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## Blow-by Test System for On-Line Measurements of Blow-By Aerosols

## BBT 143



Blow-By Test Rig BBT 143 for measuring the oil concentration of blow-by gases: Gravimetric Measuring System GMS 141, Process Aerosol Photometer PAP 610 and PAP 612

The Blow-By Test Rig BBT 143 is a mobile measuring system for the determination of oil droplet content in the crankcase gases (blow-by) on engine test stands. It combines the accuracy of a gravimetric measurement by the GMS 141 with the dynamics of an optical concentration measurement by the aerosol photometers PAP 610 and PAP 612, and it allows effective and time-saving recording of oil consumption values of complete engine maps.

For an optional pressure compensation, a blower is available which is capable of compensating the differential pressure across the measuring system (e. g. in filter measurements) compared to a pipe guidance without measuring devices.

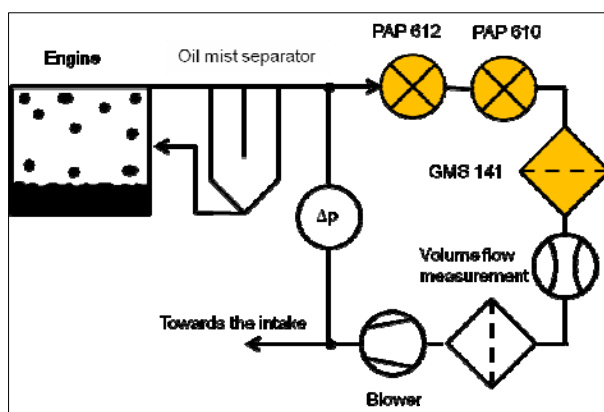
Additionally, the compact photometer PAP 612 offers the possibility of detecting oil films in tubes and gushes of oil, for example, in swivel test rigs.

### Special Advantages

- Time-saving and reproducible determination of oil content in blow-by gases in a wide concentration range
- Integration in engine test stands (CAN)
- Measurement in the full flow of the blow-by (up to 300 l/min), possible bypass flow measurements at large blow-by volume flow rates)
- Compensation of the differential pressure of the filter measurement
- Heated measuring chamber of the GMS 141 and the PAP 610 to avoid condensation
- High temporal resolution photometric measurements in aerosols of two different wavelengths
- Easy to use and quick commissioning

### Applications

- Determination of oil content in blow-by on the engine test stand
- Evaluation of oil mist separators on the engine test stand
- On-line concentration monitoring of oil mist aerosols



Example of a measurement setup with the BBT 143

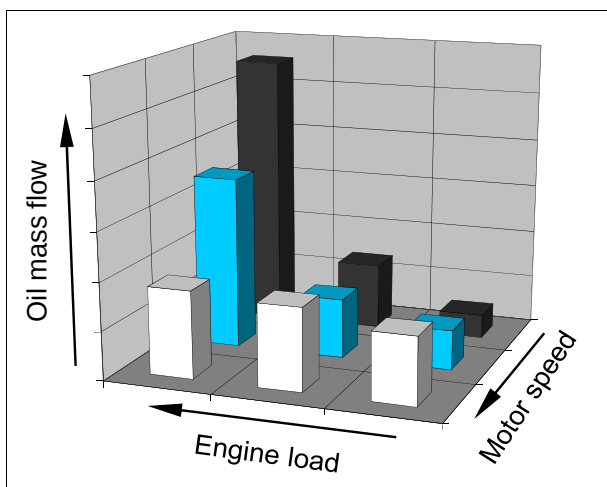
## Gravimetric Measurement System GMS 141



Gravimetric Measurement System GMS 141 with absolute filter holder for flat sheets and cartridges

The compact Gravimetric Measurement System GMS 141 allows the convenient determination of oil content in blow-by after the oil mist separator by means of flat sheet filter media or filter cartridges directly on engines or engine test stands.

The instrument combines a simple, rugged design with a low-cost manual handling and operation. The device is controlled via an Internet browser.



Example:  
Oil mass flow after the oil separator in combustion engines

### Special Advantages

- Time-saving and reproducible determination of the oil mass flow
- Differential pressure measurement on the absolute filter
- Temperature and flow rate measurement of the blow-by
- Heated absolute filter holder
- Holder for different types of filters
- Device control via Internet browser
- Easy to use, robust and space-saving design

### Application

- Determination of oil content in blow-by gases
- Evaluation of oil mist separators
- Calibration of aerosol generators and aerosol photometers

### Technical Data GMS 141

|                                       |                                                                                                                                                                                |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flow rate                             | up to 300 l/min (18 m³/h)                                                                                                                                                      |
| Differential pressure measuring range | up to 50 hPa                                                                                                                                                                   |
| Pipe connection diameter              | 28 and 32 mm                                                                                                                                                                   |
| Dimensions of absolute filter         | Filter blank sheet:<br>Ø 110 mm<br>(effectively Ø 100 mm /<br>Filter cross section:<br>78,5 cm²)<br>Filter cartridge:<br>Ø 65 mm, L= 93 mm<br>Filter cross section:<br>679 cm² |
| Temperature of absolute filter        | max. 120 °C (adjustable)                                                                                                                                                       |
| Aerosol contacted materials           | stainless steel, aluminum, Viton (FKM)                                                                                                                                         |
| Power supply                          | 230 V AC, 3 A                                                                                                                                                                  |
| Dimensions                            | ca. 520 x 240 x 350 mm                                                                                                                                                         |
| Weight                                | 14 kg                                                                                                                                                                          |

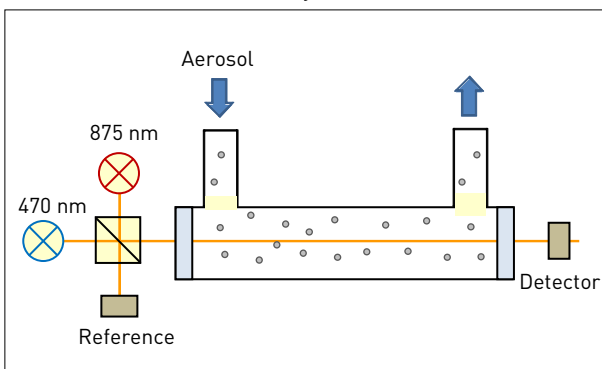
## Process Aerosol Photometer PAP 610



Process Aerosol Photometer PAP 610

The process Aerosol Photometer PAP 610 is used for inline concentration measurement of oil content in blow-by aerosols. Due to the high temporal resolution it allows both the rapid measurement of engine maps as well as the study of dynamic processes such as for load or speed changes.

This measuring instrument is a supplement to the Gravimetric Measurement System GMS 141 and requires a gravimetric calibration. It does not allow direct indication of the particle size distribution of the blow-by aerosol.



Measuring principle of the PAP 610

### Advantages

- High temporal resolution concentration measurement with two wavelengths
- Significant time saving when recording engine operation maps
- Heatable measuring chamber
- Simple usability and service

### Applications

- Determination of oil content in blow-by
- Analysis of dynamic processes on the engine test stand
- Concentration monitoring of aerosol generators on oil mist test rigs (SPT 140)
- In-line monitoring of oil mist separators
- Monitoring of the mean particle size in submicron aerosols

### Technical Data PAP 610

|                                   |                                             |
|-----------------------------------|---------------------------------------------|
| Measuring principle               | Transmittance / Extinction                  |
| Optical path length               | 300 mm                                      |
| Volume flow                       | max. 300 l/min (18 m³/h)                    |
| Oil concentration                 | approx. 0.02 to 3 g/m³                      |
| Wavelengths                       | 875 nm and 470 nm                           |
| Pipe connection diameter          | 28 mm and 32 mm                             |
| Temperature of measuring chamber  | max. 120 °C                                 |
| Aerosol contacted materials       | stainless steel, glass, aluminum, Viton FKM |
| Power supply:                     |                                             |
| Heater                            | 230 V AC, 1 A                               |
| Photometer                        | USB supply (12 V)                           |
| Dimensions measuring tube (L x Ø) | 560 x 76 mm                                 |
| Weight                            | 6 kg                                        |

## Process Aerosol Photometer PAP 612



Process Aerosol Photometer PAP 612

The Process Aerosol Photometer PAP 612 is a combined in-line extinction and scattered-light photometer with dual measurement sections and two wavelengths, which can be operated under conditions of overpressure or underpressure.

The device is used to measure high oil contents in blow-by aerosols and the detection of interfering liquids in pipe systems (e.g. gushes of oil, wall film and condensation detection).

Due to its compact design, the device can be used in test systems, laboratories and in field tests.

### Applications

- Determination of high oil mist concentration in the blow-by
- Detection of interfering liquids in pipe systems for gas transport (e. g gushes of oil, wall film or condensation detection)
- In-line characterization and concentration monitoring of blow-by aerosols
- Concentration measurement of aerosols, suspensions, and emulsions
- Particle size control in submicron aerosols

### Advantages

- Compact design for use in laboratories as well as on engine test stands, swivelling test rigs and for field use
- High temporal resolution transmission and light scattering measurement in aerosols with two wavelengths
- Higher measurement reliability and redundancy due to double measurement sections
- Overpressure and underpressure operation
- Easy handling and maintenance

### Technical Data PAP 612

|                             |                                       |
|-----------------------------|---------------------------------------|
| Measuring principle         | extinction, scattered light           |
| Optical path length         | 25 mm                                 |
| Volume flow                 | max. 300 l/min (18 m³/h)              |
| Oil concentration           | > 2 g/m³                              |
| Wavelengths                 | 630 nm and 470 nm                     |
| Pipe connection diameter    | 28 mm                                 |
| Compressive strength        | 4 bar                                 |
| Temperature range           | -10 ... + 60°C                        |
| Aerosol contacted materials | Aluminum, Viton (FKM), sapphire glass |
| Power supply                | USB supply (12 V)                     |
| Dimensions (L x Ø)          | 200 x 80 mm                           |
| Weight                      | 1.2 kg                                |

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