July 15, 2015

Perfect Pick User Manual

Document Revision 15-01

Document History

Doc Rev	Date	Changes (click blue text to go to that page)
13-01	May 2013	Initial Release.
15-01	July 15, 2015	Page 22 - Updated Diagnostic screen (Fig. 7) Page 26 - Added FCC rules and regulations as well as Industry Canada Information Page 2 - New Document History table implemented

If you find errors, inaccuracies, or any other issues or concerns with this document, please contact the OPEX Technical Writers via email at: GroupTechwriters@opex.com

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1 Introduction

About this manual

The Perfect Pick manuals use the following conventions to describe certain procedures and situations. Please be aware of these conventions when reading the manuals and operating the machine:

DANGER: Indicates a hazardous situation that, if not avoided, will result in death or severe injury. The use of this signal word is limited to the most extreme situations.

WARNING: Indicates a hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION: Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

NOTICE: Indicates information considered important, but not hazard-related.

Terminology

The following terms/concepts are used to describe the software and functionality of the Perfect Pick machine.

Warehouse Management System (WMS)

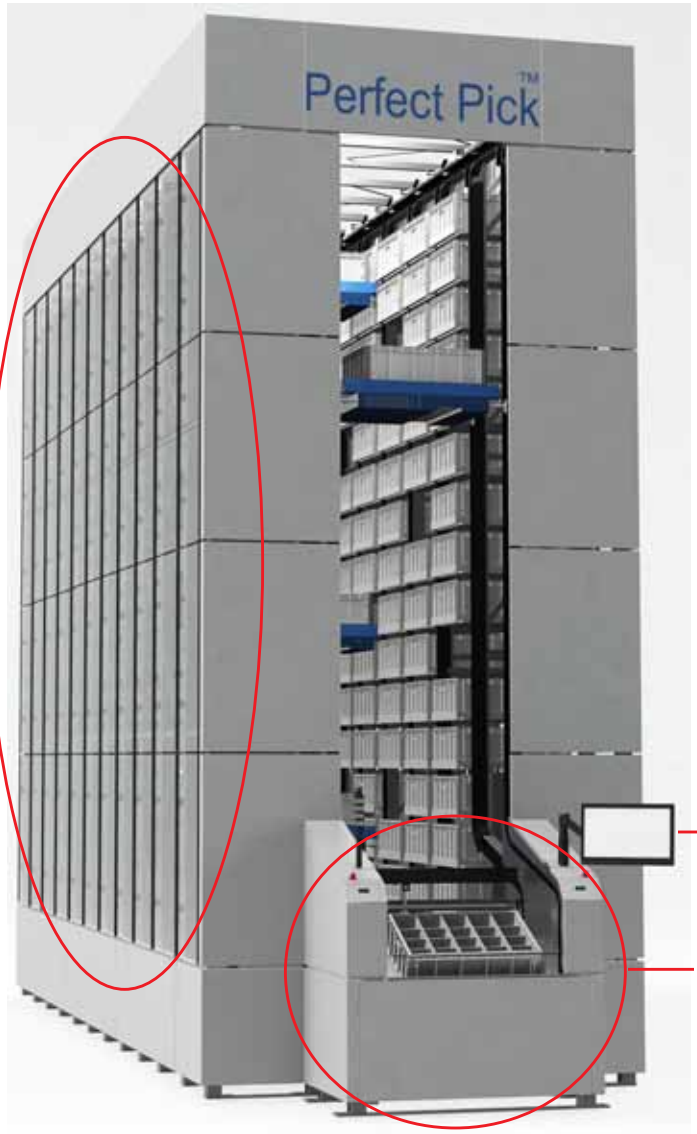
Manages physical inventory locations, and provides automation: conveyors, Automated Storage/Retrieval System (AS/RS), picking, restocking, etc.

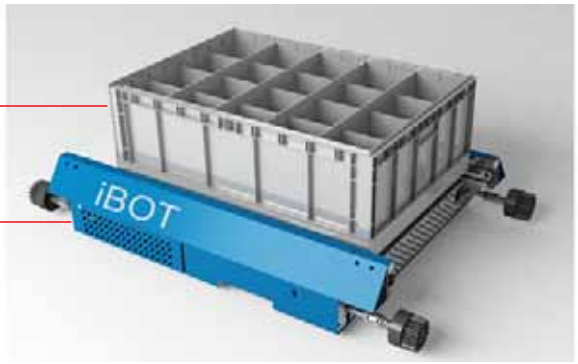
Warehouse Control System

Controls and tracks inventory movements.

Inventory Control System (ICS)

This term is used to describe the third-party software that provides *both* the Warehouse Management System and the Warehouse Control System.


Perfect Pick™
Storage locations (both sides of the machine)
Inventory Control System Monitor
Pick station


Tote
iBOT
iBOT

Overview

WARNING: Read “Safety” on page 10 before attempting to operate this equipment.

The Perfect Pick™ Solution

Opex Perfect Pick™ is a fast, compact and highly scalable automated aisle storage and piece picking solution. Ultra-capacitor powered wireless iBOTs™ (Intelligent Robotic Wireless Vehicles) navigate along a track system integrated within the storage rack. Every iBOT can access every location and deliver trays or totes directly to pick stations at either end of the aisle. Aisle throughputs are highly scalable up to 1000 dual cycles per hour.

Perfect Pick is a unique, automated, goods-to-man, picking solution that achieves superior throughput in a self-contained aisle that relies on a single component – the iBOT.

- Perfect Pick employs proven iBOT delivery technology to pick and stock inventory simultaneously.
- Every iBOT has access to 100% of the inventory.
- iBOTs deliver totes or trays with precise sequencing directly to ergonomically designed pick stations located at one or both ends of the aisle at rates up to 1000 dual cycles per hour.
- As ultra-capacitor powered iBOTs navigate along a track system integrated within the storage rack, they capture regenerated energy.
- iBOTs operate on the principle of redundancy, so Perfect Pick has no single point of failure.
- The iBOTs can be tilted for ergonomic picking.

Base System

The Perfect Pick base system includes:

- Front pick station
- Host PC with Inventory Control System software
- OPEX PC with OPEX software
- Two Storage columns (the number of tote locations varies with height and load size).
- 5 iBOTs

The Perfect Pick can be expanded over time by adding racking modules and/or additional iBOTs.

Note: See “Specifications” on page 23 for configuration details.

Safety

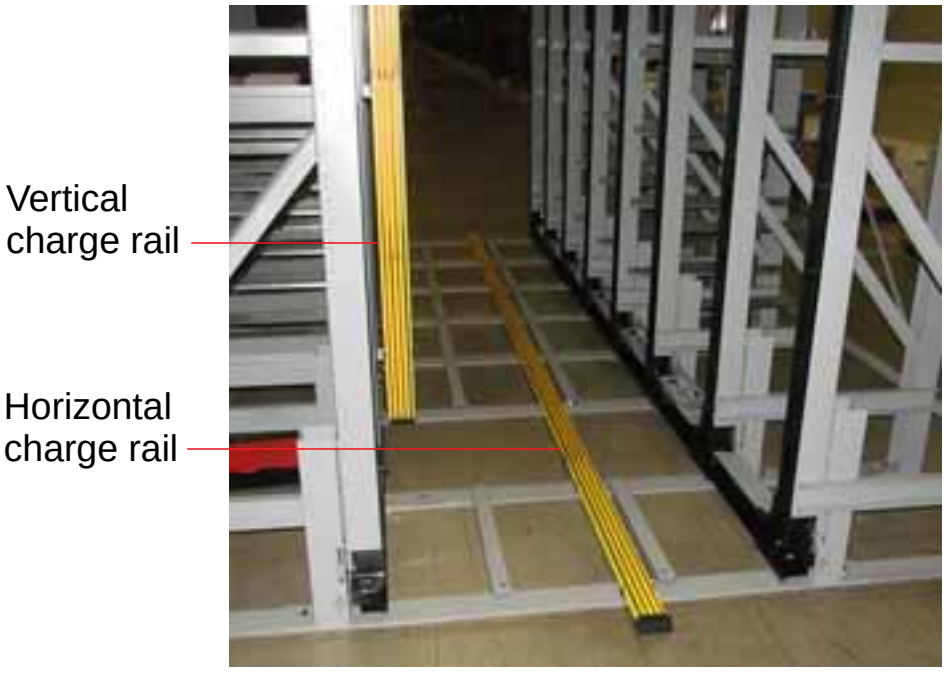
Follow these safety precautions to avoid injury when operating the Perfect Pick. Failure to follow these precautions may result in severe personal injury or damage to the machine.

Machine Entry Do not go inside the Perfect Pick rack system for any reason. Only approved OPEX technicians can enter the machine.

The following label is found on both sides of the pick station(s).

Charging rail Hands should be kept clear of the charging rails at all times. Shorting of the charging rails with either a watch or ring may result in electrical shock.

TIP: One of the easiest ways to determine the front of the machine is to note the location of the vertical charge rail. The vertical charge rail will always be in the front of the machine.



Climbing the structure Do not use the scissor lift, fork lifts, ladders, or climb the structure. Only approved OPEX technicians and qualified personnel are authorized to use the scissor lifts and iBOT recovery tools.

This label is found on the exposed ends of every other ladder, just above where the exterior cover ends. If the machine has no rear pick station, another set of these labels goes on the backs of the rear ladders.

Moving parts Keep loose objects away from any exposed, moving parts of the machine. The moving parts of the Perfect Pick can become jammed and/or damaged by foreign objects. Also, keep hands, hair, loose clothing or jewelry away from the moving parts.

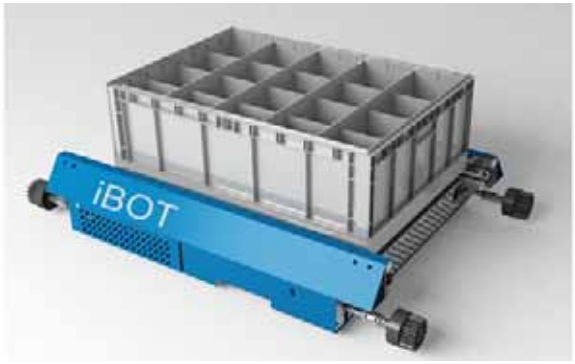
This label can be found on both sides of each pick station, on the metal plate above the diagonal track.

Main Power Enclosure Only approved OPEX technicians and qualified personnel are authorized to access the main power enclosure for trouble-shooting and/or servicing the machine.

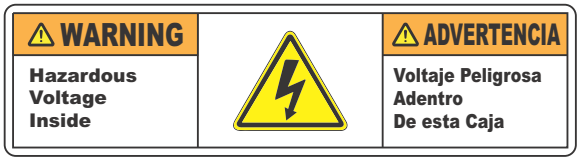
Main Power Enclosure

This warning label is found on the front of the Main Power Enclosure

iBOT safety The iBOT was designed to carry loads of up to 60 pounds. In order to function properly, the iBOT incorporates automated machinery along with potentially hazardous voltages. Therefore, it should be treated with care.



This label is found on the exposed metal on the top of the iBOT. One facing front, one facing back.



There are two of these labels on the iBOT, next to the hazardous voltage labels.

This label is on the iBOT's cover. One on each side, on the slanted surface.

Other Cautions

CAUTION: The ultra-capacitors that power the iBOTs contain acetonitrile. In the event that an ultra-capacitor should leak, avoid contact with or breathing the acetonitrile. For information on ultra-capacitor safety, refer to “Ultra-capacitor Product Information” on page 14.

Product Information Sheet

An MSDS is not required. This information sheet is provided as a service to our customers. An MSDS for the active chemical inside the listed products is available upon request. **For US Customers:** The products referenced herein are exempt articles and are not subject to the OSHA Hazard Communications Standard Requirement 29 CFR 1910.1200. **For EU Customers:** The products referenced herein are not submitted to 91-155 EEC, as they are considered as components and not as a chemical substance. **Notice**: The information and recommendations herein contained are made in good faith and are believed to be accurate at the date of preparation. Maxwell Technologies Inc. makes no warranty expressed or implied.

Product Information

Manufacturer
Maxwell Technologies Inc.
9244 Balboa Avenue San Diego, CA 92123
Phone: 858-503-3300
Fax: 858-503-3333

Product: Ultracapacitors

Models: All configurations and versions of PC5, PC10, PC5-5, BCAP0005 and BCAP0010

Date: June 19, 2009

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Chemtrec Hazmat Communication Center 1 800 424 9300
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Swiss Toxicological Information Centre +41 (0)44 251 5151

Asia
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Product Components

Important Safety Note: Ultracapacitors should not be opened, disassembled, crushed, burned, or exposed to high temperatures (>85°C, 185°F), and should be operated only within their defined operating specifications. Failure to adhere to operating specifications could result in poor device performance or unsafe operating conditions. Exposure to the components contained within the ultracapacitor could be harmful under certain circumstances. In case of exposure to ultracapacitor contents, wash affected area for at least 15 minutes with generous amounts of water and seek medical attention. Fires involving these types of ultracapacitors should be extinguished with CO2, dry chemical, alcohol foam, or all purpose AFFF extinguishing media. Water may be ineffective but should be used to cool fire-exposed containers, structures and to protect personnel.

BOOSTCAP® ultracapacitors are composed of the following major components:

Electrodes:	Activated Carbon
Separator:	Polypropylene or Cellulose
Electrolyte:	Quaternary salt (tetraethylammonium tetraflouroborate) Organic solvent (acetonitrile)
Other:	Aluminum, steel

Disposal

BOOSTCAP ultracapacitors are neither specifically listed nor exempted from government hazardous waste regulations. The only material of possible concern is the organic solvent, which when discarded or disposed of, is a hazardous waste according to Federal regulations (40 CFR 261). It is listed as Hazardous Waste Number U003, so listed due to its toxicity and ignitability. Disposal can occur only in properly permitted facilities. Check state and local regulations for any additional requirements, as these may be more restrictive than federal laws and regulations.

Transportation

Ultracapacitors as articles are not specifically listed nor exempted from hazardous materials regulations (HMR). The U.S. Department of Transportation has provided Maxwell Technologies a written determination regarding Maxwell's PC5 and PC10 BOOSTCAP ultracapacitor products that the materials comprising the ultracapacitors are "…in a quantity and form that does not pose a hazard in transportation. Therefore, the ultracapacitors are not subject to the HMR."

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Document #1004596.4

Interlock system

The system interlocks include the drop-away panel (Figure 1), the light curtain (shown in Figure 2), and the E-Stop switches. The light curtain is used to stop just the iBOTs in the pick station area, should you have your hands in the iBOT travel areas when the iBOTs are in motion.

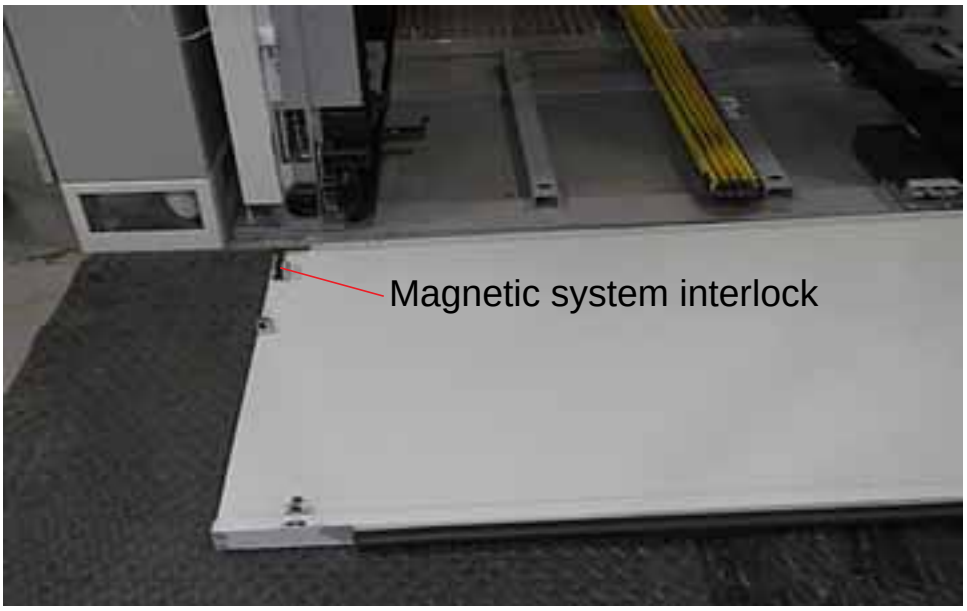


Figure 1: Drop-away Panel (removed from the machine)

Note: The magnetic sensor is located at the bottom left side of the panel and can be easily tripped by kicking the panel. When this panel is removed, all iBOT motion will stop. This panel must be removed when the service technician needs to install/remove an iBOT from the system.

WARNING: If an iBOT is completely discharged and away from the charging rail, moving the iBOT so that it comes in contact with a live rail could cause an arc capable of damaging the iBOT. Protections are in place to prevent this from happening, but if the interlocks or e-stops are bypassed, the potential for damage exists.

Emergency Stop (E-Stop) switches

The Perfect Pick system incorporates emergency-stop buttons and interlocks to help keep the operator safe. Familiarize yourself with the location of the machine Emergency Stop (E-stop) switches. The E-Stop should be used prior to entering the machine, in the event of an emergency, or situations which may result in personnel injury. The E-stops are installed on the front and back of the machine. The big, red, mushroom-shaped emergency stop switches enable a quick stop of all motors in the machine. If necessary, push one of the e-stops and the machine will stop immediately and kill power to the charging rails. To restart the machine, have the OPEX technician clear the machine (if needed), pull the E-Stop knob out, and restart the machine by pressing the green Start button. The Clear to Pick light is also a safety feature and only lights when it is safe for the user to pick an item from the presented tote.

Figure 2: E-stop and interlock locations

Light Tower

The light tower shows the status of the machine:

No Lights - Stopped/Off

Green - running normally

Blue - jammed/maintenance required
Flashing Blue - maintenance mode (see note)

Flashing Yellow - starting

Red - Interlock/E-Stop tripped

Beeping Audible - Starting

Note: From Maintenance mode, the machine is restarted which will bring the solid green light on in addition to the flashing blue light. Once the technician determines that the machine is operating properly, he/she will turn off the flashing blue light by exiting Maintenance mode, leaving only the solid green light.

Inventory Control System software

It is not the scope of this document to describe the functionality and operation of the third-party Inventory Control System (ICS) software. However, it is important to understand the basics, since the ICS provides the main interface with the Perfect Pick system.

The inventory control software can operate in several modes. In normal operations, the user will primarily use Continuous mode. This mode presents a number of order-request containers to the picker along a conveyor, with each container being replaced as soon as it is completed.

Another mode that may be used (depending on your setup) is Put-away mode, which is used for restocking inventory. Put-away is initiated when an operator selects **put-away** from the ICS user interface. The procedure is similar to Continuous mode. A container with inventory items is presented to the operator, who then puts the specified amount of items into the iBOT-delivered tote.

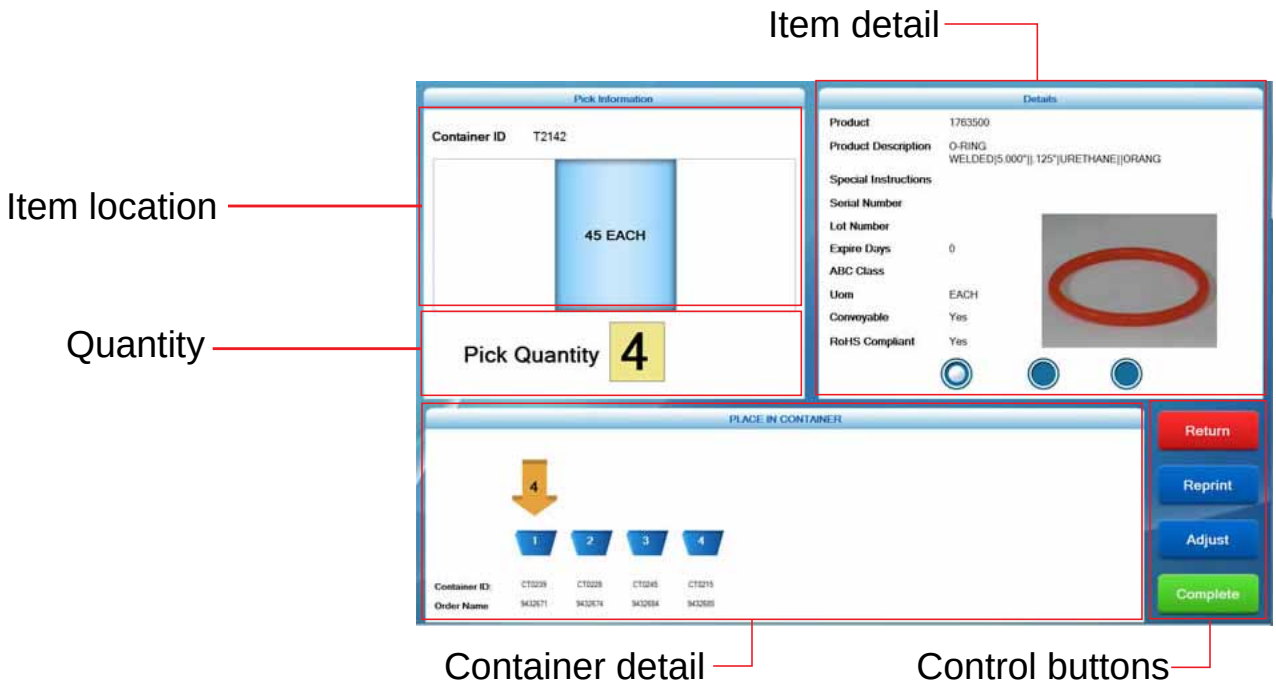


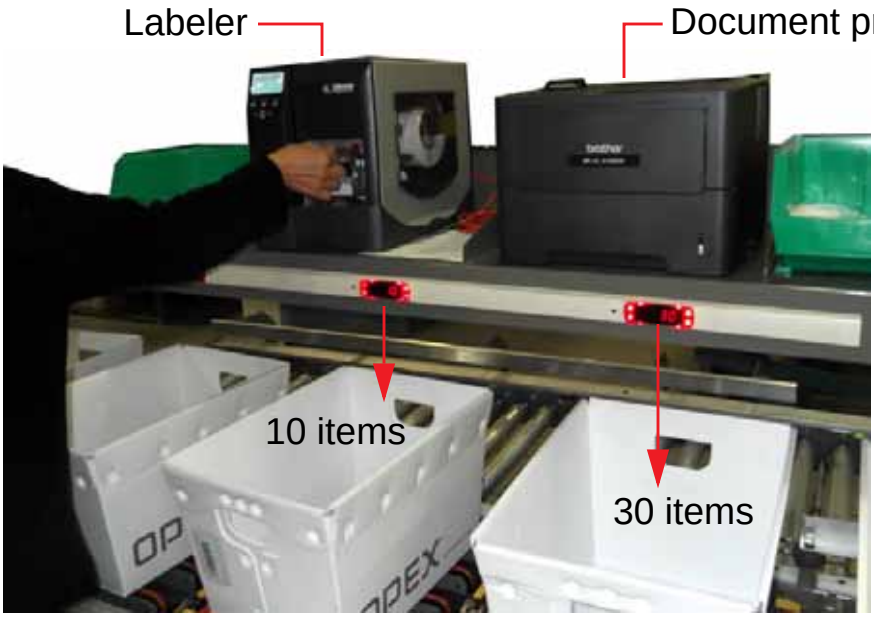
Figure 3: Inventory Control System - example

Overview of operation (refer to Figure 3)

1. The monitor identifies the next item to be picked (Item detail), the Pick Quantity, and the item location within the tote - an iBOT could present one large tote, or a compartmentalized tote. Figure 3 (Item location) shows a tote broken up into thirds, and the picker is directed to pick from the middle.
2. Pick the quantity identified in the interface (in this example, the quantity is 4). Depending on your operation, you might also have to bag the items and place a label on the bag (the labeler is shown in Figure 5).
3. To the right of the Perfect Pick is a conveyor with containers. As the containers advance toward the Perfect Pick, they pass a scanner (see Figure 4), which reads the bar code on each container. The scanned information is used to determine in which container to place the picked parts.

Figure 4: Scanner

4. The monitor identifies the location of the container on the conveyor where the user needs to place the picked part. There are four available locations which are identified by the light bar (see Figure 5).



In this example, 10 items are needed for the 3rd container, and 30 items are needed for the 4th container.

Figure 5: Light bar

5 Put the selected quantity in the correct container(s).

6 Press the light bar button to advance to the next item.

7 When an order has been completed (all parts picked), a packing list is automatically printed and the monitor displays a “Place document in container” message (see Figure 6).

Note: Depending on your operation, your system may not require a printer.

The screen displays a message that the order is completed.

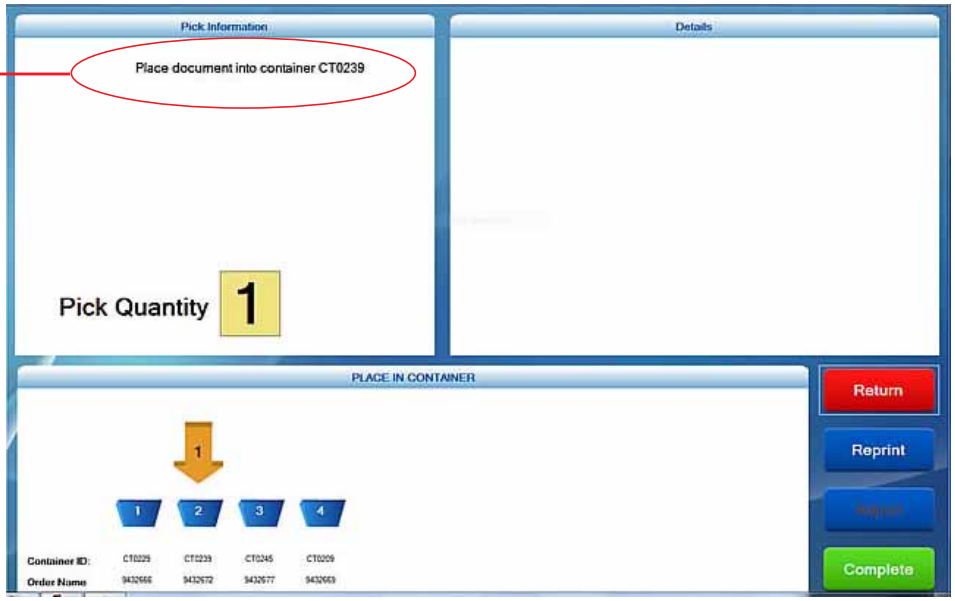


Figure 6: Inventory Control System - end of order message

8 Place the packing list in the container.

9 Press the light bar button to send the container off for further processing.

The Inventory Control System will provide information as to when the job is finished.

Note: When running in “put away” mode, you should never restock a tote with items piled higher than the top of the tote. Overfilling the tote will likely cause jams in the machine.

OPEX software

The OPEX software is used for troubleshooting the Perfect Pick system. In diagnostics, it shows the status of the iBOTs and their locations, as well as the locations of the totes in real time. Though primarily used by the OPEX technician, there may be situations where you need to use this software, such as to park the iBOTs.

How to park the iBOTs

CAUTION: The actual removal and installation of iBOTs should only be done by a qualified Opex technician. These instructions are provided for informational purposes only.

1 At the Perfect Pick controls, if the Diagnostics screen is not displayed, click the **Diagnostics** button.

Note: If you are on the Run Screen, clicking the **iBOTs** tab will also display the following information.

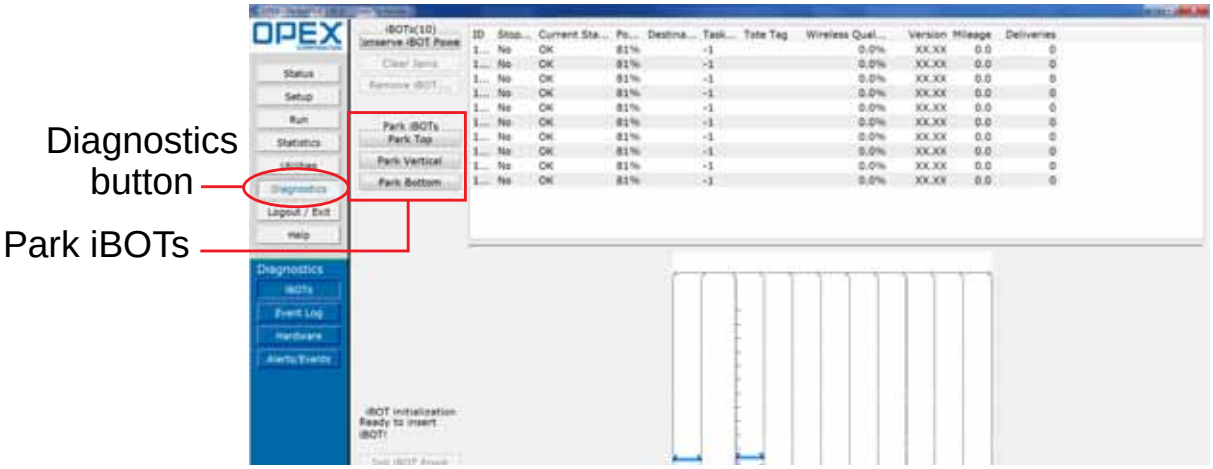


Figure 7: Diagnostics screen

2 This screen offers three buttons to park the iBOTs at different locations: **Park Top**, **Park Vertical**, or **Park Bottom**. Click the appropriate button.

Note: If functional iBOTs are sent to wait at the top of the machine, you will have approximately 2 hours before they lose their charge. The **Conserve iBOT Power** button in Diagnostics makes the iBOTs stop sending constant status updates to the machine to save energy.

Specifications

Physical Specifications:

Height	16 ft. 6 in. to 32 ft. 4 in., in approx 4 ft. increments
Length	• 3 bay module: 74.2 in. • Front pick station: 145 in. (includes two storage bays) • Optional rear pick station: 88 in. (includes no storage bays) • Expandable up to 200 feet
Width	9 feet
Power Requirements	• 440VAC 60HZ 3-phase - at location of main electrical enclosure • 115VAC 1-phase - one to the UPS for computers in front, one to the UPS for computers in back
Minimum space between aisles	6 inches
Options	• Rear Pick Station • In-Rack sprinkler system • Side Covers

Tote/Tray Specifications:

12 in. Tote	• Dimensions: 20.8785 in. x 29.75 in. (inside: 19 in. X 28.625 in.) • Internal height: 10.875 in. • Weight: Tote: 12 lbs. Short divider: 0.8 lbs. Long divider: 1.25 lbs. **Note:** Other size totes may now be available. Multiple tote heights can be intermixed within an aisle.

Tray	• 20.6 in. x 30.0 in. • 2.0 in. high (1 in. reinforced floor thickness, with 1 in. rim) • Weight: 6 lbs.
Picking module	Double ended

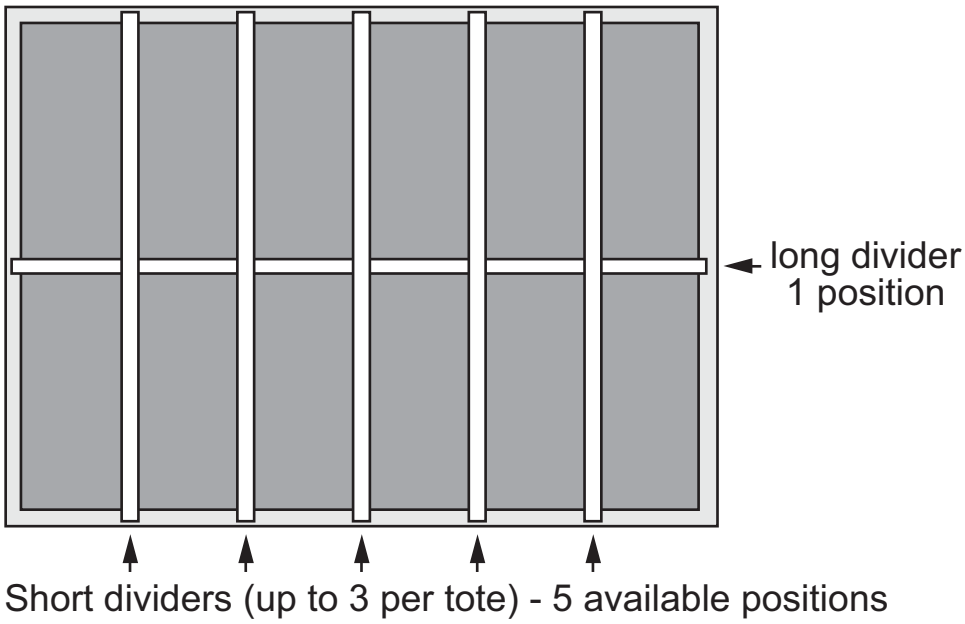


Figure 8: Tote dividers (drawing not to scale)

iBOT Specifications:

Speed	Up to 75 ips
Acceleration	Configurable by tote, up to 1/2 g
Max load	60 lbs. (including tray/tote)
Performance	• Scalable Throughput • Up to 1,000 Dual Cycles Per Hour
Safety Features	• “Safe move only” centralized traffic control system • Dual fail-safe braking systems
Wireless Communi-cations	2.4 GHz wireless communication

Environmental Specifications:

Temperature	50F - 90F
Humidity	0 - 95% RH non-condensing

Wireless Transceiver

FCC information / informations FCC

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The wireless transceiver antennae must not be modified or, replaced with that of a different type. Servicing of the transceiver is limited to properly trained OPEX technicians. No end-user servicing is permitted.

Changes or modifications not expressly approved by OPEX Corporation could void the user's authority to operate the equipment.

Module cannot be co-located with other antenna or transmitter except as specified in the grant condition of equipment authorization; other electronic functions not associated with the certified module or certified transmitter may require additional equipment authorization. The module should not be marketed and sold in a way that have to be end-user accessible/replaceable. A host product is required to comply with all applicable FCC equipment authorizations regulations, requirements and equipment functions not associated with the transmitter module portion. To ensure compliance with all non-transmitter functions the host manufacturer is responsible for ensuring compliance with the module(s) installed and fully operational.

Users and persons nearby the equipment will maintain a minimum 20 cm (8") separation distance from device antenna.

FCC ID VDM2048910 Model 2048910

Cet appareil est conforme à la partie 15 des règles de la FCC. Son fonctionnement est soumis aux deux conditions suivantes: (1) ce dispositif ne doit pas causer d'interférences nuisibles, et (2) cet appareil doit accepter toute interférence reçue, y compris les interférences qui peuvent provoquer un fonctionnement indésirable.
Les antennes d'émission-réception sans fil ne doit pas être modifié ou remplacé par celui d'un autre type. Entretien de l'émetteur-récepteur est limitée à une formation adéquate des techniciens OPEX. Pas de service de l'utilisateur final est autorisé.

Les changements ou modifications non expressément approuvés par OPEX Corporation pourraient annuler l'autorité de l'utilisateur à utiliser l'équipement.

Module ne peut pas être co-localisé avec autre antenne ou émetteur, sauf comme indiqué dans l'état de la délivrance de l'autorisation de l'équipement; d'autres fonctions électroniques ne sont pas associés avec le module émetteur certifié ou certifié peuvent exiger une autorisation de matériel supplémentaire. Le module ne doit pas être commercialisé et vendu d'une manière qui doivent être l'utilisateur final accessible / remplaçable. Un produit d'accueil est tenu de se conformer à toutes les autorisations applicables FCC d'équipement règlements, des exigences et des fonctions de l'équipement ne sont pas associés avec la partie de module émetteur. Pour assurer la conformité avec toutes les fonctions non-émetteur le fabricant hôte est responsable d'assurer la conformité avec le module (s) installé et pleinement opérationnel.

Les utilisateurs et les personnes à proximité de l'équipement seront de maintenir un minimum de 20 cm (8 '') de la distance de séparation de l'antenne de l'appareil.

FCC ID VDM2048910 Model 2048910

Industry Canada information / Industrie Canada l'information

According to RSS-Gen Issue 4 Section 8.3:

This radio transmitter IC: 7175A-2048910 has been approved by Industry

Canada to operate with the antenna types listed below with the maximum permissible gain indicated.

Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Internal antenna: Inverted F PCB (gain: 2.2 dBi); or,

External antenna: Digi-International A24-HASM-450 (gain 2.14 dBi)

According to RSS-Gen Issue 4 Section 8.4:

This device complies with Industry Canada’s license-exempt RSSs. Operation is subject to the following two conditions:

1. This device may not cause interference; and
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Selon RSS-Gen Numéro 4 Section 8.4:
Cet appareil est conforme aux CNR exempts de licence d'Industrie Canada. Son fonctionnement est soumis aux deux conditions suivantes:

1. Ce dispositif ne peut causer des interférences; et
2. Ce dispositif doit accepter toute interférence, y compris les interférences qui peuvent causer un mauvais fonctionnement de l'appareil.

IC : 7175A-2048910 Model 2048910