

MIE-D 1.2

APPARATUS FOR MEASUREMENT OF THE MINIMUM IGNITION ENERGY OF DUST DISPERSIONS

Product Datasheet



TEST PRINCIPLE

The minimum ignition energy (MIE) of a combustible substance is the lowest value of the electrical energy stored in a capacitor, which upon discharge, just suffices to ignite the most readily ignitable fuel/air mixture at atmospheric pressure and room temperature. The dust sample is dispersed in the 1.2-liter glass tube by a defined pulse of compressed air and then tested for ignition by the electric spark of defined energy.

APPLICATIONS

The minimum ignition energy of dust dispersions is the key parameter for an assessment of the hazard situations in the processing industries. This testing method is the essential part of a standard set of tests for assessing ignitability and explosibility properties of combustible dusts providing the quantitative data for various hazard situations in the industries. The results are required for designing relevant safety precautions preventing the dust explosions and fires. The testing is usually done by certified bodies, universities, research organizations and processing plants.

TESTING STANDARDS

The instrument complies with the following standards:

- **EN 13821:** Potentially Explosive Atmospheres – Explosion Prevention and Protection – Determination of Minimum Ignition Energy of Dust/Air Mixtures
- **ASTM E 2019:** Standard Test Method for Minimum Ignition Energy of a Dust Cloud in Air
- **IEC 61241-2-3:** replaced by ISO/IEC 80079-20-2:2016
- **ISO/IEC 80079-20-2:2016:** Explosive Atmospheres. Material Characteristics. Combustible Dusts Test Methods

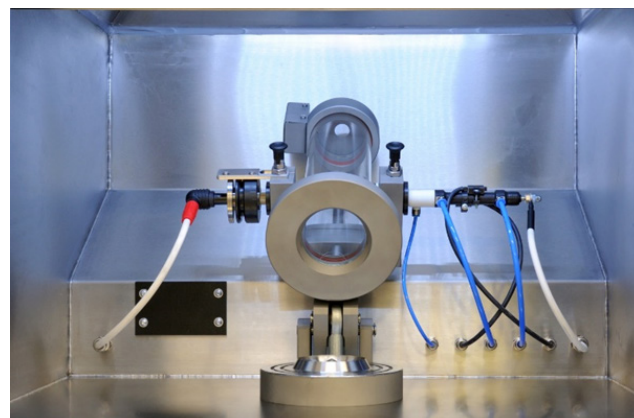
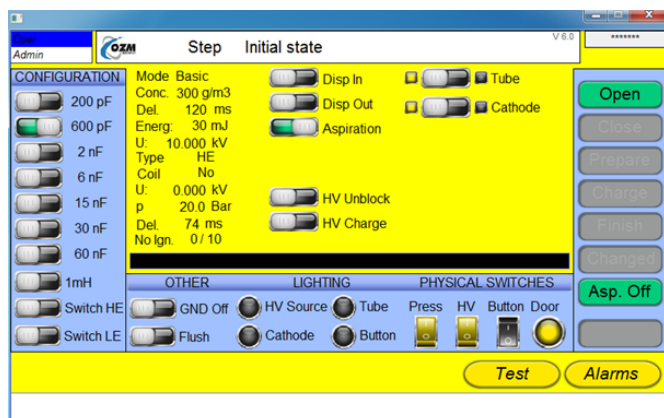
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MAIN FEATURES AND ADVANTAGES

- Scientific mode allows for measurement at any user-specified level in the range from 1 mJ up to 2 J (with 3 J as an option), above the standard set of 7 predefined energies.
- Triggering by three possible methods:
 - High-voltage switch (1 mJ, 3 mJ)
 - Moving electrode (10 mJ to 2 J)
 - Dust cloud itself
- Automation with electronic and pneumatic control by PLC, including pneumatic-driven opening of the tube, minimizing necessary manual operations.
- Two user-friendly interfaces – TFT LCD touch panel and optional isolated PC connection with data evaluation software.
- Stainless-steel case with the safety window equipped with safety interlocks.
- Firing button for safe remote execution of the test from a distance of up to 4 m.
- Adjustable dispersion pressure up to 8 bar.
- Optionally, the instrument can be equipped with a closed stainless-steel tube for explosion pressure and lower explosion limit (LEL) measurements.
- Optionally, optical flash detector can be used for measurement of the duration and relative intensity of the dust explosion.
- Optionally, alternative statistic evaluation of the sample testing could be used. Interval of energies causing the initiation with certain probability, called the sensitivity curve, is the product instead of a single sharp boundary between energy levels causing ignition and not causing ignition. The sensitivity curve is represented with the cumulative distribution function for lognormal distribution.



TECHNICAL PARAMETERS

Standard energy levels:	1, 3, 10, 30, 100, 300 and 1000 mJ
Scientific mode:	any energy in the range 1 – 2000 mJ
Charging voltage:	adjustable in the whole efficient range from 7 to 15 kV
Inductance (with coil in the circuit):	between 1.0 and 2.0 mH, typically 1.1 mH
Inductance (without coil):	≤ 0.025 mH

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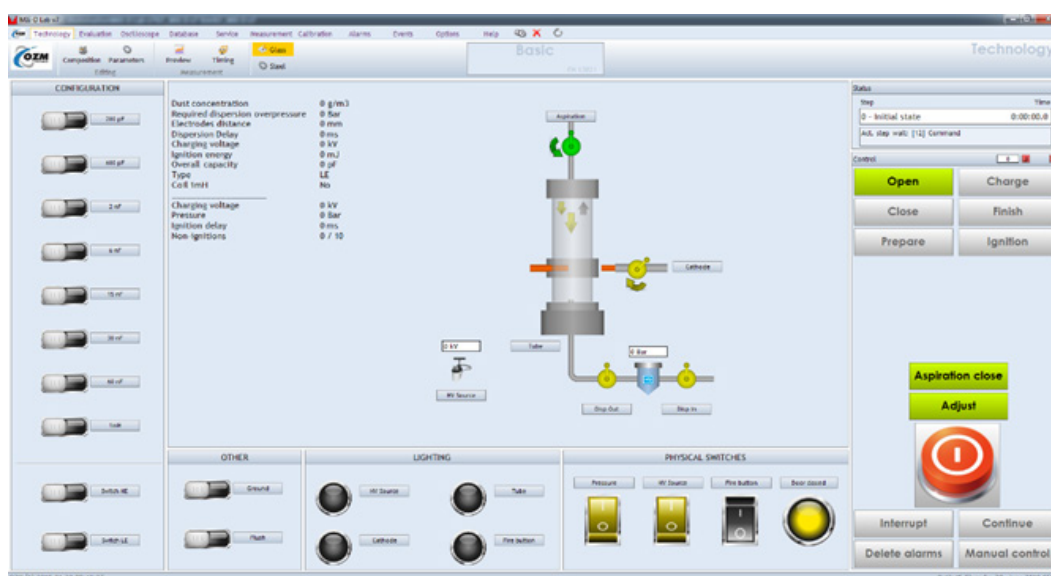
HV Electrode material:	tungsten
HV Electrode diameter:	2.0 ± 0.5 mm
Standard HV Electrode gap:	≥ 6 mm (minimum), adjustable
Capacitance of the electrode system:	between 35 and 80 pF (usually 55 pF)
Dispersion pressure:	up to 8 bar
Ignition delay time:	60 – 300 ms, adjustable with 30 ms time steps
Electronic and pneumatic control:	PLC independent on evaluation PC
Pneumatically driven opening of the tube	



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STANDARD INSTRUMENT PARTS

Part No.:	Description:
Hart- 1.2	<p>Modified Hartmann tube – transparent glass tube with stainless-steel connection adapter, V = 1.2 liters</p> <p>Dust dispersion system: 50 ml dispersion vessel, mushroom-shaped nozzle</p> <p>High-voltage (HV) Spark Generator</p> <p>Electronic and pneumatic control</p> <p>Touch screen – 7" 800 x 480 TFT LCD</p> <p>Grounded stainless-steel case with connection to local exhaust (150 mm), safety interlocks</p> <p>Firing button</p> <p>Cleaning kit and accessories</p>

OPTIONAL EQUIPMENT

Part No.:	Description:
Hart-FW	Isolated optical data connection interface and the PC software MIE-D-Lab v7 (Win 7 - 10) for more user-friendly evaluation and storage of measured results
DAEU- 17HD	<p>Notebook PC with the following minimum specification:</p> <p>Intel Pentium Dual Core Processor 2.0 GHz, Microsoft Windows 10 x64, 4 GB RAM, 17" full HD display, 500 GB HDD, DVD RW, WLAN 802.11 b/g/n, LAN 10/100/1000, USB 2.0/3.0, USB mouse and keyboard, one license of Acronis True Image (a professional backup software), 64 GB USB flash drive</p>
Hart- 1.2-P	Stainless-steel Hartmann tube (1.2-litre) for screening explosibility tests, Lower Explosion Limit screening together with explosion pressure measurements
MIE-OPT	Optical flash detector

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CONSUMABLES

Part No.:	Description:
MIE-D-HV-EA	High-voltage anode
MIE-D-HV-EC	High-voltage cathode

INSTALLATION REQUIREMENTS

Testing place:

Dimensions of the instrument:	Width x Depth x Height: 990 x 647 x 1082 mm
Weight of the instrument:	approx. 190 kg
Conditions:	21 °C ± 5 °C, RH 20 - 80 %, non-condensing
Stable electric power source:	230 V / 50 Hz (120 V / 60 Hz), 3 A
Compress air source:	nominal 9 bar female tread 1/4" or connector for 6 mm plastic tubes
Local exhaust:	DN150 connection
Vacuum cleaner	
Separate room grounding is an advantage	

Space for sample preparation:

Measuring equipment for weight of samples. Scales with minimum range 100 grams, resolution at least 0.001 grams.
Measurement of barometric pressure, laboratory humidity and temperature.

Recommended:

Equipment for measurement of sample's particle size distribution.

MANUFACTURING NOTE

The product is manufactured according to relevant EU directives and manufacturing standards.