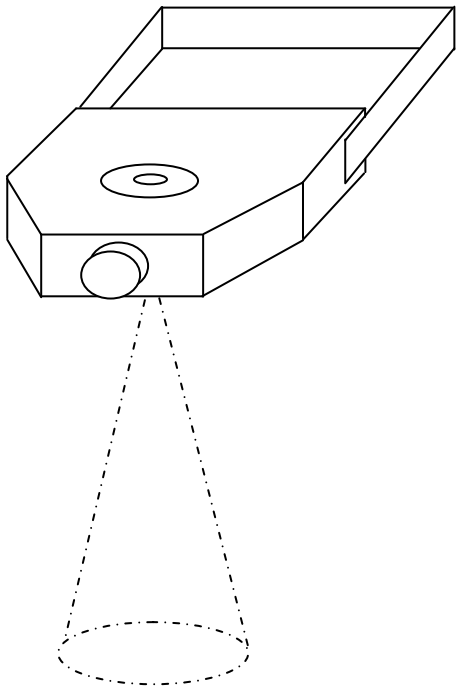
RADCOM (Technologies)

World Leading Specialists in the field of Water Management Systems



This Instruction Manual covers :-

- **"Ultrasonic Level Sensor"**

and

- **"Serial Interface Unit"**

and

- **"Comms Equipment" (Safe Area)**

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1 General Introduction

Radcom's "SonicSens" system comprises an ultrasonic level sensor and a serial interface unit. The "SonicSens" system can be used in conjunction with Radcom battery powered data loggers to monitor the level of water and other liquids. The non-contacting Ultrasonic technique is also ideal for monitoring levels in liquids containing solids, eg Effluent discharge applications.

1.1 The main features of the Radcom SonicSens system include:

- *Non-contacting level monitoring*
- *No external battery supply is required*
- *Battery life greater than 5 years*
- *Lightweight, small compact IP68 design*
- *Integral bubble spirit level to assist installation vertical alignment*
- *Plastic case and stainless steel bracket for corrosion free installations*
- *Intelligent operation*

1.2 SonicSens Specification

1.2.1 COMMUNICATIONS:

- "SonicSens" has one 4 pin military connector for communications towards the separate data logger.

1.2.2 PHYSICAL:

Operating Temperature Range:	-20ºC to +40ºC
Construction:	Plastic case with Stainless Steel bracket
Sealing:	IP68 (Fully Submersible) (Pressure Tested)
Dimensions:	155 x 105 x 50mm
Weight:	0.5Kg

1.2.3 Approvals

RAU R01 / 02 Ultrasonic Level Sensor approvals: **Baseefa04ATEX0345**

 II 1 G EEx ia IIC (–20°C ≤Ta≤ +40°C) and

RAIF 001 Serial Interface unit approvals: **Baseefa04ATEX0343**

 II (1) G [EEx ia] IIC (–20°C ≤Ta≤ +40°C)

2 Safety Guidelines

Warning notices must be observed to ensure personal safely as well as that of others, and to protect the product and the connected equipment. These warning notices are accompanied by clarification of the level of caution to be observed.

2.1.1 Qualified Personnel

This device/system may only be set up and operated in conjunction with this manual.

Qualified personnel are only authorised to install and operate this equipment in accordance with established safety practices and standards.

2.1.2 Warnings

Warning: This product can only function properly and safely if it is correctly transported, stored, installed, set up, operated, and maintained.

Note: Always use product in accordance with specifications.

3 Installation Procedures

3.1.1 Environmental

The Ultrasonic level sensor should be mounted in an area that is within the temperature range specified, and that is suitable to the housing rating and materials of construction.

It is advisable to keep the Ultrasonic level sensor away from high voltage or current runs, contactors and SCR control drives.

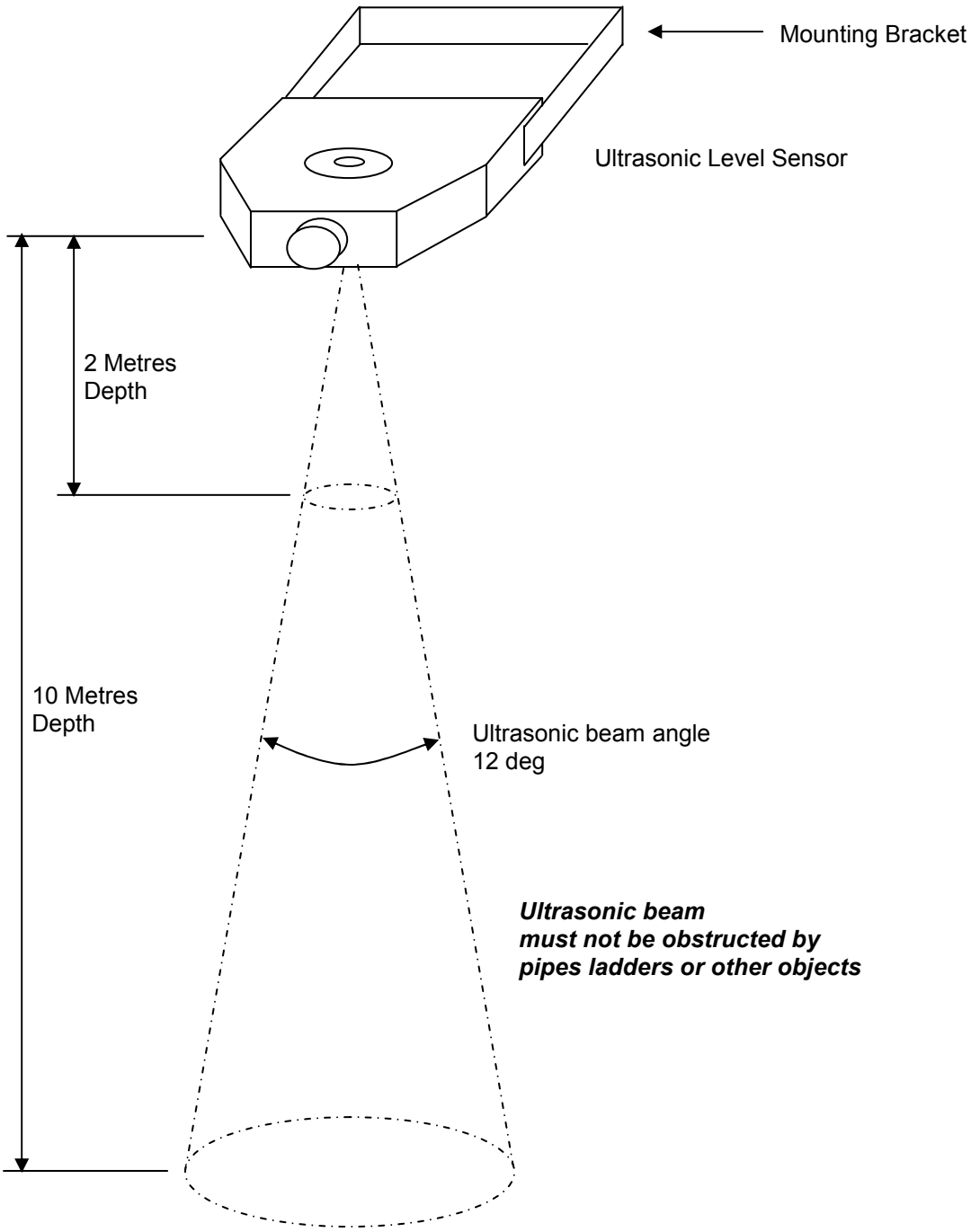
3.1.2 Location

Locate Ultrasonic level sensor so that it will have a clear sound path perpendicular to the liquid surface.

The Ultrasonic sensor's sound path should not intersect the fill path, rough walls, seams, rungs, etc.

If the liquid surface is rough due to entry or exit disturbances, or floating items, the consistency of the output signal will be affected.

3.1.3 Mechanical Installation



3.1.4 General Guidelines for Intrinsically

The following relates to "Intrinsically Safe" SonicSens sensor system comprising the Ultrasonic level Sensor and the serial interface unit approved to **Baseefa04ATEX0345** and **Baseefa04ATEX0343** respectively.

1. The sensor apparatus may be used in Zone 0 with flammable gases and vapours with Apparatus Group IIC and with temperature class ($-20^{O}C \leq Ta \leq +40^{O}C$).

2. The equipment is certified for use in an ambient range of $-20^{O}C$ to $+40^{O}C$.

3. Installation and inspection of this equipment shall be carried out by suitably trained personnel in accordance with the applicable code of practice. (EN 60079-14 and EN60079-17 within Europe).

4. Faulty equipment should be replaced with new working units. Repair of this equipment shall NOT be carried out on site. Faulty equipment should be returned back to Radcom.

5. The certification of this equipment relies upon the following materials used in its construction:

   Stainless steel loaded plastic case.
   Potting compound
   Voltage limiting diodes
   Fuses

If the equipment is likely to come in contact with aggressive substances, then it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type protection is not compromised.

Aggressive substances: e.g. solvents that may affect polymeric materials.

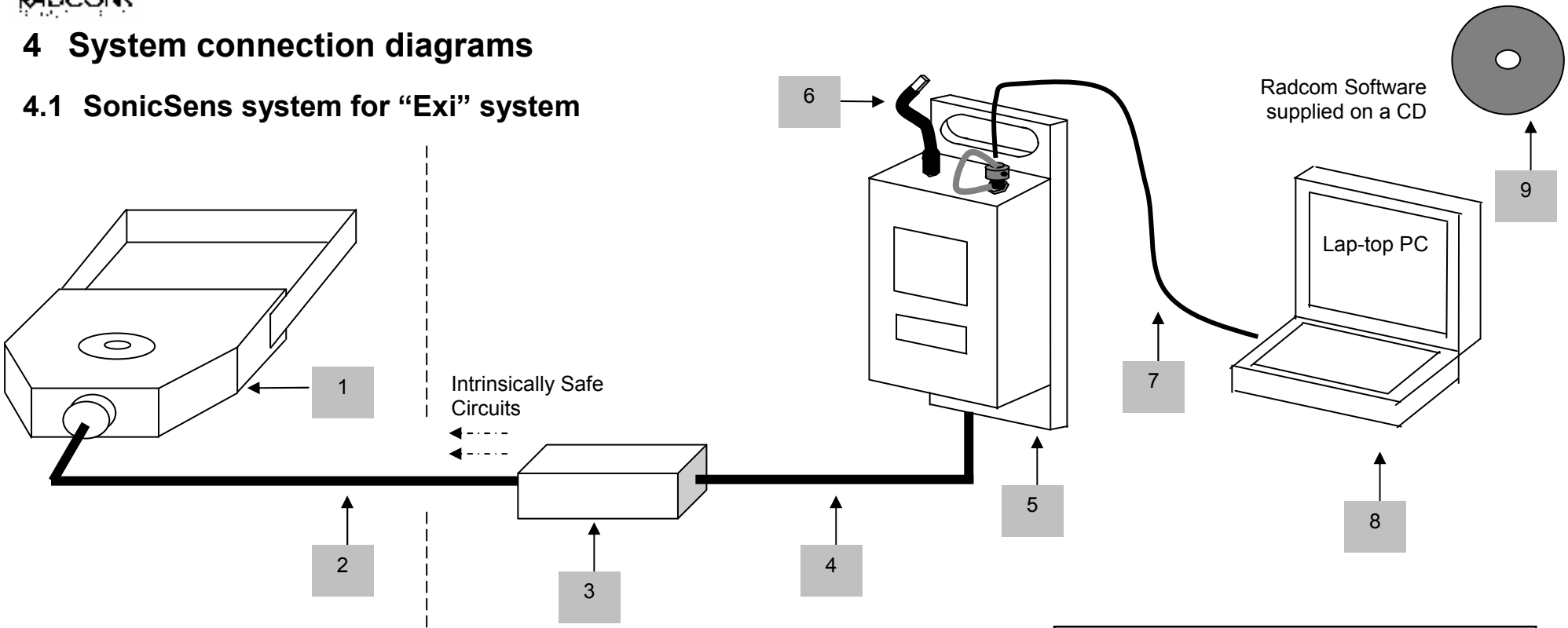
Suitable precautions: e.g. regular checks as part of routine inspections or establishing from the materials data sheet that it is resistant to certain chemicals.

3.1.5 SonicSens system

Refer to diagrams on next pages when installing the Radcom SonicSens system.

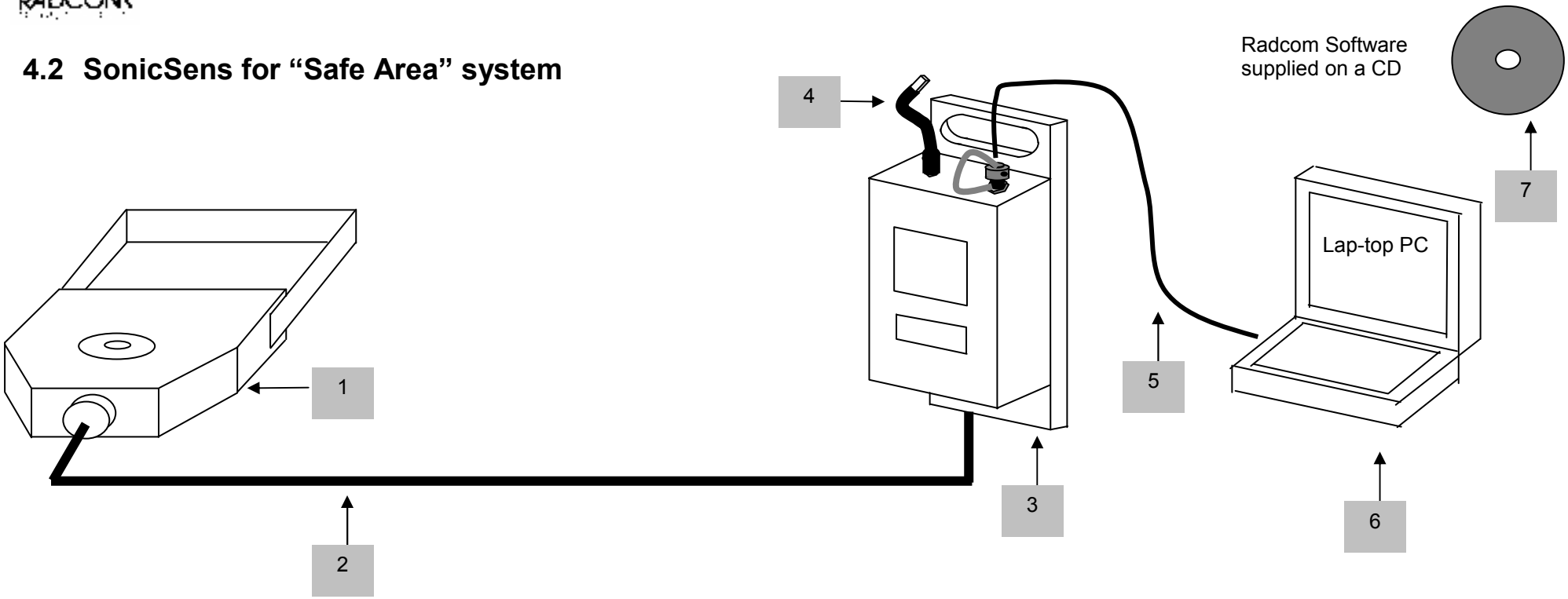
4 System connection diagrams

4.1 SonicSens system for "Exi" system



1. Ultrasonic Level Sensor
2. Connecting Cable (Sensor to Serial Interface)
3. Serial Interface Unit
4. Connecting Cable (Serial Interface to Logger)
5. Data Logger
6. GSM Cellular Antenna, or PSTN phone cable
7. Communications Cable (Logger to PC)
8. Laptop PC to set-up & download data
9. Radcom software – RadWin

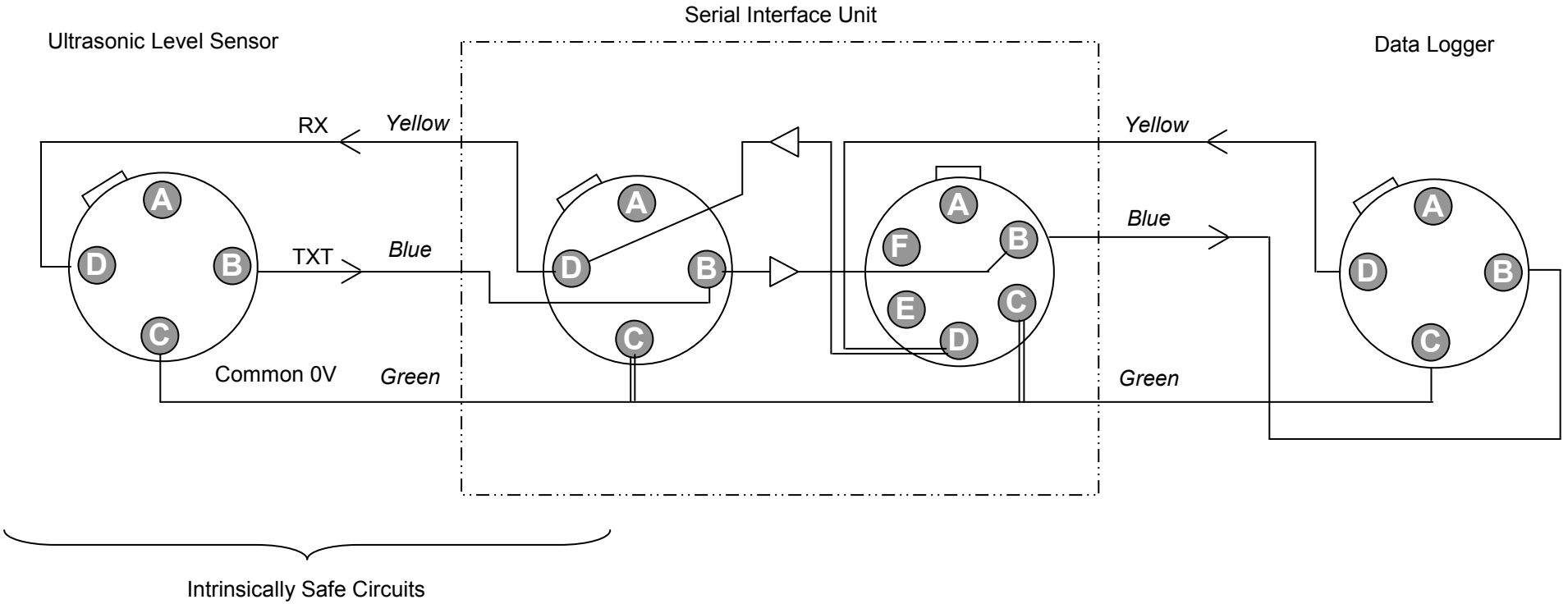
4.2 SonicSens for "Safe Area" system



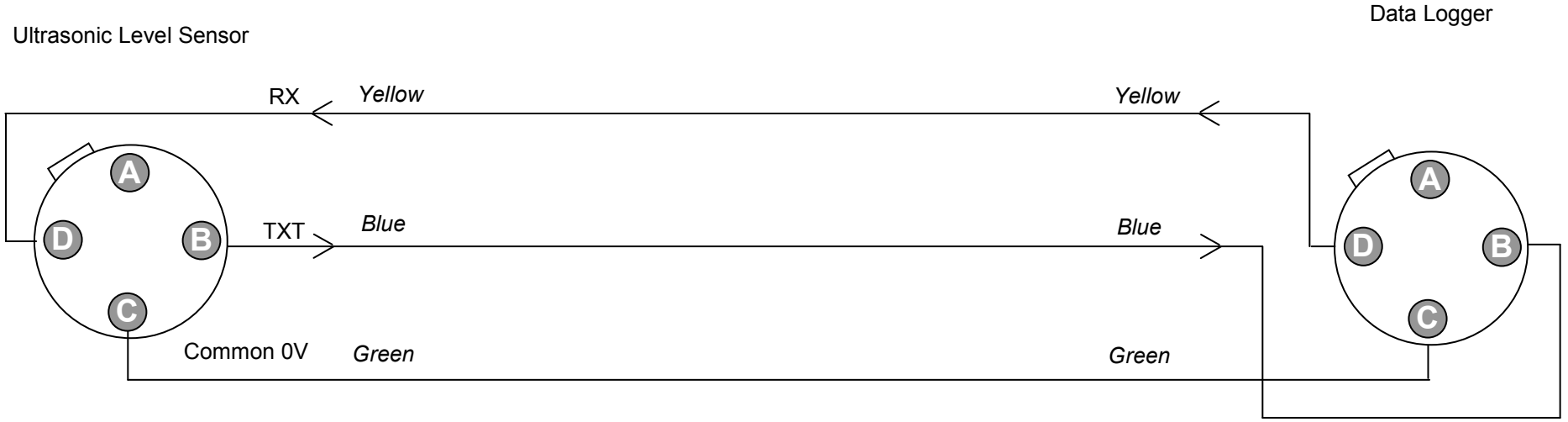
All equipment located in Non Hazardous Areas

1. Ultrasonic Level Sensor
2. Connecting Cable (Sensor to Logger)
3. Data Logger
4. GSM Cellular Antenna, or PSTN phone cable
5. Communications Cable (Logger to PC)
6. Laptop PC to set-up & download data
7. Radcom software – RadWin

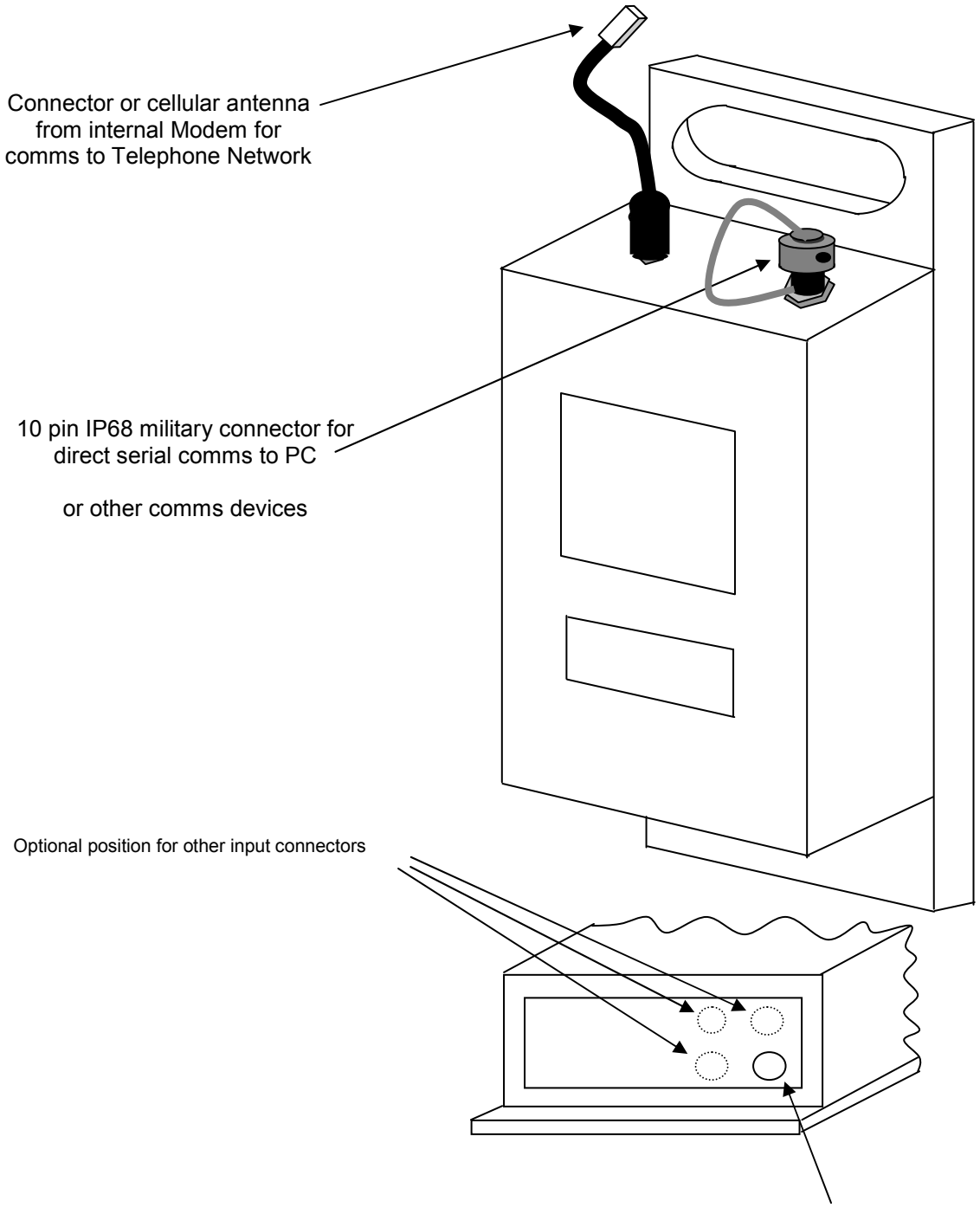
4.3 Input Electrical Connections (Exi system)



4.4 Input Electrical Connections (Non-Hazardous Area system)



4.5 Typical Data Logger Illustration



5 Maintenance

5.1 SonicSens System

The battery life of the SonicSens system is greater than 5 years under normal operating conditions. Once the battery fails, the device should be returned to RADCOM (Technologies) Ltd where the old batteries can be disposed in a safe manner and new batteries fitted.

In the instance of any other failure, the sensor can be returned to RADCOM (Technologies) Ltd, where the product can be assessed for repair or replacement.

The sensor has been designed for continuous operation throughout the battery's life. There are no serviceable parts within the sensor for any unauthorised maintenance.

Dismantling the sensor will invalidate any Warranty claim against "Radcom (Technologies) Ltd".

Appendix A: ATEX and CE Certificates

Certificate Number
Baseefa04ATEX0345

Baseefa

Issued 26th November 2004
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1 **EC - TYPE EXAMINATION CERTIFICATE**

2 **Equipment or Protective System Intended for use in Potentially Explosive Atmospheres Directive 94/9/EC**

3 EC - Type Examination Certificate Number: **Baseefa04ATEX0345**

4 Equipment or Protective System: **Ultrasonic Level Sensor Type RAU R 01/02**

5 Manufacturer: **Radcom Technologies Ltd**

6 Address: **10 Romsey Ind Park, Greatbridge Road, Romsey, Hampshire, SO51 0HR**

7 This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8 Baseefa (2001) Ltd., Notified Body number 1180, in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential Report No. **03(C)0526/2**

9 Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50014: 1997 + Amds 1 & 2 **EN 50020: 2002** **EN 50284: 1999**

except in respect of those requirements listed at item 18 of the Schedule.

10 If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

11 This EC - TYPE EXAMINATION CERTIFICATE relates only to the design and construction of the specified equipment or protective system. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

12 The marking of the equipment or protective system shall include the following :

Ex **II 1G EEx ia IIC T4 ($-20°C \leq T_a \leq +40°C$)**

Baseefa (2001) Ltd. Customer Reference No. **5070** Project File No. **03/0526**

This certificate is granted subject to the general terms and conditions of Baseefa (2001) Ltd. It does not necessarily indicate that the equipment may be used in particular industries or circumstances.

R S SINCLAIR
DIRECTOR
On behalf of
Baseefa (2001) Ltd.

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Buxton, Derbyshire SK17 9RZ
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Baseefa is a trading name of Baseefa (2001) Ltd
Registered in England No. 4305578 at the above address

13 **Schedule**

14 **Certificate Number Baseefa04ATEX0345**

15 Description of Equipment or Protective System

The Ultrasonic Level Sensor Type RAU R 01/02 is designed to measure liquid levels in open and closed vessels.

The Ultrasonic Level Sensor Type RAU R 01/02 comprises a printed circuit board (pcb), an ultrasonic transducer and a battery pack all encapsulated inside a plastic enclosure. The two primary lithium cells are encapsulated into their own compartment and are wired to the pcb. The apparatus is fitted with a stainless steel mounting bracket.

External circuit connections for data signal transmission are made at the socket connector fixed in the enclosure wall. This connector ensures that a common connection is established between the external data Interface and the internal battery.

There are two versions of the Sensor Type RAU R01/02/10 is fitted with an ultrasonic transducer with a range of 10m and Type RAU R01/02/02 is fitted with an ultrasonic transducer with a range of 2m.

Input Parameters

At the Serial Data Interface connector J4

U_i =7.14V
I_i = 16mA
P_i = 28mW
C_i = 0
L_i = 0

Output Parameters

At the Serial Interface connector J4

U_o =7.14V
I_o = 15mA
P_o = 26mW
C_i = 0
L_i = 0

16 Report Number

03(C)0526/2

17 Special Conditions for Safe Use

None

18 Essential Health and Safety Requirements

All relevant Essential Health and Safety Requirements are covered by the standards listed at item 9.

19 Drawings and Documents

Number	Sheet	Issue	Date	Description
88-1301/01DGA		A	10.04	General Assembly
80-1301/01DCD	1 to 3	B	11.04	Circuit
80-1301/03DPL	1 & 2	F	10.11.04	Safety Components
83-1301/10D		A	09.04	PCB Component Layout
83-1301/11D		A	09.04	PCB Track Side 1
83-1301/12D		A	09.04	PCB Track Side 2
83-1301/13D		A	08.04	Ultrasonic Transducer AT-120
83-1301/14D		A	08.04	Ultrasonic Transducer AT-50
83-1301/09D		A	11.04	Label

Certificate Number
Baseefa04ATEX0343

Baseefa

Issued 26th November 2004
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1 **EC - TYPE EXAMINATION CERTIFICATE**

2 **Equipment or Protective System Intended for use in Potentially Explosive Atmospheres Directive 94/9/EC**

3 EC - Type Examination Certificate Number: **Baseefa04ATEX0343**

4 Equipment or Protective System: **Serial Interface Type RAIF001**

5 Manufacturer: **Radcom Technologies Ltd**

6 Address: **10 Romsey Ind Park, Greatbridge Road, Romsey, Hampshire, SO51 0HR**

7 This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8 Baseefa (2001) Ltd., Notified Body number 1180, in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

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9 Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50014: 1997 + Amds 1 & 2 **EN 50020: 2002**

except in respect of those requirements listed at item 18 of the Schedule.

10 If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

11 This EC - TYPE EXAMINATION CERTIFICATE relates only to the design and construction of the specified equipment or protective system. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

12 The marking of the equipment or protective system shall include the following :

Ex **II (1)G [EEx ia] IIC (-20°C ≤ T_a ≤ +40°C)**

This certificate may only be reproduced in its entirety, without any change, schedule included.

Baseefa (2001) Ltd. Customer Reference No. **5070** Project File No. **03/0526**

This certificate is granted subject to the general terms and conditions of Baseefa (2001) Ltd. It does not necessarily indicate that the equipment may be used in particular industries or circumstances.

R S SINCLAIR
DIRECTOR
On behalf of
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Baseefa is a trading name of Baseefa (2001) Ltd

13 **Schedule**

14 **Certificate Number Baseefa04ATEX0343**

15 Description of Equipment or Protective System

The Serial Interface Type RAIF001 is designed to provide energy limitation between the unspecified electrical circuit (computer) in the safe area and the intrinsically safe circuits (Data Logger or Ultrasonic Sensor) in the hazardous area.

The Serial Interface Type RAIF001comprises electronic components mounted on a printed circuit board. The board is fitted and potted inside a plastic box. External connections are made at the two connectors, one for the safe area side circuit and another for the hazardous area side circuit.

Input Parameters

At the safe area side connector J1

$U_m = 253V$

Output Parameters

At the hazardous area side connector J2

$U_o = 7.14V$
$I_o = 16mA$
$P_o = 28mW$

$C_o = 13.5\mu F$
$L_o = 135mH$
$L_o/R_o = 939\mu H/\Omega$

16 Report Number

03(C)0526

17 Special Conditions for Safe Use

None

18 Essential Health and Safety Requirements

All relevant Essential Health and Safety Requirements are covered by the standards listed at item 9.

19 Drawings and Documents

Number	Issue	Date	Description
88-1302/01DGA	A	10.04	General Assembly
80-1302/01DCD	A	10.04	Circuit
83-1302/02D	A	10.04	PCB Component Layout
83-1302/03D	A	10.04	PCB Track Side 1
83-1302/04D	A	10.04	PCB Track Side 2
83-1302/01D	A	10.04	Label

EC DECLARATION OF CONFORMITY

This is to certify that the :

"SonicSens" Ultrasonic level sensor product series RAU R01/ 02
comprising the following products:

- RAU R01/ 02 / 02 SonicSens sensor with 2 metre range with serial output to Data logger
- RAU R01/ 02 / 10 SonicSens sensor greater than 5 metre range with serial output to Data logger

Manufactured by:

RADCOM (Technologies) ltd.
Sentry House, 10 Romsey Ind Park
Greatbridge Road
Romsey
Hampshire, SO51 OHR
United Kingdom

Tel: +44 (0)1794 528700

Conforms with the protection requirements of Council Directive 89/336/EEC, relating to Electromagnetic Compatibility, by the application of the following EMC standards :

- EN 50081-1 : 1992 Generic emission standard – Residential, commercial and light industry.
- EN 50081-1 : 1992 Generic immunity standard – Residential, commercial and light industry.

Conforms with the ATEX standards for "Equipment or Protective Systems Intended for use in Potentially Explosive Atmospheres" Directive 94/9/EC :

SonicSens sensor : ⟨Ex⟩ II 1G EExia II C T4 (-20 °C ≤Ta ≤ +40°C)
SonicSens interface : ⟨Ex⟩ II (1)G [EExia] II C (-20 °C ≤Ta ≤ +40°C)

- EN 50014: 1997+Amds 1&2 General requirements
- EN 50020: 2002 Intrinsic Safety "i"
- EN 50284: 1999 Special requirements for construction, test and marking of equipment group II, category 1G

signed : …… **date : 12/ 07/ 2006**

Technical Director