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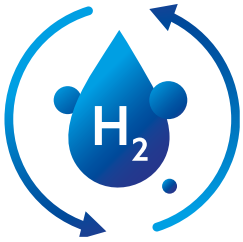
Fuel cell system FC-01

HYDROGEN POWER - CLEAN ENERGY FOR OUR FUTURE



HYDROGEN
ZERO EMISSION
CLEAN ENERGY

GENERAL DESCRIPTION

The FC-01 fuel cell system is based on hydrogen-powered FCO 2.5 fuel cells. The system consists of two parts:

a. The gas part, where hydrogen bottles are installed,
b. The hardware part, where FCU 2.5 fuel cells are installed.

Praca systemu nadzorowana jest przez sterownik MCU Jupiter.

The operation of the system is supervised by the MCU Jupiter controller.

The system is enclosed in an outdoor cabinet. Its task is to fully protect the equipment mounted in it from negative environmental influences and from interference by unauthorized persons.

An important task of the cabinet is to maintain in its compartment certain thermal conditions suitable for the equipment installed in the cabinet.

APPLICATION

- OFF-grid applications
- telecommunication and teletransmission
- Industry.

KEY FEATURES

- ✓ highly scalable – output power from 2.5 to 10 kW
- ✓ simple operation
- ✓ efficiency exceeding 50%
- ✓ Fuel cells are smaller and lighter than conventional solutions such as lead acid batteries or diesel generators
- ✓ wider temperature range in comparison to the battery
- ✓ low complexity and high reliability
- ✓ robust design: excellent protection against corrosion, dust, vandalism and intrusion
- ✓ two separate compartments for installation:
  - → 50l hydrogen bottles
  - → FCU 2.5 fuel cells
- ✓ the fuel cell module and the controller are plug&play technology for easy installation, commissioning, operation and maintenance
- ✓ expandable cabinets – possibility to extend the key parameters of the power system
- ✓ resistance to harsh climatic conditions
- ✓ thermodynamic functions of the cabinet
  - → heating during periods of low temperature
  - → ventilation during periods of high temperatures
- ✓ AC and DC distribution panel.

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TECHNICAL SPECIFICATIONS

Technical data		
Output voltage	Vdc	48
Output voltage with inverter system	Vdc	40,5÷57
Output power	kW	2,5÷10
System efficiency	%	>50
Output power / numer of fuel cells	kW	2,5 (1 fuel cell) 10 (4 fuel cels)
Range of ambient temperature	°C	-33÷+45
Material		galvanized steel
IP protection		IP54
Coating		External walls powder paint, RAL 7035
hydrogen storage		up to 6 x 50l high pressure 300bar bottles each provides 18.66kWh electrical energy
External dimensions of the cabinet (H×W×D)	mm	2000 × 1954 × 900
External dimensions of the MCU Jupiter controller module (H×W×D)	mm	3U × 19″ × 540
External dimensions Of the FCU 2,5 Fuel Cell (H×W×D)	mm	7U × 19″ × 540

SYSTEM DESIGN

The fuel cell modules are designed to connect directly to a 48 VDC bus. In standby mode, the fuel cell system consumes less than 50W of power and requires connection to an existing DC power system.

An external battery is required to provide system startup.

The cabinet consists of separate compartments with different purposes and adjusted thermal conditions to suit the equipment installed inside:

Fuel Cell Cabinet

The compartment is thermally insulated and can be heated or ventilated in case of very low or very high temperatures.

The air used for ventilation is supplied through a separate duct from the air supplied to the fuel cells used for the power generation process.

The air inlet and outlet channels are located on the rear wall of the fuel cell compartment. There are cable conduits in the compartment.

Gas cabinet

The hydrogen compartment is directly connected to the fuel cell compartment. The first cabinet contains a management module with a pressure regulator, pressure sensors and valves. For ease of access, all the piping is located at the top of the cabinet.

JUPITER CONTROL UNIT BASIC FUNCTIONS

- continuous control of system's operation
- remote monitoring:
  - → potential free contacts for Alarm, Warning, Low Fuel, Fuel Cell in Operation,
  - → RS485 (Modbus)
  - → Ethernet (TCP/IP) for Web Interface

System Operation Modes:

Standby: Constant monitoring of the 48Vdc bus voltage and takes low energy consumption from the external DC power system, switching on the heating or ventilation system in case of very high or very low temperatures,

Normal operation (battery extension mode) – when AC power is lost and switching to battery power, the voltage on the DC bus decreases. When it exceeds the preset level, the fuel cells start up and activate, which begin to generate power. The pressure in the tanks is constantly monitored to determine the remaining operating time. When the minimum threshold is exceeded, a low hydrogen capacity signal is generated.

Shut down – when the mains voltage is restored, the rectifiers start working and the voltage on the DC bus increases. When a certain (configurable) level is reached, the fuel cells will automatically shut down.

Self-test – When the standby state lasts for more than 30 days, an automatic system test is performed. The cells are activated for a short period of time, during which the components are tested. After a successful test, the system switches to standby mode.

varsion: v4.0 - released on: 26.05.2023
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