

Emissions
Measurement
Solutions

SEMTECH[®] CPN 23|10

Condensation Particle Number Configurable down to 10 nm On-Board PEMS

Innovation. *Built on Experience.*

The **SEMTECH[®]** CPN 23|10 is a real-time, on-board measurement device for the quantification of solid particle number concentrations in automotive exhaust.

The new switchable **SEMTECH[®]** CPN 23|10 is designed and manufactured to fully comply with world-wide current regulations for RDE PN measurements, notably; the size efficiency requirements from 23 to 200nm. The proposed new efficiency requirements (EU, JRC study 2020) extending measurements down to 10nm can also be measured through a user selectable flow path (bypassing the diffusion screen) and software switch to incorporate the second calibration factors. Similarly, the metrology information at these extended sizes can also be provided by an accredited calibration laboratory. (Example shown on page 2.)



Technology: The **SEMTECH[®]** CPN 23|10 measurement module closely follows the design specifications for the EU regulatory test-cell particle measurement program (PMP), notably RDE-LDV, (EU) 2017/1151. In brief, the PMP and **SEMTECH[®]** CPN 23|10 measurement system is described as being; a sampling probe with heated line, a hot dilution unit to provide initial dilution (PND1), a volatile particle remover (VPR), a second stage diluter (PND2) and a particle measurement instrument.

Sensors, Inc., as used in all PMP systems, uses a condensation particle counter for the measurement of the particle number concentrations. Condensation particle counters are the preferred choice of instruments because they are linear, independent to changes in particle size and have the required large dynamic range of operation. The incoming particles are mixed with a vapor (e.g. Butanol) and then cooled to facilitate condensation of the vapor onto the particles. This condensation causes the particles to grow and be easily detected using laser optics.

As shown in the on-vehicle picture, the battery powered **SEMTECH[®]** CPN 23|10 and **SEMTECH[®]** DS+ can be easily mounted and operated under the RDE test conditions and is immune from shock and vibration during real world driving.



**Official RDE Testing
[Gaseous and PN]**

The CPN 23|10 offers the following benefits:

Low Cost of Ownership: With little maintenance required, the CPN 23|10 remains a low cost solution throughout the life of the system.

All Day Testing: An optional large butanol reservoir ensures uninterrupted, extended testing.

Real-Time Data: The system is capable of second-by-second data acquisition, for real-time testing.

Large Dynamic Range: Two dilution stages are used, making the system capable of accurate measurements over a large dynamic concentration range.

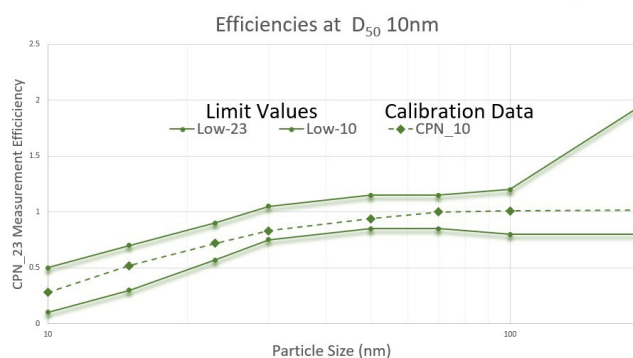
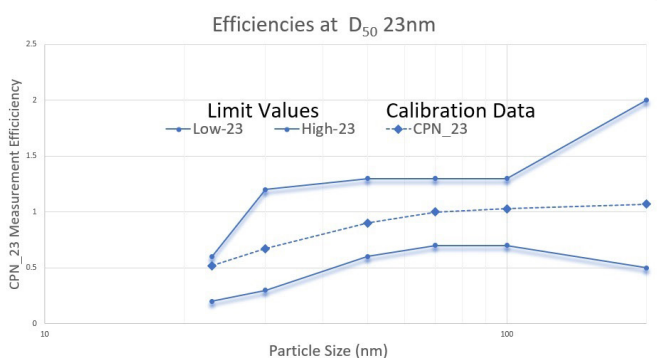


Internal CPC Module



CERTIFICATE OF CALIBRATION

ISSUED BY Ricardo-AEA Ltd trading as Ricardo Energy & Environment



CPN 23|10 SPECIFICATIONS

Parameter	CPN 23 10
Minimum Particle Size	23nm option (standard): d ₅₀ approx. 23nm 10nm option: d ₅₀ approx. 15nm with minimum size < 10nm
Particle Concentration Range at CPC	0 – 1x10 ⁴ #/cm ³ , calibrated 0 – 3x10 ⁴ #/cm ³ , uncalibrated above 1x10 ⁴
Dilution Ratio (nominal)	High Dilution Option: Switchable between 1500:1, 3000:1 Low Dilution Option: Switchable between 120:1, 400:1
Calibrated Measurement Range (nominal)	High Dilution Option: 0 – 6x10 ⁷ #/cm ³ Low Dilution Option: 0 – 8x10 ⁶ #/cm ³
Dimensions (W x D x H)	43.6 x 31.1 x 18.0 cm 17.2 x 12.3 x 7.1 inches
Weight	Approximately 20 kg (44 lbs)
Power Requirements	12 VDC, <200W at steady state (including 1m heated sampling line)
Operating Environment	-10°C to 40°C, 860-1020 mbar [up to 2500m above sea level]