



UNICONT

**ANALOG DIGITAL
PROGRAMMABLE CONVERTER
ADPC-101
TECHNICAL MANUAL**



Caution

- Carefully read this Manual before use for accurate and safe handling.
- The present Manual is a document combining converter Certificate.
- Preserve this Manual as a reference guide during the whole operating life of this device.

Contents

1. General	5
2. Delivery set	6
3. Performance specifications	7
4. Device installation	9
5. Unit operation	16
5.1 Device switch on procedure	16
5.2 Input of initial course value	16
6. Auxiliary mode for display of signal status at input terminals	18
7. Mode for display of traveled distance	19
8. Menu functions and changing settings	20
8.1 Gyrocompass tuning	20
8.2 Log tuning	20
8.3 Serial port tuning	21
8.4 Keyboard tuning	21
8.5 Display tuning	21
8.6 Operator idling tuning	21
8.7 Alarm tuning	21
8.8 NMEA tuning	21
8.9 Non-authenticity of data	23
9. Example of connecting ADPC-101	25
10. Warranty	26
11. Selling report	27
12. Acceptance report	28
13. Commissioning report	29
14. Default settings	30

1. General

Thank You for purchasing our ADPC-101 navigation device. Design and production of this device are developed in compliance with applicable industrial standards for marine use.

This device is mounted on ships with gyrocompasses and logs not capable to generate current values in NMEA format for navigation equipment requiring course and speed data in digital format.

Device executes the following functions:

- Reception of current course value from gyrocompasses with synchro or stepper interface;
- Reception of current speed value from logs with stepper interface or interface on “closing” contact;
- Indication of current speed and course values on built-in display;
- Conversion of received data into NMEA-0183 format;
- Transmission of converted course and speed data via standard interface (RS-232 and RS-422/485 ports) to external devices in NMEA-0183 format.

Operating modes of this device are easily tuned by user-friendly menu options and widely used symbols on keyboard pads.

2. Delivery set

Delivery set includes:

1. ADPC-101 converter 1 unit
2. Operations Manual in English 1 package

Additionally, delivery set may include.

3. Performance specifications

Types of connected equipment

1. Gyrocompasses:
 - gyrocompass with synchro type;
 - gyrocompass with stepper type.
2. Logs:
 - log with stepper (pulses) type;
 - log with interface on "closing" contact.

Input signals

1. Gyrocompass:
 - sine voltage of synchro windings;
 - voltage pulses (stepper type compass)
 - voltage up to 400V;
 - frequency up to 500Hz;
 - step transmission - 0.6, 1, 1.5, 3, 4 or 6 per degree.
 Rate of course variations (during vessel turning) up to 80 degrees/s

2. Log:
 - voltage pulses (stepper type interface);
 - "closing" contact;
 - voltage up to 400V;
 - 100/200/300/400/500/600 pulses per mile.

Input specification

- optoisolated inputs (exclude log with closing contact);
- switching level 3V/6V (switched by jumpers).

Output

1. Ports:
 - two asynchronous serial interfaces RS-232, RS-422/485;
 - parity no/even/odd;
 - stop bits - 1 or 2;
 - NMEA refresh: 1, 2, 5, 10Hz.
2. Output signal format:
 - standard line NMEA 0183 with line checksum;
 - 15 options for line output: (heading, speed in separate lines; in one line; heading only; speed only; disabled).

3. Format parameters:

Data bit: 8 bit;

Rate, bit/s: 4800, 9600, 14400, 19200, 28800, 38400, 57600, 76800, 115200, 230400.

Indicator

Type LCD with backlighting

Lines 2

Characters 16

Range of measurements

Speed: 0..99.9 knots

Heading: 0..359.9 degrees

Data statement precision

Course value 0.1 degree

Speed value 0.1 knot

Keyboard

- 3x4, film-type, with upper and lower case;
- sound when any key is depressed;
- function of operator idling.

Power supply

+9..36 VDC, galvanic isolation.

Power consumption 150 mA maximum.

Working temperature

-15..+55 °C

Storage temperature

-20..+70 °C

Weight

1.5 kg.

Overall dimensions

200 x 134 x 64 mm.

4. Device installation

Mount unit in easy of access place, for example: vertical wall inside of ship.

Safety precautions

- Avoid device sinking in water and water ingress inside device casing.
- While disconnecting power supply cable, observe correct procedure for disconnection of cable contacts, avoid contact with printed circuit board.
- Do not use organic solvents during cleaning of device surface to avoid damages of applied decals.

Prohibited:

- to use device in floor-mounted position;
- to expose device for mechanical shocks and tensioning of power supply cable;
- to use faulty device.

Note

This device should be mounted at least 1 meter from magnetic compass.

It is recommended to install device in the following order:

- remove the device face panel;
- firmly secure separated casing without face panel on a vertical wall;
- route and pass connecting cables from external devices through cable entries.

Arrangement of openings, the spacing between openings and overall dimensions are indicated in Fig.1.

Caution

- The whole equipment being connected to the device must be de-energized for the period of connection.

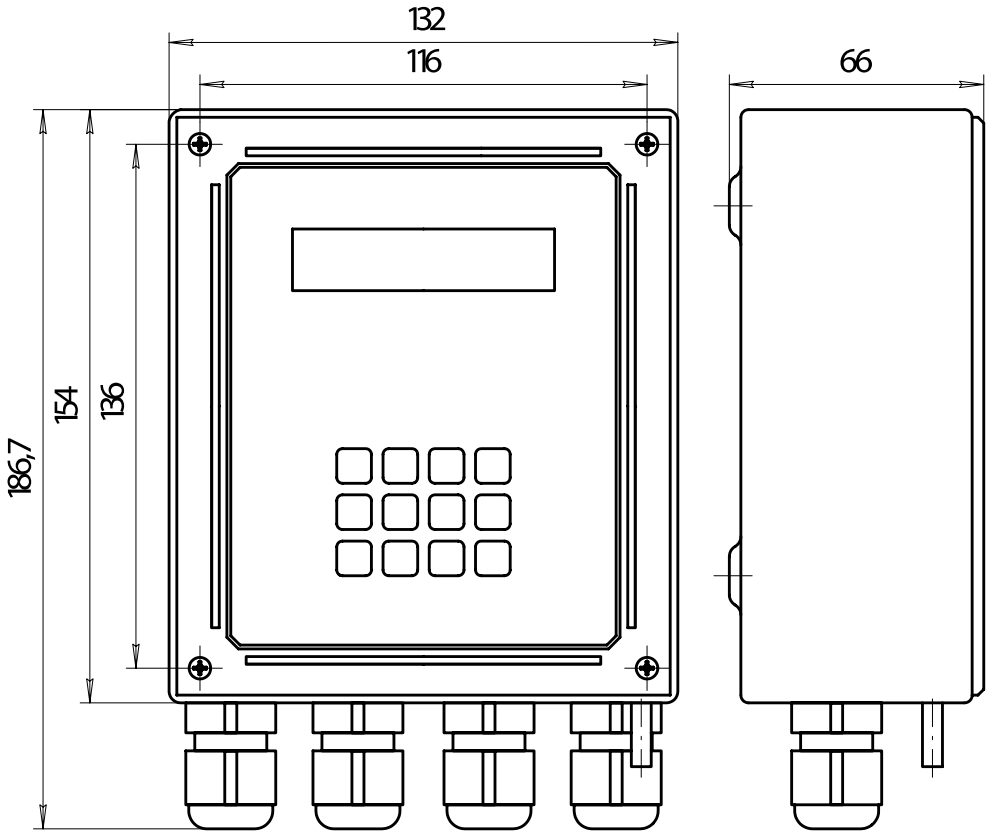
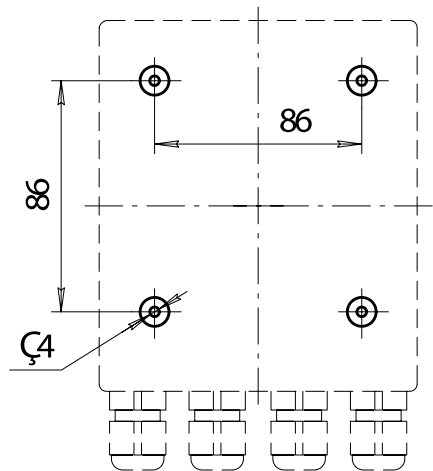


Fig.1 ADPC-101 mounting dimensions



Input channels

Converter has four cable entries to route wires from external devices inside the device and to connect them to relevant terminals of terminal strips:

- connect cables to terminal blocks of unit;
- secure the device face panel on mounted casing;
- tighten gland seals of cable entries.

Arrangement of terminal strips on the board and purpose of contacts are stated in Fig.2.

Wiring diagram for power supply source, output contacts of gyro compass, log and consumers of course and speed values in NMEA format are stated on diagram – Fig.3 and 4.

1. Inputs for gyro compass

Both types of gyro compass, namely synchro and stepper (pulse) type are connected to the same optically isolated inputs capable to change switching threshold.

Connector J1

Inputs: CS1-, CS1+, CS2-, CS2+, CS3-, CS3+, CSR-, CSR+.

1.1 Synchro type gyrocompass.

Synchro type gyrocompass is connected as follows:

- output of 1st winding is connected to contacts CS1+, CS3-;
- output of 2nd winding is connected to contacts CS2+, CS1-.
- output of 3rd winding is connected to contacts CS3+, CS2-.
- output of win ce winding is connected to contacts CSR+, CSR-.

1.2 Stepper type gyrocompass.

Stepper type gyrocompass is connected as follows:

- all inputs with sign “-” in designation are connected jointly and further are connected to a common gyrocompass wire (GND), and compass outputs are connected to relevant inputs “+” as designated.

2. Inputs for log

2.1 Inputs for log with interface on “closing” contact.

Connector J2

inputs LOG, GND.

2.2 Input for log with stepper type interface.

An input is optically isolated which is capable to change switching threshold.

Connector J2

inputs LOG-, LOG+.

3. Information outputs

Information is relayed through asynchronous serial interface of two types:

RS-232: connector J3, output TX, common wire GND;

RS-422/485: connector J3, differential outputs TX- and TX+, common wire GND.

4. Power supply

DC voltage power supply within +9..36 V is applied to connector J3, contacts +9..36V and common wire GND.
Power consumption is 150 mA maximum.

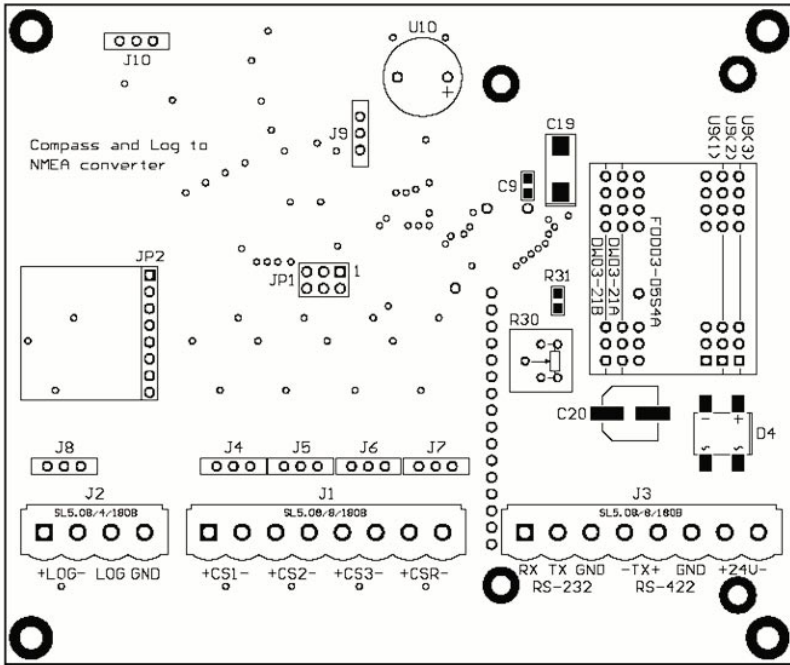





Fig. 2. Arrangement of terminals on printed circuit board.


To change switching threshold of optically isolated inputs of log and gyro compass, use DIP-switches J4, J5, J6, J7, J8 (or jumpers). With closed contacts, threshold input voltage is approximately 6 V and about 3V with open contacts.

J4, J5, J6, J7, J8

 or  – input voltage is approximately 3V

 – input voltage is approximately 6V

J10:  device switched as last point in an interface RS-422 (120 Ohm resistor is switched on)

 device switched as not a last point in an interface RS-422 (120 Ohm resistor is switched off)

Contacts J9 and JP1 use for programming and never use during exploitation of unit.

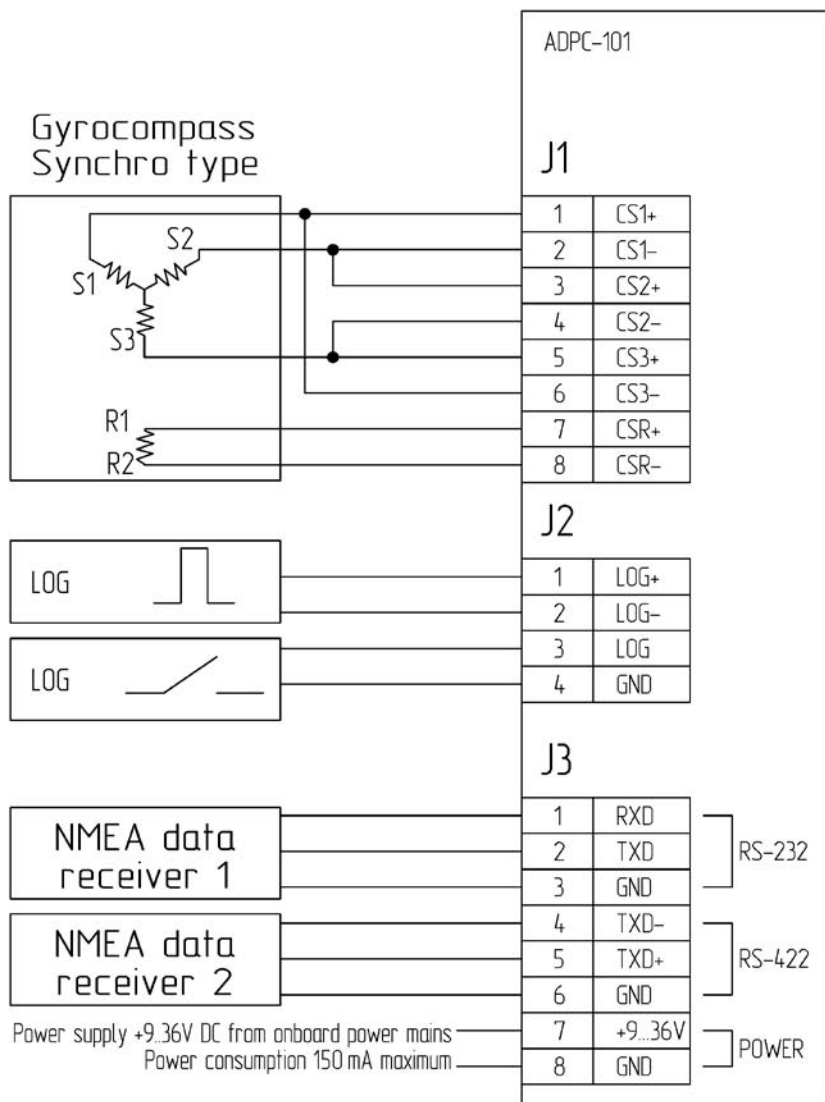


Fig. 3 Wiring diagram for synchro type gyrocompass.

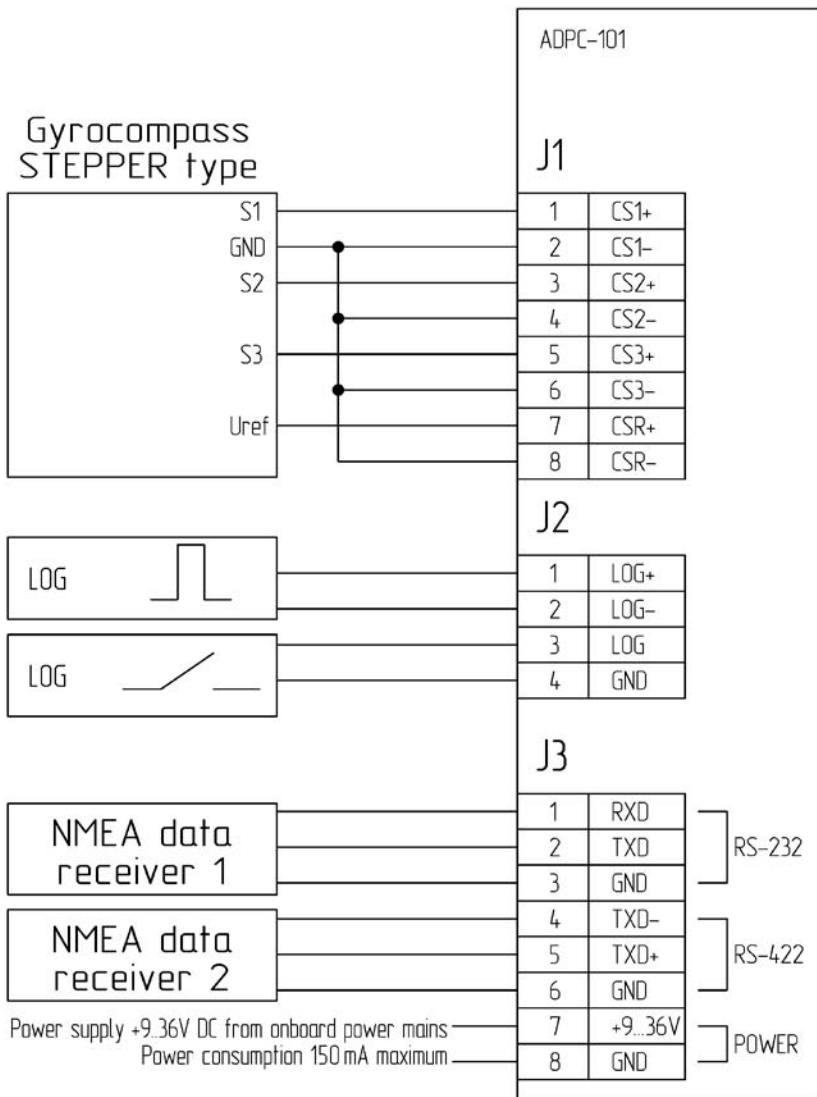


Fig. 4 Wiring diagram for stepper type gyrocompass.

5. Unit operation

Caution

- Before device commissioning, at first complete installation procedure (see paragraph 4 “Device installation”).

5.1. Device switch on procedure

When power is applied, device transfers to review mode of course and speed values. Besides, readings of compass or log values are indicated as zeroes and the signal at converter output will be disabled. The unit is in standby mode for input of initial course value and instructions for applicable types of gyrocompass and log.

To achieve correct device operation, select type of compass and log in menu settings (see paragraph 8 “Menu functions and changing of settings”) and manually enter the current course value for gyrocompass in use.

Should received values of compass and log are not trustworthy, display will show the sign ‘?’ (question) at the beginning of relevant line.

<p>LOG: 0.0 kt GYRO: 0.0</p>	<p>– indicator readings during device power ON (mode of review for current course and speed values).</p>
--	--

Note

When the type of compass, namely stepper/synchro is switched over, again enter the current gyrocompass value.

5.2. Input of initial course value

- look at and remember course readings on gyrocompass, which is connected to the unit;
- press on the key **[1]** on converter keyboard. There will be a prompt to enter course value:

<p>Enter GYRO value ?</p>

- enter course value by using keys with applied digits and decimal point [.];

– press **[ENTER]** .

The screen returns to a mode for review of current compass course and log speed.

When it is necessary to edit or delete the last character of entered value one may use the key **[CLEAR]**.

Keys **[.]** and **[CLEAR]** are entered in the upper case and after depression **[.]** the case automatically shifts to the lower case and remains in the upper case when **[CLEAR]** is depressed.

Use key **[SHIFT]** key to change cases.

The status of case can be visually defined by cursor status:

- blinking cursor with illumination of font recticle – lower case;
- no blinking (underlining) – upper case.

Caution

- All tuned options are stored in ROM memory and remain unchanged after power ON/OFF. If gyrocompass course readings were changed during converter power OFF period, enter a new current course value to ensure correct operation of device.

Note

- In this mode of tuning one may enter a number with floating point and one decimal point of decimal fractions. If incorrect value is entered (over 359.9) the number will be ignored.

- In case of operator idling and selected option unuse timeout (in position 5s, 10s, 15s, 20s, 25s except for OFF) there will be an automatic exit from input mode to review mode of course and speed values without changing of any option.

- Selected options are preserved only after depression on **[ENTER]**.

After selection of gyrocompass and log types and input of initial course value and reception of trustworthy data, device starts to transmit NMEA signal to both outputs RS-232 and RS-422/485 in parallel, once per second.

Example:

For input value “320.3” should press:

[1] [3] [2] [0] [SHIFT] [.] [3] [ENTER]

6. Auxiliary mode for display of signal status at input terminals

In this mode display shows logical status of signals at device inputs which may be used during device deployment.

```
GYRO: R 123 LOG:  
LEVEL x xxx x
```

To go into this mode press on **[9]** key.

- **logic '0'** denotes that a signal level at relevant optically isolated input is below switching threshold;
- **logic '1'** denotes that a signal level at relevant optically isolated input has exceeded switching threshold;
- **123 1st, 2nd, 3rd** gyrocompass's windings.

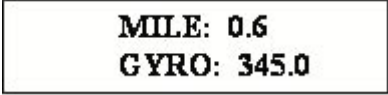
For input of "closing contact" type log:

- **logic '0'** denotes that the contact is opened;
- **logic '1'** denotes that the contact is closed.

The unit will be in this mode until operator initiates exit by pressing on any key.

7. Mode for display of traveled distance

In this mode display shows traveled distance by a ship after last nulling of distance counter. Nulling except after shutdown of convertor or with pressing **[7]** key by operator. After activating this mode upper string of display with log information changed to string with information about traveled distance.



MILE: 0.6
GYRO: 345.0

To go into this mode press on **[2]** key. To go out from this mode press on **[2]** key again.

NMEA data output in this mode does not stop or change.

8. Menu functions and changing of settings

Press on **[4]** key and enter menu of settings. Use **[3]**, **[0]** keys (up and down) for scrolling between options.



Use **[6]**, **[8]** keys (left, right) to select probable option values.

Again press on **[4]** key for exit from selected mode. Selected options are stored only after pressing on **[ENTER]**.

When operator is idling and **unuse timeout** option is selected (in positions 5s, 10s, 15s, 20s, 25s except for OFF) an automatic exit from the menu is initiated without changes of any option.

8.1. Gyrocompass tuning

8.1.1. **GYRO ratio** – ratio of input pulses from gyro:

Setting	6 pulses per	1 pulse per
360x	1 deg	10 min
240x	1.5 deg	15 min
180x	2 deg	20 min
90x	4 deg	40 min
60x	6 deg	60 min
36x	10 deg	100 min

8.1.2. **GYRO sign** – direction of compass rotation: **positive, negative**.

8.1.3. **GYRO type** – gyrocompass type: **selsyn, stepper**.

Note

Again enter the current compass value during switching of stepper/synchro compass type.

8.1.4. **GYROref polarity** – selection of reference signal polarity: **positive, negative**.

- as far as synchro type compass is concerned, selection of negative polarity causes signal inversion and operation for signal edge shift by 180 degrees;
- as far as stepper type gyrocompass is concerned, positive polarity corresponds to high level and negative one to low level, which is used

for determination of gyrocompass working mode.

8.2. Log tuning

8.2.1 **LOG pulse/mile** – number of pulses per one mile: **100, 200, 300, 400, 500, 600.**

Note

If log pulse repetition period at exact moment exceeds data update interval (1s), speed is computed based on current measurement history following the last log pulse.

8.2.2. **LOG bounce delay** – time for programmable deletion of contact “bounce”: **10 ms, 20 ms, 30 ms, 40 ms, 50 ms, 70 ms, 100 ms.**

8.3. Serial port tuning

8.3.1 **COM baudrate** – baud rate, bit/s: **4800, 9600, 14400, 19200, 28800, 38400, 57600, 76800, 115200, 230400.**

8.3.2 **COM parity** – parity bit: **NO, EVEN, ODD** (no, even, odd).

8.3.3 **COM stop bits** – number of stop bits: **1 bit, 2 bits.**

8.4. Keyboard tuning

Button click – sound click of depressed key: **Yes, No.**

8.5. Display tuning

DISPLAY REFRESH – refresh frequency of displayed data: **1, 2, 5 and 10 Hz**

8.6. Operator idling (timeout) tuning

Unuse timeout – time of automatic OFF for backlighting and exit from menu of options or input mode in case of operator idling: **5 second, 10 second, 15 second, 20 second, 25 second, OFF.**

8.7. Alarm tuning

Alarm – ON, OFF. If option is setted, device is emitted sound when input data from gyrocompass or lag is incorrect. Operator can stop alarm by pressing any button on keyboard in main screen mode.

8.8. NMEA tuning

8.8.1. NMEA REFRESH – refresh frequency of output data: 1, 2, 5 and 10 Hz.

8.8.2. NMEA format – the selection of NMEA format is divided into three separate option:

“NMEA LOG ftm”

Option: disable, VMVTG, VMVBW, IIVTG, IIVBW, SIVHW (+GYRO).

“NMEA GYRO ftm”

Option: disable, AGHDT, HEHDT, HCHDT, SIVHW (+LOG).

“NMEA ROT fmt”

Option: disable, TIROT, HNROT.

(Line format $\$_{ROT,x,x,A} *cs <CR><LF>$, where instead of $_TI$ or HN are relayed vessel turning speed in degrees/min with a plus sign when the angle increases from 0 to 360; and minus when it decreases from 360 to 0, cs – is a checksum).

Note

1. In each option **Disable** is set first, thus by default (after programming) transmitting of all lines is forbidden.

2. In Case of choice of the same format **SIVHW** for both **LOG** and **GYRO**, there will be transmitted to the serial port only one line **SIVHW**, but not two.

NMEA format options:

Option 1. **\$AGHDT, \$VMVTG**

$\$AGHDT,x,x,T *cs <CR><LF>$ – true course;

$\$VMVTG,,,,,x,x,N,, *cs <CR><LF>$ – speed.

Option 2. **\$AGHDT, \$VMVBW**

$\$AGHDT,x,x,T *cs <CR><LF>$ – true course;

$\$VMVBW,x,x,,A,, *cs <CR><LF>$ – speed.

Option 3. **\$HEHDT, \$VMVTG**

$\$HEHDT,x,x,T *cs <CR><LF>$ – true course;

\$VMVTG,,,,,x.x,N,, *cs<CR><LF> – speed.

Option 4. \$HEHDT, \$VMVBW

\$HEHDT,x.x,T *cs<CR><LF> – true course;

\$VMVBW,x.x,A,,, *cs<CR><LF> – speed.

Option 5. \$AGHDT, \$IIVTG

\$AGHDT,x.x,T *cs<CR><LF> – true course;

\$IIVTG,,,,,x.x,N,, *cs<CR><LF> – speed.

Option 6. \$AGHDT, \$IIVBW

\$AGHDT,x.x,T *cs<CR><LF> – true course;

\$IIVBW,x.x,A,,, *cs<CR><LF> – speed.

Option 7. \$HEHDT, \$IIVTG

\$HEHDT,x.x,T *cs<CR><LF> – true course;

\$IIVTG,,,,,x.x,N,, *cs<CR><LF> – speed.

Option 8. \$HEHDT, \$IIVBW

\$HEHDT,x.x,T *cs<CR><LF> – true course;

\$IIVBW,x.x,A,,, *cs<CR><LF> – speed.

Option 9. \$SIVHW (mixed)

\$SIVHW,x.x,T,,,x.x,N,, *cs<CR><LF> – true course and speed in one line.

Option 10. \$AGHDT (no LOG)

\$AGHDT,x.x,T *cs<CR><LF> – true course (speed is disabled).

Option 11. \$HEHDT (no LOG)

\$HEHDT,x.x,T *cs<CR><LF> – true course (speed is disabled).

Option 12. \$VMVTG (no GYRO)

\$VMVTG,,,,,x.x,N,, *cs<CR><LF> – speed (true course is disabled).

Option 13. \$VMVBW (no GYRO)

\$VMVBW,x.x,A,,, *cs<CR><LF> – speed (true course is disabled).

Option 14. \$IIVTG (no GYRO)

\$IIVTG,,,,,x.x,N,, *cs<CR><LF> – speed (true course is disabled).

Option 15. \$IIVBW (no GYRO)

\$IIVBW,x,x,,A,,, *cs<CR><LF> – speed (true course is disabled).

Option 16. **Disable** – NMEA is disabled.

cs – checksum.

8.9. Non-authenticity of data

1. Non-authenticity of gyrocompass data.

Non-authenticity is defined by absence of reference signal.

- as far as stepper type gyrocompass is concerned – lack of required

level;

- as far as synchro type gyrocompass is concerned – lack of sine signal differentials, emergence of timing jitter (breaking of sector alteration priority) or presence of inadmissible states.

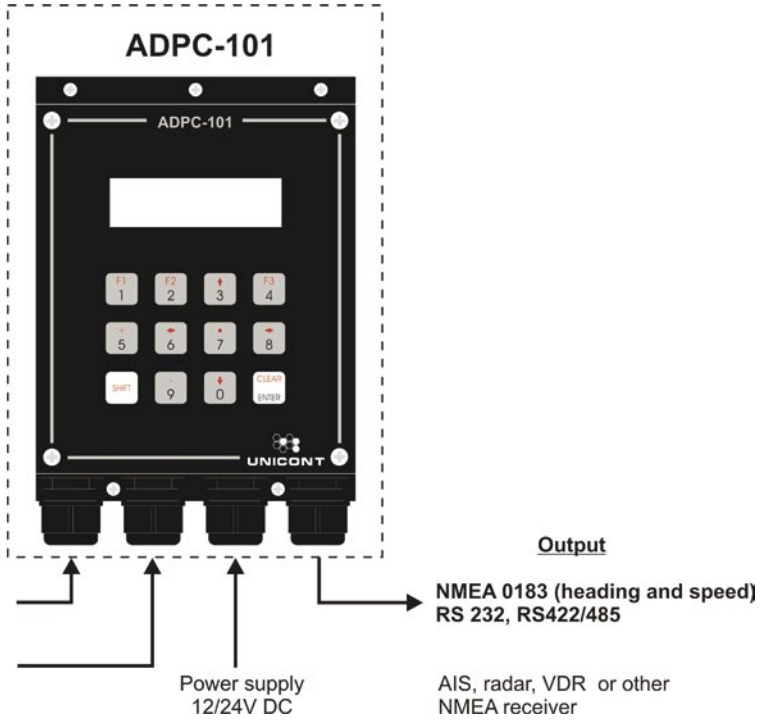
2. Non-authenticity of log data.

Non-authenticity is determined provided that measured speed is 100 knots and more.

In case when gyrocompass and/or log data are not trustworthy, relevant NMEA line is stopped for transmission to serial port and display shows '?' (question) at the beginning of relevant line. If Alarm option is set, device emits sound. To stop the sound press any button, or switch off the Alarm option.

When trustworthy data comes back, data transmission resumes and alarm sound stops.

9. Example of connecting ADPC-101



10. Warranty

The Manufacturer guarantees normal operation and compliance of the present documentation under observance of rules related to operation, shipment, storage and installation.

Warranty period of device shelf life – 18 months from the day of sale.
Warranty period of operation – 12 months from the day of device commissioning.

During warranty period, the Owner is entitled for free of charge repair or replacement of individual unit should the failure is the fault of the Manufacturer.

Warranty repair is valid if the present Operations Manual with correct information about acceptance and putting into operation is available.

The Manufacturer is not liable for converter failures and the warranty is void in the following events:

- after the expiry of warranty period;
- failure to observe rules of installation, operation and shipment;
- application of self-made electrical appliances;
- attempt to perform repair by any person who is not an authorized representative of the Manufacturer;
- loss of sales appearance of device and casing integrity, as well as due to other reasons outside the scope of the Manufacturer liabilities.

The period of warranty repair without record about commissioning is calculated from the date of commissioning.

Should the present Operations Manual is lost, duplicates of acceptance report and commissioning report are not issued and the Owner's power for a free of charge repair during warranty period becomes void.

11. Selling report

Serial number _____

Programm version _____

Date of manufacture _____

Producer **UNICONT COMPANY LIMITED**

L.S.

12. Acceptance Report

ADCP-101 converter complies with the requirements of present documentation and is approved suitable for marine use.

Serial number _____

Surrender

Company name _____

Responsible persons _____ Signature _____

Accept

Company name _____

Responsible persons _____ Signature _____

Date of acceptance _____

13. Commissioning Report

ADCP-101 converter

Serial number _____

Commissioned at

Date _____

Seating

Setter _____

14. Default settings

Unit have default settings, which do possible connecting it to wide range of types of gyrocompasses and logs also AIS and other NMEA signal receivers. Change this setting if you have great confidence in your action.

GYRO pulse/deg	360x
Alarm	ON
Display refresh	1 Hz
NMEA refresh	1 Hz
NMEA Rot fmt	TIROT
NMEA GYRO	HEHDT
NMEA LOG	IIVTG
Unuse timeout	10 s
Button click	NO
COM stop bits	1
COM parity	no
COM baudrate	9600
LOG bounce delay	20
LOG pulse/mile	200
GYRO ref polarity	positive
GYRO type	stepper
GYRO sign	positive

20 line, 5-7, V.O., 199106, St.Petersburg, RUSSIA
phone/fax: +7 (812) 3205704, e-mail: info@unicont.ru

