GRAVITATIONAL
SYSTEMS

CENTRIFUGAL CONCENTRATORS

ITOMAK

Unmatched results for extraction
of dust and fine gold.

Centrifugal Concentrators

Centrifugal concentrators of horizontal type are the principal type of produce by ITOMAK, CJSC. They are designed to extract fine free particles of noble metals and heavy minerals out of deposits, ores, and technogenic mineral formations, as well as for engineering and geological sampling. The operating principle of the concentrator is in the forced separation of the material being processed into the two fractions: “heavy” and “light” in the centrifugal field. The separation occurs as a result of interaction of the rinsing water, centrifugal forces, and the gravity field. All these affects a particle in a horizontally or inclined rotating rotor. The intensity of the process of extraction of particles by density increases due to oscillations of the mineral layer which are caused by the rotor position. The key point of ITOMAK concentrators is the horizontal position of the rotor, which results in the fluctuations of particles of the layer being concentrated at the rotational frequency of the rotor. It allows to accelerate the discharge of the concentrator, simplify its design, increase operational reliability, and improve operating conditions for the main units of the concentrator.

Advantages of ITOMAK concentrators:

- High specific performance and efficiency. Low power consumption, small weight, overall dimensions, and the area occupied.
- Environmental cleanness. Only water and power is required to operate the units.
- Unmatched results for extraction of small grain size, fine, “flat” and “floating” gold.
- Operational reliability and ease of use, maintenance, and serviceability.
- Accelerated discharge of the concentrate as compared to analogues.
- Improved reliability due to the inclined and horizontal position of the rotor rotational axis, with the ingression of water or sand into the bearings unit eliminated.
- In many cases, concentrators are equipped with an automatic control system which allows to perform concentration continuously without the operator, and provides safety of the concentrate.

ITOMAK KN-0.1

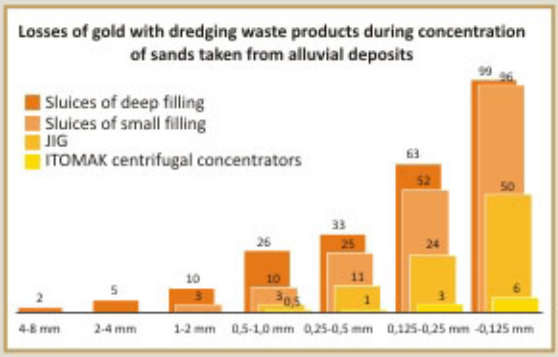
ITOMAK KN-1.0

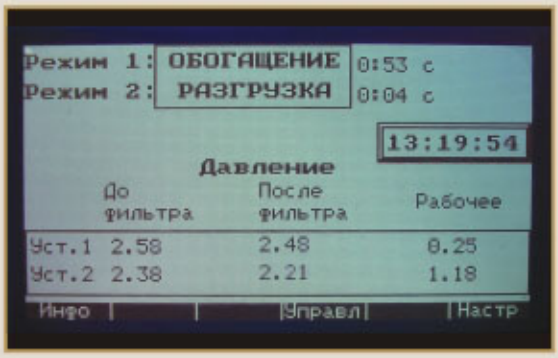
ITOMAK KG-2.0

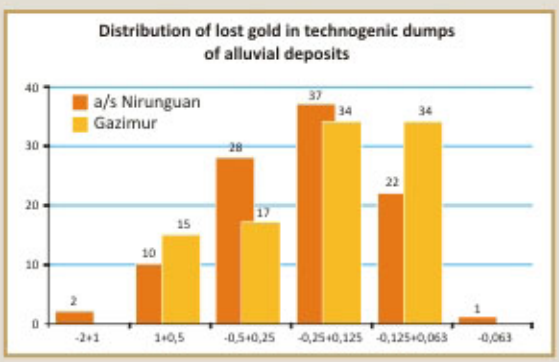
Specifications

Table 1.

NAME	KN-0.1	KN-1.0	KG-2.0
Electric motor power, kW	0,25	1,1	1,1
Electric motor power of the discharge unit drive, kW	–	–	0,09
Rotational frequency of the rotor, RPM	1250	700	750
Solids capacity, ton/hr	0,1	1	2
Slurry output capacity, m^3/hr	0,5	4,5	6,0
Maximum consumption of washwater, m^3/hr	2,0	5,0	6,0
Coarseness of the fed materials, (for alluvium),mm, no more than	2,0	3,0	3,0
Coarseness of the fed materials, (for ore), mm, no more than	0,5	1,0	1,0
Slurry solid contents, %	up 75	up 75	up 75
Volume of the concentrate, l, no more than	0,15	1,0	1,7
Weight of the concentrate, kg, no more than	–	2,0	3,5
Weight of the product, kg, not more than	35	120	150
Product dimensions, mm, not more than			
Length/Length with the hatch opened	550	770	890/1150
Width	350	550	830
Height	620	980	805







Automatic control systems

The system for concentrator automatic control allows to perform concentration continuously, or use simultaneously several concentrators assembled into a multi-rotor complex and, as the cup is filled with heavy minerals, shut down in turn for discharging. The system is fully automated, offers an offline control unit, and a programmable controller. The main system parameters are monitored via a colour LCD touch screen. Adjustment of the whole control system via the user-friendly interface allows monitoring the operation of not only the primary but secondary equipment, including latches, valves, pumps, and samplers.

Losses in mining alluvial and hardrock gold

The major losses in mining alluvial and hardrock gold are among

- finely-dispersed
- laminar
- dust gold
- with particle size ranging from 1 mm down to a few microns

Modern prospectors' crews using traditional washing instruments lose within 20 to 60% of gold. Therefore, it is clear today that technogenic dumps are an attractive source of raw material. The real trouble is when by the demand of supervising bodies many prospectors' crews, in order to hide their losses and accelerate recultivation, dilute and dig gold-containing tails into earth.

The ITOMAK concentrating complexes comprising centrifugal concentrators and a smoothing complex:

- have proved efficient ROI for repeated commercial exploitation of technogenic sites;
- technogenic deposits are a product that is already prepared for concentration: it is extracted from the bowel, comminuted and classified.

Use of ITOMAK equipment at technogenic deposits:

- depends on the type of dumps;
- includes all stages of mining fine gold;
- covers the process up to the production of commercial gold;
- allows up to 98% extraction of free gold out of the source product; and
- typical levels of gold contents in alluvial dumps are 200-500 mg/m^3.

ITOMAK KGM-5.0

ITOMAK KGM-10.0

ITOMAK KGM2-20.0

Specifications

Table 2.

NAME	KGM-5.0	KGM-10.0	KGM2-20.0
Electric motor power, kW	3,0	5,5	5,5
Electric motor power of the discharge unit drive, kW	0,25	0,37	0,37
Rotational frequency of the rotor, RPM	650	600	500
Solids capacity, ton/hr	5	10	20
Slurry output capacity, m^3/hr	9,0	20	45,0
Maximum consumption of washwater, m^3/hr	15,0	18,0	30,0
Coarseness of the fed materials, (for alluvium),mm, no more than	3,0	3,0	3,0
Coarseness of the fed materials, (for ore), mm, no more than	1,0	1,0	1,0
Slurry solid contents, %	up 75	up 75	up 75
Volume of the concentrate, l, no more than	3,0	6,1	13,0
Weight of the concentrate, kg, no more than	6,0	12,5	25,0
Weight of the product, kg, not more than	500	800	1000
Product dimensions, mm, not more than:			
Length/Length with the hatch opened	1600	2050	2190/2460
Width	1110	1200	1590
Height	1230	1400	1630

ITOMAK Multi-Rotor Complexes with Continuous Discharge of the Concentrate

- The complexes comprise several ITOMAK centrifugal concentrators united into a single system. During the operation, as one of the rotors is filled with heavy minerals, it shuts down for discharge. Automatic control provides consecutive switching of the rotors into the discharge mode, as well as the periodicity of the process (within a few minutes to hours).
- The advantages of multi-rotor complexes are in the simplicity of the design, in the possibility to create complexes of varying performance, ease of control and repair, low price.
- The simplicity of the design is in the complex comprising several single-type concentrators of small performance (10-40 ton/hr). They have been batch-produced for over 15 years, are reliable and well-tested. The spare parts and supplies for them are always available; they are easy in maintenance and repair. The complex may comprise two, three, or more concentrators; therefore, its capacity can be scaled if necessary.
- The first three-rotor centrifugal concentrator was created at the design bureau of ITOMAK, CJSC in 2006. To date about 20 multi-rotor complexes with automatic control have been shipped to mining enterprises.
- For alluvial deposits we could recommend complexes based on three centrifugal concentrators of the capacity ranging within 10 to 40 ton/hr. From 25 to 100 ton/hr of solid material of minus 3 mm fraction can be fed to such a complex.
- For gold-extraction factories we could recommend the 3KG-40 complex of 100-110 ton/hr capacity for the below 1 mm material to be concentrated.

ITOMAK KG-30.0

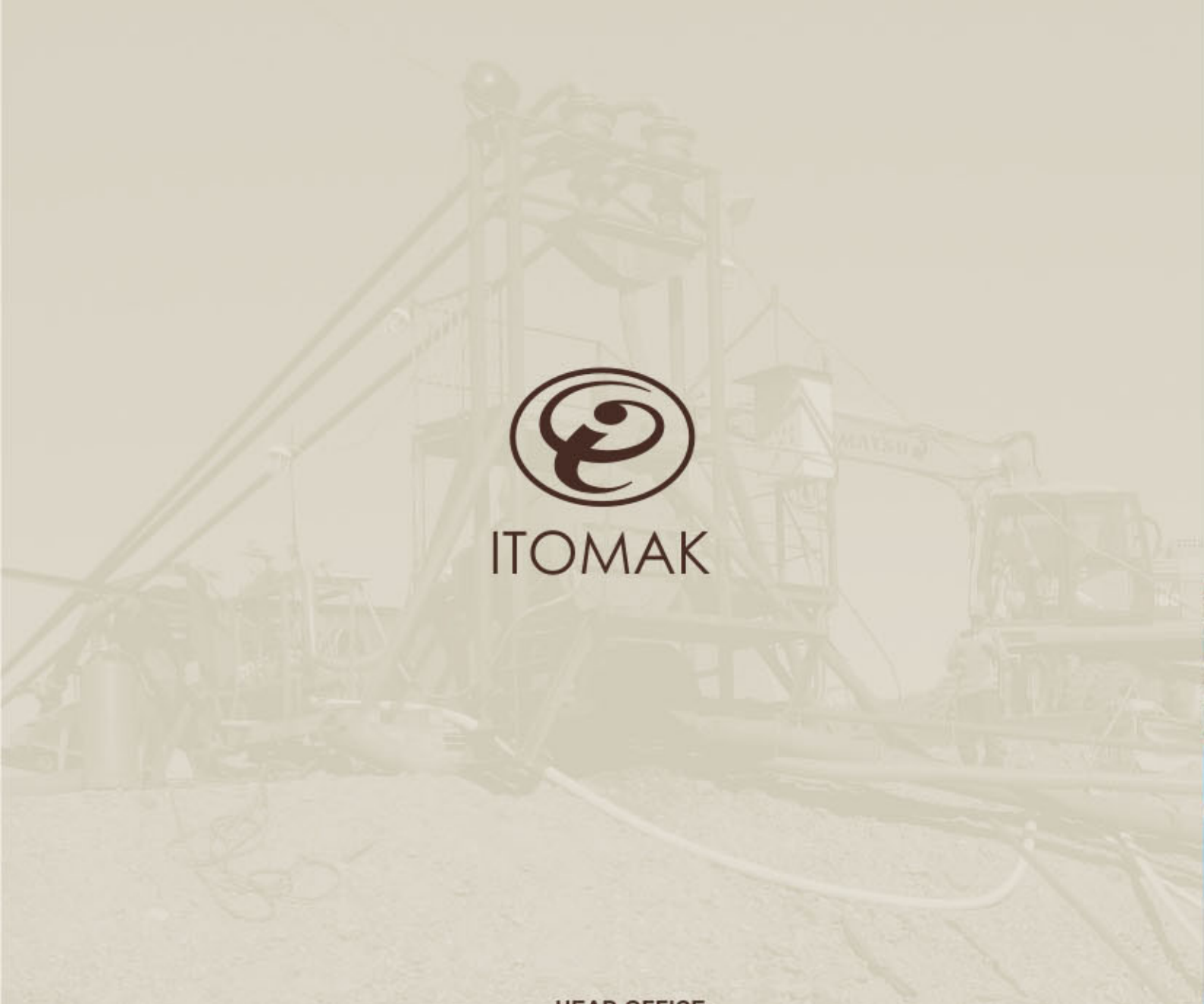
ITOMAK KGM-40.0 DK

ITOMAK MKG-120.0

Specifications

Table 3.

NAME	KG-30,0	KGM-40.0 DK	MKG-120.0
Electric motor power, kW	7,5	11	3x11,0
Electric motor power of the discharge unit drive, kW	0,37	0,37	0,37
Rotational frequency of the rotor, RPM	430	430	430
Solids capacity, ton/hr	30	40	100
Slurry output capacity, m^3/hr	60,0	80,0	200,0
Maximum consumption of washwater, m^3/hr	40,0	60,0	180,0
Coarseness of the fed materials, (for alluvium),mm, no more than	3,0	3,0	3,0
Coarseness of the fed materials, (for ore), mm, no more than	1,0	1,0	1,0
Slurry solid contents, %	up 75	up 75	up 75
Volume of the concentrate, l, no more than	15,0	40,0	120,0
Weight of the concentrate, kg, no more than	30,0	80,0	240,0
Weight of the product, kg, not more than	1250	1800	5000
Product dimensions, mm, not more than			
Length	2760	2760	3365
Width	1550	1500	3500
Height	1750	1780	2765



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