

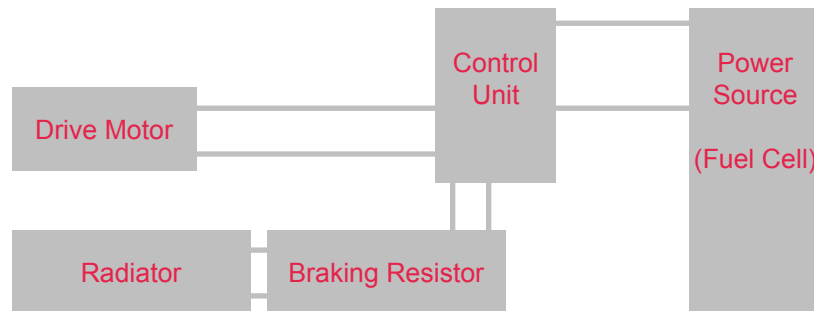
## LCHP SERIES

The liquid-cooled high power range of braking resistors has been designed for the Fuel Cell and Hybrid automotive vehicles where both, size and weight, is a major consideration.

Due to the advanced construction and the use of new materials it has been possible to reduce the size dramatically and therefore the ability of mounting the resistor within the motor compartment. The weight reduction in comparison to the conventional metal construction can be up to 50% and in some cases even more.

The LCHP range of resistors will, subject to the design of the controlling electronic and software, have the ability to provide a number of functions in the operation of the vehicle.

The simplest function is to operate as the braking of the vehicle, by the electronic controller connecting the LCHP across the drive motor when it is in the generating mode for the purpose of slowing down the vehicle.



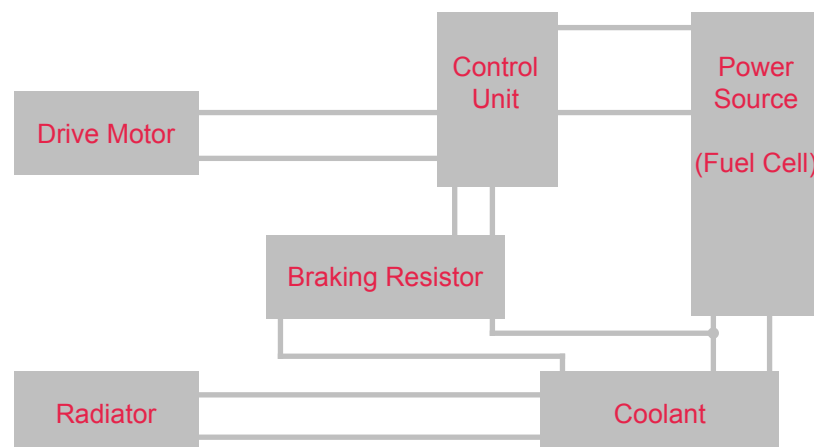
Adding to the electronic control software, the facility of controlling the braking of the vehicle in such a way, that when the vehicle is travelling down hill, a pre-set speed will be hold by the LCHP braking resistor, by being interjected across the drive motor which by now is a generator, thereby holding the vehicle to the selected speed.

The LCHP braking resistor, when power is directed to it by the electronic control unit, will convert the power into heat which is transferred to the liquid coolant.

This raises the question, where this heat could be used more effectively instead of just wasting it.

In the simplest mode the generated heat, when required for the heating of the passenger compartment, will be directed to the heater, alternatively to the vehicle radiator.

A more appropriate use of the LCHP braking function is, to use the coolant and the generated heat for the purpose of retaining the Fuel Cell at the optimum temperature, so the temperature within the Fuel Cell is no longer sustained by the generating of electrical power.



Additionally the LCHP resistor can be used at the start-up, to assist the Fuel Cell obtaining the operating temperature by initially passing some or all of the generated power through the LCHP resistor and then using the coolant heat to rapidly increase the thermal status of the Fuel Cell.

In countries where the winter ambient temperature can be extremely low the LCHP resistor could be, through the electronic control unit, connected to the local power mains for the purpose of generating the minimum heating for the vehicle and the Fuel Cell to keep it at an appropriate temperature. Both, for the vehicle occupants and the Fuel Cell.