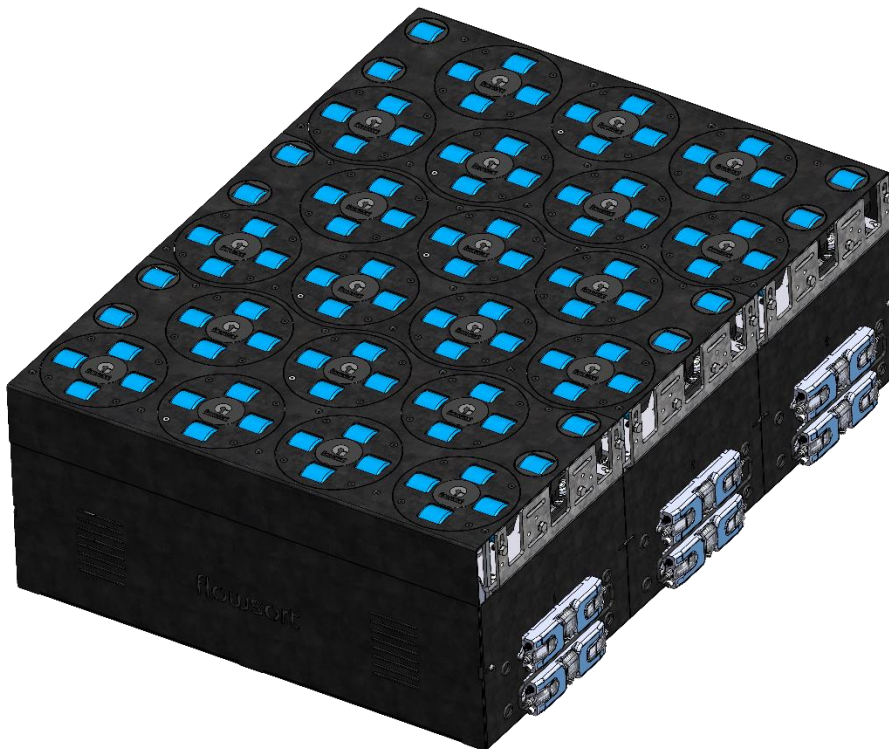


# Instruction Manual

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Installation and Operating Instructions

## ZZ - ZigZag Sorter 24V



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## SAFETY PRECAUTIONS

### 1.1 GENERAL WARNING



**Warning:** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

Do not use the product in an explosive atmosphere, flammable gas atmosphere, corrosive atmosphere, a place exposed to water splashes, or a place close to combustibles. It may cause an electric shock, injury and/or fire.

All work (e.g., installation, connection, operation, maintenance and failure diagnostics) must be done by a qualified and well trained person. Failure to do so may cause a fire, electric shock and/or injury.

Machine movements are very dangerous. Do not conduct operations as moving, installation, connection and maintenance while the power is on. Be sure to conduct such operations after turning off the power in order to prevent injury and/or accidents.

#### 1.1.1 INSTALLATION

Never touch the power supply when installing PGD/control card of the ZigZag sorter. It may cause an electric shock and/or injury.

Please check the specifications of the power supply, the voltage 24V ( $\pm 5\%$ ), before wiring. Failure to do so may cause a fire, electric shock, injury and/or breakage.

The ZigZag sorter shall be incorporated into an emergency stop circuit arranged by the system integrator.

Please make sure that the control circuit has to meet standard EN-IEC 60204-1 and that the emergency stop system must be provided according EN-ISO13850.

#### 1.1.2 OPERATIONS

Do not touch the internal structure during operation to prevent entanglement and/or clamping accidents. Be sure to add instructions such as start/stop, after switching on the power. It may cause an injury and/or accident due to unexpected start-up.

If control card protection function worked, remove the cause prior to release the function. Otherwise, malfunction may occur again and it could result in an accident, injury and/or breakage.

If abnormal noises are being given out from the ZigZag sorter, turn off the power switch and cut the power supply immediately to avoid unpredictable accidents. Immediately rectify any defects or damage which occurs.

Do not use the unit in any way beyond its specifications. It may cause an injury and/or breakage.

Safety and danger notices must be fully legible.

## 1.2 GENERAL CAUTION



**Caution:** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury and could cause property damage.

Never store or leave the ZigZag sorter outdoors.

Do not climb and/or overload on the product. It may cause an accident and/or breakage.

Do not exceed the maximum load capacity or insert objects into gaps. It may cause an accident and/or breakage. The ZigZag sorter must be in a good/safe condition.

Never modify the main unit of the ZigZag sorter and control card. It may cause an accident, injury and/or breakage.

Make sure that no liquids can get onto the ZigZag sorter. It may cause an electric shock, injury and/or breakage. The ZigZag sorter is not provided with dust- and/or waterproof function.

Prevent high impact, such as dropping or striking the ZigZag sorter. It may cause an accident and/or breakage.

Do not touch the product immediately after operation. It can get very hot and there is a danger that you may get burned and/or injured.

Wear gloves as many metallic parts are used for the ZigZag sorter. Failure to do so may cause an injury.

No loose clothes, jewellery or loose hair allowed when working with this machinery.

Do not install the ZigZag sorter in a place with high vibration.

Take measures against gravity fall of the unit loads when the unit is installed at elevated position, i.e. side rails/ guards.

### 1.2.1 INSTALLATION

Always install the product horizontally and make sure it is well mounted in the framework.

Do not pull, bend or twist the electric cable with unnecessary force. There is a danger of fire or electric shock due to breakage.

The DC power supply must be earthed. It may cause an electric shock in case of a breakdown or electrical leakage.

Keep sufficient working space around the ZigZag sorter for maintenance.

Wear protective shoes during installation (gravity fall causing foot injury).

### 1.2.2 MAINTENANCE

Any damage to the ZigZag sorter should be repaired immediately.

Turn off the power and wait a couple of minutes before starting maintenance/inspection/repairs. Make sure you secure the power supply against being switched on again.

Only access the plant where access is allowed and follow safety notices. Always wear protective clothes and/or use safety equipment.

When replacing parts to the ZigZag sorter disassemble only the parts as specified in the manual.

Be careful for not getting your fingers caught in the ZigZag sorter.

Make sure you will mount covers and tighten screws properly after maintenance/inspection/repair.

### 1.3 SYMBOLS



***Warning: Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.***



***Caution: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury and could cause property damage.***



***Note: In order to keep the machine in full performance, comply with all technical requirements for the correct use of the machine.***



***Info: additional information for optimizing and taking the full advantage of your machine.***

## 1.4 RISK ANALYSIS

Hazard	Cause	Avoidance
Serious injury to the area of the spine/wrist	Excessive physical stress during manual lifting of the products	Use appropriate lifting equipment instead of manually lifting.
Serious injury to hands	Clamping of hands between moving objects  Catching of clothing/jewellery in moving machine parts during maintenance or operation	Do not touch the product when it is connected to a power source or when it is operating.  Use approved working clothes and remove all jewellery.
Serious injury to head	Catching of hair in moving machine parts during maintenance or operation	Bind long hair together and always use a hairnet.
Serious injury to body	Falling of unit loads while removing from the ZigZag sorter after breakdown/emergency stop.	Use of safety shoes (minimum Class SB) Use of safety gloves with grip coating Use of safety straps when lifting unit loads above 25kg.



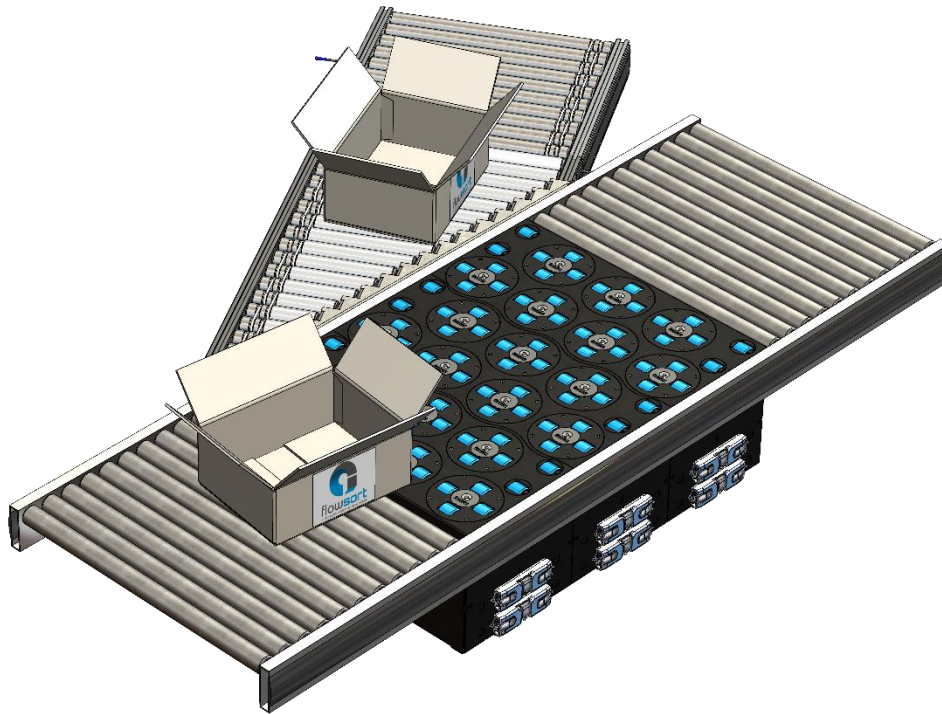
## PRODUCT INFORMATION

### 2.1 TECHNICAL DATA SHEET

General Data	
Voltage	DC24V
Controller	DC24V – Max. power consumption 0,05kW
ZigZag sorter speed	0,1 – 1,6 m/s – Faster on request
Max. load capacity	35 kg – Maximum load capacity is depending on the combination of speed & load
Operating ambient temperature	0°C to 40°C
Operating ambient humidity	Less than or equal to 90% (No condensation)
Noise level	<80dB – Noise level can vary due to surrounding conditions
Installation site	Indoors
Dimensions	
SW (Sorter width)	400mm, 600mm, 800mm and 1000mm (max. +50mm)
Length	Depending on the configuration
$\alpha$ -angle	-90° up to +90°
Weight	24 – 60 kg per module Depending on size of sorter
Wheel drive assembly	
Wheel diameter	180mm
Roller diameter	58mm
Roller material	Plastic with PU cover
Roller bearing	Precision ball bearing 608-2RS
Wheel drive assembly motor	DC24V
Transmission belt for rollers in wheel	ConveyXonic PJ 214 2rib
Transmission belt for wheel drive assembly	HTD 5M 515-9
Swivel Wheel drive	
Swivel drive	DC24V
Swivel time	180° in 0,3 sec
Transmission belt for wheel	HTD 5M 630-9
Small wheel	
Wheel diameter	62mm
Roller diameter	58mm
Roller bearing	Precision ball bearing 625-2RS
Belts in roller sub-assembly	Round Belt 228mm
Transmission belt between wheel assemblies	ConveyXonic PJ 214 2rib
Transmission belt for wheel drive assembly	HTD 5M 400-9

## 2.2 PRODUCT DESCRIPTION

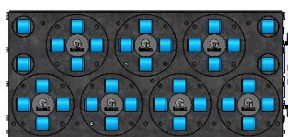
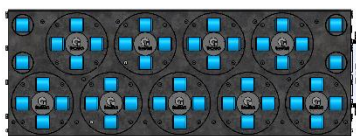
The ZigZag sorter is used for diverting unit loads, preferably with smooth bottom surfaces, at different angles onto chutes to the right or to the left. It can also be used as a package aligner before final sorting.



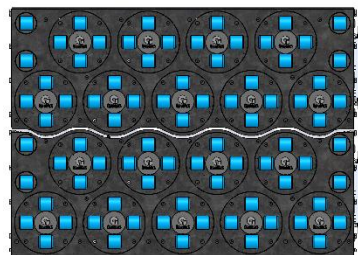
## 2.3 OPTIONS

The ZigZag sorter has a variety of options which will affect dimensions and weight. Apart from diverter speed and divert angles, which will not affect dimensions, the possible frame widths can differ. The options are 400mm with 2 wheel drive assemblies, 600mm with 3 wheel drive assemblies, 800mm with 4 wheel drive assemblies and the 1000mm with 5 wheel drive assemblies in one row.

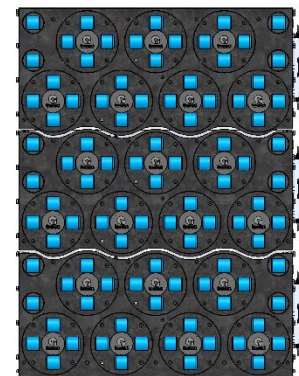
The difference between the ZigZag Sorter is the length and the number of modules. The ZigZag sorter can be built with multiple rows depending on the demands of the customer and lay-out. See some examples below.



**2 rows; 1 module**



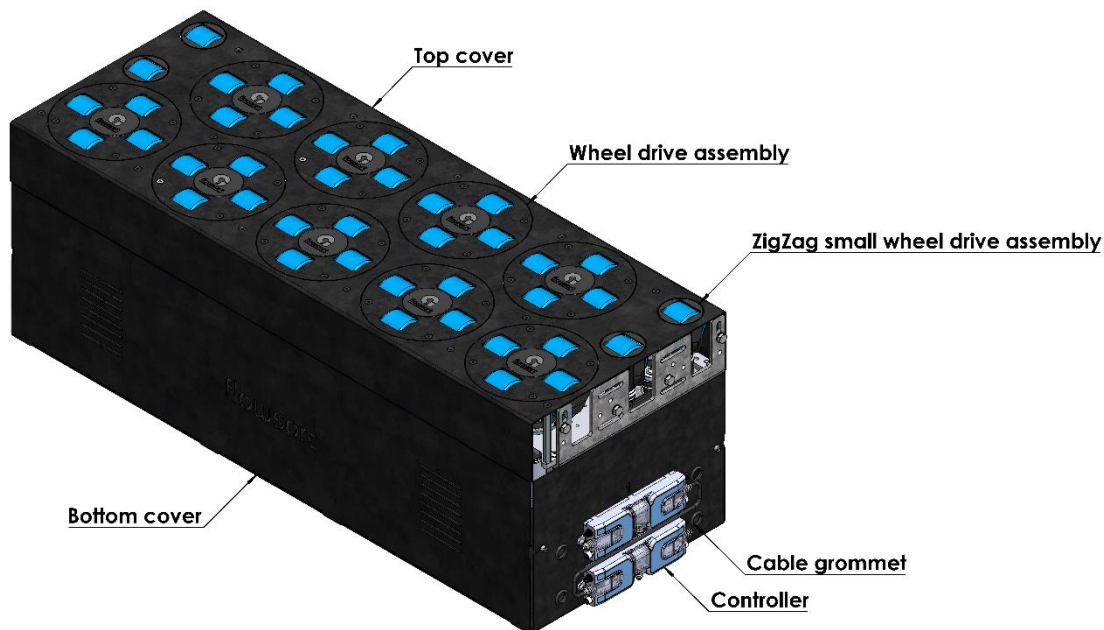
**4 rows; 2 modules**



**6 rows; 3 modules**

## PRECAUTIONS BEFORE USE

### 3.1 EXPLANATION PART NAMES



- Control card
- Wheel drive assembly
- ZigZag small wheel drive assembly
- Covers
- Cable grommet

### 3.2 ADDITIONAL DOCUMENTATION FOR APPLICATION



- General and local rules for accident prevention.
- Law on the Protection of staff.
- Requirements for environmental protection.
- Compliance with established house rules.

### 3.3 STAFF TRAINING



- You have completed the required training and you are fully aware of the possible risks.
- You are aware of the predefined house rules and have been instructed by the responsible operator.
- You understand the contents of this documentation.

### 3.4 SAFE OPERATION



- Please ensure that there are no persons or obstacles in the danger areas.
- When there is a threat of danger make sure you shut down operation at once.
- Regular monitoring and maintenance keeps your machines ready for use and safe.
- Safety and hazard statements must be fully legible.
- Immediately correct any defects or damages.
- Wearing and using protective equipment.

## INSTALLATION

### 4.1 GENERAL RULES

Before starting assembly take the following into account:

- Make sure you install the ZigZag sorter as designed in the overall layout.
- Check packaging for damages before unpacking the ZigZag sorter.
- During unpacking make sure you do not damage the ZigZag sorter and you are using proper tooling. See crate for first instructions.
- Make sure you will align the system together with the rest of the system standing around it.
- Please make sure you clean the worksite after assembly and before testing. Do not leave any spare parts or tools in the work site and surrounding area, it can cause damages.
- Perform a full risk analysis of the entire installation as the ZigZag sorter itself is not a complete system.

Assembly and installation can only be done by properly instructed personnel. This personnel must be under the supervision of a manager who is technically competent concerning the following:

- Knowhow concerning the ZigZag sorter and its use.
- The dangers in relation to the assembly of heavy machinery.
- The risks related to incorrect installation.
- The adjustments required for correct installation.

### 4.2 INSTALLATION

The installation manual provided by Flowsort B.V. is an overall guide line in how to install the modules. Always adapt the installation manual to the national and local safety rules and restrictions.

Flowsort B.V. will always deliver the ZigZag sorter pre-assembled. Installation on site only consist out of the following:

- Mounting into frame work
- Cable/wiring (24VDC and data; UTP-cable)



***If any adjustments are made, both to the ZigZag sorter itself as to the position within the framework, then Flowsort B.V. will not take responsibility for the machinery because it represents unintended use of the ZigZag sorter.***

***For wiring instructions please check <https://www.pulseroller.com/downloads>***



***Make sure that each module section is well supported before you mount the ZigZag sorter into the framework. After assembly do not move this framework as it could cause damages to the framework. After installation always mount the leg set to the floor or to a solid construction. It reduces movement/vibration during operation.***

### 4.3 LIFTING AND TRANSPORTATION OF THE SORTERS

The ZigZag sorter contains pre-mounted eye-bolts on the base plate to be used for lifting the modules. The eye-bolts are accessible after removing the top cover. The diverters can also carefully be transported by supporting the diverters from below.

Gently support the diverters from below to get to the right position. Make sure not to bump in the bottom covers or move the diverters sideways. Always pick the diverters up by the two side plates or by the eye-bolts.

*Lifting and transporting the diverters is at own risk and own responsibility.  
Be careful while moving the diverters over the ground and thru the air!*

#### Step 1:

Remove the M5x10 countersunk head screw and remove the top cover plate.

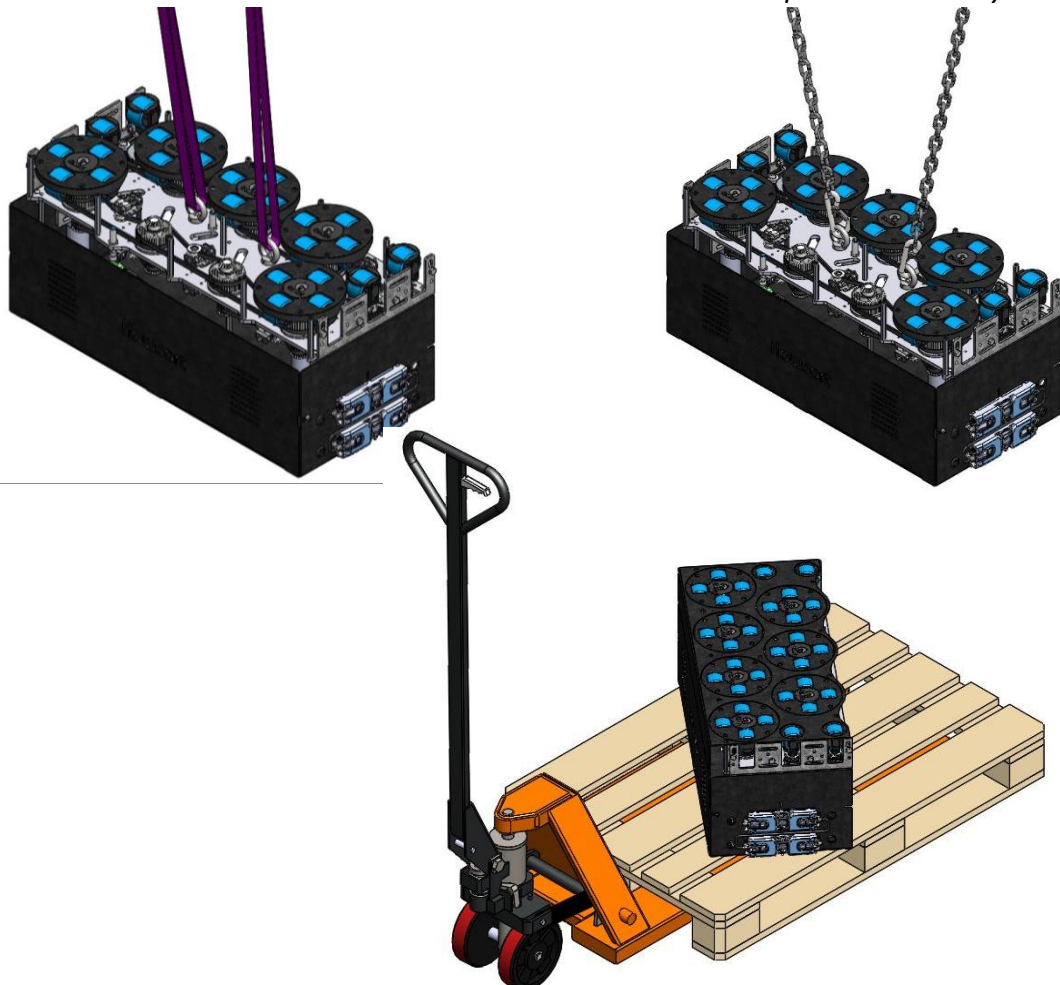
#### Step 2:

Lift the diverters by using the eye-bolts mounted on the base plate.

#### Step 3:

Place the top cover plate back and mount the M5x10 countersunk head screws.

*Fasten the black M5x10 countersunk head screws in the top cover with only 3Nm!*





#### 4.4 ASSEMBLY/DISASSEMBLY ZIGZAG SORTER VS FRAMEWORK

The ZigZag sorter contains pre-mounted bolts on the side frame to be used for mounting into the frame work.

##### Step 1:

Remove the hexagon bolts M8x16 including spring lock washer at the side of the diverter.

##### Step 2:

Make sure that the framework has  $\varnothing 8.2$  holes corresponding to the holes of the diverter. Check TOR (top of roller) or TOB (top of belt) height to match the diverter height.

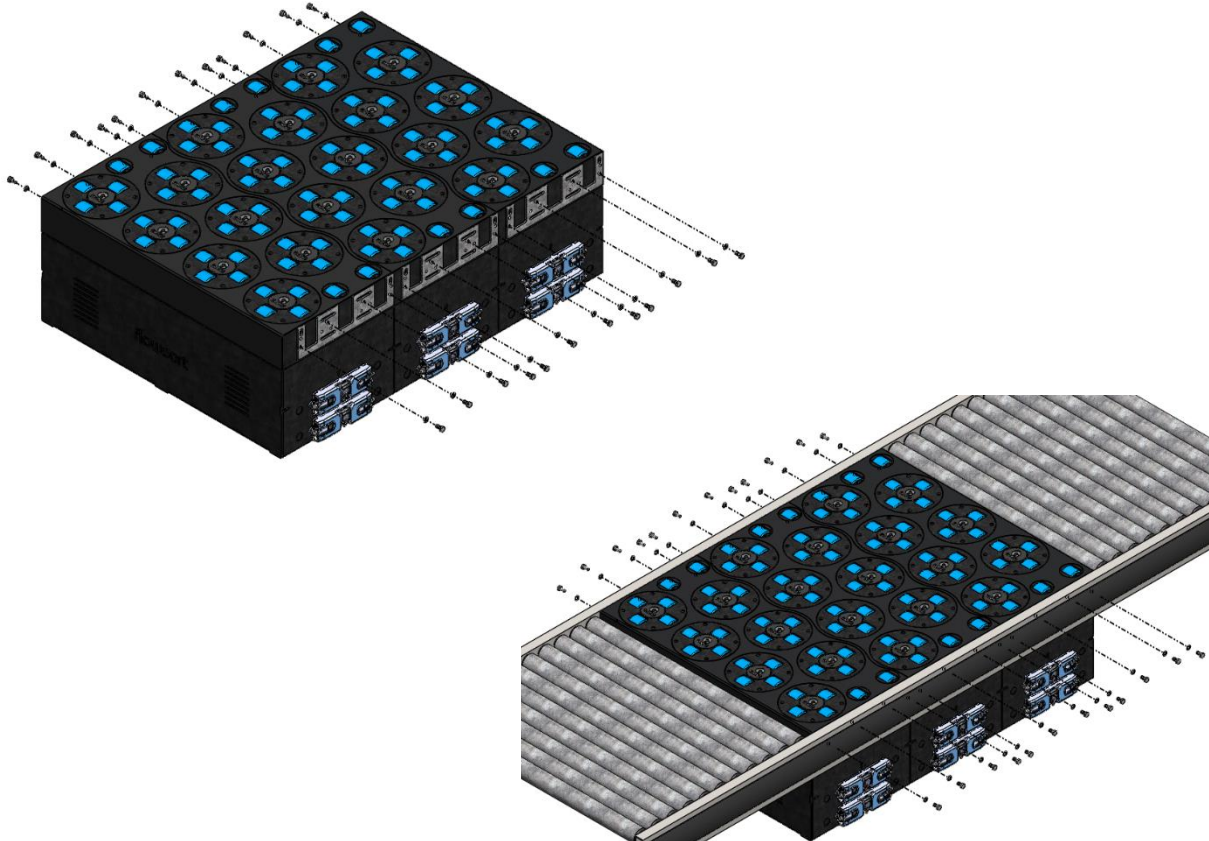
*We recommend you to use a +2mm height of the diverter wheels relative to the TOR/TOB. The distances between the rollers should be equal on both sides. The roller may not hit the diverter cover otherwise it could get damaged. If it is not aligned then untighten the diverter and move the diverter until you have the same gap between the rollers on both ends of the diverter.*

##### Step 3

Lift up the ZigZag sorter with appropriate lifting equipment and align the holes from the ZigZag sorter with the framework. Mount the M8x16 hexagon bolt with the spring lock washer.

##### Step 4

Disassembly can be done by repeating the steps in reverse order.



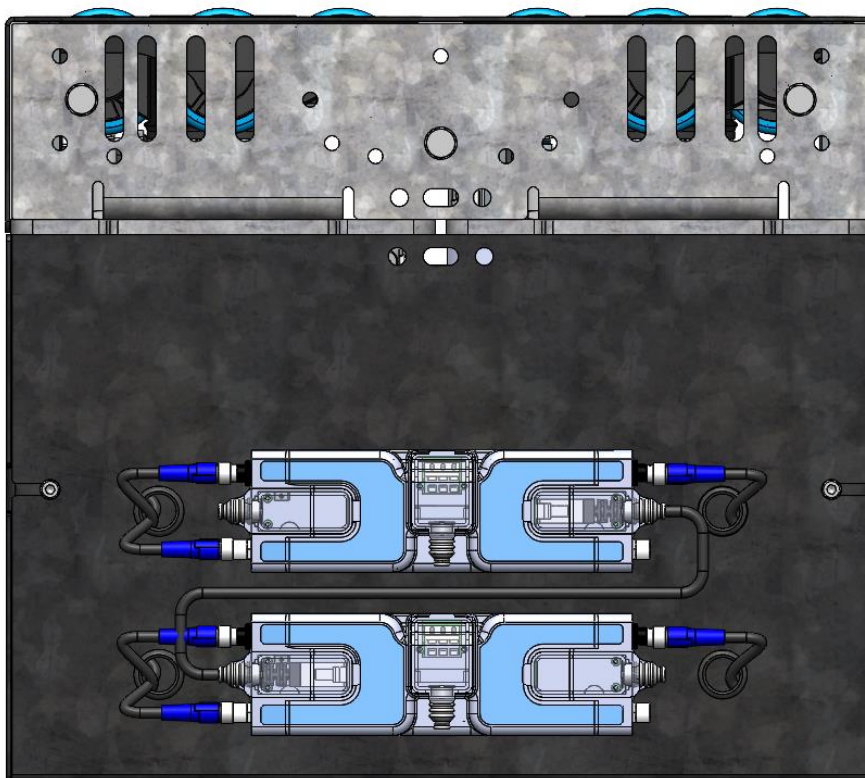
## 4.5 WIRING OF THE ZIGZAG SORTER

The control card can be found at the right side or the bottom of the ZigZag sorter module(s). Make sure all cables are connected properly. Failure to do so may lead to malfunction.

Sensors and motors are already pre-cabled during production. Flowsort will also provide an UTP-cable between the two controllers in a DLD. Wiring the drive control card, like power supply and PLC-communication, has to be done according to the integration manual. Flowsort will provide the integration manual on order or on request.

When using the diverters, a higher electrical voltage build-up is generally not to be expected. However, the dust and the high speeds on the belt can cause a voltage build-up. Therefore Flowsort states that each diverter is connected to a main ground of the electrical connection according to DIN VDE 0100 (VDE 0100). The best is to do ground the base plate of the diverters.

This is a protection against possible electrical sparking, dust accumulation and it also protects the motor electronics from overvoltage.



## OPERATION

### 5.1 FIRST CHECKS BEFORE OPERATING



- When connecting the ZigZag sorter to another system, you will have to perform a risk analysis of the entire installation.
- Always check the installed modules for damages before starting operation. If there are visible damages please inform operating supervisor immediately. Do not start operation, see maintenance.
- Check the area for material that should not be there, and remove this when it is there. (packaging material, tools, debris, etc.)
- Check if all signs/restrictions are in place (max. load capacity and restriction for use).
- Check if all personnel is properly instructed before working with or near the ZigZag sorter.

### 5.2 DURING OPERATION



Shut down the whole system if any of the following occurs:

- A broken or damaged component.
- Damage to structural components such as frame, side guiding and leg set.
- Doubtful noise from any of the components.
- Liquids are on the systems.
- Unit loads on the conveyor system are getting stuck.

### 5.3 IN CASE OF AN ACCIDENT



- Press in the emergency stop of the system where the ZigZag sorter is located.
- Secure the area and set up appropriate signage.
- In the event of an accident: provide first aid and let someone else call the emergency services.
- Inform qualified personnel and/or operating supervisor.
- Have the system repaired by qualified maintenance personnel.
- Do not use the ZigZag sorter until it has been approved by qualified maintenance personnel.

### 5.4 SET-UP DIVERTING ANGLE

The diverting angles can be set between  $-90^\circ$  and  $+90^\circ$  in relation to its start position which is  $0^\circ$ . The diverter has an inductive sensor for its home position. Setting up the angle will be done in the software. A possible set-up is  $-45^\circ$  and  $+30^\circ$  depending on the chutes. Please contact Flowsort B.V. for the right function blocks. The function blocks are available in multiple brands of PLC-suppliers (i.e. Siemens, Beckhoff, Allen Bradley, Omron and others).



## MAINTENANCE

### 6.1 MAINTENANCE INTERVALS

Damage can occur if maintenance is not performed as planned. If the maintenance intervals are not followed as suggested, the warranty expires. Flowsort B.V. has defined the following maintenance intervals:

	Hours	Interval per
Working hours per day	0-12	3 months
Working hours per day	12-24	2 months

During these maintenance periods the ZigZag sorter should be disconnected from the power supply. Please clean and look closely for wear during inspection. If errors are found during inspections, they must be corrected immediately.

### 6.2 GENERAL MAINTENANCE INFORMATION



Clean the outside of the ZigZag sorter with a dry cloth. Do not use aggressive cleaning agents as it could affect the components resulting in a possible oxidization of the parts. Never use water for cleaning!

Secure the working area and shut down the system and apply appropriate signage. Make sure nobody can start up the system during maintenance.

Make sure maintenance is carried out by qualified personnel who are familiar with the instruction manual and procedures.

Wear personal protective equipment.

If in doubt, contact the supplier or manufacturer of the parts.

### 6.3 CLEANING THE BLUE WHEELS

Due to dust and small splinters of damaged products (i.e. cardboard dust, loosened tapes, etc.) the blue rollers in the discs can get dirty. The dirtiness on the blue rollers can reduce the grip on the transported products. With real dirt on the rollers, the sortation movement can be affected. Therefore, the blue rollers need to be cleaned with the following intervals:

**Clean the blue wheels after: 1000 hours of rotation**

To clean the blue wheels, use a degreaser or an other liquid which doesn't affects the TPU-surface of the blue wheels.

### 6.4 SPARE PARTS

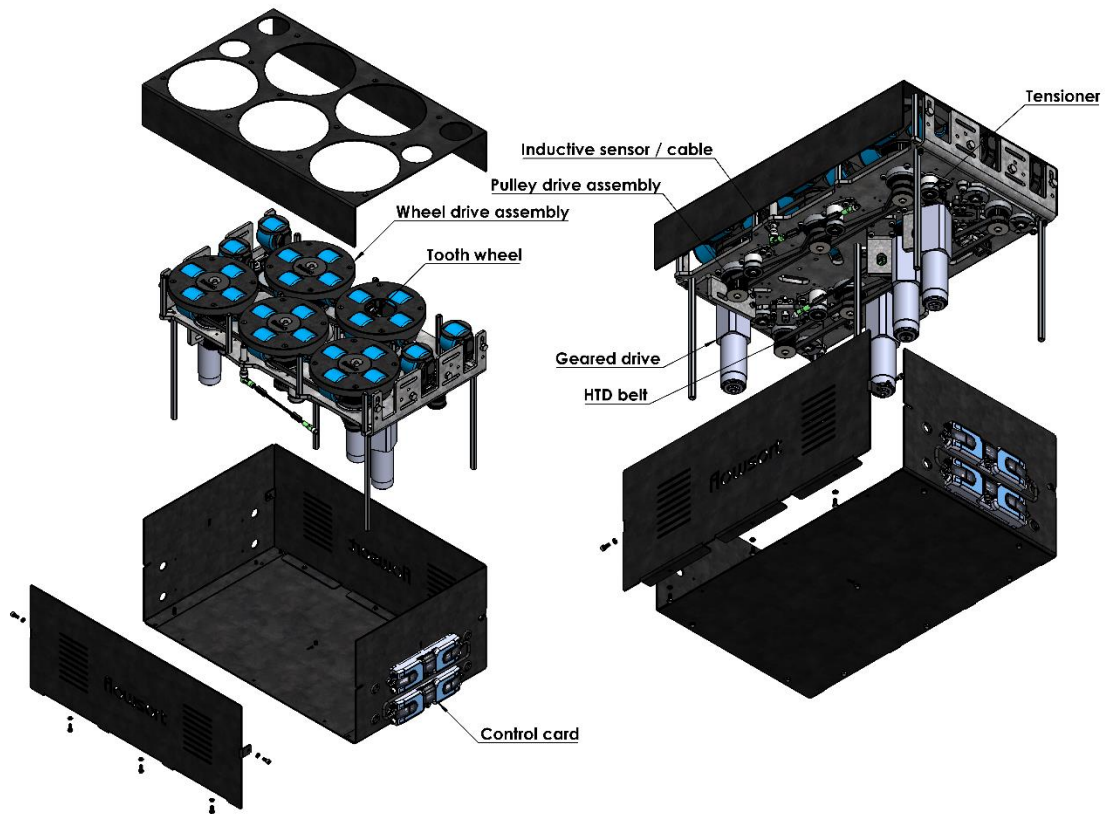
All electronic and drive parts are from preferred suppliers. Please check the appendix or have a look on their website for additional maintenance and cleaning information.

Please have a look at our recommended spare part list in this document.

Main spare parts for the ZigZag sorter;

- Geared drive
- Pulley drive assembly
- HTD belt
- Control card
- Tooth wheel
- Tensioner
- Wheel drive assembly
- Inductive sensor/cable

## 6.5 INSPECTION ZIGZAG SORTER



- Geared drive
- Wheel drive assembly
- Pulley drive assembly
- Control card
- Tooth wheel
- Inductive sensor/cable
- HTD belt
- Tensioner

Item	Inspection	Outcome	Action to execute
Geared drive	Visual check Sound check  Mounting check	Damaged cable Abnormal/scratchy noise Bolts are too loose	Replace geared drive Replace geared drive  Tighten bolts with torque wrench
Wheel drive assembly	Visual check  Sound check	Damaged wheels  Leaking bearings  Abnormal/scratchy noise	Replace wheel drive assembly Replace wheel drive assembly Replace wheel drive assembly
Pulley drive assembly	Visual check  Sound check	Damaged tooth wheel Abnormal/scratchy noise	Replace tooth wheel Replace pulley drive assembly

Control card	Visual check	No power  Loose cables  Dirtiness  Damaged	Check power supply  Fasten loose cables and check wiring Clean control card  Replace control card
Tooth wheel	Visual check	Damaged tooth wheel	Replace complete wheel drive assembly
Inductive sensor/cable	Visual check  Mounting check	LED off  Sensor too loose	Check wiring and/or cable connection. Check power supply Tighten nuts Replace sensor
HTD belt	Visual check	Damaged/broken belt	Replace HTD belt
Tensioner	Visual check Sound check	Damaged Abnormal/scratchy noise	Replace tensioner Replace tensioner

## 6.6 REMOVAL AND REPLACEMENT OF PARTS

The parts in the diverters need to be repaired and replaced as soon as possible. Make sure the ZigZag sorter is disconnected from the power supply during cleaning, maintenance and/or replacements.

### 6.6.1 ZIGZAG SORTER COVER REMOVAL/REPLACEMENT

Make sure the ZigZag sorter is disconnected from the power supply during cleaning, maintenance and/or replacements.

#### Step 1

Disconnect all cables to the control card. Please keep in mind how the cables are connected to the control card.

#### Step 2

Remove the black M5x10 countersunk head screw and remove the top cover plate.

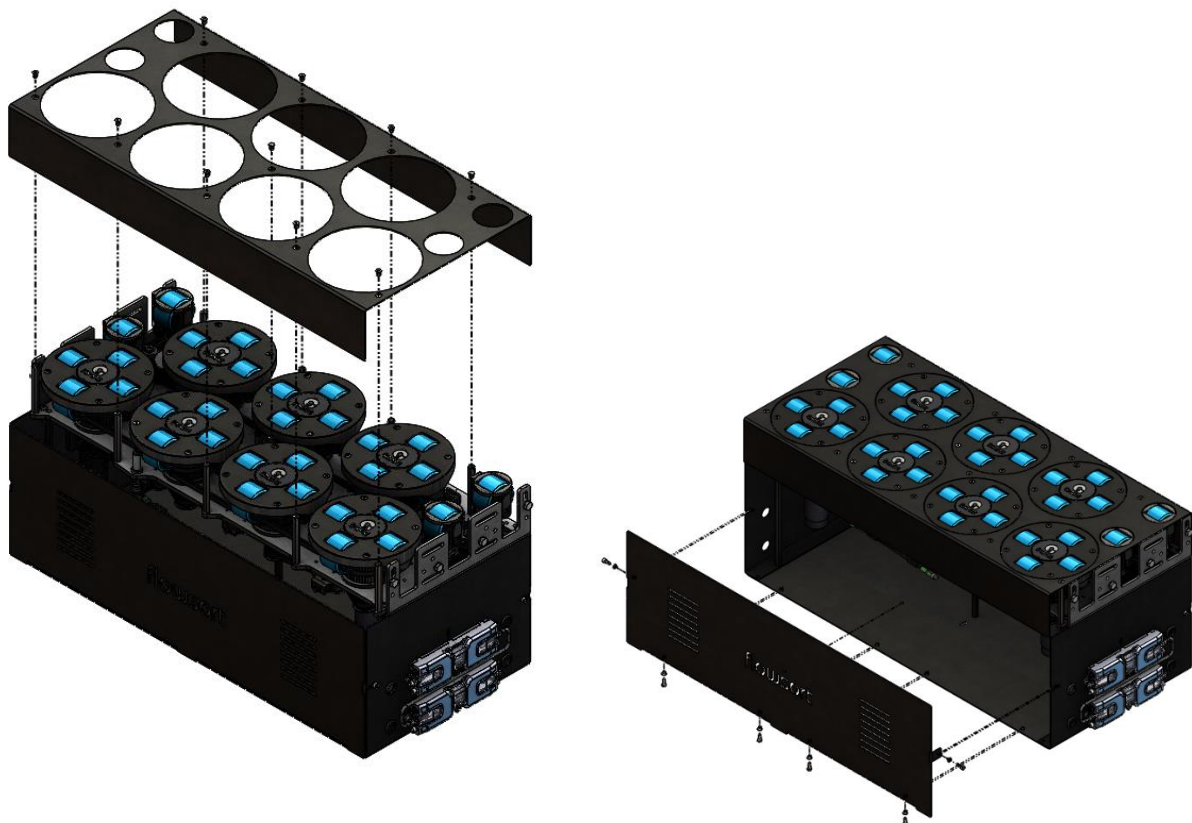
#### Step 3

Remove the galvanized M5x12 hexagon screws on the bottom and loosen the M5x12 bolts on both sides. Remove the bottom cover side plate to get access to the inside. Put all bolts in a bag not to lose them.

#### Step 4

Replacing the covers can be done by repeating the steps in reverse order.

*Fasten the M5x10 countersunk head screws in the bottom or top cover with only 3Nm!*



## 6.6.2 ZIGZAG SORTER WHEEL GEARED DRIVE REMOVAL/REPLACEMENT

Make sure the ZigZag sorter is disconnected from the power supply during cleaning, maintenance and/or replacements.

Before starting with step 1 see paragraph 6.6.1. ZigZag sorter cover removal/replacement.

### Step 1

Loosen the motor cable from the controllers so the motor is not powered any more. Release the tension on the belt by untightening the M5x12 socket head bolts including spring lock washers holding the tensioner on the base plate.

### Step 2

Remove the four M5x16 Hexagon socket head cap screw and M5 spring lock washer which is holding the geared drive. Remove the geared drive from the plate. Put the fasteners in a bag not to lose them.

### Step 3

Remove the pulley, large washer, M6 spring lock washer, M6 bolt and key from the geared drive.

### Step 4

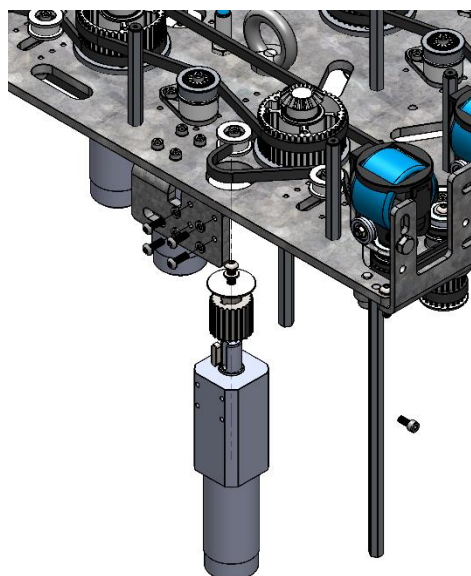
Take a new geared drive and assemble the key, pulley, M6 spring lock washer, large washer and M6 bolt in written order.

### Step 5

Tighten the geared drive with the four M5x16 Hexagon socket head cap screw and M5 spring lock washer to the plate.

### Step 6

Put back the tension on the belt. See paragraph 6.7 Tensioning the belts. Reconnect the cables to the control card and mount the top cover plate by using the M5x10 countersunk head bolt.



### 6.6.3 ZIGZAG SORTER WHEEL DRIVE ASSEMBLY REMOVAL/REPLACEMENT

Make sure the ZigZag sorter is disconnected from the power supply during cleaning, maintenance and/or replacements.

#### Step 1

Remove the cover cap in the middle of the wheel drive assembly.

#### Step 2

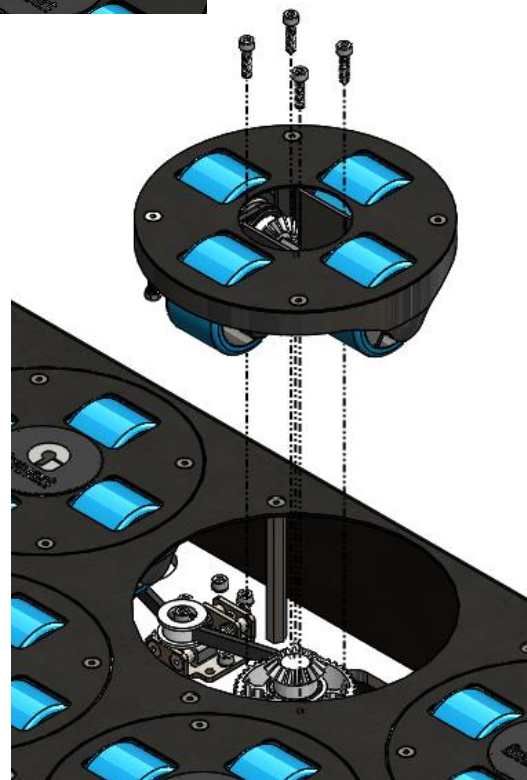
Use an impact wrench in order to remove the four M5x20 Hexagon socket head cap screw.

#### Step 3

Remove the wheel drive assembly.

#### Step 4

Replacing the wheel drive assembly can be done by repeating the steps in reverse order.





#### 6.6.4 ZIGZAG SORTER PULLEY DRIVE ASSEMBLY REMOVAL/REPLACEMENT

Make sure the ZigZag sorter is disconnected from the power supply during cleaning, maintenance and/or replacements.

Before starting with step 1 see paragraph 6.6.1. ZigZag sorter cover removal/replacement and paragraph 6.6.3. ZigZag sorter wheel drive assembly removal/replacement.

##### Step 1

Remove the timing belts on the top site of the ZigZag sorter which are connected to the pulley drive assembly to be removed. Take of the tension of the tensioners, it makes it easier to remove the belt.

##### Step 2

Remove the timing belts on the bottom site of the ZigZag sorter which are connected to the pulley drive assembly to be removed. Take of the tension of the tensioners it makes it easier to remove the belt.

##### Step 3

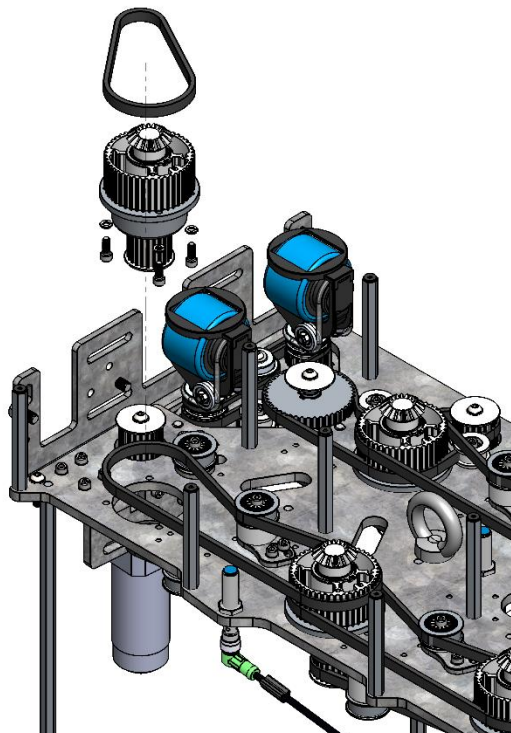
Remove the four M5x14 socket head bolts and the spring lock washer connecting the pulley drive assembly to the baseplate.

##### Step 4

Remove the pulley drive assembly.

##### Step 5

Replacing the pulley drive assembly can be done by repeating the steps in reverse order. See paragraph 6.6.10. ZigZag sorter HTD belt removal/replacement for correct belt replacement.



### 6.6.5 ZIGZAG SORTER SWIVEL GEARED DRIVE REMOVAL/REPLACEMENT

Make sure the ZigZag sorter is disconnected from the power supply during cleaning, maintenance and/or replacements.

Before starting with step 1 see paragraph 6.6.1. ZigZag sorter cover removal/replacement.

#### Step 1

Release the tension on the belt by untightening the M5x12 socket head bolts including spring lock washers holding the tensioner on the base plate.

#### Step 2

Remove the four M5x16 hexagon socket head cap screw and M5 spring lock washers which are holding the geared drive. Remove the geared drive from the plate. Put the fasteners in a bag not to lose them.

#### Step 3

Remove the pulley, large washer, M6 spring lock washer, M6 bolt and key from the geared drive.

#### Step 4

Take a new geared drive and assemble the key, pulley, M6 spring lock washer, large washer and M6 bolt in written order.

#### Step 5

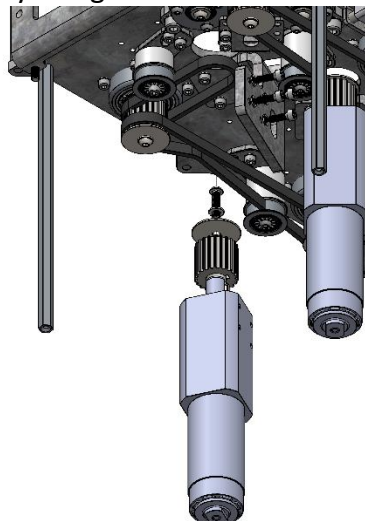
Tighten the geared drive with the four M5x16 Hexagon socket head cap screw and M5 spring lock washer to the plate.

#### Step 6

Put back the tension on the belt. See paragraph 6.7 Tensioning the belts.

#### Step 7

Put all cables through the holes in the bottom plate and place the bottom cover plate back by using the M5x10 bolts. Reconnect all cables to the control card and mount the top cover plate by using the M5x10 countersunk head bolt.





### 6.6.6 ZIGZAG SORTER CONTROL CARD REMOVAL/REPLACEMENT

Make sure the ZigZag sorter is disconnected from the power supply during cleaning, maintenance and/or replacements.

#### Step 1

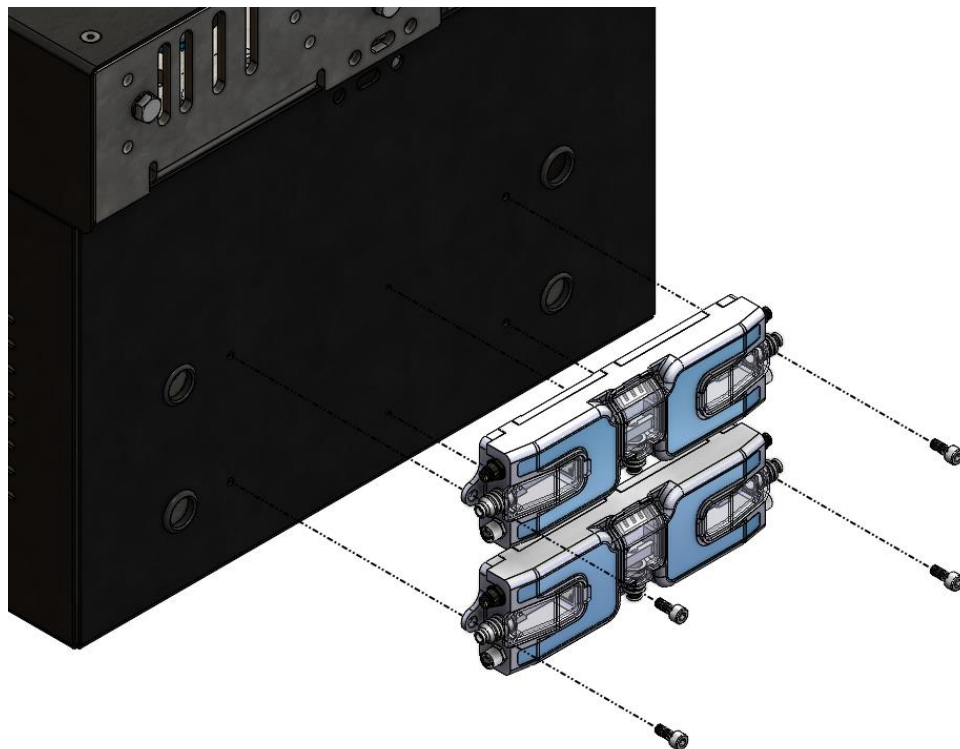
Disconnect all cables to the control card. Please keep in mind how the cables are connected to the control card.

#### Step 2

Untighten the two M5x12 socket head bolts holding the control card.

#### Step 3

Replacing the control card can be done by repeating the steps in reverse order.



### 6.6.7 ZIGZAG SORTER TOOTH WHEEL REMOVAL/REPLACEMENT

Make sure the ZigZag sorter is disconnected from the power supply during cleaning, maintenance and/or replacements.

Before starting with step 1 see paragraph 6.6.3. ZigZag sorter wheel drive assembly removal/replacement.

#### Step 1

Remove tooth wheel by pulling the tooth wheel upwards. You can do this with your hands but in some occasions a screwdriver can be useful. You then place the screwdriver under the tooth wheel and push it up by leverage.

#### Step 2

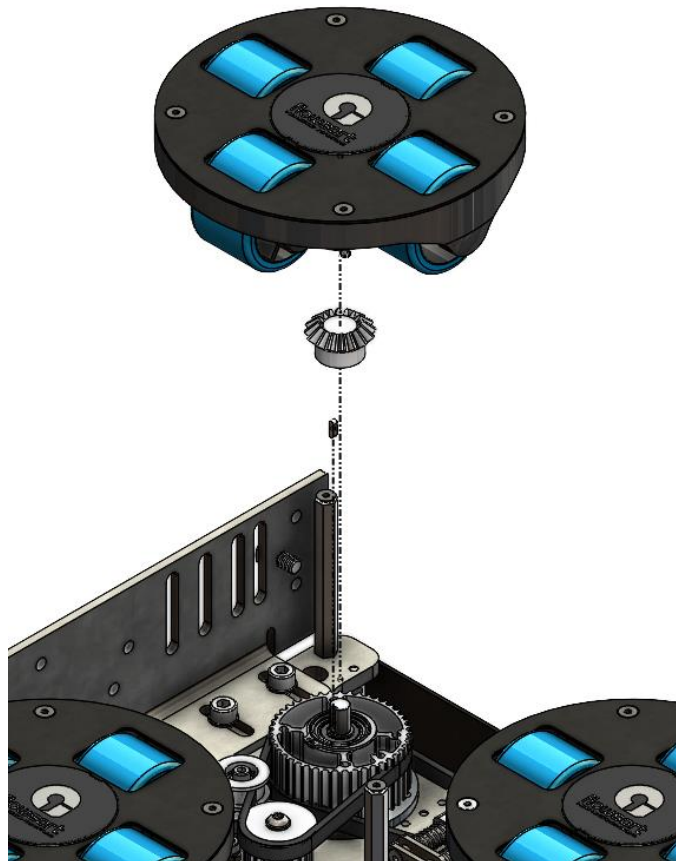
Remove the key 3x3x10 out of the tooth wheel and place this back on the shaft of the pulley drive assembly.

#### Step 3

Place the new tooth wheel on the shaft. Make sure key way is in line with the key on the shaft. Push the tooth wheel down the shaft until it stops moving.

#### Step 4

Replace the drive wheel assembly, see paragraph 6.6.3. ZigZag sorter wheel drive assembly removal/replacement.



### 6.6.8 ZIGZAG SORTER INDUCTIVE SENSOR REMOVAL/REPLACEMENT

Make sure the ZigZag sorter is disconnected from the power supply during cleaning, maintenance and/or replacements.

Before starting with step 1 see paragraph 6.6.1. ZigZag sorter cover removal/replacement and paragraph 6.6.3. ZigZag sorter wheel drive assembly removal/replacement.

#### Step 1

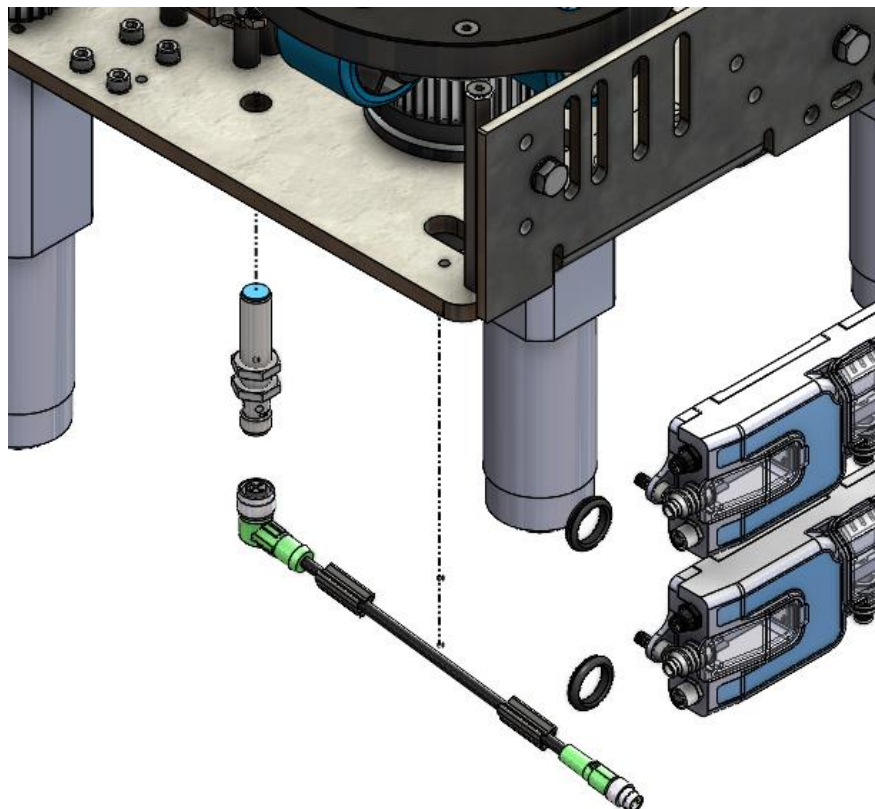
Disconnect the sensor cable by turning the nut counter clockwise.

#### Step 2

Use two wrenches for untighten the two M12 nuts holding the inductive sensor on the base plate.

#### Step 3

Replacing the inductive sensor or sensor cable can be done by repeating the steps in reverse order. The distance between the inductive sensor and the object has to be set between 2 - 4 mm. Make sure that after replacing the sensor cable it does not come close to the toothed belt. Tighten the sensor cable with tyraps on the tyraps mounting base.



### 6.6.9 ZIGZAG SORTER TENSIONER REMOVAL/REPLACEMENT

Make sure the ZigZag sorter is disconnected from the power supply during cleaning, maintenance and/or replacements.

Before starting with step 1 see paragraph 6.6.1. ZigZag sorter cover removal/replacement and paragraph 6.6.3. ZigZag sorter wheel drive assembly removal/replacement.

#### Step 1

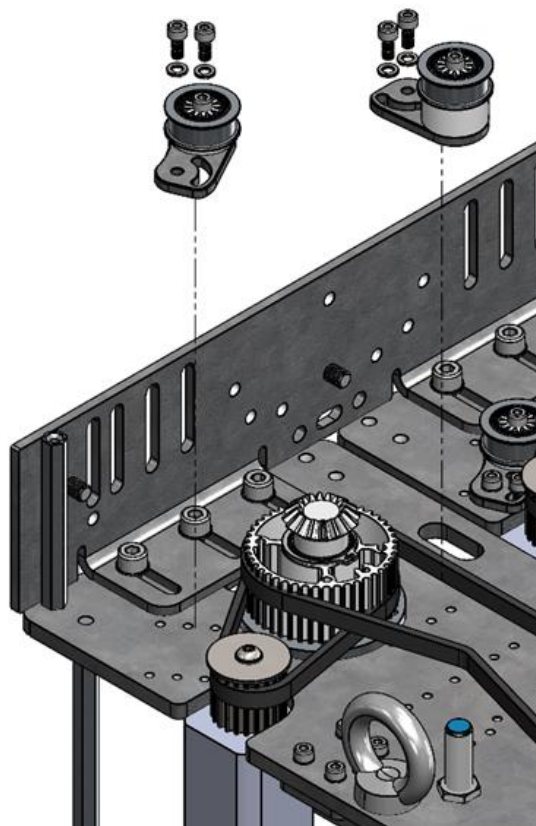
Release the tension on the belt by untightening the M5x12 socket head bolts including spring lock washers holding the tensioner on the base plate.

#### Step 2

Remove both M5x12 socket head bolts including spring lock washers from the tensioner. Now you can remove the tensioner.

#### Step 3

Replacing the tensioner can be done by repeating the steps in reversed order. At the top side of the diverter you have to align the pulley drive assembly and its timing belt before replacing the tensioner. See paragraph 6.6.10. ZigZag diverter timing belt removal/replacement. To put the right tension on the belt, see paragraph 6.7 Tensioning the belts.



### 6.6.10 ZIGZAG SORTER TIMING BELT REMOVAL/REPLACEMENT

Make sure the ZigZag sorter is disconnected from the power supply during cleaning, maintenance and/or replacements.

Before starting with step 1 see paragraph 6.6.1. ZigZag sorter cover removal/replacement and paragraph 6.6.3. ZigZag sorter wheel drive assembly removal/replacement. When it comes to the tensioner and the tensioner wheel isn't visible, read paragraph 6.6.9. ZigZag sorter tensioner removal/replacement too.

#### Step 1

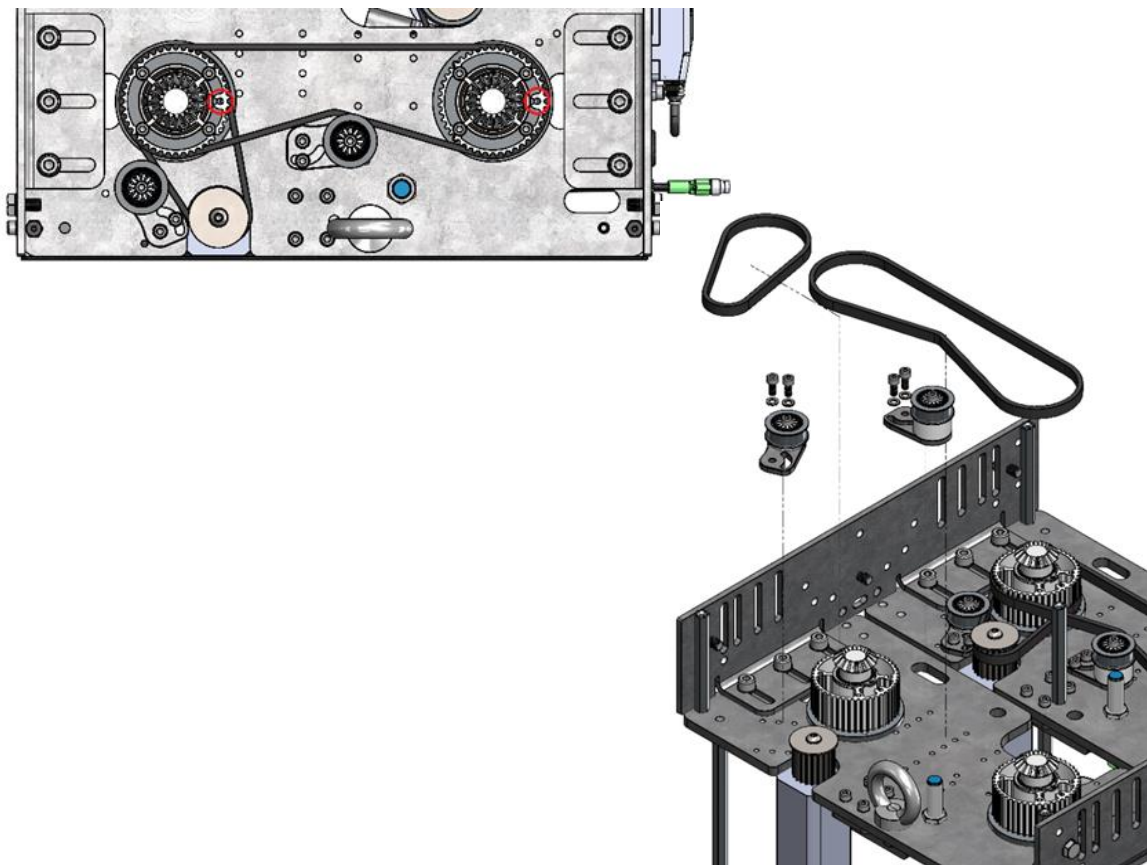
Release the tension on the belt by untightening the M5x12 socket head bolts including spring lock washers holding the tensioner on the base plate.

#### Step 2

Remove both M5x12 socket head bolts including spring lock washers from the tensioner. Now you can remove the belt.

#### Step 3

Replacing the belt can be done by repeating the steps in reversed order. At the top side of the diverter you have to align the pulley drive assemblies during timing belt replacement. Otherwise your wheel drive assemblies are not standing in the same position. This can be done by placing two shafts (*max Ø4 mm*) in the centring hole fixing the pulley wheel drives and then adding the timing belt. To put the right tension on the belt, see paragraph 6.7 Tensioning the belts.



### 6.6.11 ZIGZAG SORTER SMALL WHEEL DRIVE ASSEMBLY REMOVAL/REPLACEMENT

Make sure the ZigZag sorter is disconnected from the power supply during cleaning, maintenance and/or replacements.

Before starting with step 1 see paragraph 6.6.1. ZigZag sorter cover removal/replacement and paragraph 6.6.3. ZigZag sorter wheel drive assembly removal/replacement. When it comes to the tensioner and the tensioner wheel isn't visible, read paragraph 6.6.9. ZigZag sorter tensioner removal/replacement too.

#### Step 1

Release the tension on the belts by turning the by untightening the M5x12 socket head bolts including spring lock washers holding the tensioner on the base plate. Do this at the tensioners on both sides of the base plate.

#### Step 2

Remove the timing belt at the top side first and then remove the timing belt on the bottom side as well.

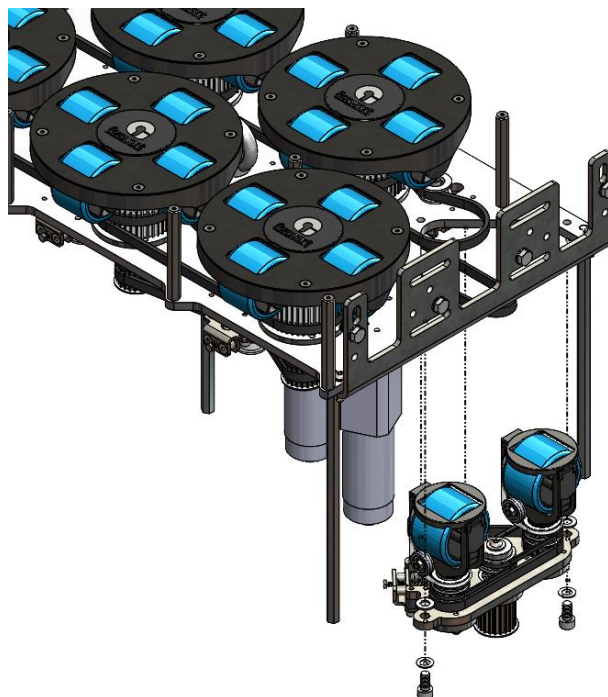
#### Step 3

Loosen the three M8x20 socket head bolts, including the spring lock washer, underneath the ZigZag 2 wheel assembly. Now you can remove the complete assembly including the spacers between the base plate and the assembly.

#### Step 4

Replacing the assembly can be done by repeating the steps in reverse order.

At the top side of the diverter you have to align the pulley drive assembly and its timing belt before completing the replacement. See paragraph 6.6.10. ZigZag sorter HTD belt removal/replacement.





## 6.7 TENSIONING THE BELTS

Make sure the ZigZag Sorter is disconnected from the power supply during cleaning, maintenance and/or replacements.

The diverters are equipped HTD timing belts. The HTD timing belts are used on top of the base plate for the disc-rotation. Underneath the base plate the HTD timing belts are used for the rotation of the blue wheels in the discs, the transportation. These belts need to be set to the right tension and these should also be checked after 3 months of running.

### 6.7.1 TENSIONING TOOLS

To be sure that the belts are tensioned in the right way, a tensioning tool should be used.



### 6.7.2 TENSIONING THE HTD TIMING BELTS

The HTD timing belts are used on both sides of the base plates for the two rotations. There are multiple belts with different lengths used in the diverters; the 265 mm, 325 mm, 400 mm, 425 mm, 500 mm, 515 mm and the 630 mm long belts.

On the top side the order is always the same for the 'normal' structure, without the small wheels. The 325 mm belt is placed over the geared drive with a low flat tensioner. The 630 mm is used between all the other pulley drive assemblies on the top side of the base plate. The first tensioner on the first 630 mm belt is the high one with the flat surface. Every next pulley drive assembly will get an additional 630 mm belt with the right tensioner. The tensioners will change every next time from high to low and vice versa.

The two with the small wheels has a bit more difficult set-up with different belt lengths. See the pictures of the base plates, and the specific belts, below.

### 6.7.2.1. Tensioning the HTD timing belt with the Spring Tension Scale

The HTD timing belts can be tensioned with a normal spring tension scale.

#### Step 1

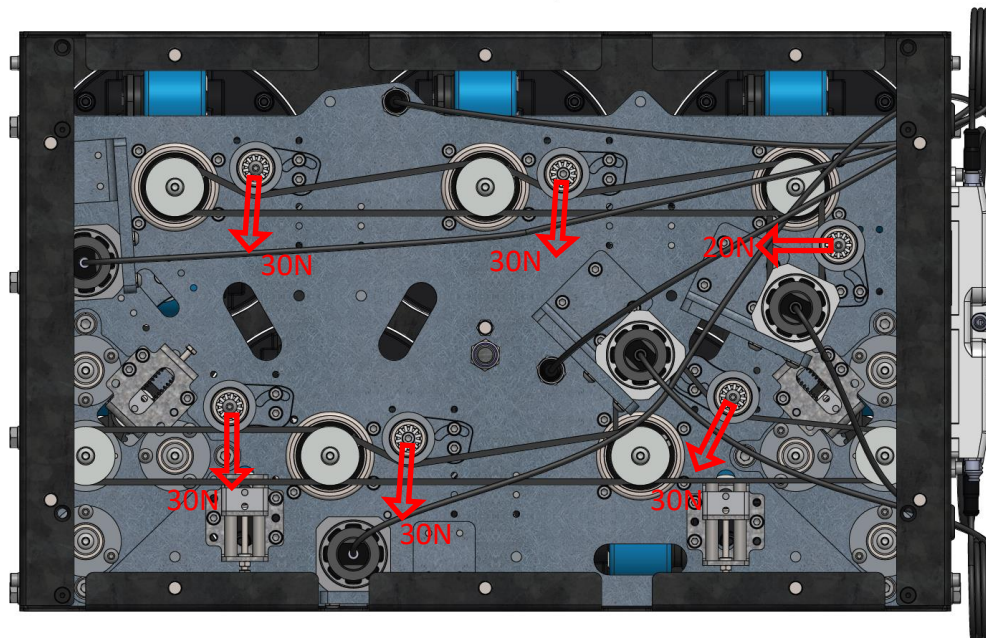
To put the right tension on the HTD timing belts, the tensioners should be placed at their positions already. Push the tensioner towards the belt and in the meantime check the belt tension. It should be set according to the below numbers.

#### Step 2

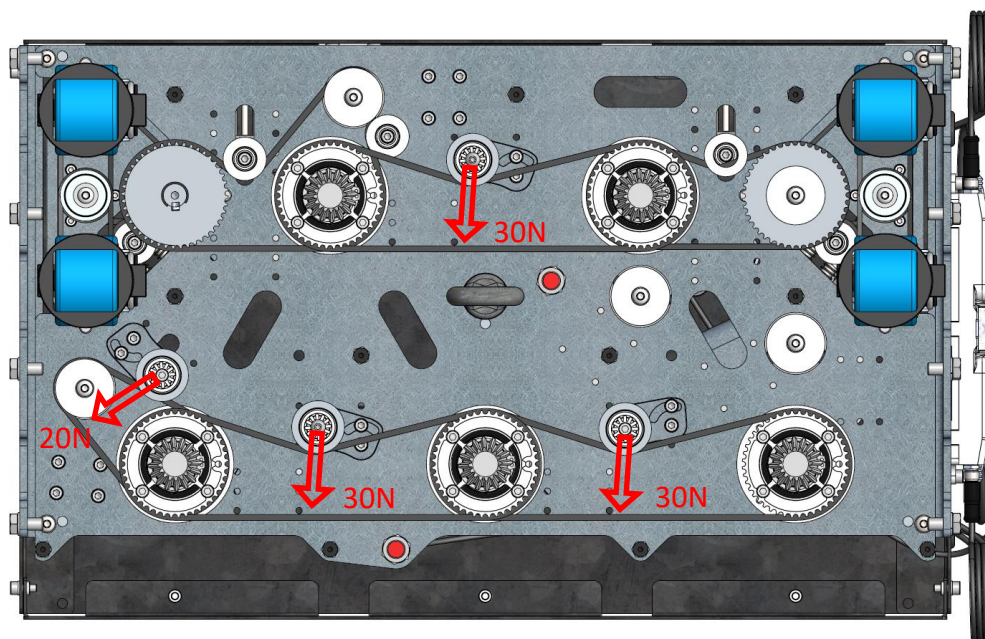
When the tension is as it should be fasten both the M5x12 socket head bolts. In this way the tensioner should be fixed firmly and the tension on the belt should be kept on the belt. The tension on the HTD timing belts should be:

Belt	Initial tension value	Running tension value (after 3 months)
265 mm	20 N	Between 20 N and 15,4 N
325 mm	20 N	Between 20 N and 15,4 N
400 mm	30 N	Between 30 N and 23,1 N
425 mm	30 N	Between 30 N and 23,1 N
500 mm	30 N	Between 30 N and 23,1 N
515 mm	30 N	Between 30 N and 23,1 N
630 mm	30 N	Between 30 N and 23,1 N

See the below pictures where and how the measurement should be done. Flowsort allows a deviation of roughly 20 degrees to the below indications.







#### 6.7.2.2. *Tensioning the HTD timing belts with the Belt Frequency Meter*

The HTD timing belts can also be tensioned and checked with a Belt Frequency Meter. The tension needs to be set first on the belts and then this has to be checked by the vibration of the belt.

##### **Step 1**

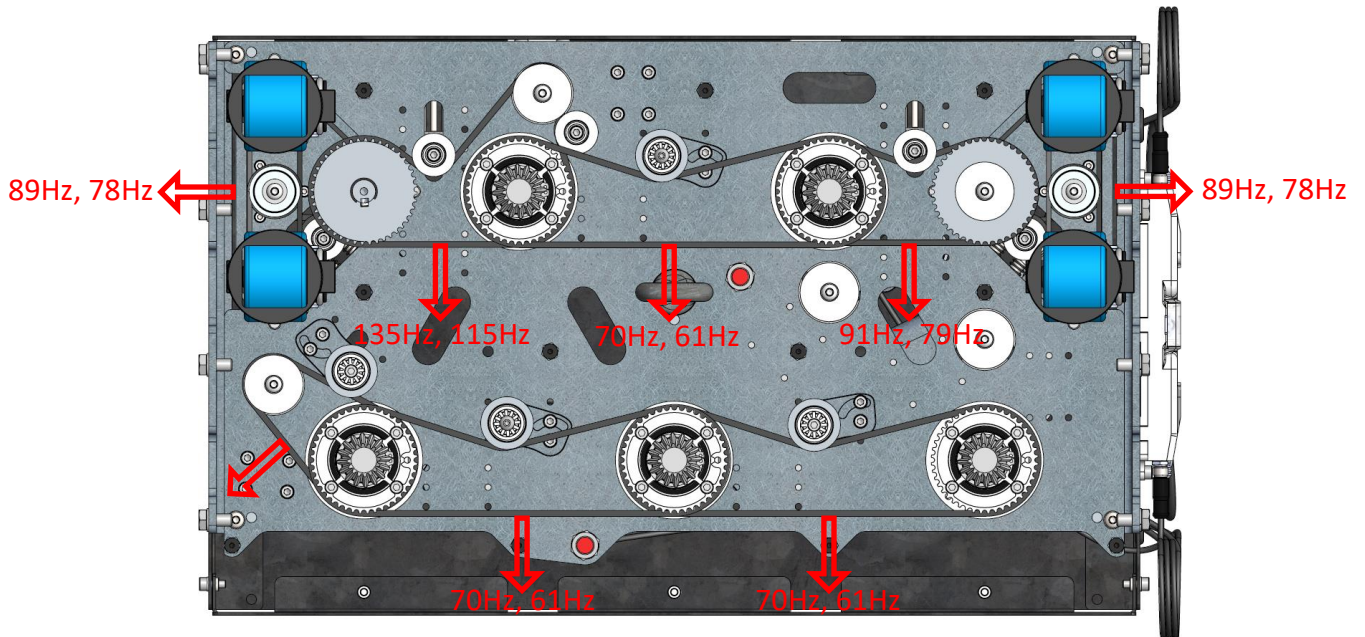
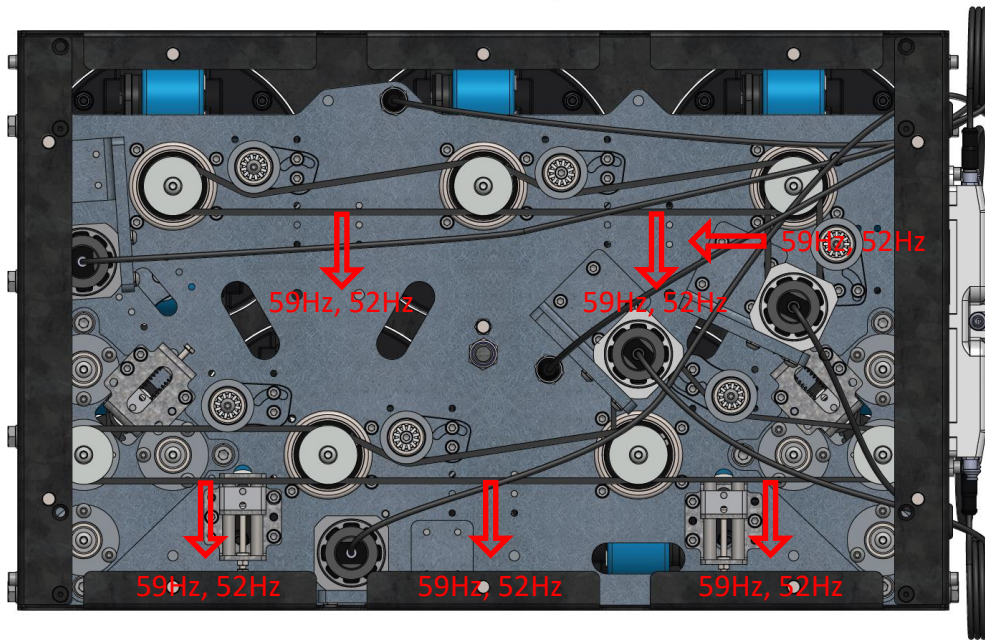
Rotate the tensioner towards the belt and mount the bolts in the tensioner by hand when the tension feels right.

##### **Step 2**

Trigger the belt on the right position and immediately check the belt tension with the meter. If the tension is too high, move the tensioner away from the belt. If the tension is too low, push the tensioner more towards the belt. We accept a deviation of  $\pm 5\text{Hz}$ . See the below table for the right tension on the belts:

Belt	Initial tension value	Running tension value (after 3 months)
265 mm	106 Hz	93 Hz
325 mm	125 Hz	110 Hz
400 mm	89 Hz	78 Hz
425 mm	68 Hz	60 Hz
500 mm	135 Hz	115 Hz
515 mm	59 Hz	52 Hz
630 mm	70 Hz	61 Hz

Please measure the tension on the belts at these positions of the belts:



### 6.7.3 MAINTENANCE AND RE-TENSIONING

Flowsort recommends to check the belt tension after 3 months for sure. After this period, Flowsort recommends to check the belt tension every 8 to 10 weeks. If this is done properly and on a regular base, we can see an improved life time of the belt and for the complete diverters.

## TROUBLESHOOTING

### 7.1 ZIGZAG SORTER TROUBLESHOOTING

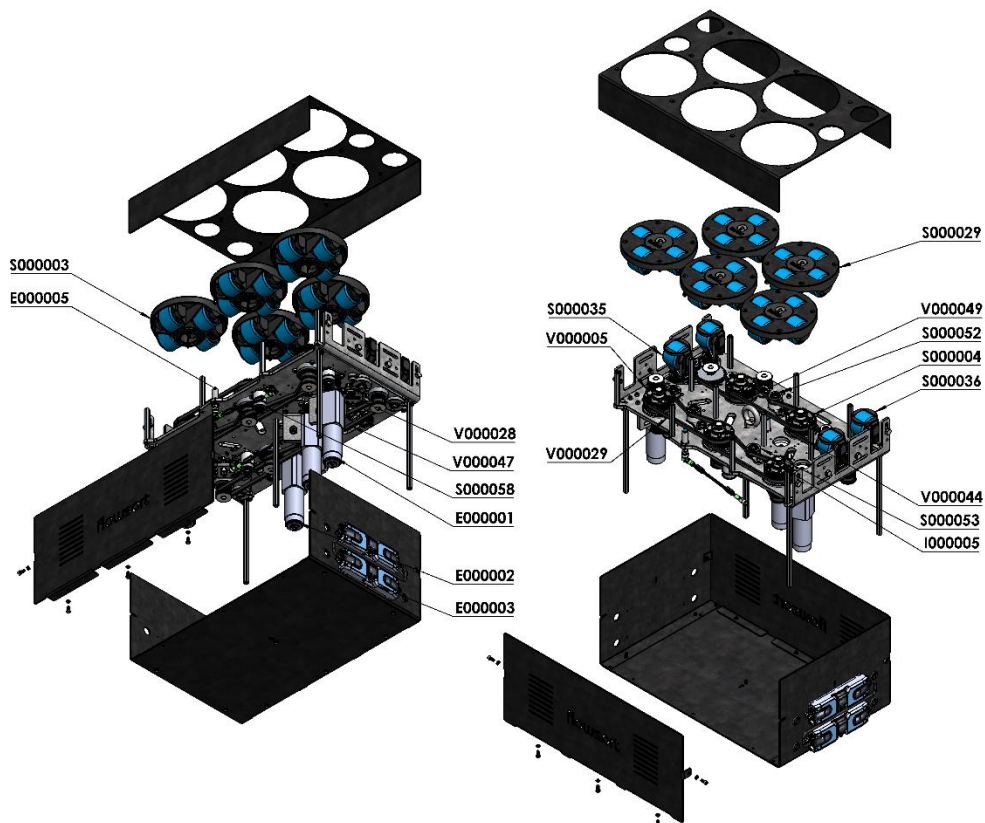
Issue	Cause	Avoidance
Control card does not work	No power	Check power supply
	No signal inductive sensors	Clean sensor located under the wheel drive assembly with a different colour screw
	Broken inductive sensors	Replace inductive sensor
	Zone controller is broken due damaging or used internal fuse	Replace control card
Control card shows failure	Motor is broken due to overheating	Check PGD drive and if necessary replace PGD drive
Wheel drive assembly is not running	Load is too heavy	Use Boost mode option in the control card. It will affect wheel drive speed in a negative way
	Tooth wheel is damaged	Replace tooth wheel
	Tooth wheel of wheel drive assembly is damaged	Replace wheel drive assembly
	Poly-V belt is damaged	Replace wheel drive assembly
	HTD belt is damaged	Replace HTD belt
	Motor is damaged	Replace PGD drive
	Motor cable is damaged	Replace PGD drive
	Control card failure	Check issue "Control card does not work"
	Broken shaft	Replace pulley drive assembly
Wheel drive assembly is not rotating	HTD belt is damaged	Replace HTD belt
	Control card failure	Check issue "Control card does not work"
	Broken inductive sensor	Replace inductive sensor
	Motor is damaged	Replace PGD drive
	Motor cable is damaged	Replace PGD drive
Product flow goes wrong	Unit load is leaving the diverter in the wrong angle	Check software and check inductive sensor
No tension of the belt	Broken/damaged tensioner	Replace belt tensioner



## SPARE PARTS

### 8.1 SPARE PARTS ZIGZAG SORTER

Number	Article code	Description
1	S000003	Wheel Drive Assembly
2	S000004	Pulley Drive Assembly
3	S000029	Wheel Drive Assembly Sensor
4	S000035	ZigZag 2 wheel assembly Left
5	S000036	ZigZag 2 wheel assembly Right
6	S000052	Tensioner Flat High
7	S000053	Tensioner Flat Low
8	S000058	Tensioner Flat High For ZigZag
9	E000001	Motor; PGD024-SE2-11AAA
10	E000002	Motor; PGD024-SE2-15AAA
11	E000003	Controller; Conveylinx-Ai2
12	E000005	M12 Inductive sensor
13	I000005	Bevel Gear Ø10 mm with keyway 3x3
14	V000005	Timing belt HTD 5M-325-9
15	V000028	Timing belt HTD 5M-265-9
16	V000029	Timing belt HTD 5M-630-9
17	V000044	Timing belt HTD 5M-425-9
18	V000047	Timing belt HTD 5M-515-9
19	V000049	Timing belt HTD 5M-500-9



**Declaration of Incorporation of partly completed machinery**  
*In accordance with the EC Machinery Directive 2006/42/EC, Appendix II 1 B*

**Manufacturer:**

**Flowsort B.V.**  
De Hooge Akker 18  
5661 NG Geldrop  
Netherlands

**Flowsort Kft.**  
Gyár u. 2  
2040 Budaörs  
Hungary

**Declare under our own responsibility:**

- We are the producer of the following partly completed machinery to which this declaration relates:
  - Brand: Flowsort B.V.
  - Type: ZigZag sorter 24V
  - Serial number: All numbers
  - Function: Transporting unit loads
- This product is intended to be incorporated in machinery, or to be joined together with other products into a single machine in which the machine directive is applicable. This product is an incomplete machine according to the Machinery Directive 2006/42/EC and therefore does not fully meet the requirements of this directive.

The relevant technical documents are prepared in accordance with Annex VII B of this directive.
- The relevant technical documents (which include the risk assessment) will be kept by us and will be available to national authorities upon a reasoned request.
- It is forbidden to use this product before the machine in which the product is incorporated or of which it forms part is fully compliant with the Machinery Directive.
- The following requirements of annex 1 of Directive 2006/42/EC have not been met: 1.2, 1.2.4.3 and 1.31.
- The machine meets the requirements of the following other EC directives:
  - the EMC-directive 2014/30/EU (as last amended)

## DECLARATION OF CONFORMITY

Concerning The supply of Machinery (Safety) Regulations 2008 (appendix II 1 A)

**Manufacturer:**

**Flowsort B.V.**  
De Hooe Akker 18  
5661 NG Geldrop  
Netherlands

**Flowsort Kft.**  
Gyár u. 2  
2040 Budaörs  
Hungary

**Declare entirely under our own responsibility:**

1. We are the manufacturer of the product:  
Mark: **Flowsort**  
Type: **SLD/DLD diverter + ZigZag Sorter**  
Function: conveying unit loads  
Year of construction: \*  
Serial no: \*  
to which this declaration refers.
2. The machine has been designed and built conforming with the requirements of The supply of Machinery (Safety) Regulation 2008
3. The machine meets the requirements of the additional EC directives shown below:
  - Electromagnetic Compatibility Regulations 2016

4. The machine has been designed and built in conforming with the European Standards:

BS-EN-ISO 12100-1:2010

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

BS-EN-IEC 60204-1:2018

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


**Note: This Declaration does not include all issues concerning the control system, such as: the wiring, programming and supply of control components for this is delivered by another party.**

**Date:**

03-01-2023

**Signed by:**

Till Zupancic - Flowsort BV



**Flowsort B.V.**  
De Hooe Akker 18  
5661 NG Geldrop  
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