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REF. : DOC10089

INDICE : D

DATE : 14/05/2014

## KanAtoN 1 / 3 AIS Transponder

### Installation Manual





### **Radio Frequency Exposure Warning**

**WARNING:** The AIS transmitter is a radio transmitter which emits radio frequency radiation when activated. When transmitting, the user's minimum distance of exposure is 1 meter.

### *FCC notice*

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.

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.

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

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## R&TTE Declaration of Conformity

We, Orolia S.A.S., Z.I. des Cinq Chemins 56520 GUIDEL – FRANCE

**declare under our sole responsibility that the product:**

Product name: **KanAtoN 3**

Type or model: **1202559**

has been manufactured and tested as required by the provisions of the Directive 1999/5/EC on Radio Equipment and Telecommunications Terminal Equipment and are in accordance with the Regulations, Codes or Standards stated on the Statement of Opinion

**N° 114453-627704-A**      date **July 6th, 2012**

issued by LCIE notified for the purpose of the Directive under number 0081.

**CE 0081** 

The full Declaration of Compliance is available from:

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Place of date of issue: Guidel, July 6<sup>th</sup>, 2012

Signed by or for the manufacturer

Name (in print): Jacques SAVOIA

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## R&TTE Declaration of Conformity

We, Orolia S.A.S., Z.I. des Cinq Chemins 56520 GUIDEL – FRANCE

**declare under our sole responsibility that the product:**


Product name: **KanAtoN 1**

Type or model: **AtoN 1**

has been manufactured and tested as required by the provisions of the Directive 1999/5/EC on Radio Equipment and Telecommunications Terminal Equipment and are in accordance with the Regulations, Codes or Standards stated on the Statement of Opinion

**N° 114453-627704-B**      date **July 6th, 2012**

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## 1. Product definition

### 1.1. Purpose

KanAtoN 1 AIS and KanAtoN 3 AIS Transponders are designed to be installed on a buoy to transmit information relating to this buoy using a HF transmitter in the 160 MHz band with AIS FATDMA protocol for KanAtoN 1 AIS and FATDMA or AIS RATDMA protocols for KanAtoN 3 AIS.

Transmitted data are:

- buoy identification;
- name;
- ON or OFF signaling lights information;
- buoy position;
- Optionally meteorological and hydrological data.

The transponder is housed in a dome comprising a cover and a moulded base.

This manual describes the installation and start up of KanAtoN 3 AIS Transponder. The software configuration is described in another document.

### 1.2. Main components included in the KanAtoN 3 AIS

#### 1.2.1. Before installing KanAtoN 3 AIS Transponder

Important: Read this manual completely before beginning the installation.

Make sure that all the items listed in the following paragraph are included in the box and that they have not been physically damaged during shipment.

#### 1.2.2. Inventory

Main parts required to install the KanAtoN 3 AIS Transponder are ([see figure 1](#)):

1. A dome assembly.
2. A 5 meters cable, Amphénol C16-1 male connector.
3. A 5 meters cable, Amphénol C16-1 female connector.
4. A coaxial cable with an N connector at one end.
5. An unassembled N connector.
6. A dome mounting.
7. An L-shaped mounting bracket.
8. Two U-bolts (D = 42, wire = 8 mm, Stainless A4).
9. Three screws (M6.3 x 16 Stainless A4 POZIDRIVE) to attach the dome onto the dome mounting bracket.
10. Three flat washers (M6 Stainless A4) to attach the dome onto the dome mounting bracket.
11. Eight nuts (M8 Stainless A4) to fix the U-Bolts onto the dome or onto the L-shape bracket.
12. Four flat washer (M8 Stainless A4) for the U-Bolts.
13. Four screws (H M8x20 EF Stainless A4) to fix the L-shape bracket onto the dome.
14. CD ROM user manual.

Note: VHF antenna is supplied in a separate package.



Figure 1: Contents of KanAtoN 3 AIS Transponder packaging

### 1.3. Description

#### 1.3.1. General description

The dome may be fixed using a horizontal and a vertical mounting (L-shape) bracket.

The dome must be mounted on the buoy and powered from a 12 or 24 V DC supply using the C-16-1 Amphenol cable (female connector connected to the transponder).

#### 1.3.2. Dome

The dome houses the KanAtoN 3 AIS Transponder. Electrical connections are located on its base. Mechanical interfaces are supplied for its installation.



Figure 2: Dome



### 1.3.3. Mechanical interfaces

The AtoN AIS is supplied with two mounting brackets, screws and bolts:

1. a pole mounting bracket and two U-bolts are used to attach the dome to a mast or a guard rail;
2. an L-shaped bracket is used in association with the pole mounting bracket to fix the dome on either a horizontal or vertical flat surface.

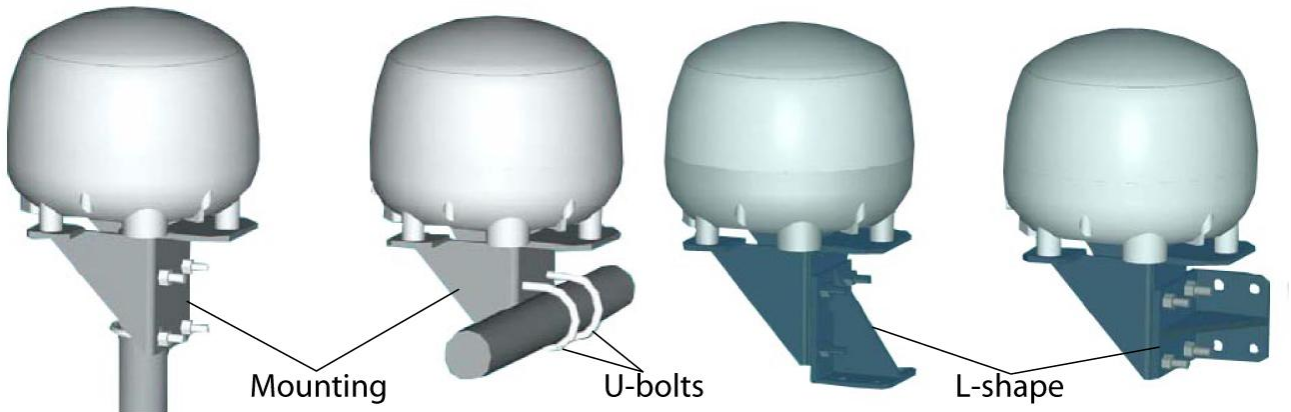


Figure 3: Mechanical interfaces

### 1.3.4. Electrical interfaces

1. A cable with an Amphenol C16-1 female connector:
  - Transponder power supply.
  - RS232 serial interface.
2. A cable with an Amphenol C16-1 male connector:
  - RS485 serial interface.
3. A N plug is used to connect the VHF antenna.
4. A ground terminal is used to connect the transponder to the ground of the buoy.
5. A tricolor LED is used to monitor the transponder.

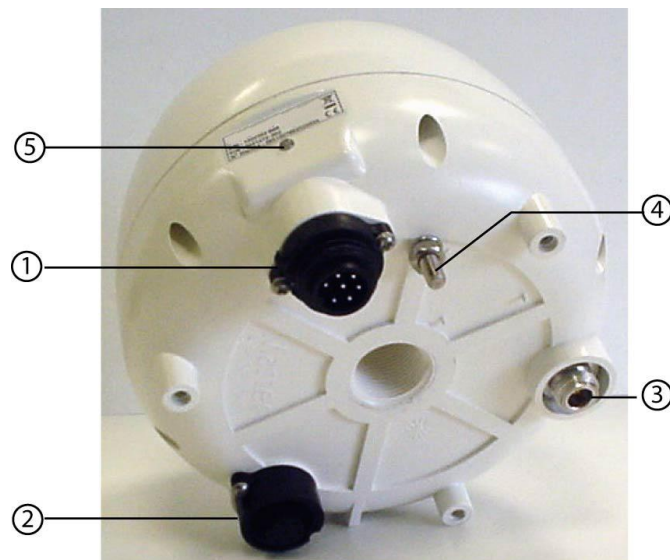


Figure 4: Electrical interfaces

## 2. Installation procedure

The KanAtoN 3 AIS Transponder is supplied with hardware designed to provide a variety of installation configurations ([see figure 4](#)). The dome can be mounted on a mast, a horizontal railing or on either a horizontal or vertical flat surface.

Note: In the installation procedure, numbers in brackets match with the numbers of parts listed [figure 1](#). **Installation Precautions**

The N connectors supplied are watertight; however Scotch™ 23 or any equivalent product such as electrical moisture sealant for marine applications may be used to provide additional protection.

Position fixing and synchronisation are provided by a GPS receiver integrated in the dome. Accordingly, the dome shall be installed horizontally with an unobstructed view of the sky.

The VHF antenna shall be installed at least 50 cm (19.7 in) above the dome and as far as possible shall not be mounted close to any vertical metallic members.

Before its installation, AIS AtoN 3 shall be set up using the configuration software on the CD-ROM supplied. Refer to the “Configuration Software” manual, DOC10091, for setting up the AIS AtoN 3.

A 9 pin D-type connector fitted with 3 quick release cable connector is used to connect the AIS AtoN 3 to a PC (38K4 Serial Link).

Connection of the programming kit shall be carried out as follows:

- Connect the green wire of the kit to the green wire of the female C16-1 Amphenol cable.
- Connect the blue wire of the kit to the blue wire of the female C16-1 Amphenol cable.
- Connect the black wire of the kit to 0 Volt of power supply.

The N connector shall be assembled as follows:

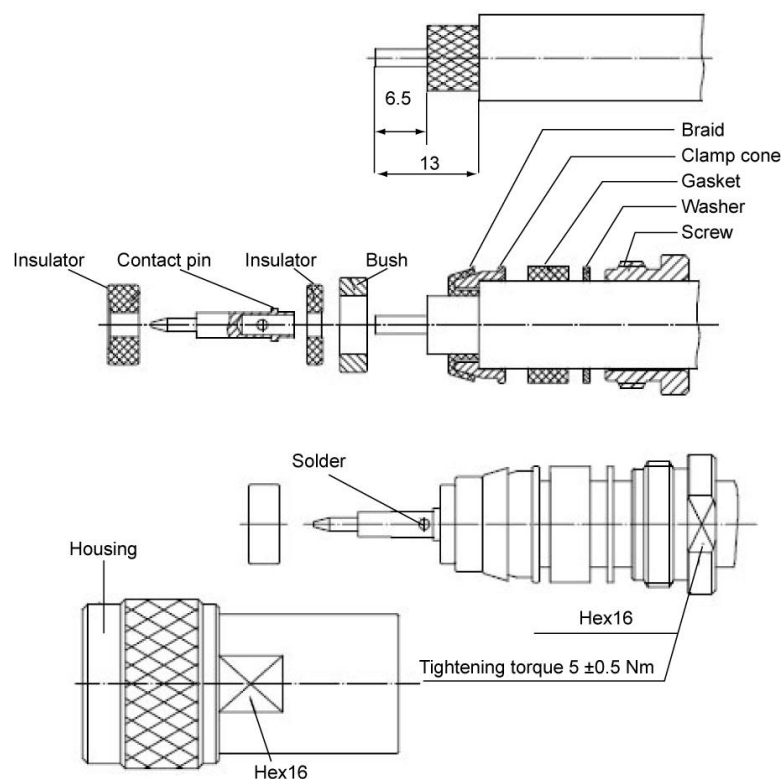


Figure 5: Assembling the N connector

## 2.2. Mounting on a mast or hard rail

To mount the dome on a mast or a hard rail, only the pole mounting bracket (4) and the U-bolts (6) are required.

1. Fix the pole mounting bracket (4) to the dome (1) using the three M6 washers (8) and the three M6.3 POZIDRIVE screws (7).

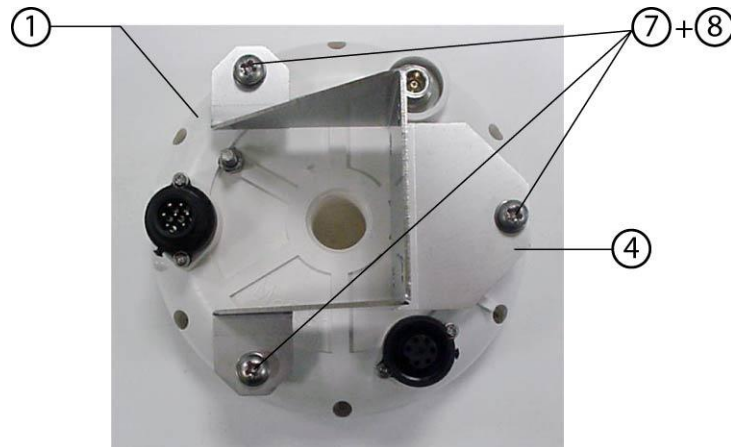


Figure 6: Fixing the mounting onto the dome

2. Put the U-bolts (6) over the mast or the rail guard.
3. Insert the U-bolts (6) into the holes of the pole mounting bracket (4).
4. Fix the U-bolts (6) to the pole mounting bracket (4) using the four M8 washers (10) and the four M8 nuts (9).

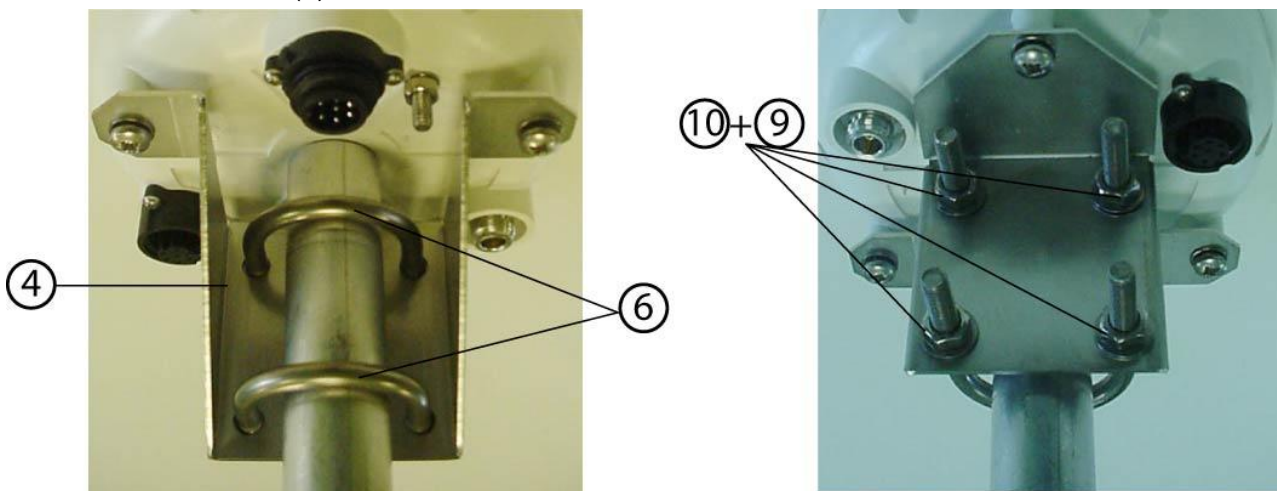


Figure 7: Fixing the U-bolts to the mounting

### 2.3. Mounting on horizontal or vertical surface

Use the pole mounting bracket (4) and L-shaped bracket (5) together to fix the dome onto a horizontal or vertical surface. Do not use U-bolts.

#### 5. Mounting on horizontal surface:

- Fix the L-shaped bracket (5) onto the pole mounting bracket (4) using the four H M8 screws (11), M8 washers (10) and M8 nuts (9) as indicated below.

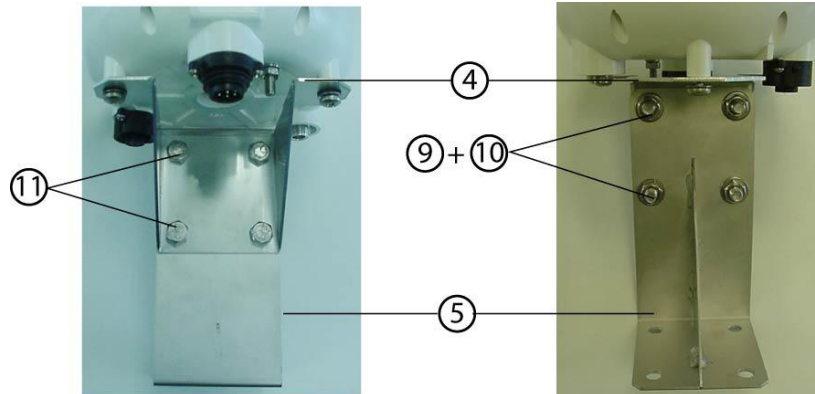


Figure 8: Mounting the dome on horizontal surface

#### 6. Mounting on vertical surface:

- As above but rotate the L-shaped bracket by 90 degrees when fixing to the pole mounting bracket.

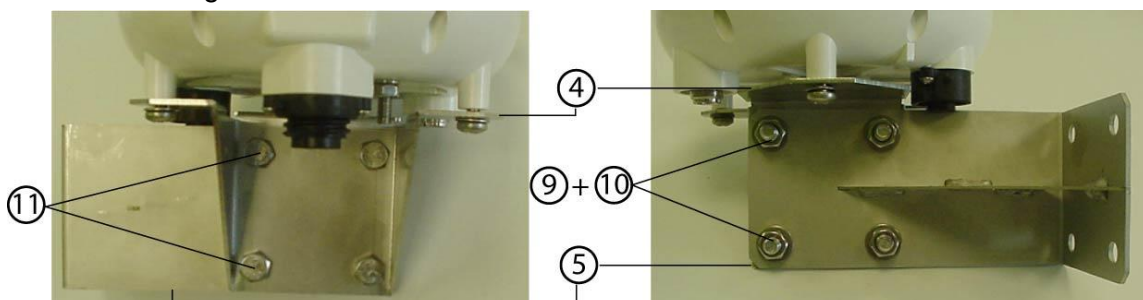


Figure 9: Mounting the dome on vertical surface

### 2.4. Dome connection

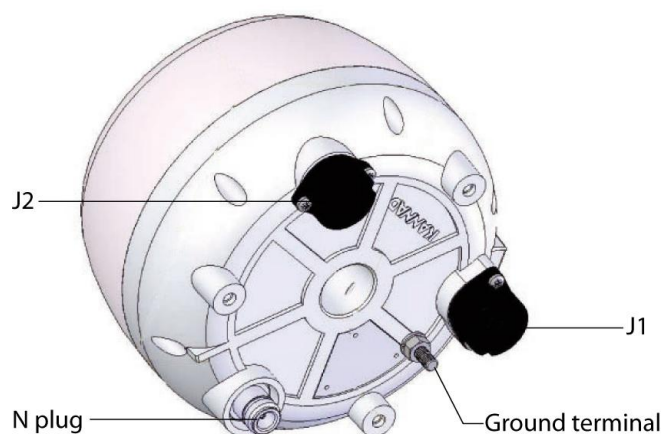


Figure 10: Dome connection

1. Cut the coaxial cable to the correct length then connect the N connector to the cable.  
Note: [refer to Figure 5](#) for assembly the N connector.
2. Connect the VHF antenna to the N plug.
3. Connect the cable with the female Amphenol C16-1 connector to the buoy according to pin-out below.

Table 1: « Power supply - RS232 link cable » pin-out

Functions	Pin	C16-1	Color
Power supply	Plus	6	Red
	Minus and COM RS232 (to pin 5 DB9/PC)	7	Black
RS232	Tx (to pin 2 DB9/PC)	5	Green
	Rx (to pin 3 DB9/PC)	4	Blue
Tor	Tor1	3	Yellow
	Tor2	2	White
	Common	1	Brown

4. Connect the cable with the male Amphenol C16-1 connector to the buoy according to pin-out below.

Table 2: « RS485 link cable » pin-out

Functions	Pin	C16-1	Color
Data output	Plus	6	Red
	Minus	7	Black
RS485	RxA	4	Blue
	RxB	5	Green
Tor	Tor3	3	Yellow
	Tor4	2	White
	Common	1	Brown

5. Connect the ground of transponder to the ground of buoy ([refer to Figure 4](#) item 4).
6. Connect the male Amphenol C16-1 connector to J2 plug of transponder.
7. Connect the female Amphenol C16-1 connector to J1 plug of transponder.

**2.5. Check of Installation**

The LED switches on « steady green » a few seconds after connecting the cable to J1 plug:

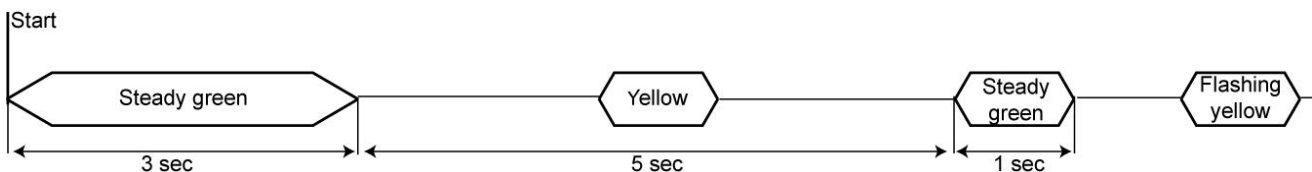


Figure 11: Normal sequence - Correct functioning visual display

- The AtoN AIS is powered supply and ready to be used.  
Else, go to [section 5. Failures analysis](#).

### 3. Working mode

#### 3.1. Position fixing

Position fixing and timing are performed by the internal GPS receiver.

#### 3.2. Back up at configuration setting

The following data are saved by an internal E2prom microprocessor:

- Slots and transmission channels.
- Message number to be transmitted.
- AIS beacon Id.
- Definition of sensors outputs parameters, etc.

#### 3.3. Events back up

A log file of essential events is recorded for subsequent analysis. Recorded data are the following:

- Regular storage of technical parameters, operating voltage, internal temperature, quality of power transmission information.
- Storage of defaults, GPS failure, unintentional reset, etc.

#### 3.4. Working safety

At each power-on, a self-test is performed by the system to check:

- operating voltage;
- program integrity by checksum calculation;
- operation of different peripherals;
- consistency of 32, 768 KHz clock and frequency of microprocessor quartz.

The self-test result is displayed on the LED located at the base of the dome.

#### 3.5. Serial interfaces

Two RS232 and RS485 serial interfaces are available:

- The RS232 serial interface is used for:
  - AtoN transmitter configuration;
  - Monitoring of message transmission;
  - downloading software updates;
  - recovering file of recorded events.
- The RS485 serial interface is used for:
  - meteorological and hydrological data input.

#### 3.6. On-going transmission

Messages transmitted on the VHF AIS through the NMEA VDM and VDO sentences, are reported on the RS232 serial link.

In order to minimise power consumption, the serial link is only active if a peripheral (COM Port of PC) is connected.

#### 3.7. Update of software

Internal software can be update using the RS232 serial link and the configuration software.

### **3.8. Reception of meteorological and hydrological data**

NMEA Format Data is input at 4800 bauds using the RS485 serial link.

Meteorological / Hydrological data acquisition and processing by the CPU can take a considerable time. Consequently a programmable parameter has been included in the configuration software which may be used to extend the wake up time of the transponder to take this into account.

### **3.9. Reception of technical data**

Data supplied by the remote monitoring system are accessible on RS232 or RS485 serial link. The choice of this serial link is performed during the transponder configuration.

### **3.10. Specification of TOR inputs**

Four inputs and one common signal that can be connected either to a PLUS or to a MINUS of a power supply.

The four inputs are insulated by an optocoupler with AC inputs; the characteristics of these four inputs are the following:

- Insulated by optocoupler, 5300 Vrms insulation voltage.
- Protected by Transil and polyswitch, 30 V 600 W voltage protection during 1 ms.
- Operating voltage 30 V to 3.3 V.

### **3.11. Designation of TOR inputs**

- TOR1: Light state (ON or OFF).
- TOR2: Light fault.
- TOR3: Racon fault.
- TOR4: General error signal.



CAUTION: Common of J1 and J2 plugs are linked to the same point.

The active level of TOR inputs can be defined by the configuration software.

- Active input if the input is not connected or linked to the common .
- Or active input if the input is at a different level from the common.

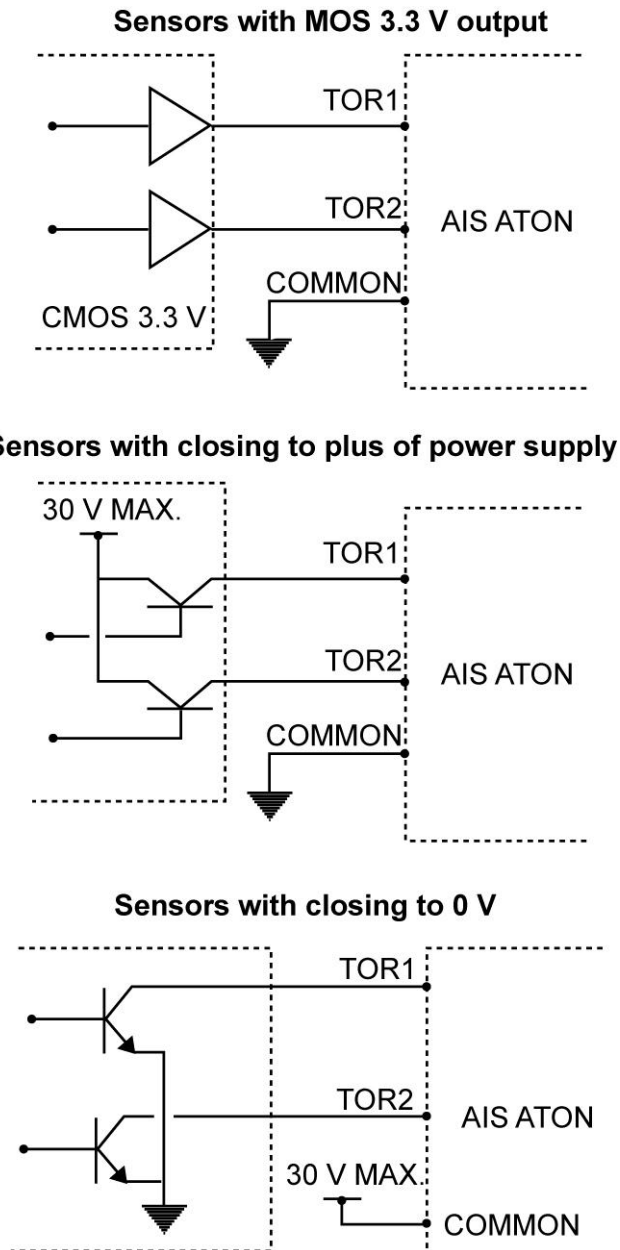


Figure 12: Examples of connections

### 3.12. Information output

Information output is carried out by a static relay.

Characteristics of output information are the following:

- Insulation voltage: 5300 Vrms.
- Maximum current: 200 mA.
- Admissible maximum voltage on input connector: 30 V (restricted by Transil and polyswitch restriction).
- Ron Resistor: 10 Ohms.



## 4. Technical specifications

### 4.1. Environmental specifications

The KanAtoN 3 AIS Transponder is compliant with the following specifications of IEC60945 standard except for « low temperature » and « water immersion » which are more restrictive than the standard and for « condensation tests » not required by IEC60945 standard.

- Dry heat storage 70°C for a period of 10 hours
- Dry heat operation 60°C for a period of 10 hours
- Damp heat 40°C, 93% humidity for a period of 3 hours, operations 30 minutes after
- Low temperature Operation -40°C for a period of 10 hours
- Vibrations 2 Hz to 100 Hz
- Corrosion Salt fog resistance
- Immersion 1 meter for a period of 20 minutes
- Compass safe distance 5 meters
- Condensation 100% of humidity without condensation

### 4.2. CEM specifications

The KanAtoN 3 AIS Transponder is compliant with the CEM specifications of IEC60945 standard.

- Conducted transmissions.
- Radiated transmissions.
- Conducted radio frequencies.
- Fast transient.
- Power supply fault.
- Electrostatic discharge.

### 4.3. GPS receiver

Characteristics of GPS receiver are the following:

- Consumption 117 mW typical
- Temperature (storage and operating) -40°C to +85°C
- Acquisition time Cold Start: 26 seconds  
Hot Start: 1 seconds
- Sensitivity In acquisition (cold): -141 dBm  
In acquisition (hot, warm): -157 dBm  
In tracking: -162 dBm
- Compliant with WAAS /EGNOS/ MSAS
- GALILEO compatible with upgrade

#### 4.4. Antenna

- Frequency 160 MHz
- VSWR < 2
- Impedance 50 Ohms
- Power ≥ 20 Watts

#### 4.5. Consumption

- Operating consumption 10 to 30 volts
- Operating current at 13.5 V
  - < 1 mA in sleep
  - 25 mA in GPS operation
  - 2.7 A in 12 W transmission
  - 90 mA in reception
- Operating current at 24 V
  - < 1 mA in sleep
  - 15 mA in GPS operation
  - 0.5 A in 12 W transmission
  - 50 mA in reception

Table 3: Examples of consumption with 3 minutes intervals

Mode	13,5 V 12.5 W	13,5 V 2 W	24 V 12,5 W	24 V 2 W
FATDMA A	0.1	0.1	0.07	0.07
FATDMA B	0.15	0.1	0.08	0.07
FATDMA C	0.1	0.1	0.07	0.07
RATDMA A (only KanAtoN 3)	1	0.9	0.6	0.5
RATDMA B (only KanAtoN 3)	1.1	0.9	0.6	0.5
RATDMA C (only KanAtoN 3)	1	0.9	0.6	0.5

#### 4.6. Function of configuration software « AIS-config.exe »

- Back up and recovering of configuration files for each AtoN beacon
- Parameters by beacon
  - MMSI number
  - Name
  - GPS Position
  - Transmission Slots
- On-going transmission of transmitted AIS message. Capability to display in clear the transmitted message.
- The AIS transponder can be changed to test or update mode.
- The configuration software is an ordinary executable software which does not require specific installation.
- The documentation is available on the CD-Rom with the executable file.
- Characteristics of configuration RS232 link: 38400 bauds, 8 bits, no parity, 1 stop bit.

## 5. Failures analysis

This section is a guide for diagnostic and resolution of the most current problems.

### 5.1. Self-test

When the transponder is switched on, a self-test is carried.

- The LED lights green for 3 seconds then displays the result of the self-test..
- The LED lights red for 3 seconds if the test has failed, then transmits a series of long red flashes with a period of 1 second. The number of flashes gives an indication of the faulty parameter detected during the self-test.

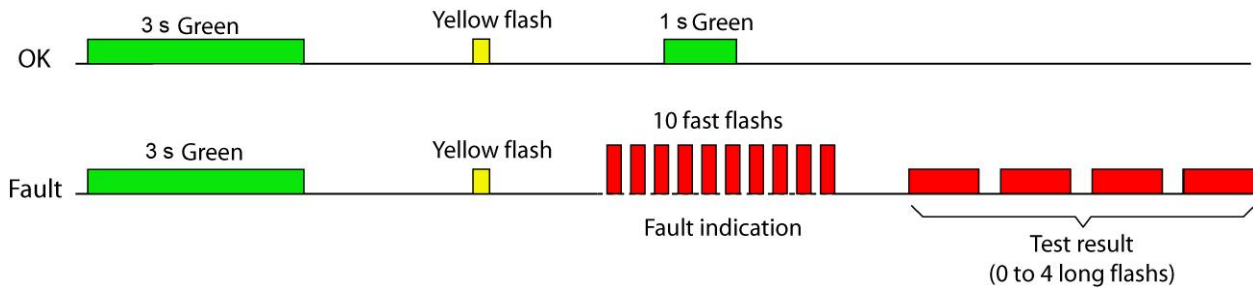


Figure 13: Fault detection during self-test

Flash Nb.	Fault	Action
1 <sup>(seernote)</sup>	Loss of configuration	Carry out a new configuration of transponder
2	Power supply fault	Check power supply and link of buoy
3	AIS transmission	Back to manufacturer
4	Internal	Back to manufacturer

Note: when starting for the first time, this error may occur if the transponder configuration was not performed.

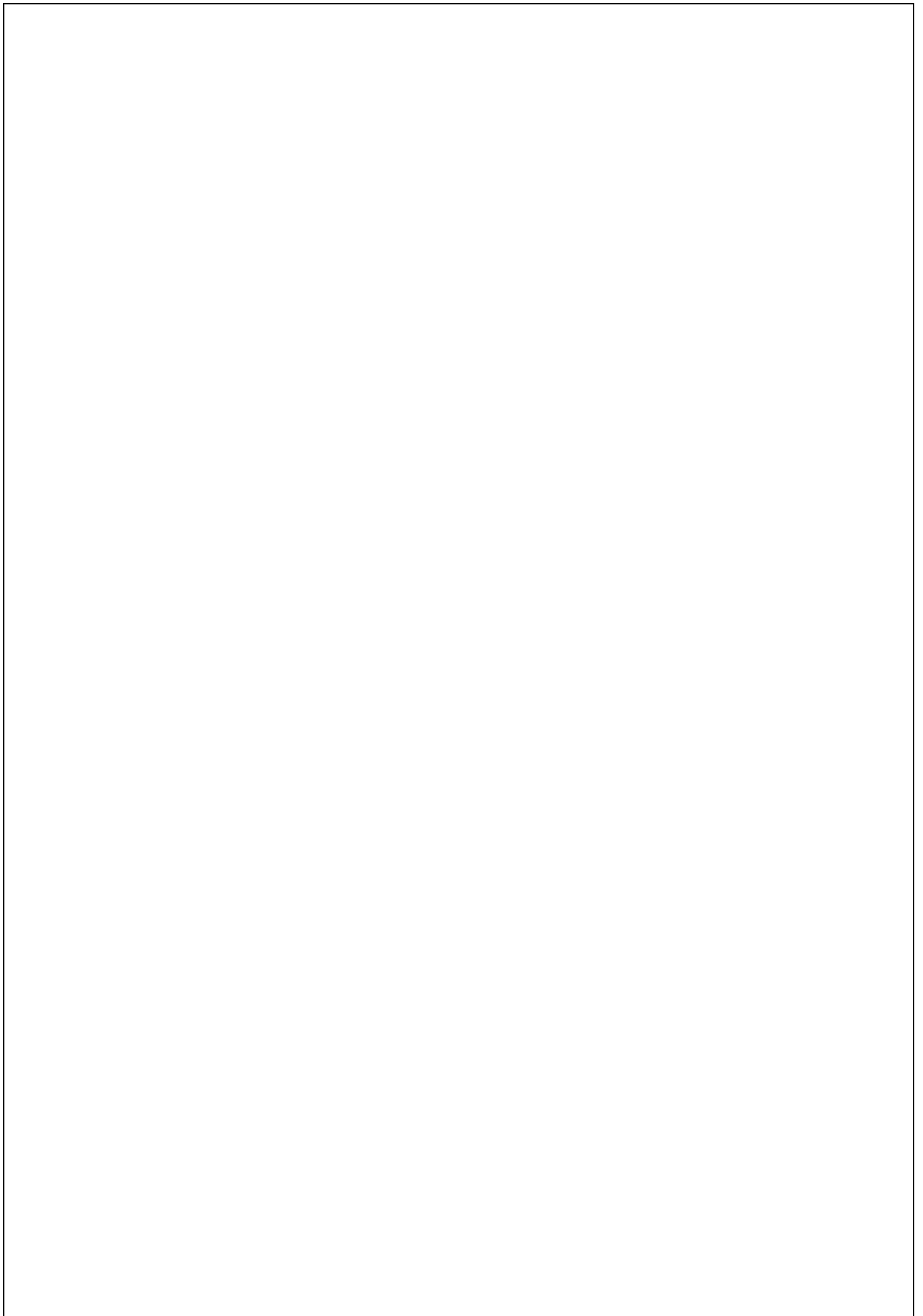
### 5.2. Operating

The LED flashes yellow to indicate that the GPS acquisition is in progress then green as soon as the synchronization is done.

The LED briefly lights red during AIS transmission.

## 6. Transmitter Shutdown Procedure

In case of non intentional uninterrupted continuous transmission, the transmission will automatically be shut down.



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