Econo Inline Chuck Capper Operations Manual

V1.1

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1.1 SAFETY

1.2 GENERAL SAFETY

Apex Filling Systems, LLC (APEX) manufactures and designs all of its products so they can be operated safely. However the primary responsibility for safety rests with those who use and maintain these products. The following safety precautions are offered as a guide that if conscientiously followed, will minimize the possibility of accidents throughout the useful life of this equipment. The safety of personnel, equipment and plant facilities should be considered during equipment operation and with each changeover of product, or any machine modifications.

Only those who have been trained and delegated to do so and have read and understood this operator's manual should operate the equipment. Failure to follow the instructions, procedures and safety precautions in this manual can result in accidents and injuries.

DO NOT modify the equipment except with written factory approval. Unauthorized equipment modifications will void the warranty.

Each day walk around the equipment and inspect for leaks, loose parts, missing or damaged components, and parts out of adjustment. Perform all recommended maintenance noted in this manual.

EQUIPMENT SHOULD <u>ALWAYS</u> BE DE-ENERGIZED (POWER AND AIR) BEFORE MAKING MECHANICAL ADJUSTMENTS.

1.3 ELECTRICAL SHOCK

- ✓ To avoid electrical shock hazard, make sure this equipment is properly grounded.
- ✓ Dangerous voltages are present within the electrical enclosures. DO NOT operate this equipment with electrical covers open or removed.
- ✓ Keep all parts of the body, hand held tools, or other conductive objects away from exposed live-parts of the electrical system. Maintain dry footing and stand on insulating surfaces. DO NOT contact any portion of the equipment when adjusting or making repair to exposed live parts of electrical system.
- ✓ Attempt repairs only in a clean, dry, well-lighted, and ventilated area.

1.4 CONTACT MATERIALS COMPATIBILITY

APEX endeavors to make all contact parts compatible with buyer's products, if known. Because of the wide variety of possible products, Apex Filling Systems, LLC cannot be responsible or liable for ensuring compatibility of contact material with the products. Evaluate material compatibility prior to machine use. Failure to follow this procedure can result in machine damage, fire, operator injury or deat.

1.5 SAFETY COMPLIANCE LIABILITY

APEX endeavors to make machinery as safe to operate as possible. National, state and local laws related to safety in the workplace apply primarily to the responsibilities of the employer, and not the equipment manufacturer. The seller agrees to cooperate with the buyer in finding feasible answers to compliance problems. However, because APEX has little control of the many factors which may significantly affect the environment in which this equipment is installed, the seller does not warrant this equipment to be in compliance with OSHA or any like state or local laws or regulations. It is the buyer's responsibility to provide the modifications necessary to assure compliance with the laws and regulations at the point of installation.

A complete inspection of product is necessary until the machinery is proven to produce acceptable results. This should also be performed after every changeover.

1.6 CONVENTIONS

To ensure the safety of personnel which will install, adjust, maintain and operate this equipment, it is imperative that they understand the dangers, warnings and caution notices. It is important to understand the ***signal words*** that may be used throughout this manual.

	Alerts to immediate hazard, which will result in death or severe personal injury, if not avoided
	Alerts to a hazard which will result in serious injury, or death in some cases, if not avoided.
	Alerts to a potential hazard that may result in a serious personal injury, if not avoided. It also alerts against an unsafe practice that will permanently damage equipment or property.
IMPORTANT	Indicates a suggestion as to how to use or adjust the equipment for best product results.
NOTE	Points out a proper use that will avoid damage to the equipment, or will extend the life of the parts.

2.1 MACHINE FEATURES & SPECIFICATIONS

2.2 INTRODUCTION

APEX equipment is designed to be easy to setup and maintain, capable of providing years of reliable service. Versatile by design, APEX machinery can accommodate a wide variety of product and container configurations, often without the need for change parts. Modular design allows for fully automatic or semi-automatic systems. Tool-less adjustments are available, and allow for easy and quick changeover for various product and container combinations. Operator controls are easily accessed via the front panel of the unit.

2.3 FEATURES & BENEFITS

- ✓ **Easy Changeover**
  Simple mechanical adjustment for different bottle sizes. Quick to changeover, simple to use and easy to clean
- ✓ **Robust**
  Anodized aluminum and stainless steel shells, frames, legs and housings maximize the working life of your machine, and minimize maintenance costs and downtime
- ✓ **Customizable**
  Whatever the production need, APEX has a design to meet.
- ✓ **Flexible**
  Versatility and Simplicity are intrinsic to the design. Many container sizes and shapes, and many products can be run on one machine

2.4 ELECTRICAL SPECIFICATIONS & REQUIREMENTS

Electrical Requirements: Standard - 120VAC / 50/60Hz / 1 Φ / 3A
Other voltages available per application

Refer to machine specific documentation if applicable.

2.5 AIR SPECIFICATIONS & REQUIREMENTS

Compressed Air Consumption: Clean, dry (non-oiled) compressed air 80-100*psi* /
up to 20*cfm* depending on options
Refer to machine specific documentation if applicable.

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3.1 INSTALLATION & START-UP

3.2 INSTALLATION PROCEDURES

The capper assembly should be placed on a solid, level foundation, with the capping head assembly centered over the container conveyor. The main capper frame should be leveled using threaded leveling pads or other suitable means to secure the equipment in place. Electrical connections should be properly terminated into the main electrical enclosure by properly trained technicians, and appropriate supply voltage, proper phase and adequate supply amperage should be verified prior to powering up the equipment.

3.3 START-UP & COMMISSIONING

This manual should be read completely before powering-up the machine. Commissioning of the machine should be performed by a trained technician only after complete understanding of the machine, and with products that match samples indicated to APEX Filling Systems, LLC if supplied. After the machine is adjusted for the bottle and product combination, the machine can be put into operation with the following steps.

- ✓ Check the machine to see that guards are in place
- ✓ Check the mechanical system for loose or missing parts

1. Ensure the E-STOP button is depressed, and the unit is clear of personnel.

Figure 3-1
Emergency Stop

2. Remove any lock-out/tag-out devices and rotate the main power disconnect clockwise to ON

Figure 3-2
Main Disconnect

Figure 3-3
Main Air Disconnect and Filter Regulator

3. Keeping clear of any moving parts and assemblies, remove any lock-out/tag-out devices and rotate the main air disconnect clockwise to ON.

4. Air pressure should be verified to be at least 20psi for the capping unit air supply, and at least 60psi for the indexing/accessory air supply.

5. Verify that sufficient containers and product to be capped are available to be supplied to the capper.
6. On the operator interface, press Cycle Start (or equivalent, depending upon controller used) to begin the container indexing and filling cycle.
7. If cap torques are insufficient, or machine indexing does not perform properly, refer to the appropriate mechanical adjustments (*Sec 4.1*) to rectify, or adjust the capping and indexing program timers (*see controller manual for detailed adjustments*).

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4.1 MECHANICAL ADJUSTMENTS

4.2 THEORY OF OPERATION

APEX automatic inline chuck cappers utilize a container conveying system, typically a flat tabletop chained conveyor, to move containers into and out of the capping area. Container location is precisely controlled with the use of guide rails, and indexed using air cylinders (commonly referred as "**gates**" or "**pins**") to stop and release containers and contained with a container locator to keep the containers from rotating during capping.

The capping unit dives down onto the loosely started cap, and tightens the cap to the preset torque.

4.3 MACHINE COMPONENT OVERVIEW

Figure 4-1 shows a front overview of the econo inline chuck capper components.

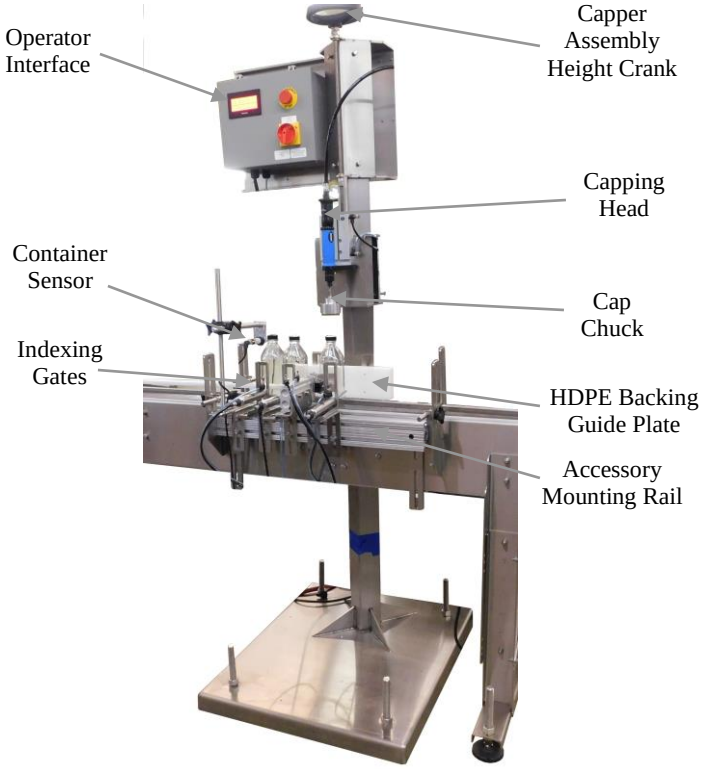

Figure 4-1
Machine Front Overview

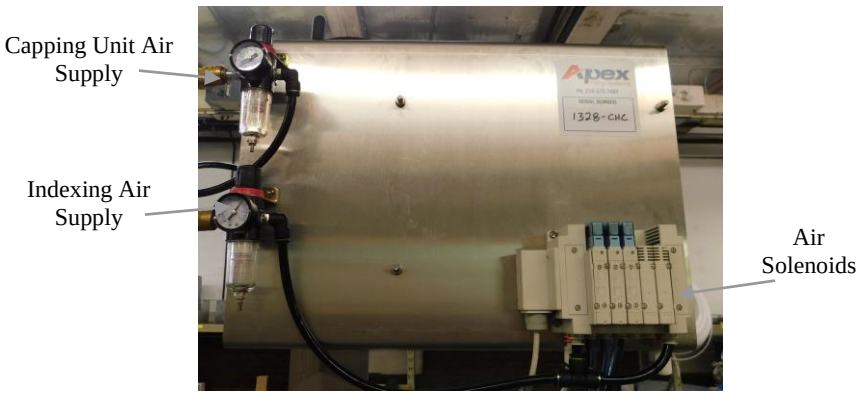

Figure 4-2
Machine Rear Overview

Figure 4-2 shows a rear overview of the econo inline chuck capper components.

4.4 CAPPING AREA OVERVIEW

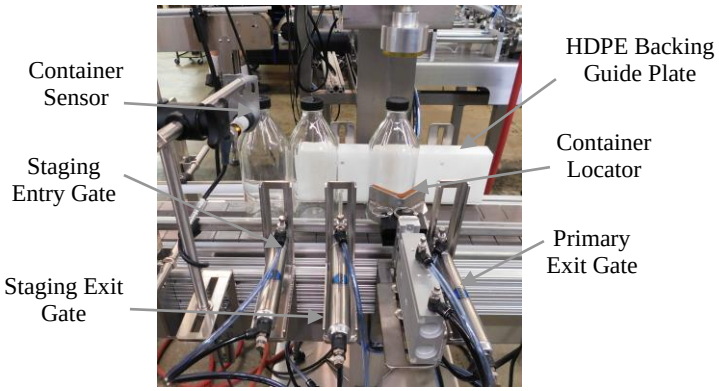

Figure 4-3
Capping Area Overview

Figure 4-3 shows a closeup view of the capping area.

4.5 GUIDE RAIL ADJUSTMENT

Figure 4-4
Guide Rails and Indexing Gates

For containers to move properly down the conveyor, guide rails must be adjusted so that containers move smoothly, without binding, in a uniform manner. Guide rails will typically be set toward the base of the container for best results. Difficult-to-control containers may require an alternate setup (multiple rails, special containment, etc) to effectively control the location of the containers. Guide rails are typically adjusted in/out and up/down with turnbuckles which hold the guide rail rods in place, as shown in *Fig 4-4*.

4.6 BACK PLATE ADJUSTMENT

The HDPE backing guide plate is mounted on sliding brackets, secured with adjustment knobs to lock it into place. The plate itself should be adjusted so that the containers ride smoothly along the guide in-line with the conveyor guide rails.

Figure 4-5
Back Plate Adjustment

Figure 4-6
Accessory Mount Rail

Figure 4-6 shows accessories mounted to a slotted rail, used for indexing and container control. Loosening the mount nuts allow the brackets to slide left and right as needed for different containers, and slotted brackets allow for adjustment up and down to accommodate a wide variety of container sizes and shapes.

In addition to the container guide rails, containers are situated in the capping area by the **Entry Gate** and **Exit Gate** locations. The **gates** or **pins**, are mounted in place with L-brackets mounted to a sliding mount rail as shown, and are positioned and locked into place with standard nuts and bolts.

The **exit gate** is set so that it extends over more than half of the container diameter, so the containers are positively stopped during the indexing cycle. The **entry gate** only extends far enough to hold back incoming (empty) containers from moving past it, without affecting their position when extended, as shown in *Fig 4-7*.

Air cylinders are typically equipped with air flow control valves to adjust the speed which the cylinders will operate. Turn clockwise to decrease the extension or retraction, counter-clockwise to increase.

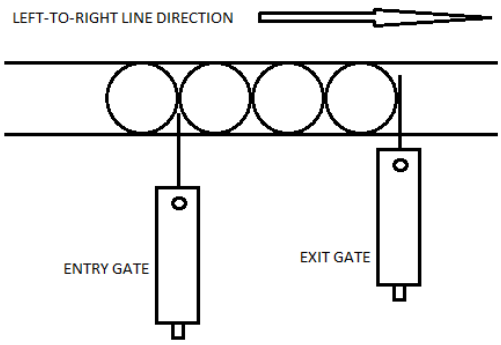

Figure 4-7
Indexing Gate Positioning

4.7 CAPPER ASSEMBLY HEIGHT ADJUSTMENT

The height of the capper assembly is adjusted with the crank located at the top of the unit. Turning the crank clockwise raises the assembly, counter-clockwise lowers. Be sure to loosen lock bolts on assembly first. The crank is shown in *Figure 4-1*.

4.8 APPLICATION TORQUE ADJUSTMENT

Shown in figure 4-8 is the bottom of the push-to-start screwdriver with the torque adjustment cover in place. To adjust the cap application torque, first remove this cover to expose the torque adjustment dial underneath.

After removing the cover, turn the dial clockwise to increase the application torque, or counter-clockwise to decrease the application torque.

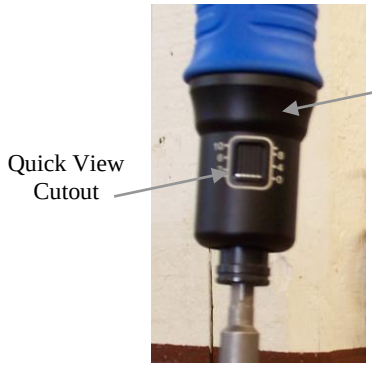

Figure 4-8
Torque Adjustment Cover

Figure 4-9
Torque Adjustment Dial

Above the dial is marked for reference, as shown in figure 4-9.

4.9 CHUCK INSERTION AND REMOVAL

To insert or remove the aluminum chuck, simply pull down on the chuck collet to release the hex drive lock, and insert chuck or remove from the tool.

Figure 1-6
Chuck Assembled

4.10 CONTAINER SENSOR ADJUSTMENTS AND LOCATIONS

Sensors are positioned along the container path on the conveyor (such as shown in *Fig 4-10*) to count and/or verify the container position. A variety of sensors can be utilized, depending upon the type of container to be sensed (clear glass, plastic bottle, metal can, etc.) Sensors located prior to the capping area verify that sufficient containers are available prior to the capping area. Sensors located downstream from the capping area will sense if a backup has occurred, and will pause the capping operation until the backup or jam has cleared.

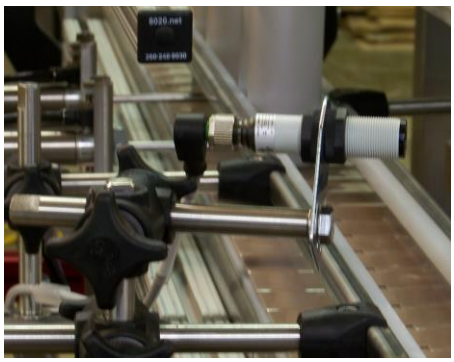

Figure 4-10
Typical Container Sensor

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4.11 RUBBER CHUCK INSERTS

Inserts are sized per the cap, and the appropriate material is used for proper grip, and to avoid scuffing the cap. Typical inserts are made from polyurethane, vinyl, white, black and tan rubber of varying durometers. Consult APEX for determining the proper material for the application.

The Durometer is the international standard for measuring the hardness of rubber, plastic and other NON-METALLIC materials. A durometer tool measures a compound's susceptibility to indentation, which should not be confused with durability or tensile strength as there is no inherent relationship across all compounds. Durometers are described in the American Society for Testing and Materials specification ASTM D2240. There are a variety of Durometer scales. Our products are measured using the "Shore A" Scale.

Refer to the chart below for available inserts:

MATERIAL	CHARACTERISTICS	STD DUROMETER
POLYURETHANE	Exhibits excellent wear properties and leaves little to no residue or particulates ensuring an unmarked closure. Durometers up to 80-85 available on request.	45-55
VINYL	Offers grip on caps where polyurethane may slip. Generally suggested for caps that feature smooth contact surfaces.	45-55
WHITE RUBBER	Often matched to applications with white closures or caps to avoid marking. Suggested for smooth contact surfaces or minor serrations.	50-60
BLACK RUBBER	A slightly higher durometer helps extend life while offering the same level of grip as white. The color makes it ideal for dark colored caps.	60-70
TAN RUBBER	This is the hardest of the rubber inserts and is suggested for metal caps with serrations or very abrasive applications.	70-80

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4.12 SET-UP

Basic setup instructions are as follows:

1. Remove air and power from machine. Use lockout/tagout if available
2. Loosen guide rails and slide out
3. Loosen indexing brackets and slide them out of the way of the container travel on the conveyor
4. With air pressure removed, head unit should be in the lowered position
5. Adjust head unit assembly so chuck is above the capped bottle
6. Center container with cap directly underneath chuck
7. Adjust HDPE backing guide plate up to container
8. Adjust rails to contain the front of the container
9. Ensure that containers can move freely from beginning to end of the conveyor
10. With container centered under the chuck, crank head unit down with adjustment knob so that chuck compresses (it is not necessary to be forced down, snugly pressed on top is sufficient)
11. Adjust primary exit gate so that it extends more than halfway across the conveyor, ensuring that the gate bracket will not interfere with the locator block movement. To avoid interference, it may be necessary to adjust the exit gate at a slight angle, depending upon the container diameter.
12. Adjust staging exit gate to hold the upstream container so there is a gap between the staged container and the container under the capping head
13. Adjust staging entry gate so that it extends just enough to hold back the pre-staged containers in-line. The entry gate should be adjusted so it extends as shown in *Fig. 4-7*.
14. Adjust container sensor so it properly senses a container at least one container's width prior to the entry gate to allow for minimum consistent back pressure
15. With a container located underneath the capping unit, adjust the container locator so it positively controls the container location and tightly enough against the container back plate so that the container is not allowed to rotate during the capping operation
16. Reconnect the indexing air supply, which extends the exit gates, retracts the entry gate, and raises the capping head. Always stay clear of moving parts when reconnecting compressed air supply
17. With the appropriate cap chuck already inserted into the capping head, reconnect the capping unit's air supply
18. With a loosely capped container located underneath the capping head, extend the container locator manually through the operator interface
19. Dive the capping head assembly manually through the operator interface
    a. The chuck should quickly rotate and stall, tightening the cap onto the container
    b. If the chuck continually spins, either the torque setting is too high for the chuck's grip on the cap, or the overall assembly height is too high. Raise the capping head assembly manually through the operator interface, and adjust as needed. Repeat this process until the chuck stalls and the cap is tightened as needed.
20. With the capping assembly in the raised position, remove containers from the indexing and capping area
21. Remove the capping unit's air supply and remove the chuck assembly from the capping unit
22. Place containers in-line prior to the entry gate

23. Start a cycle from the operator interface to ensure that indexing is set properly. With the chuck removed, it will not make contact with the container. Ensure that the containers index properly. Adjust gate location or program timers as needed.
24. Replace capping head chuck, and then replace capping unit's air supply.
25. Once indexing gates and timers and capping torque is set, the machine is ready for production

5.1 ELECTRICAL AND PNEUMATIC CONTROLS

5.2 MAIN CONTROL BOX

Figure 5-1
Main Control Box

On the front of the main control box is located the Operator Interface, Main Emergency Stop Button, and the Main Power Disconnect Switch.

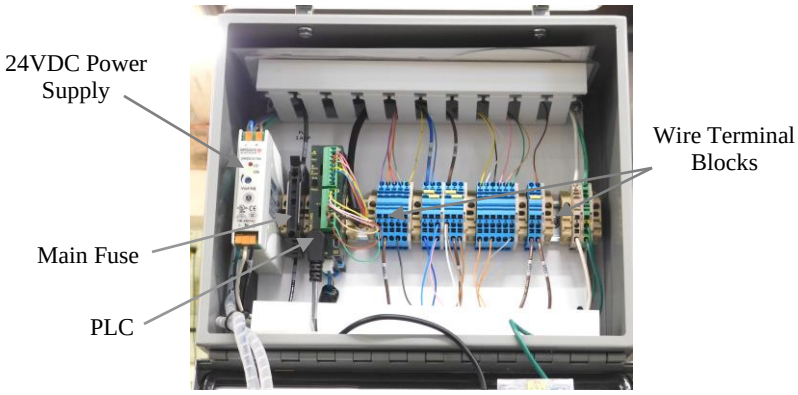

Figure 5-2
Control Box Components

5.3 AIR SOLENOIDS

Figure 5-3
Air Solenoids

Air solenoids, typically mounted to the side, or rear, of the main control box, provide pneumatic logic control for the machine operation. An electrical signal, sent from the PLC, activates the solenoid attached to the air valve, switching the air pressure from one port to the other, extending or retracting the connected air cylinder (indexing gates, dive cylinder, etc)

Solenoids may be manually activated by pressing the button located on the face of the solenoid assembly to assist with troubleshooting.

6.1 TROUBLESHOOTING

6.2 GENERAL TROUBLESHOOTING

SYMPTOMS	POSSIBLE RESOLUTIONS
Machine does not power-up	Verify inlet power is active
	Verify Main Disconnect is rotated to ON
	Check Main Fuses or Circuit Breakers
Chuck does not stall on cap, or cap application torque is not sufficient	Check chuck insert for excessive wear, replace if needed
	Check capper assembly height, and lower to provide more downward pressure on cap
	Adjust torque setting on capper
Main exit gate closes too early or late, striking the leading or trailing edge of the container entering the capping or staging area	Adjust index duration in operator interface
	Adjust air flow control on air cylinder
	Increase gap between capping area and staging area by moving the staging gates upstream

7.1 SERVICING

7.2 CLEANING PROCEDURE

It is important that the machine is kept clean of dirt, broken glass, sand, etc. as these will reduce the wear life of the air cylinders, seals, inserts, o-rings, etc. The machine should be cleaned with water or soap at regular intervals. Stronger detergents are often used in the food industry and can be corrosive on the machine components. Therefore, the machine should be washed down thoroughly immediately after cleaning with any harsh detergents.

WARNING: When using a high-pressure pistol with cold and hot water, or steam for cleaning, do not spray near any electrical enclosures.

8.1 FACTORY CONTACT INFORMATION

8.2 CONTACT APEX DIRECTLY

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NOTES

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