GENIUS 640-1200 Optical Sorter

Pre-installation Guide

II. Unpacking and placing of GENIUS sorter

2.1. Unloading and unpacking

The **GENIUS** optical sorter and any other equipment delivered will be unloaded and unpacked by the Purchaser. If while doing so the Purchaser detects any damage, he will inform **BEST** within three working days from receipt. He will also take all necessary measures to be able to prove the nature and extent of such damage (by taking photographs or recording on video). If the Purchaser detects any freight damages, he will make a reservation on the carrier's waybill (CMR – document).

**Please contact us if you notice any damages,
either on the crates or on the plastics covering the crates.**

Attention:
**In case the crates are
DAMAGED, DO NOT UNPACK.**

Take pictures and describe the visible damage and send the information to:

**BEST Eindhoven BV,
Marinus van Meelweg 20,
5657 EN, EINDHOVEN,
THE NETHERLANDS**

**General tel. +31 (40) 292 2622 –
Service tel. +31 (40) 292 2620 –
Fax. +31 (40) 292 2633 –**

Email: service.BNL@bestsorting.com

or

**BESTnv
Research Park Haasrode
Romeinse straat 20
B-3001 HEVERLEE
BELGIUM**

**General tel.: +32 (0)16 396 396
Service tel.: +32 (0)16 396 386
Fax: +32 (0)16 396 390
Email: service.BBE@bestsorting.com**

2.2. Contents of the pallets / crates

Usually the machinery will be loaded directly on the truck, but it can also be packed in special crates, depending on the destination and the kind of transport. In general a number of additional parts and some spare parts packed in separate crates or pallets will be sent along with the **GENIUS** sorter unit.

Table 2.1

Crate + Machine Part GENIUS 640 mm	max. Dimensions (mm/inch)			Crate weight (kg/lbs)
	L	W	H	
GENIUS Sorter Unit	3345/132	1280/51	2320/92	max. 1800/4000
Infeed Shaker	1800/71	650/25.5	1270/50	max. 750/1650

Crate + Machine Part GENIUS 1200 mm	max. Dimensions (mm/inch)			Crate weight (kg/lbs)
	L	W	H	
GENIUS Sorter Unit	3345/132	1930/76	2320/92	max. 2200/4850
Infeed Shaker	1800/71	1300/51	1270/50	max. 1000/2200

List of parts on the crates:

- 1 **GENIUS** optical sorter + 4 Adjustable Feet
- 1 Infeed Shaker + 4 Adjustable Feet
- 1 Accept Shaker/Belt (sometimes mounted on sorter frame) Optional
- 1 Reject Shaker/Belt (sometimes mounted on sorter frame) Optional
- Return system (shakers/belts for DRS or ARS system) Optional
- 1 Cooling Unit Optional
- 1 Fan Box Assembly (With laser box option)
- Plastic Pipe for Fan Box: 4 m (With laser box option)
- 1 Nitrogen Overpressure Regulator (With laser box option)
- 25m Nitrogen tubing ø6 mm (With laser box option)
- Background Drums (With laser box option)
- 1 Set of door keys
- 2 **GENIUS** Manuals
- 1 Standard Spare Parts Box (recommended) Optional

2.3. Technical data

On the location where the GENIUS will be placed in the production line, the necessary piping for water and compressed air, and the wiring for electricity has to be provided by the Purchaser.

For more information on the exact position of the different connections on the sorter, please check the pictures on the next pages and the electrical schematics in the Attachments chapter.

General requirements

Operating temperature : between +5°C and +40°C (23°F to 104°F)
Outside this temperature range, heating or cooling must be added.
Relative humidity : max. 90% / non-condensing

Electrical requirements

Voltages : 3 phase 400V (+ neutral & earthing) (+/- 10%)
Electrical power : 6 kVA
Frequency : 50 or 60 Hz

For the incoming 3-phase electrical supply a fuse of 25A will be needed, with 4 mm² wires (11 AWG). The fuse needs to be at least CLASS C, with a switch-off current of 10 to 14 times the nominal current.
If these voltages are not available in your factory, a separate transformer can be provided by **BEST** on specific demand.
If additional optional machinery (e.g. cooling unit, compressor unit, ...) is needed, additional separate electricity supplies may have to be provided. For more information about the specific electrical requirements of this additional machinery, please check the corresponding paragraph in this chapter and the user manual(s) in the Attachment chapter at the back of this manual.

Compressed air requirements

Minimum pressure : 6-7 bar (90-100 PSI) (on the sorter connection)
Typical consumption : 400/1500 L/min (14/53 cfm) depending on configuration
Max. consumption : 10000 L/min (177 cfm)
Quality : filtered 40 µm oil, water and dust free
Connection : 1" (1 inch) (Gaz) female
Tubing : 2" (2 inch) tubes

Water requirements

Water pressure : between 1 and 3 bar (15 to 45 psi)
Temperature : between 5°C and 12°C (41°F to 54°F)
Max. consumption : 500 l/h (132 gal/h)
Connection : 14 mm (0.55") inside (inlet & outlet)
Quality : lime-free and reusable (add glycol if necessary).
If a separate cooling unit is being used, please check the user manual of said cooling unit for the specific water requirements.

There may be several independent water connections on the **GENIUS** sorter, depending on the configuration: on top of the sorter unit (internal cooling circuit in/out), underneath sorter unit (cleaning of bottom unit and cleaning belt, bull nose return axle). For more information on the exact position of the different connections, please check the pictures on the next pages and the electrical schematics in the Attachments chapter.

Clean air fan box requirements (only with laser box option)

Position : a place where dry, clean air is available
Electrical connection : wired to and controlled by **GENIUS** sorter unit
Mechanical connection : thin-walled plastic tubing to sorter unit
ø 80 mm (ø 31.4 inch), 4 m (+/-13ft) length provided by BEST

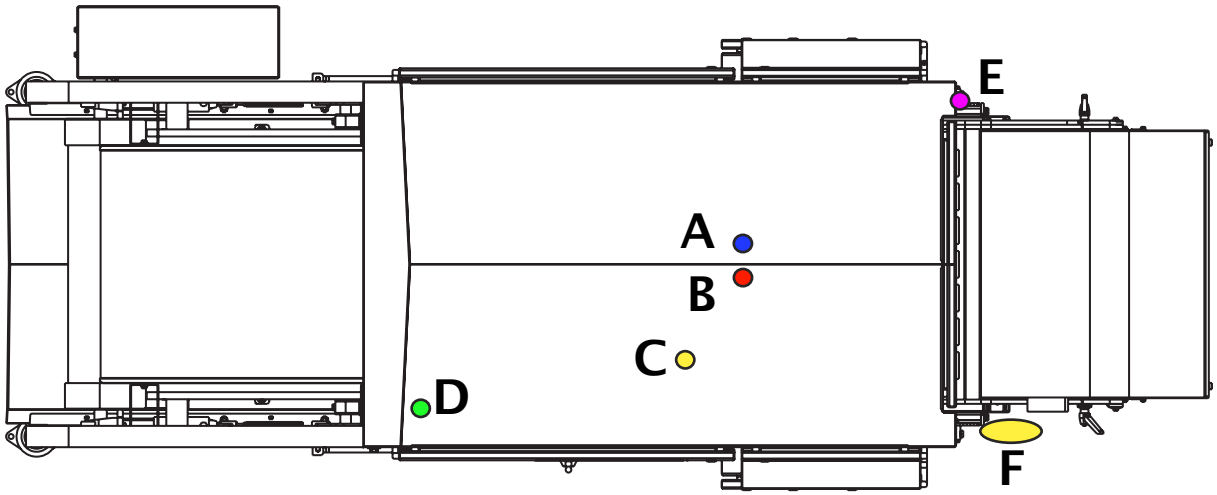
Nitrogen specifications : N_2 - Grade 5.0

Purity (vol/vol%) : 99.999
Cylinder size-contents : B50 - 10 m³
Outlet nitro bottle must be : G 1/2" (inch) x 14, male

Attention! *- It may be necessary for the Purchaser to buy a coupling piece if the connections of local nitrogen bottles do not match these requirements.*

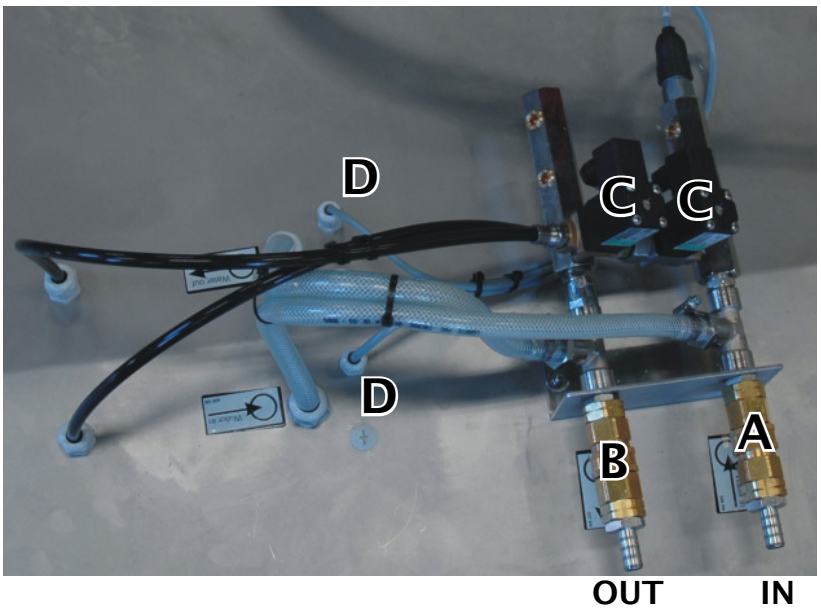
Technical schematics and pictures are always seen in the same direction as the product stream, please take this into account when interpreting left or right in this manual.

Picture: Top view Genius 640: Water, electricity, nitrogen & compressed air connections



A: Water input; from cooling unit (14 mm / 0.55" inside)
B: Water exit; to cooling unit (14 mm / 0.55" inside)
C: Compressed air supply (1" Gaz)
D: Electricity supply sorter
E: Nitrogen connections (only with laser box option)
F: Clean air fan box tube connection (only with laser box option)

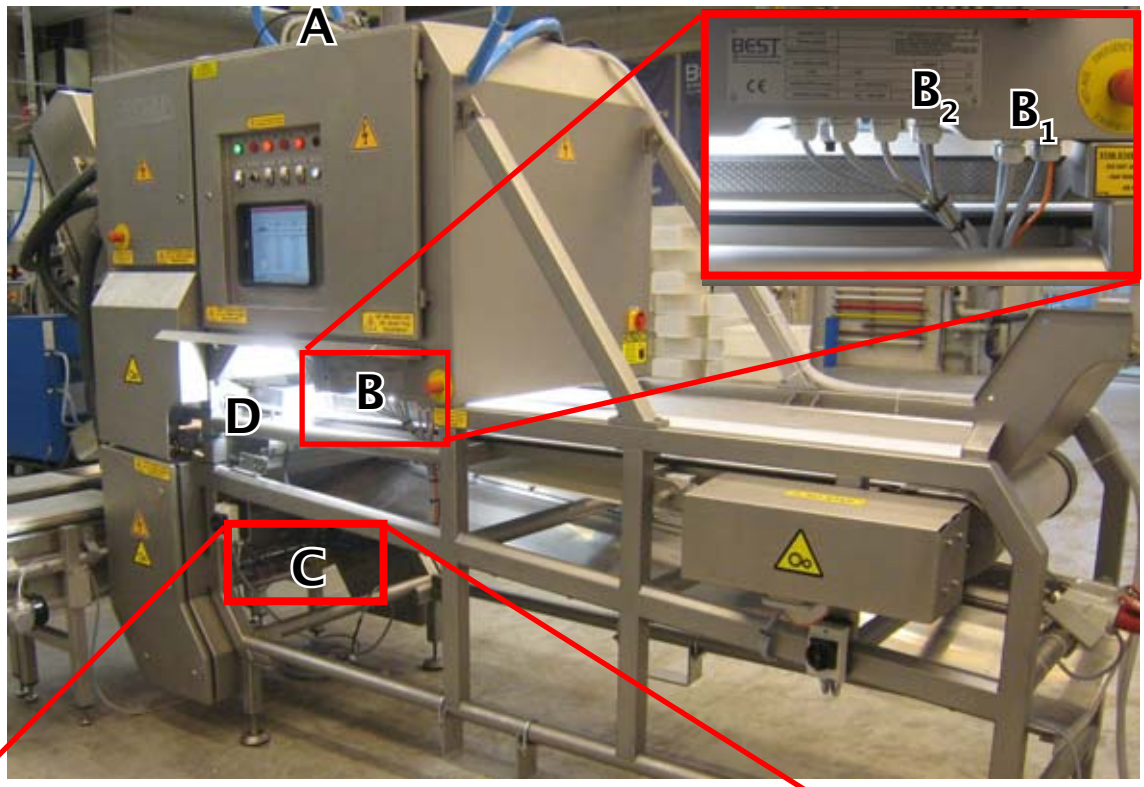
Picture: Connections for cooling water on top of sorter cabinet

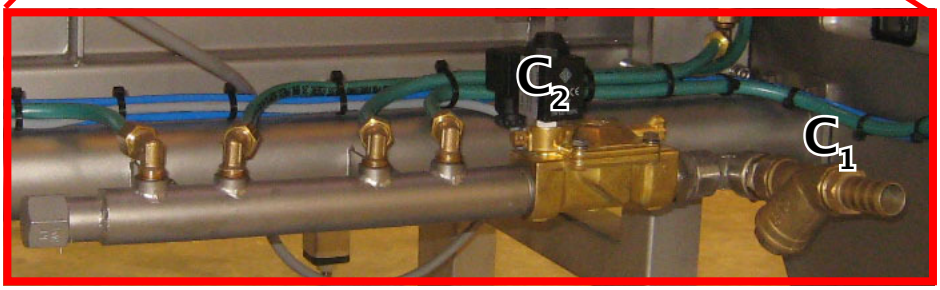


Picture: Fan box connection

A: Water input; from cooling unit
B: Water output; to cooling unit
C: Electronic water valves for laser box water circuit (option)
D: Control cables of the electronic water valves

Picture: Side view Genius 640 water for cleaning & connections for belts and shaker motors





A: Water & compressed air connections on top of sorter unit
B: 1. Connections to detection belt motor & infeed shaker motors (usually on same side as belt motor).
2. Connections to motors of the (optional) output belts
C: 1. Water input for cleaning system of (optional) FSV unit
2. Electronic water valve
D: 1. Water input for belt cleaning system
2. Optional alternative water input

2.4. Installation

2.4.1. Lifting the GENIUS sorter unit

Always use proper lifting equipment adequate for lifting a machine of this size and weight. The **GENIUS** sorter unit weighs maximum 2200 kg (4850 lbs) for the 1200 mm type or 1800 kg (4000 lbs) for the 650 mm type. Please, be aware of the fact that the **centre of gravity is NOT in the middle of the machine**.

When using a forklift to lift the **GENIUS** sorter unit, please note the **lifting handles** that have been mounted on the frame for this purpose. Put the one part of the fork of the forklift in the handles, and the other underneath the cabinet, to ensure the weight of the unit is properly divided. These handles can be removed by the customer. When moving the sorter unit, please first place back the lifting handles.

Picture 2.4.1: Lift sorter unit using the handles on tube frame underneath the sorter unit

After the sorter unit has been placed in the production line, it must be placed level. This is very important, especially for the rotating parts such as the drive drum and the return axle of the conveyor belt. It should be sufficient to check the position of the tube frame underneath the sorter unit. Adjustments can be made using the adjustable legs underneath the machine.

2.4.3. Placing the different units

Once the **GENIUS sorter unit** (see **2.5.2. The GENIUS sorter unit**) has been placed in the production line, lift the shaker unit and turn in the adjustable feet.

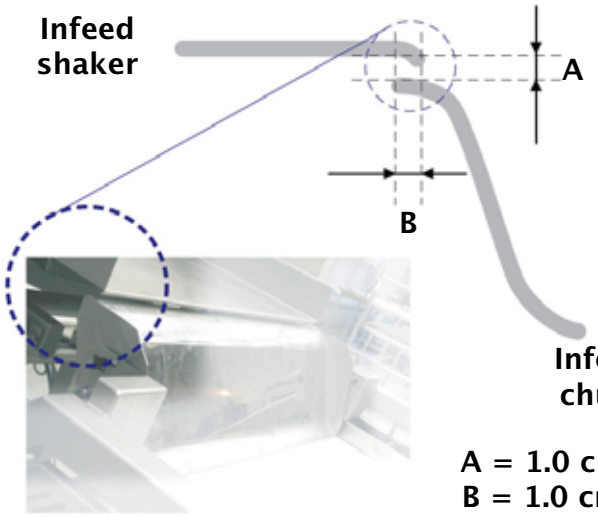
– Move the shaker up against the front of the sorter unit:
With infeed chute: the gap between the infeed shaker nose and the infeed chute of the sorter unit should be no more than 1.0 cm (0.4") in height. The nose of the shaker should overlap the beginning of the infeed chute by approximately 1.0 cm (0.4").

Without infeed chute: the gap between the infeed shaker nose and the belt drive drum should be no more than 1.0 cm (0.4") in height. The nose of the shaker should overlap the highest point of the belt drive drum by approximately 1.0 cm (0.4").

(For further details see **2.5.3. The Infeed shaker**)

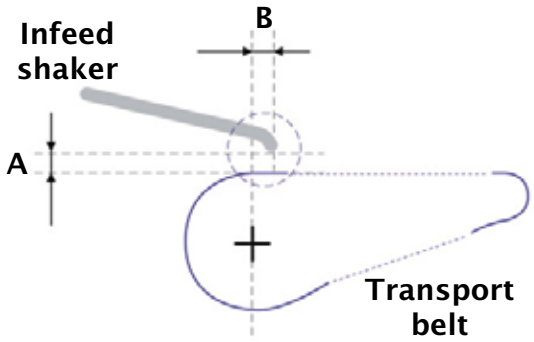
Picture 2.5.11: Relative position of infeed shaker

(sorter with infeed chute)



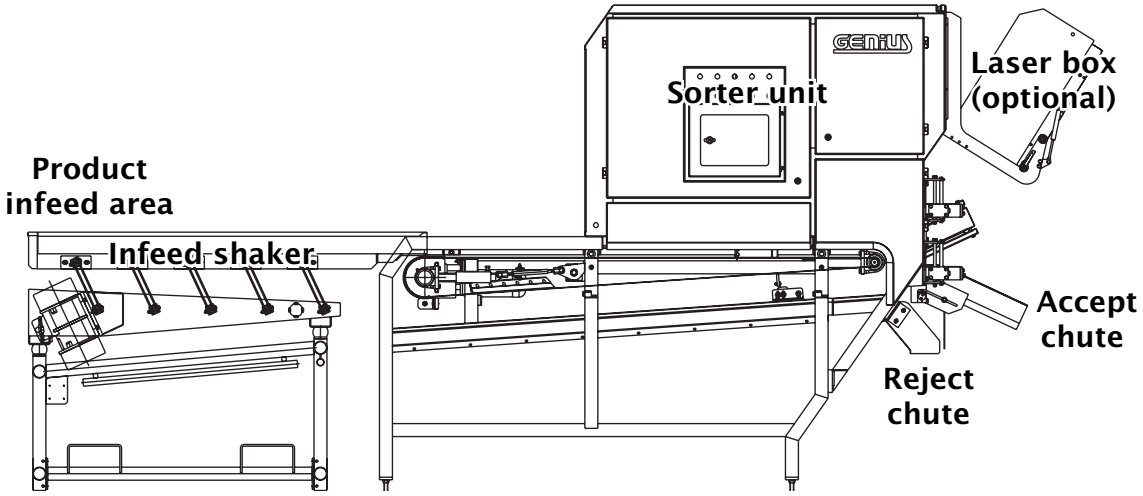
A = 1.0 cm (0.4")
B = 1.0 cm (0.4")

(sorter without infeed chute)



Attention : ***- Do not fix the sorter unit or the shaker frame to the ground before the final position has been determined and approved by BEST's service engineer during the commissioning.***

Picture: Placing the shaker unit



Next the **output shakers / belts (optional)** can be placed underneath the sorter unit.

- Often the output shakers/belts will already be mounted and fixed underneath the sorter unit in the factory before the sorter installation is shipped.

- When the shakers/belts still have to be installed, please go to subchapter **2.5.4. Output Shakers/Belts (optional)** for more information. It is always advisable to place the output sides of these shakers/belts on the side of the touchscreen, so as to enable the operators to easily check the accept and the reject (e.g. the percentage of good product in the reject) while setting the sensitivities.

And finally, all extra optional equipment that may be necessary, such as cooling unit, compressor, etc. ..., should be placed.

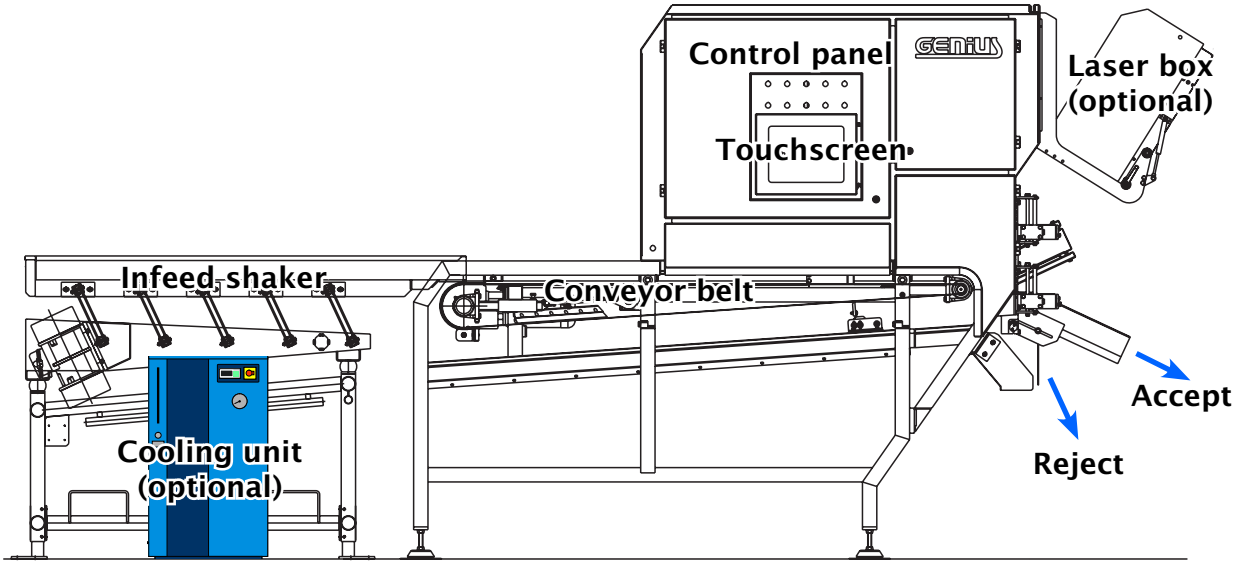
- The cooling unit should be placed as close to the sorter as possible, bearing in mind that enough space must be available around the cooling unit to ensure optimal operation, and give easy access to the machine for the service personnel (see **2.5.7. The Cooling unit**).

When the optical sorter unit, the infeed shaker, the output shakers/belts (optional), and all other optional equipment have been placed in the production line, they should all be placed level.

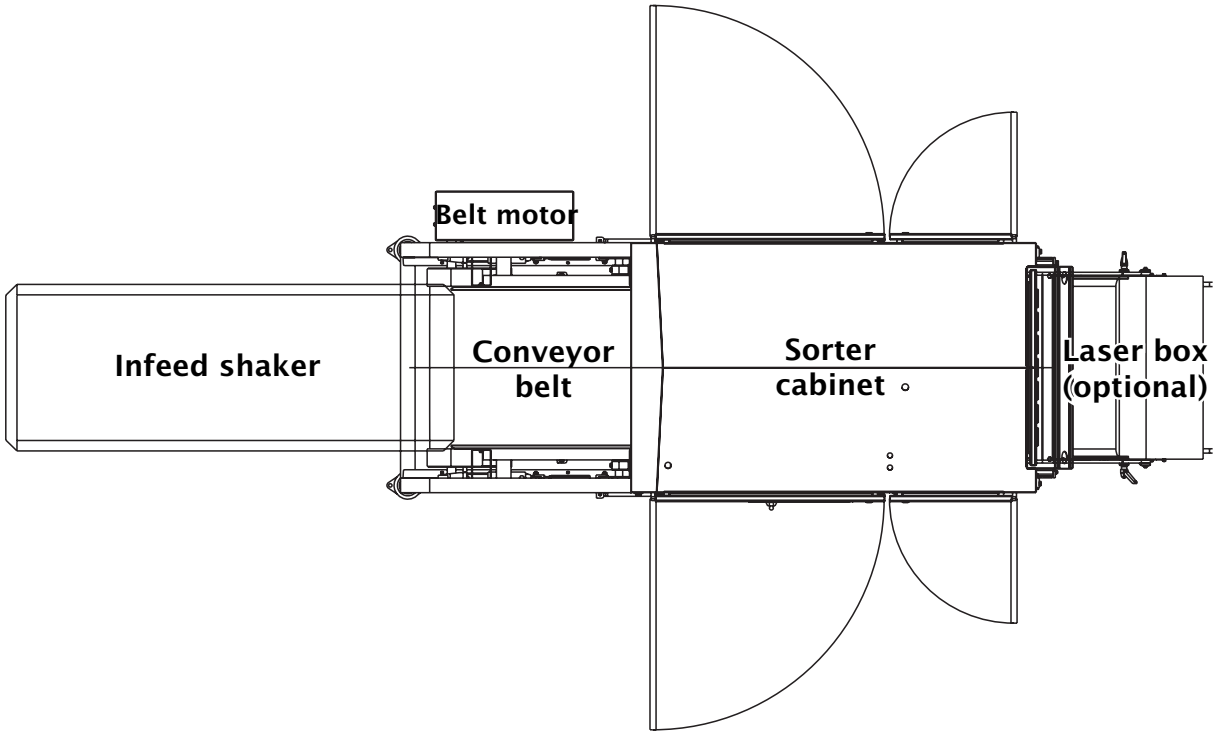
Remark: *- It may be advisable to make sure the infeed shaker is placed slightly sloping towards the sorter unit, to prevent water from remaining in the shaker pan (for better hygiene).*

The following pictures present an overview of the positions of the different units from different viewpoints.

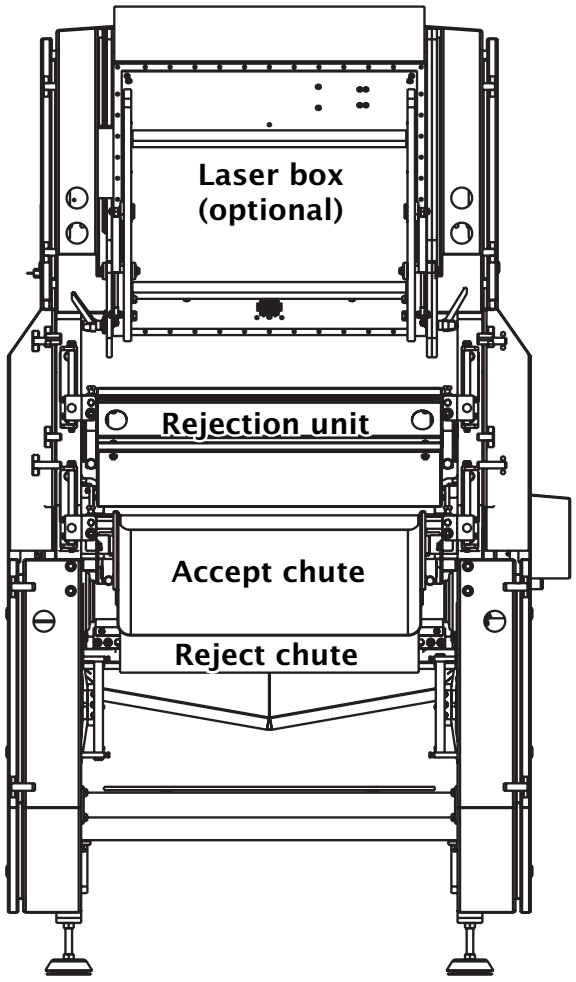
Picture: Side view of the **GENIUS** optical sorter installation



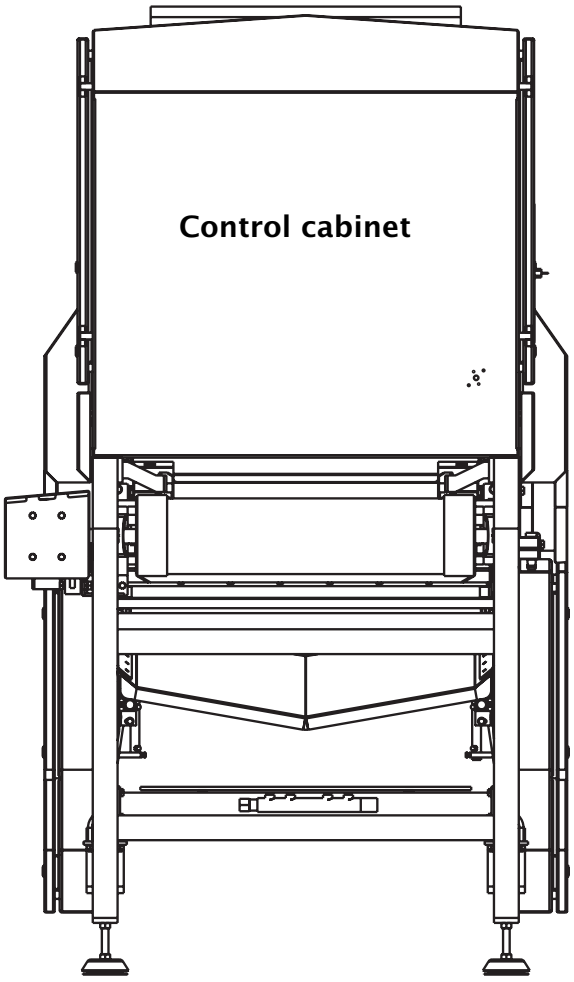
Picture: Top view of the **GENIUS** sorter installation



Picture: Front view **GENIUS** sorter unit



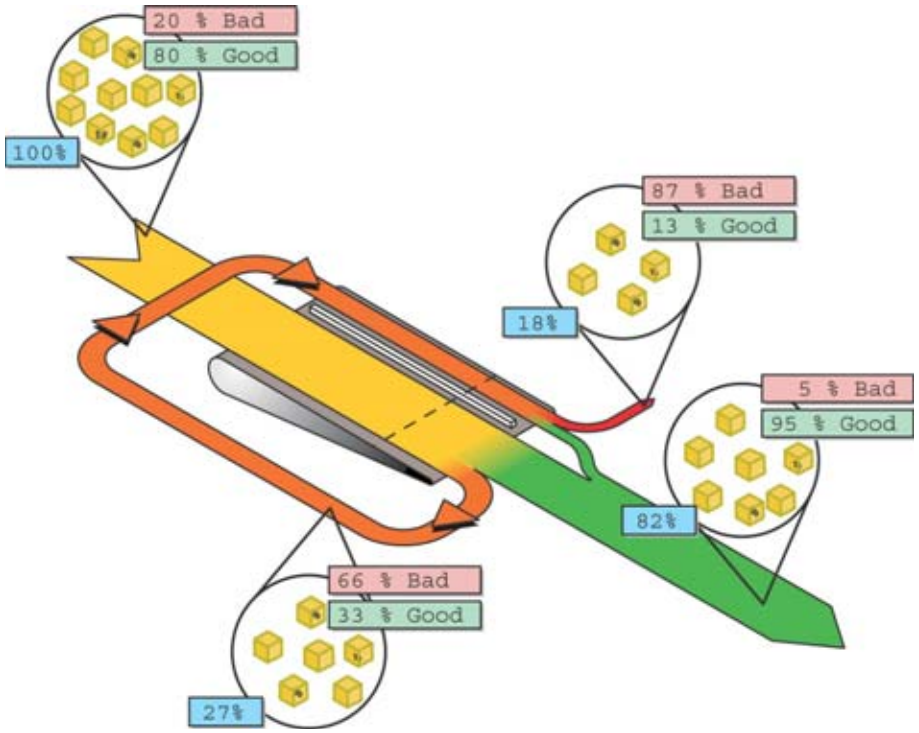
Picture: Rear view **GENIUS** sorter unit



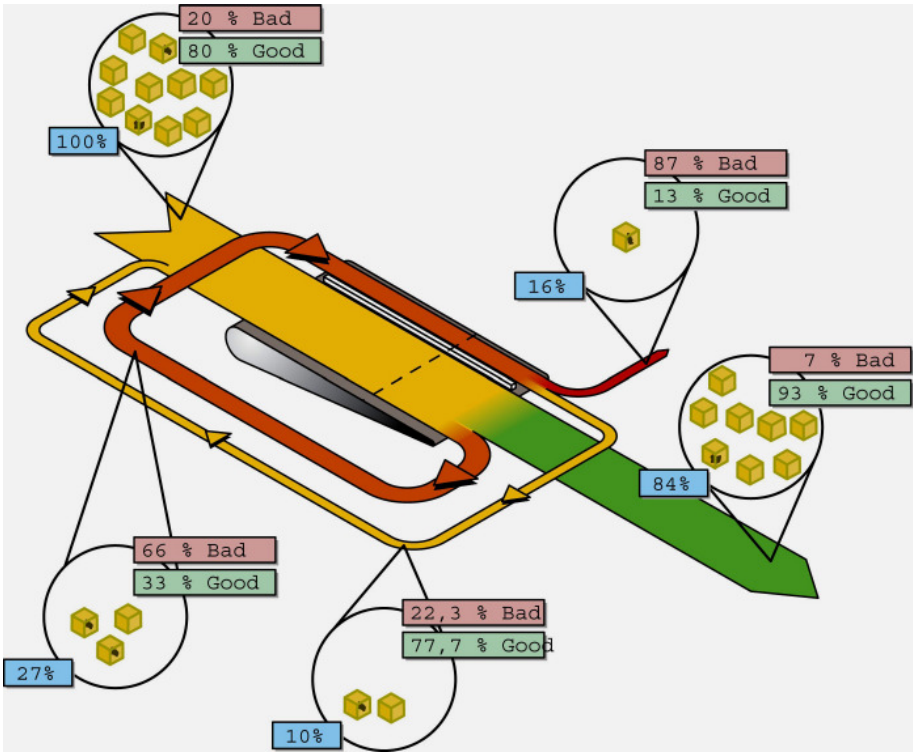
DRS or ARS systems

In case of DRS or ARS (Defect Return System or Accept Return System, see pictures underneath) specific installation schematics will be sent to you along with the confirmation of the order. These will also be included in this manual and will contain all data relevant to the mechanical installation of these systems. (The percentages in the following pictures are just examples and in no way representative for any particular product.)

DRS-system



ARS-system



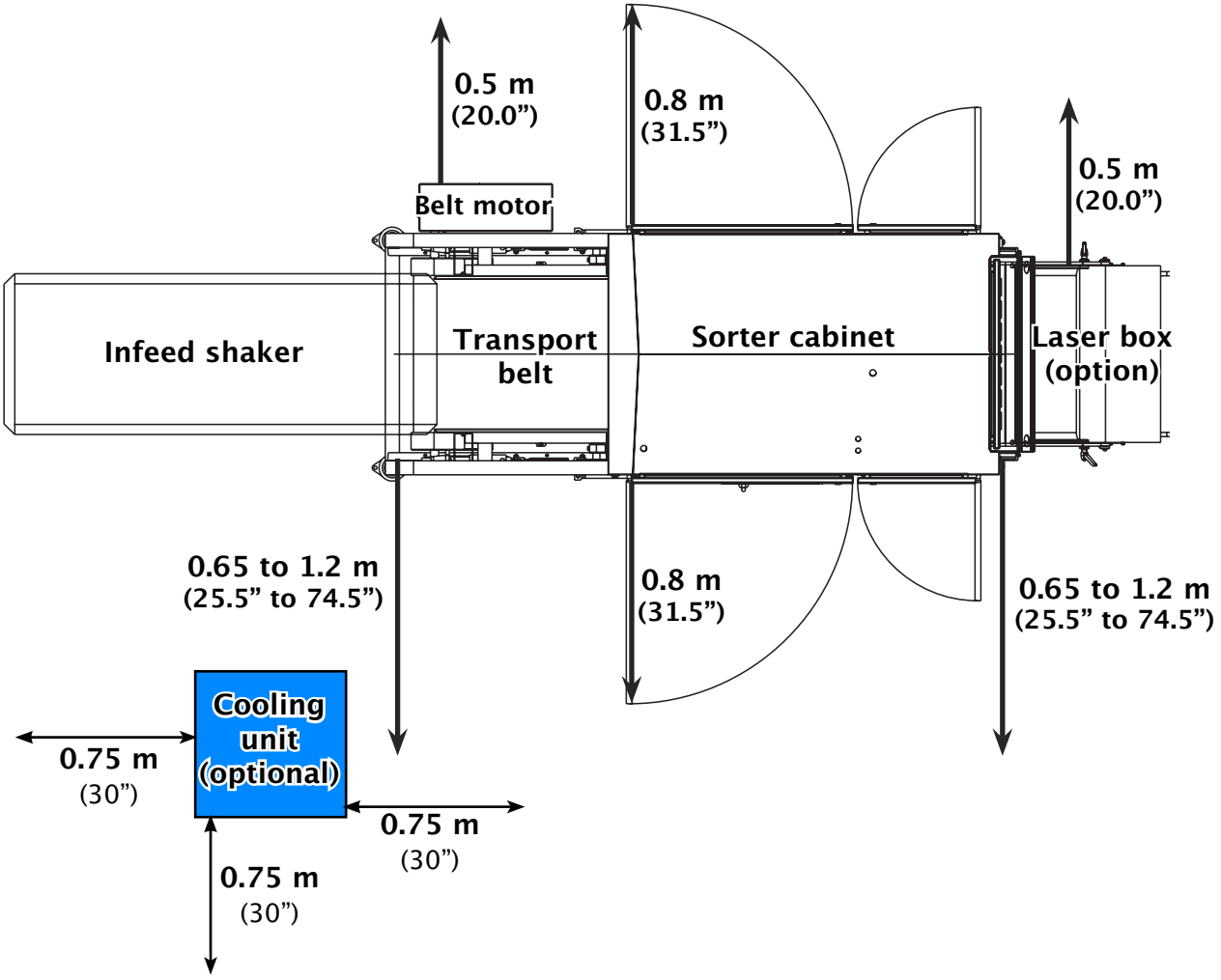
2.5. Full Pre-installation list

2.5.1. Preparation of the area

When preparing the area where the **GENIUS** sorter is to be installed, all factors that might impede its proper functioning should be avoided (vibrating floors, steam formation, freezer vapour, contact with other machines, extreme temperature variations, etc...). The Purchaser therefore has to arrange this with **BEST** in advance. The Purchaser will be responsible for providing and preparing the area where the sorter, the infeed shaker, the optional output shakers/belts and all other accessories or optional equipment have to be installed. He will have to prepare this area before the date of delivery. Drawings of the **GENIUS sorter installation** will be provided with the order confirmation by **BEST** after the signing of the contracts.

Attention: *- Make sure to allow enough space (minimum 0.8 m / 31.5") for the opening of all cabinet doors on both sides of the* GENIUS*.*
- There also has to be enough free space (minimum 0.5 m / 20") on both sides (left and right) of the GENIUS *to allow free access to all parts.*
- At one side of the GENIUS *sorter unit, opposite to the drum drive motor, it is advisable to leave extra space (min. 0.65 m / 25.6" for the GENIUS 650 and 1.2 m / 74.3" for the GENIUS 1200) to enable the replacement of the detection (transport) belt and the reversing axle/ bull nose.*

Picture 2.5.1: Free space needed around sorter installation

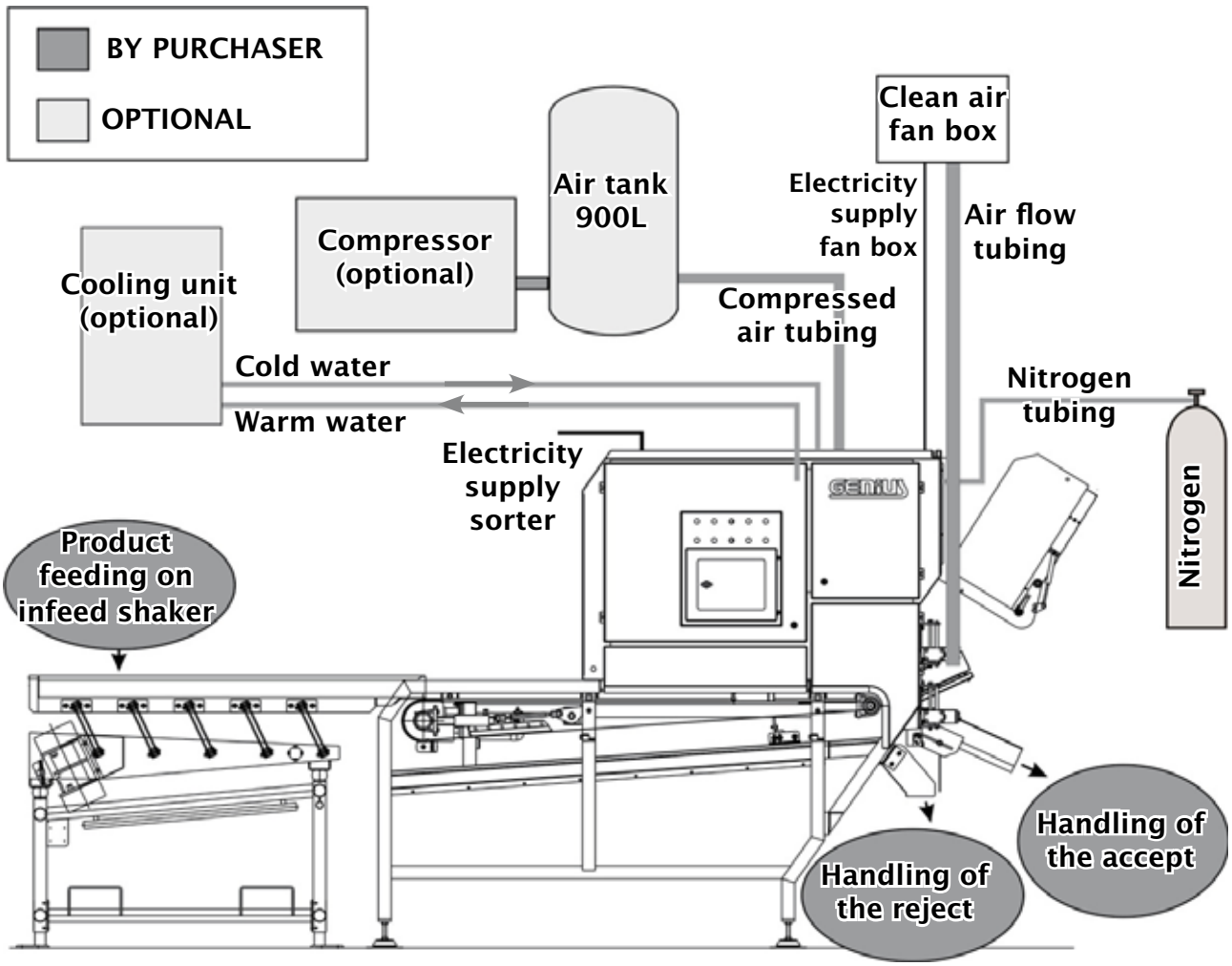


2.5.2. The GENIUS optical sorter

Mechanical mounting of the GENIUS sorter installation

The Purchaser will take care of the mechanical installation of the **GENIUS** sorter installation in the area agreed upon. To this end he will provide all necessary and appropriate lifting, hoisting and transporting devices.

Picture 2.5.2: Complete installation schedule



Installing the GENIUS optical sorter

The Purchaser will provide and install all pipes and tubing for water, nitrogen (optional), compressed air and wiring for electricity.

The electrical wiring and the compressed air tubes have to be laid up to the connection ends of the machine. The Purchaser should connect the necessary piping and tubing for water, pressurized air and nitrogen (optional) to the **GENIUS** sorter unit, the clean air fan box (optional) and the cooling unit (optional). The wiring for the electricity should be laid with the cable ends reaching into the machine parts, but all final connections shall be made by the installation engineer from **BEST**. All piping, tubing and wiring should be installed without initiating electricity, water, nitrogen or compressed air supply. If new pipes are used, please make sure to flush the pipes for a considerable number of minutes (+/- 15 min.) before connecting the tubes to the sorter installation. The last end of the compressed air tubing should always consist of flexible tubing, so as to allow some flexibility when positioning the machine.

Attention : *- Do not fix the sorter unit to the floor before the final position has been determined by* **BEST***'s service engineer during the commissioning.*

The purchaser will also install all necessary operating panels (starters, circuit breakers, cables, etc...) between the **GENIUS** sorter installation and the local power grid, as and when mandatory under local legislation. **BEST**'s service engineer will do a complete check-up on the sorter installation and make all necessary adjustments to put it in perfect working order before setting it into operation.

Attention: *- Do not weld on or near the sorter installation.*

- Do not fix items on any of the sorter units without consulting **BEST***, for this could seriously obstruct service and operation of the machine.*

- Never fix any of the sorter parts to the floor before the position and location of all parts has been approved by **BEST**'s *installation engineer.*

- Make sure there is enough free space (minimum 0.5 m (20")*) around all sorter units, so as to leave all parts accessible for service and repair by* **BEST** *engineers.*

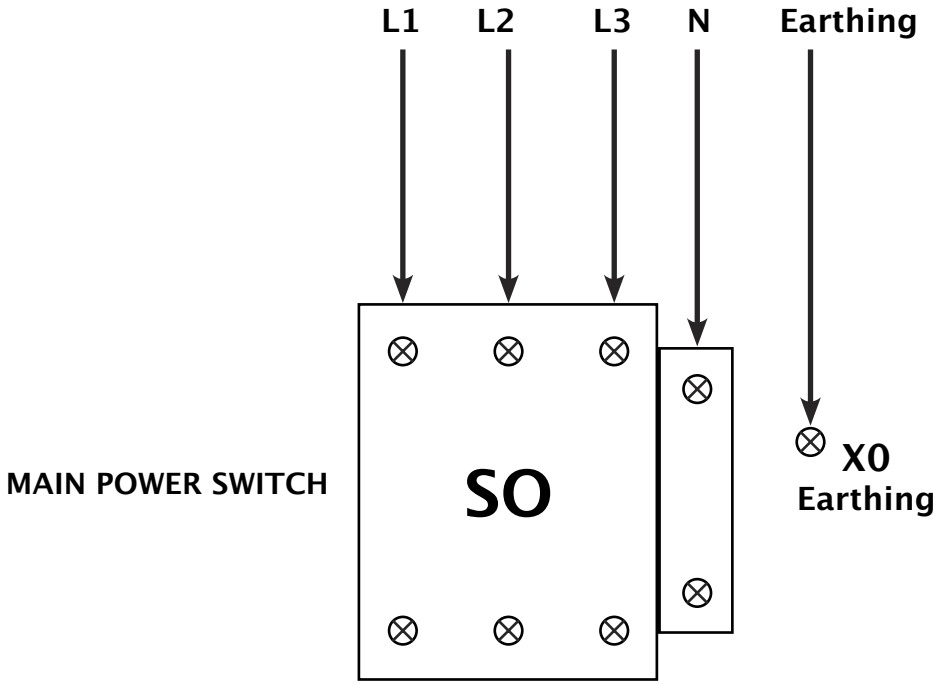
- Do not initiate the electricity, water, nitrogen and/or compressed air supply before the installation engineer has approved the installation.

- Make sure the sorter units do not come into contact with any other machinery, in order to avoid the transfer of vibrations to the shaker, which might seriously hinder the sorting process and in certain cases cause damages to the sorter which are not covered under warranty.

GENIUS Electrical Power Connections

a) Standard Electrical Connections (no transformer needed)

– 3 phase 400V (+ neutral & earthing), 6 kVA, 25A, 4mm² (AWG 11), 50 Hz (or 60 Hz USA)

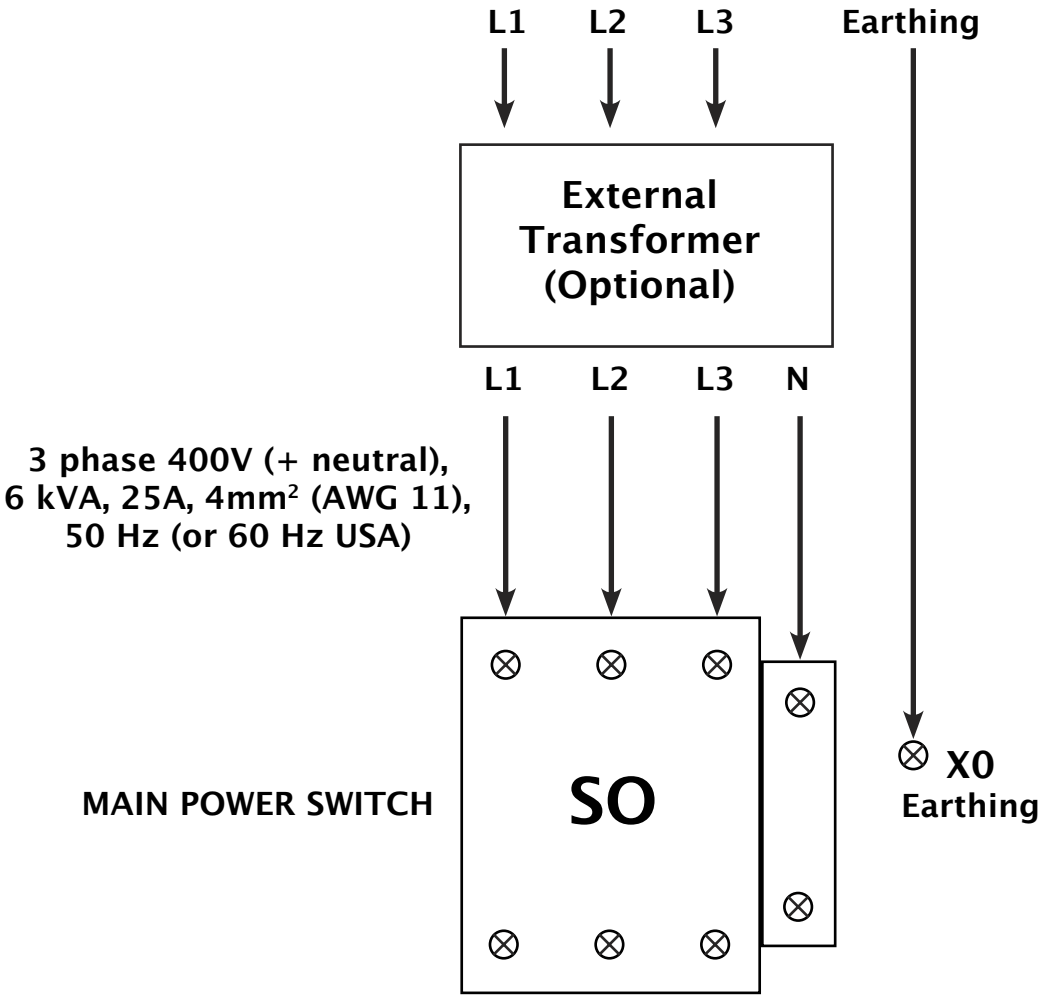


If these voltages are not available on site, an external transformer will be needed. This is the responsibility of the purchaser. On specific request an optional external transformer can be provided by **BEST** along with the sorter, but it has to be installed and connected by the Purchaser before the installation visit by the **BEST** engineer, for more info on how to install and connect the optional transformer, see next page).

THE ELECTRICAL CIRCUITS SHOULD BE FUSED AND NO OTHER ELECTRICAL APPLIANCE SHOULD BE CONNECTED TO THE CIRCUIT.

ALL ELECTRICAL WIRING MUST BE IN ACCORDANCE WITH NATIONAL AND LOCAL ELECTRICAL CODES.

b) Electrical Connections with optional external transformer
(Only on specific request by customer, if the normal 3 phase 400V is not available)

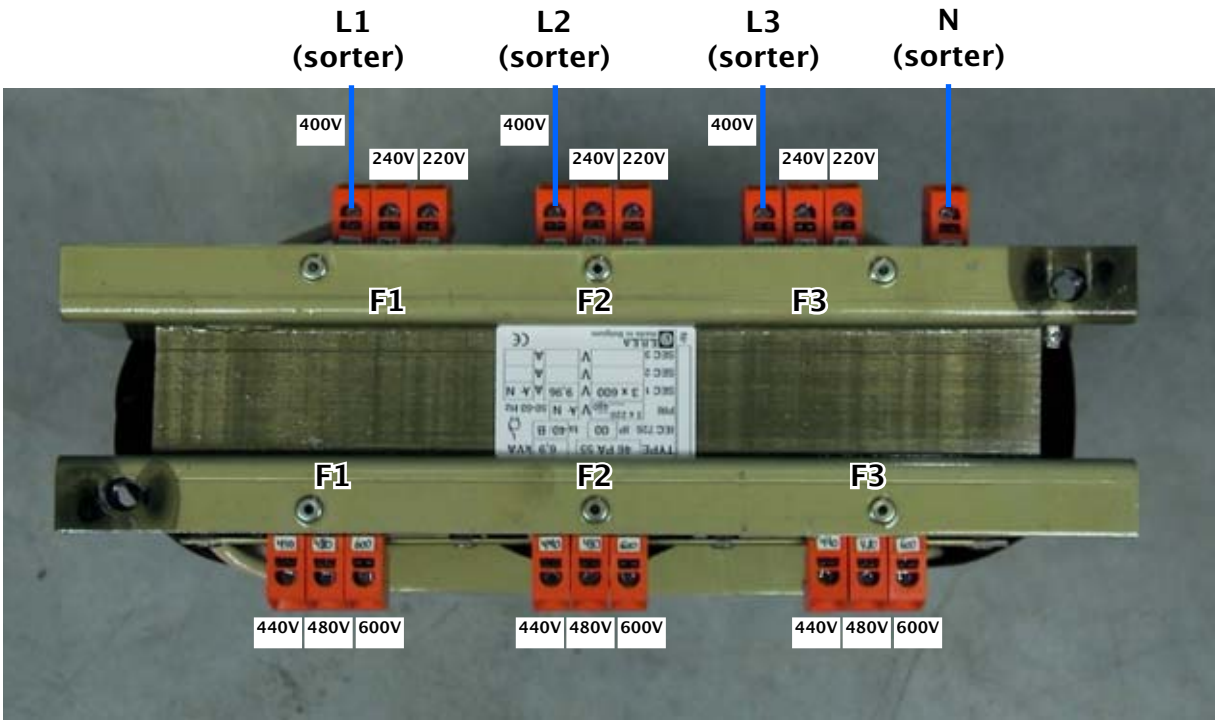


The Transformer needs to be installed in a secure and dry area.
AVOID EXPOSURE TO WATER

3-phase external transformer: Type 46 PA55; 6.9 kVA	
Voltage U [V]	**Fuse I [A]**
220 V	25 A
240 V	20 A
400 V	20 A
440 V	10 A
480 V	10 A
600 V	10 A

Connections on 3-phase optional external transformer:
(Only available on special request if no 3 x 400V power supply is available.)

Picture: Connections on optional 3-phase external transformer



To adjust incoming and outcoming voltages on the optional external transformer:

- Remove the cover of the external transformer.

- Check which 3-phase voltages are available in the plant and use the highest voltage available on the primary side of the transformer.

- Next connect the earthing cable to the earthing connection and connect the three cables of the incoming power supply to the appropriate connections, see labels on connections (see picture above).
  - In case the available voltage differs somewhat from the voltages indicated on the transformer, simply choose the voltage closest to the available voltage, if in doubt, choose the somewhat higher voltage on the transformer.

- Connect the 400V secondary power and the neutral connection on the transformer to the sorter connections (see picture above and on previous page).

- Place the cover of the external transformer back.

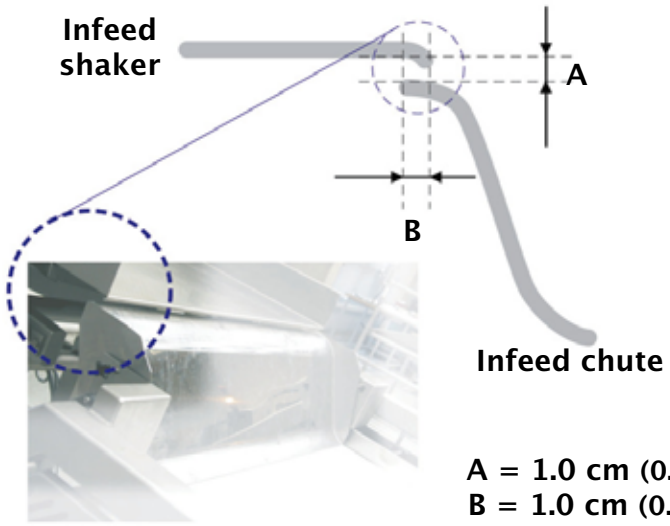
2.5.3. The infeed shaker

The infeed shaker arrives on a separate pallet or crate. The Purchaser will take care of the mechanical mounting of the infeed shaker and put it in position in front of the sorter unit. The distance between the infeed shaker and the machine should be as indicated in the drawing below. The distance between the nose of the infeed shaker and the infeed chute of the machine should be approximately 1.0 cm (0.4"). The final position of the infeed shaker depends on the product and will be determined by **BEST**'s service engineer during the installation, it is therefore important not to fix the shaker or/and sorter unit to the floor.

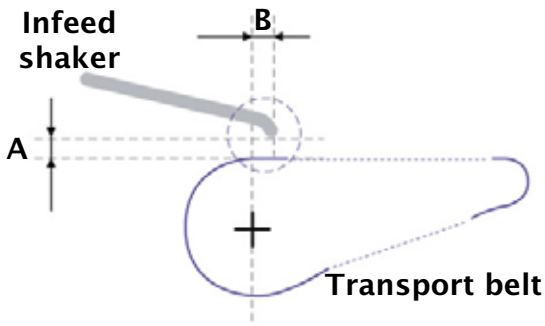
Attention: *- Do not fix the shaker frame to the floor before the final position has been determined by* **BEST***'s service engineer during commissioning.*

Picture 2.5.11: Relative position of infeed shaker

(sorter with infeed chute)

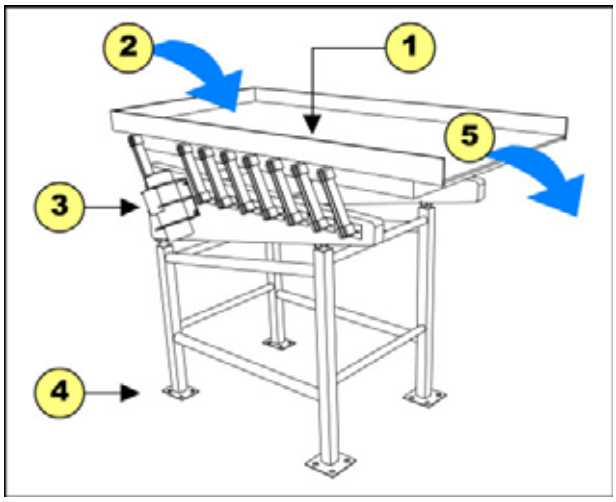


(sorter without infeed chute)



A = 1.0 cm (0.4")
B = 1.0 cm (0.4")

Picture 2.5.12: Infeed Shaker



1. **Shaker table**
2. **Product infeed shaker**
3. **Shaker motors**
4. **Adjustable feet**
5. **Product outfeed (towards sorter)**

The infeed shaker is electrically controlled by the **GENIUS** sorter unit, and all wiring has been provided by **BEST**. The necessary connections inside the sorter unit will be made by the installation engineer.

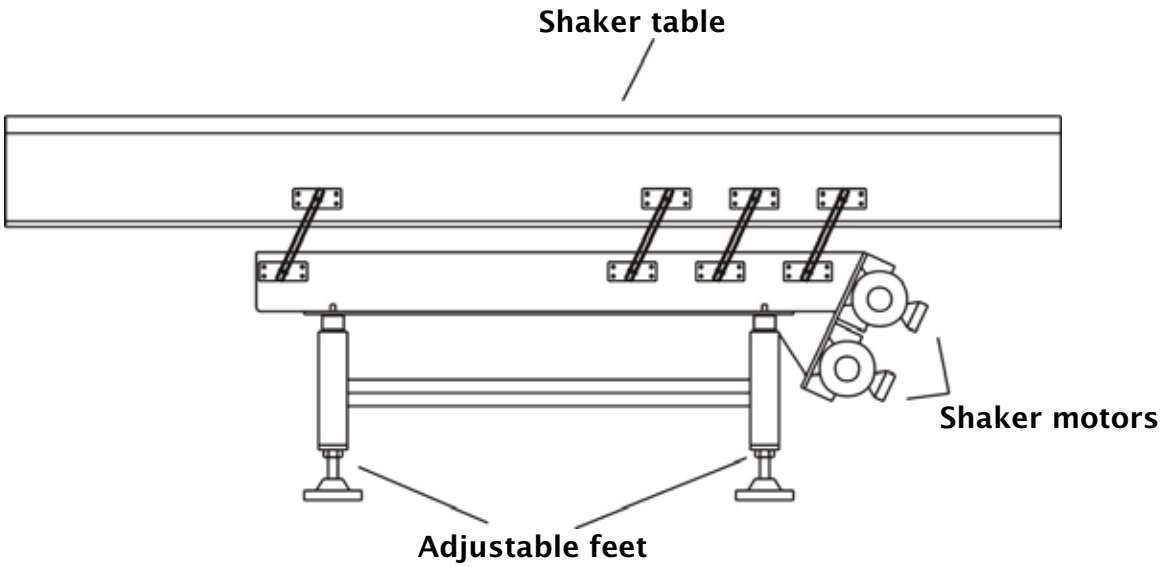
2.5.4. The output shakers or belts (optional)

- Often the output shakers/belts have already been mounted and fixed underneath the sorter unit in the factory before the sorter installation is shipped.

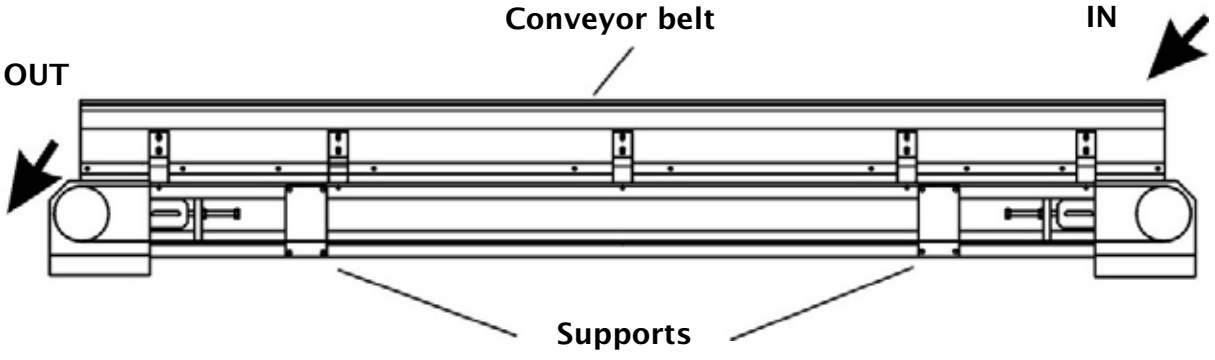
- When the shakers/belts still have to be installed, the customer will take care of the mechanical mounting without welding or drilling holes in the machine, but using clamps or other fastening devices. Please note that it is always advisable to place the output sides of shakers/belts on the side of the touchscreen, so as to enable the operators to easily check the accept and the reject (e.g. the percentage of good product in the reject) while setting the sensitivities.

- The output shakers or belts are electrically controlled by the **GENIUS** sorter unit, and if the shakers/belts were not provided and mounted by **BEST**, the purchaser has to provide the necessary cables and wiring (+/- 4 m / 13 ft) to enable the installation engineer to connect the shakers/belts with the sorter unit.

Picture 2.5.8: Output Shaker



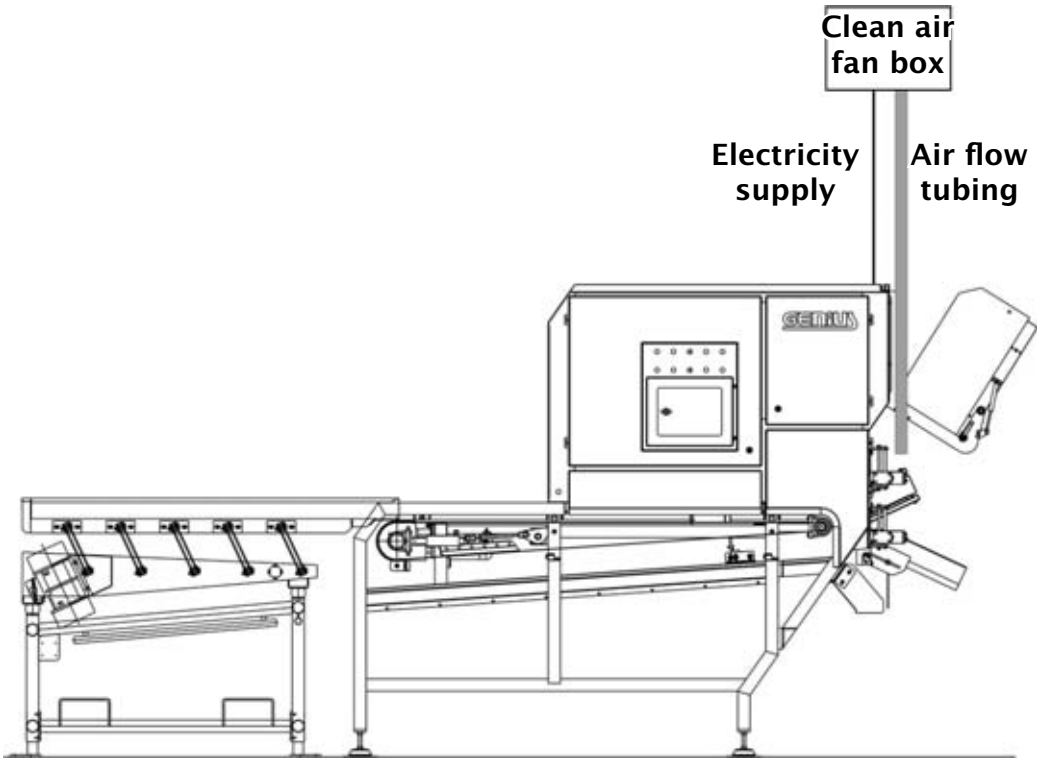
Picture 2.5.9: Output Belt



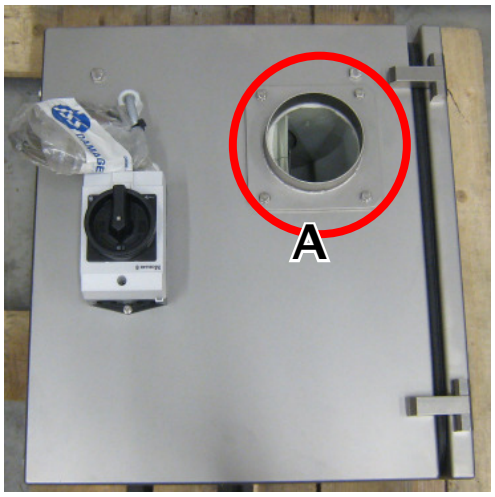
2.5.5. The clean air fan box (only with laser box option)

The clean air fan box is delivered separately with the machine. This box, containing a ventilator and filter system should be installed at a position in the factory – in the neighbourhood of the machine – where dry clean air is available. **BEST** provides 4 m of air tubing (flexible plastic tubing, diameter 80 mm) and approximately 4 m of electrical wiring, but the rest of the tubing and the wiring needed to connect the fan box to the sorter unit will have to be provided by the Purchaser. The clean air fan box is electrically controlled by the sorter unit and the wiring and the tubing will be installed by the Purchaser prior to the installation visit (see pictures below).

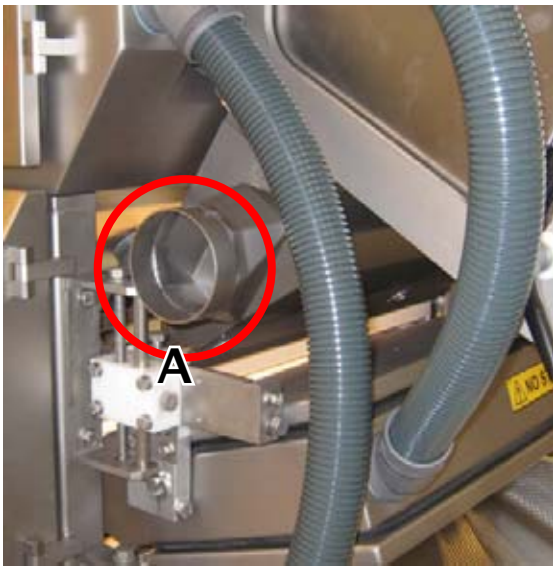
Picture 2.5.16: Connections to Clean Air Fan Box



Picture 2.5.17: Outside connections



A: Connections for flexible air tubing



2.5.6. The nitrogen bottle (only with laser box option)

Due to safety regulations, **BEST** cannot ship a nitrogen bottle. The bottle of nitrogen therefore has to be provided by the Purchaser (for specifications: see table 2.2). **BEST** will supply a pressure control valve and plastic tubing. The plastic tubing will be laid and connected to the **GENIUS** by the Purchaser prior to the installation visit (see pictures next page). You will notice a fine tube is connected to the nitrogen out-connection, this is normal and the tube should not be removed or connected to anything.

Attention: ***- Nitrogen bottle and regulator have to be installed at a dry and secure place. In accordance with safety regulations the nitrogen bottle has to be fixed to the wall.***
- Be very careful when moving the nitrogen bottle! Should the tap be seriously damaged, due to a fall for example, the bottle could ignite and even explode, causing serious damage.

BEST's service engineer will check the installation during his installation visit and shall then pressurize the system. The Purchaser will not pressurize the system without prior permission of **BEST**. The nitrogen bottle should be installed within 25 m (82 ft) (standard length of tubing) of the sorter unit.

Nitrogen specifications : N_2 - Grade 5.0

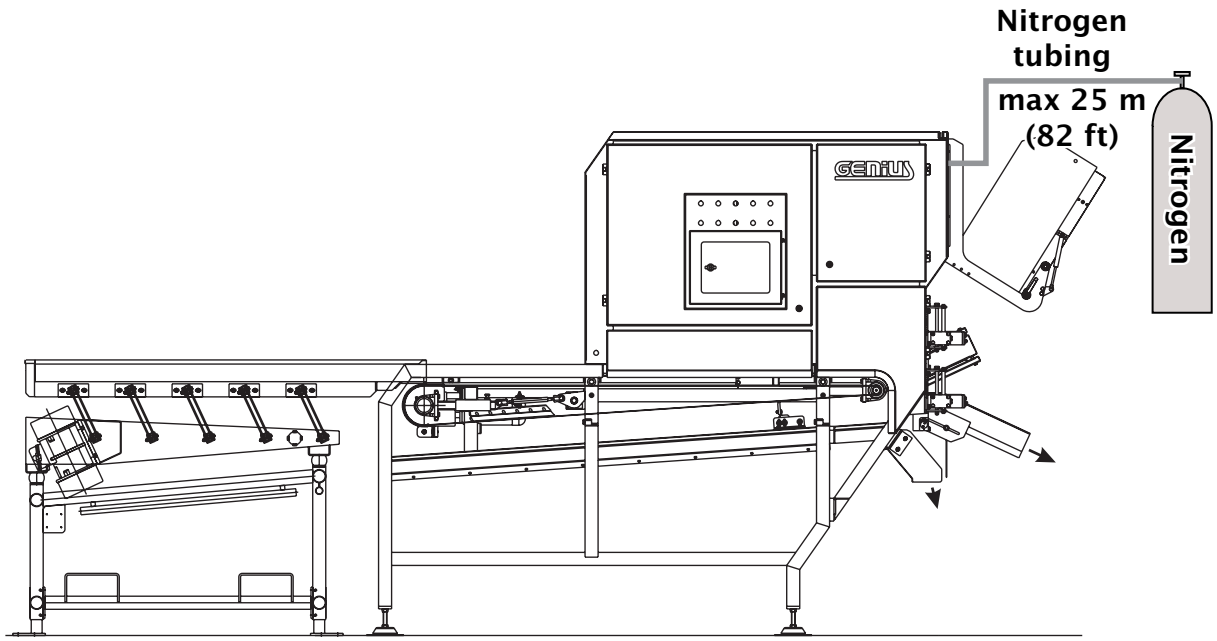
Purity (vol/vol%)	:	99.999
Analysis phase	:	Gas
Cylinder size-contents	:	B50 – 10 m³
Outlet nitro bottle must be	:	G 1/2" (inch) x 14, male

Attention! ***- It may be necessary for the Purchaser to buy a coupling piece if the connections of local nitrogen bottles do not match these requirements.***

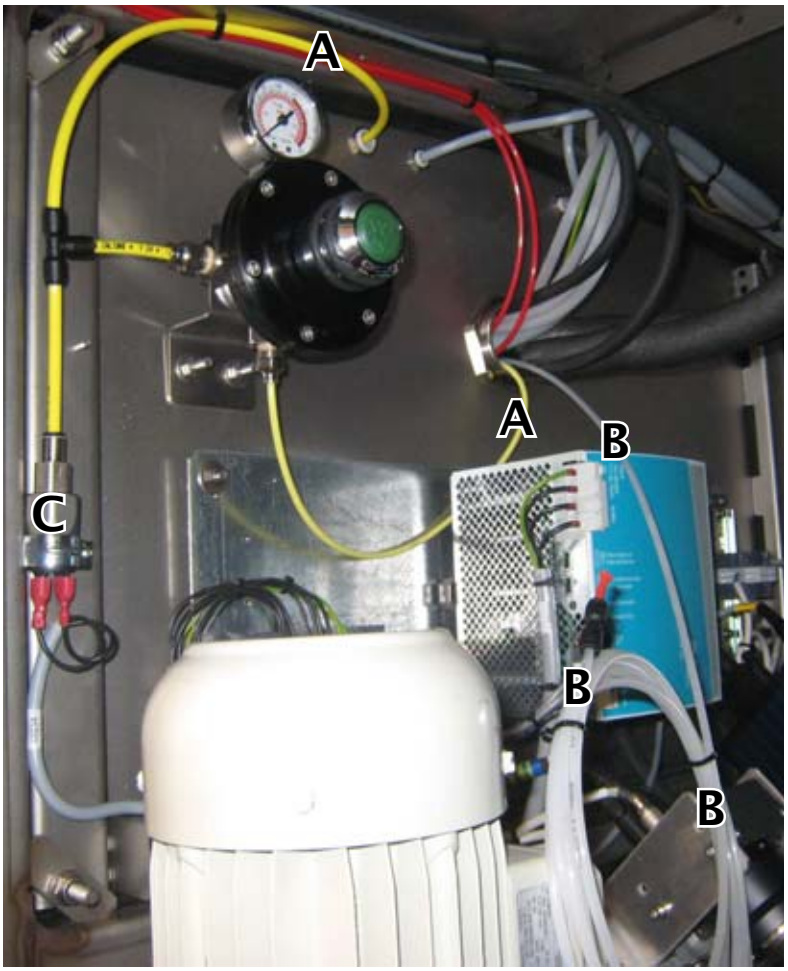
Table 2.2

Maximum Impurities	
Components	**vppm**
O_2	3
H_2	1
$CO + CO_2$	0.5
H_2O	2
THC (as CH_4)	0.5

Picture: Installation of nitrogen bottle



Pictures 2.5.20: Nitrogen supply connection on sorter cabinet



A: Incoming nitrogen supply (yellow tubing)
B: Outgoing nitrogen tube (white transparent tubing)
C: Nitrogen pressure sensor

2.5.7. The cooling unit (optional)

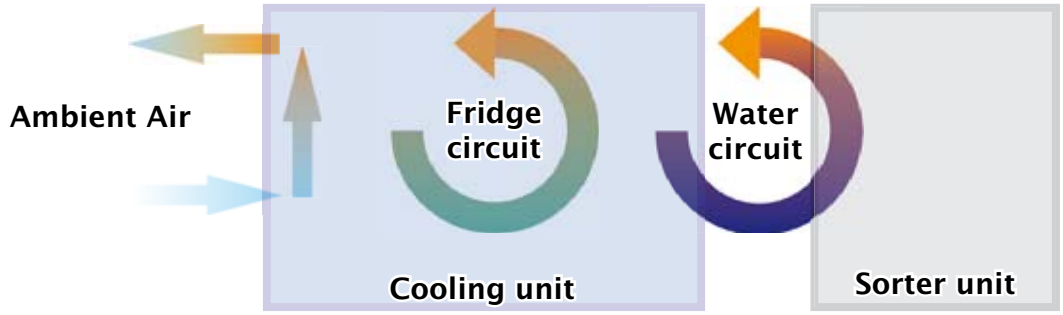
A. Introduction

BEST uses cooling units (also called chillers) to ensure a constant temperature of the cooling water flow. This water flow is used to cool lasers, electronics and other heat generating devices inside the sorter, thus increasing productivity and lengthening the life of many components, which in turn significantly reduces the maintenance costs.
The cooling units are not manufactured by **BEST**, and different types coming from different manufacturers are being used. The data in the following subchapter are only indicative and subject to changes depending on your actual chiller type. It is advisable to always check the original user manual provided in the Attachments chapter of this sorter manual (when chiller is provided by BEST).

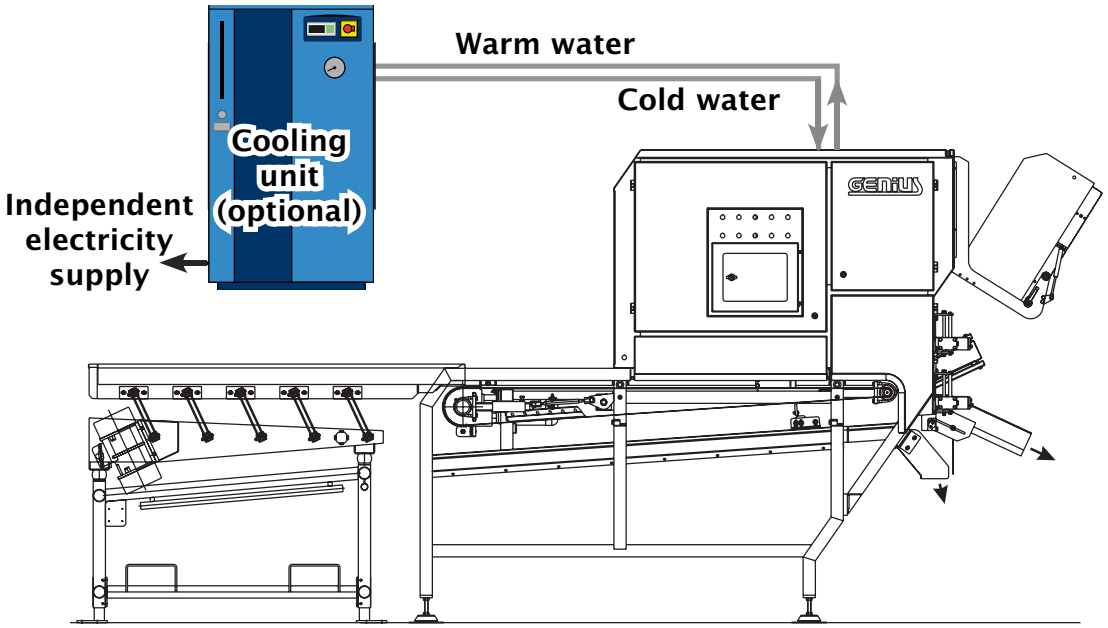
B. Principle

The water of the cooling circuit inside the chiller is cooled by an internal fridge circuit (using freon). This fridge cooling circuit gets rid of the heat it has absorbed from the cooling water by giving it to the outside air. Relatively cool outside air is sucked in and forced through a condenser element which passes on the heat to the cooler air. The warmed air is then expelled.

Picture 2.5.21:



Picture 2.5.22: Cooling unit connections



C. Installation

– Use appropriate lifting devices to move the chiller, such as pallet jack or forklift truck.

Attention: ***- Always keep the cooling unit upright while transporting. DO NOT TILT when shipping or moving.***

C1. Installation Site

– The cooling unit must be installed in a ***clean, corrosive free, dust-free atmosphere***.
  ° Dust and dirt clogging the condenser and or air filter will seriously reduce chiller efficiency and can even impede proper functioning.

– The cooling unit must be installed on a ***solid level surface*** capable of easily sustaining the weight of the filled cooling unit (see user manual cooling unit).

– The installation site of the chiller has to be within the ***ambient temperature range of 5°C to 50°C (41°F to 122°F)***. If the ambient temperature can go below this temperature range, ethylene glycol can be added to prevent freezing (max 30%), extending the temperature range to -15°C.
  ° The use of Ethylene glycol will reduce the cooling performance of the chiller and can reduce the life of the of the water pump.
  ° Following table shows freezing point of different proportions of ethylene alcohol + appropriate low flow/temp. control thermostat setpoints.

% Ethylene glycol	0	10	20	30
Freezing point °C (°F)	0 (32)	-3 (26.6)	-8 (17.6)	-15 (5)
Low flow/temp. control thermostat's setpoint (°C/°F)	+1/34	-1/30	-6/21	-10/12

Attention: ***- Never use automotive glycols, only ethylene glycol mixed with water.***
- Do not go beyond 30% glycol.

– The ***site must be well ventilated***.
The cooling unit emits heat by blowing out warm air. It is important that this warm air can be removed or can disperse easily, in order to maintain the ambient temperature as low as possible. The higher the ambient temperature, the lower the performance of the chiller. If the chiller is to be placed in a separate room, the minimum volume of the room and the air renewal rate must be in accordance with the minimum requirements stated in the manual of the cooling unit, see Attachments chapter.

– The cooling unit is ***IP44***. It is therefore strongly ***recommended to install the unit indoors***. In case of outdoor installation, the chiller must be protected against precipitation with a roof, and must be installed in such a way that the control panel receives as little sunlight as possible.

C2. Mechanical

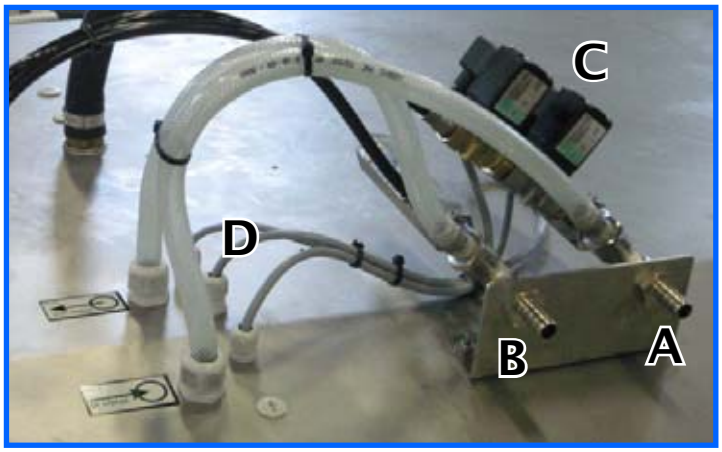
- The cooling unit must be ***installed at approximately the same ground level as the sorter unit***. The water moves in a closed loop from the cooling unit to the sorter unit and back. Minor differences in height between the **GENIUS** and the cooling unit should be no problem.
  If placed lower than the sorter unit, the cooling unit might lose water due to the overflow mechanism.
  - To prevent this, one could install a non return valve on the water output and a solenoid valve on the water input of the cooling unit.
  - The ***height difference between chiller and sorter unit should never exceed 5 m (16 feet)***.

- The cooling should be located ***as close to the sorter unit as possible, always taking into account the recommendations for the installation site***. This is to keep water pressure drop due to distance minimal (see also C3. Pipes and Fluids).

- To facilitate air flow around the unit, and to allow access to maintenance panels for service and repair, a ***minimum clearance around the cooling unit will be needed***. The exact clearance requirements will be stated in the user manual of the cooling unit.

- It is ***strongly recommended to install a manual valve at the chiller outlet to adjust the pressure on the water pump***. This pressure should be equal to the nominal pressure value that can be found on the characteristics plate of the chiller.
  - If the pump is not working within ideal pressure range, this will seriously reduce its efficiency and markedly shorten its life span.

Pictures: Water connections for cooling water on top of sorter unit



A: Water input; from cooling unit
B: Water output; to cooling unit
C: Electronic main water valve
D: Control cables for electronic water valves

C3. Electrical

- With the **GENIUS** sorter installation all chiller types require a separate electricity supply. All wiring and cables to the cooling unit will be provided and laid by the Purchaser.

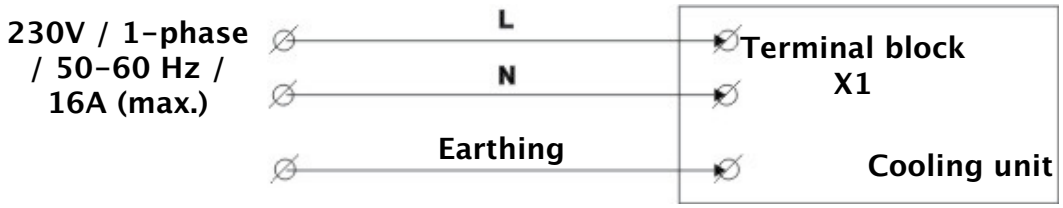
- Remote contacts are available inside the cooling unit: with these contacts the cooling unit can be switched on/off remotely, and any alarms that occur on the cooling unit can be communicated.

- Electrical requirements
  Donaldson UC 0020 or 0040:
  230V / 1-phase / 50-60 Hz / 16A (max.), usually connected directly to sorter.
  Donaldson UC 0080:
  460V / 50-60Hz, independent power supply.
  For the requirements of other chiller types provided by BEST, please check the user manual of the cooling unit in the Attachments chapter.
  ° The supply voltage variation should never exceed the nominal voltage by more than 10%.

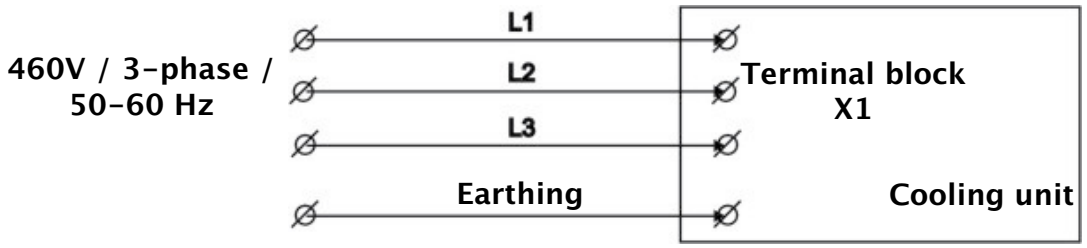
- Connections
  Check the schematics in the user manual of the cooling unit for the exact position of the main power connections in the chiller.

- Remote Contacts (On/Off + alarm) are available inside the cooling unit (see cooling unit manual).

Independent 1-phase power supply for UC 0020 / 0040 (most common):



Independent 3-phase power supply for UC 0080:



THE ELECTRICAL CIRCUITS SHOULD BE FUSED AND NO OTHER ELECTRICAL APPLIANCE SHOULD BE CONNECTED TO THE CIRCUIT.

ALL ELECTRICAL WIRING MUST BE IN ACCORDANCE WITH NATIONAL AND LOCAL ELECTRICAL CODES.

C4. Pipes and Fluids

- All water pipes and tubing – for warm and cold water – between the cooling unit and the sorter unit is to be provided and installed by the Purchaser (see instructions below).

- It is advisable to first flush the pipes with clean tap water to remove any remaining dirt or particles.

- The water connections are located at the back of the chiller: see user manual of the cooling unit for exact dimensions.

- Try to ***avoid pressure drops*** as much as possible (max 0.7 bar):
  - ° Locate chiller as close as possible to sorter unit: maximum pipe length approx.:
    - 1/2" pipes: 30 meters (100 feet) total distance
    - 3/4" pipes: 60 meters (200 feet) total distance
  - ° Minimize number of bends in piping:
    - A 90° bend has an equivalent pressure drop of +/- 1.5 m (5 feet)
    - A ball valve has an equivalent pressure drop of +/- 0.3 m (1 foot)
  - ° Avoid major height differences: max 10 meter (33 feet)
  - ° Always use pipes of at least 16 mm or 5/8 inch diameter
  - ° Connections on sorter unit: 16 mm (5/8 inch) hose couplings (inlet & outlet)

- It is strongly advised to ***use opaque (not transparent) tubing***. This in order to avoid algae and/or germ growth.

- It is advisable to ***insulate all water pipes*** to prevent thermal losses that decrease the cooling efficiency. This will also provide added protection against low ambient temperatures and prevent the forming of condensation on the pipes..

- If non-flexible pipes or tubing are used, it is advisable to ***use flexible tubing for the last 1.5 m (60") at inlet and outlet*** of the cooling unit, so as to make it possible to move the chiller (for maintenance or service) without having to dismantle the water pipes.

- Use ***Pressure safe piping and tubing***. If flexible tubing is used, this should be of reinforced construction. All piping and tubing must be capable of withstanding a minimum working pressure of 4 bar (58 psig) within a temperature range from -10°C (14°F) to 50°C (122°C).

- The ***quality of the water*** to be used with the chiller has to be ***within the limits specified in table 1.3***, and ***in accordance with the rules and recommendations stated directly below***. Non compliance will void the warranty agreement of the cooling unit.
  - The ***ideal fluid*** for the chiller is ***filtered or single distilled water that is completely replaced every six to twelve months*** to prevent buildup of algae and particles.
  - Never use flammable or corrosive fluids in or on the chiller.
  - Never use automotive antifreeze to protect against lower temperatures. Only ethylene glycol (max 30%) may be used.
  - It is not advisable to use untreated tap water. This often contains too much calcium, or too much ionized solids which will increase galvanic cell corrosion and may eventually cause leaks in the cooling circuit.
  - Ultra pure waters with a conductivity below 50 µS/cm, like deionised water, can also be harmful to some of the materials used in the chiller (leaches ions from metallic surfaces causing pitting and finally leaks). Deionised water may be used if its conductivity is between 1 to 3 megohm-cm (compensated to 25°C).
  - It may be advisable to add a bactericide to the water to protect the chiller. If the Chiller has been delivered by BEST, a bactericide "Refrifluid B" will be supplied with the chiller (see picture). This additive is strongly recommended and about 2% should be added to protect the chiller.

  - Never use corrosive or chlorine-derivated additives. These will dissolve the copper water couplings of the water circuit in the chiller and the sorter unit. The leaks that are thus created can cause grave damages to the optics, electronics and the electrical installation.

Table 1.3: Water quality

Parameter	Limit Values
pH	7 – 8
Total Hardness	< 150 ppm (of CA_2CO_3)
Conductivity	50 – 500 µS/cm
NH_3	< 2 ppm
Total iron ions (Fe^{2+} and Fe^{3+})	< 0.2 ppm
Chloride (CL^-)	< 300 ppm
H_2S	< 0.05 ppm
Solid particles	< 150 µm
Ethylene glycol	< 30% (with stainless steel pump)

2.5.8. The compressed air supply (optional compressor)

The Purchaser is responsible for providing the compressed air in accordance with the requirements stated in 2.3. On specific request **BEST** can provide a compressor with air tank, but this will need a separate power supply and will have to be installed and connected by the Purchaser (see pictures below). The air tubing to the sorter unit, or between the optional compressor, the air tank and the sorter unit, is to be provided by the Purchaser. A 1.5" or 2 " tubing will be needed, from the compressor to the air tank and also from the air tank to as close as possible to the sorter unit. For further information about the optional compressor system, see Provider information.

Attention: ***- The last metre of tubing to the sorter unit should be kept flexible for easy positioning of the machine and to prevent any vibrations from being transferred to the sorter unit.***

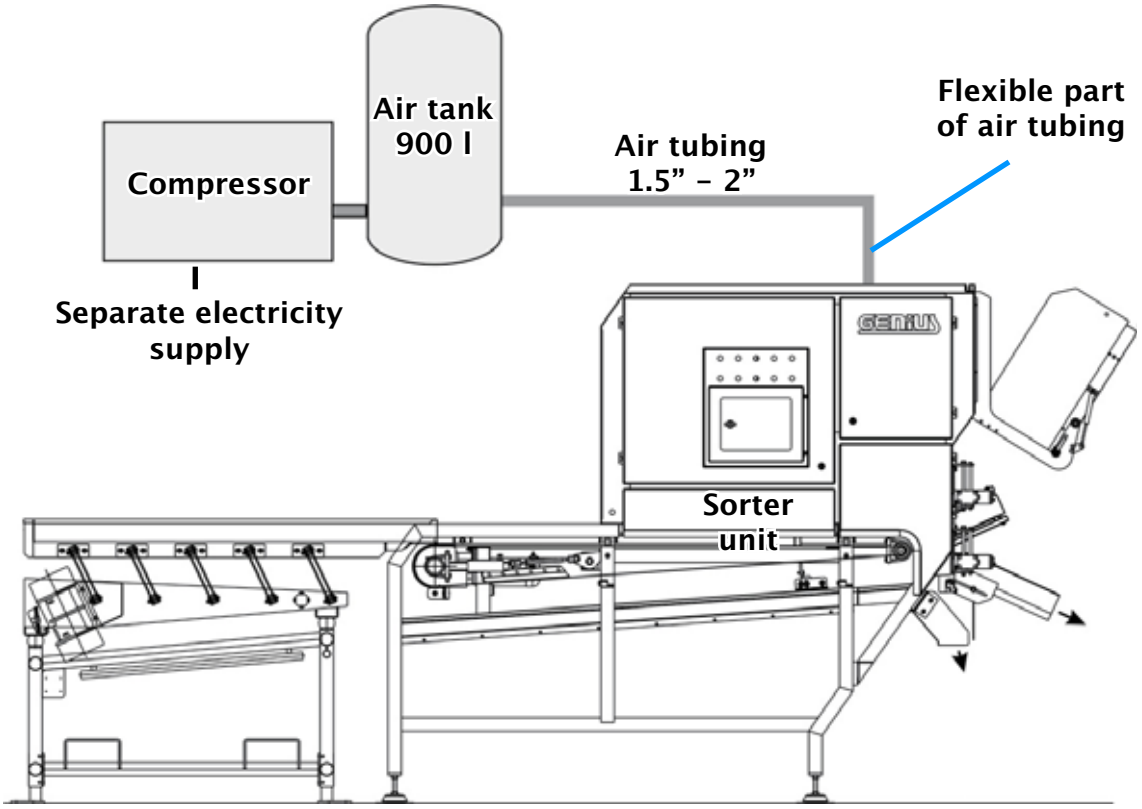
Remarks :

- Connection at machine (pictures next page) : 1" (1 inch) (Gaz) female
- If distance compressor – machine < 20 m : 1.5" tubing
- If distance compressor – machine > 20 m : 2" tubing

- Minimum pressure (on the sorter connection) : 6–7 bar (90–100 PSI)

- The optional compressor will need a separate electricity supply (not controlled by the sorter unit): 3 phase 400 V / 27,9 kW / 40 A / 50 Hz / wires 3 x 16 mm² (5 AWG).

Picture 2.5.24: Installation of compressor group

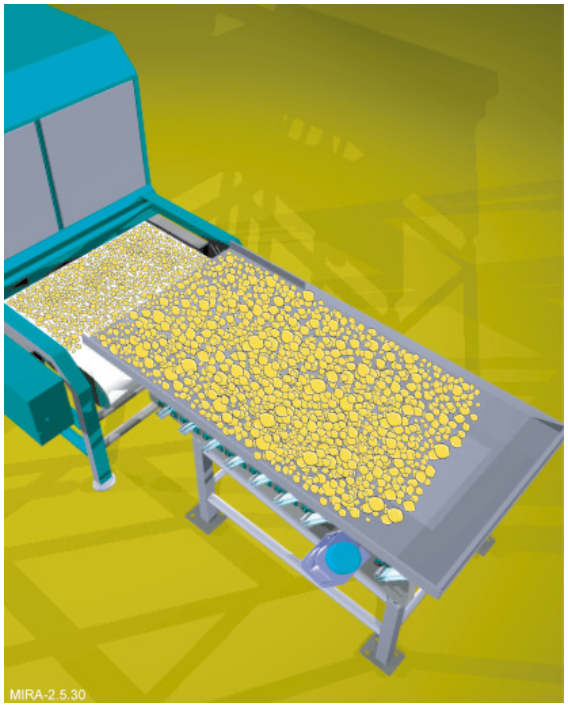


2.5.9. Product streams to and away from the GENIUS sorter

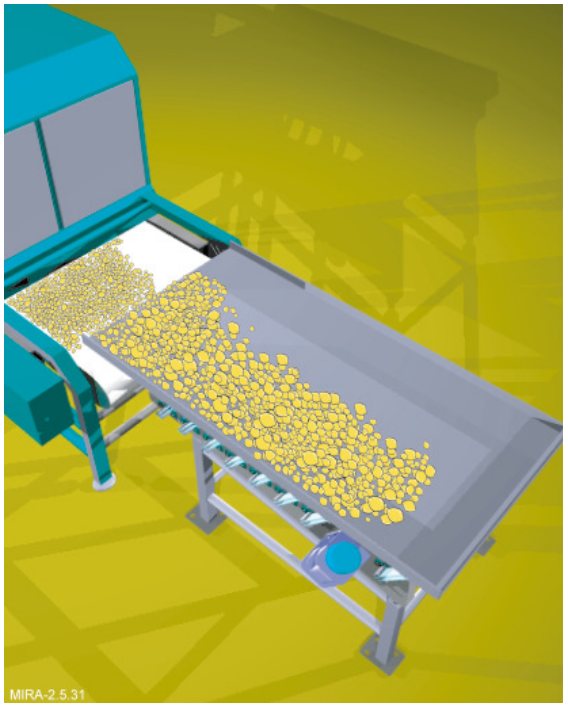
The input of the infeed shaker

The Purchaser is responsible for feeding the infeed shaker of the sorter using a belt, an elevator, or any other equipment. This equipment must be ready and installed before the arrival of **BEST**'s personnel for the start-up. Feeding must be done in the middle of the product infeed area, and must be immediately dispersed over minimum 80% of the width of the shaker, in order to accomplish maximum dispersal of the product on the belt and maximum efficiency of the sorter unit (see pictures below).

Picture 2.5.30: **Good**:
product in middle of infeed area



Picture 2.5.31: **Bad**:
product to one side of infeed area



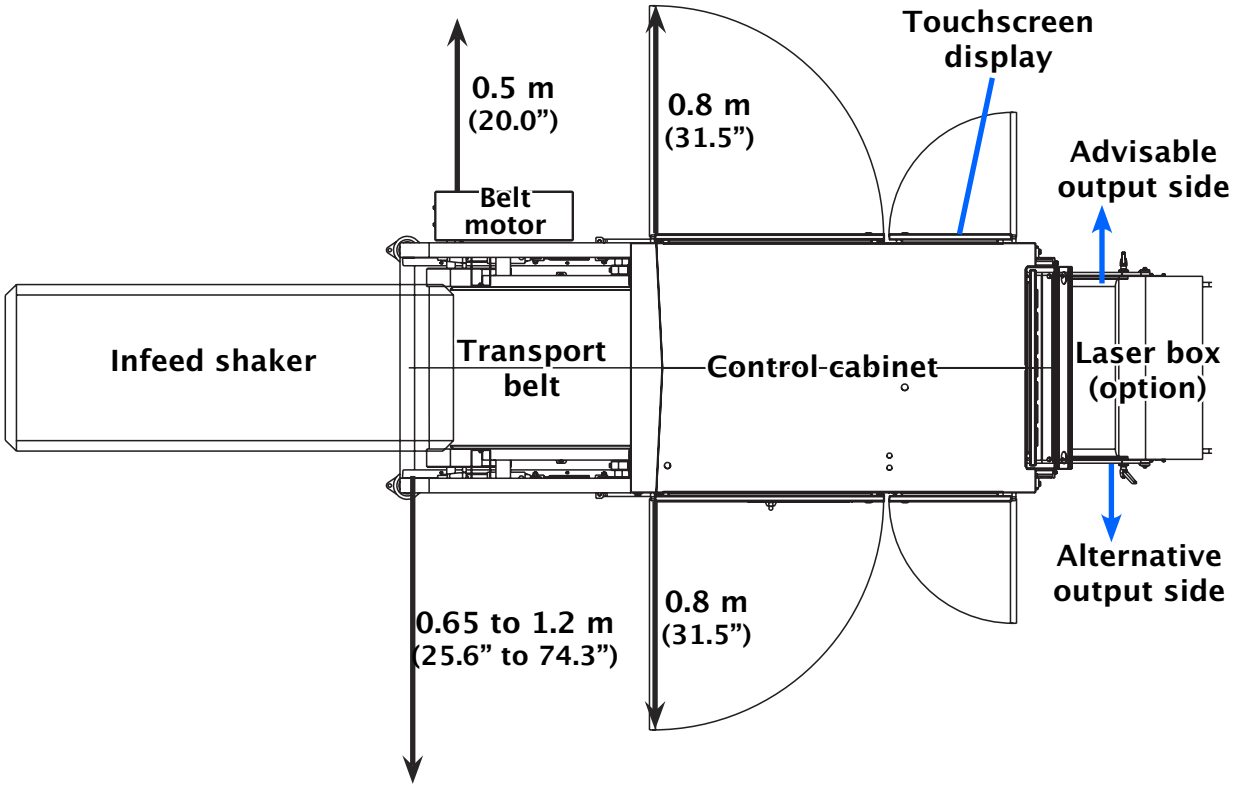
The product handling of the accepted and rejected product

Accept and reject leave the sorter by means of shakers or belts provided by **BEST** (generally). These can be positioned with the output at either side of the sorter (in accordance with the Purchaser's wishes). It is however advisable to keep the output of accept and reject within view of the touchscreen display on the control panel. This can be a substantial help while setting the sensitivities (see picture underneath).

Upon leaving the output shakers or belts, the product can be collected in trays, transported on a belt or moved via any other system to be provided by the Purchaser. The Purchaser is responsible for the handling of reject and accepted product using a belt, an elevator or any other equipment. This equipment must be ready and installed before the arrival of **BEST's** personnel for the start-up.

Attention: *- Make sure to leave enough room to the sides of the* **GENIUS** *sorter to allow cleaning, service and maintenance personnel free access to all parts of the machine at all times (see picture 2.5.1).*

Picture: top view output possibilities **GENIUS**



2.6. Pre-installation checklist summary

1	Preparation of the installation area	– The location where the sorter is to be installed must be free of interfering factors: (Vibrating floors, water vapour, dust clouds, etc. ...)	
2		– An adequate water and compressed air supply must be present	
3		– The appropriate electrical connections must be present	
4		– Enough space must be available for placement and easy access	
5	Unpacking the sorter	– Check for damage	
6		– Check whether all parts are present	
7	Installation of the equipment	– Sorter unit	
8		– Infeed shaker	
9		– Output Shakers/Belts (optional)	
10		– Clean Air Fan Box	
11		– Return system DRS/ARS (optional)	
12		– Nitrogen Bottle	
13		– Cooling unit (optional)	
14		– Compressor unit with air tank (optional)	
15		– The necessary tubing, piping and wiring is present.	
16		– Connections with and placement in the production line are OK.	