**NIMEC LIMITED**

*Fast-Easy-Amazing*

# Product
# and
# Technology Presentation

Zero carbon emissions

Stable power generation

Modular structure

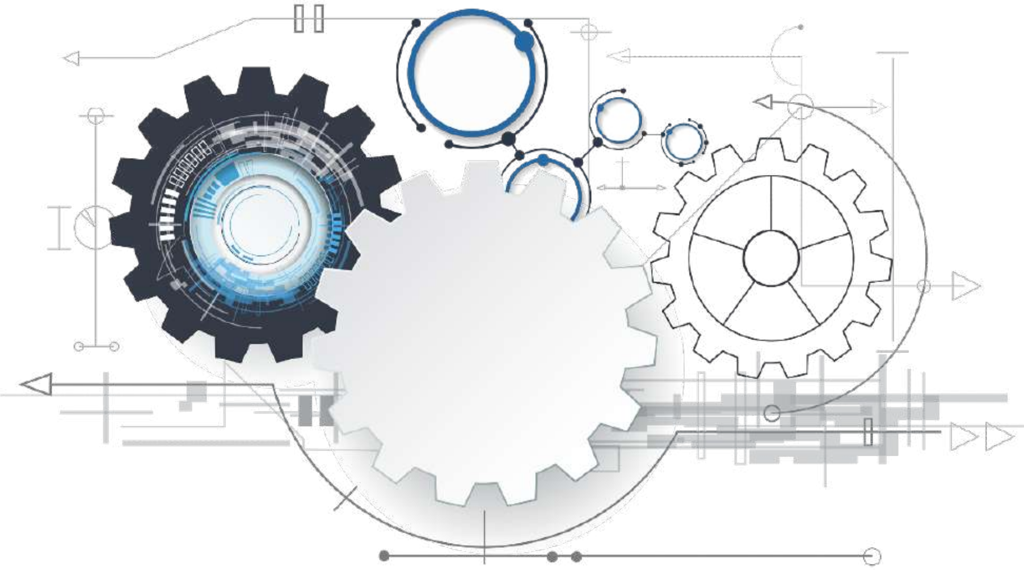

**2025**

**rev 3**

# Content







# 1. Introduction

NIMEC 's systems approach to creating stand-alone power systems that are modular, reliable, and ready for use in a wide range of environments.

We don't invent new equipment. We just re-engineer existing equipment chains and link it together by a new way.

NIMEC technical solutions are based on well-studied and decades-tested components - permanent magnets, inertial masses, industrial electronics and alternators. Our difference is in how they are connected to each other.

We develop architectures in which standard elements reveal new levels of efficiency, autonomy and durability.

NIMEC power systems are designed for long-term autonomous operation and are intended to provide reliable power supply in a wide range of conditions - from urban facilities and industrial sites to isolated areas, offshore platforms and mobile solutions. Each system is assembled based on serially produced components, without unique or unproven parts.

The generating modules are easily scalable and can be integrated into existing infrastructure or operate completely autonomously.

This document provides the fundamental operating principles of NIMEC power plants , key definitions and calculations, descriptions of components and possible configurations, and application examples in sectors ranging from power generation and mobile transport to the transition to a carbon-neutral economy.

# 2. Physical principles works

NIMEC power system is based not on fantasy, but on physics. In this section, we examine in detail the physical foundations on which the operation of the power plant is built. There is no place for pseudoscience here - all principles are based on proven laws of mechanics, electromagnetism and energy conversion.

We will show how standard components – from the flywheel to the magnetic system – form a closed engineering architecture capable of delivering stable and repeatable performance.

This is not a "perpetual motion machine", not an attempt to violate the second law of thermodynamics. It is the result of rigorous engineering and a precise understanding of interactions in a closed system with minimal losses.

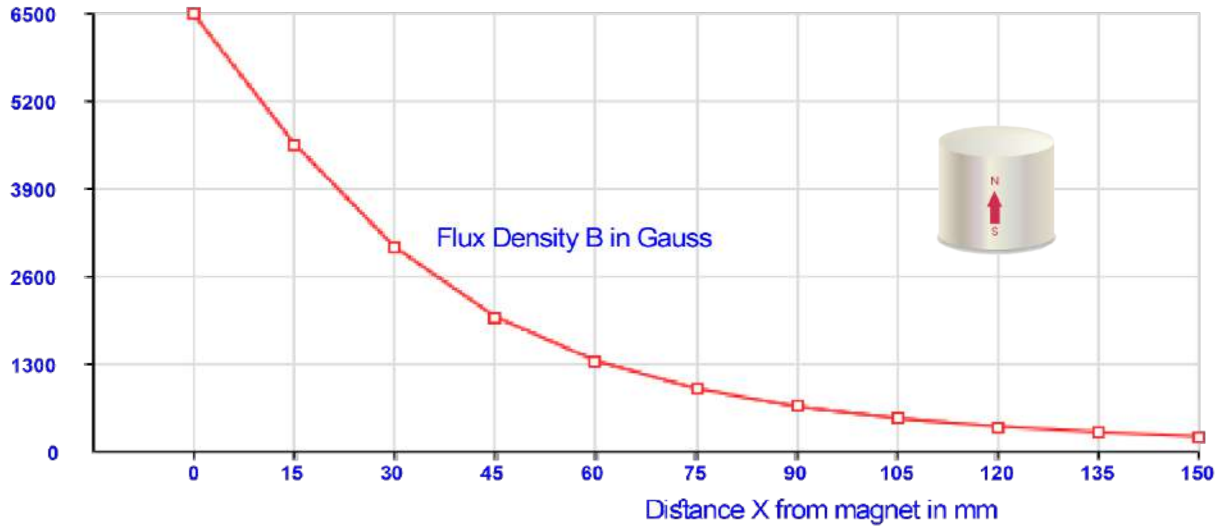
## 2.1. Key Definitions

This section provides a diagram of the action of the main forces from the point of view of classical mechanics, and also provides definitions of all the key physical quantities used in further calculations.

| Parameter | Formula for calculations | Units measurements | Definition |
|---|---|---|---|
| $\boldsymbol{n}$ | | rpm | rotation speed |
| $\boldsymbol{\omega}$ | $\omega = \frac{2\pi n}{60}$ | rad/s | angular velocity is the speed at which an object rotates or revolves around an axis |
| $\boldsymbol{l}$ | | m | distance (lever) |
| $\boldsymbol{l_m}$ | | m | length of electromagnet wire |
| $m$ | | kg | net weight |
| $g$ | 9.80665 | $m/s^2$ | acceleration of gravity |
| $\boldsymbol{F}$ | $F = mg$ | N | force is an effect that can change the speed of an object |
| $\boldsymbol{T}$ | $T = Fl$ | Nm | Torque is the rotational analogue of linear force |
| $\boldsymbol{P}$ | $P = T\omega$ | W | power - the amount of energy transferred or converted per unit of time |
| $\boldsymbol{v}$ | $v = l\omega$ | m/s | Linear velocity is the rate of change of linear displacement |
| $\boldsymbol{M_m}$ | | | number of permanent magnets |
| $\boldsymbol{N_m}$ | | | number of electromagnets |
| $\boldsymbol{f}$ | $f = \frac{nN}{60M}$ | Hz | switching frequency of one electromagnet |
| $\boldsymbol{R_d}$ | | m | radius of the full circle at the vertices of the magnets |
| $\boldsymbol{d}$ | | mm | diameter of permanent magnet |
| $\boldsymbol{z}$ | | mm | gap between magnets |
| $\boldsymbol{B_r}$ | | Gs | residual magnetization |
| $\boldsymbol{B_0}$ | | Gs | residual magnetic induction of a permanent magnet |
| $\boldsymbol{\mu_0}$ | $4\pi 10^{-7}$ | GN/m | magnetic constant |
| $\boldsymbol{B_{(z)}}$ | $B_{(z)} = B_0(\frac{d}{d+2z})^3$ | Gs | gap induction |
| $\boldsymbol{N_l}$ | | | number of turns electromagnet |
| $\boldsymbol{n_m}$ | $n_m = \frac{N_l}{l_m}$ | | number of turns per unit length |
| $\boldsymbol{I}$ | | A | current strength |
| $\boldsymbol{B_{0m}}$ | $B_{0m} = \mu_0 I n_m$ | | magnetic induction in the gap of the electromagnet |
| $\boldsymbol{R}$ | | Ohm | resistance of the electromagnet winding |
| $\boldsymbol{U}$ | $U = RI$ | IN | voltage |
| $\boldsymbol{P_m}$ | $P_m = UI$ | Tue | electrical power |
| $\boldsymbol{S_m}$ | $S_m = \frac{\pi d^2}{4}$ | $m^2$ | magnet pole area |
| $\boldsymbol{F_m}$ | $F_m \approx \frac{B^2 10^{-8} S_m}{2\mu_0}$ | N | magnet holding force |

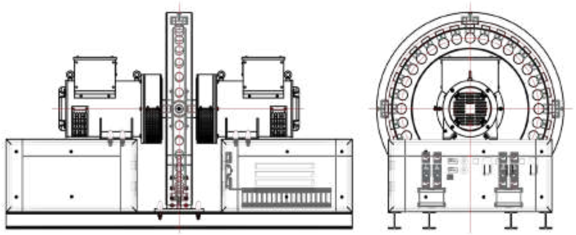
Now we define some parameters as constants for all systems using a permanent magnet motor: rotation speed ***n = 750 rpm***. The material of the permanent magnet is ***NdFeB ($Nd_2Fe_{14}B$)***, since it is the most energy-saturated of all serial types of permanent magnets, its residual magnetic induction reaches ***1.48 T***, the coercive force is not less than ***836 kA/m***, and the maximum magnetic energy density exceeds ***390 kJ/m³***. The class of the permanent magnet is ***N52M*** and ***Br = 14500 Гс***. We define the permanent magnet as a dense cylinder with a diameter of ***d = 100 mm = 0.1 m*** and height ***h = 100 mm = 0.1 m***.

Based on the above initial data, we determine ***ω = 78.54 рад/с***, ***$S_m$ = 0,00785 $м^2$***, residual magnetic induction of a permanent magnet ***$B_0$ = 6484,58 Гс***, magnet holding force at a temperature of 20°C, ***$F_m$ = 7762.747 Н***, weight of one permanent magnet 5.812 kg.




To minimize energy consumption during the interaction of the electromagnet with permanent magnets, a ***U-shaped core was selected***. The core material is ***Permendur (Fe-Co-V)***, which has a saturation induction of up to ***2.35–2.4 T***, which significantly exceeds the indicators of traditional structural and electrical steels. The system is designed with a calculated induction in the core of ***2.0 T***. The use of a U-shaped core implies two flywheels in the system. We determine the number of permanent magnets on one flywheel $M_m = 30$.

## 2.2. Scheme and Principle of Operation

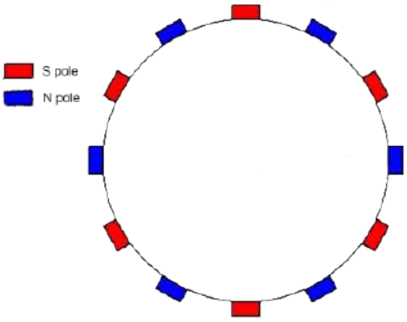


The drawing shows an electric generator that uses magnetic force to rotate alternator rotors. The drawing shows one disk, but multiple disks can be used to increase power.

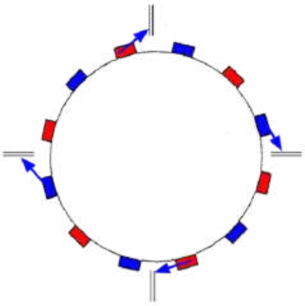
The principle of operation is based on the alternation of attraction and repulsion of magnetic fields, arising as a result of precise synchronization of their interaction.

The key engineering difference between the NIMEC magnetic propulsion system and most analogues is the ratio of forces between permanent magnets and electromagnets. In typical solutions, the main work is performed by electromagnets, which leads to high energy consumption and reduced efficiency. In the NIMEC system, on the contrary, the main force load is taken by powerful permanent magnets, and electromagnets are used exclusively in pulse mode - for short-term correction of magnetic interaction and cycle control. This allows to significantly reduce the overall energy consumption of the installation while maintaining stable mechanical operation.

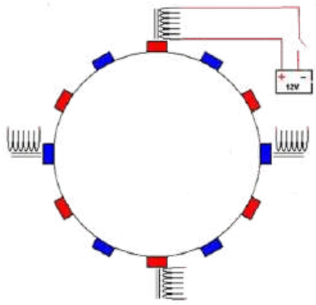
The diagram on the right shows the arrangement of permanent magnets on the flywheel rim. This arrangement is necessary to obtain the maximum force effect and minimum cost of electricity in providing rotation, which ensures the rotation of the alternator shaft, generating electricity for consumption.



This solution allows for the most efficient use of magnetic field energy, minimizing the use of electricity, which is critical for autonomous systems and remote applications.



The diagram on the left shows the attraction of permanent magnets to the cores of electromagnets. This interaction determines the rotation of the flywheel without the need for external energy sources. The energy sources are the magnets themselves, and as long as the permanent magnets retain their magnetic force, the effect of attraction will be maintained. This explains the principle of the "magnetic battery".



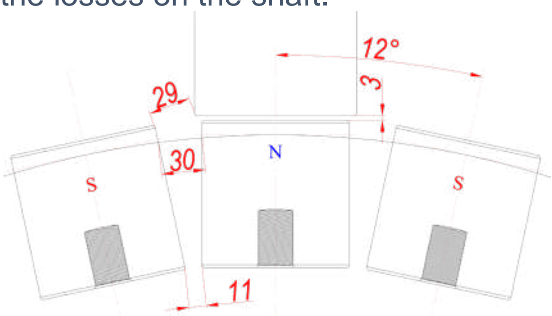

Next, to ensure free rotation, we switch on the electromagnets so that the polarities of the pole of the electromagnet, which interacts with the pole of the permanent magnet, and the pole of the permanent magnet coincide, thus we ensure the repulsion of the poles of the two magnets and thus the “flight” of the permanent magnet under the electromagnet. Next, we switch again electromagnet, changing its polarity, which ensures the attraction of the subsequent permanent magnet and increases the force of interaction, which is a very positive factor. Then the cycle is repeated again, ensuring rotation with minimal costs from external energy sources

## 2.3. Calculations and computations

This section presents the basic calculations that form the mathematical model of the plant operation. These calculations demonstrate the fundamental feasibility and confirm the complete energy autonomy of the generating modules. The assumptions used correspond to the classical laws of physics and engineering approaches, which allows an objective assessment of the system potential at various scales and configurations.

### 2.3.1. Calculation of Magnetic Generator with Power of 1000 kW

Using the above initial data, we will calculate the forces from the point of view of mechanics. Based on the mechanical efficiency of alternators on permanent magnets equal to ***0.98***, we determine the required torque ***T = 12992 H*** with rounding up. Since the alternator couplings are attached directly to the rotation wheel without a shaft, we neglect the losses on the shaft.




The drawing on the left shows a diagram of the interaction of magnets taking into account their overall dimensions and the minimum distances required to ensure the strength and rigidity of the flywheel system with magnets. Based on this arrangement, we will construct a flywheel drawing for further calculations.

The optimum diameter of the ***U-shaped electromagnet core is set at 110 mm***. This choice is based on engineering practice recommendations and the IEC 60404-8-4 standard, which provides for a core diameter to interacting permanent magnet size ratio in the range of 1.1–1.2. This size ensures uniform distribution of magnetic flux, minimization of material saturation at the edges, and optimum overlap of the permanent magnet field, the ***diameter of which is 100 mm***.

We take the lifting force of one pole rod of the ***electromagnet to be equal to 1500 kg***, which corresponds to the total lifting force of the ***U-shaped magnet*** assembled is ***3000 kg***.

Before we continue the calculations, we will determine the operation of the system and magnetic interactions. In the initial configuration, when the electromagnet is switched off, one permanent magnet is located opposite the electromagnet core due to the attractive forces, two adjacent permanent magnets are symmetrically on the sides. The attractive force of the central magnet is much greater than the attractive force of the side magnets due to weakening by mutual repulsion from the central magnet. In this state, the system comes to equilibrium, there is no torque. When the electromagnet with the opposite pole is switched on, there is a repulsion of the central magnet and an increased attraction of the side magnets. In practice, the attractive force is stronger and symmetry is preserved, only a chatter occurs, but no movement. To eliminate this effect, we raise the electromagnet coil by 10 mm from the edge of the core and shield one side of the core with an aluminum insert. As a result of this configuration, the attractive and repulsive forces on the side of the shield are mutually compensated. Since we use this configuration, in further calculations we will take into account only the active attractive force on the unshielded side.

We determine the induction in a ***gap of 30 mm***, using the law of field decay from the surface of the magnet with distance:

$$B'_{(30)} = B_0 (\frac{d}{d + 2z})^3 = 1583.1 \text{ Гс}$$

$$B''_{(30)} \approx 2680 \text{ Гс}$$

$$B_{(30)} = \frac{B'_{(30)} + B''_{(30)}}{2} = 2131.55 \text{ Гс}$$

where ***d*** is the diameter of the permanent magnet, mm; ***z*** is the gap between the magnets, mm. Now we define $F_{(30)}$:

$$F_{(30)} = F_0 (\frac{B_{(30)}}{B_0})^2 = 805 \text{ Н}$$

and thus we take into account magnets $F_{(30)} = 800$ N.

The diameter of the rim of the flywheel of the magnetic motor is 1.24 m , this diameter ensures a reliable fit of cylindrical magnets with a diameter 100 mm and 100 mm high , so that the magnets protrude by 50 mm above the surface of the rim end. Considering the non-magnetic material of the rim (aluminum or its analogue), such a position of the permanent magnets will ensure the preservation of maximum interaction of the magnetic field of the permanent magnet with the core of the electromagnet. We obtain the length of the arm from the point of interaction magnets to the center of the alternator shaft equal to the radius of the full circle at the tops of the magnets ***R = 0.670 m***.

Knowing the required torque and radius, we determine the required total force for one part of the flywheel with magnets and one pole of the electromagnets $F_{total} = 9696$ N rounded up. From here we determine the number of electromagnets $N_m = 14$ rounded up.

Now let's calculate the switching frequency of one electromagnet:

$$f = \frac{nN}{60M} = \frac{750 \cdot 30}{60 \cdot 14} = 27\text{Гц}$$

The obtained switching frequency ***is 27 Hz*** for one electromagnet corresponds to a low-frequency pulse mode, which is acceptable and technically justified for the selected massive ***U-shaped core*** electromagnet, high lifting force of one coil (from ***1500 kg*** ), pulse operation with saturation up to ***2 T.*** Such frequency provides effective control of magnetic interaction without overheating and allows precise calculation of the parameters of the coil and switching circuit.

Using our calculations, we will select an electromagnet from manufacturers: for an electromagnet with a lifting force ***of 30,000 N (3000 kg)***, voltage ***24 V*** DC and consumption ***90 watts*** . We get the total power consumption ***$P_{imp}$ = 14 magnets x 90 watts = 1260 watts***.

Thus, with a calculated mechanical power on the shaft ***of 1000 kW*** and power consumption of the electromagnetic system of ***1260 W*** , high conversion efficiency is achieved due to the support ***of a powerful magnetic field of permanent magnets*** . Electromagnets are only briefly switched on to form a torque, ***without creating active traction, but only initiating movement*** . This allows you to minimize losses, reduce the thermal load and simplify the power supply system, while maintaining the reliability and controllability of the drive.

### 2.3.2. 10MW Module Scheme

Module composition:

| Name | Quantity | Parameter |
|---|---|---|
| Generator, kW | 2 | 5000 |
| Electromagnets, pcs. | 140 | 90W |
| Own consumption, kW | - | 30 |
| Permanent magnets, pcs. | 600 | N52 |
| Containers | 4 | 40 feet |
| AC-DC transition, pcs | 1 | D173-5000 |
| Supercapacitor Bank, pcs. | 1 | GTSM-75V-200FUTHF |
| DC-AC inverter, pcs | 1 | FF6000R33TE3 |
| Transformers, pcs. | 2 | Siemens GEAFOL Cast-Resin type |
| Control system, pcs. | 1 | NIMEC |
| Fire extinguishing system, pcs. | 1 | Nitrogen gas |

# 3. Components systems

This section examines in detail all the major design elements that comprise the system. The goal is to confirm that the entire system is formed exclusively from standard components that are widely used in industry and available on the open market. This is essential both from the standpoint of technological feasibility and from the standpoint of repeatability and scalability.

Each element — be it permanent magnets, electromagnets, generators, flywheel, control system or power source — has serial analogues supplied by leading manufacturers. The complexity of the design is achieved not by the uniqueness of the parts, but by their engineering-verified interaction. Such modularity simplifies the assembly, maintenance and modernization of the system, allowing for independent verification of the operation of each unit.

## 3.1. Alternators

Alternators can be classified by the method of magnetic field generation: with permanent magnets ( PMG ) and with electromagnetic excitation ( EG ). For the considered design of the magnetic motor, preference is given to alternators with permanent magnets. This decision is based on the technical analysis of the key characteristics of both technologies and their applicability in a system with variable rotation speed.

In permanent magnet alternators, excitation is created by permanent magnets installed in the rotor. This eliminates the need for supplying excitation current, slip rings and brushes, reduces the number of moving elements and simplifies the design. This design allows for a stable magnetic field to be obtained in a wide range of revolutions, starting from low speeds (from 20 rpm), which is especially important in systems with variable load and irregular dynamics.

In contrast, excitation-winding alternators require an external power source and a brush assembly, which increases mechanical complexity and reduces reliability. In addition, such systems have a limited operating speed range and require constant excitation current control to maintain stable output voltage parameters.

In terms of efficiency, permanent magnet generators show higher values - up to 99% versus 80-85% for excitation machines. Also worth noting is the higher power factor and lower heat loss. The PMG design is usually more compact and lighter with the same output power.

Overall, PMG alternators provide better energy efficiency, simplify operation, eliminate components with limited life (brushes), and are more resistant to load fluctuations. These advantages make them the most suitable solution for use in a magnetic motor system, where reliability, modularity, and minimal energy conversion losses are critical.

## 3.2. Supercapacitors

For the accumulation and short-term supply of energy in pulse systems like the magnetic motor, the key parameters are the charge/discharge rate, permissible current, temperature stability and service life. Against this background, a comparison of the two main technologies - lithium batteries and supercapacitors - demonstrates the obvious advantage of the latter when applied to the system under consideration.

Supercapacitors provide high power density and are capable of delivering high currents in a very short time, which is critical for the pulse power supply mode of electromagnets. Unlike batteries, they are practically unlimited in discharge current and can instantly deliver accumulated energy without reducing the resource. This allows for stable and repeated switching of coils without overheating or degradation of the power element.

In terms of charging speed, supercapacitors are also significantly superior to batteries. They can charge up to 80% of their capacity in a matter of minutes, while lithium batteries require significantly more time even when using fast-charging modes, which in turn reduces their service life.

It is also important to consider operational reliability. Supercapacitors do not contain flammable components, are not subject to thermal runaway, and do not require complex protection systems, unlike lithium batteries, where overheating can lead to critical consequences. This is especially true in systems with variable temperature loads and vibration effects.

The service life of supercapacitors is many times longer than that of batteries. Typical values are more than 20,000 charge-discharge cycles without significant loss of capacity, while lithium cells rarely exceed 1000-2000 cycles under strict operating conditions.

Thus, taking into account the pulse nature of the load, high switching frequency and requirements for durability and safety, the use of supercapacitors instead of traditional batteries is the most justified technical solution.

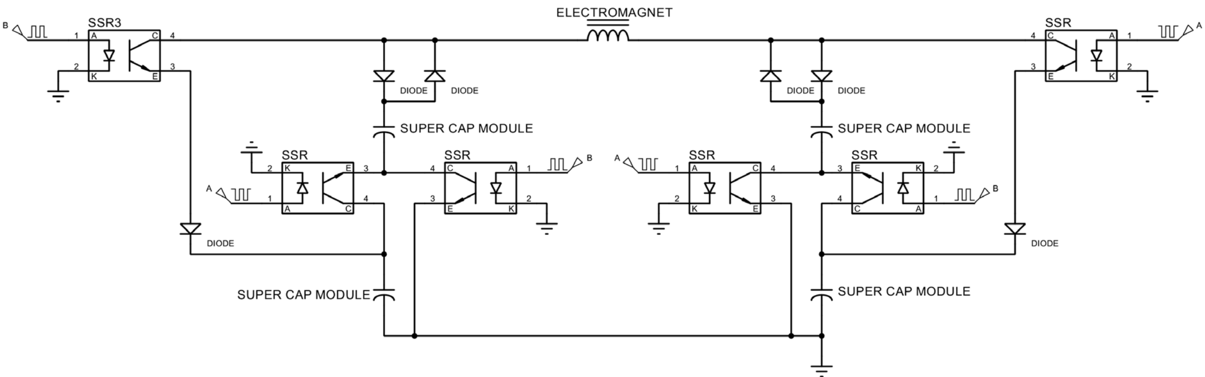
### 3.3. Control System

The control architecture is based on the NIMEC T-Switch node, an advanced pulse switch developed based on the principles of the Tesla circuit.

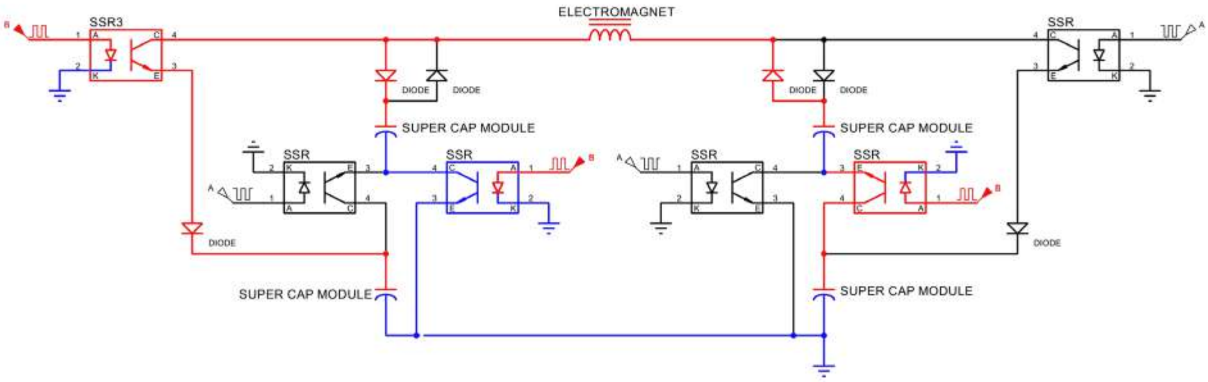
It ensures precise synchronization of the electromagnets with the rotor movement and allows minimizing energy consumption while maintaining a stable magnetic pulse.

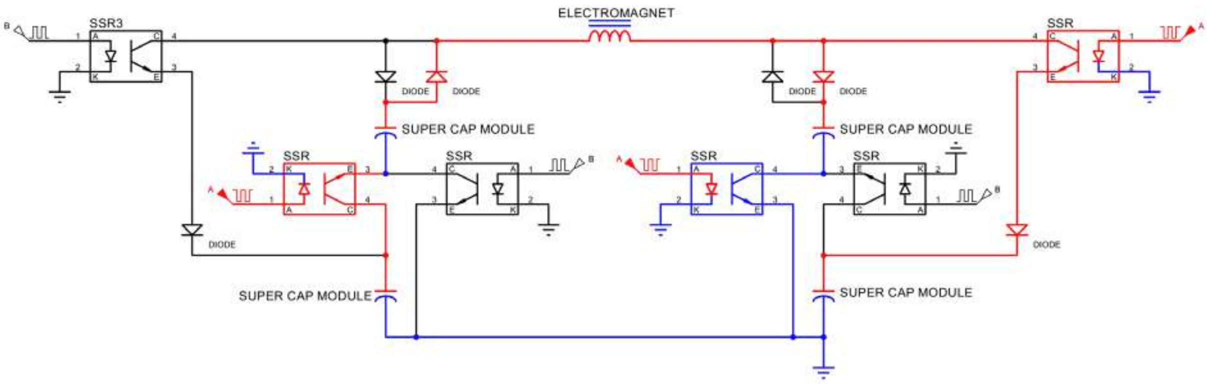
The control system is built on industrial components and can be integrated into any module configuration. The Tesla Switch is a concept proposed by Nikola Tesla based on a special circuit for controlling current between several sources and load.

The idea is based on the use of the reversible nature of electric motors and capacitive storage devices (in the original - capacitors) to organize a continuous flow of energy without its complete consumption. This approach allows not only to supply the load, but also to partially return the energy back to the source, thereby increasing the overall efficiency of the system.




The use of supercapacitors in the switch is critical due to their ability to charge and discharge quickly, withstand high currents, and lose virtually no capacity over time. Unlike batteries, they are resilient to frequent cycling and provide instantaneous energy output, making them ideal for circuits with pulsed or reversible current. In the context of a magnetic motor, supercapacitors allow the back EMF to be efficiently captured and utilized, increasing the overall efficiency and stability of the entire system.




During the operation of electromagnets, an electromotive force (EMF) inevitably arises in their windings due to changes in magnetic flux. In traditional systems, this energy is dissipated, but in our configuration itis captured and accumulated using supercapacitors. Due to their high response speed and ability to effectively accept pulse energy, supercapacitors provide partial recovery, which significantly extends the system's operating cycle on a single charge and increases its overall energy efficiency.

# 4. Application areas

The Applications section demonstrates the versatility and adaptability of NIMEC solutions . It highlights key areas where our technologies deliver efficient, reliable and environmentally friendly power – from large industrial facilities to mobile systems and carbon neutrality initiatives.

## 4.1. Electricity generation

NIMEC magnetic technologies, which allow energy to be generated without the use of fossil fuels and without harmful gas emissions. Permanent magnets serve as a reliable and durable energy source, ensuring stable operation without the need for frequent replacement or maintenance, which makes the system as environmentally friendly and economical as possible.

### 4.1.1. Installations with magnetic battery

NIMEC Magnetic Battery Power Modules are a plug-and-play solution that requires no external power source and uses no fossil fuels. Power is provided by the interaction of permanent magnets and pulsed electromagnetic activation.

Each module is housed in an industrial-grade noise-absorbing case. Standardized dimensions — width 1800 mm, height 1800 mm, length 2200 mm — ensure compatibility with transport standards, simplify logistics and installation. Despite the same dimensions, the modules vary in weight depending on their power: from 200 kW to 1 MW.

Only high-quality materials and components from renowned manufacturers are used inside the units. This guarantees reliable operation in a wide range of conditions - from autonomous industrial facilities to critical infrastructure.

#### 4.1.2. Modules

This system is the world's first modular power plant based on Container - Based technology. Power! This innovative system is a completely autonomous power generating station, assembled from four High format containers Cube 40 ft. The station is supplied in Plug & Play mode.

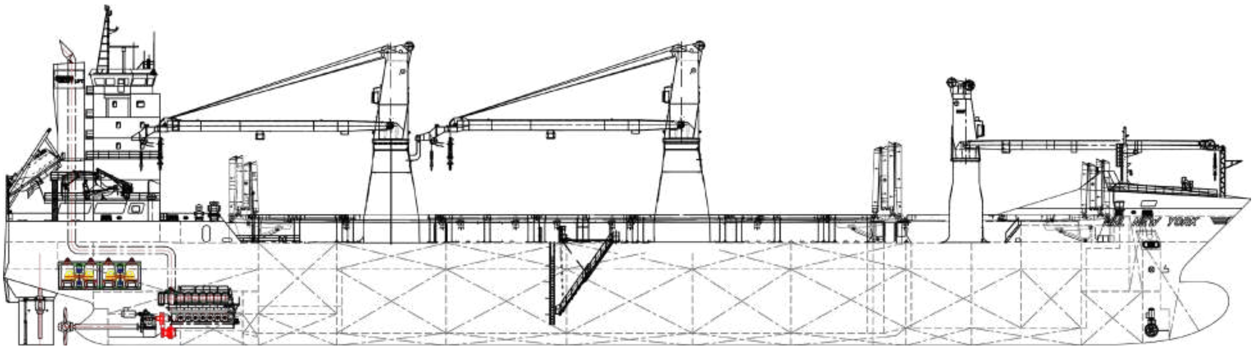
The use of permanent magnet motors allows us to convert almost 100% of mechanical energy into electrical energy with minimal losses. A unique solution - combining two generators on one common shaft and using a magnetic motor to rotate the shaft made it possible to create a closed energy system.

As a result: 100% of the energy produced by the generators is transmitted to consumers; the energy required for the internal operation of the station is provided by a small magnetic generating unit. This principle allows for truly autonomous, balanced and highly efficient operation of the entire system, completely isolated from external conditions.

### 4.2. Mobile application

This section examines the potential for NIMEC autonomous power modules in mobile systems for a variety of applications, from marine and wheeled transport to unmanned vehicles and robotics. These modules are compact, have high power density, and are independent of external fuel sources. They provide stable operation, easy integration, and are designed for long-term use in a variety of conditions.

#### 4.2.1. At Sea



We offer a unique solution that allows the ship's propeller to rotate without using the ship's internal combustion engine, and therefore without consuming traditional fuel.

Our solution does not require redesigning the ship's structure: there is no need to remove or exclude the existing power plant. All equipment is additionally mounted, integrating into the system without interfering with the standard mechanisms. This solution increases the reliability of the vessel and allows the use of two independent power plants - at the choice of the crew and depending on the sea conditions.

We use only standard equipment certified for marine use by leading global manufacturers such as: Bosch Rexroth is the world leader in marine hydraulics and drives; Danfoss Power Solutions — developer of reliable hydraulic motors for heavy-duty applications; Parker Hannifin is a supplier of hydraulic solutions for the shipbuilding and marine industry; Linde Hydraulics is a manufacturer of high-performance hydraulic motors and pumps for ships.

We connect a hydraulic motor of the appropriate power to the shaft or existing gearbox of the marine engine. In most cases, for small and medium-sized vessels, the power of one propeller does not exceed 800 kW - which fully complies with the parameters of standard certified hydraulic motors, tested by time and operation. The rotation speed of the propellers, as a rule, is 200-300 rpm - the ideal operating range for hydraulic motors.

The hydraulic motor is connected to the oil station via high-pressure oil supply and low-pressure oil return lines. The oil station configuration is selected individually depending on the characteristics of the selected hydraulic motor, using only standard, industrial, marine-standard tested solutions.

The oil station is powered by electricity generated by our autonomous energy system. This installation is based on the conversion of energy from the interaction of magnetic fields of permanent magnets and electromagnets, which ensures a stable, reliable and environmentally friendly supply of energy without emissions and fuel costs.

Converting a vessel to NIMEC technology significantly reduces operating costs by eliminating the need for traditional marine fuels and expensive emissions control systems. In most cases, vessels operating without heavy fuel oil save significantly on fuel costs, port fees, and environmental fines. Maintenance costs are also lower due to simpler, cleaner systems. Overall, the conversion provides significant financial benefits and improves long-term profitability.

### 4.2.2. On Land

The NIMEC Magnetic Module is a completely self-contained power plant that can be directly connected to both electric alternators and hydraulic pumps. This connection allows for efficient power supply of both generators and complex hydraulic systems – without the use of fuel, transmissions or conventional combustion engines. For ground applications – especially on tracked, wheeled and special equipment – the NIMEC module offers a number of technological advantages:


**Complete autonomy**: no internal combustion engine means no fuel required, no emissions and reduced maintenance requirements.

**Maximum reliability**: elimination of transmissions and vulnerable mechanical components - fewer breakdowns and failures in the field.

**Precise motion control**: hydraulic motors allow smooth or abrupt rotation, precise speed control and instant direction changes.

**Silence and eco-friendliness**: minimal noise, zero emissions - excellent indicators for use in cities, warehouses, and areas with special conditions.

**Low visibility**: virtually zero thermal signature - the equipment remains invisible to thermal imagers and IR guidance.

**Durability**: Even if the chassis is partially damaged (for example, individual tracks), the vehicle remains mobile thanks to multiple driving points.

**Quick replacement of supercapacitors**: under intensive loads, a discharged unit can be replaced with a pre-charged one in a matter of minutes - the equipment does not stand still.

NIMEC solutions are focused on modern challenges - autonomous power supply for mobile equipment in the most difficult conditions, including special operations, construction, logistics and remote facilities.

### 4.2.3. For Drones and Robots

In the context of rapidly developing robotics and autonomous systems, the key requirements for energy sources are compactness, durability and high specific power. Standard batteries are limited both in terms of operating time and temperature conditions, while technologies based on NIMEC magnetic installations open up new horizons of autonomy.


The NIMEC magnetic installation is a modular energy cell capable of providing stable power supply to highly loaded drives, sensor systems and computing units. Due to the use of powerful permanent magnets working in tandem with pulsed electromagnets and supercapacitors, a high level of energy output is achieved with minimal losses.

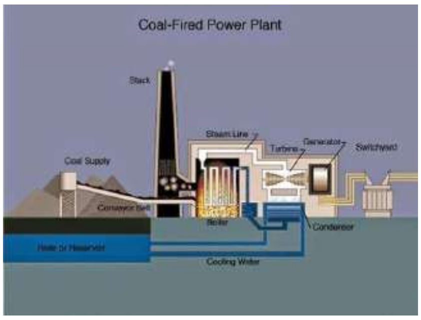
The absence of chemically active components allows the installation to be used in a wide range of temperatures and in conditions of complete absence of maintenance. This is especially important for reconnaissance or industrial drones purposes, as well as for robots operating in areas of radiation, chemical contamination or in hard-to-reach areas.

The ultra-low thermal footprint and complete silence of the installation ensure the devices operate unnoticeably in combat and noise-sensitive environments. At the same time, the design supports quick replacement of supercapacitor modules, which makes the system suitable for long-term autonomous missions without downtime.

The hydraulic system integrated into the NIMEC system also enables linear movements using flexible hydraulic cylinders, including those that mimic the work of human muscles. With its high energy density and precise pulse pressure supply, the system can be used as a hydraulic “heart” for autonomous robots, exoskeletons, and bionic mechanisms. Controlled contractions and expansions allow for natural dynamics movement without the use of rigid drives or external power supply.

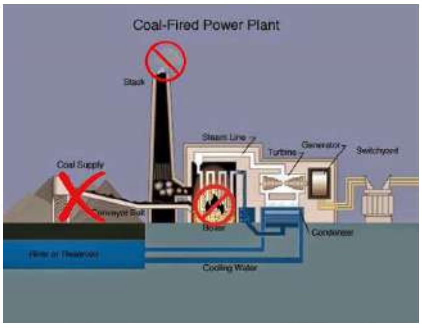
This opens up the prospect of creating truly durable and autonomous machines capable of operating in the field without recharging. The NIMEC module is a step towards complete energy independence for next-generation mobile autonomous systems.

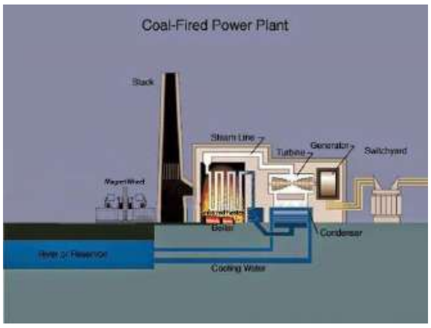
### 4.3. Transformation to Carbon Neutrality




Modern coal and gas power plants are designed according to a universal thermodynamic principle: fuel is burned in a boiler, heating water to a state of superheated steam, which then rotates a turbine that drives a generator. Despite the differences in fuel types, all such plants structurally include the same critical zone - a combustion chamber and a tubular hot-water boiler.

The operation of such boilers is associated with serious operational limitations. Water heating is carried out due to heat transfer from the walls of the pipes that come into contact with fire. This process is uneven, causing overheating and burnout of the pipes, which requires their frequent replacement. In addition, starting the system requires warming up the entire chamber to the operating temperature, which makes shutdowns and restarts extremely costly and technically undesirable. The main problem here is the physical nature of the heat produced by the chemical combustion reaction.




NIMEC offers a fundamentally new solution: replacing chemical heating with electric infrared heating. Infrared lamps create thermal radiation as close as possible to solar radiation, which is uniformly penetrates the boiler and heats the water directly through the tubes through a combination of radiation and heat transfer. Unlike open fire, infrared heat does not create local overheating, does not destroy the structure of the tubes and provides a stable and uniform temperature throughout the chamber.

The power of modern infrared radiation sources reaches 20 kW/m², which is significantly exceeds the efficiency of traditional combustion and allows the system to be easily scaled to suit any requirements.

Infrared lamps can be built into existing infrastructure - their installation in the boiler chamber does not require a complete replacement of equipment, only minor modifications. As a result, the structure of the station itself remains unchanged, but the need for fuel, smoke stacks, storage and transportation systems for raw materials disappears.

The energy for the infrared heaters is supplied by NIMEC installations. This results in environmentally friendly generation: no emissions, no coal or gas supplies, no destruction of the landscape. Just stable, autonomous, cheap and silent electricity production, ready for use on an existing industrial scale.

Retrofitting requires minimal investment — only the boiler chamber is modernized, the rest of the infrastructure is preserved. Fuel costs, its delivery and storage are completely eliminated. Operating costs are reduced: the service life of pipes increases many times, frequent repairs are not required. Electricity from NIMEC units is almost free, and the efficiency of infrared heating is higher. The result is a quick payback and a sharp reduction in production costs.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