

**PRACTICAL
KNOWLEDGE GUIDE**

Electrical? Compact? Peltier?



**SEMICON-
DUCTOR
DEHUMIDIFIERS**

**FACTS
VERSUS FICTION**

Category

- Household & Living
- > Air conditioners
- > Dehumidifiers

Selection

- Fraudster
- Cheater
- Swindler
- Lies
- Deception
- Fake
- Fudge
- Rubbish



MUMBO-JUMBO Mini construction dryer against humidity in the kitchen, bedroom, caravan and garage – for rooms up to 150 sq. ft.

☆☆☆☆☆

47.99 €

Delivery until next week



BALDERDASH 1 litre dehumidifier against humidity. For wardrobe, bathroom, bedroom, office, garage

☆☆☆☆☆

57.44 €

Delivery until next week



NONSENSE Electric ambient dehumidifier, very low power consumption, highly efficient with a supply area of up to 25 square metres.

☆☆☆☆☆

44.33 €

Delivery until next week



HOOEY 500 ml dehumidifier against moisture, dirt and mould in the house, garage or caravan

☆☆☆☆☆

39.99 €

Delivery until next week

THE PELTIER PHENOMENON – FACTS VERSUS FICTION

WHAT CAN SEMICONDUCTOR DEHUMIDIFIERS ACHIEVE – AND WHAT’S NOT POSSIBLE?

When looking for a suitable dehumidifier nowadays, one encounters more and more Peltier devices, also called semiconductor, electric or mini dehumidifiers.

As illustrated in our cartoon of a fictitious online shop, you might indeed quickly get the impression from looking through many supplier descriptions that these semiconductor dehumidifiers are veritable marvels that make the use of compressor devices completely obsolete in many areas.

At first sight, the little ones seem to be better at everything – but a closer look reveals that it’s more illusion than reality and that many myths entwine around the Peltier devices.

With this guide, we would like to provide serious facts about the praised Peltier products so that you can inform yourself objectively before making a purchase and avoid unnecessary bad purchases.

MYTH 1

“Semiconductor dehumidifiers can achieve the same things as compressor devices”

Dehumidifiers with compressor technology and Peltier technology indeed have one thing in common. Both are condensation dehumidifiers which means they generate cold air so that the air can condense as water in the cooling section and can be collected in the collection container.

In principle, compressor devices work like your refrigerator at home - both devices are equipped with similar components. And semiconductor dehumidifiers work like a camping cooler - Peltier semiconductor elements are used in electric dehumidifiers and camping coolers.

But not a single manufacturer of household appliances in the world includes Peltier elements in its refrigerators, however, compressor technology is used.

Why? For a good reason: The performance of the Peltier technology is simply not sufficient for the intended use.



The same applies to semiconductor dehumidifiers. Semiconductor dehumidifiers are advertised in some online offers with exaggerated application possibilities that almost border on fraud, but which the technology cannot achieve. Neither can you replace your fridge with a travel cooler.

MYTH 2

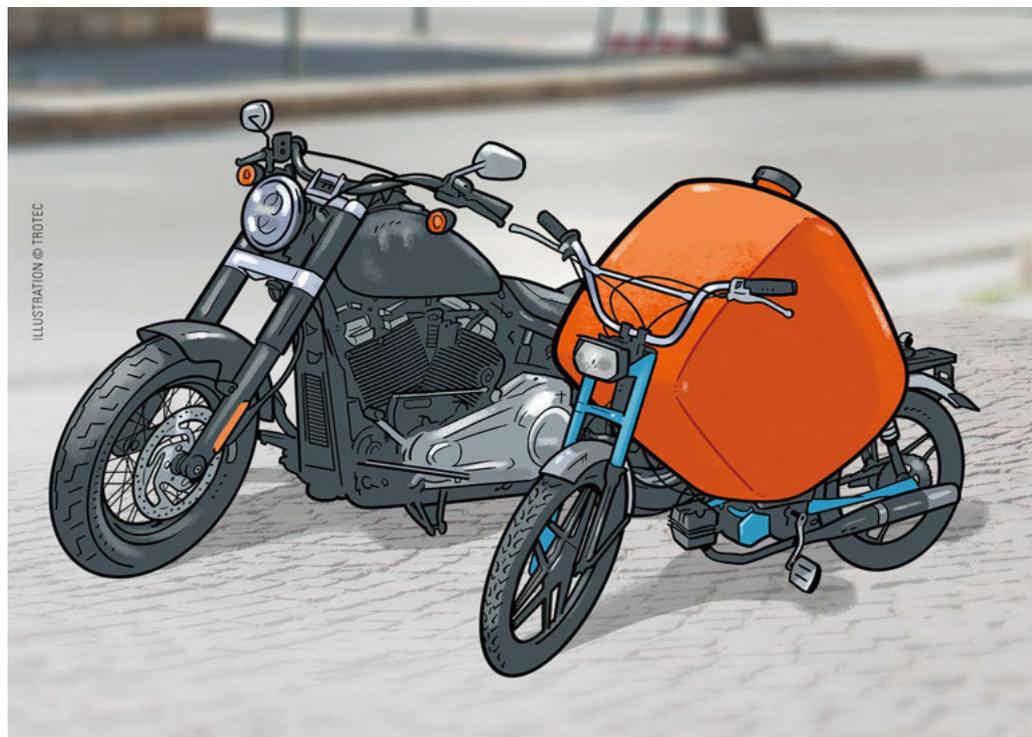
“Dehumidifiers with a capacity of one or two litres or more are also available as inexpensive Peltier devices”

600 ml device, 1,000 ml dehumidifier and more, the internet is full of such offers. At first glance, this seems to be the daily output of the dehumidification capacity. But if you look closely, you will quickly notice that these specifications for semiconductor dehumidifiers usually only indicate the **size of the water tank**.

But a larger tank does not necessarily mean greater performance!

If your car was equipped with a tank twice as large, the motor would still have the same power, wouldn't it?

When choosing a dehumidifier, don't be fooled by the number of litres specified in the title, but pay attention to the given dehumidification capacity. The dehumidification capacity is often less than half the tank volume.



MYTH 3

“Semiconductor dehumidifiers are highly efficient and consume very little power”

When reading the technical data of Peltier dehumidifiers, the power consumption immediately catches the eye.

Only 40, 30 or even 20 watts per hour, that is much more energy-saving than the consumption of compressor devices that start at 200 watts per hour.

Sounds too good to be true, and is therefore only half the truth. It is not the hourly consumption that is important, but only the active power. Casually speaking: “How much power do you have to put in to get out what you want?”

Everything suddenly looks quite different. To condense one litre of water from the air, an average Peltier dehumidifier usually needs approx. 2,400 watts of electricity! However, a compact compressor device only needs about 500 watts for 1 litre.

The semiconductor dehumidifier therefore requires almost five times more power for providing the same dehumidification performance!¹ This is not highly efficient and energy-saving, is it?



¹ Basis of calculation: Typical Peltier dehumidifier with a power consumption of 30 W/h and a dehumidification capacity of 300 ml/24 h (at 30 °C/80 % RH). To sum up, this device requires 80 hours and 2,400 watts of electricity (80 x 30) to condense one litre of water from the air. Typical compressor dehumidifier with a power consumption of 290 W/h and a dehumidification capacity of 14 l/24 h (at 30 °C/80 % RH). To sum up, this device requires 1.7 hours and 493 watts of electricity (1.7 x 290) to condense one litre of water from the air. ² Basis of calculation: Purchase price of 40 euros of a typical Peltier dehumidifier with 300 ml/24 h dehumidification capacity, purchase price of 120 euros of a typical compressor dehumidifier with 14 litres/24 h dehumidification capacity. Results in the following acquisition costs per litre of dehumidification capacity: Peltier: 133 euros (40 ÷ 0.3), compressor dehumidifier: 8.57 euros (120 ÷ 14).

MYTH 4

“Semiconductor dehumidifiers cost much less than compressor devices”

Admittedly, when looking just at the purchase price in isolation, the Peltier dehumidifier does indeed come off well.

While such devices are already available for around € 40, you’d have to invest a minimum of € 120 for small compressor devices.

However, you should bear in mind the following: When viewed in isolation, a bicycle is also significantly cheaper than a car. They are both means of transport, aren’t they? And Peltier and compressor devices are both dehumidifiers, right?

This comparison is only solid when the purchase costs per litre of dehumidification capacity are considered.

A Peltier dehumidifier often costs a whopping € 130 and more per litre, while you can normally get compressor devices for only € 8 per litre.²



The acquisition costs per litre of dehumidification capacity for the semiconductor dehumidifier are therefore easily 16 times higher than for the compressor device! Almost 20 times more money for the same water - this is not quite that cheap, is it?

MYTH 5

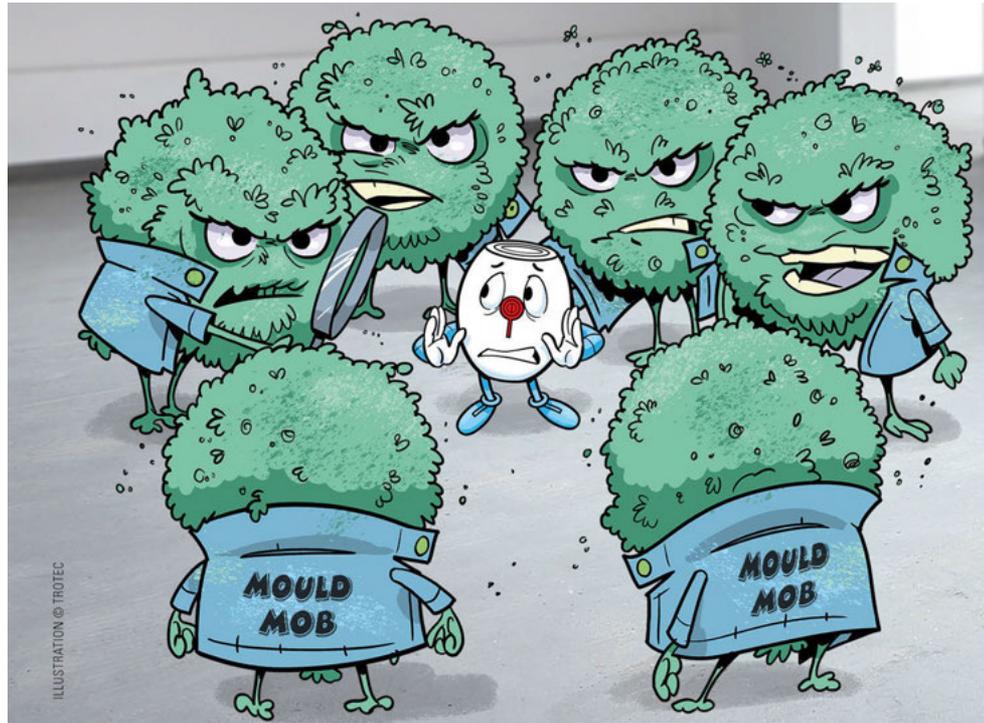
“For small rooms, a semiconductor dehumidifier is also sufficient, for example, just to prevent mould growth”

In order for the room air to reach a state of well-being without the risk of mould formation, the relative humidity should be around 50 % RH. Even in a very small room with a floor space of only 10 m², more than 600 ml of water must be dehumidified from the air every day and under the best conditions - new building, good insulation - to create such a climate. In old buildings, you would need to dehumidify more than 1,000 ml.³

However, in the best case, a Peltier dehumidifier achieves a performance of around 300 ml per day under “test conditions” at 30 °C/80 % RH. In the real environment in practice, it is more likely to be only 100 ml, i.e. considerably less. With this extremely low dehumidification performance, semiconductor dehumidifiers are nowhere near enough suitable for such applications.

Thus, what we didn’t include in our calculation are the effects on the humidity level caused by the presence of people or houseplants. Both people and houseplants introduce additional humidity into the room

which would also have to be dehumidified. In this case, the dehumidifier would have to achieve a dehumidification performance of around 1,680 ml per day³ - which is almost six times more than the capacity of a Peltier dehumidifier! **Only a compressor device is suitable for permanently lowering the room humidity, even in very small rooms.**



³ Basis of calculation: The moisture load depends on the respective ambient climate. If the relative humidity level of the outdoor climate is 70 % and the temperature is at 20 °C, 12.1 ml of water is bound in each cubic metre. At 50 % RH, these are 8.6 ml. The difference must be dehumidified, i.e. 3.5 ml. Since the humid air cannot penetrate unhindered from outside (insulation, closed doors/windows), an infiltration factor is taken into account, which is 0.3 for good building insulations, i.e. 3.5 ml x 0.3 = 1.05 ml/h. With a ceiling height of 2.5 m and an area of 10 m², 630 ml must be dehumidified on a daily basis (1.05 x 10 x 2.5 x 24). In old buildings (infiltration factor 0.5) this would be 1,050 ml per day. Inhabited rooms with one person plus 1,000 ml moisture load/24 h, for each potted plant an additional 48 ml/24 h.

MYTH 6

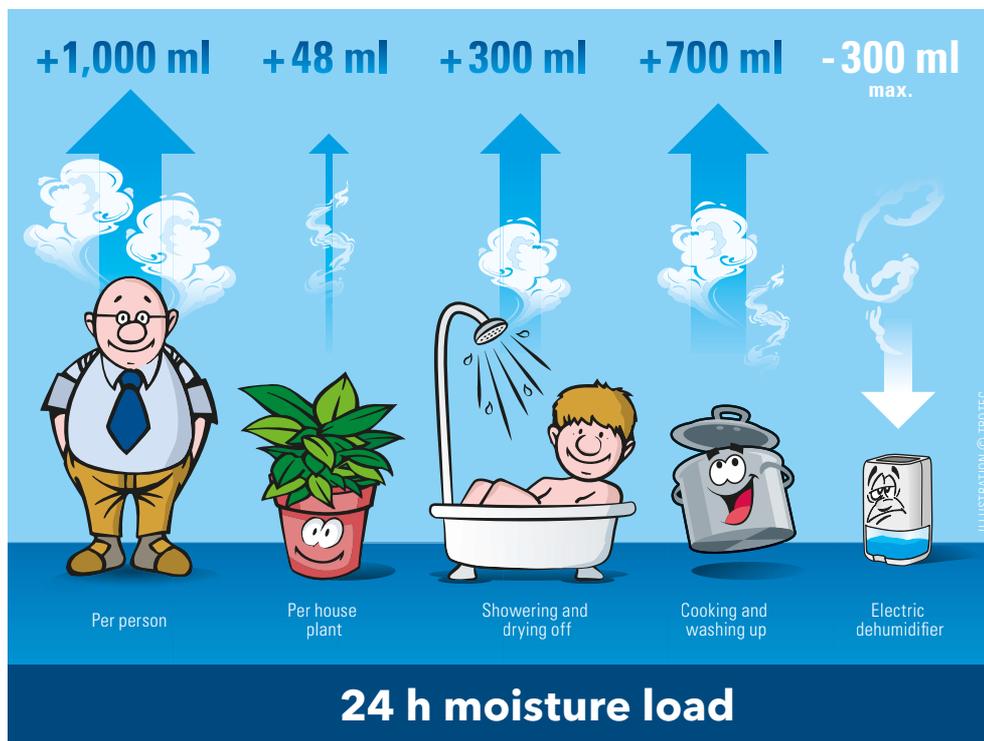
“The compact electric dehumidifiers can be flexibly placed in living rooms, bedrooms, kitchens or bathrooms to keep the room air dry”

Depending on the type of use, additional humidity is introduced into your rooms every day. More humid outdoor air also mixes with the indoor air if it is drier. The expert speaks of internal and external moisture load.

Each person introduces almost 1,000 ml of additional moisture into the room air through their presence alone (skin evaporation, breathing) and each potted plant increases the amount with another 48 ml. Cooking and washing up add 700 ml, showering 300 ml - this applies to every single person respectively.

A dehumidifier actually has to “process” these additional moisture loads at first in order to merely be able to maintain the actual condition.

However, an electric dehumidifier with Peltier technology only achieves to remove around 300 ml of moisture from the air per day, in the best case!



With these numerical values, you can easily work out for yourself that semiconductor dehumidifiers are absolutely unsuitable for kitchens, bathrooms and the like. Only a compressor device of the required performance class can be used for keeping rooms dry in an effective way.

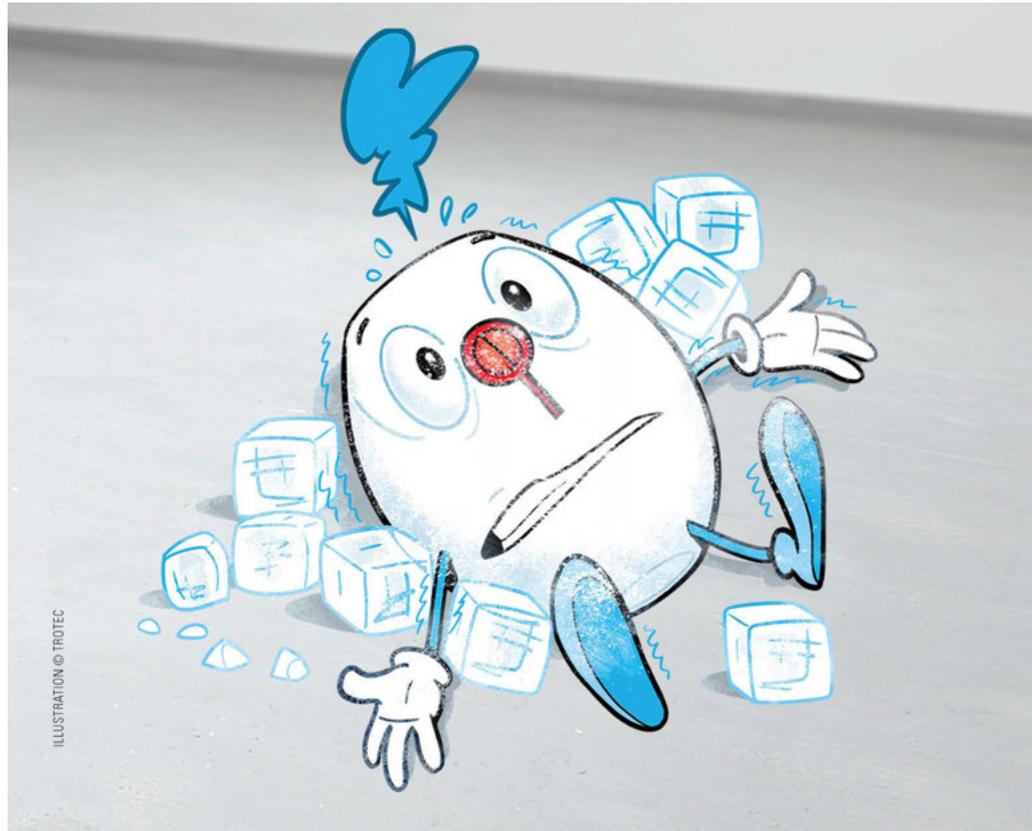
MYTH 7

“A small electric dehumidifier is sufficient for my basement or garage”

As a matter of course, an electric dehumidifier can be set up anywhere for decoration purposes, but not for dehumidification. Since the cooling element ices up in unheated and cool rooms, dehumidification by condensation is physically no longer possible.

Incidentally, this also applies to compressor devices with air circulation defrosting, such as those offered for heated living spaces. Even in heated living spaces, the evaporator also ices up at low room temperatures and can no longer be defrosted by air recirculation alone.

For permanently dehumidifying unheated rooms with room temperatures below 15 °C, only compressor devices with hot gas defrosting should be used.



MYTH 8

“If one electric dehumidifier is not enough, I’ll simply use several. It’s still cheaper than compressor devices!”

Peltier technology is not scalable - in purely physical terms, it is therefore practically impossible to dehumidify more than 450 ml of water from the air with a semiconductor dehumidifier within 24 hours.

And such best values can only be achieved at 30 °C room temperature and 80 % relative humidity, i.e. under laboratory conditions!

Even at 20 °C room temperature and 70 % humidity, the capacity of the devices is already less than 50 % of the stated maximum output.

As a matter of course, several devices could be used together if the demand is higher but that would be neither cheap nor energy-efficient. Converted to one litre of dehumidification capacity, the acquisition costs of a semiconductor dehumidifier are around 130 euros and the device consumes a whopping 2.2 kW of power for each litre to be dehumidified. Besides, 9 litres of dehumidification capacity would require a whole 32 Peltier devices.

In addition, dozens of installed electric dehumidifiers don’t necessarily enhance the aesthetics of your rooms and regularly emptying 32 tanks is also quite labour-intensive, isn’t it?



Compressor technology, on the other hand, is scalable; there is a suitable device for every power requirement.

“What’s in is what’s on”

Unfortunately, there is little to be gained from semiconductor dehumidifiers, even if there are lots of nice-sounding words given in the description.

“Room dehumidifier”, “Mini construction dryer”, “up to 25 m² room size” - this and much more can be found in the colourfully illustrated advertising descriptions of Peltier dehumidifiers. But of course, frequently repeating alone does not make these statements any truer. And you are clever enough to see through this and not let yourself be fooled.

“Room dehumidifier” implies that it can be used in a room of normal size, but more than 10 m² is clearly beyond the performance scope of Peltier dehumidifiers.

And “construction dryers”, even the mini versions, require mandatory hot gas defrosting. Peltier dehumidifiers, on the other hand, do not even have any defrosting device.

Of course, semiconductor dehumidifiers also have their right to exist, but no miraculous powers!



NOT
A MYTH

Peltier dehumidifiers are useful niche products

And that in the truest sense of the word: Semiconductor dehumidifiers are indeed well suited for dehumidification applications for closed rooms with very small dimensions. Being a long-time leader in the mobile dehumidification market, this is why Trotec also offers semiconductor dehumidifiers in its product range.

These devices are ideal for dry keeping closets and shoe cabinets, pantries or windowless bathrooms. Nothing more, nothing less.

You can easily work that out for yourself:

To keep such rooms dry at a room humidity level of 50 % RH, about 26 ml per cubic metre must be dehumidified in 24 hours. With a usual maximum dehumidification capacity of 300 ml per day, this means that a room volume of just under 12 cubic metres is the end of the line and the Peltier technology reaches its limits.

But you could have it even easier: Simply use our convenient online tool for individual capacity calculation. Every conceivable application can be easily configured. Besides, you will receive a customised recommendation - from the compact Peltier dehumidifier to the large comfort dehumidifier, depending on your requirement scenario!

You can call up the Trotec online calculator very conveniently under uk.trotec.com/dehumidification_calculator.



Simply scan the QR code with your smartphone or tablet to be redirected to the online calculator.

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The Peltier phenomenon - facts versus fiction

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