



## 1. Introduction to TEV's super capacitor series hybrid drive system solution

Regarding the introduction super capacitor technology to power public transportation buses in Public Transport Victoria (PTV), Hunan CSR Times Electric Co.,Ltd (shortly TEV) recommend our super capacitor series hybrid drive system solution. In terms of super capacitor and engine, we can employ the international famous brand, for instance, Maxwell and Cummins. As for motor and drive systems, we can use our core products with our own intellectual property rights.

With the support of Chinese National High-Technology (863) projects implemented by China's Ministry of Science & Technology, in 2004 we start to explore and study on the series hybrid drive system technology. In 2008, first 20 buses installed our series hybrid drive system have been put in business operation. So far, there are nearly 1000 buses with our system (super capacitor) running across many cities in China, operate a total mileage of 200 million kilometers and longest mileage of 400,000 kilometers per bus, which now has a mature commercial operation mode and also get the consistent high praise from our customers. What's more, our buses with this system also contribute to public transport services for 2014 FIFA World Cup in Brazil.

In addition to the newly-build buses installed this system, we have successfully introduced our series hybrid drive system (super capacitor) to power a small batch of public transport buses with diesel engines for a big public transport company in China. So far, all the buses converted with our series hybrid drive system (super capacitor) have been put into use, and they are running stable and reliable, with remarkable improved fuel economy and emission reduction.

We have the mature super capacitor series hybrid technology as well as its practical mass application and conversion experience, which we believe, will help us to consolidate the technical and engineering basis to undertake PTV bus projects.

## 2. Technical Specification for Super Capacitor Series Hybrid Drive System

### 2.1 Working Principle

- Major parts include motor, generator, controller and super capacitor.
- Engine only drive generator, do not drive the bus. The bus is driven by the motor.
- To use the super capacitor to mediate engine work at high efficient working conditions in order to improve the fuel economy and emission reduction.
- To take the advantage of high power density characteristics of super capacitor to recover the regenerative braking energy in order to get improved and better economy.

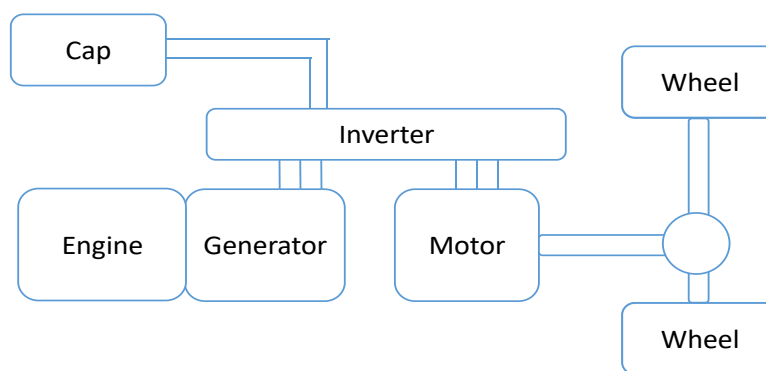


Figure 1 Structural Principle

### 2.2 Main Technical Parameters

Our system is designed to comply with the requirements of public transport services required buses to operate with high levels of stopping, accelerating, decelerating and idling in public spaces.

No.	Description	Parameter	Comment
1	Length (mm)	10~12	City Buses
2	Max Speed (km/h)	≥70	GB7258-2012
3	Max Gradeability	≥12%	CJ/T350-201
4	0~50km/h Accelerate Time (s)	≤25	
5	Weight Increase (kg)	≤800	Compared to Traditional Diesel Buses
6	Energy Consumption Indicator (Diesel-saving rate)	≥20	Actual Road Condition

Other parts: GB7258-2012 (National Standard) and other standards.

Table 1 Main Technical Parameters

### 2.3 Main Parts Technical Parameters

No.	Main Parameter	Main Part	
		Motor	Generator
1	Max Torque (N.m)	≥2500	≥550
2	Peak Power (kW)	≥135	≥110
3	Rated/Max Speed (r/min)	≥2600	≥2600
4	Cooling	Water-cooled	Water-cooled
5	Motor Type	AC Asynchronous or Permanent Magnet Synchronous	Permanent Magnet Synchronous

Table 2 Main Parts Technical Parameters

Note: Based on the difference requirements of bus power performance, the configuration of motors and generators can be adjusted.