



DIVISION OF GWL GROUP A.S.

# AMVOLT 35 kWh LV Module AMVOLT 50 kWh LV Module

scalable robust battery storage from the Czech Republic  
on low voltage up to 60 V with power up to 108 kW

capacity: 35 kWh, 70 kWh, 105 kWh, 140 kWh, etc. without limit  
capacity: 50 kWh, 100 kWh, 150 kWh, 200 kWh, etc. without limit

**Standard delivery within 4 weeks after the binding order!**

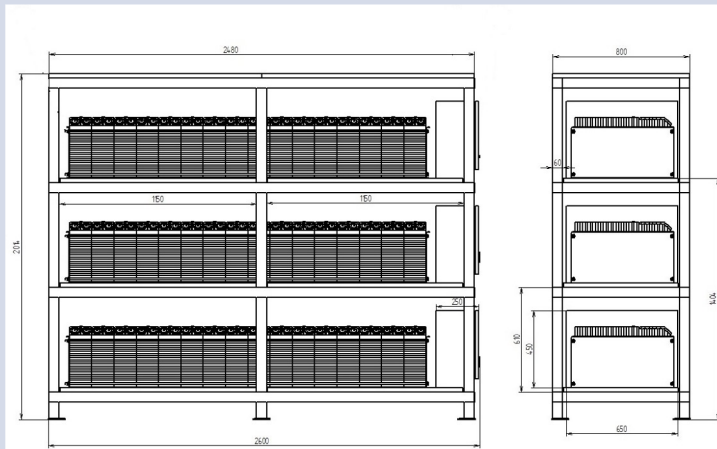


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# 1. Basic description of AMVOLT 35 kWh and 50 kWh LV Modules

- AMVOLT's technical philosophy is to build open storage systems in the Czech Republic from individual battery cells and interchangeable standardized components. This significantly extends the life of the entire storage system compared to the now widespread closed, non-repairable battery boxes and drawers. The AMVOLT LV Modules are intentionally designed to allow the customer to have the option of any future expansion, modification or service without depending on the AMVOLT itself..
- AMVOLT rack-mounted battery modules are freely scalable (in increments of 35 kWh or 50 kWh) and offer customers a complete solution in a compact, modular, industrial form for indoor placement or as part of a container variant. All components except cells (i.e. contactors, relays, BMS, protection circuits...) are made in the EU and USA.
- **Thanks to our own permanent stock of LFP battery cells and other necessary components, we are able to deliver standardized AMVOLT battery modules for indoor use within 4 weeks of a binding order.**
- Each AMVOLT module is designed for 16 Winston WB-LYP700AHA 3.3 V, 700 Ah (35 kWh variant) LiFePO<sub>4</sub> cells with a nominal voltage of 48 V, or 16 Winston WB-LYP1000AHC 3.3 V, 1000 Ah (50 kWh variant) LiFePO<sub>4</sub> cells with a nominal voltage of 48 V and ČSN EN 62619 certification [IEC 62619 certification \(distributor website\)](#).
- **AMVOLT LV Modules can be placed in any number in the technical room (or in a container) - on top of each other or side by side according to the space possibilities and customer requirements. AMVOLT LV Modules can also be dimensionally designed to the customer's specific space needs beyond the standardized dimensions (see below).**
- Each AMVOLT LV Module is usually equipped with a switchboard cabinet (RDC) including BMS, emergency disconnecter, fuses and auxiliary relays. The BMS has automatic tripping of the emergency contactor when the voltage limits of any cell are exceeded.



An example of a variant of the AMVOLT LV base module with two used floors supplemented by a third floor with a total capacity of 110/150 kWh.

## 2. Competitive comparison



### BLACK-BOX BATTERY STORAGE

- ❌ 95% of complete batt. storage systems from Asia, mainly China - individual cells cannot be replaced,
- ❌ the BMS cannot be replaced/repared,
- ❌ no standardized components are used, spare parts are not available,
- ❌ mostly high-voltage, so they are very difficult to disassemble in principle,
- ❌ in combination with black-box inverters the risk of data flow to countries of origin,
- ❌ the customer has no technical documentation for servicing.

### OPEN BATTERY STORAGE AMVOLT

- ✅ European solutions, except the cells (for now),
- ✅ individual cells are replaceable,
- ✅ BMS can be replaced/repared,
- ✅ standardised components, widely available spare parts, fully repairable solutions,
- ✅ low-voltage solutions are safer, easy to disassemble and therefore truly recyclable,
- ✅ no data spillover to other countries, full control,
- ✅ the customer receives technical documentation for servicing, has control over the equipment.



### 3. Technical parameters of AMVOLT 35 kWh and 50 kWh LV Modules

#### Standardized technical parameters, variants and dimensions

English - Industry Amvolt 35 (48V) TSWB				
Cells: WINSTON 700 AHC		Low Voltage (LV) 48V		
Capacity [Ah]	No. of cells [pcs]	Nominal energy [kWh]	Usable energy (80%) [kWh]	Size [w/h/d cm]
700	16	<b>36,96</b>	<b>29,6</b>	78/141/260
700	32	<b>73,92</b>	<b>59,1</b>	78/141/260
700	48	<b>110,88</b>	<b>88,7</b>	78/202/260
700	16	<b>36,96</b>	<b>29,6</b>	130/141/130
700	32	<b>73,92</b>	<b>59,1</b>	130/141/130

English - Industry Amvolt 50 (48V) TSWB				
Cells: WINSTON 1000 AHC		Low Voltage (LV) 48V		
Capacity [Ah]	No. of cells [pcs]	Nominal energy [kWh]	Usable energy (80%) [kWh]	Size [w/h/d cm]
1000	16	<b>52,80</b>	<b>42,2</b>	80/141/260
1000	32	<b>105,60</b>	<b>84,5</b>	80/141/260
1000	48	<b>158,40</b>	<b>126,7</b>	80/202/260
1000	16	<b>52,80</b>	<b>42,2</b>	130/141/130
1000	32	<b>105,60</b>	<b>84,5</b>	130/141/130

#### Function

#### description:

Each AMVOLT LV Module is composed of individual prismatic LiFePO<sub>4</sub> cells (16 pcs in 16S1P circuit) and connected into a functional unit using original jumpers. AMVOLT LV Modules are designed for direct connection of inverters, MPPT controllers, chargers or other devices compatible with system voltages from 45 V to 60 V. Discharge, overcharge or fault signalling is by means of status contacts. Disconnected contacts = normal operating condition, disconnected contacts = end of charging or discharging.



Fig.: 3x AMVOLT 50kWh Module in three floors above each other. 3x16 pieces of LiFePO<sub>4</sub> cells Winston WB-LYP1000AHC 3.3 V, 1000 Ah with nominal voltage 48 V, general installation contractor: ENER-SERVIS a.s. + Tomáš Vocílka (Asolar s.r.o.)



Fig.: Example of dimensionally modified AMVOLT 50kWh LV Modules according to customer's specific space requirements, installation partner Tomáš Vocilka (Asolar s.r.o.)

## 4. Battery cells and the logic of their usage

In all AMVOLT battery storage systems we use industrial LFP ( $\text{LiFePO}_4$ ) prismatic cells of the world-proven Winston brand, which we purchase from our parent company GWL Group a.s. The latter has a stock of LFP cells of various variants in its Prague warehouses with a capacity of around 12 MWh, which significantly contributes to the fast delivery times of AMVOLT storage facilities.

Winston LFP cells are characterized by high safety and long service life, they are non-flammable, non-explosive. Typical cell life is up to 8 thousand cycles, but even after that the cells can be used for many more years without problems. In the event of damage to any of the cells in any Amvolt storage system, individual cells can be replaced, or the other cells can be reassembled and used - so the entire storage system is not damaged, as is the case with sealed battery boxes.



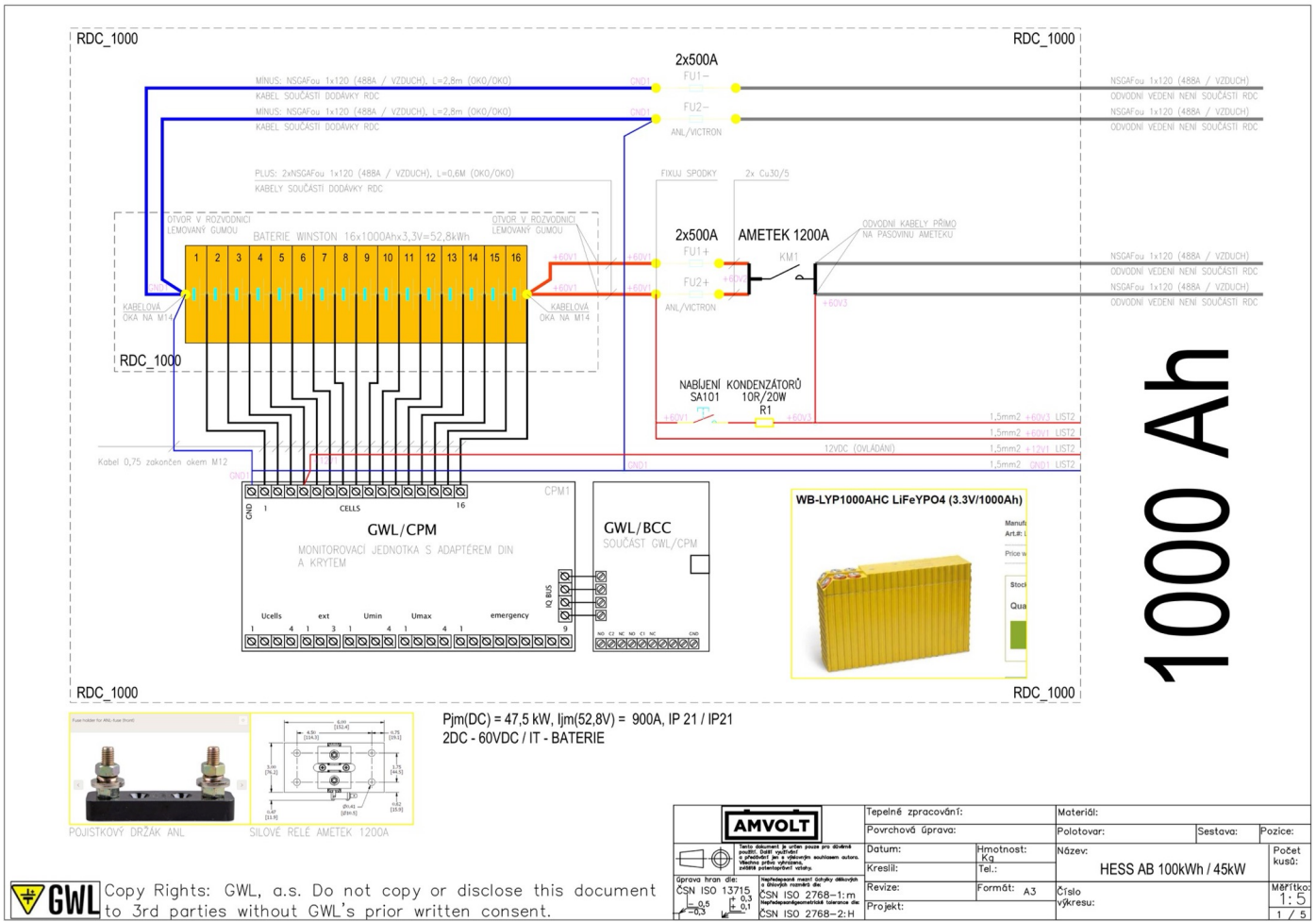
## 5. Basic operating states

- 1) Charging from a DC source with a system voltage of 48-60 V: e.g. PV or DC part of an inverter (maximum charging power 45 kW / 1 floor / Winston cells)
- 2) Discharge to the DC part of the inverter: generally a load with a system voltage of 48-60 V (maximum discharge power 45 kW / 1 floor / Winston cells)

### List of important components of the basic AMVOLT LV Module (35/50 kWh):

16 Winston lithium cells with a nominal capacity of 700 Ah (35 kWh variant) or 1000 Ah (50 kWh variant) and a voltage of 3.3 V; fasteners; copper jumpers/ropes with lugs; BMS (automatic disconnection  $U_{max}$ ,  $U_{min}$ ); DC power contactor; balancing module for 16 cells; construction

# 6. Block diagram of AMVOLT 50 kWh LV Module



# 7. Placement options

a) AMVOLT LV Modules for the technical room



b) Complete low-voltage container storage (technical specifications on request from AMVOLT)



## 8. Compatibility and communication with inverters

### Inverter information

AMVOLT LV Modules are compatible with any inverter that supports battery voltages between 48 and 58 V. It also needs to be able to stop charging based on a specific battery voltage (55-56 V) or a change in the state of the potential-free contact, and stop discharging based on reaching a specific voltage (48 V) or a change in the state of the potential-free contact. The two potential-free (status) contacts for stopping charging and discharging can be in any configuration, i.e. either NC (normally closed) or NO (normally open).

Victron Ecosystem for AMVOLT LV Battery Containers			
Victron QUATTRO 15 kVA		Low Voltage (LV) 48V	
Variant	Number	Output [kW / 400V]	recommended (80%) [kW / 400V]
1	3 x 15 kVA	45	36
2	6 x 15 kVA	90	72
3	9 x 15 kVA	135	108

With AMVOLT battery storage we supply Multiplus I., Multiplus II. or Quattro inverters from Victron Energy as standard, which are currently 100% compatible, verified and [certified \(manufacturer's website\)](#).

We are only able to supply battery storage at the customer's request, but we still recommend Victron Quattro inverters as the most suitable.

### BMS and communication

AMVOLT LV Modules have an integrated BMS of their own design manufactured in the Czech Republic. It is deliberately not connected to any foreign cloud (for security reasons), but at the same time it allows remote control and monitoring by direct access through a firewall, which the customer has under his complete control. No one - except persons authorized by the customer - has the ability to remotely shut down, disable, control or monitor the device.

AMVOLT BMS is highly secure: it has the software source code in open source mode on GitHub, eliminating any back door threats. Furthermore, AMVOLT BMS can be easily replaced with another BMS at any time in the future.

AMVOLT LV Modules can discharge and charge with a maximum power output of 108 kW over almost the entire capacity range (i.e. up to 3 C). For maximum lifetime, however, we recommend using a current of max 1 C.

AMVOLT LV Modules do not intentionally have any digital bus communication (RS485, CAN, Modbus...), because in our long-term experience this is a potential source of frequent problems, incompatibility and limits future upgrades, replacement with another type, etc. Digital communication is really more necessary for less robust batteries that require SoC-based limitations on discharge and charge performance. This is not the case for AMVOLT LV Modules.

Depending on the customer, we offer several variants of BMS and the method of communication with inverters:

#### 1. Basic, fully sufficient

The AMVOLT BMS and integrated DC contactor provide battery protection against over-discharge, overcharging or overbalancing. The integrated Victron Smart shunt then communicates battery SoC %, current and voltage information to the Victron master system (included as standard) via the VE-Direct interface.

#### 2. Advanced communication solution

It also includes a Victron BMV 702 module (display and shunt). It has all the functions of the basic system and also has a display with basic battery data (current, voltage, SoC) and 1x NC/NO relay, whose on/off can be set based on % SoC. This is useful for controlling an external charger, MPPT controller, etc. outside the Victron ecosystem.

#### 3. Maximum communication solution

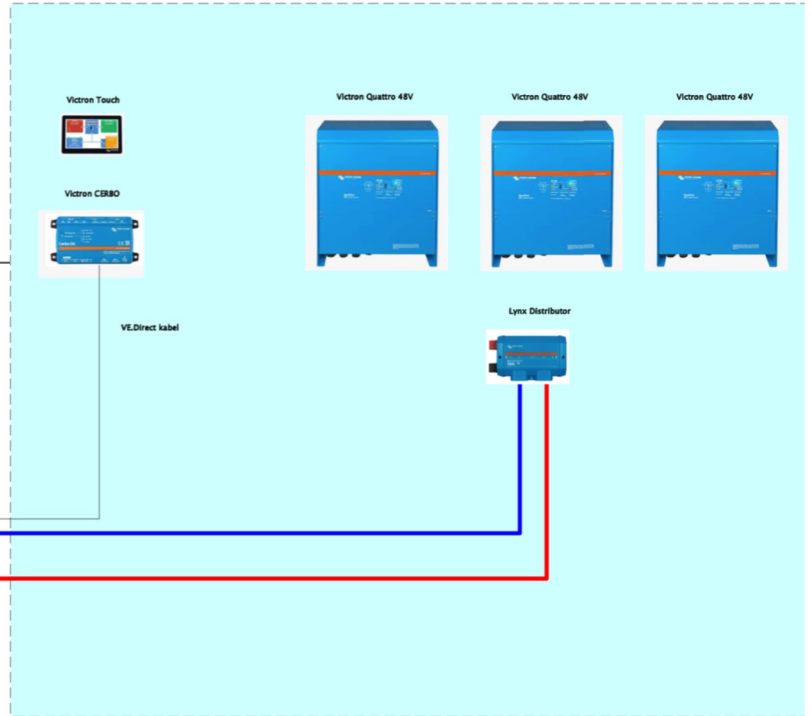
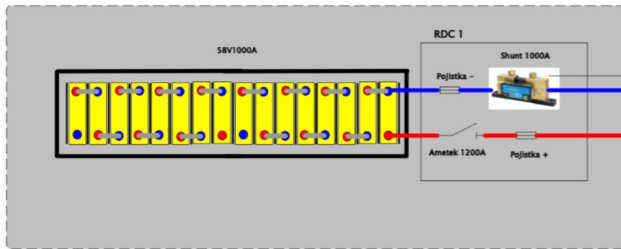
It includes everything that the extended version does plus a Victron Cerbo GX module that adds 2-3 more NO/NC relays that can be programmed based on SoC, temperature, etc.

This variant can alternatively be fitted with the REC-BMS module which allows CAN + RS485 + Modbus communication compatible with Victron and other inverters, see [supplier's website](#).

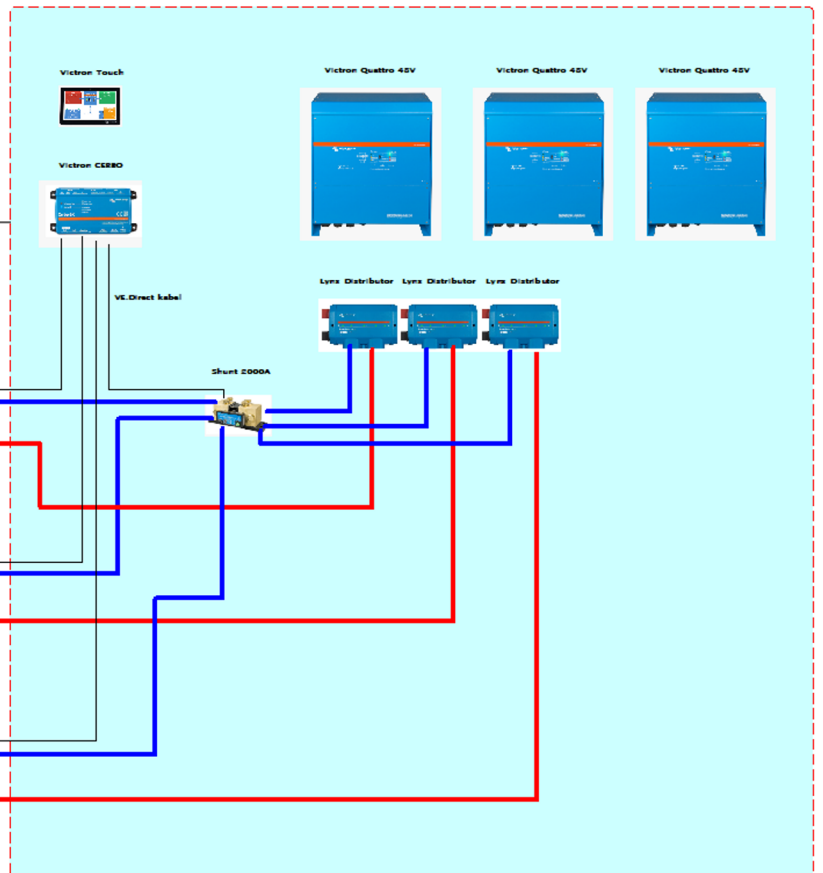
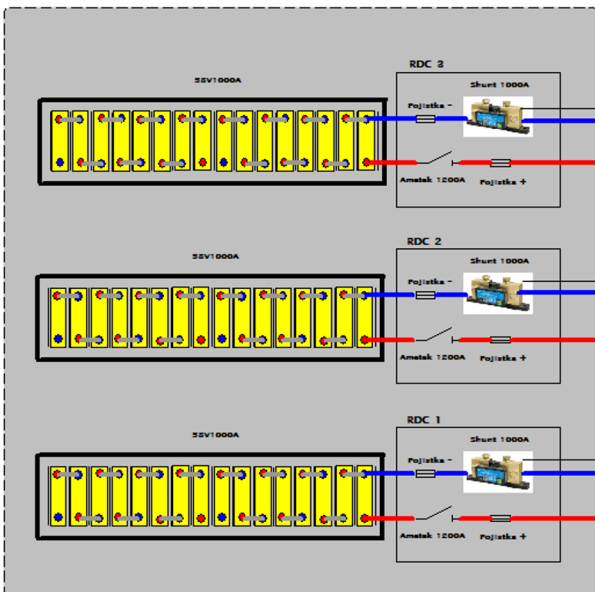


## 9. Examples of connecting AMVOLT LV Modules to the Victron ecosystem

When installing 1 AMVOLT LV rack module (i.e. 35/50 kWh), a Victron Shunt is installed in the battery cabinet and connected via a V-direct cable to the Victron Cerba.



When installing 3 AMVOLT LV Modules, a Victron Shunt is installed in each battery cabinet and connected via a V-direct cable to the Victron Cerba.



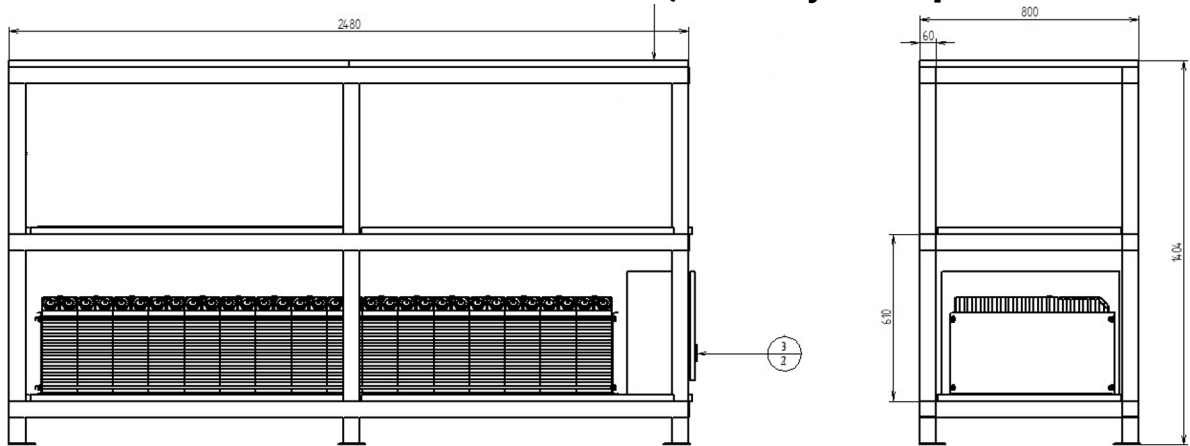
Note: The storage connection wires shall be NSGAFou (or equivalent), of the same length, terminated with cable lugs.

## 10. Reference photos of AMVOLT 50 kWh LV Modules (50 kWh = 1 floor)

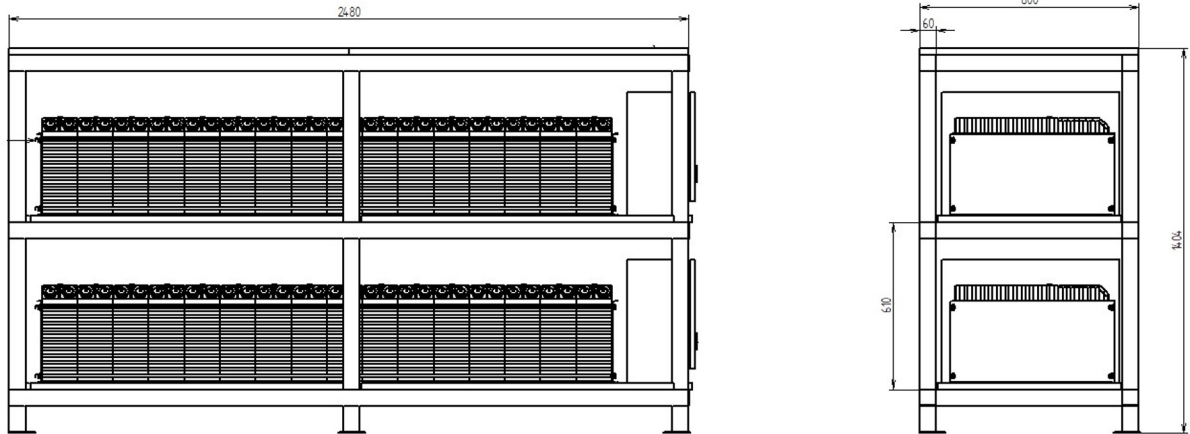


# 11. Layout - placement of technologies

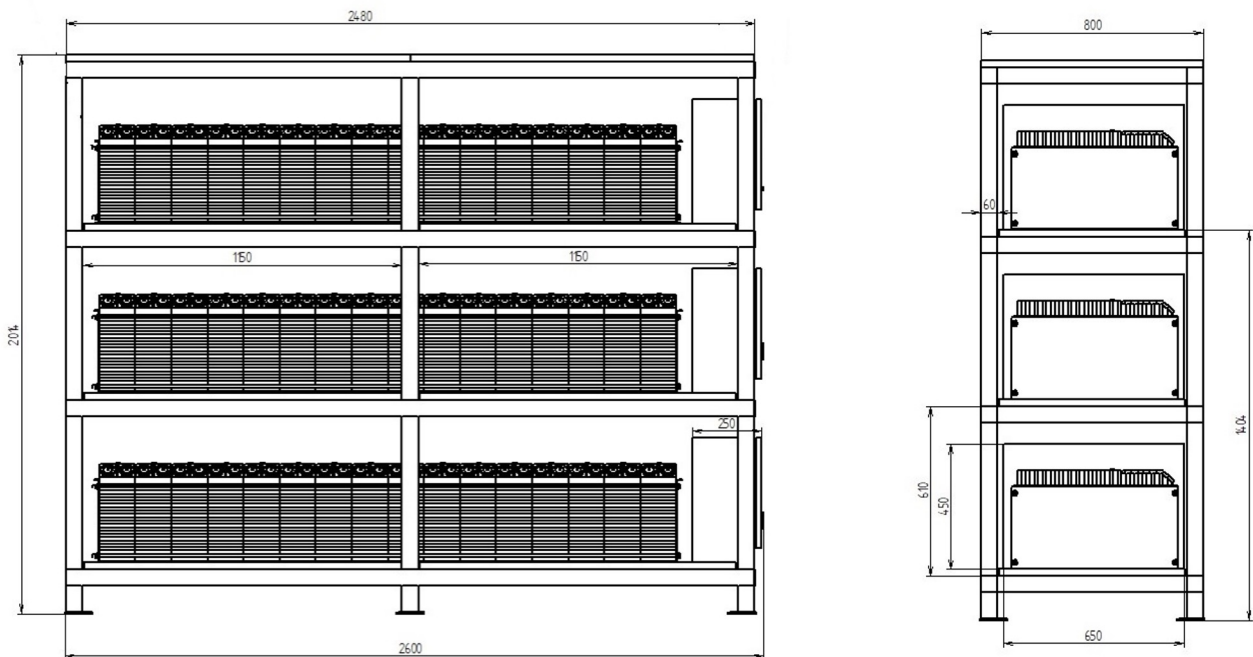
**Base module = 2 floors: 1. used 35/50 kWh, 2. ready for expansion**



**Base module = 2 floors: 1st used 35/50 kWh, 2nd used 35/50 kWh**



**Base module + additional floor = 3 floors, 105 kWh or 150 kWh**



AMVOLT LV Modules can be dimensionally designed according to the customer's specific space needs beyond these standardized dimensions.

## 12. Details of standard delivery of AMVOLT LV Modules

### The delivery includes:

- charged battery cells according to required capacity
- power elements
- corsets, jumpers, support rack with cabling
- X pieces of switchgear (according to the number of floors)
- Victron inverters according to the required capacity
- DC interconnection of substation and inverter (e.g. using NSGAFoU 120 mm<sup>2</sup> cables)
- transport of material
- staff travel and accommodation
- electrical documentation, wiring diagram of the battery and BMS
- mechanical assembly
- battery recovery at the installation site
- authorised inspection after the first month of operation.

### The delivery doesn't include:

- temperature management of the technical room in the range of 10 - 35 °C (air conditioning, insulation...)
- BMS internet connection (1 x UTP cable + 1 x fixed private IP address for each module required)
- regular revision by the Amvolt team once a year (to maintain the maximum warranty)

## 13. Warranty conditions of AMVOLT LV Modules

- 12 years warranty from the date of delivery for the mechanical construction of the shelving modules
- Warranty 12 years or 8000 charge cycles = charge (70% SoC) and discharge (70% DoD) (whichever comes first) to 60% of nominal battery cell capacity
- 5 year warranty on battery protection circuitry (BMS)
- 5 years transferred supplier's warranty on modular switchgear components such as circuit breakers, contactors
- Lifetime warranty for technical support, service and upgrade options
- To maintain the maximum warranty, we recommend that regular annual system inspections are carried out and that any interventions to the internal wiring are only entrusted to trained and qualified personnel of the supplier or storage operator



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**AMVOLT is a part of the Czech company GWL Group a.s., which has been testing high quality LiFePO4 battery cells for 15 years and is one of their largest European distributors.**

AMVOLT energy storages are characterized by open architecture and the concept of repairability of single components of the system. AMVOLT is a Czech manufacturer of modular energy storage systems ranging from large 1+MWh containers (BESS) to small 5 kWh units. AMVOLT's mission is to help reduce the general dependence on energy products from Asia.



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