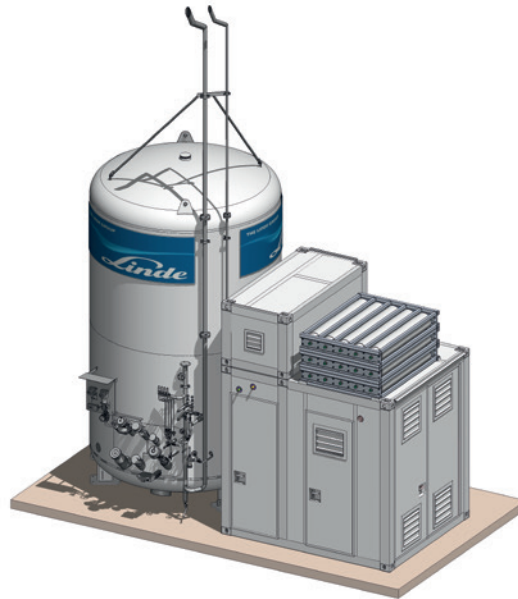




## Hydrogen fuelling station with cryo pump technology. Efficiency at its best.



Hydrogen fuelling station with cryo pump technology

### Description

Linde's high-performance cryogenic piston pump sets new standards for hydrogen fuelling stations. The extremely efficient process takes full advantage of the direct compression of liquid hydrogen and thus reduces energy consumption to a minimum. Due to the cooling capacity of liquid hydrogen, neither active cooling during fuelling nor standby is required, which further reduces operation costs. With all components necessary to meet the latest SAE J 2601 standard, the pre-mounted fuelling station is delivered to the construction site and can be installed very quickly.

### Technical setup

The setup consists mainly of the liquid hydrogen tank, the equipment container and the dispenser. Depending on customer preference, the tank capacities vary between 400 kg and 4,000 kg of liquid hydrogen. Within the container, the compression is carried out by the cryo pump with a maximum allowed working pressure (MAWP) of 100 MPa and a fuelling capacity of 50–70 kg/h (standard version). For special applications, the cryo pump can be modified to deliver up to 100 kg/h.

A highly integrated and thermodynamically very efficient temperature management system adjusts the dispensing temperature according to SAE J 2601 requirements. All controls and electrical cabinets are integrated in the equipment container. The interface between the fuelling station and the fuel cell electric vehicle is Linde's 35/70 MPa hydrogen dispenser, where also the flow measurement is performed.

### Fuelling process

The initial vehicle pressure is determined by a test pulse. Based on this test measurement and on the applicable tables in the SAE J 2601, and taking the ambient temperature into account, the final vehicle target pressure is calculated. The fuelling process starts by pressure equalisation through the buffer storage sections and online fuelling of the cryo pump system. According to the required pressure ramp rate defined by SAE J 2601, the hydrogen is fuelled into the vehicle tank until it reaches the target pressure. After the fuelling process, the station automatically switches to recharge mode and fuels the high-pressure section to 85 MPa.

## Technical data

Hydrogen fuelling station	CGH <sub>2</sub> fuelling technology
Dimensions (L x W x H)	6.1 m x 3.4 m x 4.0 m
Maximum allowable working pressure (MAWP)	100 MPa
Power input (complete station)	Below 45 kW
Storage tank capacities	From 400 kg to 4,000 kg hydrogen (depending on customer preference)
Storage tank pressure	Approx. 3 bar
Delivery rate of pump (standard version)	50–70 kg/h
Delivery rate of pump (modified version)	100 kg/h
Average delivery rate of fuelling station (standard version)	33.6 kg/h (i.e. 6 fuellings per hour with 5.6 kg dispensed per fuelling)
Noise level (standard version)	74 dB(A)
Ambient temperature	-40 °C to +50 °C
<b>Buffer storage</b>	
Buffer storage volume	3 x 0.25 m <sup>3</sup>
Maximum allowable working pressure	100 MPa
<b>Dispenser</b>	
Flow rate measuring	Mass flow meter
Maximum flow rate	60 g/s
Maximum delivery pressure (35 MPa)	43.75 MPa
Maximum delivery pressure (70 MPa)	87.5 MPa
Minimum nozzle temperature at 70 MPa	-40 °C
<b>Fuelling nozzles</b>	
Manufacturer/types	Various, optionally available with IRDA

## Advantages

- Very low energy consumption for compression and temperature management system
- High storage capacity on site on a small footprint
- Low power input below 45 kW for complete fuelling station
- High throughput
- Hydrogen with highest purities
- No additional cooling system
- High reliability
- Little maintenance effort and low costs
- Low noise emission
- Conformity with latest fuelling standard SAE J 2601

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