

# Introduction to thermostats technology

Average electrical life of a thermostat switch rated 15A250V, 300.000 cycles



Average approximate values for a snap action mechanism with silver contacts.

Characteristic points:

- A: Zone of mechanical break of the contact blade by metal fatigue
- B: Contacts fast melting zone due to combination of inductive current, high voltage and high intensity
- C: Zone of contacts rapid deterioration due to huge arcs
- D: Zone of contact damage due to heating of the contact blade by the Joule effect and the loss of its elastic characteristics, combined with the electrical arcs

## 2.3.3 AC AND DC

In the alternative current, the voltage crosses zero in each cycle, causing the arc extinction.

In DC circuits the contact does not pass a zero voltage.

So, the arc will extinguish only when the contacts gap becomes large enough to break the arc (a phenomenon used in arc welding equipment).

In thermostats the contact gap is generally low, from 0.3 to 0.5 mm.

In voltages higher than 48VDC, this contact gap is insufficient to extinguish the arc, which continues through the electrical conductivity of the ionized air caused by the passage of current.

Contacts wearing is then extremely fast, and contacts can melt or weld in a few cycles, because the unidirectional flow of current causes a transfer of metal between the contacts

Any application requiring the use of a thermostat in a DC circuit above 48V should be studied carefully, in collaboration with the supplier of the thermostat, so that reliable technical solutions (increased contact gap, magnetic blow of the arc or other contact protection) can be implemented.

### DC Indicative breaking capacities reduction on snap action silver contacts, with the same lifetime, in resistive circuit

Current	0.2 mm contact gap	0.25 mm contact gap	0.5 mm contact gap
AC, 250V	15	15	15
DC, 8V	15	15	15
DC, 30V	2	2	6
DC, 120V	0.4	0.4	0.5
DC, 230V	0.2	0.2	0.25

