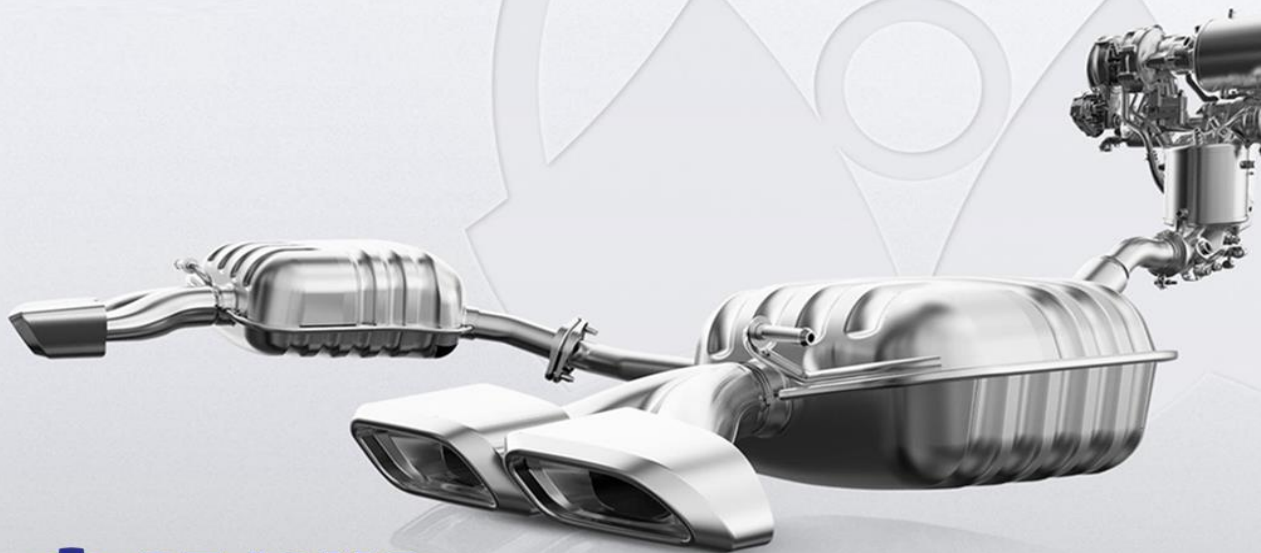


THE WORLD'S LEADING AUTOMOTIVE SUPPLIERS
SEJONG INDUSTRIAL Co., Ltd.

SEJONG Group



2.1

Hydrogen Sensor

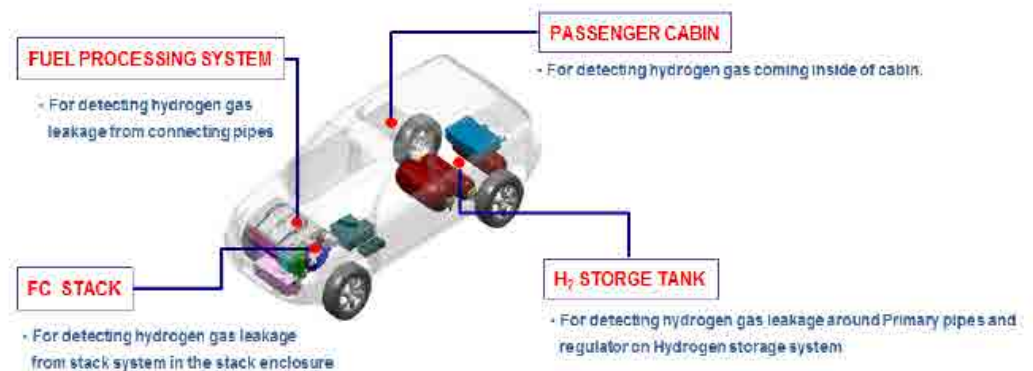
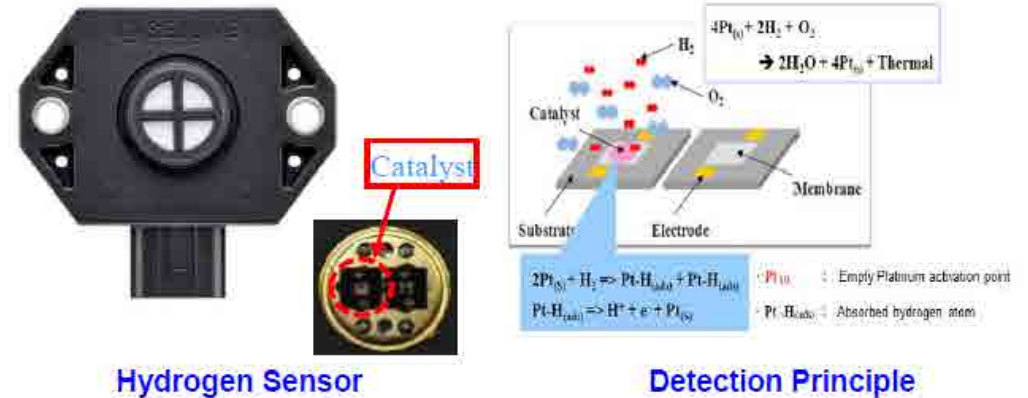
Function

- The hydrogen sensor is a core-component as safety device in fuel cell vehicle.
- Detecting any leakage of hydrogen gas is mandatory for vehicle safety
- In case hydrogen is gas detected, the sensor sends warning signal to the driver and ECU

No	ITEM	SEJONG Product
1	Detect Range	0 ~ 4%
2	Power Consumption	About 200 mW
3	Response Speed	Less than 2 sec
4	Accuracy	Within $\pm 10\%$
5	Working Temp.	-40 ~ 105°C

Application

- H₂ Gas leak detection in fuel cell systems
- H₂ Gas concentration monitors
- Hydrogen fuel cell vehicle



Installation of Hydrogen Sensors

Figure

2.2

Pressure Sensor

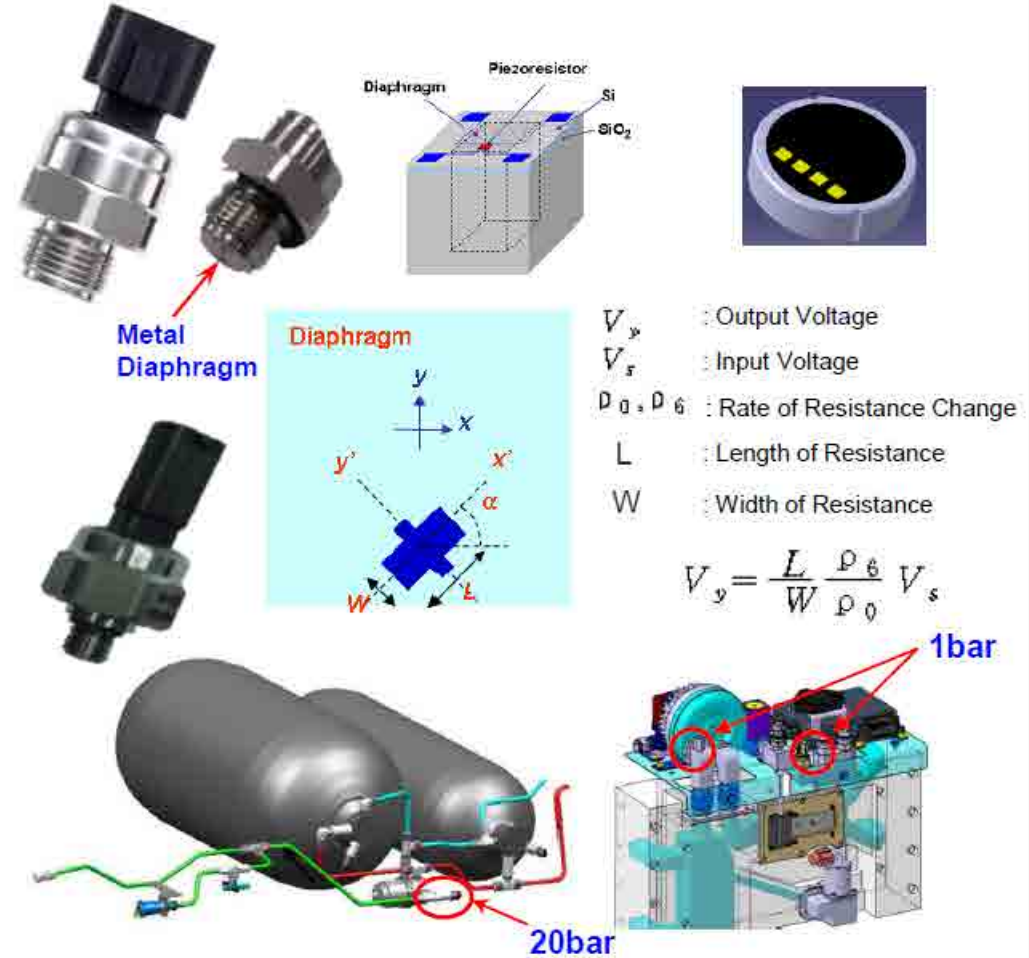
Function

- Monitoring the Pressure in the hydrogen supply line of FCEV
- It is needed for securing safety and controlling system driving condition
- Installing location of the pressure sensor by model
 - Mid Pressure : 20bar (H2 Pipe Line)
 - Low Pressure : 1bar (FPS)

NO	Standard	SEJONG Product
1	Output Range	DC 0.5 ~ 4.5V (Ratiometric)
2	Accuracy	< ±1.5% (typical)
3	Working Temp.	-40 ~ 125°C (typical)
4	Working Range	0~1bar, 0~20bar

Application

- Fuel Cell Electric Vehicle (FCEV)
- Fuel Cell Generator



Figure

2.3

Temp-Pressure Sensor

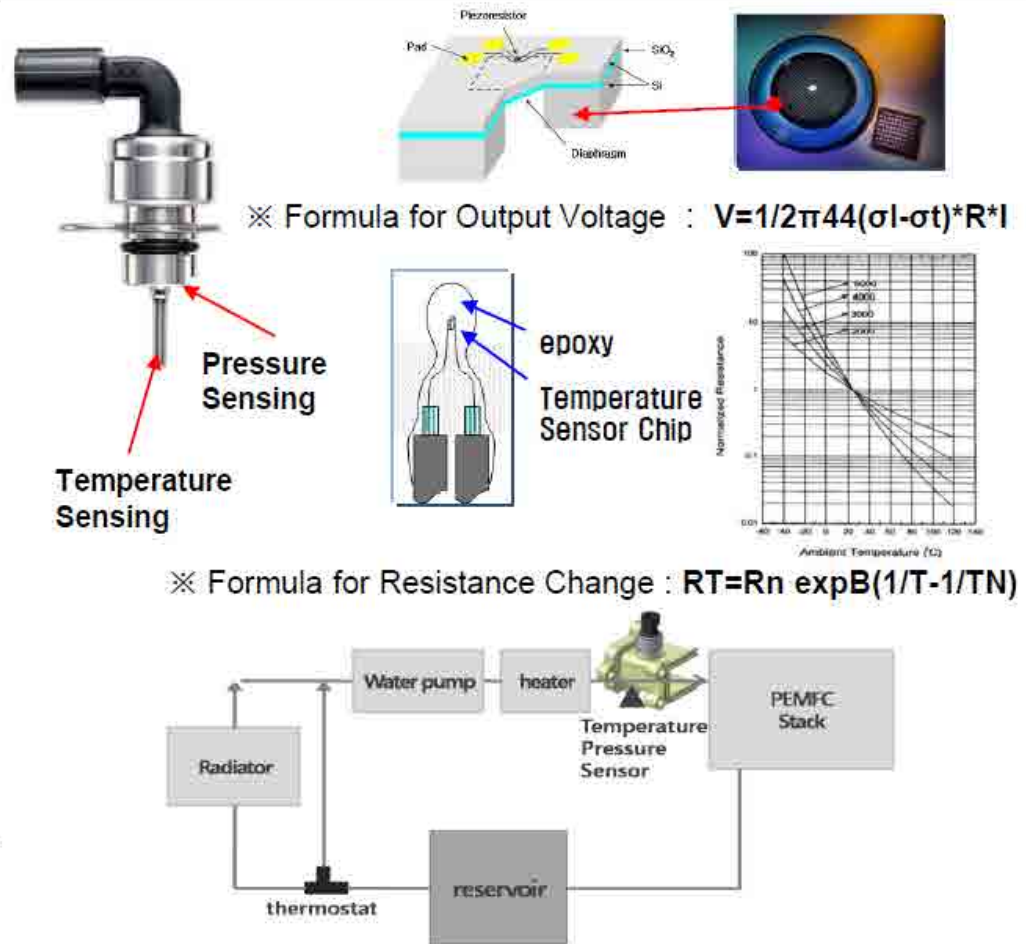
Function

- Measuring the temp & Pressure Sensor inside of Vehicle System
- By developing integrated Temperature/Pressure sensor, system packaging simplification and cost/weight reduction are possible

NO	ITEM	SEJONG Product
1	Accuracy(Pressure)	< ± 1.5% (typical)
2	Accuracy(Temperature)	< ± 1% @ 25°C (typical)
3	Working Temperature	-40 ~ 125°C (typical)
4	Detecting Range	0~1bar

Application

- Fuel Cell Electric Vehicle (FCEV)
- Coolant System
- Fuel Cell Generator



Figure

2.4

Water Level Sensor

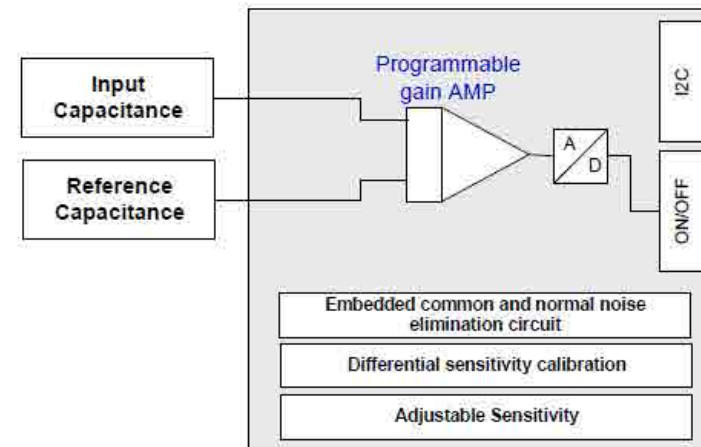
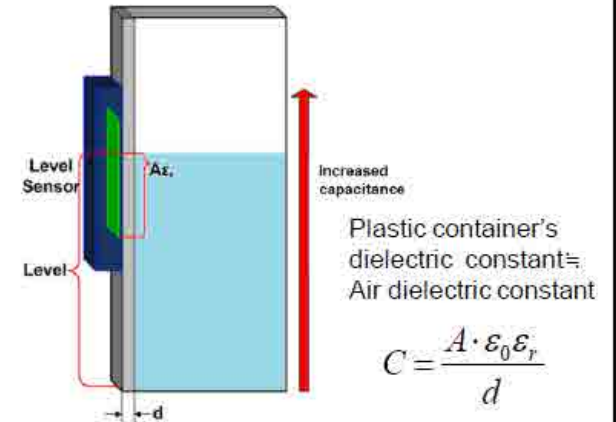
- Detection of water level in the water trap which controls saving and discharging of water, makes from fuel cell stack
- Electrostatic capacity Type Contactless Sensor

Function

ITEM	Specifications
Input Voltage	8~16 V
Input Current	Less than 20mA
Temperature Range	-30~105°C
Output Voltage	(Not Sensing) 4.0 / (Sensing) 1.0 ± 0.25V
Accuracy	Sensing Base Line ± 2mm

Application

- Fuel Cell Electric Vehicle (FCEV)
- Remote Liquid Level Sensing



Figure

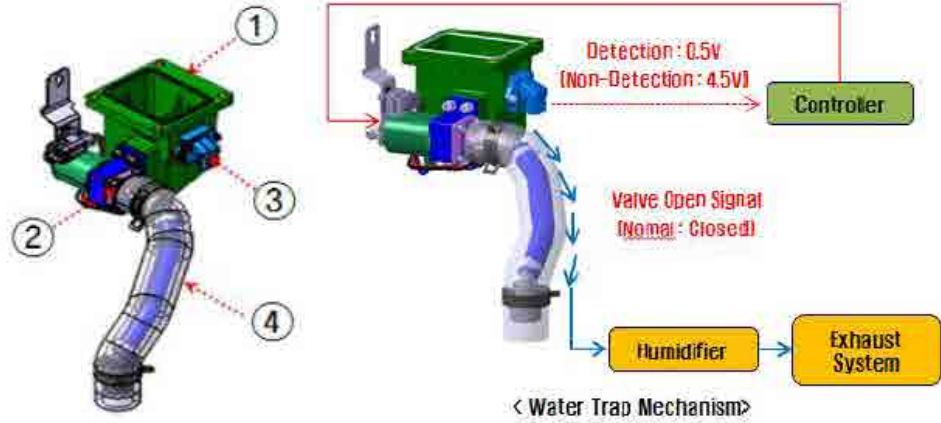
2.5 **Water Trap**

Function

- Functional component to control the condensation of vapor produced in the fuel cell stack in order to optimize the performance and reinforce the durability of hydrogen fuel cell vehicles
- Applied water level sensor which has superior responsiveness to precise detection of the water level without coming into direct contact with the condensate

Application

- Hydrogen fuel cell vehicle
- Industrial fuel cell instrumentation



① WATER TRAP	② VALVE-DRAIN
③ SENSOR-WATER LEVEL	④ TUBE-DRAIN ASSY

Category		Specifications
Operating Conditions	Operating Fluid	Condensate Water, Hydrogen Gas, Air
	Operating Temperature	-30 ~ 105℃
	Durability Temperature	-40 ~ 115℃
	Operating Pressure	0.5 ~ 1.0 barg
Capacity of storage (Max)		220 ml
Drain Performance		50cc/sec@0.15barg 65cc/sec@0.20barg
Noise Level		Under 60dB (Within 0.5m)
Signal Output (Sensor)		Non-Detection : 4.5V, Detection : 0.5V

Figure

2.6

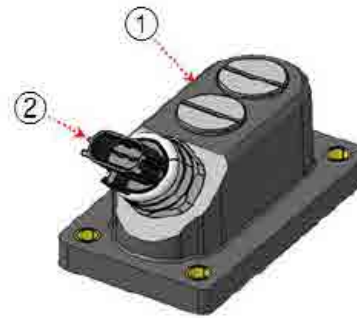
Pressure Relief Valve

Function

- Safety equipment which is installed in order to protect the system by reacting to pressure which has exceeded regulations during abnormal operation of the fuel cell system while driving
- Hydrogen Pressure Monitoring of fuel cell system

Application

- Hydrogen fuel cell vehicle
- Industrial fuel cell instrumentation



① Block Manifold Ass'y



② Transducer Pressure



< Pressure Relief Valve - Mechanism >

Category		Specifications
Operating Conditions	Operating Fluid	Hydrogen Gas, Air
	Operating Temperature	-30 ~ 105°C
	Durability Temperature	-40 ~ 115°C
	Operating Pressure	0.5 ~ 1.0 barg
Cracking Pressure		0.7 = 0.035 bar
Discharge Flow Rate (MAX)		1,800 nNm @ 1 barg
Pressure-Resistant (MAX)		2.8 barg
Pressure Sensing Range		0~1.0 barg

Figure

Function

- Main purpose of exhaust system is exhaust fluid of fuel cell stack (air, water vapor, hydrogen, water)
- Exhaust tail pipe is installed at rear of vehicle to avoid misunderstanding with overheat and exhaust vapor
- To avoid hydrogen explosion, exhaust gas should be diluted with air for lower concentration

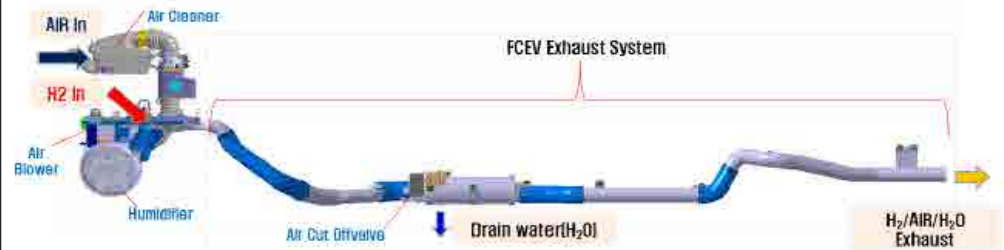
Application

- Hydrogen fuel cell vehicle (FCEV)



< Fuel Cell Power Module >

Contents		Specifications	Note
Operating Conditions	Operating Fluid	Air, Water Vapor, Hydrogen, Water	
	Mass Flow rate (Qmax)	Air : 140 g/s, Water Vapor : 30 g/s	
	Operating Temperature	-40 ~ 60 °C	End of Humidifier
	Operating Humidity	30 ~ 60 %	End of Humidifier
Hydrogen Concentration		Mean : 4% (3sec) Maximum : Below 8% (Peak)	GB Standard
Back Pressure		Below 7kPa @ 0.000lpm, Air	
Discharge Noise		90dB @ Max	



< Exhaust System for Fuel Cell Vehicle >

2.8

Metal Bipolar Plate & MEA

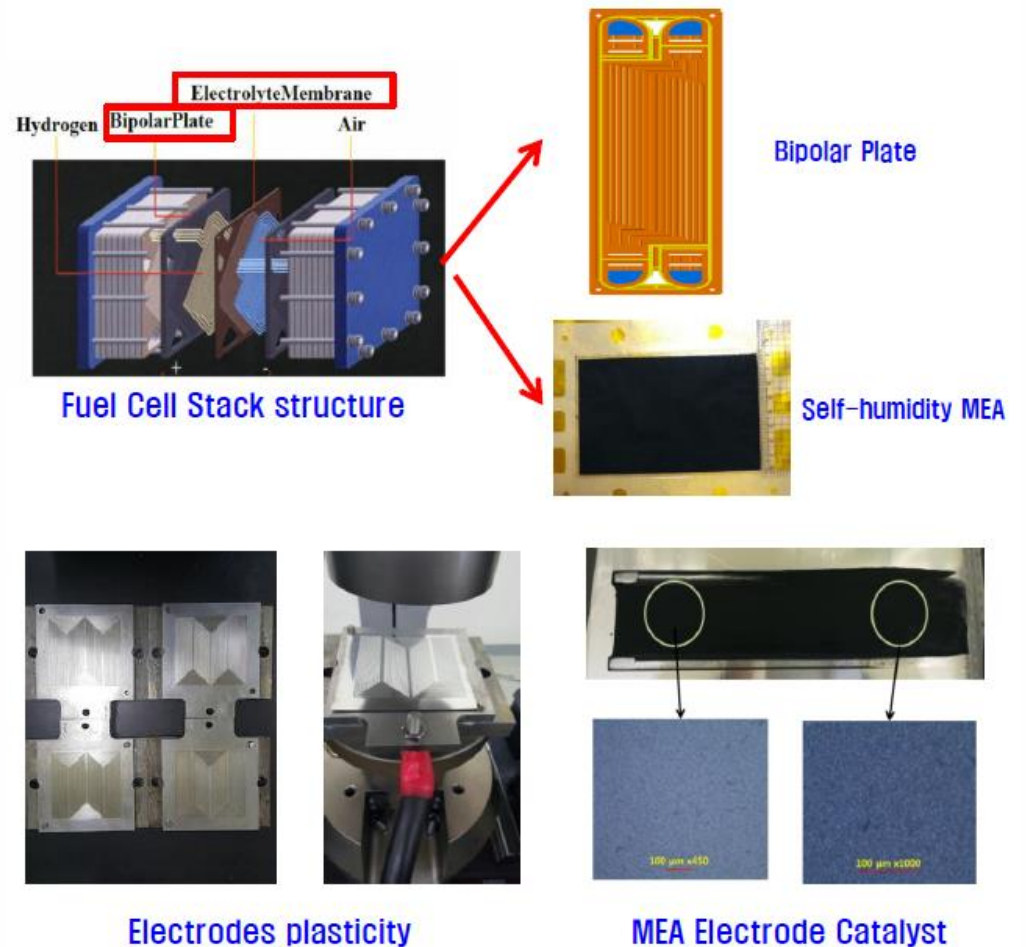
Function

- **Metal Bipolar Plate**
Flow path for reaction of hydrogen gas and air in MEA
 - Remove the spring back and residual stress
 - Flatness of the thin bipolar plate
- **MEA (Membrane Electrode Assembly)**
Assembly of the hydrogen/air catalyst layers and membrane for the transfer of hydrogen positive charge.
 - Thin polymer type of electrolyte layer
 - Nano sized dense structure for self-humidity MEA

Classification	Specification
MEA Performance	1.5A/cm ² @0.6V
MEA Recovery Rate	Over 99%
MEA Reaction Area	300cm ²
Bipolar Plate Size	49.2cm X 12.7cm
Bipolar Plate Accuracy	Under 2%

Application

- Fuel Cell Electric Vehicle
- Fuel Cell System for Stationary



Figure

2.9

Portable Hydrogen Leakage Detector

Function

- Portable hydrogen gas detectors help to keep workers safe by measuring concentrations of hydrogen gas to guard against explosions at various plants and operating sites
- The **SJ H₂ DETECTOR** is portable hydrogen leak detector able to respond to the lower explosive limit (LEL) range of hydrogen gas Concentrations without the need of any peripheral equipment

Application

- Safety System of Power plant
- Hydrogen production / storage / supply related to factory and facilities



Contents	SPECIFICATIONS
Current consumption	70mA (Typical)
Detectable H ₂ concentration	100~40,000ppm
Cross-Sensitivity	No detection toward CO, DME, EtOH, THC, NO ₂ , SO ₂
Accuracy	<10% (Reading values)
Response time	Within 2 seconds (T ₉₀)
Start-up time	Within 2 seconds
Operating temperature	-20 ~ 90°C
Weight	300g
Dimensions (L X W X H)	130 x 66 x 20mm

Figure