

ANNEX 12 TO TEST REPORT # EMCC-010133AF, 2002-07-19

USER MANUAL: i-PORT 3 USER'S GUIDE

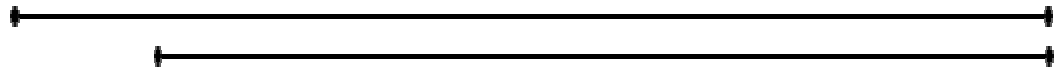
EQUIPMENT UNDER TEST:

Trade Name:	ILR [®]
Model:	i-Port3
Serial No:	143
Equipment Category:	902-928 MHz Frequency Hopping Spread Spectrum Transceiver
Manufacturer:	IDENITEC SOLUTIONS AG
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RELEVANT STANDARD: 47 CFR Part 15.247



i-PORT3 User's Guide



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Radio Frequency Compliance Statement

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

MODEL:	i-PORT 3	i-CARD	i-D2 TAGS	i-Qxx TAGS
FCC ID:	O2E-ILR-IPORT3	O2E-ICARD-NA	OO4-ILR-ID2	OO4-ILR-IQ8T or OO4-ILR-IQR
CANADA:	Pending	35381032231	3538A12112	35381021756A or 35381021825
EUROPE:	CE 0678(!)	CE 0678(!)	CE 0678(!)	CE 0682(!)

The user(s) of these products are cautioned to only use accessories and peripherals approved, in advance, by IDENTEC SOLUTIONS, Inc. The use of accessories and peripherals, other than those approved by IDENTEC SOLUTIONS, Inc., 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.

Operation is subject to the following conditions: (1) these devices may not cause harmful interference, and (2) these devices must accept any interference, including interference that may cause undesired operation of the device.

FCC Compliance

This equipment 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 communication. 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/her own expense.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Industry Canada Compliance

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication.

Important Note

To comply with FCC radio frequency exposure compliance requirements, this device must be installed by an IDENTEC SOLUTIONS certified technician. When installing antennas, a 20 centimeter passing distance must be maintained from any body part of the user or nearby persons and the antenna.

The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada.

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1.0 Introduction

1.1 Fundamentals

IDENTEC SOLUTIONS' ILR[®] (Intelligent Long Range[®]) technology is the next generation of long range RFID (Radio Frequency IDentification). The objective is wireless and automated data collection over large distances.

HOW RFID WORKS

Data is transmitted via high frequency radio waves between a tag and an interrogator. Information stored on the tag can be read and modified. Data can be exchanged over long distances, even in the presence of extreme operating conditions such as dust, dirt, paint or oil.

The core element of the system is the active ILR tag, which can communicate large amounts of data (up to 32 kBytes) at a rapid rate of transmission over very long distances (up to 100 meters). A sophisticated anti-collision handling algorithm enables the interrogator (i-PORT) to record data simultaneously from hundreds of these tags within seconds. Connection of the interrogator to a host computer system permits global data accessibility via a variety of software platforms.

CHARACTERISTICS OF ILR:

- UHF Frequency (868 / 915 MHz)
- Long read and write range of 30 meters (optional up to 100 meters)
- Variable read range from just a few meters up to 100 meters
- Large storage capacity (8 kB or 32 kB)
- Temperature monitoring and recording (optional)
- Highly visible LED "pick-by-light" (optional)
- Long battery lifetime (up to 6 years)
- Anti-collision process and multi-tag handling

1.2 System Overview

IDENTEC SOLUTIONS' ILR-System consists of 4 main components:

- Active tags (also called transponders) with internal power supply, which are used to identify goods or to store data and histories
- Interrogator (i-PORT; fixed-mounted) and handheld devices (mobile), which exchange information with the tags and host computer systems
- Antenna types for different applications
- A central computer system as basis for control and monitoring

2.0 COMPONENTS

2.1 *i-PORT3*



i-PORT3 is the next generation of IDENTEC SOLUTIONS' ILR interrogators. It is capable of communicating not only with tags from the i-Q series, but also with tags from the i-D2 series. The communication range is up to 100 meters for i-Q tags and up to 6 meters for i-D tags.

Up to four antennas (plus one extra send antenna) can be connected to i-PORT3; built-in signal strength measurement capability enables the localization of tags using triangulation.

i-PORT3 is delivered complete with standard software, which offers the user a variety of options:

- Communication with ILR tags (i-Q and i-D)
- Simultaneous operation with up to four antennas (receive), with the option of a fifth antenna (send)
- Communication with host computer systems via Ethernet interface
- Data processing (event messages, in/out, etc.)
- Configuration by means of web-interface (remote maintenance)

i-PORT3 has a Real-Time Operating System (RTOS: Thread X) and an internal Real-Time Clock (RTC), which permit an exact time allocation of the data. Up to 2000 data messages can be stored temporarily.

2.2 *Antennas*

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 read zone is achieved by the right choice of antenna (characteristics) and the power setting. As the antennas are passive system elements, no tuning is required, which facilitates installation and maintenance.

Please consult your system integrator to discuss which antenna is most suited for your project requirements.

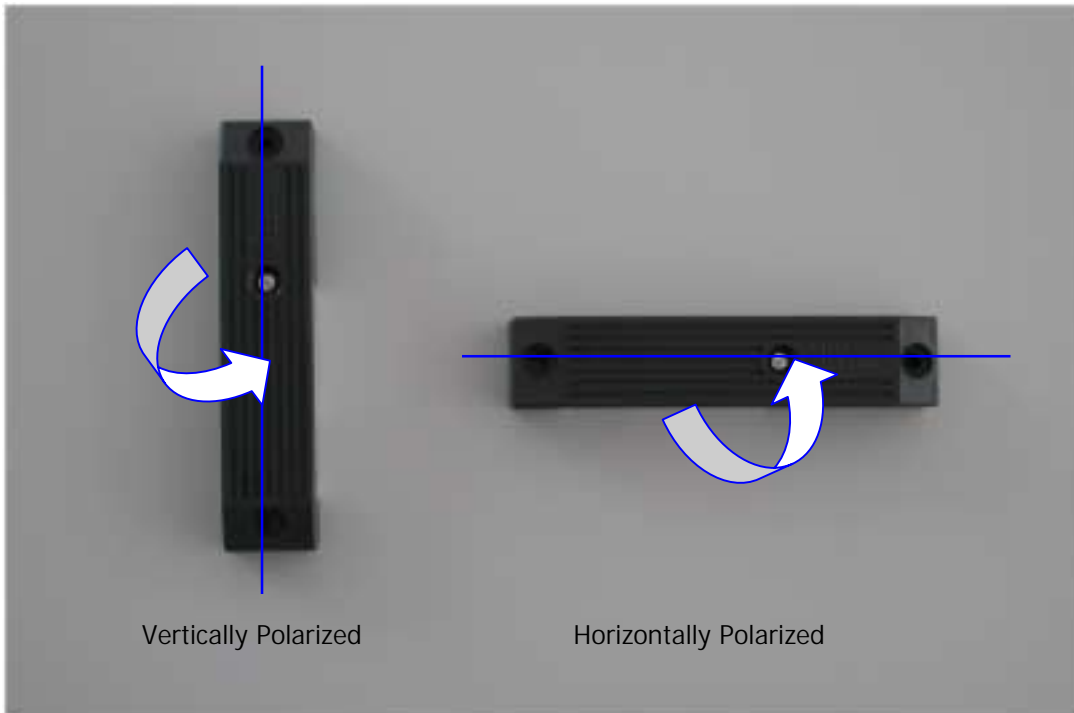
2.3 i-Q Tag



This active tag is particularly suited for:

- Identification
- Tracking and Tracing
- Localization
- Temperature Monitoring

i-Q tags are available in a variety of configurations, i.e. with 8 kByte or 32 kByte of memory, an optional LED for visual recognition, and optional temperature logging function. Furthermore, they are available at 868 MHz for use in Europe, at 915 MHz for use in North America and at both frequencies for transcontinental applications.



Polarization is dependent on orientation and is rotation symmetrical.

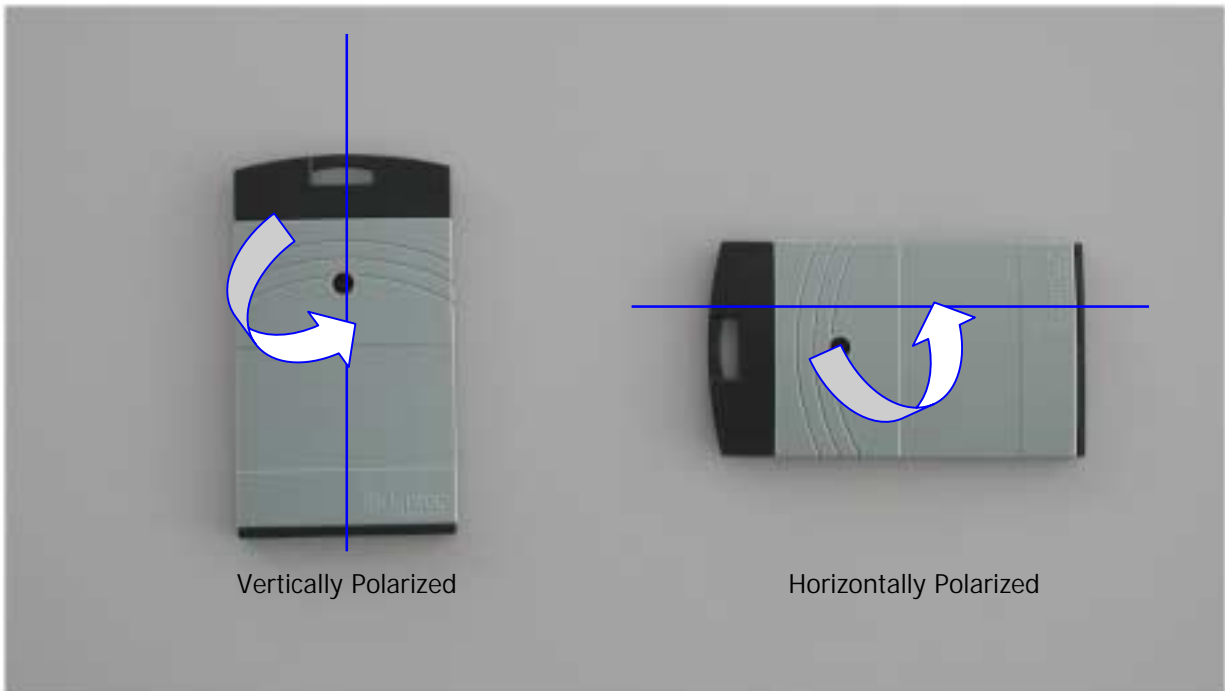
2.4 i-D2 Tag



This active tag is particularly suited for:

- Identification
- Tracking and Tracing
- Localization

i-D tags are available in a variety of configurations. The tags have 64 bytes of memory, an optional LED for visual recognition, and are available in two different housing types (for personnel identification and for industrial applications). The tag transmits a low power signal at 868 MHz and can therefore be used in both Europe and North America.



Polarization is dependent on orientation and is rotation symmetrical.

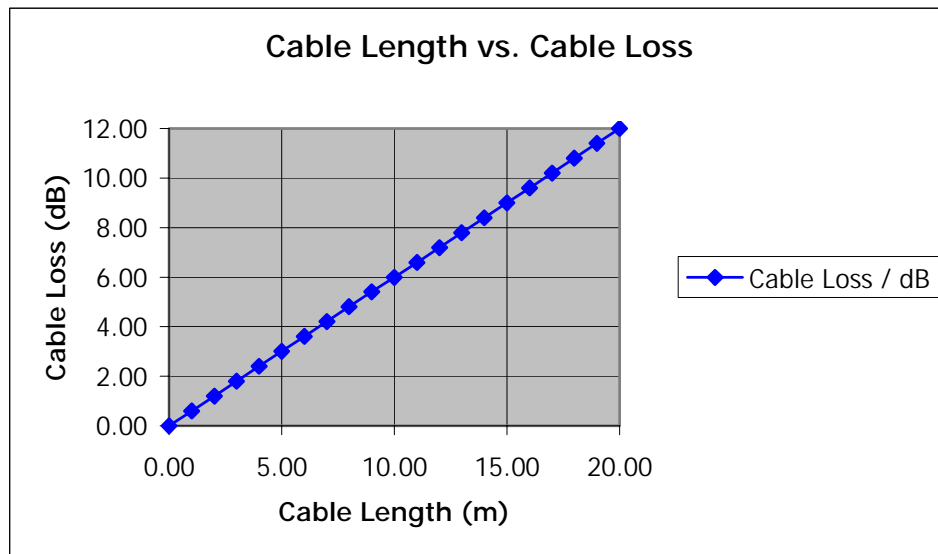
3.0 INSTALLATION AND START-UP

3.1 Installation and Start-Up

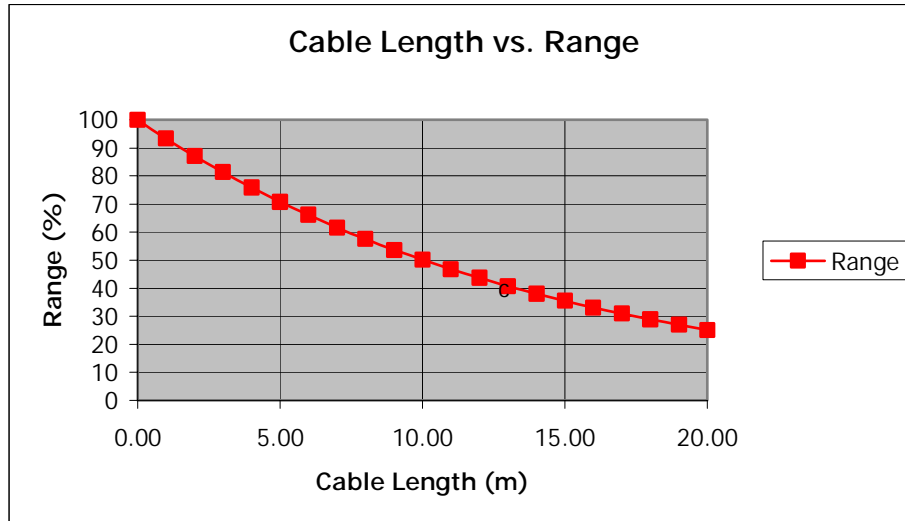
Before installation, the user should have thorough knowledge of the application. The read locations need to be defined; whether the object is moving or stationary needs to be determined. If the objects in question are moving objects, their speed is important for determining the scan interval. The read locations need to be sufficiently spaced. Rule of thumb is that the distance between two i-PORTs should be at least double the read range of the i-PORTs (or double the distance required) to synchronize the i-PORTs.

Mounting Site:

The i-PORT should be mounted as close as possible to the read location as lengthy antenna cables reduce the range of the system. A 10-meter coaxial cable induces a loss of 6 dB. This in turn means a reduction by 50% in output power and range (see diagrams).



Cable losses as a function of cable length are displayed in the above diagram. The values are based on an RG58 coaxial cable at a frequency of 900 MHz.



In the diagram above, the **relative** range is displayed as a function of the cable length. Relative because the range is dependent on the environment of the system. Under ideal conditions (free field, high-sensitivity tags, high-sensitivity i-PORT, maximum output power), ranges of up to 100 meters can be achieved. But if 20 meters of antenna cabling are used, the cable losses amount to approximately 12 dB, which reduces the original range to just one-quarter (25 meters)!

The range losses as displayed in the diagram are independent of the original range. If the range is 30 meters (free field, low-sensitivity tags, low-sensitivity i-PORT, maximum output power) and 10 meters of antenna cabling are used, the range is reduced by 50%.

After mounting the i-PORT, the antennas need to be installed and connected to the designated antenna sockets. If antenna extension cables are required, check these for function or short circuits before you begin with the start-up.

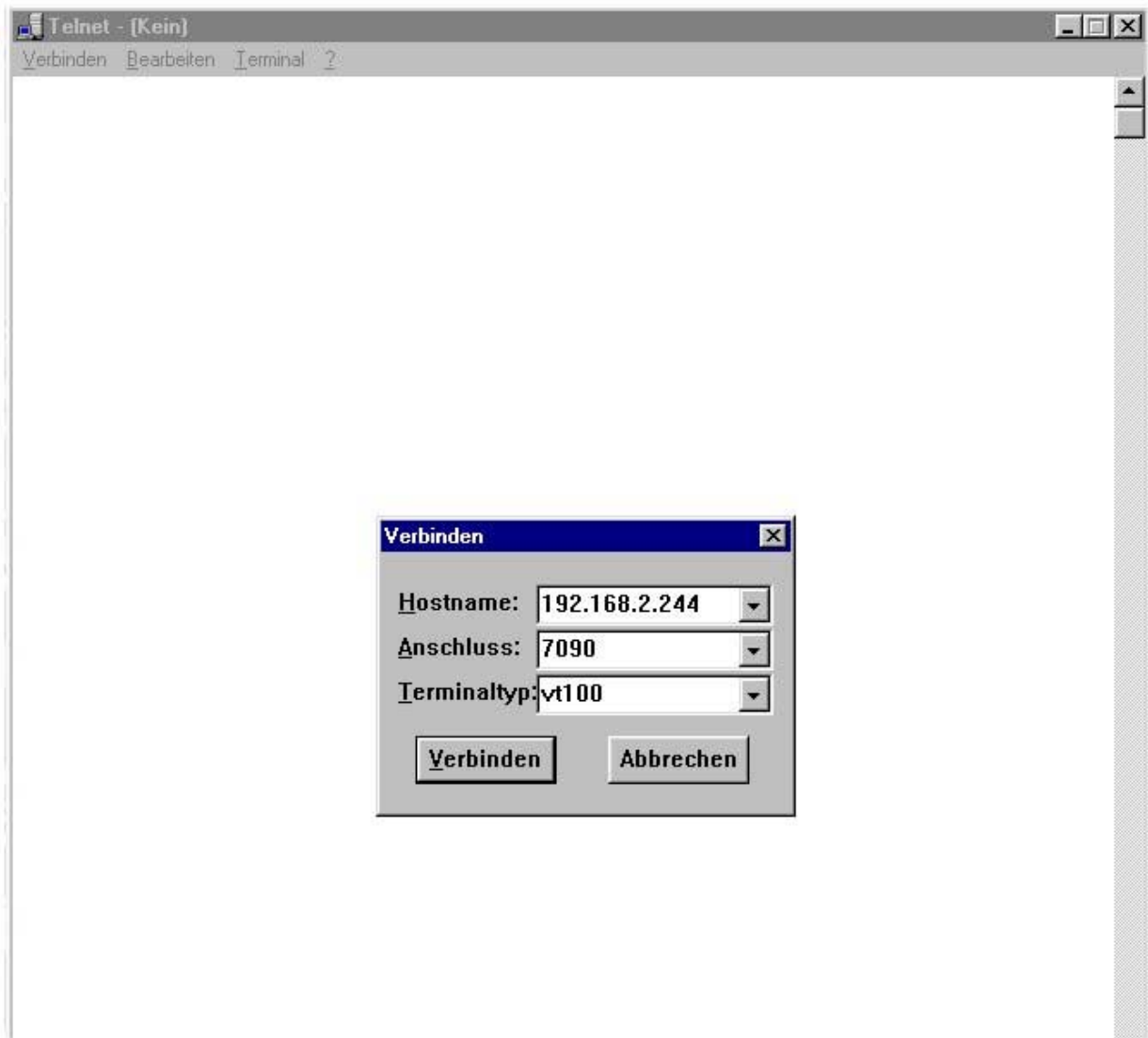
Alignment of Antennas:

Align the antennas with the tags or the objects to be monitored. Linearly polarized antennas must have the same polarization as the tags, either horizontal or vertical. Circular polarized antennas are not dependent on the polarization of the tags.

Based on the Orientation Diagram, an initial rough estimate of the read zone is possible. First set the send range of the i-PORT. To do this, use the i-PORT’s blink mode (Note: Inhibit Time must be set to “0”). With a test tag (with LED) in hand, walk off the read zone. As long as the tag blinks, you are still within the zone. Reduce the i-Q or i-D Tx Power parameter as much as required until the read zone has reached the desired size.

System Test:

You can use the debug port to test the system and the range. Connect the i-PORT via crossover network cable directly to a laptop computer. Create a Telnet connection by dialing up on the debug port (IP-Address: 192.168.2.244, Port: 7090). Under “Start” and “Execute”, type in “Telnet”. This terminal program will then be started.



Enter the IP-Address of the i-PORT, in order to connect with the i-PORT debug port. Debug information will then be displayed on the monitor. The debug port must be activated (see Debug Config).

```

Telnet - 192.168.2.244
Verbinden Bearbeiten Terminal 2
Welcome to i-PORT Debug Port
IDENTEC SOLUTIONS
-----

-- Debug Tag List --
RTCTime : 8:07:14
Tags in list: 2
ID          P(A1) P(A2) P(A3) P(A4) S R DATA
0000206925  -23  -21  -----  0 0 no data.
0000206916  -16  -12  -----  0 0 no data.

-- Debug Tag List --
RTCTime : 8:07:19
Tags in list: 2
ID          P(A1) P(A2) P(A3) P(A4) S R DATA
0000206925  -24  -21  -----  0 0 no data.
0000206916  -16  -12  -----  0 0 no data.

-- Debug Tag List --
RTCTime : 8:07:24
Tags in list: 2
ID          P(A1) P(A2) P(A3) P(A4) S R DATA
0000206925  -24  -21  -----  0 0 no data.
0000206916  -16  -12  -----  0 0 no data.

-- Debug Tag List --
RTCTime : 8:07:29
Tags in list: 2
ID          P(A1) P(A2) P(A3) P(A4) S R DATA
0000206925  -24  -21  -----  0 0 no data.
0000206916  -16  -12  -----  0 0 no data.

```

The result of the scan is displayed on the debug port. Each Tag-ID is listed with the measured signal strength (depending on the number of active antennas).

3.2 LED Displays



Status LEDs:

- a) POWER: Lights up when power is applied to the i-PORT
- b) RUN: Blinks (every 2 seconds) as soon as the i-PORT has booted (approx. 10 seconds after power-up)
- c) HOST: Lights up when a host is connected to the i-PORT
- d) ERROR: Lights up when an error occurs (see section: Troubleshooting)

COM LEDs:

- a) RX: Lights up when the i-PORT receives data on serial interface
- b) TX: Lights up when the i-PORT sends data on serial interface

INPUT LEDs:

- a) 1-4: Light up when Inputs 1-4 are set (Connection to Ground)

NOTE: This functionality has not been implemented at this time.

ANTENNA LEDs:

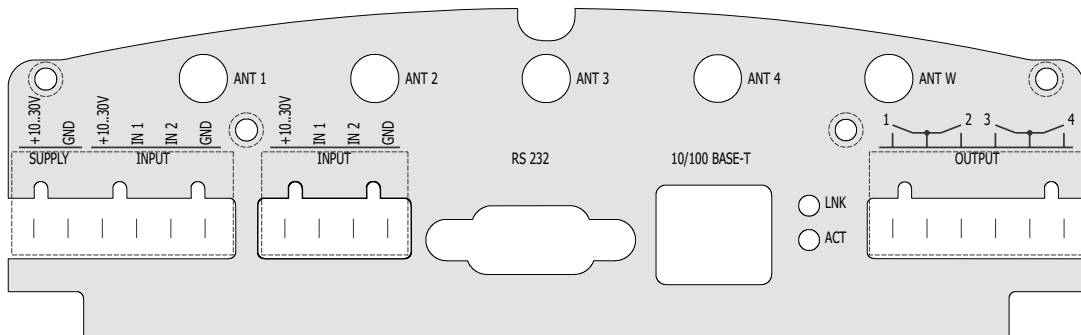
- a) 1-4: Light up when there is activity at corresponding Antennas 1-4
 - Green: Antenna is sending
 - Red: Antenna is receiving (Orange to red, depending on the strength of the signal)
- b) W: Lights up when there is activity at the Wake-up Antenna

OUTPUT LEDs:

- a) 1-4: Light up when the corresponding Outputs 1-4 are set

NOTE: This functionality has not been implemented at this time.

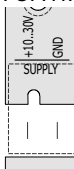
3.3 Cable Connections and Plug Allocation



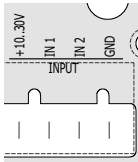
Antenna jacks:

- ANT1-4: SMA sockets, send and receive antennas
- ANT W: SMA socket, send antenna ONLY (WakeUp Antenna)

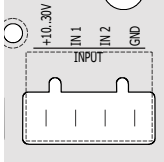
Terminal Block 1:	+10-30V GND	Connection for power supply (10-30V DC) Connection for power supply (GND)	Supply Supply
-------------------	----------------	--	------------------



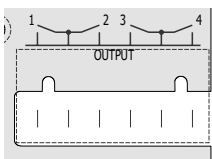
Terminal Block 2:	Functionality has not been implemented at this time.
-------------------	--



Terminal Block 3:	Functionality has not been implemented at this time.
-------------------	--



Terminal Block 4:	Functionality has not been implemented at this time.
-------------------	--



Serial and Ethernet Interface:

RS 232 interface (up to 115 kb/s) and Ethernet interface (10 / 100 Mbit/s)

4.0 Software, Configuration

4.1 Standard Settings, IP-Address, Password

The i-PORT is supplied with the following factory settings:

IP-Address 192.168.2.244
Subnet-Mask: 255.255.255.0

User Name: user
Password: identec

To change the IP-Address, see "Boot Menu (Serial)"

4.2 Configuration, Settings

Direct Connection:

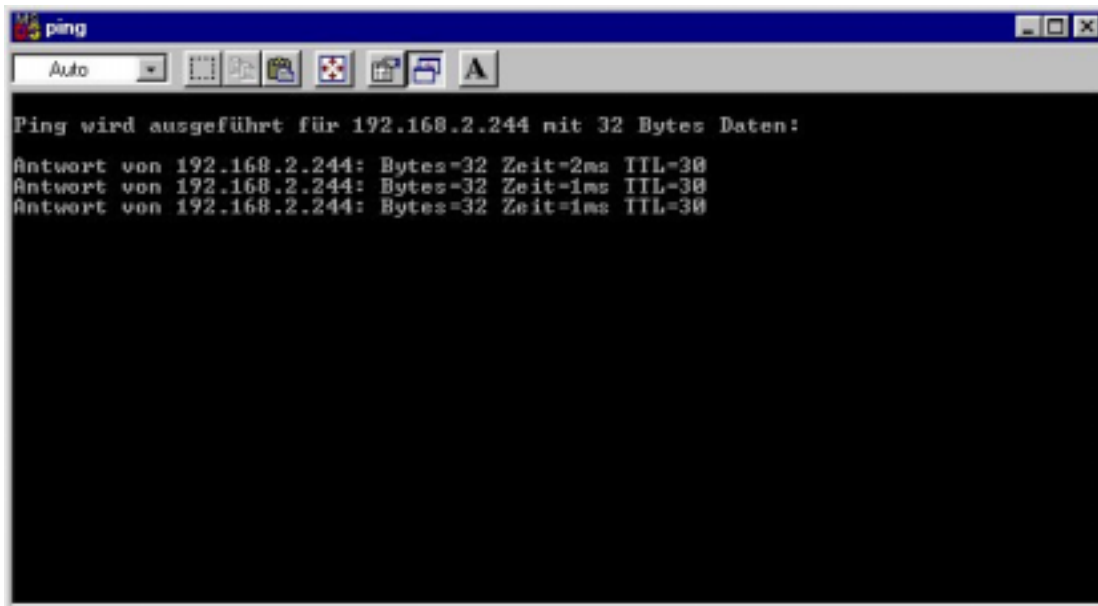
Connect the i-PORT directly to the network connection in your PC, laptop, etc. using a crossover network cable.

Ensure that the PC's IP-Address lies in the same subnet as that of the i-PORT.

Network Connection:

Connect the i-PORT with a straight network cable to the network.

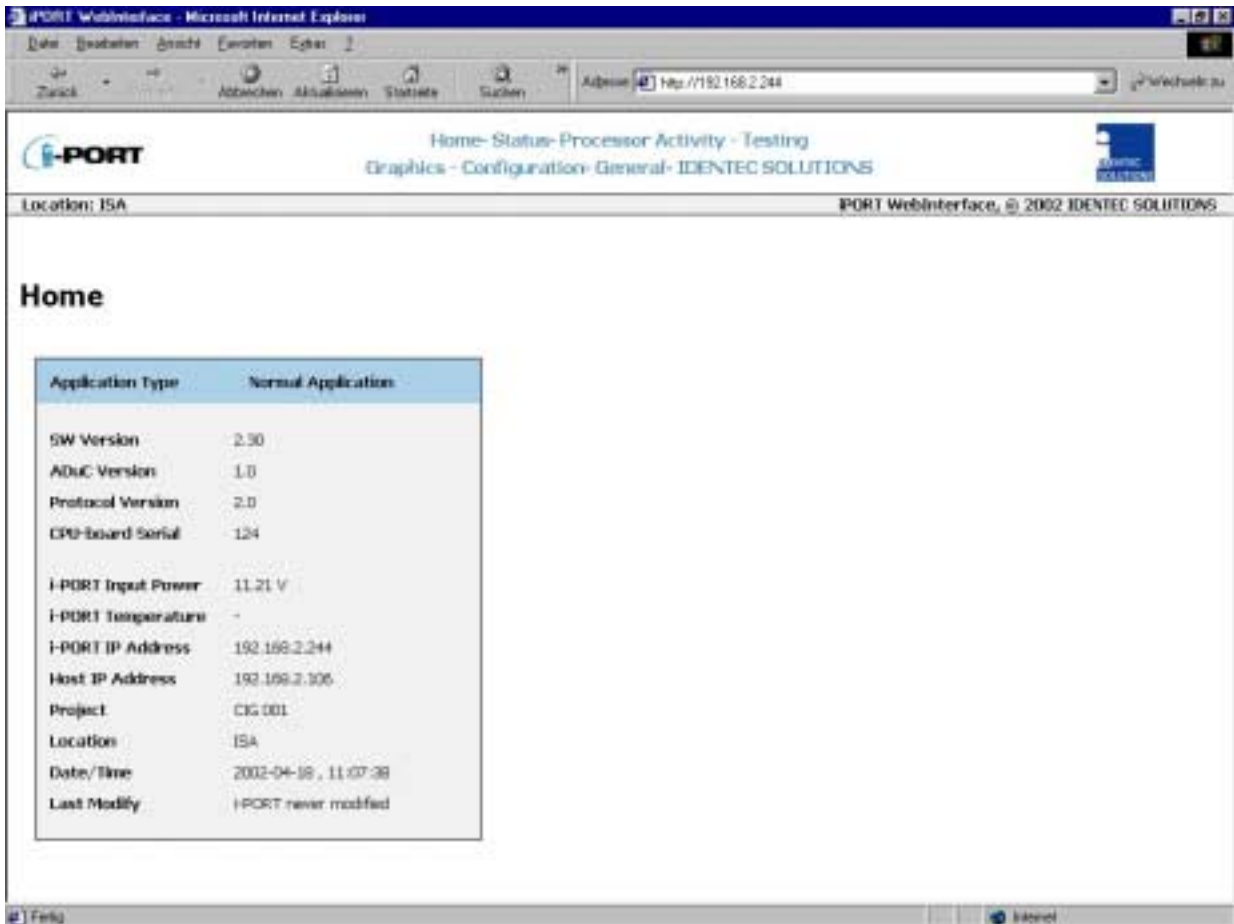
To test the connection to the i-PORT, open a DOS window and type in the command <ping 192.168.2.244>. You should receive a reply from the i-PORT.



After successfully testing the i-PORT connection, you can start your browser and open the i-PORT web interface. To do this, type in the i-PORT address <http://192.168.2.244>

In doing this, you will get to the Start page for the i-PORT. Several sub-menus are available to you for configuration and for testing purposes.

“Home” Menu:

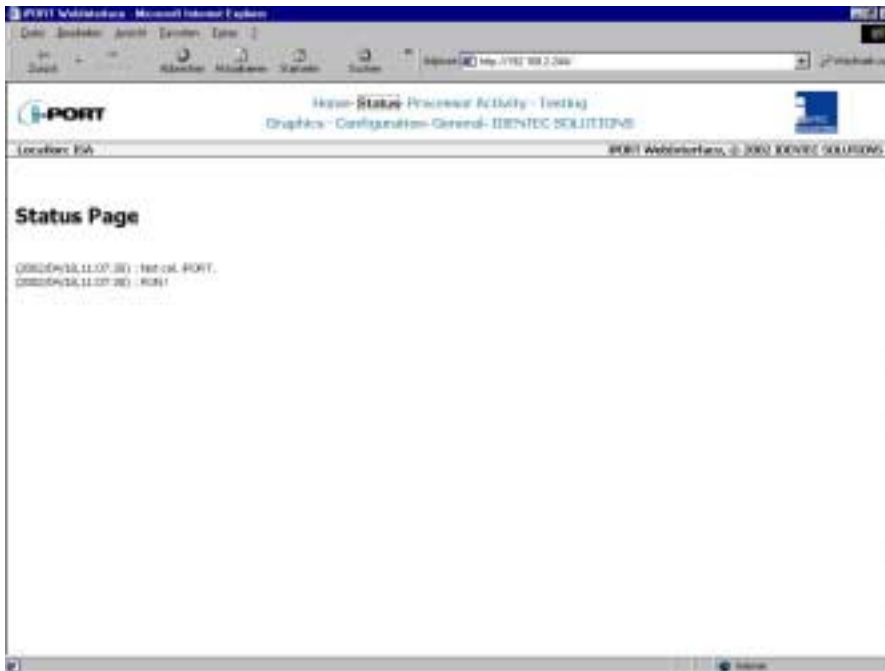


Application Type	Normal Application
SW Version	2.30
ADuC Version	1.0
Protocol Version	2.0
CPU-board Serial	124
I-PORT Input Power	11.21 V
I-PORT Temperature	-
I-PORT IP Address	192.168.2.244
Host IP Address	192.168.2.306
Project	CIG 001
Location	ISA
Date/Time	2002-04-18 , 11:07:38
Last Modify	I-PORT never modified

Information about version numbers, firmware, serial numbers, etc. is contained in this menu.

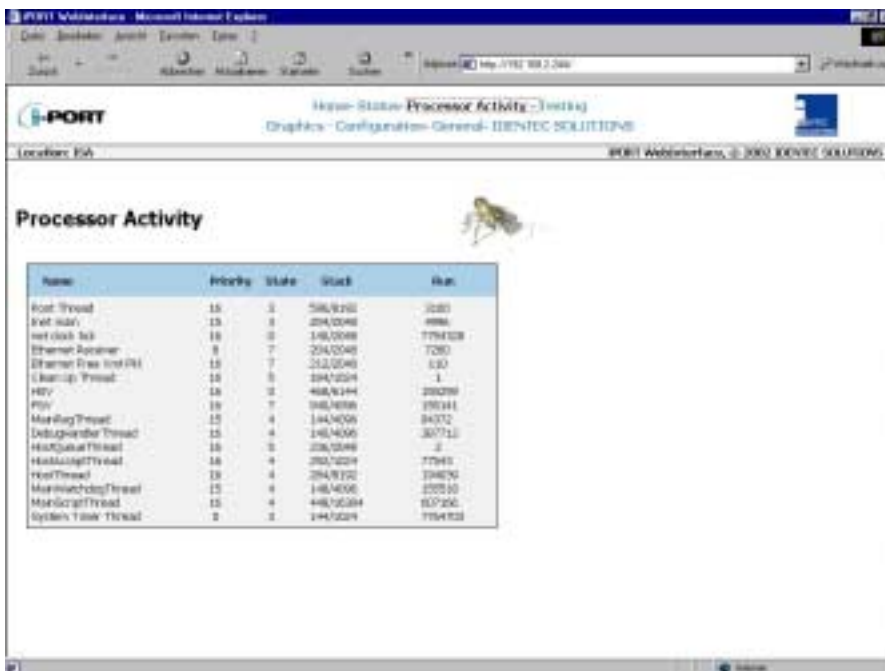
In the top line you can see an overview of all the menus. Click here to get to any of the other menus.

“Status” Menu:



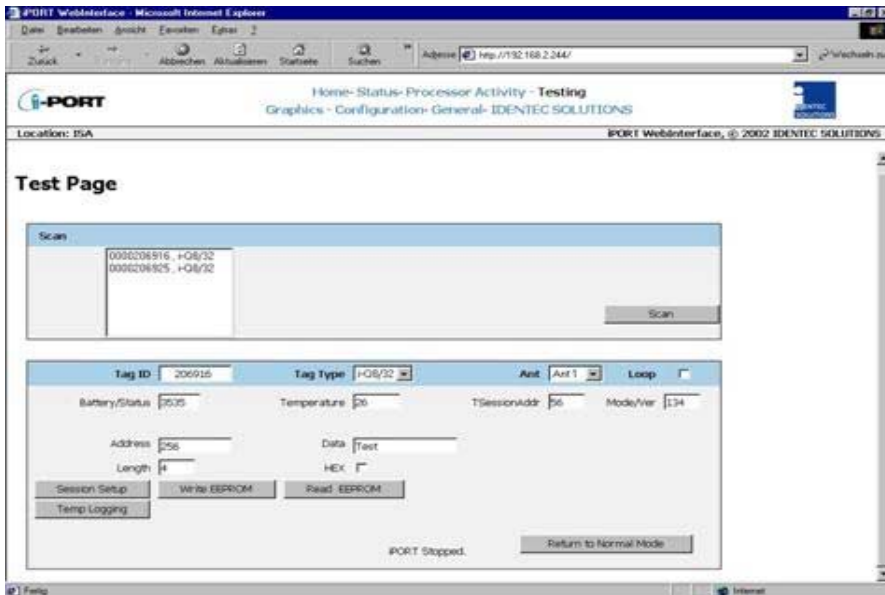
Status information, which may be required in case maintenance is needed, is available in this menu.

“Processor Activity” Menu:



Processor information, which may be required in case maintenance is needed, is available in this menu.

“Testing” Menu:



Several test possibilities are available in this menu. i-PORT operation is put on hold during test mode (operation will resume after leaving test mode). The settings from the Configuration Page (antenna settings, slots, etc.) apply here also.

Miscellaneous Settings:

- Tag Type:** i-Q8/32 or i-D2 tags
- Ant:** Send antenna during test mode (for receive antenna, see Configuration)
- Loop:** Operation takes place in closed-loop action

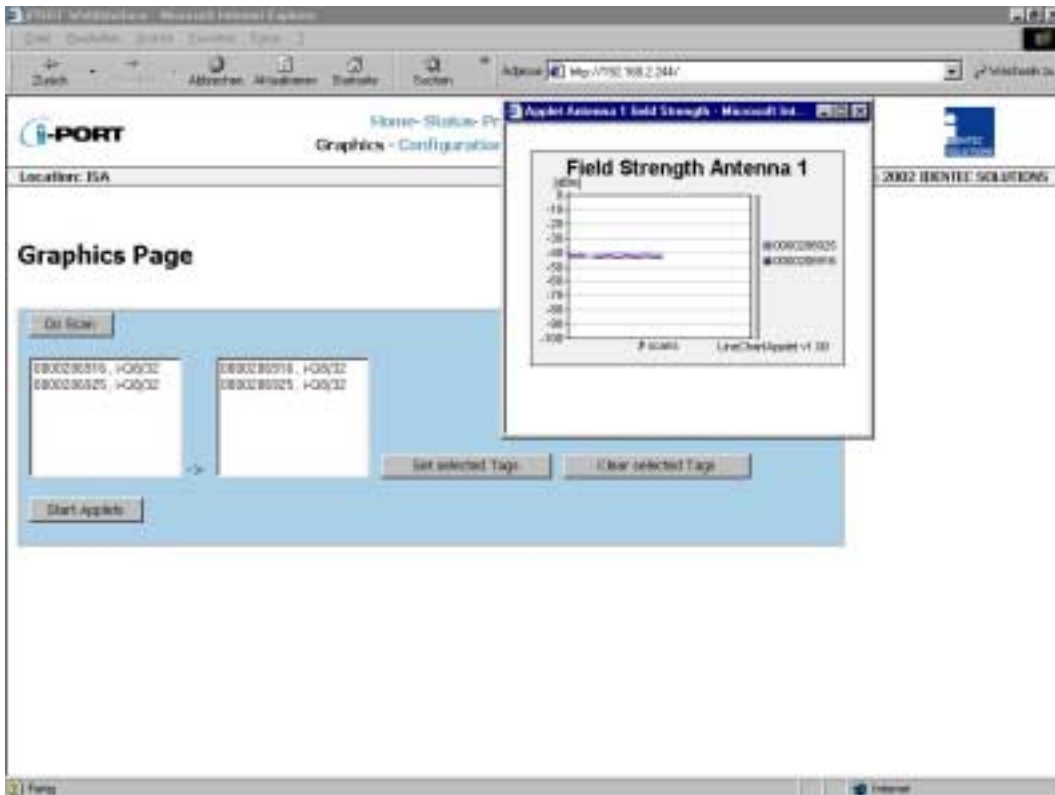
Pressing the **SCAN** button triggers a scan. If tags are located in the zone, a list of these tags will be displayed. Clicking on a tag selects that Tag ID (see “Tag-ID” field). Consequently, data can be exchanged with this tag.

- Session Setup:** This command determines battery voltage (mV), i.e. tag status (tag blinks).
- Write EEPROM:** Data can be written to the tags using this command. Enter the desired address into the “Address” field; enter the data into the “Data” field (*Length* = Amount/No. of Data Items).
- Read EEPROM:** Data can be read from the tags using this command. In the “Address” field, enter the address FOLLOWING WHICH the data should be read.
- Temp. Logging:** Temperature progression of a temperature tag can be displayed using this command. First execute “Session Setup”, and then click on “Temp. Logging”! (Prerequisite: temperature tag; tag must have activated Logger!)

Writable Data Range for Tags (decimal):

Tag Type	Start Address	Stop Address	Start Address	Stop Address
i-D2	8	64		
i-Q8	132	8191		
i-Q8T	132	5887	6144	8191
i-Q32T	132	5887	6144	32767

“Graphics” Menu:



With this menu you have the ability to graphically display a tag's field strength. This can be useful for estimating the possible ranges i.e. to set the read zones.

The parameters from the Configuration Page (antennas, output power, scan-interval, etc.) are to be used as settings.

Pressing the **DO SCAN** button triggers a scan. If tags are located in the zone, a list of these tags will be displayed. Clicking on one or more tags transfers those Tag IDs to the next field. Next, click on **SET SELECTED TAGS**.

Clicking on **START APPLETS** opens a window for each activated antenna (see "Configuration"). In this window, the field strength progression is graphically displayed for each tag that was selected. After every scan, the measured field strength from the tag signal is entered into the diagram.

This feature allows you to estimate the size of the read zone at the given output power, i.e. to roughly estimate the distance of the tag.

“Configuration” Menu:

The screenshot shows the i-PORT configuration web interface. At the top, there is a navigation bar with 'Home', 'Status', 'Processor Activity', and 'Testing'. Below this, the page title is 'i-PORT Configuration-General-IDENTEC SOLUTIONS'. The main content area is titled 'i-PORT Configuration' and contains several sections:

- i-PORT General:** Includes fields for PORTType (F1a), PORTMod (1), PORTSubID (0), PORTSeDevice (No Device), PORTLongitude (33.0000), and PORTLatitude (47.0000).
- Host Connection:** Includes fields for HostAddr (10.0.0.0), HostPort (7001), HostTimeout (s) (1), HostConnInterval (s) (0), HostSendInterval (s) (0), and HostWindowSize (0).
- Debug Config:** Includes checkboxes for DebugWithError (checked), DebugTagset (s) (0), DebugNewTag (unchecked), and DebugScanTag (unchecked).
- Synchronization:** Includes fields for Neighbour(s) IP and Timeout (0.1s) (0).
- Scan:** Includes fields for Mode (Host Only), Slot Select (04 Slots), Num of Scans (2), and ScanPause (0.1s) (0.0).
- IIR:** (Empty section)
- Read data:** Includes fields for Start address, Num of bytes, Filter mask (dB) (0), and Name.
- Tag power saving:** Includes fields for Mode (Sleep) and Duration (s) (0).
- Detection:** Includes fields for TagType (+Q/Q2), Mode (Normal), Detection Time (s) (0), and InhibitTime (s) (0).
- Event message:** Includes fields for Event reason (Tag Error), Input 1 (None), Input 2 (None), Input 3 (None), and Message content (PORT ID, Time/Date, Tag Status, Field strength).
- Antenna Settings:** A table with columns for Antenna 1, Antenna 2, Antenna 3, Antenna 4, and Antenna W. Each column has checkboxes for Enable and Scan Enable, and input fields for I-Q Tolerance (dBm), I-D Tolerance (dBm), Ec Threshold (dBm), Sensitivity, and Calibration (dB).

At the bottom of the configuration area, there are buttons for 'Set Configuration' and 'Load default Configuration'. Below the configuration area, there are links for 'upload config to iPORT' and 'download config from iPORT'.

For explanation of parameters, see next page.

i-PORT General:

Standard i-PORT settings such as type, external devices, etc.

i-PORT Type	2 possibilities: "Fix" and "mobile VisuMC" Enter the i-PORT type here. Standard type is "Fix", this means that the i-PORT is stationary. Currently only special software "MobileVisuMC" still available.
i-PORT Main ID	i-PORT identifier for event messages (Area ID)
i-PORT SubID	i-PORT identifier for event messages (Area SubID)
i-PORT SerDevice	Used to select the type of device connected to the serial port. This functionality has not been implemented at this time.
i-PORT Longitude	Longitude co-ordinates
i-PORT Latitude	Latitude co-ordinates

Host Connection:

These are settings used if the i-PORT is to be connected to a host computer (currently only "Mobile VisuMC").

Host IPAddr	Host computer IP address
Host Port	Host computer port
Host TimeOut	i-PORT timeout
Host SyncInterval	Interval for synchronizing i-PORT time (if a GPS device is connected, time is synchronized with GPS time)
Host SendInterval	Interval for sending messages to host computer
Host ListSize	When this value is reached, the list is sent to the host computer

Debug Config:

Settings for the Debug output (Port 7090). If a check-box is selected, that parameter is valid.

Debug HostMirror	Output on Debug Port of all data that is exchanged on the Host Interface (serial or Ethernet).
Debug TagList	Time after which a tag list is outputted on the Debug Port ("0" means no output)
Debug NewTag	Output of newly-recognized tags (Note the Inhibit Time!!)
Debug ScanTag	Output of tag list after sequence execution (see Page 28)

Synchronization:

Settings when several i-PORTs are located in a small space, necessitating synchronization. After marking the check-box, the IPs of the other i-PORTs can be entered into the designated field.

Neighbour(s) IP	Enter IP addresses of the neighbouring i-PORTs
Timeout	Timeout for synchronization

Scan:

i-PORT settings for the scan process.

Mode:	3 possibilities: "Host Only", "Continuous" and "Input 1" "Host Only" means that the i-PORT waits for commands, processes them, and is otherwise inactive. "Continuous" means that the i-PORT performs continuous scans. "Input 1" mode has not been implemented at this time.
Slot Select	Number of slots in which tags can answer. This is part of the anti-collision process. Set at least double the amount of slots as the maximum number of tags that can be located in the zone at one time. The elapsed time per slot in which tags can answer is 1.2 ms.
Num of Scans	In "Test Mode", this is also the number of scans.
Scan Pause	Pause inserted by i-PORT after each sequence (see page 28)

Blink:

Setting to cause tags entering the zone to blink (dependent on Inhibit Time!)

Blink If this check box is marked off, each newly-recognized tag will blink. If Inhibit Time is activated (>0), it must first elapse for the tag (reentering the zone) to blink again.

Read data:

Settings for i-PORT to read data from tags (mark off check box)

Start Address Address from which i-PORT begins to read data
Num of Bytes Number of bytes that are read starting from the Start Address
Power Boost Additional output power required for read process
Retries Number of maximum attempts to read data

Tag power saving:

Settings for i-PORT to send tags into Sleep Mode (mark off check box)

Mode 3 possibilities: "Sleep", "Mute" or "Both"
Sleep, Mute, Both (i-Q): All 3 settings have the same effect for i-Q tags (sleep). For this duration, the tags can no longer be communicated with (also from other i-PORTs). After this time span has expired, the tags become available again.
Sleep (i-D): The tag cannot be communicated with for the duration of the sleep time. If after the sleep time a renewed sleep signal is received from the same i-PORT, the tag will again go into sleep mode. If no signal is received from the same i-PORT or if a signal is received from a different i-PORT, the tag returns to normal mode.
Mute (i-D): Tags receive a signal, but give no answer for the duration of the "mute". If the tag receives a renewed signal from the same i-PORT, the time will be re-triggered. Otherwise, the tag returns to normal mode, as it likewise does if it receives a signal from a different i-PORT.
Both (i-D): Combination of Sleep and Mute!
Duration Duration of the Sleep/Mute mode

Detection:

i-PORT settings which determine which tag types to interrogate, and how.

Tag Type 3 possibilities: "i-Q", "i-D" and "Both"
 Depends on which tags need to be interrogated.
Mode 3 possibilities: "Normal", "Max. Level" and "In/Out"
Normal: A tag is detected when it enters the zone
Max. Level: Tag detection at maximum field strength (see also "Detection Time")
In/Out: Orientation recognition activated (Antenna 1...In, Antenna 2...Out, Antenna 3...In, Antenna 4...Out)
Detection Time **Max. Level Mode:** Detection of tag at largest recorded field strength value within the detection time interval
In/Out Mode: Detection of tag and calculation of orientation after detection time interval
Inhibit Time If a previously interrogated tag leaves the zone for longer than the Inhibit Time, it will be recognized as a new tag when it reenters the zone. If the tag reenters the zone before expiration of the Inhibit Time, this time is reset as if the tag had never left the zone

Event message:

Settings to determine when an event message is to be sent and how it should look.

Event reason	A tag or an input can serve as a trigger for an event
Tag	3 possibilities: "Enter", "Leave" or "Enter or Leave" A message is generated when the tag enters the zone, when it leaves the zone, or both when it enters AND when it leaves the zone.
Input	This functionality has not been implemented at this time.
Message content	Each message can contain up to 4 additional pieces of information. By clicking on the check box, the corresponding information is added to the message (in addition to the Tag ID): i-PORT ID, Time/Date, Tag Status and Field Strength.

Antenna settings:

Settings for the antennas, power outputs, etc.

Enable	By marking the check box, the corresponding antenna is activated
Scan Enable	By marking the check box, the corresponding antenna is also able to send
i-Q TxPower	Power setting for i-Q tags at time of scan (send)
i-D TxPower	Power setting for i-D tags at time of scan (send)
Rx Threshold	Threshold (field strength of tag signal) required for tag recognition
Sensitivity	i-PORT receiver mode; this means that the Rx Threshold reaches -60dBm in low sensitivity mode and -90dBm in high sensitivity mode
Calibration	Differences in the various antenna types and cable lengths can be adjusted here (see example below)

Valid data for each parameter can be obtained from table in Appendix A.

Sequence:

A sequence is defined as successive scans on one or several antennas.

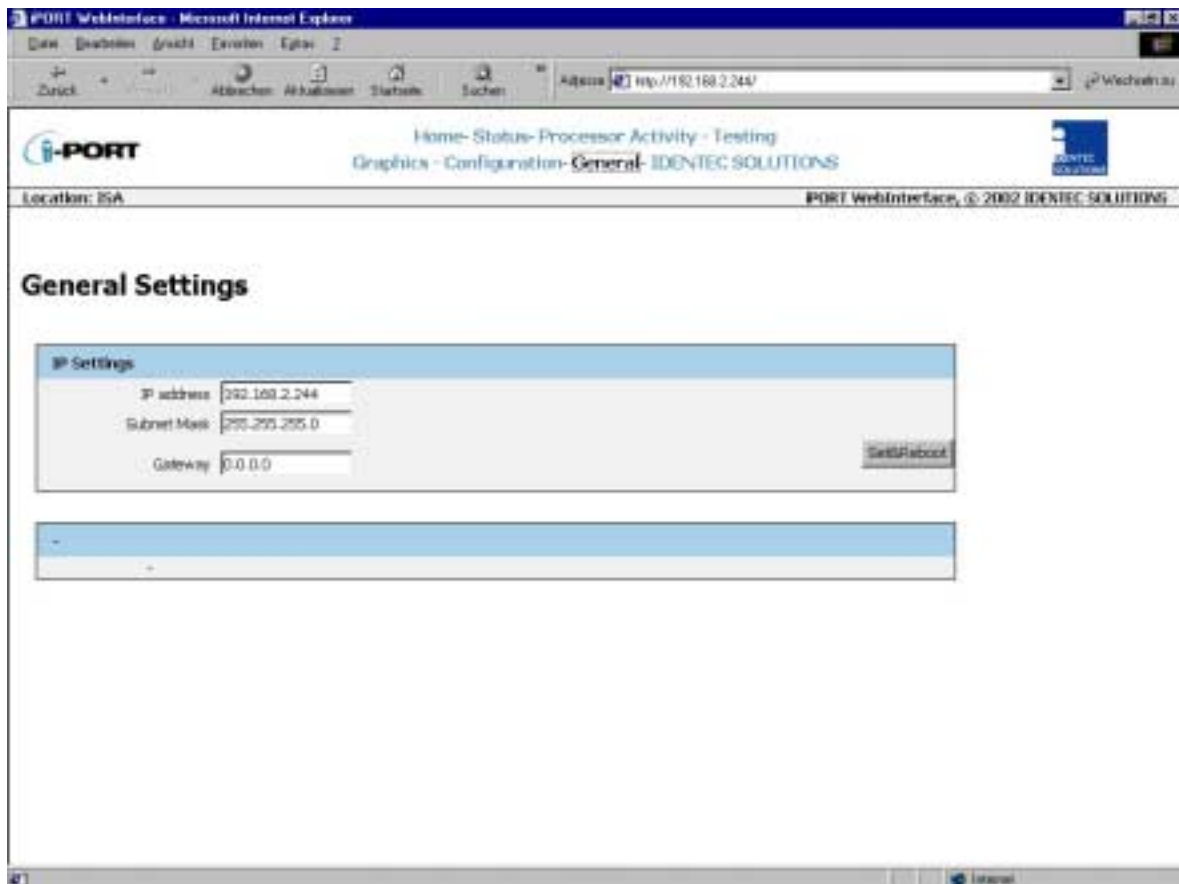
Example:	2 antennas are connected (enabled and scan enabled) "Scan" command is sent to the i-PORT Scan is executed on Antenna 1 (Tx), Antennas 1 and 2 receive (Rx) Scan is executed on Antenna 2 (Tx), Antennas 1 and 2 receive (Rx) Results of the scan command / sequence are sent back
----------	---

Calculation example for calibration:

Coaxial cable RG58 loss of approximately 6dB for every 10 meters (at 900 MHz), i.e. 0.6 dB/m

- 1) Antenna 1: 5dB gain, 3-meter coaxial cable
Antenna 2: 5dB gain, 10-meter coaxial cable
Calibration parameters
Antenna 1 = $-(\text{Gain Ant1} - \text{Loss Cable 1}) = -(5\text{dB} - 3\text{m} \times 0.6 \text{ dB/m}) = \underline{\underline{-3.2 \text{ dB}}}$
Antenna 2 = $-(\text{Gain Ant2} - \text{Loss Cable 2}) = -(5\text{dB} - 10\text{m} \times 0.6 \text{ dB/m}) = \underline{\underline{+1.0 \text{ dB}}}$
- 2) Antenna 1: 5dB gain, 3-meter coaxial cable
Antenna 2: 5dB gain, 15-meter coaxial cable
Calibration parameters
Antenna 1 = $-(\text{Gain Ant1} - \text{Loss Cable 1}) = -(5\text{dB} - 3\text{m} \times 0.6 \text{ dB/m}) = \underline{\underline{-3.2 \text{ dB}}}$
Antenna 2 = $-(\text{Gain Ant2} - \text{Loss Cable 2}) = -(5\text{dB} - 15\text{m} \times 0.6 \text{ dB/m}) = \underline{\underline{+4.0 \text{ dB}}}$

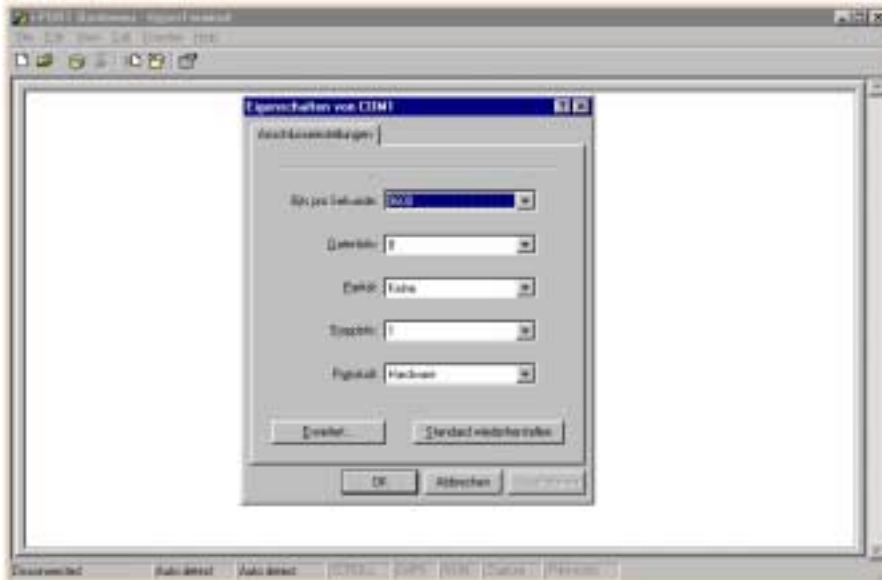
“General” Menu:



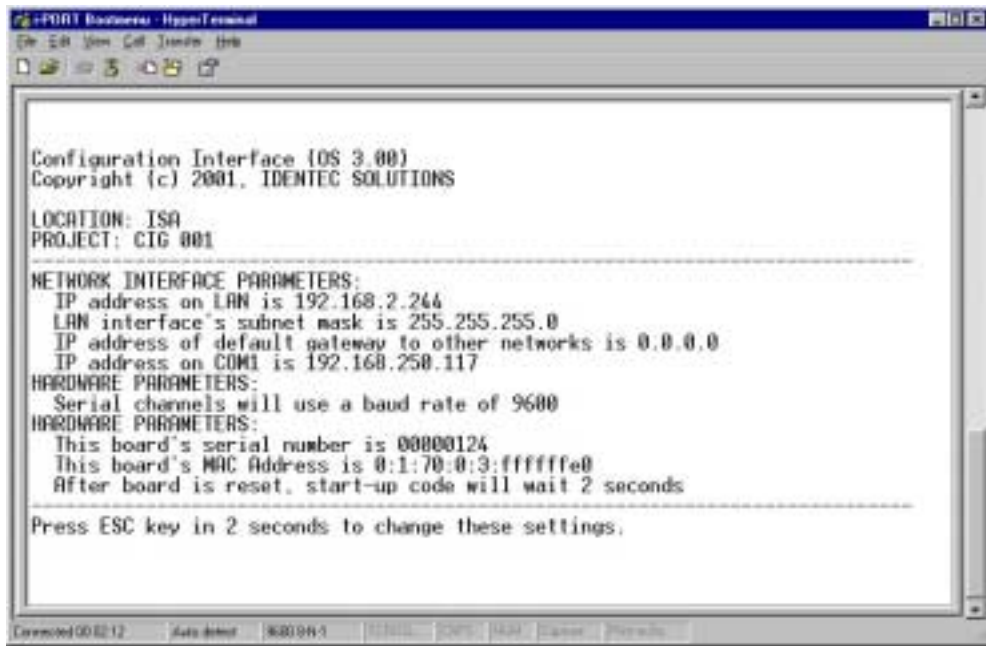
With this menu, you can change the network settings of the i-PORT. Simply enter the new values in the appropriate fields and click on the [SET&REBOOT](#) button. The i-PORT will then reboot with the new network settings. You can write down the new IP address in the designated spot inside the i-PORT door.

4.3 Boot Menu (Serial)

It is possible to change basic settings such as IP address, passwords, etc. via the serial interface. To accomplish this, the i-PORT has to be connected via the serial interface to a PC, (with a null-modem serial cable). Next, you need to start a terminal program (Hyperterminal, GanTerm, etc.) with the following settings:



Bits per second: 9600
Data bits: 8
Parity: None
Stop bits: 1
Protocol: None



Start up the i-PORT as soon as there is a connection. Boot information appears on the screen and you must press the ESCAPE button within 2 seconds, in order to change the standard settings.



You now have the ability to change various standard settings:

Project and Location Info:	Location Project	Assignment of i-PORT, Mounting Location Assignment of i-PORT, Project
Password Settings:	Password Enable/Disable Username and Password	Password on/off Username/Password
Network Interface Parameters:	DHCP/IP Address Subnet Mask Gateway Com1 PPP IP Com1 PPP Peer IP	DHCP or fixed IP Subnet mask Gateway, if needed Necessary for GSM-Modem Necessary for GSM-Modem
Hardware Parameters:	Baud Rate Boot Delay	Data transmission 1.2 to 57.6 kbit/s Time to start Boot menu

After the changes have been made and confirmed, the i-PORT will boot up and go into the designated mode. You can write down the new IP address in the designated spot inside the i-PORT door.

4.4 Interfaces

Ethernet Interface:

Rate of transmission: 10 / 100 Mbit/s

Protocols: TCP/IP, FTP, Telnet, HTTP, SNMP

Ports:	Debugport	7090	for Debug data
	Communication Port	7070	for communication (commands, messages)

WLAN:

It is possible to effect a WLAN connection by means of a converter, for example a Client Bridge or Access Point.

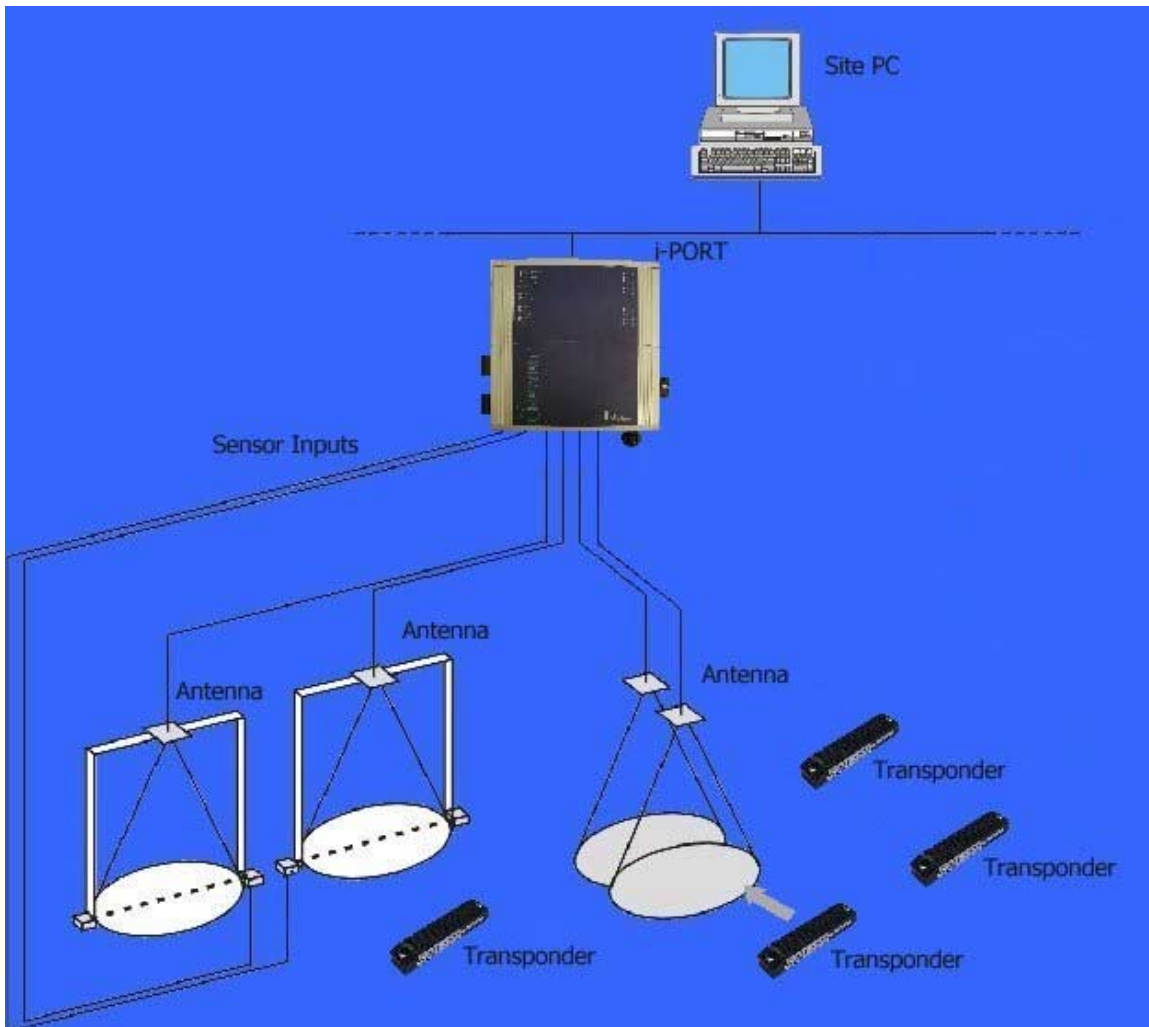
4.5 Protocols

The protocol used by the i-PORT is an ASCII protocol. The protocol allows a host computer to take control of the process or of the i-PORT. It is possible to execute scans, to read or write data, to start temperature logs etc. on command.

For more information about the protocol, please refer to the i-PORT "Communication Protocol".

5.0 System Description

5.1 Communication System, i-PORT, Tag



Data communication between i-PORT and Tag:

First the i-PORT sends out a scan signal. This signal contains an i-PORT ID and the number of available slots. All tags that are located in the read zone and that receive the signal search out a slot at random and answer in this slot. Each slot has a duration of 1.2 ms. This anti-collision process requires the availability of at least double the number of slots as the maximum number of tags expected; the probability of collisions increases as the slots are utilized. As a result of this scan signal, the i-PORT generates a tag list. Data can now be exchanged (read from or written to) with the tags on this list. Before data is exchanged with the tag, the i-PORT sends a Session Setup signal to this tag in order to prepare the tag for the impending interrogation. In contrast to the scan, which addresses all the tags, all other commands always refer to only one particular tag.

Host Only Mode:

The i-PORT is inactive in "Host Only" mode and waits for commands from the host computer. When the host computer sends a scan command to the i-PORT, the i-PORT executes the scan and sends the results back to the host computer. If data now needs to be read from or written to a tag, the host computer must send the command to do so to the i-PORT. The i-PORT can be operated via the Ethernet interface (Port 7070) or via the serial interface in "Host Only" mode.

Continuous Mode:

In contrast to the "Host Only" mode, the i-PORT scans continuously in "Continuous Mode". The settings to determine which data are to be read and in what intervals are configurable (see "Configuration"). The messages are made available at Port 7070.

Events:

Messages can be generated by tags or through inputs. The content of the messages can also be configured (see "Configuration").

6.0 Technical Specifications

6.1 Codes, Parameters

ILR® Parameters																						
Compatibility	ILR® i-Q Tags and ILR® i-D Tags																					
	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;">ILR® i-Q Tag</th> <th style="width: 5%; border-left: 1px solid black; border-right: 1px solid black;"></th> <th style="width: 45%; text-align: center;">ILR® i-D Tag</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">100m (300 ft)</td> <td style="border-left: 1px solid black; border-right: 1px solid black;"></td> <td style="text-align: center;">6m (18 ft)</td> </tr> <tr> <td style="text-align: center;">100m (300 ft)</td> <td style="border-left: 1px solid black; border-right: 1px solid black;"></td> <td style="text-align: center;">6m (18 ft)</td> </tr> <tr> <td style="text-align: center;">< 150 ms</td> <td style="border-left: 1px solid black; border-right: 1px solid black;"></td> <td style="text-align: center;">< 10ms</td> </tr> <tr> <td></td> <td style="border-left: 1px solid black; border-right: 1px solid black;"></td> <td style="text-align: center;">100 tags/s</td> </tr> <tr> <td></td> <td style="border-left: 1px solid black; border-right: 1px solid black;"></td> <td style="text-align: center;">35 tags/s</td> </tr> <tr> <td></td> <td style="border-left: 1px solid black; border-right: 1px solid black;"></td> <td style="text-align: center;">Up to 2,000 tags</td> </tr> </tbody> </table>	ILR® i-Q Tag		ILR® i-D Tag	100m (300 ft)		6m (18 ft)	100m (300 ft)		6m (18 ft)	< 150 ms		< 10ms			100 tags/s			35 tags/s			Up to 2,000 tags
ILR® i-Q Tag		ILR® i-D Tag																				
100m (300 ft)		6m (18 ft)																				
100m (300 ft)		6m (18 ft)																				
< 150 ms		< 10ms																				
		100 tags/s																				
		35 tags/s																				
		Up to 2,000 tags																				
Read range (adjustable)																						
Write range (adjustable)																						
Max. response time (single tag)																						
Read rate (ID only)																						
Read rate – 128 bit data																						
Multi-tag-handling (simultaneous)																						
RF Interface																						
Frequency	868 MHz (EU) or 915 MHz (NA) ISM Band																					
Certification	FCC, Part 15 (US) Industry Canada																					
RF rate of transmission	EN 330 220 (EU) i-Q 115.2 kbit/s; i-D 38.4 kbit/s (Tx), 115.2 kbit/s (Rx)																					
Number of antennas	5 (4 read/write + 1 wakeup)																					
Antenna transmitters	1 Output power: up to 23 dBm — adjustable (50 steps)																					
Antenna receivers	4 Sensitivity: up to -85 dBm — adjustable (100 steps)																					
Antenna control	Independent antennas, simultaneous operation (receive)																					
User Interface																						
Ethernet interface	10 Mbit/s / 100 Mbit/s																					
Protocols	TCP/IP, FTP, Telnet, HTTP, SNMP																					
Ports	7090 Debug port, 7070 Communication port																					
Serial interface	RS 232 – Setup and diagnostics only																					
Input/Output control	Functionality not implemented at this time																					
Status signals	19 status LEDs (for service and installation)																					
CPU																						
Operating system	RTOS (Real Time Operating System) Thread X																					
Program memory	2 MB Flash 8 MB DRAM																					
Data memory	128 KB SRAM																					
Configuration memory	8 KB EEPROM																					
Time base	Battery-backed Real Time Clock (RTC)																					
Electrical Data																						
Input voltage	10 – 30 VDC																					
Input power	7.5 W minimum																					
Standards / safety	CE and EN 330 220																					

Environmental Conditions	
Operating temperature	0°C to +50°C optional -30°C to +70°C
Storage temperature	-40°C to +80°C
Humidity	90%, non-condensing
Physical Data	
Dimensions	211mm x 190mm x 58mm
Enclosure	Aluminum, anodized
Mass	1.9 kg
Mounting	4 mounting holes, diameter 5mm
Enclosure rating	IP 64

7.0 Troubleshooting

7.1 Troubleshooting

- 1) If the red *Error* LED blinks during the boot process and continues blinking after a restart, contact the IDENTEC SOLUTIONS hotline.
- 2) If the *Error* LED lights up during operation, a system error has occurred (exception). First execute a cold start (interrupt the power supply) and observe the system. If the error occurs again, contact the IDENTEC SOLUTIONS hotline.
- 3) For other problems, follow the procedures as outlined below.

Problem	Possible Cause	Procedure	Solution
No functionality after turning on the power supply	No power - Measure the voltage at the terminal blocks	- If no voltage at terminal blocks, check power supply unit - Measure directly at the outlet for a power adaptor - For a switching power supply, measure voltage at both input and output sides	Change power supply unit, if necessary
No communication between i-PORT and network (PC) i.e. cannot ping i-PORT	Wrong IP address	- Double-check the i-PORT IP address. Default-IP: 192.168.2.244 - Perform a ping on the IP (see "Configuration, Settings") - If this is unsuccessful, start the Boot menu and check/change the IP	Change the IP address if necessary and try to ping the i-PORT
	i-PORT IP and Host IP are not in the same subnet	- Double-check the subnet mask	Change the subnet mask
	Wrong network cable	- Direct connection i-PORT / Host: cross-over network cable - i-PORT integrated into network: network cable	Possibly change the network cable
	Defective network cable	- Do optical check on cable	Change network cable
Tags are not being recognized	Antennas are not connected	- Check if the antennas are connected correctly	Fasten antenna cables to the designated sites. Use torque wrench, if available, otherwise tighten the SMA plug lightly.
	Antennas are not being triggered	- Check if antenna LEDs light up (LED: ANT1, ANT2, ANT3, ANT4, W)	Activate the corresponding antenna (see "Configuration")

	Antenna is defective	- Do optical check to see if antenna is defective	Change antenna(s) if necessary
	Tag is out of read zone	- Hold the test tag in front of the antenna and check if tag is being recognized (blinks, i.e. Debug port)	If necessary, adjust the output power to the requirements
i-PORT does not scan on various antennas	Antennas are not being triggered	- Check if the antennas in question are activated and scan-enabled (see "Configuration")	Turn on the desired antennas
No messages on Port 7090 (Debug port)	DebugInfo has been turned off (7090)	- Check if Debug port is activated (i.e. which data is being transmitted)	Activate the Debug port ("Configuration")
File download unsuccessful, i.e. i-PORT does not accept the file	No connection with i-PORT	- Check the IP address and the network cable	Change the IP address if required or change the network cable
Internet browser cannot display i-PORT web page	Browser is trying to access Proxy Server	- Deactivate your Internet browser's proxy function	

7.2 Hotline

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