

USER MANUAL

Original document

V-move® 650



CE

Version 1.0 March 2016

Introductory remarks

This user manual has been written for everyone who is to work on or with the V-move 650. You must first have read this manual before you start working with or on the V-move 650.

The user manual contains important instructions/information about how the V-move 650 can be used in a safe, competent and economic way, and must always be available at the place where the V-move 650 is used.

The user manual must be supplemented by existing national regulations with respect to accident prevention and environmental protection.

This user manual contains information about the operation of the V-move 650. Only use the information that is applicable to your V-move 650. The V-move 650 can be fitted with various options depending on the intensity of use and customer wishes. Consult your sales advisor for this.

Verhagen Leiden BV is not responsible for errors in this manual or for any consequences thereof.

Verhagen Leiden BV cannot be held liable for any direct or indirect damage as a result of operating faults, the lack of proper maintenance, or any use of the machine other than described in this manual.

The liability of Verhagen Leiden BV also no longer applies if you or third parties carry out activities such as adaptations or extensions on the V-move 650 without prior written permission.

The V-move 650 is only suitable for process ambient conditions as mentioned in the "Specifications and Tolerances" section in this manual. Any other use is forbidden by Verhagen Leiden BV and can result in danger to the driver and/or his/her environment.

This product is supplied under the general delivery and payment conditions issued by the Metaalunie and designated as METAALUNIE CONDITIONS or as SMECOMA CONDITIONS.

The text applies from 1 September 1993 and was deposited at the Court Registry of the District Court of Rotterdam on 1 January 2014. Published by the Metaalunie, PO Box 2600, 3430 GA Nieuwegein, the Netherlands.

The following guarantee provisions apply unless otherwise agreed in writing:

- Verhagen Leiden BV provides a guarantee to the first user for a period of 12 months after delivery.
- Faults must be reported to Verhagen Leiden BV before the end of the guarantee period.
- The guarantee is applicable to faults that:
 - occur during normal use of the V-move 650.
 - originate due to defective construction or materials.
- The guarantee is no longer applicable to faults that occur due to:
 - normal wear.
 - incompetent or inappropriate use.
 - the use of other consumer goods than those specified.
- In the event of faults Verhagen Leiden BV will:
 - replace the parts. Verhagen Leiden BV becomes the owner of the replaced parts.
 - repair the faults.
 - choose another replacement solution if a repair is not reasonably possible.
- The customer must give Verhagen Leiden BV the opportunity to rectify any faults.
- For built-in parts from third parties the guarantee conditions of the supplier concerned are applicable. The guarantee period can differ from that stipulated above.

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1. Technical specifications and tolerances



The V-move 650 may only be used within the limits for specifications and tolerances as specified in the order, on the assembly drawing and in this manual. If the V-move 650 is not used according to these specifications, Verhagen Leiden BV no longer bears any responsibility for the V-move 650.



The V-move 650 is designed to transfer heavy loads on wheels. The V-move 650 is only suitable as a drive-along tug by using driving switches on the tiller head. This tug is not intended for lifting loads.



Do not use the V-move 650 for other purposes than those for which Verhagen Leiden BV has made the appliance. This can result in damage and danger to the driver and his/her environment.



The control unit for the V-move 650 is supplied with a set of adjustable variables. Apart from setting these variables no changes may be made to the control unit or its software.

A number of couplings can be supplied to be able to couple up different container types.

The position of the tiller is adjustable so the vehicle can be provided as a standing or seated tug. The battery pack can be changed through an opening with door on the side of the vehicle.

| Specifications | |
|------------------------------------|--|
| Year of manufacture | See rating plate. |
| Dimensions | L= 1345, W=760, H= 1165 mm |
| Maximum speed | 12 kph |
| Temperature limits | -20/60°C |
| Weight | 135 kg |
| Weight lead batteries | 60 kg |
| Maximum pulling load | 3500 kg |
| Maximum pulling force | 350 kg |
| Maximum gradient with/without load | 10/20 |
| Motor type | 24V AC |
| Motor power | 1.2 kW |
| Drive | Single drive motor with differential |
| Battery configuration | 2 x 12V |
| Battery pack | Maintenance-free (lead) batteries interchangeable |
| Total battery power | 200 Ah |
| Charger | 24V 10A internal charger with automatic cable reel |
| Wheel configuration | 2 driven + tiller wheel |
| Tyres | Pneumatic/foam |
| Brake | Drum brakes rear + motor-braked |
| Options | Various couplings |
| | Signal light |

2. Safety









The V-move 650 is built using the latest technology and in accordance with the recognised technical safety regulations. Nevertheless, its use can cause danger of injury or death to the user or third parties. Its use can also cause damage to the V-move 650 or other goods.

2.1 Conditions

1. Operation and maintenance of the V-move 650 must be carried out by qualified personnel while respecting the warnings on the V-move 650 and according to the user manual.
2. The V-move 650 is suitable for use outdoors. Electrical components are only splash-proof.
3. The V-move 650 is only suitable for ambient conditions as mentioned in the “Specifications and Tolerances” section in this manual. Any other use is forbidden by Verhagen Leiden BV and can result in danger to the driver and/or his/her environment.
4. Only move safe and stable loads. The V-move 650 is unsuitable for transporting trailers with persons. Passengers may not be transported on the tugged vehicle.
5. Make sure that the capacity of the V-move 650 is sufficient for the weight of the load.
6. The V-move 650 is unsuitable for moving goods containing toxic, explosive, dangerous or flammable substances.
7. The V-move 650 is not approved for driving on public roads.
8. Check whether your V-move 650 is approved for driving in your work environment or have this checked, for example for environments with a fire hazard or danger of explosion. When driving, sparks can be caused when switching on and off.
9. No connection or safety provision whatsoever may be removed while the V-move 650 is switched on. Only use the V-move 650 when all protective devices and safety-dependent provisions are in place and ready for operation.
10. Terms for periodic inspections and maintenance prescribed or mentioned in the user manual must be complied with.
11. If a machine part becomes damaged or no longer works in the correct way, the work must immediately be stopped. Resumption is only allowed when the machine part has been repaired or replaced and has been checked.
12. The V-move 650 may not be modified without prior written approval from Verhagen Leiden BV.
13. In addition to the user manual, generally applicable legal and other compulsory rules with regard to safety, accident prevention and environmental protection must also be complied with. These include, for example, rules for personal protection equipment and traffic regulations.
14. Only have the V-move 650 maintained and repaired by qualified and skilled personnel and only use original replacement parts.
15. Inform operating personnel before starting maintenance work. Shut off the supply voltage before you start examining or maintaining the V-move 650. With battery driven machines the battery power must first be cut off from the rest of the machine.
16. At the end of the working life parts must be disposed of in accordance with the local laws and regulations.

2.2 Signs

Explanation of the signs:

| Sign | Meaning |
|---|---|
|  | Warning. Important points for attention and/or instructions concerning safety and/or damage prevention are marked with this warning sign. |
|  | Read and understand this manual before bringing the V-move 650 into use and/or maintaining it. |
|  | Switch the ignition off and remove the ignition key, disconnect the charging plug and press the emergency stop button. Refer to the user manual. |
|  | Danger of injury due to collision due to the load swinging out. Danger of trapping. |
|  | Danger of serious injury due to heavy loads tipping over on gradients. The V-move 650 is only intended for driving on flat, dry, paved and sufficiently load-bearing surfaces. |
|  | Always wear safety shoes during all work with the V-move 650. |

2.3 Definitions

Driver: Person who drives, controls, supervises the operation of and can start or stop the V-move 650, etc. It is the responsibility of the company to sufficiently train the driver.

Only persons with thorough (internal) theory and practical training for driving the V-move 650 may drive the V-move 650.

Drivers must strictly comply with the safety instructions.

Maintenance mechanic: Person who is familiar with the whole V-move 650, can adjust the safety devices and can maintain the V-move 650. The maintenance mechanic is familiar with the functions and safety standards and is trained to maintain the V-move 650. It is the responsibility of the company to ensure that maintenance personnel are sufficiently schooled and trained.

3. Description of parts

3.1 Machine summary V-move 650

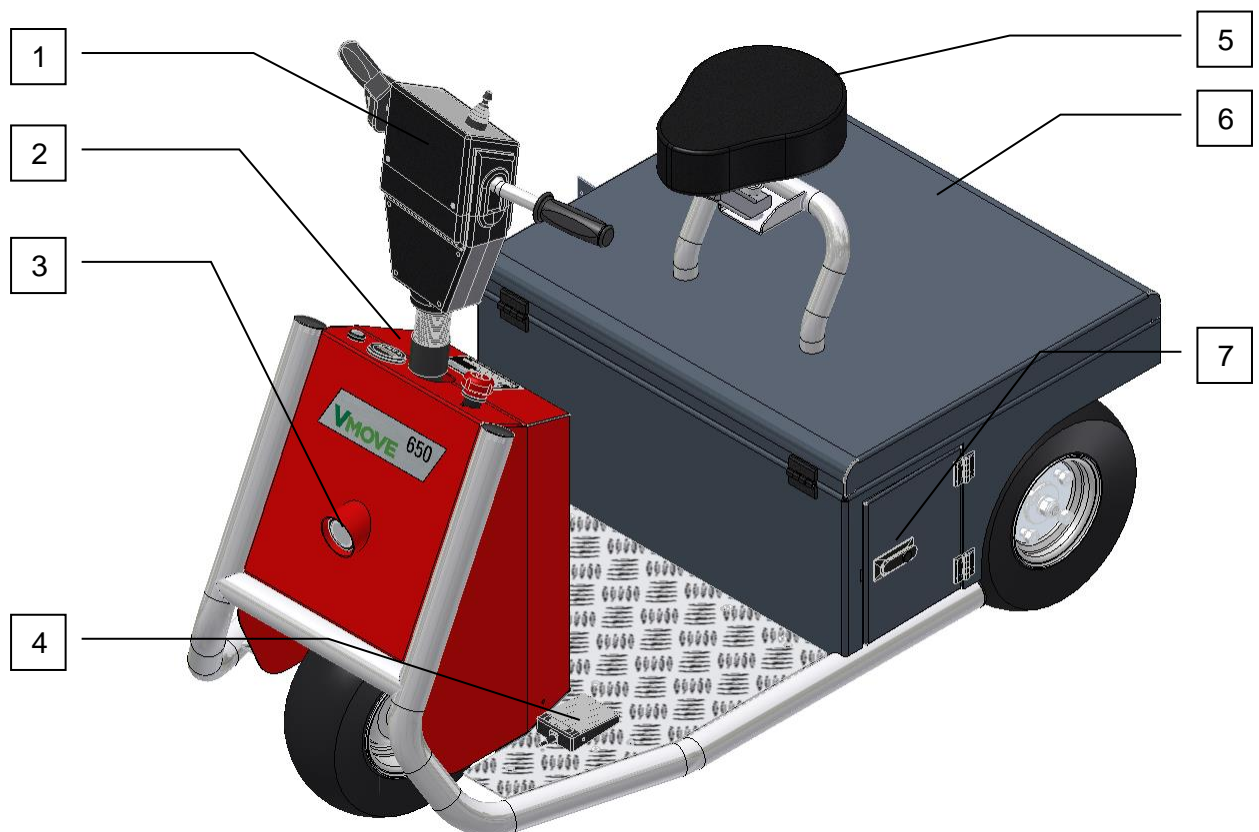


Figure 1

1. Tiller.
2. Operating controls.
3. Headlight.
4. Pedals (2).
5. Seat (adjustable).
6. Bonnet.
7. Door for battery access.

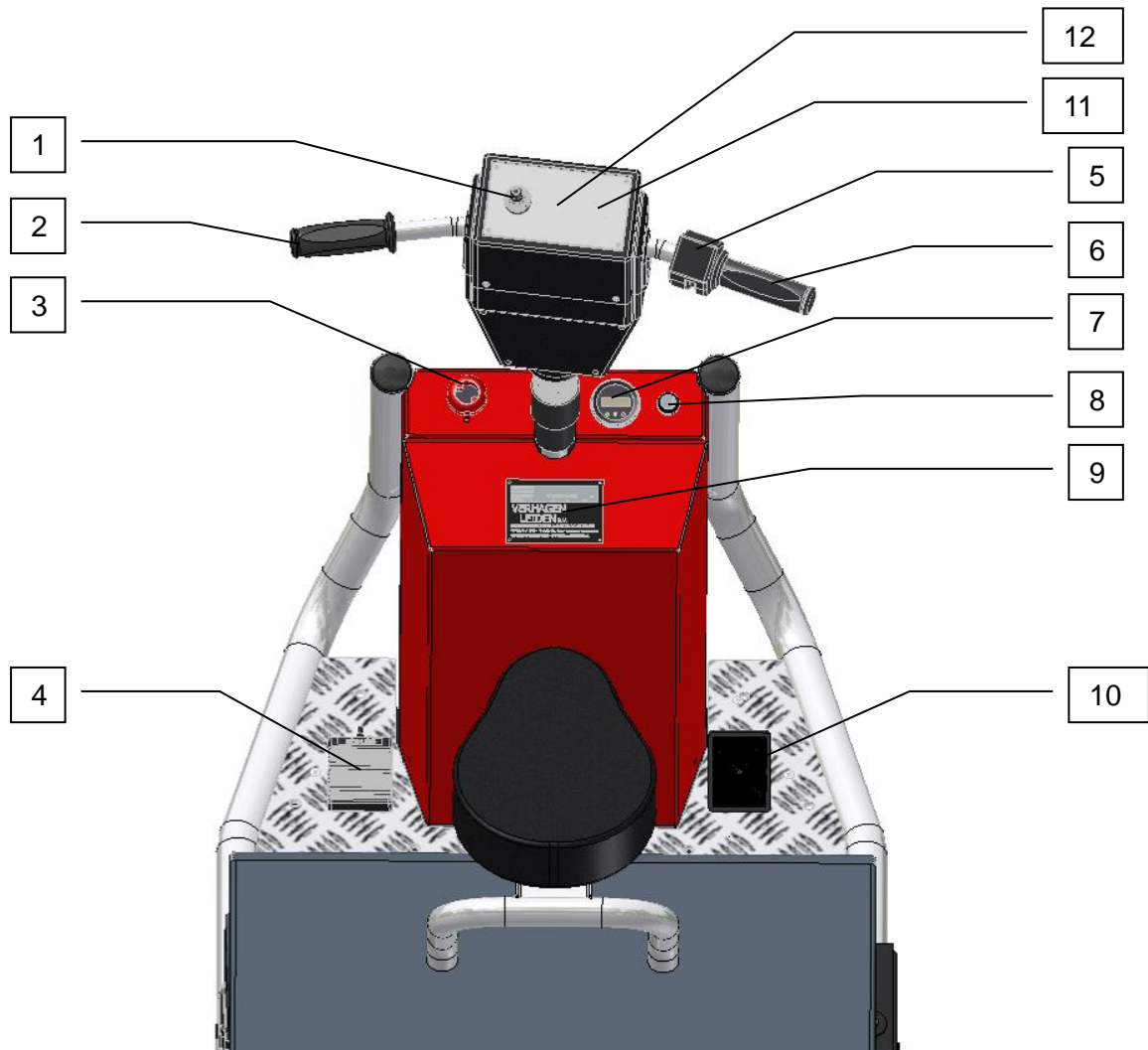


Figure 2

1. Driving switch forwards/reverse.
2. Tiller.
3. Emergency stop button.
4. Floor switch for driver detection.
5. Horn.
6. Throttle.
7. Battery status indicator.
8. Ignition.
9. Rating plate.
10. Brake pedal.
11. Switch lighting on/off.
12. Speed limit switch hare/tortoise.

4. Transport



Follow all instructions as described in this manual, in particular in the safety section.

The truck.



V-move 650 may only be moved by driving under its own force or lifting using a fork-lift. Towing causes serious damage to the drive gear.

Instructions:

1. A stable loading surface with sufficient carrying capacity must be used.
2. The V-move 650 must be secured against tipping over or slipping.
3. The following is forbidden:
 - a. Proceeding onto or under the V-move 650 when it is being lifted.
 - b. Proceeding within the tipping range of the V-move 650 when loading.

The V-move 650 is fixed on a pallet using straps and is covered with a box.

Report damage during or immediately after delivery to the transporter and to Verhagen Leiden BV. Take all the necessary measures to prevent further damage.

5. Bringing into use

5.1 Unpacking

The V-move 650 is fixed on a pallet using straps and is covered with a box.



Prevent injury and damage by wrongly positioning the lifting forks of the fork-lift truck.

Save the packaging for possible further transport. If you want to dispose of the packaging, you must comply with the local and national regulations relating to plastic waste processing.

5.2 Moving, towing the V-move 650



The V-move 650 may only be moved by driving under its own force or lifting using a fork-lift truck. Towing causes serious damage to the drive gear.

5.3 Inadvertent use

The V-move 650 is unsuitable for transporting trailers with persons.

The V-move 650 is unsuitable for moving goods containing toxic, explosive, dangerous or flammable substances.

The V-move 650 is not approved for driving on public roads.

The electrical components and wiring are splashproof so the V-move 650 must be stored in a dry place.

5.4 Checks before bringing into use

Besides good maintenance, the driver of the V-move 650 must check the following points after each work period:

- Check whether there is damage to the exterior of the vehicle.
- Check the coupling point for bending or damage.
- Check whether the batteries are sufficiently charged.
- Drive forwards and backwards and check brake performance.
- While slowly driving check the total manoeuvrability of the V-move 650.



If you observe a defect or are in doubt about the functioning of the V-move 650, the V-move 650 may no longer be used. Immediately alert Verhagen Leiden BV.

6. Operation



Follow all instructions as described in this manual, in particular in the safety section.

6.1 Coupling the products to be moved

The V-move 650 has a coupling point to which the product to be moved is coupled.

Procedure:

1. Drive the V-move 650 carefully in reverse to the coupling point on the product to be moved.
2. Position the coupling point of the V-move 650 under the trailer to couple up.



Never put your hands between the V-move 650 coupling.

6.2 Start



Pay close attention to the driving area. At crossings and in places where there is not a good view reduce your speed and sound a signal. Drive slowly in narrow lanes. Avoid bends if possible and exercise caution at gradients, thresholds, etc. Reduce speed at sharp bends.



The V-move 650 may only drive at a speed at which it can be stopped in good time if, for example, there is an obstacle in the driving area.



Accelerating, stopping, steering and making manoeuvres must always be done slowly so the stability of the vehicle(s) being towed is not endangered.



Exercise care if the vehicle is driving on a slight gradient or on slippery ground.

Procedure:

1. Proceed into the driving position.
2. Press the brake pedal.
3. Switch the ignition on.
4. Unlock the emergency stop button if this has been pressed.
5. Put your left foot on the “Floor switch for driver detection”.



When releasing the “Floor switch for driver detection” the motor will mechanically brake.

6. Choose the driving direction with the switch on the tiller.
 - a. Only switch the driving direction to forwards or backwards when the V-move 650 is standing still.
7. Follow the traffic rules.
8. Gently release the brake.
9. Drive carefully by accelerating.

6.3 Stop

Procedure:

1. Take your foot off the accelerator pedal.
2. Brake with the brake pedal until the V-move 650 is stationary in a safe place.
3. Take your left foot off the "Floor switch for driver detection".
4. Release the brake pedal and check that the V-move 650 remains at a standstill.
5. Switch the ignition off.
6. When you leave the V-move 650 always remove the ignition keys.

If the V-move 650 is not to be used for a certain period, you must:

- Connect the battery charger or have the batteries recharged at least every 3 months.

6.4 Emergency stop

There is an emergency stop button on the dashboard (figure 2, position 3).

Procedure:

1. Press the emergency stop button if there is a possible danger. The emergency stop disconnects the batteries so the electrical system is no longer powered. The V-move 650 will then slow down and stop.

After the emergency stop situation has been resolved the V-move 650 can be started up again.

Procedure:

1. Pull out the emergency stop button.

6.5 Changing the battery

Batteries of the V-move 650 are interchangeable.

Procedure:

1. Switch the machine off.
2. Remove any connected charging plug (figure 4, position 1) from the machine.
3. Open the door for access to the battery (figure 1, position 7).
4. Take the plug out (1).
5. Unlock locking device (2).
6. Slide the battery pack (3) out.
7. Change the battery pack (3).
8. Slide the battery pack (3) in.
9. Lock locking device (2).
10. Insert plug (1).
11. Close the door for access to the battery (figure 1, position 7).

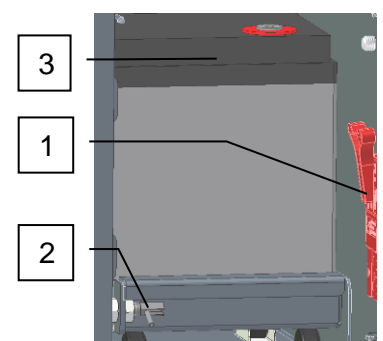


Figure 3

6.6 Charging the battery



The charging location must be well ventilated because during charging explosion-dangerous gases (fulminating gas) are continuously released.



Avoid naked flames or sparks at the charging location during charging. An explosive gas can be released during charging.

When the batteries have discharged to 30% of their capacity, the V-move 650 will only drive at 50% of its normal speed. The V-move 650 must then be charged. When the batteries have discharged to 20% of their capacity, the V-move 650 will stop.

Procedure:

1. The connection plug for the battery charger is inside a recess in the housing above the right rear wheel behind a flap (2).
2. Open the flap (2).
3. Carefully take the plug (1) out.
4. Insert the plug (1) in a 230V plug socket to charge.
5. The automatic battery charger will charge all elements to maximum voltage.
6. The battery charger automatically switches off.

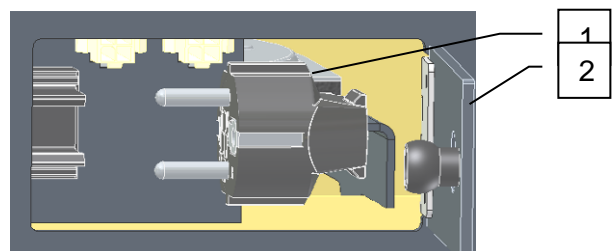


Figure 4

There is a vehicle control display on the V-move 650 dashboard (figure 2, position 7).

- Battery voltage.
- Battery charged level.

Regularly check that the battery charger automatically stops when the battery is full.

6.7 Cleaning



When cleaning do not use a high pressure cleaner or hard water jet because the electrical and electronic system is not waterproof and can be damaged.

The bottom side will become soiled after use inside and outside. It is necessary to regularly remove this soiling because this can impede the operation of the drive gear.

7. Maintenance



Follow all instructions as described in this manual, in particular in the safety section.



The V-move 650 may only be moved by driving under its own force or lifting using a fork-lift truck. Towing causes serious damage to the drive gear.



Maintenance of the V-move 650 must be carried out by qualified personnel while respecting the warnings on the V-move 650 and according to the user manual.



Before you remove the batteries, always shut off all current consumers because of spark formation.



The batteries are filled with acid and sealed. They are fully enclosed and maintenance-free. Distilled water can and may not be added.



Battery fluid is a corrosive acid. Avoid contact with clothing, skin and eyes. Immediately wash off any splashes of battery acid on clothing or the skin with soap and water, then rinse with copious amounts of water. Rinse acid splashes in the eyes for at least 5 minutes with clean water and immediately see a doctor.

7.1 Preventive maintenance

The V-move 650 is lubricated, set and has been test run at your supplier.

Normal usage is assumed for the following maintenance instructions. For intensive use or use in extreme conditions, the maintenance must be performed at shorter intervals.

| Item | Once every | Remarks |
|-------------------------------------|------------|---|
| Batteries | Day | Check charging. |
| V-move 650 | Day | Check for external damage or faults. |
| Tyres | Week | Check for tyre wear. If the wheels skid on sudden braking, they must be replaced. Check the tyre pressure. The correct pressure is 2.6 Bar. |
| Signs | Week | Check their legibility and replace if necessary. |
| Cleaning | Year | See section 6.7 |
| Maximum speed | | It must be possible to reach the maximum speed with gentle acceleration. If this is not the case, contact Verhagen Leiden BV. |
| Lubrication | Year | Lubricate grease nipples on bearings, drive wheels and castors. |
| Bolts, turning points, hinge points | ½ year | Check that all bolts are still tight and check the turning and hinge points and guides for wear and clearance. |

7.2 Faults and repairs



During the guarantee period it is forbidden to perform repairs, changes and modifications on the V-move 650 of the guarantee becomes no longer applicable.

V-move 650 does not drive:

| Cause | Solution |
|--------------------------------------|---------------------------------|
| Flat batteries | Charge batteries. |
| Emergency stop button pressed in. | Pull out emergency stop button. |
| Battery terminals have poor contact. | Clean, place back. |
| Driving direction switch defective. | Have switch replaced. |

V-move 650 works intermittently:

| Cause | Solution |
|--|-------------------|
| Loose wiring. | Check wiring. |
| Relay does not properly "switch" due to soiling or defect. | Clean or replace. |

The speed is not (properly) adjustable or immediately drives at high speed:

| Cause | Solution |
|----------------------------|--------------------------------|
| Speed regulator defective. | Have speed regulator replaced. |
| Relay defective. | Have relay replaced. |

In case of a fault with the cause not immediately clear, we advise you to contact Verhagen Leiden BV by telephone.

7.3 Spare parts and parts subject to wear

The following details must be mentioned when ordering (spare) parts from Verhagen Leiden BV: order number, description, drawing number, position number, Amperage (if applicable) and the required quantity.

Only original Verhagen Leiden BV parts and accessories may be used for the V-move 650.

7.4 Battery life



Batteries can wear quickly if they are not used correctly. Fast wear falls outside the guarantee.

Tips for a long battery life:

1. It is recommended to never drive the battery fully flat. Further charging a nearly full battery is also advised against.
2. Immediate charging of an empty battery considerably lengthens the working life. Discharging more than 20% affects the working life.
3. Never interrupt charging and allow the battery to fully charge.
4. If the V-move 650 is put out of use (for a longer time), it is advisable to keep the battery charger connected. This automatically keeps the battery charged.
5. If the batteries are too heavily loaded this will greatly shorten the working life. It is then necessary to adapt the load.
6. It is advisable to not fully discharge the batteries. If this happens too often, faster wear will be the result. Keep a close eye on the battery condition meter. Connect the battery charger in good time.
7. The batteries must be charged with the correct charger and for a certain time. If the charging current is too low or the duration of charging is too short, the batteries will not be fully charged and the capacity of the batteries will be too low for your application, with faster wear as a consequence. If the charging current is too high or the duration of charging is too long, the battery will become overloaded. The plates in your battery will then become overheated and can be damaged.
8. If the batteries are only e.g. 60% empty and connected to the charger again, the batteries will not have time to rest. The temperature of the batteries will rise with faster wear as a consequence. The battery voltage will also be higher than the actual energy state so a discharge limiter will no longer correctly work.
9. The temperature of the battery may not become too high. This makes the acid more aggressive. Working with and charging in a cool space lengthens the working life.
10. If the batteries are used on more than 3 days a week they will wear more quickly. When choosing the batteries it is important to take account of the frequency of use.
11. A battery gradually empties by self-discharging. If a battery remains in a discharged state, it will sulphate and can be irreparably damaged. We therefore recommend recharging a stored V-move 650 at least every 3 months. It is also possible to keep the charger connected. The batteries are then kept charged with a trickle function.

When replacing the battery, the old battery must be disposed of according to the locally applicable regulations.

8. CE declaration of conformity

Declaration of conformity for complete machinery
(Directive 2006/42/EC, Annex II, sub A)



Verhagen Leiden B.V.
Hoge Rijndijk 267
2314 AG Leiden
The Netherlands

declares that:

V-move 650

- is in conformity with Machinery Directive 2006/42/EC;
- meets the requirements of harmonised European Standards:

| Harmonised European Standard | Description | Harmonised European Standard | Description |
|------------------------------|--|------------------------------|---|
| NEN-EN-ISO 12100_2010 | Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology | NEN-EN-ISO 13857 | Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs |
| NEN-EN-IEC 60204-1 | Safety of machinery - Electrical equipment of machines - Part 1: General requirements | | |

The Netherlands, Leiden
February 2016

A.W.J.M. Verhagen
Director

