Thermo Scientific *i*MEGA CEMS

The only factory designed NDIR system with 5 built-in safeguards to protect against moisture.

Part of Thermo Fisher Scientific

Thermo SCIENTIFIC

Clean Air Commitment

Since 1970 and the original Clean Air Act, we have been serving industry needs and protecting the environment with crucial monitoring solutions to help keep industrial operations running safely, efficiently and in compliance. We offer the industry's most comprehensive line of air quality instrumentation and Continuous Emissions Monitoring Systems (CEMS) for detecting a broad range of gaseous pollutants.

We have devoted nearly forty years to perfecting the design of systems for the execution of demanding operational and environmental requirements. Our state of the art technologies, along with long term distinguished industry performance, are qualities incorporated with each delivered system. Operating continuously in extreme monitoring environments, Thermo Scientific CEMS offer the unsurpassed precision and reproducibility critical monitoring applications depend on.

Thermo Scientific *i*MEGA CEMS

5 Built-in Moisture Safeguards

The Thermo Scientific *i*MEGA Continuous Emissions Monitoring System (CEMS) was designed and engineered with 5 built-in safeguards to protect against moisture.

- Automatic and continuous moisture measurement via Infrared Absorption
- Lower sample flow rate
- Continuous monitoring of the chiller temperature
- Integrated water slip-sensor
- No permeation drier means less components exposed to moisture

The *i*MEGA system also features a wide dynamic range and moisture alarms with automatic shut-off or purging of the sampling system in the event of high moisture levels.

Factory Designed

With over 30 years of experience manufacturing systems and system components, we ensure each system is built to the same industry proven standard. Our tradition of reliability and ease of use continues with the Thermo Scientific *i*MEGA CEMS.

Significant engineering efforts were put forth to ensure the *i*MEGA design was simple in nature. This approach reduces the number of unexpected problems as compared to more complex conventional systems. The *i*MEGA system design also ensures that all of the components will work together the first time, every time, eliminating any concerns regarding existing equipment inter-connectivity. All the of these characteristics combined make operating the *i*MEGA system easier on a daily, monthly and yearly basis.

Designed with built-in iterative algorithms, the *i*MEGA system is able to automatically correct for fractional effects of interfering gases, which results in more accurate measurements. Additionally, the *i*MEGA also provides a direct NO_2 measurement in place of a "calculated" NO_2 method common with most other analyzers.

The System

The Thermo Scientific *i*MEGA CEMS includes a full extractive probe, probe controller, calibrator, multi-gas analyzer, and sample conditioner (thermoelectric chiller), all fully integrated in a standard 19" rack enclosure.

Each system component is designed to meet U.S. EPA 40CFR Part 60 requirements.

At the stack:

- A full extractive heated probe with heated barrel and 3-wire RTDs to ensure proper sample extraction and transport.
- Two solenoid valves for effective probe blow-backs
- One or two zone umbilical with 3-wire RTDs for continuous temperature monitoring
- Field replaceable particulate filter

In the shelter or at the platform:

4 system components fitting into a standard 19" rack:

- A multi-gas analyzer with optional oxygen measurement
- A probe controller
- A multi-gas calibrator
- A sample conditioner (chiller)
- Optional zero air supply

*Shown with optional zero air supply

Thermo Scientific Multi-Gas Analyzer, Model 60*i*

Six Gases, One Analyzer

O_2 CO_2 NO_2 CO NO SO_2

The Thermo Scientific Multi-Gas Analyzer Model 60*i* is a full extractive, multi-gas analyzer utilizing non-dispersive infrared (NDIR) optical filter technology to measure five gases, in addition to oxygen measurement via either chemical cell or paramagnetic technology.

The Model 60*i* is the only multi-gas analyzer with built-in safeguards to protect the instrument from moisture damage. The Model 60*i* utilizes a low sample flow rate that reduces the amount of maintenance due to high particulate and moisture loading on optical surfaces. The analyzer also continuously measures moisture and can shut off the sample pump and activate an alarm before high levels of moisture damage the sensitive components. The wide dynamic range of the 60*i* can accommodate most power utility emission levels as well as those of other industries such as petrochemical, cement, pulp and paper, and similar heavy industry applications.

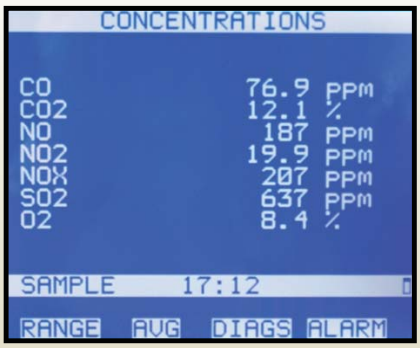
Additionally, our simple design requires no permeation dryer, which results in fewer components being exposed to moisture, less complexity and lower operation and maintenance costs. These redundant and diverse safeguards significantly reduce the risk of the moisture reaching and flooding the analyzer, protecting your investment for many years to come.

The *i*MEGA user interface is easier to use than ever.

The Multi-Gas Calibrator Model 61*i* and Multi-Gas Probe Controller Model 62*i* are configured and controlled through the Model 60*i* analyzer. The system can be remotely accessed through the Thermo Scientific *i*Port software. Designed around intuitive navigation and easy to program short-cut keys that allow you to jump to frequently accessed functions, menus or screens, the analyzer is easy to operate at any experience level.

Easier to interface, easier to maintain

Expanded I/O functionality and connectivity capabilities make it easy to integrate any *i*Series instrument into just about any plant operation. Supporting MODBUS and TCP/IP protocols as well as the iPort custom remote communications software package, *i*Series instruments are backward-compatible with our earlier generation analyzers and fit right into your current product lineup. *i*Series instruments were also re-engineered with on-site serviceability in mind. All components have been made more accessible for quick maintenance or change-out by simply removing the top panel, sliding apart the interior sections and folding down the interior divider panel.



Easy to navigate, user-configurable screens

NDIR Optical Filter wheel directly measures NO_2

Factory designed system makes connecting to other system components simple via a single cable

Compound	Minimum Range	Extended Range	Lower Detection	Linearity
O_2 - Electrochemical	0 - 5%	0 - 25%	0.20%	0.20%
- Paramagnetic	0 - 5%	0 - 25%	0.10%	0.10%
CO	0 - 100 ppm	0 - 2,500 ppm	0.5 ppm	2% of full scale
CO_2	0 - 5%	0 - 25%	0.05%	or
NO	0 - 50 ppm	0 - 2,000 ppm	0.5 ppm	5% of measured
NO_2	0 - 20 ppm	0 - 500 ppm	0.2 ppm	value, whichever
SO_2	0 - 20 ppm	0 - 10,000 ppm	0.2 ppm	is smaller

Thermo Scientific Multi-Gas Calibrator Model 61*i*

Calibrates up to FIVE channels plus zero air with one instrument

The Multi-Gas Calibrator Model 61*i*, accepts up to five calibration gases plus zero air and controls the calibration of the gas analyzer.

The front panel display features LEDs that illuminate as an indication of which gas is being delivered at any one time. Designed to ease system calibrations, zeros and spans, intuitive set-ups are controlled through the Multi-Gas Analyzer Model 60*i* and can be set to perform daily zero/span checks at the probe or at the analyzer only. Available with an optional ozonator, the Model 61*i* can also eliminate the need for separate cylinders of NO_2 calibration gas.

Like the Model 60*i*, this calibrator is built on the *i*Series platform and incorporates the same intuitive interface (accessed through the 60*i*) as well as plant proven components, advanced electronics and operator friendly software in a compact design.

Thermo Scientific Multi-Gas Probe Controller Model 62*i*

The Multi-Gas Probe Controller Model 62*i* monitors and controls the probe and chiller temperature as well as system temperatures including the filter body, probe barrel and umbilical temperatures. It also monitors sample conditioner performance, and enables automated filter blow-back.

The Model 62*i* also provides power to the stack probe, eliminating the need for power at the stack.

Utilizing the Multi-Gas Analyzer Model 60*i* interface and interconnection capabilities, the Model 62*i* is fully programmable for all functions including the time, duration and frequency of the probe blow-back.

Features:

- Monitors and controls all sampling system temperatures
- Provides power to the probe
- Automates probe barrel and filter blow-back
- Designed to meet U.S. EPA 40CFR Part 60 requirements

Thermo Scientific Full Extractive Probe, PRO3000

The Full Extractive Probe Model PRO3000 consists of:

- A full extractive probe
- Solenoid valve for probe blow-back
- Heated Filter and Probe Barrel

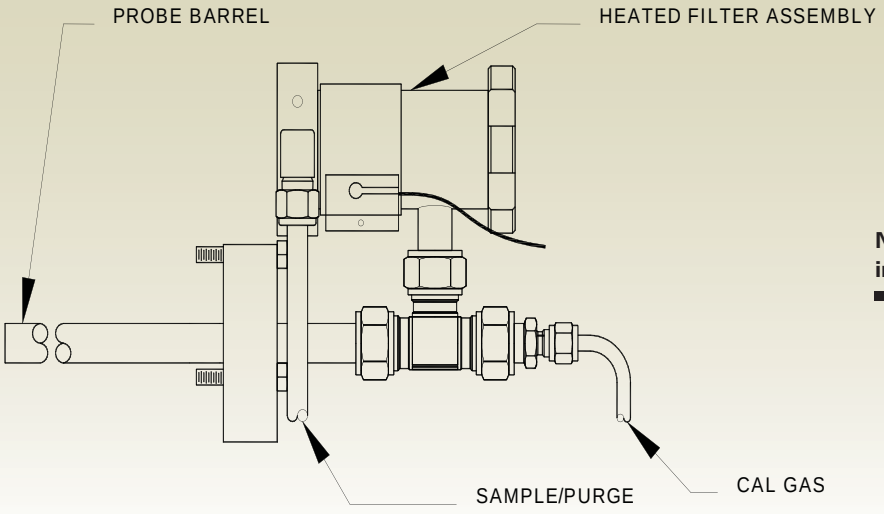
The Full Extractive Probe Model PRO3000 is capable of wet or dry-basis measurement and was designed to handle the toughest environments while offering significant advantages over other probe designs.

Housed in a NEMA 4X enclosure to protect it from harsh environments, this probe is highly durable and easily mountable to the stack or duct. The PRO3000 probe assembly includes a full extractive probe, heated probe barrel, purge valve, check valve and an insulated enclosure. The probe is attached to the stack by a standard four inch ANSI flange or may be fitted with a 2.5, 3 or 6 inch flange to suit existing sampling ports.

This probe passes calibration gas through the filter element in compliance with U.S. EPA requirements as defined in 40CFR Part 75 and 40CFR Part 60 for continuous emissions monitoring systems. Typical applications include utility boilers, pulp mills, waste-to-energy facilities, incinerators, turbines, refineries, petrochemical plants, and cogeneration facilities.

Features:

- NEMA 4X Fiberglass enclosure for protection from harsh stack environments (steel enclosure optional)
- Low maintenance, reusable filter
- Versatile design for a wide range of applications
- Complies with U.S. EPA requirements as defined in 40CFR Part 60
- Used for dry and wet-basis extractive measurements



No tools required for filter inspection or replacement.

Thermo Scientific DataLOGGER, 600DL

The Thermo Scientific DataLOGGER, 600DL is a state-of-the-art data acquisition and handling system the includes the hardware and software required for storing, processing and transmitting data. Capable of accepting up to 255 instruments via Ethernet or serial communication or 25 instruments using analog inputs.

The 600DL can be configured to report up to 255 instruments, sensors or channels with the ability to also calibrate up to four instruments automatically. The flexible architecture allows the end-user to operate the 600DL as a standalone or part of an integrated system such as the *i*MEGA CEMS or a network of systems.

Reporting capabilities are confirgurable to meet local requirements and include U.S. EPA type reports, including calibration results, data flagging, drift correction changes and historic-trending and charting.

Significant data storage capabilities of 10 years or more, as well as wireless remote data storage in a central concentrator, historic record transmission and Modbus communications configurations are also available on the 600DL.

The 600DL comes standard with 5 analog inputs, 8 digital outputs and a pulse counter. The input and output capabilities may also be expanded up to twenty-five analog inputs, forty digital outputs and five pulse counters to accommodate most network requirements including complex configurations.

Key Features
- Accommodates up to 255 instruments, sensors or channels.
- Compatible with open source, license free Modbus TCP/IP
- Automatic, unattended calibration of instruments
- Flexible system architecture
- Remote monitoring and control capabilities
- Generates calibration reports, customer reports and charts.

Inputs and Outputs
- Inputs via Modbus TCP (up to 255)
- 5 analog inputs (24 bits)
- 8 digital inputs or outputs (user selectable)
- 1 Pulse input

Integration Services
Designed as a complete, integrated solution, the *i*MEGA CEMS can be modified to meet your plant's specific needs. Our step-by-step integration process goes from proposal to drawings, equipment checklist to factory acceptance test, training, installation and start-up. Additionally, our expertise as an analyzer and system manufacturer allows for time and cost efficiencies throughout the process.

Integration
Our integration process is designed to include you at every step. Each stage begins with listening and carefully analyzing your specific needs, applying our experience to the next step, and finally, receiving your approval or changes before proceeding further.

A start-to-finish proposal
After determining your specific needs, we submit a detailed proposal for your system to be installed in an existing structure or an environmentally controlled shelter that we can also provide.

A full set of drawings
Block, rack, plumbing and electrical drawings will be created and submitted for your approval to serve as a foundation for the integration process.

Smoothing the way for startup
We provide a Pre-Installation Checklist outlining the necessary advanced on-site preparation to facilitate a smooth, timely installation process.

Factory Acceptance Test
Following factory assembly, a Factory Acceptance Test (FAT) encompassing calibration and operation of the system, spanning approximately one day, can be conducted. Detailed checklists are jointly reviewed, followed by signing an acceptance agreement. Requested changes will be made and shipping arrangements and special delivery requirements will be finalized.

On-site or factory training
Classes on your premises or at the factory assure that your operations and maintenance personnel have in-depth technical training on the system from day one. Our training course provides the knowledge needed to maintain equipment to factory specifications. A lecture portion includes an overview and theory of operation, plus hands-on training covering instrument assembly, disassembly, set-up, and installation. The lab portion addresses check out and calibration. Participants will learn to troubleshoot and calibrate the analyzer and perform routine preventive maintenance. Each course typically consists of no more than five students. Copies of all relevant course materials will be given to each attendee. The duration and the location of the classes are tailored to your specific needs.

Installation and startup
Installation and startup is a cooperative process, with a Thermo Fisher Scientific Field Service Engineer assisting your support staff. Services include the verification of proper mechanical installation, correct signal wiring and tubing terminations, and power connections as well as:
- Power-up and alignment of the sample-conditioning probe
- Power-up the analyzer rack
- Complete system calibration
- Review of system operation and maintenance requirements
- Verification and setup of requested analog signal outputs

Performance testing and start-up assistance
In conjunction with the actual certification of the unit, our Field Service Engineer will arrive at your site at least one day prior to the test team to check out the fully functional system and to calibrate each component prior to starting the performance test. The Field Service Engineer will remain on site during the test to assist the certification team.

SERVICE OFFERINGS

Experienced technical support is readily available for service back-up, or to help talk through a problem.

EXPANDED TECHNICAL SUPPORT COVERAGE

Our highly trained and experienced technical support team is ready to provide application expertise and work with you to determine the product and configuration that best meets your needs. The team is there to troubleshoot instruments. Service contracts and short-term leasing/financing are also available.

CUSTOMER SERVICE

Our customer service team processes orders, provides status of current orders as well as pricing and availability of product. Our international customer service team is export-compliant trained and extremely experienced in shipping to all regions of the world.

CALL US

Our team can be reached between 8:00 AM and 8:00 PM, Monday through Friday,
Eastern Standard Time by calling 866-282-0430 or 508-520-0430. Or fax us at 508-520-2800.

For more information about Thermo Scientific Continuous Emissions Monitoring Systems,
or any of our other monitoring solutions, please visit www.thermo.com/CEMS

For ordering information, please contact your local dealer or Thermo Fisher Scientific representative.

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