

Unicont SPb Ltd

**Analog repeater
DR-309**

Technical Documentation

(309-3-25032011)

St. Petersburg
2011

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1. General

Analog repeater DR-309 is intended to display ship heading information incoming in the form of NMEA statements from different digital sources by means of a card indicator and LED indicator, as well as repeating of the received information in NMEA form by communication channel RS-422.

2. Delivery Set

1. Analog repeater DR-309	1 piece
2. Bracket for installation on the surface	1 piece
3. “Wing nuts” to fix repeater inclination angle	2 pieces
4. Operation manual	1 piece

Option: a bracket for installation into the panel can be included in the delivery set.

3. Specifications

Input Specifications:

Interface:	CH1, CH2 2 x RS- 2/422 with optical isolation 1 x CAN* (option)
Data:	NMEA 0183, NMEA2000* (option)
Statement Types:	\$xxHDT, \$xxHDG, \$xxHDM.

* - *option*

Output Specifications:

Interface:	OUTPUT, 1 x RS-232/422 (asynchronous serial port)
Data:	NMEA, repeat input data of active channel according to settings of heading source.

Interface Settings:

RS – 232/422:	
Parity bit:	no / even / odd;
Stop bits:	1 or 2.
Bit rate (RS – 232/422):	4800/9600/19200/38400/57600/ 76800/115200 bps
CAN:	
Bit rate (CAN):	up to 1 Mbps

Indication:

Type:	Card indicator, LED indicator and three LEDs (Gyro, Magnetic, THT) for indication of the selected source for heading data
Adjustments:	brightness of highlighting from the keyboard and selection of the data source

Operational Specifications:

Follow-up rate:	> 12 °/s
Resolution:	
character display	0.1°
compass card indicator	1°

Electrical Specifications:

Power voltage	10..36 VDC
Power consumption	12.5 W maximum
Galvanic isolation	Galvanic isolation from supply mains

General Specifications:

Dimensions:	144 x 144 x 92 mm
Weight:	2 kg
Operating temperature:	-20..+55 °C
Storage temperature:	-55..+70 °C
Protection class:	IP 22

4. Operation Principle

Analog heading repeater DR-309 consists of the following main parts.

Controller controls the device operation and processes input heading data. To receive data, the device is equipped with interface transmitters CAN and RS – 232/422. To display data in the user-friendly format the provision is made for the card indicator, which includes a card, stepper motor and encoder, character display for data display in the digital format, as well as built-in LED indicator (Gyro, Magnetic, THT), which displays the selected heading source. The provision is made for three buttons “F”, “▼” and “▲” for device control. The button purpose is described in para. 6. To supply power to the device the provision is made for a built-in power supply unit for input voltage 10–36 VDC.

DR-309 has three input channels. Each channel can be individually configured using the menu of device settings. Gyrocompass, magnetic compass, and satellite compass can be used as main heading sources for the device. Repeater DR-309 can be individually configured for each data source: define the number of input channel, set the type of NMEA 0183 (“\$--HDG”, “\$--HDM”, “\$--HDT”) statement, as well as switch on or off the test mode of control total.

According to the selected settings the device accepts the heading and performs appropriate transformations of received data according to built-in algorithm. Then heading values are displayed with the character display located at the bottom left part of the device, and are displayed on the card indicator. Received data are repeated by device DR-309 via output channel RS-422, which is physically connected to port CH2 (refer to paragraph 7.6).



Figure 1. Device Appearance

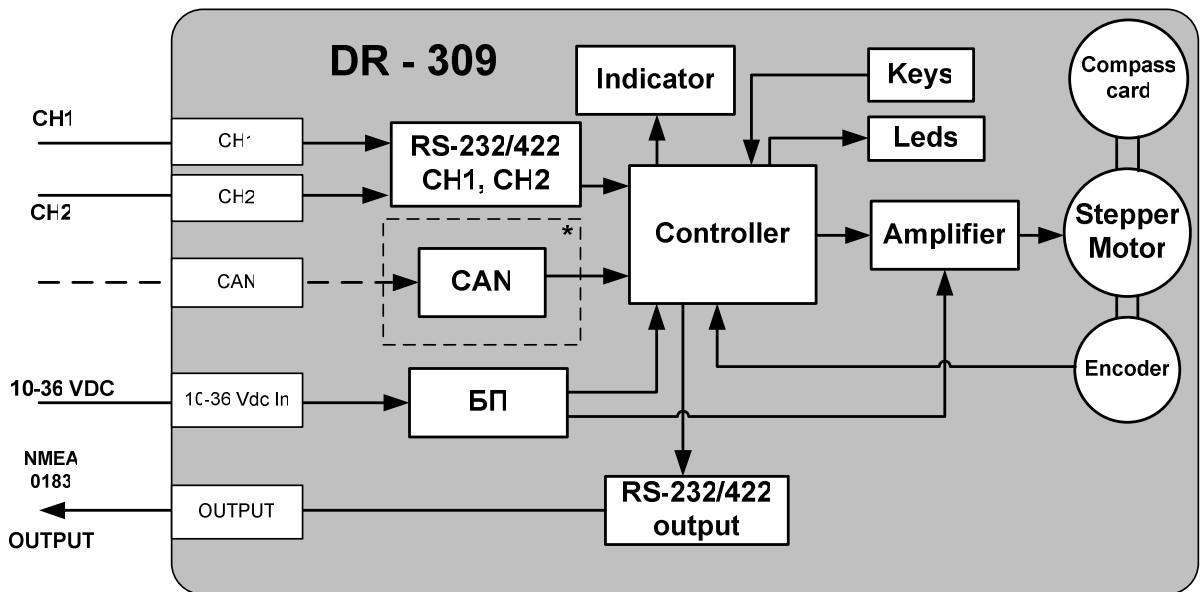


Figure 2. Device Circuit Diagram

5. Installation and Connection of the Device

The device shall be installed and mounting holes shall be prepared according to the drawing (refer to Figure 3). Installation can be performed into the panel, as well as on horizontal or vertical surface by means of special holding bracket delivered according to the order.

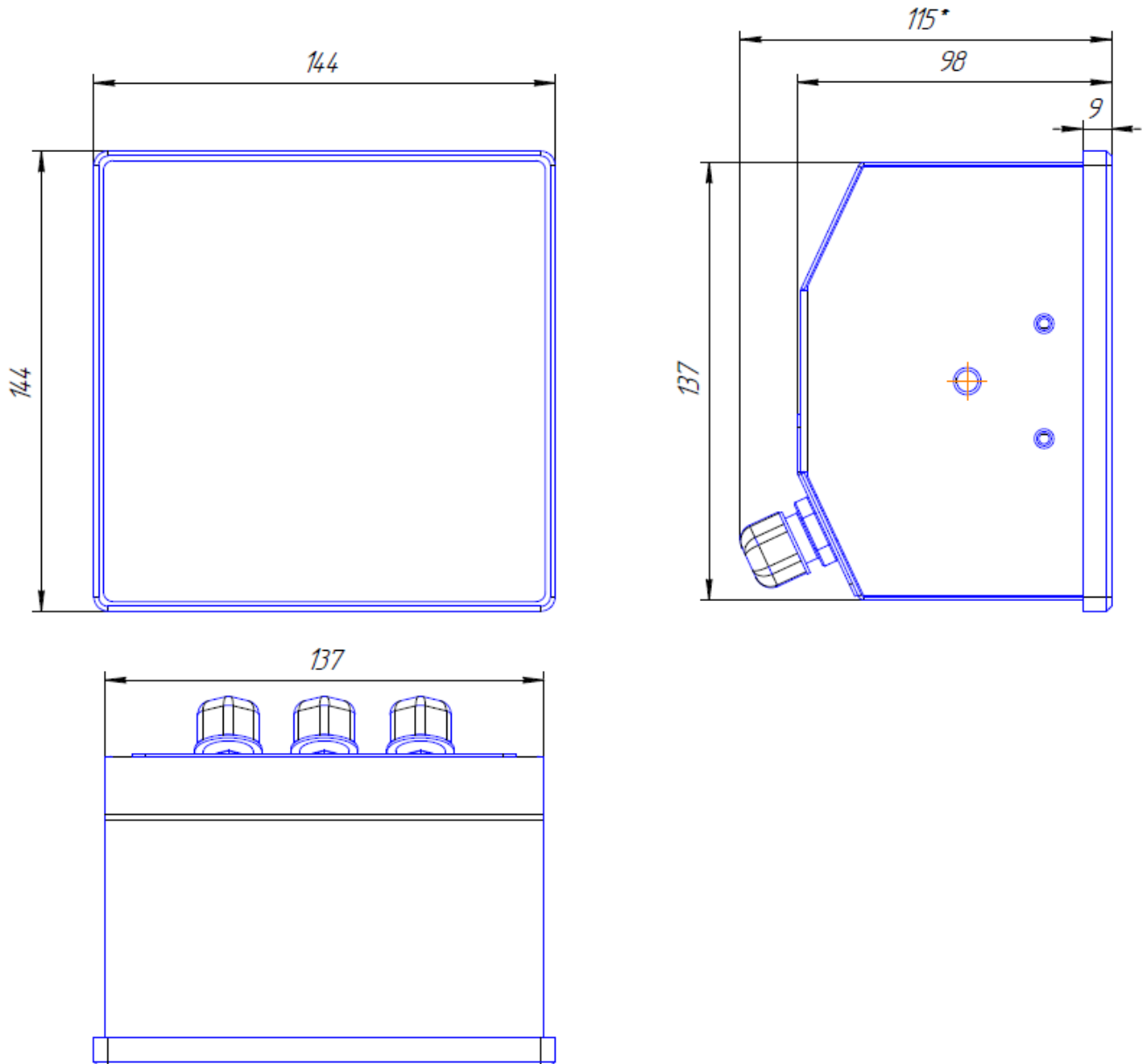


Figure 3. Outline Drawing DR-309

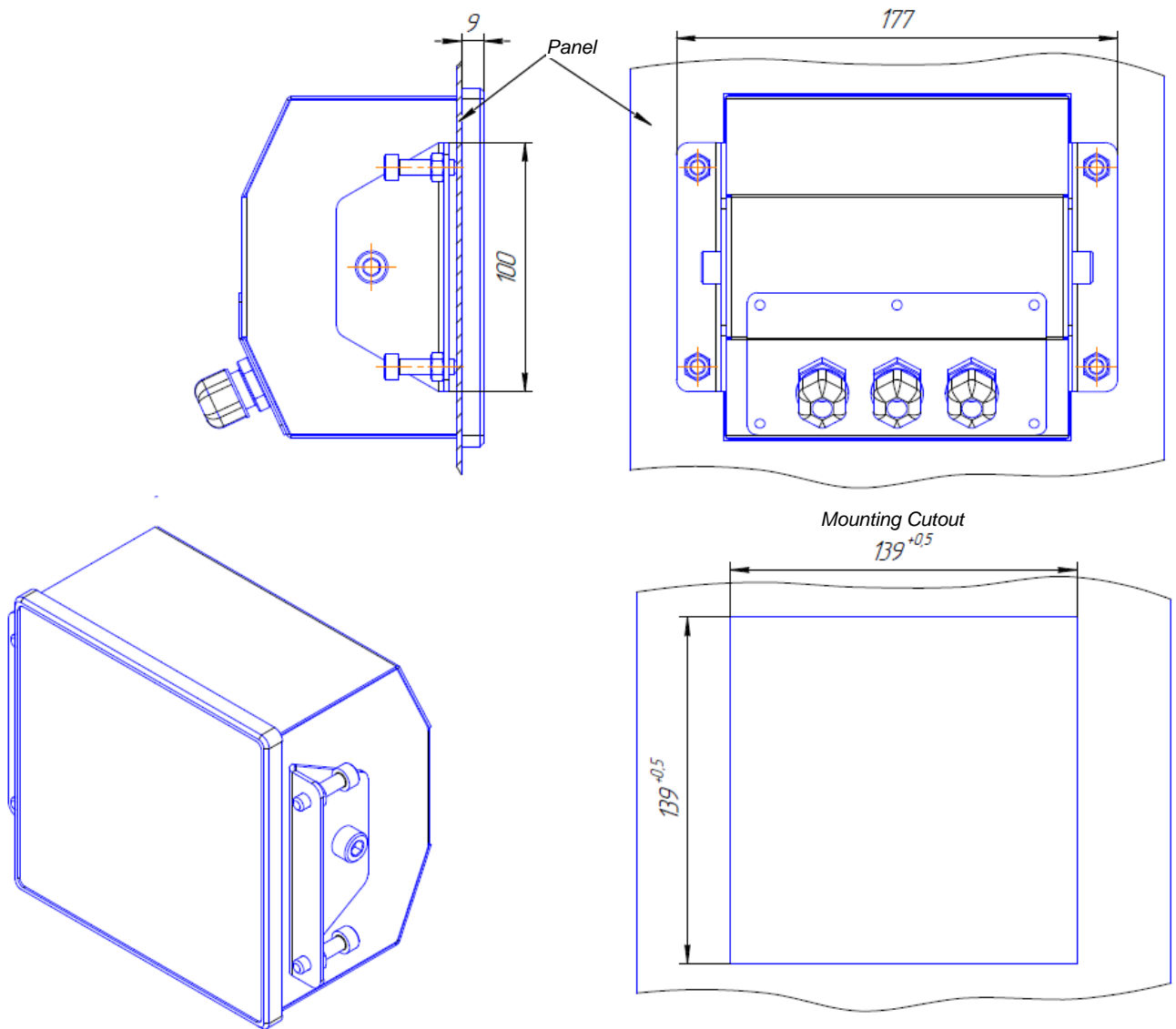
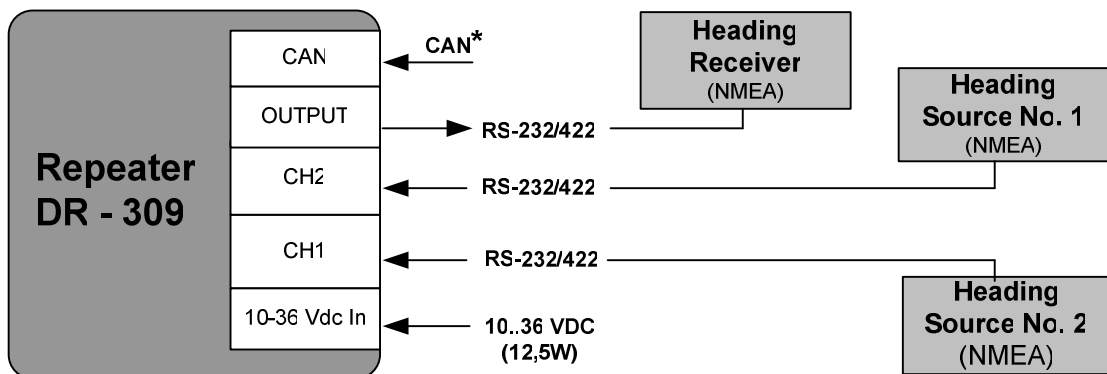


Figure 4. DR-309 Repeater Built-in Installation

Lay and attach connection cables from external devices as shown in connecting diagrams (Figure 5, Figure 6, Figure 8).



* Option

Figure 5. DR-309 Repeater Connection Diagram

Supply power for DR-309.

Set devices according to paragraph 7 of the manual. To check serviceability the repeater can be used in the simulation mode (refer to paragraph 7.8).

Check serviceability of the device:

- NMEA message reception – displaying the received data on the character display.
- data correspondence with values on the indicator and the repeater card.
- correct indication of the data source.

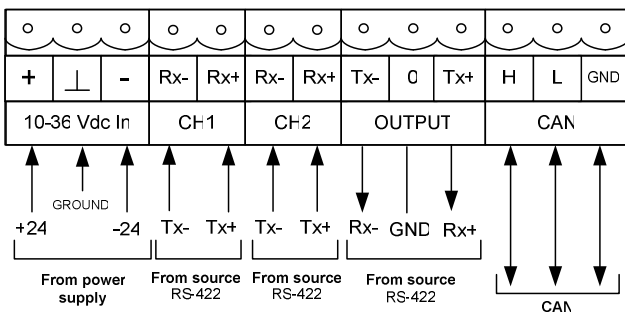


Figure 6. Connection and Layout Diagram of Outputs on DR-309 (RS-422) Device Board

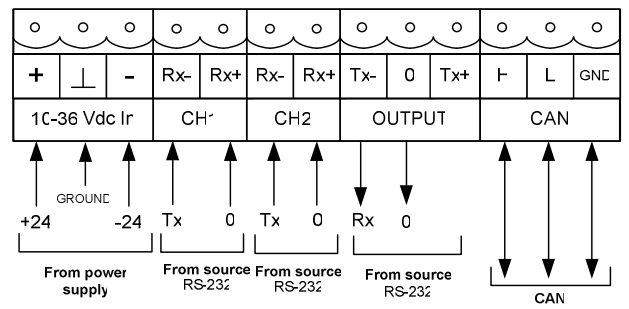


Figure 7. Connection and Layout Diagram of Outputs on DR-309 (RS-232) Device Board

To connect the following cable is recommended to be used:

- Power – КМПБЭ (3 x 1.0),
- Data – КУПБВ (2 x 2 x 0.5)Э

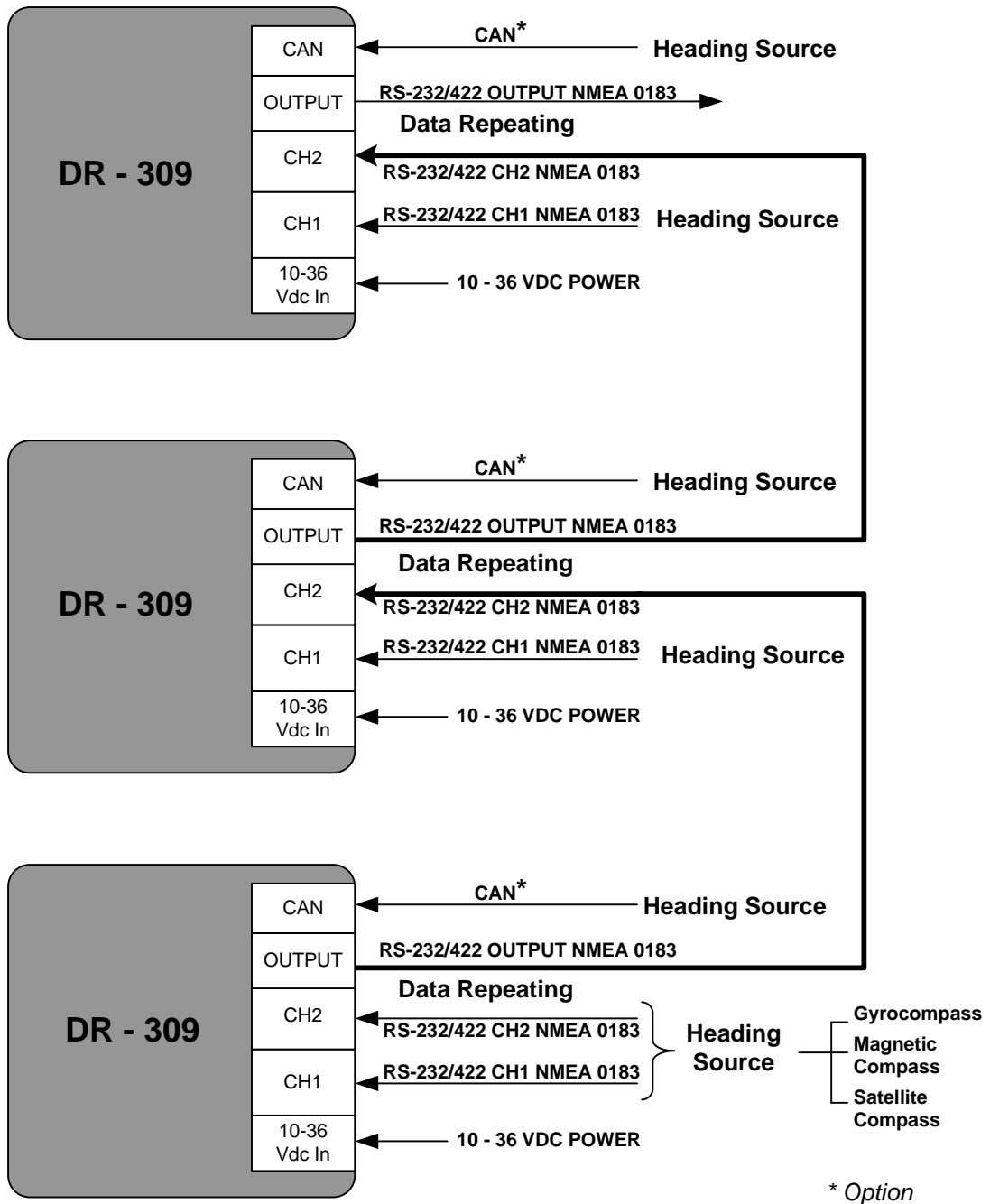


Figure 8. Connection Diagram for Several Devices DR-309

6. Device Operation

6.1 Controls

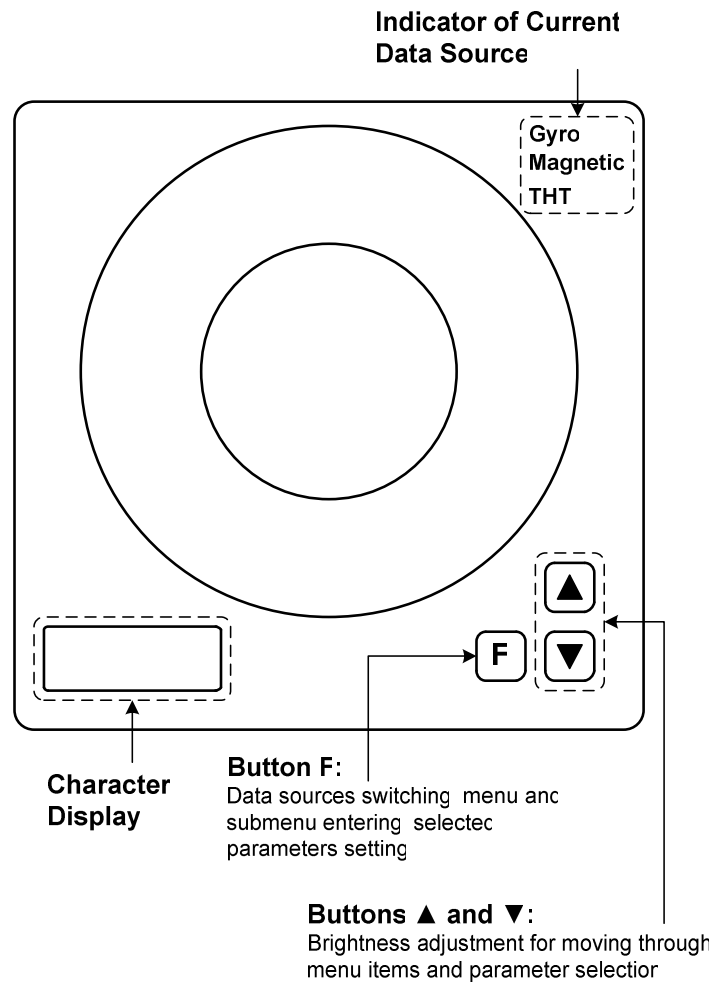


Figure 9. Controls and Indication Elements of Device DR-309

In mode of heading display control buttons perform the following functions:

F	Switching of input heading data sources While holding it provides entering the main menu mode
▲	Increases brightness of highlighting
▼	Reduces brightness of highlighting

6.2 Adjustment of Highlighting Brightness

Highlighting brightness of a card indicator, character display and LED indicator (Gyro, Magnetic, THT) in the heading display mode shall be adjusted by buttons ▼ and ▲. Press button ▲ for highlight brightness increase. Press button ▼ for reduction of highlighting brightness.

Attention! When switching on the device the last set level of highlighting brightness is specified.

6.3 Selection of Input Heading Data Source

The current data source is displayed by means of LED indicator at the top right part of the device. It is possible to switch to another source of input data by pressing button “F” in the standby mode.

It is possible to configure repeater DR-309 for each data source using menu (refer to paragraph 7.2).

Attention! When switching on/off the device, the last selected heading source is saved.

7. Function Description

While operating the device can be in several operation modes:

1. Mode of heading display is basic for repeater DR-309 (refer to paragraph 7.1).
2. To set operational parameters the device moves to operation mode with the menu (refer to paragraph 7.2). While operating in this mode heading data reception, data repeating and heading information display by the indicator card and LED indicator is stopped. Highlighting brightness LED indicator and LED indicator of data source (Gyro, Magnetic, THT) is set for maximum value. When exiting this setting mode highlighting and serviceability are restored in the previous condition.
3. The emergency mode is provided to detect emergency situations (refer to paragraph 7.9).
4. Emulation mode required for check of serviceability of the repeater system (refer to paragraph 7.8).

When switching on the device, the unit immediately enters in the heading display mode. When data transfer is stopped, the unit passes into the emergency mode.

Transfer into operation mode with menu is carried out by button “F”.

Attention! When switching on, DR-309 loads the last saved user settings, highlighting brightness level and selected heading source from the non-volatile memory.

7.1 Mode of Heading Display

In the mode of the heading display the device reproduces received data using an indicator card, duplicates the data on built-in LED indicator and repeat them via output communication channel RS – 232/422.

7.2 Main Menu Mode

The device is set in the main menu.

To enter the menu press and hold button “F” for 3 seconds until text “CH 1” appears on LED indicator (refer to Figure 10).

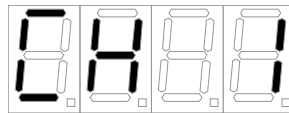


Figure 10

Assignment of Controls in the Main Menu Mode

F	Entering the selected submenu
▲	Selection of menu (submenu) item
▼	

Table 1. Description of Main Menu Items:

No.	Name of Menu Item	Description
1	CH 1 	Setting submenu for the first (input) channel (refer to paragraph 7.3)
2	CH 2 	Setting submenu for the second (input/output) channel (refer to paragraph 7.3)
3	SOUR 	Setting submenu for operation parameters with data sources (refer to paragraph 7.4)
4	SYNC 	Synchronization mode of the repeater indicator card (refer to paragraph 7.7)
5	TEST 	Simulator mode (refer to paragraph 7.8)
6	-UP- 	Menu exit

7.3 Setting Submenu for First “CH1” and Second “CH2” Channel

Basic parameters of communication channels CH1 and CH2 are set in submenu (“CH1”, “CH2”).

Setting submenus for the first and second channels are identical by item content.

CH1, CH2 submenu description:

BR	Selection of data receive rate. Possible values (in Kbit): 4.8, 9.6, 11.4, 19.2, 28.8, 38.4, 57.6, 76.8, 115.2
----	--

Pbit 	Selection of even check bit Possible values: 0 – no check, 1(odd) – odd check, 2(even) – even check
Sbit 	Selection of stop-bit number Possible values: 1 – one stop-bit, 2 – two stop-bits
-UP- 	Menu exit “CH 1” (“CH 2”)

Purpose of control buttons in the setting submenus for channels CH, CH2:

F	Entering the selected submenu. While direct parameter selection – storage of selected value and exit the submenu.
▲	Selection of menu item
▼	

Attention! For defining (storing) value for the selected setting, use button “F”. Moreover, exit the setting submenu for the selected parameter is provided.

7.4 Setting Submenu for Operation Parameters with Data Sources “SOUR”

Table 2. Submenu Item Description:

No.	Designation	Description
1	SRC1 	Parameter setting submenu for the first heading source (Gyro)(refer to paragraph 7.5)
2	SRC2 	Parameter setting submenu for the second heading source Magnetic(refer to paragraph 7.5)
3	SRC3 	Parameter setting submenu for the third heading source (THT)(refer to paragraph 7.5)
4	-UP- 	Exit submenu “SOUR”

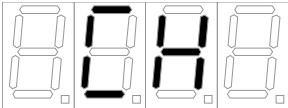
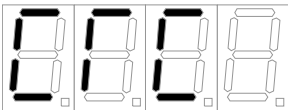
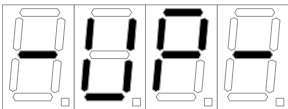
Purpose of control buttons in the setting submenu for the data sources:

F	Entering the selected submenu.
▲	Selection of menu item
▼	

7.5 Submenu “SRC1”, “SRC2”, and “SRC3” for Individual Setting of Operation with Heading Data Source

In the submenu the basic operation parameters of repeater DR-309 with each input data source “SRC1”, “SRC2”, and “SRC3” are set. For each heading source menu items are the same.

Description of Submenu Items “SRC1”, “SRC2”, and “SRC3”:

<p>CH</p> 	<p>Selection of data receiving channel, with which data source is connected</p> <p>Possible values: 1 – first channel, 2 – second channel</p>
<p>CRC</p> 	<p>Check on/off for test function of NMEA 0183 statement</p> <p>Possible values: ON – activated check, OFF – deactivated check</p>
<p>-UP-</p> 	<p>Exit submenu “SRC1” (“SRC2” or “SRC3”)</p>

Purpose of control buttons in submenu “SRC1”, “SRC2”, “SRC3” for heading source setting:

F	Entering selected submenu. While parameter selection – storing value and exit the submenu.
▲	Selection of menu item
▼	

Attention! To set the selected setting value use button “F”. Moreover, exit the setting submenu for selected parameter is provided.

7.6 Data Repeating

Data repeating function is provided in this device. The device repeats only input data of the active channel via OUTPUT port (refer to Figure 6) according to set parameters for selected heading source.

Attention! Channel settings (transmission rate, even check bit, number of stop-bits) for input CH2 and output OUTPUT (refer to Figure 6) coincide, as one transmitter/receiver is used, therefore repeating is performed with settings, which are specified for input channel CH2 in the setting submenu for the second channel (refer to paragraph 7.3).

7.7 “SYNC” Mode for Indicator Card Adjustment (Synchronization)

In “SYNC” mode readings of the card indicator and the character display are synchronized in case of the reading mismatching.

For synchronization enter adjustment mode “SYNC”. The indicator card is located in the special position for synchronization. Wait for the card stop. The previous stored synchronization value will be shown on the character display. If the readings of the character display and the card indicator don’t coincide, then specify the current value, which is shown by the card indicator, by means of buttons ▲ and ▼. Press button “F”. Synchronizing value is stored in the non-volatile memory and exit the adjustment mode is provided.

Purpose of control buttons in adjustment mode “SYNC” for repeater card:

F	Storing of selected setting value and exit the synchronization mode.
▲	Specifying current position (in degrees)
▼	

7.8 Simulator Mode “TEST”

In “TEST” mode operation mode of DR-309 device is emulated if there are no input data. During emulation alternating heading value is shown on the character display and indicator card. Moreover in this mode periodic message transfer is provided in the following format with frequency 1 Hz:

“\$HEHDT,xxx.x,T*hh<CR><LF>”, where

xxx.x – current heading value in the simulation mode;

hh – control total CRC

<CR><LF> – line end (cartridge return and line break).

Parameters of transferring output channel “OUTPUT” coincide with settings of input channel “CH2” (refer to paragraph 7.6).

In order to activate the simulator mode, select item “TEST” in the main menu (refer to paragraph 7.8) and press button “F”.

Press button “F” once again to exit the simulator mode.

7.9 Light Alarm

7.9.1. Emergency Operation Mode

When stopping input data incoming, incorrect data incoming, receiving data not corresponding to the message format selected in the device settings, repeater passes into emergency mode.

7.9.2. Light Indication

After detection of an emergency situation transferring into emergency mode is provided. Highlighting of card indicator starts flashing and inscription “----” is shown on the character display (refer to Figure 11).

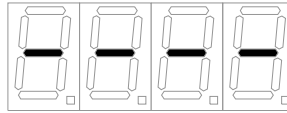


Figure 11. Inscription in Case of Data Absence

To stop flashing for light indication it is sufficient to press any button.

After flashing deactivation the device is kept in the emergency mode and inscription “----” remains on the character display.

7.9.3. Serviceability Recovery

For recovery of the normal operation mode for the device the several methods are possible:

1. Eliminate problems with equipment causing data incoming stop, and recover heading data transfer.
2. Change device settings in case of message format incompliance and device current parameters.
3. Switch to backup data source by button “F”

After elimination of emergencies the device directly transfers into the heading displaying mode.

8. Device Setting

The device setting is recommended to be performed in the following order:

1. Check serviceability of the device by means of the emulation mode
2. If necessary, perform synchronization of readings for the indicator card and character display.
3. Set parameters of channels for heading data receiving and transferring.
4. Perform operation parameter configuration with data sources.

8.1 Device Serviceability Check

To check DR-309 repeater serviceability it is necessary to select item “TEST” in the main menu and enter the emulation mode (refer to paragraph 7.8).

8.2 Reading Synchronization of Indicator Card and Character Display

In case of reading mismatching of the indicator card and character display it is necessary to perform their synchronization. For this purpose it is necessary to select item “SYNC” in the main menu and adjust readings (refer to paragraph 7.7).

8.3 Setting of Parameters for Data Receiving and Transferring Channels

Communication channels are set in the menu. To set the first channel (CH1) it is necessary to select item “CH1” in the main menu and specify transfer rate, even check bit, and number of stop-bits (refer to paragraph 7.3).

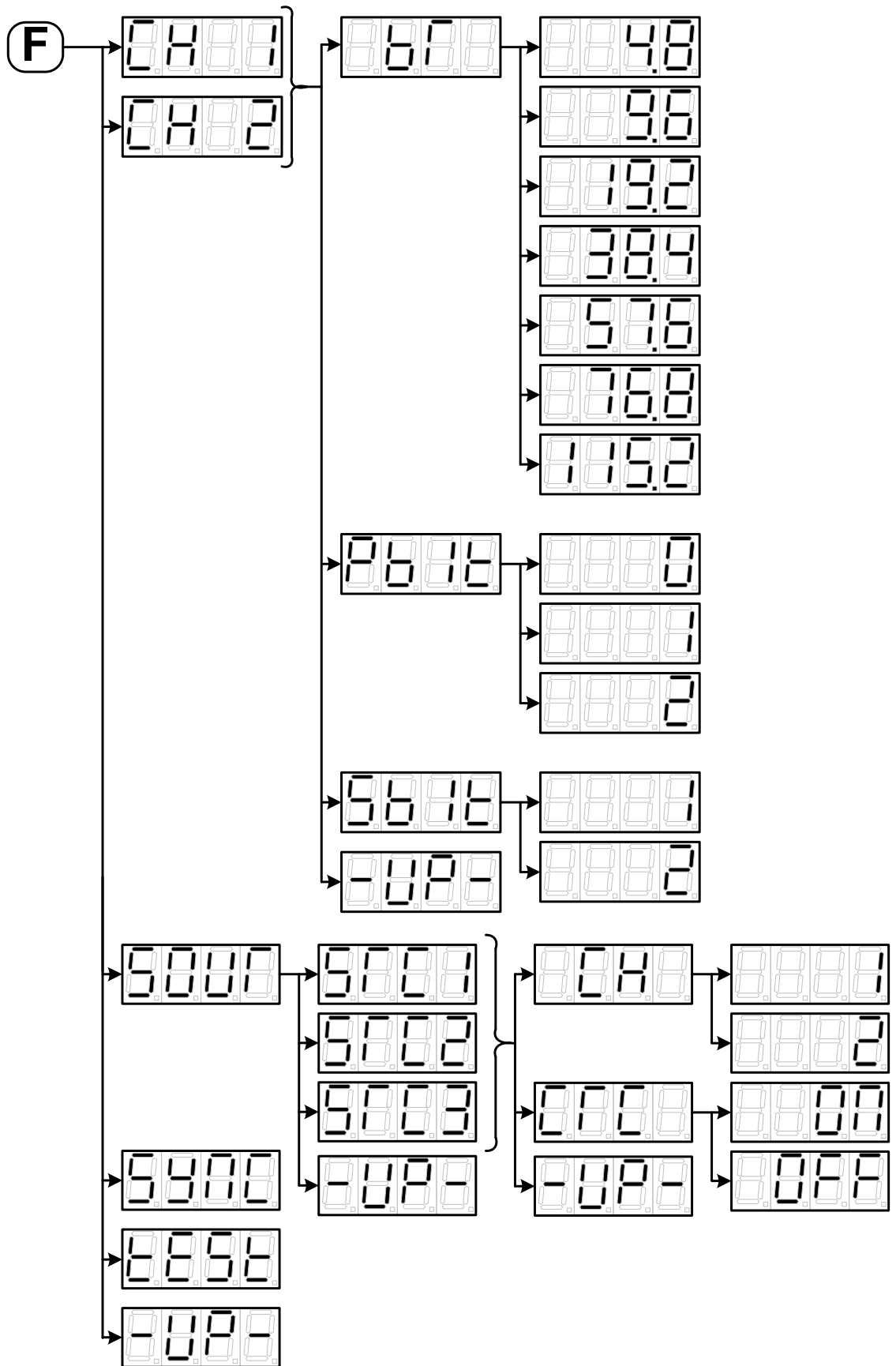
To set the second input channel (CH2) and output channel (OUTPUT) it is necessary to select item “CH2” in the main menu and perform above mentioned actions (refer to paragraph 7.3).

8.4 Parameter Configuration for Operation with Data Sources

To configure operation parameters with data sources (Gyro, Magnetic, THT) it is necessary to select “SOUR” item in the main menu.

DR-309 repeater can be individually set for each data source: determine number of input channel, specify type of NMEA 0183 (“\$--HDG”, “\$--HDM”, “\$--HDT”) statement, as well as switch on or off control total check mode (refer to paragraph 7.5).

9. DR-309 Device Menu Structure



10. Transportation and Storage

The battery charger shall be stored in heated space at air temperature of +5 °C to +35 °C (maximum values of -55 °C to +70 °C), at relative humidity of air not exceeding 95 % at temperature of +25 °C and content of dust, oil, moisture and aggressive admixtures in the air not exceeding the norms envisaged by GOST 12.1.005-88 for the working zone of production areas.

The device shall be transported in transport container of the manufacturer in closed transport.

Means of transport:

- automobile and railway closed transport (covered wagons, universal containers)
- by air (in pressurized and heated bays of airplane)
- by sea (in dry service spaces).

The device shall be transported in accordance with the transport regulations in force for the particular transport.

During handling operations and transportations strictly observe the requirements of handling marks on boxes and do not allow bumps and impacts which can affect preservation and serviceability of the device.

Packed devices shall be reliably secured in vehicles.

After storage in stores or transportation at temperature below +10 °C the devices shall be unpacked only in heated spaces after keeping them unpacked in under normal climatic conditions for 12 hours.

11. Warranty

The manufacturer guarantees the unit DR-309 complies with this manual provided that the operation, transportation and storage conditions are adhered to during the warranty period.

The unit's warranty period expires 24 months from the date of its shipping from the manufacturer's storehouse.

Within the warranty period, the owner is entitled for a free repair, or a replacement of a separate part, provided that the malfunction occurred through the manufacturer's fault.

Warranty repair is provided if the unit is submitted with the manufacturer's label and a legible serial number available on it, as well as this operating manual.

The manufacturer is not responsible and cannot guarantee the unit's operation:

1. After the warranty period is over;
2. In case of the failure to observe the unit's operation, transportation, storage and installation rules and conditions;
3. If the unit is in an unmarketable condition, or has a damaged body, and other causes beyond the manufacturer's control;
4. If self-made electrical devices were used.
5. If there was an attempt to repair the unit by a person who is not an authorized representative of the manufacturer.

If the owner loses this operating manual or the manufacturer's label with a serial number, the manufacturer shall not provide their copies, and the owner shall be divested of the right for a free repair during the warranty period.

Upon the warranty expiry, the manufacturer shall facilitate the repair of the unit at the owner's expense.

Note: in case of warranty repair, the unit's disassembling from the installation site and its delivery to the manufacturer's service center are done at the owner's expense.

Visit the manufacturer's website www.unicont.spb.ru (section "support/warranty") to find:

- forms to fill in claims,
- full warranty description;
- full description of the warranty service rendering procedure.

The manufacturer service center's address and contact details:

Unicont SPb, Ltd.

Bld. 26E Kibalchich Str., Saint Petersburg, 192174, Russia

tel.: + 7 (812) 622 23 10, +7 (812) 622 23 11

fax: +7 (812) 362 76 36

e-mail: service@unicont.spb.ru

12. DATE OF PACKING

Analog repeater _____ DR-309 _____ № _____
 name of article designation serial number

Packed _____
 Manufacturer

according to the requirements of the current technical documentation.

_____ signature _____ clarification of signature
 post

year, month, day

13. ACCEPTANCE DETAILS

Analog repeater _____ DR-309 _____ № _____
 name of article designation serial number

was manufactured and accepted in accordance with the regulatory requirements of the state standards and applicable technical documentation, and is suitable for operation.

Quality control representative

Stamp _____ clarification of signature
 here signature

year, month, day

14. DATE OF COMMISSIONING

Analog repeater _____ DR-309 _____ № _____
 name of article designation serial number

The unit has been put into operation.

Date of installation: _____

Place of installation: _____

Person in charge of installation: _____