



Brady IOX100

UHF RFID IO-LINK READER

User Manual

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Brady Worldwide, Inc.
6555 West Good Hope Road
Milwaukee, WI 53223
bradyid.com

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Safety and Environment

Please read and understand this manual before using the IOX100 RFID reader for the first time. This manual describes all of the main functions of the IOX100 RFID reader.

Precautions

Before using the IOX100 RFID reader, please note the following precautions:

- Read all instructions carefully before operating the RFID reader and prior to performing any procedure.
- Do not place the unit on an unstable surface or stand.
- Do not place anything on top of the unit.
- Only use the power source indicated on the rating label.
- This equipment is not intended for use by children.



CAUTION!

To avoid unnecessary exposure to RF radiation:

- Always maintain a 30.1 cm (12 inch) distance between the antenna and users and/or bystanders.

Technical Support and Registration

Contact Information

Visit the Brady Knowledge Base at support.bradyid.com/s/.

For repair or technical assistance, locate your regional Brady Technical Support office by going to:

- **United States:** bradyid.com/techsupport
- **Canada:** bradycanada.ca/contact-us
- **Mexico:** bradyid.com.mx/es-mx/contacto
- **Latin America:** bradylatinamerica.com/es-mx/soporte-técnico
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- **Australia:** bradyid.com.au/technical-support
- **Asia Pacific:** brady.co.uk/landing-pages/global-landing-page

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If for any reason you need to return the product for repair, please contact Brady Technical Support for repair and replacement information.

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Brady works together with full support and primary support partners. Full support partners can handle both warranty and non-warranty repairs on behalf of Brady in their own regions. In addition, Brady has a network of smaller repair centers, primary support partners, who offer the first line of support to their customers locally.

Document Conventions

When using this document, it is important that you understand the conventions used throughout the manual.

- All user actions are indicated by **Bold** text.
- References to menus, windows, buttons and screens are indicated by *Italicized* text.

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1 Getting Started

The Brady IOX100 is designed for quick, accurate and reliable data collection via IO-link interface using a state-of-the-art UHF RFID engine. The reader is controlled using the Brady Industrial reader protocol (IRP).

The IOX100 supports all the features of the ISO 18000-63 specification. It supports the IO-link version 1.1 common and FW update profiles and operates at COM3 speed

Device Variants

The Brady IOX100 is available in multiple variants.

CODE	FREQUENCY	DESCRIPTION
NPR00001-EU	868 MHz	Brady IOX100 Reader UHF 868 EU
NPR00002-US	915 MHz	Brady IOX100 Reader UHF 915 US



Figure 1-1. Brady IOX100 device

Accessories

The following accessories are available for the Brady IOX100.

CODE	DESCRIPTION
CWH00XXX	M12-A 5pin cable 1m
CWH00XXX	M12-A 5pin cable 5m
CWH00XXX	M12-A 5pin cable 10m
ACP00XXX	TMG USB IO-link Master V2 SE

In-Box Content

The Brady IOX100 box contains the following items:

- Brady IOX100 device
- Safety and regulations card

Features

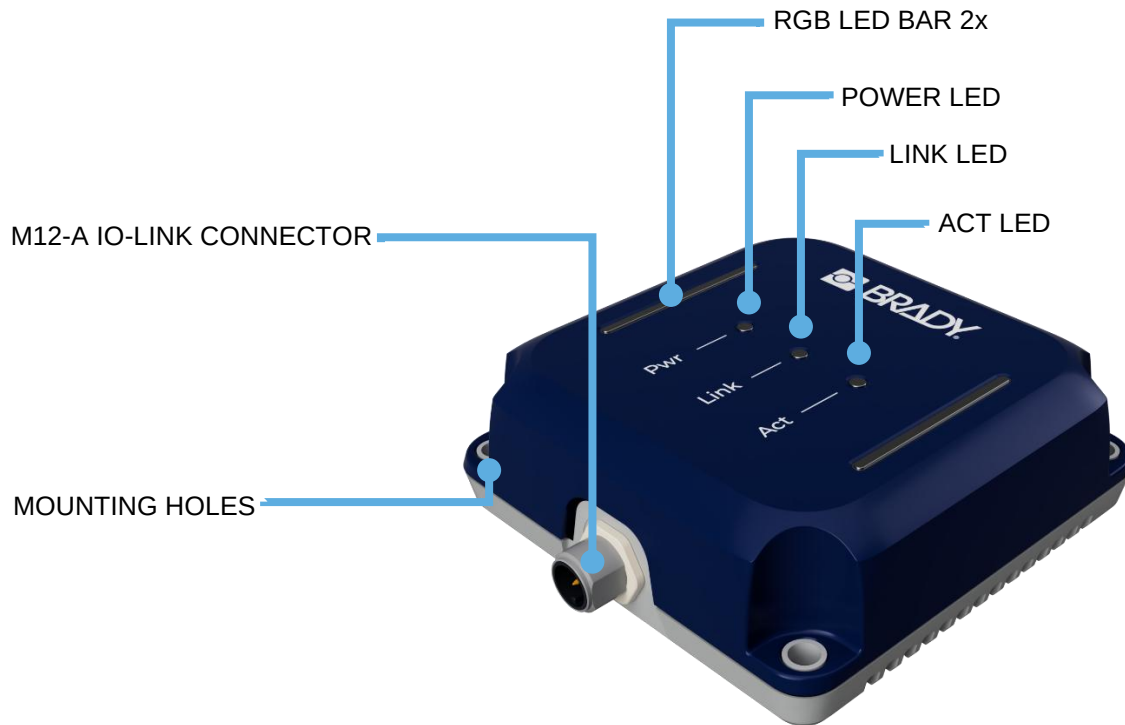


Figure 1-2. Brady IOX100 features

Connecting the Device

The IOX100 connects to IO-link master devices using an M12-A 5-pin or 4pin cable. Below is the connection diagram of the M12-A connector. PIN1 = 24V, PIN2 = NC, PIN3 = GND, PIN4 = C/Q.

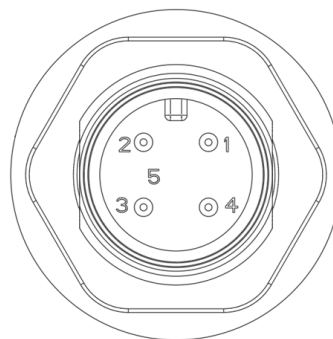


Figure 1-3. Connection diagram

2 Installing the Device

This chapter describes transport, placement, and installation instructions for the IOX100.

Storage

Keep the original packaging and always store and transport the device in it. Ensure that the device is always in a clean and dry environment that meets the specified ambient conditions.

Placement and Orientation

When positioning the IOX100 in your facility, allow at least 50 cm clearance between the reader and conductive materials such as metals or liquids. The distance between the read/write device and the ground should also be at least 50 cm.

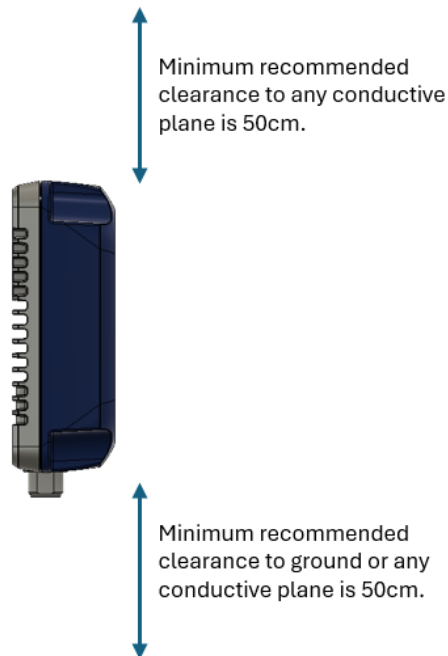


Figure 2-1. Minimum clearances

For optimal tag reading, install the IOX100 relative to the tag orientation shown in the following figure. The rule of thumb is that the long side of the tag should be visible to the reader.

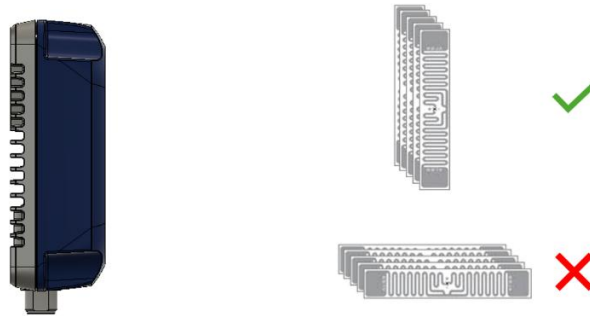


Figure 2-2. Optimal device orientation

Device Mounting

To attach the IOX100, use four 5 mm diameter screws, flat washers, and fastening material appropriate for the mounting surface. The tightening torque of the screws depends on the type of mounting; we recommend using a tightening torque of 2 Nm. To prevent damage to the housing, the maximum tightening torque is 2.5 Nm.

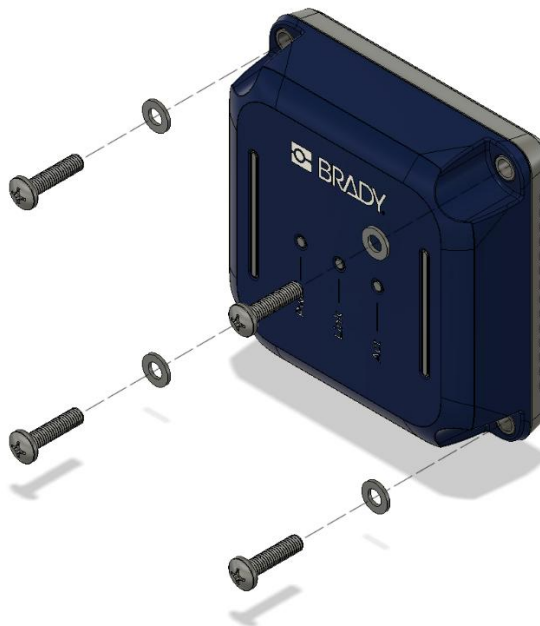


Figure 2-3. Mounting the IOX100

Mechanical Dimensions

Mechanical dimension of IOX100 reader is presented below.

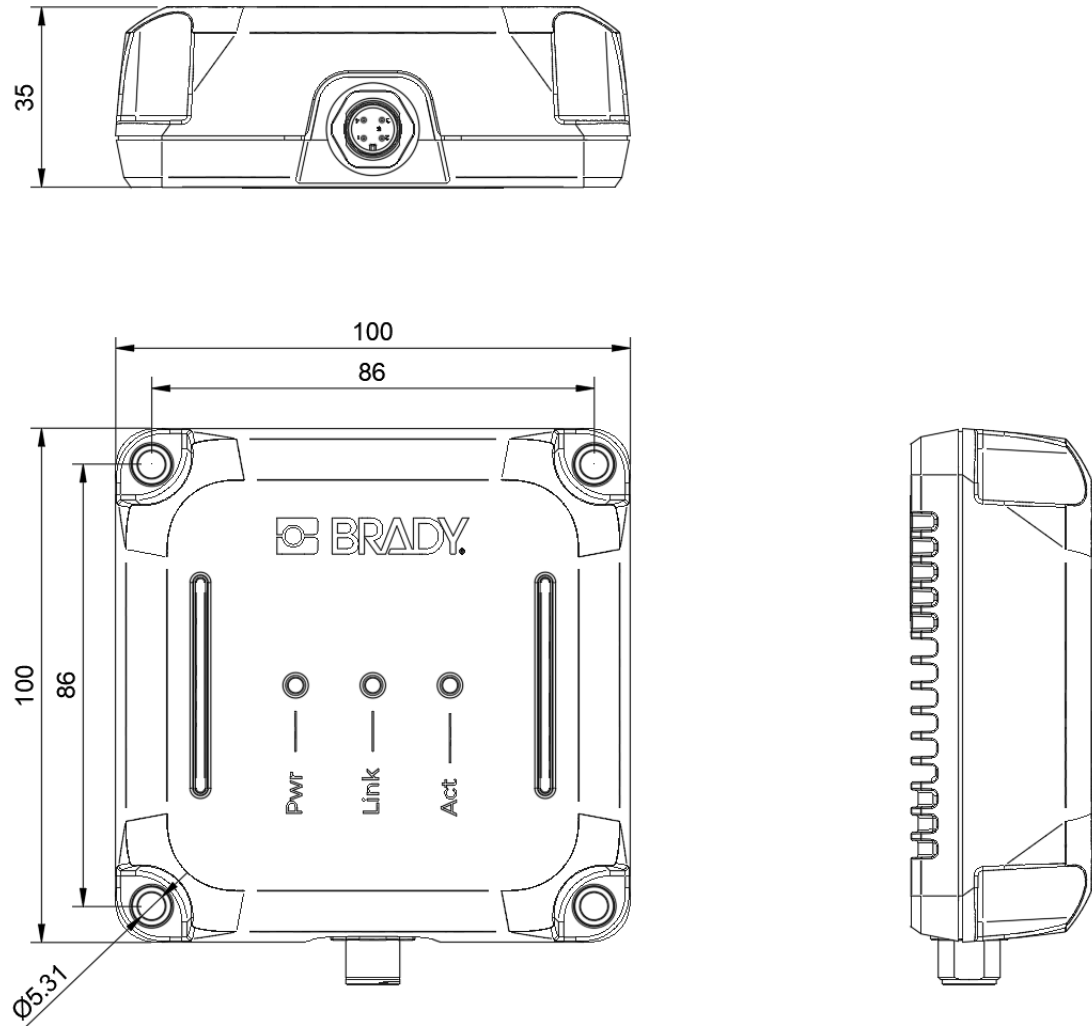


Figure 2-4. Mechanical dimension

3 Integrated Antenna

The Brady IOX100 is equipped with an integrated UHF RFID antenna with circular polarization, which means that the Brady IOX100 can read tags in any orientation (vertical, horizontal, or mixed). The nominal reading distance is up to approximately 5 m / 15 ft. The actual reading range depends on the tag and the operating environment.

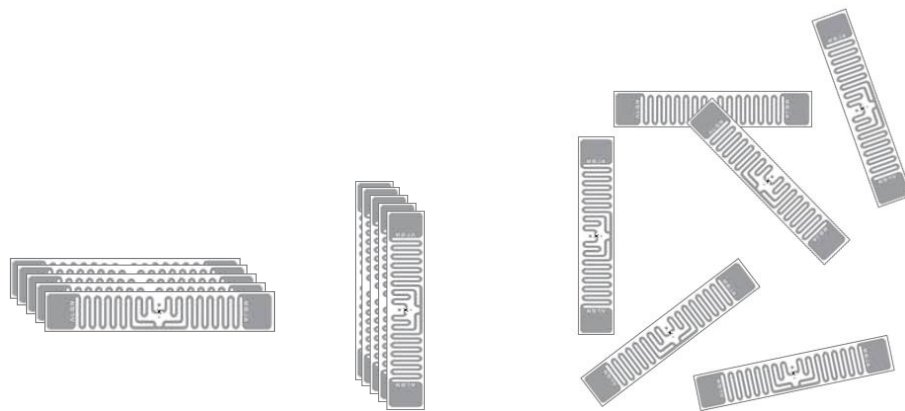


Figure 3-1. RFID tags in horizontal, vertical, and mixed orientation

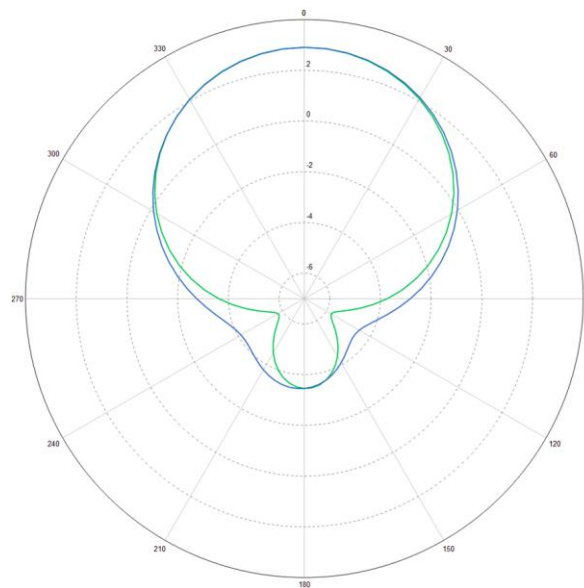


Figure 3-2. Internal antenna radiation pattern

UHF RFID SPECIFICATION	VALUE
Frequency	ETSI 865.6-867.6 MHz or FCC/IC 902-928 MHz
Maximum gain	+2.5 dBic
3 dB Beam width	70°
Front-to-back ratio	7 dB
Axial ratio	<1.5 dB
Maximum input power	2 W

Reading Zones

Reading zone of the IOX100 can be impacted in multiple ways. Most used method is to adjust the TX power level of the reader. IOX100 supports TX level adjustments in 1dB steps (0 – 30dBm). Another effective way to limit the reading zone is to apply an RSSI filter. This can be applied individually to inventory operations and to tag read and write operations.

Note that due to multipath propagation the reading zone can be visualized to have two zones. The first one is the actual reading zone where tags are constantly readable. Second is the extended reading zone where tags are occasionally readable.

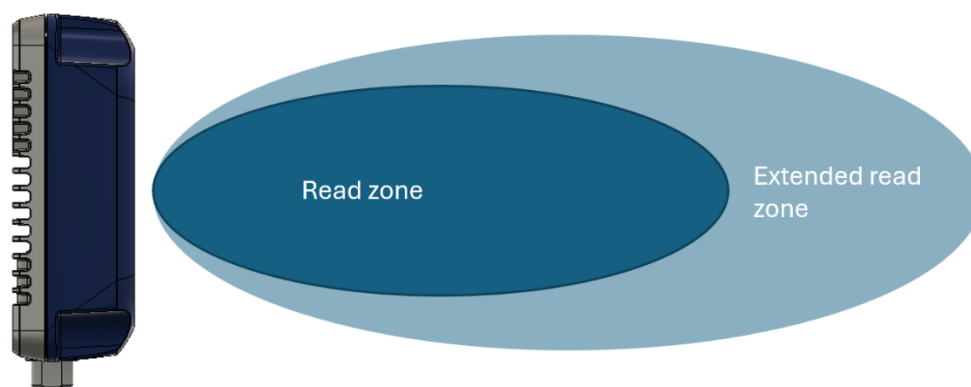


Figure 3-3. Read zones

Cross-Reading

Cross reading is a phenomenon where reader A is reading a tag which is physically located in a read zone of another reader (reader B). Most common way for this to happen is that reader A hears the response of a tag while it is communicating with a reader B. It is also possible that tag gets energized by

reader B and then just in a right time hears the command from a reader A (in a way acting like a semi-passive tag). The latter example happens only rarely.

There are multiple ways you can lower the cross reading. Applying an RSSI filter is one of the most used methods. As cross read signal is coming further away than the wanted tags signal, it is usually having a lower signal strength. Note that due to multipath propagation this is not 100% sure. Secondly, as cross reading can only happen if two or more readers are operating at the same time, thus only reading when needed is a very effective way to lower cross reading. This can be achieved, for example using an external sensor to trigger the reading only when needed. One can also use different RF-profiles in adjacent readers.

RF Profiles

The Brady IOX100 supports the following RF profiles with the maximum read rates supported by the RFID engine. Because of IO-link data rate limitations, actual read rates to the application layer are considerably slower. Actual read rates also depend on factors such as the operating environment, reader settings, tag population, and tag type.

CODE	DESCRIPTION
Robust	- Link frequency: 160 kHz - Coding: Miller 8 - Read rate: Up to 50 tags/s Optimized for sensitivity through slower data speed. Ideal for challenging environments where there can be interfering signals from other readers, signal sources, or reflections from the environment.
Nominal	- Link frequency: 250/300 kHz - Coding: Miller 4 - Read rate: Up to 250 tags/s The default profile for Brady IOX100. This profile is recommended for DRM use cases.
Fast	- Link frequency: 640 kHz - Coding: Miller 4 - Read rate: Up to 500 tags/s Provides a balance between speed and sensitivity.
High speed	- Link frequency: 640 kHz - Coding: FM0 - Read rate: Up to 900 tags/s Optimized for speed at the cost of high sensitivity. Good for environments where little interference is expected.
High speed 2	- Link frequency: 640 kHz - Coding: FM0 - Read rate: Up to 1000 tags/s or more The High speed 2 profile further optimizes for speed by reducing the Tari value for the pulse interval encoded (PIE) data.

4 Operation

This section describes the operations of the Brady IOX100 reader.

Communication Interface

The intended way to control the IOX100 is by using Brady IRP protocol. Please see chapter 4 for a detailed description of the IRP. IRP commands and responses are sent and received via ISDU read and write operations (index 64/65). In addition to the IRP command-respond interface there is PDin data available for obtaining the status of a device. This status information contains information, for example about messages waiting to be read.

Process Data

Process data input (PDin) is used to obtain status, the number of waiting IRP messages and GPIO state information from the device. Process data output (PDout) is used to control the GPIO states. Note that in IOX100, these GPIOs are not actual GPIOs, but are tied to controlling high visibility LED bars. Please see Status and process LED indications and IRP chapters for more information.

Process data input

Sub	Bit offset	Length	Name	Data type	Value	Description
		256 bits	PDin	RecordT		
.1	240	16 bits	StatusMask	UIntegerT	0x1 0x2 0x4 0x8 0x10 0x20 0x40 0x80..	Busy Critical error IRP send buffer full Device booted Heartbeat Temperature warning Temperature error Reserved
.2	224	16 bits	NumMsgsWaiting	UIntegerT	0..206	Low priority event buffer 200 messages High priority response buffer 5 messages NOTE SendBufferFull triggered if low priority event buffer gets full.
.3	208	16 bits	GPIO_StateMask	UIntegerT		GPIO_DriveMask is mirrored here when applied on the device side.
.4	0	208 bits				Reserved for Simple-mode

Process data output

Sub	Bit offset	Length	Name	Data type	Value	Description
		256 bits	PDout	RecordT		
.1	240	16 bits	GPIO_DriveMask	UIntegerT	0x1 0x2 0x4 0x8 0x10 0x20 0x40..	Left side RED Left side GREEN Left side BLUE Right side RED Right side GREEN Right side BLUE Reserved
.2	0	240 bits				Reserved for Simple-mode

Note that PDout data is only taken into use in a device if PDout data state is valid. In case of invalid state, the device will act like the data would be all zeros.

Industrial reader protocol over ISDU Read/Write

IRP command-response interface is implemented using ISDU read and write operations. IRP commands are written into Index 64 and responses and event messages are read from Index 65. Note that settings and configurations which are changed via IRP commands, are only stored into NV-memory if a specific IRP store -command is sent. Settings and parameters which are changed directly using an ISDU write into specific indexes are stored into NV-memory automatically.

Parametrization

IOX100 does support DS (data storage) and block parametrization. The following tables do indicate the settings which can be accessed through parameters, and which are also stored into non-volatile memory of a device.

Identification					
Index	Parameter	Access	Data type	Length	Description
16 (0x10)	Vendor name	ro	String	13 byte	The vendor name.
17 (0x11)	Vendor text	ro	String	29 byte	Additional information about the vendor.
18 (0x12)	Product name	ro	String	Max 32 byte	Complete product name.
19 (0x13)	Product ID	ro	String	8 byte	Vendor specific product ID (model).
20 (0x14)	Product text	ro	String	22 byte	Additional product information.
21 (0x15)	Serial number	ro	String	14 byte	Unique serial number of the device.
22 (0x16)	Hardware revision	ro	String	7 byte	Vendor specific hardware revision of the product.
23 (0x17)	Firmware revision	ro	String	7 byte	Vendor specific firmware revision of the product.
24 (0x18)	Application specific tag	rw	String	Max 32 byte	Application specific information.
25 (0x19)	Function tag	rw	String	Max 32 byte	Function specific information.
26 (0x1A)	Location tag	rw	String	Max 32 byte	Location specific information.
27 (0x1B)	Product URI	ro	String	32 byte	Link to a product page.
192 (0xC0)	Installation tag	rw	String	Max 32 byte	Installation specific information.

Parameters - IRP							
Index	Bit offset	Length	Parameter	Data type	Access	Value	Description
70 (0x46)		8 bits	IRP	RecordT	rw		
.1	0	8 bits	ByteOrder	UIntegerT	rw	0 1 2 3	Error Warning Info Debug

Parameters - Log

Index	Bit offset	Length	Parameter	Data type	Access	Value	Description
71 (0x47)		32 bits	Log	RecordT	rw		
.1	0	8 bits	Level	UIntegerT	rw	0 1 2 3	Error Warning Info Debug
.2	8	1 bit	DebugDefault	UIntegerT	rw	0 1	Off On
.3	9	1 bit	DebugSettings	UIntegerT	rw	0 1	Off On
.4	10	1 bit	DebugIrpTransport	UIntegerT	rw	0 1	Off On
.5	11	1 bit	DebugIrpMessages	UIntegerT	rw	0 1	Off On
.6	12	1 bit	DebugIrpInternal	UIntegerT	rw	0 1	Off On
.7	13	1 bit	DebugNurFW	UIntegerT	rw	0 1	Off On
	14	18 bits					Reserved

Parameters – Reader and antenna config

Index	Bit offset	Length	Parameter	Data type	Access	Value	Description
72 (0x48)		224 bits	ReaderConfig	RecordT	rw		
.1	208	16 bits	TagReadTimeoutMs	UIntegerT	rw	0..4000	
.2	192	16 bits	TagWriteTimeoutMs	UIntegerT	rw	0..4000	
.3	176	16 bits	TagLockTimeoutMs	UIntegerT	rw	0..4000	
.4	160	16 bits	TagKillTimeoutMs	UIntegerT	rw	0..4000	
.5	152	8 bits	RfProfile	UIntegerT	rw	0 1 2 3 4	HiSens Nominal Fast HiSpeed HiSpeed2
.6	144	8 bits	InventoryMinRssi	IntegerT	rw	-128..0	0=Disabled
.7	136	8 bits	TagopMinRssi	IntegerT	rw	-128..0	0=Disabled
.8	128	8 bits	NumAntennaConfigs	UIntegerT	rw	1	Only 1 antenna supported by the device.
.9	96	32 bits	AC[0]:Mask	OctetStringT	rw	0x1	Only 1 antenna supported by the device.
.10	80	16 bits	AC[0]:TransitTimeMs	UIntegerT	rw	0..4000	Actual max can be shorter in some regions.
.11	72	8 bits	AC[0]:DefaultPowerDbm	UIntegerT	rw	0..30	
.12	64	8 bits	AC[0]:TagReadPowerDbm	UIntegerT	rw	0..30 255	255 = Use DefaultPowerDbm
.13	56	8 bits	AC[0]:TagWritePowerDbm	UIntegerT	rw	0..30 255	255 = Use DefaultPowerDbm
.14	48	8 bits	AC[0]:InventoryQ	UIntegerT	rw	0..15	0=Automatic
.15	40	8 bits	AC[0]:InventoryTarget	UIntegerT	rw	0 1 2	A B AB

.16	32	8 bits	AC[0]:InventorySession	UIntegerT	rw	0 1 2 3	S0 S1 S2 S3
.17	24	8 bits	AC[0]:InventoryRounds	UIntegerT	rw	0..10	0=Automatic
	0	24 bits					Reserved

Parameters – Inventory read config

Index	Bit offset	Length	Parameter	Data type	Access	Value	Description
73 (0x49)		64 bits	InventoryReadConfig	RecordT	rw		
.1	56	8 bits	Enable	UIntegerT	rw	0 1	Disable Enable
.2	48	8 bits	Bank	UIntegerT	rw	0 1 2 3	Password EPC TID User
.3	40	8 bits					Reserved
.4	32	8 bits	ReadLengthBytes	UIntegerT	rw		
.5	0	32 bits	AddressBytes	UIntegerT	rw		

Parameters – Inventory select mask config

Index	Bit offset	Length	Parameter	Data type	Access	Value	Description
74 (0x4A)		1312 bits	InventorySelectMaskConfig	RecordT	rw		
.1	1304	8 bits	Enabled	UIntegerT	rw	0 1	Disabled Enabled
.2	1296	8 bits	InventorySelectState	UIntegerT	rw	0 2 3	All NotSL SL
.3	1288	8 bits					Reserved
.4	1280	8 bits	NumSelectMasks	UIntegerT	rw	0..4	
.5	1272	8 bits	Mask[0]:Target	UIntegerT	rw	0 1 2 3 4	S0 S1 S2 S3 SL
.6	1264	8 bits	Mask[0]:Action	UIntegerT	rw	0 1 2 3 4 5 6 7	A0 A1 A2 A3 A4 A5 A6 A7
.7	1256	8 bits	Mask[0]:Bank	UIntegerT	rw	0 1 2 3	Password EPC TID User
.8	1248	8 bits	Mask[0]:LenBits	UIntegerT			
.9	1216	32 bits	Mask[0]:AddressBits	UIntegerT			
.10	960	256 bits	Mask[0]:Data	OctetStringT			
.11	952	8 bits	Mask[1]:Target	UIntegerT	rw	0 1 2 3 4	S0 S1 S2 S3 SL

.12	944	8 bits	Mask[1]:Action	UIntegerT	rw	0 1 2 3 4 5 6 7	A0 A1 A2 A3 A4 A5 A6 A7
.13	936	8 bits	Mask[1]:Bank	UIntegerT	rw	0 1 2 3	Password EPC TID User
.14	928	8 bits	Mask[1]:LenBits	UIntegerT			
.15	896	32 bits	Mask[1]:AddressBits	UIntegerT			
.16	640	256 bits	Mask[1]:Data	OctetStringT			
.17	632	8 bits	Mask[2]:Target	UIntegerT	rw	0 1 2 3 4	S0 S1 S2 S3 SL
.18	624	8 bits	Mask[2]:Action	UIntegerT	rw	0 1 2 3 4 5 6 7	A0 A1 A2 A3 A4 A5 A6 A7
.19	616	8 bits	Mask[2]:Bank	UIntegerT	rw	0 1 2 3	Password EPC TID User
.20	608	8 bits	Mask[2]:LenBits	UIntegerT			
.21	576	32 bits	Mask[2]:AddressBits	UIntegerT			
.22	320	256 bits	Mask[2]:Data	OctetStringT			
.23	312	8 bits	Mask[3]:Target	UIntegerT	rw	0 1 2 3 4	S0 S1 S2 S3 SL

.24	304	8 bits	Mask[3]:Action	UIntegerT	rw	0 1 2 3 4 5 6 7	A0 A1 A2 A3 A4 A5 A6 A7
.25	296	8 bits	Mask[3]:Bank	UIntegerT	rw	0 1 2 3	Password EPC TID User
.26	288	8 bits	Mask[3]:LenBits	UIntegerT			
.27	256	32 bits	Mask[3]:AddressBits	UIntegerT			
.28	0	256 bits	Mask[3]:Data	OctetStringT			

Diagnosis

Index	Parameter	Access	Data type	Length	Description
36 (0x24)	Device status	ro	UInteger	8 bit	Indicates the current device status: 0 = Device OK 1 = Maintenance required 2 = Out of specification 3 = Functional check 4 = Failure
37 (0x25)	Detailed device status	ro	Array	15 byte	List of pending events in the device.
	Element 1 (sub 1)		Octetstr	3 byte	
	Element 2 (sub 2)		Octetstr	3 byte	
	Element 3 (sub 3)		Octetstr	3 byte	
	Element 4 (sub 4)		Octetstr	3 byte	
	Element 5 (sub 5)		Octetstr	3 byte	
32 (0x20)	Error count	ro	UInteger	2 byte	Counter for ERROR type events occurred since boot up.
66 (0x42)	Operational temperature	ro	UInteger	2 byte	Current operational temperature of a device in Celsius.

Observation

Index	Parameter	Access	Data type	Length	Description
40 (0x28)	PD input	ro	Record	6 byte	Last valid process input data.
41 (0x29)	PD output	ro	Record	2 byte	Last valid process output data

Command interface

Index	Parameter	Access	Data type	Length	Value	Description
2 (0x02)	System command	wo	UInteger	8 bit	See command value	Command interface for applications.

Command value	Command	Description
126 (0x7E)	Locator start	Starts the Locator indication using led bars (bling green).
127 (0x7F)	Locator stop	Stops the Locator indication.
129 (0x81)	Application reset	IRP and logging level parameters are set to defaults. Identification parameters will remain unchanged.
131 (0x83)	Back-to-box	All the parameters of the device are set to factory default and communication of an IO-link interface is halted. Note: Remove the device from the master port after command.
160 (0xA0)	Reboot	Device will reboot itself.

Event codes

Code	Type	Name	Description
20480 (0x5000)	Error	Hardware error	Device hardware fault – device exchange.

Error codes			
Code	Additional code	Name	Description
128 (0x80)	17 (0x11)	Index not available	Read or write access attempt to a non-existing index.
128 (0x80)	18 (0x12)	Subindex not available	Read or write access attempt to a non-existing subindex of an existing index.
128 (0x80)	32 (0x20)	Service temporarily not available	Parameter not accessible due to the current state of the technology-specific application.
128 (0x80)	33 (0x21)	Service temporarily not available - local control	Parameter not accessible. The device is currently ongoing, locally controlled operation.
128 (0x80)	34 (0x22)	Service temporarily not available - device control	Parameter not accessible. The technology-specific application is currently in a remotely triggered operation.
128 (0x80)	35 (0x23)	Access denied	Write access to a read-only parameter or read access to write-only parameter.
128 (0x80)	48 (0x30)	Parameter value out of range	Written parameter value is outside of the permitted value range.
128 (0x80)	49 (0x31)	Parameter value above limit	Written parameter value is above its specified value range.
128 (0x80)	50 (0x32)	Parameter value below limit	The written parameter value is below its specified value range.
128 (0x80)	51 (0x33)	Parameter length overrun	The written parameter is longer than specified.
128 (0x80)	52 (0x34)	Parameter length underrun	Written parameter is shorter than specified.
128 (0x80)	53 (0x35)	Function not available	Written command is not supported by technology-specific application.
128 (0x80)	54 (0x36)	Function temporarily unavailable	Written command is unavailable due to the current state of the technology-specific application.
128 (0x80)	64 (0x40)	Invalid parameter set	Written single parameter value collides with other existing parameter settings.
128 (0x80)	65 (0x41)	Inconsistent parameter set	Parameter set inconsistencies at the end of block parameter transfer. Device plausibility check failed.

Reading tags

To perform a normal inventory operation, it is required that Inventory request command is sent to a device. As a parameter to this request, you can set the stop conditions and define which types of events you want to receive from the device and from which antennas (IOX100 only has one internal antenna). There are three types of tag events which are relevant to IOX100 reader. Recommendation is to only use events which are needed for the specific use case. With inventory request command it is also possible to set a certain cycle time value. This defines the interval time between sequential inventory rounds. 0 means no interval between inventory rounds.

Note that IO-link interface is slow by nature which might cause event buffer to go full. The size of the event buffer is 200 messages. A full buffer is indicated by the device's status LED and by the status mask in the PDIn. In this case the reader will start to throttle the tag reading.

Tag read events

Global visibility event

This event is generated when a new tag is seen by the reader. The direction in this case for the tag is IN. If tag is not seen within a time defined by the event tag timeout, a new event is generated with a direction of OUT.

RSSI delta threshold event

This event is generated when tags RSSI value changes more than what is defined as a RSSI delta threshold value.

Seen count interval event

This event is generated when same tag is seen as many times as defined by the seen count interval value (and multiples of that).

Antenna visibility event

Not relevant to IOX100 reader as it only has one antenna. Thus, this type of event should not be used.

Stop conditions

Stop cycle limit

The reader will continue to read tags until it has performed the number of inventory rounds defined by the stop cycle limit.

Stop tag limit

The reader will continue to read tags until it has found the number of unique tags defined by the stop tag limit.

Stop static timeout

The reader will continue to read tags until the time defined by the stop static timeout has elapsed.

Stop no new tags timeout

The reader will continue to read tags until the time defined by the stop no new tags timeout has elapsed since the last found new tag.

Note that if there is no stop conditions defined, the reader will continue to read until IRP stop command is sent.

System commands

Brady IOX100 supports back-to-box and application reset commands. Back-to-box command resets all the device's settings and parameters to default and stops the IO-link stack operations. After the command is executed, the device will start to blink RED in the Link status LED: This indicates that device can now be disconnected from the cable.

Application reset command resets IRP and Logging level settings to defaults but not the identification data.

In addition to reset commands, IOX100 is supporting Locator start and stop commands. Locator can be used to identify which device is in question. The device will start to blink green with process LED bars when command is executed. Stop command will stop the blinking.

Status and process LED indications

Device has three status LEDs to indicate the operation state of a reader. The following table shows the meaning of the LEDs. Additionally, to the status LEDs, IOX100 has two high visibility process LED bars which can be controlled by the host PLC. Process LED bars can be controlled by setting 6 lowest bits from the process output data.

LED	STATE	DESCRIPTION
PWR	Stable blue	Device in bootloader
PWR	Blinking blue	Device in bootloader and FW update ongoing (during flash writing stable green)

PWR	Stable green	Device is in application
PWR	Stable red	Critical error state (while in application)
LINK	Blinking green	Waiting for the master to connect
LINK	Stable green	IO-link connection active
LINK	Stable red	Message buffer is full
LINK	Blinking red	IO-link transceiver chip in fault state
ACT	Green	RF-operation is being performed

PROCESS DATA OUTPUT	SIDE	DESCRIPTION
Bit 0	Left	Red
Bit 1	Left	Green
Bit 2	Left	Blue
Bit 3	Right	Red
Bit 4	Right	Green
Bit 5	Right	Blue
Bit 7		Reserved
...		Reserved
Bit 15		Reserved

Firmware Update

Brady IOX100 supports a standardized FW update profile which enables all the IO-link masters supporting this feature to update the IOX100 firmware. One of those master's which do support this is the TMG USB IO-link master V2 SE.

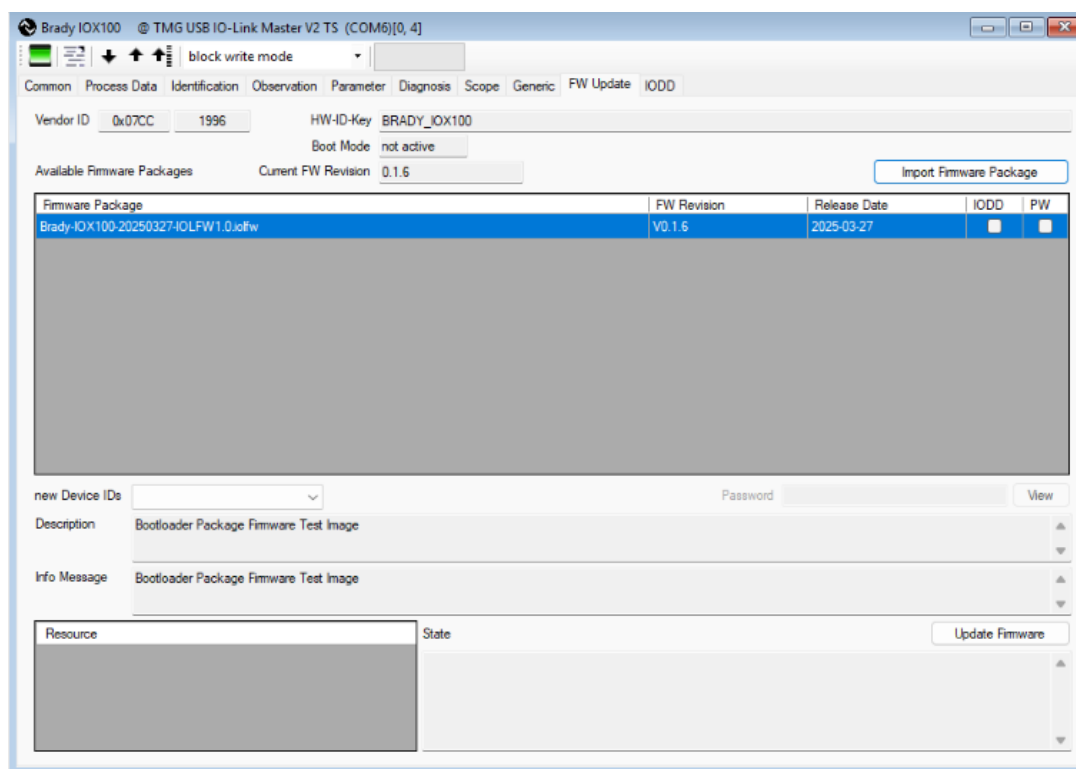


Figure 4-1. FW update using TMG Device Tool.

5 Industrial Reader Protocol (IRP)

This section describes the Brady Industrial Reader Protocol, a request/response message interface.

Message Types and Responses

The message type names refer to entries within the `IRP_MsgType` enum.

Payload names refer to structs with the `IRP_MsgPayload_` prefix.

MESSAGE TYPE	MESSAGE PAYLOAD	RESPONSE TYPE
0x00: Ignore	-	-
0x10: GetReaderCapabilitiesReq	-	GetReaderCapabilitiesResp or ErrorCodeResp on error
0x11: GetReaderConfigReq	-	GetReaderConfigResp or ErrorCodeResp on error
0x12: SetReaderConfigReq	ReaderConfig	ErrorCodeResp
0x13: GetInventoryReadConfigReq	-	GetInventoryReadConfigResp or ErrorCodeResp on error
0x14: SetInventoryReadConfigReq	InventoryReadConfig	ErrorCodeResp
0x15: GetInventorySelectMaskConfigReq	-	GetInventorySelectMaskConfigResp or ErrorCodeResp on error
0x16: SetInventorySelectMaskConfigReq	InventorySelectMaskConfig	ErrorCodeResp
0x17: InventoryReq	InventoryReq	ErrorCodeResp
0x18: TagOpSelectMaskReq	TagOpSelectMaskReq	ErrorCodeResp
0x1a: TagOpReadReq	TagOpReadReq	TagOpReadResp or ErrorCodeResp on error
0x1b: TagOpWriteReq	TagOpWriteReq	ErrorCodeResp
0x1c: TagOpLockReq	TagOpLockReq	ErrorCodeResp
0x1d: TagOpKillReq	TagOpKillReq	ErrorCodeResp
0x1e: StopAllReq	StopAllReq	ErrorCodeResp
0x1f: SaveConfigReq	-	ErrorCodeResp

MESSAGE TYPE	MESSAGE PAYLOAD	RESPONSE TYPE
0x40: ErrorCodeResp	ErrorCode	-
0x41: GetReaderCapabilitiesResp	ReaderCapabilities	-
0x42: GetReaderConfigResp	ReaderConfig	-
0x43: GetInventoryReadConfigResp	InventoryReadConfig	-
0x44: GetInventorySelectMaskConfigResp	InventorySelectMaskConfig	-
0x45: TagOpReadResp	TagOpReadResp	-
0x80: InventoryGlobalVisibilityEvent		
0x81: InventoryAntennaVisibilityEvent		
0x82: InventoryRssiDeltaThresholdEvent		
0x83: InventorySeenCountIntervalEvent		

Global Definitions

The following table lists the global definitions in IRP.

ITEM	VALUE
IRP_REVISION	3
IRP_MAX_MSG_LEN	188
IRP_MAX_ANTENNAS	1
IRP_MAX_EPC_LEN	64
IRP_MAX_DATA_LEN	64
IRP_MAX_EPCDATA_LEN	128
IRP_MAX_SELMASK_LEN	32
IRP_MAX_CAPSTR_LEN	16
IRP_MAX_INV_SELMASKS	4

ITEM	VALUE
IRP_MAX_READ_BYTES	180
IRP_MAX_WRITE_BYTES	166
IRP_MAX_TIMEOUT_MS	4000
IRP_DEFAULT_TIMEOUT_MS	500

Enum Data Types

The following tables list and describe the ENUM data types in IRP.

ENUM	TYPE
IRP_MsgType	uint16_t
IRP_Direction	uint8_t
IRP_ErrorCode	uint32_t
IRP_EventMask	uint32_t
IRP_InventorySelState	uint8_t
IRP_InventorySession	uint8_t
IRP_InventoryTarget	uint8_t
IRP_RfProfile	uint8_t
IRP_SelectAction	uint8_t
IRP_SelectTarget	uint8_t
IRP_StopFlags	uint8_t
IRP_TagBank	uint8_t

IRP_MsgType

NAME	VALUE
IRP_MsgType_Ignore	0x00
IRP_MsgType_GetReaderCapabilitiesReq	0x10
IRP_MsgType_GetReaderConfigReq	0x11
IRP_MsgType_SetReaderConfigReq	0x12
IRP_MsgType_GetInventoryReadConfigReq	0x13
IRP_MsgType_SetInventoryReadConfigReq	0x14
IRP_MsgType_GetInventorySelectMaskConfigReq	0x15
IRP_MsgType_SetInventorySelectMaskConfigReq	0x16
IRP_MsgType_InventoryReq	0x17
IRP_MsgType_TagOpSelectMaskReq	0x18
IRP_MsgType_TagOpReadReq	0x1a
IRP_MsgType_TagOpWriteReq	0x1b
IRP_MsgType_TagOpLockReq	0x1c
IRP_MsgType_TagOpKillReq	0x1d
IRP_MsgType_StopAllReq	0x1e
IRP_MsgType_SaveConfigReq	0x1f
IRP_MsgType_ErrorCodeResp	0x40
IRP_MsgType_GetReaderCapabilitiesResp	0x41
IRP_MsgType_GetReaderConfigResp	0x42
IRP_MsgType_GetInventoryReadConfigResp	0x43
IRP_MsgType_GetInventorySelectMaskConfigResp	0x44
IRP_MsgType_TagOpReadResp	0x45
IRP_MsgType_InventoryGlobalVisibilityEvent	0x80
IRP_MsgType_InventoryAntennaVisibilityEvent	0x81

NAME	VALUE
IRP_MsgType_InventoryRssiDeltaThresholdEvent	0x82
IRP_MsgType_InventorySeenCountIntervalEvent	0x83

IRP_Direction

NAME	VALUE	COMMENT
IRP_Direction_IN	1	Tag arrived
IRP_Direction_OUT	0	Tag left

IRP_ErrorCode

NAME	VALUE	COMMENT
IRP_ErrorCode_SUCCESS	0	
IRP_ErrorCode_EUNKNOWN	1	Unexpected error received from NurAPI
IRP_ErrorCode_EREVISION	2	Requested revision is newer than installed firmware
IRP_ErrorCode_EINVAL	3	Invalid argument for received message type/revision
IRP_ErrorCode_EBUSY	4	
IRP_ErrorCode_EINTERNAL	5	Internal error, either Inventory task or Nur module not responding
IRP_ErrorCode_EDENIED	6	If LocalParametrization is locked
IRP_ErrorCode_EHWERR	20	
IRP_ErrorCode_EHIREFLECTIONS	21	
IRP_ErrorCode_ELOWVOLTAGE	22	
IRP_ErrorCode_EOVERTEMP	23	
IRP_ErrorCode_ETAGNOTFOUND	40	
IRP_ErrorCode_ETAGACCESS	41	Wrong password

NAME	VALUE	COMMENT
IRP_ErrorCode_ETAGMEMOVERRUN	42	
IRP_ErrorCode_ETAGMEMLOCKED	43	
IRP_ErrorCode_ETAGINSUFPOWER	44	
IRP_ErrorCode_ETAGSELECT	45	
IRP_ErrorCode_ETAGREAD	46	
IRP_ErrorCode_ETAGREADPARTIAL	47	

IRP_EventMask

The values must be maskable bit fields.

NAME	VALUE	COMMENT
IRP_EventMask_InventoryGlobalVisibility	0x01	Triggered when tag appears and disappears (not seen within a defined timeout).
IRP_EventMask_InventoryAntennaVisibility	0x02	In addition to above, event is triggered when tag changes between antennas.
IRP_EventMask_InventoryRssiDeltaThreshold	0x04	Triggered when tag's RSSI value changes more than the defined threshold.
IRP_EventMask_InventorySeenCountInterval	0x08	Triggered when tag has been read as many times as defined by interval value (and multiples of that).

IRP_InventorySelState

NAME	VALUE	COMMENT
IRP_InventorySelState_All	0	All tags respond, ignoring SL flag
IRP_InventorySelState_NotSL	2	Only tags with SL de-asserted responds
IRP_InventorySelState_SL	3	Only tags with SL asserted responds

IRP_InventorySession

NAME	VALUE
IRP_InventorySession_S0	0
IRP_InventorySession_S1	1
IRP_InventorySession_S2	2
IRP_InventorySession_S3	3

IRP_InventoryTarget

NAME	VALUE	COMMENT
IRP_InventoryTarget_A	0	Query tags with inventoried flag set to A
IRP_InventoryTarget_B	1	Query tags with inventoried flag set to B
IRP_InventoryTarget_AB	2	Query tags with inventoried flag set to A or B

IRP_RfProfile

NAME	VALUE
IRP_RfProfile_HiSens	0
IRP_RfProfile_Nominal	1
IRP_RfProfile_Fast	2
IRP_RfProfile_HiSpeed	3
IRP_RfProfile_HiSpeed2	4

IRP_SelectAction

NAME	VALUE	COMMENT
IRP_SelectAction_A0	0	Matching tags: assert SL or inventoried session flag -> A. Non-matching: de-assert SL or inventoried session flag -> B
IRP_SelectAction_A1	1	Matching tags: assert SL or inventoried session flag -> A. Non-matching: do nothing
IRP_SelectAction_A2	2	Matching tags: do nothing. Non-matching: de-assert SL or inventoried session -> B
IRP_SelectAction_A3	3	Matching tags: negate SL or invert inventoried session flag (A->B, B->A). Non-matching: do nothing
IRP_SelectAction_A4	4	Matching tags: de-assert SL or inventoried session flag -> B. Non-matching: assert SL or inventoried session flag -> A
IRP_SelectAction_A5	5	Matching tags: de-assert SL or inventoried session flag -> B. Non-matching: assert SL or inventoried session flag -> A
IRP_SelectAction_A6	6	Matching tags: do nothing. Non-matching: assert SL or inventoried session flag -> A

IRP_SelectTarget

NAME	VALUE
IRP_SelectTarget_S0	0
IRP_SelectTarget_S1	1
IRP_SelectTarget_S2	2
IRP_SelectTarget_S3	3
IRP_SelectTarget_SL	4

IRP_StopFlags

NAME	VALUE	COMMENT
IRP_StopFlags_ClearEventBuffer	0x01	Remove queued events from the send buffer

IRP_TagBank

NAME	VALUE
IRP_TagBank_Password	0
IRP_TagBank_EPC	1
IRP_TagBank_TID	2
IRP_TagBank_User	3

Data Structures

The following tables describe the data structures used in IRP.

IRP_AntennaConfig

OFFSET	SIZE	TYPE	ITEM	COMMENT
0	4	uint32_t	antennaMask	Defines the antenna(s) which this configuration is applied to
4	2	uint16_t	transitTimeMs	Defines the maximum time the reading is performed
6	1	uint8_t	defaultPowerDbm	Power used during inventory. Default power for tag operations if not defined separately
7	1	uint8_t	tagReadPowerDbm	Power used during tag read operations. Set 255 to use defaultPowerDbm
8	1	uint8_t	tagWritePowerDbm	Power used during tag write/lock/kill operations. Set 255 to use defaultPowerDbm
9	1	uint8_t	inventoryQ	Defines the Q-value used in the inventory. Set 0 for automatic
10	1	uint8_t	inventoryTarget	Defines the target parameter used in the inventory
11	1	uint8_t	inventorySession	Defines the session parameter used in the inventory
12	1	uint8_t	inventoryRounds	Defines the number of rounds done within one inventory cycle. Set 0 for automatic
13	1	uint8_t	reserved0	
14	1	uint8_t	reserved1	
15	1	uint8_t	reserved2	
Total	16	bytes		

IRP_InventoryEventTag

OFFSET	SIZE	TYPE	ITEM	COMMENT
0	8	uint64_t	firstSeenTime	Indicates the time when the tag was first seen
8	8	uint64_t	lastSeenTime	Indicates the time when the tag was last seen
16	4	uint32_t	seenCount	Indicates how many times the tag has been read
20	4	uint32_t	freq	Tag's reply frequency
24	2	int16_t	phaseDiff	Tag's reply phase difference value
26	1	uint8_t	antennald	ID of the antenna which read the tag
27	1	int8_t	rssi	Tag's reply received signal strength indication
28	2	uint16_t	pc	Protocol control bits
30	1	uint8_t	dataLen	Length of the data content
31	1	uint8_t	epcLen	Length of the EPC content
32	128	uint8_t[IRP_MAX_EPCDATA_LEN]	epcData	Tag's EPC (+data if InventoryRead is enabled)
Total	160	bytes		

IRP_InventorySelectMask

OFFSET	SIZE	TYPE	ITEM	COMMENT
0	1	uint8_t	target	One of IRP_SelectTarget
1	1	uint8_t	action	One of IRP_SelectAction
2	1	uint8_t	bank	One of IRP_TagBank
3	1	uint8_t	maskLenBits	Length of the inventory select mask
4	4	uint32_t	addressBits	Address of the inventory select mask
8	32	uint8_t[IRP_MAX_SELMASK_LEN]	maskData	Inventory select mask
Total	40	bytes		

IRP_MsgHeader

OFFSET	SIZE	TYPE	ITEM	COMMENT
0	2	uint16_t	type	One of IRP_MsgType
2	2	uint16_t	id	request ID: responses use matching ID, events use zero here
4	2	uint16_t	revision	IRP protocol revision
6	2	uint16_t	reserved	
8	0	uint8_t[0]	payload	
Total	8	bytes		

IRP_MsgPayload_ReaderCapabilities

OFFSET	SIZE	TYPE	ITEM	COMMENT
0	4	int32_t	minPowerDbm	Minimum power level setting supported by the reader
4	4	int32_t	maxPowerDbm	Maximum power level setting supported by the reader
8	4	int32_t	stepDb	Size of the power adjustment step
12	1	uint8_t	region	Defines the operating region. Note that this is pre-configured based on SKU and is locked
13	1	uint8_t	maxNumAntennas	Maximum number of antennas supported by the reader
14	1	uint8_t	readerIdLen	Length of the reader ID variable
15	1	uint8_t	icssFwVersionLen	Length of the ICSS firmware variable
16	1	uint8_t	rfidFwVersionLen	Length of the RFID firmware variable
17	1	uint8_t	modelNameLen	Length of the reader model variable
18	16	char[IRP_MAX_CAPSTR_LEN]	readerId	Reader ID
34	16	char[IRP_MAX_CAPSTR_LEN]	icssFwVersion	ICSS firmware version
50	16	char[IRP_MAX_CAPSTR_LEN]	rfidFwVersion	RFID firmware version
66	16	char[IRP_MAX_CAPSTR_LEN]	modelName	Reader model

OFFSET	SIZE	TYPE	ITEM	COMMENT
82	1	uint8_t	irpRevision	
83	1	uint8_t	reserved1	
Total	84	bytes		

IRP_MsgPayload_ReaderConfig

OFFSET	SIZE	TYPE	ITEM	COMMENT
0	2	uint16_t	tagReadTimeoutMs	Set 0 to use IRP_DEFAULT_TIMEOUT_MS
2	2	uint16_t	tagWriteTimeoutMs	Set 0 to use IRP_DEFAULT_TIMEOUT_MS
4	2	uint16_t	tagLockTimeoutMs	Set 0 to use IRP_DEFAULT_TIMEOUT_MS
6	2	uint16_t	tagKillTimeoutMs	Set 0 to use IRP_DEFAULT_TIMEOUT_MS
8	1	uint8_t	rfProfile	Defines the used RF-profile.
9	1	int8_t	inventoryMinRssi	Defines minimum signal strength for tag's inclusion in inventory operation. Set 0 to disable.
10	1	int8_t	tagOpMinRssi	Defines minimum signal strength for tag's inclusion in tag operation. Set 0 to disable.
11	1	uint8_t	numAntennaConfigs	The number of unique antenna configurations which will be set to the reader
12	16	IRP_AntennaConfig[IRP_MAX_ANTENNAS]	antennaConfigs	
Total	28	bytes		

IRP_MsgPayload_ErrorCode

OFFSET	SIZE	TYPE	ITEM	COMMENT
0	4	UInt32_t	errorCode	One of IRP_ErrorCode
Total	4	bytes		

IRP_MsgPayload_InventoryReq

OFFSET	SIZE	TYPE	ITEM	COMMENT
0	4	uint32_t	antennaMask	Defines which antenna(s) to be used for reading
4	4	uint32_t	cycleTimeMs	Defines the minimum time between sequential inventory operations
8	4	uint32_t	stopTagLimit	If set, reading will stop when set number of tags is found
12	4	uint32_t	stopCycleLimit	If set, reading will stop when set number of inventory operations is done
16	4	uint32_t	stopStaticTimeoutMs	If set, reading will stop when set time is expired
20	4	uint32_t	stopNoNewTagsTimeoutMs	If set, reading will stop when no new tags found within the defined timeout
24	4	uint32_t	eventMask	Multiple of IRP_EventMask
28	4	uint32_t	eventTagTimeoutMs	Defines the timeout used by the visibility and antenna events
32	4	uint32_t	eventAntennaMask	Defines the antenna(s) which will be considered when generating inventory antenna visibility events
36	1	uint8_t	eventRssiThreshold	Defines the RSSI threshold which triggers the RSSI threshold event
37	1	uint8_t	eventSeenCountInterval	Defines the seen count interval which triggers the seen count event
38	1	uint8_t	reserved0	
39	1	uint8_t	reserved1	
Total	40	bytes		

IRP_MsgPayload_InventorySelectMaskConfig

OFFSET	SIZE	TYPE	ITEM	COMMENT
0	1	uint8_t	enabled	SelectMask is active if enabled and numSelectMasks > 0
1	1	uint8_t	inventorySelState	One of IRP_InventorySelState
2	1	uint8_t	reserved0	
3	1	uint8_t	numSelectMasks	range: 0..IRP_MAX_INV_SELMASKS
4	40	IRP_InventorySelectMask[IRP_MAX_INV_SELMASKS]	selectMasks	

OFFSET	SIZE	TYPE	ITEM	COMMENT
Total	164	bytes		

IRP_MsgPayload_InventoryReadConfig

OFFSET	SIZE	TYPE	ITEM	COMMENT
0	1	uint8_t	enabled	Enable or disable the inventory read functionality
1	1	uint8_t	bank	One of IRP_TagBank
2	2	Uint16_t	readLenBytes	Defines the read length. Must be even. Set 0 to read whole bank
4	4	uint32_t	addressBytes	Defines the read address. Must be even
Total	8	bytes		

IRP_MsgPayload_TagOpSelectMaskReq

OFFSET	SIZE	TYPE	ITEM	COMMENT
0	1	uint8_t	enabled	SelectMask is active if enabled and numSelectMasks > 0
1	1	uint8_t	bank	One of IRP_TagBank
2	2	uint16_t	maskLenBits	Length of the tag operation select mask
4	4	uint32_t	addressBits	Address of the tag operation select mask
8	32	uint8_t[IRP_MAX_SELMASK_LEN]	maskData	Tag operation select mask
Total	40	bytes		

IRP_MsgPayload_TagOpReadReq

OFFSET	SIZE	TYPE	ITEM	COMMENT
0	4	uint32_t	antennaMask	Defines the used antenna(s) for the operation. Set 0 to use all

OFFSET	SIZE	TYPE	ITEM	COMMENT
				configured antennas
4	4	uint32_t	accessPasswd	Tag access password. Set 0 to disable
8	1	uint8_t	bank	One of IRP_TagBank
9	1	uint8_t	reserved0	
10	2	UInt16_t	readLenBytes	Defines the read length. Must be even. Set 0 to read whole bank
12	4	uint32_t	addressBytes	Defines the read address. Must be even
Total	16	bytes		

IRP_MsgPayload_TagOpReadResp

OFFSET	SIZE	TYPE	ITEM	COMMENT
0	2	uint16_t	numReadBytes	
2	180	uint8_t[IRP_MAX_READ_BYTES]	readBytes	
Total	182	bytes		

IRP_MsgPayload_TagOpWriteReq

OFFSET	SIZE	TYPE	ITEM	COMMENT
0	4	uint32_t	antennaMask	Defines the used antenna(s) for the operation. Set 0 to use all configured antennas
4	4	uint32_t	accessPasswd	Tag access password. Set 0 to disable
8	1	uint8_t	bank	One of IRP_TagBank
9	1	uint8_t	reserved0	
10	2	uint16_t	writeLenBytes	Defines the write length. Must be even
12	4	uint32_t	addressBytes	Defines the write address. Must be even
16	166	uint8_t[IRP_MAX_WRITE_BYTES]	writeBytes	Write data

OFFSET	SIZE	TYPE	ITEM	COMMENT
Total	182	bytes		

IRP_MsgPayload_TagOpLockReq

OFFSET	SIZE	TYPE	ITEM	COMMENT
0	4	uint32_t	antennaMask	Defines the used antenna(s) for the operation. Set 0 to use all configured antennas
4	4	uint32_t	accessPasswd	Tag access password
8	2	uint16_t	mask	
10	2	uint16_t	action	
Total	12	bytes		

IRP_MsgPayload_TagOpKillReq

OFFSET	SIZE	TYPE	ITEM	COMMENT
0	4	uint32_t	antennaMask	Defines the used antenna(s) for the operation. Set 0 to use all configured antennas
4	4	uint32_t	killPasswd	Tag kill password. Required
Total	8	bytes		

IRP_MsgPayload_StopAllReq

OFFSET	SIZE	TYPE	ITEM	COMMENT
0	1	Uint8_t	stopFlags	Multiple of IRP_StopFlags
Total	1	byte		

IRP_MsgPayload_InventoryAntennaVisibilityEvent

OFFSET	SIZE	TYPE	ITEM	COMMENT
0	8	uint64_t	timestamp	MS resolution of UNIX time (UTC)
8	160	IRP_InventoryEventTag	tagInfo	
168	1	uint8_t	antennaId	range: 1..IRP_MAX_ANTENNAS
169	1	uint8_t	direction	One of IRP_Direction
170	1	uint8_t	reserved0	
171	1	uint8_t	reserved1	
172	1	uint8_t	reserved2	
173	1	uint8_t	reserved3	
174	1	uint8_t	reserved4	
175	1	uint8_t	reserved5	
Total	176	bytes		

IRP_MsgPayload_InventoryGlobalVisibilityEvent

OFFSET	SIZE	TYPE	ITEM	COMMENT
0	8	uint64_t	timestamp	MS resolution of UNIX time (UTC)
8	160	IRP_InventoryEventTag	tagInfo	
168	1	uint8_t	direction	One of IRP_Direction
169	1	uint8_t	reserved0	
170	1	uint8_t	reserved1	
171	1	uint8_t	reserved2	
172	1	uint8_t	reserved3	
173	1	uint8_t	reserved4	
174	1	uint8_t	reserved5	

OFFSET	SIZE	TYPE	ITEM	COMMENT
175	1	uint8_t	reserved6	
Total	176	bytes		

IRP_MsgPayload_InventoryRssiDeltaThresholdEvent

OFFSET	SIZE	TYPE	ITEM	COMMENT
0	8	uint64_t	timestamp	MS resolution of UNIX time (UTC)
8	160	IRP_InventoryEventTag	tagInfo	
168	1	int8_t	prevRssi	
169	1	uint8_t	reserved0	
170	1	uint8_t	reserved1	
171	1	uint8_t	reserved2	
172	1	uint8_t	reserved3	
173	1	uint8_t	reserved4	
174	1	uint8_t	reserved5	
175	1	uint8_t	reserved6	
Total	176	bytes		

IRP_MsgPayload_InventorySeenCountIntervalEvent

OFFSET	SIZE	TYPE	ITEM	COMMENT
0	8	uint64_t	timestamp	MS resolution of UNIX time (UTC)
8	160	IRP_InventoryEventTag	tagInfo	
168	4	uint32_t	prevSeenCount	
172	1	uint8_t	reserved0	

OFFSET	SIZE	TYPE	ITEM	COMMENT
173	1	uint8_t	reserved1	
174	1	uint8_t	reserved2	
175	1	uint8_t	reserved3	
Total	176	bytes		

6 Data exchange with the PLC

Brady can provide support and sample projects to help with the integration of the IOX100. Samples and function blocks are available for the following environments.

TIO Portal

Sample project for TIO portal V18/V19 using Siemens S7-1500/1200 PLCs are available upon request.

Studio 5000

Sample project for Studio 5000 using Allen-Bradley PLC is available upon request

A Regulatory Compliance

Regional Settings

Regional regulatory agencies such as ETSI and FCC have defined rules and requirements for UHF RFID readers, which specify the operating frequencies, output power, and other RF parameters that are permitted.

Brady UHF RFID readers support the operating frequency range 860 – 960 MHz. Some readers cover the full operating frequency band, while others support two sub bands: 868 ETSI band (865.6 - 867.6 MHz) and 915 FCC band (902 – 928 MHz).

To ensure that Brady products comply with local regulations throughout their lifespan, devices with UHF RFID functionality are locked to predefined regional settings based on the region to which it is sold. For example, if a device is sold to a customer in Europe, its settings are configured and locked to the ETSI requirements. Similarly, if the device is sold to a customer in Australia, it is locked to the settings required in Australia.

CE

Hereby, Nordic ID, a Brady Company, declares that this device is in compliance with the essential requirements and other relevant provisions of:

- RED: 2014/53/EU
- EMC: 2014/30/EU
- LVD: 2014/35/EU
- RoHS: 2011/65/EU

FCC/IC

The Brady IOX100 RFID device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

WARNING: Changes or modifications not expressly approved by the party responsible for compliance can void the user's authority to operate the equipment.

The IOX100 RFID device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference.

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

- 1) L'appareil ne doit pas produire de brouillage;*
- 2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.*

RF Exposure

This equipment complies with the EU, FCC and IC RF radiation exposure limits set forth for an uncontrolled environment under the following conditions:

The IOX100 device should be installed and operated such that a minimum separation distance of 30.1 cm (12 inches) is maintained between the antenna and the body of the user or other nearby persons at all times.

Cet équipement est conforme aux limites d'exposition aux rayonnements RF de l'UE, de la FCC et de l'IC établies pour un environnement non contrôlé dans les conditions suivantes:

IOX100 doit être installé et utilisé de manière à ce qu'une distance de séparation minimale de 30.1cm soit maintenue à tout moment entre l'antenne et le corps de l'utilisateur / de la personne proche.

B Related Documents and Content

- Brady IOX100 datasheet
- Brady IOX100 Quick Guide
- Safety and Regulations Guide
- GitHub organization for developers (<https://github.com/NordicID>)