



## **User Manual**

# **M2200 Compact Grader**

**SW version 2.10 / HW version 1.40 (CG60)**

**SW version 2.10 / HW version 1.00 (CG62)**

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This user manual is the original English language instructions.

### Change history

Version	Release date (dd-mm-yyy)	Changes
5	05-07-2013	Part list revisions (drive unit) New document template

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# STANDARD SAFETY AND WARNING NOTICE FOR ALL MAREL EQUIPMENT

All persons involved in the use and/or installation of this machinery should be aware of the following instructions.

Failure to follow these instructions or other safety instructions in the manual voids all warranties and may result in malfunction of the machinery, property damage, serious personal injury, or death.

## WARNING

- The installation and use of this product must comply with all applicable national, state, and local codes.
- Turn the electrical power off when working on the machinery. Turn the main electrical breaker, located on the electrical cabinet, to the OFF position and lock the breaker with a padlock.
- Electrical installations and repairs must be performed by a licensed electrician, in accordance with manufacturer's specifications and national and local electrical codes.
- Operating the machinery without the supplied guards or covers installed is a misuse of the machinery and can cause a personal hazard.

## Do Not

work on any moving parts of the machinery, such as belts, motors, belt tension adjusters, or rollers, without first **disconnecting the electrical power** and **closing the main air supply valve**. Otherwise, a serious personal injury or death may result.

## Do Not

work on electrical or air cabinets without first **disconnecting the electrical power**, or a serious personal injury or death may result.

## Do Not

make any changes to the emergency stop buttons.

## Additional Safety Information

- Keep long hair tied back and covered.
- Avoid wearing loose clothing, jewelry, or accessories near moving machine parts. This includes ties, shirtsleeves, rings, watches, and other loose fitting items.
- Disengage the machinery to avoid moving parts when cleaning and lubricating bearings.
- Avoid moving parts when lubricating with hand-sprayed lubricants.
- Never work without another person in the vicinity.
- Wear safety glasses when doing the following:
  - using a hammer to drive pins, riveting, staking, etc.
  - drilling, grinding, etc.
  - using spring hooks or attached springs.
  - soldering, cutting wire, removing steel bands, etc.
  - cleaning parts with solvents, spray, or cleaners.
- After cleaning or maintenance, reinstall all safety devices such as guards, shields, signs, and grounding wires.
- Wear ear protection when exposed to noise exceeding 90 dB, such as when using a grinder, band saw or hammer.

- Lift items with a straight back, and push up with your leg muscles, to prevent back strain. Do not lift any equipment or parts weighing more than 30 kg (60 lb.) without assistance.
- Use only FDA or USDA approved solvents, grease or oils.



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# Introduction

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## About This Manual

The Compact Grader, User's Guide is intended to assist you in installing, operating, and maintaining the Marel Compact Grader.

**NOTE**

Before you install or use the grader, make sure you read and understand the warnings and the warranty agreement.

The manual is divided into seven main chapters:

- Introduction – this introduction, a general description of the Compact Grader and the structure of the manual.
- Installation
- Safety Instructions
- Operation
- Maintenance
- Troubleshooting
- Cleaning

The manual also contains comprehensive appendices with mechanical and electrical parts lists and order forms, a glossary and an extensive index.

The instructions in this manual apply to models CG60 and CG62.

Differences in technical specifications and mechanical parts are listed when applicable.

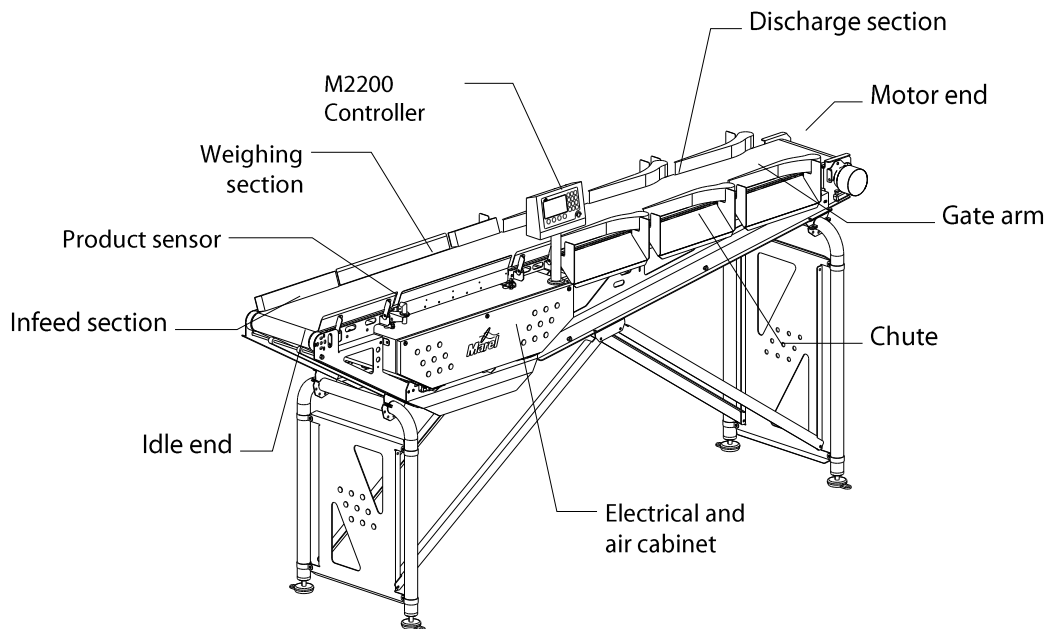
## About the Compact Grader

The Compact Grader is a device used for grading by weight. It consists of four main parts, the M2200 Controller, a weighing device, a discharge section with six gates, and a motor driven conveyor belt that transfers material across the weighing device to the discharge gates (see Figure 1).

The Compact Grader is available in two models: CG60 (Standard) and CG62 (XL).

This is how the Compact Grader works:

1. The material to be weighed and graded is transported to the grader on an infeed conveyor or from a tray.
2. A product sensor in front of the weighing section detects individual pieces of the material using a light beam which is transmitted across the belt.



**Figure 1 The Compact Grader.**

3. A sensor on the idle end, the tacho-sensor, registers the speed of the belt to maintain the position of each piece on the belt.
4. The weight of individual pieces and their destination gate is displayed on the M2200 Controller.
5. The pieces of raw material are then transported on to the discharge section.
6. The M2200 software determines through which gate a specific piece of material is to be discharged and sends this information to the relevant gate arm.
7. The pneumatically operated gate arms direct the material flow on the belt to the chutes on the sides of the discharge section.

# Technical Specifications

**Table 1 Technical data.**

<b>Dimensions</b>	CG60: 2920 x 1520 x 625 mm (L x H x W) CG62: 3720 x 1520 x 625 mm (L x H x W)
<b>Weight</b>	CG60: 180 kg CG62: 230 kg
<b>Power supply voltage</b>	1 x 208-230 VAC
<b>Power consumption</b>	Less than 500 W
<b>Frequency</b>	50/60 Hz
<b>External fuse</b>	Up to 16 A (slow)
<b>Air supply</b>	6-10 bar
<b>Operating air pressure</b>	5.5 bar (80 psi)
<b>Air consumption</b>	Approx. 1 liter/min for each piece/min
<b>Oper. temperature</b>	0-30° C
<b>Belt type</b>	Intralox <sup>1</sup> Series, S.1100 FT, Polypropylene
<b>Belt speed</b>	1.2 m/sec
<b>Belt width</b>	305 mm
<b>Belt length</b>	CG60: 5930 mm, 390 links CG62: 7510 mm, 494 links
<b>Number of gates</b>	6
<b>Capacity</b>	CG60: 120 pieces/min CG62: 80 pieces/min
<b>Max. piece length</b>	CG60: 400 mm CG62: 700 mm
<b>Piece weight</b>	40-3000 g
<b>Weighing accuracy (1.5 standard deviation)</b>	CG60: 40-600 g / 2 g 600-1500 g / 5 g 1500-3000 g / 10 g CG62: 100-1500 g / 5 g 1500-3000 g / 10 g
<b>Arm spacing</b>	CG60: 460 mm CG62: 600 mm
<b>Indicator</b>	M2200 Controller

<sup>1</sup> Intralox® is a registered trademark of Intralox Inc.

## Improvements and Customer Support

You can help improve this manual and the equipment you purchased. If you find errors in the manual, please let us know. You can contact us at: Marel Iceland ehf, Austurhraun 9, IS-210 Gardabaer, Iceland; phone (+354) 563-8000, fax (+354) 563-8001, attn. Documentation & Localization, email: [documentation@marel.com](mailto:documentation@marel.com).

For customer support please contact your local Marel service partner. For details see [www.marel.com](http://www.marel.com) or Marel's Service Department, email: [service@marel.com](mailto:service@marel.com).

## Warranty Information

For specific warranty information, please consult the written contract of the purchase.

**NOTE**

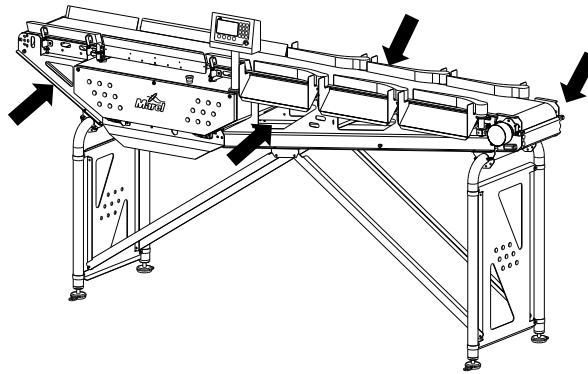
Marel Iceland ehf does not warrant any equipment that has not been used according to specifications.

# Safety Instructions

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## General

The Compact Grader is not a dangerous piece of equipment, but during operation care should nevertheless be taken in these places:




**Figure 2 Potential hazard areas**


- **The frame**  
Do not put your hands through the frame holes near the motor or any moving parts. Fingers can get crushed.
- **Conveyor ends**  
Do not place your hands under the belts, especially not near the rollers at the conveyor ends.
- **The product chutes and gate arms**  
Do not place your hands near the gate arms or the product chutes.

# Emergency Stop Buttons



**Figure 3 M2200 icon: active emergency stop**

The Compact Grader is supplied with two emergency stop buttons on the top of the electrical cabinet. When you activate an emergency stop, the Compact Grader stops immediately and a warning icon  appears on the M2200 Controller.

- To start the Compact Grader again after an emergency stop, release the emergency stop button (turn the button counterclockwise) and press the On/Off key  on the M2200 Controller to start the belt running.

## Warning Labels

The Compact Grader is supplied with the following warning labels:



**ELECTRICAL HAZARD**

The label is placed on both sides of the electrical cabinet.



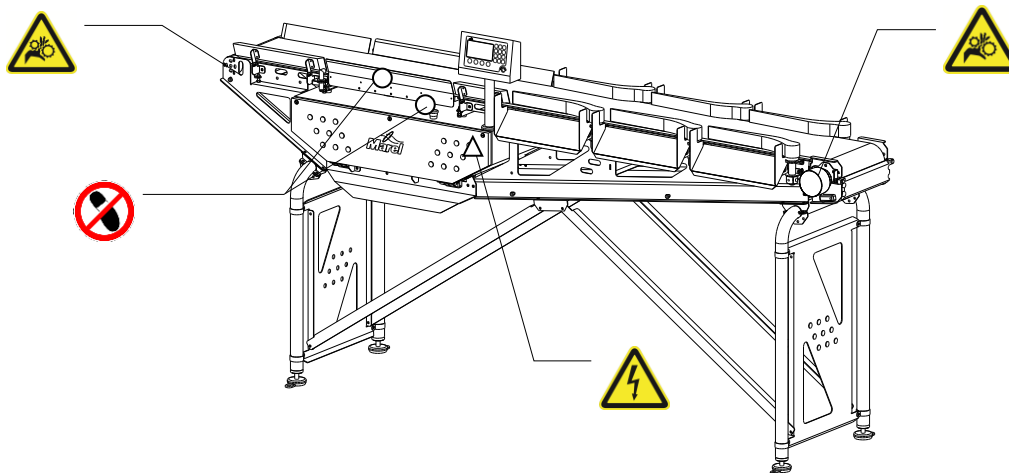
**CRUSHING**

Danger of hands or arms getting crushed between belt roller and belt. The label is placed near the conveyor ends on both sides.



**NO CLIMBING**

Do not climb on the Compact Grader. The label is placed on the top of the electrical cabinet and on the sideboards.



**Figure 4 Position of warning labels**



# Installation

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## Site Requirements

The following issues are important when you choose the proper location for the Compact Grader:

- **Environment:** The Compact Grader should not be placed near doorways or where there is a traffic of people passing. Neither should the grader be placed where there is draught, e.g. from a ceiling fan, or in an environment where there are vibrations.
- **Floor:** The Compact Grader should be placed on an even and stable surface and, for best results, it should be bolted to the floor.
- **Accessibility:** There should be enough space around the grader for easy cleaning and maintenance.
- **Temperature:** The room temperature must not get below 7°C (45°F).
- **Electricity:** A 208–230 VAC, 50-60 Hz power supply must be available.
- **Air:** The air pressure to the grader must be 6-10 bar. Adjusted operating pressure (adjusted with the air pressure regulator in the electrical cabinet) should be 5.5 bar

## Verifying the Equipment

Before you install the Compact Grader, verify the following:

- Inspect the equipment for damages incurred during shipment, such as scratches or dents. If the equipment has been damaged, report immediately to your Marel agent.
- Compare the equipment you have received to the packing list to see if the shipment is complete. Report any discrepancies to your Marel agent.

## Installing the Compact Grader

This section provides instructions on how to install the Compact Grader.

The Compact Grader is delivered ready for installation, tested, and with all basic setups in place. On-site the installation of the Compact Grader involves:

- Positioning the grader
- Mounting the legs
- Adjusting the height of the grader
- Bolting down the grader
- Connecting air installations to air supply

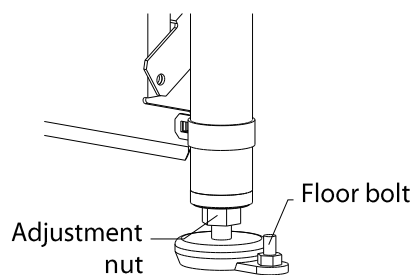
- Connecting the electrical cord to power supply

**WARNING!**

**Do not weld near the grader when it has been installed and connected to a power supply as this may damage the grader. If welding needs to be done near the grader, unplug the electrical cord and keep the welding ground as close to the welding point as possible**

To install the Compact Grader:

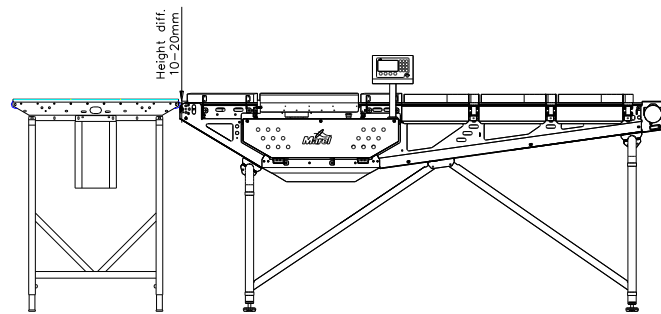
1. Position the Compact Grader on the location of your choice.
2. Secure the legs to the frame according to the instruction sheet delivered with the grader.
3. The grader must be kept free of vibrations. Therefore, make sure that the legs are level, rigid and stable.
4. During installation, be careful not to twist or force the grader in any way. Until the legs have been bolted down, the grader is not perfectly rigid. It is therefore very important that you make sure the grader is perfectly straight and level.
5. Adjust the legs using the adjustment nuts (see
6. Figure 5) so the grader is perfectly level, length- and widthwise. Use a spirit level to verify that the grader is correctly aligned:
  - Place the spirit level across each conveyor end.
  - Place the spirit level lengthwise on top of the weighing section on both sides of the grader.
  - Check the area between the sides to make sure both sides have the same height.



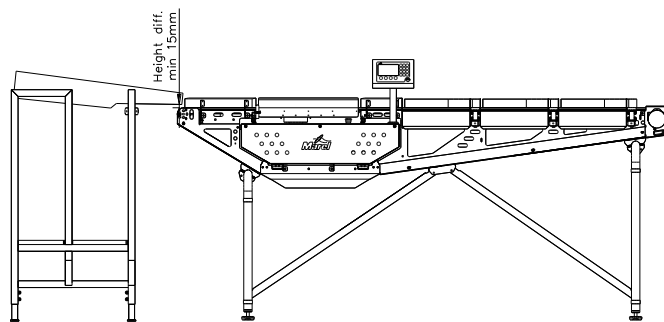
**Figure 5 Leg and floor bolt**

7. Drill holes for the floor bolts that will keep the Compact Grader stable and in place.
8. Position the bolts in the assigned holes, and tighten (see
9. Figure 5).
10. Plug the electrical cord into the nearest suitable power supply (220 V) and connect the air supply (see "Pneumatic Installations" on page 10 for more details).
11. It is important for correct operation that any attached equipment, for example an infeed conveyor or tray, is aligned with the grader (see Figure 6 and Figure 7):
  - The speed of the infeed conveyor must never exceed the speed of the Compact Grader's belt.
  - The belt on the infeed conveyor or the distance between its side guides must be of the same width, or narrower, than the belt of the Compact Grader.
  - Position the Compact Grader and the extra unit end to end, with center lines aligned, as close to each other as possible yet without the extra unit touching the grader's belt.

- A slight drop in height between the infeed unit (conveyor or tray) and the grader will ensure a smooth transition of items from one belt to another. A drop of 10-20 mm is commonly used.



**Figure 6 Height difference between infeed conveyor and grader**



**Figure 7 The height difference between infeed tray and conveyor**

**NOTE**

If an infeed conveyor or tray is used, it is important that you make sure they do not touch the conveyor belt. Contact with the infeed conveyor or tray could damage the belt and impair the grader's weighing accuracy.

12. When the Compact Grader has been installed and mechanically adjusted, calibrate the grader to ensure correct weighing results (see "Calibration" on page 10).

**IMPORTANT!**

The Compact Grader must be securely fastened to the floor. Vibrations on the grader must be avoided.

## Electrical Installations

The Compact Grader is supplied with a power cable and plug. Make sure the power cable is run so it will not affect the function of the Compact Grader or disturb workers at the grader.

The mains rating is listed on the rating plate on the electrical cabinet.

The electrical cabinet should be kept closed at all times, except when work is being performed on it.

## Pneumatic Installations

The air cylinders are operated by compressed air. The grader requires a supply of dry air, minimum 150 l/min at 6 bar.

### NOTE









Recommended local air pressure is 6-10 bar. Pressure below 6 bar will affect the grader's performance while pressure above 10 bar may damage the grader.

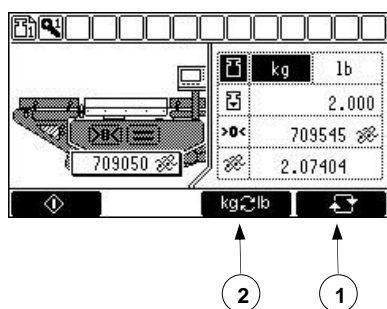
The lifespan of air valves and cylinders is affected by the quality of the air supplied. Therefore, it is important that you only use clean and dry air. Traces of oil in the air will damage the self-lubricating air cylinders and valves.


## Calibration

### NOTE

Access to the static calibration of the Compact Grader is restricted to users with Service access authorization

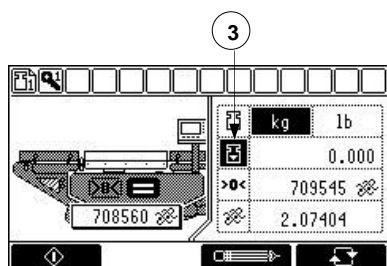
1. From the Home  page, press the  key, enter your Service password (default 62735) and press . For more details on passwords see "Access Control" on page 17.
2. Turn off the conveyor (press the  key).
3. From the Home  page, press the  key on the keypad four times to go to the Calibration  page.  
Use the  key (1) to navigate between fields on the page. If you do not turn off the conveyor, you will only be able to navigate between the first two fields.



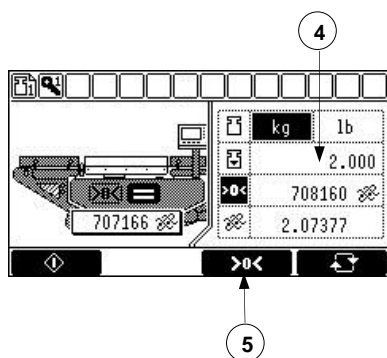
4. Use the  key (2) to select a unit of weight (kg or lb) for the calibration.






**NOTE**


When you select the unit of weight here, you are not only selecting the unit of weight for the calibration but for all other operations on the grader as well.



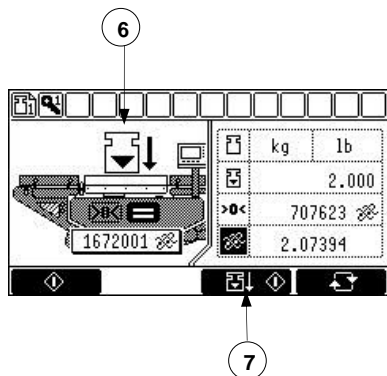
5. Navigate to the  field (3) where you specify the reference weight.







6. Press the  key and enter the reference weight to be used, in this example 2.000 kg (4). Press  to confirm. After you press , a new key,  'C', appears on the display. Use this key to cancel the reference weight value and enter a new one, if necessary.
7. Empty the weighing platform and press the  key (5) to take a new zero weight reference.

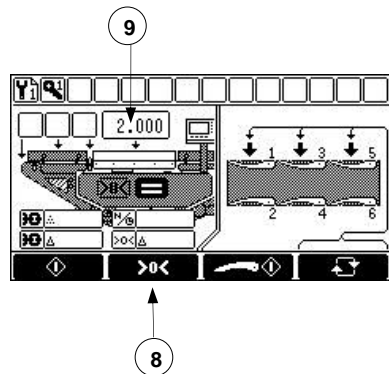
The  symbol (hands off!) is displayed briefly, warning you not to touch the platform while the zeroing takes place.




A new platform zero is effective as soon as the symbol disappears



8. When the grader has reached zero point (the  symbol appears below the platform), navigate to the  field (span calibration). You are now requested to place the reference weight on the platform (6). Make sure you place the weight in the center of the platform and press the  key (7) to start the calibration.

While the span calibration is in progress, the  symbol is displayed, warning you not to touch the platform while the calibration takes place.



9. Remove the reference weight from the platform, and use the  key on the keypad to navigate to the Service  page. Zero the platform by pressing the  key (8), and then place the reference weight back on the platform. If the weight displayed in (9) is identical to the reference weight (2.000), the calibration has been successful.

An unsuccessful, but correctly performed, calibration indicates hardware problems, e.g. with the weighing platform. For more details and possible causes see "Belt Quality Alarm" on page 40.

## Check List

Use this check list for the initial start of the Compact Grader.

	The electrical cabinet is dry and no moisture can get in. If the cabinet is damp, do not plug in the grader. Open both doors and air the cabinet until completely dry.
	The M2200 Controller turns on when you power up the grader.
	Rinse the Compact Grader and the belt with clean water before you start the grader. This will make the belt run more smoothly.
	There are no loose objects, for example tools, lying on the belt.
	The quality of the belt is in order; no sticking links and no dirt hindering free movement of the belt.
	There are no alarm icons in the icon row on the M2200 Controller.

# Operation

## Starting the Compact Grader

Before you start the Compact Grader:

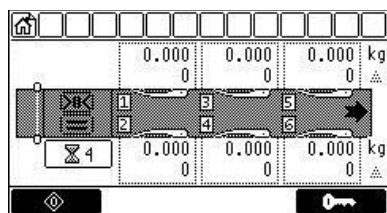
1. Check the belt carefully for dirt or foreign objects.
2. Check if the belt is properly positioned on the motor-end sprocket wheel, and if the belt is centered in relation to the infeed, weighing, and discharge sections.
3. Check if the belt is properly positioned on the idle end.
4. Make sure the belt does not touch any attached equipment, an infeed conveyor or tray, for example, located at the grader's conveyor ends.

### WARNING



If the belt is started with objects on it, a personal injury or damage to the machinery may result

## Initial Start

Follow these instructions when you start the Compact Grader for the first time:

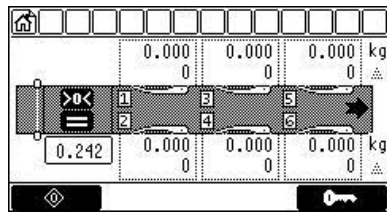


**Figure 8 M2200, startup**

1. Press the On/Off key  on the M2200 Controller to start the belt running. Let the belt run empty while the M2200 Controller runs a start-up check of the grader. During this period an hourglass is displayed on the Home page  while a countdown from six to one takes place.

### NOTE

Make sure that nothing touches the weighing section or its metal sideboards while the grader is running. Any pressure here, however slight, will affect the grader's weighing accuracy.



**Figure 9 Home page; grader ready for operation**

2. If the check routine encounters no alarms, the Home page appears as displayed in Figure 9, clean of alarm icons in the icon row. The grader is now ready for operation.
3. In case there are alarm icons displayed in the icon row, refer to the chapter on "Troubleshooting" on page 39 for more details

For everyday start of the Compact Grader repeat steps 1 – 2 above.

To stop the grader, press the On/Off key  on the M2200 Controller.

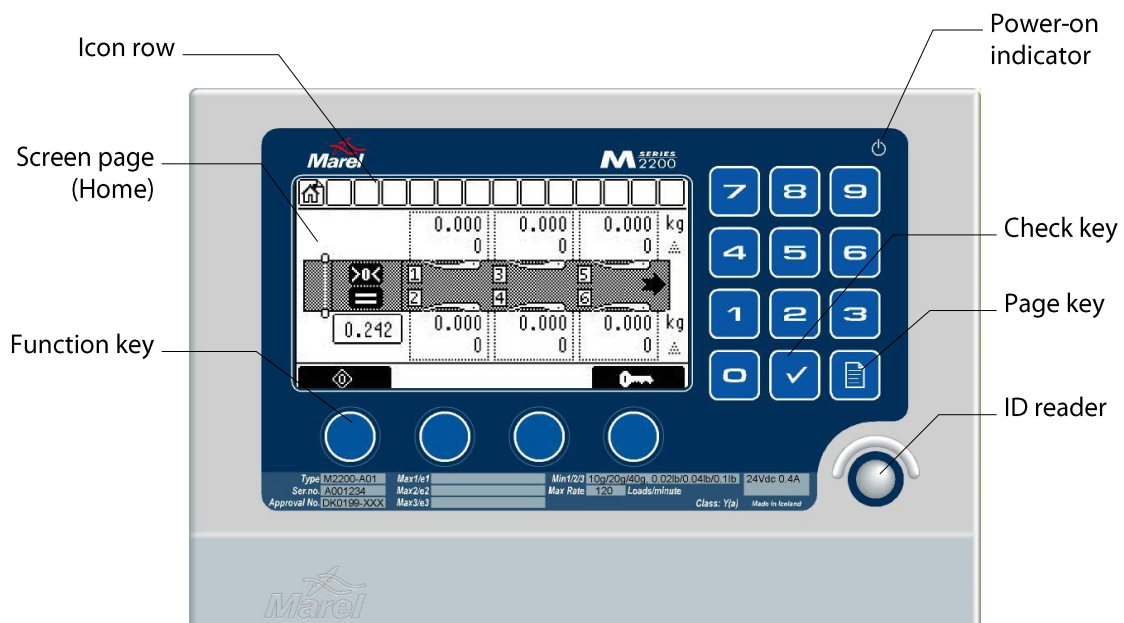
If you do not need further information on the user interface and the access control, you can go directly to page 19 for instructions on how to set up the grader

#### NOTE

Do not unplug the grader after you stop the belt. Constant power generates heat in the M2200 Controller and in the electrical cabinet and this will prevent condensation of moisture in the grader.

## The User Interface

The Compact Grader's user interface is designed for an operator and a supervisor, the foreman for example, who is responsible for the daily operation of the grader.

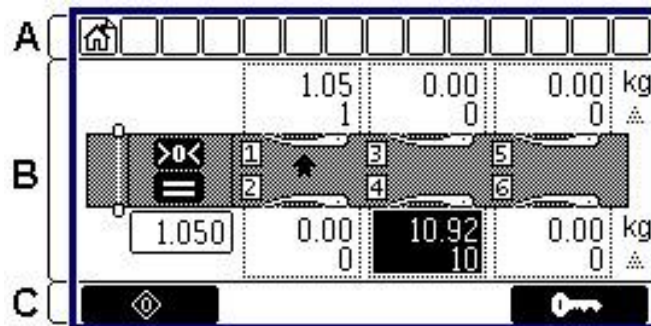


**Figure 10 The Compact Grader's user interface**



The user interface consists of an M2200 front panel with a keypad and a screen with programmable function keys and various screen items.

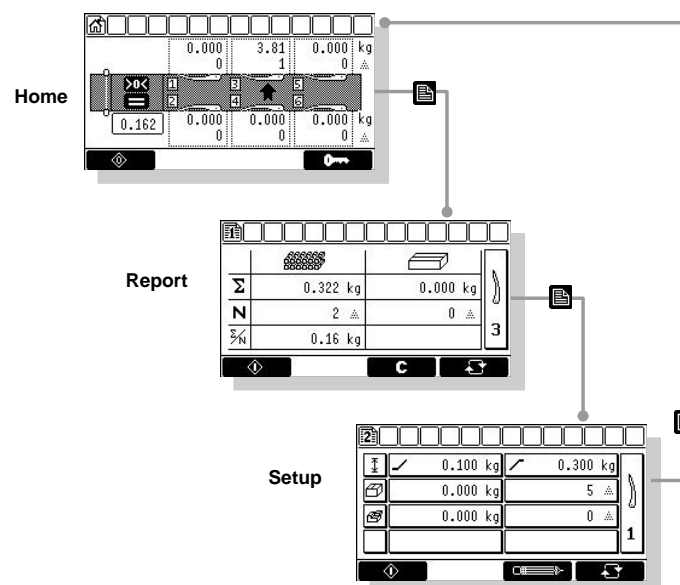
## Pages



**Figure 11 Typical Compact Grader page**




The screen is divided into three areas. At the top of the screen a row of icons (A) displays the state of the grader. The center piece of the screen is the screen page itself (B), while there are four programmable function keys (C) at the bottom of the screen.

Figure 12 below shows an overview of available pages in the Compact Grader's user interface, on Operator access level.



**Figure 12 Overview of pages in the Compact Grader user interface**

There are three basic pages for standard operations (Operator access level):

- **Home**  page where you can follow the results of normal grading or batching by weight, number of pieces, or a combination of the two.
- **Report**  page where you can view the accumulated results of the grading and batching.
- **Setup**  page where you can view and edit settings for the gates, e.g. weight limits, batch weights or the number of pieces in a batch.

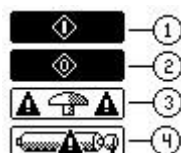
For users with a higher access level (Supervisor and Service) there are additional pages available with access to various system parameters for maintenance purposes.

## Function Keys

The bottom part of the Compact Grader page has four programmable function keys.


### On/Off key

Use this key to turn the Compact Grader on or off. This key is always located in the bottom left corner of the display and can appear in four different forms:

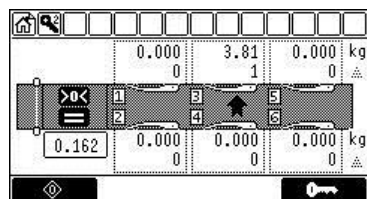





1. The conveyor is stopped. Press this key to turn the conveyor on.
2. The conveyor is running. Press this key to stop the conveyor.
3. The emergency stop button has been pressed. You cannot start the conveyor again until you have released the emergency button manually and the key has changed back to 1.
4. Motor overload. You cannot start the conveyor again until the key has changed back to 1.





### Access key

Use the Access key  to display the password dialog box and work with access levels.


The three access levels are displayed by the second icon from the left in the icon row at the top of the display:






-  Operator (blank)
-  Supervisor
-  Service

	<b>Edit key</b> Lets you enter new settings and change existing ones.
	<b>Scroll key</b> Use this key to navigate between gates (displayed to the right) on the Setup page and the Reports page.
	<b>Clear/Cancel key</b> When in Edit mode (on the Setup page), this key cancels an entry. On the Report page, the key clears the accumulation values in the fields.
	<b>Down arrow</b> Appears on the Setup page in Edit mode. Use this key to navigate between fields (settings) on the page.

## Access Control

The user interface is password protected to prevent unauthorized use of the grader. The password protection operates with three access levels, shown by the Access icon  in the row of icons at the top of the page:

- Operator  (default), no password required
- Supervisor 
- Service 

A password is required for Supervisor and Service. A password for the Supervisor level is optional.

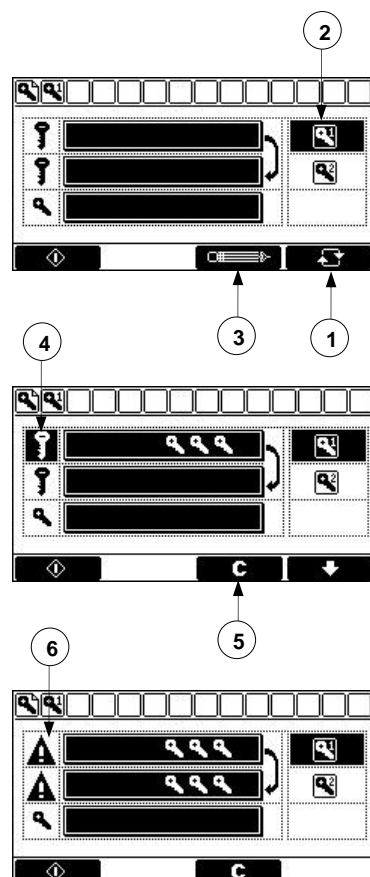
Only users with Supervisor or Service access authorizations can specify new passwords or change existing ones.










Supervisor and Service can share a password.

### NOTE

If you decide not to specify the Supervisor password, the Operator will have access to actions that would otherwise be available to the Supervisor alone.


To specify Supervisor and Service passwords:





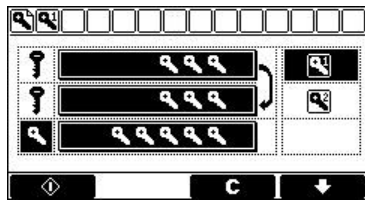
1. As a first-time user on a new grader you will need to enter the default Service password (62735) and press  to access the Password Setup  page.
2. From the Home  page, use the  key to go to the Password Setup  page. Use the  key (1) to select a level (2),  Service or  Supervisor, for which you wish to specify a password.
3. Press the  key (3) and enter your new password in the first field.

Note that the highlighted key (4) to the left indicates which of the three fields is currently active. The password can be any combination of the numbers, maximum six in all.

You can use the  key (5) to cancel your input, if necessary.

4. Press  to navigate to the second field where you confirm the new password by reentering it.

If there is a mismatch between the two passwords, a warning  will be displayed (6). Use the  key to clear both fields and start again.

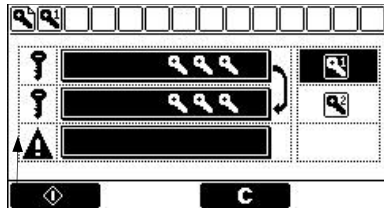


5. Press to navigate to the bottom field where you must enter your current password:

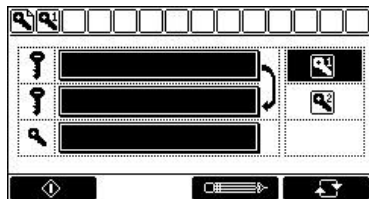
- **Service:** a new or changed Service password must be confirmed with the current Service password (for a first-time user, the default password).
- **Supervisor:** a new or changed Supervisor password must be confirmed with the current Supervisor or Service password.

6. Press to confirm.

If the confirmation password is incorrect, a warning is displayed (7). Press to get a blank Password Setup page and start over again.



7



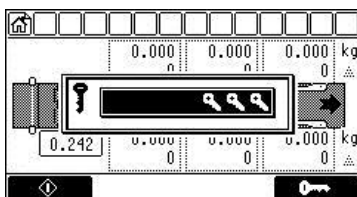
A successfully specified password displays a blank Password Setup page, where you can continue and specify a password for the other access level, if you wish.

If not, use the page key to exit the Password Setup page.

## Permanent or temporary passwords?

Passwords for the Compact Grader interface can grant permanent or temporary access.

A password that is entered on the Home page gives you permanent access, which means that once you have entered the password you have access to all actions on all the other pages as well.



**Figure 13 Password pop-up window.**

If, on the other hand, you do not enter a password until the interface requires one by displaying the pop-up window displayed in Figure 13, your access authorization is valid only for that particular page.

To enter a password:



1. Press the key and key in your password.
2. Press the key to confirm or to cancel.

### NOTE

Users with Supervisor access authorization can change their own password, while users

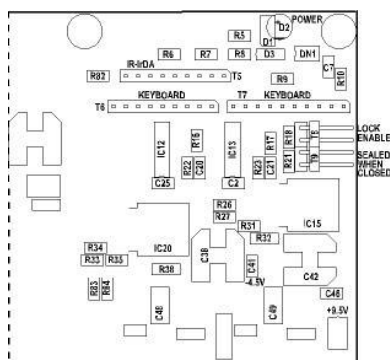
with Service authorization can change passwords for both Supervisor and Service access levels.

To lock the grader for unauthorized access:

1. Press the  key and enter a number which is not in use as a password (the 0 (zero) character can be recommended).
2. Press the  key. The user interface is now at Operator level.

To reset a lost password:

1. Unplug the grader.



**Figure 14 Detail of M2200 circuit board: Location of Lock enable jumper.**

2. Carefully lift the M2200 Controller cover upwards until the jumper marked "Lock enable" (shown on Figure 14) is revealed on the circuit board. Remove the jumper.
3. Plug in the grader, and wait until the Home page is displayed.
4. Unplug the grader again, put the jumper back in its place, and put the M2200 cover back in place.
5. Plug in the grader and it will start with the default passwords (62735).





## Setting Up Grader Functions










After the initial start of the grader, you must set up the grader's functions and specify grading and/or batching parameters for each gate you intend to use.

The Compact Grader is designed to perform two basic tasks, grading and batching a flow of raw material. There are five options available for these tasks, one of which is specified for each of the six gates.

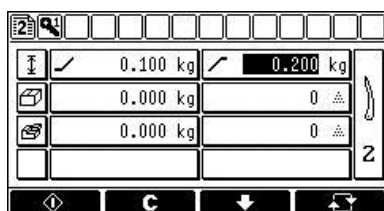
The table below lists all icons available on the Setup page.

**Table 2 Icons used on the Setup page.**

	A valid password has been entered.		Lower weight limit. Shows where the lower weight limit of a batch is entered.
	Gate number. Shows the number of the gate for which data is currently being displayed.		Upper weight limit. Shows where the upper weight limit of a batch is entered.

-  **Weight limits.**  
Line header. Shows the line where upper and lower weight limits are entered.
-  **Batch.**  
Line header. Shows the line where the total target weight of a batch () or the total target number of pieces () in a batch is entered.
-  **Unfinished batch.**  
Line header. Shows the line where the current weight of a batch () or the current number of pieces () in the unfinished batch is entered.
-  **Unit of weight.**  
The unit is kg or lb, depending on how the grader was calibrated at the installation.
-  **Number of pieces in a batch.**

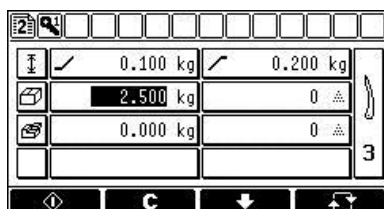
The following are examples of the five grading and batching options available on the Compact Grader:



The screen shows the 'Simple grading' mode. The top line has a weight limit icon and a slash icon. The second line shows '0.100 kg' and '0.200 kg'. The third line shows '0.000 kg' and '0'. The fourth line shows '0.000 kg' and '0'. The bottom right corner shows the number '2'.

#### Simple grading

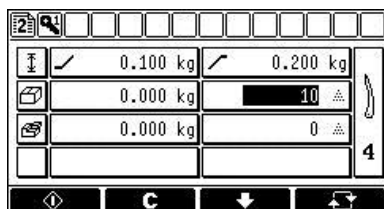
The user specifies the upper (0.200 kg) and lower (0.100 kg) weight limits for pieces and clears all other fields on the page. This option is useful when all you need is a simple sorting by weight



The screen shows the 'Batching by weight' mode. The top line has a weight limit icon, a slash icon, and a box icon. The second line shows '0.100 kg' and '0.200 kg'. The third line shows '2.500 kg' and '0'. The fourth line shows '0.000 kg' and '0'. The bottom right corner shows the number '3'.

#### Batching by weight kg

The user specifies the upper (0.200 kg) and lower (0.100 kg) weight limits for pieces and the minimum total target weight for the batch (2.500 kg). Use this option when you wish to create batches of a given minimum weight.



The screen shows the 'Batching by number of pieces' mode. The top line has a weight limit icon, a slash icon, and a box icon. The second line shows '0.100 kg' and '0.200 kg'. The third line shows '0.000 kg' and '10'. The fourth line shows '0.000 kg' and '0'. The bottom right corner shows the number '4'.

#### Batching by number of pieces




The user specifies the upper (0.200 kg) and lower (0.100 kg) weight limits for pieces and the number of pieces (10) in each batch.

<sup>2</sup> The icons in the examples refer to lines and fields on the Setup page. The first icon tells you which line you should edit, the others which fields you should enter values in. The unit of weight on the Setup page and in the examples can be kilograms (kg) or pounds (lb), depending on how the grader was calibrated at the installation.

[Icons]			
[Weight]	0.100 kg	[Weight]	0.300 kg
[Weight]	2.500 kg	[Pieces]	10
[Weight]	0.000 kg	[Pieces]	0
		5	
[Navigation]			

[Icons]			
[Weight]	0.100 kg	[Weight]	0.200 kg
[Weight]	5.000 kg	[Pieces]	0
[Weight]	3.650 kg	[Pieces]	0
		3	
[Navigation]			

### Batching by weight and number of pieces


  kg 

The user specifies the upper (0.300 kg) and lower (0.100 kg) weight limits for pieces, the minimum target weight for the batch (2.500 kg), and the number of pieces (10) in each batch.

A batch is considered completed when the specified number of pieces **and** the target weight have been reached.



**Note** that here the target weight is the minimum acceptable weight of the batch.


### Continuing unfinished batches kg

The user places an unfinished batch under the discharge chute and enters the current weight (3.650 kg) of the batch in the  kg field. The grader will then continue filling the batch until the total target weight (5.000 kg) has been reached. You can also use this option to complete batches by number of pieces or a combination of weight and number of pieces.

This option is useful when the processing is interrupted for some reason: there is no more raw material or you are gathering boxes on pallets, to name a few examples.

### Tip


On page 63 of this manual you will find a blank form sheet. Copy the sheet and use it for writing down the weight (or number of pieces) of your unfinished batches. Later, when you want to complete the batches, you will have the relevant data at hand and all you have to do is enter the weight in the  kg field (or the number of pieces in the  field) and then let the grader continue filling the batch.

As the Setup page works with one gate at a time (use the  key to navigate between gates), you can use one of the above options for one or more gates and the other options for the remaining gates.

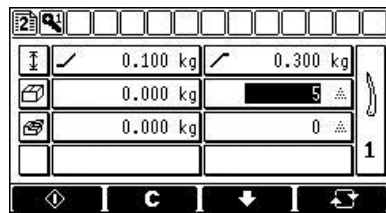
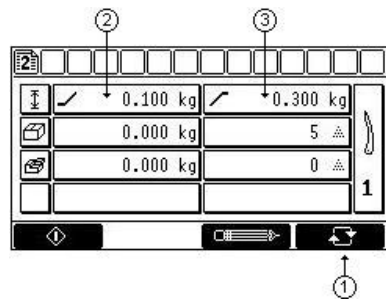
Example:

Gate 1 and gate 3 do simple grading, while gate 2 creates batches with a specified number of pieces, and gate 4 creates batches by weight etc.

### NOTE

You must be authorized as a Supervisor to set up or change the gate parameters. If you are not a Supervisor, the access control window appears when you press the  key to let you enter the required password.

To set up gate parameters:






- From the Home page, press the key twice to go to the Setup page.
- Select the gate you wish to set up using the key (1).
- Press the key, enter the password (if required), and set the lower (0.100 kg) (2) and upper (0.300 kg) (3) piece weight limits for the gate (here gate #1).  
Press the key to confirm.
- Having set the weight limits (in step 3), use the key to navigate to the remaining fields, depending on which grading or batching option you wish to use:
 

Simple grading:	Clear all remaining fields.
Batching by weight:	Set the target weight in the  kg field. Clear all remaining fields.
Batching by number:	Set the number of pieces in the  field. Clear all remaining fields.
Batching by weight and number:	Set the target weight in the  kg field. Set the number of pieces in the  field. Clear all remaining fields.
Continuing unfinished batches:	Enter the current weight of the unfinished batch in the  kg field and, optionally, the target number of pieces in the complete batch in the  field.
- When you have finished setting the above parameters, press the On/Off key to start the grader.




## Working in Edit Mode




When you press the  key to specify or edit parameters, two new function keys are added to the screen:

-  • **Clear/Cancel key.** Use this key to cancel an entry.
-  • **Down arrow.** Use this key to navigate between fields (settings) on the Setup page.

The changes you make in an input field take immediate effect when you exit the field.

## During Grading

When you have set up the gates and the grading has started, you have access to information on the grading process on the Home  page.

Use the  key on the keypad to navigate from the Setup  page to the Home  page.

When the Compact Grader is in operation, a typical Home page would look as Figure 15.

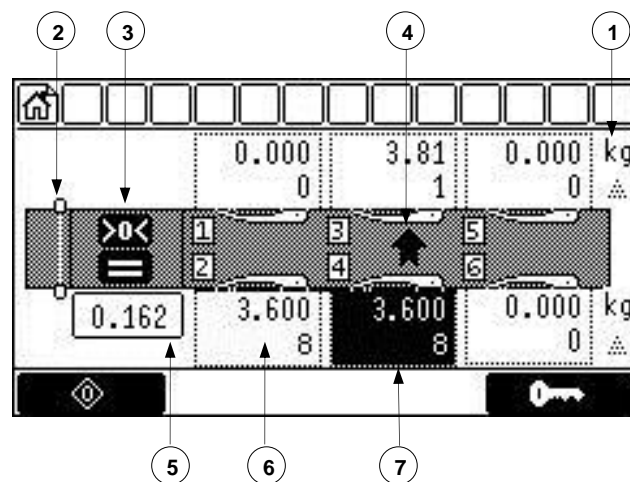








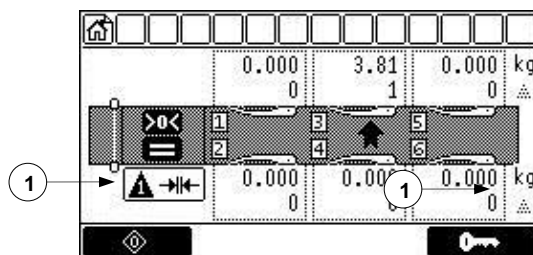
Figure 15 The Home page.

Here you see

- the unit of weight (kg or lb) being used (1) and, in the line below, a symbol for the number of pieces in each batch.
- the product sensor as a white line across the conveyor belt (2). The line becomes black when the sensor “sees” a product.  
If the product sensor is blocked for an extended period of time, an alarm icon  appears in the icon row.
- the status of the weighing (3). The  icon means the weighing is at zero point () and the weighing platform is steady (), while  means the weight is off the zero point and the platform unstable.
- the weight of the last piece to run over the weighing plate (5) in the unit of weight selected for the grader at the installation.
- an arrow (4) showing through which gate the piece was discharged, or off the conveyor end if the piece was rejected. The arrow always shows the destination of the piece whose weight is currently displayed in (5).
- numbers by each gate showing the accumulated weight (6) and number of pieces in the particular bin.
- the same numbers in reverse color (7), indicating that the target weight and/or number specified for that gate has been reached and that the operator can now make the bin ready for the next batch by pressing the numeric key corresponding to the gate on the M2200 keypad. After that the gate is again available for grading.  
Nothing is sent to the gate as long as this number is in reverse color.

## Weighing Fault Indicators

In case of problems with the weighing, the user is alerted by fault indicators (1) which appear on the Home page .



There are five possible fault indicators:



The last two pieces on the weighing platform are too close to each other.



The last piece on the weighing platform is too long.





The weight registered on the platform is too heavy.




The weight registered on the platform is too light.





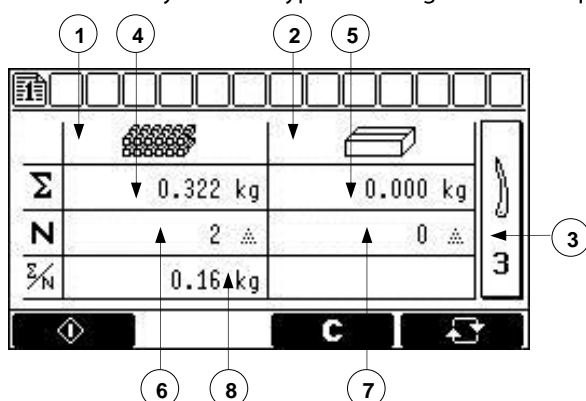
The weight on the platform is unstable.

- Indicator  (weight too light) can be triggered by debris on the belt or by other small items obstructing the product sensor's light beam.
- Indicator  (weight unstable) can be triggered by a draft from an open door or fan, from vibrations in the environment, or because the actual length of the piece being weighed is too close to the maximum length limits for the grader.


## Working with Reports

You can view a report with the accumulated grading results at any time, regardless of the grader running or not. Provided you have the proper access authorization (Supervisor or Service), you can also clear the accumulation figures on the Report page .

Use the  key on the keypad to navigate to the Report page .




**Figure 16 The Report page, an example.**

The Report page is divided into two columns, one for individual pieces (1), the other for batches (2). Information on the Report page is displayed for one gate at a time (3). Use the  key to navigate between gates.



**Figure 17 "Clear all gates" icon.**

Use the  key to delete data for one gate at a time or select the gate icon displaying all 6 arms to clear data for all gates in a single action.

On the Report page you see



- **Pieces**  
a column header. Data in the column below apply to individual pieces.



- **Batch**  
a column header. Data in the column below apply to a batch.



- **Total sum**  
the total sum of the accumulated weight of pieces (4) that have been run over the grader and the total sum of the accumulated weight of completed batches (5).



- **Total number**  
the total number of weighed pieces (6) and the total number of completed batches (7).



- **Average**  
the average weight of each weighed piece (8) and the average weight of each completed batch.

#### NOTE

The discrepancy between the piece weight and the batch weight on the Report page is normal, because batches are not counted until the set target weight or number of pieces has been reached. Therefore, a batch may be in the making, which explains the higher figure for accumulated piece weight.

# Maintenance

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## Maintenance Schedule

This chapter describes preventive maintenance of the Compact Grader and various adjustments that may have to be made to the grader.

The maintenance schedule for the Compact Grader is shown in Table 3.

Table 3

**Table 3 Maintenance schedule**

<b>Every working shift:</b>	<ul style="list-style-type: none"><li>• Check that the grader weighs correctly.</li><li>• Check the tracking of the belt.</li><li>• Wash the plastic modular belt.</li></ul>
<b>Daily:</b>	<ul style="list-style-type: none"><li>• Check motor, belt and idle end for abnormal noise.</li><li>• Run the gate arms in test mode for 1 minute.</li><li>• Check that the product sensor is clean and correctly positioned.</li><li>• Clean the Compact Grader.</li></ul>
<b>Weekly:</b>	<ul style="list-style-type: none"><li>• Remove and wash the Intralox belt.</li><li>• Check the tension and the tracking of the belt.</li><li>• Check the belt for wear.</li><li>• Check all air cylinders.</li><li>• Check the gate arms.</li><li>• Check the quality of the weighing zero.</li></ul>
<b>Monthly:</b>	<ul style="list-style-type: none"><li>• Check the emergency stop.</li><li>• Check the water trap (pneumatic system).</li><li>• Check the tension of the belt and the status of the belt in general (see Figure 19).</li><li>• Check that the belt sensor does not jut out from the bracket.</li><li>• Check the sprockets on idle and motor end for wear.</li></ul>
<b>Yearly:</b>	<ul style="list-style-type: none"><li>• General service and control of the pneumatic and electrical system.</li></ul>
<b>After 10.000 operat. hrs:</b>	<ul style="list-style-type: none"><li>• Change the oil in the drum motors.</li></ul>

# Maintenance Procedures

The following sections describe the maintenance procedures for the parts listed below:

- Belt
- Weighing zero
- Belt sensor
- Belt tension
- Product sensor
- Drum motor
- Idle shaft
- Pneumatic system
- Air cylinders
- Gate arms
- Emergency stop buttons

## Belt

### IMPORTANT

To ensure the quality of the belt and the grader's weighing accuracy, Intralox Inc. supplies Marel hf. with specially selected belts. If belts from other suppliers are used, Marel cannot guarantee the grader's accuracy and reliability.

The belt on the Compact Grader is an Intralox belt, made of plastic links held together by plastic rods.

It is very important for accurate weighing that the links do not stick and thus prevent the belt from rotating smoothly on the rods.

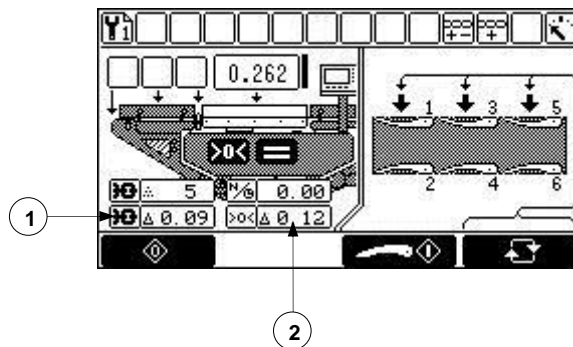
If you need to replace the belt, follow the instructions in the Intralox brochure delivered with the grader.

After replacing the belt, make sure the belt index has been inserted into the belt and that you check the quality of the belt as described below.

To check the belt quality:

1. Store your spare belt away from dust and other debris.
2. Before installing the new belt, place it on a bench, pick up one link at a time, and check if the link moves freely by bending it back and forth.
3. Look for sticking rods and for dirt that can make the links stiff. In case some of the links are stiff because of dirt, clean the belt more thoroughly, or replace the stiff links with new ones.
4. Make sure the rods have not been damaged by tools, e.g. screwdrivers or pliers.
5. Start the conveyor and check the belt quality and, by consequence, the quality of the weighing zero, following the instructions below.

To check the belt and weighing zero quality:



The value in (1) shows the quality of the belt and (2) the quality of the weighing zero.

**30 Δ 0.09**

A numeric value higher than 20 in **30 Δ 0.09** (1) indicates a problem with the belt:

- make sure there are no sticking links or damaged rods in the belt
- clean the belt
- adjust the belt tension
- replace the belt.

**>0< Δ 0.12**

A numeric value higher than 1.3 in **>0< Δ 0.12** (2) indicates a problem with the weighing zero. Check that

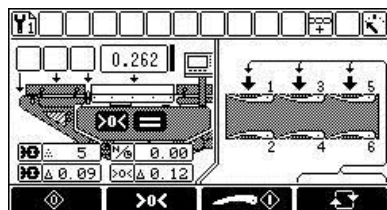
- the drop between infeed, weighing and discharge sections is correct (0.5-1.0 mm)
- the sideboards on the weighing section are free
- the belt tension is in order (see Figure 19)
- the space between motor end plate and the belt is correct (2-3 mm).

If you need to adjust the motor end plate, follow the instructions below:

1. Loosen the lock nut (see Figure 36).
2. Use the adjustment bolt to adjust the distance between the belt and the plate. The space should be approximately 2-3 mm.
3. Fasten the lock nut.

When you have verified that the above items are in order, test the weighing following these instructions.

## Static test




1. Stop the conveyor belt by pressing the **⬢** key.
2. On the Service page, press the **>0<** key (1).

3. Place a reference weight in the exact center of the weighing platform. Make sure the reference weight is within the grader's maximum weighing capacity (3 kg).
4. The weight, as registered by the grader, is displayed on the Service page (2).
5. If the weight in (2) is not identical with the reference weight, do the following:
  - make sure nothing touches the weighing platform or the sideboards.
  - make sure the reference weight is reliable.
  - perform a static calibration (see "Calibration" on page 10).

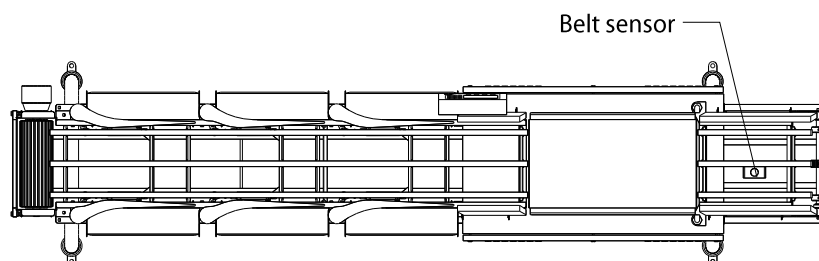
**NOTE**

After completing each of the above steps, you should check whether the correct zero value is displayed in (2) on the Service page.

**Dynamic test**

1. Start the conveyor belt by pressing the  key.
2. Run a piece of soft rubber repeatedly over the grader, moving your arm in a steady rhythm, always dropping the piece in the same place, from a similar height. If an infeed conveyor is used with the grader, place the test pieces on the infeed conveyor.
3. Watch how the grader registers the weight of the test piece. It should be more or less the same every time ( $\pm$  the grader's weighing accuracy, see "Technical Specifications" on page 3).

Wash the Intralox belt thoroughly every day of operation. For more detailed information on how to clean the belt, see "Cleaning Procedures" on page 49.

**Belt Sensor**

**Figure 18 Details of the Compact Grader, belt sensor.**

It is important that

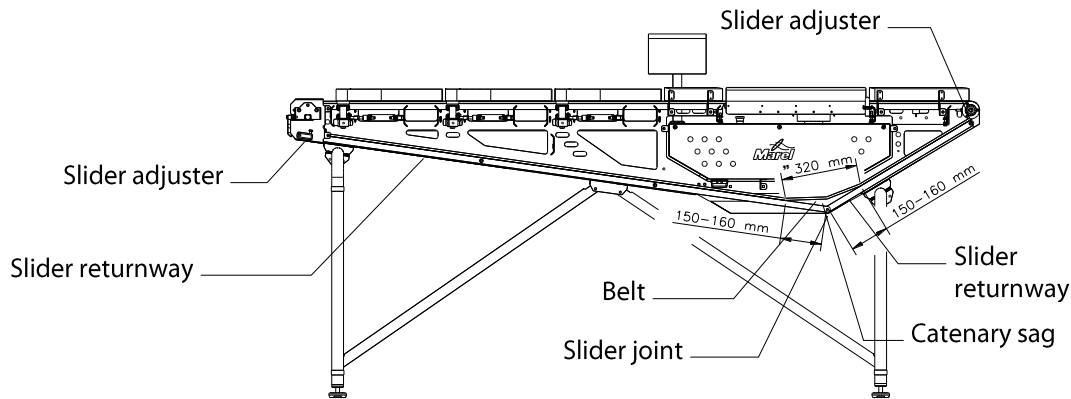
- you make sure the belt sensor does not stick out from the bracket, or it could damage the belt
- the belt is correctly mounted on the grader with the belt index in alignment with the sensor.



## Belt Tension

You must check the tension of the belt every month of operation.

It is very important that the belt is not strained in any way as this could impair the weighing accuracy.



**Figure 19 Belt tension, conveyor in operation.**

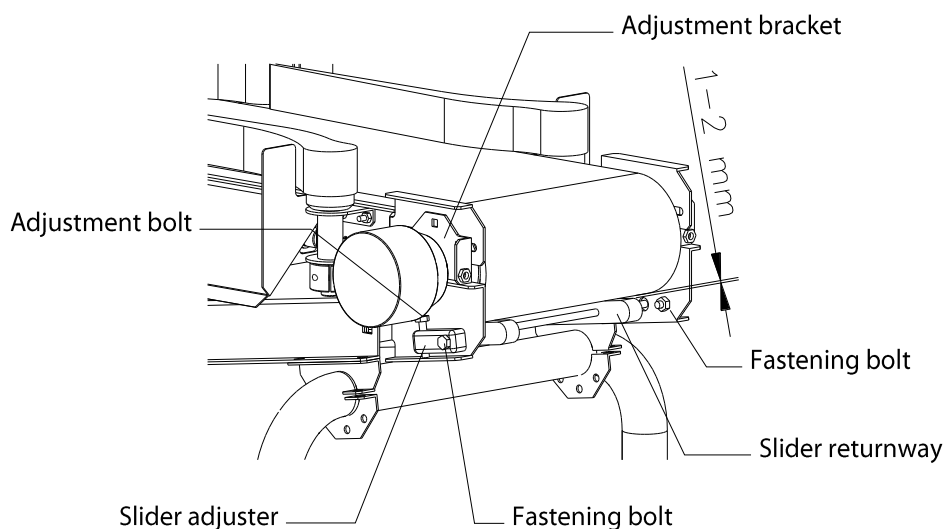
The belt tension (catenary sag) should be as similar as possible to the values shown in Figure 19.

The slider returnways are made of plastic bars and consist of two pairs of bars, which are connected in a joint (slider joint). Each slider is then fastened to the grader by hinges (slider adjusters) at the grader's conveyor ends.

When adjusting the belt tension (catenary sag), you must loosen the adjustment bracket slightly and then move the motor forwards/backwards until you reach the sag shown in Figure 19.

The sliders are then adjusted at the conveyor motor end by loosening the fastening bolt (see Figure 20). The adjustment bolt is then used to move the slider adjuster until the suitable spacing is obtained (1-2 mm).

Use the same procedure on the idle end.



**Figure 20 Detail of Figure 15.**

To adjust the belt tension (catenary sag):

1. Stop the Compact Grader using the emergency stop button.
2. Loosen the adjustment bracket slightly.
3. Manually move the motor back or forth and fasten when the sag is as shown in Figure 19.

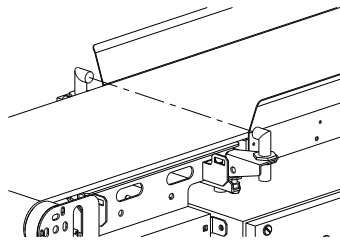
To align the sliders with the motor/idle end:

1. The sliders must also be aligned with the motor/idle end.
2. Loosen the fastening bolt slightly.
3. Turn the adjustment bolt to move the slider adjuster.
4. Adjust the gap between motor/idle end and sliders until the sliders almost touch the belt (1-2 mm).
5. Fasten the adjustment bolt again.

**NOTE**

A proper adjustment of the belt is very important. If the belt is too slack, there is a risk of the belt jumping out of position on the sprockets. That situation could cause unreliable and inaccurate weighing and too much wear on both belt and sprockets.

## Product sensor



**Figure 21 The product sensor**

It is very important that the product sensor is kept clean and correctly positioned.

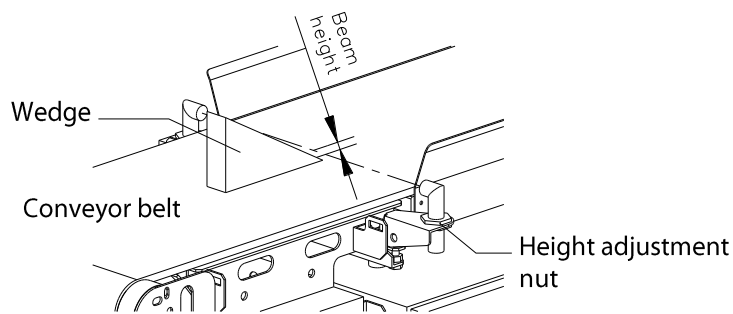
Do not allow dirt to build up on or around the sensor. The sensor consists of two identical looking parts, a light transmitter and a receiver. Both parts of the sensor and the entire area between them must be kept clean at all times, or else the light beam may be interrupted.

If the product sensor needs to be replaced, you must adjust the light beam.

To adjust the light beam:

1. Set the height of the light beam across the belt to approx. 5-10 mm above the belt, depending on the product to be weighed.

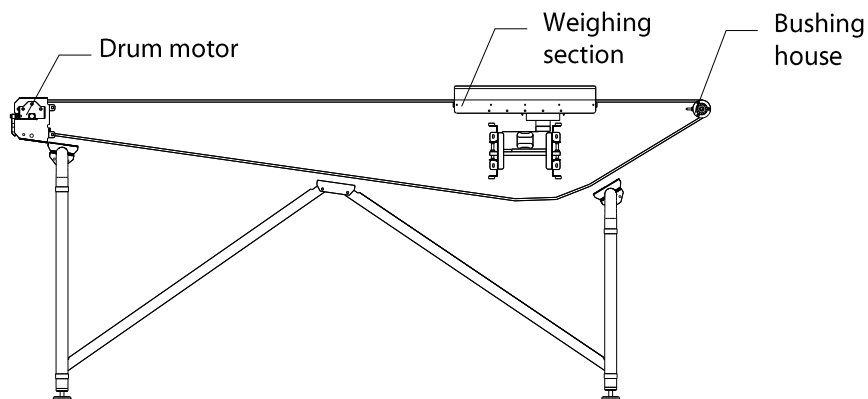
This is to make sure that a small build-up of dirt etc. on the conveyor belt will not interrupt the light beam.



**Figure 22 Adjusting the light beam.**

2. Adjust the light beam. Use, for example, a small wedge-shaped piece of cardboard.
3. Place the wedge in front of the light beam, and check when the beam is interrupted. The height of the light beam can now be measured as the height of the wedge where it crosses the light beam.
4. Check the height from both sides of the belt and from the center, and adjust both transmitter and receiver to the same height.

## Drum Motor

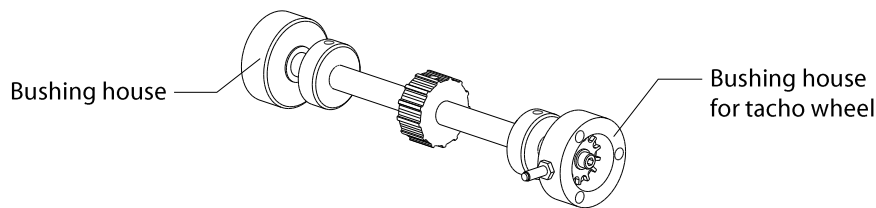


**Figure 23 Motor and idle shaft.**

The drum motor is maintenance-free. Nevertheless, the following should be observed:

- Inspect the motor every day of operation. This is necessary to ensure the motor runs normally and that there is no abnormal noise from the motor.
- Change the oil after every 10.000 operating hours.  
For refill, use EG gear oil SAE 90. For further details see the motor manufacturer's instructions.

## Idle shaft



**Figure 24 Bushing houses on idle shaft.**

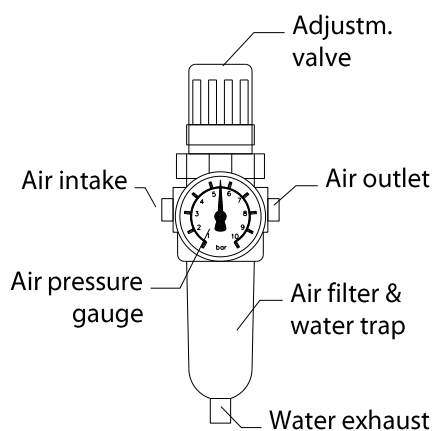
- Inspect the idle shaft and the sprocket wheel daily. This is to ensure that the shaft and the wheel turn freely, that there is no abnormal noise from the bushings, and that they are in good order.
- The bushings do not require lubrication. If a bushing “squeaks”, it is sufficient to inject it with water.

## Pneumatic System

### NOTE

The air valves are self-lubricating and should not be lubricated manually. Otherwise, damages may occur.

The grader must **not** be connected to a self-lubricating pneumatic system. The air for the pneumatic system should be clean, dry and free of any traces of oil.



**Figure 25 Filter regulator and air pressure gauge, electrical cabinet**

To operate properly the Compact Grader requires a constant level of air pressure.

The air pressure regulator in the electrical and air cabinet (see Figure 25) is set to the pressure required to operate the gate arms, 5.5 bar.

Too great a pressure, over 5.5 bar, can interrupt the weighing accuracy. Too low a pressure can cause the gate arms to open too slowly and so miss their designated pieces of product.

The water trap in the air cabinet (see Figure 25) is equipped with an automatic filter regulator

## Air Cylinders

### WARNING!

Always show great caution when working on the air cylinders and gate arms. You cannot test the arms unless the conveyor is running, but always **stop the conveyor** using the emergency stop button whenever you need to replace an air cylinder.

When you replace the air cylinders for the gate arms, please note the following:

- After replacing a cylinder, you must adjust the cylinder speed and buffer cushioning. Before you start the adjustments, make sure the air pressure for the grader is at the correct level.
- After the cylinder has been replaced, make sure the piston does not knock against the enclosure:  
Adjust the shock absorbing mechanism in the cylinder by turning the small adjustment screws on both ends of the cylinder (see
- Figure 26, B and D).

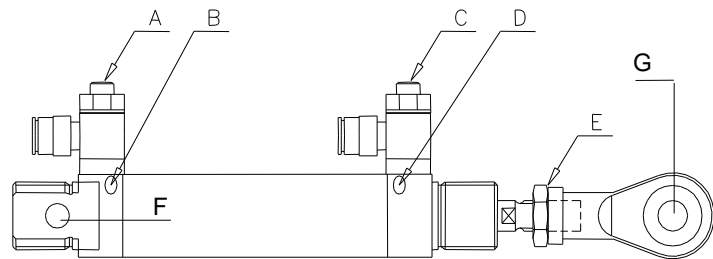
A= speed adjustment screw, cylinder "in" movement

B, D= adjustable buffer cushioning to avoid impact of shock of in/out movement

C= speed adjustment screw, cylinder "out" movement

E= piston length, adjustment screw (ball joint eye on the piston rod)

F, G= bolt connection



**Figure 26 Adjusting the shock absorbing mechanism**

- Make sure the bolt connection F (to the frame) has room to rotate.
- Firmly tighten bolt connection G (to the gate arm).

To adjust air cylinder speed and buffer cushioning:

1. To adjust the "out" speed of the piston rod, adjust the speed adjustment screw at the front end of the cylinder (see Figure 26, C).
2. To adjust the "in" speed of the piston rod, adjust the speed adjustment screw at the rear end of the cylinder (see Figure 26, A).

When the right piston speed has been reached, you must adjust the cylinder's buffer cushioning. The cushioning is to minimize the effect of the shock on the weighing mechanism when the gate arm stops abruptly:

1. Adjust the cushioning for the "out" movement with the adjustment screw (see Figure 26, D). Turn the screw clockwise to increase the cushioning effect, counterclockwise to decrease the effect.

2. Adjust the cushioning for the "in" movement with the adjustment screw (see Figure 26, B). Turn the screw clockwise to increase the cushioning effect, counterclockwise to decrease the effect.

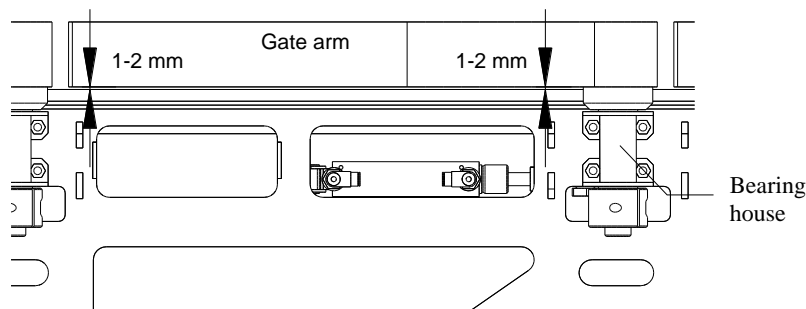
## Gate Arms

### **WARNING!**

Always show great caution when working on the air cylinders and gate arms. You cannot test the arms unless the conveyor is running, but always **stop the conveyor** using the emergency stop button whenever you need to replace an air cylinder.

Check the function and state of the gate arms every week.

1. Move the gate arms manually and check for abnormal friction in the bearings or the air cylinders.
2. Check for play in the joints and whether the arm is badly worn.
3. Check for abnormal noise in the arm joint.
4. Check if the arm rubs against the belt or if the space between arm and belt is too large. The appropriate space between arm and belt is 1-2 mm.



**Figure 27 Spacing between arm and belt, 1-2 mm**

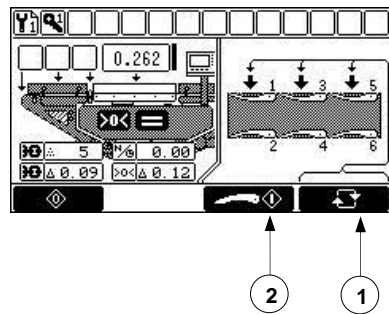
## Testing the Gate Arms

We recommend that you test the movement of the gate arms daily to make sure the arms do not rub against the belt and to loosen them up before starting operation.

There are four main issues which you should be aware of when testing the gate arms:

- The speed of the "open" movement should be just enough for the arm to catch the piece of product assigned to the gate.
- The speed of the "close" movement should be just enough for the arm to catch only the assigned piece and not the piece that follows next.
- You should use maximum buffer cushioning without the cushioning interfering with the "open" and "close" speeds. The purpose of the buffer cushioning is to prevent the impact of shock from the arms affecting the weighing results, and you must make sure the arms do not stop so abruptly as to produce a shock going through the grader corrupting the weighing results.
- You must make sure that opposite arms do not strike each other ("clap" together).

To test the gate arms:



1. Start the conveyor with the key.
2. Use the key on the keyboard to go to the Service page . Note that access to this page is limited to users with a Service password.
3. Use the key (1) to select the pair of gate arms you wish to test.
4. Press the key (2) to activate the arms. The arms now operate continuously and you can check if they operate normally, without touching each other, or if you need to adjust them.

#### NOTE

The test will stop automatically if the product sensor light beam is broken by a piece of product.

5. Stop the test using the key or by breaking the product sensor light beam.

To adjust the gate arms:

1. Turn the buffer cushioning screws (Figure 28, B and D) for the arm pair you are testing all the way in (clockwise) and then ca. half a turn back (counterclockwise).

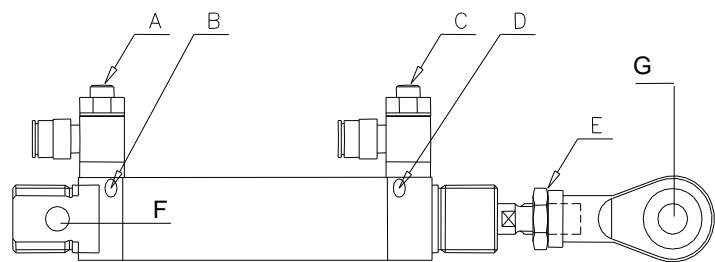
A= speed adjustment screw, cylinder "in" movement

B, D= adjustable buffer cushioning to avoid impact of shock of in/out movement

C= speed adjustment screw, cylinder "out" movement

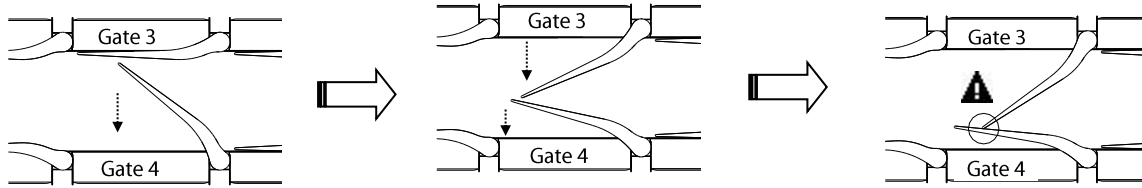
E= piston length, adjustment screw (ball joint eye on the piston rod)

F, G= bolt connection



**Figure 28 Adjusting gate arm movements**

2. Reduce the gate arm speed by turning the speed adjustment screws (Figure 26, A and C) all the way in (clockwise) and then three turns back (counterclockwise). The arms are now set to move in a "soft" rhythm, as illustrated in Figure 29 and Figure 30.



**Figure 29 No shock in  
"in" movement**

**Figure 30 Soft movement,  
no "clapping"**

**Figure 31 Arms striking  
each other; to be avoided.**

Figure 29 shows gate arm 3, which has just closed and is followed by gate arm 4, which is always "one step behind" arm 3 and closes just as softly without ever striking arm 3. Figure 29 shows the same arms at a different stage in the movement.

Figure 30 shows the arms striking each other. This situation should be avoided as it affects the grader's weighing accuracy.

3. If you need to adjust the speed of the arms or the cushioning, refer to instructions on how to adjust the air cylinders on p. 35.
4. Run a piece of product over the grader.  
Have the piece discharged through the gates you have just adjusted (gate 3 and 4 in the example) and use the adjustment screws to tune the arm movement, if necessary.
5. Repeat this process for the other gate arms.

## Emergency Stop Buttons

Press the emergency stop buttons at least once every month to test if the buttons function as designed.

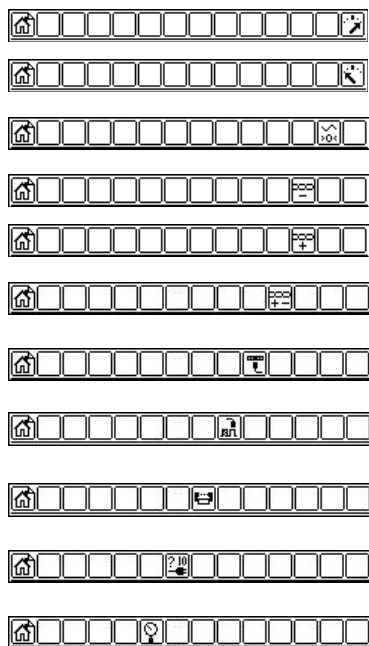


# Troubleshooting

## Alarm Icons

Alarms and faults on the Compact Grader are shown on the M2200 Controller as icons in the icon row at the top of the display.

The following is a list of all available alarm icons on the Compact Grader.



**Figure 32** Positions on icon row

**Table 4** Alarms on the Compact Grader.

Icon	Description	Action
	Belt speed is too fast	Contact your Marel agent.
	Belt speed is too slow	Contact your Marel agent.
	Belt quality alarm	See details in “Belt Quality Alarm” on page 40.
	Belt is too short	See details in “Belt Too Short” on page 42.
	Belt is too long	See details in “Belt Too Long” on page 42.
	Unstable length of belt	See details in “Unstable Length of Belt” on page 43.
	No signal from belt sensor	See details in “No Signal from Belt Sensor” on page 43.
	No signal from tachometer	See details in “No Signal from Tacho Sensor” on page 43.
	Product sensor is blocked	See details in “Product Sensor Is Blocked” on page 44.
	I/O module not connected	Contact your Marel agent.
	Air pressure is too low	See details in “Air Pressure Is Too Low” on page 44.

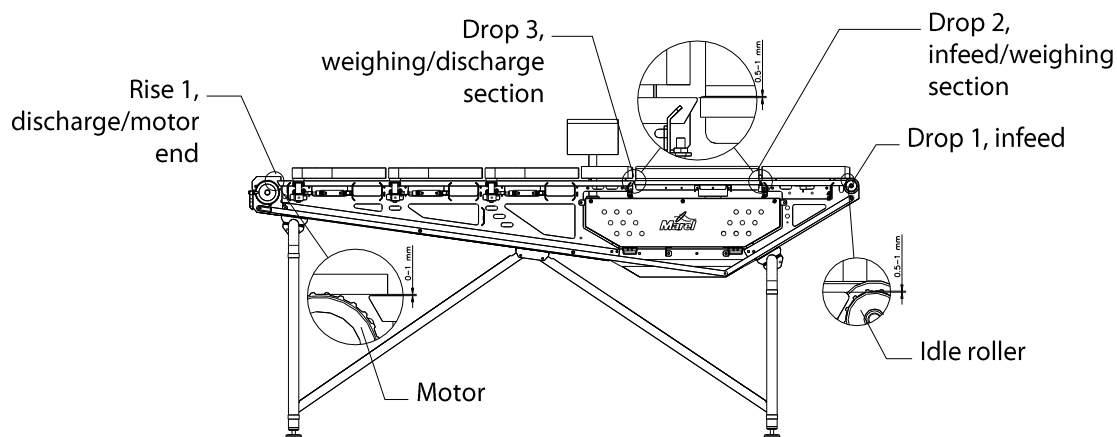
## Belt Quality Alarm



This alarm appears when variations within the belt exceed a given threshold.<sup>3</sup>

The alarm indicates problems with the belt:<sup>3</sup>

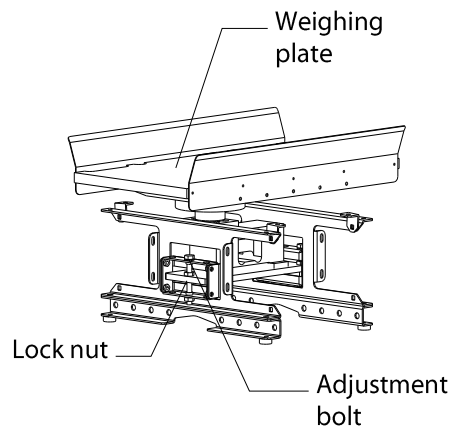
- Is there abnormal noise from the belt?
- Does the belt touch the sideboards?
- Check the belt tension (see "Belt Tension" on page 31).
- Is the belt clean?  
Yes? Try taking a new zero.  
No? Clean the belt.
- Is there hard debris stuck between the links causing stiffness?  
Yes? Clean the belt.
- Is the drop in height between the grader sections (infeed, weighing and discharge sections) correct?  
The drop should be 0.5-1.0 mm from the idle roller through every section to the discharge section and a rise up from the discharge section to the motor end.  
Follow the instructions below if you need to adjust the drop.



**Figure 33 Height difference between sections**

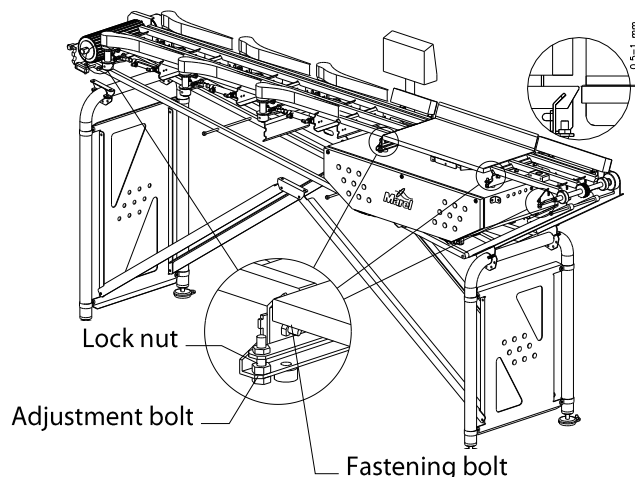
<sup>3</sup> As you go through the list, take time to take a new zero reading after each item, letting the belt move at least three rounds before taking the zero.

To adjust the drop between sections:



**Figure 34 Weighing-plate adjustments**

1. Start with the weighing-plate and loosen the lock nuts under the plate (Figure 34).
2. Adjust the plates by turning the three adjustable bolts under the weighing-plate. The plate can be adjusted up or down.
3. Use a ruler to adjust the height of the infeed and discharge sections.
4. Align the sections with each other. Use a straight-edge along the plates to make sure they are properly aligned.
5. Adjust the edge of the infeed section to be approximately  $0.5 \leq 1.0$  mm **above** the edge of the weighing-plate.
6. Adjust the edge of the discharge section to be approximately  $0.5 \leq 1.0$  mm **below** the edge of the weighing-plate (see Figure 33).
7. Tighten all lock nuts to lock the adjustment bolts in the correct position.
8. It may also be necessary to adjust the infeed and discharge sections in relation to the idle end and the motor end. This is done in a similar way, except that you begin with loosening the fastening bolt (see Figure 35) before you can start adjusting each section.



**Figure 35 Section adjustments**

**NOTE**

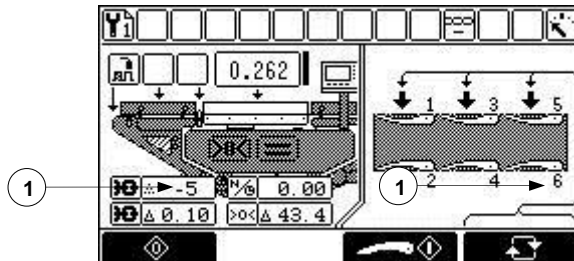
It is very important for the grader's weighing accuracy that the adjustments of the sections are consistent and that the spacing between them is evenly adjusted.

## Belt Too Short



This alarm appears when the M2200 software measures the belt to be shorter than the default belt length.

- Have links been removed from the belt?  
You must not remove links from the belt. If the belt has become worn, you should replace it with a new one.



If the value in (1) on the Service page is negative (-) and **steady**, that indicates that one or more links have been removed from the belt.

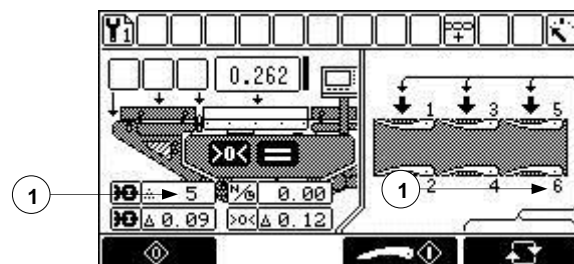
If this value (1) is negative and **unsteady** (the icon with a plus sign and a wavy line appears in the icon row), that would suggest the tacho sensor is not in order, or, although more unlikely, the belt sensor. For more details on the tacho sensor see "No Signal from Tacho Sensor" on page 43.

## Belt Too Long



This alarm appears when the M2200 software measures the belt to be longer than the default belt length.

- Have links been added to the belt or has the belt been replaced with a new belt from a supplier other than Intralox?  
You must not add links to the belt. If necessary, replace the belt with a new one.



If the value in (1) on the Service page is positive (+) and **steady**, that indicates that one or more links have been added to the belt.

If this value (1) is positive and **unsteady** (the icon with a plus sign and a wavy line appears in the icon row), that would suggest the tacho sensor is not in order, or, although more unlikely, the belt sensor. For more details on the tacho sensor see "No Signal from Tacho Sensor" on page 43.

See "Belt Tension" on page 31 for details on how to adjust the belt tension.

## Unstable Length of Belt



This alarm appears with the  and  icons, indicating a problem with the tachometer sensor, see page 43.

## No Signal from Belt Sensor



The belt sensor does not register the metal belt index while the belt is running.

Verify that

- the belt index is definitely inserted in the belt.
  - the belt is correctly mounted on the grader with the index in alignment with the sensor (see Figure 18).
  - belt sensor itself is in order: place a screwdriver on top of the sensor and the icon appears in the icon row.
- You can also perform a similar check by manually moving the belt back and forth with the index located above the sensor. If the sensor is in order, the sensor icon will appear.

## No Signal from Tacho Sensor



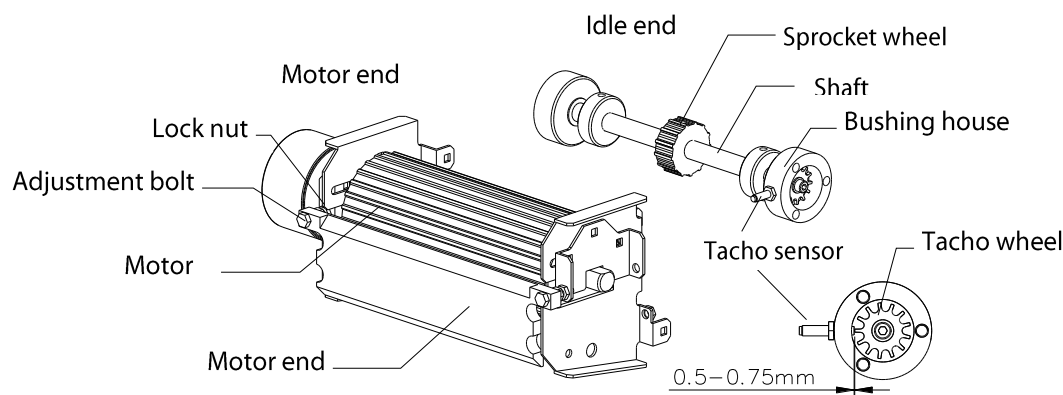
This alarm appears when the motor is running on a grader with the belt mounted, yet there is no signal from the tachometer sensor.

### NOTE

This alarm may also appear when the belt is starting up. This is not an alarm condition, if the alarm goes away once the belt starts moving.

The tachometer sensor is attached to one of the bushing houses on the idle end of the conveyor and keeps track of the belt speed. The sensor must detect each top on the tachometer wheel which is attached to the end of the idle shaft.

The alarm indicates that the tachometer sensor needs to be adjusted.



**Figure 36 Details of the Compact Grader, motor unit and tachometer sensor**

To adjust the tachometer:

1. Adjust the sensor so the gap between sensor and wheel top is approximately 0.5-0.75 mm.
2. Firmly fasten the sensor and the bushing house.

## Product Sensor Is Blocked



This alarm appears when the product sensor is blocked for an extended period of time.

Possible causes:

- an item of some kind is blocking the sensor.
- debris has accumulated on or around one or both parts of the sensor. Clean the sensor.
- the two sensor parts may be misaligned, sideways or up or down, so they do not "see" each other. Adjust the sensor.
- the sensor may be out of order.  
Check the light indicator underneath the sensor. The indicator is illuminated if the sensor is in order.

## Air Pressure Is Too Low



This alarm appears when the air pressure on the grader has fallen below the lowest acceptable limit.

- Is there any air pressure at all on the grader?  
The pressure gauge in the electrical cabinet should show 5.5 bar.
- Is there water in the filter regulator?  
Too much water in the water trap can cause a decreased air pressure.
- Is the air supply hose connected and is there pressure on the hose?  
If so, open the electrical cabinet and verify that the pressure gauge shows 5.5 bar. Since there is pressure on the system, this indicates a problem with electrical system. Contact your Marel agent.  
If the gauge shows 0 bar, either the filter regulator in the water trap is blocked or there is no air on the pneumatic system.

# Cleaning

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## Cleaning in General

The following sections contain general instructions for good cleaning practices which Marel considers appropriate for Marel equipment. The instructions are not a proposal for a complete cleaning plan for the user. The best available practices should be used at all times.

We recommend that you request an introduction to recommended cleaning agents and their use, from a qualified distributor of cleaning solutions. Selecting a sanitizer depends on the type of equipment to be sanitized, the hardness of the water, the application equipment available, the effectiveness of the sanitizer under site conditions, and cost.

Only approved sanitizers should be used in food processing plants. Lists of approved sanitizers are published by the authorities in most countries; see for example the Code of Federal Regulations in USA.

Request technical advice from a reputable sanitizer manufacturer, if you have questions on which sanitizer to use, as well as questions on the appropriate solution strength.

- It is very important that the C-Weigher is thoroughly cleaned every day after operation.
- In general, do not use excessively strong solutions of detergent. Chlorine disintegrates belts and strong base solutions (pH>13) corrode aluminum parts, air cylinders for example. The use of chlorine may cause rust spots to appear on the stainless steel.
- High-pressure water jets can easily damage sensitive mechanisms in the equipment. Therefore, do not use high-pressure water jets on the M3000 Controller display, product sensor and load cell, the electrical cabinets, or motor. Instead, use low water pressure (tap water), or clean these parts by hand and pour water over to rinse.

## Materials Used in Marel Equipment

The materials listed here are common in Marel equipment. Use the list to determine the chemical tolerance of individual parts of the equipment.

### NOTE

Specific recommendations on types and strength of solutions used for cleaning or sanitization should, at all times, come from a qualified distributor of cleaning solutions.

**Table 5 List of Materials**

Material	Used in	Resistance to detergents
<b>Metals:</b>		
Stainless steel	Frames, various parts	High (in normal conditions, for example temperatures between -20 to +30°C/-4 to 86°F )
Aluminum	Load cell brackets and spacers, load cells, pneumatic cylinder ends	Low, to strong base solutions
<b>Plastics:</b>		
Polyethylene (PE)	Guides	High
Polycarbonate (PC)	Displays and keyboards	Limited, to strong base solutions
Polypropylene (PP)	Modular conveyor belts	High
Acetyl (POM)	Modular conveyor belts	High, may develop precipitations caused by chlorine
Polyvinylchloride (PVC)	Endless belts of layered PVC and PUR canvas	Low, especially to minimally diluted solutions
Polyurethane (PUR)		



## Water and Temperature

- Water can contain a significant number of microorganisms. Therefore, inspection of water used for cleaning should be part of a HACCP plan. All impurities in water can influence the effectiveness of a detergent or sanitizer.
- Water hardness is the most important chemical property which directly effects cleaning and sanitizing efficiency. The pH value for normal water ranges from pH 5 to pH 8.5.
- Soils soluble in water are sugars, some starches and most salts.
- Always use clean water for rinsing and cleaning. Never rinse or clean with seawater.
- Rinse with cold water, except when working with fat products. In that case use 40-55°C (104-131°F) hot water to dissolve the fat. Some fats have a melting point below the recommended 40-55°C, so you should adjust the water temperature accordingly.
- Be careful when using hot water. Some proteins denature in high temperatures and may become difficult to remove.
- Avoid temperatures above 55°C (131°F) because of the corrosive nature of most chemical sanitizers.

## Detergents

The pH value of detergents used on Marel equipment should preferably be pH 12-13.

Strong base solutions are the main ingredients in most cleaning agents, for example potassiumhydroxid (KOH) or caustic soda (NaOH). Because of its corrosive effects, caustic soda is not a desirable detergent for Marel equipment.

If possible, use detergent solutions with KOH instead.

- Always use detergents according to the detergent manufacturer's instructions.
- **Do not** use a detergent containing sodium hypochlorite for daily cleaning. Sodium hypochlorite is a common ingredient in detergents, but as it contains chlorine it should be used with great care because of chlorine's corrosive effect on stainless steel.

## Daily Cleaning

Cleaning is the complete removal of food soils using appropriate detergent chemicals according to instructions. It is important that cleaning personnel have an understanding of the nature of the different types of food soils and the chemistry of their removal.

- Use high alkaline foaming detergent, 1% solution, pH 12-13, for regular daily cleaning. Avoid using a detergent containing a high amount of sodium hypochlorite for daily cleaning. The foaming detergent must be selected carefully and should contain some corrosion inhibitors and preferably potassium hydroxide (KOH) instead of sodium hydroxide (NaOH).
- Spray the detergent on all surface areas and leave it, to work for a time specified by the cleaning agent's manufacturer. Then rinse the detergent off with clean, cold water.
- To kill any remaining bacteria, you must finish the daily cleaning procedure by spraying the surface with an approved chemical sanitizer.

### NOTE

Quaternary ammonium compounds (QACs) are widely used in the food processing industry. Keep in mind, however, that while these are effective against most bacteria,

they act slowly against some common spoilage bacteria. Many common bacteria may also develop tolerance against QACs, which should therefore not be used for an extended period of time unless they are rotated with compounds of a different type.

- QACs may leave an undesirable film on the surface of the equipment and, as they should not come in contact with food, they should always be rinsed off (before processing is resumed) with cold and, most importantly, clean water.

## Sanitization

When choosing a sanitizing agent, please note that chlorine corrodes the stainless steel and disintegrates PVC and PUR belts, especially at higher temperatures. Chlorine is, however, an effective sanitizer, so occasional use of chlorine may be necessary to control the growth of microorganisms.

Marel recommends the following sanitization procedure:

- Spray the sanitizer on surfaces and leave to work according to manufacturer's instructions. Make sure you spray into all corners and hard-to-reach areas.
- After sanitizing, always rinse the equipment carefully with cold and clean water before resuming processing.
- Use chlorine or a comparable sanitizer on the equipment once a week after performing the regular cleaning procedure with a high alkaline foaming detergent.
- **Make sure the strength of chlorine, if used, does not exceed 200 ppm.**
- On days when chlorine or a comparable sanitizer is not used, use other sanitizers recommended for food processing instead.

### NOTE

Rotating different sanitizers (for example chlorine, peracid or acid-anionic) in your sanitization program may ensure more effective sanitization.

As chlorine evaporates very quickly, its sanitizing effect will fade soon after it is sprayed on the equipment. Letting chlorine stay on the equipment will not improve the sanitizing effect, but only damage the equipment. Quaternary ammonium compounds are considerably more stable than chlorine and are active for a much longer time. Therefore, the benefit of leaving QACs on the equipment for an extended period of time is much greater.

## Training Staff

It is important that new cleaning personnel receive the proper training and are made aware of the proper cleaning procedures for this machine. Demonstrate the cleaning procedures for new personnel using the instructions in the following sections. Make sure the cleaning personnel is familiar with safety rules concerning the use of cleaning agents.

# Cleaning Procedures

It is very important that the Compact Grader is thoroughly cleaned every day of operation.

This is especially important when the grader is used in an environment where, for example, salting is performed. Grainy substances such as salt etc. can have great impact on the durability of sensitive parts such as the load cell.

Before you start cleaning the grader, follow the instructions below to ensure maximum safety and effectiveness during the cleaning.

Cleaning the Compact Grader is a procedure in 5 steps:

- rinsing
- foaming
- washing
- disinfecting
- final inspection

This order is kept in the following instructions with details on specific parts of the grader.

## Rinsing

- Rinse debris off the Compact Grader using water jets or a brush. Rinse thoroughly from the top down with clean water.
- Avoid high water pressure in order not to spread the debris all over the grader.
- Do not use water temperatures over 40°C to avoid precipitation of proteins.

## Foaming

1. Keep the conveyor belt running and spray the grader with detergent foam or other appropriate type of detergent. Make sure the foam reaches all corners and hard-to-reach areas.
2. Let the detergent work as specified by the manufacturer.

## Washing

1. Keep the conveyor belt running while you rinse off dirt dissolved by the foaming, working from the top down using water jets.
2. Use a brush on solid dirt and not easily accessible surfaces.
3. Clean the electrical and air cabinet as described on page 50 (once a month).
4. After drying the grader, spray with a quarternary ammonium solution to kill any remaining bacteria. Use a 300 ppm active ingredient.
5. Finish off the washing process by rinsing the quarternary ammonium solution off surfaces in contact with the raw material, before you resume processing the next morning or after breaks. Use clean water. This also helps prevent corrosion of the stainless steel by aggressive detergents.

The Compact Grader is now ready for operation.

**NOTE**

Do not allow dirt to build up underneath the weighing platform, between platform and electrical cabinet. This could affect the grader's weighing accuracy.

Do not allow dirt to build up on or around the product sensor. Both transmitter and receiver and the entire area between them must be kept clean at all times, or else the light beam may be interrupted.

## Disinfecting

- All surfaces in contact with the product should be disinfected every day of operation.
- Make sure the surface is as dry as possible before disinfecting, because water remaining from the washing process will dilute the disinfecting agent.
- Disinfect with chlorine once a week. At other times, use disinfection agents containing quarternary ammonium compounds.
- After disinfecting, rinse the grader thoroughly with clean water.

## Cleaning the Intralox Belt

1. Wash the belt thoroughly every day of operation.
2. Remove the Intralox belt from the Compact Grader at least once a week and soak in a detergent bath.<sup>4</sup>  
For details on how to remove the belt, see the Intralox brochure delivered with the grader.

## Cleaning the Electrical Cabinet

Open the electrical cabinet once a month and check for dirt or debris.

- Unplug the electrical cord.
- Carefully wipe off the dirt with special attention to possible dirt accumulation in door grooves and on the bottom of the cabinet.
- Disinfect places where dirt has accumulated by wiping with a disinfecting cloth.
- Secure the cabinet doors.
- Plug the electrical cord in the power outlet again to maintain constant power and prevent condensation of moisture in the grader.

### WARNING

Do not use water for cleaning the electrical cabinet.

The electrical components in the electrical cabinet must **never** become wet. If they do, you must make sure they are completely dry before the Compact Grader is powered on again.

## Cleaning the M2200 Controller

Rinse the controller thoroughly every day of operation.

Do not use high-pressure jets on the controller or the weighing platform. Instead, use low water pressure, or clean by hand and pour water over to rinse.

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<sup>4</sup> The Intralox belt is heat resistant up to 100° C.

**WARNING:**

Before you start cleaning the controller, press the emergency stop button to prevent an accidental start of the conveyor.

## Final Cleaning Inspection

After cleaning, quality control personnel should evaluate the result of the cleaning process:

- By stroke of hands make sure that places where visual control is difficult are clean.
- Regularly measure cleaning results by counting the microorganisms, e.g. using RODAC cups or ATP measurements.
- After cleaning and disinfecting, make sure that all surfaces dry quickly.

# Cleaning Schedule

**Table 6 Cleaning schedule**

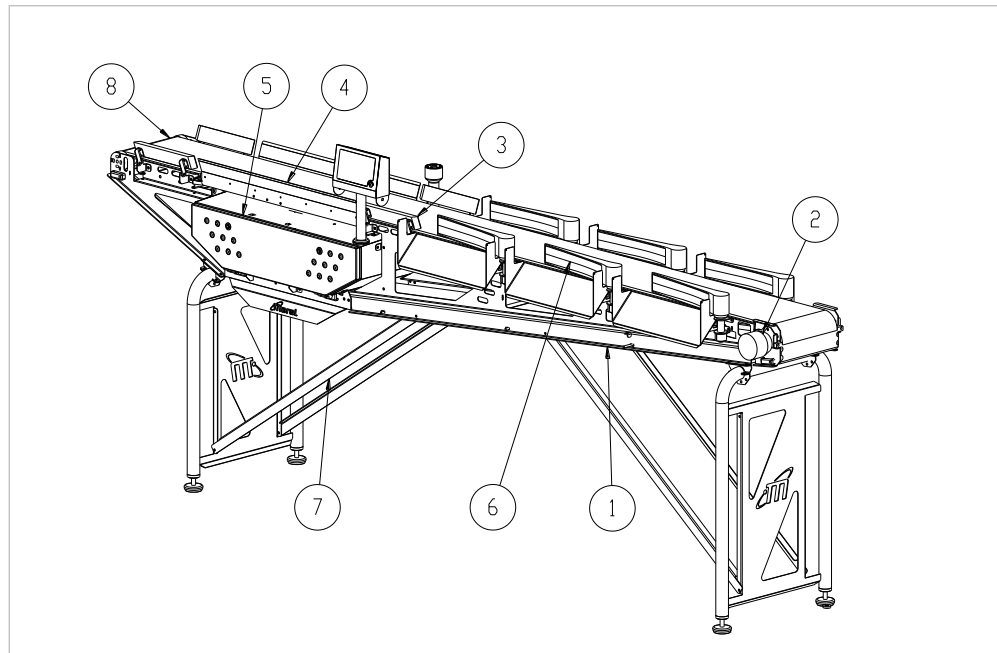
Frequency	Action	Description	Comments
Daily	<b>Rinsing</b>	<ul style="list-style-type: none"> <li>Rinse off loose soils using water jets or brushes. Do not use high water pressure.</li> </ul>	After rinsing, the machine should be free of loose soils.
Daily	<b>Foaming</b>	<ul style="list-style-type: none"> <li>Foam the machine and make sure the foam reaches into all corners and hard-to-reach places.</li> <li>Let the foam work on the machine as specified by the foam manufacturer.</li> </ul>	
Daily	<b>Washing</b>	<ul style="list-style-type: none"> <li>Use a brush to scrub difficult places and wash with a water jet.</li> <li>Wash the conveyor.</li> </ul>	
Daily	<b>Sanitizing</b>	<ul style="list-style-type: none"> <li>Make sure the surface is as dry as possible before sanitizing.</li> <li>Sanitize all parts of the machine after cleaning with approved sanitizers.</li> <li>Pay special attention to surfaces in direct contact with the raw material or products.</li> <li>Rinse the machine with clean, cold water before resuming processing.</li> </ul>	
Daily	<b>Final inspection</b>	<ul style="list-style-type: none"> <li>After cleaning quality control personnel should check and evaluate cleaning results.</li> </ul>	Count micro-organisms regularly.
Weekly	<b>Extra cleaning 1</b>	<ul style="list-style-type: none"> <li>Sanitize with chlorine or a comparable sanitizing agent once a week.</li> <li>If chlorine is used, do not leave it on the machine for long (max. 30 minutes).</li> <li>On the day when chlorine is used, you can leave out sanitizing with other agents.</li> </ul>	
Monthly	<b>Extra cleaning 2</b>	<p><b>NOTE</b> This action is performed by a certified electrician.</p> <ul style="list-style-type: none"> <li>Open the electrical cabinets and check for soils.</li> <li>Wipe off the soils and sanitize.</li> </ul>	Electrical hazard. Turn off the Mains switch.

# Appendix A – Parts List

## Mechanical Parts

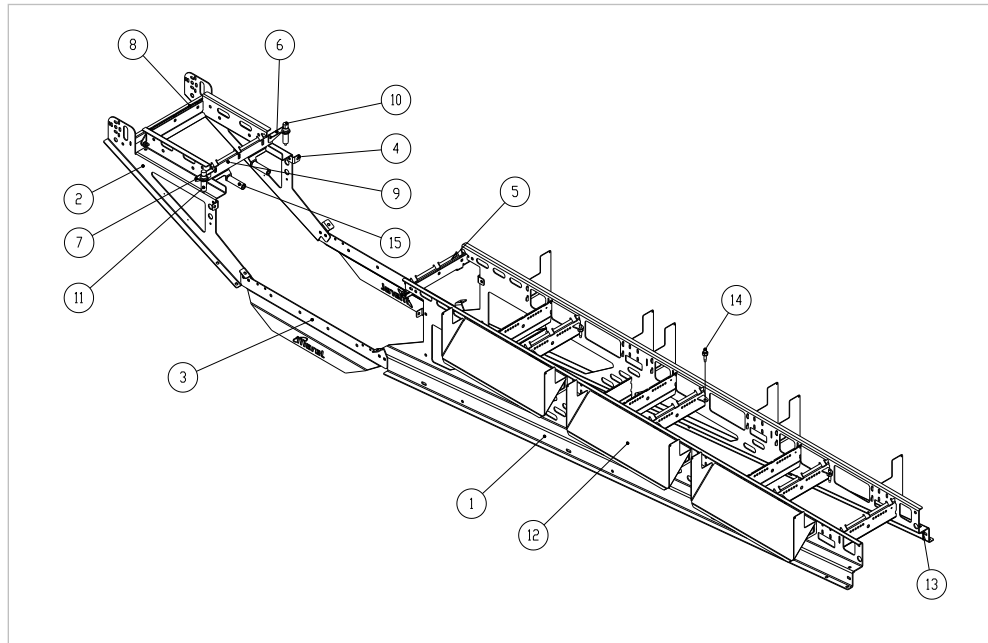
### NOTE

Before contacting our service personnel or placing an order for spare parts, please note the reference number on the rating plate located beside the electrical cabinet.



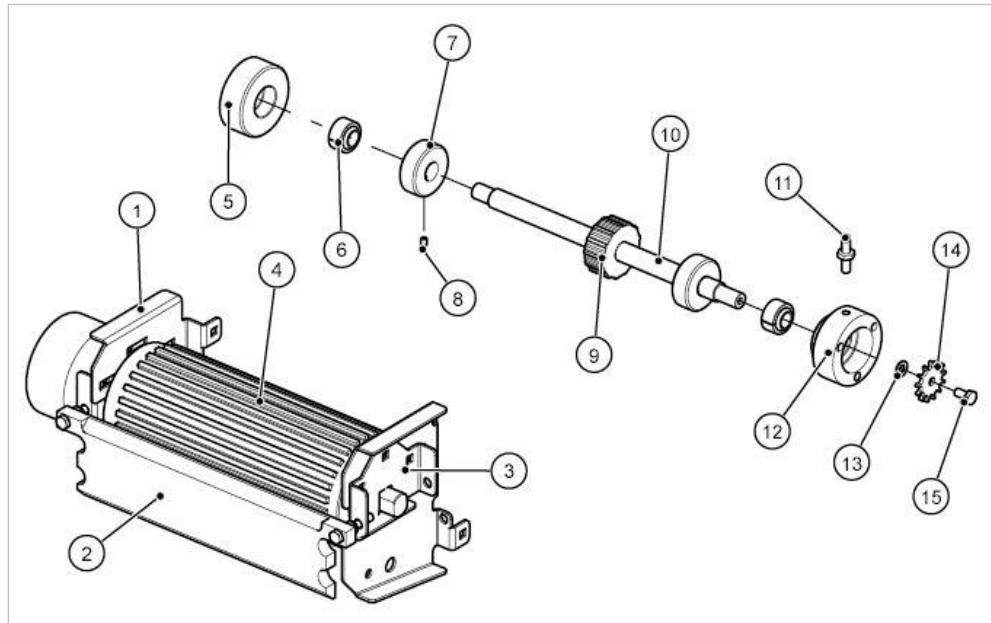
**Figure 37 Compact Grader, item overview**

Item:	Figure number:	Description:
1	38	Frame
2	39	Drive unit
3	40	Belt guide and tensioning unit
4	41	Weighing device
5	42	Electrical / air cabinet
6	43	Gate arms (right and left)
7	44	Main support legs
8	45	Belt

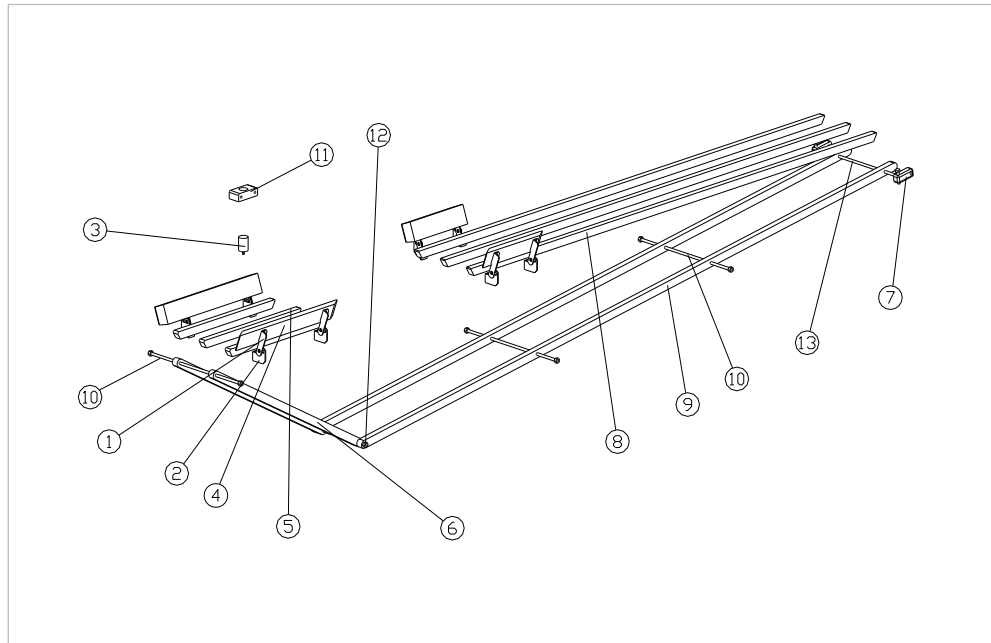
**Figure 38 Frame**

Item:	Stock number:	Qty:	Description:
1	004-0056-2150 004-0056-A002	1 1	Frame for CG60, front Frame for CG62, front
2	004-0056-2146 004-0056-A003	1 1	Frame for CG60, rear Frame for CG62, rear
3	004-0056-2004	2	Frame support
4	004-0056-2012	4	Mounting bracket
5	004-0056-2094	1	Adjustment beam (scale)
6	004-0056-2149	1	Sensor bracket (L)
7	004-0056-2239	1	Sensor bracket (R)
8	004-0056-2095	1	Adjustment beam (infeed)
9	004-0056-2148	1	Adjustment beam (scale)
10	717-3407-0048	1	Product sensor (sender)
11	717-3407-0049	1	Product sensor (receiver)
12	004-0056-2063 004-0056-A004	6 6	Chute for CG60 Chute for CG62
13	004-0056-2101	2	Adjustment bracket
14	004-0040-2282	6	Cylinder bolt
15	004-0056-2242	2	Spacer $\varnothing 20$ / $\varnothing 8.5$ / L72

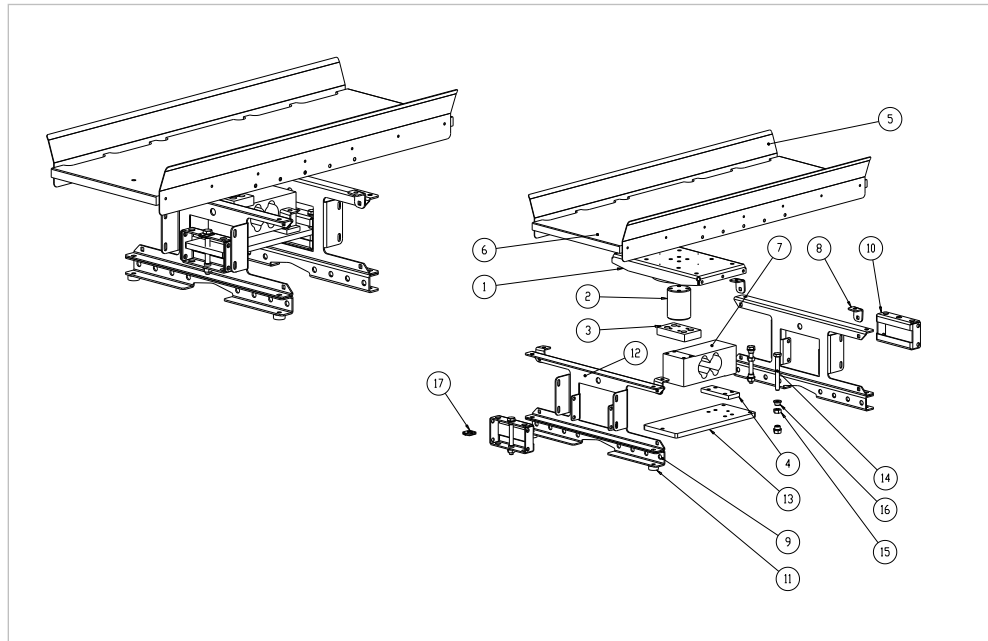


**Figure 39 Drive unit**

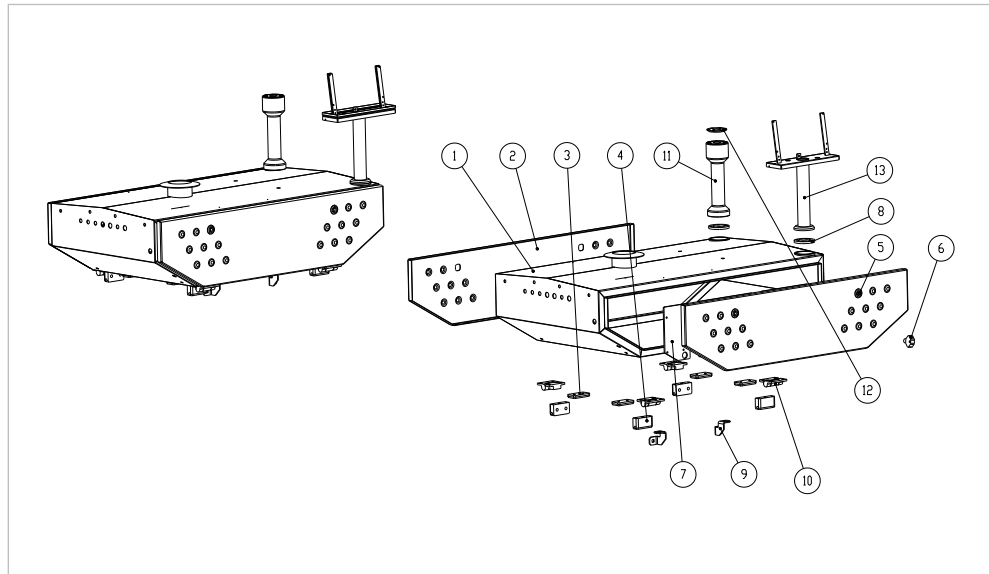
Item:	Stock number:	Qty:	Description:
1	004-0056-2186	1	Motor bracket
2	004-0056-2104	1	Motor end plate
3	004-0056-2187	2	Adjustment bracket
4	727-2111-1011886	1	Motor
5	004-0056-2299	1	Bearing house
6	732-1487-1029167	2	Bearing
7	004-0056-2017	2	Support wheel
8	740-0916-1002624	3	Socket set screw M6 x 8
9	004-0056-2016	1	Sprocket
10	004-0056-2298	1	Axle
11	717-3407-1013538	1	Sensor
12	004-0056-2300	1	Bearing house
13	740-0125-1000839	1	Flat washer M8
14	004-0056-2018	1	Tacho star
15	740-0933-1003060	1	Hexagon head bolt M8 x 16

**Figure 40 Belt guide and tensioning unit**

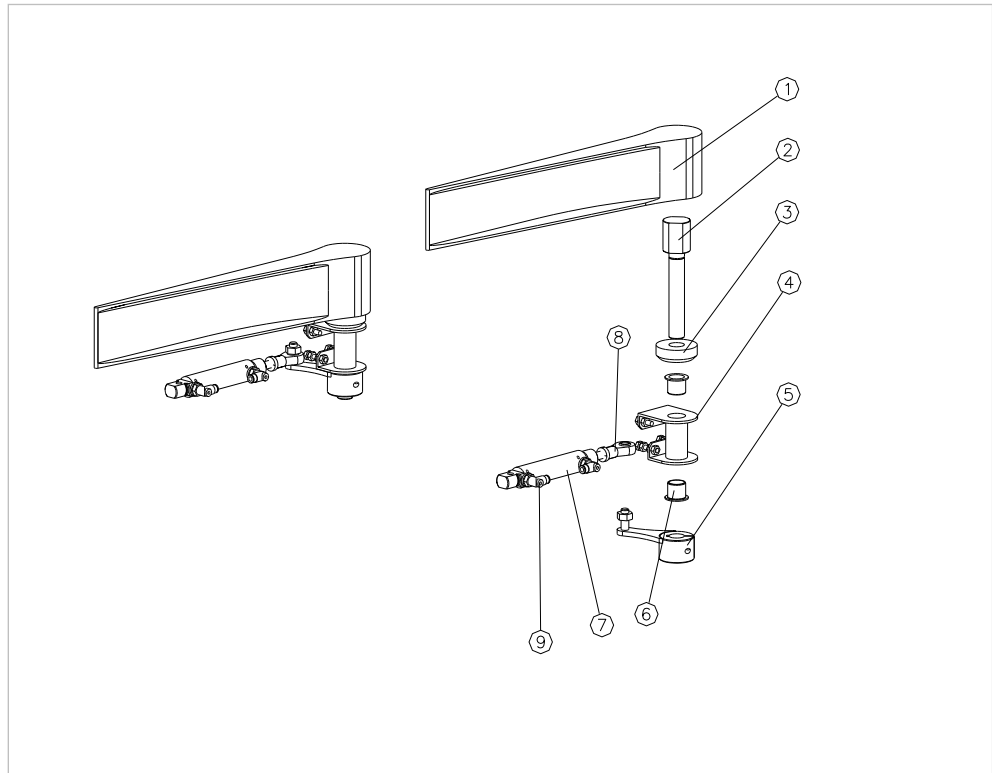
Item:	Stock number:	Qty:	Description:
1	004-0056-2188	4 pairs	Side guide (upper)
2	004-0056-2026	4 pairs	Side guide (lower)
3	717-3407-0008	1	Belt sensor
4	004-0056-2159	2 pairs	Side guide L325
5	004-0056-2158 004-0056-2226	3 3	Back carryway for CG60 Back carryway for CG62
6	004-0056-2105 004-0056-2222	2 2	Back slider support for CG60 Back slider support for CG62
7	004-0056-2102	4	Slider adjuster
8	004-0056-2160 004-0056-2224	3 3	Front carryway for CG60 Front carryway for CG62
9	004-0056-2106 004-0056-2221	2 2	Front slider support for CG60 Front slider support for CG62
10	004-0056-2133	3	Slider rod L390
11	004-0056-2024	1	Sensor bracket
12	004-0056-2031	1	Slider rod L195
13	004-0056-2107	1	Slider rod L345

**Figure 41 Weighing device, load cells**

Item:	Stock number:	Qty:	Description:
1	004-0056-2155	1	Fastening bracket for weighing platform
2	004-0056-2086	1	Platform spacer
3	004-0056-2051	1	Mounting plate
4	007-0003-2291	1	Load cell spacer
5	004-0056-2154 004-0056-2219	2 2	Side guide for CG60 Side guide for CG62
6	004-0056-2193 004-0056-2220	1 1	Weighing platform L600 for CG60 Weighing platform L900 for CG62
7	720-5300-1250k0100	1	Load cell 100 kg, mod. 1250, IP67
8	004-0056-2142	4	Fastening bracket
9	004-0056-2200	2	Weighing beam support
10	004-0056-2190	2	Support bar
11	004-0010-2319	4	Spacer $\varnothing 25 / \varnothing 9 \text{ l}=10$ (aisi 304)
12	004-0056-2189	2	Weighing beam
13	004-0056-2192	1	Load cell plate
14	740-0933-10090	3	Bolt M10 x 90 DIN 933 A4-70
15	740-0934-10	5	Nut M10 DIN 934 A4-70
16	732-0099-1014200210	6	Plastic bearing
17	007-0009-3302	1	Conductor plate

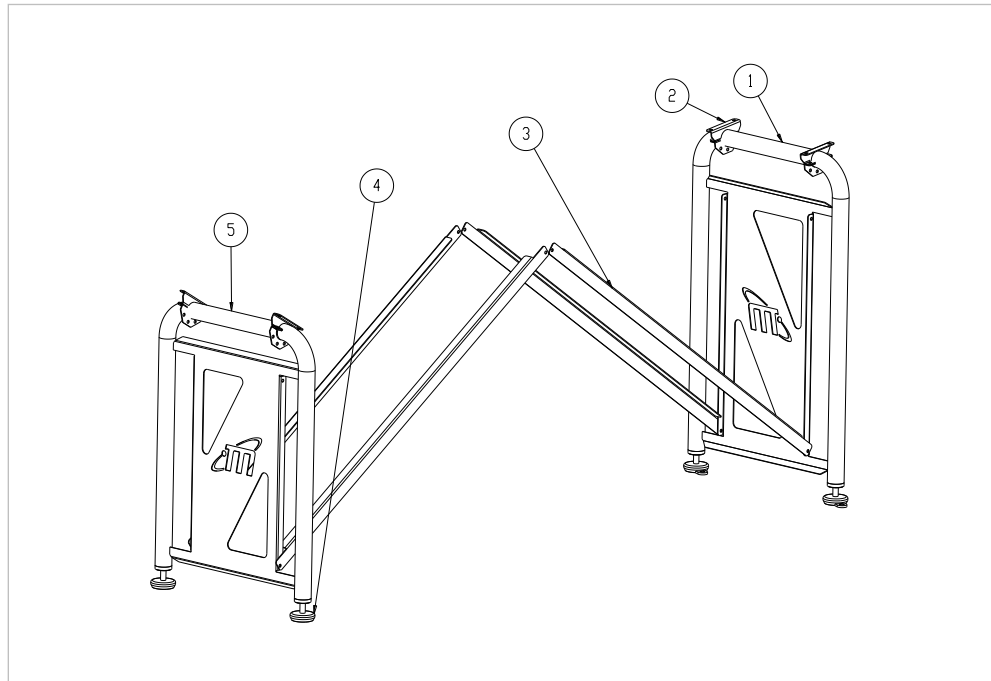
**Figure 42 Electrical / air cabinet**

Item:	Stock number:	Qty:	Description:
1	004-0056-2202	1	Cabinet
2	004-0056-2205	2	Cabinet door
3	004-0056-2033	4	Belt guide
4	004-0056-2034	4	Ventilator
5	743-5700-0020	4	HAWE lock
6	743-5700-0024	1	Key sq.8 Poly for HAWE locks
7	004-0056-2199	1	Electrical component plate
8	004-0008-2475	2	Flange ø38
9	004-0056-2089	4	Fastening bracket
10	743-5700-0009	4	Hinge
11	004-0056-2172	1	Stand for emergency stop
12	004-0056-2203	1	Plate for emergency stop
13	004-0056-2083	1	M2200 stand

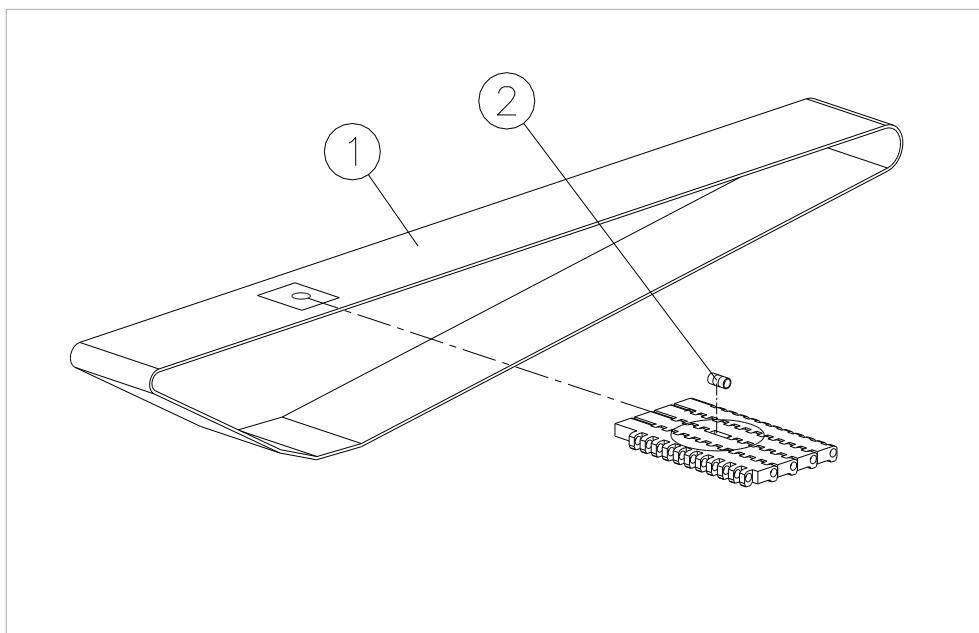


**Figure 43 Gate arms (right and left)**

Item:	Stock number:	Qty:	Description:
1	004-0056-2161	6	Gate arm, H80
2	004-0011-2256	6	Arm axle
3	004-0056-2110	6	Arm spacer
4	004-0056-2112	6	Bushing house
5.1	004-0056-2059	3	Cylinder arm (left)
5.2	004-0056-2060	3	Cylinder arm (right)
6	732-1494- xfm202321	12	Bushing XFM-2023-21
7	751-6432-8026050	6	Air cylinder ø25 x 50.
8	751-8139-802532	6	Piston rod eye
9.1	750-2400-k000018	12	Adjustment screw G/C 118 1/8"
9.2	753-6610-0618	12	Banjo body Ø6 - 1/8"

**Figure 44 Main support legs**

Item:	Stock number:	Qty:	Description:
1	004-0056-2197	1	U-leg L975
2	004-0056-2067	4	Leg fastening bracket ø50
3	004-0056-2194	4	Cross bar L1370
4	744-0ngi- m7616180	4	Leveling pad M75 M16 x 180
5	004-0056-2198	1	U-leg L800

**Figure 45 Belt**

Item:	Stock number:	Qty:	Description:
1	004-0056-1026	1	Belt for CG60
	004-0056-10260002	1	Belt for CG62
2	004-0056-2001	3	Belt index

# Electrical Parts and Diagrams

## Control Unit

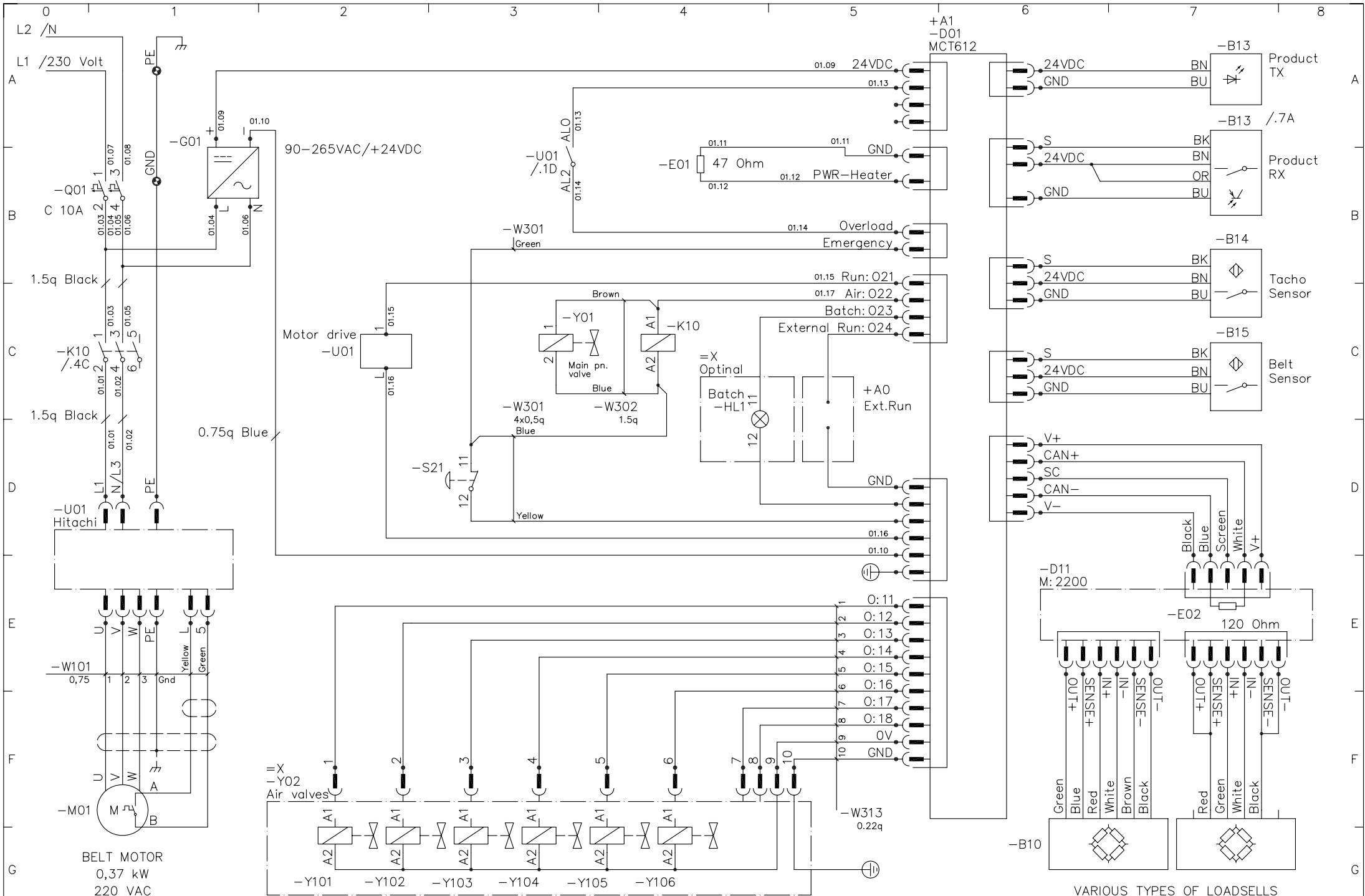
Stock number	Qty.	Description	Comp. designation
406-1can-c00000000	1	M2200 Controller	D11

## Electrical Cabinet

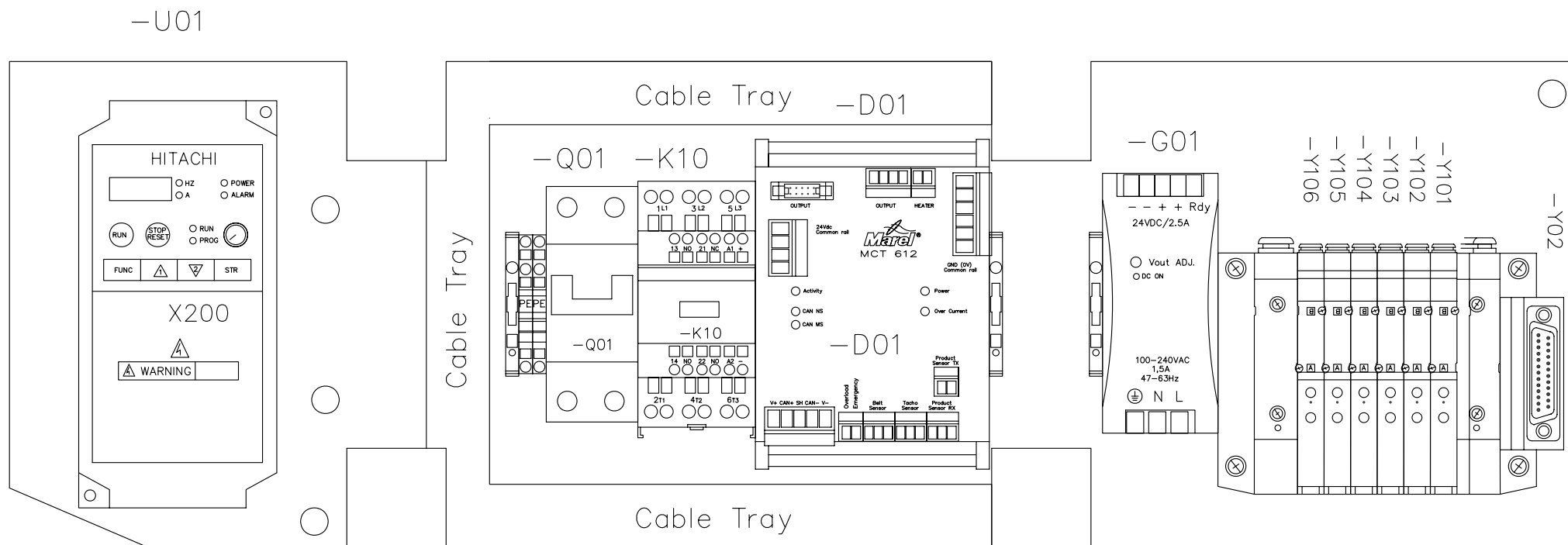
Stock number	Qty.	Description	Comp. designation
elm-ecan-mct612	1	MCT612 control module	D01
elm-enet-tbe4	1	Ethernet connection module (optional)	D12
711-2000-1470125	1	Heater resistor, 47 Ohm, 0.25W	E01
711-2000-21205	1	Resistor, 120 Ohm, 0.25W	E02
719-3600-dra6024	1	Power supply 24V DC, 2,5A	G01
717-3406-1lc1d093bl	1	Contactor 9A	K10
717-4402-102107	1	Circuit-breaker 2 pol.	Q01
725-6130-1452003	1	AC motor drive	U01
752-9000-3062232	1	Regulator unit	Y01
753-1546-0018	1	Silencer 1/8", metal	
508-0002-059	1	Cable, L=560 mm w/10 p conn.	W313
750-sv10-16phd206bc6	1	Island for air valves	Y02
750-sv10-11005fu	6	5/2 air valve	Y02
717-3405-1m22-pv	1	Emergency stop button, panel mount	
717-3404-1m22s-ck01	1	Button contact, NC	
717-3404-1m22-a	1	Button fixing adapter	



[illegible]



# ELECTRICAL CABINET +A1 CABINET LAYOUT



# Compact Grader.

## Inverter Parameters/Rating Plate:

Only parameters which differ from default values are listed  
To set inverter to default setting see manual.

### Inverter Parameters

		Inverter	—U01
Code	Variable Parameters	In Cabinet	+A1
A061	Frequency high limit setting		47.0
A062	Frequency low limit setting		32.0
C005	Thermistor thermal protection		19
F002	Acceleration time setting		10.0
F003	Deceleration time setting		10.0
F004	Keypat run key routing		00
Code	Monitoring Parameters		
D001	Output frequency monitor		
D002	Output current monitor		
D003	Rotation direction		

### Rating Plate

Rating Plate:	
Type / Cat No:	+A1
Year:	20xx
Serial No:	See Axapta
Reference No:	See Axapta
El.Diagram No:	306—2232—0101—05
Belt Type	See Axapta
Belt Size	See Axapta
Electrical Ratings:	1x230 VAC+PE 2.5 Amp./50—60Hz
Interrupting Capacity of main switch:	N.A. N.A.
Largest Motor FLA:	2.0 Amp.
Short Circuit Rating:	5kA RMS SYM 600VAC
Made In	Iceland



Marel  
Austurhraun 9  
210 Gardabaer  
Iceland  
Tel.: +354 563 8000  
Fax.: +354 563 8001  
www.marel.com

306—2232—0101  
306—2232—0101—05

Designed: ARI Drawn: ARI

Compact Grader  
Rating Plate/Inverter par.

Approved:

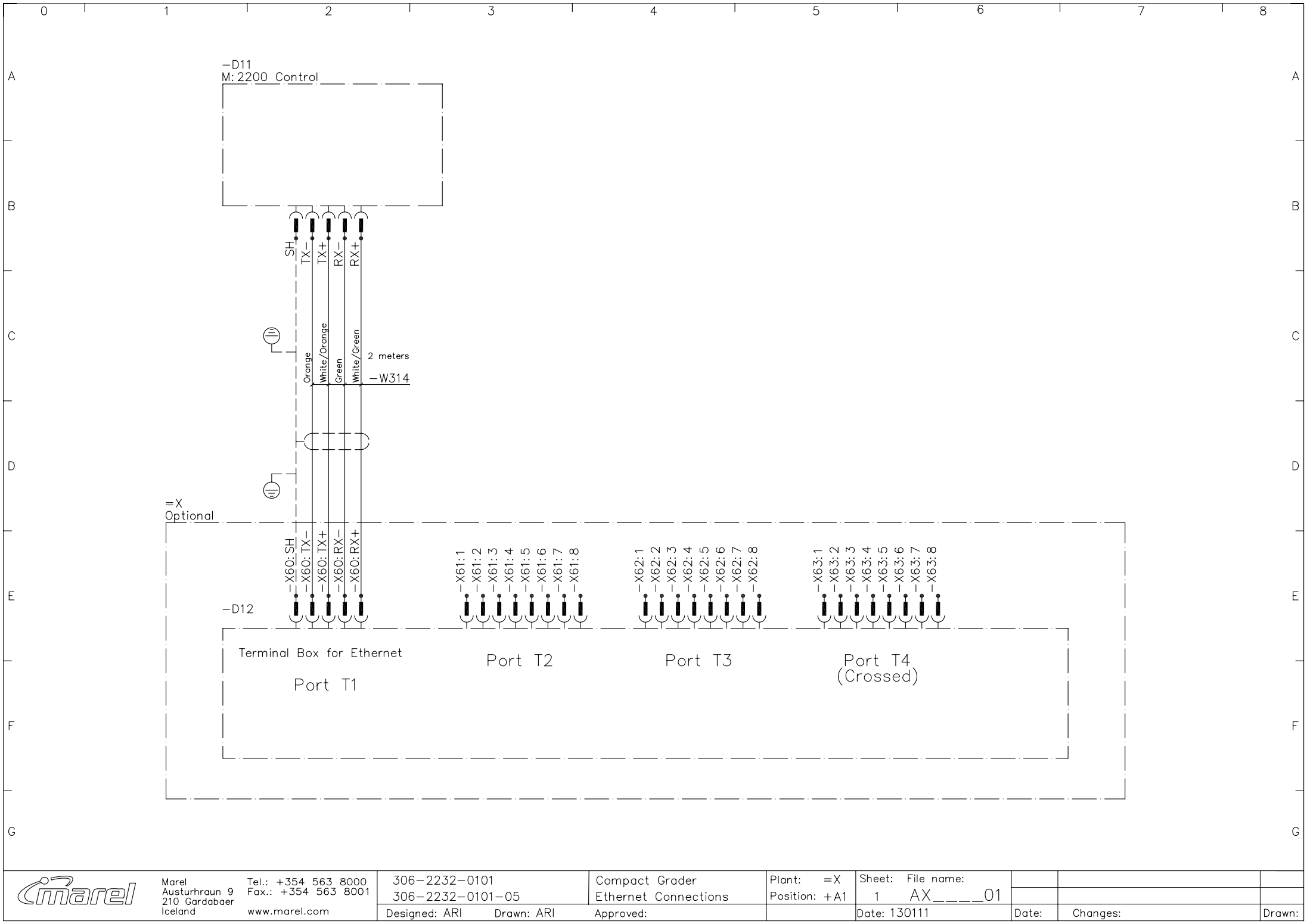
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Position: +A1

Sheet: File name:  
2 AL\_\_\_\_\_02

Date: 130111

Date: Changes:

Drawn:







Pos	Des.	Description	Electrical data	Manufacturer	Type descr.	Marel order nr.	Ref.	Index	Comment
1		E-stop button, panel mount		Moeller	M22-PV	717-3405-1m22-pv	/1.3D	SN005	
2		Button contact, front fix, NC		Moeller	1M22-CK01	717-3404-1m22s-ck01	/1.3D	SS012	
3		Button fixing adapter		Moeller	1M22-A	717-3404-1m22-a	/1.3D	SS020	
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	Marel Austurhraun 9 210 Gardabaer Iceland	Tel.: +354 563 8000 Fax.: +354 563 8001 www.marel.com	306-2232-0101	Compact Grader COMPONENT LIST	Plant: =X Position: +A1	Sheet: 1 File name: TP____01			
			306-2232-0101-05						
			Designed: ARI	Drawn: ARI	Approved:		Date: 130111	Date:	Changes:



Pos	Des.	Description	Electrical data	Manufacturer	Type descr.	Marel order nr.	Ref.	Index	Comment
35	-D01	MCT612 control module	MCT612	Marel	MCT 612	elm-ecan-mct612	/1.5A	DX025	
36		4 Pin Phönix female mini		Phönix	30-20401	715-3002-1005	/1.6C	XZ008	
37		4 Pin Phönix female		Phönix	30-204	715-3002-1004	/1.6A	XZ010	
38		5 Pin Phönix female		Phönix	30-205	715-3002-1007	/1.6D	XZ011	
39	-D11	M2200 - CAN-Compact	M2200	Marel	M2200	406-1can-c00000000	/1.6E	DP019	
40	-D12	TBE4-A, Ethernet conn. module	TBE4-A	Marel	TBE4-A	elm-enet-tbe4	/1.1E	DZ004	TBE4-A
41	-E01	Heater resistor	47 Ohm	Vishay	RH-25	711-2000-1470125	/1.4B	EH003	
42	-E02	Resistor,120 Ohm, 0.25W	120 Ohm, 0,25W			711-2000-21205	/1.7E	RZ001	
43	-E10	3 Pin Phönix female mini		Phönix	30-20301	715-3002-1003	/1.6C	XZ007	
44	-E3	6 Pin Phönix female		Phönix	30-206	715-3002-1010	/1.6D	XZ012	
45	-E4	4 Pin Phönix female mini		Phönix	30-20401	715-3002-1005	/1.7E	XZ008	
46	-E5	2 Pin Phönix female mini		Phönix	30-20201	715-3002-1001	/1.6B	XZ009	
47	-E6	2 Pin Phönix female mini		Phönix	30-20201	715-3002-1001	/1.6A	XZ009	
48	-E7	2 Pin Phönix female mini		Phönix	30-20201	715-3002-1001	/1.6B	XZ009	
49	-E8	4 Pin Phönix female mini		Phönix	30-20401	715-3002-1005	/1.6A	XZ008	
50	-E9	3 Pin Phönix female mini		Phönix	30-20301	715-3002-1003	/1.6B	XZ007	
51	-G01	Power supply 24VDC, 2,5A	24VDC/2.5A	Chinfa	DRA60-24	719-3600-DRA6024	/1.1A	GS006	
52	-K10	Contactora 9A	9A AC-3	Telemecanique	LC1D093BL	717-3406-1lc1d093bl	/1.4C	KR101	
53	-Q01	Circuit-breaker 2pol.	C 10A	Siemens	5SX2-210-7	717-4402-102107	/1.1B	FA03257	
54	-U01	AC Inverter Hitachi 0.40kw	0,40 kW 1x200-240 VAC	Hitachi	X-200-004SFEF	725-6130-1452003	/1.1D	UF022	Motor Drive
55	-Y01	Complete FRL unit SV2000	24VDC	SMC		752-9000-3062232	/1.3C	YZ014	
56		Silencer 1/8" metal		Norgren	T40C1800	753-1546-0018	/1.3C	YZ015	
57	-Y02	6 X Valve Island assembly		SMC	SMC-SV1100	750-sv10-00100610	/1.2F	YM035	
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## Appendix B – Forms

## Forms for Grader Settings and Unfinished Batches

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☐		□		▲

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2

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3

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6

2				
kg/lb				

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	☐		☐		▲	

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6



# Glossary of Terms

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**Adjustment bolt**

Used for various adjustments on the grader.

**Belt index**

Pieces of steel inserted in the belt.

**Belt sensor**

A sensor under the infeed-plate on a belt weigher. The sensor detects the belt index, thus counting every round of the belt.

**Emergency stop button**

When activated, the button immediately stops the Compact Grader. Located on the top of the electrical cabinet, one on each side.

**Flow**

Conversion formula:  $[cf / \text{min}] \approx \frac{1}{28.3} \times [l / \text{min}]$

**Infeed conveyor / tray**

Supplies the Compact Grader with raw material.

**Intralox-type belt**

The type of belt used on the Compact Grader. Consists of plastic links, interlaced with plastic rods.

**l/min**

Capacity measure — liters per minute.

**Length**

Conversion formula:  $[in] = \frac{1}{25.4} \times [mm]$

**Motor**

A motor that drives the belt.

**Pressure**

Conversion formula:  $[psi] \approx 14.5 \times [bar]$

**Product sensor**

On the Compact Grader. A light transmitter and receiver. Detects when objects enter the weighing-plate.

**psi**

Pounds per square inch.

**Speed**

Conversion formula:  $[ft/sec] \approx \frac{1}{3.28} \times [m/sec]$

**Tacho sensor**

On the Compact Grader. Registers the motion of the belt.

**Weighing-plate**

Part of the Compact Grader where the weight is registered.

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