

# RIKEN

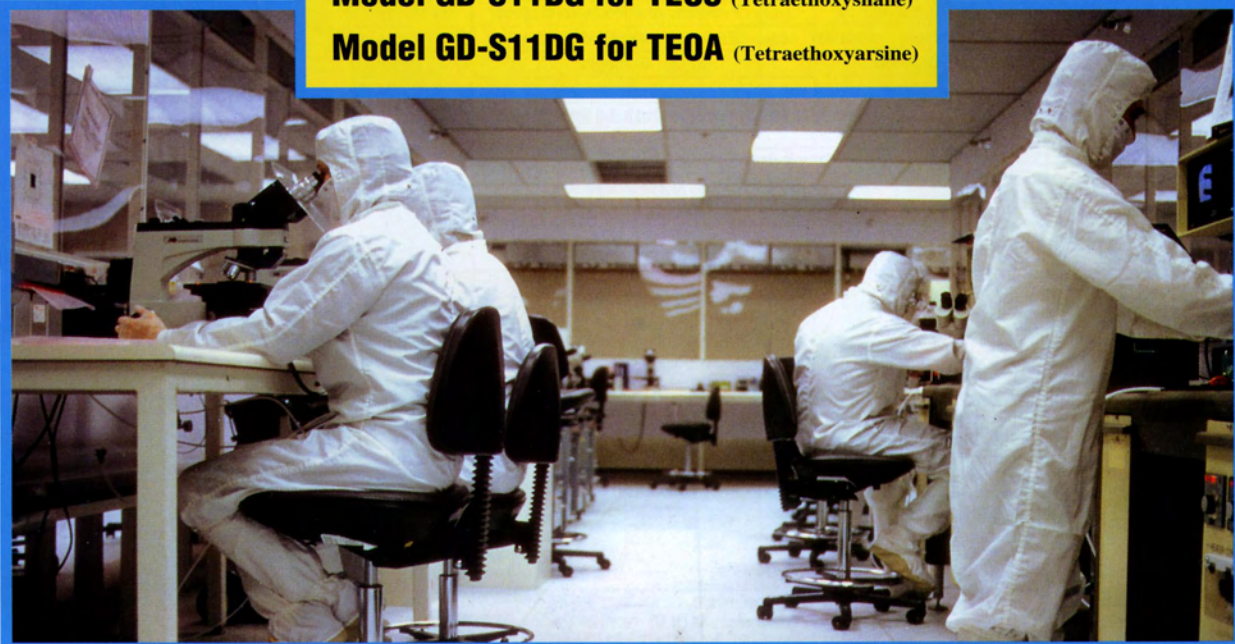
## NF<sub>3</sub>/TEOS/TEOA GAS DETECTOR HEAD

for Semiconductor Wafer Fabrication Plants

**Model GD-K11DG for NF<sub>3</sub>** (Nitrogen Trifluoride)

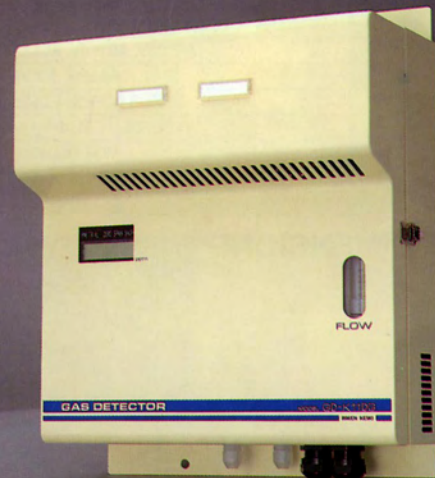
**Model GD-S11DG for TEOS** (Tetraethoxysilane)

**Model GD-S11DG for TEOA** (Tetraethoxyarsine)



### FEATURES

- ▶ Ideal for wafer fabrication applications (Clean room and cylinder cabinet)
- ▶ Virtually no interference from organic solvents and other gases
- ▶ Fast response
- ▶ Self-diagnosis of pyrolyzer condition
- ▶ Low power consumption compared to other pyrolyzer systems
- ▶ Long sensor life



Sample drawing type: GD-S11DG or GD-K11DG



**RIKEN KEIKI**

## OVERVIEW

The Riken Model GD-K11DG and GD-K11DG-BL use pyrolysis to oxidize NF<sub>3</sub> (Nitrogen trifluoride); which is then detected as NO<sub>2</sub> with an electrochemical sensor.

The Model GD-S11DG and S11DG-BL also use pyrolysis to oxidize TEOS (Tetraethoxysilane) or TEOA (Tetraethoxyarsine). The resulting SiO<sub>2</sub> (Silicon dioxide) is then detected in a dual-ionization chamber. This

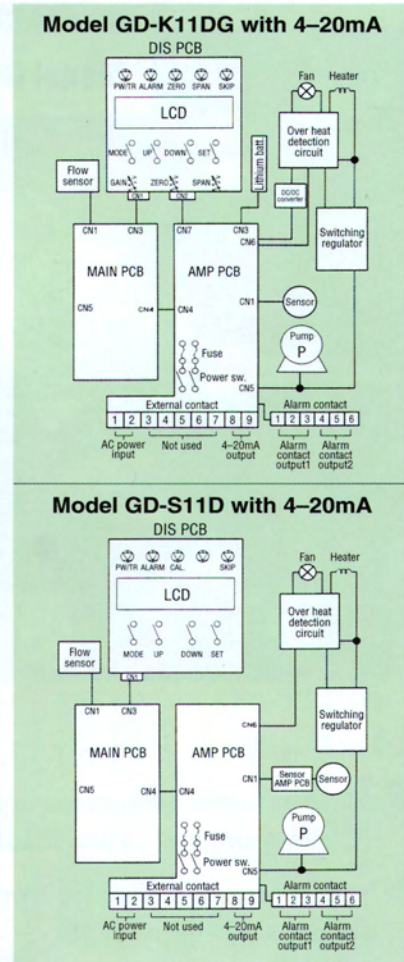
## ANALOG TRANSMISSION...Model GD-K11DG / GD-S11DG

### SPECIFICATIONS

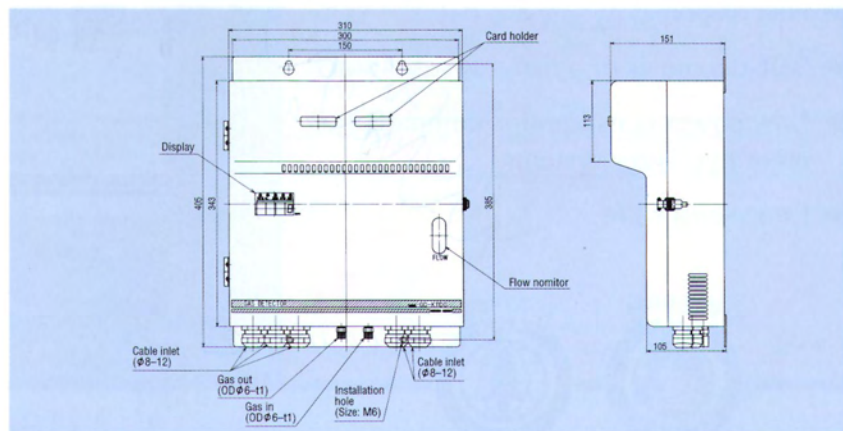
Model	GD-K11DG	GD-S11DG
Detection principle	Electrochemical cell	Pyrolysis / dual ionization chamber
Measurable gas	NF <sub>3</sub> (Nitrogen Trifluoride)	TEOS (Tetraethoxysilane) or TEOA (Tetraethoxyarsine)
Measuring range	0-30ppm	0-15ppm
Alarm setting point	10ppm	5ppm
Response time	Less than 60 sec. when exposed to the calibration gas that is 1.6 times the alarm preset point.	
Gas sampling method	Sample drawing type	
Transmission method	DC 4-20mA	
Sample flow rate	500ml / min.	1.71 / min.
Operating temperature / Humidity range	0-40°C 30-90%RH	10-40°C 30-80%RH
Display function	7 segment LCD, 4 figures * Display of gas concentration * LED lamp	7 segment LCD, 4 figures
Alarm indication	Non-latched mode Output → Dry contact 1a (N.O) Alarm display → LED lamp (Red)	
Self-diagnosis (trouble) alarm	* Contents → Abnormal memory, Flow fail, Heater disconnection. * Display → LED lamp (PW/TR), Green flashing and LCD message. * Output → 4-20mA → 0.5mA fixed output	
Power requirements	AC100V, AC110V, AC117V, 50/60Hz	
Power consumption	Approx. 100VA	
Wiring requirements	CVV - 3 CORES, 1.25Sq or 2.0Sq	
Pipe material	OD Φ6.0 - ID, Φ4.0 half union	
Structure	Wall mounting	
Dimensions & weight	(W) 310mm × (H) 343mm × (D) 151mm, Approx. 8kg	

Specifications subject to change without notice.

### BLOCK DIAGRAM



### OUTER DIMENSIONS



advanced method offers distinct advantages compared to conventional TEOS detection (Hydrolysis/electrochemical sensor): long sensor life and virtually no interference from other gases.

Both the GD-K11DG/GD-K11DG-BL and the GD-S11DG/DG-S11DG-BL are ideal for use in clean rooms and cylinder cabinets, and can be connected to standard indicator/ alarm units or integrated into a variety of monitoring systems.

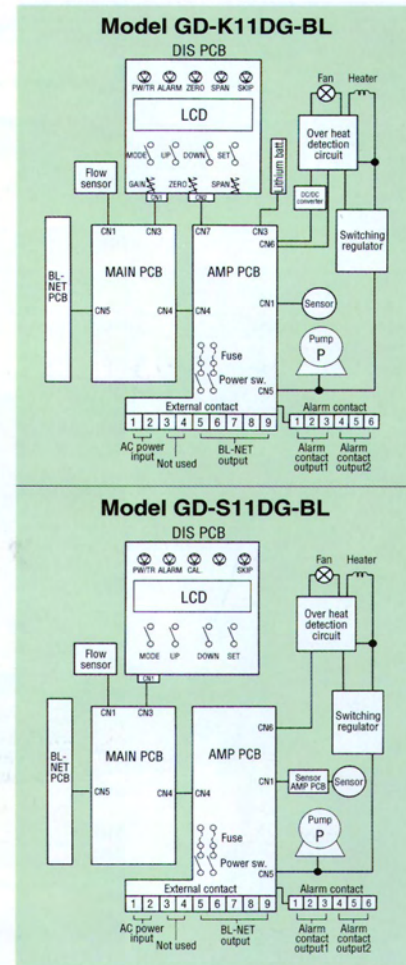
## MULTIPLEX TRANSMISSION...Model GD-K11DG-BL / GD-S11DG-BL

### SPECIFICATIONS

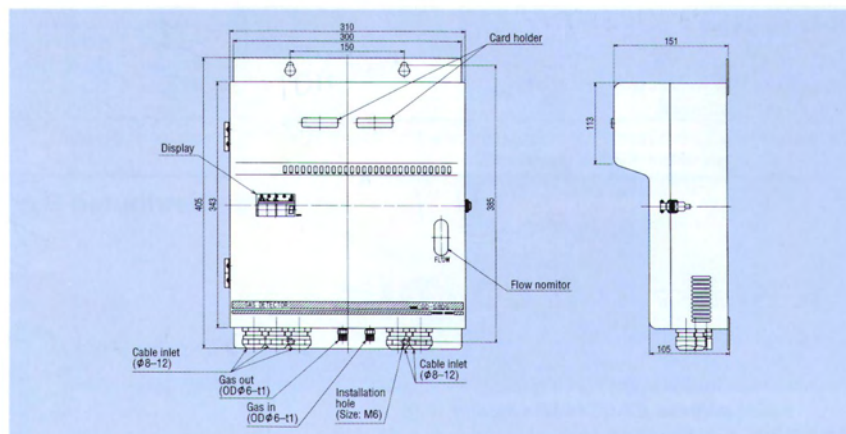
Model	GD-K11DG-BL	GD-S11DG-BL
Detection principle	Electrochemical cell	Pyrolysis/dual ionization chamber
Measurable gas	NF <sub>3</sub> (Nitrogen Trifluoride)	TEOS (Tetraethoxysilane) or TEOA (Tetraethoxyarsine)
Measuring range	0-30ppm	0-15ppm
Alarm setting point	10ppm	5ppm
Response time	Less than 60 sec. when exposed to the calibration gas that is 1.6 times the alarm preset point.	
Gas sampling method	Sample drawing type	
Transmission method	BL-NET (Multiplex transmission) CPEVS 1P above Φ0.9 KPEVS 1P above Φ1.25Sq	
Sample flow rate	500ml/min.	1.7l/min.
Operating temperature / Humidity range	0-40°C 30-90%RH	10-40°C 30-80%RH
Display function	7 segment LCD, 4 figures	7 segment LCD, 4 figures
* Display of gas concentration * LED lamp	PW/TR (Green)- Lighting at normal, Flashing at trouble AL (Red)- OFF at normal, Lighting at gas alarm. ZERO (Red)- OFF at measurement, Flashing at zero adjustment of maintenance mode. SPAN (Red)- OFF at normal, Flashing/Lighting at span adjustment of maintenance mode. SKIP (Green)- OFF at measurement, Lighting at SKIP, Flashing at maintenance mode.	PW/TR (Green)- Lighting at normal, Flashing at trouble AL (Red)- OFF at normal, Lighting at gas alarm. CAL (Red)- OFF at measurement, Lighting at SKIP, flashing at maintenance mode. SKIP (Green)- OFF at measurement, Lighting at SKIP, Flashing at maintenance mode.
Alarm indication	Non-latched mode Output → Dry contact 1a (N.O) Alarm display → LED lamp (Red)	
Self-diagnosis (trouble) alarm	* Contents → Abnormal memory, Flow fail, Heater disconnection. * Display → LED lamp (PW/TR), Green flashing and LCD message. * Output → Data output by BLNET	
Power requirements	AC100V, AC110V, AC117V, 50/60Hz	
Power consumption	Approx. 100VA	
Wiring requirements	CVV - 3 CORES, 1.25Sq or 2.0Sq	
Pipe material	OD Φ6.0 - ID, Φ4.0 half union	
Structure	Wall mounting	
Dimensions & weight	(W) 310mm × (H) 343mm × (D) 151mm, Approx. 8kg	

Specifications subject to change without notice.

### BLOCK DIAGRAM



### OUTER DIMENSIONS



# GASES DETECTABLE WITH RIKEN KEIKI's ELECTROCHEMICAL SENSORS

Measurable gases	ACGIH TLV-TWA	Measuring range	Types of detector head
Ammonia <b>NH<sub>3</sub></b>	25ppm	0~ 75ppm	GD-K11D, -K7D, -K8D, -E7D, SC-90, -K8A
Antimony Pentachloride <b>SbCl<sub>5</sub></b>		HCl 0~ 15ppm	GD-K11D, -K7D, -K8D, -K34PA, -K33, SC-90, K8A
Arsenic Pentafluoride <b>AsF<sub>5</sub></b>		HF 0~ 9ppm	GD-K11D, -K7D, -K8D, SC-90
Arsine <b>AsH<sub>3</sub></b>	0.05ppm	0~ 1ppm	GD-K11D, -K7D, -K8D, -K34PA, -K33, SC-90, K8A
		0~ 0.2ppm	GD-K11D, -K7D, -K8D, SC-90
Boron Trichloride <b>BCl<sub>3</sub></b>		HCl 0~ 15ppm	GD-K11D, -K7D, -K8D, -K34PA, -K33, SC-90, K8A
Boron Trifluoride <b>BF<sub>3</sub></b>	1ppm (C)	HF 0~ 9ppm	GD-K11D, -K7D, -K8D, SC-90
Bromine <b>Br<sub>2</sub></b>	0.1ppm	0~ 1ppm	GD-K11D, -K7D, -K8D, -K34PA, SC-90
Carbon Monoxide <b>CO</b>	25ppm	0~ 75ppm	GD-K11D, -K7D, -K8D, -K8A, SC-90
		0~ 100ppm	URAS-14
		0~ 150ppm	GD-K11D, -K7D, -K8D, -K34PA, -K33, SC-90
		0~ 200ppm	URAS-14
		0~ 300ppm	GD-K11D, -K7D, -K8D, -K34PA, -K33, SC-90
Carbon Tetrachloride <b>CCl<sub>4</sub></b>	5ppm	0~ 30ppm	GD-K8DT
Chlorine <b>Cl<sub>2</sub></b>	0.5ppm	0~ 1.5ppm	GD-K11D, -K7D, -K8D, -SC-90
		0~ 3ppm	GD-K11D, -K7D, -K8D, -K8A, K-34PA, -K33, SC-90
Chlorine Trifluoride <b>ClF<sub>3</sub></b>	0.1ppm	0~ 0.6ppm*	GD-K11D, -K7D, -K8D, SC-90
		0~ 1ppm	GD-K11D, -K7D, -K8D, -K35PN, SC-90
Diborane <b>B<sub>2</sub>H<sub>6</sub></b>	0.1ppm	0~ 5ppm	GD-K35PN
		0~ 0.3ppm	GD-K11D, -K7D, -K8D, SC-90
Dichlorosilane <b>SiH<sub>2</sub>Cl<sub>2</sub></b>		HCl 0~ 15ppm	GD-K11D, -K7D, -K8D, -K34PA, -K33, SC-90, -K8A
Disilane <b>Si<sub>2</sub>H<sub>6</sub></b>		0~ 5ppm	GD-K35PN
		0~ 15ppm	GD-K11D, -K7D, -K8D, SC-90
Fluorine <b>F<sub>2</sub></b>	1ppm	0~ 5ppm	GD-K11D, -K7D, -K8D, SC-90
		0~ 3ppm	GD-K11D, -K7D, -K8D, SC-90
Germane <b>GeH<sub>4</sub></b>	0.2ppm	0~ 0.9ppm	GD-K35PN
Hydrogen <b>H<sub>2</sub></b>		0~2000ppm	GD-V7D, SD-V8A, GD-V11D
Hydrogen Bromide <b>HBr</b>	3ppm (C)	0~ 9ppm	GD-K11D, -K7D, -K8D, -K34PA, SC-90
Hydrogen Chloride <b>HCl</b>	5ppm (C)	0~ 15ppm	GD-K11D, -K7D, -K8D, -K34PA, -K33, SC-90, K8A
Hydrogen Fluoride <b>HF</b>	3ppm (C)	0~ 9ppm	GD-K11D, -K7D, -K8D, SC-90
Hydrogen Iodine <b>HI</b>		0~ 5ppm	GD-K11D, -K7DH
Hydrogen Selenide <b>H<sub>2</sub>Se</b>	0.05ppm	0~ 0.2ppm	GD-K35PN
Hydrogen Sulfide <b>H<sub>2</sub>S</b>	10ppm	0~ 1ppm	GD-K11D, -K7D, -K8D, -K34PA, SC-90
Iodine <b>I<sub>2</sub></b>	0.1ppm (C)	0~ 1ppm	GD-K11D, -K7D, -K8D, SC-90
		0~ 2ppm	GD-K34PA
Molybdenum Fluoride <b>MOF<sub>4</sub></b>		HF 0~ 9ppm	GD-K11D, -K7D, -K8D, SC-90
Nitric Oxide <b>NO</b>	25ppm	0~ 100ppm	GD-K11D, -K7D, -K8D, -K34PA, -K33, SC-90
Nitrogen Dioxide <b>NO<sub>2</sub></b>	3ppm	0~ 15ppm	GD-K11D, -K7D, -K8D, -K8A, SC-90
Nitrogen Trifluoride <b>NF<sub>3</sub></b>	10ppm	0~ 30ppm	GD-K8DG
Nitrus Oxide <b>N<sub>2</sub>O</b>	50ppm	0~ 100ppm	URAS-14
Oxygen <b>O<sub>2</sub></b>	Below 18%	0~ 25vol%	GD-F11A
Ozone <b>O<sub>3</sub></b>	0.1ppm (C)	0~ 0.6ppm*	GD-K11D, -K7D, -K8D, SC-90
		0~ 1ppm	GD-K11D, -K7D, -K8D, -K35PN, SC-90, -K8A
Phosphine <b>PH<sub>3</sub></b>	0.3ppm	0~ 1ppm	GD-K11D, -K7D, -K8D, -K8A, -K34PA, -K33, SC-90
		0~ 0.2ppm	GD-K35PN
Phosphorus Oxychloride <b>POCl<sub>3</sub></b>	0.1ppm	HCl 0~ 15ppm	GD-K11D, -K7D, -K8D, -K34PA, -K33, SC-90, -K8A
Phosphorus Pentafluoride <b>PF<sub>5</sub></b>		HF 0~ 9ppm	GD-K11D, -K7D, -K8D, SC-90
Phosphorus Trichloride <b>PCl<sub>3</sub></b>	0.2ppm	HCl 0~ 15ppm	GD-K11D, -K7D, -K8D, -K34PA, -K33, SC-90, -K8A
Phosphorus Trifluoride <b>PF<sub>3</sub></b>	1ppm	0~ 10ppm	GD-K11D, -K7D, -K8D
Silane <b>SiH<sub>4</sub></b>	5ppm	0~ 5ppm	GD-K34PA
		0~ 15ppm	GD-K11D, -K7D, -K8D, -K8A, -K34PA, -K33, SC-90
Silicone Oxide <b>SiO<sub>2</sub></b>		10mg/m <sup>3</sup>	GD-SK34PN
Silicone Tetrachloride <b>SiCl<sub>4</sub></b>		HCl 0~ 15ppm	GD-K11D, -K7D, -K8D, -K34PA, -K33, SC-90, -K8A
Silicone Tetrafluoride <b>SiF<sub>4</sub></b>		HF 0~ 9ppm	GD-K11D, -K7D, -K8D, SC-90
Sulfur Hexafluoride <b>SF<sub>6</sub></b>	1000ppm	0~2000ppm	URAS-14
Sulfur Tetrafluoride <b>SF<sub>4</sub></b>	0.1ppm	HF 0~ 9ppm	GD-K11D, -K7D, -K8D, SC-90
Tantalum Fluoride <b>TaF<sub>5</sub></b>		HF 0~ 9ppm	GD-K11D, -K7D, -K8D, SC-90
Tetraethyl Orthosilicate (TEOS) <b>Si(OC<sub>2</sub>H<sub>5</sub>)<sub>4</sub></b>	10ppm	0~ 15ppm	GD-S8DG
Tin Tetrachloride <b>SnCl<sub>4</sub></b>		HCl 0~ 15ppm	GD-K11D, -K7D, -K8D, -K34PA, -K33, SC-90, -K8A
Titanium Fluoride <b>TiF<sub>4</sub></b>		HF 0~ 9ppm	GD-K11D, -K7D, -K8D, SC-90
Trichlorosilane <b>SiHCl<sub>3</sub></b>		HCl 0~ 15ppm	GD-K11D, -K7D, -K8D, -K34PA, -K33, SC-90, -K8A
Trimethoxy Boron (TMB) <b>B(OCH<sub>3</sub>)<sub>3</sub></b>	200ppm	0~ 500ppm	GD-S8DG
Trimethyl Phosphate (TMP) <b>P(CH<sub>3</sub>)<sub>3</sub></b>		0~ 100ppm	GD-S8DG
Tungsten Hexafluoride <b>WF<sub>6</sub></b>		HF 0~ 9ppm	GD-K11D, -K7D, -K8D, SC-90

\*1 Equivalent value for 0-0.2ppm PH<sub>3</sub> \*\* Equivalent value for 0-15ppm TEOS \*\* (F) means for HF gas only. Specifications subject to change without notice.  
For other gas, please consult Riken or nearest agent.



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