



# Electrical central storage heaters

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Electrical central storage heaters use electrical energy to produce heat that is needed to run a linked central heating system using hot water or air. The heat is stored in water or in a solid material from which it is released throughout the day, in a regulated way, into the central heating system to which it is connected. The heat is produced during the night, when the cost of energy is low.



Substantial magnetic fields are produced in the immediate vicinity of electrical central storage heaters. They are caused by the electrical currents that flow through the heating elements and through the motors for the pumps that are needed. As the distance from the appliance increases, the magnetic fields rapidly decrease.

It is not known whether the long-term impact of low-frequency magnetic fields presents a health risk. No effects are expected from short-term exposure to low-frequency emissions from central storage heaters.

The following measures will enable you to reduce exposure to magnetic fields near to central storage heaters:

- Keep a distance of 100-150 cm between the central storage heater and places where people stay for a long time to work, relax or sleep. Note that walls and concrete floors do not shield against magnetic fields.
- Electrical cables leading to the central storage heater should be kept away from relaxation areas, where people stay for some time.
- Particular cantonal specifications may exist for electric heaters. Please contact the responsible cantonal energy departments for more information.

[Kantonale Energiefachstellen — Aktuelles](#)

[Verbot & Sanierungsfrist für Elektroheizungen und Elektroboiler](#)



# 1 Technical data

Voltage: 400 V

Power: 18 - 100 kW

Frequency: 50 Hz

Electrical central storage heaters are fixed heat storage appliances, which use electrical heating elements to produce the heat that is needed. The heating elements warm up as a result of their electrical resistance.

Central storage heaters are usually connected to a central heating system, which distributes the heat to the rooms that are connected. The following types of construction can be distinguished, depending on the means of heat storage and heat transfer:

Water central storage heaters consist of an electrical heating unit and one or more linked hot water storage units. The heating unit and hot water storage units are linked together via a closed circuit of water. In systems with a single circuit of water, the hot water storage unit supplies the radiators directly with hot water. In systems with two circuits of water, a heat exchanger extracts the necessary heat from the hot water storage unit and transfers it to the second water circuit, which supplies the radiators. The water, which has cooled after going through the radiators, is returned to the hot water storage unit or to the integrated heat exchanger by a circulation pump.

The lower part of the heating unit contains electrically heated flow heaters to warm up the water. The hot water is pumped by a charging pump into the top of the hot water tank. Water that has cooled down is thereby pumped from the lower part of the hot water tank back to the flow heaters of the heater unit.

Solid central storage heaters for heating with hot water have an air circuit and a water circuit. Heat is stored in a solid core that is made of ceramic and insulated to prevent heat loss. In the core there are vertical and horizontal ducts through which air circulates, blown by a fan. The speed of the fan determines the air flow, and hence the uptake of heat from the core. A heat exchanger transfers heat from the hot air to the water circuit linked to the central heating. The air that has been cooled down by the heat exchanger then flows back through the air ducts in the core.

Solid central heat storage units for warm air heating are constructed in a similar way to those for hot water heating. A ventilation system is needed in the building to supply the connected rooms with warm air. After that, air which has cooled down flows back through the ventilation system to the heating unit. The temperature is set by flaps to mix the heated air from the core of the storage heater with cold air that returns through the ventilation.

When the central heat storage unit is being heated up, the electric current flowing through the heating elements generates a low frequency magnetic field around the appliance. The current supplying the fans and pumps also contributes to this field.



## 2 Exposure to low frequency magnetic fields

A study financed by the FOPH assessed the low frequency magnetic fields around two water central heat storage units and one solid central heat storage unit. The measurements were made 50 cm above the floor, at distances ranging from 20 cm to 160 cm from the appliance.

The magnetic fields are limited to the vicinity of the central heating unit. They decrease rapidly as the distance from the appliance increases, dropping to low values after 100-150 cm (figure 1).

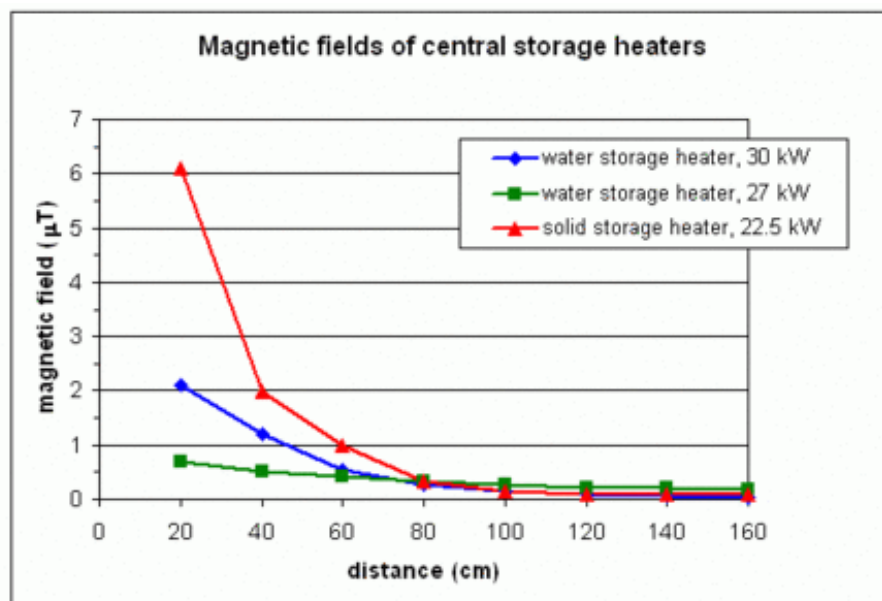


Figure 1 Low frequency magnetic fields as a function of distance from 3 central storage heaters, during the heating phase; measurements were done 50 cm above the floor

## 3 Effects on health

Low frequency magnetic fields can pass through the human body and produce electric currents in the body. If these currents exceed a certain value, there can be immediate excitation of the central nervous system. Therefore, the European threshold values for magnetic fields were set such that the current is at least 50-fold below this value [1]. The magnetic fields produced by central heat storage units are at most 6 μT, which is much lower than the threshold value of 100 μT. No effects are expected from short-term exposure, as the present threshold values preclude acute damage.

In 2002 the International Agency for Research on Cancer (IARC) classified static and low-frequency magnetic fields as possibly carcinogenic (Group 2B) [2]. This was based on epidemiological studies that suggest that long-term and durable exposure to magnetic fields in the low-dosage area of 1 μT or even lower (< 0.4 μT) could increase the risk of Alzheimer's disease [3, 4] or of childhood leukaemia [5, 6]. For central storage heaters magnetic fields of 0.4 μT occur at a distance of up to one metre from the appliance. The possible risk can be eliminated by keeping 100-150 cm away from the appliance.



## 4 Regulation in law

Electrical central storage heaters are low-voltage appliances which are regulated in Switzerland by the Ordinance on electrical low-voltage equipment ([SR 734.26 - Ordinance of 25 November 2015 on electrical low-voltage equipment | Fedlex](#)). It stipulates that low-voltage appliances may only be marketed if they comply with the safety objectives of Annex I of the European (EC) Low Voltage Directive ([Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits \(recast\) Text with EEA relevance](#)). The European directive states that low-voltage appliances must be designed and created in such a manner that protection against hazards is guaranteed when they are used as intended and adequately maintained. To this end, technical measures, among other things, must be defined to ensure that no hazardous radiation is emitted. Manufacturers of low-voltage appliances must obtain a Declaration of Conformity for a product from the time at which it is brought onto the market; this declaration states that the product complies with these requirements. The requirements for individual products are specified in the technical standards.

The conformity criteria for compliance with the requirements correspond to the limit recommended by the EU ([1999/519/EC: Council Recommendation of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields \(0 Hz to 300 GHz\) - Publications Office of the EU](#)). Manufacturers are responsible for ensuring that their appliances comply with the conformity criteria. In Switzerland, no authority checks whether electrical central storage heaters meet these standards ([23.4244 | Mobile phones emit more radiation than permitted. The time has come to check the NIR limits in Switzerland too! | Item of business | The Swiss Parliament](#) – available in German, French and Italian).

## 5 Literature

1. 1999/519/EC: Council Recommendation of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz) (OJ L 199 30.07.1999, p. 59, ELI: <http://data.europa.eu/eli/reco/1999/519/oj>)
2. IARC. 2002. Non-ionizing radiation, Part 1: Static and extremely low-frequency (ELF) electric and magnetic fields. IARC Monographs on the evaluation of carcinogenic risks to humans, Volume 80. Lyon, France: International Agency for Research on Cancer. See „further information“
3. Huss et al. Residence near power lines and mortality from neurodegenerative diseases: longitudinal study of the Swiss population. *American Journal of Epidemiology*. 169(2):167-75. 2009
4. Kheifets et al. Future needs of occupational epidemiology of extremely low frequency electric and magnetic fields: review and recommendations. *Occupational and Environmental Medicine*. 66(2):72-80. 2009
5. Kheifets et al. Pooled analysis of recent studies on magnetic fields and childhood leukaemia. *British Journal of Cancer*. 103(7):1128-35. 2010
6. Ahlbom et al. Review of the epidemiologic literature on EMF and Health; ICNIRP (International Commission for Non-Ionizing Radiation Protection) Standing Committee on Epidemiology. *Environmental Health Perspectives*. 109 Suppl 6:911-33. Review. 2001



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