Claims

1. A storage module, comprising
a stacked arrangement of a plurality of electrical storage cells, in particular at least 5, preferably at least 10, and particularly preferably at least 15 electrical storage cells, with a contacting side and a rear side opposite the contacting side, and an upper side extending between the contacting side and the rear side and a lower side opposite the upper side, extending between the contacting side and the rear side,
a plurality of carrier plates with a front-side edge corresponding to the contacting side and an opposite rear-side edge and
a circuit board plate, and
optionally a rear side plate,
wherein the contacting sides of the storage cells are present on the same side of the arrangement,
wherein the carrier plates of the plurality of carrier plates are respectively present between adjacent storage cells,
wherein the storage cells each have a first and a second contact element on the contacting side, a positive or a negative electrical pole representing the storage cell, in particular in the form of an electrically conductive metal tongue, and
wherein the circuit board plate comprises first passage openings, in particular in the form of slits, for the first and second contact elements, and
an enclosing module comprising or consisting of a first enclosing element, and a second enclosing element which is spatially separated from said first enclosing element,

wherein said enclosing elements are set up and designed for enclosing and electrically contacting an, in particular cuboid, stacked arrangement of a plurality of electrical storage cells, comprising

at least one first flat partial area, set up and designed for being brought into contact on a first side surface of the arrangement of electrical storage cells,

at least one second flat partial area, set up and designed to be brought into contact on a second side surface of the arrangement of electrical storage cells, and

at least one third flat partial area, set up and designed to be attachable, fittingly or at a distance, from the arrangement of electrical storage cells, when the first partial area and the second partial area are in contact with the first or second side surface of the arrangement of electrical storage cells,

wherein the first, second, third and optionally fourth partial areas are connected to each other, in particular are designed as a single piece,

wherein the second partial area of the first enclosing element and the second partial area of the second enclosing element are in contact with the circuit board plate,

wherein the first partial area of the first enclosing element lies in contact on the first side area of the stacked arrangement of the plurality of electrical storage cells that extends between the contacting side and the rear side of the stacked arrangement of the plurality of electrical storage cells,

wherein the first partial area of the second enclosing element lies in contact on the second side surface of the stacked arrangement of the plurality of electrical storage cells, which extends between the contacting side and the rear side, positioned opposite the first side surface, and

wherein the two enclosing elements are provided electrically insulated from each other, in particular at a distance from each other.

2. The storage module according to Claim 1 further comprising at least one fourth flat partial area, set up and designed to be attachable opposite the third partial area fittingly or at a distance from the arrangement of electrical storage cells.

3. The storage module according to Claim 1 or 2, characterized in that said enclosing element, in particular the first, second and third partial area and optionally the fourth partial area, consists of or comprises an electrically conductive material, which has an electrical conductivity of more than 1x10^6 S/m, preferably more than 20x10^6 S/m, particularly preferably more than 35x10^6 S/m, in particular more than 50x10^6 S/m, in each case at a temperature of 300K, and/or that said enclosing element, in particular first, second and third partial area, and optionally the fourth partial area, consists of a material or comprises said material

which has a thermal conductivity of more than 50 W/(m K), preferably more than 100 W/(m K), particularly preferably more than 200 W/(m K), in each case at a temperature of 0 °C.

4. The storage module according to any of the preceding Claims, characterized in that the enclosing element, in particular the at least one first partial area, the at least one second partial area and/or the at least one third partial area and optionally the at least one fourth partial area comprises copper or consists of copper.

5. The storage module according to any of the preceding Claims, characterized in that the first, second and third partial areas, and optionally the fourth partial area, have an ~~essentially~~ rectangular base area and/or in that
the second partial area has a plurality of first holes which are at a distance, in particular a regular distance, from each other, designed for the passage of soldering material, wherein preferably groups, in particular pairs or triplets, of the first holes are present at a distance from adjacent groups, in particular pairs or triplets, of the first holes, and/or in that
the third partial area has second holes, in particular three second holes, set up and designed for the mechanical and/or electrical connection of the third partial area with pole contacts, and/or in that
opposite the second partial area, no further partial area extends from the first partial area away from the surface of said partial area.

6. The storage module according to any of the preceding Claims, characterized in that the circuit board plate comprises second passage openings or recesses, arranged in particular along the ~~essentially~~ central longitudinal section of the circuit board plate, and that the carrier plates on the front-side edge are equipped with at least one first protrusion, set up and designed to engage into the respective corresponding second passage openings or recesses of the circuit board plate, in particular in a latching manner.

7. The storage module according to any of the preceding Claims, characterized in that the rear-side plate comprises third passage openings or recesses, arranged in particular along the ~~essentially~~ central longitudinal section of the rear-side plate, and the carrier plates on the rear-side edge are equipped with at least one first protrusion, set up and designed to engage into the respective corresponding third

passage openings or recesses of the rear-side plate, in particular in a latching manner.

8. The storage module according to any of the preceding Claims, characterized in that the stacked arrangement of the plurality of electrical storage cells comprises on its upper side a carrier plate from the plurality of carrier plates and/or on its lower side one carrier plate from the plurality of carrier plates, preferably equipped in each case with at least one first protrusion on the front-side edge, and optionally at least one second protrusion on the rear-side edge.

9. The storage module according to Claim 8, characterized in that
the at least one first protrusion on the front-side edge of the upper-side carrier plate engages into a second passage opening or recess or preferably into an edge-side inlet of the circuit board plate, in particular in a latching manner, and that
the at least one second protrusion on the rear-side edge of the upper-side carrier plate engages into a third passage opening or recess or preferably into an edge-side inlet of the circuit board plate, in particular in a latching manner and/or that
the at least one protrusion on the front-side edge of the lower-side carrier plate latches into a second passage opening or recess or preferably into an edge-side inlet of the circuit board plate, in particular in a latching manner, and that
the at least one second protrusion on the rear-side edge of the lower-side carrier plate engages into a third passage opening or recess or preferably into an edge-side inlet of the circuit board plate, in particular in a latching manner.

10. The storage module according to any of the preceding Claims, characterized in that the circuit board plate comprises a base plate made of plastic and on the side facing away from the storage cells, a first metal layer and spatially and/or electrically separate from this, a second metal layer, wherein the first metal layer is positioned in the area of the first passage openings for the first contact element, and the second metal layer is positioned in the area of the first passage openings for the second contact element, and wherein the first and the second metal layer have corresponding openings in the area of the overlap with the first passage openings.

11. The storage module according to any of the preceding Claims, characterized in that the stacked arrangement of ~~a~~ the plurality of electrical storage cells is sheathed, in sections or ~~essentially~~ fully, with at least one film, in particular adhesive film.

12. The storage module according to any of the preceding Claims, characterized in that the third partial area of the first enclosing element and the third partial area of the second enclosing element are arranged at a distance from and ~~essentially~~ parallel to the upper side of the stacked arrangement of the plurality of electrical storage cells.

13. The storage module according to Claim ~~2~~1, characterized in that the fourth partial area of the first enclosing element and the fourth partial area of the second enclosing element are arranged at a distance from and ~~essentially~~ parallel to the lower side of the stacked arrangement of the plurality of electrical storage cells.

14. The storage module according to any of the preceding Claims, further containing at least one module cover which is equipped with a plurality of electrical poles, in particular an even number of electrical poles, preferably at least 2 poles, particularly preferred at least 4 poles, and very particularly preferably at least 6 poles, which are set up and designed to create an electrically conductive connection with the plurality of electrical storage cells.

15. The storage module according to Claim 14, characterized in that a first group, in particular the first half, of the plurality of electrical poles is connected or connectable mechanically and electrically with the third partial area of the first enclosing element, in particular by use of the second holes present there, and that a second group, in particular the second half, of the plurality of electrical poles is connected or connectable mechanically and electrically with the third partial area of the second enclosing element, in particular by use of the second holes present there.

16. The storage module according to Claim 14 or 15, further containing a module bowl with bowl side walls and a bowl floor, wherein the module lid, in particular by use of adhesion, is connected or connectable to the module bowl, in particular in a fluid- and/or dust-tight manner.

17. The storage module according to Claim 16, characterized in that

the module bowl and module lid consist of or comprise at least one plastic material, in particular polyethylene or polypropylene or an ethylene copolymer or a propylene copolymer, wherein the module lid is formed from, and in particular consists of, a harder plastic material than the module bowl.

18. The storage module according to any one of Claims 16 to 17, further comprising between the lower side of the stacked arrangement of the plurality of electrical storage cells and the bowl floor, at least one first impact-dampening layer, or between the lower side of the stacked arrangement of the plurality of electrical storage cells and the fourth partial areas of the first and second enclosing element, at least one second impact-dampening layer and/or between the fourth partial areas of the first and second enclosing element and the bowl floor at least one third impact-dampening layer is provided.

19. The storage module according to any of the preceding Claims, characterized in that all positive electrical poles of the storage cells of the stacked arrangement of the plurality of electrical storage cells are respectively connected in an electrically conductive manner with the second partial area of the first enclosing element, and all negative electrical poles of the storage cells of the stacked arrangement of the plurality of electrical storage cells are respectively connected in an electrically conductive manner with the second partial area of the second enclosing element, so that the storage cells are provided in a parallel connection.

20. The storage module according to any one of Claims 14 to 19, characterized in that a first group, in particular the first half, of the electrical poles of the module cover is connected in an electrically conductive manner with the second partial area of the first enclosing element, and that a second group, in particular the second half, of the electrical poles of the module cover, is connected in an electrically conductive manner with the second partial area of the second enclosing element.

21. An arrangement for supplying electrical energy, comprising
at least one storage module according to any one of Claims 1 to 20 and at least one load disconnector,
set up and designed to interrupt an electrically conductive connection, comprising a communication interface,
at least one control unit and

at least one relay, set up and designed to switch to and fro between an open and a closed state,
wherein the electrically conductive connection when the relay is open is interrupted, and the electrically conductive connection when the relay is closed is closed,
wherein the control unit is set up and designed to switch the relay into the open and/or closed state, in particular into the open state, depending on the voltage, current strength, electrical capacity and/or the temperature.

22. A trough for holding storage modules, comprising
a trough body and a trough lid, and in the trough body, at least one storage module according to any one of Claims 1 to 20, and/or
at least one arrangement for supplying electrical energy according to Claim 21.

23. The trough according to Claim 22, characterized in that
the trough lid comprises at least two trough poles, which are set up and designed to conduct electric power from the interior of the closed trough to the outer side of the closed trough, and which are connected or connectable with the trough lid in a fluid-tight and/or dust-tight manner.

24. The trough according to Claim 22 or 23, characterized in that
the trough lid further comprises at least one communication interface which is set up and designed to enable communication, in particular a transmission of electrical impulses, between the interior of the closed trough and the outside world, and which is connected or connectable with the trough lid in a fluid-tight and/or dust-tight manner.

25. The trough according to Claims 22 to 24, further comprising
at least one, in particular metallic, hold-down clamp and at least two connectors, wherein the
at least one hold-down clamp is arranged between the trough lid and the at least one storage module or the at least one arrangement for supplying electrical energy.

26. The trough according to Claim 25, characterized in that
the at least one storage module with the at least one load disconnector is connected in a second connection and that the second connection is connected to the trough poles in an electrically conductive manner.

27. The trough according to any one of Claims 22 to 26, further comprising at least one electronic unit, which during generic use of the trough is preferably located above the storage module or storage modules.

28. A transport vehicle, in particular a baggage tow truck, forklift truck, golf cart, goods storage transport vehicle or aeroplane tow truck, containing at least one storage module according to any one of Claims 1 to 20, at least one arrangement for supplying electrical energy according to Claim 21 and/or at least one trough according to any one of Claims 22 to 27.

29. The use of at least one storage module according to any one of Claims 1 to 20, at least one arrangement for supplying electrical energy according to Claim 21 and/or at least one trough according to any one of Claims 22 to 27, in particular according to Claims 25 to 27, for the supply of transport vehicles, in particular baggage tow trucks, forklift trucks, golf carts, goods storage transport vehicles or aeroplane tow trucks, with electrical energy or as a stationary energy storage source.