



Axion[™]R/S+PM+NH₃

GlobalMRV is proud to introduce the Axion[™]R/S+PM+NH₃ Generation 4 with PM and NH₃ capabilities in the same compact package.

GlobalMRV continually improves Micro “Portable Emissions Measurement System” (PEMS) for real-world driving emissions, providing real-time, real-world fixed and mobile emissions testing — including marine emissions, engine testing, and performance analysis.

The Axion[™]R/S+PM+NH₃ measures mass-flow emissions of CO, CO₂, NO, HC, PM/PN, and NH₃ in real-time. The Axion[™]R/S+PM+NH₃ provides accurate and timely information for decision-making. Large fleet data set collection is now possible due to the Axion[™]R/S+PM+NH₃ flexibility, minimal set-up time, and rapid deployment.

The Axion[™] series is powered by LabVIEW[®]-based proprietary software and easily syncs with CAN broadcast software, such as INCA from ETAS, to provide municipalities, researchers, and OEMs a fully comprehensive data package for measurement verification and predictive analysis.

Redesigned to include:

- Electromagnetic Interference (EMI) Protection from external devices that may cause erroneous readings
- Multiple USB connections for integration with external devices and additional vehicle data collection products
- Remote data collection, analysis, and storage in real-time for increased security from data loss
- PM and PN Capabilities
- Multi-point calibrations for more accurate range testing

The Axion[™] Micro PEMS passed a rigorous evaluation by the United States Environmental Protection Agency (USEPA) Environmental Technology Verification (ETV) Program, demonstrating that GlobalMRV continues to set the standard for continuous PEMS field-testing.

The Axion[™] reports data in “grams-per-second” and provides all data for calculating “grams-per-mile, gallon, and kg”. Using a proprietary (and patented) flow calculation method, accurate PEMS flow data is provided. This reduces the need for extraneous equipment. On-board engine information is captured with either vehicle/ vessel OBD hardware and software or an Engine Sensor Array.

+PM Module: Particulate Matter (PM) is measured utilizing the process of a laser light scattering technique. The fully integrated PM module easily fits into the existing Axion[™]R/S footprint.

+NH₃ Module: Ammonia (NH₃) is measured utilizing the state-of-the-art Tunable Diode Laser Spectrometry (TDLS) approach. TDLS has virtually no cross-sensitivity with other gases, and it eliminates the need for a reference channel. The **+NH₃ Module** is highly selective, and has a fast response and continuous sensor status monitoring.

Online, phone, and email support are included in the warranty with the purchase of every Axion[™]R/S+PM+NH₃



Gas	Range	Accuracy	Repeatability	Noise	Resolution	Measurement and T90
HC Propane	0 - 4000 ppm 4k to 10kppm 10k to 30kppm	±8 ppm abs or ±3% rel ±5% rel ±10% rel	±6ppm abs or ± 2% rel ±3% rel ±5% rel	4ppm abs or 0.8% rel	1 ppm	NDIR < 3.5 sec
CO	0.00 - 10.00% 10.01 to 15.0%	±0.02% abs or ±3% rel ±5% rel	±0.02% abs or ± 2% rel ±3% rel	0.01% abs or 0.8% rel	0.001 vol. %	NDIR < 3.5 sec
CO 2	0.00 - 16.00% 16.01% to 20%	±0.3% abs or ±3% rel ±5% rel	±0.1% abs or ± 2% rel ±3% rel	0.1% abs or 0.8% rel 2% rel	0.01 vol. %	NDIR < 3.5sec
NO	0 - 5000 ppm	±15 ppm abs or ±3% rel	±2% rel	5 ppm abs or 1% rel	1 ppm	Electrochemical < 5s
O2	0.00 - 25.00%	±0.02% abs or ±1% rel	±0.02% abs or ±1% rel	0.02% abs or 1% rel	0.01 vol. %	Electrochemical < 6s
Optional Add-Ons to Select Devices						
NO	0 – 3000 ppm	±2ppm abs or ±2% rel	±2ppm abs or ±2% rel	<2ppm abs or 2% rel	0.1 ppm	UVRAS < 3 sec
NH ₃	0 – 500 ppm	±2ppm abs or ±2% rel	±2ppm abs or ±2% rel	<2ppm abs or 2% rel	0.1 ppm	TDLS < 2s
PM and PN						
	PM and PN		PM		PM	
Operating Principle	Laser Scattering		Laser Scattering		Laser Scattering	
Measurement Range	0~30,000µg/m³ (0~30mg/m³)		0~50,000µg/m³ 0~50mg/m³ Maximum display 1000mg/m³		0 - 250,000µg/m³ (0-2,500mg/m³)	
Output Channels	PM1.0, PM2.5, PM4.25(optional), PM10 and TSP		PM2.5, PM10 and TSP		PM2.5, PM10 and TSP	
Resolution	1 µg/m³ (0.001 mg/m³)		1 µg/m³ (0.001 mg/m³)		1 µg/m³ (0.001 mg/m³)	
Working Condition	-30°C ~ 70°C,0-95%RH (non-condensing)		-30°C ~ 70°C,0-95%RH (non-condensing)		0-55°C (32°-131°F)	
Particle Measurement Results						
PM1.0 [ug/m3]	Yes		No		Optional	
PM2.5 [ug/m3]	Yes		Yes		Optional	
PM10.0 [ug/m3]	Yes		Yes		Yes	
TPS [ug/m3]	Yes		Yes		Optional	
0.3um [ct/L]	Yes		No		No	
0.5um [ct/L]	Yes		No		No	
1.0um [ct/L]	Yes		No		No	
2.5um [ct/L]	Yes		No		No	
5.0um [ct/L]	Yes		No		No	
10.0um [ct/L]	Yes		No		No	
Global MRV Compatibility Matrix						
Axion R/S	Yes		Yes		No	
Axion R/S+	Yes		Yes		Yes	
Axion R/S+ NH3	Yes		Yes		Yes	
Axion GO	Yes		Yes		No	
Backpack	Yes		Yes		No	
Firefly	Yes		Yes		No	
Rack or Cabinet	Yes		Yes		Yes	
SCS	Yes		Yes		No	

Dimensions: 21.7"L x 16.9"W x 8.5"H (550mm x 430mm x 215mm)

Weight: 45lbs. (20.4kg)

Accessory Case: 30lbs. (13.6kg)

Power: 12-14 VDC

Amperage: 5-8 Amperes

Data Reporting Rate: 1 Hertz

Sample Flow: 20 liters/minute

System Computer: Windows 10 Embedded

User Interface: Push Button Power, keyboard, and mouse

Data Output:

Data Reported: Real-time DAQ, aligned results, test configuration (vehicle, engine, fuel, DAQs), aggregate test results (bags)

Reporting Formats: Software UI, .txt Files, CAN Broadcasts, PEMSNet

Measured Parameters: Geolocation (GPS), Vehicle Performance/Operation (OBD/ECU, Sensor Array), engine exhaust gaseous constituents, ambient conditions

Additional Parameters: Grams of pollutant per second (g/s), Intake air flow, Exhaust air flow, Fuel consumption (not all inclusive)

Optimal Instrument Conditions:

5°C to 35°C (40°F to 95°F)

0-90% relative humidity (RH), non-condensing

Emission Collection: Condensation bowls, probes, handles, and hoses.

Applicable Operational Engines: Axion has been successfully utilized in the operation of lawn equipment, motorcycles, ATVs, passenger vehicles, trucks, construction equipment, marine vessels, semi-trucks, and locomotives operating in real- world driving conditions.

Engine Information Acquisition:

Vehicle Communication Protocols (J1979 OBDII, J1587, J1939, and as requested)

Engine Sensor Array: Manifold Absolute Pressure Transducer, Thermistor, Piezoelectric Tachometer, Optical Tachometer, Inductive Tachometer

Driver's Aid

Optional Modules:

- CAN output
- PM Module:
 - PM10
 - PM2.5
- Particle Number Module
- TDLS NH3 (Ammonia) Module
- Weather Station Module:
 - Temperature
 - Humidity
 - Pressure