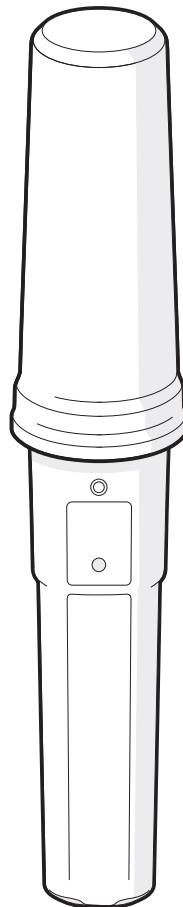


AIS CARBON AtoN EXPRESS

AIS Aids to Navigation Transmitter

Installation and operation manual



Thank you for buying this AIS CARBON AtoN EXPRESS.

This product has been engineered to offer you the highest level of performance and durability and we hope that it will provide many years of reliable service.

We constantly strive to achieve the highest possible quality standards, should you encounter any problems with this product, please contact your dealer who will be pleased to offer whatever assistance you require.


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1 Notices


 When reading this manual please pay attention to warnings marked with the warning triangle shown on the left. These are important messages for safety, installation and usage of the product.

1.1 Safety warnings

 This equipment must be installed in accordance with the instructions provided in this manual.

 Do not install this equipment in a flammable atmosphere such as in an engine room or near to fuel tanks.

 Any attempt to tamper with or damage this product will invalidate the warranty.

 This product contains a Lithium-Ion battery. Never expose to fire or high temperatures. Do not attempt to disassemble the product. Do not short circuit the battery or attempt to charge with equipment other than the supplied charger.

1.2 General notices

Position source

All marine Automatic Identification System (AIS) transceivers utilise a satellite based location system such as the Global Positioning System (GPS) network.

The accuracy of a GPS position fix is variable and is affected by factors such as the antenna positioning, how many satellites are used to determine a position and for how long satellite information has been received for.

RF emissions notice

Caution: The AIS device generates and radiates radio frequency electromagnetic energy. This equipment must be installed and operated according to the instructions contained in this manual. Failure to do so can result in personal injury and / or AIS device malfunction.

Accuracy of this manual

AtoN Express may be upgraded from time to time and future versions of AtoN Express may therefore not correspond exactly with this manual. Information contained in this manual is liable to change without notice. The manufacturer of this product disclaims any liability for consequences arising from omissions or inaccuracies in this manual and any other documentation provided with this product.

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.



WARNING: It is a violation of the rules of the Federal Communications Commission to input an MMSI that has not been properly assigned to the end user, or to otherwise input any inaccurate data in this device.

Industry Canada notice

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.

This Class B digital apparatus complies with Canadian ICES-003.

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.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

2 About AIS

The marine Automatic Identification System (AIS) is a location and vessel information reporting system. It allows vessels equipped with AIS to automatically and dynamically share and regularly update their position, speed, course and other information such as vessel identity with similarly equipped vessels. Position is derived from the Global Positioning System (GPS) and communication between vessels is by Very High Frequency (VHF) digital transmissions.

There are a number of types of AIS device as follows:

- **Class A transceivers.** Are designed to be fitted to large vessels such as cargo ships and large passenger vessels. Class A transceivers transmit at a higher VHF signal power than class B transceivers and therefore can be received by more distant vessels. They also transmit more frequently. Class A transceivers are mandatory on all vessels over 300 gross tonnes on international voyages and certain types of passenger vessels under SOLAS regulations.
- **Class B transceivers.** Similar to class A transceivers in many ways, but are normally lower cost due to the less stringent performance requirements. Class B transceivers transmit at a lower power and at a lower reporting rate than class A transceivers.
- **AIS base stations.** AIS base stations are used by Vessel Traffic Systems to monitor and control the transmissions of AIS transceivers.
- **Aids to Navigation (AtoN) transceivers.** AtoN's are transceivers mounted on buoys or other hazards to shipping which transmit details of their location to the surrounding vessels.
- **AIS receivers.** AIS receivers will generally receive transmissions from class A transceivers, class B transceivers, AtoNs and AIS base stations but do not transmit any information about the vessel on which they are installed.
- **AIS AtoN Express.** The AtoN Express is a unique, self-contained AIS Aid-to-Navigation. The key features of the AtoN Express are as follows:
 - Self-contained VHF and GPS antennas
 - Internal rechargeable battery pack for up to 5 days of operation
 - Simple installation

2.1 Static and dynamic vessel data

There are two categories of information transmitted by an AIS device: static and dynamic data.

The vessel's dynamic data, which includes location, speed over ground (SOG) and course over ground (COG), is calculated automatically using the internal GPS receiver. Dynamic data is not transmitted by AIS AtoN's.

Static data is information about the vessel or Aid-to-Navigation which must be programmed into the AIS device. This includes:

- Maritime Mobile Service Identity (MMSI)
- Vessel or AtoN name
- Vessel call sign (if available, not relevant to AtoN's)
- Vessel or AtoN type
- Vessel or AtoN dimensions

In most countries the operation of an AIS AtoN device will require the local authority to grant an operating license and MMSI number.



An MMSI number is required in order for the AIS device to operate. The product requires an AtoN specific MMSI number with the format 99*****. Please contact the relevant authority in your country for more information.

3 Installing and charging the AtoN Express

3.1 Supplied items

Figure 1 shows the items that are included with each AtoN Express.

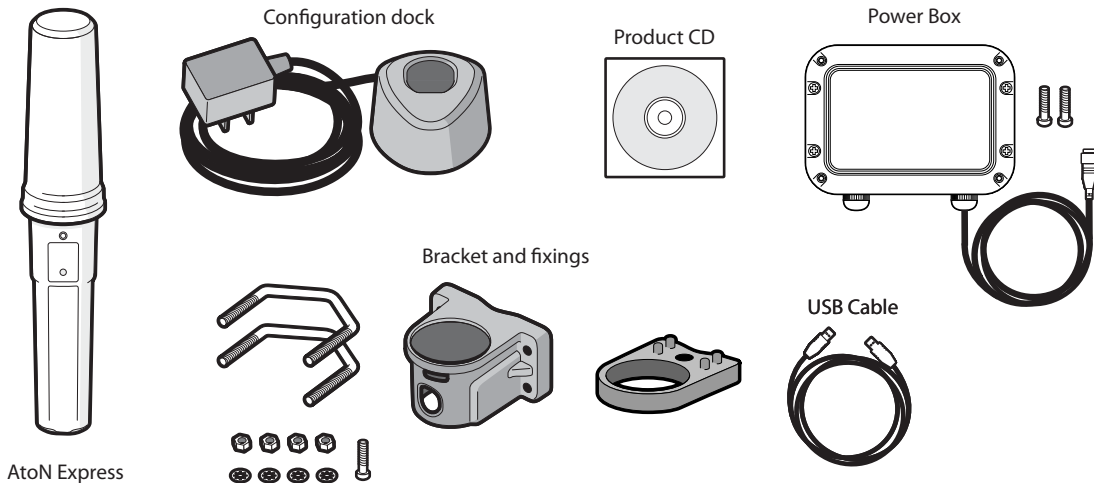


Figure 1 AtoN Express package contents

AtoN Express

The AtoN Express AIS Aid-to-Navigation device. The AtoN Express is self-contained and incorporates a rechargeable battery pack, VHF antenna and GPS antenna.

AtoN bracket and fixings

The bracket is used to attach the AtoN Express to the physical AtoN.

Configuration dock

The configuration dock is used to connect the AtoN Express to a PC during configuration. The configuration dock can also be used to charge the AtoN Express.

USB Cable

The USB Cable is used to connect the configuration dock to the PC.

CD

The CD contains the configuration software and this user manual in PDF format.

Power Box

The Power Box is used to power the AtoN Express from an external power source.

3.2 Installing the AtoN Express bracket

The AtoN Express must be located in the supplied mounting bracket when in use. Insertion into the bracket activates the AtoN Express and the AtoN Express is inactive when removed from the bracket.

The bracket should be fixed to the structure to be marked using the supplied u-bolts, washers and nuts as shown in Figure 2. The bracket should be mounted to a non-metallic vertical pole and installed in a location where the status indicator is visible. Ideally the AtoN Express should be installed approximately 2m above sea level. The area around and above the AtoN Express should be clear from any obstructions as these may affect GPS reception and / or VHF transmission range.

Ensure that the AtoN Express bracket is installed in the orientation shown in Figure 2.

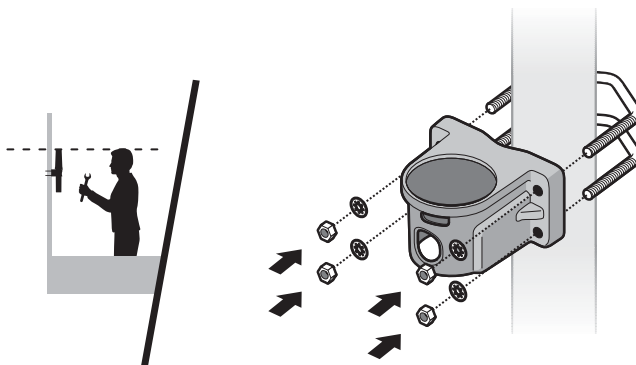


Figure 2 Installing the AtoN Express bracket

3.3 Fitting the AtoN Express to Bracket

Lower the AtoN Express into the AtoN Express Bracket and rotate clockwise until it clicks into place. Slide the locking collar up to the underside of the bracket as shown in Figure 3 and secure using the anti-tamper screw supplied in the fixing kit.

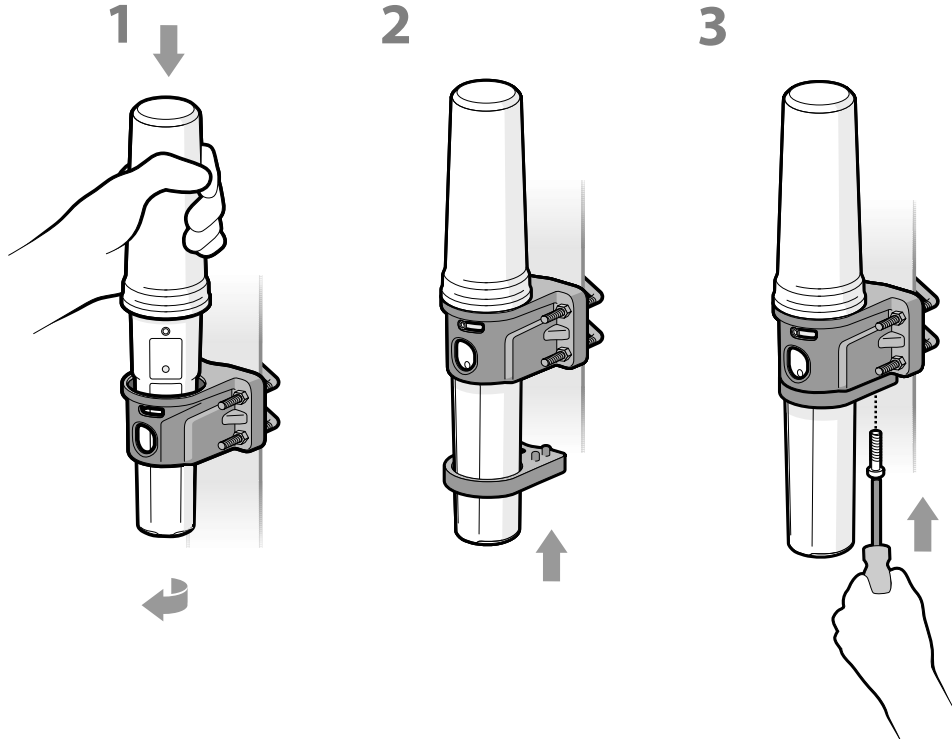


Figure 3 Fitting the AtoN Express into the bracket

3.4 Charging the AtoN Express

The AtoN Express is shipped with a partial charge and requires a full charge prior to installation on a structure to be marked (unless the unit is powered via the Power box). The AtoN Express is charged by placing it in the configuration dock as shown in Figure 4.

During charging the status indicator will flash blue at a steady rate (1 second on - 5 seconds off). When charging is complete the status indicator will flash a shorter blue flash (100 milliseconds on - 5 seconds off). Depending on the condition of the battery a full charge can take up to 5 hours to complete.

Note that the AtoN Express can be configured as described in section 4 prior to charging.

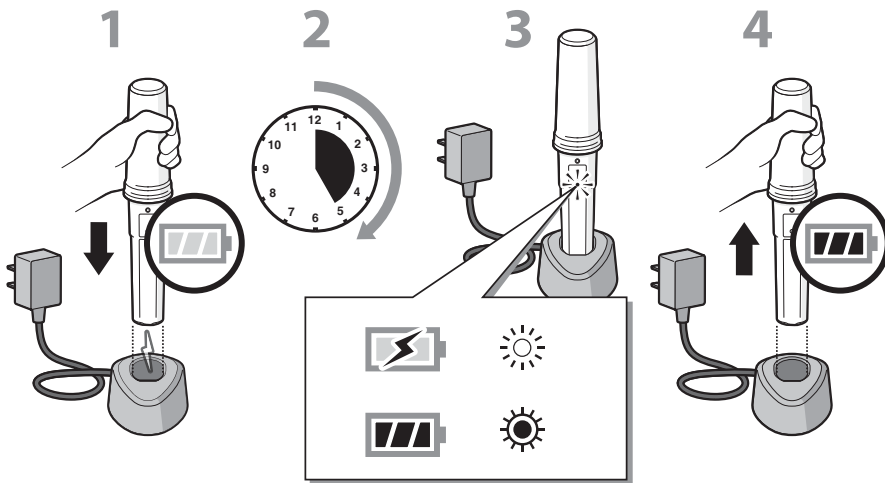


Figure 4 Charging the AtoN Express



The AtoN Express will not charge if the internal temperature is below 0°C or above 40°C. If the temperature is outside this range the status indicator will flash rapidly to indicate a charging fault.

3.5 Installing the Power box

AtoN Express is supplied with a Power Box which can be used to power the unit from an external 12 to 24VDC supply (absolute range 9.6 to 32VDC). The Power Box is waterproof to IPx6 and IPx7.

The Power box also charges the internal battery, so if the external power source fails the AtoN Express will continue working until the internal battery is exhausted.

The Power Box is supplied with a 6m cable and a connector which mates with the connector at the base of the AtoN Express. The input power cable is not supplied and will need to be fitted prior to installation.

To fit a power supply cable:

- 1) Remove the screws at each corner of the power box (see diagram 1).
- 2) Loosen the cable gland on the pre-fitted cable.
- 3) Remove the lid of the power box (feeding the attached cable through the gland).
- 4) Feed the selected power supply cable through the unused gland. A 2 core flexible cable with an external diameter not exceeding 6.5mm should be used.
- 5) Connect the +ve conductor to the Red screw terminal and -ve conductor to the Black screw terminal (see diagram 2)
- 6) Carefully feed the cables back through their gland and refit the lid of the power box. Tighten the cable glands and refit the screws at each corner of the lid (see diagram 3).
- 7) The power supply can now be attached to the external power source (see diagram 4)

When correctly connected to the external power source the Power Boxes green "Power" LED will be on.

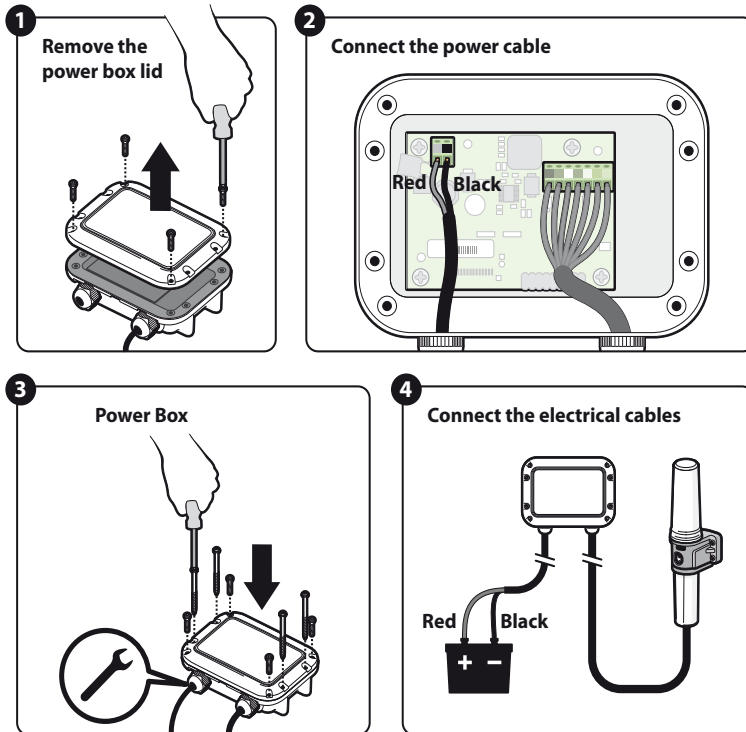


Figure 5 Installing the Power Box

4 Configuring the AtoN Express

The AtoN Express transmits standard AIS AtoN information using message #21. It requires configuration with the relevant information prior to installation.

The AtoN Express can also be configured for position reporting intervals, VHF operating frequency and other operating parameters listed below.

Configuration is carried out from a PC running the proAtoN Express application supplied on CD in the configuration pack.

4.1 Installing proAtoN Express - PC

1. Insert the CD into your PC and navigate to the proAtoNExpress 'Setup.exe' file. Double click the setup.exe file then follow the on-screen prompts.
2. If a security warning appears, click 'Install' to continue with the installation.
3. The required drivers will also be installed. Click "Next" on the driver installation pop-up window when prompted to do so.
4. The application can be started using the shortcut which is added to the programs menu.

4.2 Connecting to the AtoN Express

Connect to the AtoN Express by inserting it into the configuration dock and connecting the configuration dock USB cable to a PC. The first time the connection is made the USB drivers must be installed.

Once the drivers are installed, launch the proAtoN Express application. The connection will be attempted automatically if the PC is connected to the configuration dock. If the automatic connection is not possible the available ports are listed in a drop down menu and can be manually selected. Connect and Disconnect buttons are available to control the connection. The disconnect button should be used before physically disconnecting the AtoN express from the PC.

4.3 Basic configuration

All basic configuration is presented on the proAtoN Express configuration tab as shown in Figure 6. This tab permits configuration of the following information:

- **AtoN name**
Enter the AtoN name or other identification.
- **MMSI number**
Enter the AIS AtoN's 9 digit MMSI number.
- **AtoN type**
Select the most appropriate AtoN type from the drop down list.
- **Type of EPFS**
The EPFS used by the AtoN can be set to either Autonomous (uses the GNSS fix) or Surveyed (uses the nominal position entered). For surveyed positions the accuracy of the measurements (less than or greater than 10m) can be added.
- **Nominal Position**
The charted (or intended) location of the structure being marked.
- **Off Position Threshold.**
The distance (m) by which the AtoN may vary from its nominal position before it reports being off position.
- **RACON Fitted.**
Allows the setting of the racon fitted flag in the message #21 to indicate that a radar beacon is also available at the reported location.
- **Message Schedule**
The start slot, interval between messages and start UTC for both channels A and B can be configured for the message #21.
- **AtoN's dimensions**
Enter the AtoN dimensions, referenced to the location of the AtoN Express, to the nearest whole metre.
- **Configuration of AIS operating frequencies**
Select the required operating VHF frequencies for transmissions. The default channels are Channel A = 161.975MHz and Channel B = 162.025MHz. The default channels are intentionally reserved for AIS and should not normally be adjusted. For specific applications the frequencies can be adjusted, but it is critical that they match the configuration of any receiving equipment.

To copy the configuration to the AtoN Express click the send icon. Existing configurations can be retrieved from the AtoN Express using the retrieve icon.

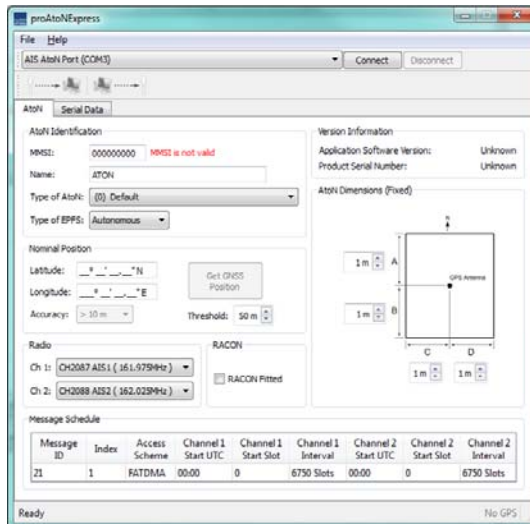


Figure 6 proAtoN Express configuration tab

4.4 Message Schedule Configuration

AtoN Express only transmits the standard AtoN message #21 using FATDMA. The scheduling of this message can be configured using the following parameters which can be entered independently for both channel A and B:

FATDMA (Fixed Access Time Division Multiple Access) access scheme requires that the AIS AtoN is configured with fixed AIS time slots in which it will transmit AIS messages. Mobile AIS stations operating in the area where an AIS AtoN is installed need to be aware of the time slots allocated to the AIS AtoN. The slots allocated to the AIS AtoN are 'reserved' by transmissions from an AIS Base Station that is operating in the same area as the AIS AtoN and is configured to make the necessary slot reservations. In some areas, where there is no base station coverage, local regulations may allow an AIS AtoN using FATDMA to be installed with out the slot reservation being made.

- **Start UTC**

The offset from UTC 00:00. This parameter is used to create different start times for the two channels when alternating transmission between the two channels. For example; a five minute transmission schedule alternating between channel A and B would have a slot interval of 22500 (10 * 2250 slots per minute) and a difference of 5 minutes between the start UTC's of the two channels.

- **Start Slot**

As FATDMA is being used, the start slot should be reserved by the local base station. The start slot can be entered independently for both channels A and B.

- **Channel Interval**

This determines the time between transmissions on each channel. The interval is set as a number of slots. 2250 slots = 1 minute.



The operating time from a complete charge is dependent on the configured reporting intervals. Shorter reporting intervals will reduce the operating time. The examples provided here are intended as a guide as actual operating time also depends on external factors such as temperature and GPS signal quality.

5 Using the AtoN Express

The AtoN Express is ready for use once charged and configured. The location of the status indicator is shown in Figure 7.

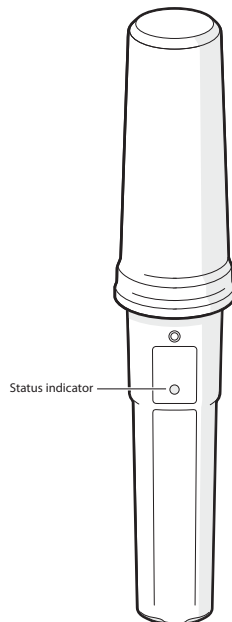


Figure 7 AtoN Express status indicator

5.1 Activating and deactivating the AtoN Express

The AtoN Express is activated by placing it in the supplied vessel bracket and de-activated when removed from the bracket. The AtoN Express will continue to report position and vessel data as configured in the incorrect bracket. To activate the AtoN Express insert and lock into the vessel bracket as shown in Figure 8.

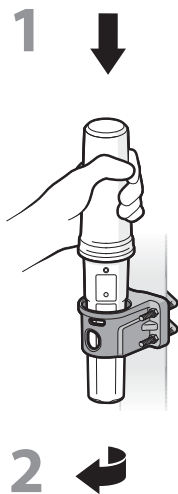


Figure 8 Activating the AtoN Express

The AtoN Express will only fit into the bracket in one orientation, as shown in Figure 8. Do not try to force the AtoN Express into the bracket in the wrong orientation.

5.2 Status indicator

While active in the fixing bracket

The status indicator shows the current operating state of the AtoN Express. The status indicator flashes green or yellow every 5 seconds. The number of flashes indicates the status conditions defined in the table below. The key status indications are also shown in Figure 9

While in the configuration dock

The status indicator shows the current operating state of the AtoN Express. The status indicator flashes blue every 5 seconds. The duration of the flashes indicates the charging status conditions defined in the table below.

Number of flashes	Status
1 Green	AtoN Express is active and operating normally.
2 Yellow	Low battery warning (<50%), AtoN Express continues to operate until battery is exhausted.
3 Yellow	Error condition - please contact your dealer for support.
5 Yellow	Waiting for GPS fix or no GPS fix. If this condition persists for more than 12 minutes, relocate the AtoN Express to a location with a clear sky view.
6 Yellow	Transmit time out - AtoN Express is unable to transmit due to AIS network congestion.
7 Yellow	No MMSI programmed. The AtoN Express is unable to transmit because no MMSI has been configured.
1 Blue (1 second)	Charging.
1 Blue (100 millisecond)	Charged.
1 Blue (3 seconds)	Charging error.

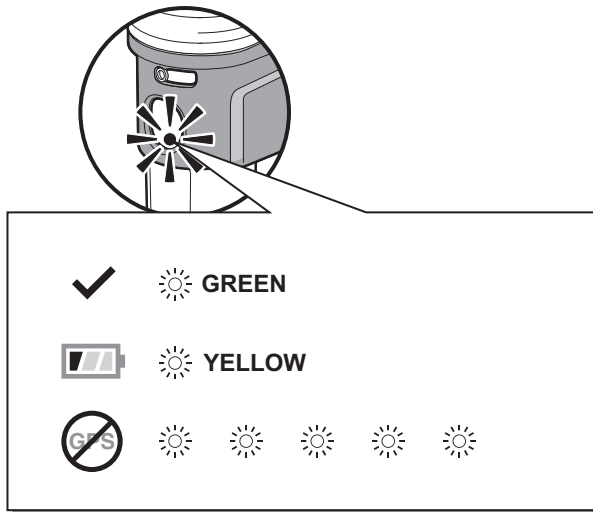


Figure 9 Identified common status indications - while active

While charging

The status indicator flashes blue (one second on - five seconds off). When charging is complete the status indicator will flash a shorter blue flash (one millisecond on - five seconds off). A charging error is indicated by a longer blue flash (three seconds on - 5 seconds off) of the status indicator. The most likely cause of a charging error is high temperature. The charger will not operate above 40°C for safety reasons.

6 Troubleshooting

Issue	Possible cause and remedy
The AtoN Express status indicator does not flash when placed in the holder.	<ul style="list-style-type: none"> • The AtoN Express is in 'deep sleep' mode and requires charging in order to activate for use. • The AtoN Express battery is exhausted and requires charging.
The AtoN Express status indicator periodically flashes more than once when placed in the holder.	<ul style="list-style-type: none"> • Please refer to the status indicator description in section 5.2.
The AIS transmission range of the AtoN Express is reduced.	<ul style="list-style-type: none"> • The AtoN Express should be mounted as high as possible on the vessel and should not be attached to a vertical metal surface or pole as this will interfere with the operation of the internal VHF antenna.
The AtoN Express does not obtain a GPS position fix (status indicator flashes 5 times).	<ul style="list-style-type: none"> • Ensure that the AtoN Express is installed outdoors with a clear unobstructed view of the sky. • Avoid locating the AtoN Express close to large metal structures.
The AtoN Express status indicator does not flash when the AtoN Express is placed in the configuration dock.	<ul style="list-style-type: none"> • Remove the AtoN Express from the configuration dock and re-insert. • Check that the configuration dock is plugged into a mains outlet and that the outlet is live.
The AtoN Express status indicator flashes Blue slowly (3 seconds on - 5 seconds off) when the AtoN Express is being charged.	<ul style="list-style-type: none"> • The temperature is too high or low to safely charge the battery. Move the AtoN Express to a location where the temperature is between 0°C and 40°C. • A charging error has occurred - please contact your dealer.
The Power indicator of the Power Box (where used) is not illuminated.	<ul style="list-style-type: none"> • The power supply to the Power Box may not be connected.

7 Specification

Parameter	Value
Dimensions	370mm x 63mm max. diameter (without bracket)
Weight	250g (AtoN Express unit only)
Power	Built in 2200mAh Lithium-Ion battery pack
Charger	100-240VAC input, 5V 1.2A output.
GPS receiver	50 channel receiver and internal GPS antenna
VHF transmitter frequency range	156.025 to 162.025MHz
Transmitter output power	1W radiated (EIRP)
Power Consumption (from internal battery)	<0.4Ah/day
Power Consumption (from external 12v supply)	<1 Ah/day
Channel bandwidth	25kHz
Modulation mode	25kHz GMSK
Environmental	IEC60945 'Exposed' category
	Waterproof to IPx6 and IPx7
	Operating temperature -15°C to 55°C



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