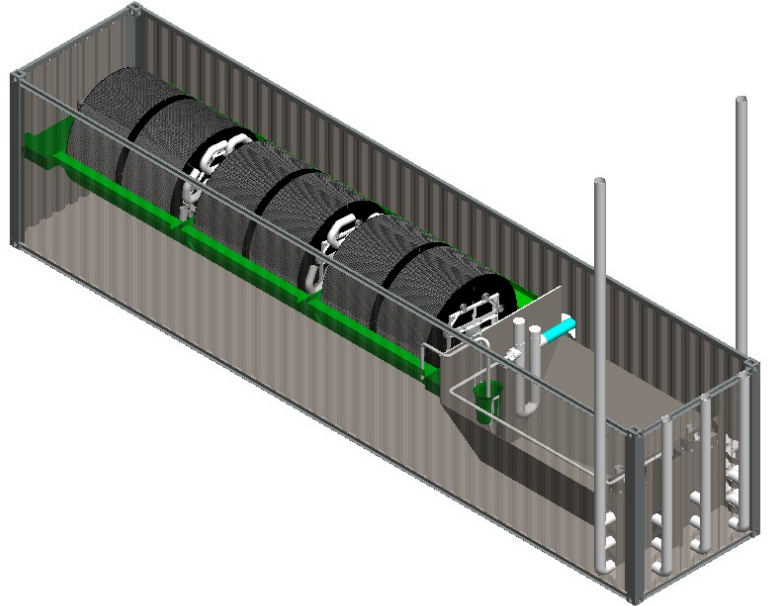


# The all-new BIOROCK-M RBC

The most advanced, high performance Rotating Biological Contactor, for the treatment of domestic wastewater, ever built.

## ALL NEW

The all-new BIOROCK-M Rotating Biological Contactor (RBC) was redesigned from the ground up over a period of 3 years to be more efficient, durable and simpler to operate and maintain than any other system currently on offer. Drawing from Decades of wastewater treatment plant design and operating experience, the system incorporates several new patent-pending process innovations, including an optimized Flow Control System and clog-free self-cleaning media, which feature the highest surface area per reactor volume currently available on the market<sup>2</sup>.



## APPLICATION

BIOROCK-M is a compact, single-piece domestic wastewater treatment plant, designed for small and medium-sized rural or semi-urban communities, with typically 250 or more population equivalents<sup>1</sup> (PE) including:

- Small municipal councils
- Hotels, Resorts, Camp grounds
- Mining, Military, Base or Aid Camps
- Expanding or rehabilitating existing plants or providing a nutrient removal unit process

## FEATURES AT A GLANCE

- A single-piece system with a sewer inlet, treated effluent outlet and electrical connection
- Standard ISO Shipping Container dimensions facilitate simple and low-cost transport and handling
- Robust & durable steel construction
- Direct drive motor – no chains or belts
- Patent-Pending Flow Control System
- Patent-Pending no-clog self-cleaning media
- No odour or vector nuisance
- Simple, Silent & Automatic
- Treated effluent can be reused
- Rapid commissioning, ready to operate within hours of delivery, ideal for temporary installations
- Low cost of ownership<sup>2</sup>

## DESIGN

BIOROCK-M incorporates all unit processes, including primary settlement, anaerobic digestion, anoxic and aerobic treatment, final settlement, polishing and disinfection in a single vessel. It can be configured either as a stand-alone unit, or with suitable flow diversion, in parallel unit processes. The patent-pending Flow Control System improves processes performance by buffering peak flows, whilst the tertiary polishing filter provides for consistent excellent final effluent.

## ENGINEERING & CONSTRUCTION

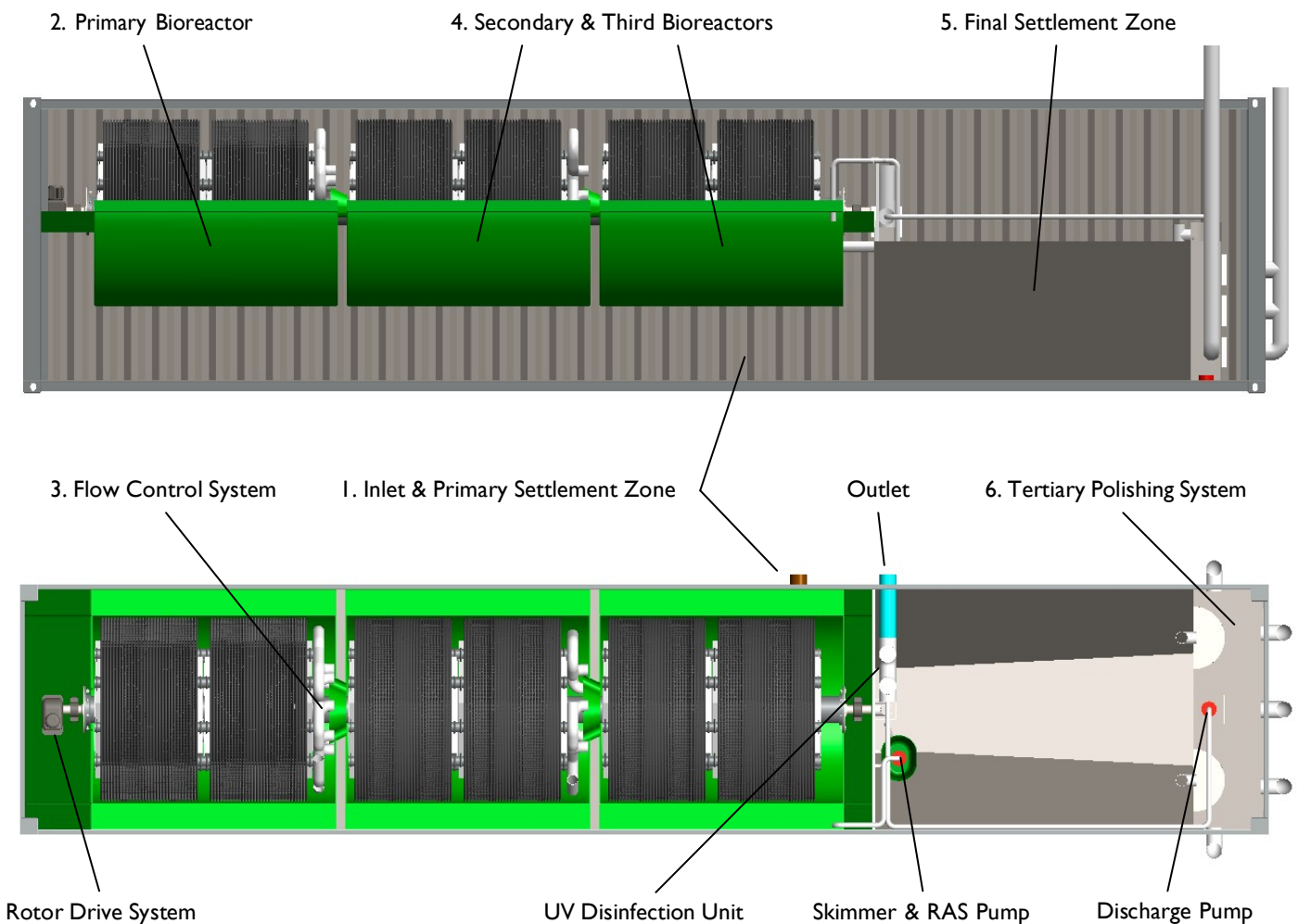
Purpose designed and built according to the specifications for a 40ft High Cube ISO Container, the BIOROCK-M is cost effective to transport, simple to handle and easy to install either above or below ground. The container dimensions result in significant transport savings when compared to other irregularly sized packaged sewage treatment plants. All steel components are suitably protected against corrosion with materials selected to find the optimal price-quality point. The system was stringently engineered with intensive focus on the drive system, rotor design and corrosion protection to counteract the consequences of poor maintenance, irregular overloading and component fatigue.

1) People Equivalent (PE): A Sanitation measurement unit representing the quantity of pollution produced by a person using between 150 and 200 litres of water/day

2) Comparative information correct as at time of publication

3) Smartphone application due for release in Q4 2013

4) Approximate figures



## OPERATING PRINCIPLE

The BIOROCK-M is a biological attached growth effluent treatment system that adapts automatically to organic load and hydraulic variations.

Bacteria develop naturally on the media discs placed in rotation to form a biological growth medium. While emerged, these bacteria become saturated with oxygen, and while immersed they feed on the dissolved organic material.

### 1. Primary Settlement Zone (Anaerobic)

Wastewater enters the primary settlement tank where solids and heavy particles including non-biodegradable items settle and consolidate into sludge, which requires periodic removal. Liquid containing suspended particles rise upwards and into the Primary Bioreactor.

### 2. Primary Bioreactor (Anoxic)

The primary bioreactor provide pre-treatment where the discs rotating at approximately 1.5RPM allow oxygen to be absorbed into the developing biofilm and naturally occurring bacteria attach to the discs.

### 3. Patent Pending Flow Control System

The Flow Control System manages the forward flow by means of baling devices attached to the media assembly to transfer a pre-determined volume of partially treated effluent into the secondary bioreactor.

### 4. Secondary and Third Bioreactors (Aerobic)

Liquor entering these zones is exposed to a further bank of discs on which grow a matrix of bacteria. Safeguarded from flow variations and harmful contaminants, the bacteria efficiently use the nutrients in the effluent as a food source. The rotation of the discs create a gentle flow path within the disc zones to move wastewater along the zone while sloughing ageing and surplus biomass from the discs, creating space for new bacteria to develop.

### 5. Final Settlement Zone

The treated effluent from the bioreactors is displaced into the final settlement zone where suspended solids and active biomass is separated from the liquor and periodically returned to the primary settlement zone. An integrated skimmer removes surface pollutants. The clarifier supernatant is displaced into the Tertiary Polishing Filter

### 6. Tertiary Polishing Filter

The BIOROCK-M tertiary polishing filter further removes residual suspended solids and pollutants without additional energy. In certain applications the tertiary polishing tank is used as a contact tank with a gravity discharge.

### 7. Disinfection

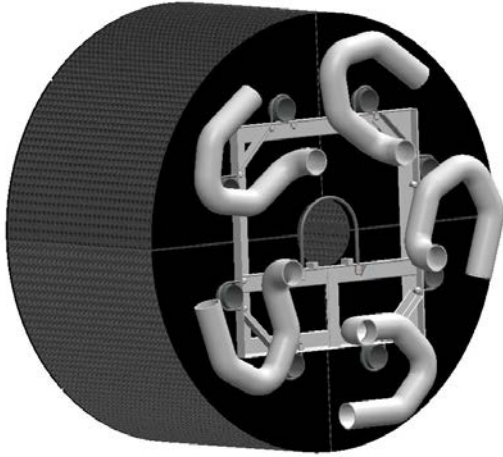
The final treated effluent is pumped through the optional UV disinfection unit.

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The BIOROCK-M Flow Control System consistently transfers a predetermined forward flow from one bioreactor to the next without clogging, effectively reducing the transfer volume over time.

#### ADVANTAGES

- Proven rotating biological contactor technology, a reliable process with consistent final effluent quality
- A complete treatment system in a single compact vessel, with a highly optimized PE-footprint ratio
- A high-end constructed solution with an excellent quality-price ratio. Robust, high-quality materials including stainless- and corrosion-treated steels, polypropylene and polyethylene discs and disc components guarantee a long service life
- Integrated primary settlement tank provides for screening of raw effluent eliminating screenings handling and improving hygiene
- Process adaptable to organic load and hydraulic variations with integrated primary settlement tank and patent-pending Flow Control System (allows ability to alter plant performance specifications for different applications)
- No risk of clogging as the self-cleaning media profile ensures a consistent biofilm thickness with continuous biofilm sloughing. Self-generating biofilm and process
- Lowest energy requirement per population equivalent compared to other treatment technologies<sup>2</sup>
- Simple operation with integrated pump or rotor failure alarm, and optional GSM notification system, necessitates minimal operator input. An optional PLC with remote monitoring and control system can be incorporated to operate the unit across WiFi or Ethernet through an internet browser or smartphone application<sup>3</sup>
- Modular design with upgradable process integrates well into any environment

#### EXCEPTIONAL FINAL EFFLUENT QUALITY

The all-new BIOROCK-M process complies with even the strictest effluent quality standards thanks to its efficient final settlement unit with integrated sludge return and surface skimmer as well as the tertiary polishing filter.

The combination of the BIOROCK-M process and BIOROCK polishing media allows separation of the treated water and the sludge. The achievement of water of very high quality, beyond most international norms or thresholds required today<sup>2</sup>, makes it possible to preserve water by re-using it, via reintroduction into the ground, landscape or agricultural irrigation, or for non-essential or non-hygiene applications such as vehicle wash bays, industrial process water, or similar.

#### TOTAL NUTRIENT REMOVAL

As an option, the BIOROCK-M can be configured for total nutrient removal (Nitrogen and Phosphorous) with an optional dosing system.



The clog-resistant self-cleaning media profiles developed for the BIOROCK-M provides high surface area for while maintaining optimal biofilm thickness.

#### OPTIONAL COMPONENTS & FEATURES

- Pump Station with duty/stand-by grinder pumps for very deep sewer inverts, to reticulate effluent to additional primary settlement tank or to lift effluent to an above-ground installation
- Integrated UV disinfection system with automatic lamp cleaner
- Chemical dosing disinfection system, either stabilised tablets or dosing pump
- Dosing system for denitrification and phosphorous removal
- Dosing system for pH correction (typically where primary settlement tank is susceptible to volatile fatty acids (VFA's) from commercial applications)
- GSM-module for system notifications
- Sludge dewatering bags for hygienic on-site sludge dewatering & sludge removal pump
- Hard cover roof for cold climate installations
- 3-Phase electrical configuration
- Insulated reactor vessel for cold climates
- Exterior coating available in various colours to suit installation site (for above-ground installation)

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## BIROCK-M Technical Specifications

Specifications subject to change

Model	M250	M400	M600
<b>Operating Loads</b>			
PE	250	400	600
Maximum daily BOD (kg)	15	24	36
Maximum daily Ammonia-Nitrogen (kg)	3	4	5
ADWF (m <sup>3</sup> )	40	60	90
PDWF (m <sup>3</sup> )	50	80	120
Nitrification	Complete	Partial	Minimal
<b>Dimensions &amp; Weight</b>			
Overall Length (mm)	12,192	12,192	12,192
Overall Width (mm)	2,438	2,438	2,438
Overall Height (mm)	2,896	2,896	2,896
Mass (Dry/Operational) (kg)	6,500 / 60,000	6,500 / 60,000	6,500 / 60,000
Inlet Invert Depth (mm)	1,495	1,495	1,495
Depth below inlet invert (mm)	1,165	1,165	1,165
Outlet Invert Depth (mm)	1,100	1,100	1,100
Depth below outlet invert (mm)	1,560	1,560	1,560
<b>Bioreactor</b>			
Disc Material	Virgin Polypropylene	Virgin Polypropylene	Virgin Polypropylene
Disc Diameter (mm)	1,800	1,800	1,800
Total Media Area (m <sup>2</sup> )	2,800	2,800	2,800
Shaft Diameter / Thickness (mm)	275 / 15	275 / 15	275 / 15
Bearings	SKF	SKF	SKF
Gearbox	Bonfiglioli A80/SEW	Bonfiglioli A80/SEW	Bonfiglioli A80/SEW
<b>Vessel</b>			
Construction	Factory welded steel	Factory welded steel	Factory welded steel
Internal Coating	Liquid Rubber MetalSafe B-300®	Liquid Rubber MetalSafe B-300®	Liquid Rubber MetalSafe B-300®
External Coating	Jotun Jotamastic 87	Jotun Jotamastic 87	Jotun Jotamastic 87
Insulation (Optional, recommended for above-ground installations in cold climates)	Factory-applied polyurethane foam	Factory-applied polyurethane foam	Factory-applied polyurethane foam
Primary Settlement Tank Sludge Storage (m <sup>3</sup> )	10	10	10
Secondary Settlement Tank Surface Area (m <sup>2</sup> )	7.5	7.5	7.5
Tertiary Filter (m <sup>3</sup> )	2.5	2.5	2.5
<b>Electrical Components</b>			
Drive Unit	Bonfiglioli MIS/SEW	Bonfiglioli MIS/SEW	Bonfiglioli MIS/SEW
Drive Unit (kW Rating & kW.hrs/day)	0.37 / 8.88	0.37 / 8.88	0.37 / 8.88
RAS Pump	Grundfos Unilift AP	Grundfos Unilift AP	Grundfos Unilift AP
RAS Pump (kW Rating & kW.hrs/day)	0.65 / 1.0	0.65 / 1.4	0.65 / 4.0
Discharge Pump	Grundfos Unilift AP	Grundfos Unilift AP	Grundfos Unilift AP
Discharge Pump (kW Rating & kW.hrs/day)	0.4 / 1.8	0.4 / 2.7	0.4 / 2.1
<b>Optional Electrical Components</b>			
UV Unit	Daro EFF	Daro EFF	Daro EFF
UV Unit (kW Rating & kW.hrs/day)	0.3 / 7.2	0.3 / 7.2	0.6 / 14.4
Chemical Dosing Pump	Grundfos DMI	Grundfos DMI	Grundfos DMI
Chemical Dosing Pump (kW Rating)	0.01 I	0.01 I	0.01 I
Nutrient Removal Dosing Pump	Grundfos DMI	Grundfos DMI	Grundfos DMI
Phosphate Removal Dosing Pumps (kW Rating)	0.01 I	0.01 I	0.01 I

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