



T9E-0153

# **Hydrogen Detector for Fuel Cell Safety Monitoring**

## **FSD-753**

### **Operating Manual**

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## 1. Product Specifications

### Functions

- Gas detection method : Natural diffusion sensor
- Detection principle : New ceramic gas sensor
- Detection target gas : Atmospheric hydrogen
- Detection concentration : 0 to 20,000 ppm or 0 to 40,000 ppm\*<sup>1</sup>
- Startup time : Output start time (within 500 ms)
- Heater : None

### Ambient conditions

- Operating temperature range : -35 °C to +100 °C
- Operating humidity range : 100 %RH or less\*<sup>2</sup>
- Storage temperature range : -40 °C to +125 °C
- Pressure : 70 kPa to 130 kPa
- Interference effects : Unaffected by HC, H<sub>2</sub>S, N<sub>2</sub>, CO, CO<sub>2</sub>, or NO<sub>x</sub> in surrounding atmosphere

### Safety

- Threshold for defect detection : 0.2 V DC (sensor disconnection)

### Construction

- Dimensions : Approx. 80 mm (W) × 55 mm (H) × 15 mm (D)  
(excluding sensor and connectors)
- Weight : Approx. 103 g
- Water protection : Sensor protected by water-repellent filter
- Dustproofing/waterproofing : IP67-compliant

### Electrical characteristics

- Input voltage (rated) : 8 V to 16 V DC (12 V DC)
- Power consumption : Max. 0.5 W at 12 V DC (for continuous use)
- Concentration output signal : 0.5 V to 4.5 V DC/0 to F.S.  
Linear output with respect to gas concentration
- Overscale : 4.5 V to 4.6 V DC
- Reverse connection : Contains protection circuit.
- Connector : Sumitomo Wiring Systems model 6188-0066, 4-pin  
(with 8 cm harness)
- EMC : Complies with ISO 11452-2/3/4 EMI standards.  
Complies with CISPR25 EMS standard.  
Complies with ISO 10605 ESD standard.

**Required characteristics at receiver**

- Input impedance : Min. 10 kΩ

**Optional accessories**

- Receiving side connector : Connector with cable
  - Riken Keiki model CCF4-3M-120
  - Riken Keiki model CCF4-3M-80

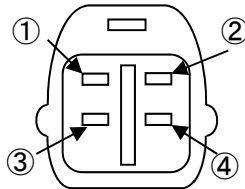
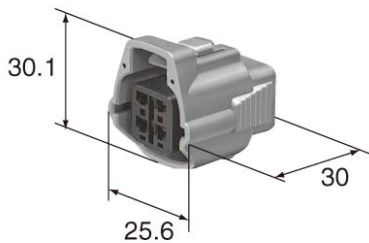
**Specifications**

Connector : Sumitomo Wiring Systems model 6189-0126, 4-pin

Cable : AESSX 0.5 f (heat resistant up to 120 °C), cable length 3 m

Or

AVS 0.5 (heat resistant up to 80°C), cable length 3 m



**Connector pin numbers**

Pin No.	Function	Wire color
Pin ①	Output signal	Red
Pin ②	Output signal ground	Yellow
Pin ③	Input power supply	Blue
Pin ④	Input power supply ground	Black

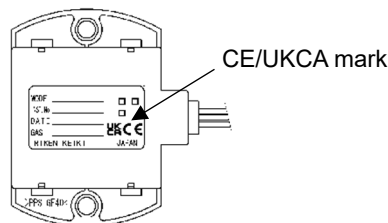
\*1: Please contact Riken Keiki for specific operating range requirements.

\*2: If condensation occurs:

- Condensation on the detector gas contact face or inside the sensor chip will reduce detection performance.
- Condensation forming inside the sensor chip during storage will increase startup time. It may also reduce product service life.

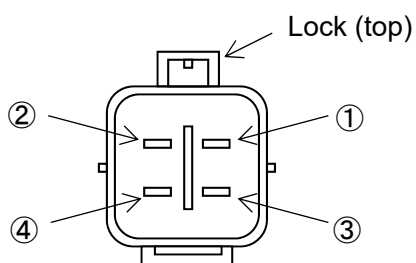
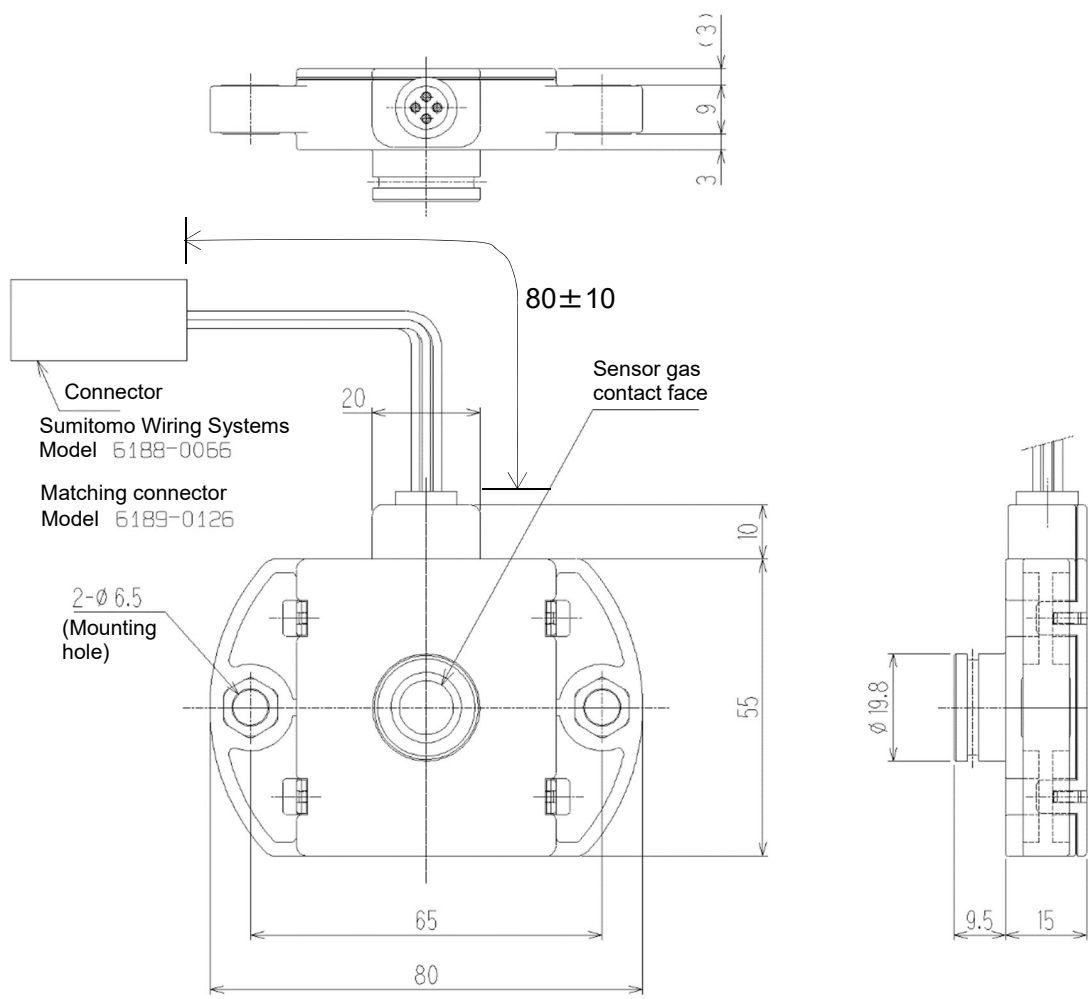
**Method of confirmation for CE/UKCA marking type**

The CE/UKCA marking is labeled on the detector in case of comply with CE/UKCA mark. Please confirm the instrument specification before using. Please refer Declaration of Conformity that is at the end of this manual if you have CE/UKCA marking type.



CE/UKCA mark label

## 2. Exterior drawings



Connector pin numbers

①	Output signal
②	Output signal ground
③	Input power supply
④	Input power supply ground

Connector diagram

## 3. Usage precautions

Usage procedures and the environment in which they are installed may cause hydrogen detectors to function incorrectly, leading to hazardous working conditions and reduced service life.

Observe the following precautions when using hydrogen detectors:

### 3-1. Mounting

- Mount using M6 mounting screws. If both the male and female screws are made of steel, tighten to a torque not exceeding  $539 \text{ N}\cdot\text{cm} \pm 73.5 \text{ N}\cdot\text{cm}$ .  
If both the male and female screws are non-ferrous, tighten to a torque not exceeding  $392 \text{ N}\cdot\text{cm} \pm 49 \text{ N}\cdot\text{cm}$ .  
Overtightening will result in damage.
- To avoid distorting the detector, mount the detector with the mounting base (face using two  $\phi 6.5$  mounting holes) on a flush surface.
- Remove the sensor protective cap during use.

### 3-2. Installation environment and handling

- Condensation may reduce detection performance.
- Sudden changes in ambient temperature may cause temporary output fluctuations.
- Avoid installing the detector close to devices that radiate heat at high temperatures. Detection performance may be reduced.
- Avoid scratching or applying sudden force to the detector or gas contact face.
- Do not use a detector that was dropped during installation. The impact may affect reliability.
- Keep the gas contact face free of blockage by water, oil, or other foreign matter.

### 3-3. Sensor characteristics

- Due to the sensor's detection principle, use in low-oxygen atmospheres will reduce detection performance.  
Additionally, note that detection of hydrogen gas at high concentrations will cause the detector to become oxygen-depleted after initially exceeding the full scale, resulting in a low detection output.
- The zero level may rise if the detector comes into contact with hydrogen gas at high concentrations.
- Output may increase even for combustible gases other than hydrogen.
- The detection performance may be impaired if synthetic cloth or sprays containing silicone are used near the detector. Take care when using in environments where silicone vapor is present.

### 3-4. Power supply and noisy environments

- Connecting the connector incorrectly will cause the product to malfunction.
- Take appropriate precautionary measures at the power supply if the supply voltage may exceed 16 V DC.
- The duration of momentary power failures and voltage drops should not exceed 1 ms.
- In cases in which power supply noise, electromagnetic radiation, or static electricity may affect the device, take appropriate precautionary measures on the receiving device side: for example, equalization or alarm delay assessment.
- Insulation resistance testing and voltage withstand testing may damage the device.

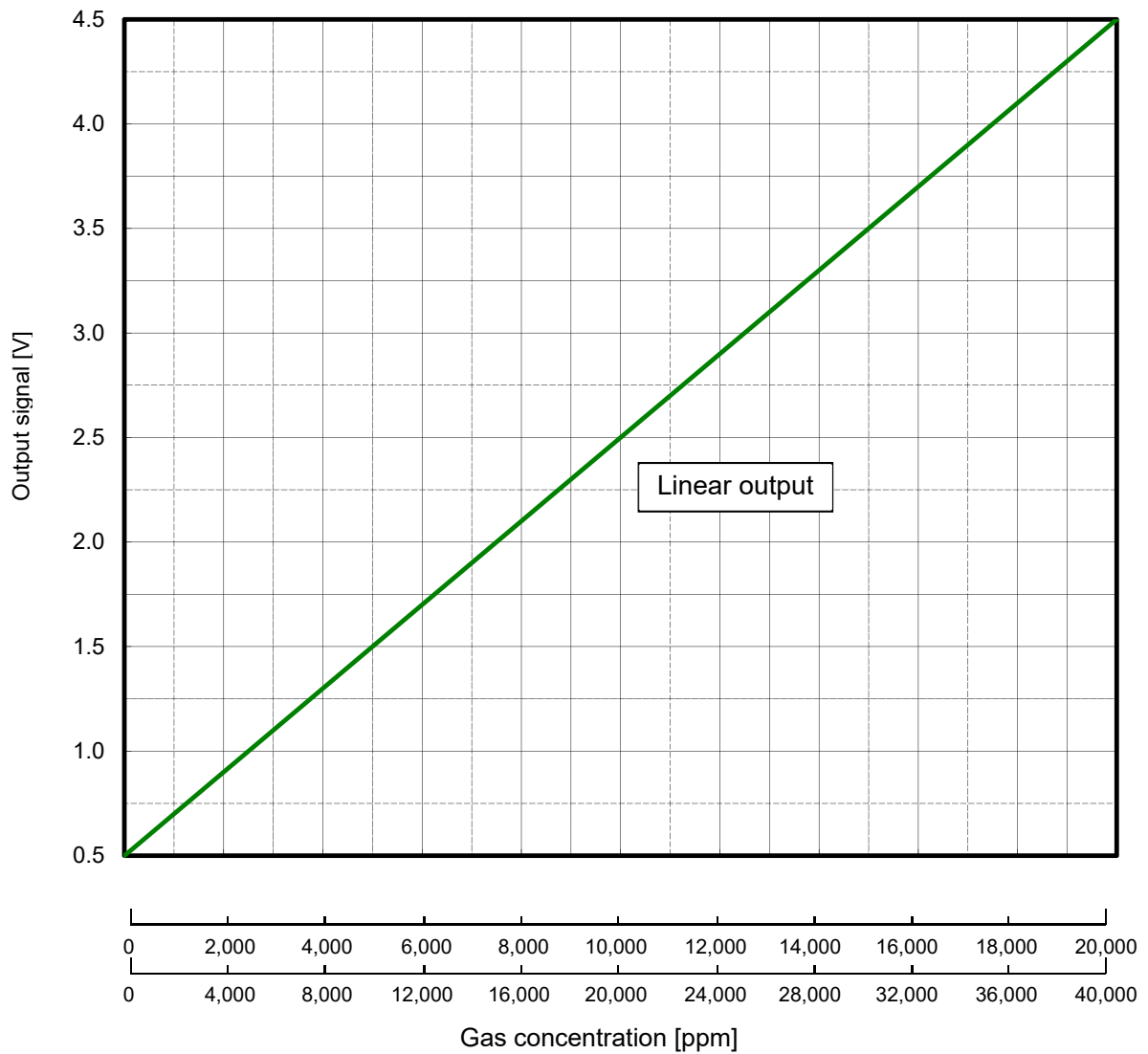
**3-5. Regular maintenance**

Check sensitivity every six months.

**3-6. Miscellaneous**

Before returning the product to Riken Keiki, pack carefully to protect against impact.

**4. Hydrogen concentration - output voltage characteristics**



## Revision history

Issue	Revision	Issue date
0	First issue	10/23/2019
1	Declaration of Conformity	04/01/2020
2	Declaration of Conformity	10/29/2021
3	Correction : CE Declaration of Conformity, Addition : Method of confirmation for CE/UKCA marking type , UKCA Declaration of Conformity	07/11/2022



## EU-Declaration of Conformity

Document No.: 320CE22052



We, RIKEN KEIKI Co., Ltd. 2-7-6, Azusawa, Itabashi-ku, Tokyo, 174-8744 Japan  
declare under our sole responsibility that the following product conforms to  
all the relevant provisions.

Product Name: Hydrogen Detector for Fuel Cell Safety  
Monitoring  
Model: FSD-753

Council Directives		Applicable Standards
2014/30/EU	EMC Directive	EN 50270:2015
2011/65/EU <sup>[1]</sup>	RoHS Directive	EN IEC 63000:2018

<sup>[1]</sup>Including substances added by Commission Delegated Directive (EU) 2015/863

Place: Tokyo, Japan

Date: Jun. 29, 2022

Takakura Toshiyuki  
General manager  
Quality Control Center



## UK-Declaration of Conformity

Document No.: 320UK22021



We, RIKEN KEIKI Co., Ltd. 2-7-6, Azusawa, Itabashi-ku, Tokyo, 174-8744 Japan declare under our sole responsibility that the following product conforms to all the relevant provisions.

Product Name: Hydrogen Detector for Fuel Cell Safety Monitoring  
Model: FSD-753

Regulations	UK designated Standards
Electromagnetic Compatibility Regulations 2016 (S.I. 2016/1091)	BS EN 50270:2015
The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (S.I. 2012/3032)	BS EN IEC 63000:2018

Place: Tokyo, Japan

Date: May. 27, 2022

Takakura Toshiyuki  
General manager  
Quality Control Center