

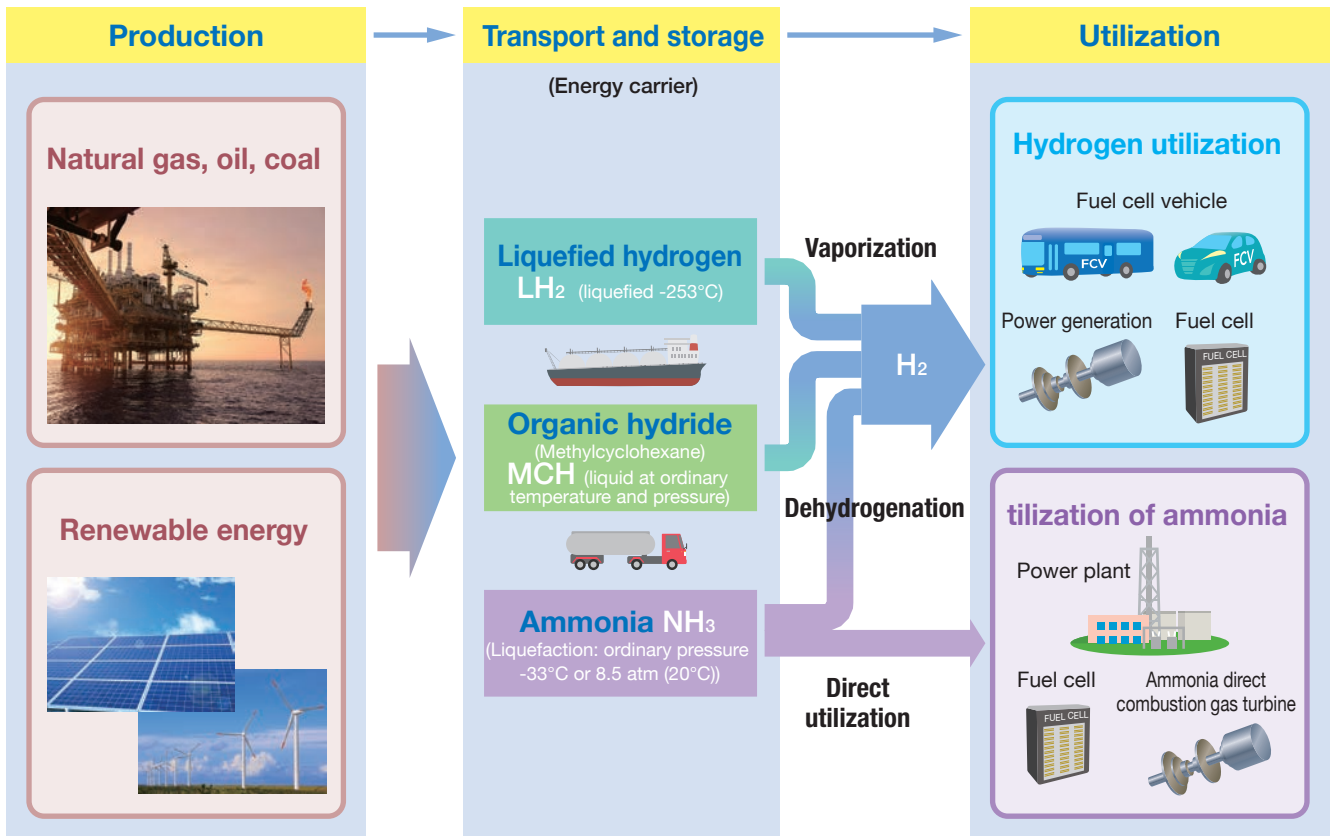
Pressure Measurement Instruments for Hydrogen Applications

We contribute to the energy of the future

supporting the age of hydrogen by manufacturing with safety,
security and reliability in mind.

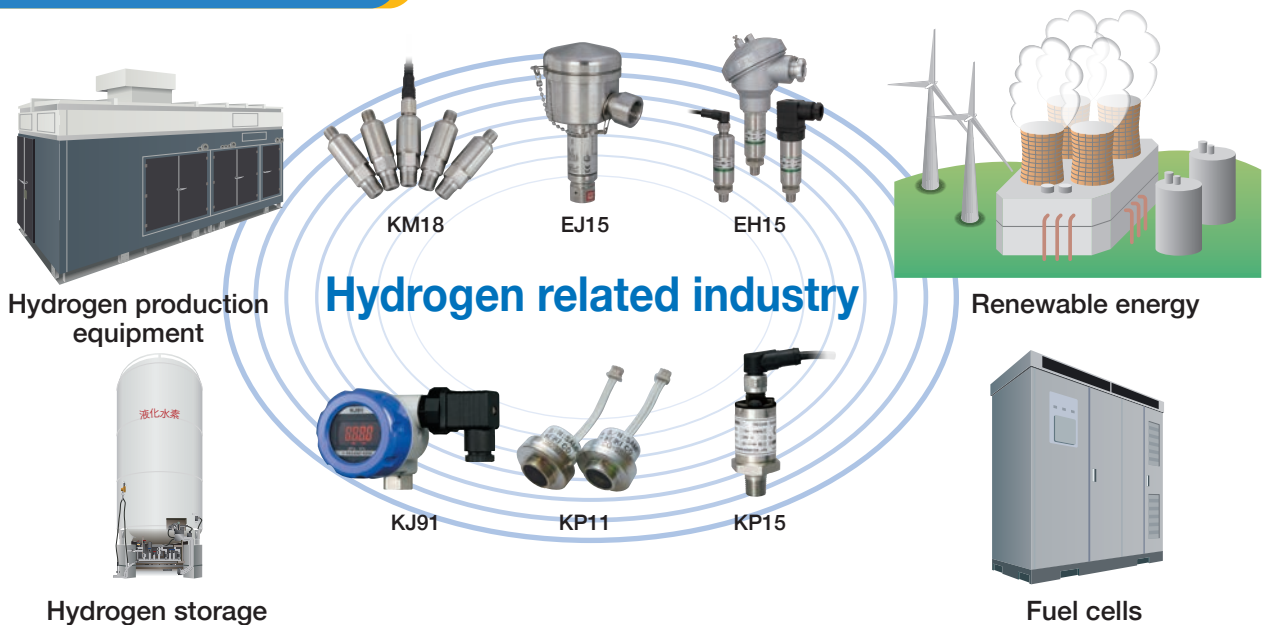


Our products cover the full value chain from hydrogen production, transportation and storage to utilization.



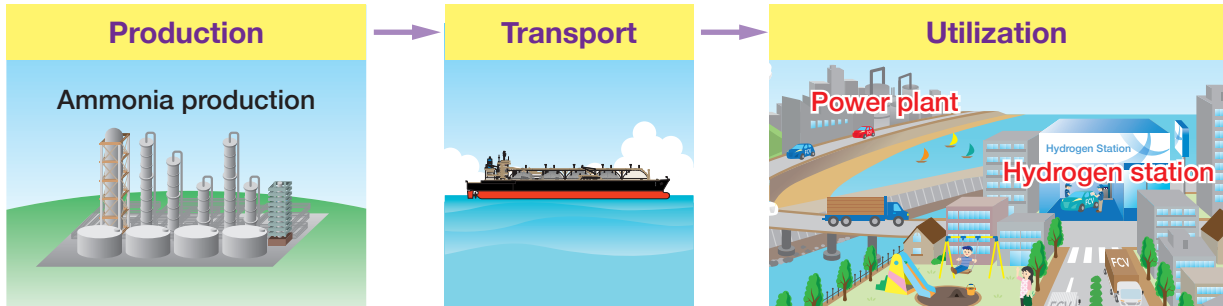
We provide measurement instruments that are not limited to fuel cell vehicles and hydrogen stations, but can also be utilized along the full value chain and contribute to the realization of a hydrogen based society.

Application examples



Our sensors for the ammonia value chain

Example of hydrogen utilization using ammonia



Ammonia (NH_3) is generated using hydrogen (H_2), transported and then hydrogenated (H_2) again for use. In addition, by directly utilizing ammonia (NH_3) as fuel, it is possible to generate electricity without generating CO_2 . It goes without saying that we provide measurement instruments for ammonia applications, too.

Mechanical

Sealed type pressure gauge
B□10



Differential pressure gauge (Level meter)
DG9□



Pressure switch
CD77



Pressure resistant explosion-proof

Explosion-proof

Pressure transmitter
KJ91



Intrinsically safe explosion-proof

Pressure sensor
EJ15



For devices and systems

Fine differential pressure transmitter
KL15



Fine pressure sensor
KL22



Small pressure transmitter
KM18



Pressure transmitter
KP11

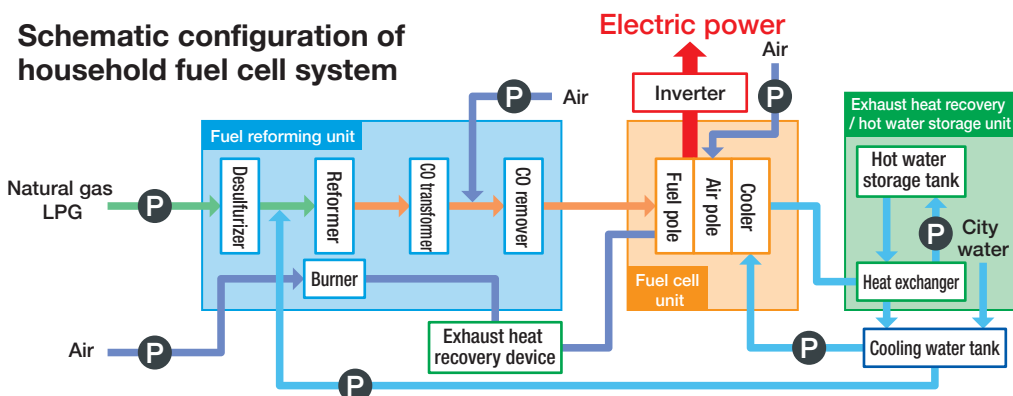


Battery-less pressure sensor
ER31



Wireless power supply
(No wiring required)

Schematic configuration of household fuel cell system



Source: Materials of New Energy and Industrial Technology Development Organization

Advantages of our pressure measurement instruments for high-pressure hydrogen applications

We have our very own in-house core technology for pressure measurement instruments for high-pressure hydrogen!

Features

■ Pressure detection element for high-pressure hydrogen

Pressure gauge

SUS316L or XM-19 (HRX19®*) is used for the Bourdon tube / joint material

- Fully developed as a specialized pressure gauge for high-pressure hydrogen applications.
- Safety structure (For GF3□ series pressure gauges: Safety glass and solid front structure are used for the front glass.)
- Reliability is ensured by field verification and impact assessment using real hydrogen.

* HRX19® is a registered trademark of NIPPON STEEL & SUMITOMO METAL CORPORATION.



GF32

GV40/45

Pressure sensor

Sensor element material: SUH660 (A286), Joint material: SUS316L

- Fully developed as a specialized pressure sensor for high-pressure hydrogen applications.
- The sensor element uses a semiconductor strain gauge measuring system. The sensor element and the fitting are welded together by Nagano Keiki's proprietary technology.
- No liquid enclosed structure realizes no risk of hydrogen permeation.



EJ15

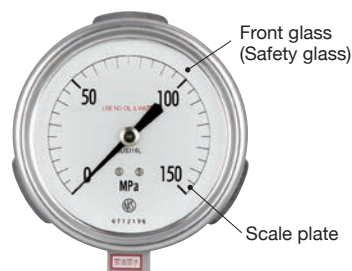
KJ16

KJ91

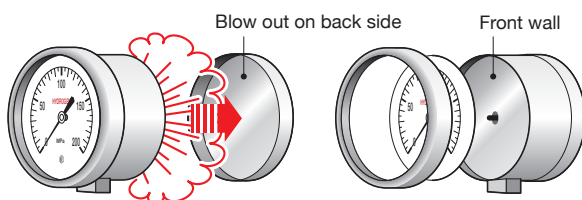
"Safety First" construction

■ Pressure gauge

Solid front type



GF32



- The gauge is protected by front safety glass and a solid front wall construction which consists of a solid front wall placed behind the dial and a blow out plate on the back side which is released from the case when internal pressure is created or the Bourdon tube is broken.

■ Pressure sensor

Intrinsically safe pressure transmitter



KJ16

KJ91

- SUH660 (A286) pressure sensing element has been newly developed for use with hydrogen.
- The pressure transmitter offers higher durability due to the improved pressure sensing element. This is achieved through optimized material control, design, excellent surface quality and heat processing.

Intrinsically safe pressure transmitter with compact design for easy installation (Exia II CT4)

- Design with high durability for burst pressure of 10 times higher than operating pressure.
- Durable construction that withstands 10 million cycles of motion pressure test (medium: oil).
- Durability was tested for a high burst pressure of over 700MPa for sensors specified for 70MPa applications after previous evaluation of the sensor in high-pressure hydrogen applications.
- No break at welded part in testing above.

Pressure measurement instruments made by Nagano Keiki recommended for high-pressure hydrogen facilities

Mechanical pressure gauge

Model / Name	Solid-front case						GV42-47 Glycerine bath type pressure gauges*1		GV40-45 φ60 Pressure gauge for high-pressure hydrogen	
	GF32-37 Pressure gauge			GF32 Glycerine bath type pressure gauges						
External Appearance										
Model Number	GF32-H01	GF32-H02	GF37-H01	GF37-H02	GF32-H03	GF32-H04	GV42-H01	GV47-H01	GV40-H01	GV45-H01
Size	φ100								φ60 60 DIA.	
Structure	Solid front type				Solid front type (Glycerine bath)		Glycerine bath type		Glycerine bath type	
Configuration	Surface mounting (Three-hole fixing)		Flush mounting (Three-hole fixing)		Surface mounting (Three-hole fixing)		Surface mounting (Three-hole fixing)		A-frame D-frame (Flush mounting)	
Pressure range	0 to 70, 100, 120, 150, 200MPa								0 to 60MPa	

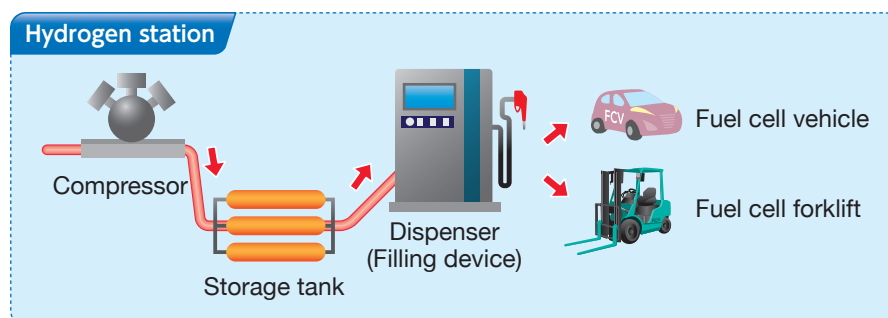
*1 GV□□ series glycerine bath type pressure gauges do not have a solid front structure. A solid front structure is recommended for high-pressure hydrogen measurement applications.

Pressure sensor






Model / Name	EJ15 Intrinsically safe Pressure sensor						KJ16 Intrinsically safe pressure transmitter	KJ91 Intrinsically safe pressure transmitter
External Appearance								
Model Number	EJ15-M□H: M12 Connector type EJ15-T□H: Terminal box type *□ indicates the type of connection screw.						KJ16-6□H: Connector type KJ16-7□H: Terminal box type (small) KJ16-9□H: Terminal box type (large) *□ indicates the type of connection screw.	KJ91-□□H *□□ indicates the mounting method and the type of connection screw respectively.
Pressure range	0 to 35, 50, 70, 100, 120MPa						For other pressure range, please contact us.	
Explosion class	Exia IIC T4 Ga						Exia IIC T4	
Specification of intrinsic safety explosion-proof construction	Explosion-proof standards	IECEX (International)	ATEX*2 (Europe)	Japan	TS (Taiwan)	NEPSI (China)	KCs (Korea)	Approval No. by Type Approval Test
	Authorized number	IECEX CML 19.0013	CML 19ATEX2063	CML 19JPN2184	TD05021J (Identification number)	GYJ19.1315	19-AV4BO-0654	TC17810 TC17267/17346

*2 Applicable directive: 2014/34/EU (ATEX directive)

Application



■ Pressure measurement instruments for high-pressure hydrogen applications

Product lineup		Pressure range		
		Low pressure 35MPa	Medium pressure 70MPa	High pressure
		Hydrogen generator, hydrogen power generation, etc.	Accumulator, dispenser, compressor, etc.	
High-pressure hydrogen recommended	Pressure gauges	 GF32-37 GV40-45		GF32,37 70 to 200MPa GV40,45 60MPa
	Pressure sensors	 EJ15 KJ91	EJ15 0.5 to 120MPa KJ91 0.3 to 120MPa	
Pressure switches		 CB33 CD77	CB33 0.1 to 15MPa CD77 0.1 to 10MPa	
Pressure sensors		 EH15 KP15	EH15 35kPa to 150MPa KP15 10kPa to 500kPa	
Device embedded products		 KM18 KL15 KP11 ER31	KM18 1 to 5MPa KP11 20 to 200kPa KL15 (Differential pressure measurement) 50 to 300Pa ER31 35kPa to 50MPa	Also supports 0 to 120kPa abs.

The contents in the catalog are subject to change without notice.

 **NAGANO KEIKI**

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