

The thermal conductivity analyser **HLC T310** for the production-area and stock-receipt measures thermal conductivity and thermal resistance of 300*300mm platform insulation materials.

Like all **HLC**-devices this stand-alone unit has to be connected on a standard 230Vac-socket only and needs no water-connection and stands out for easy handling also.

Prepared for the optional full automatic robot sample handling-system **RSH3** analyser variant **HLC T310e** has an electrical door and a sample remover. In front under 3 Status-LED's there is an additional yellow illuminated pushbutton "**door**" to open and close door manually.



According standards

EN12667:2001
EN1946-3:1999
ISO8301

the instrument measures the thermal transfer properties under steady-state conditions of
| 300*300mm platform insulation materials
| with a thickness of 15...100mm

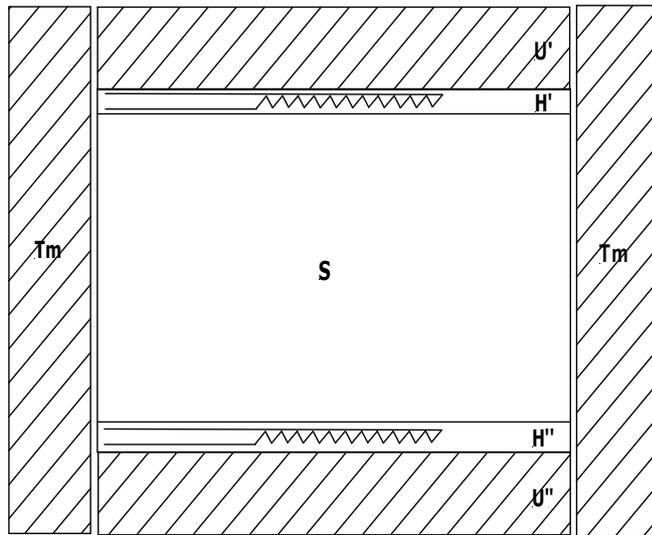
in meas-ranges of ...

| thermal resistance R up to 20m²*K/W
| transfer factor τ resp. thermal conductivity λ 5...200mW/(m*K)

By electromotoric positioning

- not only soft insulation materials with automatic distance-positioning
 - but also compact foam materials by using the pressure-position-mode on 225N
- can be analyzed under exact repeatability conditions.

The relative meas method was realized with two sensitive heat flow sensors (symmetrical configuration) for a mean temperature of 10°C. With a non metering edge-area of each 75mm heat losses to the outer edges are minimized. To be independent of ambient temperature, the measurement chamber is installed into an own temperature system which is separate regulated on the selected mean temperature. Experimental investigations confirm that with a temperature relationship of $e=(T_m-U'')/(U'-U'')=0,5$ up to 100mm thickness a thermal loss to the outer edges was not measureable.



Symmetrical configuration

- H'' heat plate U'' cool plate
- H', H''' heat flow meter
- S sample
- T_m controlled mean temperature

Construction

The heat and cool copper plate is exactly temperatured with a PI-regulated peltier-element on 2°C resp. 18°C. The peltier-units of both secondary sides are against-temperatured with a powerful liquid circulation.

On both plate surfaces are sensitive heat flow sensors adapted..

Through a servo-electronic the lower cool-plate with inserted sample is driven against upper heat-plate. Fixed in the center of the springy cool-plate a linear-measurement-system for automatic thickness registration is installed, a pressure switch under cool plate limits the servo-controlled pressure at 225N.

An independent **HLC T310**-electronic with power supplies for the temperatures control systems and sensor signal read-out is integrated. On a connected PC or Laptop *WINDOWS*-software **WinHLT#** calculates in Online-mode all meas values, which will be displayed in tables and graphic diagrams on desktop.

Features

With the Lambda-range until 200mW/(m*K) all conventional insulation materials are measurable, also plates with metallic cover. In consequence of the thermal hemispherical emittance > 0,8 this analyser is for low density materials especialy qualified.

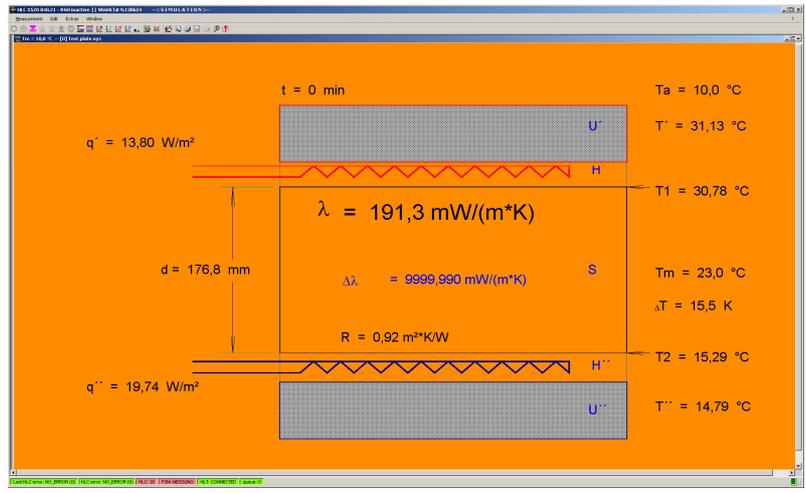
Calibration of the relative measurement is factory-set with several calibration-samples determined per **ISO8302**. With own calibration material, the user can always rapidly and simply test the adjustment.

The instrument needs no special requirements and can be used continuously. When a several day stop occurs, a Standby-mode with switched-off power-consumption can be selected.

WINDOWS-Software WinHLT#

With **HLC T310** supplied WINDOWS-software **WinHLT#** runs under **MS-WINDOWS XP / WINDOWS7**. It records, calculates and archives meas data.

Testreport according EN12667:2001 section 9	
a) Test determination:	Determination with heat flow meter methods
b) Kind of apparatus:	Single-specimen symmetrical configuration
c) Identification of apparatus:	HESTO-Lambda Control A206 - SN: 619
d) Specimen standard:	HESTO
e) Specimen no.:	0
f) Name and partment identification of specimen:	XP02030.6
g) Description of specimen:	Conformity of specimen:
h) Preparation according standard:	
i) Specimen thickness:	0,0505 m - automatic measured
j) Preparation according standard:	
k) Density of prepared specimen:	
l) Weight change of mass during pre-treatment:	
m) Weight change of mass during measurement:	
n) Middle temperature difference between specimen surface:	16,16 K
o) Middle-Temp.:	23,00 °C
p) Density:	(15,84 + 15,88) / 2 = 15,86 W/m²
q) Thermal Resistance:	1,02 m²K/W
r) Thermal Conductivity:	0,0486 W/(m*K) [$\lambda = 9999,990$ W/(m*K)]
s) Date of test end:	12.16 / 02.09.2013
t) Duration of test:	230 min
u) Date of last sensor calibration:	-no calibration data-
v) Calibration Spec.:	Thermal Resistance
w) -no calibration data-	Date of certificate
x) Certificate Inset:	cert. number
y) Orientation of the apparatus:	horizontal, warmside up
z) Water/steam-resistant cover:	
aa) Meas graphic:	
ab) Meas deviation:	2,8 % = $\sqrt{2 \cdot 10^{-4} + 2 \cdot 10^{-4}}$
ac) Conformity:	This test conforms to EN12667:2001 "Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods - Products of high and medium thermal resistance"
ad) Name of operator:	HESTO



With end of measurement the program automatically prints the test report, which is an important request of **EN12667:2001**; additional test declarations for this report will be insert in remanent text-fields. **WinHLT#** stores all these data as a data-set in a table-file on the hard-disc also. The automatic run will be moderate with meas-menus and grafic diagrams, variable keys leading errorfree to several menus for different modes and parameters. All modes keep stored after meantime analyser or PC power-off also (means an interrupted measurement in this case will continue automatically).

So with unchanged meas-mode normal operation is restricted with inserting sample material into the measurement chamber and pushing the start-key.

WinHLT# includes several language-variants: actual german, english, french, spanish, italian and polish.

Prinzip and method of operation

After the specimen is insert and "start"-button was pushed the measurement chamber will be closed by electromotoric positioning while a linear-measurement-system (solution 0,05mm) automatically registrade the thickness. On the upper specimen surface a copper-plate is exactly temperatured on 18,0°C with a PI-regulated Peltier-element. An equal unit temperatures the lower specimen surface on exact 2,0°C. Two sensitive heat flow sensors are integrated on both plate surfaces.

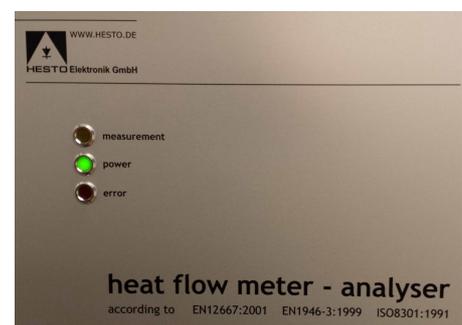
HLC T310 transfers the meas-values to the PC. With the adjust-parameters (stored on hard-disc) **WinHLT#** calculates as follows:

Sign	Size	Unit
R	thermal resistance	m²*K/W
λ	thermal conductivity	W/(m*K)
A	sensitive area	m²
d	average thickness	m
T₁	temperature hot side	K
T₂	temperature cold side	K
Φ	heat flow rate	W

$$R = \frac{A * (T_1 - T_2)}{\phi}$$

$$\lambda = \frac{\phi * d}{A * (T_1 - T_2)}$$

The necessary physical thermal balance (means steady-state condition) is ready, if both heat flux sensors deliver stable and similar signals. This status is indicated on the desktop and with a blinking LED "measurement" on **HLC T310** front. If operator finish measurement via select in menu now, chamber opens electromotorically and moves out specimen. **WinHLT#** print out the test report (as pdf and/or on a connected printer) and stores final meas data as a data-set on hard-disc.



3 year guarantee and manufatoreer direct-service

The instrument needs no special requirements and is designed for continuous operation time. Produced in Germany near Frankfurt/Main, the reliability and durability is protected with a **3-year guarantee**. In service-case the manufatoreer helps fast and direct.

Inspection and Cleaning Service

Quality assurance according to **EN ISO9000 ff.** is standard in the insulation industry. The accordance standard prescribes as an elemental condition a cyclic check with certification of the test equipments. Accomplish to this demand we offer for **HLC T310** a low-price and fast inspection/cleaning service inclusive acceptance-protocol with meas date, results and links to used reference materials.

Optional automatic Sample-Handling-System RSH3

With the automatism specimen-handler option **RSH3** the analyser variant **HLC T310e** becomes a fully automatic meas-system. An industrial robot picks measured plates out of meas-chamber and puts it on a storage-stack, thereafter he gets next to be measured plate from a pick-up-stack and brings it into analyser. So one after another could be measured without any manual intervention stacked specimens between 15...100mm thickness in size 300*300mm. Specimens with Barcode on an adhesive label will be identified with a included reader-unit and last meas-data together with barcode-number and -text will automatically stored on end of measurement as a data-set in a file on disc.

General Specifications HLC T310 HLC T310e

Construction accord. ISO8301	Single-specimen symmetrical configuration, heat flow meter on heat- and cold-plate each
Specimen thickness	15 to 100mm (according to EN1946-3:1999)
automat. Meassystem	incremental Linear-Measurement; Display Solution 0,1mm
Specimen size, weight	300*300 mm, max. 1,75kg
Case sensitive area	each 150mm
Width of non metering area	each 75mm
Measurement-Range	λ (τ) 5...200mW/(m*K) R up to 20m ² *K/W
Accuracy	< \pm 3%
Repeatability	< \pm 1%
Mean temperature	10°C , \pm 0,5°C
Temperature hot plate	18,0°C < \pm 0,01°C
Temperature cool plate	2,0°C < \pm 0,01°C
Temperature measchamber	10°C < \pm 0,2°C, regulated with independent, internal cooling-system
Ambient temperature	15°C...32°C
Positioning	electromotoric, distance selectable from 15,0 to 100,0mm; selectable pressure positioning with 225N
Meas time	about 20 minutes for 20mm thickness;for thicker material up to several hours until steady-state condition
Warmup time	about 120 minutes after power-on
PC-Interface	USB2.0
Power Requirements	230V/50Hz 3000W; about 100W in Standby-Mode
Instrument size	650*1520*800mm (W*H*D)
Noise	about 60dB with separte cooling unit
Instrument Weight	about 250kg
Delivery scope	analyser HLC T310 with power- and pc-interface-cable, a XPS/EPS test sample for cyclic check of analyser ("Internal control"), pc-software WinHLT# (pc is not part of standard delivery)