



i-Q350LX GPS –SAT

SensorSMART™



Installation and Operation Manual

Preliminary



i-Q350LX GPS -SAT USER MANUAL

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Issue 1.0 / July 2014

Subject to alteration without prior notice.

Printed in Austria

CONTACT US

EUROPE

+43 5577 87387-0
sales@identecsolutions.com

NORTH AMERICA

+1 866 402-4211
sales@identecsolutions.com

HEAD OFFICE

IDENTEC SOLUTIONS AG
Millennium Park 2
6890 Lustenau
Austria
Tel +43 5577 87387-0
Fax +43 5577 87387-15

USA

IDENTEC SOLUTIONS, INC.
Preston Plaza
17950 Preston Rd., Suite 200
Dallas, Texas 75252
USA
Tel +1 972 535 4439
Fax +1 469 424 0404

GERMANY

IDENTEC SOLUTIONS
DEUTSCHLAND GMBH
AURUM 05 / Ost
Goldbeckstraße 5
69493 Hirschberg
Germany
Tel +49 6201 99 57-0
Fax +49 6201 99 57-99

NORWAY

IDENTEC SOLUTIONS AS
Karteia 3
4626 Kristiansand
Norway
Tel +47 38 00 35 30
Fax +47 38 00 35 31

AUSTRALIA

IDENTEC SOLUTIONS
AUSTRALIA AND
NEW ZEALAND P/L
Riverview Business Park 72
Maribyrnong St, Footscray VIC
3011 Australia
Tel +61 3 9396 8900
Fax +61 3 9689 2493



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Radio Frequency Compliance Statement

IDENTEC SOLUTIONS is the responsible party for the compliance of the following devices:

MODEL:		i-Q350LX GPS -SAT
Region/Country	Organization	Marking
EUROPE:	EC	CE
USA:	FCC	FCC ID 004-ILR-IQ350SAT Contains FCC ID: L2V-STX3
Canada:	Industry Canada	IC:3538A-IQ350SAT

The user(s) of these products are cautioned to only use accessories and peripherals approved, in advance, by IDENTEC SOLUTIONS. The use of accessories and peripherals, other than those approved by IDENTEC SOLUTIONS, or unauthorized changes to approved products, may void the compliance of these products and may result in the loss of 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 (2006/95/EU, 2004/108/EC, 1999/5/EC). It is tested for compliance with the following standards: EN 300 220-1, ETSI EN 300 220-2, ETSI EN 301 489-1, ETSI EN 301 489-3, EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011

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.

FEDERAL COMMUNICATIONS COMMISSION INTERFERENCE STATEMENT

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/ TV technician for help.



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CAUTION:

Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.

Canada Certification

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

- (1) this device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device


Le présent appareil est conforme aux CNR d'Industrie 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, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

ATEX Certification


Equipment or protected system intended for use in potentially explosive atmosphere directive 94/9/EC.

Compliance with the essential health and safety Requirements has been assured by compliance with the following standards: EN 60079-0:2009, EN 60079-0:2006, EN60079-11:2007

EPS 13 ATEX ????		
	II 1 G	II 1G Ex ia T4 IIC Ga II 1D Ex ia IIIC T135 °C Da

IECEX Certification

The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards: IEC 60079-0: 2004, IEC 60079-0: 2007-10, IEC 60079-11: 2006

IECEX EPS ??		
	Type of Protection	Ex i
	Marking	Ex ia T4 IIC Ga Ex ia IIIC T135 °C Da

Special conditions for safe use – ATEX and IECEX



WARNING - Electrostatic Hazard:

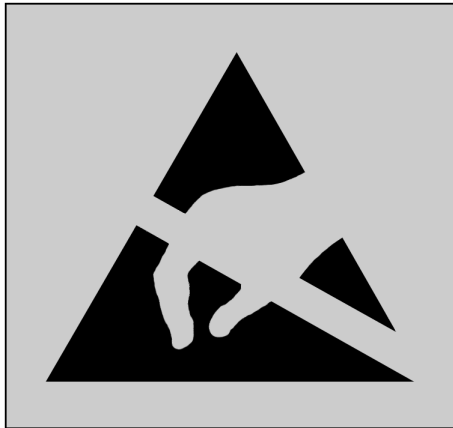
Do not install in locations with increased electrostatic charge such as close to ventilations systems or electric drives.



WARNING - Electrostatic Hazard: Clean plastic Tag surface only with a damp cloth. Do not use solvents.



WARNING - This product should be installed by personnel trained in installation of equipment in Hazardous Locations and meet the representative country's National Electrical Code.



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.

Minimum safety precautions against electrostatic discharge:

- Establish earth contact before you touch the unit. For example, touch the earthing screw on the unit. Even better: Use an antistatic ribbon and earth yourself permanently for the time you handle the unit.
- Avoid unnecessary contact with the unit connectors and assemblies inside the unit.
- Only open the unit if the operational settings (as described in the manual) expressly require this.
- Use antistatic tools for the setting of the unit. (Warning: Do not touch life-threatening voltages with these tools).
- Do not store unit and components without protective packaging.
- Only remove unit and components from the packaging immediately prior to installation.

**These notes are not sufficient to guarantee complete protection from electrostatic discharges!
We recommend the use of suitable protective equipment.**



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SAFETY INSTRUCTIONS

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

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 operations cannot be guaranteed, the system must be switched off, secured against accidental use and the service unit responsible immediately informed.

Safety Documents

The i-Q350 tag was designed, tested and supplied in perfect condition according to document IEC348 Safety Requirements for Electronic Units of Class 1.

Condensate / Change of Temperature

To avoid condensation in the system, the unit must be allowed to slowly adjust itself to warmer temperatures after removal from cold and cool environments.

Do not open the housing

There is absolutely no need to open the systems housing during set up. Configuration is done with built in interface wirelessly.

Earthing

Before establishing any connections the housing of the system must be earthed.

Battery Inside

All system tags contain a battery; therefore the following warning should be heeded:



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 °C (212 °F)
Do not incinerate, or expose contents to water

Fuses

Only experts who are aware of the dangers involved may replace the fuses. It must be ensured that only fuses of the required current rating and the correct type are used for replacement. The use of repaired fuses and/or short-circuiting the fuse holders is prohibited.



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Spare Parts

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

Electrostatic Discharge

Semi-conductors of the type MOS or CMOS as well as two-pin types and precision resistance are sensitive to ESD. All components, printed circuit boards and auxiliary systems should therefore always be classed as sensitive to electrostatic discharge.

Before opening the cover the unit should be placed onto an ESD-protected surface. As with all work on modern electronic modules, the use of ESD clamps and ESD mats during work on the unit is recommended.

- Sufficiently protect all printed circuit boards that were removed from the unit from damage.
- Observe all normal precautions for the use of tools.
- Use ESD-protected packaging material.

Never use measuring units with low impedance for measuring or testing systems with semi-conductor components. Never use high voltage testing units or dielectric test units to test systems with semi-conductor components.

If it is necessary to check the isolating properties of the field wiring, the assemblies (electronic units and sensors) should be disconnected.

Earth the test units.

IDENTEC SOLUTIONS does not accept the return of products where the regulations concerning the ESD precautions and protective packaging materials were not followed.

ESD – Electrostatic Discharge

EMC – Electromagnetic Compatibility

SELV – Safety Extra Low Voltage – Protective measure against dangerous body currents, formerly: protective first voltage range



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1. PREFACE

1.1. Preparations

This installation manual must be read carefully prior to starting the installation. The described installation works assume that installation materials like cable, antenna and data sensor holder, etc. are available.

1.2. Scope of This Document

This document is the hardware description of the i-Q350. This document is intended only for mechanical and electrical installation of these central units.

1.3. Responsibility

IDENTEC SOLUTIONS reserves the right to make changes and updates to the content contained herein. It is the user's responsibility to contact the service department for any possible changes or updates to operating and maintenance procedures.

1.4. Updates

Updates will be provided upon request. The information in this document may be subjected to changes without prior notice.

1.5. Scope of Delivery—Visual Inspection

Check whether delivery is complete and for any damages. If the delivery is not complete or damaged immediately inform the carrier. The dispatch and service organization of IDENTEC SOLUTIONS should also be informed to facilitate the repair or exchange of the system.

1.6. Associated Documents

Software description and Programmer's Guide

- SDK Online Help
- i-SHARE Manual
- Specific sensor manuals

2. INTRODUCTION

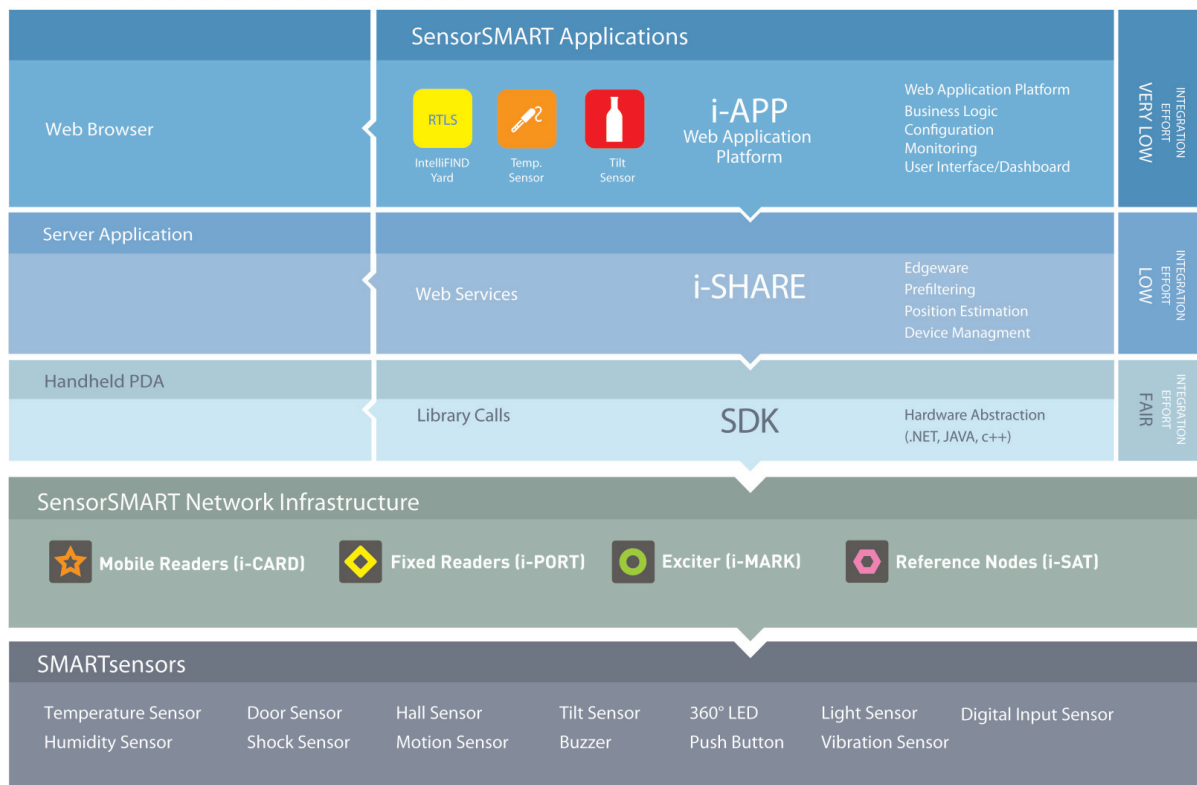
2.1. Fundamentals

The IDEN TEC SOLUTIONS' SensorSMART Platform is the latest development in asset management, localization and process optimization. Developed to deliver the last mile in industrial communication, the SensorSMART Platform fulfills a niche not previously addressed by available networks.

The SensorSMART Platform takes the complexity out of managing assets, personnel safety monitoring and/or the tracking of valuable cargo and the need for multiple technologies. The unique combination of active RFID, RTLS and WSN in one platform eliminates the necessity for complex deployments of multiple technologies, or the need to compromise with one technology's specific functionalities. The pinnacle of the SensorSMART Platform is that it captures the best of RFID, WSN, and RTLS while also avoiding the less desirable features of each technology. Third party application development is also simplified for added flexibility.

2.2. Component Overview

SensorSMART Platform



The SensorSMART Platform infrastructure features mobile readers (i-CARD), fixed readers (i-PORT) and exciters (i-MARK). Network sensors offer the highest functionality within the SensorSMART Platform. Robust and reliable, SMARTsensors monitor temperature, humidity, light, shock, tilt, motion, push button, digital input, Hall sensor, etc.

The SDK (software development kit) is an easy to use framework that allows developers high level access without requiring in depth knowledge of sensor or reader protocols, timing or implementations. Extracting, filtering and sharing data as well as calculating an object's position is only part of the i-SHARE (edgeware) functionality.

i-APP is an intuitive web browser 2.0 application that allows for rapid application development for sensor based applications. It is the SensorSMART Platform's business intelligence.

2.3. System Components—Sensors

2.3.1. i-Q350 Tags



The ILR® i-Q350LX GPS –SAT active RFID tag with satellite navigation and communication uplink provides highly accurate positioning of objects – even in the most remote on- and off-shore locations. The combination of GPS, satellite communication and active RFID sets a new benchmark in the oil and gas industry

FEATURES

Designed to withstand the harshest and most demanding environments, the i-Q350 satellite tag is ideally suited for applications such as CCU tracking and tracing or localization of high value assets and vehicles.

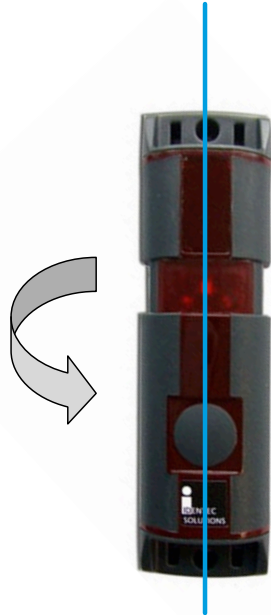
With its integrated GPS receiver and satellite modem, the tag can transmit its GPS position either via RFID or via the globally available Globalstar satellite network.

The combination of low power components and a motion sensor enables a smart energy and cost management. The tag only transmits position data when a change of the position is located. This allows an outstanding battery lifetime and minimizes the operational costs to a minimum.

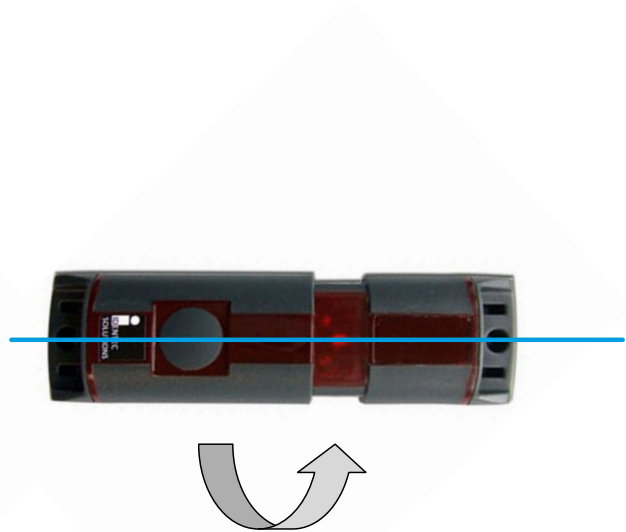
The integrated marker functionality allows to control if an object was moved through a particular zone or gate. The inductive marker field triggers the Tag to send the location information to a reader with its RFID capabilities.

The ATEX Zone 0 and IECEx certification allows usage of the tag in dangerous and potentially explosive atmospheres and is therefore ideally suited to the oil and gas industry.

2.3.2. Polarization of Sensors



Vertically polarized



Horizontally polarized

Polarization is dependent on orientation and is rotation symmetrical.

2.4. System Components—Readers

2.4.1. i-PORT M350-2



The i-PORT M350-2 is a reader for the i-Q350 and i-B350 series of IDENTEC SOLUTIONS's Response and Broadcast Sensors. Built into a compact housing, the i-PORT M350-2 reads and writes data to the sensors at distances of up to 500 meters (1640 feet) on two antennas. Connection to the host system is established via a RS422 interface, resulting in the capability to connect up to 8 readers in a Daisy Chain using commercially available CAT 5 cables and connectors.

A simple master/slave protocol enables data exchange. Not only does the protocol contain the data received from the sensor but it can also provide information about the time of data reception, field strength and information about the number of times the sensor has been received by the reader.

2.5. System Components—Antennas

IDENTEC SOLUTIONS' antennas are distinguished by their compact design. A variety of antennas can be used, depending on application. The antennas are differentiated by characteristics such as polarization, apex angle, and gain. Optimal fit to the reading zone is achieved by the right choice of antenna (characteristics) and receive sensitivity. As the antennas are passive system elements, no tuning is required, which facilitates installation and maintenance.

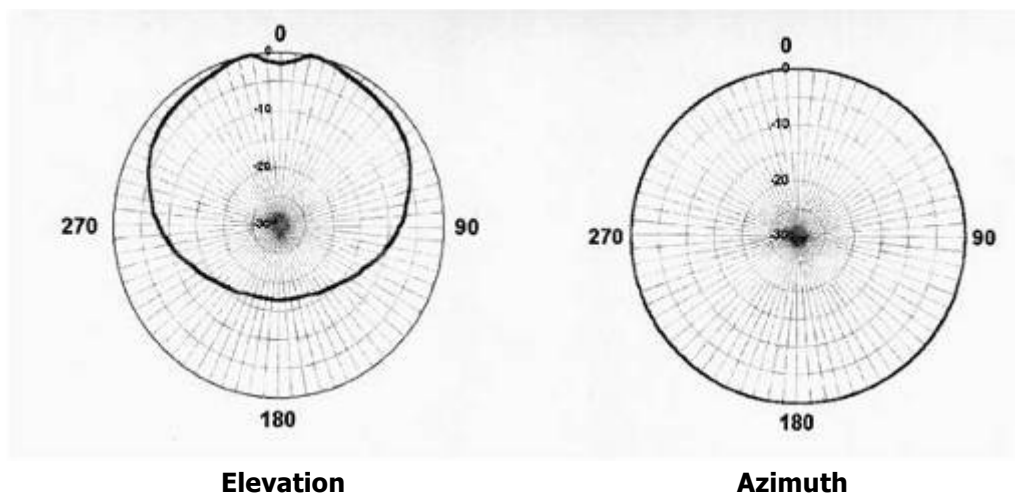
2.5.1. Elliptical Polarized Antennas



Because of the wide apex angle (120°), a large read zone is achieved, which is desirable when a large quantity of sensors need to be read at one time, or when sensors moving at great speeds need to be interrogated.

Since the polarization is elliptical, orientation of the sensor relative to the antenna is not important; if the sensor is in front of the antenna the sensor may be polarized horizontally or vertically along the line of sight of the antenna. Due to its small size and weight, this antenna is very easy to integrate.

Orientation Diagrams: Elliptical polarized antenna



For this antenna, the maximum transmit power setting is:

- A-9185: -8 dBm

2.5.2. Linear Polarized Antennas

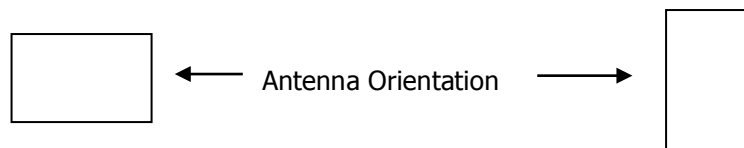
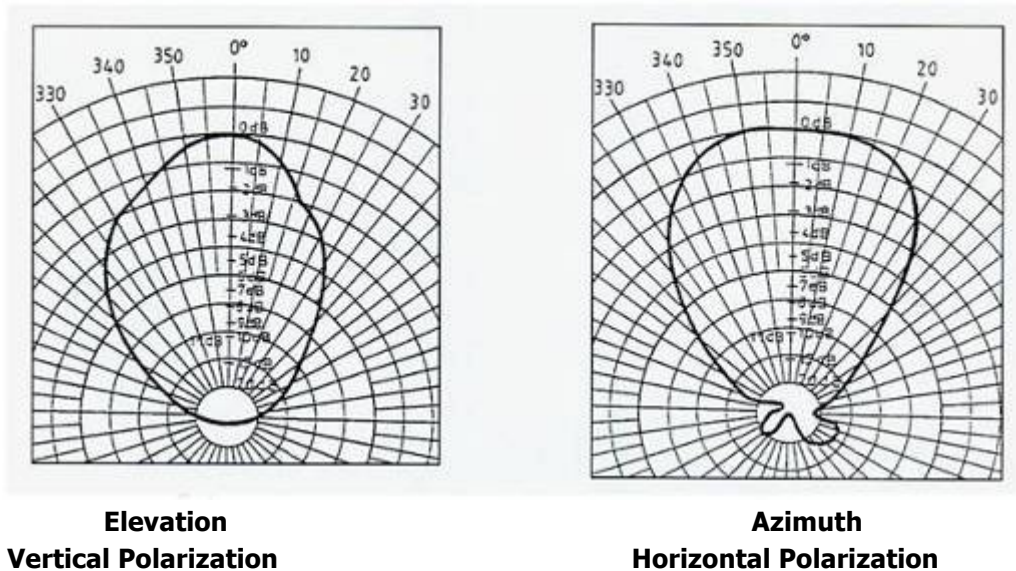


Because of the smaller apex angle (60°), this antenna is more suited to selective data collection and restriction of read zones.

Depending on the direction of mounting, the antenna's field is either vertically or horizontally polarized, requiring the sensor to have the same orientation.

Because of the greater gain, longer read ranges can be achieved with this antenna compared to the elliptical polarized type above.

Orientation Diagrams: Linear polarized antenna



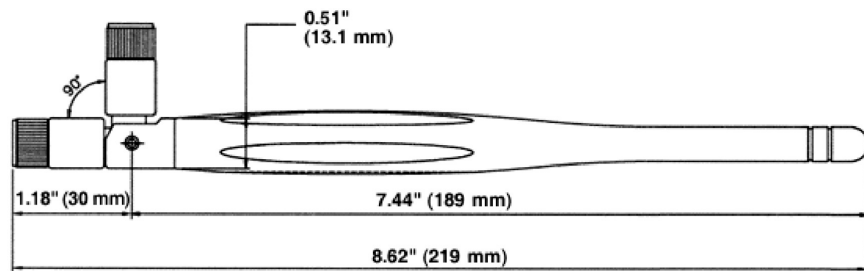
For this antenna, the maximum transmit power setting is:

- W-900R: -12 dBm

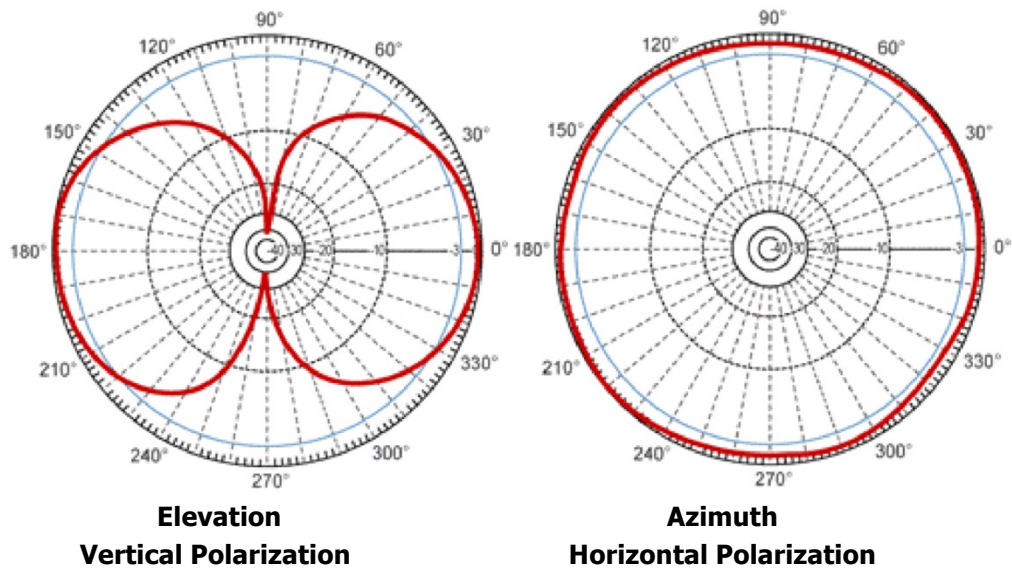
2.5.3. 1/2-Wave Whip Antenna



Dimensions



Orientation Diagrams



For this antenna, the maximum transmit power setting is:

- Rod antenna: -3 dBm

2.5.4. 1-Wave Rod Antenna

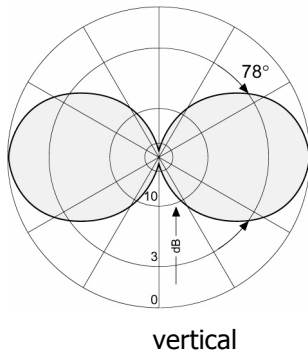


Overall Dimensions: 425 × 90 mm



Mounting proposal

Antenna diagram

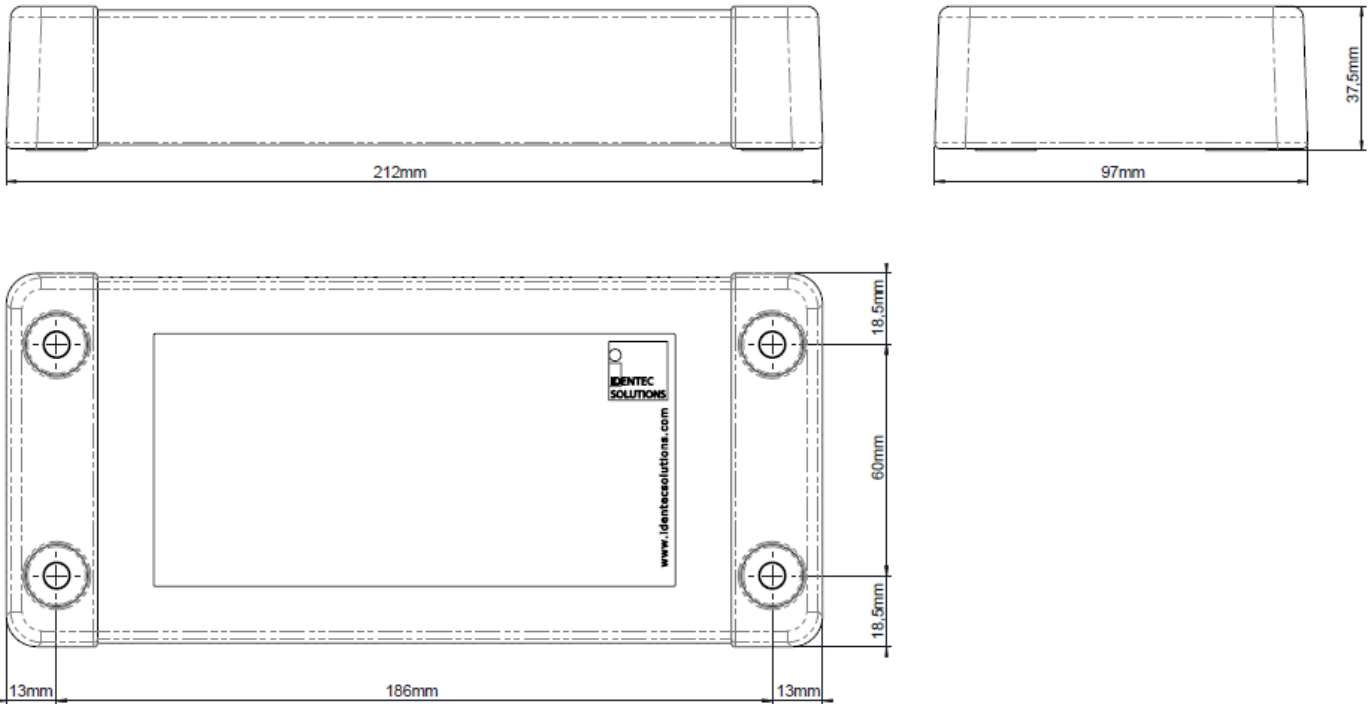


For this antenna, the maximum transmit power setting is:

- Rod antenna: -3 dBm

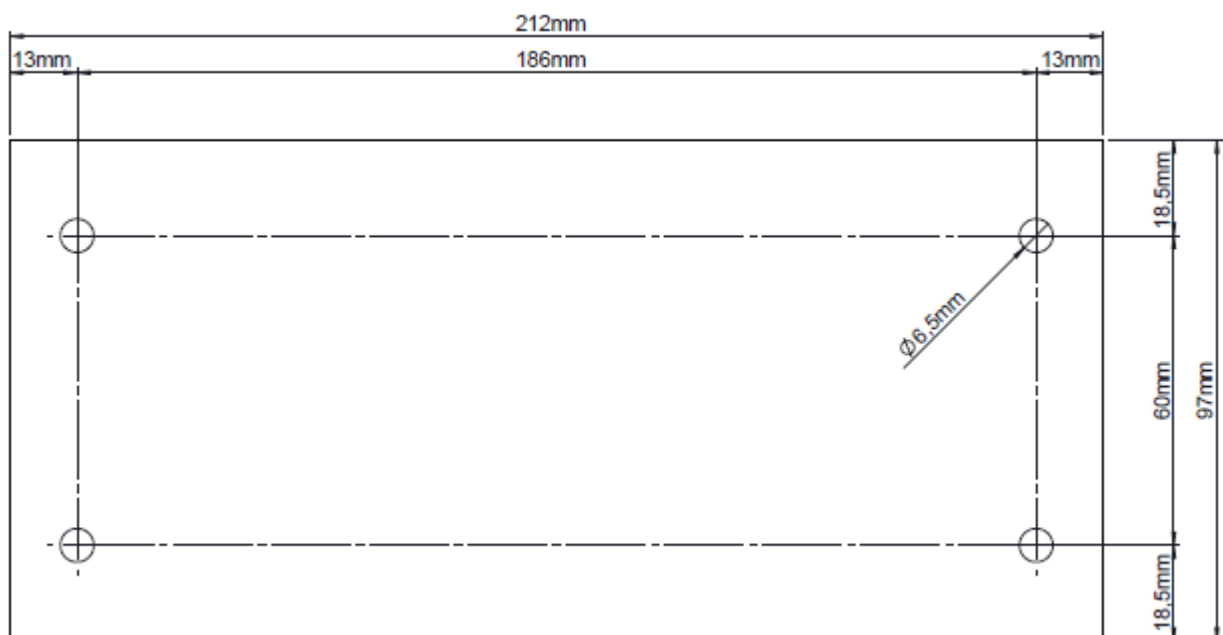
1 Tag Mounting Techniques

1.1 Dimensional Drawing

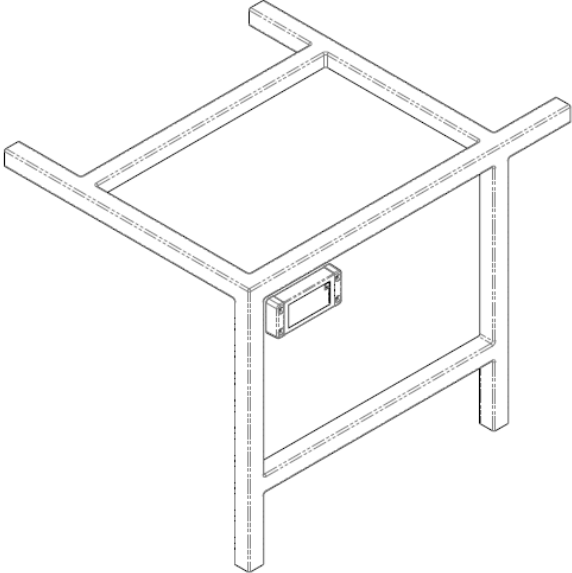
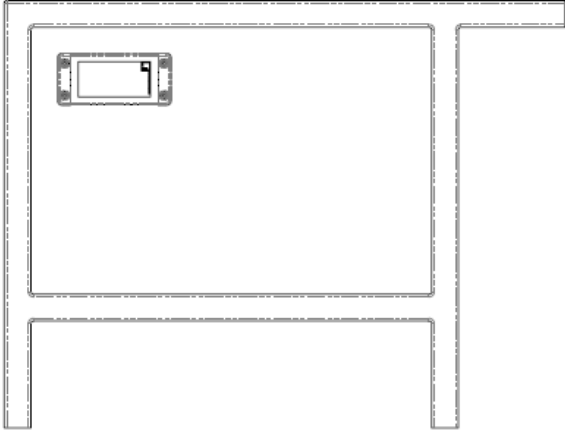


All dimensions in mm.

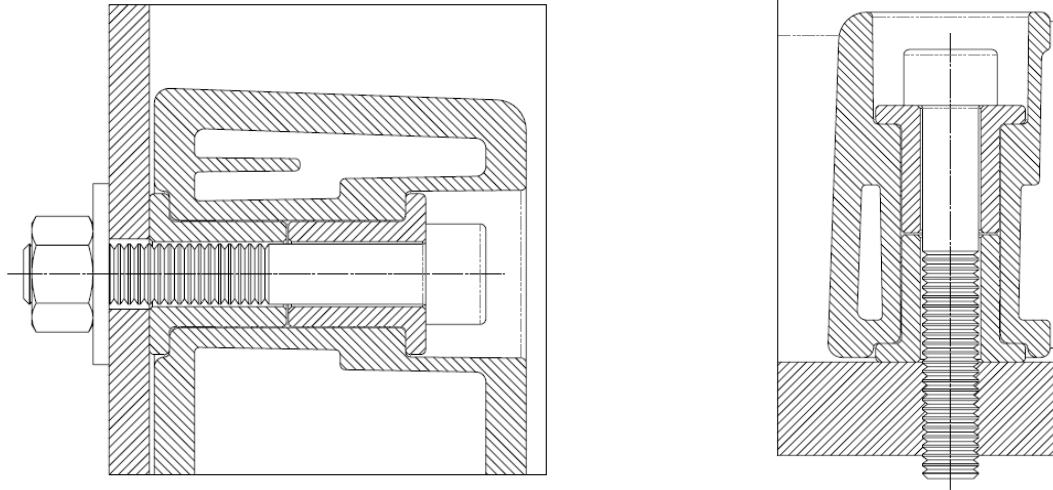
1.2 Mounting hole pattern



1.3 Mounting to container

	
<p>Mounting on container side wall</p>	<p>Make sure that the tag is mounted with a minimum distance of 50mm from the frame. Shielding of the tag can lead to a performance loss. Best performance can be achieved with a clear line of sight to the sky.</p>

1.4 Screws



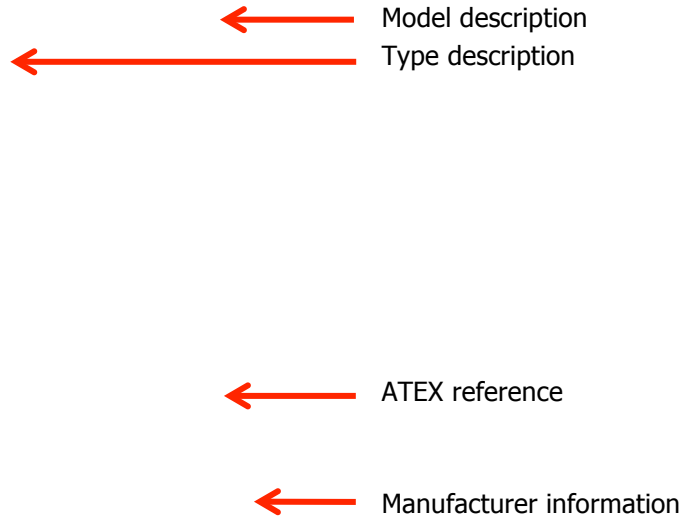
Important Information

1. Tag shall only be mounted on flat and smooth surface. Warped and uneven surface can lead to damages and to water ingress.
2. Mounting holes must not exceed a diameter of 6.5mm.
3. Only screws with cylindrical Allen heads are suitable for mounting the tag. We do not recommend using countersunk screws or screws with hexagon heads.
4. Secure the screws with self-locking nuts, spring washers or Nord-lock washers. Self-cutting tapping screws can become loose over time and should be checked regularly.
5. If the tag is mounted outdoors or in a damp environment, all mounting parts need to be made of stainless steel or other non-rusting material.
6. A temperature of at least +10 °C (+50 °F) must be maintained during mounting to prevent the casing from cracking.
7. Recommended maximum torque (for screws with property class 8.8)
 - M6/#14: 6.0 Nm
8. If the torque is any greater, the screw may over-tighten or the housing can be damaged.
9. Metal surfaces in direct proximity to the tag may reduce the tag's range of function. Tags should not be mounted in metal recesses or corners.
10. After mounting, the tag's function should be tested with appropriate devices and software.



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2.6. Tag Identification



3. INITIAL OPERATION, CONFIGURATION OF THE TAG

3.1. General

Important Note

Do not open the housing! Configuration is done using the built-in air interface of the i-Q350TLX FL.

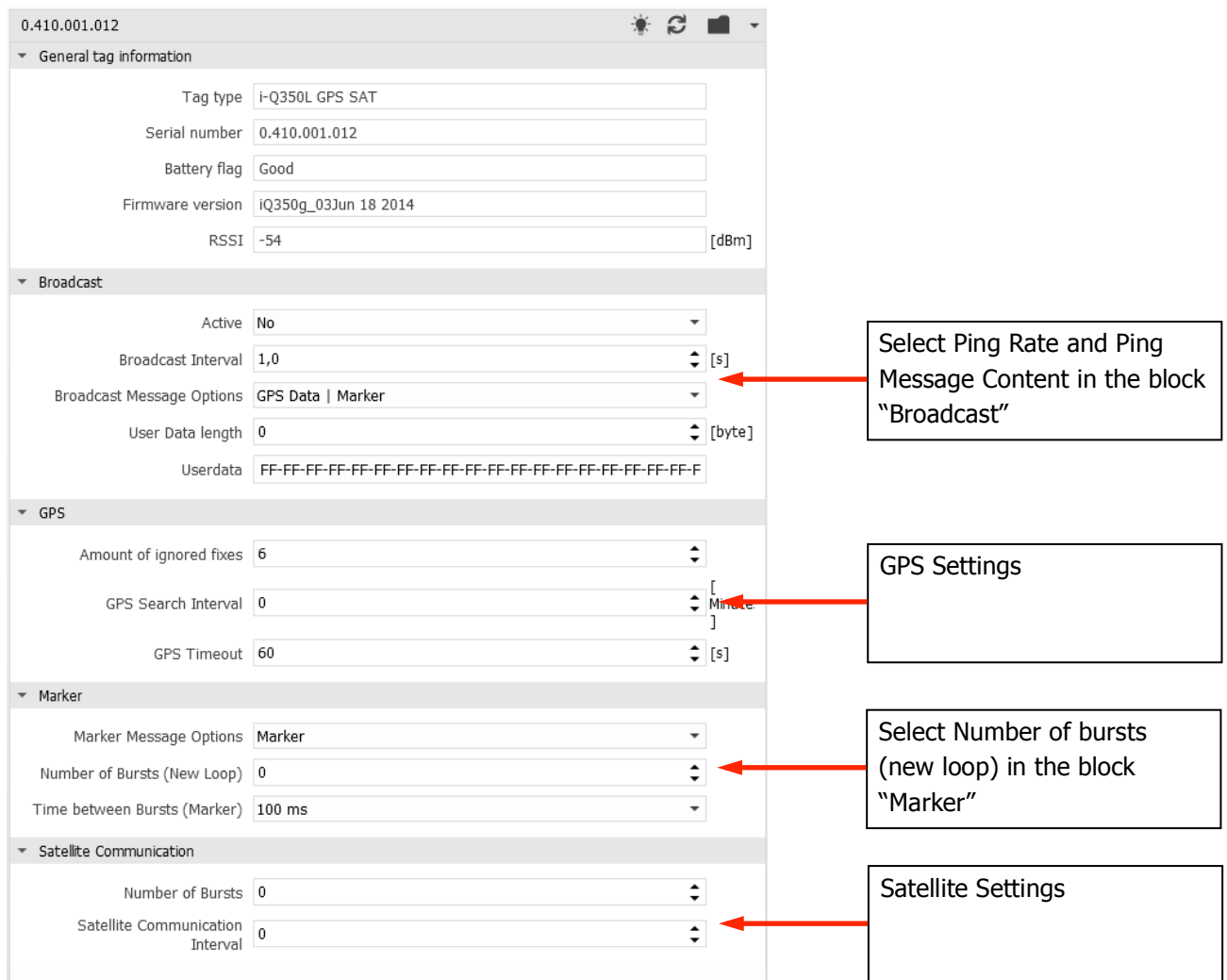
The Response mode of the i-Q350L GPS -SAT offers the following features for configuration:

- Broadcast mode can be configured for simultaneous operation. In this case the tag responds to commands from a reader as well as broadcasts configurable data in a regular interval.

Tools Needed

- PC running on MS Windows with the Tag Configuration for SSP 350 series tags
- Connection to an i-PORT M 350 or i-CARD CF 350 to communicate with the tags

Overview on the Configuration Software



The screenshot shows the configuration software interface for the i-Q350LX GPS -SAT tag. The interface is divided into several sections, each with specific configuration options:

- General tag information:** Includes fields for Tag type (i-Q350L GPS SAT), Serial number (0.410.001.012), Battery flag (Good), Firmware version (iQ350g_03Jun 18 2014), and RSSI (-54 [dBm]).
- Broadcast:** Includes Active (No), Broadcast Interval (1,0 [s]), Broadcast Message Options (GPS Data | Marker), User Data length (0 [byte]), and Userdata (FF-FF).
- GPS:** Includes Amount of ignored fixes (6), GPS Search Interval (0 [Minute]), and GPS Timeout (60 [s]).
- Marker:** Includes Marker Message Options (Marker), Number of Bursts (New Loop) (0), and Time between Bursts (Marker) (100 ms).
- Satellite Communication:** Includes Number of Bursts (0) and Satellite Communication Interval (0).

Callouts on the right side of the screenshot provide additional information:

- Select Ping Rate and Ping Message Content in the block "Broadcast":** Points to the Broadcast Interval and Broadcast Message Options fields.
- GPS Settings:** Points to the GPS Search Interval field.
- Select Number of bursts (new loop) in the block "Marker":** Points to the Number of Bursts (New Loop) field.
- Satellite Settings:** Points to the Satellite Communication Interval field.

3.2. Ping Rate

Note: These settings can be found in the Tag Configuration software tool in the section "Broadcast"

- Active: Activates or de-activates the broadcast function that regularly sends out messages.
- Broadcast Interval: 0 = no broadcast messages are sent, value > 0 = Broadcast interval in seconds. This can be set in steps of 0.5 sec, from 0.5 sec up to 300 sec.
- Broadcast Message Options: The options in this field depend on the capabilities of the tag. The subchapter "Limitations of the User Data Field" lists the possible options of this tag type.
- User Data Length: Configure the number of Bytes from the "User Data" that is sent with a broadcast message. The number starts from Byte 0 (zero). The limits of the User Data length are described at the end of this chapter

3.1. Limitations of the User Data Field

The total length of the broadcast message (burst or ping) is limited to 50 Bytes. Depending on the broadcast message options, these are the allowed number of bytes for the user data:

Message Type	Length of User Data
User Data only	max. 50 Bytes
GPS User Data	max. 42 Bytes
Marker User Data	max. 38 Bytes
Marker User Data GPS	max. 31 Bytes

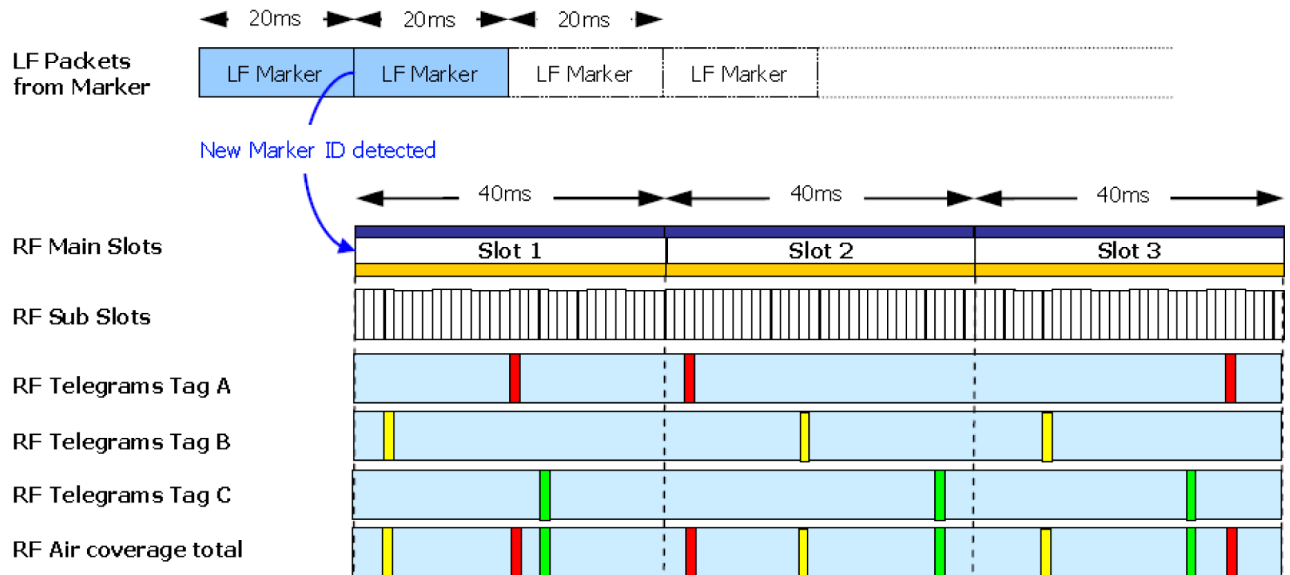
3.2. Information on Burst Settings

The parameter "Time between Bursts (Marker)" is not simply a delay time. It is in fact a timeslot. In this timeslot the tag chooses a random moment to do a single burst. This avoids that burst collisions with other tags, that are simultaneously triggered by the same marker loop. These timeslots are repeated until all bursts are sent.

In the event that dozens of tags are triggered to burst at once, this value can be increased. The result of increasing the slot width is there will be a longer time interval between other bursts being sent. Fore example with an increased value of 700 ms and 8 bursts, the amount of time for all bursts is 5.6 seconds.

Example

This example shows 3 tags (A, B, C) that are simultaneously triggered by a marker loop (LF marker) and are configured to burst 3 times. The timeslot (Time between Bursts) is set to the default value of 40 ms.



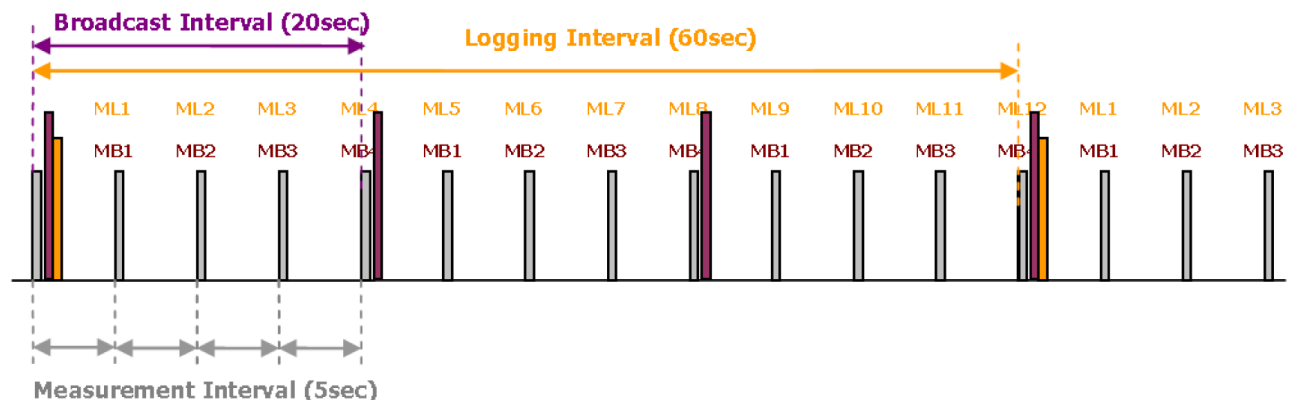
The last row shows how the random use of the timeslot avoids collision between the tags.

3.3. Impact between measurement, logging and broadcast interval

The intervals for temperature measurement, temperature logging and broadcasts can be configured independently.

Example 1

Measurement Interval: 5 sec
 Broadcast Interval: 20 sec
 Logging Interval: 60 sec



If the measurement interval is shorter than the broadcast interval, the tag broadcasts the average value measured during the time between broadcasts. In this example the value is an average over the 4 measured values during the broadcasts:

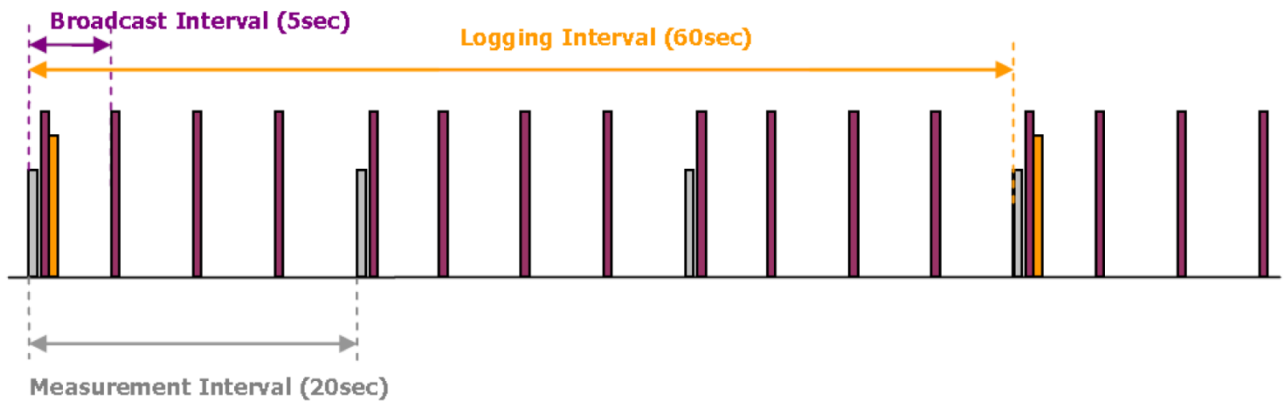
$$\text{Avg. Temperature for Broadcast} = \frac{\text{MB1} + \text{MB2} + \text{MB3} + \text{MB4}}{4}$$

With a longer logging interval, the average temperature for logging is calculated as follows:

$$\text{Avg. Temperature for Logging} = \frac{\text{ML1} + \text{ML2} + \dots + \text{ML12}}{12}$$

Example 2

Measurement Interval: 20 sec
 Broadcast Interval: 5 sec
 Logging Interval: 60 sec



If the broadcast interval is shorter than the measurement interval the tag broadcasts the last measured value until the tag measures a new one. In this example the tag sends the same value 4 times. The logged value is still the average during the log interval.

3.4. GPS and Satellite communication settings

3.5. Globalstar Satellite communication activation

The Globalstar Satellite module with the FCC ID can be accessed by carefully removing the back panel of the device. The module is properly labeled with the FCC ID: L2V-STX3



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4. MAINTENANCE

4.1. General

When installed correctly the SensorSMART System will operate virtually maintenance free for many years. However, in the event maintenance is required only trained and authorized personnel are permitted to perform the updates, changes and maintenance necessary.

4.2. Regular Cleaning of The Surface

Remove dust with a brush or compressed air. If there are fatty or oily substances use a soft cloth moistened with a mild rinsing agent.

Warning

Do not clean the tag in a dishwasher. Do not sandblast the tag. Do not use high pressure water jet or steam cleaner. Do not use cleaning products containing chemical additives.



WARNING - Electrostatic Hazard: Clean plastic Tag surface only with a damp cloth. Do not use solvents.

4.3. Precautionary Maintenance

A regular check of the system is recommended. Unstable connections could lead to damage and malfunctions of the system and should therefore be repaired as soon as possible.

A Brief Checklist

- Are all housings intact?
- Are all cables intact?
- Are all connectors intact?
- Are all connectors securely fastened?
- Are all screws still tight?
- Is there a malfunction at a specific unit?



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4.4. Returns

Parts or main components returned for repair or exchange must be handled with great care. PC cards must be returned in the appropriate ESD-protecting packaging material. Please follow the RMA policy under:

http://cdn.identecsolutions.com/wp-content/uploads/2012/06/IMS_PD-OPS-014_Hardware_Return_and_Repair_Policy_03e.pdf

Return to:

IDEN TEC SOLUTIONS AG
Service Department
Millennium Park 2
6890 Lustenau
AUSTRIA

5. TECHNICAL DATA

Communication Broadcast 350

Operation Mode	Transmits Tag ID and user data in pre-defined interval
Read Range	up to 500m (1600ft)*
Compatibility	i-PORT M350, i-CARD CF 350 and i-PORT 4-350
Operating Frequency	868 MHz (EU) or 920 MHz (NA)
Transmit Power	<1mW

Communication Response 350

Operation Mode	Bi-directional communication (reading log, blink LED, write/read data)
Read Range	up to 250m (800ft)*
Compatibility	i-PORT M350 and i-CARD CF 350
Operating Frequency	868 MHz (EU) or 920 MHz (NA)
Transmit Power	<1mW

Communication Marker

Operation Mode	Receives Marker ID and transmits marker information several times via Broadcast 350 telegrams
Read Range	up to 5m (16ft)*
Compatibility	i-MARK
Operating Frequency	125 kHz

* The communication range depends on the antenna type, the antenna cable runs and the environmental conditions.

Communication GPS

Receiver type	50 Channels GPS L1 frequency, C/A Code
Time-To-First-Fix	Cold Start 26 s Hot Start 1 s
Horiz. Position Accuracy	GPS 2.5 m

Communication Satellite

Frequency	1.610 – 1.620 GHz
Protocol	Simplex
Modulation	Direct Sequence Spread Spectrum (DSSS)
Average TX Power	18 dBm +/- 2 dB RMS
Maximum TX Time	1.4 seconds
Packet Size	9 bytes (or custom programmable)
Electronic Serial Number	Each unit identified with a unique ESN
Certification	Globalstar

Data

Data Retention	> 10 years without power
Write Cycles	1.000.000 writes
Memory Size	30.000 Bytes user defineable
Identification Code	48 bit fixed ID

Sensors

Shock	up to 100G on all 3 axis, 50mG sensitivity
Motion	up to 8G on all 3 axis, 4mG sensitivity

Configuration

Device	i-PORT M350 or i-CARD CF350
Ping Rate	Configurable from 0.5 to 300 seconds insteps of 0.5 seconds
Number of Bursts	Configurable from 0 to 15
Broadcast User Data	Up to 50 Bytes
GPS fixes	Configurable
Satellite communications	Configurable



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Electrical

Power Source

4x Lithium battery 2200mAh (not user-replaceable)

Battery lifetime expectancy

4 years @ 10 seconds ping rate, 2 GPS fixes and 2 satellite communications per day

Environmental Conditions

Operating Temperature

-30 °C to +60 °C (-22 °F to +140 °F)

Humidity

10% to 95% relative humidity @ 30°C

Shock

EN 60068-2-32: Multiple drops to concrete from 1m (3ft), 5 times

EN 60068-2-29: 50G on all 3 axis, 3 times per axis

Vibrations

EN 60068-2-6: 5G, 20 sin wave cycles per axis, 5-500Hz

EN 60068-2-64: noise 5 to 1000Hz, 90 minutes per axis

Standard/Certification

Europe**

CE (EN 300 220-1, -3; EN 301 489-1,-3; EN 60950)

North America**

FCC Part 15 (US); Industry Canada

ATEX/IECEX**

ATEX Zone 0 (II 1 G Ex ia IIC T4)

**Certification pending

Mechanical Data

Dimensions

210 x 95 x 37 mm (8.3 x 3.7 x 1.5 inches)

Enclosure Material

PA 6.6 GF30 and rubber end caps

Enclosure Rating

IP67 (immersion up to 1m) & IP69K (high pressure water jets)

Weight

500 grams (18 ounces)