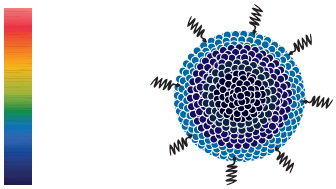
SIEMENS

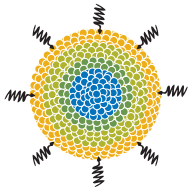
Microwave Technology

Learn about how Siemens use Microwaves

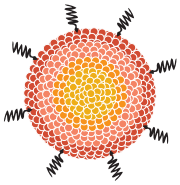
How do microwaves cook food?



Microwaves are able to penetrate food items to a depth of 1 cm. This causes the water, fat and sugar molecules in the food to vibrate causing friction which in turn causes heat.



This heat is then transferred to the internal areas of the food. Therefore, the outside of the food is likely to begin to cook before the inside.



In order to generate sufficient heat to kill bacteria throughout the food, microwave power needs repeated application to ensure the inner areas are heated to the required temperature.

The repeated application of full power on foods outer layer can result in fast overcooking of the outer layer before the core of the dish is able to reach the desired temperature. Over exposure to full power can result in food becoming burnt and dry; the outside of the dish may be hot but is still not safe to eat until the desired core temperature is reached throughout.

What are the differences between traditional microwave technology and inverters?

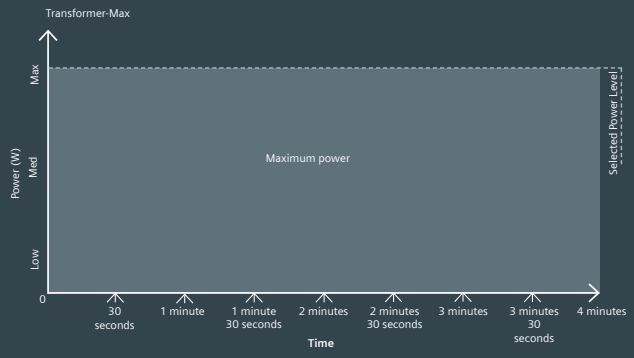
Transformer

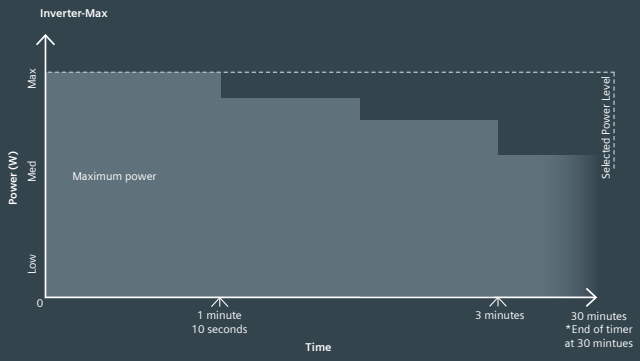
Found in traditional microwaves to convert mains power into suitable power for the magnetron to operate (the component producing the microwaves). To differ power output transformers reduce the time ratio between ON and OFF time. In ON state, the power output of transformers is always maximum power potentially damaging the end cooking results on delicate or small foods

Inverter

Able to reduce the microwave output power continuously (down to about 300W). Inverters are found in premium Siemens models as they are: more economical than transformers, lighter in weight and generate less noise (transformers tend to vibrate, this can sometimes be heard through the appliance of adjacent furniture).

Operating at maximum power output.





Traditional microwave: Delivers maximum power constantly for duration of the Cooking time

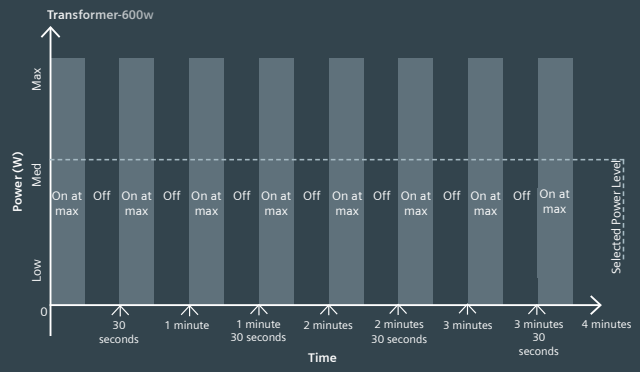
When set to maximum power, models using microwaves generated by a transformer deliver the maximum power constantly over the cooking duration. This can help speed up the cooking process, but also means there is a risk of uneven heating (hot and cold spots) or overcooking in some foods. Therefore, when using a traditional Siemens microwave we recommend selecting maximum power for foods/liquids that require a short cooking time (for example, hot drinks, porridge, Poppadum's), and reducing the power and the cooking time for more sensitive items or foods prone to overcooking.

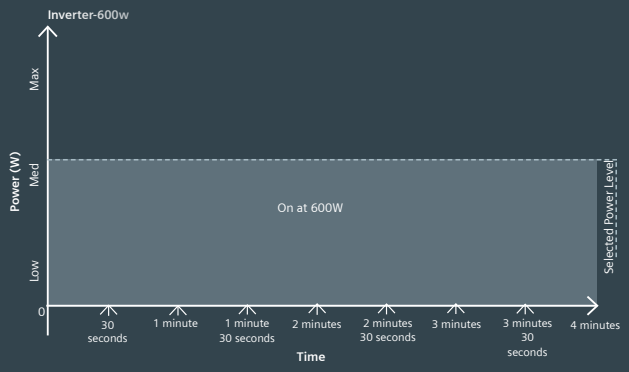
Inverter: Automatically manages the power levels during the cooking time

Microwaves generated via inverter are electronically managed in order to reduce the risk of uneven heating (hot & cold spots) and over cooking by automatically managing the power levels during the cooking time. Typically when selecting maximum power on a Siemens inverter model, the maximum power will be delivered for a short initial heating-up phase. Thereafter, the microwave power output is reduced in stages over the first few minutes down to the next power level (600W). At 600W an inverter model will deliver constant power until cooking time ends.

Consider reducing the power levels even further for sensitive or smaller items that may be susceptible to over cooking.

Operating at lower power outputs





Traditional microwave replicate lower power levels by delivering power at maximum or completely off

Microwaves using transformers are only able to deliver two levels of power: on at maximum power or completely off.

Therefore, when cooking where a lower power setting is desired (e.g. 600W), the appliance works to achieve this power level by alternating between maximum power and zero power for specifically timed intervals.

Consequently, even set to 600W, food is still subjected to bursts of maximum power over a period of time. This can be especially damaging for smaller items or more delicate / sensitive foods as the chances of hot and cold spots and overcooking foods remains. You may wish to consider reducing the power levels even further for sensitive or smaller items that may be prone to over cooking.

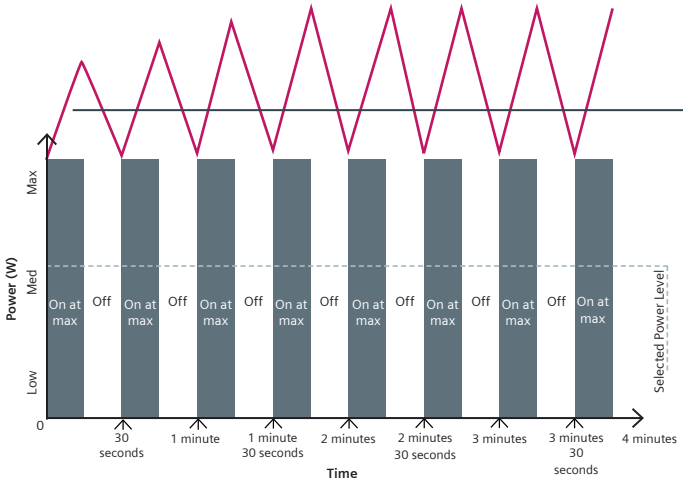
Inverters are able to deliver lower power constantly over the cooking duration

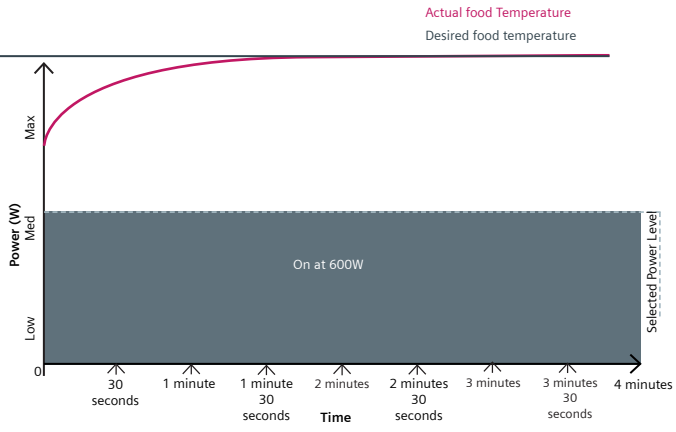
Unlike traditional microwave models, Inverter technology delivers power constantly. When 600W power is selected, the power is provided at 600W for the entire cooking duration, rather than pulsing on and off between maximum power and zero power for specific time periods.

This controlled, gentler approach to cooking aims to reduce uneven heating or over cooking and is especially beneficial for delicate foods. For example, scrambled eggs when cooked at lower, gentler, constant power input – are likely to be softer and creamier compared to a traditional microwave.

Furthermore, the constant power delivery of the inverter models can reduce the need for manual adjustment of power & time settings that might be required with other systems. This can also mean less need to check & stir food during the cooking process and reduced standing times at the end of the process. You may wish to consider reducing the power levels even further for sensitive or smaller items that may be susceptible to over cooking.

Reaching desired average temperature.





Traditional microwave (600W) desired temperature

In this diagram, the bars serve to indicate the power applied over time – the columns being the "on at full power" and the gaps representing the "off" time. The red line is intended to give a feel for the impact of this power application process by showing the likely temperature peaks and troughs in the food items themselves. These peaks and troughs can result in the outer extremities of food being cooked, while the core temperature remains below the required temperature. Alternatively, in bringing the core temperature to the required level, the repeated bursts of full power can mean the outer extremities becoming over cooked.

Inverter (600W) desired temperature

By contrast, Inverter models deliver power at a constant level with no breaks (solid blue section). This constant delivery of power at the required level (rather than alternating between maximum and off) means that the food is gradually and gently heated (indicated by the red line. This gentler, gradual approach reduces the chances of foods being cooked unevenly and reduces likelihood of outer extremities of food becoming.

*Temperature lines for indicative purposes only

How to choose your compact appliance.

APPLIANCE TYPE	OVENS WITH INTEGRAL MICROWAVE*	MICROWAVE COMBINATION OVENS*	PURE MICROWAVE
Description	• Ovens with integral microwave operate primarily as an oven, with construction, features and functions identical to a traditional single oven. These models benefit from the option of adding microwaves at low-medium power to deliver oven-led combination cooking. • A metal fan like stirrer is situated in the roof of the cavity which evenly distributes the microwaves into the cavity as they are generated, ensuring food is heated evenly. • Siemens single and compact ovens with integral microwave use inverter technology.	• Microwave combination ovens are based on standard solo microwave ovens, but benefit from the addition of traditional heating methods such as hot air and grill functions to provide more functionality than a solo microwave oven. These models are designed to function best when in combination mode with the microwave using medium-high power levels to lead the cooking process. • Depending on the model, Siemens Microwave Combination Ovens uses either a turntable or fan like stirrer in the roof or base of the appliance to allow even distribution of the microwaves inside the cavity. • Siemens Microwave Combination Ovens with stirrer fan distribution generally use inverter technology, while models with turntables use transformer technology.	• Pure microwave ovens use only microwave power to heat food, making them ideally suited to performing microwave-typical tasks, including re-heating of liquids and pre-prepared food items. • Selected models also include a grill function, providing extra cooking flexibility and the option of combining microwave and grill for browner, crispier results. • Depending on the model, Siemens microwave ovens use either a fan like stirrer in the roof or base of the appliance or a turntable to allow even distribution of the microwaves inside the cavity.
Benefits	• These models when teamed up with like-design single ovens offer a great alternative to a double-oven if you require more space for traditional cooking and grilling. With Siemens, selected single ovens also offer microwave functionality (look for varioSpeed in the specification) • Selected traditional cooking functions can be combined with microwaves – these traditional heating methods "lead" the cooking and microwave power is introduced at medium-low levels (360W). The use of inverter technology to deliver constant, gentle microwave power helps speed up the cooking process while retaining traditional results. • Using an integrated stirrer fan, evenly distributes the microwaves ensuring full flexibility in terms of useable space and capacity to accommodate a variety of food types, as well as multi-level traditional cooking options.	• Ideal when coordinated with like-design Siemens single ovens, the microwave based functionality of these models offers the perfect solution. Regular microwave heating is the priority, but with the back-up of hot air cooking and grill functionality if required in combination. • When combined with traditional heating modes such as hot air and grill, it is the microwave "leading" the cooking process, delivering medium-high power (600W), with the hot air or grill functions ensuring speedy results that are crisped and browned. • Siemens Microwave Combination Ovens use stainless steel interiors, much like traditional microwaves, not only ensuring optimum results when using pure microwave, but also providing a bright, durable and easy to clean cooking cavity.	• Depending on the model, Siemens microwave ovens are designed to coordinate with like-design ovens for installation in a tall kitchen unit or wall cabinets, thus saving valuable work top space in the kitchen. • Pure microwaves are Ideal for quick heating of pre-prepared food, liquids and can be used to prepare fresh food items that do not necessarily need browning and crisping. • Siemens microwave ovens use stainless steel interiors, to ensure optimum microwave performance and offers a bright, durable and easy to clean cooking cavity.
Things to consider	• The interior of these appliances are designed and set up as a traditional oven (e.g. enamelled interior, wire side rails), which means when operating as a pure microwave, it may be necessary to adapt cooking durations and power levels accordingly.	• These models are designed to operate best in combination mode with the aim of delivering speedy cooking solutions, so it may be necessary to adjust power levels and cooking times if the appliance is used as a pure microwave, grill or hot air oven. • Siemens appliances utilise the stirrer fan method of microwave distribution benefitting from more flexibility of useable space. In turntable models, capacity is limited to the diameter of the turntable.	• Consider models with selected traditional heating methods such as integral grill if you prepare foods that need to be grilled or foods with crispier, browned result: these models offer the benefit of the functions working separately or together. • For best results, it may be necessary to adapt cooking times and/or power levels accordingly. • If you cook more sensitive/delicate items in the microwave, items prone to overcooking or items with high fat content, we recommend you look at our inverter models
Best suited for	• Traditional roasted foods, such as browned Chicken, traditional roast potatoes, and roasted vegetables all in 50% of time compared with oven only functions. • Combination cooking-Can be used for Cakes, bakes all with time reduction.	• Roasting Meat in Lidded dishes 32 minutes for 1kg of roast Lamb, Crispy skin jacket potatoes in just 18-20 minutes. Browned pasta bakes. Baby roast potatoes, dauphinoise potatoes. Roasted peppers.	• Liquids, soups, heating prepared foods, ready meals, re-heating & snacks

* These models are designed to operate best in combination mode, so when heating using microwave only, it may be necessary to adjust cooking times.

Things to consider:

The principle of managing power input in order to regulate cooking and achieve the optimum results is not a new concept and is commonly used in cooking to achieve optimum results. For example, when preparing food on the hob (for instance, boiling items such as potatoes, pasta, or frying things like eggs or sausages) it is normal for high power to be used initially, to start the cooking process, with the power then reduced while the cooking is completed in order to ensure the food is evenly and thoroughly cooked (e.g. potatoes) and not over cooked or burned on the outside and under cooked in the centre (e.g. sausages).

Equally, there are of course, some foods that should be prepared on the hob with a quick burst of high power for best results – for example steak or stir-fry. Even when oven cooking, most foods benefit from longer, slower cooking at lower temperatures, rather using maximum power and then risking over cooking on the outside and under cooked centres.

Inverter technology reflects these simple cooking principles and offers the benefit of automating the delivery of the power to provide the best cooking results, effectively prioritising cooking quality and safety over speed.