

Installation instructions and operation manual

Installatie instructies en
bedieningshandleiding

ELINE050 / ELINE075 / ELINE100

E-Line electric propulsion

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1 Safety

Warning indications

The following warning indications are used in this manual in the context of safety:



DANGER

Indicates that great potential danger exists that can lead to serious injury or death.



WARNING

Indicates that a potential danger that can lead to injury exists.



CAUTION


Indicates that the usage procedures, actions etc. concerned can result in serious damage to property. Some CAUTION indications also advise that a potential danger exists that can lead to serious injury or death.




NOTE

Emphasises important procedures, circumstances etc.

Symbols

 Indicates that the relevant procedure must be carried out.

 Indicates that a particular action is forbidden.

Pass on the safety instructions to others using the E-Line motor.

General rules and laws concerning safety and accident prevention must always be observed.

2 Introduction

This manual give guidelines for installing a Vetus E-Line electric motor, type 'ELINE050', 'ELINE075' en 'ELINE100'.

The quality of the installation is decisive for the reliability of the E-Line system. Almost all faults can be traced back to errors or inaccuracies during installation. It is therefore imperative that the steps given in the installation instructions are followed in full during the installation process and checked afterward.

Unauthorised modifications shall exclude the liability of the manufacturer for any resulting damage.

Depending on wind area, displacement, propeller, battery pack size and shape of the underwater hull, the power delivered by the electric motor will give a different result on each vessel.

The nominal rated power output is only achievable under optimum conditions:

- During use ensure the correct battery voltage is available.
- The installation is carried out in compliance with the recommendations given in this installation instruction, in particular with regard to:
 - Sufficiently large diameter of the battery cables so that voltage drop is reduced to a minimum.
 - The inflow to the propeller.
 - Alignment of the propeller shaft system.



WARNING

Changing over the plus (+) and minus (-) connections will cause irreparable damage to the installation.



NOTE

Check for possible leakage immediately after the ship has been launched.



NOTE

After installation of the system, before commissioning, check the following points:

- Flexible motor mounts.
- Coolant leakage.
- All hose and cable connections, bolts, nuts and glands.



Make sure that the user of the vessel is supplied with the owner's manual.

3 Commissioning form

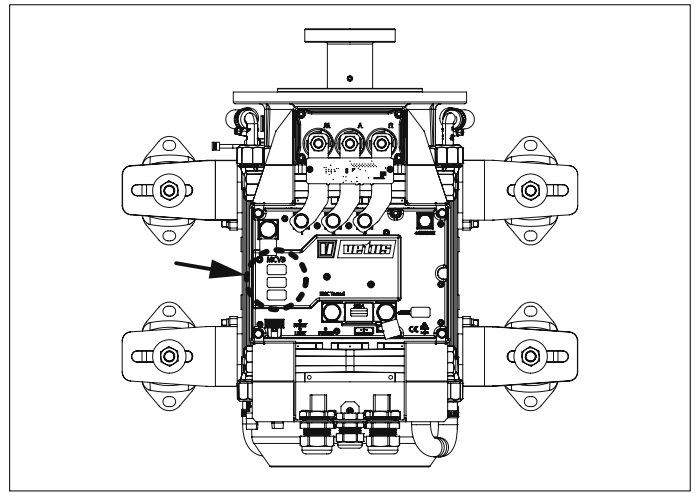
Go to the E-line product page at www.vetus.com and download the commissioning form.



NOTE

In order to make a warranty claim, please complete the commissioning form in full and send the form to: equipment@vetus.com

The serial number of the MCVB (Motor Controller Vetus Boosted Charge function) is located at the following location:



4 Motor installation

4.1 Motor support

All components of the propulsion system must be properly aligned to ensure correct operation.

The foundation must be sufficiently rigid to maintain this under all conditions.



NOTE

The E-Line motor is designed to withstand the thrust generated by the propeller. A thrust bearing is not necessary.

When determining the dimensions of the foundation, take into account a clearance of at least 10 mm (3/8") between the motor and the foundation.

The mounting surfaces of the motor supports must all be at the same level. This will prevent distortion of the rubber elements of the flexible motor supports.

The motor must be kept free of bilge water at all times.

4.2 Flexible mounting

The flexible installation is specially adapted to the characteristics of the motor. Use the supplied flexible motor supports (vibration dampers); these have been specially developed for electric propulsion engines.

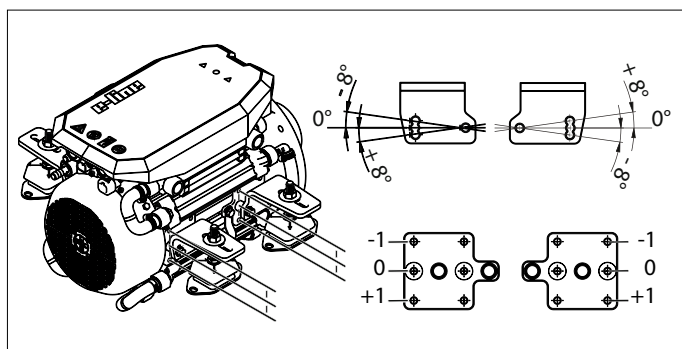
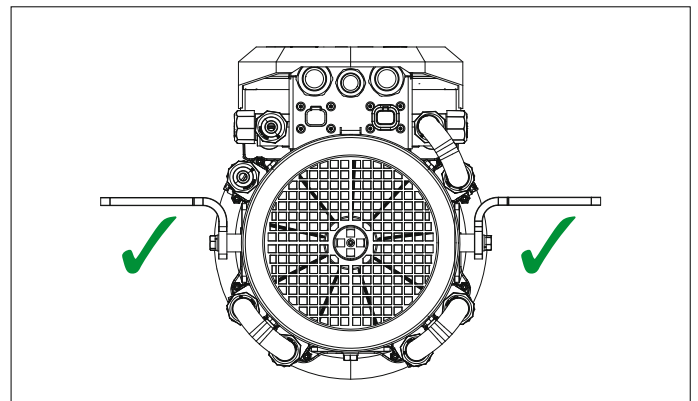
The vibration dampers must be fitted without tension in the longitudinal direction. Distorted vibration dampers can transmit vibration and noise to the boat.

The mounting brackets are easily adjustable in height and at an angle of 0° or 8°. This makes re-motorisation and connection to an existing propeller shaft easy.



NOTE

Upon receipt, the motor brackets are in the transport position. Dismantle the brackets, turn them half a turn and reassemble them.



For the front and rear of the motor setup, the compression on the left and right must be the same. A difference in compression between the front and rear is permitted and often unavoidable.

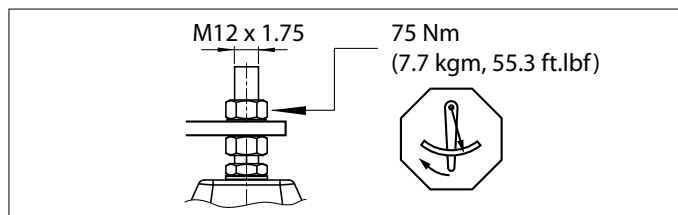
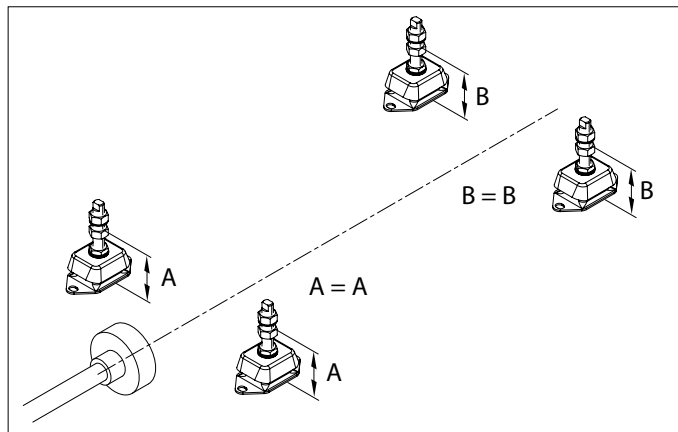
- Place the motor on the motor supports and wait 48 hours before starting the alignment. If it is not possible to wait that long, set the supports so that the motor is 0.75 mm (1/32") too high.

NOTE

It is very important that the E-Line motor and the propeller shaft are in line. Check the alignment again when the boat is in the water.

Correct adjustment of the vibration dampers can be achieved as follows:

- Set up the motor so that it is more or less in line with the propeller shaft, using the adjuster nuts on the vibration dampers, do NOT yet connect the propeller shaft with the hub of the coupling.
- Lift the motor at the front so that both front supports just come free of the vibration damper nuts.
- Lower the motor again and adjust the nuts so that both motor supports rest on the nuts at the same time.
- Repeat this at the rear end of the motor.
- When the vibration dampers have been adjusted correctly, the motor can be aligned by turning both the adjuster nuts fore and aft, left and right, exactly the same number of turns.
- Tighten the nuts to the torque indicated.



5 Propeller shaft installation

5.1 Propeller shaft coupling

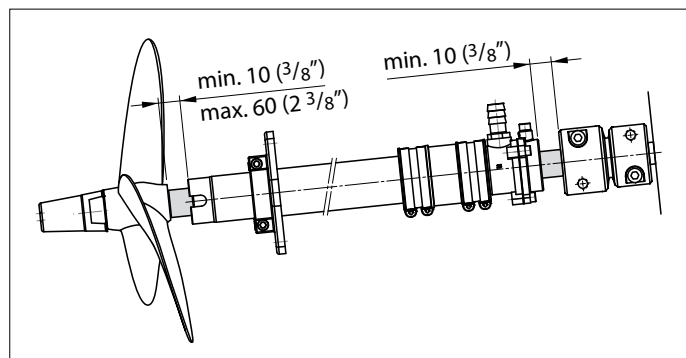
Connect the E-Line motor to the propeller shaft using a flexible coupling type Vetus Combiflex (1225/1230) or Bullflex (0120/0125).

5.2 Propeller shaft

The propeller shaft should have a diameter of at least 25 mm.

Because of the axial movement of the propeller shaft, there must be a minimum free space between:

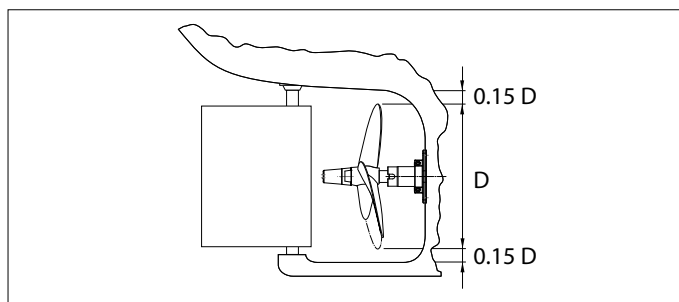
- The outer bearing and the propeller hub,
- The inner bearing and the coupling hub.
- Lock the propeller shaft cap nut with a lock plate.



5.3 Propeller aperture

- The space between the tips of the propeller blades and the bottom of the boat should be at least 15% of the propeller diameter.

- The distance from propeller hub to outer bearing must be at least 10 mm (3/8"), but not more than 60 mm (2 3/8").
- It is useful when working on the motor if the shaft can be pushed about 10 cm (4") backwards.
- The water must be able to flow freely over a distance of at least 10 cm (4") forward and aft of the propeller.



5.4 Propeller

Design of the propeller and propeller aperture are very important for the cruising characteristics of the vessel. It is especially important for a vessel with electrical propulsion that the propeller size is selected correctly.

Consult your Vetus dealer to choose the correct propeller.

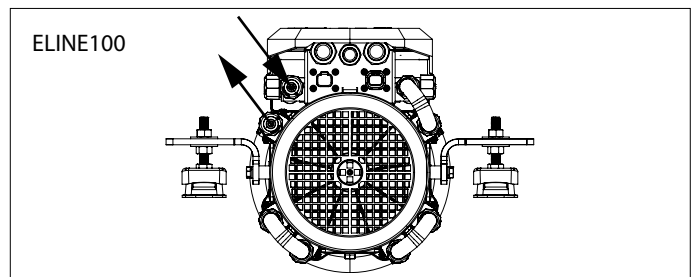
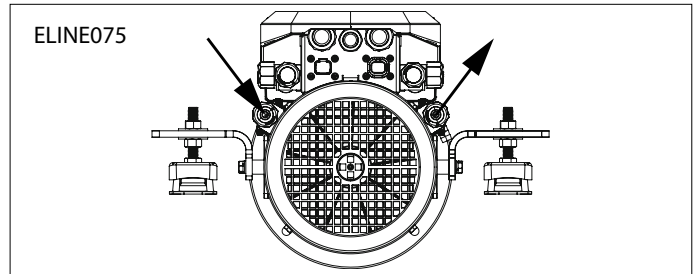
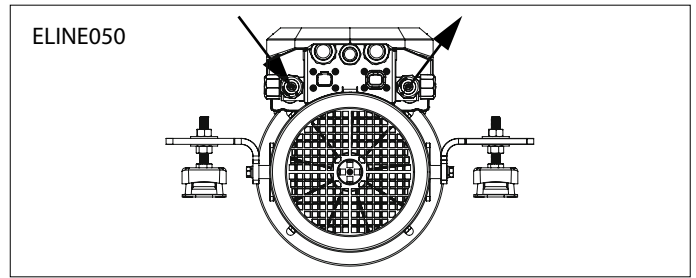
You can choose for both a left and right turning screw. Via the control panel, the direction of rotation of the motor can be linked to the movement of the control, so that forward operation also results in forward movement of the boat.

6 Cooling

To obtain the highest possible efficiency, the electric motor and motor controller are cooled by liquid. There are two options:

- Raw water cooling system
- Keel cooling system

Depending on the E-Line version, connect the cooling water hoses, 12 mm (15/33"), to the motor as follows:

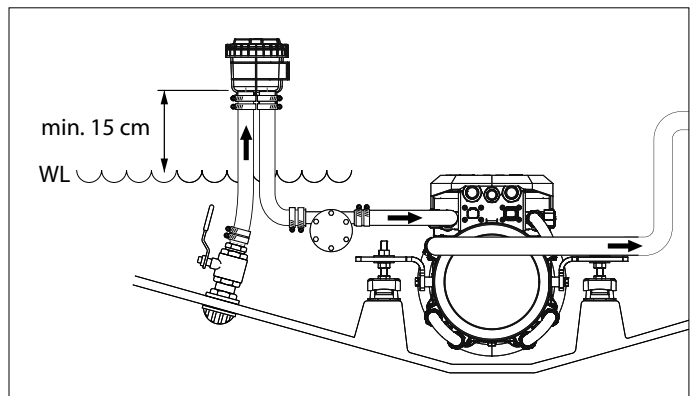


6.1 Raw water cooling

In this way of cooling, outside water flows through the system.

Heat is directly dissipated to the outside water.

- Always mount the water filter and water outlet above the water line. Attach the water filter to a vertical bulkhead.
- Always install an shut-off valve on the water inlet scoop!
- For both connections, water inlet scoop to water filter and water filter to motor, always apply flexible hose.
- Check the water filter before each use and clean it if necessary.



6.2 Keel cooling

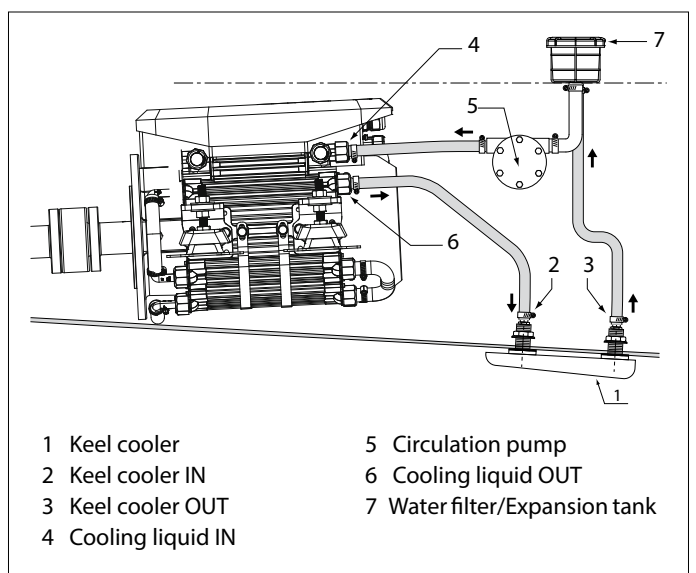
With this way of cooling, coolant circulates through the system. Heat is dissipated to the outside water through the keel cooler.

Keel cooler

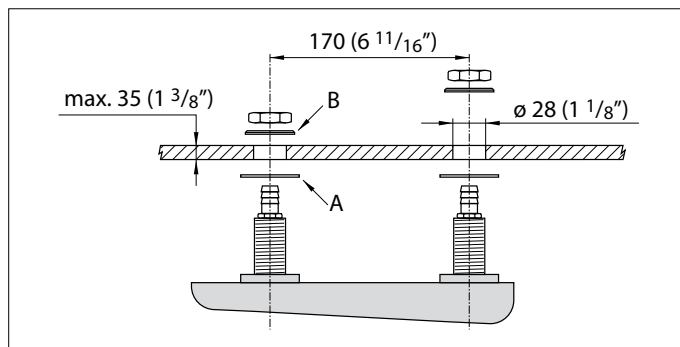
The keel cooler (1) must be placed, on the outside, against the bottom of the hull.

When choosing the position of the keel cooler, take the following into account:

- The keel cooler should be placed where a continuous flow of water is guaranteed under all circumstances.
- Near the bow, where turbulence may occur at higher speeds, is a less suitable location.

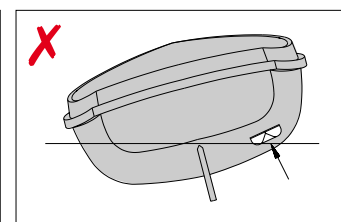
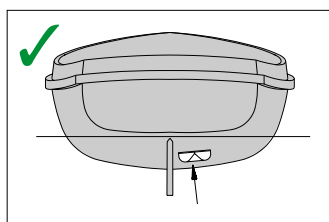
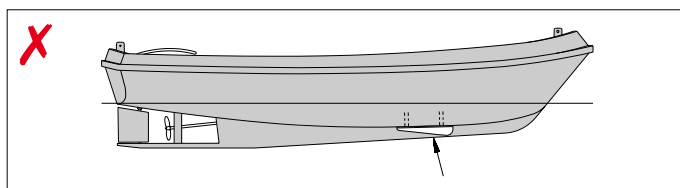
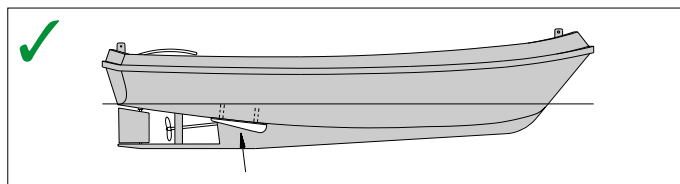


- The keel cooler should also stay under water when the ship is rolling.
- Mount the keel cooler with the packing washers (A), washers (B) and nuts provided.
- Use a sealant when mounting the keel cooler against the hull.



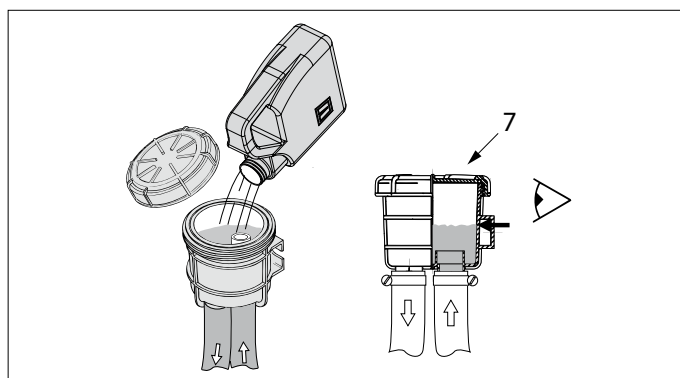
Expansion tank

- Fit the expansion tank (7) at an easily accessible place above the highest level of the electric motor.
- Always use a flexible hose with internal diameter 12 mm (1/2'') for the connections between the keel cooler, expansion tank and motor.
- Keep the hoses as short and with as few bends as possible.
- Only use water and/or soap, thus no fatty or oily products, to help make fitting the hoses to the hose connection points easier.
- Tighten each hose connection using rust-proof steel hose clamps.



6.3 Filling the cooling system

- Remove the lid from the expansion tank (7) and fill the cooling system.
Use a mixture of 40% antifreeze (on ethylene glycol basis) and 60% clean tap water and coolant or use coolant liquid only.
- Add liquid until the expansion tank is about half full.

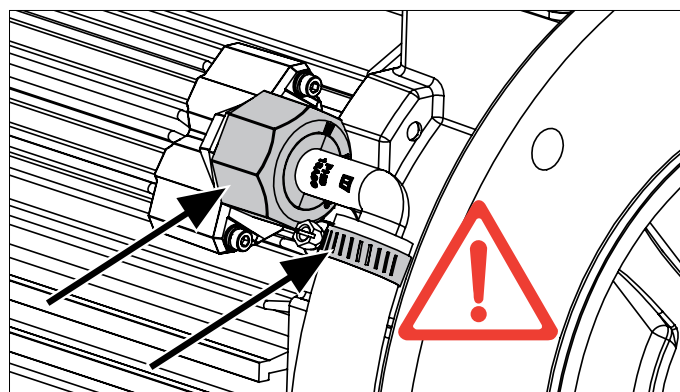


6.4 Connections

NOTE

After installation of the cooling water system, before commissioning, check the following points:

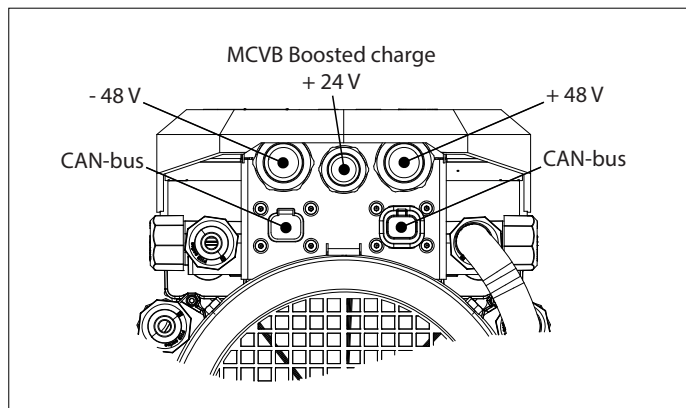
- Coolant leakage
- All hose and cable connections, bolts, nuts and glands, including the connections to the E-Line motor.



7 Electrical System

The electrical wiring between the electric motor and the motor controller has already been installed. The installation has an insulated return.

Connect the motor as follows:



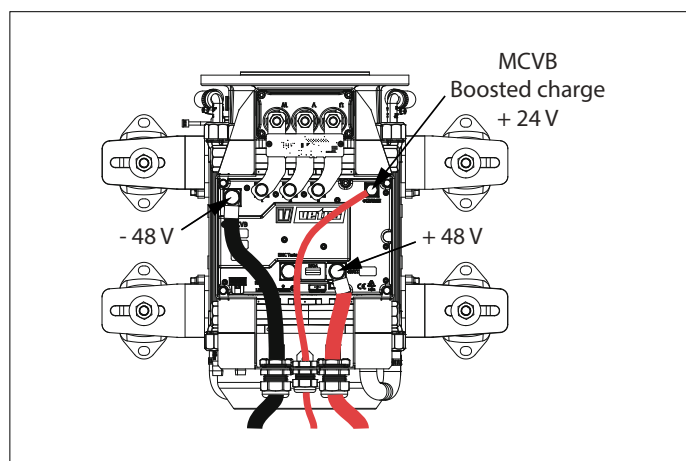
WARNING

Keeps battery cables free from the E-Line housing and sharp edges

7.1 MCVB boosted charge function

Using the MCVB boosted charge function, the 48 Volt E-Line motor can be used in an (existing) 24 V onboard network.

By connecting a 24 Volt battery bank to the MCVB boosted charge connection, the 48 Volt, E-Line, battery bank is charged. An additional charging facility is not required. See page 34 for the connection diagram.



WARNING

The MCVB boosted charge function is only suitable for lead-acid batteries as standard.

7.2 Batteries

Vetus can provide maintenance-free batteries of the type AGM (Absorbed Glass Mat), that, with approx. 375 charge cycles to a depth of discharge of 70%, are excellently suited to electric propulsion.

Starter batteries are not suitable for an electric propulsion system. Instead, semi-traction or traction batteries should be used.

7.3 Battery capacity

The following points play an important role in determining the battery capacity:

- Boat characteristics (length of waterline, weight, hull shape)
- Sailing style
- Desired range
- Battery type

Table 'Power consumption indication displacement vessel' on page 25 gives an indication of the power consumption (energy consumption) of a displacement vessel at different lengths and speeds. The power consumption can then be used to calculate the sailing time. See example below:

1. Determining battery capacity

For a boat with a length of 6 meters and a desired sailing speed of 8.8 km/h (4.7 knots) an indicative power input of 2.1 kW applies. The desired sailing time is set at a minimum of 6 hours, continuous sailing. This results in a required battery capacity of $2.1 \times 6 = 12.6$ kWh.

2. Determine battery pack

A battery pack of eight AGM batteries, C20 value 220 Ah, 12 V series parallel (4 x 12 V and 2 x 220 Ah) switched to a 48 V battery pack gives a usable battery capacity of $((220 \times 2) \times (4 \times 12) \times 0.7) = 14.8$ kWh.

3. Sailing time calculation (indication)

Based on the energy consumption of 2.1 kW, this gives a sailing time of $(14.8 / 2.1)$ more than 7 hours.

7.4 Battery installation

The following points must be taken into account when installing the batteries:



WARNING

Always follow the warning and safety instructions as stated in the battery manual.

- Batteries must be installed in a dry, well-ventilated space.
- Ventilation is important because small quantities of explosive gas can be produced while charging. If necessary, install a system of forced ventilation.
- Always install batteries above the bilge water level.
- Batteries must be fixed securely to prevent damage to the casing. Preferably fit batteries in a tray.

- Ambient temperature may not exceed 60 degrees C (140 degrees F). Never place batteries in direct sunlight!
- The batteries must be easily accessible for maintenance.
- Never fit switches or other electrical equipment in the vicinity of batteries; possible sparks could cause an explosion.
- Prevent metal objects from accidentally coming into contact with a battery terminal.

7.5 Main current cables

- Connect the motor to the batteries as shown in the diagrams, see page 34.
- Fit the fuse supplied and a main switch in the positive (+) cable.



WARNING

When calculating the cable cross-sections, take into account a maximum permissible voltage drop of 5%. Never use smaller cable cross-sections than indicated in the table below.

Motor type	E-Line 50	E-Line 75	E-Line 100
Battery cable	50 mm ²	70 mm ²	95 mm ²
Fuse	250 A	300 A	355 A

When the batteries are not being used or not charged, it is recommended that they are disconnected from each other using an isolating switch.



WARNING

NEVER fit the fuse, main switch or isolating switches in the battery space!

Take the following points into account when installing the battery cables:

- Fit the cables in the shortest possible way from batteries to motor.
- With a long cable length, bundle the '+' and '-' cables together.
- Install the '+' and '-' preferably in such a way that the total length of each cable is the same. This ensures an equal load on each battery.

- Ensure that the cables do not run through any bilge water.
- Ensure that the cables cannot come into contact with any sharp edges.
- Fix the cables in such a way to prevent wear or abrasion caused by vibration.
- Use cable terminals to connect the cables to switches, fuse and motor.
- Preferably fit cable terminals by crimping.
- Use good quality battery terminals to connect the cables to the battery posts.
- Tighten bolts securely to ensure a good connection.
- Do not use spring-loaded battery terminals!
- Grease the battery posts and battery terminals with Vaseline to prevent corrosion.
- Never change over the connector cables.
- Before leaving, check the charge status of the batteries just as you would check the tank capacity of a diesel engine.



WARNING

Changing over the plus (+) and minus (-) connections will cause irreparable damage to the installation.



WARNING

NEVER short-circuit the batteries by connecting the plus (+) pole to the minus (-) pole.

Connecting the main current cables

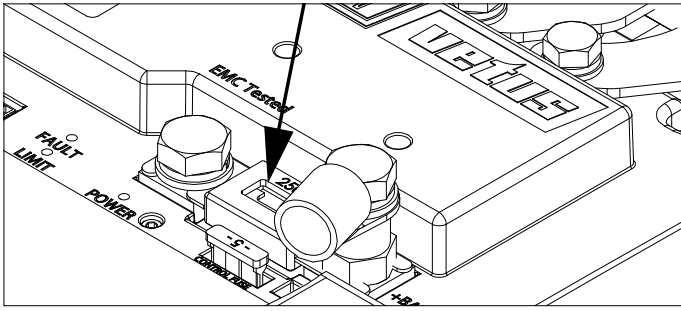
- Switch all electrical equipment off.
- Prevent any short circuits caused by tools, for example.
- Connect the positive (+) cable first, then the negative.

Power consumption indication displacement vessel

Waterline length	4 m (13 ft)	6 m (19 ft)	8 m (26 ft)	10 m (33 ft)	12 m (39 ft)
Gentle sailing	6 km/u (3.3 kn)	6 km/u (3.3 kn)	6 km/u (3.3 kn)	6 km/u (3.3 kn)	6 km/u (3.3 kn)
	1 kW	0.7 kW	0.8 kW	1 kW	1.1 kW
Cruising speed	7.2 km/u (3.8 kn)	8.8 km/u (4.7 kn)	10.2 km/u (5.5 kn)	11.4 km/u (6.1 kn)	12.5 km/u (6.7 kn)
	1.5 kW	2.1 kW	3.9 kW	6.7 kW	9.6 kW
Hull speed	9 km/u (4.9 kn)	11 km/u (5.9 kn)	12.8 km/u (6.9 kn)	14.3 km/u (7.7 kn)	15.7 km/u (8.4 kn)
	3.1 kW	4.1 kW	7.7 kW	13.4 kW	18.9 kW

7.6 Internal fuse

There is an internal fuse on the controller in the connection box. This fuse protects the controller and the motor against short circuits or overload.



NOTE

Always replace a defect fuse by a fuse of the same value.

7.7 Configuration of one or more motors

By default, the E-Line motor is configured for use in a single-motor propulsion system. Only if multiple motors are installed one of the E-Line motors must be configured.



DANGER

Only work on the system when the motor is stopped and the electrical system is switched off.

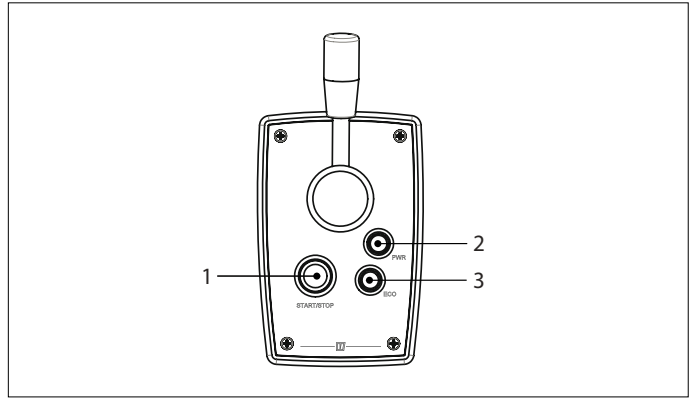
- Remove the cover and flip the switch. It is located on the underside of the circuit board (PCB). If necessary, temporarily loosen the bolts and nuts on the PCB holder.
- Move the switch from position 1 to position 2. The E-Line motor is now configured for use in a multi-motor system.
- Replace the cover.



NOTE

The direction of rotation of the motor can be set on the control panel.

7.8 The motor control panel



The image shown is for illustrative purposes and may differ from the indicated product. For the exact data, consult the manual of the respective control panel.

Start/Stop control button (1)

With this button the system can be switched on and off. In addition, this button can be used to take over the command if multiple steering positions are used.

Power mode (if available) (2)

Pressing the POWER modus button unleashes the electric peak power of the E-Line motor. Press the button again to return to the NORMAL mode.

The POWER mode will automatically switch off after a few minutes, after which the mode will be temporarily unavailable.

Eco mode (if available) (3)

By pressing the ECO modus button the maximum output power of the E-Line motor is limited. Press the button again to return to the NORMAL mode.

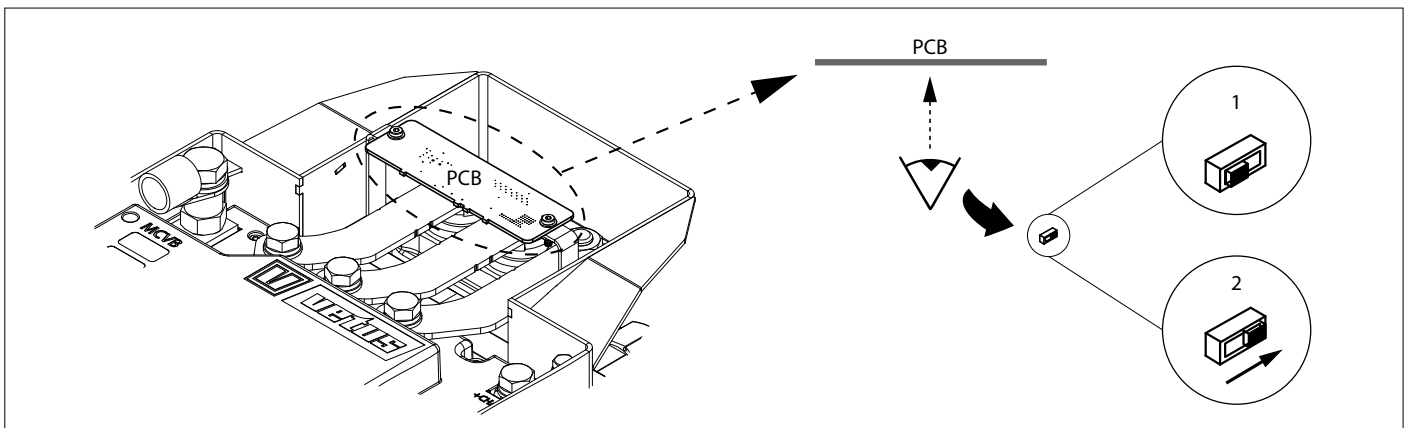
7.9 Connecting CAN bus (control current) cables

See diagrams from page 36 if multiple panels have to be connected.



NOTE

The CAN bus power supply must always be connected to 12 Volt. Use the V-CAN key switch (e.g. MPE1KB) as power supply.



8 Checking, test running and configuring the control panels

8.1 Switching on a panel

- Turn on the key switch.
- Move the lever to the neural position. Gently press the "ON / OFF" button twice in succession.

After the switch is pressed once the LED will flash green and the buzzer will sound continuously dididididi..... (.) The 'ON/OFF' switch must be pressed a second time within 6 seconds. The LED (blue) will remain on and the buzzer will confirm that the panel is ready for use by giving the signal dahdidah (- . -).

If a second panel is connected the LED on the panel 'which has not been switched ON' will flash (every second two short blue flashes, heartbeat).

8.2 Switch off a panel

Press once the 'ON/OFF' button, the buzzer will reply with the signal didididahdidah (. . . - . -).

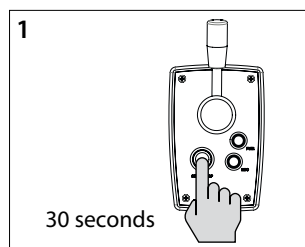
- Turn off the key switch.
- Turn off the battery main switch when leaving the boat.

8.3 Meaning LED indicator lights

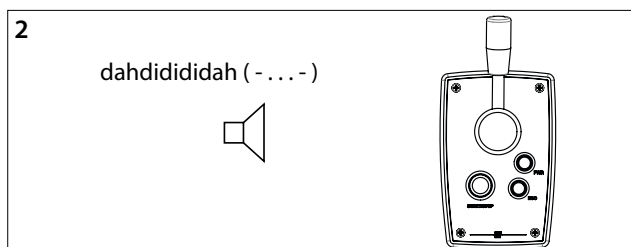
For the meaning of the LED indicator lights, see table page 41.

8.4 Restore factory settings

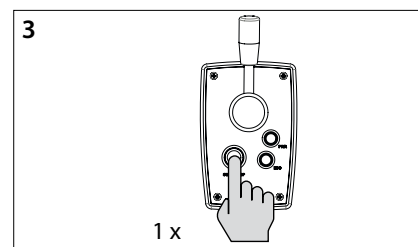
Switch off all control panels (see 8.2) and perform the following actions on the control panel to restore the factory settings of the relevant panel:



1 Press and hold the "ON / OFF" button for 30 seconds.



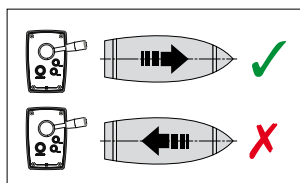
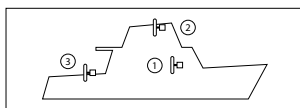
2 After 30 seconds the PWR LED flashes, the ECO LED lights up and you hear the signal, dah-di-di-dah (- . . . -). Now release the 'ON/OFF' button.



3 Press the 'ON/OFF' button once. All LEDs are off and you will hear the signal, di-da (- .). The factory settings of this control panel have been restored.

8.5 Configuring the panels

- Carry out the configuration on the panel intended to control a port or starboard motor, see 8.6.
- Carry out the configuration for the steering position on which the panel is placed, see 8.7.
- If, during the test run, it appears that the movement of the boat is opposite to the direction in which the lever is moved, this can be adjusted as indicated in 8.8.



NOTE

Keep to the following sequence for configuring the panels:

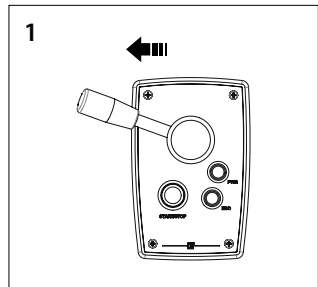
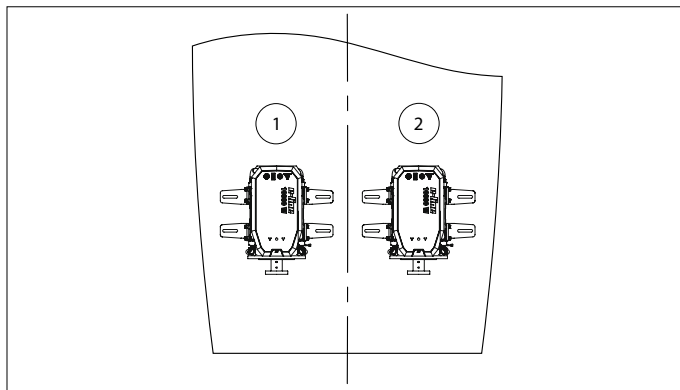
- 1) Configure a panel to control a port or starboard motor (see 8.6),
- 2) Configuring a panel for the steering position where the panel is placed (see 8.7),
- 3) Change thrust direction (only if necessary during test runs, see 8.8)

The operations shown must be carried out on each panel installed.

8.6 Configure a panel to operate a port or starboard E-Line motor

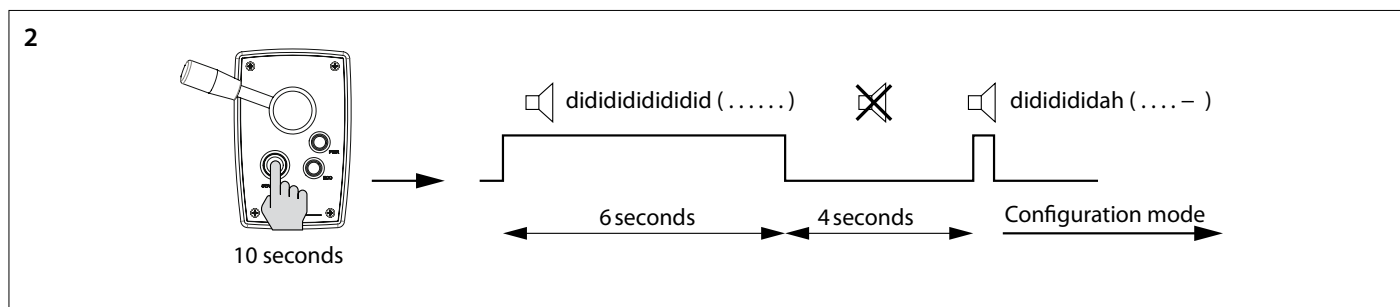
Carry out the following actions on EACH panel in the order indicated:

N.B. The panel must be in the OFF position (if the panel is NOT in the OFF position, first long press the "ON/OFF" button to turn the panel to the OFF position).



1 Move the lever to the left.

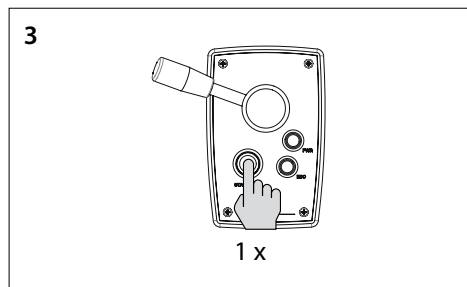
NOTE
As delivered, the panel is configured for a port side motor.



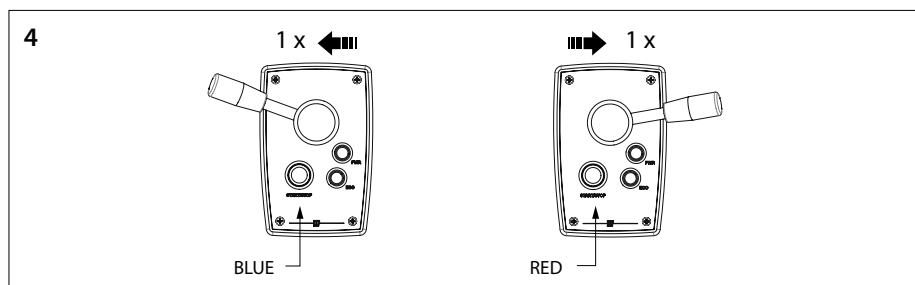
2 Place the panel in configuration mode.

- Press and hold the 'ON/OFF' button for 10 seconds.

During the first 6 seconds, the buzzer will continuously signal a didididididid (...). Keep pressing the On / Off button. After 10 seconds the buzzer sounds the signal dididididah (...-).

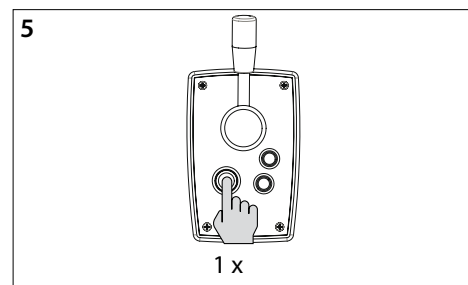


3 Press the 'ON/OFF' button to confirm. Now the panel is in configuration mode.



4 Configuring for a port side motor: Move the lever to the left once. The 'ON/OFF' button LED lights up blue.

Configuring for starboard motor: Move the lever to the right once. The 'ON/OFF' button LED lights up red.



5 Press the 'ON/OFF' button once to confirm the setting.

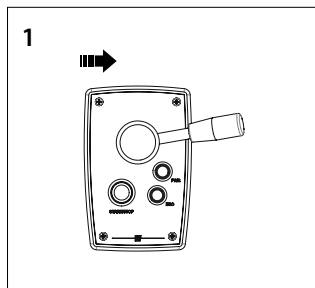
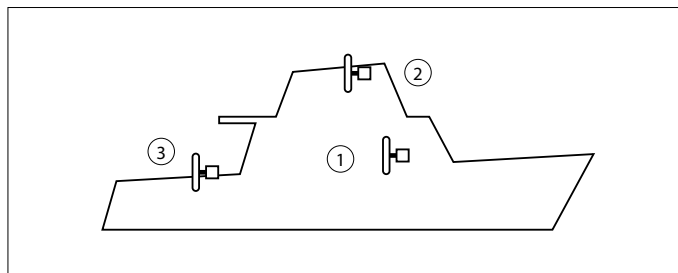
NOTE
For a port and starboard panel, together on a helm station, the set helm station number must be the same.

NOTE
Settings are retained when the power supply is switched off!

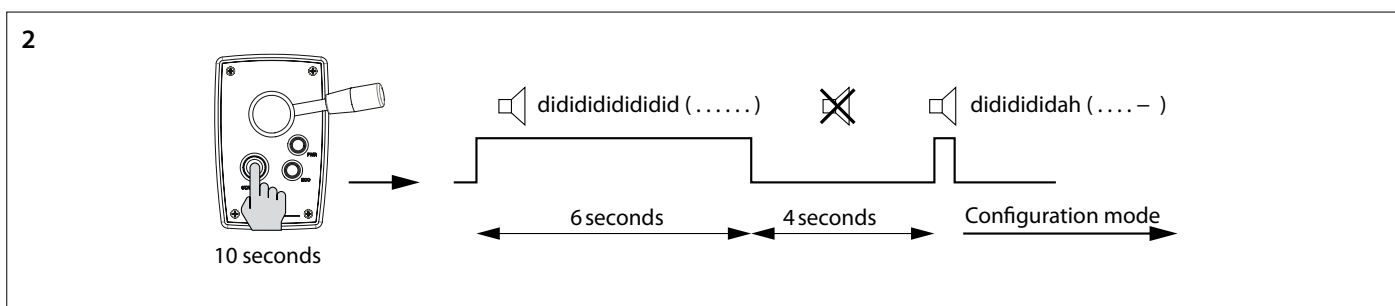
8.7 Configuring a panel for the steering position where the panel is placed

Carry out the following actions on EACH panel in the order indicated:

N.B. The panel must be in the OFF position (if the panel is NOT in the OFF position, first long press the "ON/OFF" button to turn the panel to the OFF position).



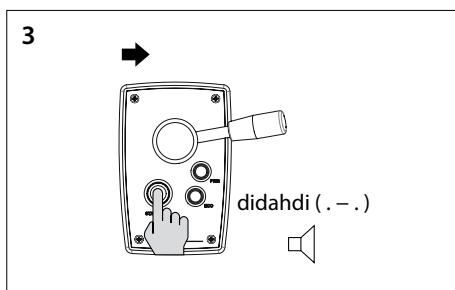
1 Move the lever to the right.



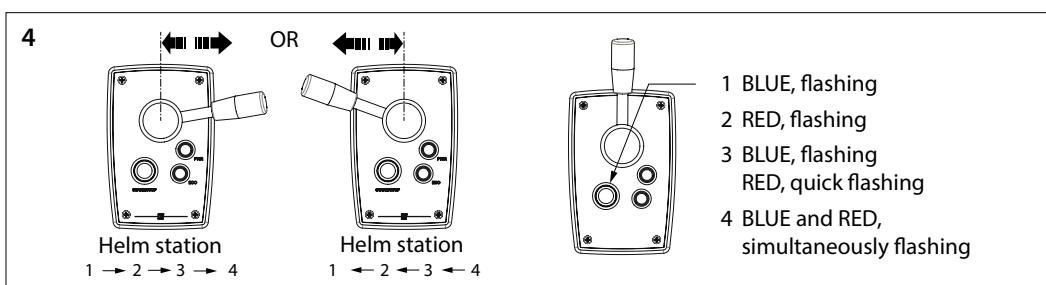
2 Place the panel in configuration mode.

- Press and hold the 'ON/OFF' button for 10 seconds.

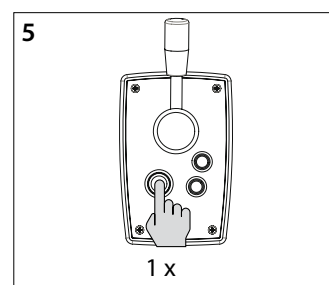
During the first 6 seconds, the buzzer will continuously signal a dididididid (.). Keep pressing the On / Off button. After 10 seconds the buzzer sounds the signal dididididah (. . . - -).



3 Press the 'ON/OFF' button to confirm. Now the panel is in configuration mode.



4 Select the steering position where the panel is located by moving the lever momentarily from neutral to the left or right and back again. The color and the flashing of the LED indicate the number of the helm position.



5 Press the 'ON/OFF' button once to confirm the setting.

NOTE
For a port and starboard panel, together on a helm station, the set helm station number must be the same.

NOTE
Settings are retained when the power supply is switched off!

NOTE

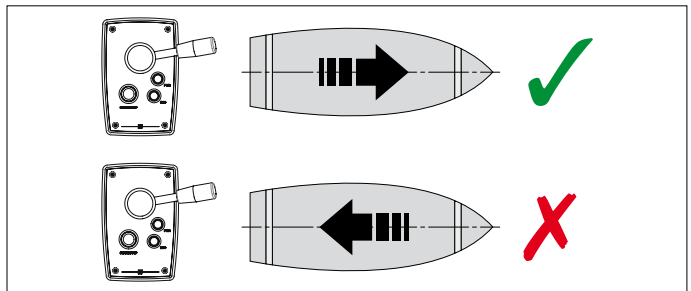
Always perform the following 2 configurations - at which helm position the panel is placed (see 8.7). Then change the thrust direction if necessary.

8.8 Changing the thrust direction

If, during the test run, it appears that the movement of the boat is opposite to the direction in which the lever is moved, this can be adjusted as follows.

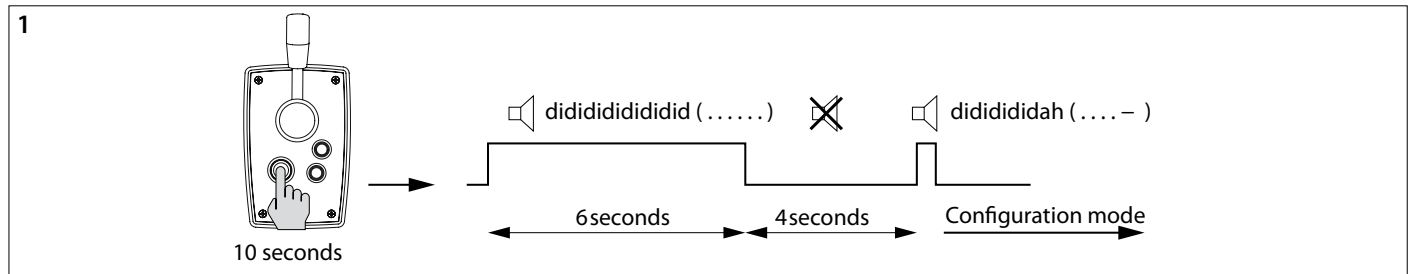
Carry out the following actions on EACH panel in the order indicated:

N.B. The panel must be in the OFF position (if the panel is NOT in the OFF position, first long press the "ON/OFF" button to turn the panel to the OFF position).



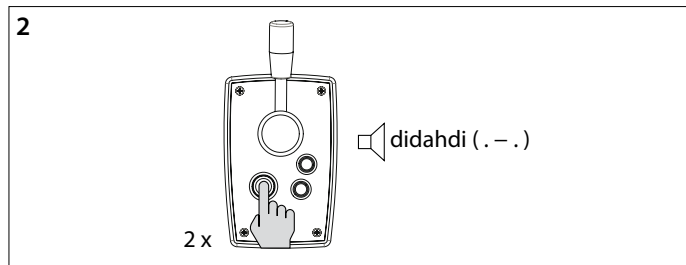
NOTE

Settings are retained when the power supply is switched off!

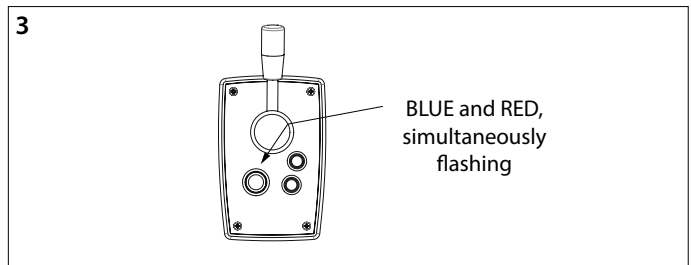


- 1 Place the panel in configuration mode.
 - Press and hold the 'ON/OFF' button for 10 seconds.

During the first 6 seconds, the buzzer will continuously signal a didididididid (...). Keep pressing the On / Off button. After 10 seconds the buzzer sounds the signal didididah (...-).



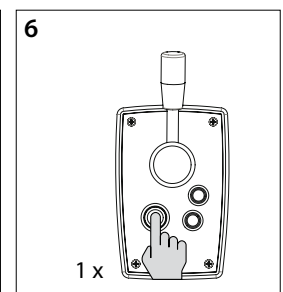
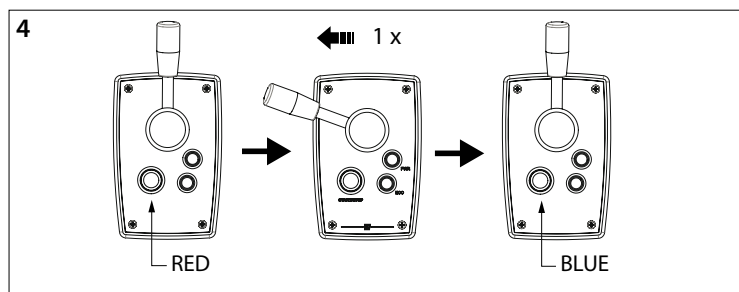
- 2 Press the "ON / OFF" button twice. Now the panel is in configuration mode.



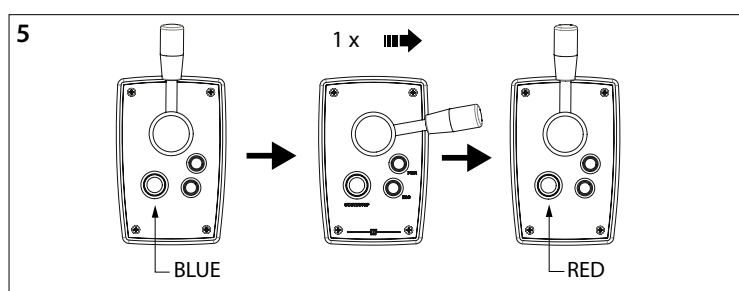
- 3 The LED at the "ON/OFF" button will now simultaneously flash blue and red and a continuous audible signal will be heard.

- 4 If the LED edge of the 'ON/OFF' button is red: move the lever once to the left. The LED edge now turns blue and the thrust direction has been changed.

OR



- 5 When the LED edge of the 'ON/OFF' button is blue: move the lever once to the left. The LED edge now turns red and the thrust direction has been changed.



- 6 Press the 'ON/OFF' button once to confirm the setting.

9 Maintenance

Here are some guidelines for daily and periodic maintenance.



DANGER

Only carry out all maintenance work with the motor stopped and the electrical system switched off.

Every 10 hours or daily, before starting

- Checking coolant level
- Check the water filter and clean it if necessary.
- Check the state of charge of the batteries.

After the first 50 hours

- Check flexible motor mounts

- Check for coolant leakage
- Check that all cable connections, bolts and nuts are tight

Every 100 hours, at least once a year

- Check batteries, cable connections, bolts and nuts

Every 500 hours, at least once a year

- Control flexible motor mounts
- Check for coolant leakage
- Check cable connections and fasteners

Every 1000 hours, at least once every 2 years

- Replace coolant (with keel cooling)

10 Take out of service - prepare for winter

Follow the instructions below if the E-Line motor is to be taken out of service for a long time. Long-term means a period longer than 3 months, for example during the winter period.

Make sure the motor compartment is ventilated. Good ventilation prevents moisture in the motor compartment. This prevents corrosion.

Carry out the necessary maintenance work before taking the motor out of service for a long time. Checks and maintenance work to be carried out:

- Clean the motor with a cloth.



NOTE

The cover plate of the E-Line motor is splashproof. The motor supports are made of stainless steel, the other motor parts of marine-grade aluminium.

- For raw water cooling: rinse the cooling water circuit with clean fresh water and if necessary fill with an anti-freeze liquid. Clean the cooling elements and tubes if necessary.



DANGER

Anti-freeze can be toxic. Never dispose of toxic anti-freeze in open water.

- Make sure that the cooling system is filled with a suitable anti-freeze liquid.
- Disconnect the batteries, fully charge them and grease the battery terminals. Store the batteries in a dry and frost-free place.

10.1 Raw water cooling

- Close the seawater shut-off valve.
- Remove the cover from the raw water strainer.
- Clean the raw water strainer if necessary.
- Connect the raw water inlet to a fresh (drinking) water pipe or to a tank with fresh water. Open the tap and let the cooling water pump run for at least 5 minutes to remove salt and contaminants from the raw water cooling system.
- Stop the pump and close the tap.
- In areas where the temperature can drop below zero during the winter, the outside water system must be protected. Pour 1 liter of anti-freeze (preferably a non-toxic biodegradable anti-freeze) into the cooling water filter and run the pump until the anti-freeze is incorporated into the cooling system.
- After cleaning and mounting, check the seal between cover and filter housing.

If the lid is not properly sealed, the seawater pump sucks in air. This can lead to an excessively high motor temperature.

10.2 Keel cooling

To prevent damage, the cooling system should be filled with an anti-freeze/water mixture (or coolant) during the winter months.

N.B. Replacement of the coolant is only necessary if the coolant present in the cooling system does not provide sufficient protection against temperatures below 0°C (104°F).

10.3 Electrical System

- If necessary, regularly charge the batteries during the winter!
- For checking and maintenance of the batteries, follow the recommendations of the battery supplier.

11 Put into service - prepare for summer

When putting the motor back into service, for example at the beginning of the boating season, the motor must be checked and maintenance work carried out.

- Check the raw water system.
- Check the coolant level of the cooling system.
- Check and reconnect the batteries.
- Check the operation of the motor.
- Check all hose connections for leaks.
- Check the operation of the instruments and motor controls.

11.1 Cooling water system

- Check whether the cover of the raw water strainer is mounted.
- Check that the cover of the raw water pump and the drain plug are installed.
- Install any loosened hose clamps.
- Open the outboard valve.
- Check the coolant level and coolant circulation when the pump is on.

11.2 Electrical system

- Check the voltage of each individual battery. In case of large voltage deviations, the batteries should be charged separately.
- Connect the batteries and fully charge the 48 volt battery bank.

11.3 Test run



WARNING

Only test the E-Line motor if you are sure that people are at a safe distance from the propeller!

- Switch on the E-Line motor and check correct operation.
- Also check the operation of the connected panels.

12 Troubleshooting

Malfunctions of the E-Line motor are in most cases caused by incorrect operation or insufficient maintenance.

In the event of a malfunction, always first check whether all operating and maintenance instructions have been followed.

If you are unable to determine the cause of a fault or rectify a fault yourself, please contact the nearest service representative.



DANGER

Before starting, make sure that nobody is in the immediate vicinity of the motor.

If necessary, disconnect the battery cables!

E-Line motor does not run

Possible cause	Solution
Defective or discharged battery.	Check / recharge battery and check battery charger.
Fuse burned out.	Check the system. Replace the fuse. If a replacement fuse blows again, this indicates an electrical problem. Have the system checked by an installer.
Loose or corroded connections in the starter circuit.	Clean and secure the connections.
Poor electrical connection.	Repair.
Defective starter switch.	Check / replace.
Jammed parts.	Repair.
Short circuit due to reverse polarity.	Irreparable damage to motor controller. Replace MCVB and all connected panels.

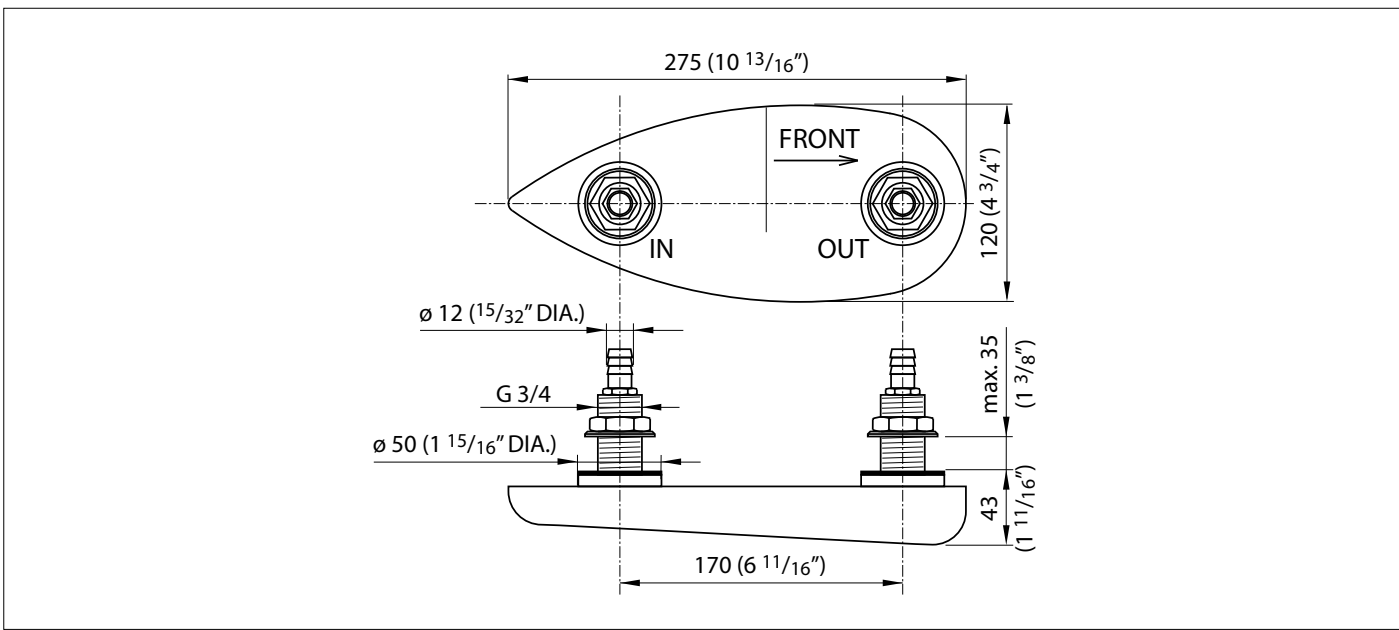
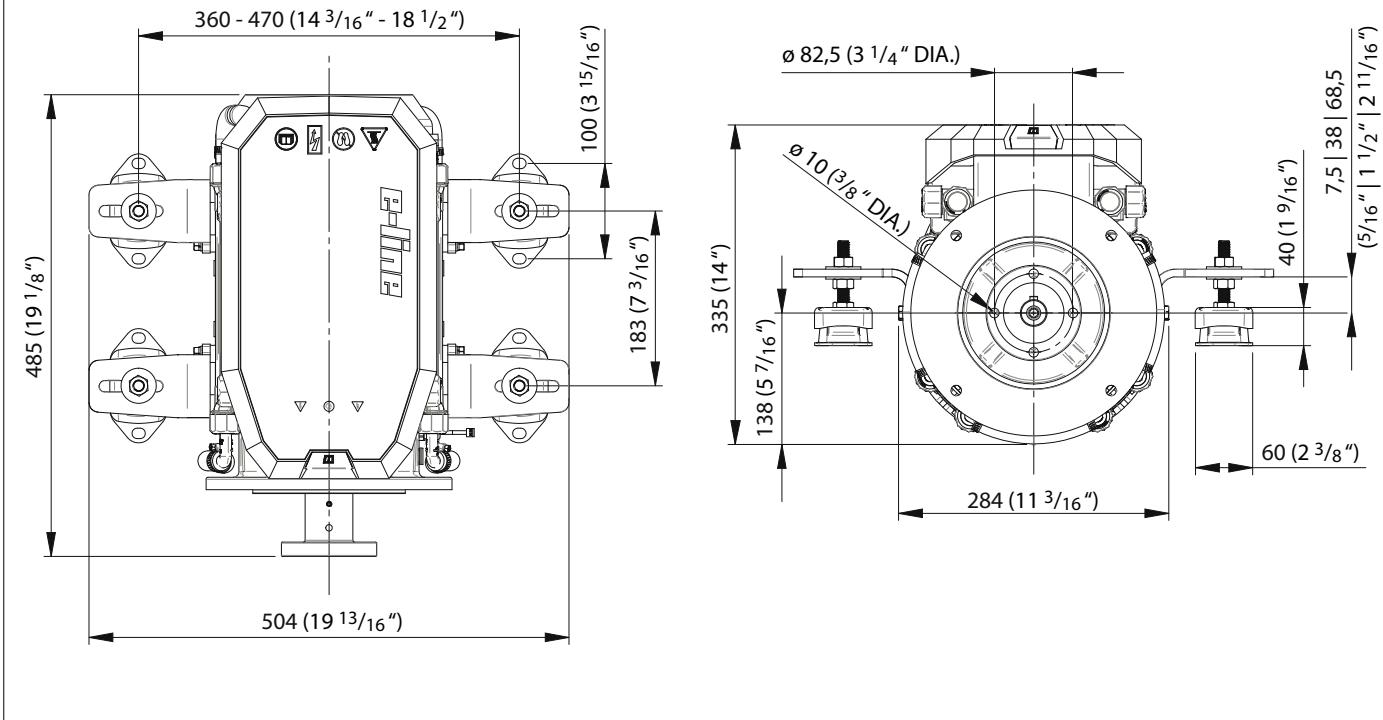
E-Line motor running hot

Possible cause	Solution
Outside water valve closed.	Open.
Outside water filter clogged.	Check / clean.
Faulty impeller outdoor water pump.	Check / replace.
Leak in outdoor water intake system.	Check / replace.
Coolant level too low.	Check / refill.
Coolant pump defective.	Check / replace.
Leak in coolant circuit.	Check.
Heat exchanger dirty or clogged due to rubber parts of a defective impeller.	Check / clean.
Motor seemingly overheated due to defective temperature sensor.	Check / replace.
Motor overheated due to faulty propeller shaft alignment.	Align propeller shaft.
Motor overheated due to heat radiation caused by poor water lubrication of the propeller shaft.	Check / repair.

13 Hoofdafmetingen

Principal dimensions

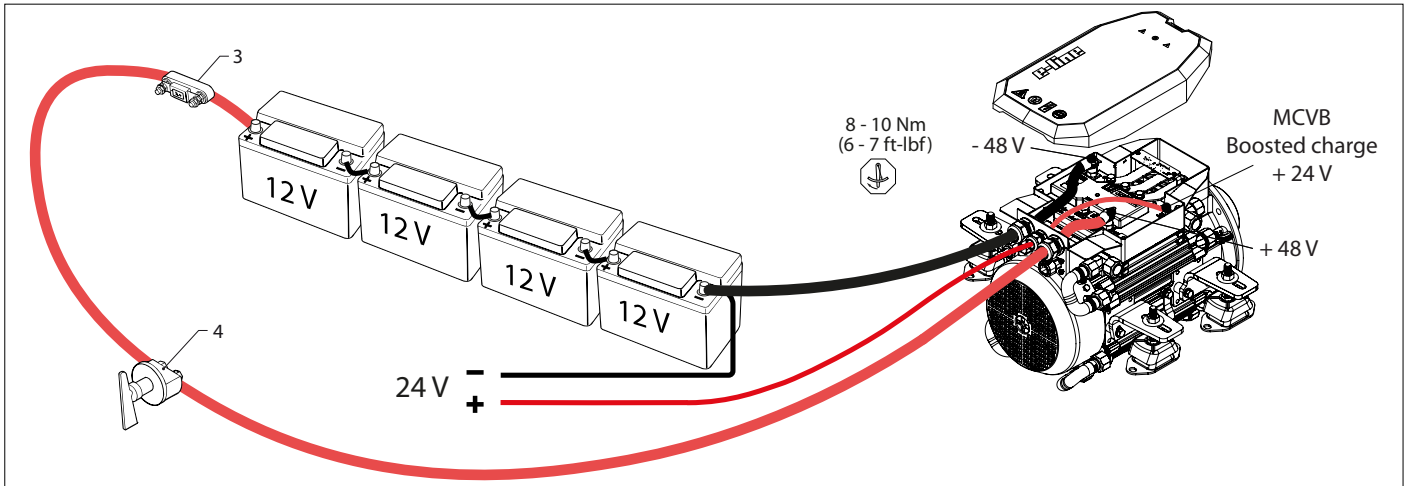
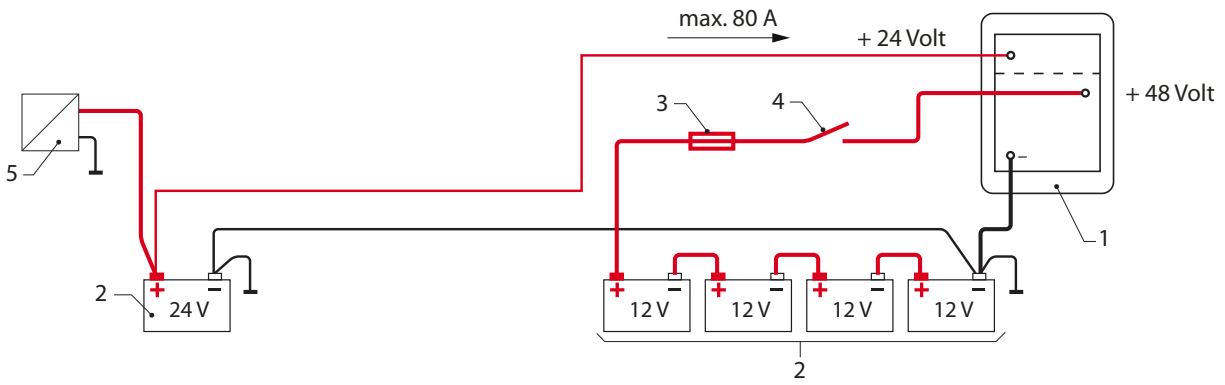
E-Line 050 / 075 / 100



14 Aansluitschema's

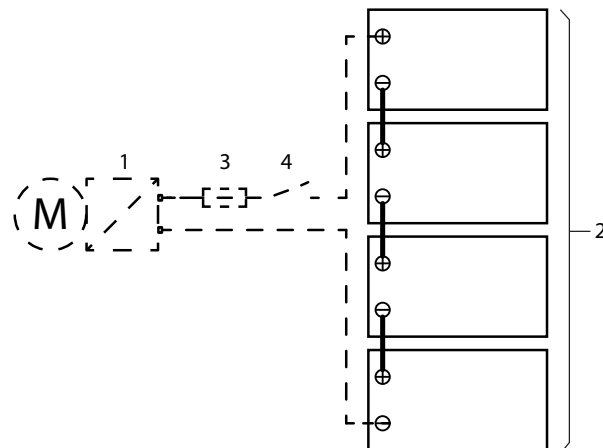
Wiring diagrams

14.1

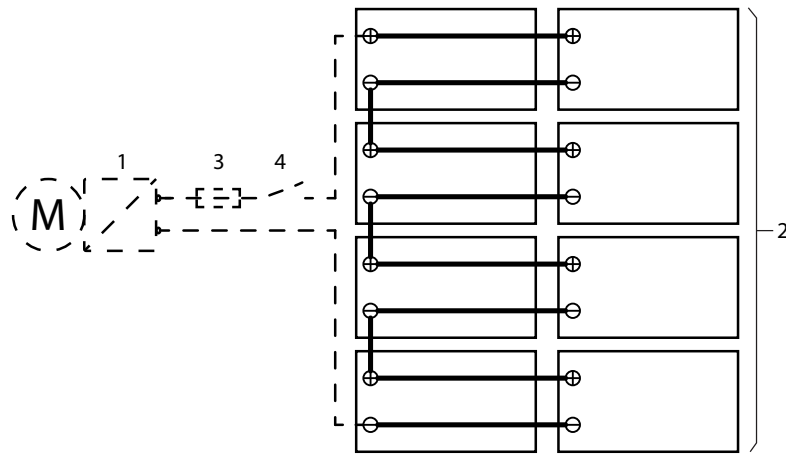


1 E-Line motor/MCVB	E-Line motor/MCVB
2 Accu	Battery
3 Hoofdzekering	Main fuse
4 Hoofdschakelaar	Main switch
5 Lader	Charger
6 Omvormer	Inverter
7 Boost charge aansluiting	Boost charge connection

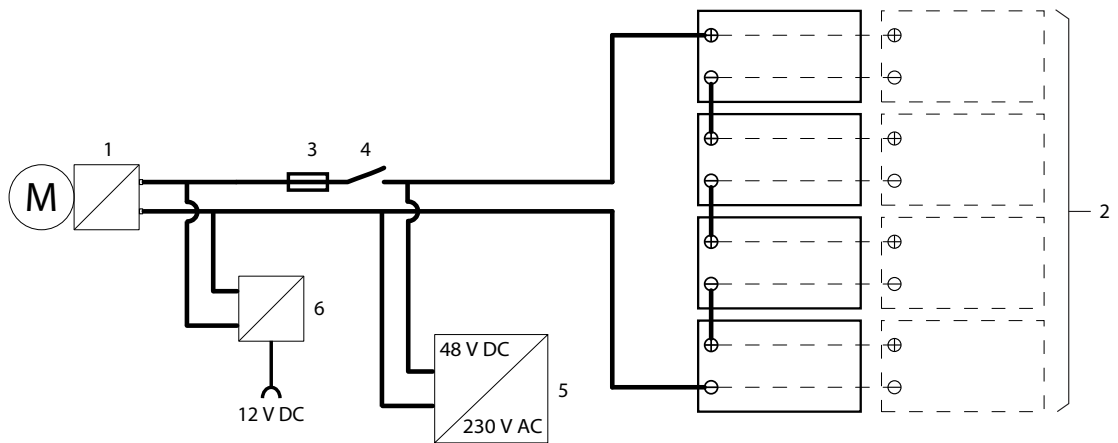
14.2



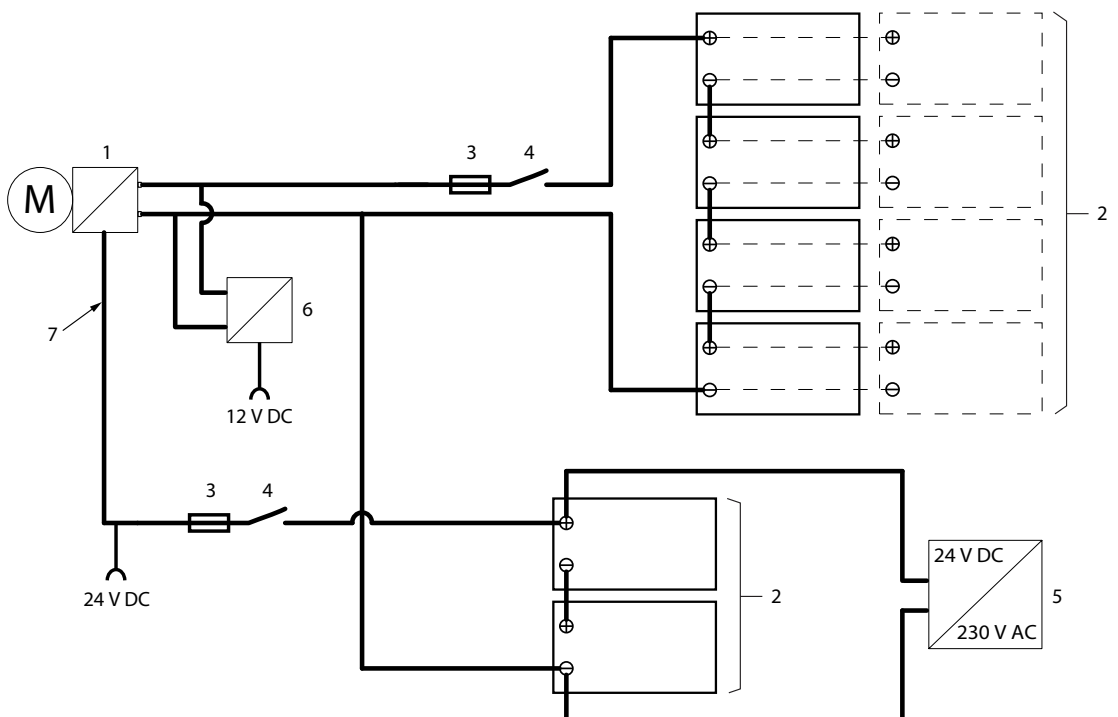
14.3

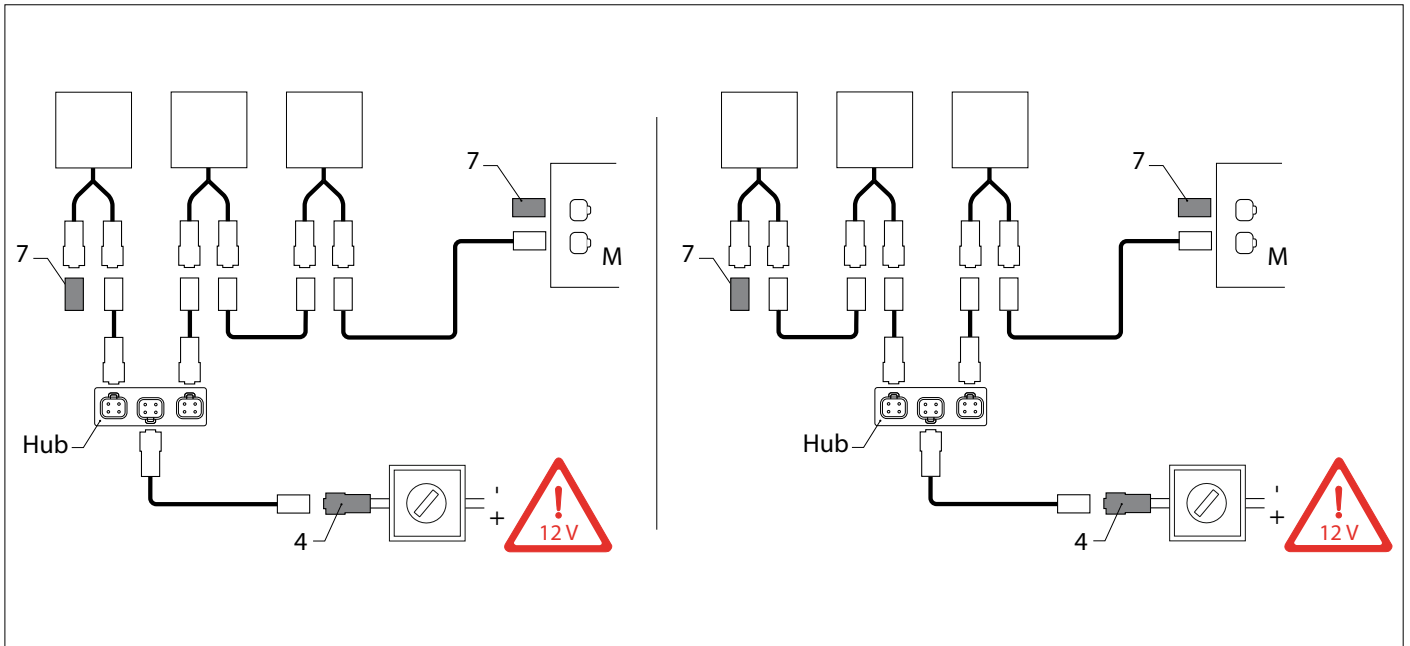


14.4



14.5





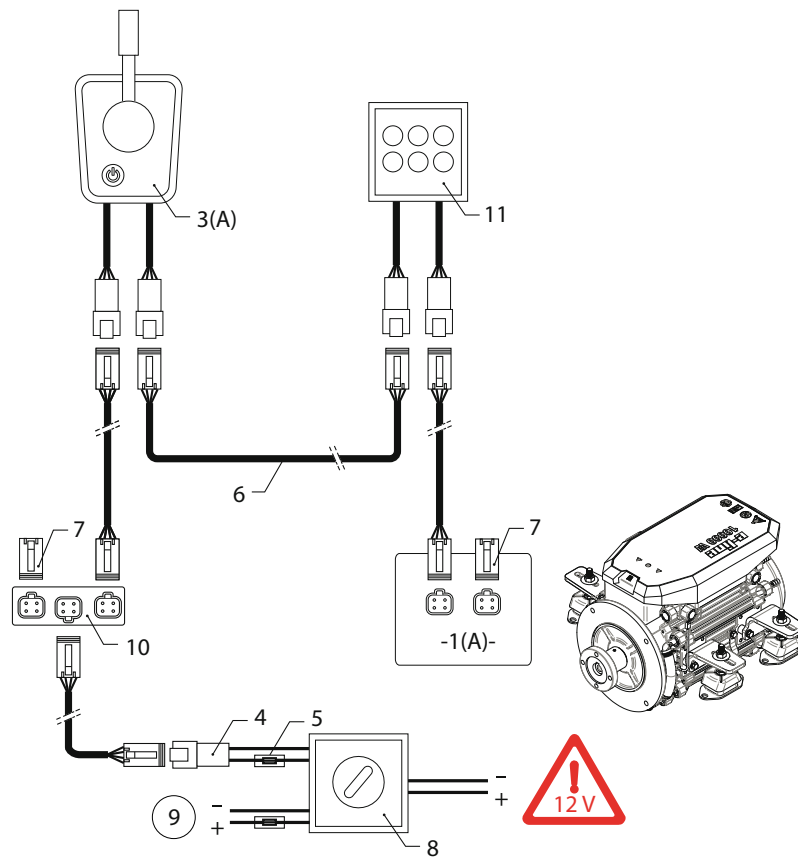
LET OP

De CAN-bus is een keten waar de E-Line motor en panelen op zijn aangesloten.
 De voeding (4) kan, via de Hub, op meerdere punten op de keten worden aangesloten. Een terminator (7) moet op beide einden van de keten worden aangesloten!

NOTE

The CAN bus is a chain to which the E-Line motor and panels are connected.
 The power supply (4) can, via the Hub, be connected to the chain at several points. A terminator (7) must be connected to both ends of the chain!

14.6

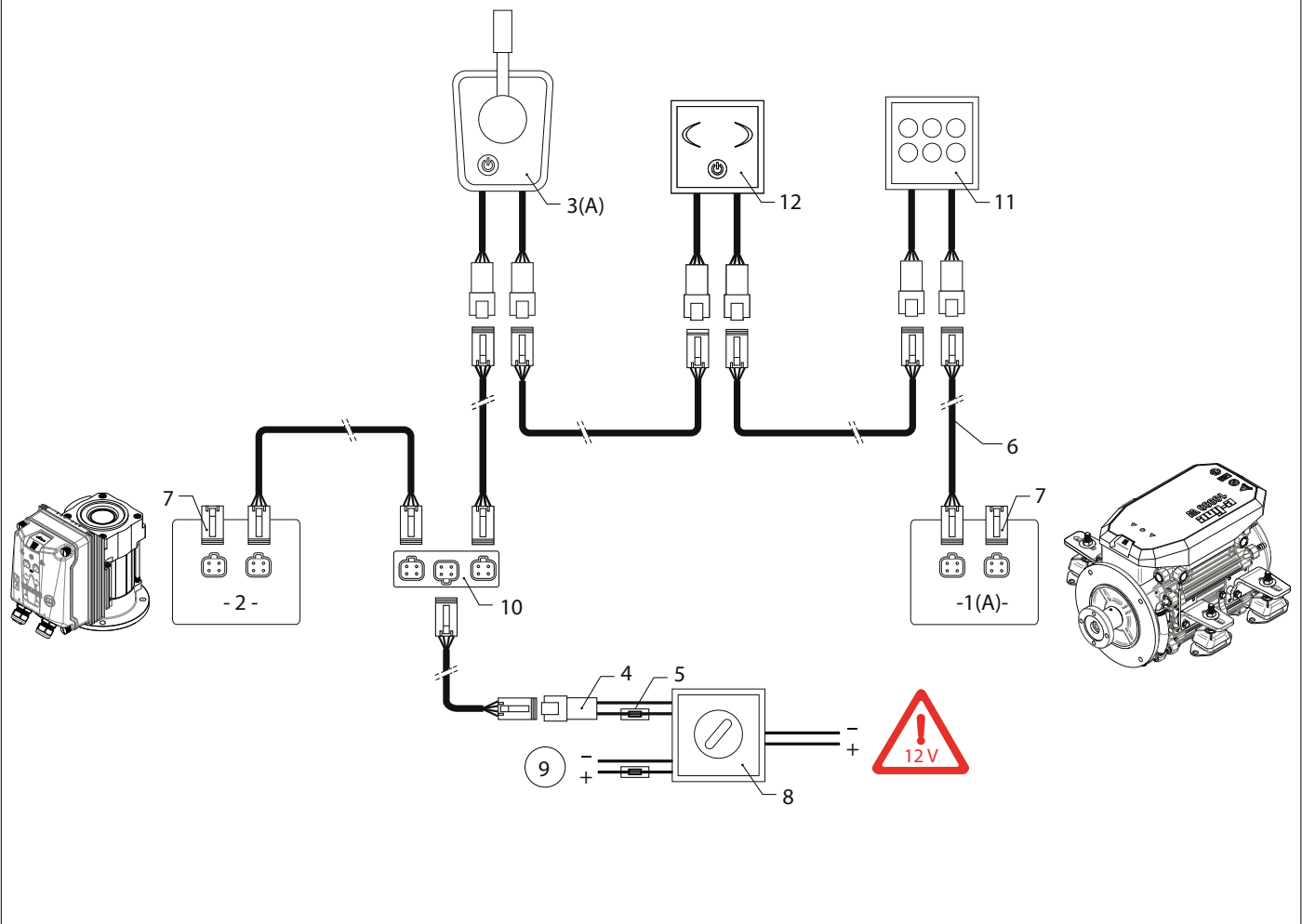


Eén E-Line motor, Eén stuurstand

One E-Line motor, One helm station

1	E-Line motor (A/B)	E-Line motor (A/B)
2	Bow thruster	Bow thruster
3	Motorbediening, motor (A/B)	Motor control, motor (A / B)
4	CAN-bus voeding	CAN-bus supply
5	Stuurstroomzekering	Control voltage fuse
6	Aansluitkabel	Connection cable
7	Terminator	Terminator
8	Contactslot	Key switch
9	Geschakelde voeding (12 V, 15 A)	Switched power supply (12 V, 15 A)
10	CAN-bus hub	CAN-bus hub
11	Monitor paneel	Monitor panel
12	Boegschroef paneel	Bow thruster panel

14.7

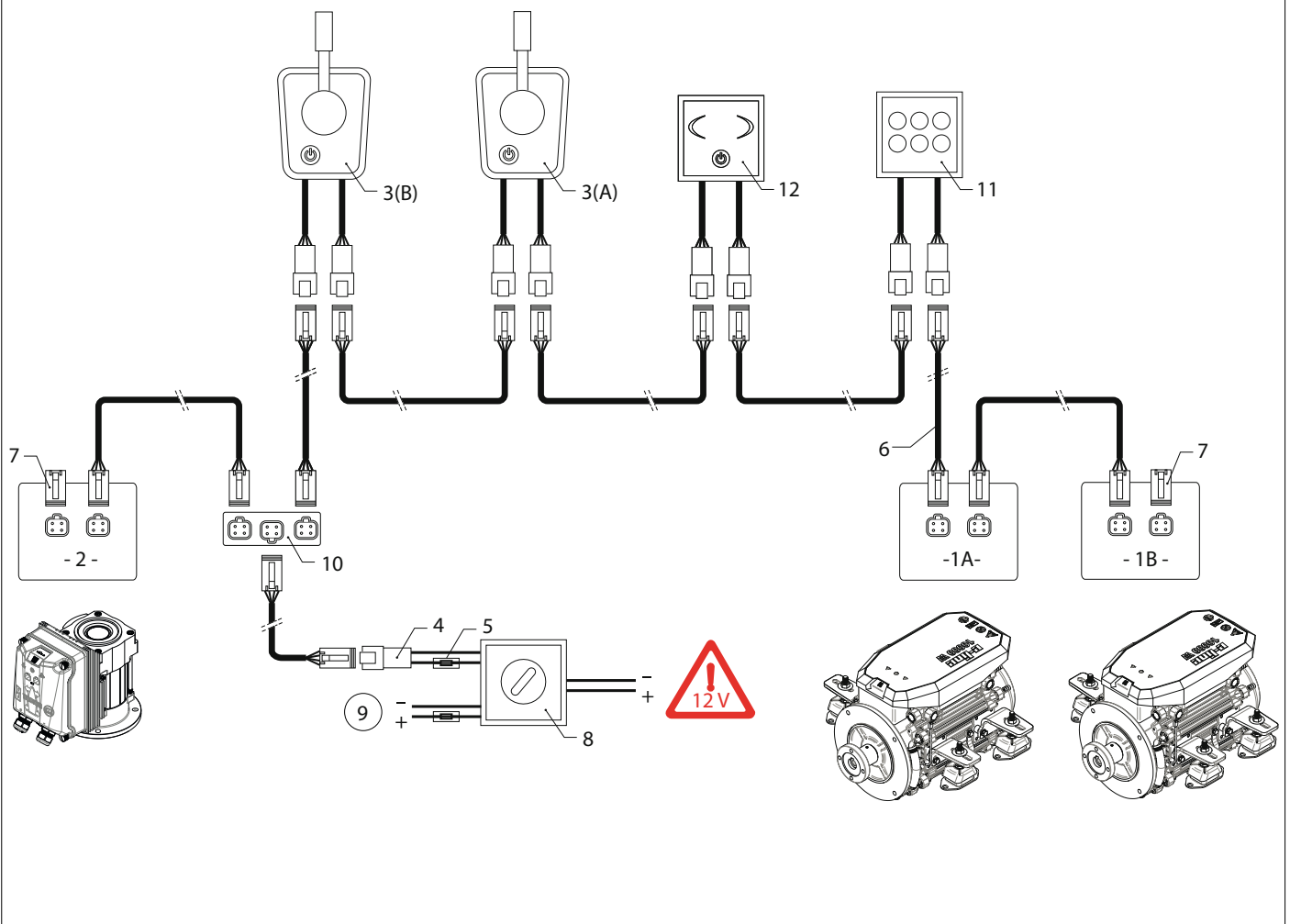


Eén E-Line motor, één boegschroef, één stuurstand. Het schema kan worden uitgebreid tot maximaal vier stuurstanden.

One E-Line motor, one bow thruster, one helm station. The diagram can be extended to up to four helm stations.

1	E-Line motor (A/B)	E-Line motor (A/B)
2	Bow thruster	Bow thruster
3	Motorbediening, motor (A/B)	Motor control, motor (A / B)
4	CAN-bus voeding	CAN-bus supply
5	Stuurstroomzekering	Control voltage fuse
6	Aansluitkabel	Connection cable
7	Terminator	Terminator
8	Contactslot	Key switch
9	Geschakelde voeding (12 V, 15 A)	Switched power supply (12 V, 15 A)
10	CAN-bus hub	CAN-bus hub
11	Monitor paneel	Monitor panel
12	Boegschroef paneel	Bow thruster panel

14.8



Twee E-Line motoren, één boegschroef, twee stuurstanden.

Two E-Line motors, one bow thruster, two helm stations.

1	E-Line motor (A/B)	E-Line motor (A/B)
2	Bow thruster	Bow thruster
3	Motorbediening, motor (A/B)	Motor control, motor (A / B)
4	CAN-bus voeding	CAN-bus supply
5	Stuurstroomzekering	Control voltage fuse
6	Aansluitkabel	Connection cable
7	Terminator	Terminator
8	Contactslot	Key switch
9	Geschakelde voeding (12 V, 15 A)	Switched power supply (12 V, 15 A)
10	CAN-bus hub	CAN-bus hub
11	Monitor paneel	Monitor panel
12	Boegschroef paneel	Bow thruster panel

15 Accucapaciteit, accukabels

Battery capacity, battery cables

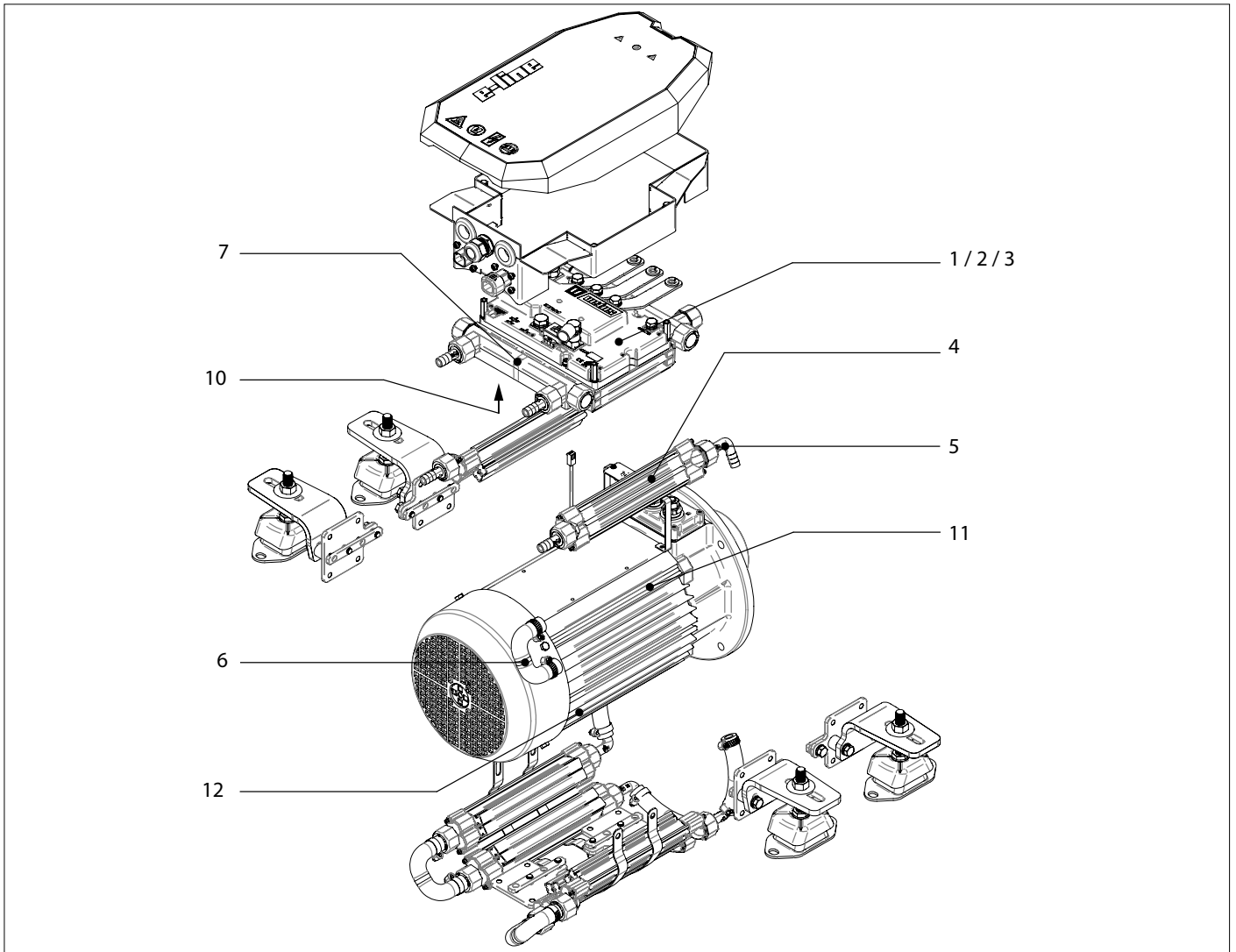
E-Line 050 / 075 100	Totale lengte plus- en min kabel		Draaddoorsnede	
E-Line 050 / 075 100	Total length of plus- and minus cable		Cable cross-section	
E-Line 050 / 075 / 100 boost charge 24 V » 48 V	0 - 21,4 m	0 - 70.2 ft	25 mm ²	AWG 4
	21,4 - 30 m	0 - 98.4 ft	35 mm ²	AWG 2
	30 - 42,9 m	0 - 140.7 ft	50 mm ²	AWG 0
	42,9 - 60 m	0 - 196.6 ft	70 mm ²	AWG 00

Betekenis LED indicatielampjes

AAN/UIT KNOP		ZOEMER	POWER KNOP	ECO KNOP	
LED BLAUW	LED ROOD		LED BLAUW	LED GROEN	
Knippert (gedurende 6s)		(.) (gedurende 6s)			Na de eerste druk op kinderslot
AAN		1x (-.-)			Na tweede druk is het systeem ingeschakeld
Knippert dubbel					Bedieningspaneel is inactief, motor is actief
				AAN	ECO modus actief
			AAN		POWER modus actief
					POWER modus staat op het punt inactief te worden
		1x (-.-)			Nadat de START knop is ingedrukt POWER modus niet beschikbaar
		1x (.)			Nadat de hendel is verplaatst (neutraal naar links/rechts) wordt de motor aangedreven
	Knippert snel	1x (-.-)			Motor is oververhit
	UIT	1x (..)			Motor was oververhit
	Knippert	1x (-.-)			Motor is overbelast
	UIT	1x (..)			Motor was overbelast
	Knippert dubbel	1x (-.-)			Motor uitgangsvermogen is begrensd
	UIT	1x (..)			Motor uitgangsvermogen niet langer begrensd
Knippert snel	Knippert	1x (-.-)			Voedingsspanning motor laag
Knippert snel	Knippert snel				Paneel V-CAN voedingsspanning laag
	AAN	1x (..-..), ∞ (.)			Ontkoppeld van het V-CAN-netwerk
	AAN (gedurende 5 sec)	1x (-.-)			Hendel is kapot

Meaning LED indicator lights

ON/OFF BUTTON		BUZZER	POWER BUTTON	ECO BUTTON	
BLUE LED	RED LED		BLUE LED	GREEN LED	
Blinks (for 6s)		(.) (for 6s)			Childlock after the first push
ON		1x (-.-)			System enabled after second push
Blinks double					Control panel is inactive, motor is active
				ON	ECO mode is active
			ON		POWER mode is active
					POWER mode about to become inactive
		1x (-.-)			After POWER button is pushed POWER mode not available
		1x (.)			After lever is moved (neutral to left/right) Motor is propelling
	Blinks fast	1x (-.-)			Motor is overheated
	OFF	1x (..)			Motor was overheated
	Blinks	1x (-.-)			Motor is overloaded
	OFF	1x (..)			Motor was overloaded
	Blinks double	1x (-.-)			Motor output power is limiting
	OFF	1x (..)			Motor output power no longer limited
Blinks fast	Blinks	1x (-.-)			Motor voltage supply is low
Blinks fast	Blinks fast				Panel V-CAN voltage supply is low
	ON	1x (..-..), ∞ (.)			Disconnected from V-CAN network
	ON (for 5 sec)	1x (-.-)			Lever is broken



Position	Quantity			Part	Omschrijving	Description
	ELINE050	ELINE075	ELINE100			
1	1	-	-	VP000001	Motorcontroller ELINE050	Motor controller ELINE050
2	-	1	-	VP000002	Motorcontroller ELINE075	Motor controller ELINE075
3	-	-	1	VP000003	Motorcontroller ELINE100	Motor controller ELINE100
4	-	2	6	VP000004	Koelblok samenstelling ELINE075/100	Cooling block assembly ELINE075/100
5	1	2	4	VP000005	Set eindkappen en slangpilaren ELIN050/075/100	Set end caps and hose pilars ELIN050/075/100
6	-	2	3	VP000006	Set slang en klemmen ELINE075/100	Set hose and clamps ELINE075/100
7	2	4	8	VP000007	O-ring revisiekit E-Line koelers	O-ring refurbish kit E-Line coolers
10	1	-	-	VP000010	Warmtegeleidingsfolie ELINE050	Heat film set ELINE050
11	-	1	-	VP000011	Warmtegeleidingsfolie ELINE075	Heat film set ELINE075
12	-	-	1	VP000012	Warmtegeleidingsfolie ELINE100	Heat film set ELINE100

