SWEATOR











SIMULATION OF THE THERMOREGULATION AT THE HUMAN-TEXTILE INTERFACE

An optimal balance between heat and humidity is a crucial aspect for comfort around humans. Comfort is a question of perceived heat. A concept which is captured within a microclimate.

At a human-textile interface, this microclimate is a result of the human thermoregulation interacting with the ambient climate. Under standardized conditions it carries a comfort blueprint which allows to differentiate finished textile solutions.

SWEATOR simulates the human thermoregulation process by emitting controlled heat and water vapour. The device has been designed in various shapes to best fit and test the thermo-physiological attributes of a wide range of finished products and textile patterns. Standard conditions enable the microclimate formation at the SWEATOR-textile interface to be a direct consequence of test product performance. SWEATOR offers a professional and quantitatively reproducible way to obtain comfort relevant key indicators of finished textiles.

Please contact us in case of further questions. Prices and delivery times on request.

PRODUCT FEATURES

- Easy handling
- Professional build up of thermo-dynamic key data
- · Controlled heat dissipation water based
- · Highly reproducible "transpiration" process
- Touch screen control unit with wall holder
- Compatible to SWEATLOG technology
- Proven device in several industry segments

FIELDS OF APPLICATION

- Thermo-physiological testing of finished products
- Sleep systems, lying systems
- Apparel, workwear, fashion
- Footwear, compression wear
- Head protection
- Textile patterns

TEST PRINCIPLE

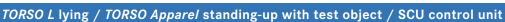
SWEATOR is a gravimetric method to gain microclimate and thermo-dynamic key data of finished textile products or samples. SWEATOR simulates the human thermoregulation at rest. Controlled heat is provided through a body of water and controlled sweat through diffusion processes. Under the standardized conditions the microclimate at the SWEATOR textile interface can be directly linked to textile performance attributes and comfort trends.

SWEATOR TORSO



SWEATOR TORSO has been designed to simulate human heat dissipation and sweat emission within sleep and lying systems as well as apparel (stand-up version). It offers two independent heat and sweat zones to either simulate the front or back of a human torso or both sides parallel.







Shapes:	TORSO S: SWEATOR TORSO with one heat and sweat zone, second side blinded, with SCU control unit and a set of 4 standard sensors for T/RH measure		
	TORSO L: Like TORSO S with two heat and sweat zones.		
	TORSO Apparel	Like L as stand-up version with filling level cylinders and shoulder piece (non-permeable).	
Data output:	T (°C), RH (%), AH (g/kg), HI (°C) = perceived T, time, as well as Q (W/m 2), R (m 2 K/W; m 2 Pa/W), and MVTR (g/m 2 /h) under standardized conditions.		
Data storage and evaluation:	Data on SD-card (TXT). We offer custom made evaluation files based on MS Excel.		
T/RH tracking:	4 SWEATLOG BodyView sensors included. Additional sensors or sensor arrays on request (SWEATLOG).		

SPECIAL FIELDS OF APPLICATION

- Sleep system testing mattresses, toppers, duvets
- Complex medical bed products with active or passive heat-humidity features.
- Apparel testing with stand-up apparel kit
- Compatible to SWEATLOG measurement devices (see SWEATLOG factsheet).
- SWEATLOG SleepView supported measurements allow the visualisation of various microclimate layers.

SWEATOR HEAD



SWEATOR HEAD has been designed to simulate the human heat dissipation and sweat emission into finished head protection devices.

A standard head form with perforation may carry virtually any helmet, hat, cap, bump cap, baclava, and more.









SWEATOR HEAD with and without test object / SCU control unit

TECHNICAL DATA

Shapes:	SWEATOR HEAD DIN EN 960:2006, size 585 shaped head with perforation.		
Data output:	T (°C), RH (%), AH (g/kg), HI (°C) = perceived T, time, as well as Q (W/m²), R (m^2K/W ; m^2Pa/W), and MVTR ($g/m^2/h$) under standardized conditions.		
Data storage and evaluation:	Data on SD-card (TXT). We offer custom made evaluation files based on MS Excel.		
Data visualisation:	In combination with SWEATLOG HeadView the microclimate between HEAD and test product can be visualized with the provided software.		
T/RH tracking:	4 SWEATLOG BodyView sensors included. Additional sensors or sensor arrays on request (e.g. HeadView).		

SPECIAL FIELDS OF APPLICATION

- Head protection devices of all kinds.
- · Workwear, fashion, military, air force

SWEATOR FOOT





SWEATOR FOOT with and without test object / SCU control unit

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Shapes:	SWEATOR FOOT Foot, standardized, size EU 42, removable toe section		
Data output:	T (°C), RH (%), AH (g/kg), HI (°C) = perceived T, time, as well as Q (W/m 2), R (m 2 K/W; m 2 Pa/W), and MVTR (g/m 2 /h) under standardized conditions.		
Data storage and evaluation:	Data on SD-card (TXT). We offer custom made evaluation files based on MS Excel.		
T/RH tracking:	4 SWEATLOG BodyView sensors included.		

SPECIAL FIELDS OF APPLICATION

Microclimate tracking in footwear of all kinds.

SWEATOR SKIN



SWEATOR SKIN has been designed to simulate the human heat dissipation and sweat emission into textile patterns. The SKIN is the only SWEATOR version with a direct membrane-textile interface serving as the heat and sweat zone. It may be used to provide controlled heat and humidity into textile patterns, pillows, seats, and other devices.



TECHNICAL DATA

Shapes:	SWEATOR SKIN regular	Box shape with "sweat"-lid (exchangeable)		
	SWEATOR-SKIN lab	Like regular with mounted constant ventilation to obtain even higher reproduction (controlled convection).		
Data output:	T (°C), RH (%), AH (g/kg), HI (°C) = perceived T, time, as well as Q (W/m²), R (m^2 K/W; m^2 Pa/W), and MVTR (g/ m^2 /h) under standardized conditions.			
Data storage and evaluation:	Data on SD-card (TXT). We offer custom made evaluation files based on MS Excel.			
T/RH tracking:	4 SWEATLOG BodyView sens	sors included.		

SPECIAL FIELDS OF APPLICATION

- · Identification of the thermo-dynamic attributes of textile patterns
- Controlled heat and humidity input into devices such as seats, wheelchairs, office furniture (upside down operation possible)
- Compatible to SWEATLOG BodyView

SWEATOR



GENERAL TECHNICAL OVERVIEW

SWEATOR TORSO

Dimensions: LxWxH 85 x 50 x 35 cm (including handrails)

Heat-sweat: water based controlled at 37°C (arbitrary)
Water diffusion: membrane bag perforated hard shell (non-metal)

Sweat rate: p-dependent (Pa) at 37°C water T and 21°C/50 % RH approx. 90 g/m²/h - 120 g/m²/h

Sweat area: 60 x 40 cm 0,24 m² (one side) Weight: empty approx. 10 kg

filled approx. 15 kg (one side) – 20 kg (both sides)

SWEATOR HEAD

Dimensions: L x W x H 32 x 20 x 20 cm, head size 58

Heat-sweat: water based controlled at 37°C (arbitrary)

Water diffusion: membrane bag perforated hard shell (non-metal)

Sweat rate: p-dependent (Pa) at 37°C water T and 21°C/50 % RH approx. 90 g/m²/h - 120 g/m²/h

Sweat area: one side approx. 0,062 m²
Weight: empty approx. 2 kg
filled approx. 4,5 kg

SWEATOR FOOT

Dimensions: Foot form (boot) EU 42, removable toe section
Heat-sweat: water based controlled at 37°C (arbitrary)
Water diffusion: membrane bag perforated hard shell (non-metal)

Sweat rate: p-dependent (Pa) at 37°C water T and 21°C/50 % RH approx. 90 g/m²/h - 120 g/m²/h

Sweat area: one side approx. 0,057 m²
Weight: empty approx. 1 kg
filled approx. 2,5 kg

SWEATOR SKIN

Dimensions: L x W x H $30 \times 25 \times 10$ cm, box style Heat-sweat: water based controlled at 37° C (arbitrary)

Water diffusion: water tank membrane shielded sweat field (non-metal)

Sweat rate: p-dependent (Pa) at 37°C water T and 21°C/50 % RH approx. 200 g/m²/h – 360 g/m²/h

Sweat area: $14,5 \times 19,5 \text{ cm}$ approx. $0,028 \text{ m}^2$ Weight: empty approx. 2 kg filled approx. 4,5 kg

SCU CONTROL UNIT

Input: touch screen various levels and input options
Heat control: PT1000 controller 37°C core water T advised

active time tracking sec

Water control: pump unit even allocation of warmed water

Energy input: 0 - 100 % equal to $0 - \approx 100 W$ Test phases: three setup, pre-test, test

Test phases: three setup, pre-test, test phases
Weight loss: optional digital scale may be integrated (A scale is not part of the delivery.

Please ask for options in case of interest.)

SWEATOR



EVALUATION EXAMPLESQuantitative *SWEATOR* based test data

Comfort relevant microclimate result between SWEATOR (representing a human) and comparable test duvets. Heat Index = concept of "perceived" heat.



Technical thermo-dynamic indicators of the above duvets after 120 test minutes.

Thermo-dynamic results SWEATOR test (here: 120 min)					
Key indicators	Description	CA	СВ	CC	
MVTR (g/m²/h)	Moisture vapor transmission rate per hour	95,77	64,52	79,64	
Q total (W)	Total energy consumption	26,36	19,68	21,52	
Q et (W)	Evaporative energy release	15,96	10,75	13,27	
Q ct (W)	Conductive energy release	10,40	8,92	8,25	
R et (m²Pa/W)	Resistance against evaporative transfer	33,31	61,46	42,84	
R ct (m ² K/W)	Resistance against conductive transfer	0,19	0,29	0,29	

