InVue® GV148 Liquid Concentration Monitor

Real-time process monitoring in an integrated, compact package

The InVue® GV148 liquid concentration monitor delivers real-time process fluid concentration measurements for chemical blending, spiking, and dilution without process intrusion or interruption.

Integrated in a compact, ultra-high purity package, the GV148 liquid concentration monitor delivers cost-effective, high-performance concentration monitoring, enabling greater process efficiency for front-end-of-line (FEOL), back-end-of-line (BEOL), and sub-fab delivery chemical systems. This increased process visibility results in tighter process control, higher wafer throughput, reduced chemical usage, and decreased scrap.

POWERFUL USER INTERFACE SOFTWARE

A dynamic and user-friendly Windows®-based HMI software application supports the GV148 configuration and monitoring in real time. This software allows users to:

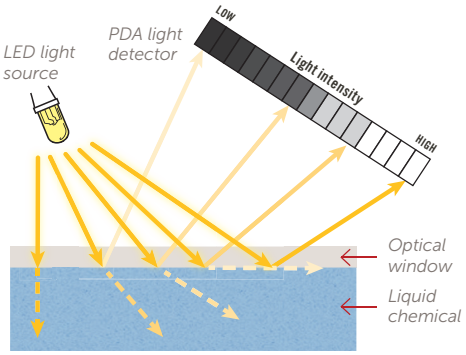
- Obtain real-time refractive index, fluid temperature, and concentration information
- Customize refractive index to concentration conversions
- Acquire and analyze data for chemistry specific temperature compensation
- Manipulate sensor averaging method
- View current alarms, system events, and alarm history
- Re-zero refractive index
- Configure analog outputs

PROVEN REFRACTIVE INDEX TECHNOLOGY

The GV148 monitor uses proven refractive index technology packaged in a compact configuration to provide an accurate, safe, and repeatable means of measuring liquid concentration. The in-line sensor accurately measures the process fluid index of refraction (IoR) and temperature. This information is then used to calculate process fluid concentration.

Principle of Operation

Using refractive index technology, the InVue GV148 concentration monitor operates when light reflects off the window/liquid interface into the photo diode array (PDA). The angle of reflection is determined by the refractive index ratio between the liquid and window. The custom designed Entegris algorithm measures small changes in the reflected light intensity. This reflection geometry and miniaturization enable concentration monitoring performance unmatched by other technologies.



APPLICATIONS

- H_2O_2 spiking in slurry
- Slurry dilution
- Proprietary additive blending
- Global and local loop monitoring
- Batch tool chemical blending
- Bath lifetime detection
- Post-CMP clean chemical blending

FEATURES & BENEFITS

Measurement based on index of refraction	Provides real-time concentration and temperature validation for process control Fast response time for immediate excursion detection Measures concentration in various media, including non-conductive fluids Non-intrusive, maintaining chemical purity and cleanliness In-line for process efficiency
Ultrapure wetted surfaces of fluoropolymers and sapphire	Maintains chemical purity and cleanliness
Small footprint with integral electronics	Minimizes overall tool size Easily integrates into new and existing tools spaces
HMI software	Tool for real-time data logging and analysis Allows for easy custom configuring of the monitor for customer proprietary chemistries Includes detailed event log for close monitoring of system events, parameter changes, and alarm history
Multiple communication option	RS485, RS422, 4-20mA Flexible to meet various control architectures
Fully potted sensor	Provides accuracy, repeatability, and reliability in the harshest environments
Ambient light cancellation algorithm	Improves accuracy in the presence of ambient light
Sensor has no consumable parts	Requires minimal hardware and preventive maintenance
Window cleaning port	Allows easy access to the sapphire window for manual cleaning
LED status lights	Provide visual indication of monitor heartbeat, communications, and error
Optional N_2/DI automated* *in situ* window cleaner (Available Q2, 2021)	Minimizes maintenance downtime, especially in slurries and hygroscopic chemistries

**With appropriate valving and control*

SPECIFICATIONS

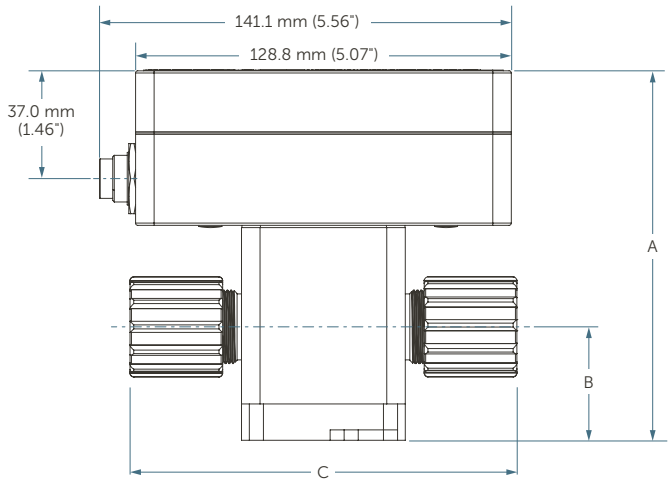
Sensor materials of construction	Flow cell body	Polytetrafluoroethylene (PTFE)*
	Optical window	Single-crystal sapphire*
	Cable jacket	Polyvinylchloride (PVC)
	Bonnet, enclosure	Polyvinylidene fluoride (PVDF)
	Mounting plate	Polypropylene (PP)
Electrical	Cable connection	19 pin Turck® male
	Current rating	1.0 A at start-up; 0.5 A during operation
	Main voltage input	24 VDC
	IO voltage input	12 – 24 VDC
	Short protection	Yes
	External LEDs	4
	Analog outputs	4 – 20 mA concentration, fluid temperature, refractive index (RI)
	Discrete digital inputs	2
	Discrete digital outputs	2, 80 mAdc maximum (each)
	Re-zero	Digital input, serial command, or HMI software
Serial communication	RS485	2-wire or 4-wire
	RS422	4-wire
	Operating system compatibility	Windows 7 or 10
	Network compatible	Yes
Pressure and thermal	Maximum pressure	80 psig at 40°C (104°F)
	Process fluid temperature range	20° to 40°C (68° to 104°F)
	Ambient temperature range	20° to 35°C (68° to 95°F)
	Storage temperature range	-15° to 40°C (5° to 104°F)
RI measurement	RI measurement range**	1.32 – 1.40 nD
	Accuracy	$\pm 2 \times 10^{-4}$ nD (@ 20°C [68°F] from 1.332987 to 1.4000 nD)
	Repeatability	5×10^{-5} nD (in clear fluid @20°C [68°F])
	Precision	3×10^{-6} nD (in DI water @20°C [68°F])
	Response time	<3 sec unaveraged response to 63% of steady state change
	Drift	$<5 \times 10^{-5}$ nD/30 days (@ 20°C [68°F])
	Pressure sensitivity (typical)	8×10^{-7} nD/psig (in DI water @ 20°C [68°F])
ROHS compliant	Yes	
Enclosure	IP54	
Orientation	Any	

**Wetted components.*

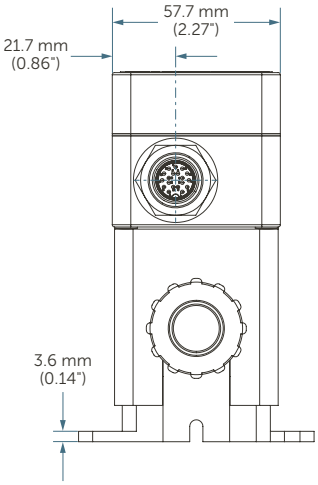
***For fluids with a refractive index outside this range, please contact Entegris.*

DIMENSIONS

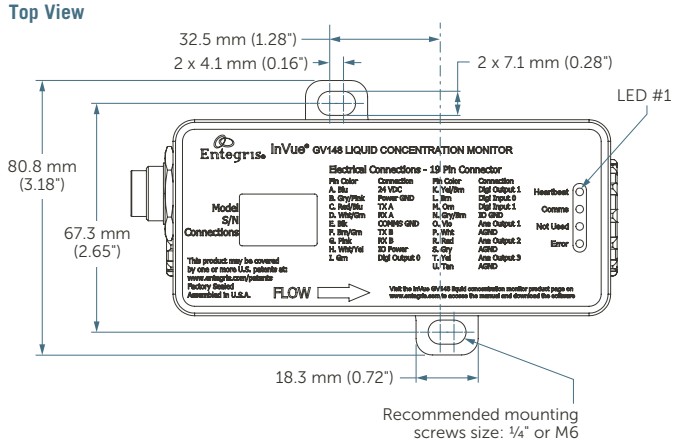
Front View



Side View



Top View



Inlet/outlet port connection	DIMENSIONS		
	A	B	C
¼" Flaretek® tube fitting	114.6 mm (4.51")	33.0 mm (1.30")	111.0 mm (4.37")
⅜" Flaretek tube fitting	117.7 mm (4.64")	34.7 mm (1.37")	113.5 mm (4.47")
½" Flaretek tube fitting	120.9 mm (4.76")	36.3 mm (1.43")	119.6 mm (4.71")
¾" Flaretek tube fitting	126.6 mm (4.99")	38.9 mm (1.53")	132.6 mm (5.22")
1" Flaretek tube fitting	126.6 mm (4.99")	38.9 mm (1.53")	154.9 mm (6.10")
½" PrimeLock® tube fitting	120.9 mm (4.76")	36.3 mm (1.43")	122.9 mm (4.84")
1" PrimeLock tube fitting	126.6 mm (4.99")	38.9 mm (1.53")	149.6 mm (5.89")
¼" Pillar tube fitting	114.6 mm (4.51")	33.0 mm (1.30")	100.5 mm (3.96")
⅜" Pillar tube fitting	117.7 mm (4.64")	34.7 mm (1.37")	112.5 mm (4.43")
¾" Pillar tube fitting	126.6 mm (4.99")	38.9 mm (1.53")	134.5 mm (5.29")

ORDERING INFORMATION

InVue GV148 Liquid Concentration Monitor: part number

GV1 M A H0 _ _ _

Port accessory
NA = None
WC = Auto *in situ* window cleaner (Available Q2, 2021)

Inlet/outlet size
04 = ¼"
06 = ⅜"
08 = ½"
12 = ¾"
16 = 1"

Inlet/outlet type
F = Flaretek® tube fitting
K = PrimeLock® tube fitting
W = Super 300 type Pillar® tube fitting

Electrical connector type
H0 = PVDF panel mount connector; mating cable sold separately**

Interface module
A = 4-20mA-AO/DI/DO – RS422*

Sensor
M = SR2

Model
GV1 = InVue GV148

**4-20mA Analog Output – Quantity 3; Digital Input – Quantity 2; Digital Output – Quantity 2*

Accessory**

Part number	Description
GV1CBLH04	19-pin Turck connector with 4.0 meter (13.12') PVC-jacketed cable
GV1USBCVT	USB to 4-wire serial converter

FOR MORE INFORMATION

Please call your Regional Customer Service Center today to learn what Entegris can do for you. Visit entegris.com and select the Contact Us link to find the customer service center nearest you.

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