

# Level Sensor for Liquefied Hydrogen

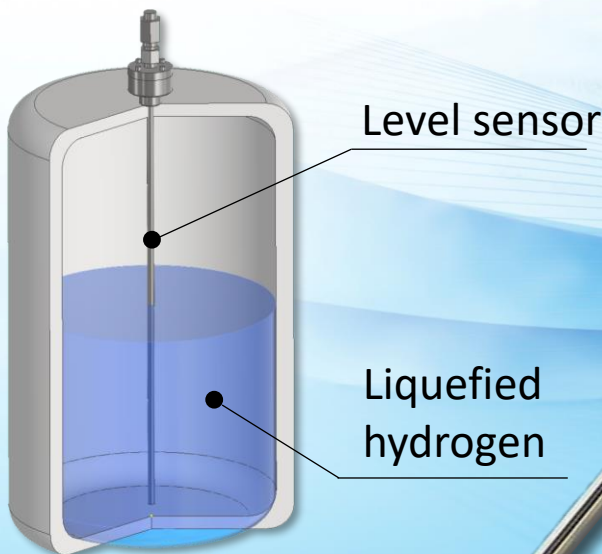
A completely new measuring device that measures the liquid level of liquefied hydrogen.

## Use superconducting wire

- ▶ Achieve high accuracy and high responsiveness
- ▶ Use inexpensive magnesium diboride

## Simple structure with no moving parts

- ▶ Maintenance-free
- ▶ Stainless steel tube that protects the superconducting wire
- ▶ The outside of the container is explosion-proof



【Installation image】



**Level controller is under development**

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※All pictures are under development.

## Outline

This product is a liquid level sensor developed for liquefied hydrogen. It is highly accurate ( $\pm 1\%$  F.S.) and responsive ( $\leq 100$  ms), enabling accurate liquid-level control of liquefied hydrogen. The main body of this meter is made of superconducting wire and has no moving parts, eliminating the need for maintenance.



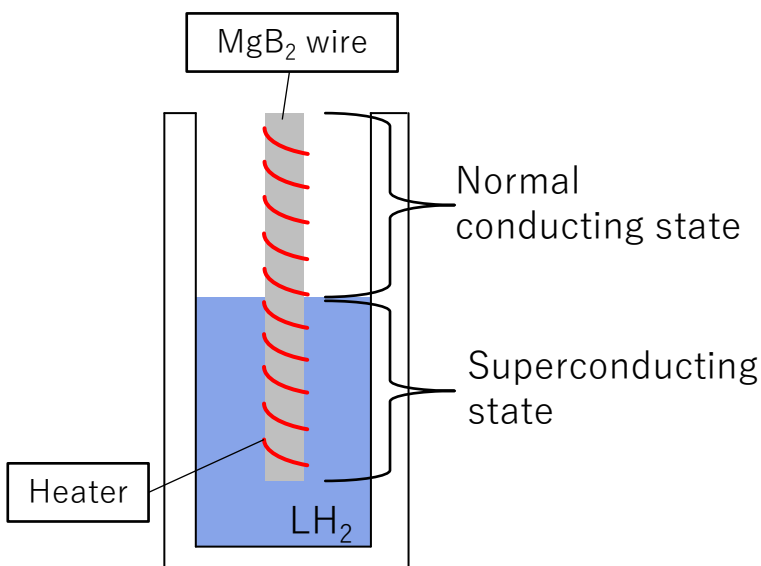
【 Level sensor 】



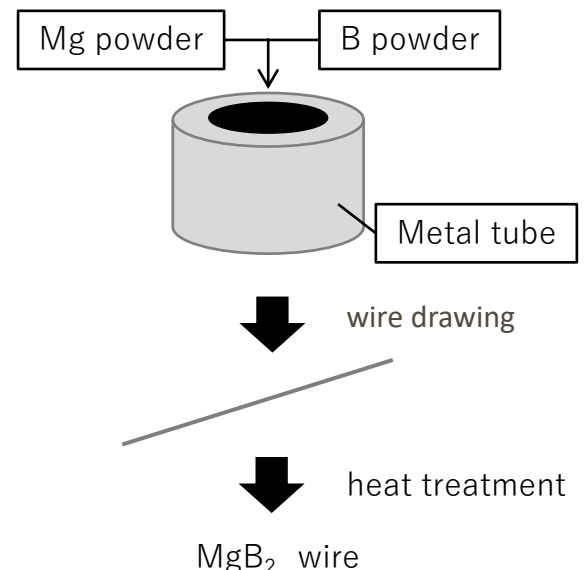
【 Level controller 】

## Principle

When a wire that becomes superconducting (zero electrical resistance) at liquefied hydrogen temperature is immersed in liquefied hydrogen, the liquid-phase part becomes superconducting. On the other hand, the gas-phase part is in the normal conducting state with electrical resistance. Therefore, the electrical resistance of the entire wire changes linearly with the liquid level, enabling accurate measurement of the liquid level. Accuracy is also improved by wrapping a heater around the wire to heat it and prevent cooling above the liquid surface. Our liquid level meter uses magnesium diboride ( $\text{MgB}_2$ ) as the superconducting wire, which is processed by the powder-in-tube (PIT) method. The inside of the wire is  $\text{MgB}_2$ , but the outer tube is made of metal with low temperature dependence on electrical resistance and high electrical resistance near the hydrogen liquefaction temperature.



【Measuring principle】



【 Powder-in-tube (PIT) method 】