



# Technical Handbook

## *METO-SWT*



**Berg Hortimotive**

**Burg. Crezeelaan 42a  
2678 KZ De Lier  
The Netherlands**

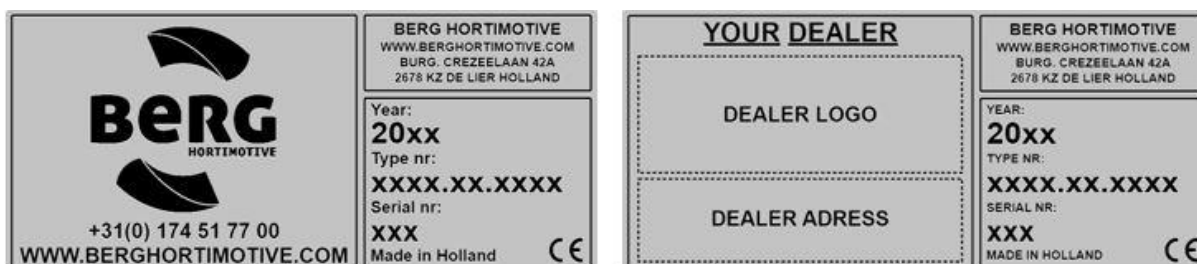
**Tel: +31 (0) 174 517 700**

**Email: [info@berghortimotive.com](mailto:info@berghortimotive.com)  
Internet: [www.berghortimotive.com](http://www.berghortimotive.com)**

## Machine type plate

The *METO-SWT* is fitted with a machine type plate which contains the following information: address details for Berg Hortimotive, CE mark, serial and type reference, serial number and year of construction.

If you would like to contact Berg Hortimotive, or one of their dealers with respect to this *METO-SWT*, please ensure that this information is always readily available.



Version 4, October 2020

The machine is manufactured by:



Berg Hortimotive

Burg. Crezeelaan 42a  
2678 KZ De Lier  
The Netherlands

Tel: +31 (0) 174 517 700

Email: [info@berghortimotive.com](mailto:info@berghortimotive.com)  
Internet: [www.berghortimotive.com](http://www.berghortimotive.com)



# 1. Declaration

## 1.1 Copyright

Berg Hortimotive  
De Lier, 2020

No part of this publication may be reproduced and/or published by way of print, photocopy, film or by any other means without the prior written consent of Berg Hortimotive, registered at De Lier, the Netherlands.

Exceptions to this include parts of the documentation which are intended for reproduction, such as abridged instructions and specifications on the machine itself.

## 1.2 Liability

Berg Hortimotive does not accept liability for dangerous situations, accidents and damage that occur as a result of ignoring warnings or instructions, such as those shown on the *METO-SWT*, or contained in this documentation - for example:

- inexperienced or incorrect usage or maintenance
- being used for applications other than those for which it was designed, or in circumstances other than those given in this documentation
- the use of components or spare parts which are not prescribed
- repairs carried without the consent of Berg Hortimotive and/or a certified dealer
- changes to the *METO-SWT* include the following:
  - alterations to the controls
  - welding, mechanical works, etc
  - extensions to the *METO-SWT* or its controls

Berg Hortimotive does not accept liability when:

- customers do not meet their obligations with respect to Berg Hortimotive (financial or otherwise)
- consequential damage is caused by defects on the *METO-SWT* - e.g. interruption of business, delays, etc.

## 1.3 Guarantee

For a period of 6 months after delivery, Berg Hortimotive gives the client a warranty on material and manufacturing defects that occur during normal use. This warranty does not apply if the defects are caused by improper use or causes other than by material and manufacture, if Berg Hortimotive - following consultation with the client - delivers used material or used goods or if the cause of the defects cannot be demonstrated clearly. The warranty provisions are set out in the METAALUNIE CONDITIONS as they read according to the most recent relevant text. The terms and conditions of delivery are available on request.

The warranty given by Berg Hortimotive for all goods and materials not manufactured by Berg Hortimotive will never be more than that given by its supplier. The warranty is ex works. Faulty machines and/or parts must be sent postage paid.

When it is not possible to send out machines or systems, any travel and subsistence expenses will be payable by the client.

Sold and delivered goods with manufacturer's, importer's or wholesaler's warranties are subject only to the warranty provisions set by the suppliers.

Hydraulic pumps are subject only to the manufacturer's warranty, provided the pump comes with an undamaged safety seal from the supplier.

Berg Hortimotive accepts responsibility for the availability of replacement parts, provided they are available from its suppliers at reasonable conditions.

#### 1.4 Approval Spraying Installation

Your national or local authorities can oblige you to check and examine your spray installation to minimize the environmental impacts from pesticides or chemicals. The *METO-SWT* Automatic Spray Trolley will be approved but must be checked in combination with your liquid supply system such as; airlock, pump and liquid tank. The checks are (for example in England) part of the NSTS (National Sprayer Testing Scheme).

More information about this testing scheme can be found at the Agricultural Engineers Association (England) or the Plant Health and Seed Inspection Service (Poland)

<p><b>Nederland:</b>  Stichting Kwaliteitseisen  Landbouwtechniek (SKL)  Agro Business Park 24  6709 PW Wageningen  Postbus 407  Tel: +31 (0) 317 47 97 06  Fax: +31 (0) 317 47 97 05  <a href="http://www.sklkeuring.nl">www.sklkeuring.nl</a>  <a href="mailto:info@sklkeuring.nl">info@sklkeuring.nl</a></p>	<p><b>Belgie:</b>  Secretariaat Keuring Spuitmachines Vlaanderen  Technologie &amp; Voeding, Agrotechniek. Instituut  voor Landbouwkundig en Visserijonderzoek  (ILVO, T&amp;V-Agrotechniek)  Burgemeester van Gansberghelaan 115  9820 Merelbeke  Tel: +32 (0) 9 272 27 57  Fax: +32 (0) 9 272 28 01  <a href="http://www.ilvo.vlaanderen.be">www.ilvo.vlaanderen.be</a>  <a href="mailto:keuringspuit@ilvo.vlaanderen.be">keuringspuit@ilvo.vlaanderen.be</a></p>
<p><b>Engeland:</b>  Agricultural Engineers Association  Samuelson House - Forder Way  Hampton  Peterborough  PE7 8JB  Tel: +44 (0) 845 64 48 7 48  Fax: +44 (0) 173 33 14 7 67  <a href="http://www.aea.uk.com">www.aea.uk.com</a>  <a href="mailto:ab@aea.uk.com">ab@aea.uk.com</a></p>	<p><b>Polen:</b>  Plant Health and Seed Inspection Service  Ul. Wspólna 30  00-930 Warsaw  Tel: 022 623 24 04  Fax: 022 623 23 04  <a href="http://www.piorin.go.pl">www.piorin.go.pl</a>  <a href="mailto:gi@piorin.gov.pl">gi@piorin.gov.pl</a>  or: Research Institute of Pomology and  Floriculture in Skjerniewice (<a href="http://www.insad.pl">www.insad.pl</a>)</p>
<p><b>Frankrijk:</b>  Cemagref Antony  Parc de Tourvoie,  BP 44F  92163 Antony Cedex  T: +33 (0) 1 40 96 61 21  F: +33 (0) 1 40 96 62 25  <a href="http://www.cemagref.fr">www.cemagref.fr</a>  <a href="mailto:info@cemagref.fr">info@cemagref.fr</a></p>	<p><b>Duitsland:</b>  Julius Kühn-Institut, Bundesforschungs-institut  für Kulturpflanzen  Messweg 11-12  38104 Braunschweig  T: +49 (0) 531 299 5000  F: +49 (0) 531 299 3000  <a href="http://www.jki.bund.de">www.jki.bund.de</a>  <a href="mailto:pb@jki.bund.de">pb@jki.bund.de</a></p>

## 2. Foreword

This handbook describes the *METO-SWT*.

This handbook provides you with information including the safety aspects, a description of the *METO-SWT* together with the working principles, as well as the operating instructions and maintenance of the machine.

Potentially dangerous situations are indicated together with recommendations for avoiding them.

It is important that this handbook is carefully read in order to learn how the *METO-SWT* should be operated and maintained. By reading this handbook and then using the *METO-SWT*, you, or anyone else, will be assisted in using the *METO-SWT* in the correct manner thereby helping to avoid personal injury as well as damage to the machine.

Berg Hortimotive produces safe machines. The machines are designed to meet the latest standards and are manufactured in accordance with the latest CE approval markings. The user remains responsible for the proper operation and for carrying out maintenance on the machine.

# Index

<b>1. DECLARATION .....</b>	<b>3</b>
1.1 COPYRIGHT .....	3
1.2 LIABILITY .....	3
1.3 GUARANTEE .....	3
1.4 APPROVAL SPRAYING INSTALLATION.....	4
<b>2. FOREWORD .....</b>	<b>5</b>
<b>3. INTRODUCTION .....</b>	<b>8</b>
3.1 GENERAL .....	8
3.2 SUPPLIER INFORMATION.....	8
<b>4. SAFETY .....</b>	<b>8</b>
4.1 EXPLANATION OF SAFETY TERMS USED .....	8
4.2 SAFETY REGULATIONS .....	8
4.3 SAFETY SYMBOLS .....	11
4.4 RESIDUAL RISKS .....	12
<b>5. INTENDED APPLICATION.....</b>	<b>13</b>
5.1 AREA OF APPLICATION.....	13
5.2 POSITION AND NAMES OF THE PARTS.....	14
<b>6. TRANSPORT .....</b>	<b>15</b>
6.1 EXTERNAL TRANSPORT .....	15
6.2 INTERNAL TRANSPORT.....	15
<b>7. COMMISSIONING.....</b>	<b>16</b>
7.1 INSPECTION BEFORE COMMISSIONING .....	16
7.2 HORTICULTURE SECTOR GUIDELINES FOR PIPE RAIL SYSTEMS .....	16
7.3 MINIMUM REQUIREMENTS FOR THE PIPE RAIL SYSTEM .....	17
7.4 MOUNTING THE SPRAY BOOMS AND HOSES.....	18
7.5 ADJUSTING THE HEIGHT OF THE SPRAY BOOM.....	18
7.6 SETTING THE MIX INJECTOR.....	19
7.7 PRESSURE REDUCING VALVE .....	20
7.8 VENTING THE SYSTEM .....	22
<b>8. OPERATION .....</b>	<b>23</b>
8.1 DISPLAY .....	24
8.2 CONTROLS .....	26
8.2.1 <i>Adjusting</i> .....	26
8.2.2 <i>Standard Automatic Function</i> .....	30
8.2.3 <i>Block shape Automatic Function</i> .....	30
8.2.4 <i>Tapered shape Automatic Function</i> .....	31
8.2.5 <i>Manual Function</i> .....	31
8.2.6 <i>Battery status</i> .....	32
8.2.7 <i>I/O screen (input &amp; output)</i> .....	33
8.2.8 <i>Alarm messages</i> .....	34
8.2.9 <i>Alarms</i> .....	35
8.2.10 <i>MAIN SWITCH (7)</i> .....	36
8.2.11 <i>EMERGENCY STOP (6a)</i> .....	36
8.2.12 <i>START (6b)</i> .....	36
8.2.13 <i>MANUAL DRIVING ON THE CONCRETE PATH (13 &amp; 14)</i> .....	36
8.3 OUT OF USE .....	37
8.4 CLEANING .....	37
8.5 DISMANTLING .....	37
<b>9. MAINTENANCE AND REPAIR .....</b>	<b>38</b>
9.1 SPECIALIST MAINTENANCE.....	38
9.2 MAINTENANCE AND INSPECTION BY THE OPERATOR .....	38

---

9.4	INSPECTION UNDER THE METO-SWT.....	39
9.5	DRIVE MAINTENANCE (SEE BSA ON OUR WEBSITE) .....	40
9.6	PUMP MAINTENANCE AND OIL LEVEL.....	41
9.7	THE CLEANING.....	41
9.8	CHARGING THE BATTERIES .....	42
9.9	PIPE RAIL SYSTEM MAINTENANCE.....	43
<b>10.</b>	<b>TECHNICAL SPECIFICATIONS .....</b>	<b>44</b>
<b>11.</b>	<b>EC-DECLARATION OF CONFORMITY.....</b>	<b>45</b>
<b>APPENDIX 1:</b>	<b>MAINTENANCE LOGBOOK .....</b>	<b>46</b>
<b>APPENDIX 2:</b>	<b>TECHNICAL DRAWINGS.....</b>	<b>47</b>
<b>APPENDIX 3:</b>	<b>BATTERY SAFETY SHEET .....</b>	<b>48</b>
<b>APPENDIX 4:</b>	<b>SPRAY NOZZLE SPECIFICATIONS .....</b>	<b>52</b>
<b>APPENDIX 5:</b>	<b>CLEANING THE POWDER COATING.....</b>	<b>54</b>

## 3. Introduction

### 3.1 General

You have made a good choice by purchasing the Berg Hortimotive *METO-SWT*. You are the owner of a first class piece of equipment that has been manufactured with great care. You will gain the most advantage from the equipment provided that you carefully follow the instructions given in this handbook with regard to safety, operating and maintenance.

Please study this user's handbook carefully before starting to use the *METO-SWT*. Always follow the safety instructions and recommendations given in this handbook.

Berg Hortimotive does not accept liability for damage or indirect damage resulting from not following the operating and safety instructions contained in this handbook.

Neither does Berg Hortimotive accept liability whenever you or a third party make modifications to the pipe rail wagon or its accessories, without receiving prior written permission from the manufacturer.

The *METO-SWT* is supplied in accordance with the conditions of sale of the Dutch METAALUNIE, as determined by the registrar of the law court of Rotterdam and in accordance with the most recent text contained therein. A copy of the terms and conditions of supply can be provided on request. You can also contact the Koninklijke Metaalunie, PO Box 2600, 3430 GA Nieuwegein, the Netherlands.





### 3.2 Supplier Information

In the event of breakdowns or defects occurring on the *METO-SWT* please contact your Berg Hortimotive dealer.

## 4. Safety

### 4.1 Explanation of safety terms used

**Safety terminology:**

<b>Danger</b>		: Indicates serious or even fatal injury may occur if the instructions in the handbook are ignored.
<b>Warning</b>		: Indicates injury if the instructions described in this handbook are ignored.
<b>Caution</b>		: Indicates damage may occur to the equipment if the instructions described in this handbook are ignored.
<b>Warning</b>		: Indicates possible problems if the instructions described in this handbook are ignored.

### 4.2 Safety regulations

Read the following safety instructions carefully.

After reading the safety instructions they should be strictly observed at all times.

If the *METO-SWT* safety instructions are not observed while it is being operated, it will become substantially more dangerous and may lead to serious physical injury.

**DANGER!**

- ***Read the manual carefully. Observe instructions, safety regulations, etc., at all times.***
- ***De METO-SWT is only suitable for operating on pipe rail systems that comply with the horticulture sector guidelines, the health and safety catalog in force in the Netherlands (see 7.2).***
- ***The METO-SWT should only be used on the correct type of pipe rail system. Check that the centre-to-centre measurement of the rails and the pipe rail wagon correspond, check the pictogram on the trolley.***
- ***It is prohibited to drive on/along the Trolley.***
- ***Use the METO-SWT only for what it is designed for.***
- ***Keep at a safe distance from power cables and parts of the greenhouse construction.***
- ***It is prohibited to use more than one pipe rail trolleys or machines in one path.***
- ***All protective screens and covers should be in place and closed during use.***
- ***When working with the spraying Trolley, wear protective clothing and take the appropriate protective measures, as stipulated in the instructions of the additive (chemicals/pesticides) used.***
- ***It is mandatory to wear shoes with protective toe caps (S1).***
- ***After using the Spray Trolley the pipes and hoses should be cleared of chemicals and liquids. This is done to prevent the occurrence of Legionella bacteria in the still water. Always clean the hose and the supply-pipe with clear water and empty the hoses***
- ***Never exceed the maximum (valve) pressure of 40 bar!***
- ***The operator must be certified to use toxic chemicals when used as additive.***
- ***The Spray Trolley should only be operated by persons who have received adequate training with regard to the Spray Trolley and who have studied and understand the contents of this manual.***
- ***Only use legally allowed pesticide!***
- ***Never use the Spray Trolley outside!***
- ***It is prohibited to enter a path where spraying activities are carried out!***

**WARNING!** 

- **Operating the METO-SWT may only take place when there are no other persons in the vicinity (apart from the operator) of the machine.**
- **The METO-SWT may only be operated by persons of 18 years or older who have received thorough instruction about the METO-SWT, who are fully familiar with this instruction handbook and are completely aware of the dangers associated with operating the machine.**
- **All personnel working in the vicinity of the Spray Trolley should be fully familiarized with the safety provisions and regulations - Employer's instruction**
- **The Spray Trolley should only be repaired by specially trained personnel by Berg Hortimotive**
- **Never carry out maintenance activities to the METO-SWT when it is being operated.**
- **Check the METO-SWT before use for faults, see chapter 9; maintenance.**
- **Keep operating equipment and safety symbols visible and clean at all times.**
- **Never leave the METO-SWT unattended.**
  - Only when you have removed the key from the main switch
- **Never carry out repairs to the METO-SWT if it is already being operated by someone else. Always switch it off via the main switch before carrying maintenance activities and remove the charging plug from the wagon.**
- **Do not carry out any modifications to the Spray Trolley without written consent from Berg Hortimotive**
- **Only use accessories and parts supplied by Berg Hortimotive.**
- **Remove obstacles, such as plant refuse, from the tracks before entering a path.**
- **Never clean the Spray Trolley with a water hose or a steam cleaner.**
- **Observe the safety regulations for the batteries, see Appendix 3.**
- **Disconnect the charger before using the Spray Trolley.**
- **Connect the Spray Trolley to the trickle charger after use!**

**CAUTION!** 

- **Always keep the workplace tidy.**
  - An untidy working area can lead to dangerous situations.
- **Always concentrate on the task in hand.**
  - Always keep your wits about you when operating the METO-SWT. Never operate the METO-SWT when you are unable to concentrate properly or when taking medicine whereby it is not advisable to operate machines or drive in traffic.

### 4.3 Safety symbols

On the *METO-SWT* a number of safety pictograms have been applied. These pictograms warn the operator about possible dangers or dangerous situations. Always observe the warnings and contact your suppliers whenever the actual danger illustrated by the pictogram is not clear. Always make sure that the pictograms are visible and undamaged!

The *METO-SWT* operator must have read and fully understood this handbook. When the operator does not understand the warnings given in either this handbook or on the machine (e.g. they speak another language), all the instructions, potential dangers, warnings and functions must be fully explained to them by a responsible person so that they can fully understand them.



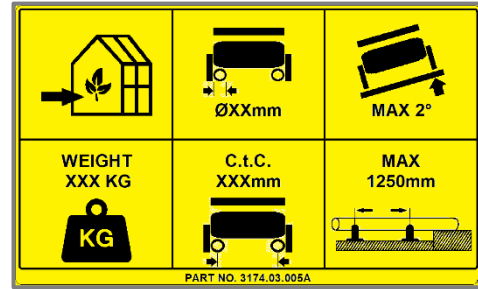
1

2

3

4

5



6

7

8



9



10



11



12



13

No.	Explanation icon:	Position icon:
1	Pay attention! Read the manual before use! Pay attention! Electric parts! Main switch, remove the key!	Back side near operation
2	Pay attention! Switch off the voltage for maintenance! Pay attention! Hazardous chemical battery: explosive gas and corrosive battery acid!	Back side near operation and on the batteries
3	Pay attention! Hazardous chemicals, corrosive substances!	Back side near operation and on the batteries
4	Be careful! Risk of impact by movement!	Back side near operation
5	Be careful! Danger for falling; do not ride along!	Back side near operation
6	Only use indoors (in the greenhouse) Mass in KG	Back side near operation
7	Pay attention! Correct user conditions!	Back side near operation
8	Pay attention! Correct user conditions!	Back side near operation
9	Keep hands and fingers away from moving parts!	Side panel tank and spray boom holder
10	Safety signals on batteries: Ventilate sufficient!, Read manual!, Fire and smoking prohibited!, Corrosive acid!, Wear safety glasses!, Explosive gas!, Recycle, do not throw away! Contains lead.	On the batteries
11	Forbidden to stand up!	Front bumper
12	Use protective equipment, fill with water!	Clean water tank
13	Pick up here with forklift!	Side panels

The values at 6, 7 and 8 depend on the *METO-SWT* type!

#### 4.4 Residual risks

Despite the best possible design and the use of risk-reducing devices and the warnings about the dangers given in the handbook and applied to the machine itself, it is still possible that dangerous situations can arise. Beware of the following:

- Danger of hands, fingers, arms becoming trapped when tilting the liquid tank up and down!
- Danger of hands, fingers, becoming trapped, when adjusting the spray boom height!
- The *METO-SWT* falling over because of an incorrect pipe rail system!
- The *METO-SWT* falling over when driving off the main path!
- Risk of impact by movement of the *METO-SWT* while driving onto the walkway!
- Risk of working with chemicals, take precautions as recommended by the manufacturer of the chemicals.

## **5. Intended application**

### **5.1 Area of application**

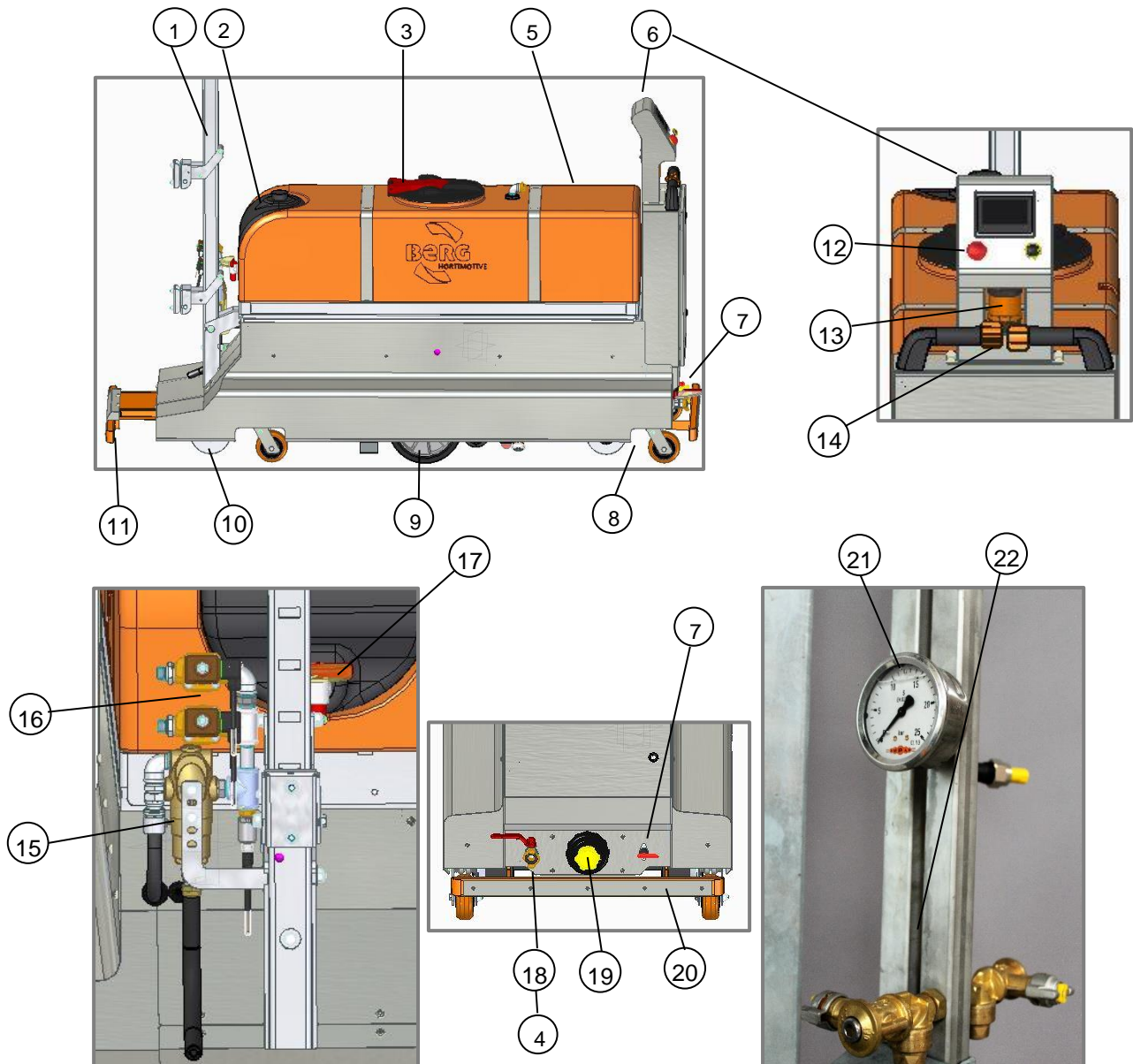
The *METO-SWT* is intended for professional use in the greenhouse horticulture sector. The controls may only be operated by one person with a minimum age of 18 years who has received thorough instruction with respect to the *METO-SWT* and the safety instructions and has read this handbook, and fully understood it.

The *METO-SWT* runs over a pipe rail system installed in accordance with the Health & Safety catalogue applicable in the Netherlands, and is intended as an aid for the care and/or maintenance (spraying) of crops. The *METO-SWT* is capable of spraying crop protection products the paths of the greenhouse either manually or semi-automatically.

The *METO-SWT* should be set up before use, for example, the liquid pressure and the length of the paths. The *METO-SWT* may only be started once it has been correctly installed on the pipe rail system. The *METO-SWT* spray trolley has an internal pump set for spraying the liquid from the tank which is spread by means of the spray booms. The use of the *METO-SWT* for other purposes than those described above is forbidden.

*The use of the METO-SWT outside is prohibited!*

## 5.2 Position and names of the parts



1	Spray boom holder	12	Emergency stop
2	Clean water tank	13	Flash light automatic / malfunction
3	Tank lid with strainer	14	Throttle drive manually (Stipo's)
4	GeKa fill connection	15	Press filter
5	Plastic tank	16	Fluid valves
6	Control panel	17	Clean water tap
7	Main switch	18	Valve
8	Caster wheel and Rear flange roll	19	Pump filter
9	Drive roll for concrete path	20	Stop bumper (rear)
10	Drive roll for ride on tubes	21	Pressure meter
11	Stop bumper (front)	22	Spray booms

## 6. Transport

The *METO-SWT* is supplied as a separate vehicle, which is placed on a transport pallet. For safe pick-up with the forklift truck, see chapter 9.4.

### 6.1 External transport

If you want to transport the *METO-SWT*, make sure that the *METO-SWT* is prepared as set out below:

- Switch off the *METO-SWT* with the main switch (turn the red key into the horizontal position).
- The *METO-SWT* must be placed on the drive rollers for the concrete path and the swivelling wheels on a non-inclined, firm surface.
- The *METO-SWT* must be dry and frost-free during transport.
- Ensure that the whole cannot slip or roll inside the cargo area.
- Before use, the machine should be inspected as specified in 7.1.

### 6.2 Internal transport

The *METO-SWT* can also be transported indoors (in the greenhouse). Do this by allowing the *METO-SWT* to run on its own drive with the manual control. See chapter 8.2.14 Manual driving.

#### **Attention!**

- **Drive slowly and carefully!**
- **Walk along and correct the steering by hand.**
- **Drive preferably with an empty tank**
- **Drive only with the tank in the folded down position!**
- **Disconnect the filling hose!**



## 7. Commissioning

The *METO-SWT* has been specially designed for running on a pipe rail system. The *METO-SWT* was checked for proper functioning and safety, before leaving the Berg Hortimotive factory. The items described in article 7.1 must be inspected prior to taking the *METO-SWT* into service.

The pipe rail system must always comply with the Health and safety catalogue applicable in the Netherlands for pipe rail systems in the horticulture sector. Article 7.3 provides the minimum pipe rail specifications for the track width, pipe diameter and support distances. These pipe rail specifications have been taken from the Health and safety catalogue applicable in the Netherlands for pipe rail systems in the horticulture sector. For the full contents of the Health and safety catalogue, we refer you to the Ministry of Social Affairs & Employment (SZW).

### 7.1 *Inspection before commissioning*

The following points must be checked before taking the *METO-SWT* into service:

- No mechanical damage to the tank, hoses and spray boom
- Front drive role, rear rollers, counting roller and swivelling wheels run smoothly
- Front and rear bumpers switch in and out smoothly
- Batteries charged
- Damage to control components and/or safety pictograms
- Damage and leaks in hoses and/or couplings, valves and filter
- The hoses and spray booms are properly connected
- Safety guards in place
- The spray boom height adjustment works properly.

### 7.2 *Horticulture sector guidelines for pipe rail systems*

The *METO-SWT* has been designed to run on a pipe rail system. This means that each path between the crops has a track that consists of two pipes of the same diameter with a fixed width between them (centre-to-centre/c to c size). The pipes are often used as heating pipes and are supported along fixed distances. The pipe rail system must satisfy the most recent requirements of the horticultural sector guidelines for pipe rail systems. In Article 7.3, the minimum requirements are also given for the pipe rail systems which are taken from the sector guidelines for pipe rail systems. The pipe rail system on which the *METO-SWT* is intended to be used, must also comply with these requirements. All the above-mentioned items should also be checked periodically in accordance with the Health & Safety catalogue applicable in the Netherlands. It is absolutely prohibited to use a pipe rail system that does not comply with the policy regulations. A number of tests are described in the policy regulations for determining whether it is possible to operate safely with the pipe rail trolley on the pipe rail system. These tests should be implemented prior to working with the combination of the pipe rail trolley and the pipe rail system.

### 7.3 Minimum requirements for the pipe rail system

The rails (normally heating pipes) must have an external diameter of either 51 mm or 45 mm and a wall thickness of at least 2 mm. The minimum material specifications for the pipes is as follows: Steel 37 (S235JR). The distance between the pipe rail system supports may not exceed 1.25 metres. When combining pipes with a diameter of 45 mm to a track width of 42cm, the distance between the rail supports should not exceed 1 metre. The pipe rail supports used should be in accordance with, or equivalent to the following specifications: 1.5 mm thick steel base plate with reinforcing profile - base plate width of at least 115 mm - the length should be such that the base plate protrudes at least 70 mm from the two vertical supports which carry the load of the pipes. The centre-to-centre distance between the pipes should be at least 42 cm. The pipes must be properly secured, precisely installed and with a maximum tilt of no more than 2° in both length or in width. The pipes must also be properly attached to the supports and the concrete track. Loose fitting pipes must not be used! At the pipe ends (in front of the wall) there should be an end-stop welded on that is at least 5 cm high - at the end of each season check whether the stops are not flat, folded, crooked or broken. A soil test bore should be carried out using probing equipment (see the Health & Safety catalogue applicable in the Netherlands). It should have a so-called cone value on the top layer of more than 0.4 Mpa (62 psi).

The use of rail systems not covered by the H&S catalogue applicable in the Netherlands is permitted on the condition that a stabilisation test is carried out in accordance with the said H&S catalogue from which it appears that the pipe rail trolley / pipe rail system combination would be stable. Furthermore, the supports for these other pipe rail systems must be installed no more than 1 metre apart, and the tilt must not exceed 2 degrees in both length and width.

→ The tubes are similar or at least equal to the specifications given in the table below.

The conditions for the axle load stand in the table below.

Cat.	Track-width	Tube-diameter / thickness	Support-distance	Permissible axle load at center to center size			
Cat.	[mm]	[mm]	[mm]	420mm [kg]	500mm [kg]	550mm [kg]	600mm [kg]
1	420 t/m 600	51 / 2,25	max. 1000	507	548	573	593
2	420 t/m 600	51 / 2,25	max. 1250	406	438	458	475
3	420 t/m 600	45 / 2	max. 1000	345	372	372	403
4	420 t/m 600	45 / 2	max. 1250	276	298	276	323

→ Quality steel 37 (St37)

→ Wheelbase between 62.5% and 125% of the support distance.

→ All values for other pipe and tube rail supports should be calculated separately.

Source: The Dutch health and safety catalog in force in the Netherlands  
<https://agroarbo.nl/catalogus/buisrailsysteem/>

## 7.4 Mounting the spray booms and hoses

Carry out the following steps to connect a spray boom to the *METO-SWT*:

- See figure 7.1 for the following operations
- Attach the spray boom to suspension point (A) and a similar suspension point higher on the pole
- Connect the wall and side spray hose to the appropriate line of the spray boom (see labels B, the side valve is the lower valve and the wall spray valve is the upper one).
- The loose hose section with the manual valve serves as a supply for rinsing the pressure filter (C).

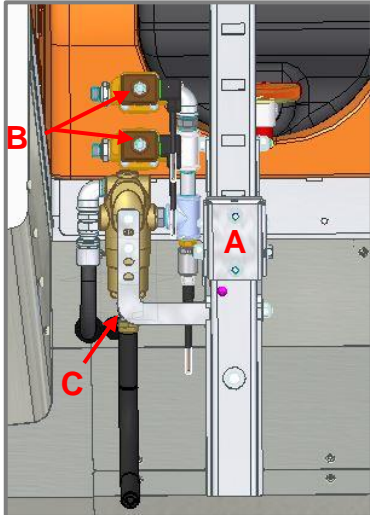


Figure 7.1; Electric valves and hose connections

## 7.5 Adjusting the height of the spray boom



Figure 7.2: Adjusting the spray boom

Carry out the following steps on the *METO-SWT* to adjust the height of a spray boom:

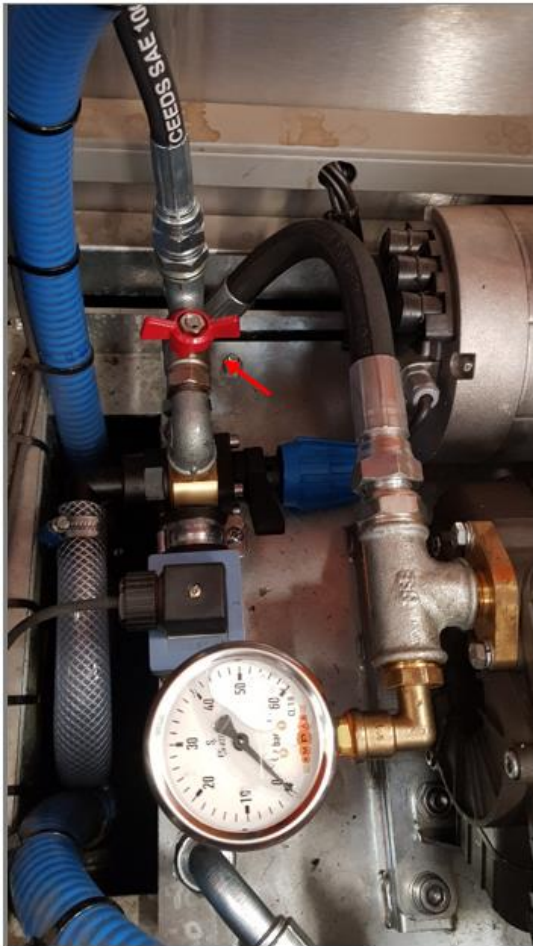
- See figure 7.2 for the following operations
- Pull the boom forwards and upwards at the same time, take account of the weight of the spray boom, which needs to be held up by hand
- Slide the spray boom vertically to the required height
- Push the locking pins (bottom and top) in a slot and at the same time allow the spray boom to drop gently so that it locks into the spray boom mast.

## 7.6 *Setting the mix injector*

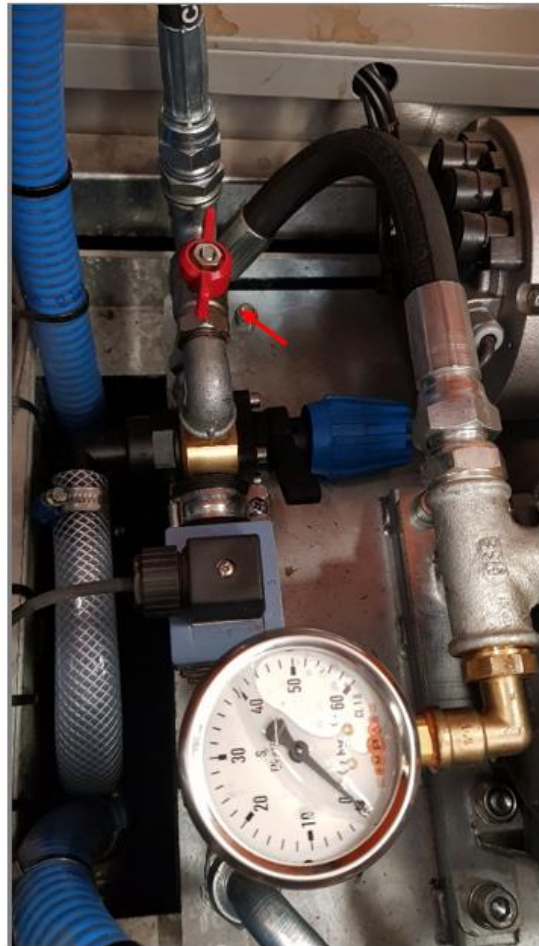
The *METO-SWT* is provided with a mix injector in order to keep the liquid in the tank moving.

**Attention! Before filling the tank, set this valve in the desired position!**

The mix injector can be operated with a manual ball valve. This valve can be set open or closed. The preference is to keep the mix injector always open for a good distribution of the additives in the water.



Valve closed, mix injector inactive



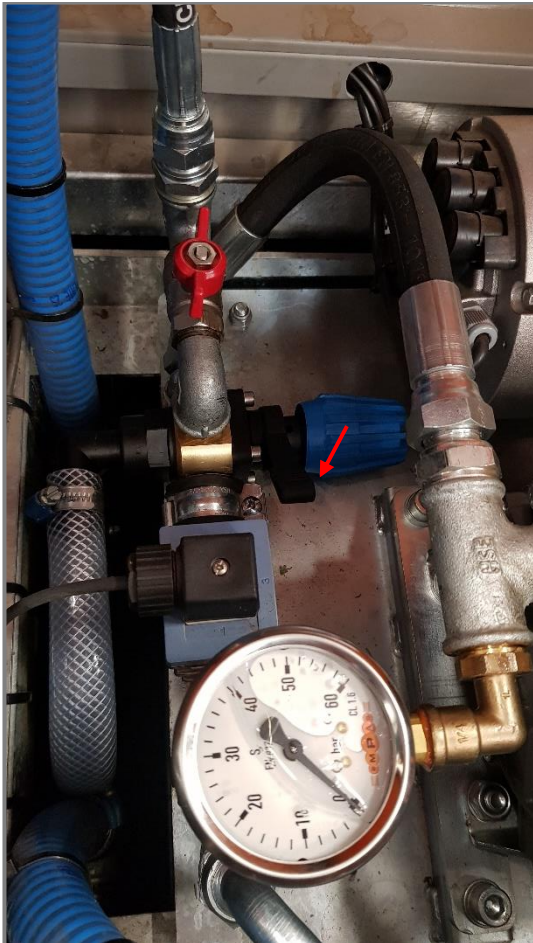
Valve open, mix injector active (preference!)

## 7.7 Pressure reducing valve

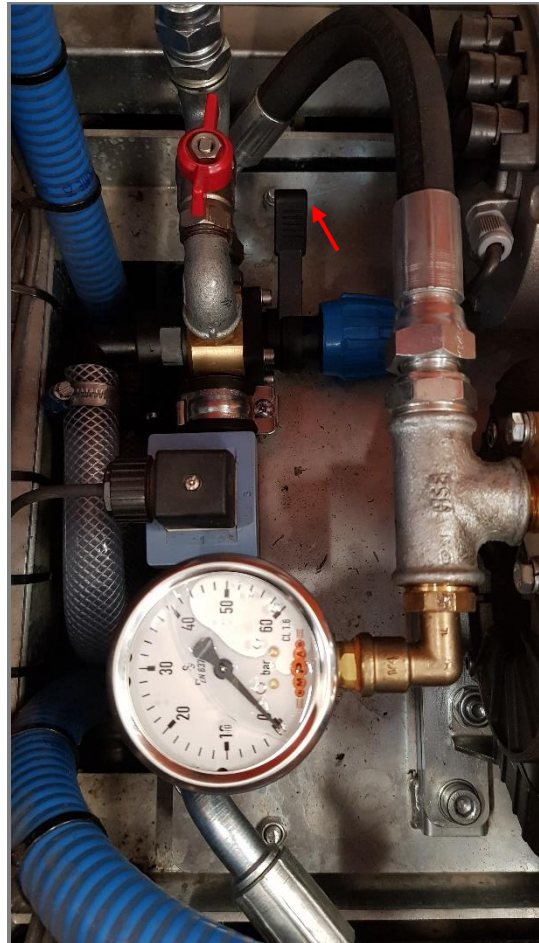
The *METO-SWT* is equipped with a pressure reducing valve, this valve has the following functions:

- Regulates the maximum pressure in the system
- Reduces the pressure and flow when working with less than approx. 6 spray nozzles

**Pay attention! Before filling the tank completely, make sure that the pressure reducing valve is set to the desired pressure!**



Lever loose, pressure reducer not active, all liquid is circulated

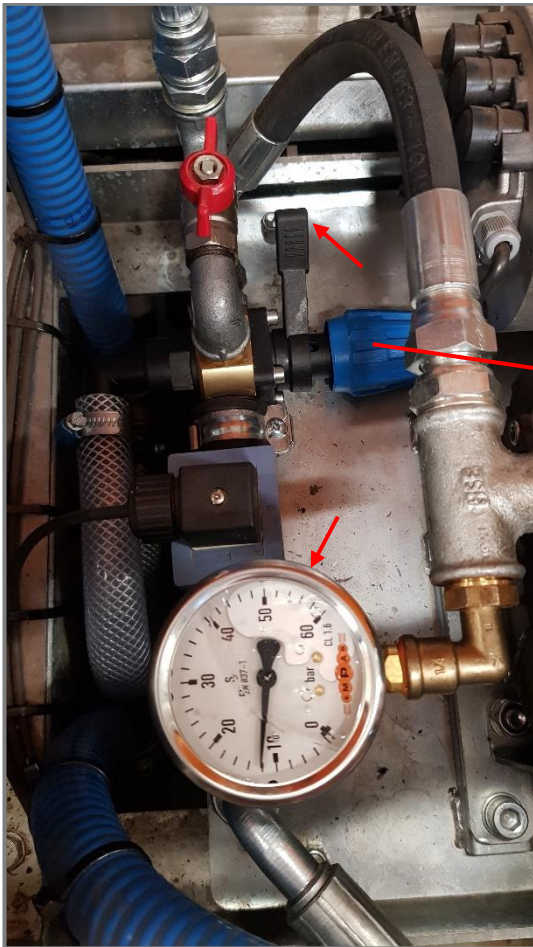


Lever fixed, pressure reducer active (necessary!)

To adjust the pressure, fill the tank to the approximate bottom of the tank indication with clean water:



Fill level so that the pressure reducing valve can be set.



Lever fixed, pressure reducing active

Blue pressure setting button

- Turn the adjustment knob clockwise for a higher pressure
- Turn the adjustment knob counter clockwise for a lower pressure

To set the pressure, the [LIQUID MIXING] function can be activated as described in chapter 8.2.5 Manual Function.

During the final inspection by Berg Hortimotive, the pressure is set to 12 bar, which will be an excellent setting for 80% of crop protection activities.

Tip! Set the pressure reducing valve approx. 2 bar higher than the operating pressure entered in the touchscreen. (chapter 8.2.1 Adjusting)

From the use of approx. 6 spray nozzles (or more), the electronic pressure control will be able to accurately adjust any desired lower working pressure up to approx. 10 bar.

If, when using fewer nozzles (4 or 2), the working pressure cannot be electronically regulated far enough backwards, the pressure reducing valve must be set to a lower pressure. ("overflow" of liquid to the tank is necessary because the pump is running at its lowest possible speed)

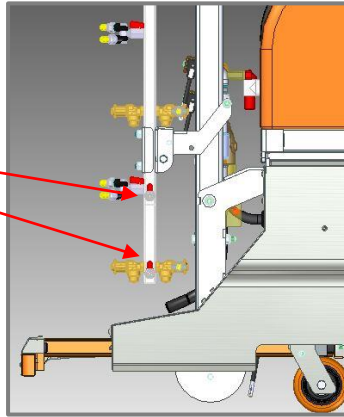
If during automatic spraying the Alarm message "Error pressure too low" appears on the screen, the pressure reducing valve must be set to a higher pressure. (approx. 2 bar higher than the operating pressure!)

## 7.8 Venting the system

For proper operation and a stable pressure and flow, the system must be vented before use. To do this, proceed as follows:

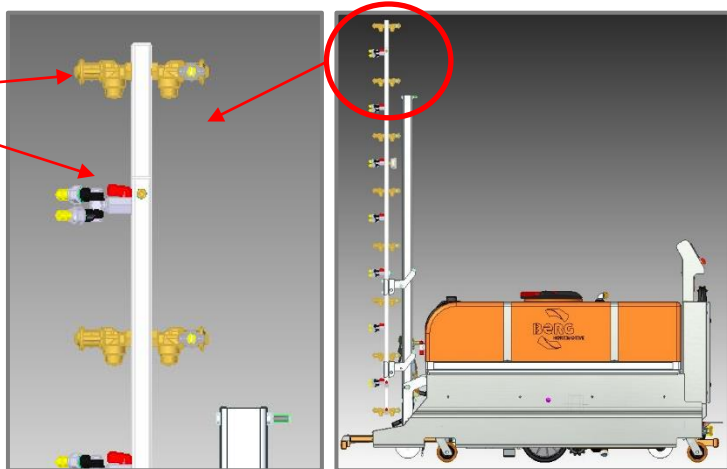
- Fill the tank with clean water via the filter in the tank lid (3)
- In Settings (8.2.1), set to the desired spray pressure
- In the manual control menu, select Spraying 1 and Wall spraying 1
- Open the lower ball valves of both spray booms and press Start to flush the system

Ball valves open!



- Keep the start button pressed until good jets of water flow out of the ball valves and the pump is running at a constant speed
- Close the ball valves
- Fold up the spray booms (if retractable booms)

Open the top nozzles!



- Open the top nozzles and press the start button again to vent the spray booms
- Keep the start button pressed until a good spray comes out of the spray nozzles
- Then turn the nozzles open at the height at which you want to spray and test by pressing the start button to be sure that all nozzles produce a good spray
- The *METO-SWT* is now vented and ready for use after having gone through chapter 8.

## 8. Operation

Make sure you are familiar with your *METO-SWT* Spray Trolley and control functions. Ensure that operators have received instructions regarding the Spray Trolley and the safety regulations and have studied and understand this manual.

- The *METO-SWT* should only be operated if it has been verified that no other people are present in the near vicinity of the Trolley.
- Remove crop refuse and other obstacles from the pipe rail system before use.
- Clean the *METO-SWT* on a regular basis. Prior to cleaning, switch the *METO-SWT* off and press the emergency button. Never clean using excessive water or a pressure cleaner.
- The *METO-SWT* should only be operated if the previous pages have been extensively studied and there are no questions for you.
- Provide an approved spray system according to national legislation, performed by a certified inspection agency for inspection of sprayers (see 1.4).
- After use switch-off the *METO-SWT* and connect to the supplied trickle charger.
- Keep the *METO-SWT* in a dry, frost-free storage area if it is expected to be idle for an extended period of time.

**Charge the batteries at least every 4 weeks! Less frequent charging will reduce the capacity of the batteries and the lifetime of the batteries, the motor and the drive control!**

**CAUTION! DANGER! HANDLING BATTERIES CAN CAUSE INJURY!**



Avoid skin contact with battery fluid. Wear safety glasses and gloves. Battery fluid is a strong corrosive acid. Upon contact, immediately wash skin with water and soap. In the event of eye contact rinse with running water for at least 10 minutes and seek medical assistance. When working with or near batteries, ensure that adequate supplies of water and soap are nearby and that assistance is available within earshot. Avoid short-circuiting (spark formation) and ensure that no (electric) connection is made between the battery poles.

Extremely explosive gas is released during battery recharge. Ensure that no fire or sparks are near the batteries during the recharge. **NO SMOKING!**

Make certain the area is well ventilated during battery recharge or battery storage (more about charging; see chapter maintenance).

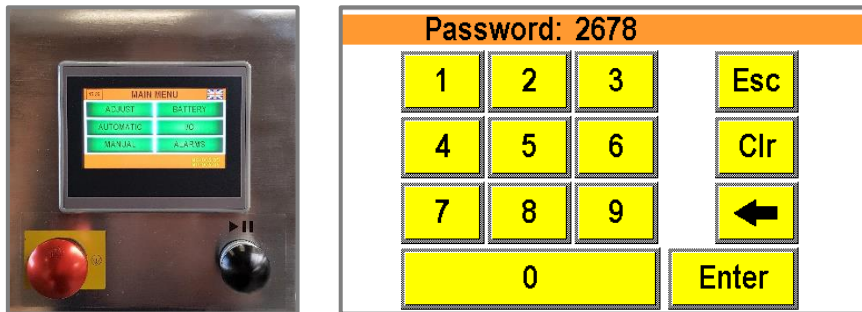
Make sure that no metal objects can fall on the battery as this can cause short-circuiting or sparks and, consequently, a fire or explosion. Remove personal items such as bracelets, rings, necklaces and watches when working near the battery. A short-circuit current is capable of melting a ring and causing severe burns.

## 8.1 Display

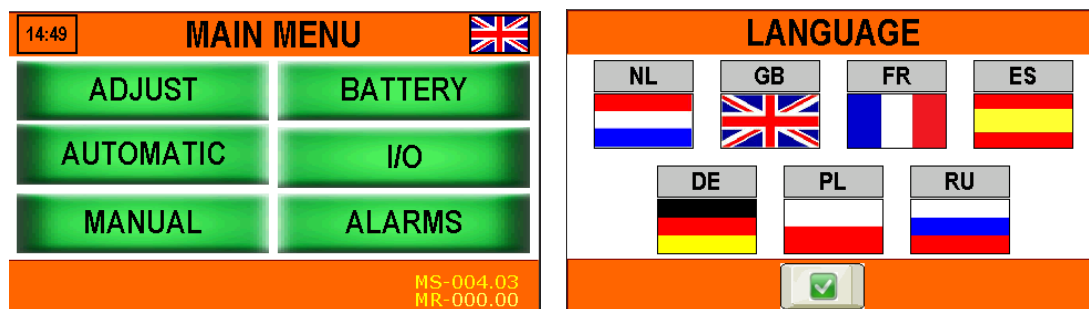
The display provides information about the *METO-SWT* settings. When switching on, the display always requests the password, enter **2678**, followed by **Enter** - the main menu now appears.

**Please note, control the screen only with the fingers and NOT with hard sharp objects!**

**Attention, the screen has a screen protection function and after a certain period it darkens, THE *METO-SWT* HAS NOT BEEN TURNED OFF!**



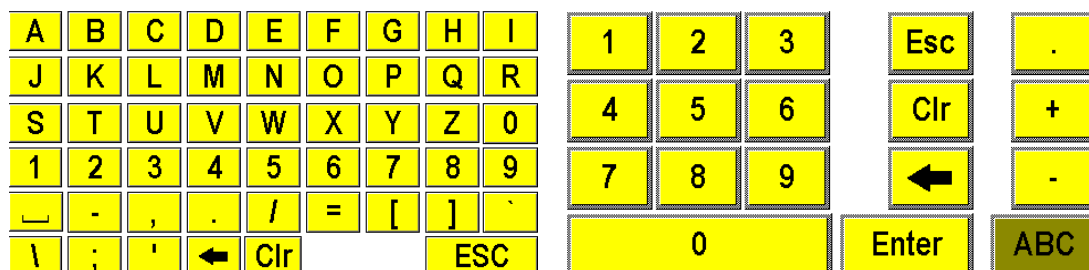
The main menu offers the following functions:



### Touch screen

Various program adjustments and function activations can be carried out via the touch screen. The language selection is made by pressing the flag.

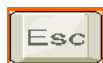
The touch screen can also generate alphanumeric input screens in order to enter variables which apply to your specific greenhouse or plants.



- Alpha keys [a, b, c etc]
- Numeric keys [0-9]
- [Clr] key for cancelling entry
- [←] key to cancel last entry
- [Ent] key to confirm entry (put into the memory)
- [ESC] key to leave the input screen or go back to previous screen
- [ABC] key for changing from Numeric to Alfa input screen



step screen up or down



back the main screen



selector key, function now **active**



selector key, function now **inactive**

START SIDESPRAY 1  
TO GABLE

0.0

this function is currently **not possible**

999 %

touch sensitive input field, opens **numeric input screen**



shows **last alarm**

9.9 s.

restart **counting period**

START

**start button** or **start photocell** active

READY

automatic **cycle** is ready



Program for gardens with all the same paths is active.



Program for block shaped gardens is active.



Program for tapered gardens is active.

## 8.2 Controls

Before you can use the *METO-SWT* spray trolley, you must enter various settings, in order to spray according to your spray needs.

Turn the *METO-SWT* spray trolley ON by turning the main switch (7) to the vertical position, the display will ask for a password, key in **2678**, the main menu appears on the display.

### 8.2.1 Adjusting

ADJUST		
LENGTH PATH	0.0	m
SPRAYINGSPEED FORWARDS	0.0	%
SPRAYINGSPEED BACKWARDS	0.0	%
SPEED WITHOUT SPRAYING	100	%
PRE-SPRAY TIME AFTER START METO	0.5	s
<div> <div>Esc</div> <div>↓</div> </div>		

#### [LENGTH PATH]

Enter the length of the path.

(For safety's sake, take 3 meters shorter than the actual length, this can be changed later).

**Pay attention! If the pad length is entered too long, large damage can occur!**



#### [SPRAYINGSPEED FORWARDS]

Enter forward speed for driving to the rear outside wall, this is often 100% because spraying is preferably done only on the return.

#### [SPRAYINGSPEED BACKWARDS]

Enter reverse driving speed for driving back to the main path, this is usually the speed that is set for the correct level of emission of the spraying fluid.

#### [SPEED WITHOUT SPRAYING]

Enter the speed for driving when the spraying valves are shut off, this can be 100% if it gives no harm to the crop.

#### [PRE-SPRAY TIME AFTER START *METO-SWT*]

If it is preferred that the *METO-SWT* unit sprays while driving forwards to the gable, this setting can be selected so that spraying comes on before moving.

By default, this setting is **0.5 sec**, increase this value if the first plants in the path do not receive enough spray liquid.

ADJUST		
SIDESPRAY FORWARDS	<input type="checkbox"/>	
SIDESPRAY FORWARDS WHOLE PATH	<input type="checkbox"/>	
START SIDESPRAY TO GABLE	0.0 m	
<div> <div>↑</div> <div>Esc</div> <div>↓</div> </div>		

ADJUST		
SIDESPRAY FORWARDS	<input checked="" type="checkbox"/>	
SIDESPRAY FORWARDS WHOLE PATH	<input checked="" type="checkbox"/>	
START SIDESPRAY TO GABLE	0.0 m	
<div> <div>↑</div> <div>Esc</div> <div>↓</div> </div>		

#### [SIDESPRAY FORWARDS]

Choice whether spraying should occur when driving the *METO-SWT* forwards to the gable.

(spraying 1 means spraying boom 1, which is often the only boom available)

ADJUST		
SIDESPRAY FORWARDS	<input checked="" type="checkbox"/>	
SIDESPRAY FORWARDS WHOLE PATH	<input type="checkbox"/>	
START SIDESPRAY TO GABLE	5.0 m	
<div> <div>↑</div> <div>Esc</div> <div>↓</div> </div>		

#### [SIDESPRAY FORWARDS WHOLE PATH]

This setting is active as standard so that the entire path is sprayed.

If this setting is **non-active** the *METO-SWT* will only spray the section at the end of the path according to the settings of the next command.

#### [START SIDESPRAY TO GABLE]

Enter the number of metres that have to be sprayed at the end of the path.

ADJUST		
SIDESPRAY BACKWARDS	<input type="checkbox"/>	
SIDESPRAY BACKWARDS WHOLE PATH	<input type="checkbox"/>	
STOP SIDESSPRAY FROM GABLE	0.0 m	
<div> <div>↑</div> <div>Esc</div> <div>↓</div> </div>		

ADJUST		
SIDESPRAY BACKWARDS	<input checked="" type="checkbox"/>	
SIDESPRAY BACKWARDS WHOLE PATH	<input checked="" type="checkbox"/>	
STOP SIDESSPRAY FROM GABLE	0.0 m	
<div> <div>↑</div> <div>Esc</div> <div>↓</div> </div>		

#### [SIDESPRAY BACKWARDS]

Select whether spraying must occur when driving the *METO-SWT* backwards to the main path.

ADJUST		
SIDESPRAY BACKWARDS	<input checked="" type="checkbox"/>	
SIDESPRAY BACKWARDS WHOLE PATH	<input type="checkbox"/>	
STOP SIDESSPRAY FROM GABLE	10.0 m	
<div> <div>↑</div> <div>Esc</div> <div>↓</div> </div>		

#### [SIDESPRAY BACKWARDS WHOLE PATH]

This setting is active as standard so that the entire path is sprayed.

If this setting is **non-active** the *METO-SWT* will only spray the section at the end of the path according to the settings of the next command.

#### [STOP SIDESPRAY FROM GABLE]

Enter the number of metres that have to be sprayed at the end of the path.

ADJUST	
START GABLE SPRAY BEFORE GABLE	1.0 m
TIME GABLE SPRAY	2.0 s
TIME GABLE SPRAY 2	0.0 s
GABLE SPRAY 2 OFF FROM GABLE	0.0 m
<div>    </div>	

#### [START GABLE SPRAY BEFORE GABLE]




Enter the number of metres that the wall sprayer starts spraying before the *METO-SWT* has driven the preset number of metres. This function allows to spray extra pesticides at the rear gable.

#### [TIME GABLE SPRAY]

Enter the period (seconds) that the wall spraying boom must spray the gable.

#### [GABLE SPRAY 2 OFF FROM GABLE]

Enter the number of metres over which wall sprayer 2 (if fitted) must remain spraying after the *METO-SWT* has reversed in the direction of the main path.

ADJUST	
AFTERSPRAY DISTANCE	0.5 m
NOZZLE TYPE (COLOUR)	
SETPOINT PRESSURE	8 bar
NUMBER OF ACTIVE NOZZLES	5 #
<div>   </div>	

#### [AFTERSPRAY DISTANCE]

Enter the distance that the *METO-SWT* must drive (spraying) after leaving the rails on the main path.

*Whether the METO-SWT spraying machine travels onto the main path while spraying depends on option SIDESPRAY 1 BACKWARDS WHOLE PATH being activated. If this is not activated, then this will be the distance that the METO-SWT must travel onto the path to come out at the centre.*

#### [NOZZLES TYPE (COLOUR)]

Enter the applied nozzle colour (type) by tapping the coloured input field. The yellow nozzles are supplied as standard.

#### [SETPOINT PRESSURE]

Enter the desired pressure, it is recommended to check the actual pressure on the pressure gauge of the boom while spraying.

#### [NUMBER OF ACTIVE NOZZLES]

Enter the number of nozzles to be sprayed with, this setting will cause the spray boom to reach the desired pressure faster.

The functions below only appear on the display if they have been set by the service engineer to “**block shaped greenhouse**” in his own menu.  
A maximum of 26 sections (blocks) can be set from A to Z.

ADJUST	
NUMBER OF PATHS IN BLOCK SECTION A	10
LENGTH PATH SECTION A	0.0 m
NUMBER OF PATHS IN BLOCK SECTION B	20
LENGTH PATH SECTION B	0.0 m
<div> <div>↑</div> <div>Esc</div> <div>↓</div> </div>	

[NUMBER OF PATHS IN BLOCK SECTION A (to Z)]  
Enter the number of **contiguous** paths of equal length.

[PATH LENGTH: SECTION A (to Z)]  
Enter the length of the paths in this section.

The following is only applicable when function “**Tapered garden**” (slanting rear wall) is on (to be set by the service engineer).

ADJUST	
NUMBER OF PATHS WITH GEER	10
DECREASE DISTANCE A PATH	0.0 m
INCREASE DISTANCE A PATH	0.0 m
<div> <div>↑</div> <div>Esc</div> <div>↓</div> </div>	

[NUMBER OF PATHS WITH GEER]  
Key in the number of paths where the rear wall is slanting.

[DECREASE DISTANCE A PATH]  
Key in the distance reduction per path in metres.  
(Do not enter anything if the paths are longer!)

[INCREASE DISTANCE A PATH]  
Key in the distance increase per path in metres.  
(Do not enter anything if the paths are shorter!)

## 8.2.2 Standard Automatic Function

AUTOMATIC	
LENGTH OF PATH	000.0 m
DISTANCE	000.0 m
PRESSURE	00.0 bar
FLOW	00000 ltr
<div>Esc</div> <div>↓</div>	

Shows path length that is set.

Shows actual driving distance and status of main path at 0 m.

Actual pressure.

Number of litres sprayed. (indication!)

Drive the *METO-SWT* spraying machine to the front of the pipe rails. Press the green START button. The *METO-SWT* spraying machine will now operate automatically in the program selected.

Walk alongside the *METO-SWT* spraying machine on the path in order to check the distance that was set.

The *METO-SWT* spraying machine must stop approximately 1.5 metres in front of the wall. Adjust this if required according to the instructions given in the previous pages. Make sure you are properly protected against the chemical agents, and keep a safe distance!

**We advise that you carry out the tests using plain water!**

◀ Tank 0% ◀◀ Tank 0% ▶	
LENGTH OF PATH	000.0 m
DISTANCE	000.0 m
PRESSURE	00.0 bar
FLOW	00000 ltr
<div>Esc</div> <div>↓</div>	

### Tank empty message!

If the tank becomes empty while spraying, the *METO-SWT* spray trolley will stop immediately and [Tank 0%] will scroll on the display screen as shown here.

Drive the *METO-SWT* spray trolley back manually (8.2.5) and fill the tank.

Automatically spray the entire path again or resume spraying manually from the place where the tank was empty.

## 8.2.3 Block shape Automatic Function

AUTOMATIC	
LENGTH OF PATH	000.0 m
DISTANCE	000.0 m
NUMBER OF PATHS	000
SECTION	PRESSURE
IN PATH	00.0 bar
000	FLOW
	00000 ltr
<div>Esc</div> <div>↓</div>	

Shows path length that is set.

Shows actual driving distance.

Shows total number of paths in the Section.

Actual pressure.

Number of litres sprayed. (indication!)

SECTION IN PATH:

Shows the actual path in the actual Section.

**Only the contiguously entered Sections will be automatically sprayed in sequence!**  
If there is a Section at "0 paths" in the settings menu, stop the *METO-SWT* at that Section and the message "READY" will flash on the screen.

**Always check the green/yellow and the " LENGTH OF PATH " fields after an ALARM!**

## 8.2.4 Tapered shape Automatic Function

AUTOMATIC	
LENGTH OF PATH	000.0 m
DISTANCE	000.0 m
NUMBER OF PATHS	000
PRESSURE	00.0 bar
IN PATH	000
FLOW	00000 ltr
<div>Esc</div> <div>↓</div>	

Shows path length that is set.  
Shows actual driving distance.  
Shows the total number of paths in the taper.  
  
Actual pressure.  
Number of litres sprayed. (indication!)  
IN PATH: Shows the actual path of the taper.


If after entering the correct data in the settings menu the automatic screen starts to flash green/yellow fields, the aim is to recheck whether what is shown corresponds with the path where you want to start spraying.  
Changes can be made directly from the automatic screen by touching the green/yellow fields - thereafter always check the " LENGTH OF PATH " field!

If the number of tapered paths are sprayed, the message "READY" flashes on the screen.

If the distance decrease or increase is set at "0" in the settings menu, the *METO* will drive the basic length on each path.

Always check the green/yellow and the " LENGTH OF PATH " fields after an ALARM!

## 8.2.5 Manual Function

Manual functions are selected by pressing , the button changes to .



The selected functions are activated with the black START button.

The screens below do not apply to the Flippers (14) for manual driving (Stipos)!

MANUAL ▶ II	
SPEED	30 %
DRIVE FORWARDS	▶ II
DRIVE BACKWARDS	▶ II
AUTO BACKWARD	▶ II
<div>Esc</div> <div>↓</div>	

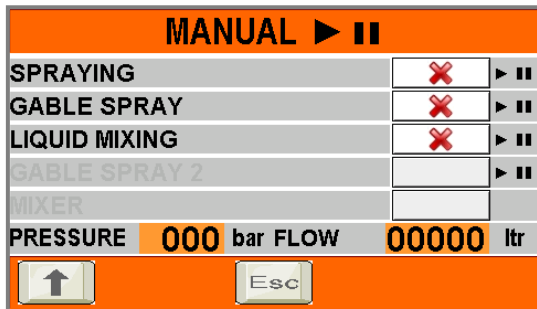
Can only be activated when the *METO-SWT* is on the pipe rails!

[SPEED & DRIVE FORWARDS or BACKWARDS]

Select the direction to be driven manually when the START button is operated, set also the required speed, **advice suggest no higher than 40%.**

[AUTO BACKWARDS]

Selection for automatic backward when the START button is operated. After a **delay period of 5 seconds** the *METO-SWT* moves until it drives off the pipe rails.



[SPRAYING AND/OR GABLE SPRAY]

Selection for manual spraying when the START button is operated. This enables the operator to check before spraying whether any of the spray nozzles are blocked.

**Combinations of functions can also be activated simultaneously in the manual menu.**

E.g. manual driving and spraying!

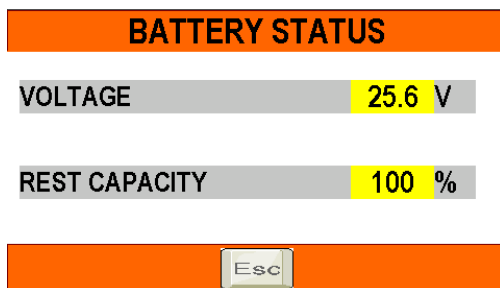
[LIQUID MIXING]

Use this feature to activate the mixing jet injection during the preparation of the crop protection product and proceed as follows:

- Fill the tank with water
- Activate the liquid mixing function and press the START button briefly
- Once the liquid mixing is finished, press the START button again.

**If the mixing function is active, other functions in the manual mode menu cannot be activated simultaneously.**

## 8.2.6 Battery status



The screen shows the battery voltage in Volts and gives an indication of the remaining capacity in %.

**Attention! The remaining capacity is not shown as a linear decline and therefore only provides the user with an indication.**

## 8.2.7 I/O screen (input & output)

INPUTS			INPUT		
Rail detection	0	Emergency	1	Motor Drive Rail OK	1
Countingsensor	0	Pause button	0	Motor Drive Left OK	1
Bumper front	1	Flowsensor	0	Motor Drive Right OK	1
Bumper rear	1	Tank level 30%	1	Pumpmotor OK	1
Start Meto	0	Tank level 0%	1	Stipo Left Forward	1
Countingsensor path	0	Obstacle detect.	0	Stipo Left Reverse	1
Start Metotrans An.	0			Stipo Right Forward	1
				Stipo Right Reverse	1

On the **inputs screen** it is possible to see if inputs are active, or will be, when you operate a switch. This is useful when there is an alarm.

On the **outputs screen** it is possible to see if outputs are active.


## 8.2.8 Alarm messages



During automatic operation, alarm messages can appear on the screen - reset these messages by holding down the key with the green check mark on it.

### **ALARM "Error front bumper"**

The front bumper touched something while in AUTOMATIC mode.

- Remove the obstacle and then press .
- From the main menu go to [AUTO].
- Check whether there is a value at "PATH LENGTH x.xx M" which is the same as the distance that the *METO-SWT* has travelled.
- If the distance is correct, the *METO-SWT* spraying machine can be restarted via START, and then after about 5 seconds it will start moving again.
- If the distance does not correspond, you must reverse the *METO-SWT* manually [AUTO REVERSE]. After operating the start button, the *METO-SWT* will reverse off the pipe rails automatically at half speed after 5 seconds have elapsed.
- During the 5 second delay, please step back from the *METO-SWT* to a safe distance.

### **ALARM "Error rear bumper"**

The rear bumper touched something while in AUTOMATIC mode.  
(See the "*METO-SWT* front bumper" description)

### **ALARM "Error rail detection forwards or rail detection backwards"**

The pipe detection in AUTOMATIC mode has dropped out during driving.  
Check if the pipe detector is working properly, consult the supplier if necessary.

### **ALARM "Error counting"**

Counting in AUTOMATIC mode has dropped out.  
Check for the proper operation of the measuring wheel sensor (warning lamps lit at each bolt on the plastic disc!). Check whether "speed forwards" and "speed backwards" are both set.

### **ALARM "Error METO-SWT has not reached the rail"**

The *METO-SWT* spraying machine in AUTOMATIC mode has not reached the pipes in the preset time (normally 4 seconds).

### **ALARM "Error rail remains detected"**

The *METO-SWT* detects in the AUTOMATIC mode after the START button was pressed that the *METO-SWT*-spray trolley is already on the rails or that the pipe detection is active. Check the correct operation of the pipe detection sensor.

### **ALARM "low battery voltage - charge battery!"**

The *METO-SWT* spraying machine batteries must be recharged, automatic spraying is no longer possible. The *METO-SWT* always sprays the path completely if this error occurs.

### **ALARM "Error pressure too low"**

The set fluid pressure is not reached. The *METO-SWT* will stop at the place where this fault occurs.

- More fluid may be drawn than the pump can handle. Spray with fewer nozzles open, or
- Decrease the desired fluid pressure in the settings menu, or
- Set the reducing valve to a higher pressure, (see 7.7), or
- Or clean the suction filter (see 9.7 Cleaning)

### **ALARM "Error motor drive "**

The drive motor regulator is faulty - switch the *METO-SWT* off and on, then check if it moves again.

### **ALARM "Obstacle" \* (Only with option Obstacle Detection Sensor)**

The obstacle sensor at the front has seen something in the AUTOMATIC mode. Remove the obstacle and restart the *METO-SWT*.

### **ALARM "Error Throttle active at start-up"**

A throttle flipper (Stipo) was active during the start-up of the *METO-SWT*. Check the neutral position of the flippers (Stipo's).

### **ALARM "acoustic 5x short beep"**

Operating conflict, operation not possible!

For example, drive forward / backward when the bumper is operated.

### **Other errors or still no result from the above solutions?**

Consult your dealer

## **8.2.9 Alarms**

Date	Time	HISTORY	↓	↑

CLEAR ALARMS  
(5 sec)

Esc

↓

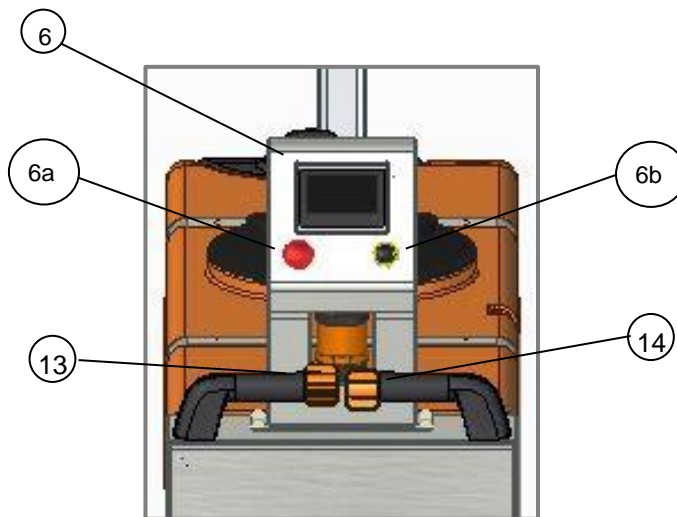
The previous failures are shown on the **alarms screen**.

### 8.2.10 MAIN SWITCH (7)


After use, always switch the *METO-SWT* off with the main switch by turning it to the horizontal position, remove the key to prevent accidental use.

**Also, the batteries must be recharged immediately after use.**

**Attention**, the screen has a **screen protection function** and after certain period it darkens, **THE *METO-SWT* HAS NOT BEEN TURNED OFF!**



### 8.2.11 EMERGENCY STOP (6a)

With the EMERGENCY STOP button you switch off the *METO-SWT* if a dangerous situation occurs. To unlock this function, pull out the button and press  on the screen.

### 8.2.12 START (6b)

With the START button you can activate automatic or manual screen functions.

### 8.2.13 MANUAL DRIVING ON THE CONCRETE PATH (13 & 14)

The throttle flippers (13 & 14) activate manual driving on the concrete path. This function works **independently** of the touch screen and as soon as the following has been completed.

Turn the *METO-SWT* spray trolley ON by turning the main switch (7) to the vertical position, the display will ask for a password, key in **2678**, the main menu appears on the display.

The further the flippers (Stipo's) are operated/turned, the faster the *METO-SWT* will drive and/or steer. If the flippers are turned equally far right and left, the *METO-SWT* will go straight on, if necessary, adjustments can be made by hand.

### 8.3 *Out of use*

When the *METO-SWT* is not being used it should be stored with fully charged batteries in a dry and frost-free environment. The batteries should be recharged at least once every 4 weeks. Ensure that the ground underneath is level. When the *METO-SWT* is not used for longer periods, cover it with a protective tarpaulin. When bringing the *METO-SWT* back into use after a lengthy period of storage, it is advisable to inspect it as described at 7.1 (inspection before starting up).

### 8.4 *Cleaning*

Regularly remove any remains of plants, leaves etc, and brush off any sand and dust. Clean the *METO-SWT* with a dry or slightly damp cloth, and never pour water over the *METO-SWT* or clean it using a steam or high-pressure water cleaner which can lead to serious damage being caused to the electrical circuits in the equipment! After usage, particularly after using chemicals, thoroughly clean the hoses, couplings and other spraying equipment with plain water (no additives).

Wash after using the filters and nozzles of the spray boom by means of flushing with clean water or after disassembly in clean water.

Some additives will quickly calcify which can lead to blockages when inadequate attention is for maintenance after spraying!

For other maintenance see section 9 *Maintenance & Repairs*.

### 8.5 *Dismantling*

When you have to dispose of your *METO-SWT* you should return it to your dealer or a company that specialises in dismantling vehicles. Never take your *METO-SWT* to a scrap metal dealer or a waste dump. The *METO-SWT* should be dismantled and the chemical components removed (hydraulic oil and batteries).

Faulty batteries should be handed into the local authority or your supplier.  
Oil should be handed in as chemical waste.



## 9. Maintenance and Repair

The *METO-SWT* pipe rail trolley is a product of extremely high quality. In order to safeguard this quality, the maintenance guidelines below should be strictly observed. Repairs and maintenance activities should be recorded in the maintenance logbook (see appendix 1). In addition, employers are obliged, at all times, that their means of labour should be in strict conformity with means of labour regulations. To ensure this, means of labour should be inspected periodically. For maintenance, switch the *METO-SWT* off at the main switch and remove the key from the ignition.

Maintenance - Checks	Tools	Daily	Weekly	Monthly	Yearly
Check the oil level pump, before each use (see 9.6)	Visually, top up with SAE 30 oil	X			
Cleaning directly after using	See 8.4, 9.7 and Appendix 5	X			
Sufficiently charged battery directly after using	Battery condition meter on display	X			
Damage to control components	Visual	X			
Damage to/visibility of pictograms & stickers	Visual	X			
Cleaning control panel	Damp cloth	X			
Check for leaks and damaged cables, hoses, tank and valves	Visual		X		
Check for ingrained dirt or string wrapped around wheels and chain (see 9.5)	Visual		X		
General mechanical damage	Visual		X		
Charge batteries after use or at least 1x monthly (see 9.9)	Battery charger			X	
Check battery fluid levels (1 cm fluid covering plates (see Appendix 3))	Distilled water, gloves & safety goggles			X	
Lubricate wheels, drive chain and bearings (see 9.5)	Bearing grease, chain grease or other universal lubricants			X	
Check chain tension (see 9.5)	Open-ended spanners			X	
Pump service: - Replace the check valves - Replace the membranes - Change the pump oil (see 9.6)	Overhaul kit Overhaul kit Oil SAE 30				X
Check the welds on the construction for (hair) cracks and rust	Visual				X

If the above checks indicate that there is a fault with the *METO-SWT*, immediate contact should be made with the *METO-SWT* dealer. Continuing to use the machine after identifying defects could lead to dangerous situations and is therefore forbidden!

### 9.1 Specialist maintenance

Maintenance and repairs to the items listed below may only be carried out by qualified specialists appointed by Berg Hortimotive:

- All Work on electrical components / wiring,
- All work on the pump,
- All work on the drive motor with gearbox except; Cleaning, re-adjusting the chain.

### 9.2 Maintenance and inspection by the operator

All the work given in the above table that is not excluded at item, 9.1 Specialist Maintenance, must be carried out periodically. Some of the actions are described below. You will find instruction film clips on our website that show how certain maintenance activities should be carried out.



[www.berghortimotive.com](http://www.berghortimotive.com)



### 9.3

## Berg Service Alert

Berg Hortimotive takes customer satisfaction very seriously. A satisfied customer is the best ambassador for our products and company!

No matter how well we manufacture our products, after a period of time they are going to need servicing and maintenance carried out. Like most people, you also know that a good maintenance schedule considerably increases the lifespan of the product. So that we can provide you and our dealers with even better support, Berg Hortimotive has started sending out the "Berg Service Alerts" (BSA).

BSA means that you can expect an email from us periodically that contains a link that takes you to a page with lots of tips and recommendations for maintaining the same Berg Hortimotive products that you own and operate. We include pictures and images as much as possible so that the information is easy to understand and apply.

**Our tip: Visit our website and subscribe to BSA!**

If as a result of these tips and recommendations you come across maintenance work that you are either unable, or do not want to carry out, please consult our extensive dealer network to find assistance. The dealers are trained by us on a regular basis and therefore have the necessary knowledge, experience and access to the original spare parts for providing you with assistance quickly and efficiently.

### 9.4

## Inspection under the METO-SWT



Raise the *METO-SWT* with the forklift truck forks at the indicated position, using a sound tension strap to secure the *METO-SWT* to the rack of the forklift truck.

**Lifting the *METO-SWT* without it being properly secured is strictly forbidden!  
Ensure a safe working situation!**

#### **Attention!**

- **Never lift higher than necessary!**
- **Make sure that the forklift truck is suitable for lifting at least 1500kg!**
- **Remove loose parts from the *METO-SWT* before lifting!**
- **Lifting only allowed with an empty tank!**
- **Place the *METO-SWT* on suitable blocks or trestles!**
- **Never work under a machine that is only supported by a forklift truck!**



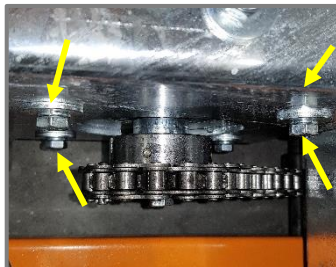
## 9.5 Drive maintenance (see BSA on our website)

Lift the *METO-SWT* according to the instructions described in 9.4.

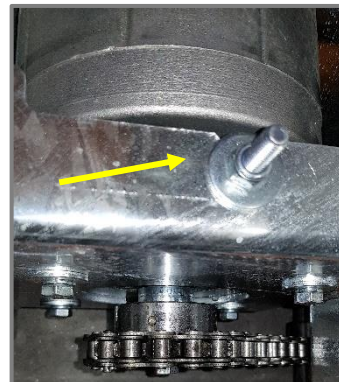
Clean the drive chain, cogwheels and rollers and remove any jammed leaf and string, check this after each use.



A



B



C

- Tension the drive roller chain if the play is more than 1 cm (A).
- Loosen the four motor fixing bolts (B) one turn.
- Tighten the clamping nut (C).
- The chain tension must allow play of about 1 cm (A).
- Then tighten the fixing bolts (B) again.

The chain of the *METO-SWT* was properly lubricated on delivery ex-factory. The chain may only be lubricated if it feels dry. This means that the chain may only be lubricated with oil after spraying for the first time (the factory coating will then have come off of the chain).

- Lubricate the chain with chain spray.



- Lubricate the swivelling wheels straight blocker with oil.
- Replace damaged wheels.

## 9.6 Pump maintenance and oil level



Filler cap

Maximum oil level

Minimum oil level

Important! Before each use, check the oil level as follows:

- Tilt the tank up
- Check the oil level
- Top up with SAE 30 if necessary
- Change the oil after 500 operating hours or annually (whichever occurs earlier) \*

\* Oil change and overall pump inspection should be performed by an authorized dealer.

## 9.7 The cleaning



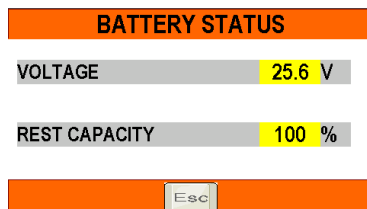
- Clean the above pressure filter and the suction filter below with clean water after every spray!
- Clean the sprayer boom according to the recommendations in Appendix 4!
- Keep the *METO-SWT* spray cart clean!



- Rinse off aggressive pesticides immediately after use using clean water!
- 1) drain the pesticides with the ball valve.
- 2) clean pump filter.
- 3) fill the tank with clean water through the above ball valve.
- 4) flush the tank, pump and spray booms with clean water!
- Clean the *METO-SWT* Spray Trolley using a soft brush, dampen cloth and/or compressed air
- Never clean the *METO-SWT* using a high pressure or steam cleaner (this can damage the electrical circuit)
- Remove still water to prevent the formation of Legionella bacteria
- See also Appendix 5

## 9.8 Charging the batteries

**Charge the batteries according to the status indication of the BATTERY STATUS screen between the 50 and 10% remaining capacity and try to approach the 10% as closely as possible according to the following advice.**



On the BATTERY STATUS screen you can check the status of the batteries. At 100%, the batteries are full, the lower the residual capacity the batteries are more discharged. If during automatic driving the alarm message "low battery voltage, Charge battery!" appears on the screen the batteries should directly be charged. Turn off the *METO-SWT* with the main switch and charge the battery continuously for minimal 12 hours or until the charger indicates full. (refer to the user manual of the charger!) Recharge "during operation!" before the BATTERY STATUS screen indicates 50% discharge should be avoided. Always try to match the approximately 10% discharge status.

This has the following advantages:

- Less charging cycle, is favourable for the life span
- Reduces water consumption

***Charge the batteries every time after using and then at least once a month regardless of use with a suitable charger!! Prevent deep discharge batteries, this gives severe damage and a shorter lifetime!!***



1



2



3

***See also the instructions in Appendix 3 battery safety sheet!***

## 9.9 Pipe rail system maintenance

The pipe rail system on which the *METO-SWT* runs should be checked on a regular basis. The system should always satisfy the Horticulture Sector Guidelines for Pipe Rail Systems in greenhouses (see 7.2). It is prohibited to use the Pipe rail wagon on a pipe rail system that does not satisfy these guidelines. The employer is also responsible for periodically checking tools and equipment according to the current Working Equipment Guidelines that cover this.

Ensure that all the pipes have sufficient support with a maximum separation distance of 1.25 m in between and that the supports are not out of line with respect to the pipes. Moreover, the pipes on the concrete path should be secured and must not be loose. At the pipe ends (in front of the wall) there should be an end-stop welded on that is at least 5 cm high - at the end of each season check whether the stops are still functioning properly. The ground under the pipe rail system should be dry, flat and hard. Soft or damp spots should be repaired and surface indentations permanently repaired.

## 10. Technical Specifications

Type: group 7030.XX.XXXX	
Dimensions [mm]:	
Centre-to-centre	500-800
Wheelbase	1612
Length	2408
Breadth	c to c + 270
Height of control panel	1419
Height of spray boom mast	2341
Weight [kg] (c-to-c 550)	690
Motor power Drive tubes/concrete [kW]	1x0,45 2x0,13
Motor power Pump [kW]	1.2
Pump capacity [Ltr/min]	30
Pump pressure (bounded) [bar]	30
Maximum spray boom pressure [bar]	15
Content tank [Ltr]	275
Content clean water tank [Ltr]	15
Max. drive speed on the tubes [m/min]	110
Max. drive speed at the concrete [m/min]	70
Max. Fluid pressure [bar]	40
Voltage [Volt DC]	24
Battery capacity C5 [Ah]	360
Noise level [dB]	<70

### *Physical operating conditions*

Ambient temperature,	
Transport & Storage	: 5 to +40 degrees Celsius
Working	: 5 to +40 degrees Celsius
Rel. Humidity (RH)	: 0% to 90%, <u>not condensing</u>
Lighting	: Normal ambient lighting.

The machine is not designed to be used outdoors.

The machine is not suitable for operating in explosive atmospheres.

## 11. EC-Declaration of Conformity

(in accordance with Appendix IIA of the Equipment Directive)

**Berg Hortimotive.  
Burg. Crezeelaan 42a  
2678 KZ De Lier – the Netherlands  
+31 (0)174 – 51 77 00**

Hereby declares to take full responsibility that the following product

***METO-SWT Automatic Spray Trolley with pump, touch screen, traction batteries 24V-360Ah, motor drive, vulkollan drive and steel running wheels including 2 electric valves. Suitable as a tool for spraying liquids inside the greenhouses.***

**Type nr.:** 7030.XX.XXXX

**Serial nr.:**

- Meets the requirements of the Machinery Directive 2006/42/EC

**Satisfies the following other EC directives:**

- Electromagnetic Compatibility Directive (EMC), 2014/30/EU
- 2009/127/EC amending Directive 2006/42/EC with regard to machinery for pesticide application

**Satisfies the following harmonized standards:**

NEN-EN-ISO 12100:2010

Safety of machinery - General principles for design - Risk assessment and risk reduction

NEN-EN-IEC 60204-1:2016

Safety of machinery - Electrical equipment of machines - Part 1: General requirements

NEN-EN 12162:2001+A1:2009

Liquid pumps - Safety requirements - Procedure for hydrostatic testing

*De Lier, the Netherlands.*

*Date .....-.....-.....*

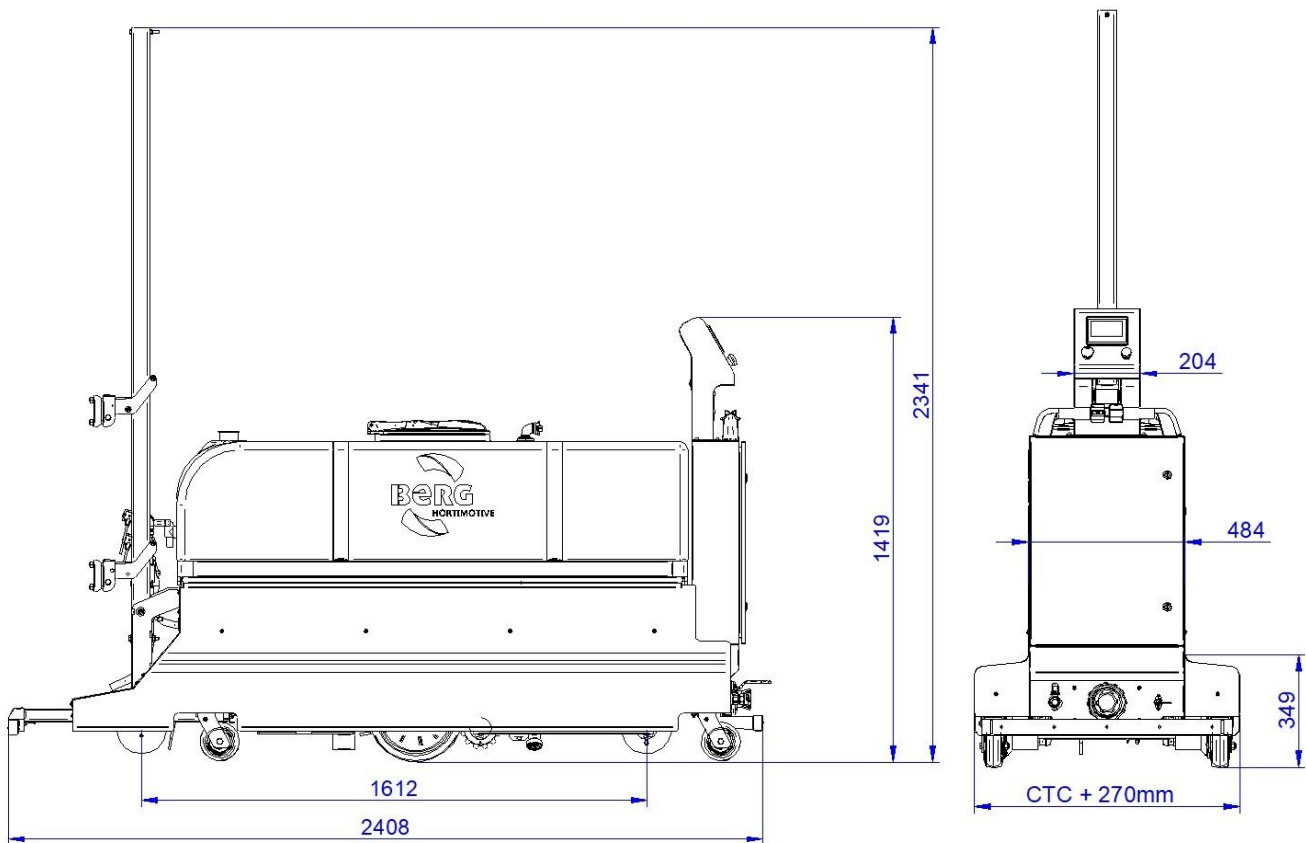
*Signature of management or other authorized representative.*

.....



## Appendix 2: Technical drawings

Dimensions in mm.



## Appendix 3: Battery safety sheet

### Battery recommendations

The following chapter provides recommendations for, safety and maintenance.

### Safe use of batteries

Below are recommendations for usage and maintenance.

#### BEWARE!

- Explosive gas is created while the batteries are being charged, therefore no fires, naked flames or smoking are permitted!
- Charging should only take place in well ventilated spaces!
- The battery fluid levels must be checked at least once a month! The battery fluid must be at least 1 cm above the level of the plates
- Top up batteries with distilled water (demineralised) only - always wear gloves!
- Always top up the batteries AFTER charging and never fill higher than the level marker in the cell opening. (see also the instruction sheet for traction batteries)



Recharge "during operation!" before the BATTERY STATUS screen indicates 50% discharge should be avoided. Always try to match the approximately 10% discharge status. Charge a discharge battery always straight on, this will increase the life span considerably. Therefore, check the acid gravity at least every month with a hydrometer (Fig. A + B and table below).

*The specific gravity of a fully charged battery should be 1280 g/l:*

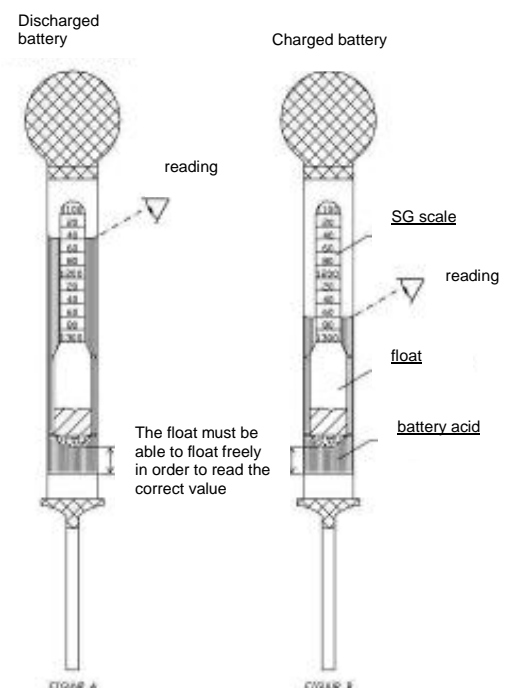
100%	sg 1280	g/l	=	12.7	volts
80%	1240			12.5	
60%	1210			12.3	
40%	1170			12.1	
20%	1140			11.9	

Before charging, switch off the *METO-SWT* with the emergency switch. When charging batteries, always connect them to the charger before switching it on. After the batteries have been charged, switch off the charger first, then disconnect the batteries.

Overcharging can cause damage to the batteries through boiling the battery acid dry.

It is advisable to use a modern battery charger with an automatic cut-off - these are available from Berg Hortimotive. **Only use a charger type that is suitable for the batteries being charged! (see charger instructions)**

The charging process should never be interrupted - charging should be completed - see the charge indicator.



When charging batteries, do not make repairs to the *METO-SWT*, nor carry out cleaning or any other activities.

Turn off everything that consumes electricity before removing the batteries - this reduces the possibility of creating sparks.

Always disconnect the earth cable (-) first when removing the batteries. When reinstalling the batteries, connect the earth cable (black) last.

**WARNING!**

***Always connect the positive terminal (+ = red) to the positive pole and the negative terminal (- = black) to the negative pole on the battery.***

Battery fluid is corrosive - avoid contact with clothing, skin and eyes.

Wash battery acid splashes on clothing or skin immediately with soap and water - thereafter thoroughly rinse in running water.

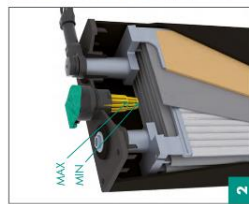
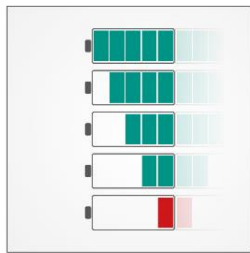
Any acid splashes to the eyes must be rinsed for at least 5 minutes in clean water and a doctor consulted immediately!

# TRACTION BATTERY MAINTENANCE

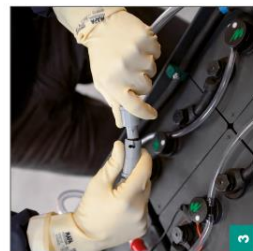
## DAILY



At the end of the work shift, recharge the battery as follows:  
 - open the lid of the battery compartment (if the battery is charged in situ on the truck)  
 - the caps on the individual cells must remain closed  
 - connect the battery to the charger and start charging



Check the electrolyte level after charging. For batteries with central filling systems or probes, check that the level indicator shows full.



When necessary, top up the battery with distilled water, when charging is complete.

## WEEKLY



Perform a thorough visual inspection.



Perform an equalisation charge. MIDAC MIDATRON battery chargers automatically equalise the battery at the normal completion of the recharging cycle. Other brands and/or older chargers may require you to manually start equalisation.



## MONTHLY



At the end of the charging phase, check and note the voltage (Fig 1) and density (Fig 2) of each single battery cell. The electrolyte voltage and density, at the nominal temperature of 30°C (Fig 3), should be OCV>2,10 VFC and SG 1,29 ±0,01 kg/L. If there is considerable variation in the results, contact customer service. Batteries with centralised filling: check the presence of electrolyte in all cells, sampling it using a hydrometer through the cap openings. Check the battery charger operation.



Check that all screws are tight, especially on the battery terminals.



Check that all screws are tight, especially on the battery terminals.



Check that all screws are tight, especially on the battery terminals.  
 - cable Tech terminals 25 Nm  
 - cable Tech connectors 25 Nm




Check that all screws are tight, especially on the battery terminals.  
 - cable Tech terminals 25 Nm  
 - cable Tech connectors 25 Nm



CAREFULLY READ THE MANUAL SUPPLIED WITH EACH BATTERY.



	TREM-CARD	<div style="border: 2px solid black; padding: 5px; text-align: center;">UN 2794</div>
---	-----------	---

Substance Batteries wet, filled with acid, electric storage

UN Number 27

HIN 80

ADR Label 8

ADR Class 8

Packing group-



## Emergency Response Information

### CORROSIVE SUBSTANCE

#### 1. Characteristics

- Corrosive, causing damage to skin, eyes and air passages
- Not flammable

#### 2. Hazards

- Heating of container(s) will cause pressure rise with risk of bursting and subsequent explosion (BLEVE).
- Gives off corrosive and irritant fumes, also when burning
- May attack metals and produce hydrogen gas which may form explosive mixture with air
- The vapour may be invisible and is heavier than air. It spreads along the ground and may enter sewers and basements

#### 3. Personal protection

- Chemical protection suit.
- Respiratory mask equipped with ABEKP1 filter

#### 4. Intervention actions

##### 4.1 General

- Keep upwind. Put on protective equipment before entering danger area.

##### 4.2 Spillage

- Stop leaks if possible.
- Dilute spillage with water spray as far as necessary to reduce hazard. Contain run off by any means available.
- If substance has entered a water course or sewer, inform the responsible authority.
- Ventilate sewers and basements where there is no risk to personnel or public

##### 4.3 Fire (involving the substance)

- Keep container(s) cool with water
- Extinguish with water fog (spray)
- Do not use water jet to extinguish
- Use water spray to knock down fire fumes if possible
- Avoid unnecessary run-off of extinguishing media which may cause pollution.

#### 5. First aid

- If substance has got into eyes, wash out with water for at least 15 minutes and seek immediate medical attention.
  - Remove contaminated clothing immediately and drench affected skin with plenty of water.
  - Persons who have been in contact with the substance or have inhaled fumes should get immediate medical attention.
- Pass on all available product information.
- Mouth to mouth resuscitation should be avoided. Use alternative methods, preferably with oxygen or compressed air driven apparatus

#### 6. Essential precautions for product recovery

- Use acid resistant equipment
- Recover spilled product in vented container fitted with absorption filter

#### 7. Precautions after intervention

##### 7.1 Undressing

- Drench contaminated suit and breathing apparatus with water before removing facemask and suit.
- Use chemical protection suit and self-contained breathing apparatus while undressing contaminated co-workers or handling contaminated equipment.

##### 7.2 Equipment clean up

- Drench with water before transporting from incident.

## Appendix 4: Spray nozzle specifications

### Cleaning and sent out from the spray nozzles EN-V1



#### Avoid clogging:

Clean after each spray activity the pipes, filters and nozzles with clean water. The flow and flushing prevents residues accumulate resources. Without rinsing there is a risk of clogging in the cap and precipitate on the outside of the nozzle. This can cause an abnormal spray pattern.

Check before spraying the nozzles with clean water for obstructions.

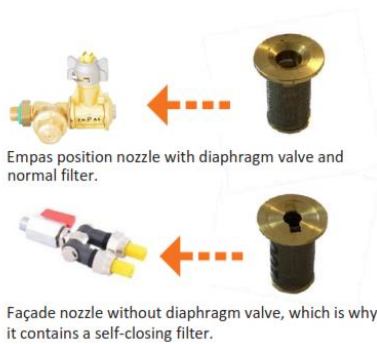
**Maximum pressure on the spray boom is 15 bar!**

**Spray nozzle table  
TeeJet**

	Pressure	Send out Ltr / min
<b>8001</b> <b>orange</b>	4	0.46
	5	0.51
	6	0.56
	7	0.60
	10	0.72
	20	1.00
<b>80015</b> <b>green</b>	4	0.68
	5	0.75
	6	0.82
	7	0.88
	8	0.94
	9	1.00
	10	1.04
	11	1.10
	12	1.15
	13	1.19
	14	1.23
<b>8002</b> <b>yellow</b>	15	1.28
	16	1.32
	4	0.90
	5	1.01
	6	1.10
	7	1.18
	8	1.26
	9	1.33
	10	1.40
<b>8003</b> <b>blue</b>	11	1.47
	12	1.53
	13	1.59
	14	1.65
	15	1.70
	16	1.75
	4	1.37
	5	1.52
	6	1.67
	7	1.80
	8	1.93
	9	2.04
	10	2.15
	11	2.25
	12	2.35
	13	2.45
	14	2.54
	15	2.63
	16	2.72



## Empas spraying booms



What is the difference between a diaphragm valve in a position nozzle and a self-closing filter in a façade nozzle?

- A position nozzle contains a diaphragm valve. Façade masts do not contain a diaphragm valve but rather a self-closing filter. Both have the same purpose: Both open and close at 0.7 bar to prevent leakage before or after.

### Filter cleaning



- Filters behind the nozzles must be cleaned every 10 hours or so (based on contamination) by rinsing them under the tap. The pressure filter must be cleaned every time.

### Checking and cleaning nozzles



- Check the nozzles every spray application; check whether the spray pattern is still correct. A poor spray pattern can be corrected by cleaning the nozzles with water and a toothbrush.



### Explanation of bayonet fitting on position nozzles

- During normal spray application one first follows the tramline without spraying and then sprays (in reverse) on the way back. The nozzles are positioned so that spraying occurs alternatingly. The tips are rotated 15 degrees so the leaves are lifted, bottom of the leaf first. This way they are not sprayed towards each other and therefore do not affect the spray pattern.



### Bleeding air from the spraying boom

- Spraying masts longer than 18 nozzles have an air bleed valve (see figure). Open the valve to bleed out air. On shorter spraying booms the uppermost tip can be opened to bleed air.

## Appendix 5: Cleaning the powder coating

### The importance of cleaning and maintenance:

- It retains the appearance and image of the product over a longer period.
- It extends the life-span.
- It prevents corrosion.
- It helps prevent the spread of plant diseases.
- It stimulates employees to operate the machines with care.

Removing contamination periodically prevents any chemical substances that may be present from affecting the powder coating. The protective layers are vulnerable to acids, salts and corrosive substances which cause premature aging. Moreover, thick layers of dirt and contamination absorb more moisture which increases the effects of corrosion on the protective layers.

### The cleaning frequency depends on the following factors:

- The level of contamination depends on what is being grown.
- Type of product, or usage between the crops or, e.g. usage only on concrete tracks.
- Exposure to chemical fluids (spraying equipment).
- Exposure to chemical vapours or mists (treating the air space in the greenhouses).
- Exposure to sunlight and UV rays.
- Humidity in the air and condensation.

The above results in a load factor that depends on the type of usage, and where applicable, the following cleaning schedule should be followed.

### When to clean:

- |  |                              |
|--|------------------------------|
| • Plant and product residues.                              | daily                        |
| • Earth and sand   | 2x weekly                    |
| • Glass, string, plastic, elastic, clips, wire hooks, etc. | 2x weekly                    |
| • Exposure to chemicals                                    | immediately after use        |
| • Dullness or contamination on the top layer               | periodically after detection |

### How to clean:

- Remove dirt or contamination on the top layer using a soft brush or cloth, or a compressed air line (<6 bar).
- Chemical contamination should be removed using a coarse sponge or soft cloth drenched in tap water.
- Clean a dull or contaminated top layer using a neutral cleaning agent with a pH value between 5 and 8 (check the label on the packaging) and a sponge or soft cloth.
- Tip, when a cleaning agent is used for the first time it is recommended to initially test the agent on a small section of the top layer before continuing.

### What you must not do:



- clean the powder coating using an abrasive or burnishing cleaning agent.
- Never use cleaning equipment with an abrasive surface (steel wool, pot scourer, Never etc).
- Pressing down, polishing or scrubbing, etc, is not permitted.
- Never use organic cleaning solutions for cleaning or maintaining the powder coating.
- Pouring over water, using a water hose or high pressure cleaner can cause damage.

### After cleaning:

- Ensure that the cleaned surfaces are properly dry and temporarily remove overlapping protective covers and screens.
- All pivots and hinges, etc, that have been in contact with cleaning agents should be lubricated according to the recommendations given in the maintenance schedule in the user manual.
- Treat any damaged areas on the powder coating layer with lacquer or paint.

### Please note:

The above are only recommendations and therefore responsibility for the proper cleaning remains with the person carrying it out. Please contact the manufacturer if you have any queries regarding the appropriate cleaning products to be used.