

# ET 292 Fuel Cell System

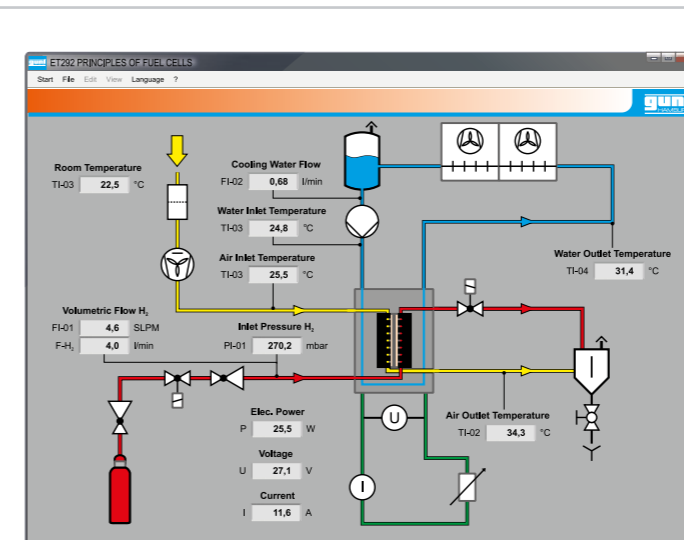
Modern fuel cell systems are becoming increasingly important in supplying households, for example in the decentralised conversion of energy. Local energy supply has the advantage of reducing transport losses to a significant extent. In addition, combined heat and power (cogeneration) provides excellent efficiency overall due to using both thermal and electrical energy. Companies in the field of heating engineering have recognised the potential of these systems and are currently

working hard on the market maturity and commercialisation of fuel cell systems for domestic energy supply. The requirements for fuel cell systems to become established in the liberalised energy market don't just include the matter of energy efficiency, but equally the economic potential. A future determined by the hydrogen energy economy is inconceivable without the use of fuel cells for energy conversion.

ET 292 is a fuel cell system which is operated in combined heat and power generation. The components of the fuel cell system are clearly mounted on a panel. The fuel cell is charged via an electronic load and operated voltage-regulated, current-regulated or power-regulated as desired.

The fuel cell uses oxygen and high purity hydrogen as working media. The oxygen is fed into the fuel cell via the ambient air by means of an integrated fan. The hydrogen is provided by a compressed gas cylinder and expanded to the fuel cell's system pressure through a multi-stage pressure reduction system.

- 1 high-pressure reducing valve with hydrogen pressure vessel
- 2 inlet valve
- 3 low-pressure reducing valve
- 4 hydrogen flow rate measurement
- 5 filter with cathode fan
- 6 fuel cell
- 7 water cooler
- 8 cooling water tank
- 9 cooling water pump
- 10 water separator



The software for ET 292 allows the most important variables to be captured

- inlet and outlet temperatures
  - ▶ air side
  - ▶ water side
- system pressure
- hydrogen volumetric flow rate
- electrical power
- current
- voltage

## Learning objectives

- conversion of chemical energy into electrical and thermal energy
- function and design of a fuel cell system
- relationships of fuel cell operating parameters
- effects on the electrical performance of fuel cells
- recording and visualisation of all relevant voltage/current characteristics
- calculation of relevant variables

