PACKAGING MACHINES AUSTRALIA

ICP-AC1-PLC USER MANUAL

Automatic inline capping machine

APRIL 2023 on

RENTAFILL
FILLING EQUIPMENT HIRE

Table of Contents

1 INTRODUCTION

ICP-AC1-PLC Auto Capping Machine.

The ICP-AC1 is a PLC-driven pneumatic capping machine designed and built in Sydney by ICP Packaging Machines Australia. Designed to mount onto a running conveyor belt, the cap tightener is adjustable for containers from 20 to 450mm tall.

ICP cappers feature an air torque motor designed to stall out at a given torque and PLC-driven pneumatic system, allowing full customisation of the capper functions and the ability to recall previous settings making the ICP-AC1-PLC an extremely versatile machine.

PLC functions include multiple timer controls for every function on the machine, allowing the user to fine-tune each function. It gives the ability to hold a sensor signal or make the jaws steady the container before the air motor descends, and more importantly, the ability to recall the previous setting into the PLC, saving the need to re-calibrate the machine on every change-over.

WARNING

BEFORE USING THE MACHINE, PLEASE ENSURE ALL OPERATORS HAVE READ THIS MANUAL AND UNDERSTAND THE SAFE OPERATION OF THE EQUIPMENT

2 SAFETY

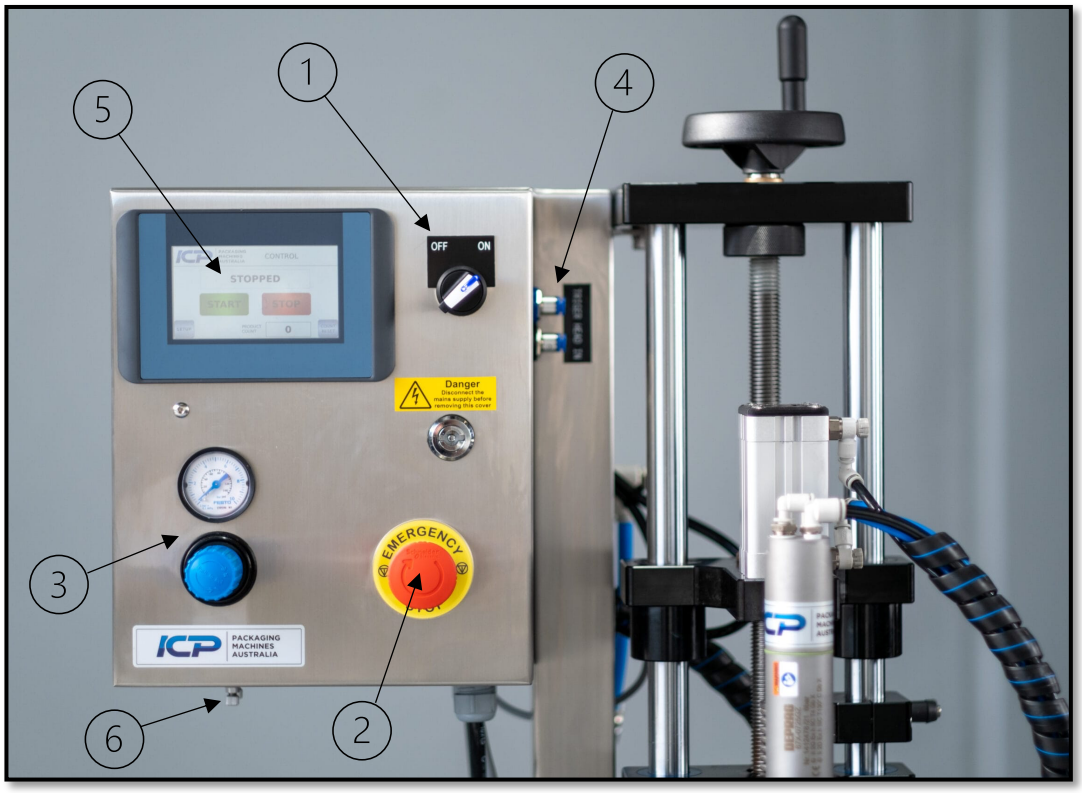
ICP Packaging machines are custom-built machines constructed for an application and/or purpose outlined by the customer and the requirements to fulfil a project.

Machinery is built with safety measures to protect the machine from damage and limit the risk of injury to the user. However, it is imperative that any user who intends to operate this equipment has a sound understanding of pneumatic-based equipment, has thoroughly read this manual, and is confident in the safe operation of the equipment.

It is also recommended that the company or persons in possession of the equipment perform their own risk assessment and install any guarding measures that they deem necessary for the safety of the operators and the environment in which the equipment will be used.

3 CONTROL FUNCTIONS

3.1 CONTROL BOX FRONT



1. ON/OFF switch
2. E-STOP Button
3. AIR MOTOR TORQUE
4. TRIGGER HEAD input
5. PLC – HMI SCREEN
6. JAWS FLOW CONTROLS

3.1.1 OFF/ON SWITCH

ON/OFF is the main switch for starting and stopping the PLC and should be used to start and stop the machine under normal operating conditions.

3.1.2 EMERGENCY STOP BUTTON (E-STOP)

E-STOP When this button is depressed, the air is "dumped" from the Machine, and the PLC goes into E_STOP mode and disables all power. The button is released by turning the knob CLOCKWISE and pressing the RESET button on the PLC.

3.1.3 AIR MOTOR TORQUE

Air motor torque is the amount of air pressure used to tighten the cap.

Too much pressure: This will result in the chuck over-tightening the cap and/or starting to spin on it after it reaches the correct torque.

Not enough pressure: This will result in the chuck not having enough torque to tighten the cap correctly and will not reach the point of stalling on the cap before it is tightened.

3.1.4 TRIGGER HEAD input

Ports for connecting optional ICP Trigger head capper unit.

Connect: **Black** to **Black** - **Blue** to **Blue**

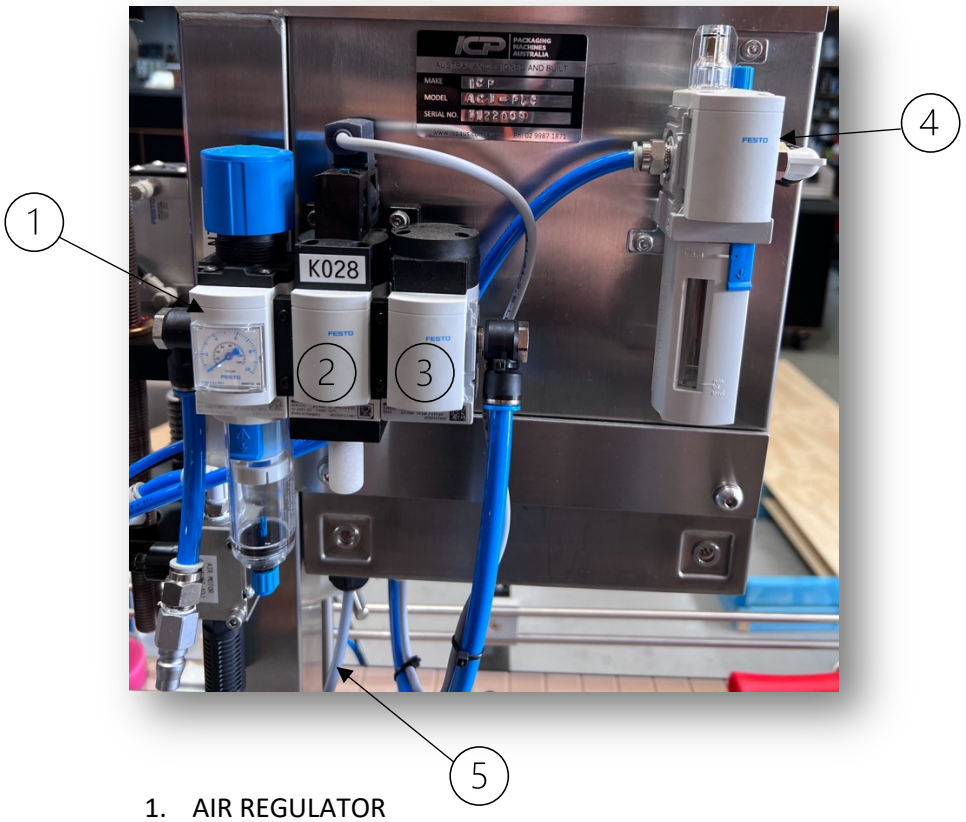
3.1.5 PLC – HMI screen

HMI Screen used to control PLC functions of the capper.

3.1.6 JAWS FLOW CONTROLS

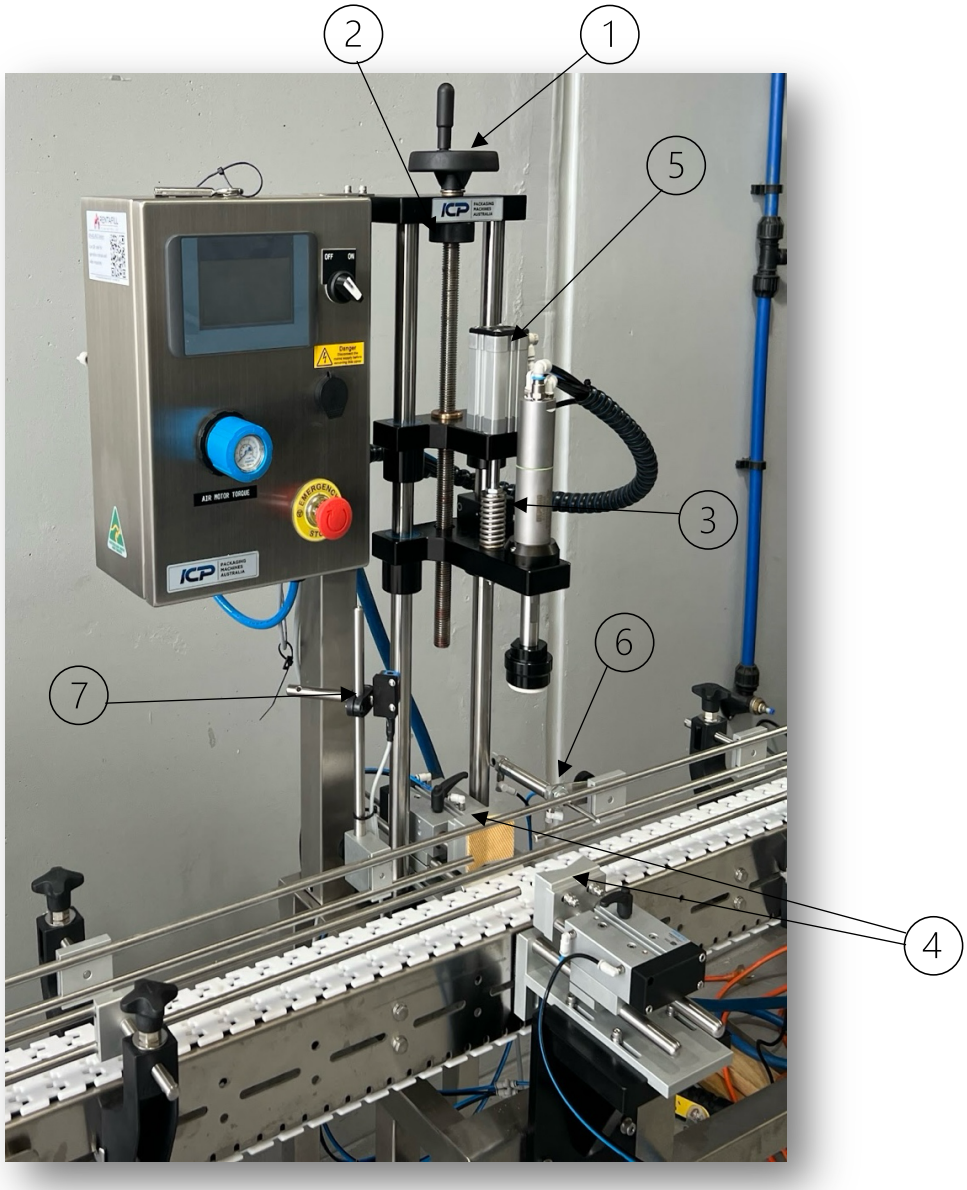
Flow controls 2x for adjusting the speed at which the jaws close and open.

3.2 CONTROL BOX REAR



1. AIR REGULATOR
2. SOLINOID ON/OF UNIT
3. SOFT START UNIT
4. AIR MOTOR OILER
5. POWER SUPPLY – 10amp

3.3 MECHANICAL CONTROLS



1. HAND WHEEL – Used to adjust the height.
2. LOCKING NUT – Used to lock the hand wheel from moving.
3. UP ADJUSTER BLOCK – Used to adjust the up height.
4. JAWS – Used for holding containers whilst tightening the cap.
5. DECENT CYLINDER – Air cylinder for descending the chuck.
6. GATE – Container gate.
7. SENSOR – Product sensor
8. CHUCK & LINER – Various sizes for tightening the caps.

WARNING: Ensure that when undergoing any mechanical adjustments, the machine is in E-STOP mode or air lines are disconnected from the machine. Failure to do so could result in personal injury or damage to the equipment.

4 PINCH POINT WARNING

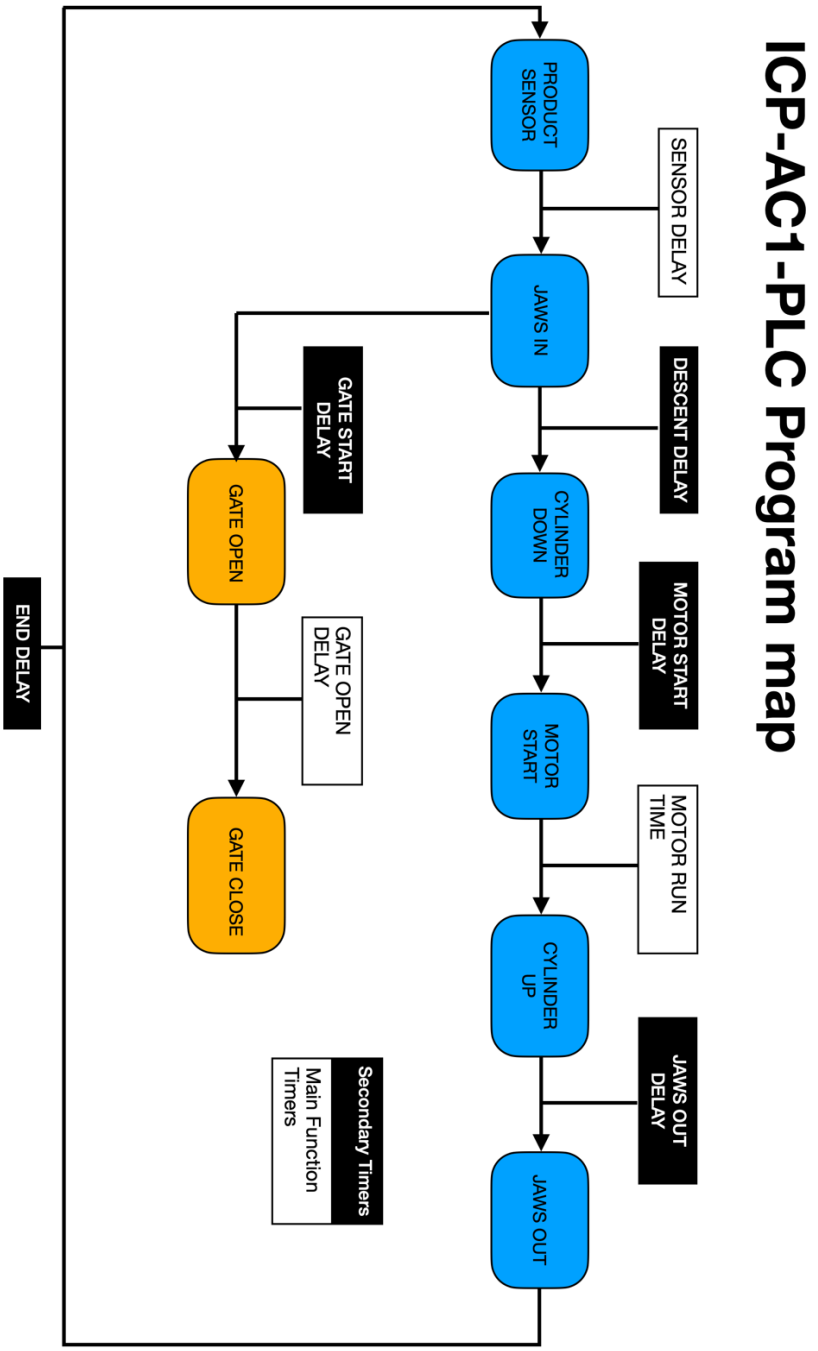
WARNING - Due to the type of pneumatic capping equipment, it is necessary to have moving parts that enable the capper to operate correctly and to enable the operator to easily adjust the machine for a different product and/or make the necessary adjustments through the production run.

Whilst the design is safe to the user under normal operation. It is essential to be aware that if, at any time, the operator needs to make adjustments to the machine, that the machine is put into E-Stop mode and/or the airlines disconnected from the machine before attempting adjustments.

Failure to do so could result in personal injury to the operator and possible damage to the machine.

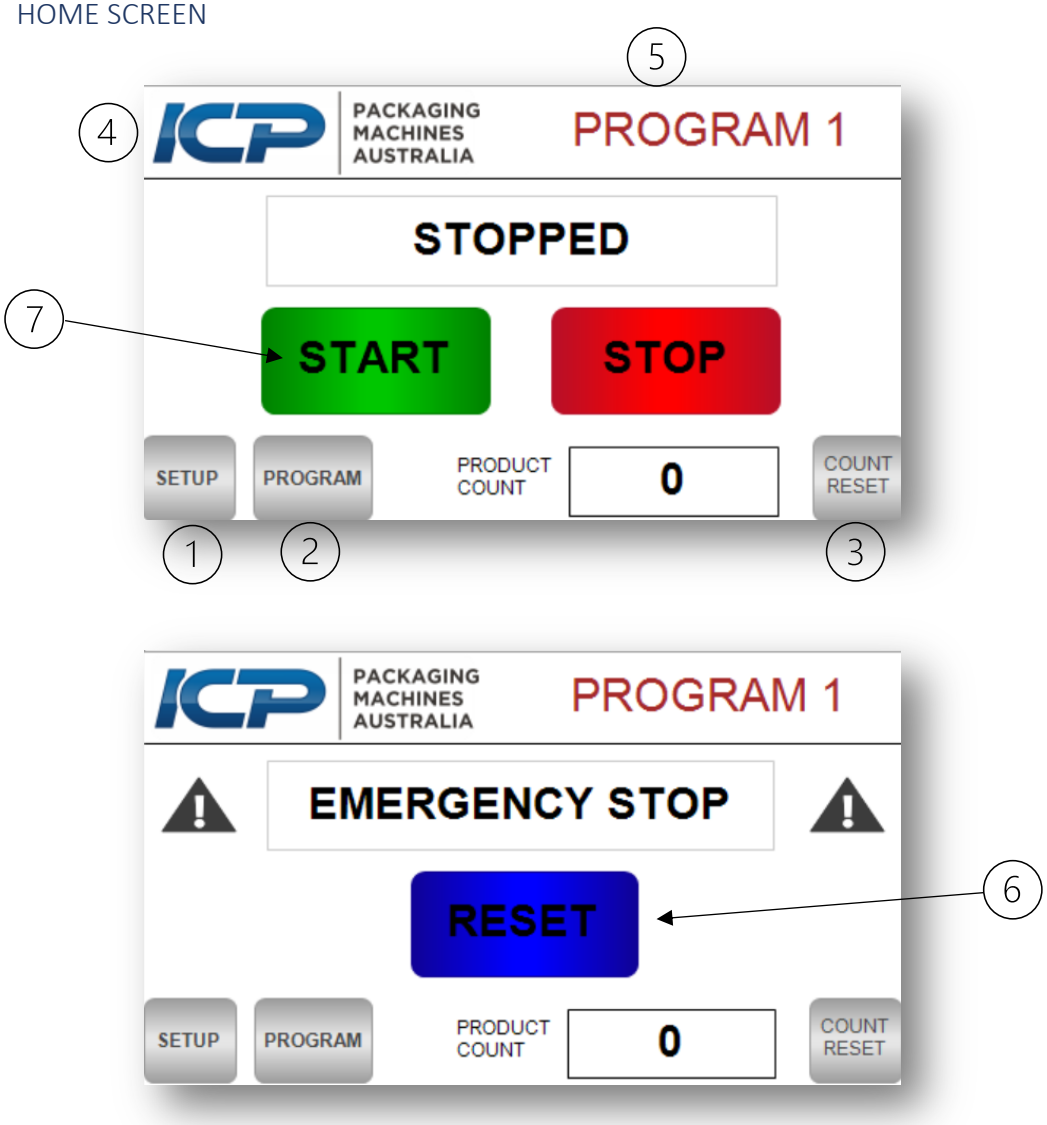
5 PLC Functions

Below is the process of the timer map.



5.1 PLC CONTROLS

5.1.1 HOME SCREEN



1. SETUP – Button to Main Function Timers.
2. PROGRAM – Button to the Program page.
3. COUNT RESET – Reset button for the product count.
4. ICP LOGO – Press on the logo to go to the Info screen.
5. PROGRAM N0. – Current program loaded.
6. RESET – System is in E-Stop mode.
7. START STOP – Start and/or stop the machine.

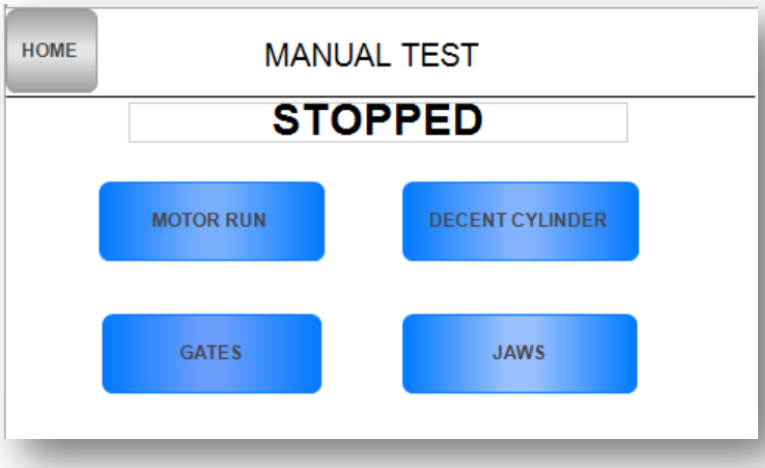
5.1.2 INFO SCREEN

The info screen will show contact details and the machine's serial number.

5.1.3 TEST SCREEN

Test screen – will allow the user to activate each function of the machine manually.

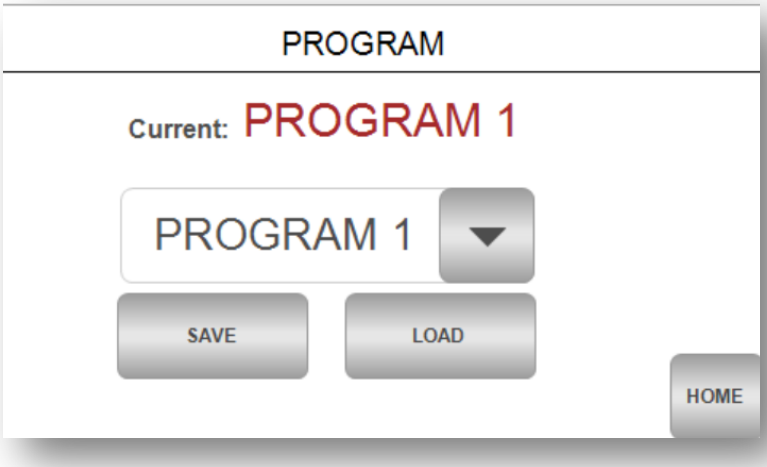
Great to test each item or fine-tune the pneumatic flow controls on the gate's descent cylinder and jaw's opening and closing speed.



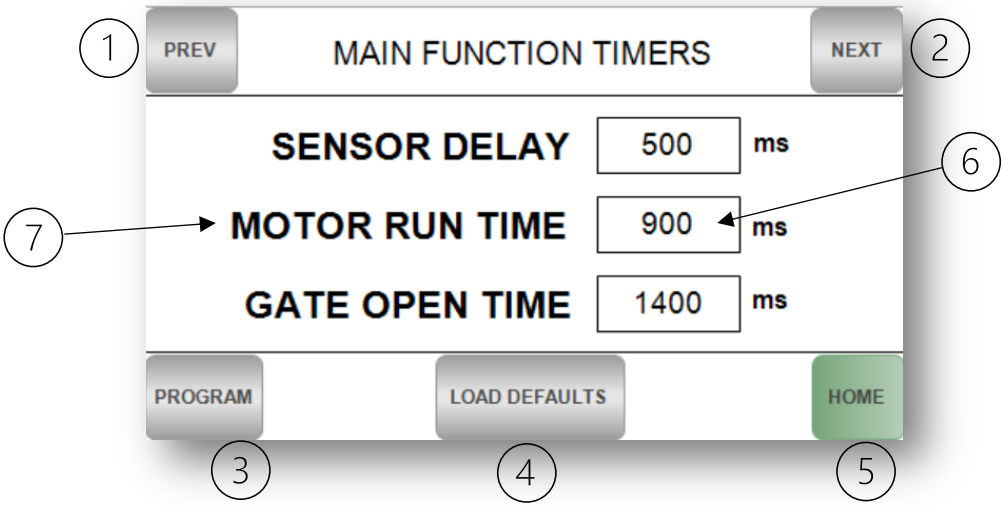
5.1.4 PROGRAM SCREEN

Used to load previously saved settings or to save the current.

Users can select from 10 programs to save or load from.

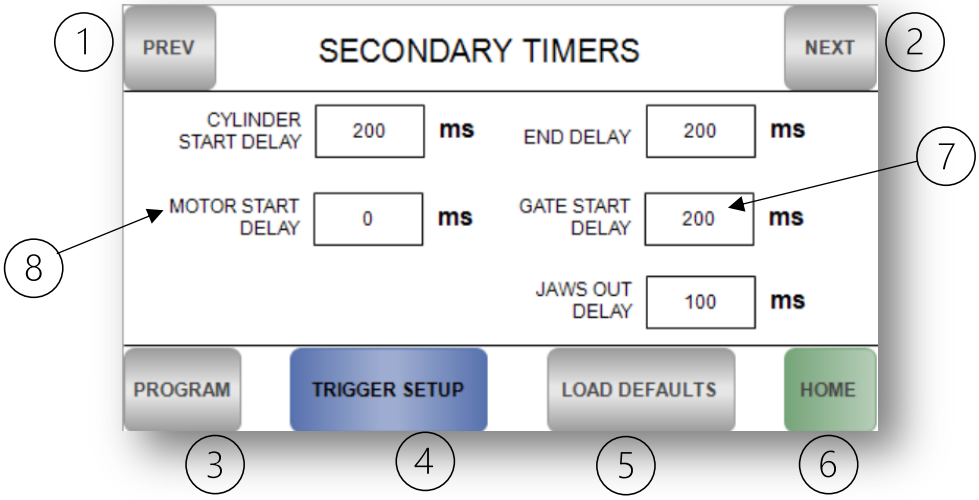


5.1.5 MAIN FUNCTION TIMERS



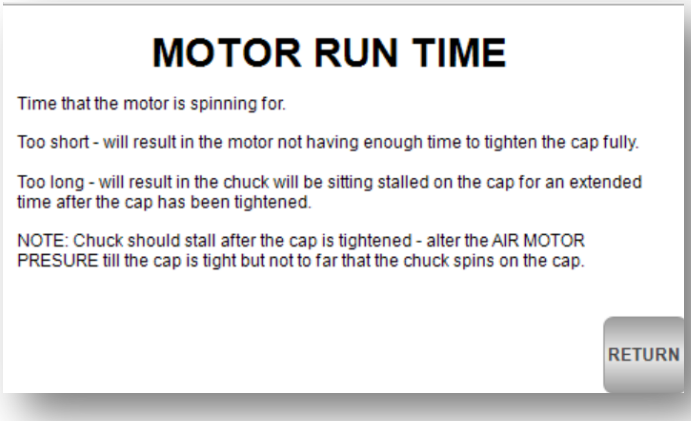
1. PREV – button to the previous screen (Main function timers)
2. NEXT – Button to next screen (MANUAL TEST)
3. PROGRAM – Button to the program page
4. LOAD DEFAULTS – All timers will be reset to manufactures defaults when pressed.
5. HOME – Button to home page.
6. TIMERS – 3 main timers – pressing the rectangle box will pop up a number pad to change the time.
7. HELP – Pressing on the name of the timer will pop up a help page on that timer function.

5.1.6 SECONDARY TIMERS SCREEN

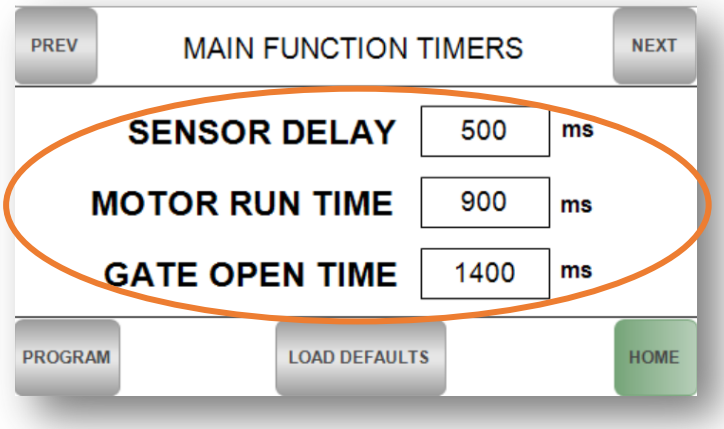


1. PREV – button to the previous screen (Main function timers)
2. NEXT – Button to next screen (MANUAL TEST)
3. TRIGGER SETUP – used to set up ICP TRIGGER HEAD (optional).
4. PROGRAM – Button to the program page
5. LOAD DEFAULTS – All timers will be reset to manufactures defaults when pressed.
6. HOME – Button to home page.
7. TIMERS – 5 secondary timers – pressing on the rectangle box will pop up a number pad to change the time.
8. HELP – Pressing on the name of the timer will pop up a help page on that timer function.

5.1.7 HELP SCREEN



5.2 MAIN FUNCTION TIMERS



5.2.1 SENSOR DELAY

Time from the sensor to when the capping process starts.

The time setting should be set longer than it takes for a container to pass the sensor completely. This way, it allows the containers to bank up behind the gate and will only activate the next process once a container stops in front of the sensor.

Too short time: The process will start before the container has arrived under the chuck.

Too long time: There will be a noticeable delay after the containers have stopped in front of the sensor, which may slow down the process.

5.2.2 MOTOR RUN TIME

The amount of time the motor is spinning for.

Too short time: This will result in the motor not having enough time to tighten the cap entirely.

Too long time: This will result in the chuck will be sitting stalled on the cap for an extended time after the cap has been fully tightened.

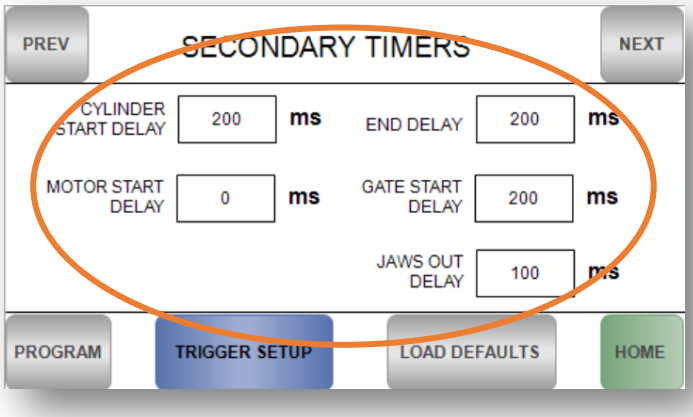
5.2.3 GATE OPEN TIME

Amount of time the gate opens to release the container.

Too short time: This will result in the gate closing onto the container before it has had time to clear the gate and/or the next container not reaching the jaws before the next process starts.

Too long time: This will result in the gate not closing before the next container arrives.

5.3 SECONDARY TIMERS



5.3.1 CYLINDER START DELAY

Amount of time between the jaws grabbing the container to the chuck descending onto the cap.

Too short time: This will result in the jaws grabbing whilst the chuck descends – this is fine in most applications. However, some applications may require the jaws to steady the container before the chuck arrives.

Too long time: This will result in grabbing the container and then creating a pause before the chuck descends. This will extend the processing time and output speed of the machine.

5.3.2 MOTOR START DELAY

Amount of time after the descent cylinder starts to when the motor starts to spin.

Too short time: This will result in the motor starting to spin up before it reaches the cap. In most applications, this is normal. However, setting a slight pause will save on the required air for the process.

Too long time: This will result in the motor not starting before the chuck reaches the cap.

5.3.3 END DELAY

Amount of time after the jaws open to the start of the new process (next container).

Too short time: This will result in the container not clearing the jaws before the next process starts.

Too long time: This will result in an added pause before the start of the following process, and it can seem like the sensor delay is too long.

5.3.4 GATE START DELAY

Amount of time from the product sensor to when the opens.

Too short time: This will result in the gate opening before the jaws completely close.

Too long time: This will result in the gate holding the container too long and in some cases, the chuck may hit the front container before it has time to get out of the way.

5.3.5 JAWS OUT DELAY

Amount of time after the descent cylinder rises to when the jaws open.

Too short time: This will result in the jaws opening at the same time as the descent cylinder rises, this is fine in most cases. However, allowing a small amount of time for the chuck to release from the cap can be handy.

Too long time: This will result in the jaws holding the container for a prolonged time.

6 SETUP PROCEDURE

6.1 MECHANICAL SETUP PROCEDURE

There are several different ways the capper can be set up, and the best option will depend on the container, cap size, and/or if using a Trigger head attachment.

Below are two setups that will cover most applications.

Some applications require modifications or speciality gating to get the best out of the capper.

WARNING: Ensure that when undergoing any mechanical adjustments around the chuck and/or the jaws, the machine is in E-STOP mode or power and air lines are disconnected from the machine. Failure to do so could result in injury or damage to the equipment.

6.1.1 AIR CONNECTION

Connect the main compressed air supply line via the NITO connection fitting on the Air Pressure Filter Regulator. Located on the rear of the machine's control panel.

Adjust air pressure to 600 kPa (87psi) via the knob on the Filter/Regulator Unit.

NOTE: ICP-AC1 requires a constant 6 bar (87psi) to the machine. It is also recommended that the air supply has a dryer installed.

6.1.2 Setting the CHUCK HEIGHT

1. Ensure the machine is in *E-STOP mode*.
2. Ensure the decent cylinder is in the down position.
3. Place a container – with a cap fully tightened – under the chuck.
4. Loosen the locking nut under the hand wheel.
5. Wind down the hand wheel until the chuck touches the cap on the container – ensuring to centre the container to the chuck at the same time.
6. Wind the handwheel a further 2 full turns down (clockwise direction)
7. Lock off the locking nut.

6.1.3 Setting the JAWS.

Setting the jaws is best done after the chuck height has been completed and whilst the chuck is still down onto the container – this way the container is centred to the chuck and conveyor.

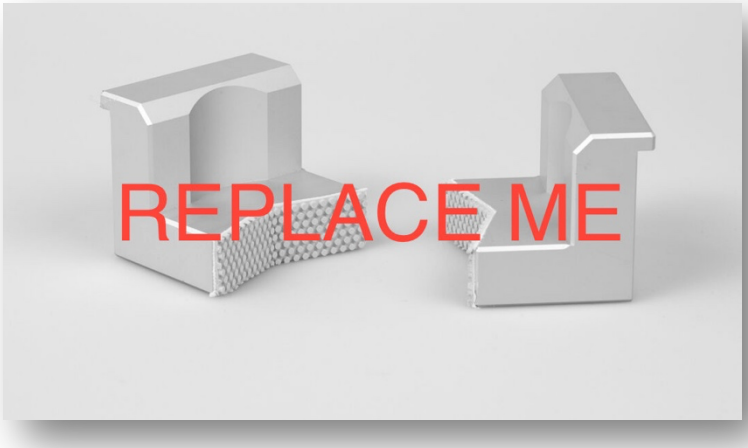
1. Ensure the machine is in *E-STOP mode*.
2. Loosen the 2 locking leavers on the JAWS.
3. Extend the jaws cylinder to full out and push the jaws against each side of the container, ensuring not to alter the location of the container.

4. Move the jaw cylinder in a further 1-2mm on each side – this will allow the jaws to apply pressure onto the container once in operation.
5. Lock off the 2 leavers.

NOTE: do not push the jaws in too far, as the jaws will crush the container, pushing the product out the top.

6.1.4 Adjusting the gate – standard setup

6.1.5 Adjusting the gate – multi gate



6.2 LOCATING THE SENSOR

The sensor can be located in many different locations and will depend on the container and the cap you are setting the machine up for.

Option 1: Set the sensor to pick up the cap on the container. In this setup, the capper will not operate if there is no cap on the container.

Option 2: Set the sensor to the body of the container. In this setup, the sensor can be located directly under the chuck, which is great if you require a faster output.

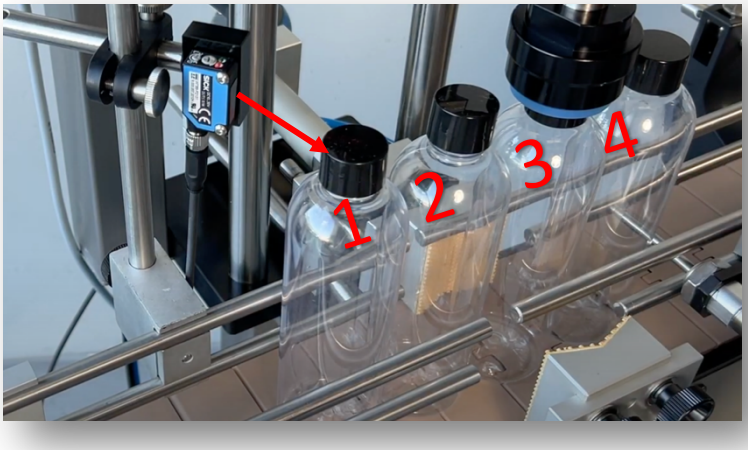
TIP: Set the signal length so the signal is only picking up the cap/container and ensure it cannot reach past the other side of the conveyor.

Place a bunch of containers with caps into the capper, ensuring the conveyor is OFF, and the capper is in STOP mode.

6.3 Adjust the sensor to pick up the cap on the container 1-3 containers downstream SETTING THE SENSOR & SENSOR DELAY TIME.

6.3.1 STANDARD SETUP

If the sensor is positioned 2-3+ containers upstream from the jaws: Adjust the time (SENSOR DELAY) setting longer than it takes for (1) container to pass the sensor completely. This way, it allows the containers to bank up behind the gate and will only activate the next process once a container stops in front of the sensor.



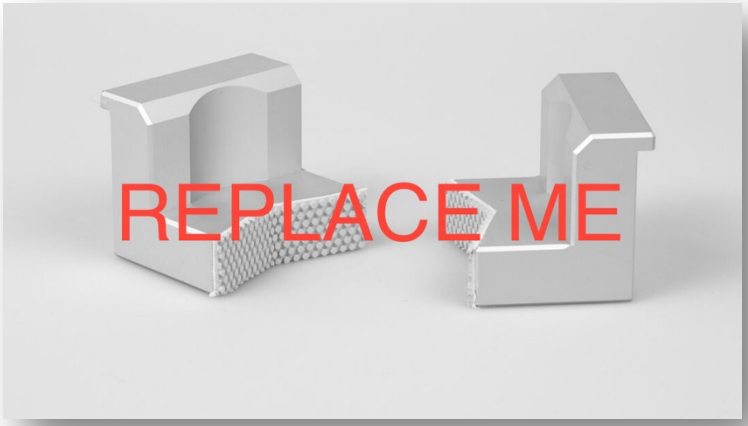
Too short of time will result in the following process starting before the container arrives under the chuck.

Too long of a time will result in a noticeable delay after the containers have stopped in front of the sensor, which may slow down the process.

NOTE: The setting is determined by the speed of the conveyor and the time taken for a container to pass the sensor. Speeding up or slowing down the conveyor will affect the time required.

6.3.2 SENSOR UNDER CHUCK

If the sensor is positioned at the container under the chuck: Adjust the sensor delay time down to allow enough time for the container to stop in the jaws before the jaws activate. You will also need to increase the END TIME on the secondary timers to allow time for the container to clear the jaws at the end of the process before the next process starts.



6.3.3 SETTING THE SICK GTB6 SENSOR

SICK GTB6 sensor has a sensing range of 10-140mm and works by bouncing the single back to the sensor from an object. In this case, your container.

When setting the sensor, it is best to set it to the flattest part of the container so that the signal can reflect back to the sensor, i.e., the middle of the container or cap.

Set the distance of the sensor to the centre of the conveyor.

Adjustment is as simple as a small Philips (No:1) screwdriver on the top adjustment **+ -** till you get the desired outcome.

6.4 SETTING THE MOTOR RUN TIME & AIR TORQUE.

Adjusting the AIR TORQUE SETTING alongside the MOTOR RUN TIME is necessary to achieve the correct timing and torque setting.

Start by setting the motor run time longer than required, i.e. 1500 ms

Also, adjust the AIR MOTOR TORQUE down and slowly bring up the pressure until the capper tightens the cap to the desired torque and stalls out – Too much torque will cause the chuck to spin on the cap.

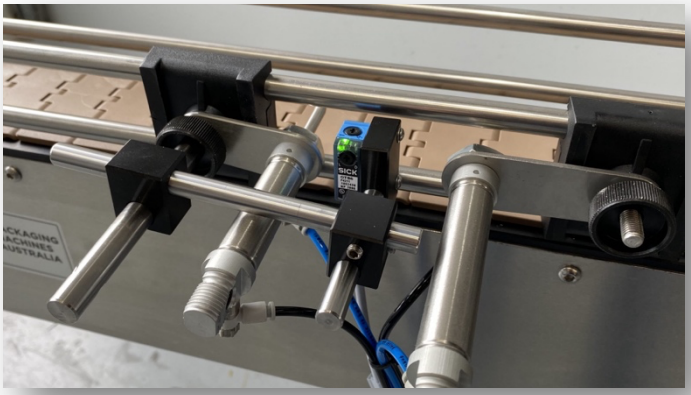
After setting the AIR TORQUE SETTING, reduce the MOTOR RUN TIME so the chuck is not stalled for a prolonged time.

Test with multiple containers to ensure the correct setting.

7 OPTIONAL ACCESSORIES

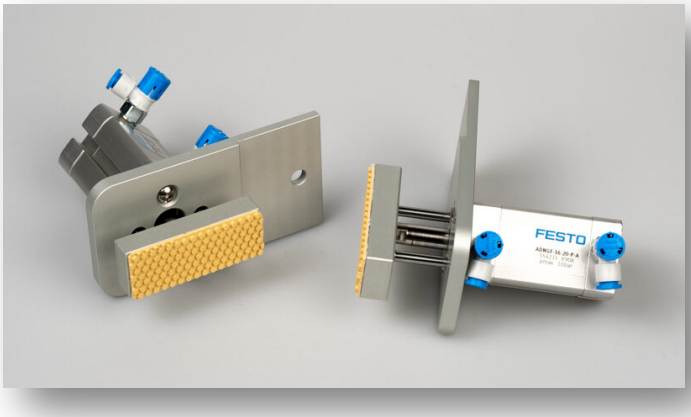
7.1 GATES

Optional changeover gates – consist of 1 long & 1 short gate. This is added as additional gates upstream from the capper and required if containers are too small for the standard setup or the container has a cap that is a similar width to the container.



7.2 FLAT GATES

Flat gates are required if the container is square/rectangular, as the standard gates will not fit between the containers without a gap.



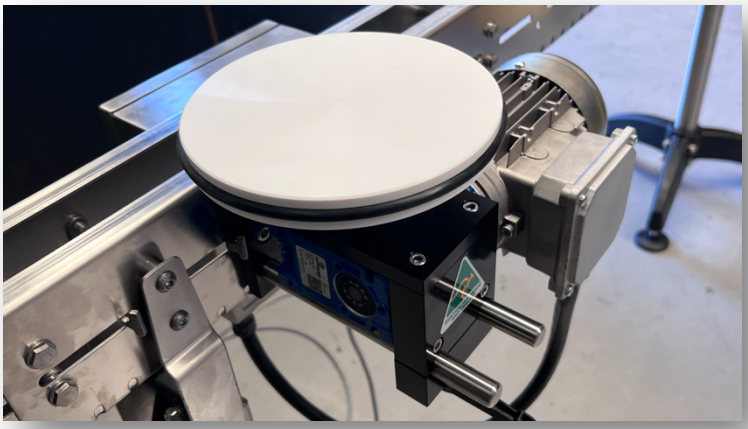
7.3 CHUCKS AND LINERS

Various sizes of chucks and liners are available to suit a vast range of caps up to 125mm.

Liners are available in 55 duro and 40 duro silicone or 65 duro polyurethane.

7.4 SPACER WHEEL

The spacer wheel is useful for spacing the containers into the capper and would work in place of upstream gates.



7.5 TRIGGER HEAD UNIT

The trigger head unit is designed to tighten caps with triggers or pump-type caps that traditional chucks are unsuitable for.

8 PREVENTATIVE MAINTENANCE

8.1 GENERAL

Your ICP-AC1 capping machine is designed for minimum maintenance operation. Its design features and construction materials eliminate the necessity for an extensive preventative maintenance routine.

The pneumatic cylinders, valves, and controls DO NOT REQUIRE LUBRICATION. Other moving parts are either self-lubricating or require only an occasional lubricant smear.

The maintenance schedule should be based on how the machine is used, the product, the environment and how often the machine is used. The below is a suggested schedule and should be used as a minimum. The maintenance schedule should be altered if the machine is in high use and/or harsh environments.

8.2 INLINE OILER

ICP-AC range of cappers is fitted with an inline air oiler. The oiler is used for the AIR TORQUE MOTOR only. The main pneumatic components are oil-free.

The air oiler will be factory-set prior to delivery.

Adjustment is by the knob on top of the unit and should be set to approx. 1 drip per min or less.

Replacement oil is FESTO pneumatic oil or similar quality.

8.3 DAILY MAINTENANCE

1. Drain the Air Filter Bowl of accumulated dirt and water.
2. Inspect electrical cords and air lines for damage.
3. Visually inspect bearing rods and moving parts for built-up grime and/or wear and tear.
4. Inspect wear parts – Chuck liners and jaw pads for excessive wear.
5. Test the E-STOP functions correctly.

8.4 WEEKLY MAINTENANCE

Regular daily maintenance plus;

1. Wipe over all bearing rods and apply a small smear of pneumatic oil.
2. Check the oil level in AIR OILER.
3. Ensure all adjustable parts are correctly tightened.

8.5 3 MONTHLY MAINTENANCE

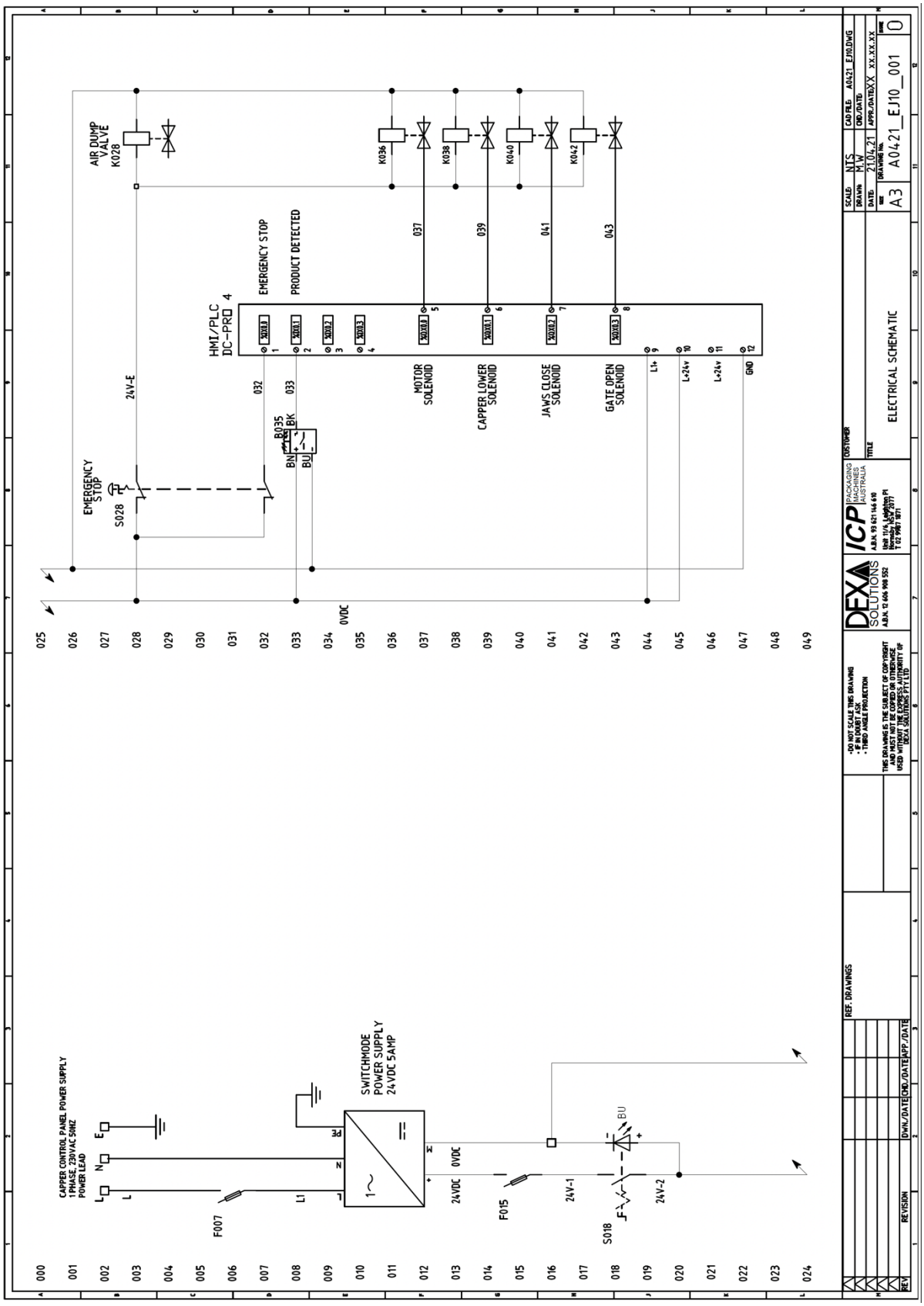
Regular daily & Weekly maintenance plus;

1. Visually Inspect the inside of the control box for:
    a. Loose air or electrical connections
    b. Loose components
    c. Oil or water from breathers
2. Thoroughly clean the machine.
3. Check all bolts and adjustable parts are tight.

WARNING: Ensure when undergoing any maintenance on the machine to disconnect power and airlines.

Ensure not to touch electrical components within the control box – **visual inspection only**. Contact a licenced electrical contractor or RENTAFILL for further assistance if an issue is found.

8.6 WIRING DIAGRAM ICP-AC1-PLC.



9 SPARE PARTS AND CONSUMABLES

For spare parts and consumable items please visit

https://rentafill.com.au/

Or contact us directly on 02 9987 1871

Unit 11/6 Leighton place

Hornsby, NSW, 2077

------- THE END -------