Rhinotest 1000 rhinomanometer

Rhinotest 1000 rhinomanometer is a stationary advanced, medical device from MES consisting precise measurement unit for functional examination of a nasal ways, operated by any PC computer with software implemented in any version of Microsoft Windows. Rhinotest 1000 measures nasal flow and pressure producing that flow, using anterior or posterior rhinomanometry, with either the Broms or Standard technique as approved by the International Standardization Committee on the Objective Assessment of Nasal Airway in Riga, 2016. Innovative technical solutions used by MES in Rhinotest 1000, affords possibilities to real-time visualization and recording flow and pressure waveforms additionally besides pressure-flow loops and provide rhinospirometry in a forced nasal flow and maximally voluntary ventilation per minute.

The software of Rhinotest 1000 has been developed and enhanced for maximum ease of use. It contains all the diagnosis tools required for both the specialized ENT hospital department and for usage in private practice. Measurement system of Rhinoest 1000 has been designed and constructed on the basis of the MES DV40 pneumotachograph with new developed digital converter. Rhinotest 1000 owes the perfect functionality to many years of experience of top class engineers-enthusiasts.

Features and advantages of Rhinotest 1000 rhinomanometer:

- lightweight, low-resistant MES DV40 pneumotach headpiece without movable elements
- 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 diastolic test appraisal
- comparison of results with predicated values
- real-time visualization of graphs: flow-time, pressure time waveforms and pressure-flow loops
- high-resolution 4-phase rhinomanometry for measuring the nasal airflow and differential pressure between the posterior of the nose and ambient air
- four phases shown in the graph of rhinomanometry measurement: ascending inspiratory, descending inspiratory, ascending expiratory, descending expiratory
- possibility of measurement's interrupting in any time for control of reached results and starting measurement again
- possibility of making many times analysis of recorded measurement at variable threshold values: Standard Zone and variation criterion- automatic determination of nasal flow and pressure patterns
- edition of the test report
- summary report provides data for a simple and easy interpretation
- test data exporting to standard statistic programs
- open-architecture database with flexible software system
- software compatible with Microsoft Windows
- reference resistor with calibration software optionally available
- low maintenance costs and easy servicing
- providing free of charge upgrades during and after warranty period

Standard examinations

The Anterior method by Broms and by Standard
The Posterior method by Broms and by Standard

The anterior method

The anterior rhinomanometry technique is a very useful procedure for measurement as it depends upon the patient's co-operation only to a small degree. In this method, we simultaneously take measurements of pressure from one nasal opening and flow from the other nasal opening. A measurement is conducted with mouth closed and nasal breathing at rest conditions. A pressure/flow curves for a nasal cavity are obtained with a mask closely applied to a face. A pneumotachograph headpiece is connected to a mask exhaust opening in which flow value is measured. Pressure measurement results are obtained inserting a closely fitted olive into a nasal opening, whose exhaust is connected with a small-diameter silicon pipe to a pressure probe.

Parameters of the Anterior Test:

Rn RSin, Rn RBin, Rn RSex, Rn RBex, Rn LSin, Rn LBIn, Rn LSex, Rn LBex, Rn Sin, Rn Bin, Rn Sex, Rn Bex, P@RSin , P@RBin, P@RSex, P@RBex, P@LSin, P@LBin, P@LSex, P@LBex, F@RSin, F@RBin, F@ RSex, F@RBex, F@LSin, F@LBin, F@ LSex, F@LBex

The posterior method

The posterior rhinomanometry technique consists in simultaneous measuring pressure in oral cavity and flow from both nasal openings. A measurement is conducted with mouth closed and nasal breathing under rest conditions. A mask closely applied to a face is used at a measurement. A pneumotachograph headpiece is connected to a mask exhaust opening in which changes in flow value in nasal cavity are measured. Pressure measurement results are obtained from a small-diameter flexible pipe placed in a patient's oral cavity.

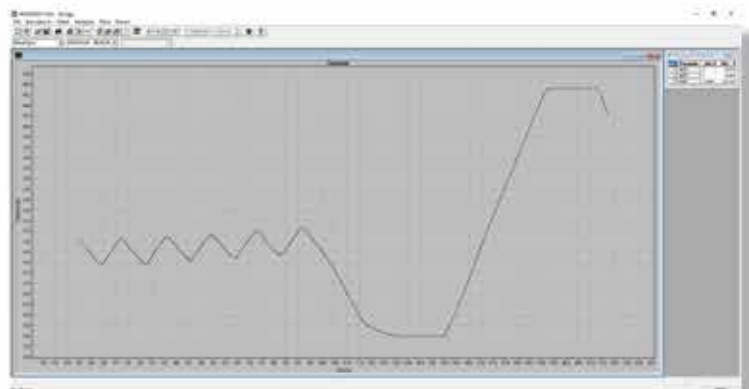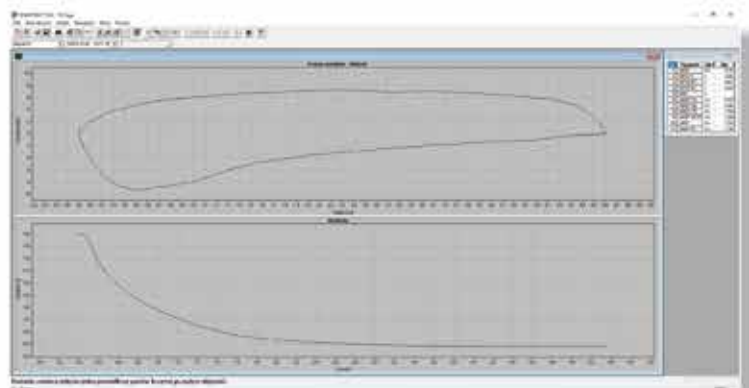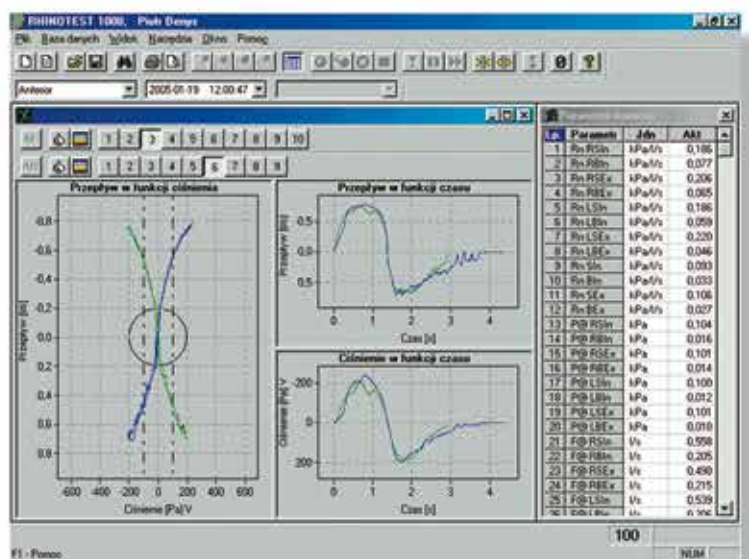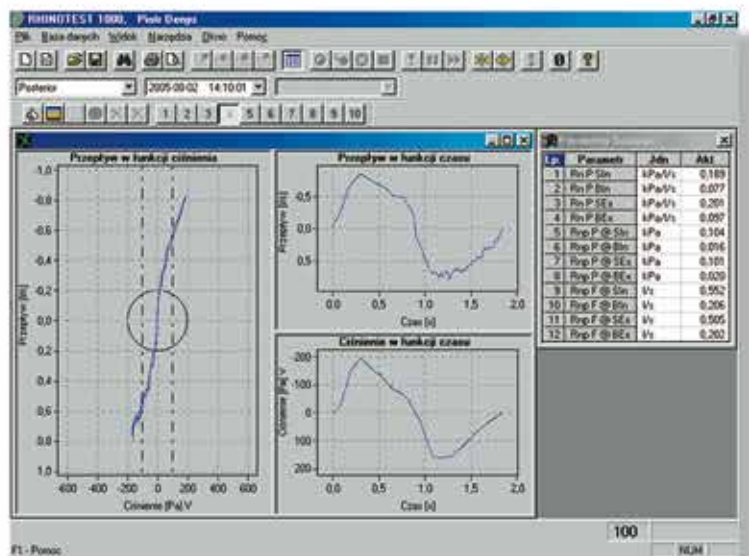## Parameters of the Posterior Test:

Rn P Sin, Rn P Bin, Rn P Sex, Rn P Bex, P@Sin, P@Bin, P@Sex, P@Bex, F@Sin, F@Bin, F@Sex, F@Bex

Parameters of nasal spirometry:

NPEF, VFEV1, VFVCEX, NFVClN, NVCEX, NMEF75, NMEF50, NMEF25, NPlF, NMlF50.

Parameters of Nasal Maximal Voluntary Ventilation:

NMV, NMVV, NBR.

Post medicine intake test

When a test is repeated after intake of the medicine, results of the second test are related to the results of a test preceding a medicine intake. Each initial test is marked as PRE and a test following a medicine intakes marked as POST to facilitate interpretation of the recorded results

Personal twenty-four hours trend

Nasal ways resistance varies during nights and days therefore twenty four hours trend might be determined for each patient. Trends help to initiate effective treatments.

Patient data

First name, last name, date of birth, body weight, height, sex, test identification number, patient identification number, patient address, employer address, insurance institution.

Data base

Data base allows for storing, comparing and transmission of examination results as well as graphs to statistical standard programs.

Printing reports

Rhinomanometer affords possibilities to print as well as compare examination results designed by a user, using color or black and white printer.
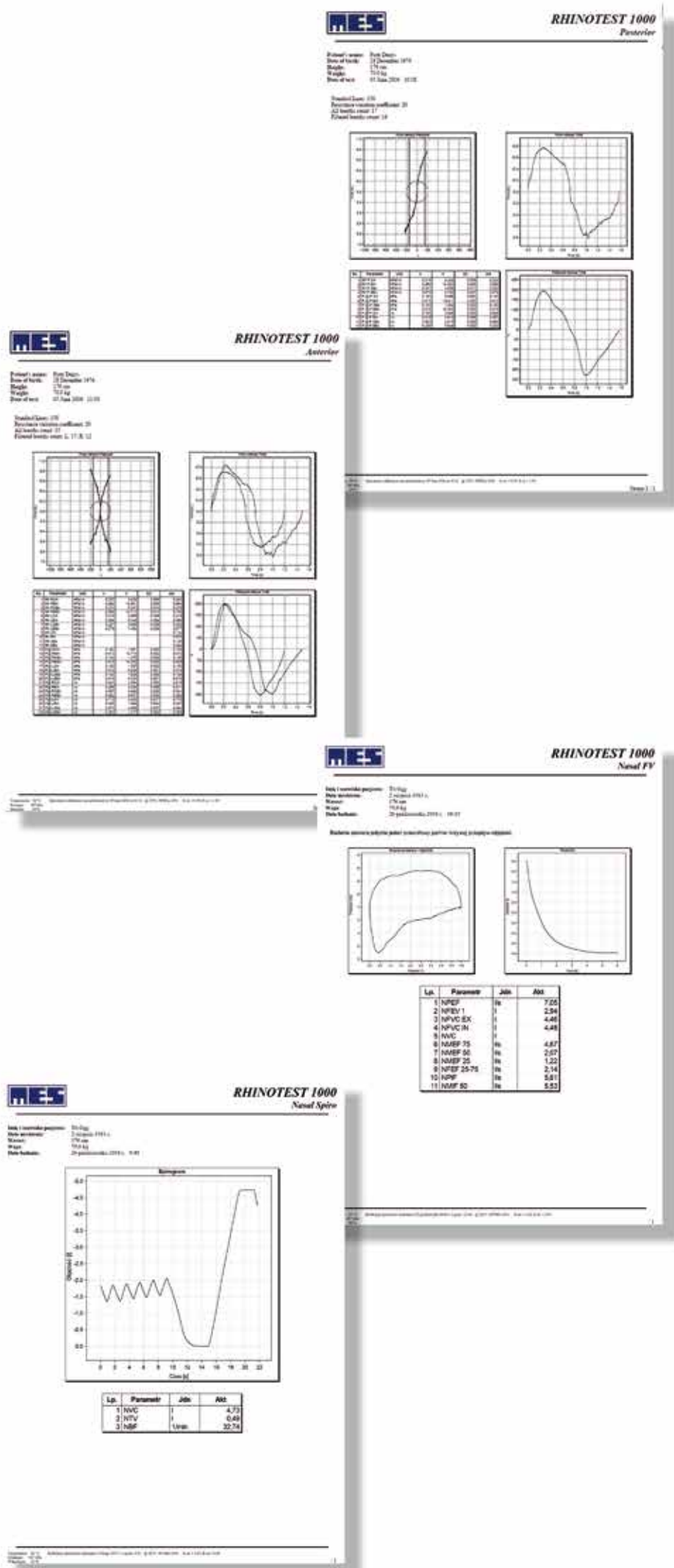
Technical specifications of the Rhinotest 1000 rhinomanometer

Flow rate and volume measurement:

- measuring headpiece	MES DV40
- dead space	38 ml
- flow range	± 20 l/s
- flow resolution	1 ml/s
- flow accuracy	< 2 %
- volume measurement range	0 - ± 10 l
- volume resolution	5 ml
- volume accuracy	< 2 %
- headpiece resistance	< 0,9 cm H2O/l/s (at 14 l/s flow)
	< 0,05 cm H2O/l/s (at 1 l/s flow)

Pressure measurement:

- pressure range	± 1,25 kPa
- pressure resolution	1 Pa
- pressure accuracy	± 1 Pa

General data:

- power supply	230 V ± 10 %, 50/60 Hz
- power intake	30 VA
- dimensions (L x W x H)	259 x 247 x 75 mm
- weight	2 kg

Ambient conditions:

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

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 418819   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