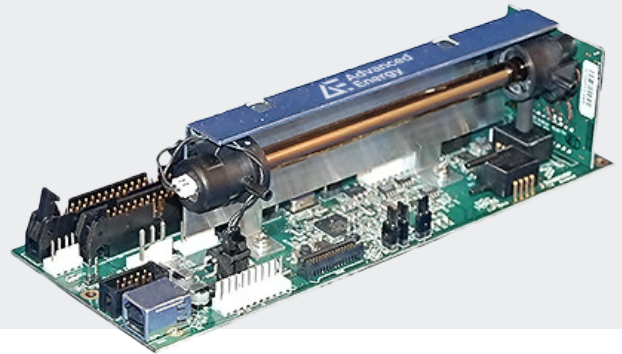


# DATASHEETS

ANDROS 6511 | ANDROS 6500 | ANDROS 6520 | ANDROS 6552

## ANDROS 6511

OEM gas analyzer for greenhouse gas detection and monitoring.



The Andros® 6511 OEM gas module achieves high reliability through simplicity of design and implementation. Andros Non-Dispersive Infrared (NDIR) gas modules are inherently reliable because there are no moving parts in the optical path. Unlike alternative analyzers that require motors, gratings, chopperwheels, and/or other moving components with limited useful lives, Andros gas analyzers use a pulsed infrared source to achieve high accuracy with high reliability.

Unlike other infrared analyzers, Andros non-dispersive infrared (NDIR) gas analyzers measure multiple gases in an instrument with a single optical path platform. Single-gas analyzers are inadequate when using methane as a bio fuel because the gas often contains large amounts of CO<sub>2</sub> as a contaminant. Andros analyzers have the ability to measure CO<sub>2</sub>, CO, and O<sub>2</sub> in addition to methane and therefore provide the optimal combination of gases for combustion optimization.

### PRODUCT HIGHLIGHTS

- Measure up to five gases: three via NDIR and two via plug-in sensors
- RS232 or USB1 outputs
- Fast response times
- User-selectable reporting: Either propane for non-methane fuels or methane

OVERVIEW

**Who Will Benefit from Methane Measurement?**

- Landfill operators that burn methane in flares, power generators, and boilers.
- Industrial operators of methane fueled boilers, furnaces, and incinerators.
- Agricultural methane capture for local use or transfer to pipelines.

The 6511 has a very wide dynamic range: CO<sub>2</sub> up to 20%, Methane up to 100% and CO up to 20%. This wide dynamic measurement range with real-time temperature and pressure compensation provides the capability to monitor anaerobic digestion processes and control of these processes to maximize methane production. Adding an optional oxygen measurement provides the capability to monitor the combustion efficiency of equipment that uses biogas as a fuel.

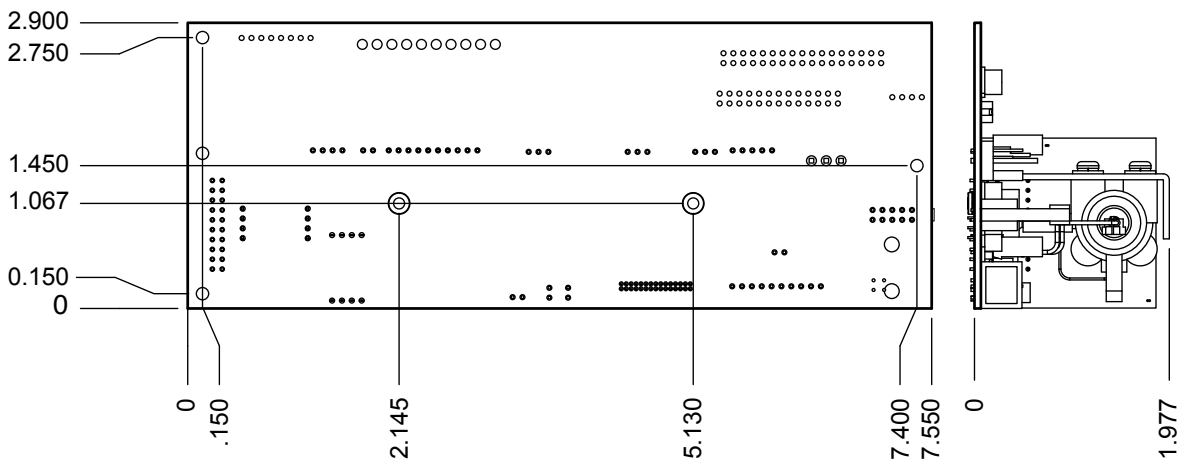
**Necessary Features for Methane Applications**

- Temperature and pressure data available for use in calculating pounds per hour of CH<sub>4</sub> and CO<sub>2</sub>.
- Two electrochemical sensor inputs for a total of five gases from a single instrument.

**Extensive Calibration For High Accuracy**

Every Andros NDIR analyzer is individually calibrated at four separate temperatures between 0 and 50°C. At each of the four temperatures, the gas channels are profiled with up to 20 separate gas concentrations. The results of this extensive calibration process are stored within each system resulting in the most accurate analysis possible. This attention to detail provides a highly accurate and stable factory calibration of the NDIR analyzer. Our factory calibration is so accurate and stable that many of our customers have chosen to never re-calibrate their Andros analyzers. This type of calibration allows for wide dynamic measurement ranges that can permit field spanning in the measurement range of interest.

DIMENSIONS



All dimensions in inches

## TECHNICAL DATA

Performance	
Response Time	Response times are specified at a sample flow rate of 1 liter per minute through the 6511 sample cell
Data Refresh Rate	1 second
Warm-up Time	30 minutes fully stable, 3 minutes for reduced accuracy unless zeroed prior to taking measurement
Warranty	1 year parts and labor warranty
Host Communication	USB or RS232C asynchronous serial; 19,200 bps or 9600 bps (default is 19,200)

Electrical Specifications	
Input Power	+12 Volts DC nominal (+9 to +16)
Power Consumption	1.8 Watts average @ 12 VDC

Physical Characteristics	
Dimensions (L x W x H)	19.18 x 7.37 x 5.03 cm (7.55" x 2.90" x 1.98")
Weight	0.3 kg (0.8 lb)

Environmental Specifications	
Operating Temperature Range	0 to 70°C (32° to 158°F), accuracy not specified > 50°C
Operating Humidity	To 95% RH (Non-condensing)
Operating Altitude	-300 to 3000 m (-1000 to 10,000 ft)

## SPECIFICATIONS

Measurement Method	Gas	Resolution	Measurement Range	Accuracy	Precision	Response Time
NDIR (Non-Dispersive Infrared) on board	Methane	1 ppm	40 to 80%	±2% rel.	3.0% rel.	T <sub>90</sub> and T <sub>10</sub> < 30 Seconds
			80 to 100%	±5% rel.		
	Carbon Monoxide (CO)	0.001%	0.000 to 10.000%	±0.02% abs. or ±3% rel.	0.01% abs. or 0.8% rel.	
			10.001 to 15.000%	±5% rel.		
	CO <sub>2</sub>	0.01%	0.00 to 16.00%	±0.3% abs. or ±3% rel.	0.03% abs. or 5% rel.	
			16.01 to 20.00%	±5% rel.		
Electrochemical sensors via connector	O <sub>2</sub>	1 ppm	1.01 to 25.00%	±0.1% abs. or ±3% rel.	0.1% abs. or 1.5% rel.	<40 seconds from amb. to 0.1% O <sub>2</sub>
	NO <sub>2</sub> and NO		Per MFG specs	Per MFG specs	Per MFG specs	Per MFG specs



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## ABOUT ADVANCED ENERGY

Advanced Energy (AE) has devoted more than three decades to perfecting power for its global customers. AE designs and manufactures highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

AE's power solutions enable customer innovation in complex semiconductor and industrial thin film plasma manufacturing processes, demanding high and low voltage applications, and temperature-critical thermal processes.

With deep applications know-how and responsive service and support across the globe, AE builds collaborative partnerships to meet rapid technological developments, propel growth for its customers and power the future of technology.

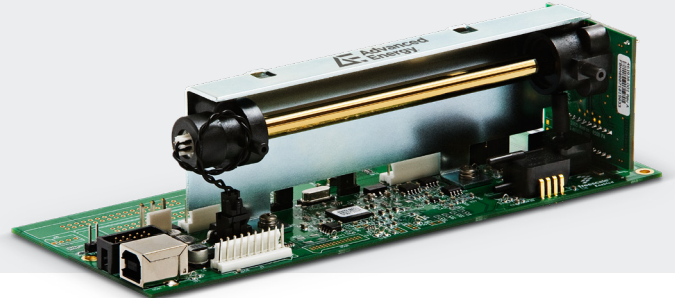
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# ANDROS 6500 AND ANDROS 6520

High-performance OEM gas analyzers for vehicle diagnostics, inspection, and maintenance.



The Andros® 6500 and 6520 OEM gas modules achieve high reliability through simplicity of design and implementation. Andros Non-Dispersive Infrared (NDIR) gas modules are inherently reliable because there are no moving parts in the optical path. Unlike alternative analyzers that require motors, gratings, chopperwheels, and/or other moving components with limited useful lives, Andros gas analyzers use a pulsed infrared source to achieve high accuracy with high reliability.

The system measures gases, communicates with the host via RS232 or USB, and allows user-defined TTL outputs, as well as analog and tachometer inputs which can be integrated into the data output stream for user convenience.

## ANDROS 6500

- Measure up to five gases: three via NDIR and two via plug-in sensors
- RS232 or USB outputs
- DC pump and solenoid valve drivers
- Two analog-to-digital inputs
- Differential pressure transducer for low flow/leak detection

## ANDROS 6520

- Same as Andros 6500 but without the differential pressure transducer

### OVERVIEW

#### Highly Accurate Calibration

Each 6500 series system is individually calibrated for operation from 0 to 50°C over the entire range of specified concentrations. The results of this intensive calibration process are stored within each system, providing the most accurate analysis possible. This attention to detail provides a highly accurate factory calibration of the NDIR analyzer. In fact, this factory calibration is so accurate and stable that many of our customers have chosen to never re-calibrate their Andros analyzers.

The Andros 6500 is designed to meet and exceed both ISO 3930/OIML R99, Class 0, and BAR 97 specifications.

#### High Stability: Rapid Warm-Up

The enhanced optics and electronics of the 6500 has virtually eliminated zero drift. Prior to this breakthrough, frequent zeroing of an analyzer was required during the first half-hour of operation for sensitive measurements. Now, with just two “zeroes” during the first three minutes, the 6500 meets all accuracy specifications.

#### Unique Optical Architecture

The optics of the 6500 series incorporates precision beam focusing architecture. A concentrated infrared beam generated from a proprietary emitter passes through a precision lens into a cleanable or replaceable gold-lined sample cell that the gas of interest is flowing through. The beam then passes into an optical assembly of highly specialized filters and a unique multi-element detector.

#### Comprehensive Software Architecture

Embedded dual protocol software makes upgrading older products utilizing models 6230, 6231, 6241, 6231A, or 6241A easy.

All calculations are performed in real-time for transmission to your host system. Control of key system devices such as gas flow solenoids and a sampling pump is provided with the ability to accept commands from the host.

#### For Current Andros Customers: A Painless Upgrade

Now it will be easy to keep older BAR 90 and OIML Class 1 equipment up to-date with the new BAR 97, ISO3930/OIML R99, Class 0 certified Andros 6500. Simply install the Andros 6500 into your existing Andros based equipment.

The 6500 not only serves as a drop in replacement for the Model 6602, but with minor mounting modifications, it can replace any of the Model 62XX product line.

No need to scrap old software and hardware when only the NDIR system needs replacing. (While the connectors and software are identical to the older systems, it is possible that a change in wiring lengths or routing may be required depending on your original design).

TECHNICAL DATA

Performance Specifications

Response Time	Response times are specified at a sample flow rate of 1 liter per minute through the 6500 sample cell
Data Refresh Rate	1 second
Warm-up Time	30 seconds ready, 3 minutes usable; 30 minutes to full performance
Host Communication	USB or RS232C asynchronous serial; 19,200 bps or 9600 bps (default is 19,200)

Electrical Specifications

Input Power	+12 V DC nominal (+9 to +16)
Power Consumption	1.8 W average @ 12 VDC

Physical Characteristics

Dimensions (L x W x H)	19.18 x 7.37 x 5.03 cm (7.55" x 2.90" x 1.98")
Weight	0.3 kg (0.8 lb)

Environmental Specifications

Operating Temperature Range	0 to 70°C (32 to 158°F), accuracy not specified > 50°C
Temperature Compensation	Incl. automatically for temp. change > 4°C for O <sub>2</sub>
Operating Humidity	To 95% RH (Non-condensing)
Operating Altitude	-300 to 3000 m (-1000 to 10,000 ft)

Standard freons available: R22, R134A, R404A, R407C, R410A, R507, R422A, R422D

SPECIFICATIONS

Measurement Method	Gas	Resolution	Measurement Range	Accuracy	Precision	Response Time
NDIR (Non-Dispersive Infrared) on board	HC [as either n-Hexane or Propane]	1 ppm	1 to 2000 ppm	±4 ppm abs. or ±3% rel.	±4 ppm abs. or ±3% rel.	T <sub>90</sub> and T <sub>10</sub> < 3 Seconds
			2001 to 15,000 ppm	±5% rel.		
			15,001 to 30,000 ppm	±8% rel.		
	CO	0.001%	0.001% to 10.000%	±0.02% abs. or ±3% rel.	±0.02% abs. or ±3% rel.	
			10.001% to 15.000%	±5% rel.		
	CO <sub>2</sub>	0.01%	0.01% to 16.00%	±0.3% abs. or ±3% rel.	±0.30% abs. or ±3% rel.	
16.01% to 20.00%			±5% rel.			
Electrochemical sensors via connector	NO <sub>x</sub>	1 ppm	0 to 4000 ppm	±25 ppm abs. or ±4% rel.	±25 ppm abs. or ±4% rel.	T <sub>90</sub> < 5 Seconds T <sub>10</sub> < 6 Seconds
			4001 to 5000 ppm	±5% rel.		
	O <sub>2</sub>	0.01%	0.01 to 25.00%	±0.10% abs. or ±3% rel.	±0.10% abs. or ±3% rel.	40 Seconds





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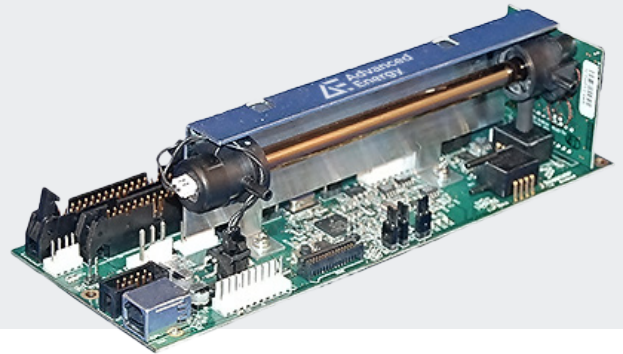
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## ANDROS 6552

OEM gas sensor for detection of Freon refrigerants and carbon dioxide.



The Andros® 6552 OEM gas module achieves high reliability through simplicity of design and implementation. Andros Non-Dispersive Infrared (NDIR) gas modules are inherently reliable because there are no moving parts in the optical path. Unlike alternative analyzers that require motors, gratings, chopperwheels, and/or other moving components with limited useful lives, Andros gas analyzers use a pulsed infrared source to achieve high accuracy with high reliability.

Available with two gas channels, the Andros 6552 can be configured for specific types of refrigeration plants or as a general purpose device that can be applied to any type or combination of refrigeration systems that may employ Freon™ refrigerants and carbon dioxide.

### PRODUCT HIGHLIGHTS

- Measure up to five gases: three via NDIR and two via plug-in sensors
- RS232 or USB outputs
- Most types of refrigerants
- Field upgradable to measure additional gases

### TYPICAL APPLICATIONS

- Refrigerant leak detection

OVERVIEW

The following standard features can provide a variety of additional functions to simplify system integration:

- Control of pneumatic components via RS232 or USB communications with the host.
- User-defined TTL outputs for interfacing to auxiliary devices or alarms.
- Two analog inputs for other process variables such as level or temperature.
- Two electrochemical sensor inputs for a total of five gases from a single instrument.

**Extensive Calibration for High Accuracy**

Every Andros 6552 NDIR bench is individually calibrated at four separate temperatures between 0 and 50°C. At each of the four temperatures, the gas channels are profiled with up to 20 separate gas concentrations.

The results of this extensive calibration process are stored within each system resulting in the most accurate analysis possible. This attention to detail provides a highly accurate and stable factory calibration of the NDIR analyzer.

Our factory calibration is so accurate and stable that many of our customers have chosen to never re-calibrate their Andros analyzers. The enhanced

optics and electronics of the 6552 have virtually eliminated zero drift after the initial warm up period. The temperature and pressure compensation eliminates the major causes of span drift in many NDIR instruments.

**Optical Architecture**

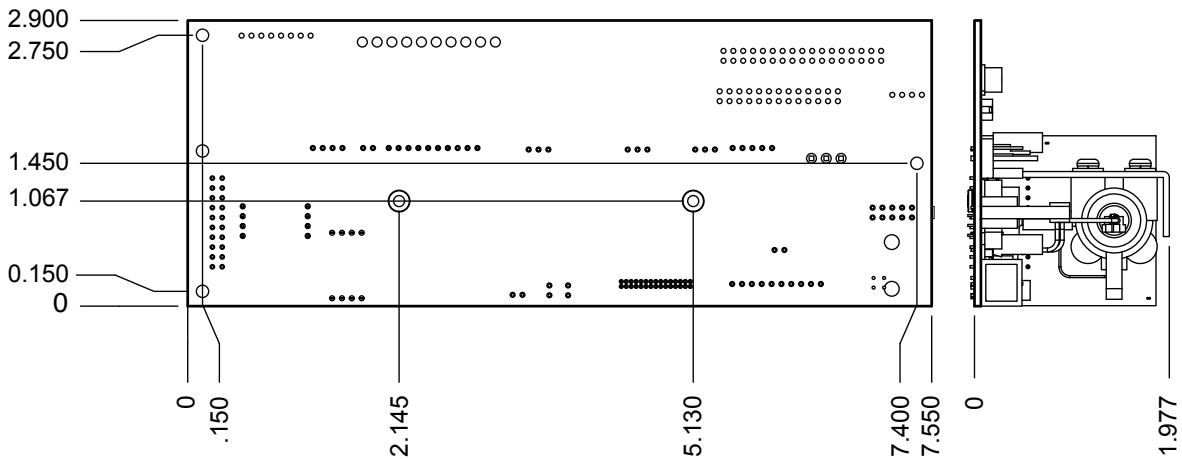
The Andros 6552 Series offers greater design flexibility to OEMs due to its small overall size, our ability to customize subsystem designs to your specifications, and low power consumption. Our analyzer can be fitted into a wide variety of enclosures.

The Andros operating system (OS) software and communications protocol is designed to make system integration simple and fast.

Our command set has the flexibility to provide a variety of output configurations from NDIR gas readings only to external devices and components interface and control.

The OS monitors the critical operating parameters that affect performance and provides real-time status of the overall integrity and quality of the gas measurement. The OS is stored in FLASH memory and can be updated in the field using a PC and Andros software utilities.

DIMENSIONS



All dimensions in inches.

## TECHNICAL DATA

Performance	
Response Time	Response times are specified at a sample flow rate of 1 liter per minute through the 6552 sample cell
Data Refresh Rate	1 second
Warm-up Time	30 minutes fully stable, 3 minutes for reduced accuracy unless zeroed prior to taking measurement
Warranty	1 year parts and labor warranty
Compliance	Designed to meet or exceed EN 14624, "performance of mobile leak detectors and of room controllers of halogenated refrigerants"
Host Communication	USB or RS232C asynchronous serial; 19,200 bps or 9600 bps (default is 19,200)

Electrical Specifications	
Input Power	+12 Volts DC nominal (+9 to +16)
Power Consumption	1.8 Watts average @ 12 VDC

Physical Characteristics	
Dimensions (L x W x H)	19.18 x 7.37 x 5.03 (7.55" x 2.90" x 1.98")
Weight	0.3 kg (0.8 lb)

Environmental Specifications	
Operating Temperature Range	0 to 70°C (32° to 158°F), accuracy not specified > 50°C
Operating Humidity	To 95% RH (Non-condensing)
Operating Altitude	-300 to 3000 m (-1000 to 10,000 ft)

Standard Freons available: R22, R134A, R404A, R407C, R410A, R507, R422A, R422D

## SPECIFICATIONS

Measurement Method	Gas	Resolution	Measurement Range	Accuracy	Precision	Response Time
NDIR (Non-Dispersive Infrared) on board	Most CFC, HFC and HCFC refrigerants	1 ppm	1 to 100 ppm	±4 ppm abs. or ±3% rel.	±4 ppm abs. or ±3% rel.	T <sub>90</sub> and T <sub>10</sub> < 3 Seconds
			101 to 1000 ppm	±5% rel.		
			1001 to 10,000 ppm	±8% rel.		
	CO <sub>2</sub>	0.01%	0.01% to 2.00%	±0.02% abs. or ±3% rel.	±0.02% abs. or ±3% rel.	
2.01% to 20.00%			±5% rel.			
Electrochemical sensors via connector	O <sub>2</sub>	performance dependent upon electrochemical sensor model				
	NO <sub>x</sub>					



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