

In-line vapor concentration monitor for bubbling supply line

Liquid and solid materials are used in MOCVD (Metal Organic Chemical Vapor Deposition) equipment, which is widely employed in compound semiconductor manufacturing processes, and are generally supplied to the chamber as vaporized gas by bubbling method. Real-time gas concentration monitoring is important to realize a stable deposition process. The system can also monitor the concentration of IPA vapor in the drying process and B_2H_6 gas, which decomposes easily.

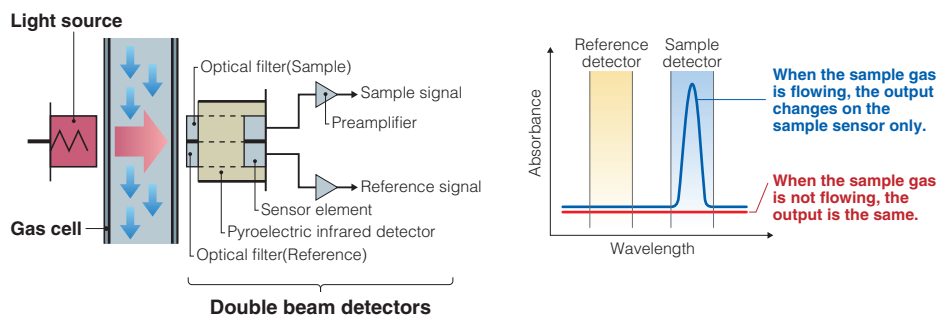
In addition to monitoring vapor concentration, the system can be applied to concentration control systems including feedback control.



Contributed to stable supply of precursor

- Real-time Monitoring
- Multi-calibration Curve Function (Optional)
- Multi-display Function
- Communications Function
- Simple, Compact Design

Non-dispersive Infrared Absorptiometry (NDIR)



The infrared absorptiometry method employed by the IR-300 Series uses the principle of the absorption by gas molecules of the infrared light emitted from an infrared light source. The sample output from a sample that has absorbed the gas being measured is compared to a reference output with no absorbance, and the result is converted into a gas concentration. The use of this double beam method enables long-term, stable measurement results to be obtained.

Applications

- Continuous concentration monitoring of precursor
- Check precursor concentration while adjusting supply conditions
- Monitor residual quantities of liquid and solid precursors for better utilization



Model	IR-312M	IR-314M	IR-315M	IR-322M	IR-324M	IR-322MB	IR-324MB
Gas cell optical path length	5 mm			50 mm			50 mm
Target precursor / full-scale concentration *1	TMGa / 25 vol% , DEZn / 10 vol% IPA / 5 vol% , IPA / 10 vol%			TMIn / 1 vol% , TMIn / 2.5 vol% , TEGa / 1 vol% , TMGa / 1 vol% TMAI / 2 vol% , DEZn / 2.5 vol% , IPA / 1 vol%			B ₂ H ₆ 10 vol% / H ₂ or He
Measurement concentration range	0-100 % of full scale						
Repeatability *2	≤ 0.5 % of full scale						
Linearity *2	≤ 1.0 % of full scale						
Accuracy *3	≤ 1.0 % of full scale						
Zero drift *2	≤ 1.0 % of full scale/day						
Response (T90) *4	≤ 4 sec						
Sensor response	≤ 0.4 sec						
Operating pressure range **2*5	30-300 kPa (A)			500 kPa (A)			100-300 kPa (A)
Proof pressure	500 kPa (A)						
Operating flow rate range **2*3	50-1000 SCCM						
Operating ambient temperature	15-35 °C					20-35 °C	
Setting gas cell temperature	60 °C (Need temperature controller prepared by users) *6					Non-heated	
Gas cell temperature sensor	Type K Thermocouple (Connector type : OMEGA SMP-K-F)						
Thermal switch	100 °C (Self-holding type)						
Warming up time	1 hour or more						
Wetted material	Body : SUS316L, Gas cell window : Sapphire, Ag, Cu, Ti, Ni *7					Body : SUS316L, Gas cell window : Sapphire, Ni, Al	
Leak integrity	≤ 5 × 10 ⁻¹² Pa·m ³ /s (He)						
Fitting	1/4 inch VCR male or equivalent						
Communication interface	Analog / RS-485	DeviceNet™	CC-Link®	Analog / RS-485	DeviceNet™	Analog / RS-485	DeviceNet™
Power requirement	Main unit ± 15 VDC / 3.8 W	DC24 V / 12 W	DC24 V ±10 % / 12 W	± 15 VDC / 3.8 W	DC24 V / 12 W	± 15 VDC / 3.8 W	DC24 V / 12 W
Gas cell heater	200-240 VAC, Maximum 50 VA (Connector type : Molex Standard 093 1545-P1)						—
Dimensions	124 mm(W) × 50.8 mm(D) × 135 mm(H) *8 Not including protrusions						
Mounting orientation	Free						
Weight	Approx. 1.2 kg			Approx. 1.5 kg			Approx. 1.5 kg

*1 Please contact HORIBASTEC regarding precursor and/or full-scale concentration other than those shown above.

*2 The specification is guaranteed under the standard conditions of HORIBASTEC.
Ambient temperature: 23±2 °C / Gas cell temperature: 60 °C / Measurement flow rate: 1000 SCCM / Calibration gas: C₂H₄ balanced in N₂ at 105 kPa (A).

*3 Accuracy is based on concentration of the calibration gas.

*4 Gas replacement time (Td: Time delay) is not included in the response. The typical Td in our inspection equipment is approx. 1.0 second.

*5 This is recommended operating condition.

*6 Required specification of temperature controller PID operation by auto tuning. Control cycle : 1 second or less

*7 Optional wetted material: Body; SUS316L, Gas cell optical window; Sapphire, Ni

*8 The height of IR-315M is 145 mm.

Selecting a model

IR-3	1	4	M	,	Target precursor1/ full-scale concentration	,	Target precursor2/ full-scale concentration	,	Target precursor3/ full-scale concentration	,	T	1	3	,	200	K	60	,	4CRL	,	A
	①	②	③				④				⑤	⑥	⑦		⑧	⑨	⑩		⑪		⑫

① Gas cell specification

1	5 mm cell* *CC-Link®: 5 mm cell only
2	50 mm cell

② Communication mode

2	Analog & RS-485 / F-net Protocol
4	DeviceNet™** *If selecting DeviceNet™, please choose an output range from ⑦
5	CC-Link®

③ Model type

M: Standard
MB: B₂H₆

④ Target precursor/full-scale concentration

Please select the desired target precursor and full scale concentration (×1 for standard, ×2 for option). This determines the gas cell specification (IR-31 or IR-32) in ①.

Target precursor/full-scale concentration	① Gas cell specification
TMGa / 25 vol% , DEZn / 10 vol% IPA / 5 vol% , IPA / 10 vol%	1
TMIn / 1 vol% , TMIn / 2.5 vol% TEGa / 1 vol% , TMGa / 1 vol% TMAI / 2 vol% , DEZn / 2.5 vol% IPA / 1 vol% B ₂ H ₆ /H ₂ 10 vol% , B ₂ H ₆ /He 10 vol%	2

Please contact us regarding target precursor/full-scale concentration not listed above.

⑤ Connector position : Top of case

⑥ Number of calibration curve

1	One component*
2	Two components (Option)
3	Three components (Option)

*If selecting MB from ③, please choose "1"

⑦ DeviceNet™ output range

Blank	Other than DeviceNet™ model
1	Concentration output full scale *100 %F.S.*
3	Concentration output full scale *133 %F.S.* (standard)
5	Concentration output full scale *133.329 %F.S.*

⑧ Heater power supply voltage : 200-240 VAC

⑨ Gas cell temperature sensor : Type K Thermocouple

⑩ Heater set temperature

60	60 °C (standard)
AMB	Non-heated (option)*

*Available for IPA 1 vol% and 5 vol%
Ambient temperature fluctuation must be within ±1 °C, otherwise concentration accuracy is out of guarantee.
*If selecting MB from ③, please choose "AMB"

⑪ Fitting : 1/4 inch VCR male or equivalent, Fitting to fitting dimension 124 mm

⑫ Cell window brazing

Blank	Standard
A	Kovar with Ni coating(option)*

*If selecting MB from ③, please choose "A"
*If selecting TMGa or TEGa from ④, please choose "Blank"



The HORIBA Group adopts IMS (Integrated Management System) which integrates Quality Management System ISO9001, Environmental Management System ISO14001, and Occupational Health and Safety Management System ISO45001. We have now integrated Business Continuity Management System ISO22301 in order to provide our products and services in a stable manner, even in emergencies.



Applying to the EU RoHS Directive : This products is compliant with the restriction of the designated 10 hazardous substances(*).

(*) lead , cadmium , mercury , hexavalent chromium , polybrominated biphenyls (PBB) , polybrominated diphenyl ethers (PBDE) , bis (2-ethylhexyl) phthalate (DEHP) , butyl benzyl phthalate (BBP) , dibutyl phthalate (DBP) and diisobutyl phthalate (DIBP)

Using lead-free soldering : Lead-free soldering is used for mounting components of printed circuit boards.

- Many countries consider the reinforcement of regulations concerning the risk caused by lead to human body and the environment

HORIBASTEC

HORIBA STEC, Co., Ltd.

<http://www.horiba.com/semiconductor>



Please read the operation manual before using this product to ensure safe and proper handling of the product.

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