

Installation and operating manual

Clesana Power-Management

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Clesana Power-Management (powered by VOTRONIC)

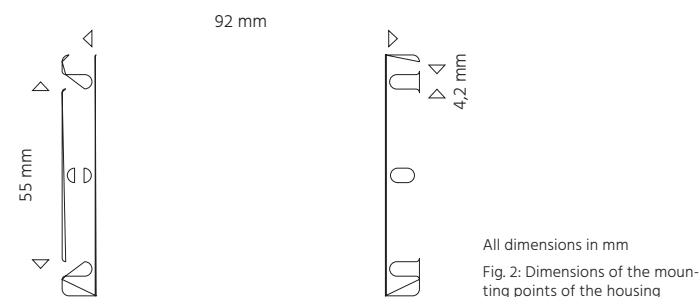
i Please read this installation and operating manual thoroughly, in particular the safety guidelines and instructions, before you start with the connection and start-up.

Using an additional buffer battery the Clesana Power-Management allows you to operate a Clesana C1 on weak 12 V power supply connections (with max. 3 A). The charging voltage of the buffer battery is based on the charging voltage of the supply battery, the power consumption is limited to 2.5 A thanks to the Clesana Power-Management. With sufficiently strong power supply (min. 22 A) the Clesana Power-Management can also be used as a remote control relay for switching off the Clesana C1.

⚠ Operation is permissible only with two identical battery rated voltages 12 V/12 V. Mixed operation can result in damages to the device and/or the batteries. Operation is not allowed on power sources not controlled by a charging program!

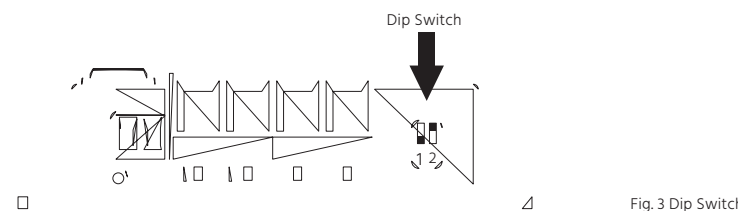
Device installation

Clesana Power-Management should be installed in the proximity of the buffer batteries as much as possible. The device must be properly protected against moisture and very good air supply must be ensured. Locations where trapped heat can build up are not suitable for the device. Clesana Power-Management can be mounted on external mounting points of the housing shown under Fig. 2. Ensure that cables are laid securely, sharp edges can damage cable insulation and lead to malfunctions or damages, always use suitable installation material. Make sure that the switch on the device is accessible and that the control LED is visible.



Setting the Dip Switch

Before electric connection of the device, you need to set the Dip Switch correctly. Consider which type of installation or function is suitable for you.



Dip Switch 1:

The following table shows the setting of the first Dip Switch (1):

Dip Switch 1	Stop	Beschreibung
OFF	top	As a relay (via supply battery)
ON	bottom	With buffer battery

Table 1: Dip Switch 1

Note, make sure to select the setting based on the executed connection scenario!

Dip Switch 2:

The battery configuration is set on Dip Switch 2, this applies only for the connection scenario "Connection with buffer battery", for the connection type as relay the setting of Dip Switch 2 is not relevant and can remain in starting position.

Dip Switch 2	Stop	Beschreibung
OFF	top	• Supply battery AGM and lithium buffer battery (LiFePo4)
ON	bottom	• Supply battery AGM and buffer battery AGM • Lithium supply battery (LiFePo4) and lithium buffer battery (LiFePo4) • *Lithium supply battery (LiFePo4) and buffer battery AGM

Table 2: Dip Switch 2

* Note, as a result of the constellation lithium supply battery and buffer battery AGM the AGM battery can be charged only to approx. 80% SOC.

⚠ ATTENTION! The Dip Switches must be set correctly before start-up, setting the Dip Switch during the operation is not allowed and can result in the destruction of the device!

Connection

The following table (Table 3: Terminals) lists the terminals of the Clesana Power-Management as they are located on the device from left to right. The terminal "EBL" is designed to be removable, all other terminals are firmly mounted on the device.

Terminal	Description
EBL+	Connect the the positive pole (+) of the control input with the output EBL/switching output +
EBL-	Negative pole (-) depending on the connection type, open (as relay) or vehicle ground (with buffer battery)
Batt.+	depending on the connection type, positive pole (+) of the buffer battery or positive pole (+) of the supply battery of the vehicle
Batt.-	depending on the connection type, negative pole (-) of the buffer battery or negative pole (-) of the supply battery of the vehicle
Toilet+	Connection + of the Clesana C1
Toilet-	Connection - of the Clesana C1

Table 3: Terminals

- The connection cable for the control input/charging current input must have a cross section of at least 0.75 mm² to 2.5 mm².
- The cable for the buffer battery must have a minimum cross section of 10 mm² and be fused with 30 A just behind the battery, use the original Clesana cable set for the installation.
- The cable for the Clesana C1 must have a minimum cross section of 10 mm², use the original Clesana cable set for installation at this location as well.

For full charging power, use **cable cross-sections and lengths** according to Table 4: Cable lengths and cross-sections). Described length is based on the total length of the supply and return conductors. For a **two-wire** cable, **half** of the specified cable length is recommended.

Cable cross-section	Battery/Clesana C1	
	Sum of cable lengths "Batt.+ and Batt.-" or "Toilet+ and Toilet-"	Cable protection fuse
10 mm ²	up to 8 m	30 A
16 mm ²	from 8 m	30 A

Table 4: Cable lengths and cross-sections

⚠ Mix-up of the "Batt.+" and "Batt.-" or "Toilet+" and "Toilet-" (reverse polarity at the input or output) can result in the destruction of the device and/or destruction of the Clesana C1. The device is not designed for operation with 24 V batteries. Improper connection can result in the destruction of the device.

The device connection is based on the intended application scenario. There is fundamental difference between the two connections. In the event that there is only a thin supply line to the Clesana C1 (mi. 3 A) and as a result the operation must be carried out with additional buffer batteries, please proceed according to the connection diagram "Connection to buffer battery". In the event that there is a sufficiently thick supply line for the Clesana C1 with min. 22 A current carrying capacity, please proceed according to the connection diagram "Connection as relay". Also note that the available supply line for the water flushing of the cassette toilet does not automatically act as a constant plus cable connected via the EBL. Provided that the available cable is not a constant plus cable connected via the EBL, in most cases it can be switched to a constant plus leading slot.

⚠ Installation may only be carried out by qualified technical personnel. Make sure that all cables are disconnected from the power supply for the installation. Pay particular attention the correct polarity. Make sure that there cannot be any unwanted short circuits.

Connection to buffer battery

- 1. Battery:** The battery is connected using the original cable set from Clesana. The cable set is fused with 30 A just behind the battery pole; do not insert the fuse yet, it is inserted for the initial start-up. Caution, the ground side of the battery must not be connected with the vehicle ground (body), the ground wire goes directly from the battery into the Clesana Power-Management, see Fig. 4.
- 2. Clesana C1:** The Clesana C1 is connected with the Power-Management using the original cable set from Clesana; here too, the negative connection of the Clesana C1 must not be connected with the vehicle ground!
- 3. Input (EBL):** On the input side, the device is connected to an EBL switching output or any another switching output. Here make sure that the switching output is connected with the vehicle ground (body) on the ground side. The switching output and the supply line must have a current carrying capacity of min. 3 A and secured accordingly using a safety fuse or another safety element. In case the supply line has no constant plus connected via the EBL and is not replugged into the EBL as described under the Item Connection, then a new control cable must be pulled from a constant plus source connected via the EBL as alternative.

⚠ The batteries to be charged must not be damaged or frozen. Pay attention to the correct polarity of the battery. Note the manual of the battery manufacturer. Never cause the battery to short circuit. Deeply discharging batteries must be pre-charged.

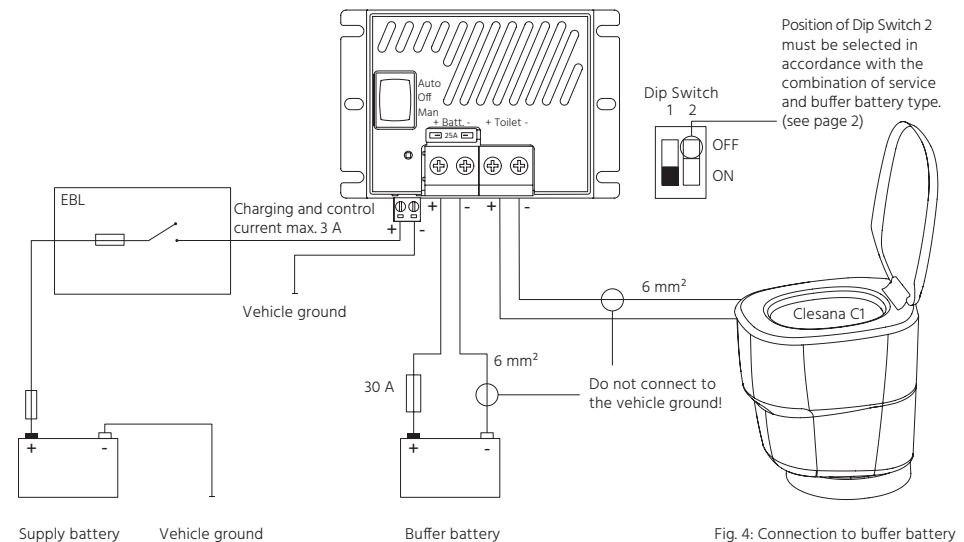


Fig. 4: Connection to buffer battery

Connection as relay (via supply battery)

- Battery:** The battery connection terminal is connected to the supply battery of the vehicle using a suitable supply cable of min. 10 mm². Fuse the supply cable with 30 A just behind the battery pole! Use colour-distinguishable supply cable for the positive (+) and the negative connection terminal (-) of the device.
- Clesana C1:** The Clesana C1 is connected to the Clesana Power-Management using a sufficiently dimensioned supply cable with a min. cross section of 10 mm². Here provide for the colour coding of the supply cables of positive (+) and negative connection (-). Do **not** connect the negative connection of the Clesana C1 to the vehicle ground!
- Input (EBL):** On the input side, the device is connected with an EBL switching output or any another switching output. Here make sure that the switching output is connected to the vehicle ground (body) on the ground side. The ground cable must be pulled up to the input terminal. The switching input is only a signal input and requires only a very small current in the single-digit mA range. In case the supply line has no constant plus connected via the EBL and is not replugged into the EBL as described under the Item Connection, then a new control cable must be pulled from a constant plus source connected via the EBL as alternative.

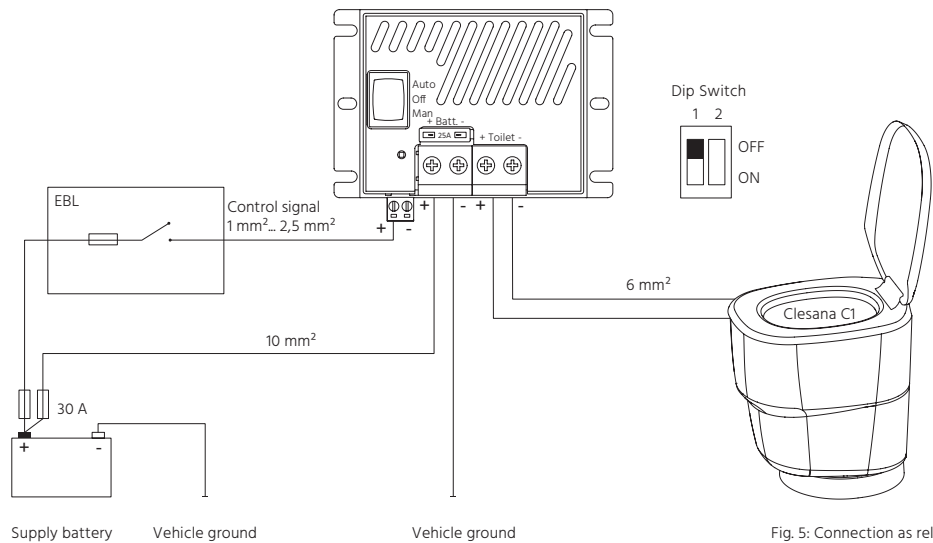


Fig. 5: Connection as relay

Main switch

The main switch located on the top side of the device has three switching positions, these have the following functions:

- Switching to "Off" position: The device is switched off completely in the middle position, neither the Clesana C1 is supplied with power nor is the battery charged in the "Connection with buffer battery".
- Switching to "Auto" position: In this position, the Clesana C1 is controlled via the EBL input; in the scenario "Connection with buffer battery" charge retention/recharge of the buffer battery takes place simultaneously.
- Switching to "Man" position: In this switching position, the Clesana C1 is always switched on, even when there is no signal from EBL. This switching position enables the use of the Clesana C1 even when the supply battery no longer has any charge.

Control LED

There is a green control LED on the top side of the device, directly behind the EBL terminal. The LED indicates the arrival of a signal from EBL, this helps to easily verify whether the cabling has been carried out correctly and whether the signal is currently switched on. Attention, the LED lights up even if the Clesana Power-Management is not switched on via the device switch. The device switch must always be in the "Auto" position so that the buffer battery can be charged and the Clesana C1 is switched on.

Start-up

- Make sure that the device switch is in the "Off" Position
- Check that the Dip Switch setting is correct
- Check all connection terminals** once again
- Insert the **30 A fuse** in the battery
- Set the device switch to "Man" battery cable, the Clesana C1 must now be switched on for the first time
- Now switch the device switch to "Auto" Position, the Clesana C1 must now be switched off again
- Switch on the source on the **EBL input**, (LED lights up), now the Clesana C1 must be switched on

Technical specifications

Control input (EBL)

Battery rated voltage	12 V
Input voltage range	10.5...15 V
Current consumption in standby	<5 mA
Max. current consumption	3 A
Terminal cable cross-sections (fine-stranded without wire end ferrule)	1...2,5 mm ²
Tightening torque for screw terminals	0,5 Nm
Cable stripping length	6 mm

Battery connection

Battery rated voltage	12 V
Output voltage setting range	12...14,8 V
Max. charging current	2,6 A
Max. discharging current	22 A
Terminal cable cross-sections (fine-stranded without wire end ferrule)	6...16 mm ²
Tightening torque for screw terminals	1,2 Nm
Cable stripping length	11 mm

Clesana C1

Rated voltage	12 V
Output voltage	12...14,8 V
Max. output current	22 A
Terminal cable cross-sections (fine-stranded without wire end ferrule)	6...16 mm ²
Tightening torque for screw terminals	1,2 Nm
Cable stripping length	11 mm

General

Battery types	Lead-gel, lead-AGM, lead-acid or lithium-Li-FePO4
Temperature range	-20...+45° C
Safety shut-down if overheating	Continuous
Dimensions (LxWxH)	78 mm x 105 mm x 40 mm
Weight	approx. 92 g
Device installation position	*Please note!
Protection class	IP2X
Humidity	max. 95% RH, non-condensing



Safety guidelines and intended use:

The charging device has been built based on applicable safety guidelines.

It must be used only:

- **For charging of Lead-gel, lead-AGM or lithium-LiFePO4 complete (with integrated BMS, Balancing, protective circuit and approval!) Batteries of the specified rated voltage in fixed/mobile installed systems.**
- **With specified cable cross sections at the device inputs and outputs.**
- **With fuses of the specified strength in the proximity of the battery for protection of cabling between batteries and the device.**
- **In technically perfect working condition.**

The device should never be used at locations on which there is risk of gas or dust explosion!

- Lay the cables such that the damages are excluded; make sure they are properly secured.
- Check live cables or lines for insulation faults, breakages as well as loosened or overloaded connections and eliminate any defects.
- Disconnect the device from all connections for electric welding works and works on the electrical system.
- Information must be obtained from an expert if for the non-commercial user it is not clear from the following descriptions as to which characteristic values apply to the device or which regulations are to be complied with.
- The user / buyer is responsible for complying with all building and safety regulations.
- Observe the safety regulations of the battery manufacturer, ventilate the battery compartment.
- Disregarding can result in personal injuries and material damages.
- The manufacturer warranty is valid for 36 months from the delivery.
- The warranty or manufacturer's guarantee expires in case of the improper use of the device, operation outside the technical specifications, improper operation or third-party intervention. No liability is assumed for resulting damages. The exclusion of liability also extends to any service provision by third parties and parties not commissioned by us in writing.



Declaration of conformity:

In accordance with the provisions of Directives 2014/35/EU, 2014/30/EU, 2009/19/EC this product complies with the following standards or normative documents:
EN55014-1; EN61000-6-1; EN61000-4-2; EN61000-4-3; EN61000-4-4;
EN60335-1; EN60335-2-29 EN50498.



The product must not be disposed of with household waste.

The product is RoHS compliant. Thus, it complies with Directive 2015/863/EU on limiting hazardous substances in electrical and electronic devices.

Quality management
produced acc. to
DIN EN ISO 9001

Delivery scope:

- 1 Power-Management (depending on the version, including cable set for installation of buffer battery)
- 1 Installation and operating manual

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