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Duct leakage tester
Operating instructions

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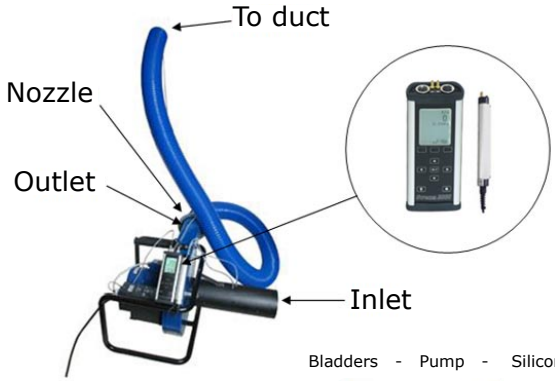
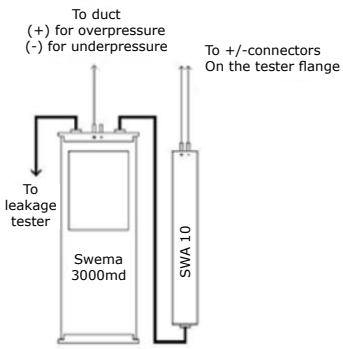
1. Introduction

The universal multifunctional instrument Swema 3000md with the external differential pressure probe SWA 10, controls the leakage tester at selected pressure levels up to 1900Pa. A leakage level / tightness class of the duct can together with the pressure level be chosen in the Swema 3000md. The built-in differential pressure sensor in the Swema 3000md measures the over/under-pressure in the duct and the external differential pressure probe, SWA 10, measures the leakage flow over a throttle device (Flange/Orifice Pipe) with a certain K-factor. The radial fan provides the air flow and pressure.

The supply and the exhaust of the ventilation duct or the two ends of the selected section of the duct must be sealed with tightness bladders.
The duct leakage tester is used according to European standards EN 12237 and EN 1507.

2. Leakage tester and accessories



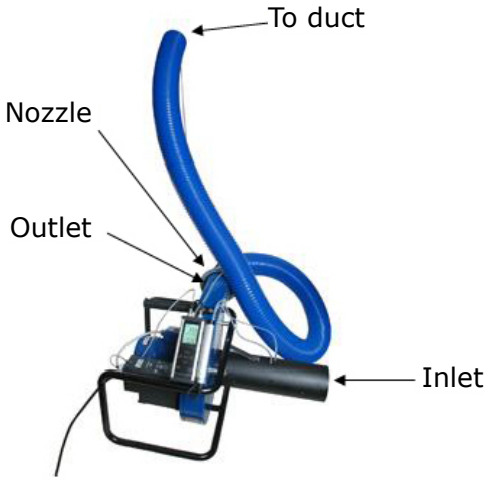


Bladders - Pump - Silicone hose

Part
765902 Duct Leakage tester 22-120 l/s
770960 Orfice plate 1,3-4 l/s
770970 Orfice late 4-33 l/s
764202 Swema 3000md
761430 SWA 10
762470 Silicon hose
766620 Pump, connector for bladders
765080 Ø250 mm bladder
765090 Ø400 mm bladder
765095 Ø500 mm bladder
765100 Ø600 mm bladder
765900 Old leakage tester 22-120 l/s
765901 Old leakage tester 4...30 l/s

3. Measuring overpressure

Connecting the **large hose** for measuring overpressure in ducts.



4. Measuring underpressure

For **underpressure** measurements the nozzle of the large hose is connected to the **inlet** of the leakage tester (the flange/orifice pipe).

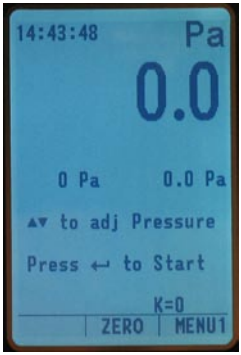
Notes:

1. For the measurements be aware that the right and corresponding k-factor and exponent must be used, (see the label on the Flange/Orifice Pipe or in the calibration certificate). There are two sets of k-factor and exponent for each Flange/Orifice Pipe. One for Overpressure and one for Underpressure.

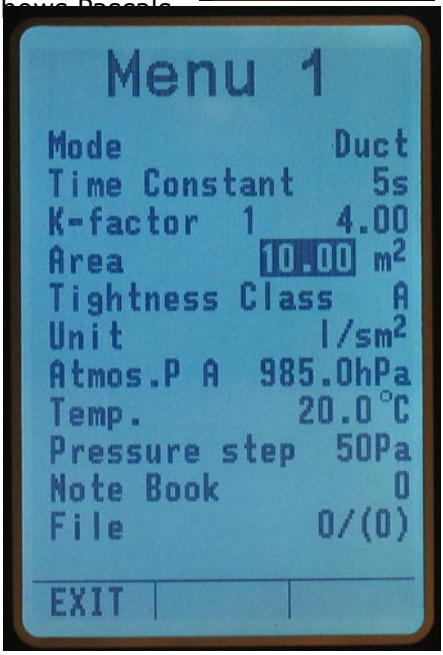
2. The diameter of the Inlet and the Outlet are the same, therefore it is possible to assemble the nozzle of the large hose to both **outlet** and **inlet**.

5. Settings

Connect Swema 3000md to the leakage tester cable (left connector) and connect the external probe Swema SWA 10 to Swema 3000md (right connector). The built-in differential pressure sensor in Swema 3000md measures over or under-pressure in ducts. Connect only one pressure hose (silicone hose) to the positive pressure connector (marked with +) on the top of Swema 3000md and the other end of the hose to the duct. SWA 10 measures the leakage flow. Connect the pressure connectors of the external probe SWA 10 to two pressure hoses (silicon hoses). Connect the other end of the hoses the connectors on each side the flange on the black plasitic pipe. Follow the convention **+ to +** and **- to -**.
Plug the Leakage tester to 230 V and set it on AUTO.



Turn Swema 3000md on. Press "MENU 1".
"**Menu 1**"
Select measuring "**Mode**" Duct
Keep the recommended 5s "**Time constant**"
The displayed value is an average over 5 second.
Set the "**K-factor**" according to flow direction and sticker on flange or calibration certificate. Set the exponent in MENU 2. The ***K-factor and Exponent must both be set*** to get the correct flow reading.
With no K-factor set the instrument shows Pascals.
After turning off and then ON, the instrument will forget the exponent and use 0,5. It has to be set again!
Set the "**Area**" of the duct section .
Set "**Tightness class**" (A, B, C or D).
Select "**Unit**" l/sm^2 or m^3/hm^2 will use the set area to calculate l/sm^2 or m^3/hm^2 to check if the leakage is within selected Class.
"**Atmos. P A**" is the measuered amospheric Pressure.
"**Temp.**" can be set or is measured with a Thermocouple type K.
The barometric pressure and temperature will compensate the flow to real or standard air flow. See Menu 2.
Set the pressure step, "10-500" Pa
It used to step to wanted test pressure level.



"**Menu 2**"

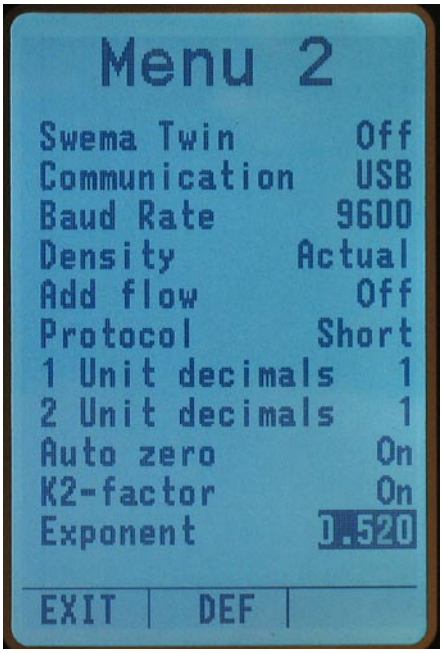
"**Denisty**" Actual will present the flow at the the current density. Standard will convert the flow rate to standard conditions of 1013 hPa and 20 deg C.

"**1 Unit decimal**" can be changed to present the flow with that number of decimals.

"Auto zero" will check the differential pressure zero point of the two sensors and compensate for an eventual off-set when taking a measurement by pressing "Enter".

Set the "**Exponent**" according to flow direction and sticker on flange or calibration certificate. Set the K-factor in MENU 1. The ***K-factor and Exponent must both be set*** to get the correct flow reading. After turning off and then ON, the instrument will forget the exponent and use 0,5. It has to be set again!

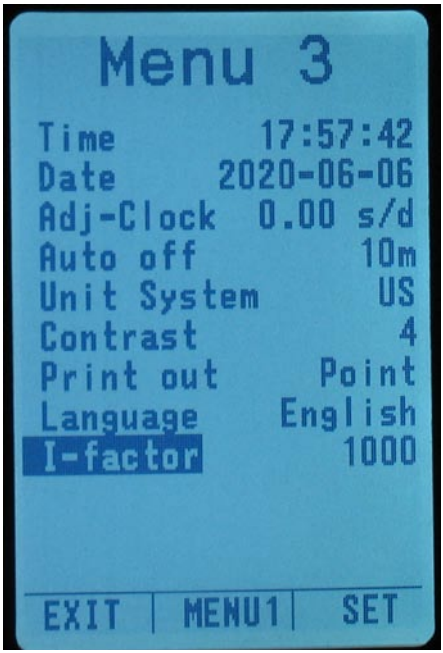
All other settings are not for duct leakage testing.



"**Menu 3**"

"**Unit System**" US will still set surface area in m^2 but the flow in CFM or CFM/ft^2.

"**I-factor**" is an integration factor (for with PID-control) that controls the fan frequency. 1000 is default and controls the fan without oscillation.

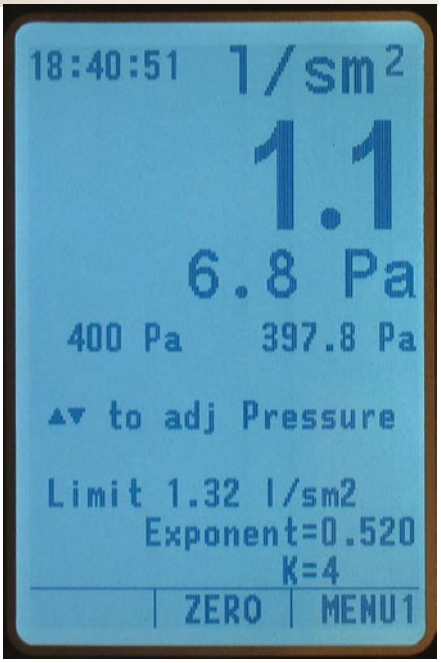


6. Extra Flanges

The leakage tester 765902 has two orfice plates as accessories, part no. 770960 and 770970 that measures in lower ranges. They are equipt with a seal and can be inserted in the measuring pipe. Change the K-factor and exponent in Menu 1 and Menu 2 in Swema 3000md. The flange is inserted in an angle to fit tight inside of the metal pins. Then the flange is leveled so it is clamped inbetween the fixed flange and the screw in pin.

7. Measurement

Press Zero to zero booth sensors. The largest digits at the top show the actual leakage flow, l/s, m^3/h, l/sm^2 or m^3/hm^2 depending on the selected unit. Below the pressure drop measured by SWA 10 over the flange. The small digits below are the set (selected) pressure value to the left and the measured pressure in the test section to the right. Press UP/DOWN to adjust the pressure in the tested duct. Wait until the pressure is stabilized.(right value). Take a measurement by pressing the ENTER button on the instrument. After that a SAVE button is shown. Save the measurment by pressing the Save button.



8. PC-transfer

Open the downloaded program SwemaTerminal 2 (available on Swema's website). SwemaTerminal 2 is a free program that runs on Windows 7, 8 and 10. The program transfers data from Swema 3000md (Note book and Log book) to a PC over an USB-port.

Connect Swema 3000md to the PC over an USB-port with an USB-cable.

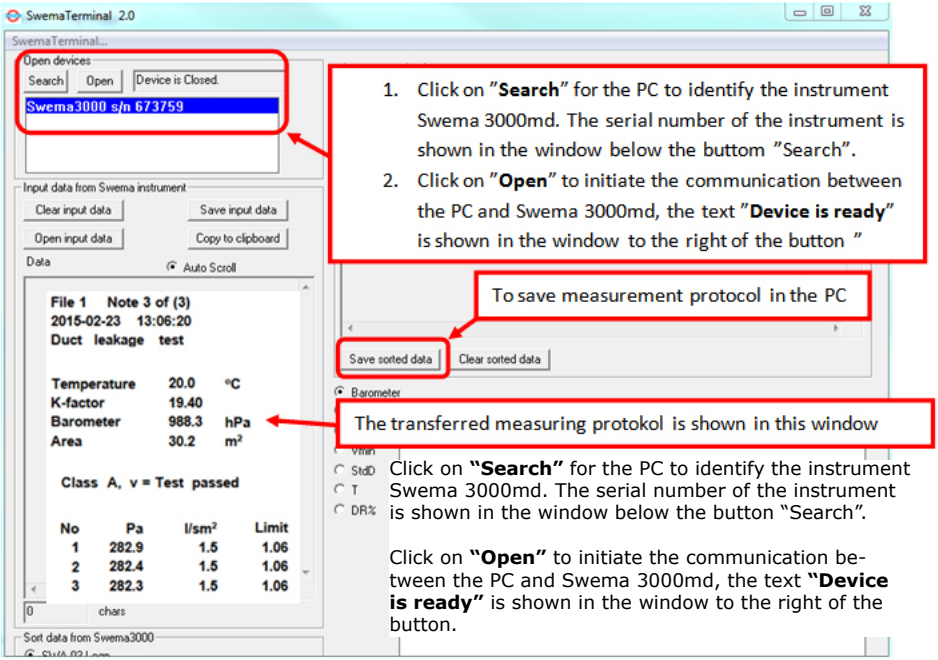
Click on the button "Search" in the program to find the connected Swema 3000md. The instrument serial number is shown once the instrument is found.

Click on the button "Open" to initiate the communication.

In the instrument in MENU 1 choose the saved Note or File to transfer to the program Swema Terminal 2,

Press "Print" on the Swema 3000md instrument and the displayed measurement protocol will be transferred to the program.

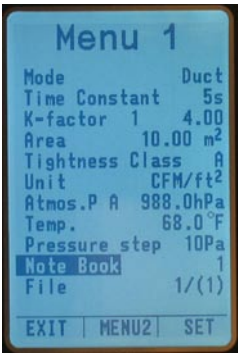
To save the measurement protocol in the PC, click on the button "Save sorted data" in Swema Terminal 2. Select or create a map and give a name to the file.
For more details for choosing a file in Swema 3000md see the Swema 3000 Manual.



Click on **"Search"** for the PC to identify the instrument Swema 3000md. The serial number of the instrument is shown in the window below the button "Search".

Click on **"Open"** to initiate the communication between the PC and Swema 3000md, the text **"Device is ready"** is shown in the window to the right of the button.

Meny 1 with One Note
in One File.



9. Technical data

Max Flow : 122 l/s
Min Flow: 4 l/s

Flow over / under-pressure
Leakage tester with hose Ø100mm:
22...120 l/s at ±400 Pa duct pressure
C-class Duct area 95...800 sqm at 400 Pa
(EN 12237, 1507)
25...103 l/s at +850 Pa duct pressure
Lower duct pressure extends the flow range.

Underpressure	
at -400 Pa	122 l/s

Overpressure	
at 1900 Pa	16 l/s
at 1500 Pa	50 l/s
at 1000 Pa	85 l/s
at 500 Pa	110 l/s
at 400 Pa	114 l/s
at 200 Pa	122 l/s

Measurement
Uncertainty: ±6.5% read value (when used together with Swema 3000md and SWA10)

Uncertainty according to GUM (JCGM 100:2008) using a coverage factor of 2, which for a normal distribution corresponds to a probability of 95%. It is important to correct the measurement values with the corrections stated in the calibration certificate to obtain the above uncertainties. Non condensing, non moist air, <80%RH, non aggressive gases.

Weight: Leakage Tester: 20,3 kg
Orifice Pipe: 0,8 kg
Size: 57x40x48 cm
Hose, diameter: Ø100 mm
Power supply: 200-240 VAC, +/-10%, 50-60 Hz (0.37 kW)