

# Underwater remotely operated vehicle

## GNOM BABY

*Operators manual*



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# 1. DESCRIPTION

## 1.1 PURPOSE

GNOM micro is a miniature underwater remotely operated vehicle.

ROV Gnom micro is intended for inspection of any underwater objects such as wrecks, ship underwater parts, propellers and different underwater constructions. The vehicle has horizontal and vertical thrusters and can move underwater in all directions. The vehicle is operated from the surface control unit via thin umbilical cable using joystick based on video and data from depth sensor on a TV screen. Maximum operation depth is 50 m. ROV Gnom micro has a tiny color camera with the tilt function. Two clusters of ultra-bright LEDs are installed at both sides of the vehicle.

The vehicle can be connected to video display, TV or/and video recorder via standard cable.

12-24VDC or 230VAC power supply or battery can be used. Maximum power consumption is 200 Watt. Battery operation (12 Ah) is more than 1 hour.

The complete system is packed into two plastic cases. One case contains the underwater vehicle and cable reel, another – control and power supply module and joystick.

The size of operating area is limited by cable length (50 m in basic set). It is possible to increase the cable length up to 75 m. The video camera together with lights provides 15-20 m daylight visibility in the transparent water. Maximum 3-4 m visibility can be reached during the night.

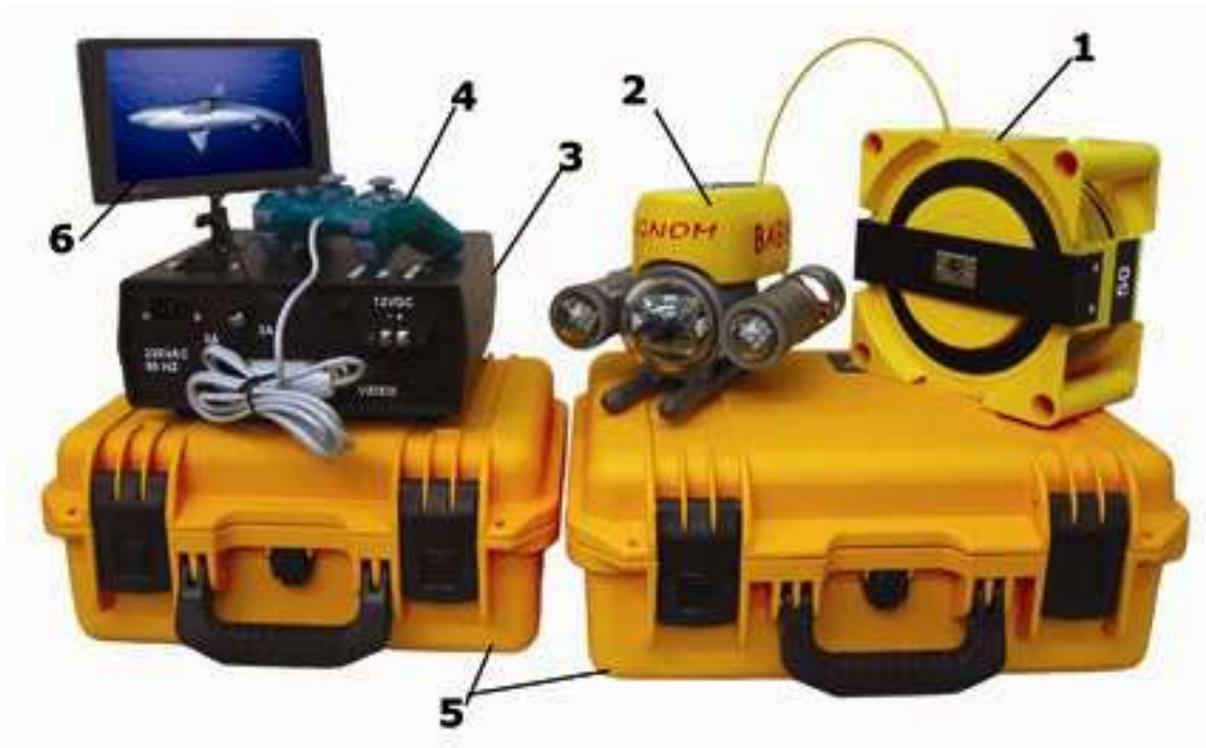
LCD display or videorecorder can be installed upon request.

For update info please visit our web site [www.vftech.sk](http://www.vftech.sk)

# 1. DESCRIPTION

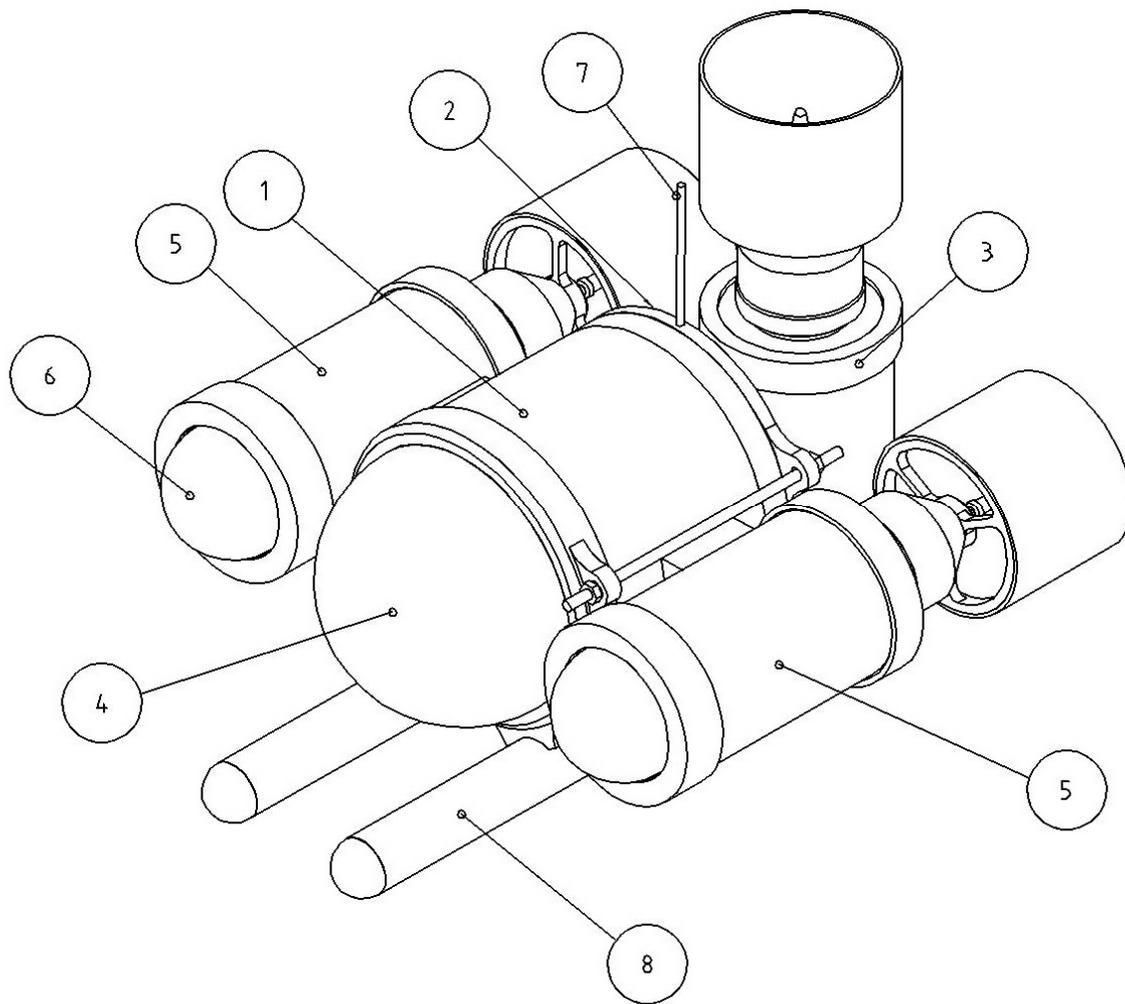
## 1.2 DESING

Recommended configurations



1. Cable reel
2. Underwater vehicle
3. Power supply/control module
4. Joystick
5. Transportation cases
6. LCD

# 1. DESCRIPTION



The system consists of underwater vehicle, cable and surface control unit. Underwater vehicle contains aluminum waterproof cylindrical hull **1** – with a side wall **2** with a fastened vertical thruster **3**. A glass dome **4** with a color camera based on a 1/3" CCD matrix locates at the front part of the vehicle. Two horizontal thrusters **5** with lighters **6** are fastened to the main hull. The plastic positively buoyant frame fastened to the spire **7**. Screw propellers are installed at the end of thrusters' axis. All the electronic parts (the power supply converter, electronic module and depth sensor) are installed into main cylindrical hull. Communication tether is placed at the back roof of the hull together with depth sensor membrane.

There are protective plastic feet **8** under the vehicle that are used for the buoyancy control of the vehicle using additional metal weights.

Thrusters are DC motors and located inside waterproof hulls. The rotation transmission to the screw propeller performed with an aid of disk magnetic coupling. One disk is fastened at the motor's shaft inside the thruster's hull and another one at the screw propeller's shaft inside the cone-shaped cap filled up with water. The cone-shaped cap can be twisted off (with an effort) by a user for cleaning.

# 1. DESCRIPTION

The vehicle is connected with the operator's module via thin coaxial cable which transmits power voltage (48V), operation commands, data from all sensors and video-signal.

The plastic cable reel with a moving lift point allows to reel in/out the cable during the operation. The cable is strengthened by the Kevlar threads and the additional polyethylene shield. The central cable core has 48V voltage. The power supply module has the short circuit protection.

Surface module is mounted in a separate case and consists of power supply module, control module and joystick. LCD display and battery 12V/7(12Ah) can be added to the basic set of equipment upon request. Module has standard RCA jack for connecting to TV or audio/video recorder.

Using the control pads and joystick the operator can move GNOM forward-backward, turn to the right-left, up-down; adjust the thruster's speed and the lighters' brightness. All the data are displayed in TV-text mode. By pressing one of the bottoms on the joystick the operator can pass to the menu of tuning up some vehicle's functions such as calibrating of the depth sensor.

## 1.2 TECHNICAL SPECIFICATION

1. 3 magnetically coupled thrusters
2. Operation time - 500 h
3. Speed:
  - horizontal – up to 1 m/sec
  - vertical - up 0,3 m/sec
4. Operation depth – 50 m, ( can be modified up to maximum depth – 100 m)
5. Cable length – 50 m
6. Cable is strengthened by the Kevlar threads and the additional polyethylene shield, negatively buoyant
7. Cable diameter – 3.5 mm, breaking effort – 90 kg,
8. Two clusters of ultra-bright LEDs
9. Color camera PAL CCD 1/3", 480 TV Lines, 0.5 lux
10. Power supply and surface control unit.
11. Power supply – 12-24VDC or 230VAC or battery 12V/7(12Ah)
12. Voltage value is displayed on a screen
13. Operating environment humidity – up to 100%
14. Operating temperature range – -5 ...+ 45° C.
15. Complete system is packed in two high-performance waterproof STORMCASE
16. ROV weight – 1.7 kg, full weight of system – 8 kg
17. Vehicle dimensions 210x185x150 mm
18. Depth sensor (sensibility 10 – 20 cm) with TV-text overlay on a screen, autodepth mode
19. Compass with TV-text overlay on a screen, autoheading mode
20. Vehicle has slight positive buoyancy, controlled by adding metal weights

## 2. USER'S MANUAL FOR OPERATION

### **WARNING!**

**The central cable wire has 48V voltage! If any damages happened you must repair or change the cable**

**2.1.** Before using, please, check up all parts of vehicle especially propellers, cable and dome. Clean the vehicle if necessary, check propeller rotation.

**2.2.** Adjust the buoyancy of the vehicle if necessary inserting additional weights into plastic feet. (Note that cable weight in water is approximately 2 g/m)

**2.3.** Plug in 3-sockets connector to reel and video cable to monitor video input. If you work from 239 VAC, connect AC power cable.

### **Only for reels without slip ring connector**

- Before connect the reel, please, pull out the cable the length you need
- Connect black cable from control module to the connector on the reel
- To pull out more cable during the operation you must switch power OFF then disconnect black cable from the reel, then pull out the cable

### **WARNING!**

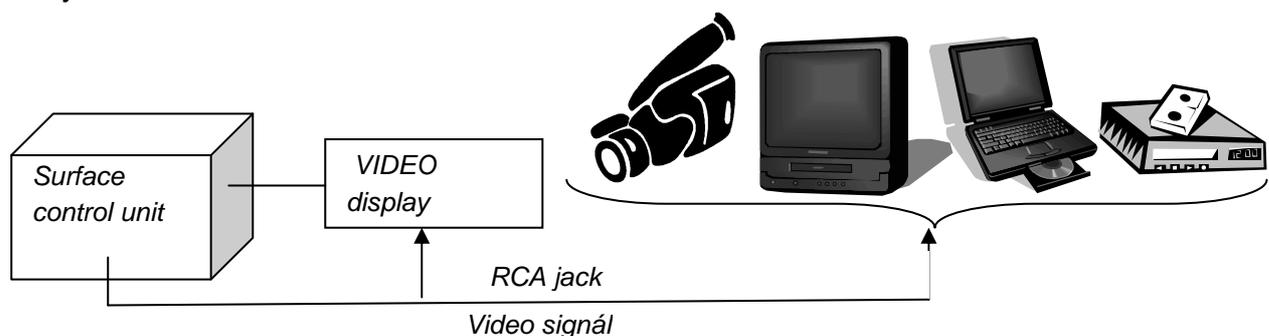
**Do not rotate thrusters on air!**

**Do not switch lights on a full power on air!**

**Be very careful with the cable, do not:**

- **Stand on it**
- **Press on it**
- **Twist it**

**2.4.** If use any additional display or audio/video recorder, please, connect video cable to RCA jack of additional video device



## 2. USER'S MANUAL FOR OPERATION

### 2.5. Power supply from 220V

#### **Important: Switch 12V must be OFF (“0”)**

Set switch 220V **ON** (UP position)

#### **Important: Switch 12V must be OFF (“0”)**

To finish operation set switch 220V in a middle position

**2.6.** If use LCD display switch on its power supply separately. Brightness, contrast and color saturation can be adjusted manually (see the user's manual). For monitor operation (TV) follow manual to the appropriate monitor.

**2.7.** After power **ON** see **WELCOME**. Gnom is ready for operation.

### 2.8. Operation

#### **WARNING!**

**Do not rotate thrusters on air!**

**Do not switch lights on a full power on air!**

Put the vehicle into the water. To start operation press key **ANALOG (MODE for wireless) on a joystick**

All control functions are displayed on a console draw (see below).

# To move vehicle **Forward/Back** and turn **Right/Left** use **right joystick**. You can adjust speed gradually (128 grades) pressing the joystick. The direction and speed are indicated on an overlay.

# To move vehicle **Up/Down** use **left joystick**. Also press left joystick to adjust the Jump mode.

# Slow mode (**SLOW**). Press **right joystick** and adjust power gradually (**50%, 75%, 100%**).

# To **switch ON and adjust lighters** use pads **X+ R1/R2**. If press **X, R1, R2** simultaneously 100% brightness turns on. By pressing **R1** you can adjust the light intensity.

# Control the **GRABBER** (if this is part of device) by keys **R1/R2**

# To tilt cam **Up/Down** press **L1/L2** pads. If press **L1, L2** simultaneously camera goes to the median position.

# **Jump mode** allows to push vehicle slightly for a distance 30 – 50 cm then stop. To chose the jump direction press arrows (**Left/Right, Up/Down**). To adjust the jump power use **left joystick**.

## 2. USER'S MANUAL FOR OPERATION

# By keys **SELECT+X** switch-on/switch off laser

# **Autodepth mode.** Press key ▲ to fix the vehicle at the depth you need. To change the depth use left joystick. Autodepth mode and depth are indicated on an overlay.

# **Autoheading** controls ON/OFF from the «Start» key (version: left joystick to left – ON, to right OFF). You should select forward speed then switch ON autoheading. Autoheading mode holds the speed and direction.

# You can choose the menu language (Russian/English)

### 2.9. Finishing the operation

To finish the operation switch **power OFF** then disconnect cables and pull into the reel.

**Try to avoid nods and twisting of the cable.**

After operation please **clean propellers and shafts of motors** and wash the vehicle in fresh water.

**Attention** (Valid for joysticks with functions **TURBO** and **MACRO**)

The joystick (COWBOY) allows to set a automatic sequence and combination of keys in the macro in the joystick and a turbo (semi-automatic volleying key). These features of joystick are not necessary for work with our system GNOM. But during the work with the system GNOM may be accidental macro settings and turbo too.

The macro and turbo have the bearing on the function of keys L2 and R2 and all functions joint with these keys. As camera down, camera set middle, lights ON/OFF.

In case when you accidental set a macro or turbo ( the joystick do not work correct by L1 and R1 keys), the solution for eliminate this problem is, to do recommended next operations :

1/ set ON the joystick (the joystick will be synchronized by control unit)

2/ to push (and let go) the key "MACRO" on the joystick (the green led on the middle lights fluently)

3/ to push (and let go) the key L2 (or R2) in the up side of joystick (the green led on the middle is blinking)

4/ to push (and hold press) the key X and next to push (and let go) the key "MACRO", then you may let go the key X (the green led on the middle turns off)

The macro on key L2 (or R2) is deleted after doing these operations. And the joystick would be to function correctly in the correspondence of user manual.

### 3. KEYS AND BUTTONS AT THE CONTROL PANEL



**ATTENTION** (Valid for joysticks with functions TURBO and MACRO)

The joystick (COWBOY) allows to set a automatic sequence and combination of keys in the macro in the joystick and a turbo (semi-automatic volleying key). These features of joystick are not necessary for work with our system GNOM. But during the work with the system GNOM may be accidental macro settings and turbo too.

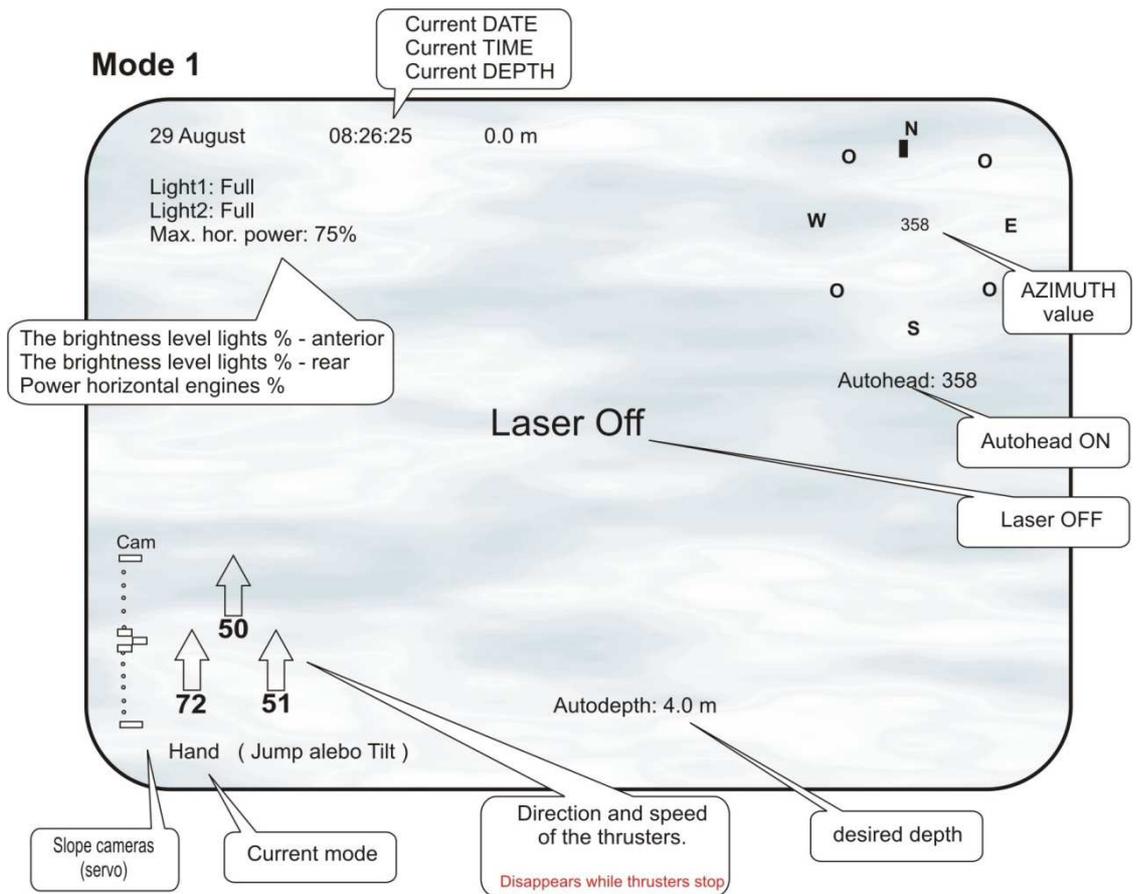
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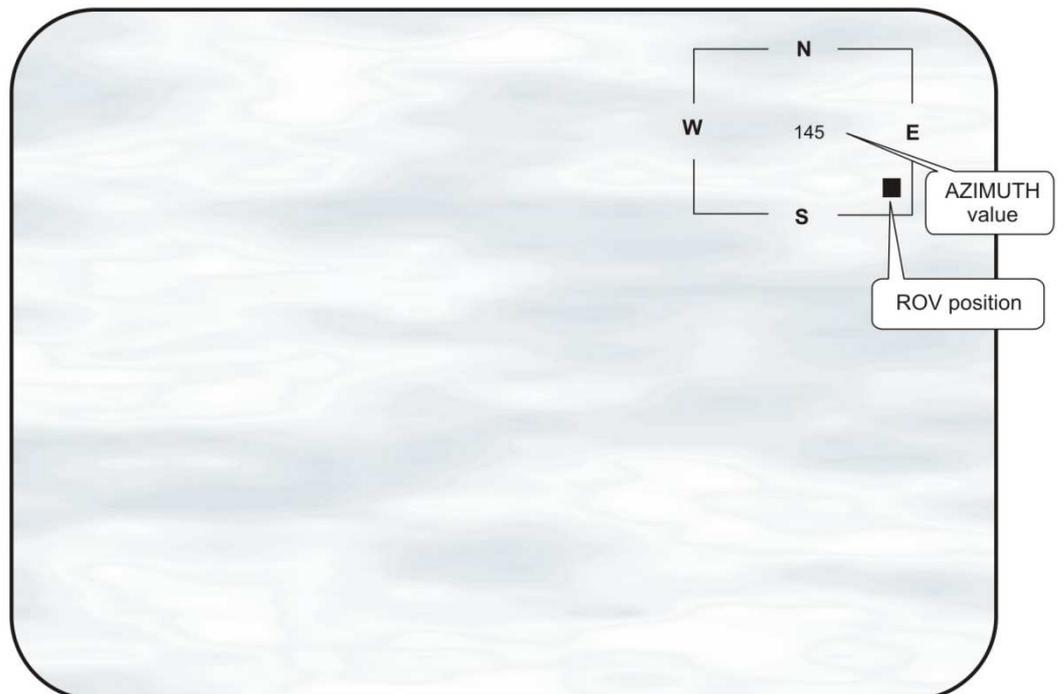
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# 4. SCREEN MODES



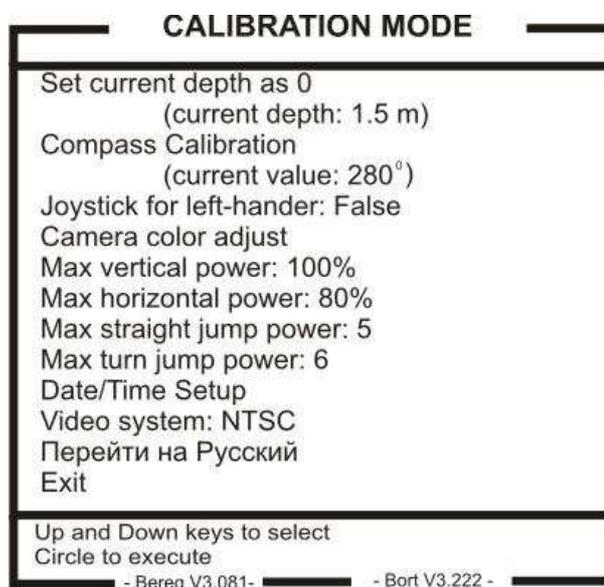
## Mode 2



## Mode 3 : only video

## 5. CALIBRATION

To enter this mode you should be in start mode (message WELCOME is indicated). To calibrate depth sensor and compass you should **press key X** and hold it for 7-8 sec **only while message WELCOME is indicated**. Message "**Calibration mode**" appears. To select function you should use left arrows. To enter functions you should use right key **O**



- **"Set current depth as 0". To calibrate depth sensor** you should set 0m when GNOM is on a surface. To finish calibration press **Enter** (right key **O**). We recommend to set depth 0 in 5 minutes after power ON.
- **"Compass Calibration". Preinstalled. Please, use only in a case of incorrect work. To calibrate compass you should do:**

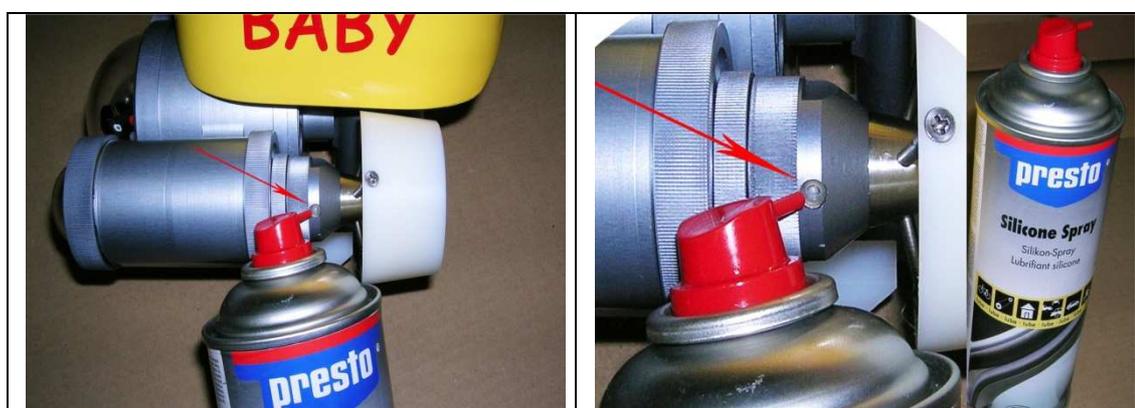
### Calibration procedure:

1. Put the GNOM on flat surface far from metal things to North directions
  2. Press circle (right key **O**) to start calibration
  3. Slowly turn the GNOM, clockwise, around own axis and not less than two turns
  4. Press circle (right key **O**) to finish calibration
- **"Joystick for left-handler". Do not use.**
  - **"Camera color adjust" . Do not use.**
  - **"Max vertical power".** Set up maximal power of vertical thrusters in %.
  - **"Max horizontal power"** Set up maximal power of horizontal thrusters in %.
  - **"Max straight jump power"** . Set up length of straight jump
  - **"Date/Time Setup"** . Set up date and time.
  - **"Video systems"** . Select PAL or NTSC.
  - **"Перейти на Русский"**. Select language (Russian or English).
  - **"- Bereg V3.081 -" and "- Bort V3.222 -"** indicates version of software.
  - To return from calibration menu set the cursor to word Exit and press **Enter** (right key **O**).

## 6. MAINTENANCE OPERATION

To maintain the vehicle it is necessary:

- to clean the propellers from algae, sand and mud
- to rinse the vehicle in the fresh water after using in the sea
- to inspect the cable after the operation. In case of any damages the cable must be repaired or changed
- to check the magnetic disk coupling regularly
- Use silicon oil spray for lubrication shafts of props every time after diving. Oil must penetrate inside of conus heads of motors. See appendix position 96, 147, 217 of thrusters assembly.
- Avoid nods and twisting of cable.



Within the certificate of warranty the bond (joint) maintenance manual is included. Use it only in case of emergency, if standard maintenance is insufficient. Before this service consult technical problems in our company on email addresses:

[odbyt@vftech.sk](mailto:odbyt@vftech.sk) or [vladoo@vftech.sk](mailto:vladoo@vftech.sk)

**Attention:**

In case of non-professional action and damage of any part, the consecutive service in our company **will be charged**.

## 7. SAFETY REQUIREMENT

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### **WARNING!!!!**

1. *Device belongs to CLASS 1 . For this reason the power adapter must have connection to protective earth.*
2. *Swith-on and swith-off the machine by main 230V switch, which is placed over the power cord to the external control unit.*
3. *Do not use the system with the damaged cable.*
4. *Do not touch underwater vehicle and the cable if you are in water and the power is turned ON.*
5. *Keep the control module and the cable reel dry.*
6. *When recharging the battery disconnect the vehicle and the cable reel.*

## 8. WARRANTY STATEMENT

VFTECH warrants that at the time of shipment all products shall be free from defects in material and workmanship and suitable for the purpose specified in the product literature. The unit/system warranty commences immediately from the date of customer acceptance and runs for a period of 1 year. Customer acceptance will always be deemed to have occurred within 72 hours of delivery.

**Note:** Any customer acceptance testing (if applicable) must be performed at either VFTECH premises or at one of their approved distributors unless mutually agreed in writing prior to despatch.

### **Conditions:**

**These include, but are not limited to, the following:**

1. The warranty is only deemed to be valid if the equipment was sold through VFTECH or one of its approved distributors.
2. The equipment must have been installed and commissioned in strict accordance with approved technical standards and specifications and for the purpose that the system was designed.
3. The warranty is not transferable, except or as applies to Purchaser first then to client.
4. VFTECH must be notified immediately (in writing) of any suspected defect and if advised by VFTECH, the equipment subject to the defect shall be returned by the customer to VFTECH, via a suitable mode of transportation and shall be freight paid.
5. The warranty does not apply to defects that have been caused by failure to follow the recommended installation or maintenance procedures. Or defects resulting from normal wear & tear, incorrect operation, fire, water ingress, lightning damage or fluctuations in vehicles supply voltages, or from any other circumstances that may arise after delivery that is without the control of VFTECH. (Note: The warranty does not apply in the event where a defect has been caused by isolation incompatibilities.)
6. The warranty does not cover the transportation of personnel and per diem allowances relating to any repair or replacement.
7. The warranty does not cover any direct, indirect, punitive, special consequential damages or any damages whatsoever arising out of or connected with misuse of this product.
8. Any equipment or parts returned under warranty provisions will be returned to the customer freight prepaid by VFTECH
9. The warranty shall become invalid if the customer attempts to repair or modify the equipment without appropriate written authority being first received from VFTECH.
10. VFTECH retains the sole right to accept or reject any warranty claim.

**11. Each product is carefully examined and checked before it is shipped. It should therefore be visually and operationally checked as soon as it is received. If it is damaged in anyway, a claim should be filed with the courier and VFTECH notified of the damage.**

Note: VFTECH reserve the right to change specifications at any time without notice and without any obligation to incorporate new features in instruments previously sold.

**Note: If the instrument is not covered by warranty, or if it is determined that the fault is caused by misuse, repair will be billed to the customer, and an estimate submitted for customer approval before the commencement of repairs.**

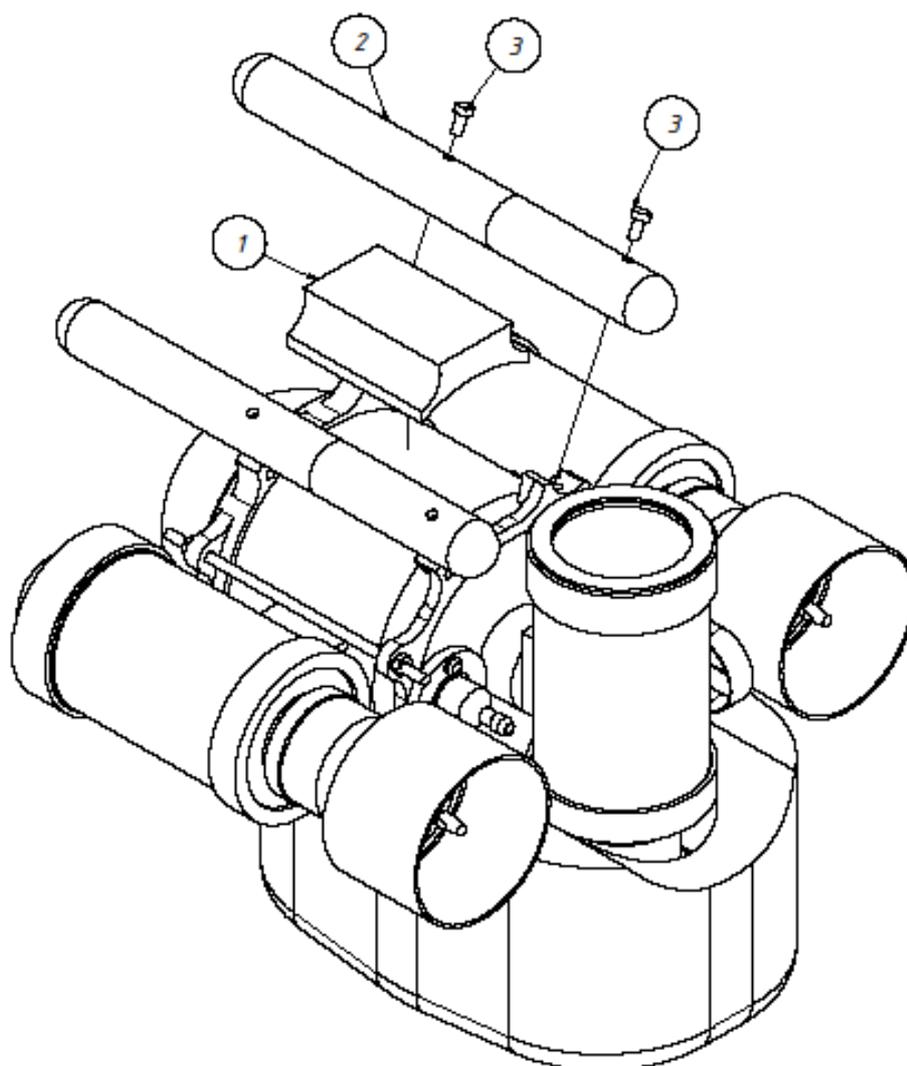
## 8. APPENDIX

5 PAGES

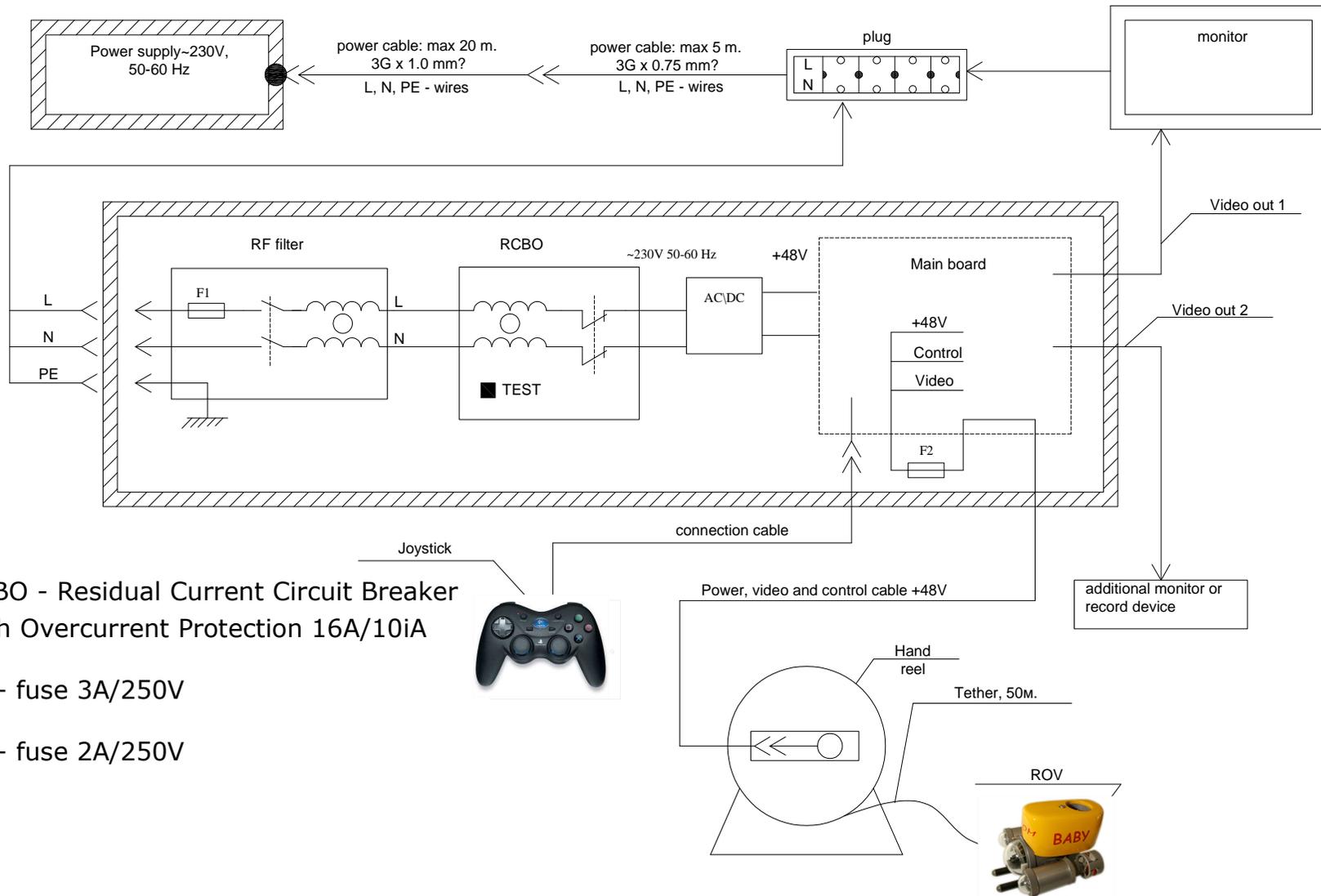
For use GNOM in **fresh water** you need install additional floatation [pos. 1]

You should do the next:

1. To unscrew screws [pos.3] of skids [pos.2]
2. To remove skids [pos.2]
3. To install the additional block of floatation [pos. 1] (enters into the equipment complete set)
4. To install skids back



## Connection diagramm

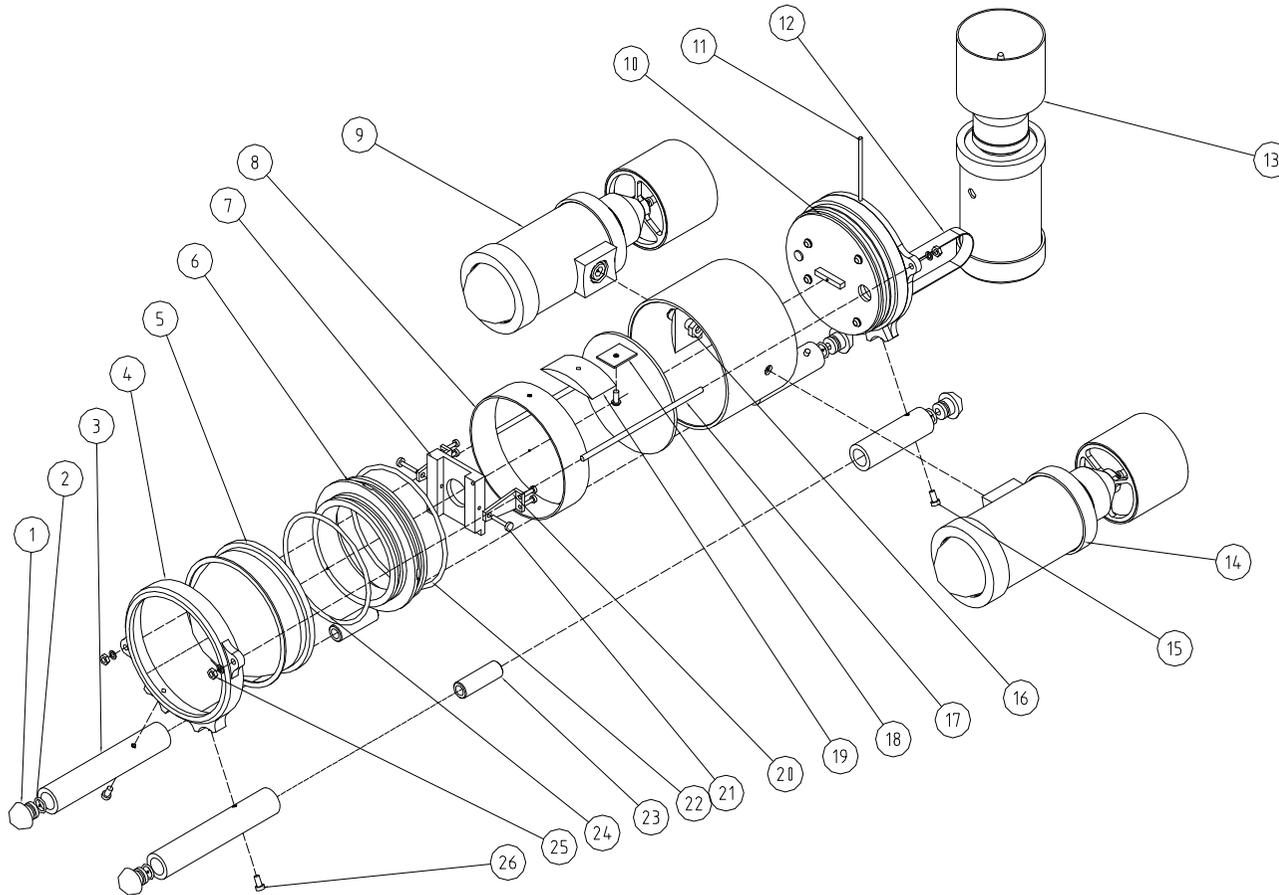


RCBO - Residual Current Circuit Breaker  
with Overcurrent Protection 16A/10iA

F1 - fuse 3A/250V

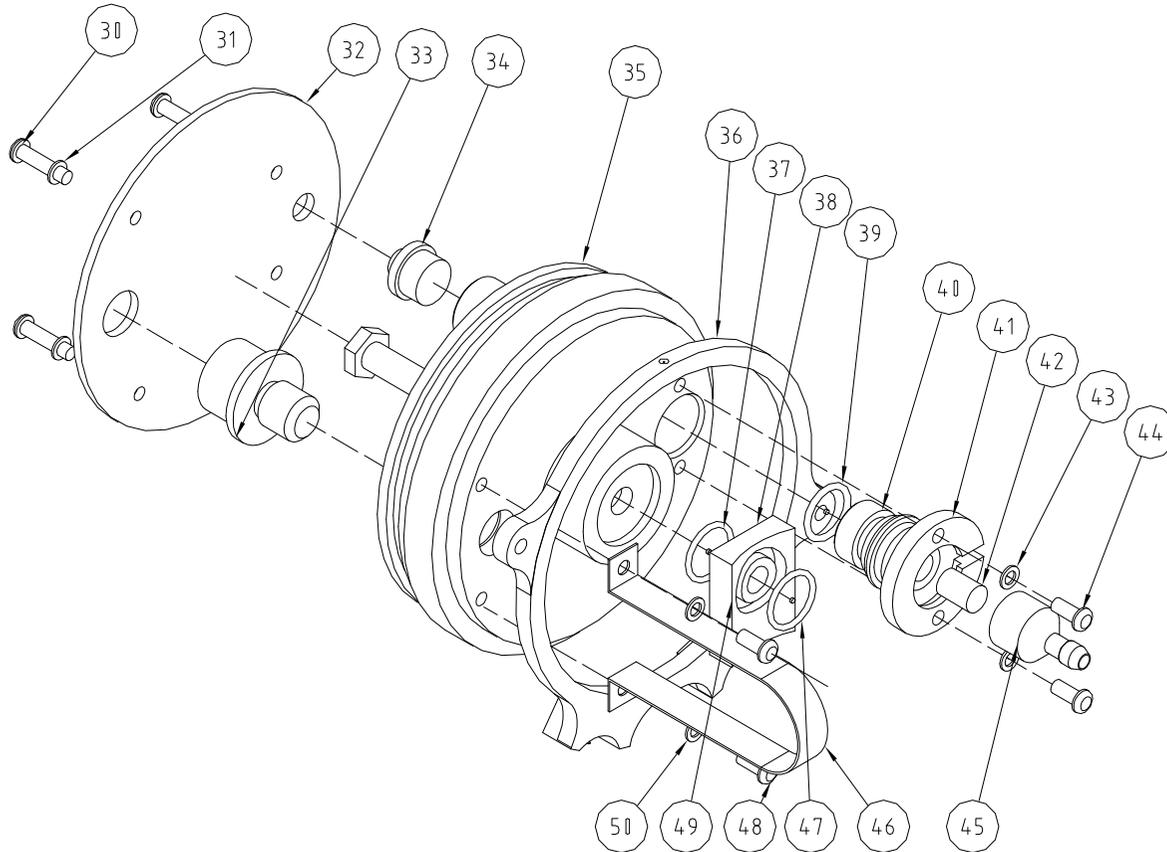
F2 - fuse 2A/250V

Сборочный чертеж малогабаритного подводного телеуправляемого обзорного аппарата  
 Micro ROV assembly



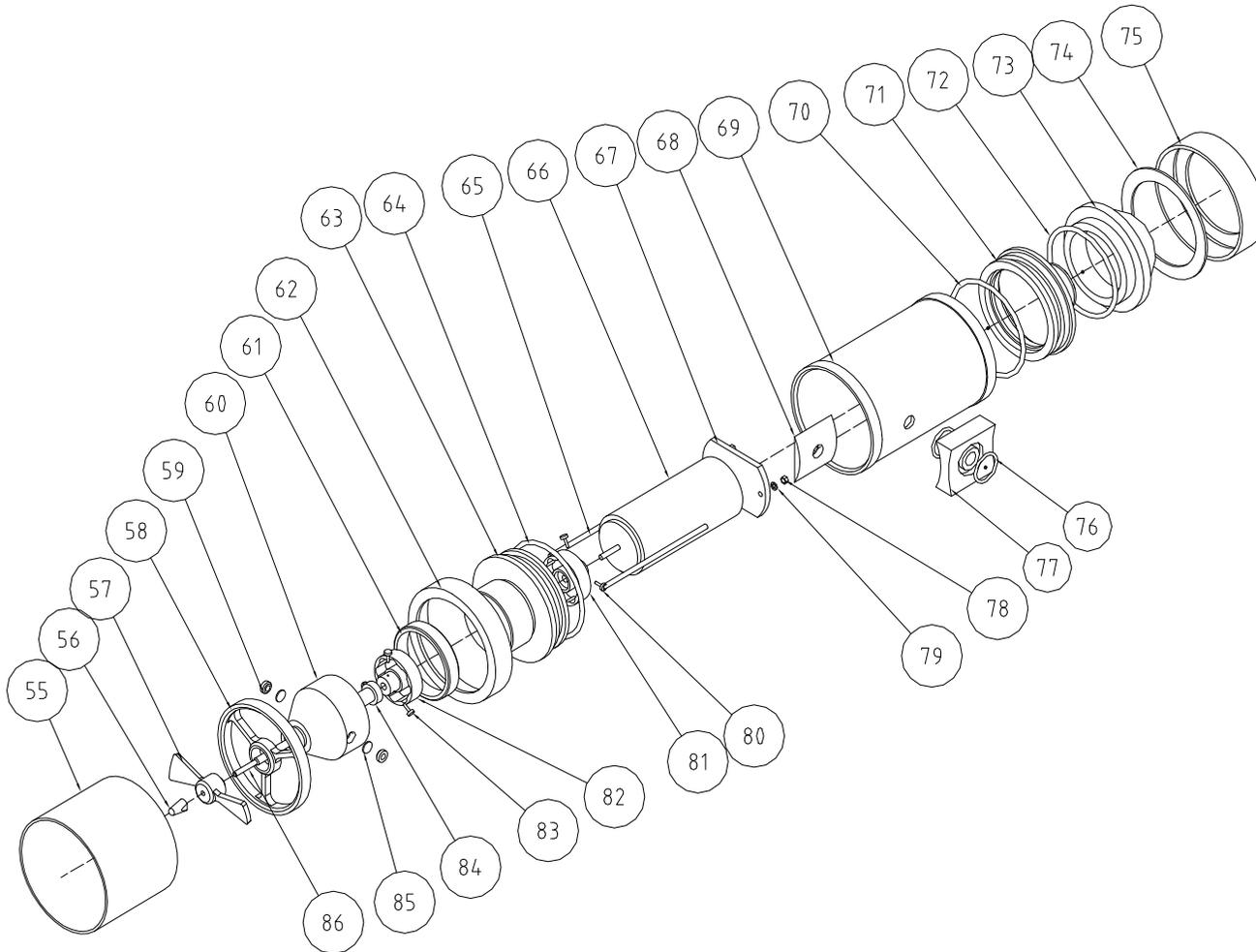
	Сборка корпуса	Main hull assembly
1	Заглушка полозьев	skid closing plug
2	Кольцо уплотнительное	sealing ring
3	Полозья опорные	skid
4	Крепление блистера	blister fixing ring
5	Иллюминатор	forward-viewing window
6	Корпус блистера	front hull insertion
7	Корпус камеры	camera fixing body
8	Кольцо крепления	PCB fixing ring
9	Сборка двигателя	horizontal thruster
10	Сборка задней крышки	assembled closure backwall
11	Шпилька крепления	flotation fastening stud
12	Хомут крепления кабеля	cable clip
13	Сборка двигателя	vertical thruster
14	Сборка двигателя	horizontal thruster
15	Болт	screw
16	Крепление движителя	thruster mounting
17	Шпилька	stud
18	Плата электроники	PCB
19	Крепление электроники	PCB mounting
20	Кронштейн крепления	tilt camera fixing body
21	Болт	screw
22	Кольцо уплотнительное	sealing ring
23	Втулка опорных полозьев	bush
24	Кольцо уплотнительное	sealing ring
25	Гайка	nut
26	Болт	screw

## Сборочный чертеж задней крышки Backwall assembly



30	Болт	screw
31	Шайба	washer
32	Плата электроники	PCB
33	Датчик глубины	depth sensor
34	RS-разъем	RS-connector
35	Крышка задняя	backwall
36	Кольцо крепления задней	backwall mounting
37	Кольцо уплотнительное	sealing ring
38	Крепление двигателя	thruster mounting
39	Кольцо уплотнительное	sealing ring
40	Гермоввод	cable pressure seal
41	Кольцо крепления	fit ring
42	Втулка гермоввода	cable pressure seal
43	Шайба	washer
44	Болт	screw
45	Гайка гермоввода кабеля	cable pressure seal
46	Хомут крепления кабеля	cable clip
47	Кольцо уплотнительное	sealing ring
48	Болт	screw
50	Шайба	washer

## Сборочный чертеж движителя Horizontal thruster assembly



	Сборка горизонтального	Horizontal thruster
55	Ограждение гребного винта	propeller guard
56	Гайка крепления гребного	propeller cap nut
57	Гребной винт	propeller
58	Кольцо крепления	propeller guard mounting
59	Втулка фильтра	filter bushing
60	Оголовье	thruster cone
61	Гайка крепления оголовья	thruster cone nut
62	Гайка корпуса	thruster cap nut
63	Передняя часть корпуса	thruster cap
64	Кольцо уплотнительное	sealing ring
65	Шпилька	thruster rod
66	Электродвигатель	thruster
67	Шайба крепления	motor mounting washer
68	Сегмент крепления	thruster mounting washer
69	Труба	thruster tube
70	Кольцо уплотнительное	sealing ring
71	Задняя часть корпуса	thruster closure backwall
72	Кольцо уплотнительное	sealing ring
73	Стекло осветителя	light port
74	Прокладка	sealing ring
75	Гайка задника	closure backwall nut
76	Кольцо уплотнительное	sealing ring
77	Проставка	hull spacer
78	Гайка	nut
79	Шайба	washer
80	Винт	screw
81	Муфта внутренняя	inside magnetic coupling
82	Муфта наружная	outside magnetic coupling
83	Винт	Screw
84	Втулка	thruster bushing
85	Фильтр	filter
86	Ось	propeller shaft