

# Acoem Dynoptic

SMART SOLUTIONS FOR  
OPACITY, DUST AND PARTICULATE MONITORING




**acoem**

CREATING ENVIRONMENTS OF POSSIBILITY







## Smart solutions for opacity, dust and particulate monitoring

While industry is moving away from combustion or incineration processes and using cleaner energy sources, there are still many industrial applications that rely on combustion to operate and a number of manufacturing processes that likewise produces emissions.

These industries have a responsibility to comply with stringent environmental regulations to monitor and control pollutants.

Communities that live near these facilities need assurance that they will be operated safely and in compliance with local and national regulations to protect public health.

Accurate and reliable monitoring of opacity, dust, smoke and particulate emissions helps ensure efficient and effective combustion and manufacturing practices. It is also critical to protecting the safety, health and wellbeing of nearby populations and maintaining ambient air quality standards.



## Who We Are

We specialise in designing, manufacturing and supplying a range of innovative yet affordable, advanced technology opacity, dust, particulate and smoke monitoring solutions.

Durable and reliable products are backed by a highly skilled, multidisciplinary engineering team who support our customers' ongoing needs.

Our business was established in 1985 as an independent electronics design house. With the growth of environmental engineering and the demand for better monitoring solutions, Dynoptic Systems evolved the 1990s to become

a leading producer of cost-effective continuous emission monitoring equipment.

In 2005 we further expanded our operations with the Tunnel Sensors arm of the business, providing underground monitoring technology for road tunnel infrastructure.

And in 2019, we solidified our market position and became part of the Acoem Group, a global company committed to reducing environmental impact and empowering industry and communities through smart monitoring, reliability, design and defence activities.

## Worldwide coverage

We export worldwide to more than 40 countries, either through our network of local distributors or directly from Acoem's regional offices.







## Applications

### Particulate monitoring

PM2.5 from fuel burning and industrial combustion processes (in combination with PM10) is recognised by the World Health Organisation (WHO) as potentially the most damaging emission, adversely affecting the health of more people worldwide than any other pollutant.

Even short-term contact can have detrimental effects on the body, including damage to the

respiratory and cardiovascular systems as PM2.5 particles penetrate the lungs.

Our single and double pass monitoring solutions provide reassurance and accurate measurement of the concentration of particulate matter in exhaust gas that passes through industrial ducts, stacks and flues.

### Opacity monitoring

Excess smoke emanating from a smokestack indicates poor combustion and increased concentrations of dust and particulate – making opacity monitoring an essential part of regulatory compliance.

Acoem Dynoptic opacity monitors use the light transmission technique – a high intensity green light beam projected across the stack measures

the visible opacity of exhaust gas in a duct, stack or flue.

Any dust, smoke or particulate present will attenuate the transmitted light and be measured based on the decrease in light intensity due to absorption and scattering. We offer both single and double pass opacity monitoring solutions.

### Dust monitoring

While all dust can be harmful, dust emissions from industrial processes have the potential to significantly impact people's health based not only on the duration and level of exposure, but also on the size, type and chemical composition of the particles involved – especially for workers at industrial sites and nearby communities.

Acoem Dynoptic dust monitors use the innovative Dynamic Detection Principle (DDP) to measure dust and particulates within exhaust gases from various manufacturing processes. They calculate the dynamic response, or the ratio of light variation to the average light intensity, which varies with the dust concentration.

#### Dynamic Detection Principle benefits

- Immune to gradual reductions in the absolute intensity of the light signal
- Less susceptible to drift with time, temperature or dirtying optics
- Reduced sensitivity to misalignment
- Requires less maintenance

#### Is DDP suited to your application? Consider the following factors:

- Typical size distribution of the particulates to be measured
- Whether they have constant or variable physical properties
- How easily monitoring heads can be accessed for routine cleaning of optical surfaces

## Our product range – designed to meet your needs

Engineered for accuracy and performance, our instruments are reliable and expertly manufactured using robust 316 stainless steel. All feature a latched head & lid design for easy installation and maintenance access with no moving parts to reduce maintenance requirements. Acoem Dynoptic monitors have become the industry standard for several large Acoem customers around the world.



**DSL-2XX SERIES  
(220, 230 & 240)**



**DSL-3XX SERIES  
(320, 330 & 340)**



**DSL-460**



**DSL-800**

### DSL-2XX SERIES (220, 230 & 240)

#### SINGLE PASS OPACITY MONITORS FOR MEASURING OPACITY, SMOKE, PARTICULATE & DUST EMISSIONS

These optical monitoring instruments are designed to measure the exhaust gases in ducts, stacks or flues from industrial processes or air filtration systems. The Transmitter/Receiver operates via a visible light beam emitted from the Transmitter that passes across the stack to a Receiver.

This cost-effective solution suits a variety of applications, from smaller to large stack diameters and allows for in-situ measurement directly in exhaust gas flow.

#### Benefits of the DSL 2XX SERIES

- Low cost
- Simple to install, commission and operate
- Excellent reliability
- Various interface options for easy integration
- PC-based set up, control and data logging







DSL-220	DSL-230	DSL-240
For stack diameters between 0.5m & 20m – opacity 0-100%	For stack diameters between 0.5m & 20m – particulate 0-1000mg/m <sup>3</sup> (at 1m path length) using optical transmission	For stack diameters between 0.5 & 20m – particulate 0-1000mg/m <sup>3</sup> (at 1m path length) using DDP Suitable for large particles and very dirty applications e.g. cement production and metal processing
Measures the visible opacity of exhaust gas passing through a duct, stack or flue from an industrial process or air filtration system	Measures the concentration of particulate matter in exhaust gas passing through a duct, stack or flue from an industrial process or air filtration system	Measures the concentration of dust in exhaust gas passing through a duct, stack, or flue from an industrial process or air filtration system
<ul style="list-style-type: none"> <li>• In situ measurement directly in exhaust gas flow</li> <li>• Measurement reading as % opacity</li> <li>• Modulated green LED source for long-life stability and immunity to ambient light</li> </ul>	<ul style="list-style-type: none"> <li>• In situ measurement directly in exhaust gas flow</li> <li>• Measurement reading as mg/m<sup>3</sup> (when calibrated against standard reference measurements)</li> <li>• Modulated green LED source for long-life stability and immunity to ambient light</li> </ul>	<ul style="list-style-type: none"> <li>• Dynamic Detection Principle (DDP) measurements</li> <li>• Immune to gradual reductions in absolute intensity of the light signal so less susceptible to drift</li> <li>• Measurement reading as mg/m<sup>3</sup> (when calibrated against standard reference measurements)</li> <li>• Internal electronic zero and span check capability</li> </ul>



### **DSL-3XX SERIES (320, 330 & 340)**

#### **DOUBLE PASS OPACITY MONITORS FOR MEASURING OPACITY, SMOKE, PARTICULATE & DUST EMISSIONS**

These optical double pass monitoring instruments are designed to measure the exhaust gases in ducts, stacks or flues from industrial processes or air filtration systems. Their double pass light transmission measurement technique is based on a folded beam Transceiver/Reflector.

A light beam emitted from the Transceiver passes across the duct, stack or flue to a Reflector, which then returns the light to the Transceiver where the intensity of the received light is measured.

All models in the range include a choice of interface options enabling easy integration; free utility software for PC based set-up, control and data logging; and optional operator interface with different mounting configurations.



#### **Benefits of the DSL 2XX SERIES**

- Suited to continuous mission monitoring
- Simpler installation than single pass opacity monitors
- Better accuracy over shorter path lengths than single pass opacity monitors
- Electrical services only required on one side of the stack

DSL-320	DSL-330	DSL-340
For stack diameters between 0.5m & 10m – opacity 0-100%	For stack diameters between 0.5m & 10m – particulate 0-1000mg/m <sup>3</sup> (at 1m path length) using optical transmission	For stack diameters between 0.5 & 10m – particulate 0-1000mg/m <sup>3</sup> (at 1m path length) using DDP  Suitable for large particles and very dirty applications e.g. cement production and metal processing
Measures the visible opacity of exhaust gas passing through a duct, stack or flue from an industrial process or air filtration system	Measures the concentration of particulate matter in exhaust gas passing through a duct, stack or flue from an industrial process or air filtration system	Measures the concentration of dust in exhaust gas passing through a duct, stack, or flue from an industrial process or air filtration system
<ul style="list-style-type: none"> <li>• In situ measurement directly in exhaust gas flow</li> <li>• Measurement reading as % Opacity</li> <li>• Modulated green LED source for long-life stability and immunity to ambient light</li> <li>• In-situ zero &amp; span manual check facility</li> </ul>	<ul style="list-style-type: none"> <li>• In situ measurement directly in exhaust gas flow</li> <li>• Measurement reading as mg/m<sup>3</sup> (when calibrated against standard reference measurements)</li> <li>• Modulated green LED source for long-life stability and immunity to ambient light</li> <li>• In-situ zero &amp; span manual check facility</li> </ul>	<ul style="list-style-type: none"> <li>• Dynamic Detection Principle (DDP) measurements</li> <li>• Immune to gradual reductions in absolute intensity of the light signal so less susceptible to drift</li> <li>• Measurement reading as mg/m<sup>3</sup> (when calibrated against standard reference measurements)</li> <li>• Internal electronic zero &amp; span check capability</li> </ul>

“

*Acoem Dynoptic monitors really assist us with limiting our environmental impact. Their compatibility with other systems, and the cost and time savings are huge factors in our decision to replace all our existing monitors with Acoem Dynoptic.”*





## DSL-460

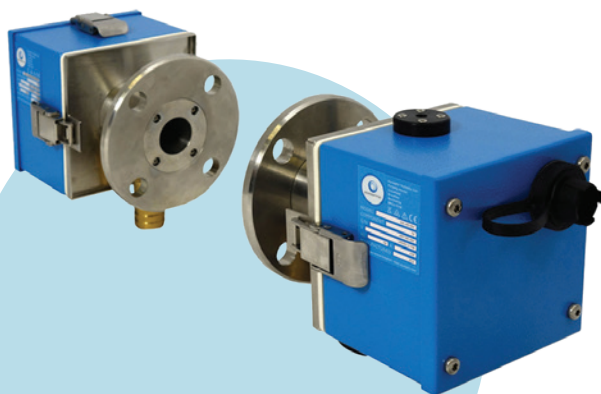
### DOUBLE PASS OPACITY MONITOR FOR MEASURING THE VISUAL OPACITY AND / OR CONCENTRATION OF DUST / PARTICULATE EMISSIONS

This instrument measures the visible opacity or particulate concentration of exhaust gases passing through a duct, stack or flue from an industrial process or air filtration system. It uses a folded beam Transceiver/Reflector measurement technique. A light beam emitted from the Transceiver passes across the duct, stack or flue to a Reflector, which then returns the light to the Transceiver where the intensity of the light is measured.

Increased particulate density in the stack gas attenuates the transmitted light and causes the light's intensity to fall. In-situ measurements provide percentage opacity, and when calibrated, this reduction can be used to calculate the particulate concentration in  $\text{mg}/\text{m}^3$ .

#### Benefits of the DSL-460

- Plug & socket connectors for easy installation
- Simpler installation than single pass opacity monitors with integrated visual alignment aid
- 'Intelligent' sensor with optional DSCU operator interface for dual parameter display
- Modulated green LED source for long-life stability & immunity to ambient light
- Better accuracy over shorter path lengths





## DSL-800

### LASER BACKSCATTER PARTICULATE MONITOR FOR MEASURING PARTICULATE MATTER CONCENTRATION

The DSL-800 is the result of several years of research and development, supported by Acoem's global expertise and 30 plus years' experience.

This instrument monitors the concentration of particulate matter in exhaust gases passing through ducts, stacks or flues of industrial combustion or air filtration processes, providing a direct, in situ measurement.

A single transceiver head makes installation easier. The TXR emits a beam of laser light into the stack and automatically detects any light backscattered from suspended particles in real-time. It delivers accurate measurement readings, operating within a compliant performance range of 0-150mg/m<sup>3</sup> when calibrated against a standard reference measurement. It features an 'Intelligent' sensor with a choice of interface options enabling easy integration.

#### Benefits of the DSL-800

- Plug & socket connectors for easy installation
- Intelligent unit with communication and outputs available directly from the head
- Simpler installation than light transmission monitors with better accuracy over shorter path lengths
- Ensure accurate management of process control and performance of your filtration system – alerting you to anomalies or requirements for maintenance
- USEPA PS-11 compliant







## Marine emissions

### SM 202M

#### SINGLE PASS OPTICAL MONITOR FOR MEASURING THE VISIBLE OPACITY OF MARINE SMOKE EMISSIONS

In 2020, the International Maritime Organisation set new global standards to lower ship emissions. Shipping companies and port authorities around the world are legally obligated to enforce and comply with these regulations.

This optical instrument was specifically designed to measure the visible opacity of smoke emissions within the marine industry and more than 2000 have already been installed on ships worldwide.

Based on a Transmitter/Receiver arrangement, a light beam emitted from the Transmitter passes across the stack to a Receiver, which measures the intensity of the received light. Increased smoke density in the stack gas attenuates the transmitted light and causes the intensity of the received light to fall.

This reduction in intensity is measured and presented as a percentage of opacity. The higher the level of smoke present, the more light lost and therefore the greater the opacity. A reading of particulate density is also available measured in  $\text{mg}/\text{m}^3$ .

#### Benefits of SM-202M

- Simple to install, commission & operate
- Easy integration into ship's control system
- Modulated red LED source for long-life stability & immunity to ambient light
- 'Intelligent' sensor so a local control unit is not required
- Local monitoring & control via panel-mounted operator interface





## Accessories

We supplement our range of opacity, particulate and dust monitors with a variety of accessories. Each is designed to make installation, operation and maintenance easier, and to ensure optimum performance and reliability of your instruments.

### Accessories include:

- Compressed air purge kits
- Air purge blower kits
- DSCU operator interfaces
- Mounting flange kits
- Calibration head assembly and zero/span filters
- Laser alignment units
- Weather covers

### Benefits of Acoem Dynoptic

- **Part of the global Acoem Group**
- **35+ years' experience**
- **Pre-sales advice on our range of products & applications**
- **Installation & commissioning assistance**
- **All systems are designed & manufactured in the UK**
- **After sales technical support, either by telephone, email or on-site service**
- **Maintenance & service support**
- **Spare & replacement parts**
- **Repairs service available at our UK factory**

## Excellence in customer service & support

We know that investing in a new monitoring system is a big commitment, and we understand the importance of offering clear, unbiased advice from the beginning of the process, so you can select the best solution to meet your needs.

We are with you every step of the way, from your initial enquiry through to routine service and beyond – not just providing the highest standard of service – but building a relationship with you and our customers around the world.

We also have a dedicated network of international distributors in 30+ countries.

All our distributors are knowledgeable and technically trained to offer helpful insight and guidance on the entire Dynoptic Systems range.

Together, we can assist you with selecting the right monitoring solution for your application, commissioning and routine maintenance/service.



## Our team can help you with:

- Personalised advice on our range of products & applications
- Assistance with system installation & commissioning
- After-sales technical support by telephone, email or on site
- Training, either on site or at our UK headquarters
- Warranty, maintenance & service support
- Spare & replacement parts
- Repairs at our UK facility

**“We have used Dynoptic equipment in multiple applications. The instruments operate to our customers’ complete satisfaction, fully compliant to their technical specifications.”**

***Distributor, Singapore***







## About Acoem

Creating environments of possibility

At Acoem, we create environments of possibility - helping organisations find the right balance between progress and preservation - safeguarding businesses and assets, and maximising opportunities while conserving the planet's resources. We deliver unrivalled, interoperable AI-powered sensors and ecosystems that empower our customers to make enlightened decisions based on accurate information.

Together with 220+ distribution partners, our 850+ employees work across 28 offices, 6 manufacturing facilities and 5 R&D centres in 11 countries, to provide trusted, holistic data solutions for customers worldwide.

For more information, please visit [acoem.com](https://acoem.com)



Dynoptic Systems Ltd - incorporating Tunnel Sensors  
Upton Lodge Buildings, Astrop Road  
Middleton Cheney  
Banbury, OX17 2PJ  
United Kingdom  
+44 (0)1285 850521 | [tunnelsensors@acoem.com](mailto:tunnelsensors@acoem.com)  
[acoem.com](https://acoem.com)