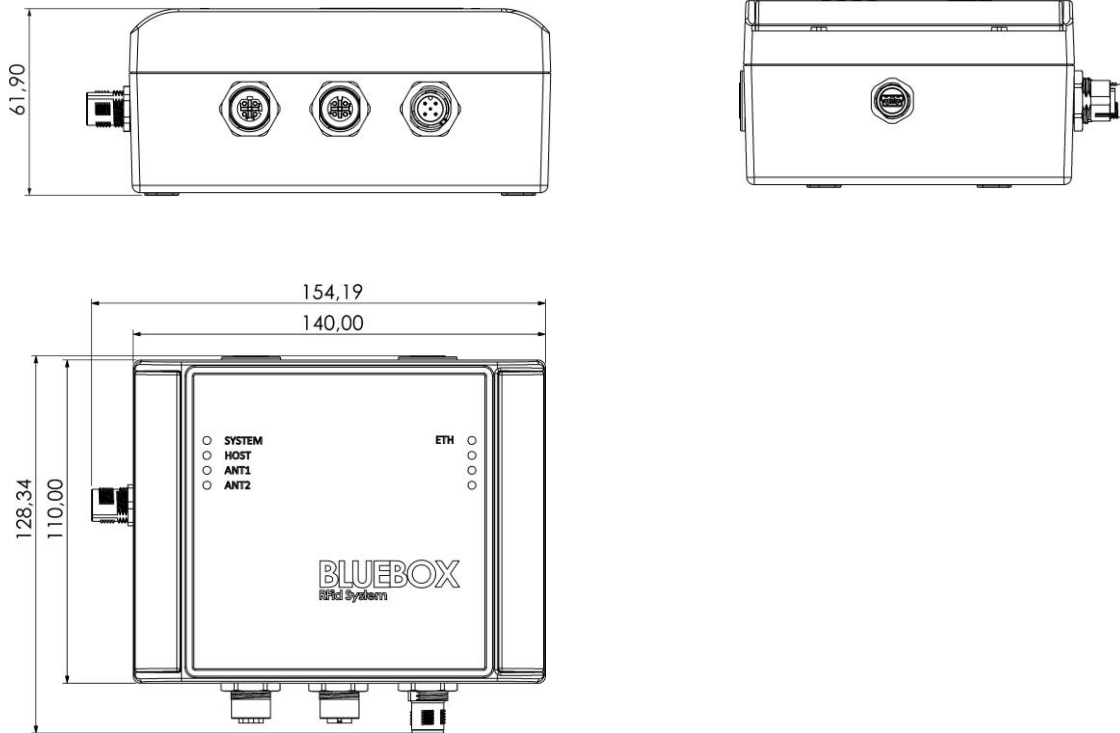
Dimensions in mm.

5232L:



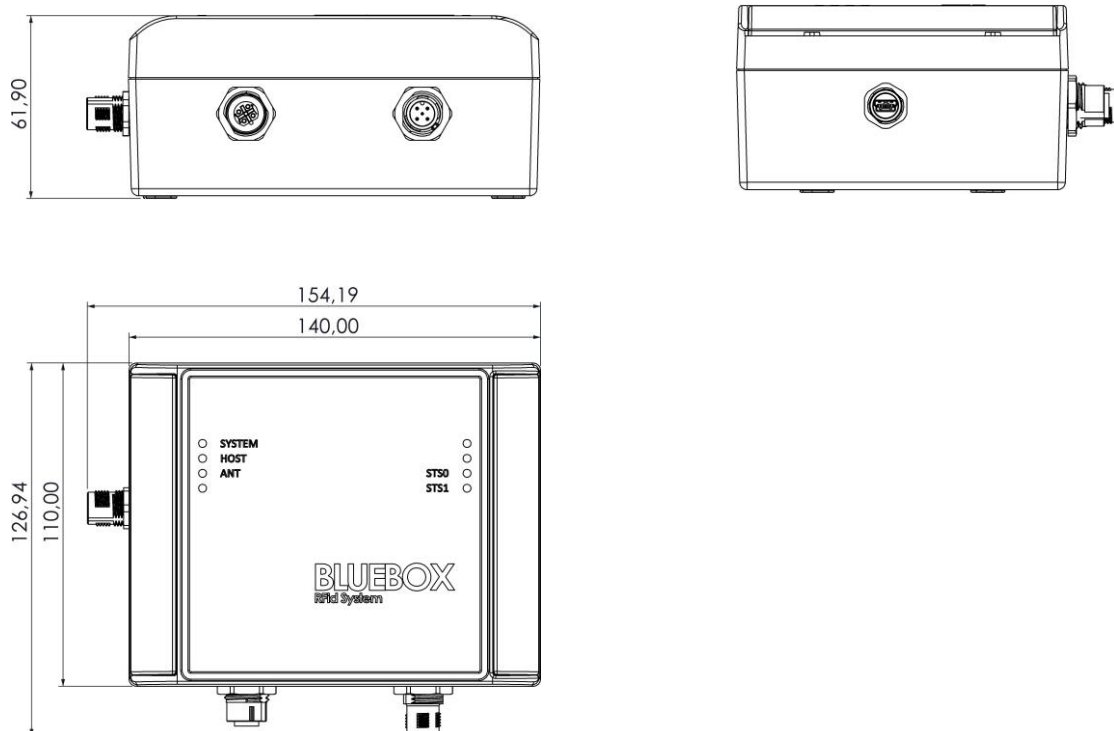
Dimensions in mm.

5242L:



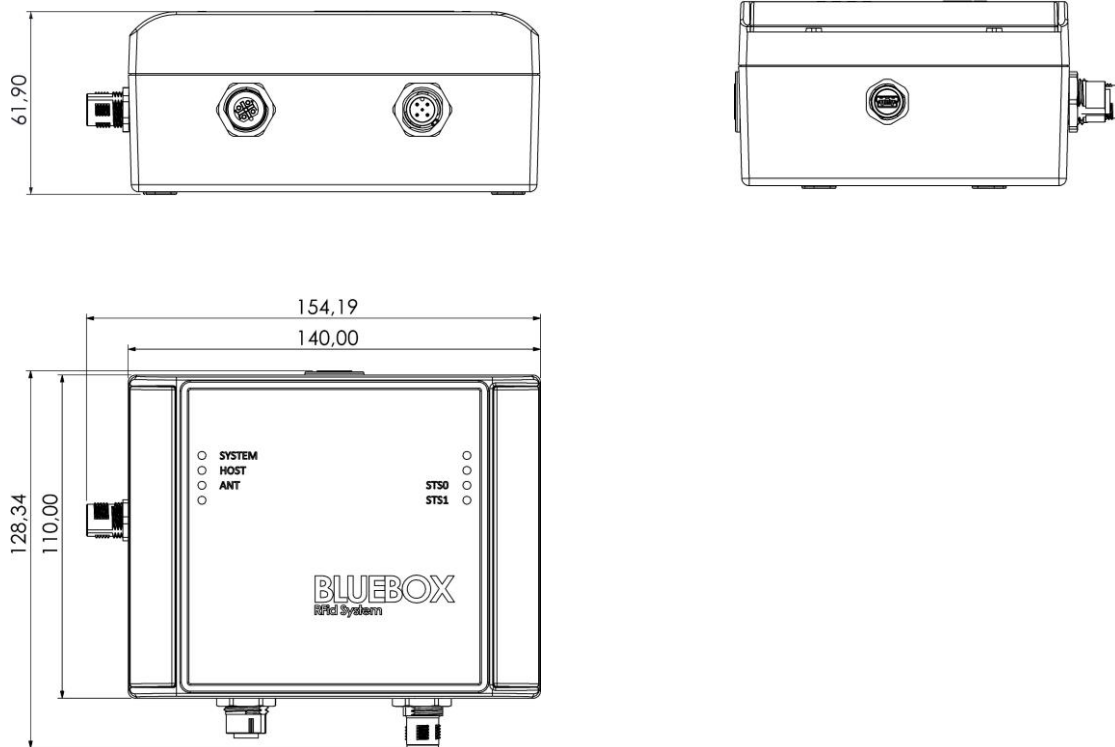
Dimensions in mm.

5223L:



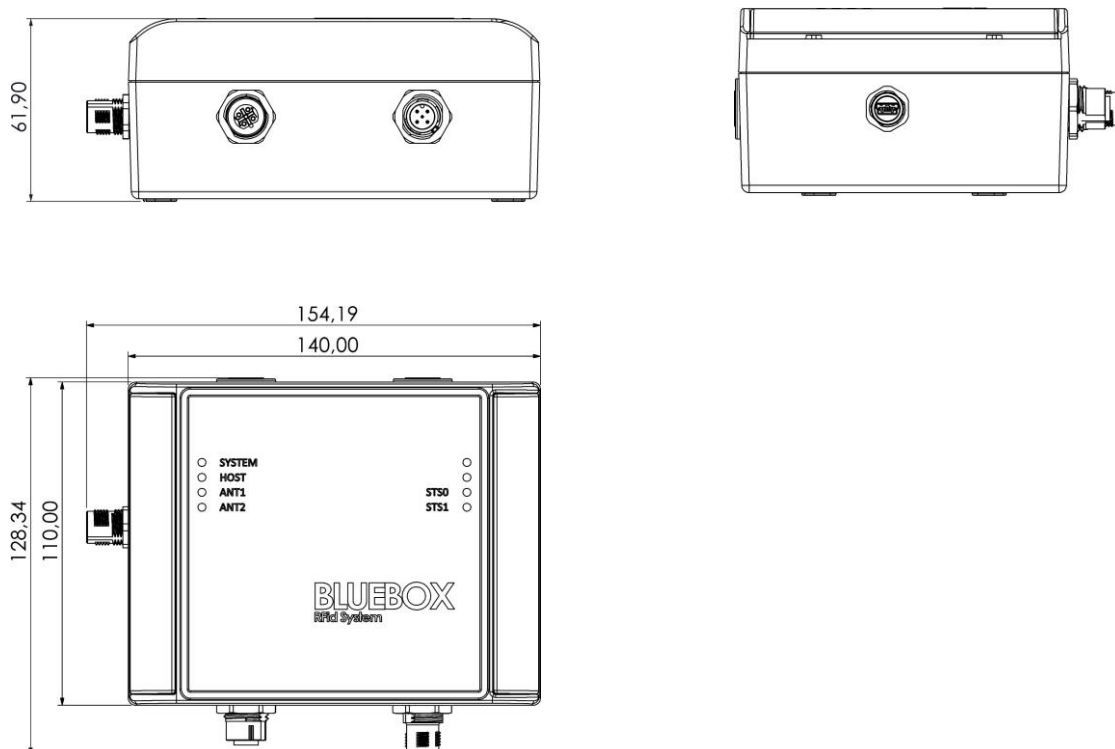
Dimensions in mm.

5233L:



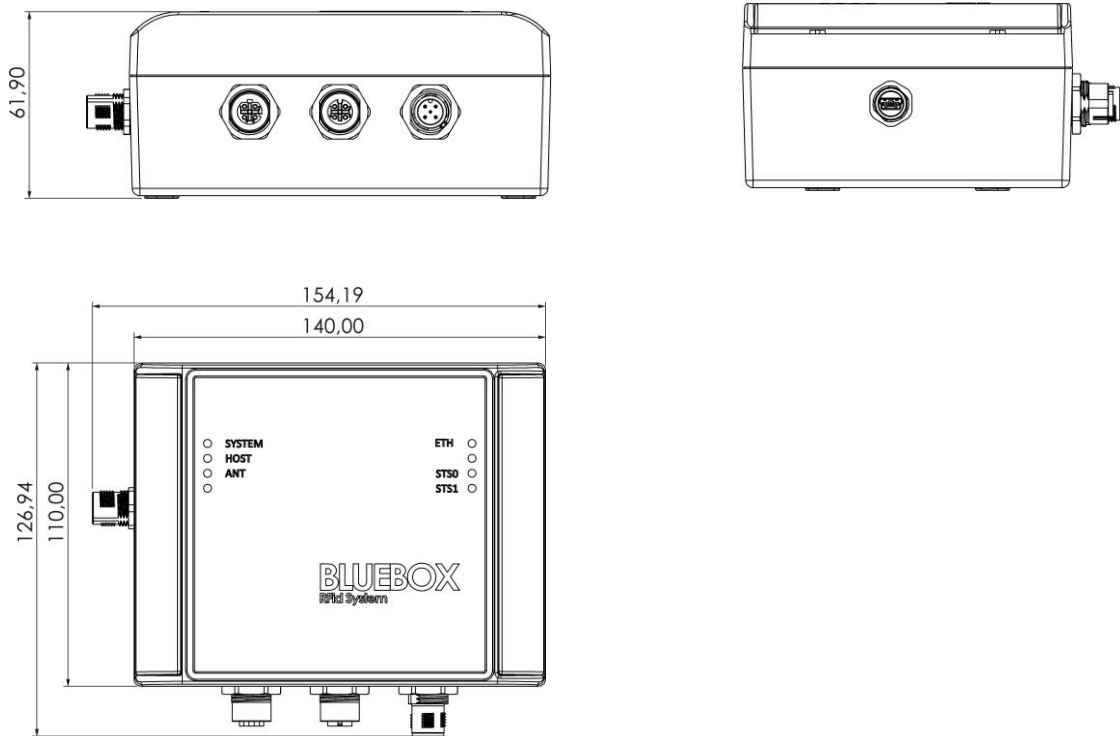
Dimensions in mm.

5243L:



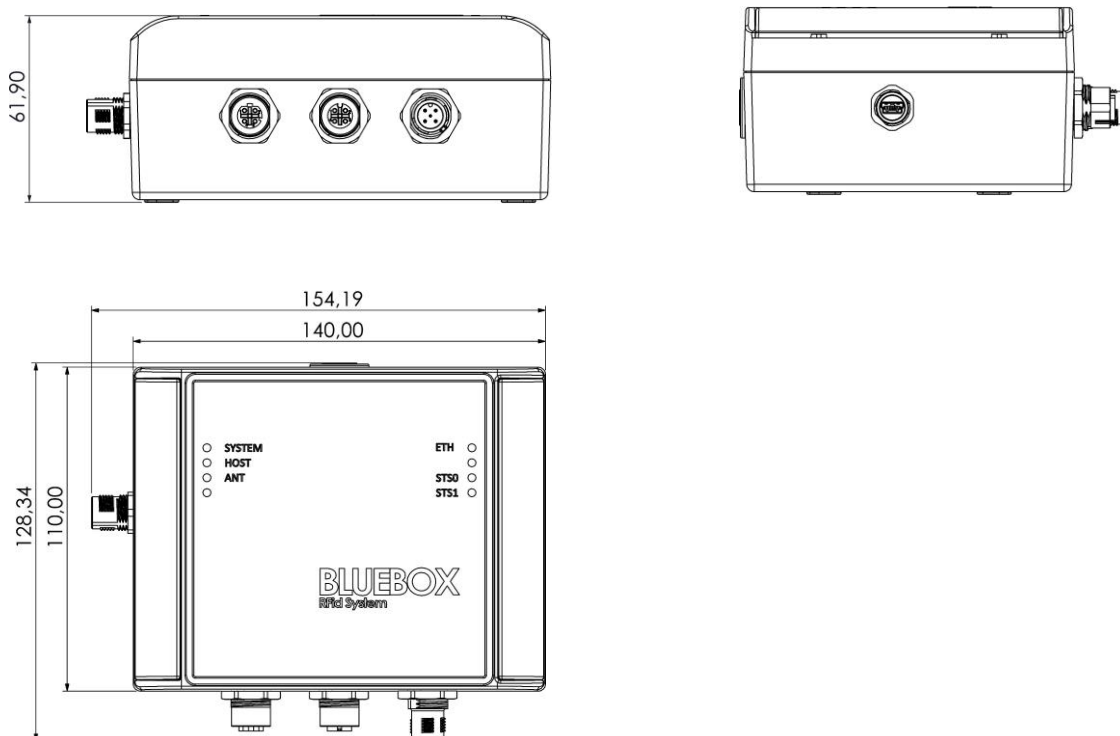
Dimensions in mm.

5222L-MB:



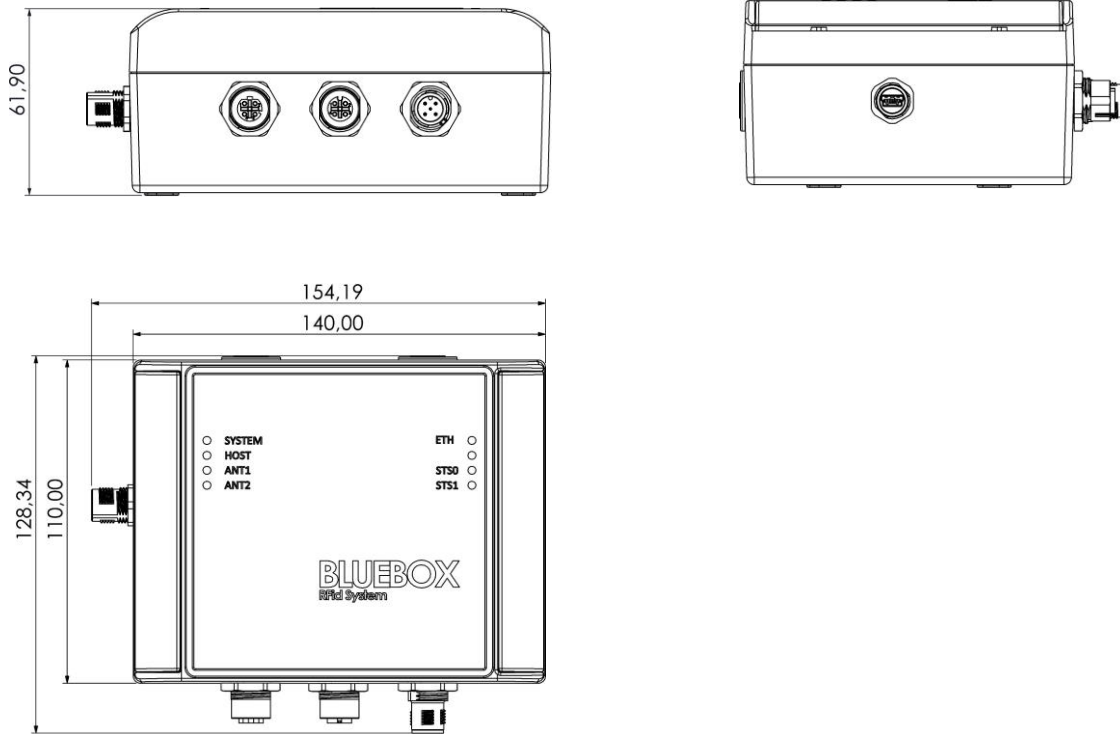
Dimensions in mm.

5232L-MB:



Dimensions in mm.

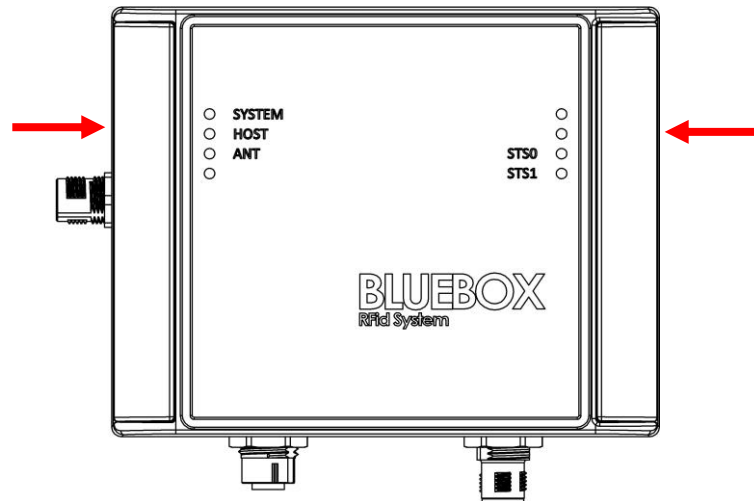
5242L-MB:



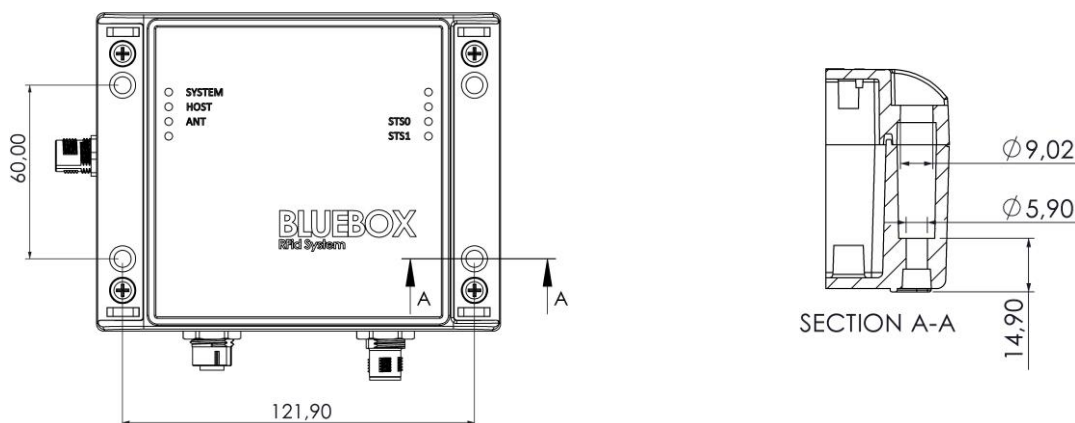
Dimensions in mm.

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.



Dimensions in mm.



The drawing is related to 5223L but the fixing holes dimensions are the same for all the items.

9 Regulatory Compliance

This section gives information on the **BLUEBOX** regulatory compliance.

9.1 CE Compliance

The **BLUEBOX** is in conformity with the relevant Union harmonisation legislation:

- **2014/53/EU** relating to the making available on the market of radio equipment
- **1999/519/EMC** on the limitation of exposure of the general public to electromagnetic fields

Reference standard:

- Audio/video, information and communication technology equipment; Part 1: Safety requirements
 - EN 62368-1:2014 + AC:2015
- Degrees of protection provided by enclosures (IP Code)
 - EN 60529:1991 + AC:1993 + A1:2000 + A2:2013
- Limitation of human exposure to electromagnetic fields from devices operating in the frequency range 0 Hz to 300 GHz, used in Electronic Article Surveillance (EAS), Radio Frequency Identification (RFID) and similar applications
 - EN 50364:2010
- Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements
 - EN 301 489-1 V1.9.2
- Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz
 - EN 301 489-3 V1.6.1
- Short Range Devices (SRD); Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz
 - EN 300 330 V2.1.1

10 Document Revision History

Date	Revision	Description
24/06/14	1.04	Initial release.
27/06/16	1.05	<p>Minor corrections in the whole document.</p> <p>Replaced the table of the ordering codes.</p> <p>Replaced cross reference table between connection pin number and the color of the wires of a standard open ended cable.</p> <p>Added the mechanical drawings section.</p> <p>Added the installation section.</p> <p>Added appendix A and B.</p>
02/09/16	1.06	<p>Added the reader's firmware versions object of this manual.</p> <p>Changes in the technical specification formatting.</p> <p>Added the operating features and description of the configurable parameters.</p> <p>Added the .gsd file as appendix B and moved the driver installation on Windows 8 OS description in appendix C.</p>
04/08/17	1.07	<p>Added the ordering code detail in preface section.</p> <p>Corrections in operating features section.</p> <p>Added a warning to changed configuration parameters that become effective only after a device reset.</p> <p>Added the device status section.</p> <p>Corrections in the connections section.</p> <p>Corrections in the status indication section.</p>
13/09/17	1.08	<p>Updated the reader's firmware versions object of this manual.</p> <p>Added the reader's with MODBUS/TCP interface (items 5222L-MB, 5232L-MB, 5242L-MB) to this manual.</p> <p>Corrections in the general and configuration parameters.</p> <p>Corrections in the status indications.</p>
03/06/19	1.09	<p>Added the CE marking, IP67 and no waste symbols.</p> <p>Corrections and updates in operating features.</p> <p>Corrections and updates in configuration parameters descriptions.</p> <p>Corrections in the buzzer description in signalling section.</p> <p>Added the regulatory compliance section.</p>

A. '.inf' File

; Communication Device Class driver installation file

;------

[Version]

Signature="\$Windows NT\$"

Class=Ports

ClassGuid={4D36E978-E325-11CE-BFC1-08002BE10318}

Provider=%Mfc%

DriverVer=27/03/2015,1.2.0.0

[Manufacturer]

%Mfc%=DeviceList,ntamd64

[DeviceList]

%BB2ADVANT%=Reader, USB\VID_28AD&PID_0000

%BB2DESKTOP%=Reader, USB\VID_28AD&PID_0001

%BB2DESKTOPv2%=Reader, USB\VID_28AD&PID_0003&MI_00

[DeviceList.ntamd64]

%BB2ADVANT%=Reader, USB\VID_28AD&PID_0000

%BB2DESKTOP%=Reader, USB\VID_28AD&PID_0001

%BB2DESKTOPv2%=Reader, USB\VID_28AD&PID_0003&MI_00

;------

; Installation

;------

[Reader]

include=mdmcpq.inf

CopyFiles=FakeModemCopyFileSection

AddReg=Reader.AddReg

```
[Reader.AddReg]
HKR,,DevLoader,,*ntkern
HKR,,NTMPDriver,,usbser.sys
HKR,,EnumPropPages32,, "MsPorts.dll,SerialPortPropPageProvider"
```

```
[Reader.Services]
AddService=usbser, 0x00000002, DriverService
```

```
[DriverService]
DisplayName=%DRIVER.SVC%
ServiceType=1
StartType=3
ErrorControl=1
ServiceBinary=%12%\usbser.sys
```

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

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

B. '.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

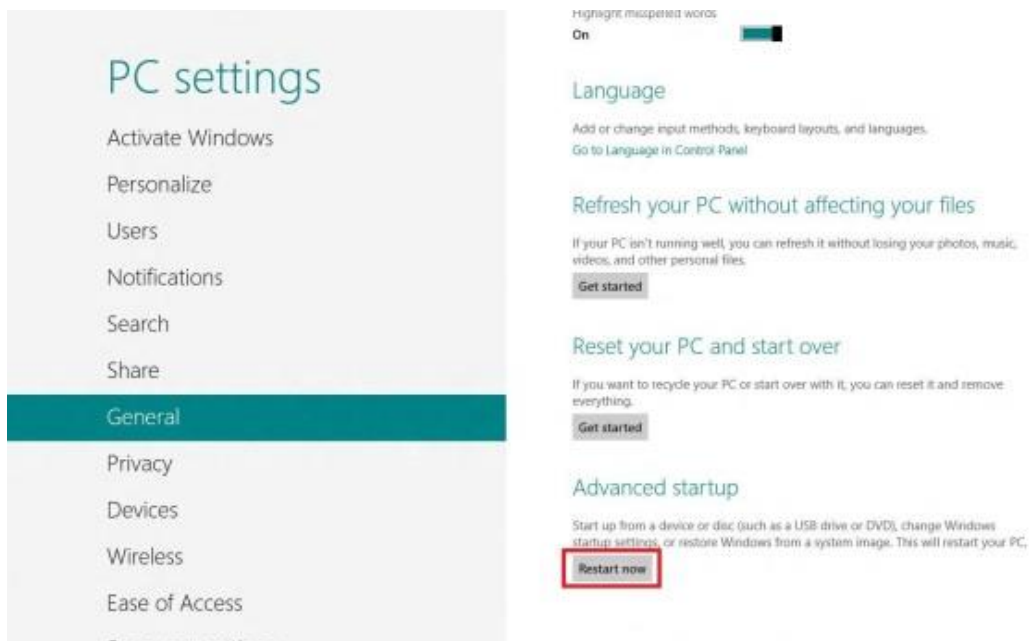
40

EndModule

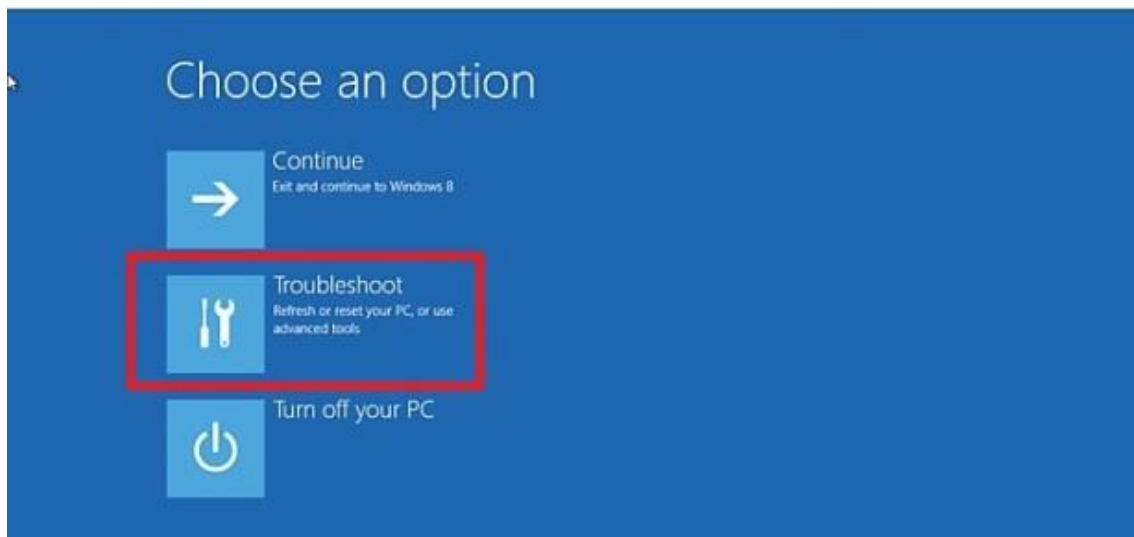
C. Driver Install on Windows 8 OS

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**":



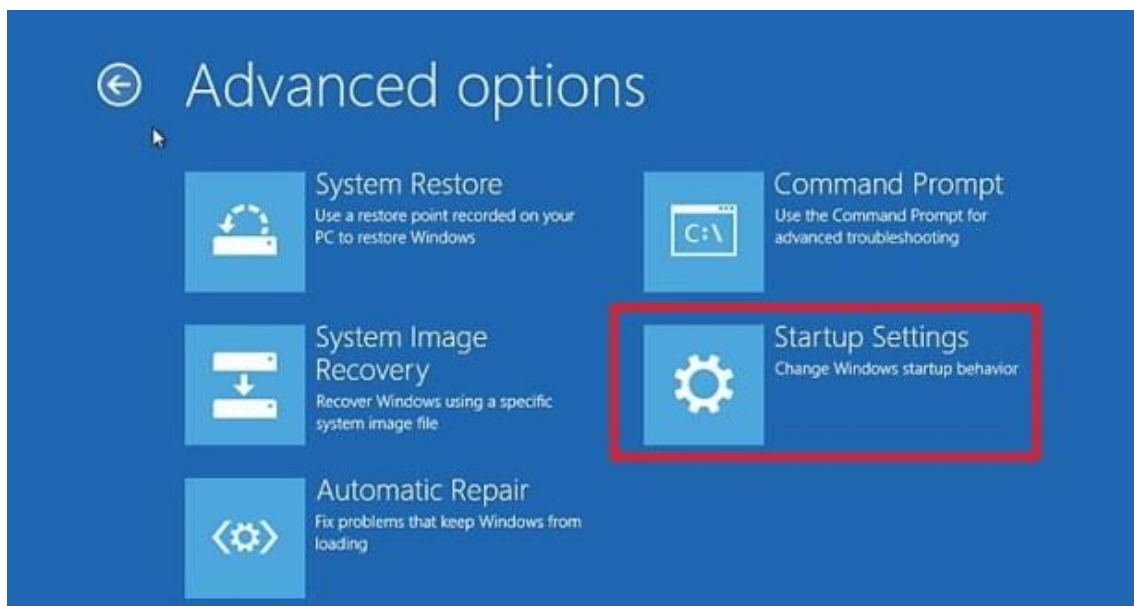
- 4) After that, Click on "**Troubleshoot**":



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



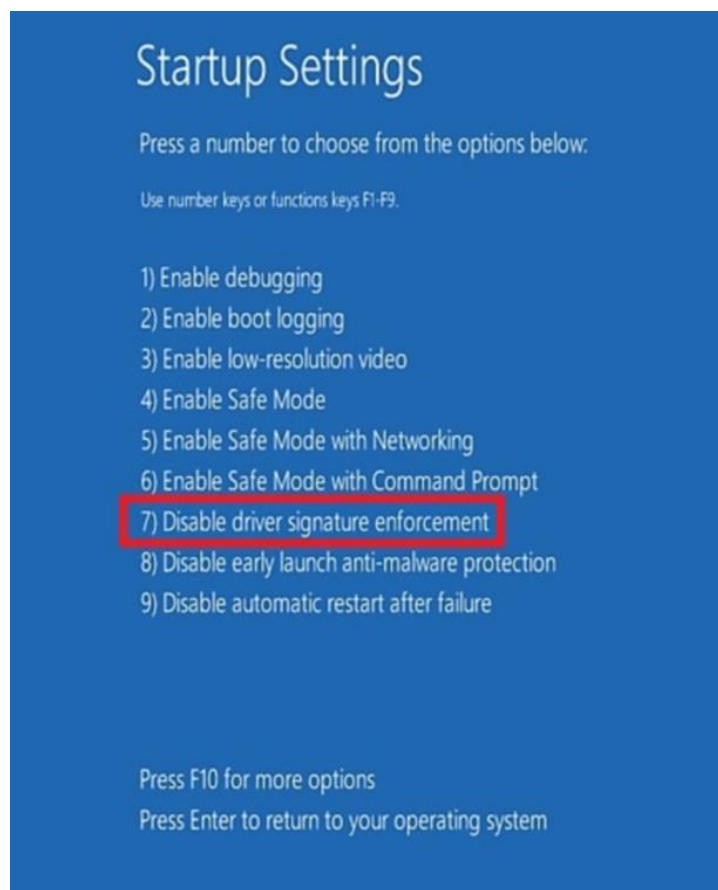
6) Then click on "**Startup Settings**":



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"**:

