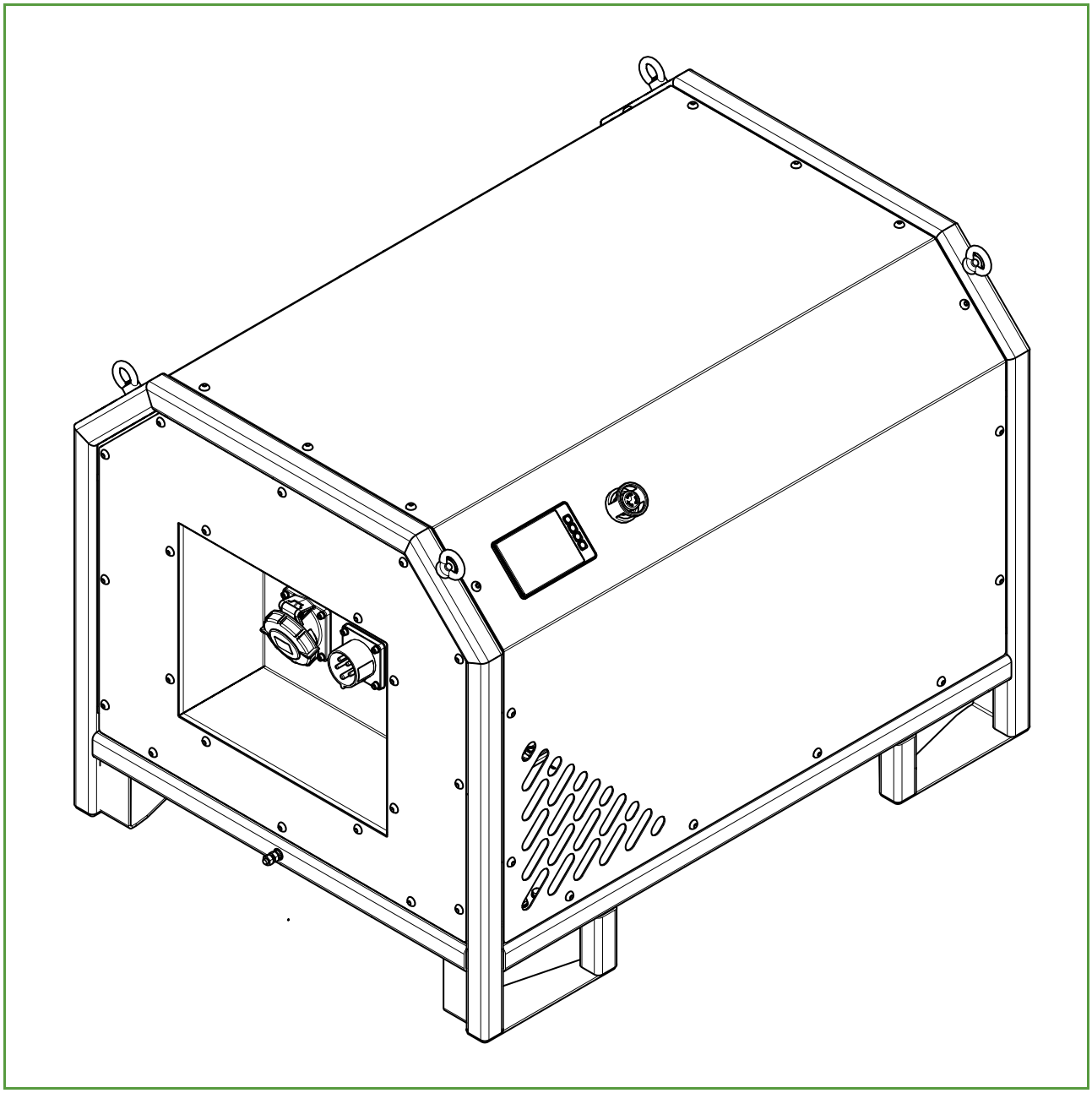
LIMACH®

User Manual

Powerbank



Documentnumber: MU000032

Version 1.0 English

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PREFACE

INTRODUCTION

This is the Limach user manual for the powerbank.

- Only start to use the powerbank after having read and understood this entire user manual.
- Obey all safety instructions.
- This user manual is intended for users.

SAFETY

Only personnel that meet these conditions can do the procedures in this user manual.

- Know this user manual.
- Know the technical manual of auxiliary machines and tools.
- Know all safety aspects of auxiliary machines and tools.
- Know the local statutory labor, safety protocols and laws.
- Always obey these protocols and laws.

OTHER MANUALS

This user manual gives no (or only partly) information about usage of auxiliary machines and tools needed to use the machine. Refer to the correct user manuals for instructions about the correct use and safe operation of these tools and machines.

EDITORIAL METHOD

Safety signs



DANGER

DANGERS identify a dangerous situation. If you ignore the manual instructions, it WILL cause serious or lethal injury to personnel and it CAN cause serious damage to the product.



WARNING

WARNINGS identify a dangerous situation. If you ignore the manual instructions, it CAN cause serious or lethal injury to personnel and it CAN cause serious damage to the product.

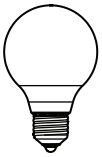


CAUTION

CAUTIONS warn to obey the manual instructions. If you ignore the manual instructions, it can cause injury to personnel and it can cause damage to the product.



NOTE
NOTES give extra information and identify potential problems.



TIP
TIPS make suggestions or instructions to do some tasks easier.

References

A reference to a **section**, **table** or **figure** always includes the chapter number and a dot.

For example: Refer to section 2.2, '*Safety instructions*'.

The numbers between square brackets are **reference numbers** in a figure. These *are only valid in the (sub)section* of that figure.

For example: Turn the shaft [1] around its axis.

If a subsection has two or more figures, the **reference number** includes the figure number.

For example: Turn the shaft [1] (figure 3.2) around its axis.

The numbers between parentheses are **part numbers**.

For example: Remove the bolts (6).

Footnotes

An asterisk (*) identifies a footnote. Footnotes usually occurs in tables and formulas. If more than one footnote are on the same page, the symbol shows two or three times.

Types of lists

Table P.1 Types of lists

Step by step instructions	Choices	Enumerations
Do:	Select option:	These parts:
1 First step	♦ A	☛ A
2 Second step	♦ B	☛ B
3 Third step	♦ C	☛ C

DOCUMENT HISTORY

Table P.2 Document history

Release date	Version	Comment
04-09-2026	Version 1.0	New release

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1 INTRODUCTION

1.1 ABOUT THIS USER MANUAL

Keep this user manual with the powerbank.

1.2 INTENDED USE

This user manual gives the procedures for the powerbank. It gives important information to use the powerbank correctly. It also contains important safety procedures and precautions to prevent accidents to personnel and damage to the equipment.

Read the instructions carefully before you use the powerbank. Make sure that you know its operation routines.

1.3 UNINTENDED USE



WARNING
Do not use the powerbank for any purpose other than that for which the powerbank was originally designed.

It is hazardous to use a powerbank:
- In an environment the powerbank was not designed for
- Under conditions the powerbank was not designed to do work in.

1.4 OPERATING CONDITIONS

1.4.1 Scope of application

Only use the powerbank under normal conditions for the areas of application shown in this manual.

Take special safety precautions and/or install the correct powerbank equipment when you use the powerbank:
- For other applications than given in this manual
- In an environment that can pose dangerous situations
- In an environment that contains explosive gases
- In an environment that contains flammable substances
- In an environment that contains asbestos-containing dust particles.

Refer to the manufacturer/dealer for more information.

1.4.2 Environmental requirements

Always think about the environment during operation, servicing and doing maintenance of the powerbank. Always obey all applicable local and national environmental protocols.

1.5 DISCLAIMER

In all cases not mentioned in this manual, concerning the use and safety of the powerbank, Limach assumes no responsibility for health damage or damage to the powerbank caused by accidental, improper, irresponsible or other use of the powerbank.

1.6 ABBREVIATIONS

Table 1.1 Abbreviations

Abbreviation	Full
AC	Alternating Current
DC	Direct Current
ECU	Electronic Control Unit
HV-box	High Voltage box
LV-box	Low Voltage box
MSD	Manual Service Disconnect
PDU-box	Power Distribution Unit box
SoC	State of Charge

1.7 CONTACT INFORMATION

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2 SAFETY

2.1 INTRODUCTION

Make sure that you obey the general safety instructions and precautions in this chapter. In each chapter are safety instructions as well.



WARNING
All personnel must understand and obey these safety instructions.

2.2 SAFETY INSTRUCTIONS



WARNING
The powerbank shall only be opened by qualified Limach employees.

- All personnel must know where to find emergency equipment.
- All personnel must understand the emergency procedures.
- Always use the correct tools and equipment.
- Always wear suitable protective clothing.
- Examine the powerbank for defects before you operate it.
- Make sure that the work area is clear of unnecessary personnel and equipment.
- Make sure that there is no maintenance in progress before you operate the powerbank.
- Make sure that there is no risk to personnel or equipment before you operate the powerbank.
- Never do work with greasy or oiled hands.
- Never operate the powerbank in an explosive or flammable environment.
- Never operate the powerbank under the influence of alcohol, medication or other narcotics.
- Only qualified personnel can operate the powerbank.
- Only use the powerbank for the purpose that it is designed for.
- Operate the powerbank in a stable physical and mental condition.
- Tell all defects to a supervisor immediately.

2.3 ENVIRONMENT

- Discard all materials in an environmentally friendly way.
- Used batteries are dangerous to the environment.
- Used rags, gloves, and other cleaning materials are dangerous to the environment.

3 DESCRIPTION

3.1 INTRODUCTION

The Limach powerbank features multiple standard connections and can be used with a wide range of equipment.

3.2 INSTALLATION OPTIONS

There are two types of powerbank:

- PB25 (capacity is 25 kWh)
- PB50 (capacity is 50 kWh)

3.3 INCLUDED ITEMS

Table 3.1 Included items

Item	PB25	PB50
Extension cable 5 m	16 A	32 A
Mobile charger	16 A	32 A
Ground electrode		

3.4 TYPE PLATES

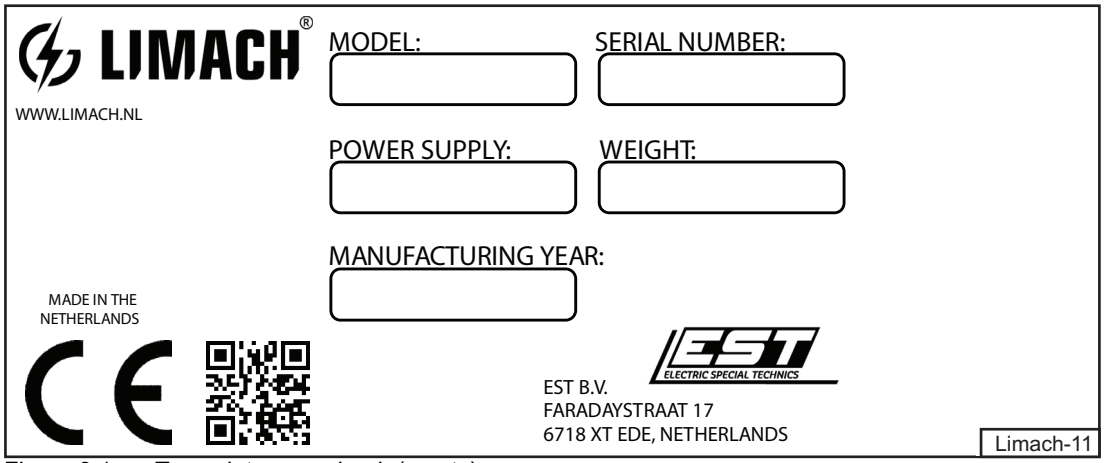


Figure 3.1 Type plate powerbank (empty)

3.5 PRIMARY PARTS

3.5.1 Overview

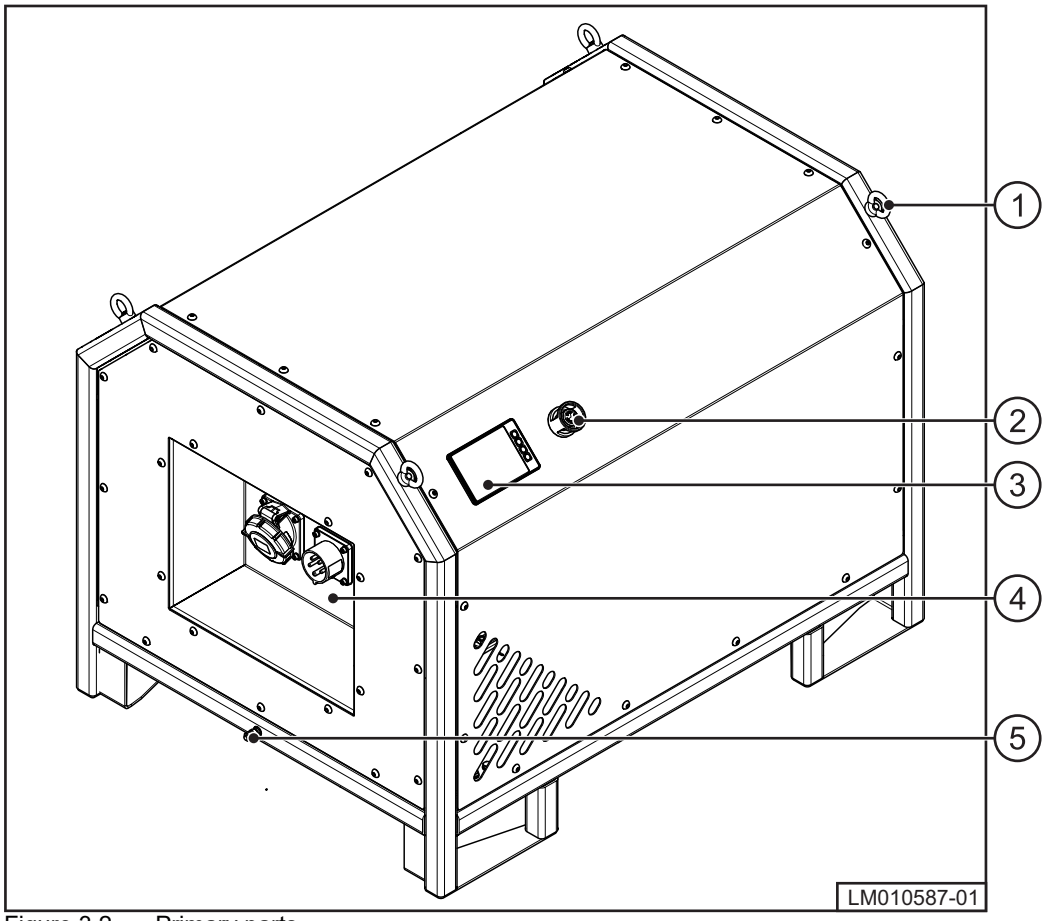


Figure 3.2 Primary parts

1 Lifting point (4×)
2 Emergency stop button
3 User interface
4 Instrument panel
5 Grounding point

The powerbank includes these primary parts:

- Lifting points
- Emergency stop button
- User interface
- Instrument panel
- Grounding point

3.5.2 Instrument panel

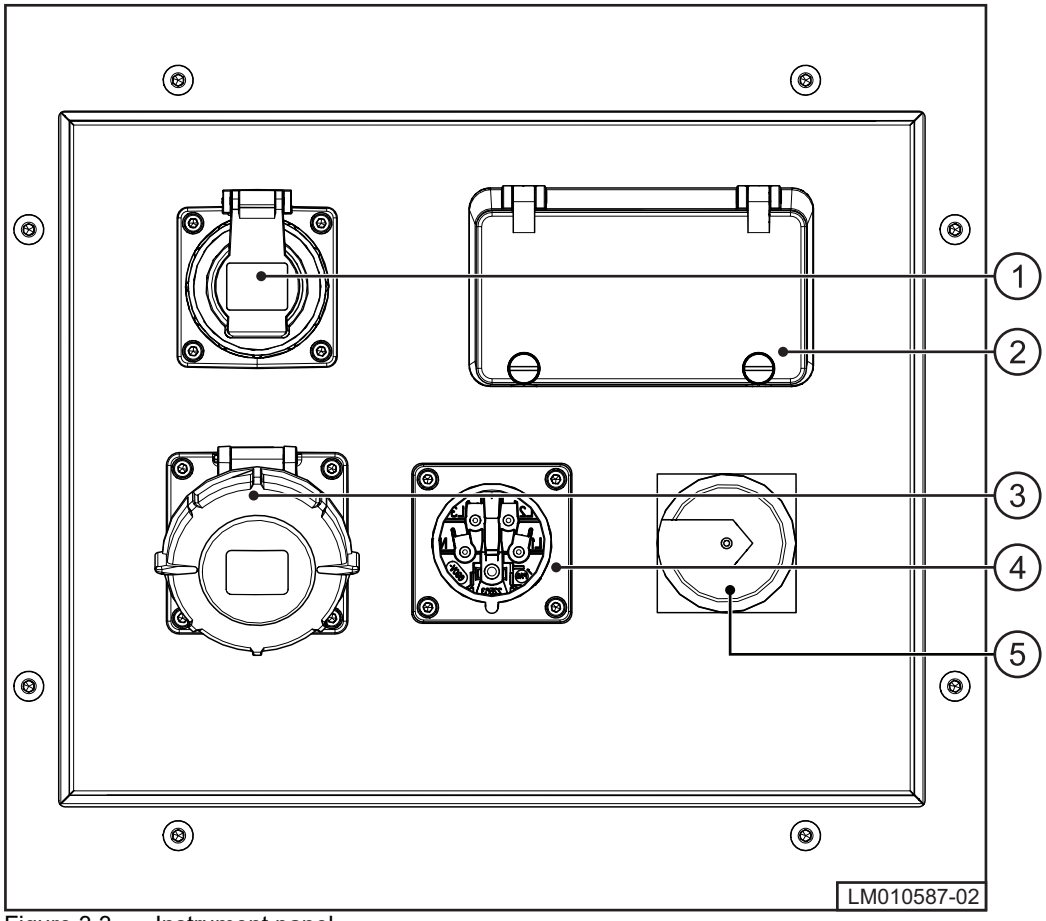


Figure 3.3 Instrument panel

1 230 V power socket
2 Circuit breakers
3 400 V power socket
4 Power inlet
5 Main power switch

3.5.3 Ground electrode

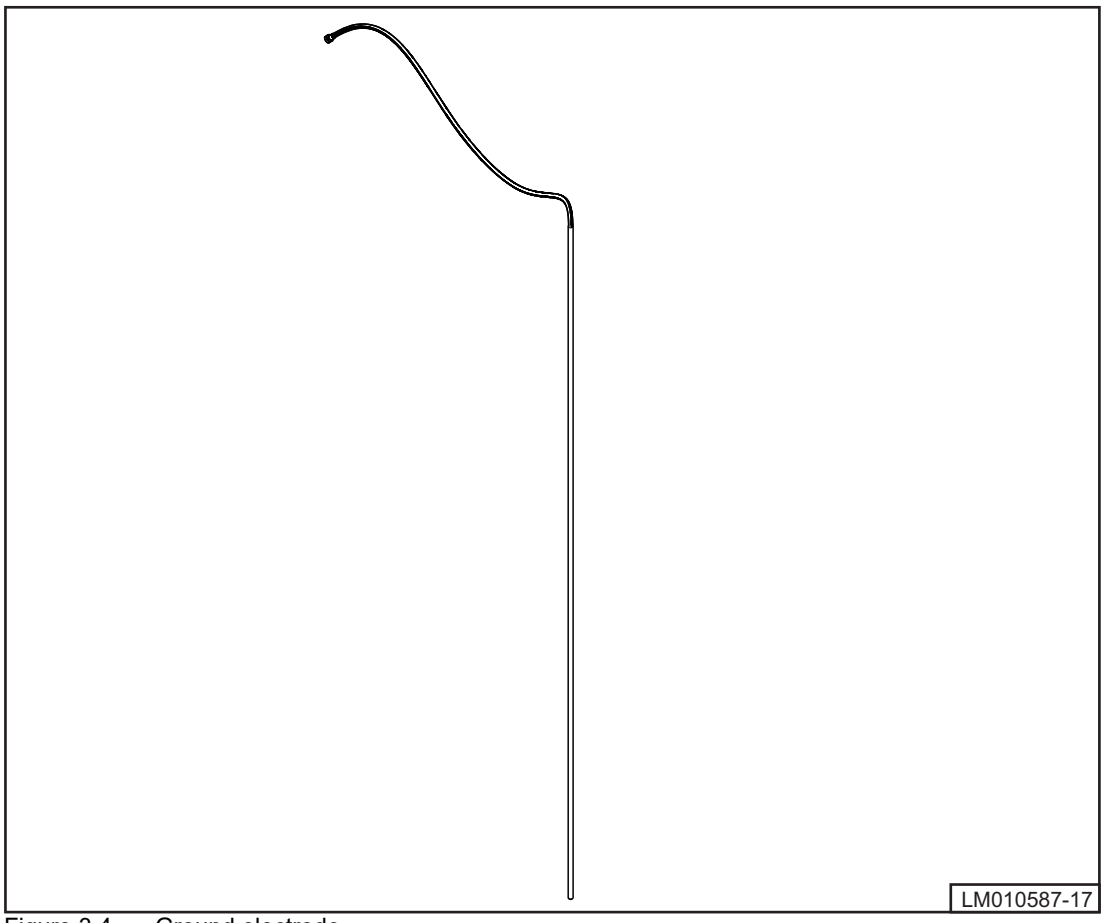


Figure 3.4 Ground electrode

3.6 USER INTERFACE / DISPLAY

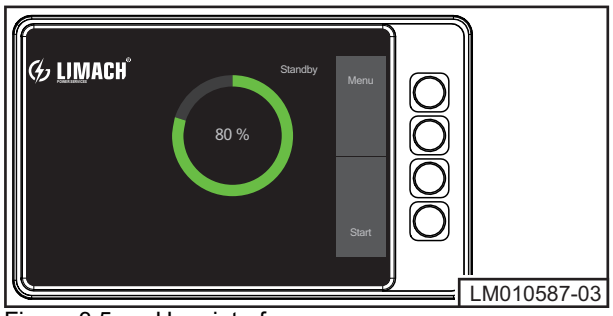


Figure 3.5 User interface

Menu options*:

- Main
- Errors
- Settings

* This manual does not describe the diagnostics menu. Do not use this function unless asked to do so by the dealer or manufacturer.

3.7 FUNCTIONS

The powerbank has these functions:

- Charging
  Charging the powerbank battery (from the power grid).
- Discharging
  Using the powerbank battery as an energy source.

3.8 STATES

These states (see the upper line in the screen) can occur:

- Standby
- Start Up
- Active
- Disconnect

4 TRANSPORT AND STORAGE

4.1 GENERAL NOTES



CAUTION

Make sure that installing, aligning, attaching and moving the powerbank on a semi-trailer or other vehicle agrees with the applicable legal provisions and regulations of the applicable country. Refer to the manufacturer/dealer for more information.



CAUTION

Safety and protect all powerbank parts correctly to prevent damage during transport and storage.



CAUTION

Prevent damage and corrosion to the powerbank during transport and storage.

4.2 WEIGHT AND SIZE

For the weight and size of the powerbank, refer to Appendix A, '*Technical specifications*'.

4.3 TRANSPORT

4.3.1 General



WARNING

Transport the powerbank only on a stable, flat, and clean surface. Remove ice, mud, or other contamination from the bottom before transporting the powerbank.

4.3.2 Preparation

Make sure that these items are ready:

- Forklift
- Anti-slip mat
- Straps

4.3.3 Stopping the powerbank

1 Make sure that all load devices are inactive.
2 Disconnect all **load** cables from the powerbank.

3 Go to the main screen.
   a Push the button next to “Menu”.
   b Push the button next to “Main”.
4 Push the button next to “Stop”.

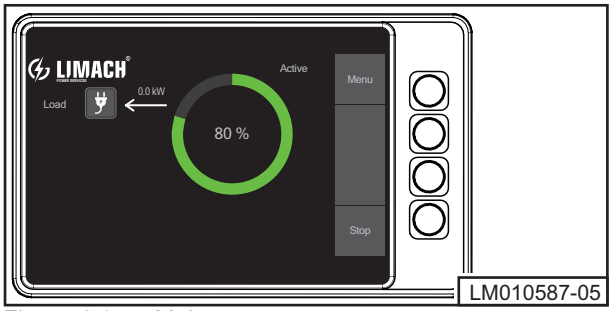


Figure 4.1 Main screen

5 Set the main power switch to the “OFF” position.
6 Disconnect the powerbank from the power grid.

4.3.4 Lifting the powerbank

There are two ways to lift the powerbank:
- Use the lifting points (refer to figure 3.2, ’*Primary parts*’)
- Use a forklift

4.4 STORAGE CONDITIONS

Temperature : -40°C – 60°C
Humidity : ≤ 75%

5 OPERATION



WARNING
Do not disconnect the powerbank from the power grid while it is active. Always stop the powerbank before disconnecting the power grid cable.



DANGER
Always use the ground electrode when using the powerbank while it is not connected to the grid.

5.1 EMERGENCY STOP PROCEDURE

1 Push the emergency stop button.
2 Set the main power switch to the “OFF” position.

5.2 GENERAL NOTES

- The powerbank contains an internal 12 V (1×12 V) battery. This is only recharged when the powerbank is actively charging or discharging.
- The powerbank detects when the power bank is connected to the power grid.
- When charging or discharging is stopped using the stop button on the screen, the powerbank will go into standby mode (note that the internal battery may discharge in this mode). The powerbank can be restarted by pushing the start button on the screen.
- The physical buttons can also be activated by tapping the touchscreen.

5.3 OPERATION PROCEDURES

5.3.1 Starting

If the main power switch is in the “OFF” position:
1 Set the main power switch to the “ON” position.

If the main power switch is in the “ON” position:

1 Go to the main screen.
   a Push the button next to “Menu”.
   b Push the button next to “Main”.
2 Push the button next to “Start”.

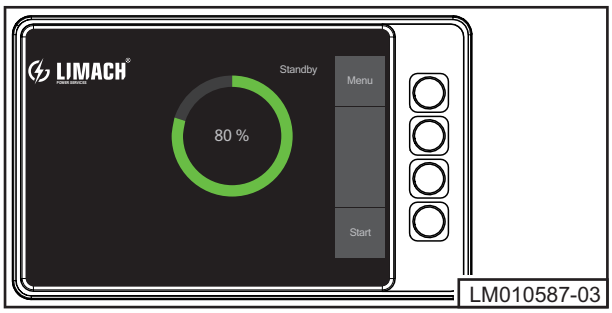


Figure 5.1 Main screen - standby

5.3.2 Charging

1 Connect the powerbank to the power grid (4 in figure 3.3, ’*Instrument panel*’).

5.3.3 Discharging

1 Connect the load to the powerbank.

5.3.4 Go to standby mode

1 Go to the main screen.
   a Push the button next to “Menu”.
   b Push the button next to “Main”.
2 Push the button next to “Stop”.

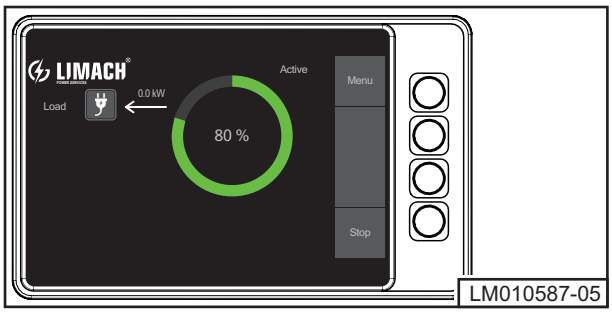


Figure 5.2 Main screen - active

5.4 STOPPING



WARNING
Never stop the powerbank with the emergency stop button unless there is an emergency.



NOTE
Always set the main power switch to “OFF” after stopping the powerbank. The internal battery does not charge while the powerbank is inactive.

1 Go to the main screen.
   a Push the button next to “Menu”.
   b Push the button next to “Main”.
2 Push the button next to “Stop”.

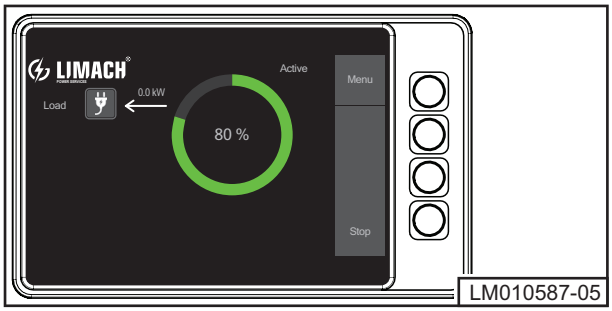


Figure 5.3 Main screen - Active

3 Set the main power switch to the “OFF” position.

5.5 MENU OPTIONS

5.5.1 Showing errors

1 Push the button next to “Menu”.
2 Push the button next to “↑” or “↓” until *Errors* is selected.
3 Push the button next to “Enter”.

For a list of error codes, refer to Appendix B, ’*Error codes*’.

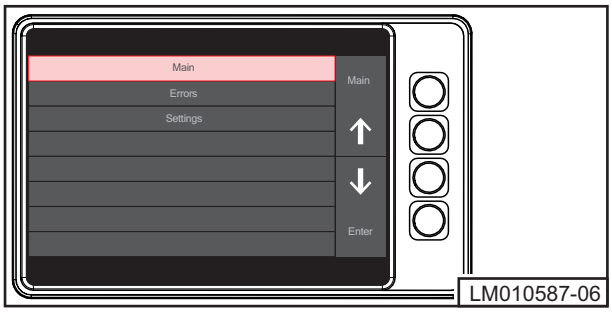


Figure 5.4 Menu screen

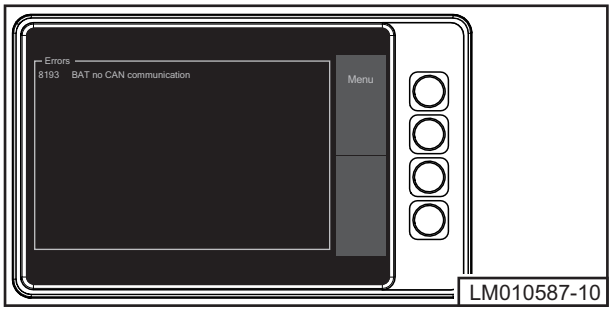


Figure 5.5 Error page screen

5.5.2 Changing settings

NOTE
The power bank must be in standby mode to change the settings.

1 Push the button next to “Menu”.
2 Push the button next to “↑” or “↓” until *Settings* is selected.
3 Push the button next to “Enter”.

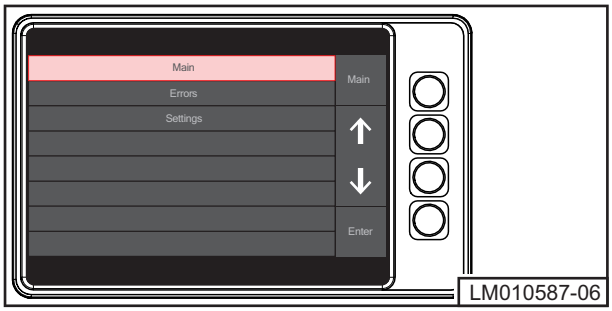


Figure 5.6 Menu screen

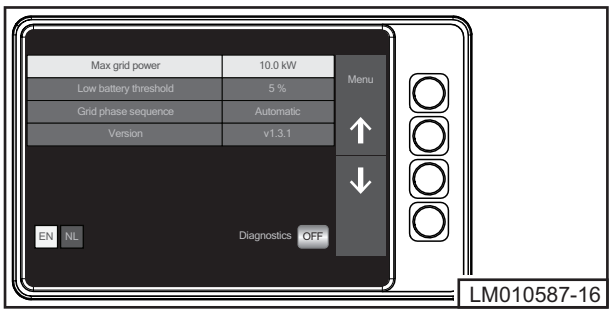


Figure 5.7 Settings screen

Table 5.1 Settings

Setting	Description	Field
Max grid power	Set the maximum power that the powerbank can pull from the grid	Numeric in kW
Low battery threshold	Set the percentage threshold for the low battery warning	Numeric in percents
Grid phase sequence	Set the connection sequence of the grid phases	Automatic / 0 120 240 / 0 240 120
Language	Set the interface language	EN / NL
Diagnostics	Show diagnostics menu options*	OFF / ON

* This manual does not describe the diagnostics menu. Do not use this function unless asked to do so by the dealer or manufacturer.

5.6 CONNECTING THE GROUND ELECTRODE

Always use the ground electrode when using the powerbank while it is not connected to the grid.

Use the two M8 nuts [3] to connect the ground electrode [1] to the grounding point [2] of the powerbank.

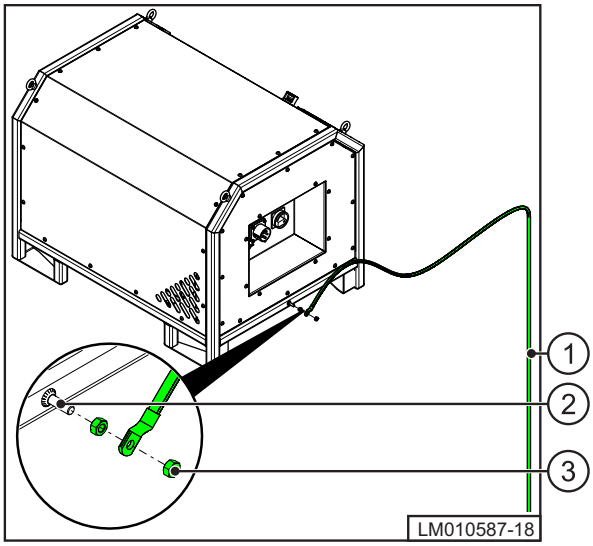


Figure 5.8 Connecting the ground electrode

6 MAINTENANCE

6.1 SCHEDULED MAINTENANCE



CAUTION

The time between maintenance inspections is not to exceed four weeks.

The maintenance procedures and their frequency are:

Table 6.1 Maintenance schedule

Time interval	Procedure	Information
8-10 hours	Visual inspection	Section 6.2

6.2 VISUAL EXAMINATION

Walk around the powerbank and:

- Look for visible damage, cracks
- Look for loose connections and bolts
- Make sure that decals are undamaged and legible.

7 SCRAPPING

All materials must be disposed of according to applicable local (legal) regulations.

8 TROUBLESHOOTING

If a problem occurs, do these steps:

1 Stop the active charging/discharging session.
2 Set the main power switch to “OFF”.
3 If applicable, disconnect the powerbank from the power grid.
4 Wait for five seconds.
5 Set the main power switch to “ON”.

If the problem still exists, call your supplier.

APPENDIX A TECHNICAL SPECIFICATIONS

Table A.1 Technical specifications

Quantity	Number		Unit
	PB25	PB50	
Max AC output power	10	20	kVA
Power output	1×230 / 16	1×230 / 16	V / A
	1×400 / 3×16	1×400 / 3×32	V / A
AC input power	10	20	kW
Power input	3×16	3×32	A
External dimensions (l×b×h)	1060×800×780	1200×800×890	mm
Mass	375	595	kg
Type of battery	NMC Lithium-ion	NMC Lithium-ion	–
Mass of battery	160	320	kg

APPENDIX B ERROR CODES

Table B.1 Error codes

Code	Severity	Display text	Description
4097	error	Battery empty, connect grid to start charging	Battery state of charge is 0%, powerbank will not start until a charging cable is connected
4098	warning	Battery low!	Battery state of charge is below the threshold set in the Settings menu
4099	warning	Auxiliary Battery low!	Please push "start" to go to active and charge the internal 12 V battery
4100	info	Please remove charging cable	The charging cable needs to be removed
4101	warning	Power threshold was exceeded. Powerbank disconnected	Powerbank disconnected, because the power output exceeded the limit set in the Settings menu
4102	error	Powerbank Main contactor welded open	Main (Battery) contactor is stuck in an open position and won't turn on, please contact service
4103	error	Powerbank Main contactor welded closed	Main (Battery) contactor is stuck in a closed position and can't turn off, please contact service immediately
4104	error	Powerbank Grid contactor welded open	Grid contactor is stuck in an open position and won't be able to charge, please turn off the powerbank and contact service
4105	error	Powerbank Grid cont weld closed, remove grid	Grid contactor is stuck in a closed position and can't disconnect from the grid, please disconnect any charging cable and contact service
4106	error	Emergency stop triggered	Interlock was disrupted, if the emergency button was not pushed, contact service
8193	warning	BATTERY no CAN communication	No CAN messages being received from the battery master, examine CAN connection cables
8194	warning	BATTERY must charge	Batteries are in a critical state and can't discharge any more
8195	warning	BATTERY must discharge	Batteries can't charge any more, a current user should be connected to discharge the batteries
8196	error	BATTERY system fault	Battery system is in fault state
8197	error	BATTERY nodes missing	A battery node is missing
8202	info	BATTERY a CAN message missing, can not start up	The battery master is not sending all CAN messages that are expected
12289	warning	CONVERTER BMS no CAN communication	No heartbeat from the CAN BMS communication with the AC/DC converter
12290	warning	Grid phase(s) missing. Powerbank will not start or charge.	The converter is detecting less than three phases on the grid connection, examine your connection
12291	warning	CONVERTER warning	The AC/DC converter is showing a warning. When only this error is displayed, please contact service
12292	error	CONVERTER fault	The AC/DC converter is showing an error
12293	error	CONVERTER F07 DC_START_Failure	The Bus voltage can't be built from PV or battery, restart powerbank
12294	error	CONVERTER F13 Working_Mode_Change	Change in grid and/or battery settings
12295	error	CONVERTER F15 AC_OuverCurr_SW_Failure	AC side over current failure

Table B.1 Error codes (Continued)

Code	Severity	Display text	Description
12296	error	CONVERTER F18 Tz_Ac_Overcurr_Fault	AC side over current fault, examine if the backup load power is within the range of the inverter
12297	error	CONVERTER F20 Tz_Dc_Overcurr_Fault	DC side over current fault, examine if the battery is connected
12298	error	CONVERTER F21 Tz_HV_Overcurr_fault	BUS over current, examine battery current settings
12299	error	CONVERTER F22 Tz_EmergStop_Fault	Remotely shutdown
12300	error	CONVERTER F26 BusUnbalance_Fault	BUS unbalanced, restart powerbank
12301	error	CONVERTER F34 AC_Overload_Fault	AC Overload fault, examine if backup load is in allowed power range
12302	error	CONVERTER F42 AC line low voltage	Grid voltage is lower than expected
12303	error	CONVERTER F47 AC_OverFreq_Fault	Grid frequency higher than expected
12304	error	CONVERTER F48 AC_UnderFreq_Fault	Grid frequency lower than expected
12305	error	CONVERTER F58 Battery_comm_Lose	BMS CAN communication lost
12306	error	CONVERTER F64 Heat_sink_high-temp-fail	Examine if the working temperature is too high
12545	warning	ECU no CAN communication	No CAN messages are being received by the ECU module
16384	warning	ISO No CAN Connection	No CAN messages are being received by the isolation measuring module
16385	error	ISO Device error active	An error has occurred in the isolation measurement
16386	warning	ISO HV_pos connection failure	Failure in the negative High Voltage connection of the isolation measurement
16387	warning	ISO HV_neg connection failure	Failure in the positive High Voltage connection of the isolation measurement
16388	warning	ISO Earth connection failure	Failure in the earth connection of the isolation measurement
16389	error	ISO value below threshold error Alarm	Iso value below threshold error
16390	warning	ISO value below threshold error Warning	Iso value below threshold warning
16391	warning	ISO Outdated. Measurement time out	Time elapsed since last measurement >= measurement timeout
16392	error	ISO Undervoltage Alarm	Under-voltage alarm
16393	warning	ISO Unsafe to Start	Isolation measurement tool can't start up because it is unsafe
16394	info	ISO Earthlift open	Earthlift open