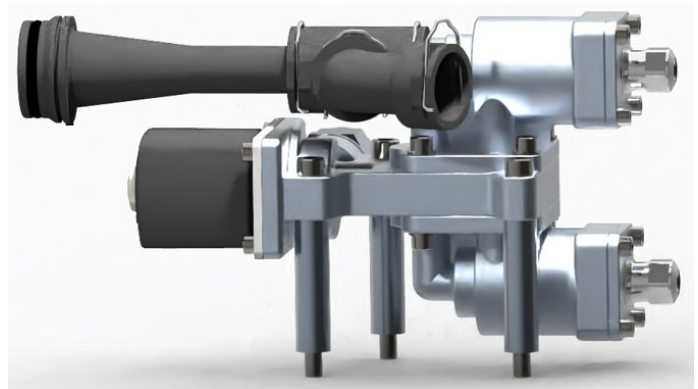


New generation

Hydrogen Pressure Control Unit

HPCU



Function

HOERBIGER's Hydrogen Pressure Control Unit (HPCU) addresses several functions in the low-pressure circuit of the anode loop in proton-exchange membrane (PEM) fuel cell architectures. Main functions are hydrogen injection and system pressure regulation in combination with passive recirculation of the anode gas. The fresh H₂ from the tank system is precisely injected into a nozzle by two valves. A nozzle accelerates the fluid to supersonic speed to create a vacuum in the recirculation stream to recirculate the fluid with hardly any parasitic losses. The HPCU is capable to cope with a wide variety of load points and therefore stack power levels higher than 150 kW for a single stack design are feasible. To provide the best performance in customer applications, the HPCU is always designed according to specific customer requirements (volume flows, stack inlet pressure, system pressure loss etc.).

Technology

Our standardized processes in product engineering and production are the basis for successful serial developments.

From the automotive industry, HOERBIGER has long-term experience in small- and large-scale production as well as in (automated) assemblies.

The valve technology is based on our patented plate valve technology originally designed for hydrogen combustion engines. HOERBIGER's HPCU utilizes two pulsating valves in order to gain flexibility in controlling load points and the amount of recirculation.

Furthermore, the HPCU design will be modular for easy customer adaption and best cost efficiency.

Parameters

- Primary hydrogen mass flows up to 3.5 g/s for stack power outputs > 150 kW
- Integrated shut-off valve (SOV) to comply with functional safety requirements
- Media compatibility for hydrogen, nitrogen, helium, air, water
- IP6K9K
- Optional sensor or filter integration
- Customer interface design and adaption

- PWM signal controlled injector valves including special operation modes
- Normally closed, current controlled Shut-off valve
- Engineering and design according to automotive standards

Technical specifications

Dimensions	
Dimensions (l x w x h)	~ (210 x 70 x 117) mm
Weight	< 2 kg
Orientation	Free, recommendation: ejector tilting slightly downwards
Functional	
Valve types	1x Shut-off valve (SOV) 2/2 NC, 2x hydrogen pressure control valves (HPCV)
Max flow	3,5 g/s (@ 10 bar _g)
External leakage (unit)	< 1·10 ⁻⁵ mbar·l/s
Working principle	Pulsating with duty cycle (5 up to 95 %)
Medium temperature	-40 °C up to +85 °C
Environmental temperature	-40 °C up to +105 °C
Mechanical	
Medium pressure side	
NWP (Nominal working pressure)	10 to 15 bar _g
MAWP (Max. allowable working pressure)	22 bar _g
Burst pressure	> 59 bar _g
Low pressure side	
NWP (Nominal working pressure)	0 to 4 bar _g
MAWP (Max. allowable working pressure)	4.5 bar _g
Burst pressure	> 5.5 bar _g
Electrical	
HPCU	
Voltage	Nominal 24 V (12 V and 48 V up on request possible)
Peak current (Changes through optimization possible)	9 A
Hold current	0.8 A
Signal frequency	10 to 35 Hz
Reaction time	< 4 ms
Average power consumption	Max. 45 W @ 10 Hz
Shut-off Valve	
Voltage	24 V (12 V upon request possible)
Connections	
Fluids	
H2-Inlet	Customer specific, e. g. G1/2" or Hylok pipe fitting
Recirculation Inlet	Customer specific, e. g. clipped flange
Outlet	Ejector is customer specific
Stack	
Connection points	e.g., 3x M6, as per customer interface
Electrical	
	AMP Superseal 1,5mm; 6 Positions Part-No. (282108-1)

Customer added value

- Less installation space and easier integrability
- Better overall system efficiency (hardly any parasitic power losses)
- System weight reduction
- Flexible load point control incl. special operation modes

Contact

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Next generation HPCU planned for 2024



- Highly integrated design
- Best ratio in terms of performance and dimensions (size)
- Ready for industrialization and up-scaled production
- Cost optimized
- Enhanced performance figures to be published soon
- Availability in Q3/24

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