



## VYCON<sup>®</sup> REGEN<sup>®</sup>

The Proven Flywheel Energy Storage System for Rail



*Innovation That Drives Industries<sup>®</sup>*



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## REGEN for Rail

- > Reduces total energy consumption
- > Reduces peak power demand charges
- > Provides voltage support for local power substations

Today, newer fleets of AC powered metro trains are equipped to regenerate a significant amount of power when braking. Unless another train is leaving the station at the same time, this regenerative power is simply wasted and turned into heat using banks of resistors to prevent causing an overvoltage on the DC bus. As an alternative, this power can be stored and used on demand when required. VYCON REGEN Flywheel Energy Storage System captures this power and makes it available to use elsewhere, such as to reduce the power required for another train to move away from a platform or to provide voltage support where power substations may not be able to support the demand.

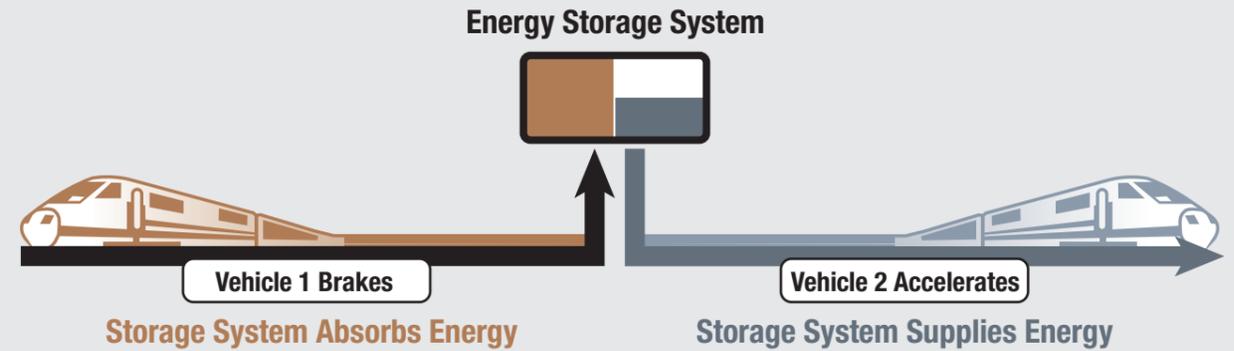
Some electric utilities charge more for power consumption during rush hours. REGEN significantly reduces, and in some cases, eliminates voltage sags and peak charges during rush hours. REGEN also addresses the effects of low voltage on the traction power system at a fraction of the cost of having to add new traction power substations. VYCON REGEN was developed together with rail and electric authorities in United States. The initial installation site at the Los Angeles Metro has accumulated over 200,000 hours and 1,000,000 cycles during normal train operations and is demonstrating significant savings.

## Proven Flywheel Technology

Flywheel energy storage systems perform reliably in applications where batteries and super capacitors fall short. VYCON REGEN stores kinetic energy in the form of a rotating mass and is designed for high power, short discharge applications. Patented technology used within the flywheel system includes the high-speed motor generator, contact-free magnetic bearings that are used to levitate and sustain the rotor during operation, and a superior control system that can provide information on the system performance and predictive maintenance. These innovative technologies enable the VYCON REGEN flywheel to charge and discharge at high rates for countless cycles, making conventional technologies obsolete.



Calnetix's global installed fleet of 1,200+ VYCON flywheel energy storage systems has accumulated over 26,000,000 operating hours and 19,000,000 discharge/recharge cycles. Applied in both regenerative energy and critical back-up power applications, the products are sold and distributed by companies like General Electric, Schneider Electric, Eaton, Mitsubishi, Vertiv (formerly Emerson Network Power) and others. They reliably back-up and condition power for the most critical applications, such as for hospitals, banks, data centers, broadcasting networks and defense organizations, in contrast to batteries and super capacitors, which can be highly unpredictable.



## Efficient and Economical Energy Storage

Unlike other energy storage technologies, such as batteries and super capacitors, which consist of hundreds or thousands of small voltage cells connected in series and in parallel, the VYCON native 750 Vdc or 1500 Vdc motor generator provides a bulk source of energy storage and provides:

- > The highest reliability and availability
- > The ability to operate continuously for a 2-minute headway metro operation without compromising product life
- > The lowest life cycle cost, lowest maintenance and operational costs and lowest installed costs
- > The smallest footprint per kWh of storage
- > Fast and simple installation and commissioning (can be done by operator)
- > Scalability through parallel REGEN systems to increase storage capacity
- > No interruption to metro rail operations or performance degradation over time due any and all of the following:
  - Number of cycles
  - Energy amount of each cycle
  - Hours of operation
  - Ambient temperature
  - Size of the energy storage installed

### Advantages of the Modular VYCON REGEN 125 kW system include:

- > Custom operating system and software interfaces optimized for the rail industry
- > Ability to operate without interdependency
- > Ability to optimize storage needs per installation site or over an entire line
- > Ability to program to optimize for energy storage, payback, voltage sags or performance as a substation

### Advantages of working with Calnetix include:

- > Easy in-house modeling tools and one-on-one training available for operators to optimize their energy storage system for their own rail operations
  - Determine where and how much energy storage to make available
  - Optimize per maximum energy savings or maximum return on capital
- > Diagnostic and prognostic information available for operators

### VYCON REGEN Specification

Output	125 kW nominal
Energy Storage	1875 kW-sec (0.52 kWh max)
Flywheel Rotational Speed	10,000 RPM to 20,000 RPM
Nominal DC Input/Output	750 Vdc/1500 Vdc*
DC Current	167 Adc @ 750 Vdc
Recharge Time	15 sec
Aux Input Power	120/200/208/240 VAC, 50/60 Hz, single phase
Enclosure Rating	IP2X
Operating Temperature	0-50°C
Humidity	95% non-condensing
Altitude	5,000 ft. max without derate
Height	89 in. (226 cm.)
Width	30 in. (76 cm.)
Depth	30 in. (76 cm.)
Weight	2200 lbs. (998 kg.)

\*Standard 750 Vdc, Optional up 1500 Vdc.

Contact Calnetix and let our product application engineers customize a REGEN energy storage solution for your specific sites.



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