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RIGAS

Research Institute of Gas Analytical Science

Calibration Gases

RIGAS 리가스
Research Institute of Gas Analytical Science



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CONTENTS

Company Information

Company specialized in Production, Analysis and Research of Standard Materials

㈜리가스는 다양한 사양의 각종 액체 및 기체표준물질을 제조하고 분석할 수 있는 능력을 보유하고 있으며, 저농도 반응성 성분 가스의 안정도 향상에 필요한 당사 고유의 용기 특수 내면 처리 기술을 적용함으로써 고객이 신뢰할 수 있는 제품을 공급하고 있습니다. ㈜리가스의 모든 표준가스는 초정밀 고용량의 천칭을 사용한 중량법으로 제조되며 각종 성분량은 다양한 전용 가스분석기 등으로 정량화 및 확인하여 그 정확도를 보장합니다.

RIGAS Co., Ltd has the capability to manufacture and analyze various specifications of liquid and gas standard materials and supplies products in which customers can trust by application of our unique special cylinder inner-surface treatment technology essential for improving stability of low concentration reactive gases. Our company also manufactures all standard gases in gravimetric method using high precision high capacity scale and guarantees the accuracy for the concentration of every components by quantifying and verifying it with various gas analyzers.

Company having Corporate-affiliated Research Institute

㈜리가스는 기초연구진흥 및 기술 개발 지원을 기반으로 1999년에 가스분석과학 연구소를 설립하였으며 미개발된 특수 가스와 가스분석의 정확도 개선과 같은 신제품 개발을 위해 활발한 가스분석 연구를 수행해 오고 있습니다.

RIGAS Co., Ltd established Research Institute of Gas Analytical Science in 1999 on the basis of Korea Basic Research Promotion and Technology Development Supporting Act, and has performed gas analysis research actively for development of new products such as undeveloped special gases and improvement of accuracy of gas analysis.

Authorized Standard Gas Testing and Certification Agency in ROK

리가스 부설 가스분석과학연구소는 국립환경과학원으로부터 환경측정용 표준가스 검정을 위한 공인검사기관으로 지정된 기관이며 가스 표준물질의 분석과 실험을 수행합니다. (굴뚝 배기가스 측정기 및 자동차 배기가스 측정 기기용 표준가스)

RIGAS Co., Ltd has been appointed as a government-authorized standard gas testing and certification agency from Korea National Institute of Environmental Research and performs testing and analysis for gaseous standard materials. (Standard gas for calibrating continuous automatic chimney exhaust gas measuring instrument and continuous automatic air measuring instrument)

Company Information

Company History

2017. 02 Expansion of the 2nd plant in Daedeok Industrial Zone

2016. 12 Obtained Clean mark as TOP3 of Reducing Exposure level

2016. 04 Obtained Youth-friendly hidden champion certificate (Ministry of Employment and Labor)

2014. 01 Obtained Certificate of Good Workplace by Risk Assessment (Korea Occupational Safety & Health Agency)

2013. 10 Selected as a hidden champion (Ministry of Employment and Labor)

2012. 01 Changed CEO from Lee Kwang-Woo to Lee Sang-Ho

2011. 05 Expanded&moved Corporate-affiliated Research Institute to 17-11 Munpyeong-dong

2008. 03 Small& Medium Business Technology Innovation Small Group Supporting Project (Korea Technology and Information Promotion Agency for SMEs)

2007. 06 Obtained INNO-BIZ Certificate (Small & Medium Business Administration)

2007. 06 Approved as Company of Daedeok Special R&D Zone (Ministry of Science and Technology)

2002. 04 Appointed as Clean Workplace (Korea Occupational Safety & Health Agency)

2001. 09 Appointed as Standard Gas Testing Agency by Environmental Technology Development Act (Korea National Institute of Environmental Research)

1999. 12 Obtained Venture Business Certificate (Small & Medium Business Administration)

1999. 03 Obtained Certificated of Gas Analysis and Science Research Institute as Corporate-affiliated Research Institute (Korea Industrial Technology Association)

1998. 09 Established a corporation in Daejeon, Korea.

ISO17025

ISO9001

Certificate of Designated Testing Agent

Certificate of corporate affiliated Research Institute

Certificate of INNO-BIZ

Certificate of Patent1

Certificate of Patent2

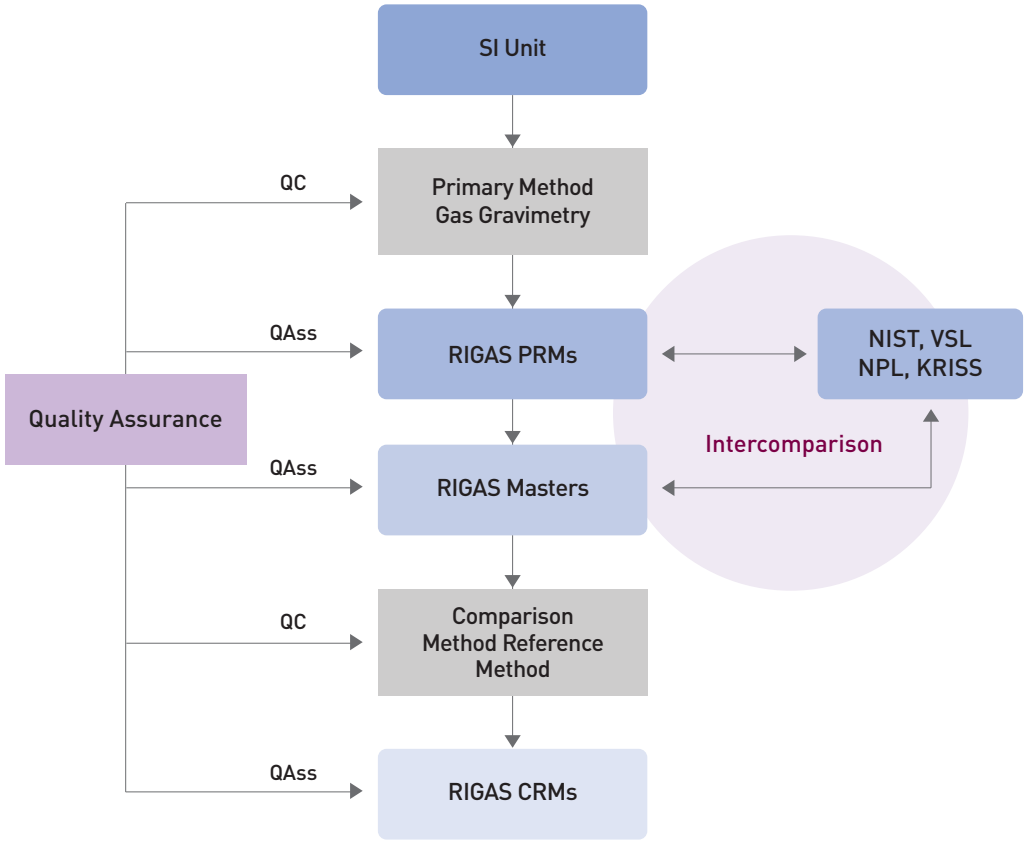
Certificate of Patent3

Certificate of Patent4

Certificate of Trademark Registration

Maintaining Traceability

Our analytical operations are traceable through a calibration standard produced to either a recognized international standard such as NIST, VSL, NPL, KRISS or a gravimetrically manufactured Primary Reference Standard traceable to KRISS standard masses.



Product Line

1. Atmospheric Environmental Calibration Standards
2. Automobile Exhaust Gas Standards
3. Petrochemical and Natural Gas Standards
4. Laser Gas Mixtures
5. Odor Standards
6. Volatile Organic Compound Standards (VOCs)
7. Other Gas Mixtures

Atmospheric Environmental Calibration Standards

Environment is one of critical element affecting to our life.
Therefore, accurate standard gas shall be used to monitor and measure industrial effluents.
RIGAS provides high accurate calibration standard gas for measuring various environmental pollutants.

COMPONENTS	
Nitric oxide	NO
Nitrogen dioxide	NO_2
Sulfur dioxide	SO_2
Carbon monoxide	CO
Oxygen	O_2
Hydrogen chloride	HCl
Hydrogen fluoride	HF
Ammonia	NH_3
Carbon dioxide	CO_2

Mixed Example

Components & Matrix	Nominal Fraction Range			Urel (k=2) %	Shelf
	From	To	Unit		
Hydrogen chloride Nitrogen	2	10 000	µmol/mol	± 2 ~ ± 5	1 ~ 2 year
Hydrogen fluoride Nitrogen	2	500	µmol/mol	± 2 ~ ± 5	1 ~ 2 year
Nitric oxide	5	5 000	µmol/mol	± 1 ~ ± 3	1 ~ 3 year
Sulfur dioxide	5	5 000	µmol/mol	Determined in accordance with the customer's needs	
Carbon monoxide	5	10 000	µmol/mol		
Nitrogen					

※ If you have any inquiry on products and mixing besides the above components and concentration, ask for consultation and we will provide further information.

Automobile Exhaust Gas Standards

Environment is one of critical element affecting to our life. Therefore, accurate standard gas shall be used to monitor and measure industrial effluents. RIGAS provides high accurate calibration standard gas for measuring various environmental pollutants.

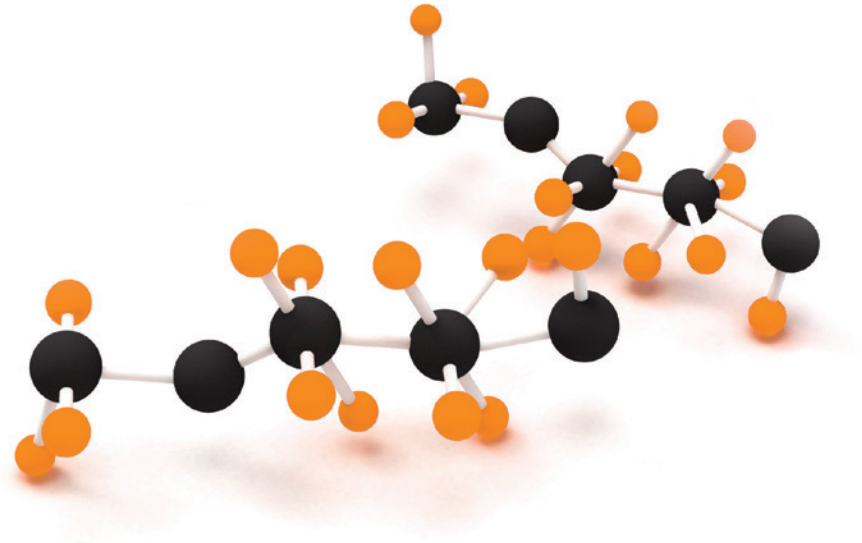
COMPONENTS	
Carbon dioxide	CO_2
Propane	C_3H_8
Carbon monoxide	CO
Oxygen	O_2

Mixed Example

cmol/mol = %mol/mol = 10^{-2}mol/mol

Component & Matrix	Nominal Fraction Range			Urel (k=2) %	Expiry
	From	To	Unit		
Carbon dioxide	10.0	20.0	cmol/mol	± 1 ~ ± 2	1 ~ 3 year
Propane	0.05	0.50	cmol/mol	Determined in accordance with the customer's needs	
Carbon monoxide	2.00	10.0	cmol/mol		
Oxygen	0.10	25.0	cmol/mol		
Nitrogen					

※ If you have any inquiry on products and mixing besides the above components and concentration, ask for consultation and we will provide further information.



Petrochemical and Natural Gas Standards

RIGAS standard material for petrochemical process are supplied in gas and liquid mixture, and multi-compounds standard material such as alkanes, alkens, aromatics or ether.

Group	Components	
Hydrocarbons Gas or Liquid Mixtures	Methane	CH_4
	Ethane	C_2H_6
	Ethylene	C_2H_4
	Propane	C_3H_8
	Cyclopropane	C_3H_6
	Propylene	C_3H_6
	iso-Butane	iso-C_4H_{10}
	n-Butane	n-C_4H_{10}
	Propadiene	C_3H_4
	Acetylene	C_2H_2
	trans-2-Butene	trans-2-C_4H_8
	1-Butene	1-C_4H_8
	iso-Butylene	iso-C_4H_8
	Cyclopentane	C_5H_{10}
	cis-2-Butene	cis-2-C_4H_8
	2,2-Dimethyl propane	2,2-C_5H_{12}
	iso-Pentane	iso-C_5H_{12}
	n-Pentane	n-C_5H_{12}
	1,2-Butadiene	1,2-C_4H_6
	1,3-Butadiene	1,3-C_4H_6
	Methyl acetylene	C_3H_4
	Vinyl acetylene	C_4H_4
	Ethyl acetylene	C_4H_6
	trans-2-Pentene	trans-2-C_5H_{10}
	etc.	–

Mixed Example-Gas Phase

cmol/mol = %mol/mol = 10^{-2}mol/mol

Component & Matrix	Nominal Fraction Range		Urel (k=2) %	Expiry
	Concentration	Unit		
Nitrogen	0.50	cmol/mol	± 1 ~ ± 2	1 ~ 3 year
Carbon dioxide	1.00	cmol/mol		
Ethane	8.00	cmol/mol		
Propane	4.00	cmol/mol		
iso-Butane	1.00	cmol/mol		
n-Butane	1.00	cmol/mol		
iso-Pentane	0.05	cmol/mol	Determined in accordance with the customer's needs	
neo-Pentane	0.05	cmol/mol		
n-Pentane	0.05	cmol/mol		
n-Hexane	0.05	cmol/mol		
Methane	84.3	cmol/mol		

※ If you have any inquiry on products and mixing besides the above components and concentration, ask for consultation and we will provide further information.

Petrochemical and Natural Gas Standards

RIGAS standard material for petrochemical process are supplied in gas and liquid mixture and multi-compounds standard material such as alkanes, alkens, aromatics or ether.

Mixed Example-Gas Phase

cmol/mol = %mol/mol = 10^{-2}mol/mol

Component & Matrix	Nominal Fraction Range		Urel (k=2) %	Expiry
	Concentration	Unit		
Methane	2.50	cmol/mol	± 1 ~ ± 3	1 ~ 3 year
Ethane	1.00	cmol/mol		
Ethylene	1.00	cmol/mol		
Propane	0.70	cmol/mol		
Propylene	4.00	cmol/mol		
iso-Butane	1.00	cmol/mol		
n-Butane	0.30	cmol/mol	Determined in accordance with the customer's needs	
trans-2-Butene	0.90	cmol/mol		
1-Butene	1.00	cmol/mol		
iso-Butylene	1.50	cmol/mol		
cis-2-Butene	1.00	cmol/mol		
iso-Pentane	1.00	cmol/mol		
n-Pentane	0.10	cmol/mol		
1,3-Butadiene	0.10	cmol/mol		
1-Pentene	1.00	cmol/mol		
n-Hexane	1.00	cmol/mol		
Nitrogen	81.9	cmol/mol		

Mixed Example-Liquid Phase

cmol/mol = %mol/mol = 10^{-2}mol/mol

Component & Matrix	Nominal Fraction Range		Urel (k=2) %	Expiry
	Concentration	Unit		
Ethane	2.00	cmol/mol	± 1 ~ ± 3	1 ~ 3 year
Ethylene	2.00	cmol/mol		
Propane	35.0	cmol/mol		
Cyclopropane	0.10	cmol/mol		
Propylene	1.00	cmol/mol		
iso-Butane	20.0	cmol/mol		
trans-2-Butene	0.20	cmol/mol	Liquid phase (Dip tube + He head pressure) Determined in accordance with the customer's needs	
1-Butene	0.20	cmol/mol		
iso-Butylene	0.20	cmol/mol		
cis-2-Butene	0.20	cmol/mol		
iso-Pentane	0.40	cmol/mol		
n-Pentane	0.10	cmol/mol		
1,3-Butadiene	0.10	cmol/mol		
n-Butane	38.5	cmol/mol		

※ If you have any inquiry on products and mixing besides the above components and concentration, ask for consultation and we will provide further information.

Laser Gas Mixtures

RIGAS Excimer laser gas is used widely including semiconductor manufacturing process, medical area or precision process.

- Vision Correction
  - PRK, LASIK
  - ArF = 193 nm
- Angioplasty & TMR
  - XeCl = 308 nm
- Microlithography
  - ArF = 193 nm
  - KrF = 248 nm

Mixed Example

cmol/mol = %mol/mol = 10^{-2}mol/mol

Component & Matrix	Excimer Laser Gas Mixtures	
	Type	Concentration
Fluorine Argon Neon	ArF (193 nm)	0.2 cmol/mol 9.0 cmol/mol
Hydrogen Chloride Hydrogen Xenon Neon	XeCl (308 nm)	0.06 cmol/mol 0.03 cmol/mol 1.50 cmol/mol
Fluorine Krypton Neon	KrF (248 nm)	0.10 cmol/mol 1.00 cmol/mol

※ If you have any inquiry on products and mixing besides the above components and concentration, ask for consultation and we will provide further information.

Odor Standards

This is RIGAS Standard gas for detecting and measuring odor.
Odor is caused by one or more volatile chemical materials in low density generally, which is recognized by human or animals.

Group	Components	
Formaldehyde	Formaldehyde	HCHO
Sulfur Compounds	Hydrogen sulfide	H_2S
	Methyl mercaptan	CH_3SH
	Dimethyl sulfide	$(CH_3)_2S$
	Dimethyl disulfide	$(CH_3)_2S_2$
Nitrogen Compounds	Ammonia	NH_3
	Trimethyl amine	$(CH_3)3N$
Aldehydes	Acetaldehyde	CH_3CHO
	Propionaldehyde	C_2H_5CHO
	n-Butyraldehyde	$n\text{-}C_3H_7CHO$
	n-Valeraldehyde	$n\text{-}C_4H_9CHO$
	iso-Valeraldehyde	$iso\text{-}C_4H_9CHO$
Alcohol & Ketones	iso-Butyl alcohol	$iso\text{-}C_4H_9OH$
	Ethyl acetate	$CH_3CO_2C_2H_5$
	Methyl isobutyl ketone	$C_4H_9COCH_3$
BTEXS	Toluene	C_7H_8
	Styrene	C_8H_8
	p-Xylene	$p\text{-}C_6H_4C_2H_6$
Acids	Propionic acid	$C_2H_5CO_2H$
	n-Butyric acid	$n\text{-}C_3H_7CO_2H$
	n-Valeric acid	$n\text{-}C_4H_9CO_2H$
	iso-Valeric acid	$iso\text{-}C_4H_9CO_2H$

Mixed Example

Component & Matrix	Nominal Fraction Range			Urel (k=2) %	Expiry
	From	To	Unit		
Formaldehyde Nitrogen	2	100	µmol/mol	± 2 ~ ± 5	1 ~ 2 year
Hydrogen sulfide	2	100	µmol/mol	± 1 ~ ± 5	1 ~ 2 year
Methyl mercaptan	2	100	µmol/mol	Determined in accordance with the customer's needs	
Nitrogen					

※ If you have any inquiry on products and mixing besides the above components and concentration, ask for consultation and we will provide further information.

Volatile Organic Compound Standards (VOCs)

VOCs in certain period may cause long term damage on human health, so it shall be monitored.
The followings are calibration gas of volatile organic compound measuring system supplied by RIGAS, and required and recommended generally.

Group	Components	
Aromatics	Benzene	C_6H_6
	Toluene	C_7H_8
	Ethylbenzene	$C_6H_5C_2H_5$
	o-Xylene	o-$C_6H_4C_2H_6$
	m-Xylene	m-$C_6H_4C_2H_6$
	p-Xylene	p-$C_6H_4C_2H_6$
	Styrene	C_8H_8
	1,2-Dichlorobenzene	1, 2-$C_6H_4Cl_2$
	1,2,4-Trimethylbenzene... etc.	1, 2, 4-$C_6H_3(CH_3)_3$...etc.
PAMs (Ozone Precursors)	Acetylene	C_2H_2
	Benzene	C_6H_6
	Butane	C_4H_{10}
	1-Butene...etc.	1-C_4H_8... etc.
CFCs / HCFCs / HFCs / PFCs	Trichloro fluoromethane	CCl_3F
	Dichloro difluoromethane	CCl_2F_2
	1,1,2-Trichloro trifluoroethane	$C_2Cl_3F_3$
	1,2-Dichloro tetrafluoroethane	1,2-$C_2Cl_2F_4$
Chlorinated Hydrocarbons	Methyl chloride	CH_3Cl
	Ethyl chloride	C_2H_5Cl
	Vinyl chloride	C_2H_3Cl
	Methylene chloride	CH_2Cl_2
	Chloroform	$CHCl_3$
	Carbon tetrachloride	CCl_4
	1,1-Dichloroethane	1, 1-$C_2H_4Cl_2$
	1,2-Dichloroethane... etc.	1, 2-$C_2H_4Cl_2$... etc.

※ If you have any inquiry on products and mixing besides the above components and concentration, ask for consultation and we will provide further information.

Volatile Organic Compound Standards (VOCs)

VOCs in certain period may cause long term damage on human health, so it shall be monitored.
The followings are calibration gas of volatile organic compound measuring system supplied by RIGAS, and required and recommended generally.

Mixed Example

Component & Matrix	Nominal Fraction Range			Urel (k=2) %	Expiry
	From	To	Unit		
Benzene	1	100	μmol/mol	± 1 ~ ± 5	1 ~ 3 year
Toluene	1	100	μmol/mol		
Ethylbenzene	1	100	μmol/mol		
o-Xylene	1	100	μmol/mol		
m-Xylene	1	100	μmol/mol		
p-Xylene	1	100	μmol/mol		
Styrene	1	100	μmol/mol	Determined in accordance with the customer's needs	
Nitrogen					

Component & Matrix	Nominal Fraction Range			Urel (k=2) %	Expiry
	From	To	Unit		
Vinyl chloride	5	10	μmol/mol	± 2 ~ ± 3	1 ~ 2 year
1, 3-Butadiene	5	10	μmol/mol		
Dichloromethane	5	10	μmol/mol		
Acrylonitrile	5	10	μmol/mol		
Chloroform	5	10	μmol/mol		
Carbon tetrachloride	5	10	μmol/mol		
Benzene	5	10	μmol/mol		
1, 2-Dichloroethane	5	10	μmol/mol		
Trichloroethylene	5	10	μmol/mol		
Tetrachloroethylene	5	10	μmol/mol		
Ethylbenzene	5	10	μmol/mol		
Styrene	5	10	μmol/mol		
Aniline	5	10	μmol/mol	Determined in accordance with the customer's needs	
Nitrogen					

※ If you have any inquiry on products and mixing besides the above components and concentration, ask for consultation and we will provide further information.

Other Gas Mixtures

RIGAS also supplies illuminating gas, rare gas or semiconductor gas mixture according to various customer needs. We RIGAS will produce gas at your order.

- Illuminating Gas Mixtures
- Semiconductor Gas Mixtures
- Research and Development Gas Mixtures
- High Purity Gases
- Toxic Gases
- Rare Gases
- Hydrocarbons
- Etc.

Cylinder

Material	Size	Material	Size
Steel	3.4 L	Aluminum	3.7 L
	10 L		10 L
	15 L		15 L
	40 L		30 L
	47 L		Etc.
	118 L		–
	Etc.		

Valve

Standard	Specification	Material
JIS	W22mm-14th -RH	Brass, Ni-Plated, SUS
	W22mm-14th –LH	
	W23mm-14th -RH	Brass
CGA	CGA 350 825”14NGO-RH-EXT	Brass, Ni-Plated, SUS
	CGA 510 885”14NGO-LH-INT	Brass
BS	Valve connector is available	
DIN		

※ The above cylinders and valves may be limited depending on the components requested by a customer. Details will be delivered when an estimate is provided.

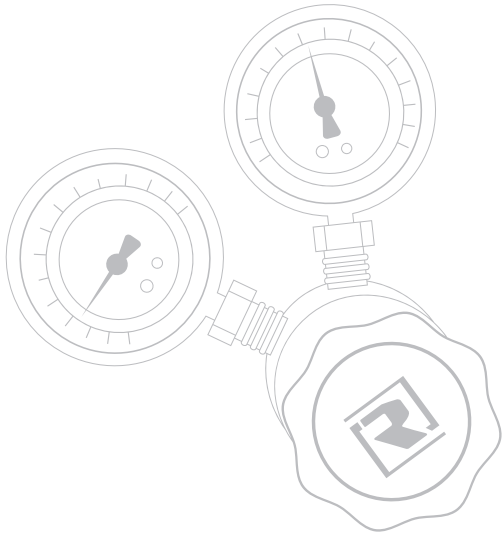
RIGAS Regulator for Calibration Gases

Specification

- 1Stage(Single-stage) and 2Stage(Double-stage) Construction
- Body : Brass(Ni-Plated), SUS316L
- Seat : PCTFE / PTFE
- Diaphragm : SUS316L / Hastelloy
- Stem : SUS316L
- Temperature Range : -40℃~74℃
- Inlet and outlet port size : 1/4 Inch NPT
- Maximum Inlet Pressure : 25 MPa

Typical Applications

- Research Laboratories
- Gas Chromatography
- Laser Gas System
- Process Analyzer
- Zero & Calibration Gases
- Purging Systems
- The following gases can be analyzed
  : HCl, Amine, BTEX, HCHO, HF, etc.



Order information

Series	Material	Stage	Inlet pressure gauge	Pressure control range	Inlet connections (Nut type)	Outlet connections (Male connector)
G S	S : SUS316L B : Brass (Ni-Plated)	1 : 1stage 2 : 2stage	25 : 25 MPa	06 : 0.6 MPa 10 : 1.0 MPa	R : 22 mm-RH L : 22 mm-LH C : CGA350 N : No option E : etc.	0 : No option 1 : 1/4 inch 2 : 1/8 inch 3 : 1/16 inch 4 : etc.

RIGAS 리가스
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