



**ILR Series i-Q310 Transponders
Models CST/SET/ATR/LPT/DRT/ATN
Installation and Operation Manual**



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Radio Frequency Compliance Statement

IDEN TEC SOLUTIONS is the responsible party for the compliance of the following devices:

MODELS:	i-Q310 CST, i-Q310 SET, i-Q310 ATR, i-Q310 LPT, i-Q310, i-Q310 DRT, i-Q310 ATN
EUROPE:	CE
USA	FCC, HERO
Canada	Industry Canada

USA: FCC ID OO4-IQ310 for Models i-Q310 SET, i-Q310 ATR, i-Q310 LPT, i-Q310 DRT

FCC ID OO4-IQ310CST for Model i-Q310 CST

FCC ID OO4-IQ310ATN for Model i-Q310 ATN

Industry Canada: IC:3538A-IQ310 for Models i-Q310 SET, i-Q310 ATR, i-Q310 LPT, i-Q310 DRT

IC:3538A-IQ310CST for Model i-Q310 CST

IC:3538A-IQ310ATN for Model i-Q310 ATN

HERO:

The user(s) of these products are cautioned to only use accessories and peripherals approved, in advance, by IDEN TEC SOLUTIONS. The use of accessories and peripherals, other than those approved by IDEN TEC SOLUTIONS, or any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

European Notification according R&TTE Directive

This equipment complies to Art. 6.4 of R&TTE Directive (1999/5/EC). It is tested for compliance with the following standards: ETSI EN 300 220, ETSI EN 301 489, EN 60950

USA Notification

This device complies with part 15 of the FCC Rules. Operation is subject to the following two 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.

The user(s) of these products are cautioned to only use accessories and peripherals approved, in advance, by IDEN TEC SOLUTIONS. The use of accessories and peripherals, other than those approved by IDEN TEC SOLUTIONS, or any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The device has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Safety Precautions

Important Safety Notes

The system described in this manual is for exclusive operation by trained employees. Only qualified personnel that know the potential dangers involved should perform the installation, settings, maintenance and repair of the units used.

On account of high operating temperature of 80°C (+176°F) care must be taken, if the tags are heated. To avoid burn wait a while until the tags have cooled down or use gloves. At temperatures below 0°C (+32°F) tags can be iced. In this case, wait a while until tags are warmed up or use gloves.

The models i-Q310 SET, i-Q310 CST, i-Q310 ATR, i-Q310 LPT and i-Q310 DRT contain replaceable battery. Due to UL safety clauses this battery must be replaced only by skilled personnel. See also chapter Battery Replacement Procedure.

All tags contain a battery. That is the reason for the following instructions:

CAUTION
RISK OF EXPLOSION IF BATTERY IS REPLACED
BY AN INCORRECT TYPE.
DISPOSE OF USED BATTERIES ACCORDING
TO THE INSTRUCTIONS

Operational Safety

The correct and safe use of these systems assumes that operating and service personnel follow the safety measures described in the manual alongside the generally acceptable safety procedures.

If there is a possibility that safe operation cannot be guaranteed the system must be switched off and secured against accidental use. Then the service unit responsible must be informed.

Electrostatic Discharge



This product contains components that are sensitive to electrostatic discharges. Please observe the special instructions for their protection. Incorrect handling can damage the unit and cause the invalidation of the warranty.

Safety Documents

This ILR system was designed, tested and supplied in perfect condition according to document testreport EN60950.

Condensation/Change of Temperature

Moving the systems from a cold to a warm environment could lead to dangerous situations due to condensation. Therefore it must be ensured that the system can adjust itself to the warmer temperature.

Spare Parts

We recommend that only original products, spare and replacement parts authorized by IDENTEC SOLUTIONS be used for installation, service and repair. Otherwise IDENTEC SOLUTIONS does not accept any responsibility for materials used, work carried out or possible consequences.

Contents

1	INTRODUCTION	6
1.1	I-Q310 SERIES TRANSPONDER FUNCTIONALITY	6
1.2	CST AND SET FEATURES AND BENEFITS	6
2	TECHNICAL SPECIFICATIONS.....	7
3	TRANSPONDER DESCRIPTION.....	8
3.1	HOUSING	8
3.2	TRANSPONDER DATA MEMORY.....	9
3.3	USB INTERFACE	9
3.4	BATTERY INSTALLATION AND POWER UP INDICATION	10
4	INSTALLATION	11
4.1	SET MOUNTING OPTIONS	11
4.2	MOUNTING THE SET TRANSPONDER	12
4.3	MOUNTING THE CST TRANSPONDER.....	13
4.4	TRANSPONDER ENCLOSURE PROTECTION	14
5	INITIAL OPERATION.....	15
5.1	ACTIVATING THE TRANSPONDER	15
5.1.1	How to Activate the Transponder	15
5.1.2	Battery Replacement Procedure.....	16
5.1.3	CST/SET LED description and operation	17
5.1.3.1	Sensor LEDs.....	17
5.1.3.2	Light Sensor input.....	17
5.1.3.3	Push Button	17
5.1.3.4	Humidity Sensor input	17
5.1.3.5	BAT power LED.....	18
5.2	CONFIGURATION	18
6	USB OPERATION	19
6.1	USING THE USB CONNECTION.....	19
6.2	DISCONNECTING THE USB CONNECTION.....	19
7	MAINTENANCE AND TROUBLESHOOTING	21
7.1	TROUBLESHOOTING	21
7.2	TRANSPONDER BATTERY	21
7.2.1	Replacing the Transponder's Battery.....	21
7.3	RETURNS	22
8	ASSOCIATED DOCUMENTS.....	23



1 Introduction

1.1 i-Q310 Series Transponder Functionality

The i-Q ISO 18000-7 transponders are high performance active RFID devices suitable for a wide variety of applications. The transponder responds to interrogator commands over the distance of 100 (and more) meters in line of sight. The transponders have a battery with a typical operational life of 3 or more years. This battery is easily replaceable in most models (ATR, DRT, LPT, SET and CST) for prolonged life span. The exception is the ATN transponder that has a non-removable sealed battery.

The i-Q310 series includes the following transponders:

- i-Q310 ATR = Asset Transponder
- i-Q310 ATN = Asset Transponder with Non-Replaceable Battery described on page 20
- i-Q310 DRT = Data Rich Transponder
- i-Q310 LPT = License Plate Transponder
- i-Q310 SET = Sensor Transponder
- i-Q310 CST = Container Security Transponder

For description and instructions for ATR, ATN, DRT and LPT Transponders, please see a separate i-Q310 Series Installation and Operation Manual for ATR, ATN, DRT and LPT.

1.2 CST and SET Features and Benefits

- 100-meters (300 ft) read/write range allows automated identification, tracking and tracing of assets without human intervention.
- The CST and SET transponders offer two memory areas.
 - The SET and CST have 128kB of memory allocated for user data
 - The SET and CST have 32 bits of memory allocated for a fixed, unique, Identification Code.
 - The SET and CST have 32kB of memory allocated for sensor logging.
- 433 MHz operating frequency allows low-power, long communication range and high data transmission rates with minimal interference due to local conditions.
- ISO / IEC 18000-7 compatible allows manufacturer independent interoperation. US DoD and NATO ITV compatible.
- All transponders carry a speaker for acoustic signalization during search, locate, alarms.
- The CST and SET transponders provide USB 2.0 Hardwire Interface for fast and secure data transfer with USB connection with mini-B connector.
- 3-year battery lifetime and more delivers long-time maintenance-free operation, without battery replacement.
- CST and SET transponders have a replaceable battery for extended lifetime.
- Communication on demand eliminates RF flooding through software-controlled read/write operations.
- Non-line-of-sight data transmission allows tags to be buried while transmitting for improved tracking and tracing efficiency.

2 Technical Specifications

Performance

Read rate	Up to 100 tags/s (Collect Tag Identification Code only)
Max. response time	< 150 ms (single tag)

RF Communication

Read range	Up to 100 m (300 feet) @ free air
Write range	Up to 100 m (300 feet) @ free air
Operating frequency	433.92MHz
Data rate (download to tag)	27.778 Kbits/s
Data rate (upload to reader)	27.778 Kbits/s
Frequency	433.92MHz international ISM band
Modulation	FSK \pm 50 kHz at 27.778 kHz data rate
Sensitivity	-85dBm / range at least 300ft (~100m)
Maximum transmission power	1mW– comply with national regulations
Standard / Certification	ISO/IEC 18000-7

Hardwire Communication

Standard	USB 2.0
Connector	Mini-B

Electrical

Power source	Lithium battery (replaceable, except ATN)
Expected battery life	Typically 3 years and more depending on usage
Battery monitoring	Yes

Data

Data retention	>10 years without power
Write cycles	100,000 writes to a tag
Memory size	128k bytes/32k bytes
Identification code	32 bit fixed ID

Environmental

Operating temperature	-40°C to +80°C (-40°F to +176°F)
Humidity	10% to 90% relative humidity at 30°C (+86°F)
Shock	50 G, 3 times DIN IEC 68-2-27 Multiple drops to concrete from 1 m (3 ft)
Vibration	3 G, 20 sine wave cycles, 5 Hz to 150 Hz, DIN IEC 68-2-6 5 G, noise 5 Hz to 1000 Hz, 30 minutes DIN IEC 68-2-64

Physical

Dimensions (CST)	7 in. length x 4.24 in. width x 3.97 in height. (17.7 cm x 10.7 cm x 10 cm)
Weight (CST)	200 g (7 oz)
Dimensions (SET) with bracket	6.25 in. length x 2.15 in. width x 1.75 in. height (15cm x 5.5 cm x 4.5 cm)
Dimensions (SET) without bracket	5.76 in length x 2.17 in width x 1.53 in height (14.6 cm x 5.5 cm x 3.9 cm)
Weight (SET)	100 g (3.52 oz)
Enclosure	Plastic (ASA / Luran® S)
Enclosure rating	IP 65

3 Transponder Description

3.1 Housing

The SET and CST i-Q310 transponders are made of a rugged plastic housing with IP 65 rating. On the front side (see Fig. 3.1 and 3.2) there are identification labels, which provide information about the type of the tag, the tag manufacturer and prime contractor, certifications, barcode and the IAW MIL-Std-129P markings where appropriate. On the rear side of the transponder, there are brackets with openings for transponder mounting and for clip-on magnetic mounts. The SET and CST transponders have identical front panel markings, sensors, and LEDs.

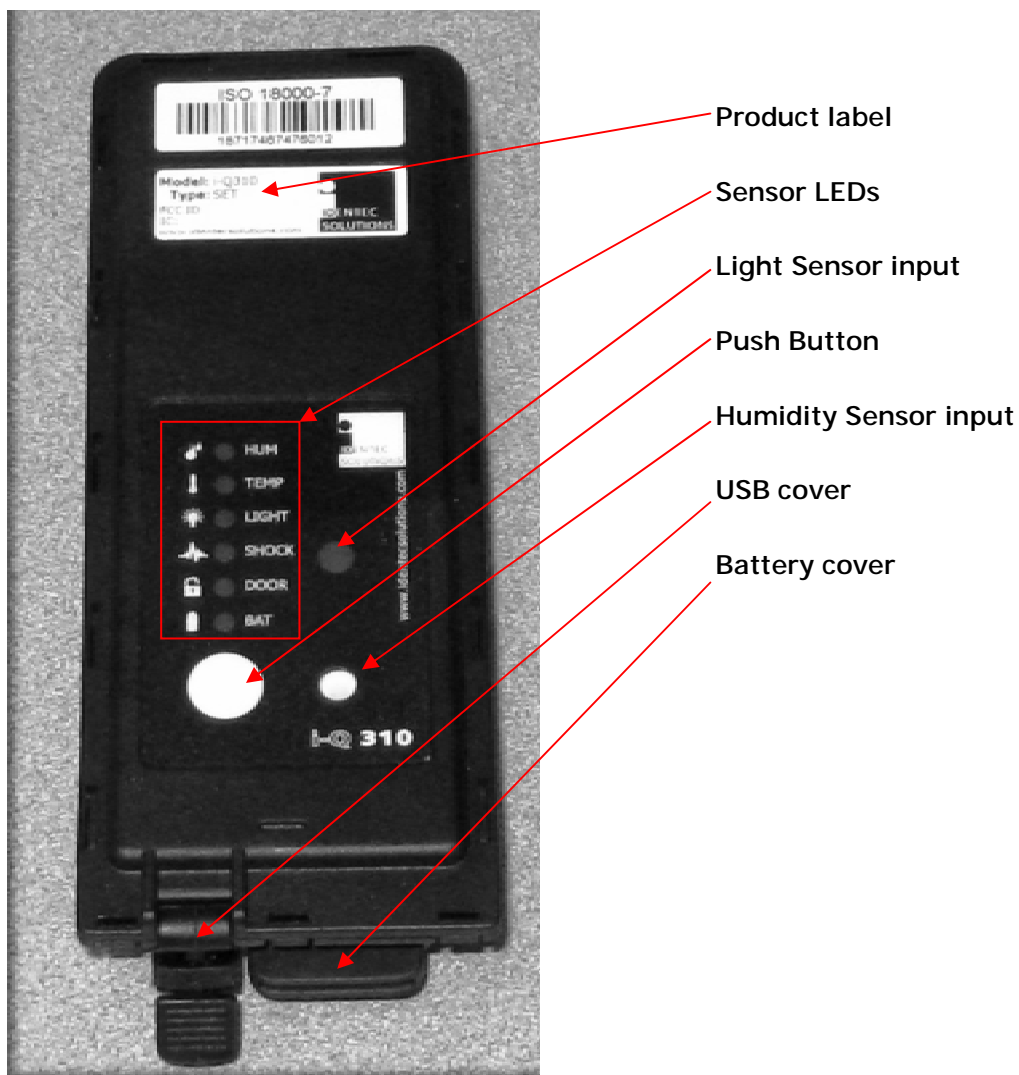


Figure 3.1 Front view of the SET transponder



Figure 3.2 Front view of the CST transponder

3.2 Transponder Data Memory

The CST and SET models of the i-Q310 series transponders offer 128 kBytes of non-volatile memory for general purpose and user data. In addition, 32kBytes of non-volatile memory is available for sensor logging.

3.3 USB Interface

The transponders are enabled for fast and secure data transfer using USB connection with mini-B connector. The USB connector is placed next to the battery cap under a separate cover (Fig. 3.3).

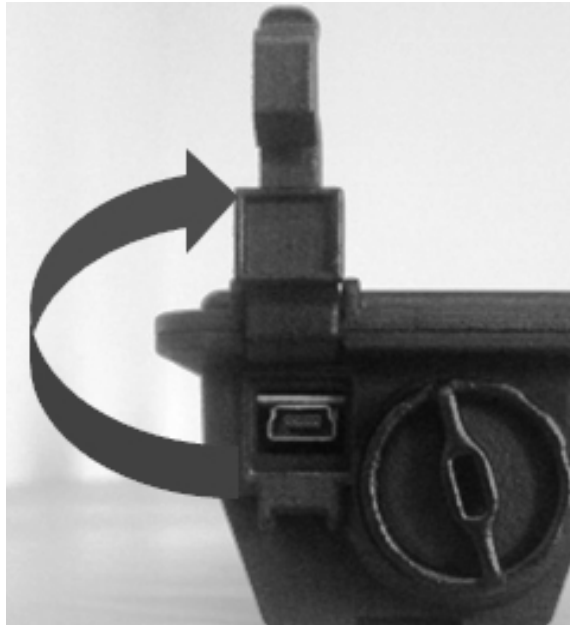


Figure 3.3 USB connector

3.4 Battery installation and power up indication

The transponder ships with the battery reversed; please see Chapter 5 for details on how to power and activate the transponder.

4 Installation

4.1 SET Mounting Options

The transponders are designed with two mounting holes so they can be firmly mounted onto virtually any surface. The transponder can be mounted using various methods dependent on the particular application. Among the common types of mounting are:

- Screws
- Rivets
- Double sided tape
- Wire ties
- Mounting bracket (Fig. 4.1 and 4.2)
- Magnetic mount (Fig. 4.3)



Figure 4.1 The SET mounting bracket



Figure 4.2 Installing the SET transponder into the bracket

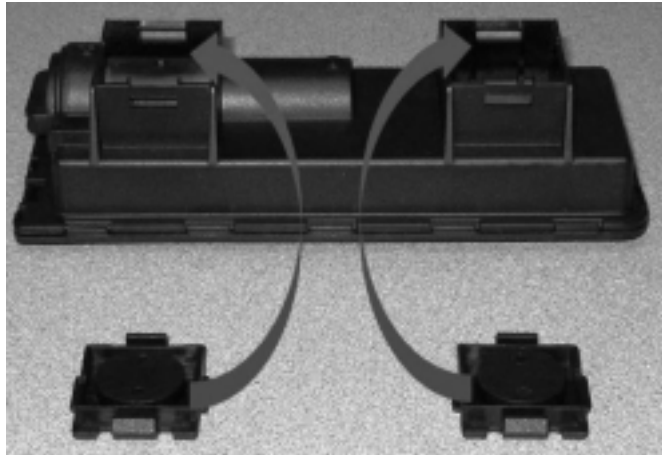


Figure 4.3 Magnetic mount installation for the SET

4.2 Mounting the SET Transponder

The transponder has slots that allow mounting using wire ties without the mounting bracket. The mounting bracket has also openings in order to be wire tied to a post or other object (Fig 2.4).



Figure 4.4 SET Mounting with wire ties

4.3 Mounting the CST transponder

The CST is intended for ISO shipping containers like the one shown below in Fig 4.5.



Figure 4.5 ISO container (typical)

The CST transponder is shown below mounted in various orientations. The ISO door mount opening on the CST is 55mm (2.17") shown in Figure 4.6. It must be mounted on the left door with the antenna outside the container and the sensor body and switch mounted inside the container, shown in Figs 4.8 and 4.9.

The roller switch arm shown in Fig 4.6 and 4.8 should contact the right door to detect a breach or opening of the door.

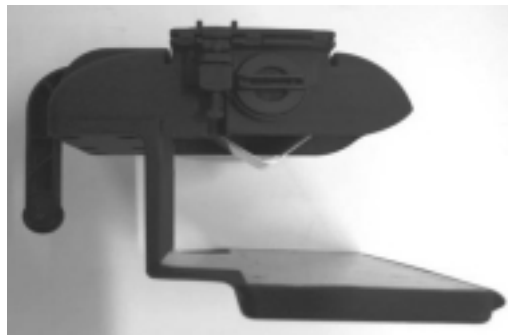


Figure 4.6 CST door mount opening



Figure 4.7 CST inside left door mounting



Figure 4.8 CST inside left door mounting

4.4 Transponder enclosure protection

The CST and SET transponders all have enclosures rated at IP 65. This means that the transponders are dust tight and water tight. However care should be taken to not immerse in liquids or subject to powerful jets of water. The transponder casing should not be opened at any time in order to preserve the integrity of the IP 65 rating and maintain the factory seal.



Figure 4.9 Transponder seal

5 Initial Operation

5.1 Activating the Transponder

The i-Q310 ISO 18000-7 transponders need to be activated. They are shipped with a reversed battery to prevent communication and battery consumption (Fig. 5.1).



Figure 5.1 Battery shown reversed with the negative (-) terminal shown.

5.1.1 How to Activate the Transponder

Before use, the battery cover has to be opened, battery flipped over and securely closed. This activates the transponder for operation. Use only A size 3.6 V Lithium Li-SOCl₂ batteries.



Figure 5.2 Battery shown in correct orientation with the positive (+) terminal shown.

5.1.2 Battery Replacement Procedure

Before starting battery replacement regard following instructions:

1. Due to UL safety clauses this battery must be replaced only by skilled personnel.
2. Warning Fire, explosion and burn hazard
Risk of explosion if battery is replaced by an incorrect type
Do not recharge, short circuit, crush, disassemble, heat above 100°(212°F)
Do not incinerate, or expose contents to water
3. Use only 3.6 V Lithium Li-SOCl₂ batteries, and only type: Saft LS 17500
4. Do not replace the battery or open the battery compartment outdoors or in cold or moist environment. Always replace it in a warm and dry place. If the tag has been brought from a cold (less than 10 °C/50 °F) into a warm environment it should warm up for 1 hour.
5. Do not dispose used batteries into household waste. Used batteries are hazardous waste.

1. Remove the battery cover by rotating counter clockwise while slightly depressing cover (Fig 5.3).



Figure 5.3 Opening the Battery Cap

2. Remove the battery and put it back with the poles reversed (Fig. 5.2). The ⊕ should point out.
3. Replace the battery cover by rotating it clockwise while slightly depressing it.
4. When you hear a short beep, the transponder is activated and ready for operation (see section 5.1.3).
5. If no beep is heard, either the battery is not oriented correctly or it needs to be replaced.
6. Follow steps 2 – 4 for battery replacement in case of depletion.

Note: To keep moisture and dust out of the transponder take care to not lose the o-ring seal on the battery cover or to leave the battery cover off the transponder for extended periods.

5.1.3 CST/SET LED description and operation

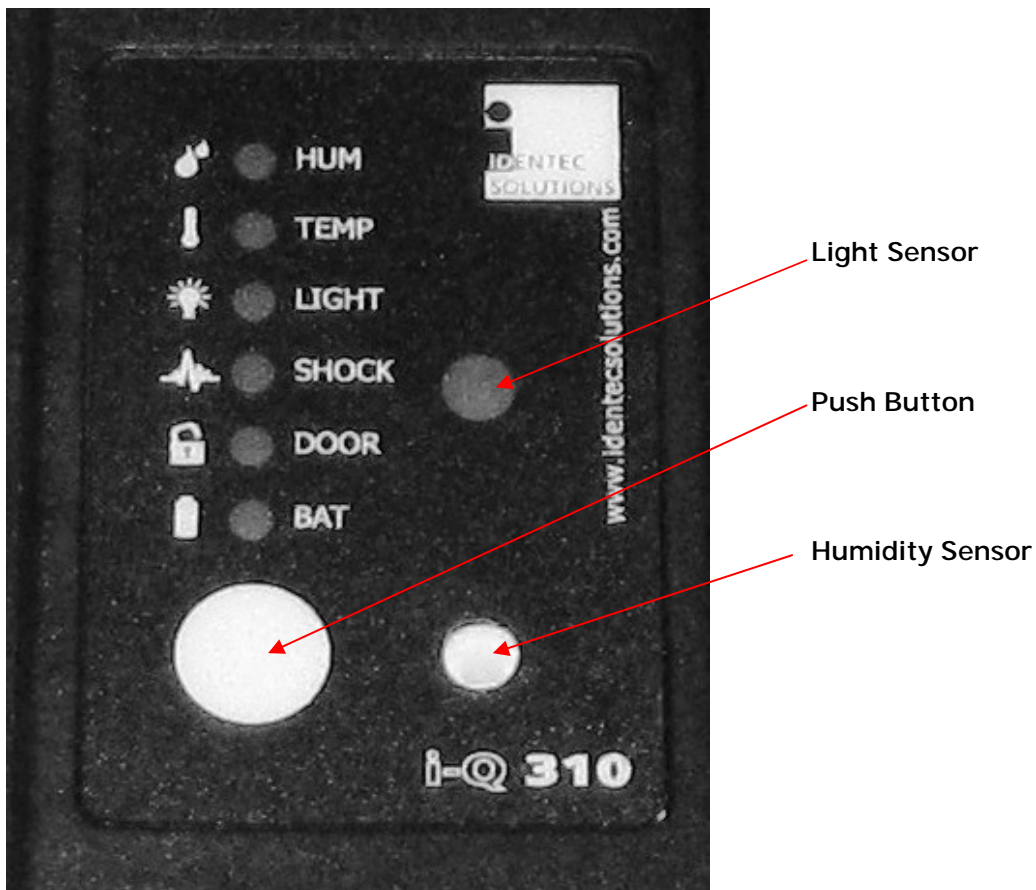


Figure 5.4 LED indicators and sensor inputs

5.1.3.1 Sensor LEDs

The sensor LEDs are illuminated when.....???

5.1.3.2 Light Sensor input

Need description for content

5.1.3.3 Push Button

Need description for content

5.1.3.4 Humidity Sensor input

Need description for content

5.1.3.5 *BAT power LED*

The SET and CST transponders have an LED for battery status as indicated in Fig 5.4. If the battery has more than a 15% charge remaining the LED will be green. Below this level the battery warning flag is set in memory, and the LED will illuminate red. The battery LED will be off when the battery charge is depleted or not installed.

5.2 Configuration

The i-Q310 series transponders are not configured directly. They are configured using the i-PORT F310 device via the air interface and appropriate software. Please see the FDU and Handheld User's Guide for information on how to configure transponders.

6 USB Operation

Important Note

While a transponder is connected via USB to a PC it is continuously powered by the internal battery. In order to save battery life, please close the USB connection and remove the transponder from the USB connection after data transfer.

On account of high operating temperature only use usb cable specified up to +80°C (+176°F). Recommended cable is Kabeltronic Bestell Nr. 1918010. This cable is specified from -20°C to +80°C. For that reason USB is not usable at temperatures below -20°C.

6.1 Using the USB Connection

Please see the FDU Software Manual for details.

6.2 Disconnecting the USB Connection

As the transponder is not operating as a USB mass storage device with buffers that must be flushed before removal, it is quite easy to disconnect it from the USB connection:

- Stop the service software or cancel the connection to the transponder in the service software.
- Remove the transponder from the USB connection.
- Protect the USB connector by safely tightening the protective rubber lid of the transponder.

Asset Tag i-Q310 ATN



The i-Q310 series of tags is IDEN TEC SOLUTIONS' well-established generation of Intelligent Long Range® (ILR®) active RFID tags based on the ISO 18000-7 standard.

ILR provides highly accurate, real-time data collection without human intervention in wireless applications such as:

Identification, tracking and tracing.

Using advanced UHF radio frequency technology, i-Q310 ATN tags transmit and receive data at distances of up to 100 meters (300 feet).

The standardized anti-collision multi-tag-handling algorithm allows communication to tags even when thousands of tags are within the interrogator's read zone.

The tag has very thin profile to fit in very small spaces.

Because of its very low power consumption, the tag can operate effectively for over 3 years.

Integrated speaker supports acoustic signalization during search, locate and alarms.

The i-Q310 tag line can withstand the abuse expected from work processes; the tags are very economical and an ideal fit for high volume tracking of assets.

Features Benefits

- | | |
|--|--|
| ■ 100-meters (300 ft) read/write range | Allows automated identification, tracking and tracing of assets without human intervention. |
| ■ 2 kBytes memory | Stores 2 kBytes of user data. |
| ■ 433 MHz operating frequency | Allows low-power, long communication range and high data transmission rates with minimal interference due to local conditions. |
| ■ ISO/IEC 18000-7 compatible | Manufacturer independent interoperation. US DoD and NATO ITV compatible. |
| ■ Speaker | Acoustic signalization during search, locate, alarms. |
| ■ 3-year battery lifetime and more | Delivers long-time maintenance-free operation, without battery replacement. |
| ■ Dormant Mode | The tag can be set to a non-responsive mode. |
| ■ Communication on demand only | Eliminates RF flooding through software-controlled read/write operations. |
| ■ Non-line-of-sight data transmission | Allows tags to be buried while transmitting for improved tracking/locating efficiency. |
| ■ Thin Profile | The smaller dimensions make the tag perfect for tight spaces. |
| ■ Low cost | Economical tracking of large quantities of assets using high-performance active technology. |

7 Maintenance and Troubleshooting

7.1 Troubleshooting

The transponder does not respond to interrogation at all.

- Make sure the battery is inserted in a correct orientation.
- Make sure the battery is not depleted. Change the battery.
- Tighten the battery cap in order to ensure that both poles are in contact with the transponder's circuits.

The transponder is not accessible through USB.

- Ensure that the USB cable is tightly plugged into the transponder and the host PC.
- Switch the USB cable.
- Are the correct drivers installed, communication configured? Please refer to the FDU Software User's Manual.

Other issues:

If none of the above steps resolved the issue or there are other issues with the transponder not mentioned here, please contact technical support.

7.2 Transponder Battery

The battery of the transponder has a typical lifetime expectancy of more than 3 years. A depleted battery can be replaced with a new one.

7.2.1 Replacing the Transponder's Battery

For steps on how to replace the battery, please see Chapter 5.

Safety Instructions

Do not replace the battery or open the battery compartment outdoors or in cold or moist environment. Always replace it in a warm and dry place. If the transponder has been brought from a cold (less than 10 °C/50 °F) into a warm environment it should warm up for 1 hour.

Replace the battery only with a type provided by or recommended by IDENTEC SOLUTIONS.

The battery has to be disposed as special refuse.

Important Note

If the battery is replaced after the transponder has signaled a "battery low" status, simply replace the battery following the description in advance. The transponder will automatically recognize the battery exchange and will automatically reset its battery usage counter.

If the battery is replaced on a regular precautionary basis without the "battery low" signal, after replacing the battery, the transponder needs a service command in order to reset its battery usage counter.

7.3 Returns

Parts or main components returned for repair or exchange must be handled with great care. All returns should include a completed returns form (see appendix) and be sent to:

IDENTEC SOLUTIONS, Inc.
5057 Keller Springs Rd., Ste 375
Addison, TX 75001
USA

8 Associated Documents

Manuals

IM.0780.EN	System Description, English
IM.0781.EN	i-PORT F310 Hardware and Installation Manual, English
IM.0782.EN	i-Q310 Series Transponder Installation and Operation Manual for ATN, ATR, DRT and LPT, English
IM.0783.EN	i-PORT H310 Handheld Interrogator Module, English

Data Sheets

ID.0680.EN	i-PORT F310, English
ID.0681.EN	i-Q310 ATN—Asset Transponder, English
ID.0682.EN	i-Q310 ATR—Asset Transponder, English
ID.0683.EN	i-Q310 DRT—Data Rich Transponder, English
ID.0684.EN	i-Q310 SET—Sensor Transponder, English
ID.0685.EN	i-Q310 LPT—License Plate Transponder, English
ID.0686.EN	i-Q310 CST—Container Security Transponder, English
ID.0689.EN	i-PORT H310 Handheld Interrogator Module, English