OPTICOELECTRON

ARTILLERY - GRENADE LAUNCHERS

Land, Naval And Air Optical Technologies Since 1971

ISO 14001
ISO 18001
ISO 27001
NATO NCAGE
Dear Customers,
Dear Partners,

Opticoelectron Group JSCo has more than 45 years long experience in production of optomechanical and optoelectronic devices and systems for military purposes.

Our focus has always been on providing you with high-quality products and solutions, and we work hard to ensure that our products and services have the features and functionality that best contribute to your success.

As always, customer service is our top priority. We appreciate your loyalty and look forward to serving you even better in the years to come.

Sincerely,

dipl.eng. Ivan Garchev
dipl.eng. Nikodim Kazandzhiev

Executive Managers of Opticoelectron Group JSCo
Opticoelectron Group JSCo is one of the most advanced companies specialized in optomechanical, optoelectronic and laser devices and systems for defence and security, medicine, device-building, machine-building. The company has more than 45 years old history and traditions, and it is considered as a leader of optical devices production in Bulgaria, as well as an international market leader.

It has a closed cycle of production starting from research and development going through production process to marketing, promoting and trading finished products. The company head office and its premises are in the town of Penagyurishte which is 90 km. south-east of capital city Sofia and 80 km. north-west of Plovdiv (the second largest city in Bulgaria). It is located in an Industrial Park of 260 000 sq.m. where 108 000 sq.m. of the total area are production plots.

Over 97% of total production goes on export to EU countries, North America and the Middle East. Opticoelectron Group JSC is ISO 9001, ISO 14001, ISO 18001 and ISO 27001 certified. Our NATO Commercial and Governmental Entity code (NCAGE) is 000DU. Opticoelectron Group JSC has obtained a Certificate for Registry in the field of international relations “NATO-SECRET” and a Certificate for access to operate with state classified information. The company also has a statute of supplier for US Government - DUNS Registration.

Key defence products in our portfolio are as follows: anti-aircraft and ground artillery sights for firing in daytime and in nighttime; day, night and thermal optical sights, SWIR lenses, laser range finders, laser target designators, optical systems for armoured vehicles, video observation and surveillance systems.

HI-TECH INDUSTRIAL PARK
“OPTICOELECTRON”

<table>
<thead>
<tr>
<th>Total site area:</th>
<th>260 000 m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total building footprint:</td>
<td>50 100 m²</td>
</tr>
<tr>
<td>Total building area:</td>
<td>108 500 m²</td>
</tr>
</tbody>
</table>
MUM-706M
Unified Mortar Sight
NSN 1240-50-000-1579

Description:
Unified Mortar Sight MUM is designed for sighting 60 mm, 81 mm, 82 mm and 120 mm mortars during direct fire and from covered positions as well as for observing the battlefield. For operation under low visibility conditions (in dusk or night), there is a system for illumination of the scales and reticle, included in the sight set.

Technical characteristics:

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnification</td>
<td>2.5 x</td>
</tr>
<tr>
<td>Field of view</td>
<td>9°</td>
</tr>
<tr>
<td>Exit pupil distance</td>
<td>26 mm</td>
</tr>
<tr>
<td>Exit pupil diameter</td>
<td>4 mm</td>
</tr>
<tr>
<td>Resolution</td>
<td>25”</td>
</tr>
<tr>
<td>Diopter adjustment</td>
<td>-0.75 dppt</td>
</tr>
<tr>
<td>Range of horizontal sighting</td>
<td>360°</td>
</tr>
<tr>
<td>Angle of inclination in vertical plane</td>
<td>± 30°</td>
</tr>
<tr>
<td>Angle of elevation</td>
<td>35° to 90°</td>
</tr>
</tbody>
</table>

Value of divisions of the angles of elevation mechanism and angleometer:
- Coarse scale, artillery thousandths (1/6000): 1 - 00
- Precise scale, artillery thousandths (1/6000): 0 - 01
- Parallax: 2”
- Weight: 0.9 kg
- Size: 190 x 100 x 108 mm
Description:
Combined Artillery Optical Sight MBOK-9M is designed for precise laying of artillery gun B10 during direct fire and from covered positions, determining the distance to target and observation the battle field. For operation under the low visibility conditions (in dusk or night), there is a system for illumination of the scales and reticle, included in the sight set.

Technical characteristics:

**Sight for direct laying:**

- Magnification: 4.2 x
- Field of view: 10.5°
- Exit pupil distance: 27 mm
- Exit pupil diameter: 4.2 mm
- Resolution: 14"

**Sight:**

- Magnification: 2.5 x
- Field of view: 9°
- Exit pupil distance: 26 mm
- Resolution: 25"
- Weight: 2.9 kg
- Overall dimension: 225 x 162 x 220 mm
ZAP-23
Anti-Aircraft
Automatic Sight
NSN 1240-50-000-9498

Description:
Anti-Aircraft Automatic Sight ZAP-23 is designed for solving the task about meeting the projectile with the target, during firing on air and ground targets. The sight is a part of 23 mm twin launcher ZU-23 that is a powerful instrument for fighting air targets distanced up to 2500 m and height 1500 m.

Technical characteristics:
Sight 2Ts 27:
- Range of distance scale: 0 - 2000 m
- Range of speed scale: 0.300 m/sec
- Target course: no limitation
- Scales of landing angles:
  - Elevation angles: 0° to 90°
- Distance scale (value of one scale division): 100 m
- Speed scale (value of one scale division): 5 m/sec
- Course scale (value of one scale division): 1°
- Scales of landing and elevation (value of one scale division): 5°
- Range of elevation angles (value of one scale division): -11°15' to +82°
- Guide inclination angle toward the sight control area (value of one scale division): 1°50' ± 5'

Optical sight 1 OM 8:
- Magnification: 3.5 x
- Field of View: 4°30'
- Resolution: 17'
- Exit pupil diameter: 6 mm
- Exit pupil distance: 72 mm
- Range of fire distance: 500 - 2000 m
- Value of one scale division of distance scale: 100 m
- Range of sight correction, artillery thousandths (1/6000): ± 0 - 10
- Value of one scale division of sight correction, artillery thousandths (1/6000): 0 - 010
- Parallax: ≤ 2°
- Collimator KV-L:
  - Value of one scale division, artillery thousandths (1/6000): 0 - 05
  - Parallax, artillery thousandths (1/6000): ≤ 0 - 01
Description:
Panoramic Periscope Sight PG-1M is designed for precise laying of artillery weapons in vertical and horizontal plane during direct fire and from covered positions. The laying mechanism provides horizontal and vertical laying by the scales for coarse and precise reading. When there are not natural distanced points for laying, the panoramic periscope sight is used together with weapon collimator K-1 (optional). The measuring scale includes a special scale for working with the collimator and a scale for side corrections during direct fire.

Technical characteristics of MNV-50:
- Magnification: 3.7 x
- Field of view: 10°5'
- Exit pupil distance: 20 mm
- Exit pupil diameter: 4 mm
- Value of a scale division for precise reading the angle meter and angles of elevation, artillery thousandths (1/6000): 0 - 01
- Range of measuring angles in horizontal plane, artillery thousandths (1/6000): 60 - 00
- Range of measuring angles in vertical plane, artillery thousandths (1/6000): ± 3 - 00
- Size: 257 x 79 x 106 mm
- Weight: 2 kg
Description:
Designed for aiming of various types of artillery guns while performing direct fire on fixed or moving targets. The sight has mechanisms for inserting the measuring angles and forwarding. The optical scale comprises the following elements: distance scales, long range measuring scale, scale for side corrections, scale for correction in distance, scale for side-components of target speed.

The distance scales correspond to the used gun ballistics and type of ammunitions. For operation under low visibility conditions (in dusk and night), you can use "Luch" system for reticle illumination.

Technical characteristics:
- Magnification: 5.5 x
- Field of View: 11°
- Exit pupil distance: 24 mm
- Exit pupil diameter: 5.5 mm
- Resolution: 8"
- Weight: 5 kg
- Length in operation position: ≤ 430 mm
Description:
Optical Gun Sight 1-OMG-122 is designed for precise laying of the one barrel rocket system GRAD-P and observation of the battlefield. For operation under the conditions of low visibility (in dusk or night), it can be used for reticles or illumination system which is included in the sight set.

Technical characteristics:
- Magnification: \( 2.5 \times \)
- Field of view: \( 9^\circ \)
- Exit pupil distance: \( 26 \) mm
- Exit pupil diameter: \( 4 \) mm
- Resolution: \( 14'' \)
- Weight: \( 2.6 \) kg
- Size: \( 240 \times 156 \times 220 \) mm
**SGO - 7VMU (MGO-7VMU)**

Grenade Launcher Optical Sight

**Description:**
Our best selling grenade launcher optical sight SGO-7VMU is designed for sighting hand – held antitank grenade launcher RPG-7 and its modifications for direct fire.

SGO-7VMU provides accurate fire with all types of grenades, including modern thermobaric rounds as GTB-7VS. Firing warheads PG-7V, PG-7VL, PG-7VLT, PG-7VR is performed using the optical reticle marks, and firing with grenades K0-7V, 0FG-7V, 0G-7V (0G-7VM), 0G-7VE is done using a graduated drum mechanical scale.

There are optical reticle marks for deflection corrections on left and right up to 0 - 50 with step 0 - 10. The long range reticle allows to be determined distances to targets at base 2.7 meters.

**Technical characteristics:**

- **Magnification:** 2.7 x
- **Field of View:** 13°
- **Exit pupil diameter:** 4.5 mm
- **Eye relief distance:** 27 mm
- **Resolution:** 28"
- **Power supply source:** Lithium Battery 3V 1/3N, 3.6V ½ AA
  
  *Different options of power supply sources are available on customer request*

- **Parallax:** < 2'
- **Range of elevation turning:** > 30°
- **Operational temperature range:** -50°C to +50°C
- **Storage temperature:** -55°C to +60°C
- **Weight:** 1.08 kg
- **Overall Dimensions:** 140 x 180 x 70 mm
Description of MNV-50:
Designed to fit your specific night vision needs. The brightest and sharpest images available due to a High Resolution 3rd Generation or Super Gen Image Intensifier Tube. Compact yet rugged design.

Technical characteristics of MNV-50:
- Magnification: 1 x
- F-number: 1.2 f/#
- Focal length: 50 mm
- Adjustment range of the focal: 1 m to infinity
- Field of View: ≥ 19.85°
- Resolution with IIT 18 mm XD-4: ≥ 58 lp/mm
- Resolution with IIT 18 mm XR5: ≥ 62 lp/mm
- Diopter adjustment: -2 to +2 dpt
- Eye relief: 24 mm
- Length / Width / Height: 180 x 55 x 74 mm
- Weight without battery: 570 g
- Power supply: 1x battery size AA
- Temperature ranges operation: -50°C to +50°C
  *In the range from -35°C to -50°C not more than 4 h
- Storage: -35°C to +35°C
- Dimensions: 205 x 55 x 74 mm
SGO - 7V (MGO-7V)
Grenade Launcher
Optical Sight

**Description:**
Designed for sighting hand – held antitank grenade launcher RPG-7 and its modifications during direct fire. The sight provides accurate firing during day and night (to visible targets), with grenades PG-7V, PG-7VM, PG-7VL and PG-7VR with the marks of the reticle.

There are side correction marks on the optical reticle – left and right, up to 0-50 (artillery thousandths) with step 0 – 10 (artillery thousandths).

The long-range reticle allows to be determined distances to targets with 2.7-meter base.

Available illumination system for operation under low visibility conditions (in dusk and night).

**Technical characteristics:**

- **Magnification:** 2.7 x
- **Field of View:** 13°
- **Exit pupil diameter:** 4.5 mm
- **Exit pupil distance:** 27 mm
- **Resolution:** 28°
- **Power supply sources:** Lithium Battery 3.6V 1/2AA, 3V 1/3N, 2x1.5V AA
- **Parallax:** 2°
- **Electric current consumption:** 0.010 A
- **Operational temperature range:** -50°C to +50°C
- **Storage temperature:** -55°C to +6°C
- **Continuous operation with one battery:** > 60 h
- **Weight:** 0.6 kg
- **Dimensions:** 140 x 180 x 62 mm
**SGO - 7VP**
Grenade Launcher Optical Sight

**Description:**
Designed for sighting hand-held antitank grenade launcher RPG-7 and its modifications during direct fire. The sight provides accurate firing during day and night (to visible targets), with grenades PG-7V, PG-7VM, PG-7VL and PG-7VR with the marks of the reticle.

There are side correction marks on the optical reticle – left and right, up to 0-50 (artillery thousandths) with step 0 – 10 (artillery thousandths).

The long-range reticle allows to be determined distances to targets with 2.7-meter base.

Available illumination system for operation under low visibility conditions (in dusk and night) and automatic brightness control function. The body of the device is made from hard plastic.

**Technical characteristics:**

- **Magnification:** 2.7 x
- **Field of View:** 13°
- **Exit pupil diameter:** 4.5 mm
- **Exit pupil distance:** 27 mm
- **Resolution:** 28"
- **Power supply sources:** Lithium Battery 3.6V 1/2AA
- **Paralax:** 2'
- **Electric current consumption:** 0.003 - 0.012 A
- **Operational temperature range:** -50°C to +50°C
- **Storage temperature:** -55°C to +60°C
- **Continuous operation with one battery:** > 60 h
- **Weight:** 0.37 kg
- **Dimensions:** 140 x 180 x 62 mm
SGO 100 3X
Grenade Launcher
Optical Sight

Description:
It is designed for sighting hand-held automatic grenade launcher RPG-7 and its modification during direct fire. The sight provides accurate fire with projectiles PG-7V, PG-7VL and PG-7VLT.

There are marks for side corrections on the optical reticle – left and right, up to 0-50 (artillery thousandths) with step 0-10 (artillery thousandths).

The long range reticle allows to be determined distances to targets with 2.7 meter base.

Technical characteristics:
Magnification: 3 x
Field of View: 8°
Exit pupil diameter: 4 mm
Exit pupil distance: 43.8 mm
Resolution: ≤ 30"
Operation temperature range: -50°C to +60°C
Storage temperature: -55°C to +60°C
Weight: 0.270 kg
Dimensions: 185 x 135 x 55 mm
**Description:**
Designed for precise laying of grenade launcher SPG - 9 (6G8) for direct fire and from closed positions. Designed to determine the distance to the target and for battlefield observation. Available illumination system for operation under low visibility conditions (in dusk or night), included in the sight set.

**Technical characteristics:**

<table>
<thead>
<tr>
<th>Sight for direct laying:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnification:</td>
<td>4.2 x</td>
</tr>
<tr>
<td>Field of View:</td>
<td>10.5°</td>
</tr>
<tr>
<td>Exit pupil distance:</td>
<td>27 mm</td>
</tr>
<tr>
<td>Exit pupil diameter:</td>
<td>4.2 mm</td>
</tr>
<tr>
<td>Resolution:</td>
<td>14&quot;</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sight:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Visible magnification:</td>
<td>2.5 x</td>
</tr>
<tr>
<td>Field of view:</td>
<td>9°</td>
</tr>
<tr>
<td>Exit pupil distance:</td>
<td>26 mm</td>
</tr>
<tr>
<td>Exit pupil diameter:</td>
<td>4 mm</td>
</tr>
<tr>
<td>Power supply source:</td>
<td>Lithium Battery 3V</td>
</tr>
<tr>
<td>Resolution:</td>
<td>25&quot;</td>
</tr>
</tbody>
</table>

**Operational temperature range:**
-50°C to +50°C

**Storage temperature:**
-55°C to +60°C

**Weight:** 2.45 kg

**Overall Dimensions:** 225 x 162 x 220 mm
KO

Gunner Quadrant

Description:
Designed to determine the elevation of a gun barrel. It is fitted with a spirit level and the scale is marked from 0° to 90°.

Technical characteristics:
Range of measured angles, artillery thousandths (1/6000): from 0 - 00 to 15 - 00
Value of divisions of the gear sector scale: 25 divisions of angle meter

Value of divisions of the guiding arc, artillery thousandths (1/6000): 0 - 00.5 (S divisions of angle meter)

Value of divisions of the level bubble: 60° ± 6′

Error of quadrant reading while measuring angles in range from 0 to 90 (0 - 00 to 15 - 00 divisions of angle meter): < ±0.5 divisions of angle meter for whole temp. range (50° C)

Operational temperature range: ± 50
Weight: 1.13 kg
Total weight including appliances and case: 2.05 kg
Size with case: 228 x 215 x 56 mm
Description:
Designed for horizontal laying of guns, mortars, etc. with absence of naturally illuminated points for laying, or under low visibility conditions (at dusk, night, rain, snow and smoke fire position).

Technical characteristics:
- Field of View: 10.7°
- Exit pupil diameter: 48 mm
- Number of strips (scale divisions): 76
- Value of one scale division artillery thousandths (1/6000): 0 - 0.22
- Size: 280 x 31 x 95 mm
### 6G-18 Container For Anti-Tank Disposable Grenade Launcher RPG-22

**Description:**
Designed for a disposable, single shot rocket launcher RPG-22 pre-loaded with fin-stabilized rocket. The smoothbore barrel/container is made from two parts, main tube and a telescoping forward extension, which sides over the barrel, both made of fiberglass.

It is used with projectile PG-2 for fighting against tanks, self propelled artillery launchers and other armored vehicles of the enemy as well as for destroying covered enemies behind light shelters and brick buildings. The grenade launcher is suitable for parachute-landing.

**Technical characteristics:**
- **Caliber:** 72.5 mm
- **Armor penetration:** 400 mm
- **Distance of right shot:** 150 m
- **Initial speed:** 133 m/s
- **Time for changing from march to battle position:** < 10 s
- **Size:** 870 x 90 x 340 mm
- **Weight:**
  - including round: 4.8 kg
  - without round: 2.7 kg

### DREBG 7 Container For Anti-Tank Disposable Grenade Launcher

**Description:**
Designed for a disposable rocket launcher loaded with EBG-73 round.

**Technical characteristics:**
- **Caliber:** 72.5 mm
- **Armor penetration:** 350 mm
- **Distance of right shot at target height 2 m:** 95 m
- **Initial speed:** 76 m/s
- **Time for changing from march to battle position:** < 10 s
- **Size:** 765 x 140 x 200 mm
- **Weight:**
  - including round: 4.55 kg
  - without round: 1.9 kg
PAB 2 AM
Periscope Artillery Aiming Circle

Description:
Designed to determine the azimuth, to provide orientation according to the stars location, to measure the horizontal and vertical terrain angles as well as for determining distances up to 400 m based on a certain outer base. The periscopic artillery aiming circle can be used at the observation point of the fire position, as well as for topographic works at daytime and under low visibility conditions (dusk), using illumination for the reticles of aiming circle, the monocular and the long range measuring rod. The available periscope in the sets allows observation from a covered position. PAB 2AM is available in different complete sets, it is supplied according to our customers' request with scale graduation in mils (1/6400).

Technical characteristics:
Aiming circle magnification: 8 x
Field of view (with and without the periscope):
  - in artillery thousandths (1/6000): 0 – 83
  - in linear meters at distance 1000 m: 87 m
Exit pupil distance: 12.5 mm
Exit pupil diameter: 2.8 mm
Entrance pupil diameter: 22 mm
Periscopity: 350 mm
Range of angle measuring, artillery thousandths (1/6000):
  - horizontal angles: 60 – 00 (3600)
  - vertical angles: 30 – 00 (180)
Value of divisions of the angle measuring scale and aiming circle scale:
  - coarse, artillery thousandths (1/6000): 1 – 00
  - precise, artillery thousandths (1/6000): 0 – 01
Value of divisions of the scale for vertical reading:
  - coarse, artillery thousandths (1/6000): 1 – 00
  - precise, artillery thousandths (1/6000): 0 – 01
Reading accuracy, artillery thousandths (1/6000): 0 – 01 (3.6')
Value of the round level divisions, artillery thousandths (1/6000): 0 – 03
Azimuth head:
Magnification: 4 x
Field of view: 9° 20'
Exit pupil distance: 9.6 mm
Exit pupil diameter: 4 mm
Value of the level division: 2'
Sighting line shift from the vertical line while turning at vertical plane at 900, artillery thousandths (1/6000): 0 – 00.4 (1.5')
Power supply:
2.4V, 2 accumulator batteries type 2HKKB-2, in parallel connected
Operational temperature range: from -40°C to + 50°C
Weight (complete set): 15 kg
LARTOS
Forward Artillery Observer Post

Description:
The LARTOS system is designed to identify targets and objects, the distance to them, and their angular coordinates with respect to the LARTOS itself or to a particular point (position) whose coordinates are pre-entered/set in the system. The LARTOS system also calculates the opposite task - to define its own coordinates and direction "NORTH" (orientational directions) by known data for one or several points with known linear and/or angular coordinates (directional angles) with accuracy ±00-02 thousandths/±2,1mils. The following functional modules are included in the "LARTOS" system: main system module, control and visualization unit, power unit, positioning unit, cables, software to perform tasks of artillery instrumental intelligence (azimuth, elevation angle, defining a distance to the target from the LARTOS and a distance to the target from a forward position).

The LARTOS system maintains a database of coordinates of objectives and objects. This is non-volatile database, i.e. when the system power is turned off, the data is not lost.

The system consists of following modules:
- Main module
- Height and Azimuth Movement module
- Leveling mechanism
- Power supply unit
- Touchscreen display
Technical characteristics:

**Main module**
In the main module are included thermal imaging channel, laser rangefinder, measurement module.

1.1 Thermal imaging channel

- Objective: 100 mm with focal length from 80 m to infinity
- Field of view: 6.2°(Hor.) x 5°(Ver.)
- Working spectral range: 7.5 – 13.5 µm
- Pixel size: 17 µm
- Matrix resolution: 336 x 256 pxl or 640 x 512 pxl
- Matrix type: Uncooled VOx Microbolometer
- Analog/Digital video interface: 1 Vpp PAL(CCIR), NTSC(RS-170) / BT601,656
- Noise equivalent differential temperature (NEdT): < 50 mK at f/1.0

- Detection and Recognition characteristics:
  - Detection vehicle 2.3 x 2.3 m > 4.5 km
  - Detection human figure > 3 km
  - Recognition vehicle 2.3 x 2.3 m > 3 km
  - Recognition human figure > 1.2 km

**Laser rangefinder module**

- Range: from 100 to 20000 m
- Accuracy: ± 5 m
- Field of view: 7°
- Optical magnification: 7 x
- Exit pupil diameter: 12.5 mm
- Measurements per minute: 8
- Guaranteed number of measurements: 20 000
- Wavelength: 1064 nm
- Interface for data exchange with external devices: RS 232

**Measurement module**

- Measurement of horizontal angles: from 00-00 to 59-99 accuracy of ± 00-01 thousandths / ±1,06 mils
- Measurement of vertical angles: ±05-00 with accuracy of ± 00-01 thousandths/±1,06 mils
- Interface for data exchange with external devices: RS 232
- GPS-accuracy of horizontal positioning: < 2.5m

**Management and visualization unit**

The main function of the control and visualization unit is to combine the information from all devices of the LARTOS system - to visualize the picture from the thermal imaging channel, perform calculations of the data, ensuring the fulfillment of the tasks of the artillery intelligence (azimuth determination, distance to the target from the device and distance to the target from another position). The control of the modular system LARTOS is done by a touchscreen display with a screen resolution of 800 x 480 pixels, 10-finger capacitive touch and viewable screen size: 155 mm x 86 mm.

**Leveling mechanism**
Used to set the system to a position for leveling (figure 1 pos.3).

**Height and Azimuth Movement module**
It serves to horizontalize the system for smooth and fast moving in vertical and azimuth. It is located above the tripod (Figure 1 pos.2).

**Power supply module**
Provides no less than 6 hours continuous autonomous operation of the modular system LARTOS with one power supply unit. It is mounted at the bottom of the tripod (Fig. 1 pos. 4). It consists of a LiFePO4/12,8V/10A rechargeable battery with an integrated electronics unit, housed in an aluminum housing. The system is equipped with two power units and chargers: 230V AC and 12V DC for car socket.

**Working environment and protection:**

- Working temperature: from - 25°C to + 55°C
- Relative humidity, noncondensing: from 10% to 70%
- Storage temperature: from - 45°C to + 65°C in the original shipping case
- IP protection class: IP 65