



GAS	MEASURES	APPLICATION
MULTIPLE	ULTRA TRACE PPB  ULTRA TRACE PPT	QUALITY

### SENSING TECHNOLOGY

GAS CHROMATOGRAPHY



PLASMA



## SUB-PPB TRACE MEASUREMENT OF H<sub>2</sub>, CH<sub>4</sub>, CO, CO<sub>2</sub>, N<sub>2</sub>, Ar AND NMHC FOR THE SEMICONDUCTOR INDUSTRY

### UNRIVALLED PERFORMANCE

- Innovative high-sensitivity Plasma Emission Detector (PED) enables ultra-trace measurements of Ar, N<sub>2</sub>, H<sub>2</sub>, CH<sub>4</sub>, CO and CO<sub>2</sub>, and NMHC
- ProPeak peak detection technique enables unprecedented measurement sensitivity
- Direct Analysis Methodology removes uncertainties of FID and RGD measurements

### FLEXIBLE

- Comprehensive solution for ultra-trace H<sub>2</sub>, CH<sub>4</sub>, CO, CO<sub>2</sub>, N<sub>2</sub>, Ar and NMHC in a wide range of common background gases including He, H<sub>2</sub>, N<sub>2</sub>, Ar and O<sub>2</sub>
- A complete stand-alone UHP gas analysis solution when combined with DF-500 analyzers for trace O<sub>2</sub> and DF-700 analyzers for trace moisture
- Digital communications for remote access: Internet/ Ethernet and RS232

### EASY TO USE

- Comprehensive report monitoring software for full access to chromatograms, process results, statistics and historical values
- Internal dilution system option
- No requirement for flammable fuel gas, improving safety and simplifying installation

### LOW COST OF OWNERSHIP

- Non-depleting sensor and intelligent software extends calibration intervals
- No need for methaniser or consumable fuel gas
- Cost-effective and simplified ongoing maintenance

### BENCHMARK COMPLIANCE

- In compliance with Low Voltage, EMC and applicable Directives

### KEY APPLICATIONS

- Semiconductor production - quality control measurements
- Semiconductor production - stationary analytical systems
- UHP gas production - quality control measurements

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### THE DEFINITIVE SOLUTION FOR UHP GAS MONITORING APPLICATIONS

When monitoring UHP gases used in semiconductor wafer manufacture, the highest sensitivity and performance is essential. A suitable analytical solution must offer the flexibility to monitor all required gases in common background gases - and do so with complete selectivity and accuracy at ultra-trace levels. No matter your application needs, you'll want a solution that can reduce ongoing costs and help you leverage business efficiencies. We don't believe you should have to compromise.

### A NO COMPROMISE SOLUTION

The NanoChrome is a game-changing analyzer that provides the highest level of performance accuracy and selectivity currently available. Using leading-edge, patented PED sensing technology, this device delivers notable advantages over comparable analysis techniques. Not only is it highly specific to the gases being measured in diverse gas streams, it also removes the need for flammable fuel gas - allowing the NanoChrome to deliver an enhanced-safety solution. When a complete, stand-alone solution is demanded, NanoChrome can be combined with the DF-500 (ultra-trace ppt O<sub>2</sub>) and DF-700 (ultra-trace moisture) analyzer series.

### SIMPLE MAINTENANCE AND REDUCED ONGOING COSTS

By combining Servomex's specially developed non-depleting PED technology with advanced new processing and operational software, NanoChrome allows calibration periods to be extended, helping to reduce on-going costs considerably over product life. The addition of intelligent signal processing ensures this device offers the highest grade of accuracy, maximizing process uptime. Comprehensive digital communications protocols and access via a network or internet browser facilitate flexible remote device interaction, while an intelligent software package provides the ability to generate comprehensive reporting and statistical analysis. This makes the NanoChrome the analyzer to which all other UHP gas monitoring analyzers will be compared.

### USEFUL LINKS



*These analyzers are not intended for any form of use on humans and are not medical devices as described in the Medical Devices Directive 93/42EEC.*

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# TECHNICAL DATA SHEET

## SERVOPRO NanoChrome



### SPECIFICATIONS

<b>GAS MEASURED</b>		H <sub>2</sub> , CH <sub>4</sub> , CO, CO <sub>2</sub> , N <sub>2</sub> , Ar and NMHC impurities in UHP gases				
<b>TECHNOLOGY</b>		Plasma emission detector (PED)				
<b>PERFORMANCE</b>						
<b>Limit of Detection (LOD) †</b>		<b>Background Gas</b>				
		He	H <sub>2</sub>	N <sub>2</sub>	Ar	O <sub>2</sub>
<b>Impurities</b>	H <sub>2</sub>	0.5ppb	-	0.5ppb		0.8ppb
	CO	0.5ppb				
	CH <sub>4</sub>	0.5ppb				
	CO <sub>2</sub>	0.5ppb				
	NMHC	0.5ppb				
	Ar	0.5ppb			-	0.5ppb
	N <sub>2</sub>	0.3ppb		-	0.3ppb	
<b>Range</b>		0-250ppb •				
<b>Accuracy (intrinsic error) FS</b>		The greater of ±2% of reading or LOD				
<b>Repeatability</b>		The greater of ±2% of reading or LOD				
<b>SIGNAL OUTPUTS/INPUTS</b>						
<b>Analog output</b>		1 x 4-20mA output per peak - up to 8 outputs				
<b>Digital outputs</b>		1 x remote range identification output per peak - up to 8 2 x alarm dry contact outputs - user pre-settable limited 1 x system status dry contact output				
<b>Digital inputs</b>		1 x digital isolated input - remote initiation of analysis				
<b>Serial comms</b>		Remote interaction via RS232 ASCII protocol and ethernet/internet				
<b>OPTIONS</b>						
<b>Sample dilution</b>		Internal, integrated system. Enables calibration with 5ppm cal gas				
<b>PHYSICAL</b>						
<b>Size</b>		482mm (18.9") Wide x 177mm (7") High x 600mm (23.6") Deep (per chassis)				
<b>Weight</b>		11-27kg (25-60lb) (application dependent)				
<b>OPERATING ENVIRONMENT</b>						
<b>Temperature</b>		+5°C to +40°C (+41°F to +104°F)				
<b>Relative humidity</b>		0-95% RH non-condensing				
<b>Altitude</b>		2,000m (max)				
<b>Ingress protection</b>		IP20				

† LOD: 3 sigma 95% confidence limit  
• Other ranges available on request

The performance specification has been written and verified in accordance with the international standard IEC 61207-1:1994 "Expression of performance of gas analyzers"



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<b>SAMPLE GAS</b>	
Condition	Oil free, non-corrosive, non-condensing
Sample flow	50 to 300ml/min (application dependent)
Sample pressure	30psig (application dependent)
<b>CARRIER GAS *</b>	
Specification	He carrier gas must be free of Ar (<1ppb)
Inlet pressure	O <sub>2</sub> background gas = 85psig, other background gases = 80psig
Flow	90 to 810ml/min
<b>UTILITIES</b>	
Supply voltage	100-120Vac or 220-240Vac**, 50/60Hz

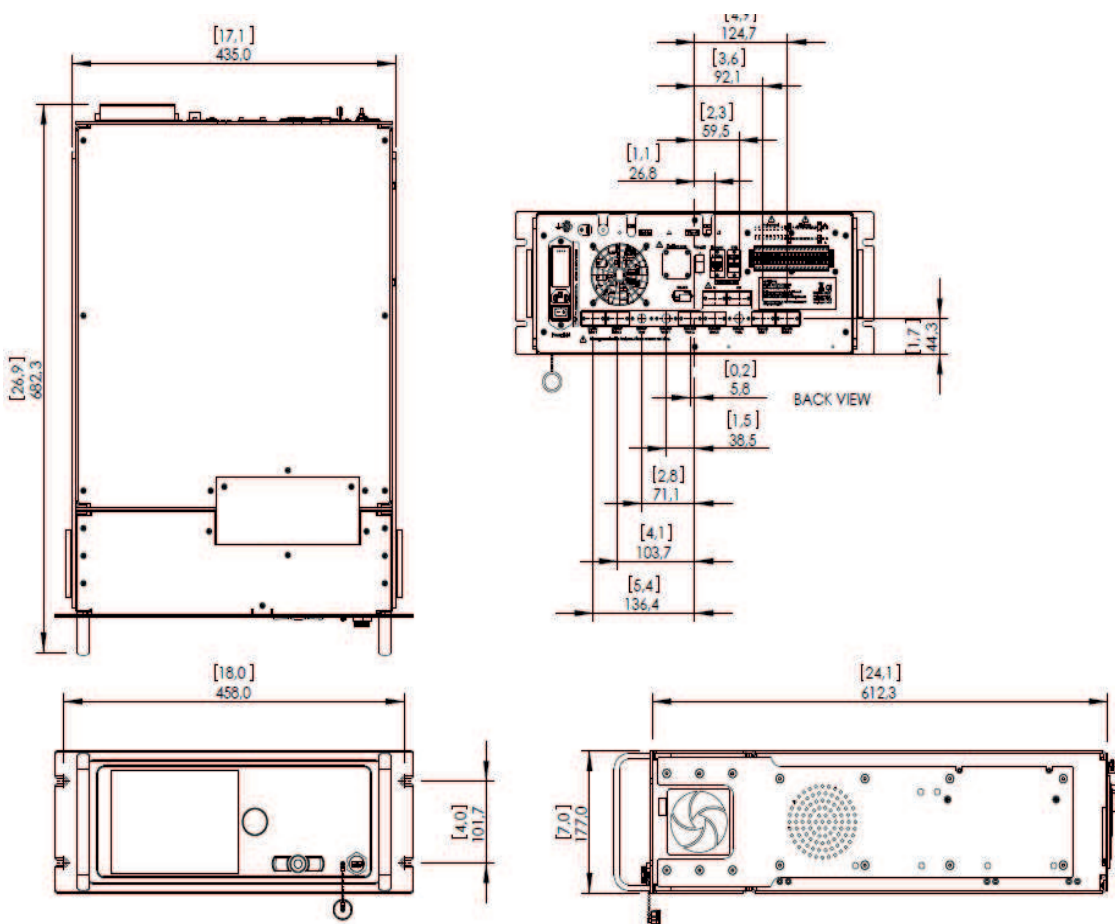
\* Normally helium. Argon carrier gas used for N<sub>2</sub> determination in Argon

\*\* The analyzer is supplied configured with one of these voltage ranges; specify range at time of order

## COMPLIANCE

<b>EC DIRECTIVES</b>	This product complies with the EMC Directive, the Low Voltage Directive, and all other applicable directives.
<b>ELECTRICAL SAFETY</b>	Electrical safety to IEC 61010-1 Rated for "Overvoltage Category II" and "Pollution Degree 2"

## DIMENSIONAL DRAWINGS



Dimensions shown in millimetres  
(dimensions in square brackets are in inches)



# APPLICATION CONFIGURATIONS



	Packages	Application	Form Factor
ARGON	Pack 1A	N <sub>2</sub>	MC
	Pack 1B	CO <sub>2</sub> , CH <sub>4</sub> , NMHC	MC
	Pack 2A	H <sub>2</sub> , CO	PC + SC
	Pack 3A	H <sub>2</sub> , CO, CO <sub>2</sub> , CH <sub>4</sub>	MC + SC
	Pack 3B	N <sub>2</sub> , CO, CO <sub>2</sub> , CH <sub>4</sub>	MC + SC
	Pack 3C	H <sub>2</sub> , CO, CO <sub>2</sub> , CH <sub>4</sub> , NMHC	MC + SC
	Pack 3D	N <sub>2</sub> , CO, CO <sub>2</sub> , CH <sub>4</sub> , NMHC	MC + SC
	Pack 4A	N <sub>2</sub> , H <sub>2</sub> , CO, CO <sub>2</sub> , CH <sub>4</sub>	PC + SC + SC
	Pack 4B	N <sub>2</sub> , H <sub>2</sub> , CO, CO <sub>2</sub> , CH <sub>4</sub> , NMHC	PC + SC + SC
NITROGEN	Pack 1A	Ar	MC
	Pack 1B	H <sub>2</sub>	MC
	Pack 1C	CO <sub>2</sub> , CH <sub>4</sub> , NMHC	MC
	Pack 2A	H <sub>2</sub> , CO	PC + SC
	Pack 2B	CO, CO <sub>2</sub> , CH <sub>4</sub>	PC + SC
	Pack 2C	CO, CO <sub>2</sub> , CH <sub>4</sub> , NMHC	PC + SC
	Pack 3A	H <sub>2</sub> , CO, CO <sub>2</sub> , CH <sub>4</sub>	MC + SC
	Pack 3B	H <sub>2</sub> , CO, CO <sub>2</sub> , CH <sub>4</sub> , NMHC	MC + SC
	Pack 4A	Ar, H <sub>2</sub> , CO, CO <sub>2</sub> , CH <sub>4</sub>	PC + SC + SC
	Pack 4B	Ar, H <sub>2</sub> , CO, CO <sub>2</sub> , CH <sub>4</sub> , NMHC	PC + SC + SC
OXYGEN	Pack 1A	Ar	MC
	Pack 2A	Ar, N <sub>2</sub>	PC + SC
	Pack 2B	N <sub>2</sub> , H <sub>2</sub> , CH <sub>4</sub>	PC + SC
	Pack 2C	CH <sub>4</sub> , NMHC	PC + SC
	Pack 2D	CH <sub>4</sub> , H <sub>2</sub> , CO	PC + SC
	Pack 3A	CO, CO <sub>2</sub> , H <sub>2</sub> , CH <sub>4</sub>	MC + SC
	Pack 3B	N <sub>2</sub> , Ar, CH <sub>4</sub>	MC + SC
	Pack 3C	CO <sub>2</sub> , H <sub>2</sub> , CH <sub>4</sub> , NMHC	MC + SC
	Pack 4A	N <sub>2</sub> , CO, CO <sub>2</sub> , H <sub>2</sub> , CH <sub>4</sub>	PC + SC + SC
	Pack 4B	Ar, H <sub>2</sub> , CO, CO <sub>2</sub> , CH <sub>4</sub>	PC + SC + SC
	Pack 4C	H <sub>2</sub> , CO, CO <sub>2</sub> , CH <sub>4</sub> , NMHC	PC + SC + SC
	Pack 5A	Ar, N <sub>2</sub> , H <sub>2</sub> , CO, CO <sub>2</sub> , CH <sub>4</sub>	MC + SC + SC
	Pack 5B	N <sub>2</sub> , H <sub>2</sub> , CO, CO <sub>2</sub> , CH <sub>4</sub> , NMHC	MC + SC + SC
	Pack 5C	Ar, H <sub>2</sub> , CO, CO <sub>2</sub> , CH <sub>4</sub> , NMHC	MC + SC + SC
Pack 5D	Ar, N <sub>2</sub> , H <sub>2</sub> , CO, CO <sub>2</sub> , CH <sub>4</sub> , NMHC	MC + SC + SC	
HYDROGEN	Pack 1A	N <sub>2</sub>	MC
	Pack 1B	CO	MC
	Pack 1C	CO <sub>2</sub> , CH <sub>4</sub> , NMHC	MC
	Pack 2A	CO, CO <sub>2</sub>	PC + SC
	Pack 2B	Ar, N <sub>2</sub>	PC + SC
	Pack 2C	CO, CO <sub>2</sub> , CH <sub>4</sub>	PC + SC
	Pack 2D	CO, CO <sub>2</sub> , CH <sub>4</sub> , NMHC	PC + SC
	Pack 3A	N <sub>2</sub> , CO, CO <sub>2</sub> , CH <sub>4</sub>	MC + SC
	Pack 3B	CO, CO <sub>2</sub> , CH <sub>4</sub> , NMHC, H <sub>2</sub>	MC + SC
	Pack 4A	Ar, N <sub>2</sub> , CO, CO <sub>2</sub> , CH <sub>4</sub>	PC + SC + SC
	Pack 4B	Ar, N <sub>2</sub> , CO, CO <sub>2</sub> , CH <sub>4</sub> , NMHC	PC + SC + SC
	HELIUM	Pack 1A	N <sub>2</sub>
Pack 1B		CO, CO <sub>2</sub> , CH <sub>4</sub>	MC
Pack 1C		CO <sub>2</sub> , CH <sub>4</sub> , NMHC	MC
Pack 2A		Ar, N <sub>2</sub>	PC + SC
Pack 2B		CO, CO <sub>2</sub> , CH <sub>4</sub> , NMHC	PC + SC
Pack 3A		N <sub>2</sub> , H <sub>2</sub> , CO, CO <sub>2</sub> , CH <sub>4</sub>	MC + SC
Pack 3B		N <sub>2</sub> , H <sub>2</sub> , CO, CO <sub>2</sub> , CH <sub>4</sub> , NMHC	MC + SC
Pack 3D		Ar, N <sub>2</sub> , H <sub>2</sub> , CO, CO <sub>2</sub> , CH <sub>4</sub> , NMHC	MC + SC

## NOTES

MC = MASTER CHASSIS, SC = SECONDARY CHASSIS, PC = STAND-ALONE COMPUTER



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HIGH-PERFORMANCE GAS ANALYSIS

# > WE'RE READY TO HELP

WHATEVER YOUR GAS ANALYSIS REQUIREMENTS, WHEREVER YOU ARE

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