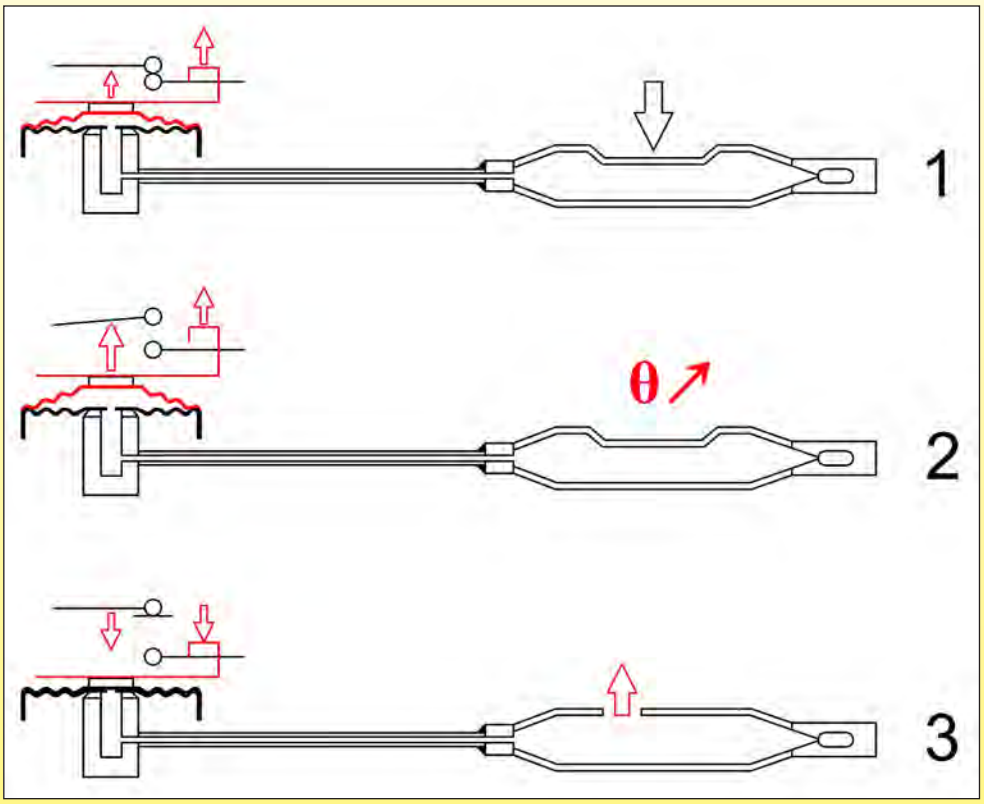
Diastat Standard Operation:
Position1: a standard diastat is shown in the starting position, at room temperature.
In position 2: the temperature of the sensor has reached the set point, and the inflation of the bellows caused the opening of the contact, stopping heating.
In position 3: the bulb (or capillary) leaks, the bellows deflates, the electrical contact closes, and the heating is switched on again. But no further expansion is transmitted to the bellows, and nothing can stop nor regulate heating. This is the dangerous situation that failsafe systems must obviate.
Positive safety is primarily used on manual reset thermostat, installed after a standard temperature control unit.
There are two fail safe systems with a different mode of operation, each system having its own advantages and disadvantages.

Liquid expansion type failsafe systems



In these systems, after sealing the diastat at ambient temperature, a small bump is made on the bulb, causing an artificial inflation of the bellows (1). It is also possible to produce the same function by sealing the diastat at a negative temperature (-20, -30 ° C). By these ways the bellows continues to contract at temperatures below room temperature.
When the temperature on the bulb increases (2), the movable part of the electrical contact is actuated by the bellows. When the bulb or the capillary is leaking (3) the bellows is deflated under the thickness it has at ambient temperature, and an auxiliary mechanism (in red) displaces the fixed part of electrical contact out of reach of the movable part, thereby opening the contact.
This positive safety system allows easy adjustment of the thermostats trigger temperature, because the mechanism is similar to an adjustable thermostat, and calibration can therefore cover the entire temperature range of these adjustable thermostats.
However, it has two issues:
• The artificial increase of the bellows significantly increases the volume of liquid inside thereof, and thus increases its sensitivity to the ambient temperature on the thermostat head.

Examples of calibration point drift on a manual reset thermostat with 1.5 m capillary, calibrated at 90 ° C

Type of mechanism	Set point drift with head temperature at 0°C	Set point drift with head temperature at 50°C
With fail safe	90+8,1	90-9.5
Without fail safe	90+5,5	90-6,5

• When the ambient temperature falls under the freezing point, the bellows continues to contract, and can unexpectedly actuate the safety.
This type of false tripping is supervised by the EN60730 standard, which sets the minimum ambient temperature without triggering at -15 ° C.
However, when using these thermostats in areas with ambient temperature lower than this limit, it is necessary to warm up the thermostat bulb around 20 ° C to reset the safety when it has triggered.