

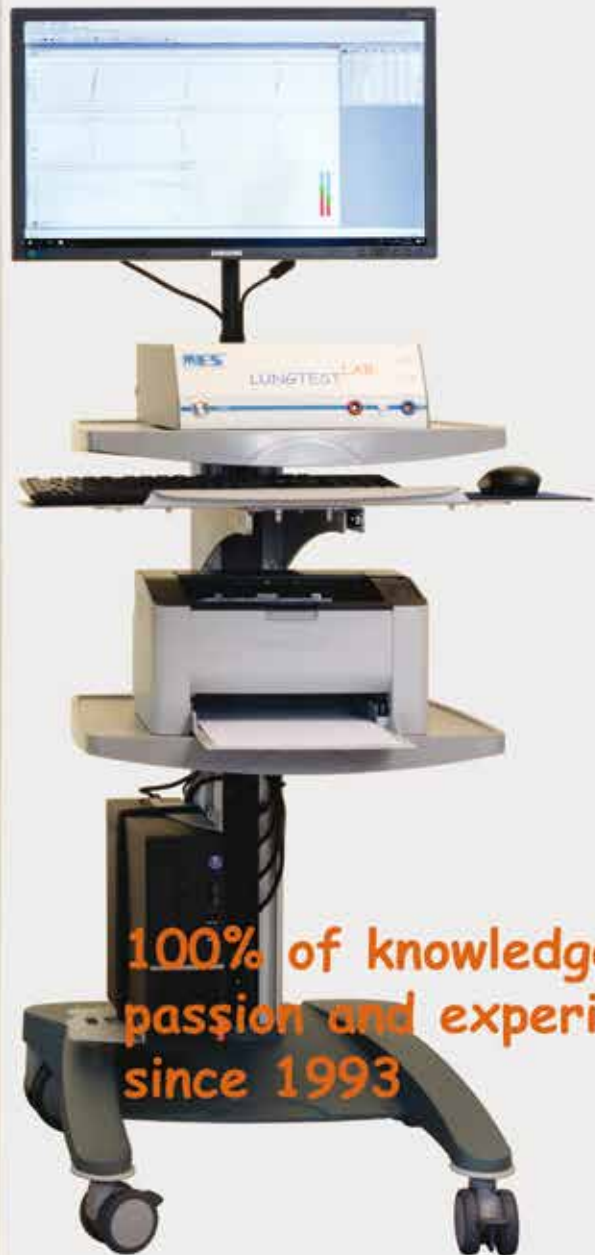


MES Sp. z o.o.
Founded 1993

spirometer

above

the standards



100% of knowledge,
passion and experience
since 1993

LUNGTEST LAB BODY

LUNGTEST LAB BODY



Lungtest LAB BODY is a stationary advanced device from MES designed for whole spirometry and bodyplethysmography measurement for adults and children over 3 years old. Lungtest LAB BODY is able to perform computer analysis of the measurements, operated by any PC with software implemented in any version of Microsoft Windows system. Lungtest LAB BODY fully complies with all ATS/ERS standards and is the perfect tool for accurate and reliable data in any hospital department or physician's office. Measurement system of Lungtest LAB BODY has been designed and constructed on the basis of the MES DV 40 pneumotachograph with new developed digital converter. Lungtest LAB BODY is a compact device with a modern design owes the perfect functionality to many years of experience of top class engineers-enthusiasts.

Developed and patented by MES digital flow converter (Patent Nr 230143), placed directly on the pneumotachograph MES DV40 headpiece (Patent Nr 173767)

Flow measurement is performed with use of the unique MES DV40 pneumotachograph head patented by MES. Low resistance for flow, small dead space and low

weight ensure patient conditions similar to the natural. No moving parts in the headpiece and a complete lack of sensitivity to humidity provide high accuracy and noise immunity. Sterilization of the entire headpiece gives a complete safety to tested subject. We introduced our new invention in the construction of the device which enables to eliminate air hoses, transmitting a differential pressure signal from our MES DV40 pneumotachograph to a sensor situated in the housing of the device. We developed and patented a flow measuring system with a digital converter of air flow. Its essence is to place pressure sensors with digital converter directly on the MES DV40 pneumotachograph head and transmitting the measured flow signal digital by means of a cable. We can say that we have the digital pneumotachograph now which will be a key element in all of our new devices. This solution also prevents a signal distortion during the transmission over air hoses cables and increases the ease of movement of the subject's head.

Lungtest LAB BODY – advanced part of the modular PFT system

Lungtest LAB BODY can be a part of full PFT system giving high-quality measurements and excellent repeatability. Our customers who wants to begin their activity with spirometry can buy a basic version of

Lungtest BASIC which allows a spirometry measurement only but they should to know that it can be the base for the Lungtest LAB BODY. Patented main parts of flow measurements and other hardware components allow accurate measurements and fast test procedures.

Features and advantages of Lungtest LAB BODY:

- lightweight, low-resistant MES DV40 pneumotach headpiece without movable elements
- easy replaceable measurement pneumotach headpiece - with no anti-bacterial filters
- immediately ready to use after replacing a headpiece
- measuring air flow system with digital converter placed inside a coupler of the MES DV40 pneumotachograph close to headpiece
- air tubes for flow measurement eliminated and digital signal is sent by cable to the main unit
- automatic ambient conditions measuring system
- automatic control of the test correctness according to ATS/ERS standards
- automatic assessment of the quality of the correctly performed examination in the A-F scale

- real-time visualization of graphs: flow-time, volume-time time waveforms and flow- volume loops
- possibility of measurement's interrupting in any time for control of reached results and starting measurement again
- automatic assessment of the diastolic test according to ERS with text commentary
- possibility to turn on the automatic diagnosis system
- computation of standard deviations and percentiles
- presentation of measured values against predicted values
- GLI and many others predicted values available
- edition of the test report
- summary report provides data for a simple and easy interpretation
- test data exporting to standard statistic programs
- motivational system for children
- database without any limitations with quick searching for patients and examinations
- open-architecture database with flexible software system
- user-friendly software compatible with Microsoft Windows
- numerous upgrading options
- possibility to control the spirometer calibration by the user with the use of a syringe
- low maintenance costs and easy servicing
- very stable and highly mobile trolley available
- providing free of charge upgrades during and after warranty period

Innovation and new technological solutions in Lungtest LAB BODY

Lung volume measurement can be performed by a Lungtest LAB BODY device with the addition of a variable-pressure plethysmographic body-box with extremely fast times of stabilization and calibration. The large constant-volume cabin (940 l) is a comfortable facility for measurement of lung volume and airways resistance. The device measures pressure changes initiated with movements of patient's chest. This method guarantees high accuracy, speed and repeatability of results and reduces the need of patient's co-operation. Plethysmographic TGV is considered the gold standard of absolute volume measurements and includes the nonventilated airspace. Whole-body plethysmograph provides a measure of true change in TGV. The clinical measurement of plethysmographic air-flow resistance is also considered to be the gold standard, and is more widely applied than either pulmonary resistance measured noninvasively. It is emphasised that the plethysmographic measurement of resist-

ance requires two separate measurements: first, that of sRaw, and secondly, the measurement of TGV itself. A complete whole-body plethysmography, measurement is divided into three standardized measuring sequences whose order may be defined by diagnostic requirements. sRaw is usually measured first, followed by measurement of TGV and concluding with measurement of the entire range of lung volumes, both slow and forced spirometry. Individual measurement phases can be skipped or repeated, depending on the diagnostic information required and/or the patient's ability to cooperate. An accurate pneumatach headpiece and a fast flow closing valve constructed by MES as well as a chamber with stable thermal parameters are components of a high class device. The software contains original algorithms compensating a change from ATP to BTPS without necessity of using breath bags.

Unique patented shutter

While producing the equipment, the MES company places special emphasis on the patient's protection against infections. The pneumotachographic head that we have patented offers the possibility of using sterile measurement elements for each patient during the basic spirometric examination. The new construction of shutter for the RRS, P0.1 and bodyplethysmography examinations is a development based on the idea of easy sterilization of elements used during the examinations in the area of respiratory mechanisms. The idea behind the construction of new shutter is the elimination of potential threats of infection during the examination performance. The MES shutter is driven by a rotary solenoid built-in into the ergonomic plastic casing. An element closing the air flow is replaceable and design for sterilization. The whole item consists of one drive and many replaceable shutters.

Advantages of the new shutter construction:

- sterile closing element for each patient
- easy sterilization of the whole closing element
- small dead space of the closing element
- small flow resistance of the closing element
- low price of the replaceable closing elements
- drive of the closing element placed in ergonomic casing
- fast and easy replacement of the closing element
- universal construction to be used in the RRS, P0.1 and bodyplethysmography examinations
- closing element is not susceptible to dampness

Lungtest LAB BODY

- basic range of functionality

Patient's data

Lungtest LAB BODY allows entering the following patient's data: name, surname, date of birth, weight, height, sex, identification number, the data listed above plus address, place of work, insurer, type of illness, attending doctor, diagnosis, history number, hospital ward, a name of the person carrying out the test.

Bodyplethysmography

- the determined parameters: Rtot, Rex, Rin, Rpeak, Gtot, SRtot, Sgot, TLC, VC, IC, ERV, RV, ITGV, ITGV(FRC), RV% TLC, RV, TLC, ITGV% TLC

Spirometry

- the determined parameters: VC, IC, ERV, TV, IRV, MV, BF

Flow/volume loop

- the determined parameters: FEV0.5, FEV0.75, FEV1, FEV2, FEV3, FEV6, FVCEX, PEF, MEF75, MEF50, MEF25, MEF@FRC, FEF75/85, FEF25/75, FEF0.2-1.2, VPEF, TPEF, TPEF%FET, FET, MEF50%FVCEX, FEV1%FVCEX, FEV1%VC, FEV1/PEF, FEV1%VCmax, FEV1%FEV3, FEV1%FEV6, BEV, BEV%FVCex, TC25/50, MTT, AEX, FVC IN, FIV1, PIF, MIF50, FIT, TPIF, VPIF, TPIF%FIT, FEV1%FVCIN, MEF50/MIF50, PEF/PIF, FEV1/FIV1, FET%FIT, TTOT

Maximal Voluntary Ventilation

- the determined parameters: MVV, BF, BR

Pre/ Post Bronchiodilatation

When a test is repeated after intake of the medicine, results of the second test are related to the results of the test preceding the medicine intake. Each initial test is marked as PRE and the test following the medicine intake is marked as POST to facilitate interpretation of the recorded results. The software allows automatic evaluation of a diastolic test consistent with ERS.

Predicted values

Usually the due values are calculated according to ERS but the Lungtest LAB BODY software contains currently 31 authors including GLI, NHANES III, Kuster, Hankinson, Falaschetti.

Data base

Patient data are stored in Microsoft SQL database, providing the flexibility to access, manipulate and report data in multiple ways, as well as transmitting the results to standard statistic programs and net using HL7 protocol.

Trend reports

Trend reports allow printing and graphing data from previous patient visits so that progress can be monitored.

Printouts

Lungtest Lab Body allows printing of the results and comparisons of results in color or black and white in formats designed by the User.

Technical specifications of the Lungtest LAB BODY

Flow rate and volume measurement:

- measuring headpiece	MES DV40 (or DV40e)
- dead space	38 ml (or 20 ml)
- flow range	± 20 l/s
- flow resolution	1 ml/s
- usable flow resolution	10 ml/s
- volume measurement range	0 - ± 10 l (0 - 20 l)
- usable volume resolution	10 ml
- accuracy	< 2 %
- headpiece resistance	< 0,9 cmH ₂ O/l/s (at 14 l/s flow rate)
- ventilation range	300 l/min

Bodyplethysmography chamber:

- measurement principle	constant volume
- box volume	940 l (1000 l)
- dimensions	785 x 895 x 1550 (1650) mm
- weight	125 kg
- design	five transparent walls
- chamber time constant	4-7 s

General data:

- power supply:	230 V ±10%, 50/60 Hz
- power intake:	150 VA
- dimensions :	530 x 200 x 240mm
(module with sinus pump)	
- weight:	12 kg

Used patents:

- Patent 173767 Developed and patented by MES the pneumotachograph MES DV40 headpiece for flow measurement
- Patent 195041 Developed and patented by MES the fast coupler, for quick and easy replacement of the pneumotachograph MES DV40 headpiece
- Patent 213374 Developed and patented by MES shutter for blocking airflow path close to mouth
- Patent 230143 Developed and patented by MES digital flow converter, placed directly on the pneumotachograph MES DV40 headpiece

Certificates: CE 1011, ISO 13485:2016

Advantages of our pneumotachograph head with digital converter (patents: nr 173767 and 230143)

■ cable transmission of the measured flow signal	■ high accuracy and resolution	■ lightweight
■ headpiece cable connected with main unit	■ parameters do not change in the course of a test	■ small dead space
■ pre-test calibration is not required	■ no moving elements	■ low flow resistance
	■ sterile for each patient	■ no heating system
	■ easily sterilizable as a whole	■ insensitive to moisture
		■ life period - 10.000 tests

Ambient Condition

Electronic Module

All spirometry volume values should be reported at BTPS. The calibration is done under ATP i.e. ambient conditions. This means current temperature, current barometric pressure and current humidity. A volume change occurs during expiration

the measurement on the patient because of the changes in temperature and humidity. These changes are corrected to BTPS conditions and the conversion from ATP to BTPS occurs automatically. Ambient Condition Electronic Module is hung on a wall and connected with PC via USB, allows continuous acquisition of ambient condition parameters in laboratory.

Chamber pressure measurement

- pressure range	± 20 Pa
- pressure accuracy	± 2 %
- pressure resolution	0,1 Pa

Occlusion pressure measurement

- pressure range	± 10 kPa
- pressure accuracy	± 2 %
- pressure resolution	10 Pa

Air flow closing valve

- type	replaceable shutter driven by rotary solenoid
- closing response time	20 ms

Chamber calibration:

- occlusion pressure: automatically by using constant pressure pattern 200 Pa
- chamber pressure: automatically by using 50 ml sine pump
- the half value time of chamber: automatically by opening and closing chamber valve
- conversion from ATP to BTPS occurs automatically

Ambient conditions:

- humidity	0-100%
- temperature	0 - + 50 °C
- atmospheric pressure	500 - 1200 hPa



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