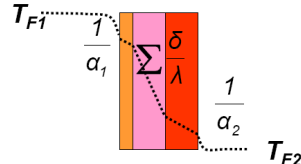


UNIVERZITET CRNE GORE  
 MAŠINSKI FAKULTET  
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Mjerenja:  $U$  – vrijednost zida (koeficijent prolaza toplote)  
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Izvod iz teorije

Koeficijent **prolaza** toplote  $U$  [ $W/m^2K$ ] ili  $k$  [ $W/m^2K$ ]



$$Q[W] = Aq$$

$$q = \frac{\Delta T}{R_q} = U(k)\Delta T \Rightarrow R_q = 1/U(k)$$

$$R_q = \frac{1}{\alpha_1} + \sum \frac{\delta}{\lambda} + \frac{1}{\alpha_2} = \frac{1}{U}$$

$$U \left[ \frac{W}{m^2K} \right] = \frac{1}{\frac{1}{\alpha_1} + \sum \frac{\delta}{\lambda} + \frac{1}{\alpha_2}} \quad 32$$

**Princip rada aparata Testo 635:**



- Na unutrašnju površinu zida zalijepe se 3 termopara, na rastojanju od  $\sim 10\text{cm}$
- Sa spoljašnje strane zida, postavi se bežična sonda spoljašnje temperature. Ili se može koristiti dodatni termopar, koji se priključuje u odgovarajući džek u aparatu. Sonda se uključi.
- Korisnik unosi (procijenjenu) vrijednost koeficijenta prelaza toplote sa unutrašnje strane:  $\alpha$  ili  $h \sim 7.69$  [ $W/m^2 K$ ] (u mirnom vazduhu)
- Pročita se  $U$ -vrijednost. Poželjna je razlika temperatura od bar  $15^\circ C$ . Ako se mjeri  $U$ -zida, neophodno je snimanje u dužem periodu vremena (i preko noći), kako bi se otklonili nestacionarni efekti provođenja toplote kroz zid. Ovaj uticaj je zanemarljiv kod prozora. Snimljene veličine mogu da se unesu u računar preko USB kabla.
- Relevantne relacije pomoću kojih aparat sračunava  $U$  su:

$$\left. \begin{aligned} q &= \alpha_U \cdot (T_{F1} - T_W) \quad (1) \\ q &= U \cdot (T_{F1} - T_{F2}) \quad (2) \end{aligned} \right\} (*)$$

gdje su:  $T_{F1}, T_W, T_{F2}$  temperature sobnog vazduha, unutrašnje površine zida i spoljašnja temperatura vazduha. Iz sistema (\*) aparat određuje  $U$ :

$$U = \frac{q}{T_{F1} - T_{F2}} \quad [W/m^2 K]$$

**Napomena:** Relacija (2) važi za stacionarne uslove prolaza toplote. Zbog efekta akumulacije kod zidova, neophodno je vršiti snimanje.



- ① Infrared, USB interface
- ② Display (light can be activated)
- ③ Control buttons
- ④ Rear: Battery and radio module compartment, holding magnets



Strong magnets

**Damage to other instruments!**

➤ Keep a safe distance from products which could be damaged by magnetism (e.g. monitors, computers, pacemakers, credit cards).

- ⑤ Probe socket(s)

#### Button functions

Button	Functions
	Function button (3x): The function depends on the button assignment at the time
	Change display of the 1 <sup>st</sup> reading line In configuration mode: Increase value, select option
	Change display of the 2 <sup>nd</sup> reading line In configuration mode: Decrease value, select option
	Print data 635-1 only: If the Cyclical Printing function is activated, the programmed measuring program is started.
	Switch instrument on, switch display light on/off; switch instrument off (press and hold)

#### Function buttons (Function dependant on profile and setting)

Button	Functions
	Open (main) menu
	Enter confirmation
	Cancel
	Hold value/display current measurement value
	Reset max./min. values to current measurement value
	Open menu item "Multi-point mean calculation"
	Open menu item "Measuring program" (635-2only)
	Start test series (635-2 only)
	End test series (635-2 only), End Cyclical Print (635-1 only)
	Save values (635-2 only)
	Open menu item "Material"
	Open menu item "Radio"

#### Important displays

Display	Meaning
	Battery capacity (only for operation by battery/rechargeable battery): - 4 segments in the battery symbol are lit: Instrument battery is fully charged - No segments in the battery symbol are lit: Instrument battery is almost spent
	Print function: Data are sent to the printer
	Measurement channel no.: Channel 1, channel 2. If a measurement channel is a radio channel, the radio symbol lights up as well as the measurement channel no.