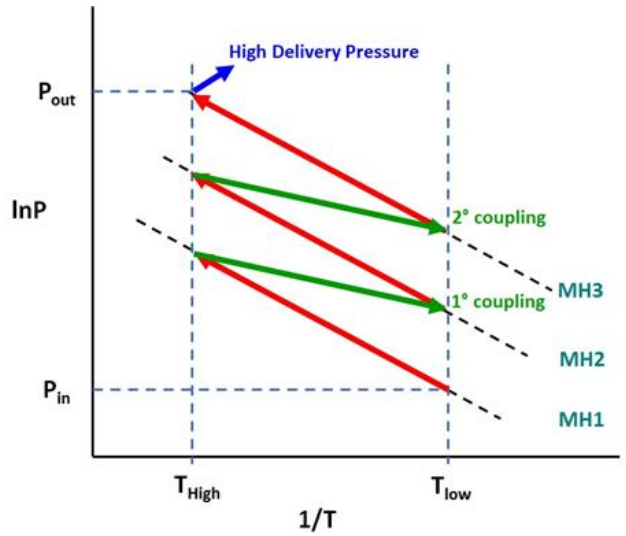
Model: MH-200-CYRUS-1.0

PRODUCT DESCRIPTION

MH-200-CYRUS-1.0 compressor is a non-mechanical high-pressure fully automated hydrogen compressor using metal hydrides. Hydrogen compression based on the reversible hydrogenation / dehydrogenation ability of metal hydrides (MH) has been proposed and investigated as a reliable process to compress hydrogen to high pressure without contamination and with relatively low energy costs. The method utilizes a reversible heat-driven interaction of a hydride-forming metal or alloy or intermetallic compound with hydrogen to form MH and offers an attractive alternative to conventional (mechanical) and other newly developed (electrochemical, ionic liquid pistons) concepts for hydrogen compression. The advantages of MH compression include simplicity in design and operation, absence of moving parts, compactness, safety and reliability, and the possibility to utilize waste industrial heat and/or excess renewable energy (e.g. solar thermal) for the required heating of the MH tanks.

The metal hydride-based hydrogen compressor can be tailored to cover a wide range of operating pressures and pressure ratios by selecting suitable alloys. To have a high outlet pressure, more hydride units can be serially connected, each unit with a different alloy and successively higher operating pressure. The most important properties of an alloy suitable for hydrogen compression are good hydrogen absorption - desorption rate, smaller process enthalpy, fast reaction kinetics, great structural stability during the cycles. For compression, metal hydrides with large pressure to temperature gradients are desired, especially in the range of low temperatures.



Generic Van't Hoff plot illustrating the operation of a three-stage metal hydride hydrogen compressor

This operating principle called thermal hydrogen compression system – based on the equilibrium pressure as a function of temperature and hydrogen content of the hydride – offers an innovative economic alternative to traditional mechanical hydrogen compressors apart from the technical application for hydrogen storage in solid material.

Technical data

General	
Type	Thermal Compressor
Material	Metal hydrides
Version	1.0
Application	Hydrogen Refuelling Stations (HRS)

Mechanical	
Dimensions (L x W x H)	1.94 x 2.10 x 1.86 m
Weight	200 Kg
No of stages	6
Noise level	25 dB(A) @ 5 m
Cooling/heating medium	water
Inlet pressure	0.7 to 15 MPa
Maximum operating pressure	30 Mpa
Target fuelling pressure	20 MPa at 20 °C
Ambient operating temperature	-10 °C to 50 °C
MH operating temperature	5 °C to 95 °C
Outlet Flow rate	1.5 Nm^3H_2/h
Energy requirement	4.5 kWh/kg H2 from 0.7 to 20 MPa

Electrical	
Electrical Power	120 Watt (excl. water pumps & control system)
Power supply voltage	230VAC, 50/60 Hz
Power supply current (max)	30A

Control	
Operation	Fully automated based on advanced control algorithms

Certification	
Type of certification:	CE
Certification body:	EUROCERT

Technical diagram