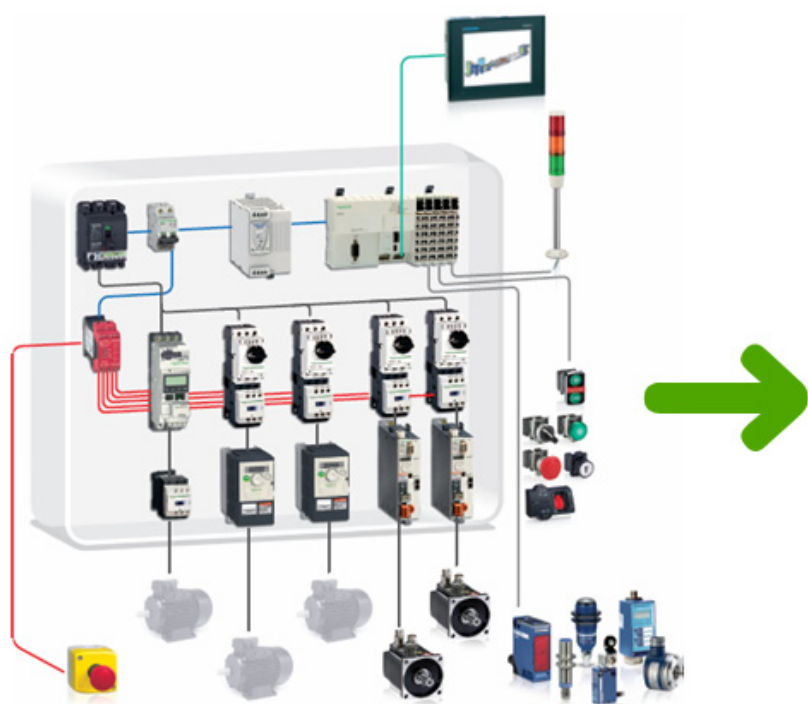


Panel Builders

Every day... more and more sensitive equipment are installed



... and the right protection is needed



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Clean environments

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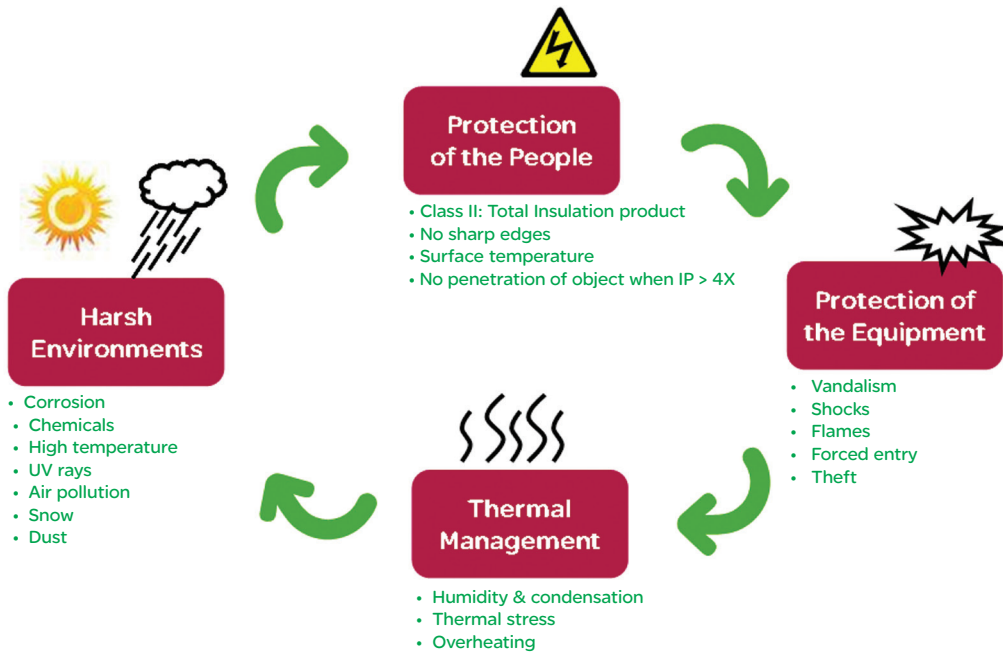
Polluted environments

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Most Common Constraints



Plastic or metal?



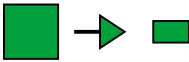
Universal Enclosures Offer

	SPACIAL RANGE		THALASSA RANGE		OTHER	
Wall-Mounting	IP66 SPACIAL CRN	IP66 SPACIAL S3X & Stainless Steel offer	IP66 THALASSA PLM (GRP or FRP)	IP66 Wall-Mounting ATEX Range		
Floor-Standing	IP55 SPACIAL SF (Suitable cabinet)	IP55 SPACIAL SM (Mono bloc cabinet)	IP44-65 THALASSA PLA (GRP or FRP)			
Industrial Boxes & Thermal Control	CLIMASYS RANGE		IP65 THALASSA TBS-TBP	IP20 FS & WM VDI OFFER		
	AIRING & VENTILATION	HEATING & CONTROL	IP66 THALASSA PLS			

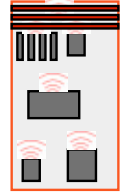


What is Thermal Management?

Most important factors that make thermal management increasingly more necessary

- > Technological evolution of electrical and electronic equipment
- > Miniaturisation of components 
- > New products based on power electronics
Trend towards the optimisation of space in enclosures
- > More extreme/severe climatic environments
where the most advanced technology is installed

Temp. 



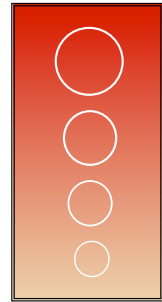
They oblige us to talk about THERMAL PROTECTION in electrical enclosures.

Why is it necessary to control the temperature/humidity?

In enclosures where no thermal management system has been applied:

- > The temperature inside the enclosure is always higher than the outside.
- > The inside temperature (T_i) of the enclosure is not even.
The top areas will always be hotter than the bottom ones.
- > The walls and roof of the enclosure will always be at an intermediate temperature between the inside temperature and the outside temperature (T_e).
- > The roof of the enclosure will be at a higher temperature than that of the vertical walls.

T_e

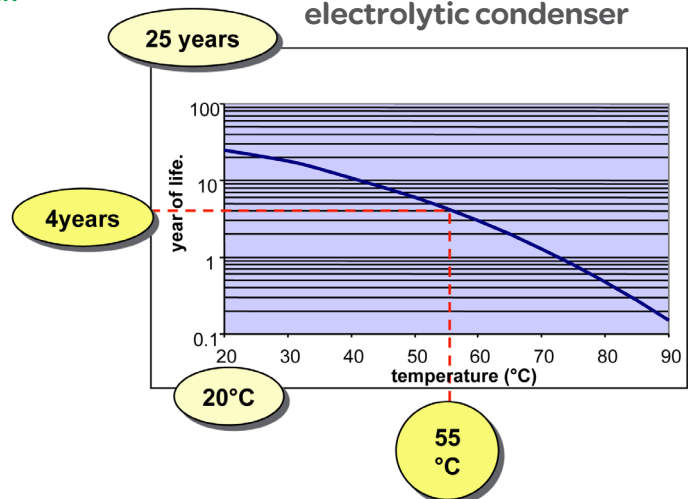


$$T_e < T_1 < T_2 < T_3$$

Risks linked to lack of Thermal Management

- The service life of the electrical and electronic components depends on the operating temperature (inside temperature of the enclosure).

Service life of an electrolytic condenser





2 The most sensitive equipment in the enclosure are those related to electronics.

Maximum temperatures recommended for industrial control components:

- > Speed adjusters 35°C
- > Programmable automata 35°C
- > Contactors 45°C
- > Magnetothermal switches 45°C
- > Fuses 50°C
- > Power supply sources 35°C
- > Electronic charts 30°
- > Electrical batteries (storage) 20°C–25°C
- > Telecommunications equipment 40-50°C
- > PFC Condensers 50°C
- > Circuit breakers if temp > 50°C we must declassify
- > Power electronics: high heat dissipation

35°C

Ideal temp. inside the enclosure → most critical component

Thermal offer



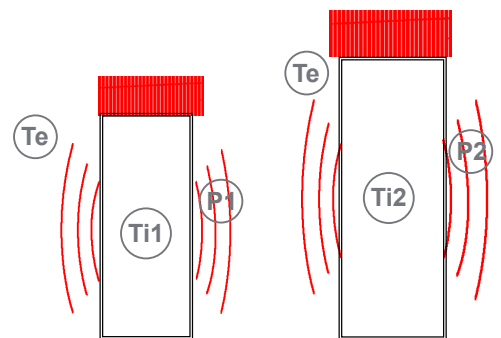
> ClimaSys offer comprising of 5 different functions:

- Airing
- Ventilation
- Heating
- Control
- Cooling

Natural dissipation

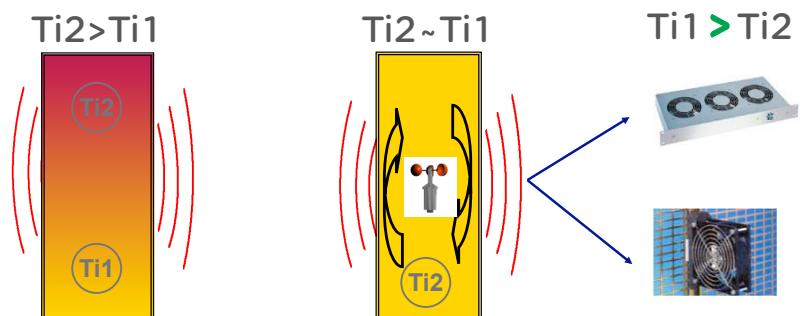
- > Uses the **enclosure** as an exchanger
- > Increases the size of the enclosure to **reduce** the inside temperature

$T_{i1} > T_{i2}$
 $P1 < P2$
 $T_e = T_e$
 P: dissipated power



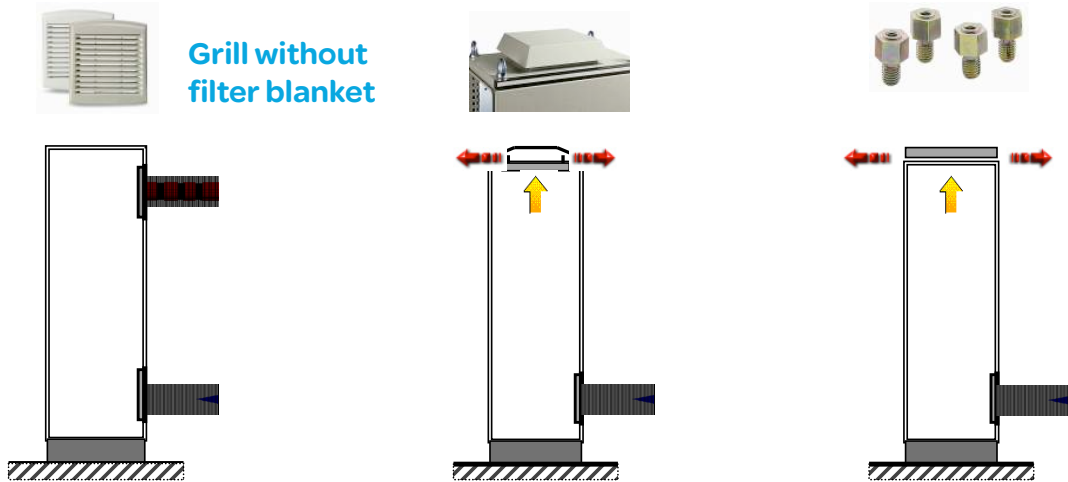
Moving the air

- > Generates constant, strong **turbulence** inside the enclosure



Airing

> Uses **natural** convection



Ventilation: Filterfans

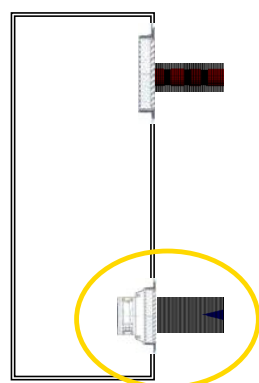
> Renews the air inside the enclosure with **cold air** from outside, with the right flow rate to guarantee a **correct DT** (Ti-Te 5°C)

> Maintains the necessary **IP** in each case.

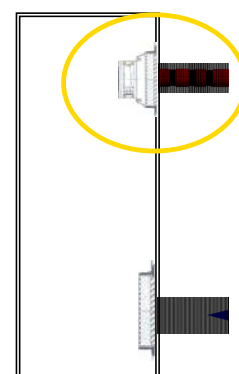


What Ventilating system would you choose? A or B?

> Option A



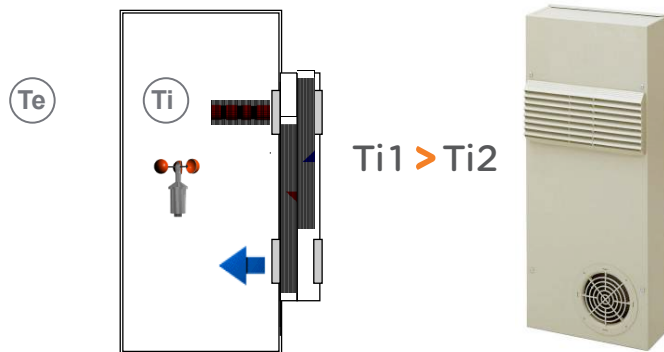
> Option B





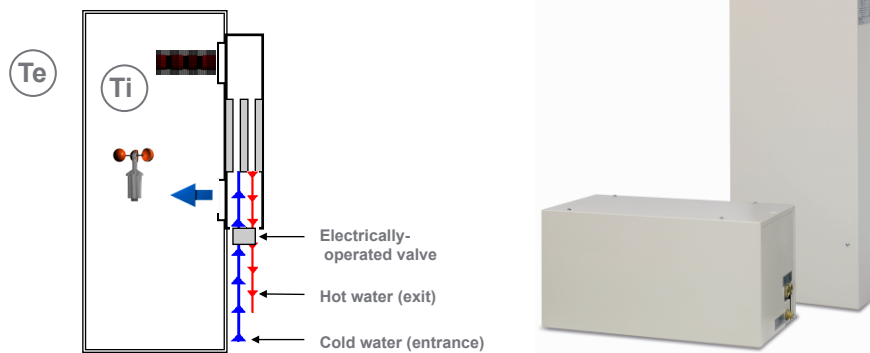
Dissipation: Air/air exchangers

- > They allow **heat to be exchanged** between separate atmospheres through an aluminium exchange battery.



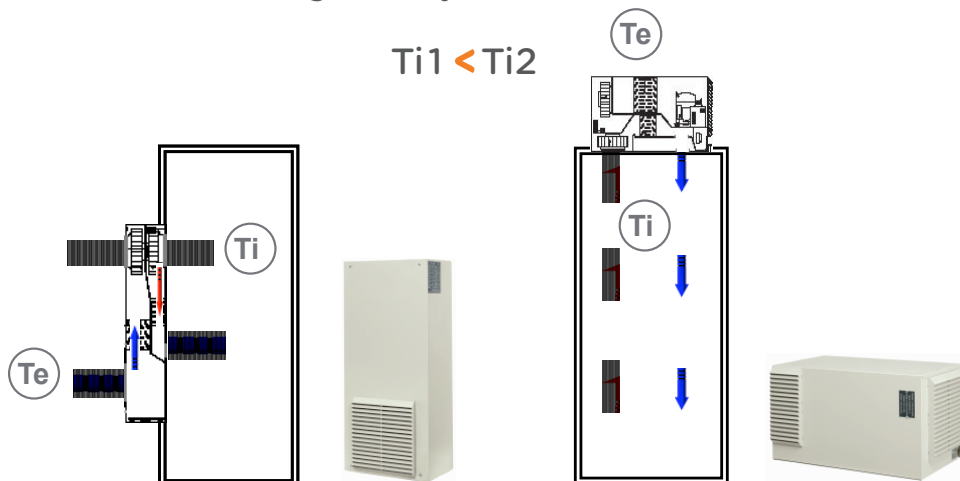
Cooling: Air/water exchangers

- > This is the only system that **does not** use external air for cooling
- > It offers the best guarantee of **IP** resistance



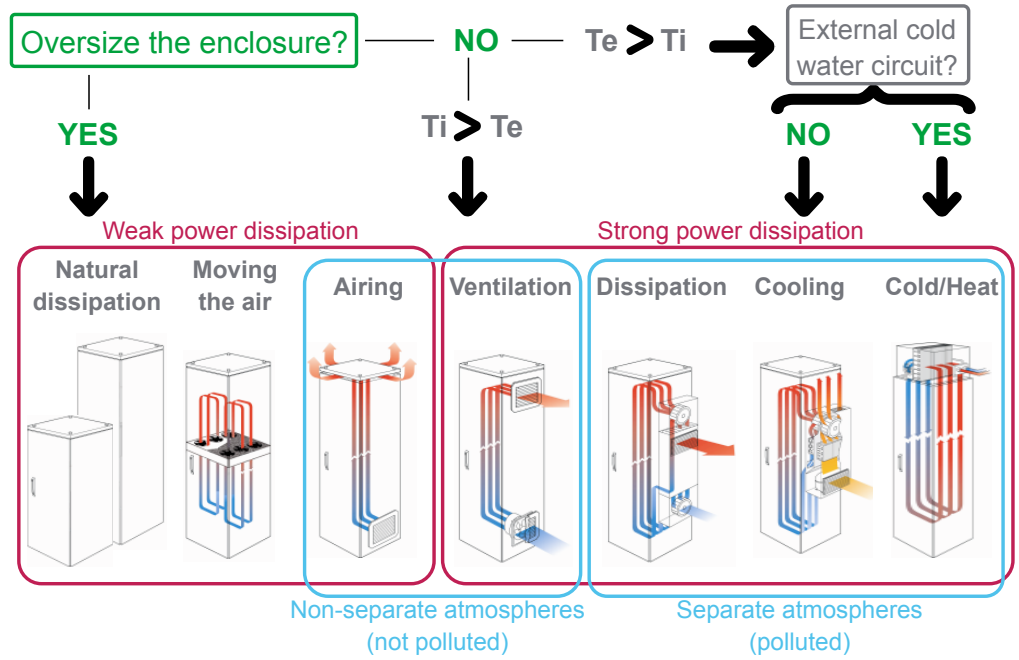
Cooling/Heating: Air-conditioning units

- > They allow **heat to be exchanged** between separate atmospheres through an aluminium exchange battery.

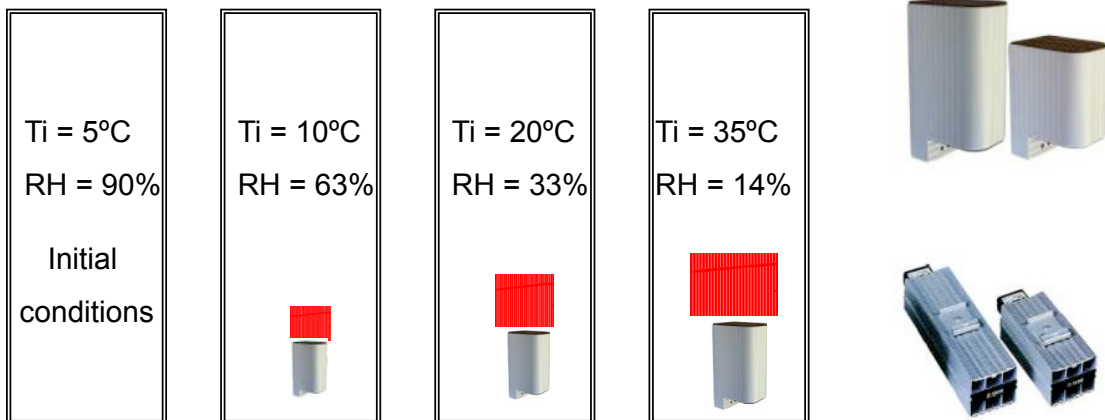




Solutions



Humidity: heating



Thermal Guidelines

> T_i Vs T_o

- $T_i < T_o$ → We cannot use the air from outside
 - Want board (95-100°F) → Outside 115°F
 - C/U, A/W exchangers
- $T_i > T_o$ → We can use the air outside
 - Fans, C/U, Exchangers...

> Air pollution

- Air is clean → We can use the air outside
 - Any
- Air is dirty (oil, saw dust, etc...) → We cannot use the air outside
 - C/U, Exchangers, **oversize**

> Condensation

- Heaters
- Cooling Units

Thermal study: determine the thermal solution

> Variables to be taken into account

- **The enclosure**
 - Type of material
 - Degree of IP
 - Dimensions
 - Physical location of the enclosure
 - Position of the equipment in the enclosure
 - **Environmental conditions**
 - Temp., humidity and at. pressure
 - Pollution, chemical contamination, extreme conditions
 - **Power dissipated by each component**
 - **Temp. required in the enclosure**
- They are necessary variables for producing a good thermal calculation!!!**



Thermal calculation: PROCLIMA V5.0 Software

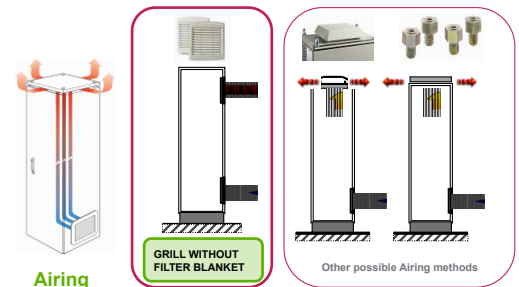
AIRING: The use of natural convection

> Specially recommended for installations in which:

- Weak power dissipation is needed
- The ambient temperature is lower than the desired temperature inside the enclosure
- The surrounding environment is relatively clean, allowing air to enter the enclosure.



- > Standard Color: Ral 7035
- > UL Certified



NATURAL VENTILATION

The use of natural ventilation has advantages as no energy consumption.

The airing function uses natural ventilation as the source for energy exchange. It is very important for the air to have low or very low dust content. In this case, it is advisable to remove the outlet filter from the outlet grill to allow a greater flow through it. The hot air will exit the cabinet naturally by the top, but this solution is only valid for weak power dissipation.

> Specially recommended for installations in which:

- The ambient temperature is lower than the desired temperature inside the enclosure.
- A high protection rating is required: IP54 or IP55.
- The surrounding environment is relatively clean, allowing air to enter the enclosure.

- > Standard Color: Ral 7035
- > UL Certified

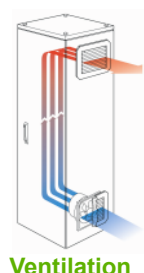
Cut-out dimensions	Air-flow (M ³)	Voltage	Reference
125 x 125	85 m ³ /h	230V	NSYCVF85M230PF
		115V	NSYCVF85M115PF
223 x 223	165 m ³ /h	230V	NSYCVF165M230PF
		115V	NSYCVF165M115PF
	302 m ³ /h	230V	NSYCVF300M230PF
		115V	NSYCVF300M115PF
291 x 291	562 m ³ /h	230V	NSYCVF560M230PF
		115V	NSYCVF560M115PF

FORCED VENTILATION

The use of forced ventilation has many advantages:

- 1- The value for money is very good.
- 2- It helps to "pressurize" the enclosure (because the output runs towards the inside of the enclosure). It should normally be installed at the bottom of the enclosure. At the top there will be an outlet grill to facilitate the release of hot air.

The range is UL-certified.
The difference between outside and inside temperature should be at least 5°C for optimal effectiveness.



Ventilation



HEATING: Resistors / Heaters

To prevent condensation inside the enclosure.

- > Aluminum resistances without forced ventilation
- > **Aluminum profile changes**
 - Same heat dissipation with a different design
 - Same fast connections by clip
- > **Powers P (W):** Selected powers of 20W, 55W & 100W
- > **Voltages: 110-250 AC**
- > **References:**
 - NSYCR20WU2 Resist.heaterAlum 20W, 110-250V**
 - NSYCR55WU2 Resist.heaterAlum 55W, 110-250V**
 - NSYCR100WU2 Resist.heaterAlum 100W 110-250V**

AVOID CONDENSATION

One way to reduce the humidity inside the cabinet is to install heating elements inside it.

A similar application, by way of an example, is the anti-fog heating system used in car windscreens.

When the temperature inside the watertight enclosure is modified (IP54 or more), the relative humidity is modified and the amount of water vapour in suspension is maintained.

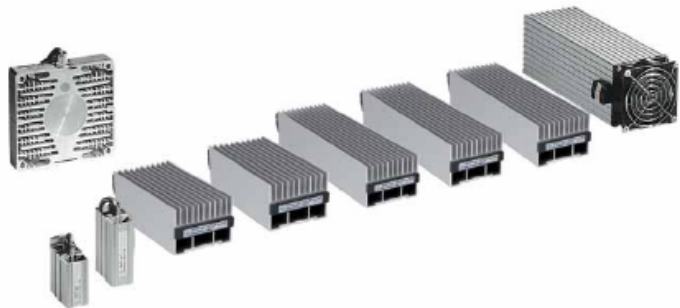
When temperature decreases we have the risk to reach the "Dew point" and have condensation. By increasing temperature with a heater we decrease the RH ratio preventing the humidity in the air to turn into a liquid state and cause problems in our equipment.

↑

VOLTAGE

In the complete offer we have 3 possible voltages to choose:

- U1: 12-24 DC
- U2: 110-220 AC
- U3: 270-420 AC



CONTROL: Thermostats

- > **Adjustable thermostats**
- > **UL Certification**

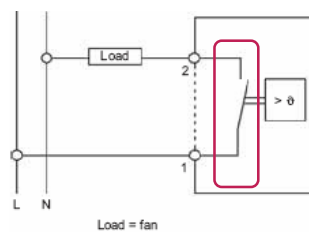
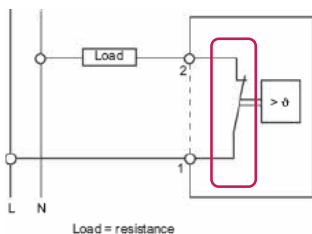
Bimetal Thermostat with NC contact

Controls the **stopping of a resistance** heater when temperature exceeds the displayed maximum value.

- Temperature adjustment range: 0... +60°C
- Operating temperature: -20... +80°C
- IP20
- Ref: **NSYCCOTHC**

Controls the **starting up of a fan** when temperature exceeds the displayed maximum value.

- Temperature adjustment range: 0... +60°C
- Operating temperature: -20... +80°C
- IP20
- Ref: **NSYCCOTHO**



4 QUICK FIXING WAYS

1) On 35mm DIN Rail



2) On Spacial Upright



3) On cross-rail



4) Mounting plate



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