



Drone-capture net system

for capturing and retrieving small drones

Operating Manual

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LIST OF ABBREVIATIONS USED

UA – unmanned aircraft;

UAV - unmanned aerial vehicle;

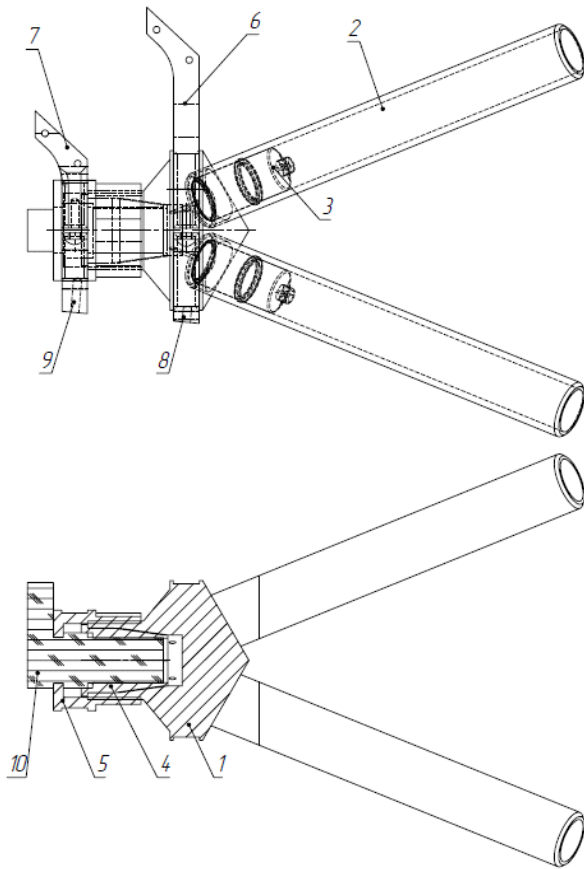
AD – aerial device;

OM – operating manual;

1. INTRODUCTION

The drone-capture net system for small unmanned vehicles is designed to capture and transport the UAV to the point of destination. The capture is executed with a 6,000 x 6,000 mm net shot towards the drone from the UAV carrier.

2. DESCRIPTION AND OPERATION



2.1 The drone-capture net system is a device that consists of:

- gas distributor – 1 with a nut – 5;



- collet – 4;



- burster – 10;



- pipes – 2;



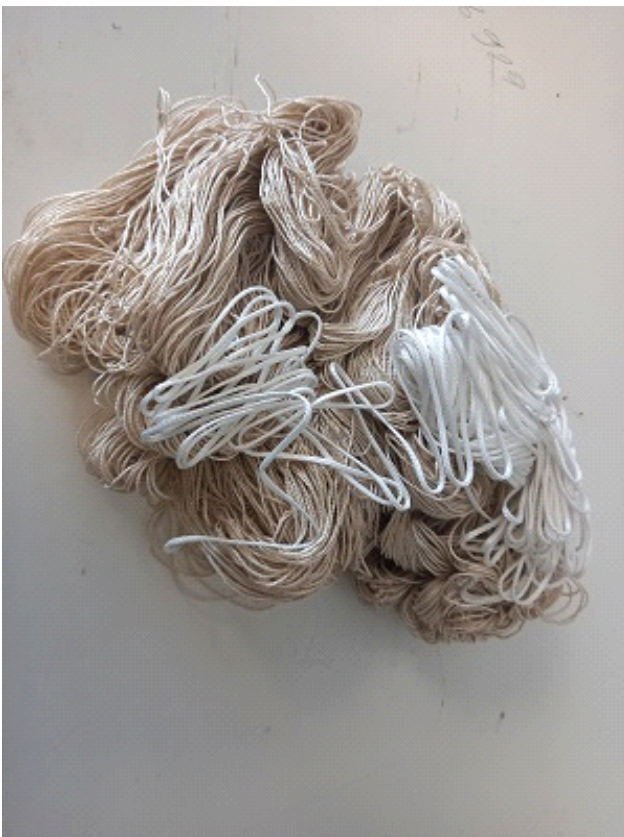
- exhaust weights with holes for attaching the net leads – 3;



- container for net laying;



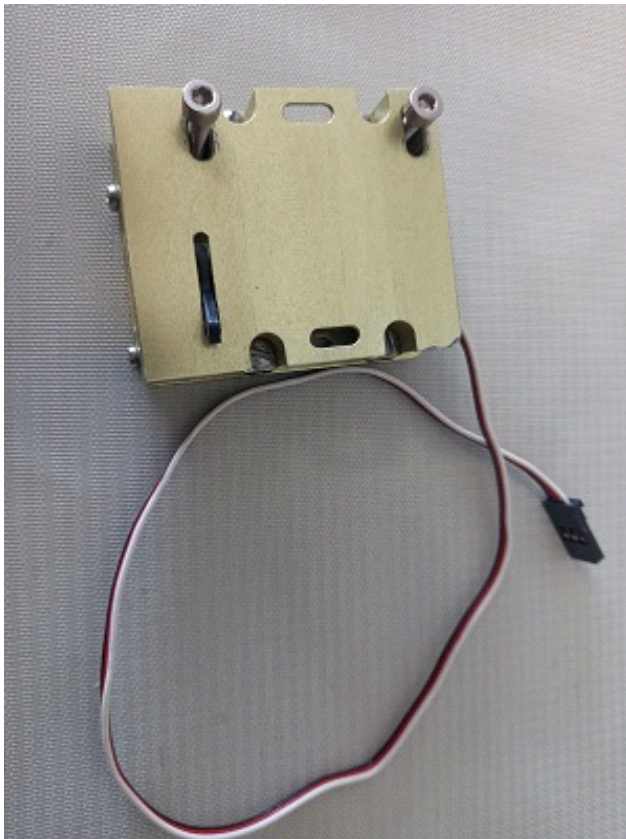
- net with the cord;



- brackets for attaching the system to the adapter – 6, 7, 8, 9;



- release lock with the servomotor;



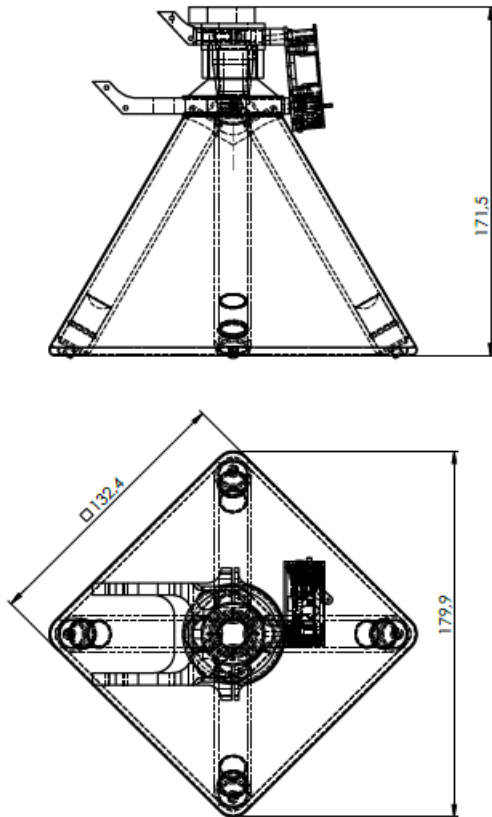
- fittings for cord laying.



WARNING! It must be borne in mind that a unique adapter is required to attach the device to a specific aerial device (the adapter can be designed, manufactured and supplied upon additional agreement). Alternatively, the adapter can be manufactured by the operator using the recommendations of the drone-capture net system developer.

2.2 Weight dimension characteristics:

- gross tare weight 765 g (with the 6,000 x 6,000 mm net)
- dimensions – 132.4 x 132.4 x 171.5 mm.



2.3 Long-term performance:

The device as a whole has an unlimited service life, while the individual elements have a limited, assigned operation time and condition-based operation time.

2.3.1 Operation life of individual system elements:

Gas distributor -- limited operation life, 10 applications;

Collet -- limited operation life, 10 applications;

Burster -- expendable;

Tubes -- assigned operation life, 50 applications;

Net with the cord -- condition-based;

Container -- condition-based;

Lock with the servomotor -- assigned operation life, 500 applications;

After the end of the assigned operation life of the individual components they must be replaced or their operation life must be extended by the manufacturer.

2.4 Operation conditions:

Minimum safe height of use – 20 m;

Wind strength – 5 m/s;

Operation temperature – from -20 to +40 °C;

Carrier airspeed at the time of system application – not more than 15 m/s;

Carrier vertical descent speed at the time of system application – not more than 2 m/s;

The perfect operation of the capture-drone net system is not guaranteed in rainy conditions and relative humidity of over 80 %.

Maximum permissible weight of an intercepted UAV – 5 kg.

WARNING!

The presence of people in the direction of device application is forbidden.

2.4.1 Burster parameters:

- firing current – not less than 500 mA;
- firing voltage – not less than 5 V.

2.4.2 Parameters of the Futaba S3173Vi servomotor:

- power supply voltage – 6.0 to 7.4 V
- PVM or S.bus signal

(<https://futabausa.com/wp-content/uploads/2018/09/S3173SVi.pdf>)

3. INTENDED USE

3.1 Instructions on laying and preparation for the use of the device.

3.1.1 These instructions on laying are intended for studying and conducting laying and mounting, as well as for the studying of the basic rules for the use and storage of interception systems for small UAS.

3.2 General instructions

3.2.1 Before laying the drone-capture system, check the completeness of the system and accessories for laying in accordance with the instructions as well as the drone-capture system location on the UAV. Replace any improper parts with the spare parts. Replacement of the drone-capture system parts can be carried out only in strict accordance with the instructions.

3.3.1 After using the drone-capture system, proceed as follows:

Replace the burster (the replacement instructions are provided below)

If the drone-capture system is used more than 10 times, replace the gas distributor and the collet (the replacement instructions are provided below)

Inspect the tubes, make sure there is no damage or destruction. Clean the inner surface of the tubes with a clean cotton cloth. Lubricate from the inside with LIQUI MOLY SILICON-FETT liquid silicone (a syringe with silicone is included in the scope of supply).



Inspect the exhaust weights, clean off any combustion products. Check the presence and integrity of the rubber seals, replace them, if necessary.

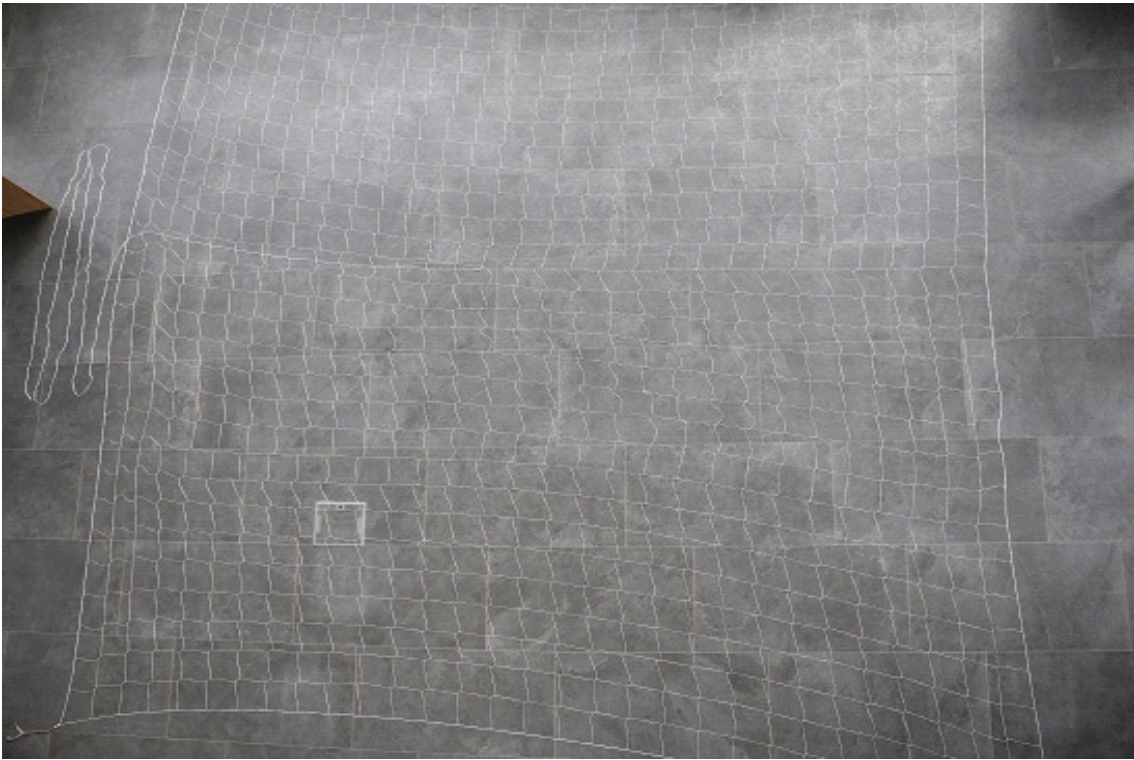
3.3.2 Net laying

WARNING! READ THE INSTRUCTIONS CAREFULLY BEFORE STARTING NET LAYING.

The container must be prepared for laying in advance. During net laying, the device must be taken in hand by the lower part with the tubes facing upwards. The container lugs must be open outward. Stretch a cord through the locking hinge of the container lugs to tighten them afterwards.



Lay out the net on a flat, clean, dry surface.



Make sure that the net is not damaged, torn or entangled. If tears are found, replace the net.

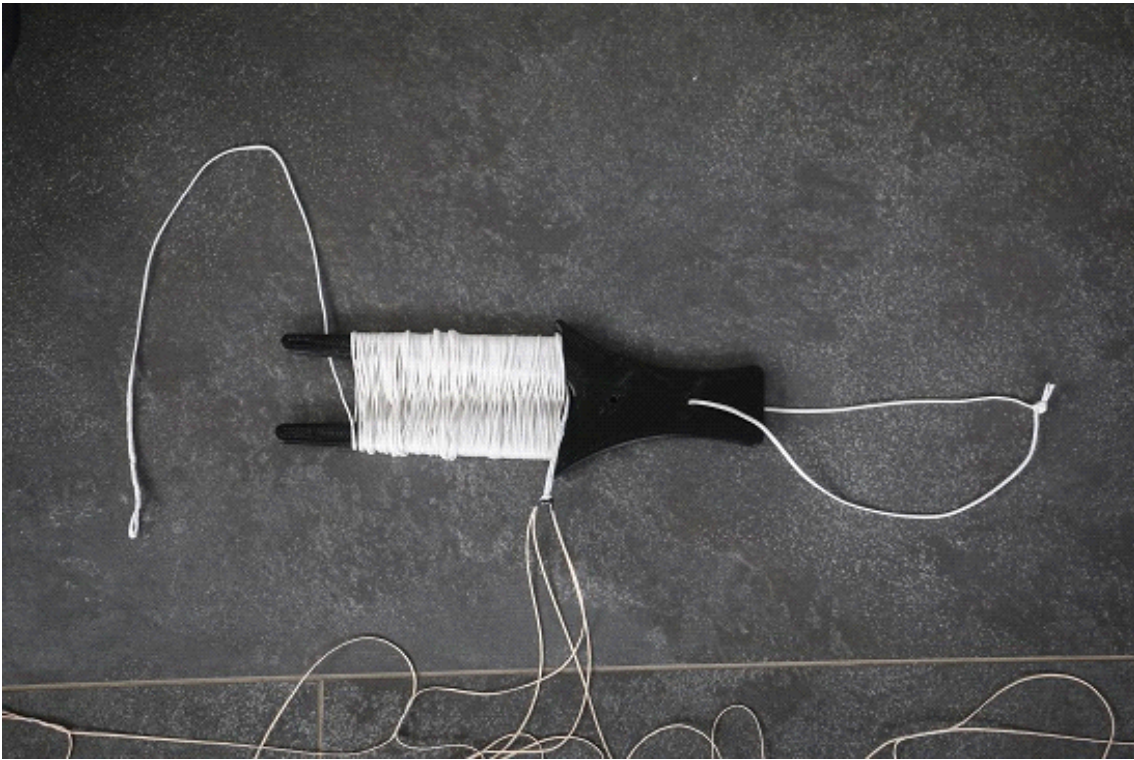
Make sure that the lids of the exhaust weights and the cotter are securely fastened;
Check the cord fasteners. The cord must be fixed in the geometric center of the net. The cord must not be damaged, torn or entangled (excluding the attachment point);
Lay the net in half; the weights on the top of the net should face forward and the weights on the bottom should face outward.



Begin net laying with the cord laying. The cord is wound from the center of the net in the S-shape manner on special fittings:

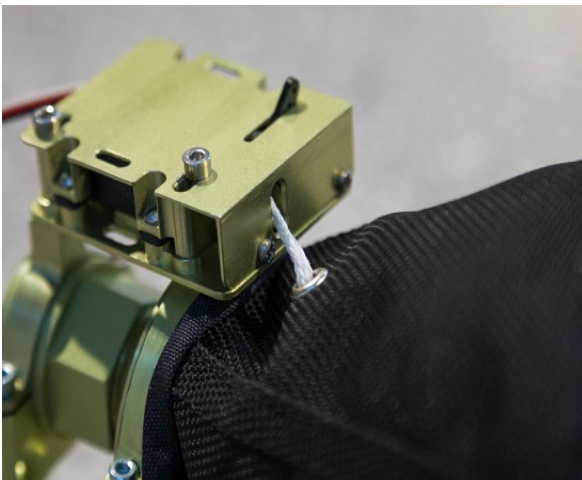






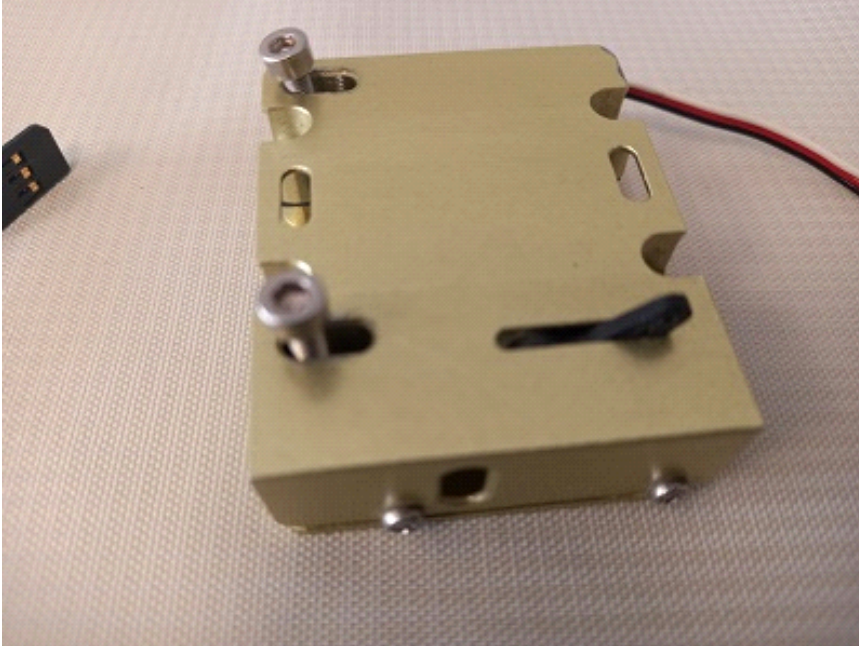
Next, insert the cord hinge from the inside of the container into the existing opening.

Fix the cord hinge in the lock.

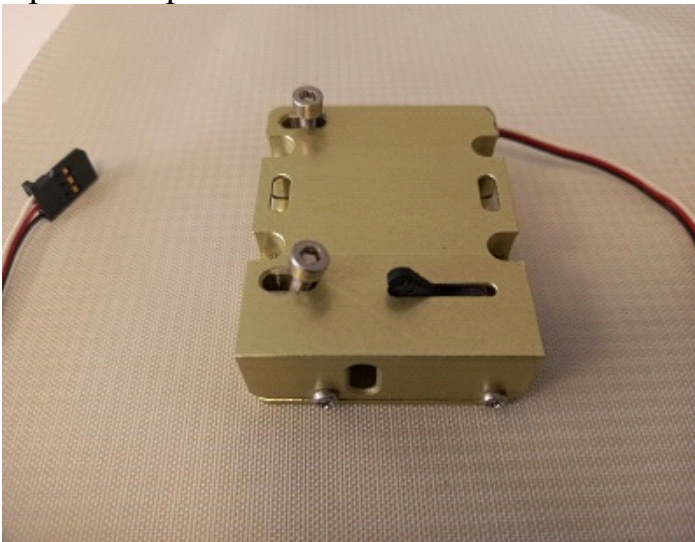


The lock is opened and closed manually in the deenergized state with a lever.

Closed lock position

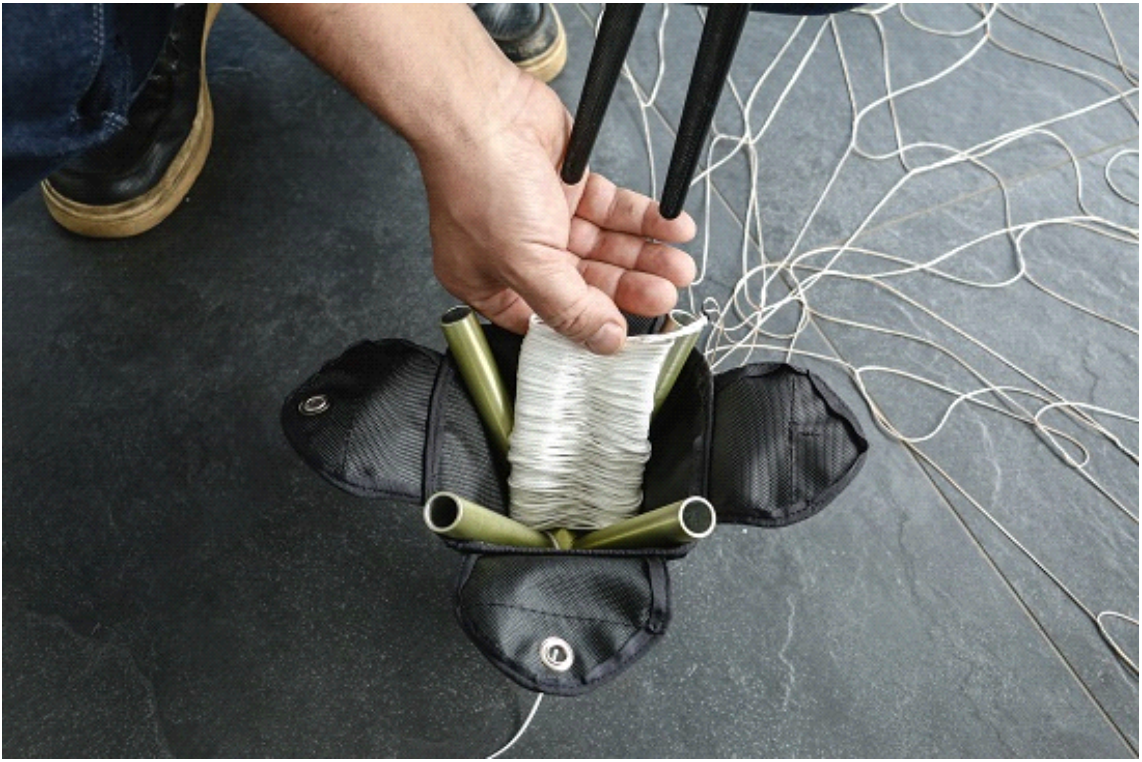


Open lock position



After laying the entire cord on the fittings, carefully remove the cord from the fittings, preventing entanglement and overlapping, and place it on the bottom of the container.







Next, from the center of the net, gradually pulling up towards yourself, in the S-shape manner, consistently lay the net into the hand.



WARNING! When laying the net into the hand, pull the net towards yourself and make sure that the weights do not change their original position in relation to each other: the weights of the lower half of the net should be on the edges and the weights of the upper half should be closer to the center:



Once all the net is in the hand,



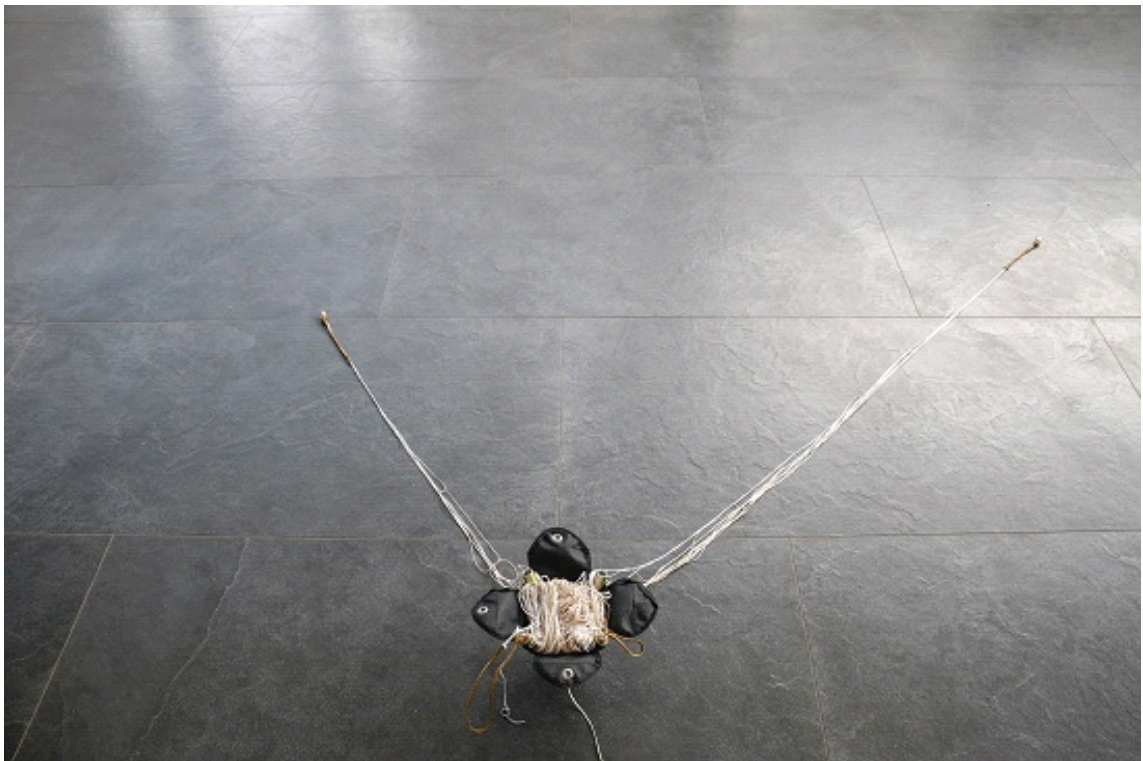
carefully lay the net into the container in such a way, that the cord is the first in the bottom of the container followed by the net.



IMPORTANT! The ends of the net to which the exhaust weights are attached must not become entangled or twisted together.

Then insert the weights into the tubes and submerge them slightly in sequence, laying the corner part of the net to which the weight is attached in the S-shape manner into the container:



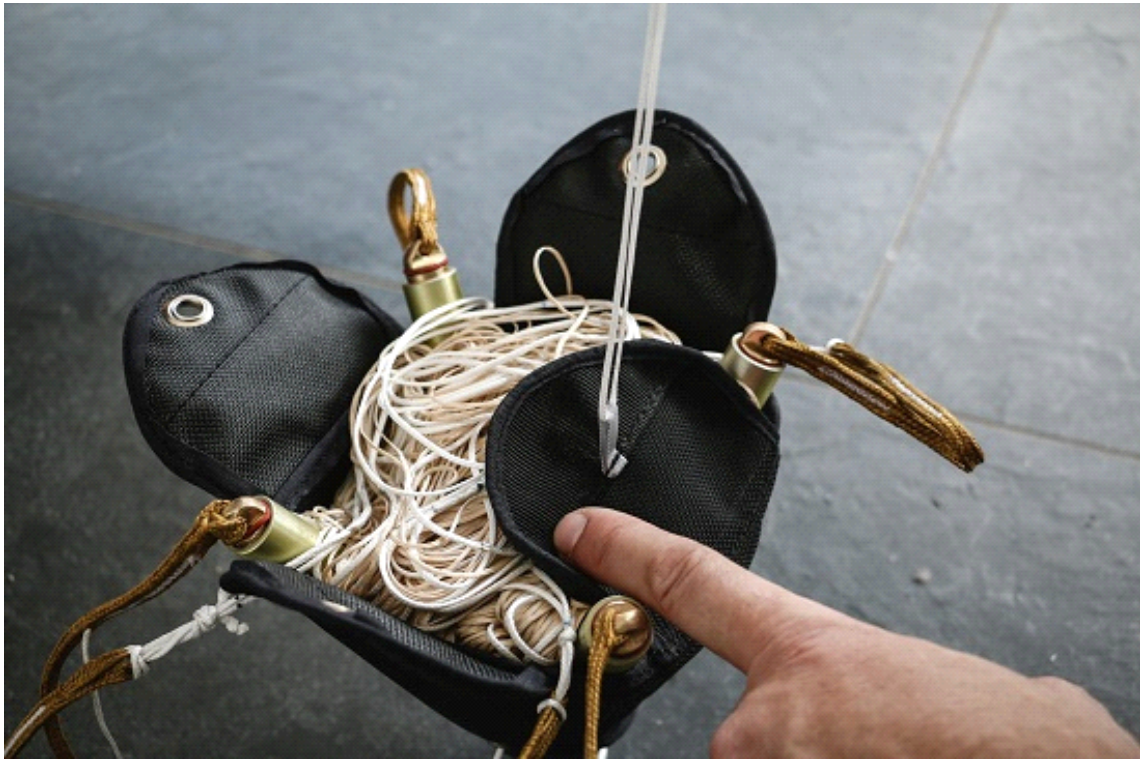






Stretch the cord through the opening in the opposite lug and tighten. Then stretch the cord through the openings in the remaining lugs randomly and tighten in such a way that the lug locking hinge goes through all the openings;

While holding the cord in the strained position, insert the cotter into the locking hinge and pull the cord out;







Insert the cotter into the locking hinge:

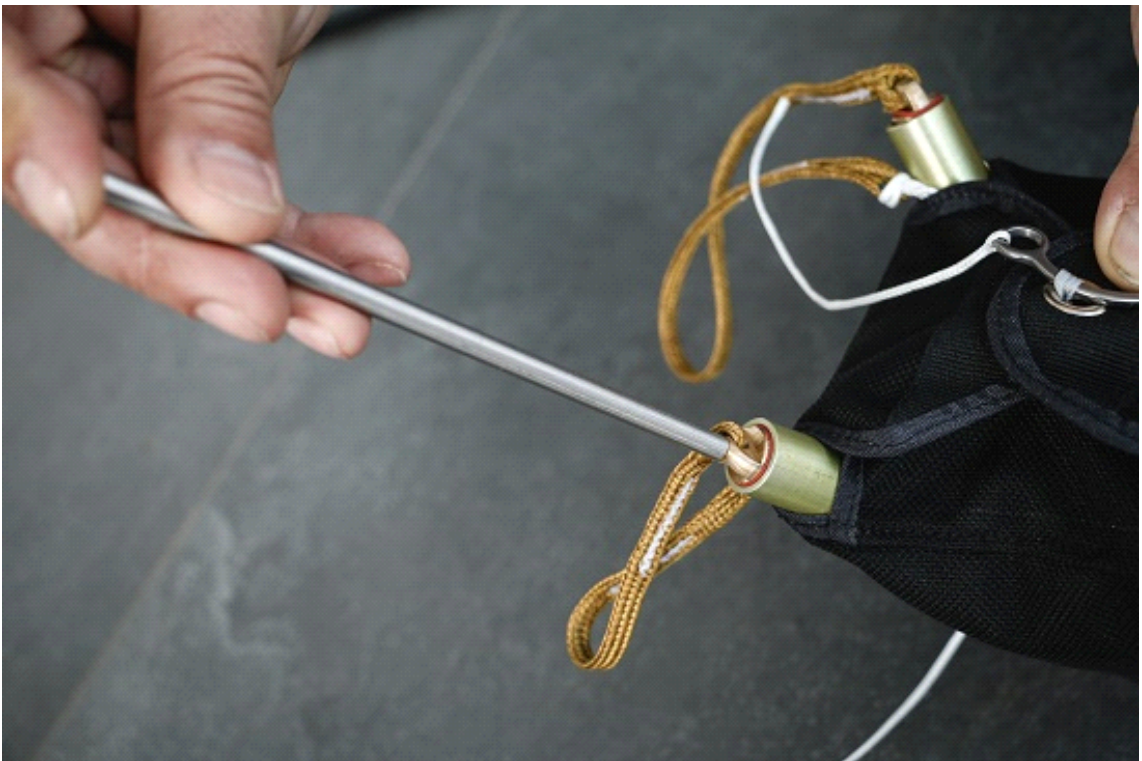


After inserting the cotter into the locking hinge pull the cord out:



Next, remove the exhaust weights from the tubes in sequence, lubricate with liquid silicone (LIQUI MOLY SILICON-FETT) and insert them back;

Using a screwdriver or a metal bar, press the exhaust weights into the tubes in sequence until they stop;





Lay the excess cord of the exhaust weights appropriately into the corners of the container under the lugs;

Promptly lay the container lugs.



WARNING! Net laying is carried out in suspension. Carry out laying together with the helper.

WARNING! Any foreign object (even a piece of thread, a twig, a pine needle, etc.) That accidentally falls into the net and is left there after laying can cause the incorrect opening or system failure.

3.3.3 Attachment and connection of the interception system to the carrier, preparation for use.

Attach the device to the adapter fitted on the carrier;

Connect the electrical connector to the burster

ATTENTION!!! MAKE SURE THE CONNECTOR IS DEENERGIZED BEFORE CONNECTING IT!

Connect the power connector and the control connector for the lock servomotor.

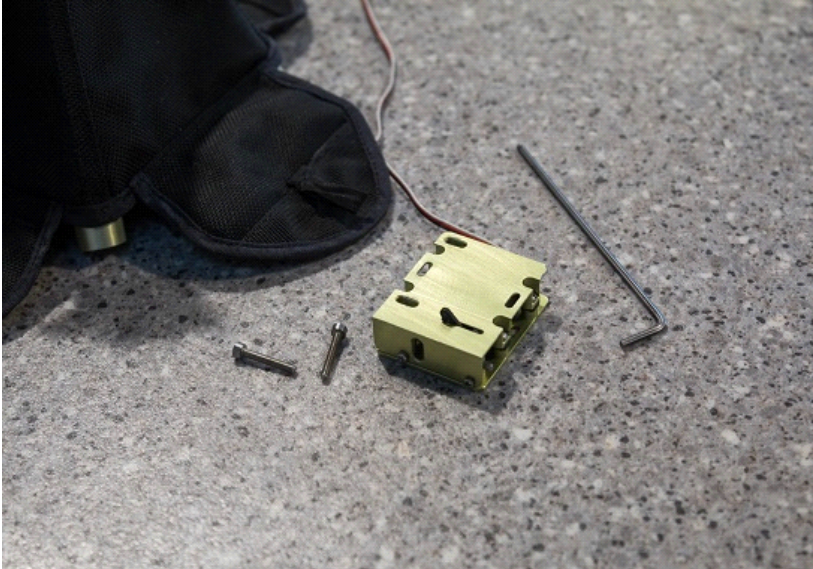
Carry out system checkup.

4. MAINTENANCE AND REPAIR.

4. Replacement of parts with limited operation life.

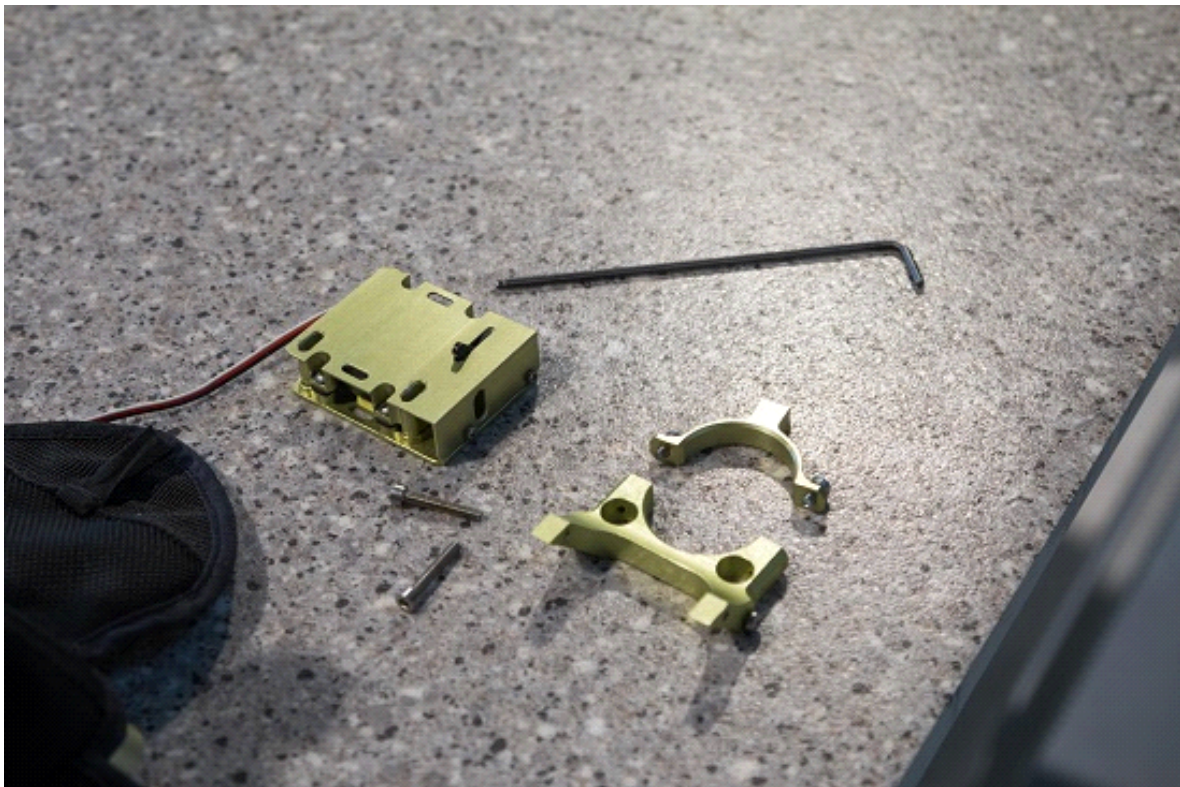
4.1 Burster mounting.

- dismantle the lock with the servomotor;



- dismantle the upper bracket;





- unscrew the burster retaining nut (with a 26 mm spanner wrench);



- remove the used burster.



Probably, the used burster will be clutched in the collet. In this case, remove the collet from the gas distributor body and knock out the used burster from the back.





- mount the new burster;
- torque the burster retaining nut;
- mount the upper bracket;
- mount the lock with the servomotor.

4.2 Gas distributor replacement

- dismantle the lock with the servomotor;
- dismantle the upper bracket;
- dismantle the lower bracket;



- unscrew the burster retaining nut;
- remove the used burster;
- remove the container;



- unscrew the tubes in sequence;





- screw the tubes to the new gas distributor;
- mount the container;
- mount the new burster;
- torque the burster retaining nut;
- mount the lower and the upper brackets;
- mount the lock with the servomotor.