

In the frame of an ESA TRP project, CTEC has developed an innovative double stage reed valve compressor for Hydrogen storage. This compressor is using 4 Moving Iron Controllable Actuators concept (MICA). MICA™ is a CTEC patented magnetic actuator offering proportional control, high efficiency and very low heating.

It features a fixed coil and fixed magnets placed in a stator, allowing to drive a moving iron part connected to a piston. In the compressor, the stator is outside the pressure housing, insuring very efficient heat drain and clean gas applications. Double effect piston concept ensures efficient vibration cancellation and quiet motion. Initial applications are zero boil off (ZBO) of Liquid cryogenic storages of bio-Gaz and Hydrogen, using Joules Thomson liquefaction principle. Because of their high efficiency and low heating, MICAs are also selected for space pulse type cryocooler applications.

> **APPLICATIONS**

Hydrogen Compressor, ZBO, pulse type cryocoolers

SPECIFICATION	UNIT	MICA™
Nominal force	N	360
Peak force	N	670
Nominal constant	N/A	36
Resistance	Ohm	0.4
Mass	Kg	20

Table 1: Performances of the MICA™ used in the hydrogen compressor

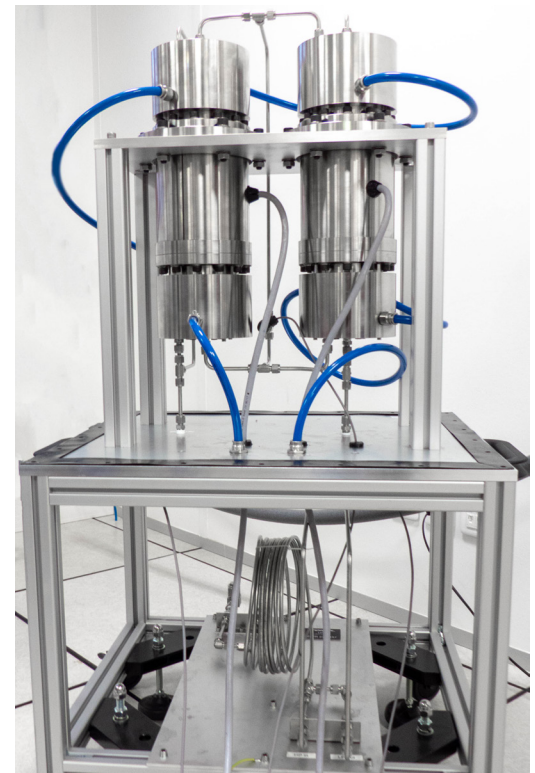


Fig. 1: View of the reed valve compressor

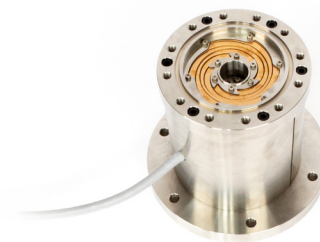


Fig. 2: View of the MICA™ used in the hydrogen compressor

SPECIFICATION	UNIT	HYDROGEN COMPRESSOR
> Two stages compressor system		
First stage input	Bar	5
First stage output	Bar	18
Second stage input	Bar	18
Second stage output	Bar	50
Other stages possible	Bar	<200
> Actuation		
Actuator technology		CTEC MICA™
Actuation force	N	>300
Electric power	kW	>1
Efficiency	%	80

Table 2: Performances of the hydrogen compressor

> **Advanced flexure bearing design**

- Frictionless design
- Free of lubrication
- Infinite lifetime >10 years at 50Hz
- Zero maintenance required

> **Dry compressor**

- Clean gas operation (Helium, Hydrogen, Xenon...)
- Only clean part in contact with gas