

HMIs for BEV charging stations

Electric cars - BEVs (Battery Electric Vehicles) for short - are very highly popular with buyers and are to be welcomed with a view to reducing CO₂ emissions. Such vehicles need to be charged with electrical energy. This is done using charging stations, often just called wallboxes, which use a wide variety of control units.



BEVs with charging station

The days of petrol, diesel and even hybrid vehicles are coming to an end. The future will be dominated by BEVs. Quiet and clean. In Norway, Europe's most BEV-friendly country, around 82 percent of all newly registered cars in 2023 were already purely electric. Norway is not yet the norm, but the Scandinavians clearly show where this vehicle category is heading. The network of charging stations needs to be expanded to the same extent. Wallboxes for charging vehicles in private homes or company parking lots as well as fast-charging stations in public spaces are needed.

The task of a wallbox

At first glance, the task of a charging station for BEVs appears simple. It is intended to charge the batteries - or

more correctly the accumulators - of the vehicles with electrical energy. However, this task is not so simple if you want your vehicle to have a long life. The service life of BEVs depends heavily on how owners charge their vehicles. BEV battery packs are sensitive to deep discharges and daily full charges to 100%. What they do appreciate, however, is a gentle charging process.

Control unit of a wallbox

A wallbox is located between the BEV and the power grid. In its simplest form, it corresponds virtually to a socket with one or two LEDs that provide information about the operating and charging status. Inputs can be made directly at the wallbox using robust buttons (preferably made of metal, piezoelectric or with stroke technology)

with or without lighting, but buyers of a more exclusive vehicle will hardly be satisfied with the basic version of this central component of their personal electromobility. Additional features, a color display and a higher-quality finish will then become a significant selling point.

It also becomes more complex when a large number of charging stations are in operation in underground car parks. The available connected load is often not sufficient to charge all vehicles simultaneously at full power. In this case, load management comes into play, which distributes the available power among the connected BEVs. There are various approaches to prioritizing charging. What they all have in common, however, is that vehicle owners want to be able to read the distribution of charging power, the charging duration and the operating mode of the wallbox. This

requires a display or communication via a smartphone app, which can be used to retrieve the information.

Indoor vs Outdoor

Which technologies are used for the control units - HMI for Human Machine Interface - depends to a large extent on where the wallbox is located. If it is outside, exposed to wind and weather, this must of course be taken into account. Switches in stroke technology are not suitable for unprotected locations, as moisture can penetrate the gap between the actuator and the housing, which could freeze at low temperatures. Piezoelectric buttons or keypads are appropriate for harsh conditions.

In addition, the operation of the charging stations must not be affected by UV exposure in direct sunlight or large temperature fluctuations or moisture. Particularly robust HMIs, ideally protected against vandalism in public areas, are essential for reliable 24/7 operation. HMIs with protection class IP67 and impact resistance up to IK10 are ideal here.

Easy readability

An important aspect is that the information is easy to read and quickly apparent. It also makes sense to use sunlight-readable displays. PCAP touchpanels, which offer perfect color display as well as high contrast and brightness thanks to optical bonding, represent the gold standard. For permanent use in extreme weather conditions with snow and ice, resistive glass-film-glass (GFG) touchscreens are a proven option. In addition, HMIs with a large viewing angle are advantageous in order to display important



PCAP touchscreen: the gold standard



Outdoor applications require waterproof and sunlight-readable displays that are particularly robust and vandal-proof

information across a wide viewing angle. If you keep your wallbox in a dry place, you have far more options. In a garage, where temperatures do not reach near freezing point, all technologies (switches with stroke, piezo switches, capacitive switches, resistive touchscreens or membrane switches) are available. One point that must always be given special attention, whether indoors or outdoors, is the extreme reliability of the products used.

Increasing complexity - bidirectional charging

Anyone looking ahead today will quickly be confronted with the topic of "bidirectional charging". In simple terms, this means that a BEV is not only seen as an electricity consumer, but also as an energy storage device. In the simplest version, the BEV then has a 230 VAC socket to which any electrical device can be connected. This not particularly revolutionary but very practical function is known as vehicle-to-load (V2L) or vehicle-to-device (V2D).

Another variant is considerably more advanced: the BEV connected to the wallbox supplies energy to the home power grid. This is known as vehicle-to-home (V2H). Here - for example, if the photovoltaic system on your own roof is not supplying any electricity - the electrical energy previously charged in the BEV is returned

to the home for your own consumption.

Last but not least, there is the V2G variant, which stands for vehicle-to-grid. Here, the BEV feeds directly into the power grid, not just for personal consumption. The basic idea behind this is as follows: thanks to V2G, many thousands of BEVs could be interconnected to form a battery-electric power plant by means of an intelligent control system, thus helping to stabilize the energy supply. A standard for bidirectional charging is in place. In April 2023, the IEC (International Electrotechnical Commission) published ISO 15118-20, which regulates communication between BEVs and wallboxes. BEV manufacturers are now responsible for equipping their vehicles in accordance with this standard.

Conclusion

The charging station of a BEV is a fundamental component of electromobility. It will become increasingly important in the future if BEVs are also integrated into the overall energy supply as energy storage devices. The greater complexity will then require significantly more elaborate HMIs, which must nevertheless enable the operating status to be quickly recorded.

Thanks to decades of experience and in-depth know-how in the field of HMI, SCHURTER supports manufacturers of charging stations with switches and more



About SCHURTER

The SCHURTER Group is a globally successful Swiss technology business. With our components ensuring the clean and safe supply of power and input systems for ease of use we impress our customers with agility and excellent product and service quality.

SCHURTER AG
 Werkhofstrasse 8-12
 CH-6002 Lucerne
 +41 41 369 31 11
 contact.ch@schurter.com
 schurter.com

Piezoelectric switches are particularly suitable for harsh outdoor use. They are characterized by extreme robustness and reliability.

complex input systems. Resistive, capacitive and piezoelectric systems can be customized for every conceivable application. There are virtually no limits to product design for displays and touchscreens. SCHURTER products for wallboxes work reliably under the most demanding conditions and meet the highest industry

standards. In close cooperation with the customer, HMI solutions are created just the way the user wants them.



The era of fossil fuel combustion engines is coming to an end. In the passenger car sector, the future clearly belongs to electric cars. However, this will require a massive build-up and expansion of the charging infrastructure in both the private and public sectors. Source: iStockphoto