

Hydrogen Refuelling: RF1034

Hydrogen Playing it's Part in the Decarbonisation Mission

As we strive to meet global net zero goals, hydrogen is being recognised as one technology available to support with the decarbonisation of hard to abate sectors including mobility, aviation, and construction, where it can be used as an alternative clean energy source for propulsion or power generation either through hydrogen combustion or fuel cell technologies.



Hydrogen Refuelling Stations and the Facilitation of H2 Adoption

To facilitate the adoption of hydrogen, hydrogen refuelling stations (HRS) must be established and made available within the ecosystem to support the transition away from fossil fuels, enabling a cleaner future. In the same way a conventional petrol station operates, HRS's allow hydrogen vehicles to quickly, safely and reliably refuel.

The Importance of Delivering Hydrogen Safely

It is crucial that the high-pressure compressed and stored hydrogen gas is delivered into the vehicle's hydrogen tank in a controlled way whilst refuelling.

Without any measure of flow or pressure control there is significant risk of over-pressurisation, and because of the characteristics of hydrogen, over-heating of the hydrogen cylinders that could lead to a significant safety risk.

Pressure regulators in conjunction with industry standard refuelling protocols are adopted to mitigate these risks and allow for the safe and controlled refuelling of hydrogen vehicles.



ABOVE: Pressure Tech's spring, pneumatic and electrically actuated RF1034 pressure regulators.

It is crucial pressure regulators are designed to withstand the **low and high pressures** associated with H2 refuelling.

What Part do Pressure Regulators Play?

Maintaining Pressure

Pressure regulators are designed to maintain a constant and stable outlet pressure, regardless of the inlet pressure and any fluctuations or spikes. This ensures the precise control that is crucial for safe and efficient hydrogen refuelling.

High Flow Rates

Pressure regulators are capable of handling higher flow rates. This makes them more suitable for hydrogen refuelling applications than other solutions, serving multiple vehicles safely and quickly.

Robust & Reliable

Pressure regulators are robust and reliable, they are therefore able to withstand continuous operation in demanding environments. This means they are less prone to wear and tear, and so require less frequent maintenance and less HRS downtime.

Where do Regulators Fit Within the Hydrogen Refuelling System?

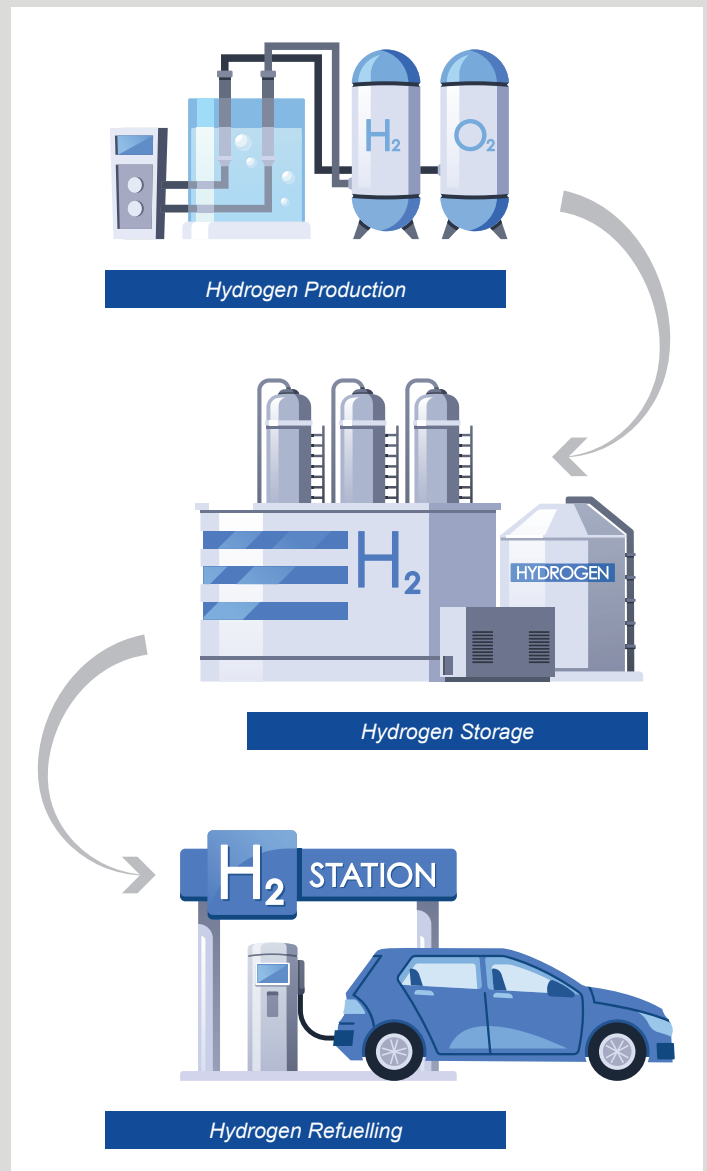
Within a HRS, the pressure regulator is a vital component integrated between the high-pressure storage that supplies the hydrogen gas and the dispensing nozzle that delivers the gas to the vehicles.

The high-pressure hydrogen is piped to the inlet of the pressure regulator and is reduced to as little as 20 bar, gradually increasing up to a pressure that will then fill the vehicle's hydrogen tank, typically 350 bar or 700 bar.

To enable this safe and reliable gradual pressure increase, the pressure regulator is typically controlled either electronically or pneumatically to dynamically condition the hydrogen outlet pressure in accordance with the refuelling protocol's pressure ramp rate.

Without a pressure regulator, there would be no way of controlling the refuelling operation and may result in over-pressurising or over-heating the vehicle's hydrogen tanks.

With all of this in mind, we designed and manufactured the Pressure Tech RF1034 hydrogen refuelling regulator.



The Pressure Tech RF1034 Custom-Designed Solution

The RF1034 is a piston-sensed regulator designed and manufactured by Pressure Tech. Every aspect of its construction has been considered with hydrogen refuelling in mind. From withstanding the low and high pressures associated with hydrogen refuelling, to being able to deliver high flow capabilities of up to 300g/s allowing for fast refuelling.

Controlling the Pressure: Methods of Actuation

To control outlet pressure, the RF1034 is available with a choice of three actuation methods – electronic, pneumatic, or spring.



1

Electronic

Electrical signals are used to automate pressure control.

Automated pressure control

Ease of system integration

Multiple options available to suit most requirements



2

Pneumatic

Compressed air is used to control the outlet pressure of the hydrogen.

Automated pressure control

Ease of system integration

Low actuation pressure: 7 bar max for full control



3

Spring


Springs generate movement within the regulator to control pressure.

Cost effective high pressure reduction and system protection

Easy low torque handwheel adjust, even at high pressures

Can be set and locked to a specific outlet pressure



	RF1034 Specification							
	TYPICAL PORT	CV	WEIGHT	SERVICE	MAX INLET	MAX OUTLET	SENSOR	VENT
	3/8" MP / HP 9/16" MP / HP	0.5 or 1.0	11.4kg (pneumatically actuated version)	Hydrogen	1,034 bar (15,000 psi)	1,034 bar (15,000 psi)	Piston	Non- or Self-Venting (Captured)



Weight:
11.4kg
(25lbs)



Height:
222mm
(8.8z")



Width:
203mm
(8")

Summary

The key features of our RF1034 hydrogen refuelling regulator include:

- 
Balanced Main Valve
 For the accurate pressure control demand by HRS applications.
- 
Cv 0.5 or 1.0
 For refuelling times which are in full compliance with SAE J2601.
- 
1,034 Bar Max. Working Pressure
 To easily cater for 350 bar and 750 bar applications.
- 
High Quality Materials
 Including a stainless-steel body, for reliability, longevity and performance.
- 
Designed to Industry Standards
 For example, ISO 19880-3, ensuring compatibility with new and existing HRS.
- 
Multiple Control Options
 Pneumatic, and electronic control allow for system design flexibility and pressure ramp-up in line with industry standards.



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