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EPC MANUAL & KNOWLEDGE BOOK

HOW AN ELECTRONIC PRESSURE COOKER (EPC) WORKS

**ELECTRIC PRESSURE COOKERS FOR SCHOOLS (EPC4S)
CLEAN COOKING SOLUTION FOR SCHOOL CANTEENS**

SUPPORTED BY



DEVELOPED BY

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Training Objectives

By the end of this training, participants should be able to:

- Define an Electric Pressure Cooker (EPC) and understand its basic functionality.
- Identify key features of an EPC and their roles in efficient cooking.
- Understand safety measures when using an EPC.
- Demonstrate knowledge retention through practical cook demonstrations.

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1 INTRODUCTION TO ELECTRIC PRESSURE COOKERS (EPCS)

WHAT IS AN ELECTRIC PRESSURE COOKER?

An EPC is a modern, clean cooking device that integrates software and hardware to generate and retain heat efficiently. It operates using electricity, which is converted into thermal energy to facilitate cooking. EPCs combine features from traditional cooking appliances like fireless cookers, electric hot plates, and non-electric pressure cookers.



BRIEF HISTORY AND INTRODUCTION OF PRESSURE COOKERS AND ELECTRONIC PRESSURE COOKERS

A pressure cooker is a sealed vessel for cooking food with the use of high-pressure steam and water or a water-based liquid. This process of cooking is called pressure cooking.

The pressure cooker's history dates back to 1679 when French physicist Denis Papin invented the "steam digester," considered the first prototype of a pressure cooker; this early design was called a "bone digester" as it was meant to extract fat and collagen from bones using steam pressure to cook food faster; over time, the design was refined with improved safety features and materials, leading to the modern pressure cooker we know today, which is often categorized into generations based on features like pressure regulation and ease of use.



Home pressure cooking, however, took a major step forward in 1938 when German Alfred Vischler introduced his "Flex-Seal Speed Cooker," the first "saucepan-style" pressure cooker, at a New York City Trade Show. Although Vischler's idea was on target, the product that caught the attention of homemakers was the "Presto" pressure cooker, unveiled at the 1939 New York World's Fair.

INTRODUCTION OF ELECTRIC PRESSURE COOKERS

Electric pressure cookers were first introduced in the 1990s, marking a significant shift in the world of pressure cooking. Electric pressure cookers are different from stovetop pressure cookers in that they are fully electric and do not require an open flame to cook. They are equipped with digital displays, programmable cooking settings, and automatic shut-off features, making them more convenient and easier to use. Electric pressure cookers are also available in a range of sizes, shapes, and styles, catering to different cooking needs and preferences.

- The first **electric** pressure cooker was patented in 1991.
- Over time, engineering advancements have enhanced EPCs for efficiency, safety, and ease of use.
- There are three generations of EPCs, each incorporating improved features and technologies.

1st Generation Pressure Cooker

Also known as "old type" pressure cookers, these operate with a weight-modified or "jiggler" valve, which releases pressure during operation. Some people consider them loud because the valve rattles as excess steam is released. Older pressure cookers typically offered only one pressure level, but from the 1960s onwards some allow the operator to change the weight of the valve, thus changing the pressure.



2nd Generation Pressure Cooker

This generation is characterized by two or more pressure settings. Some of these pressure cookers do not release any steam during operation (non-venting) and instead use a rising indicator with markings to show the pressure level. These only release steam when the pan is opened, or as a safety precaution if the heat source is not reduced enough when the pan reaches the required cooking pressure. Others use a dial that the operator can advance by a few clicks (which alters the spring tension) to change the pressure setting or release pressure; these release steam during operation (venting).



3rd Generation "Electric Pressure Cookers" - EPCs (Latest Version)

After the stove-top pressure cookers came the electric pressure cookers in 1991, called the "third generation" pressure cookers.

These include an electric heat source that is automatically regulated to maintain the operating temperature and pressure. They also include a spring-loaded valve (as described above) and are typically non-venting during cooking.



THE ELECTRIC PRESSURE COOKER (OR MULTICOOKER)

The electric pressure cooker (or multicooker) is an appliance that is a combination of an electric hotplate, a pressure cooker and an insulated hotbox with a fully automated control system. Some pressure cookers are multifunctional (multicookers): An electric pressure cooker is often called a multicooker because it can perform multiple cooking operations: multicookers can boil, simmer, bake, fry, deep fry, grill roast, stew, steam, and brown food, pressure cooking and baking.

An electric pressure cooker integrates a timer.

- Incorporates **smart programming** with advanced sensors.
- Maintains consistent pressure and power supply for **faster and more efficient cooking**.
- Features **improved safety mechanisms**, such as automatic pressure regulation.

Depending on cooking control capability, there are three generations of electric pressure cookers:

- First-generation electric, with mechanical timer. There is no delayed cooking capability.
- Second-generation electric, with digital controller. Delayed cooking becomes possible and the controller shows a countdown timer when working pressure is reached.
- Third-generation electric, with smart programming, which includes pre-set cooking times and settings based on heating intensity, temperature, pressure, and duration.

TYPES OF ELECTRIC PRESSURE COOKERS (EPCS)

Electric pressure cookers (EPCs) come in a variety of models, each designed with unique features and functionalities. However, when considering the user interface and control system, EPCs can be broadly categorized into two major types: Type A (Rotary Type, Mechanical EPC). and Type B (Button Type, Electronic EPC)

Type A: Rotary Type (Mechanical EPC)

Rotary-type electric pressure cookers feature a mechanical control system with a rotary timer dial. Instead of digital controls, the user sets the cooking time manually by turning the dial to the desired number of minutes.

Key Features:

- **Manual Time Setting:** Users adjust the cooking time by turning the dial, which is simple but requires experience to gauge the correct cooking duration.
- **Immediate Countdown:** Unlike electronic models, the timer starts as soon as the dial is set, not when pressure is reached. This requires users to estimate the time needed to reach pressure and add it to the actual cooking time.
- **Pressure Build-Up Estimation:** Depending on the amount of food, reaching full pressure could take up to 20 minutes, particularly for larger capacities like a 6L EPC. Users need to account for this when setting the timer.
- **Durability and Simplicity:** Mechanical EPCs generally have fewer electronic components, which can make them more durable and easier to maintain.



Type A: Button Type (Electronic EPC)

Button-type electric pressure cookers are equipped with an electronic control panel featuring various buttons. Each button is programmed with pre-set options to cook specific foods for predetermined times. These models are particularly user-friendly, providing convenience and precision in cooking.

Key Features:

- **Pre-Set Cooking Programs:** Button-type EPCs come with dedicated buttons for common food items such as rice, beans, meat, curd, and vegetables. This feature simplifies the cooking process, allowing users to start cooking with a single press.
- **Manual Adjustment:** While pre-sets are available, most models also allow users to manually adjust the cooking time and pressure settings, offering flexibility for customized recipes.
- **Automatic Timing:** The timer on button-type EPCs only starts counting down once the cooker reaches the required pressure. This ensures accurate cooking times and prevents undercooked or overcooked meals.
- **Additional Features:** Many button-type EPCs include advanced features such as delayed start, keep warm, and safety mechanisms that enhance usability and safety.



Advantages for School Use:

- Ideal for preparing large batches of meals quickly and efficiently, which is useful in school kitchens.
- The pre-set programs reduce the need for constant monitoring, allowing staff to focus on other tasks.
- Consistent cooking results are important for maintaining food quality and safety

2 HOW AN ELECTRONIC PRESSURE COOKER (EPC) - WORKS

An electronic pressure cooker (EPC) works by using electricity to heat a sealed chamber, causing the water inside to generate steam and build pressure, which then cooks food at a higher temperature than the normal boiling point of water, leading to significantly faster cooking times; essentially, it traps steam to create a pressurized environment that enables quicker food preparation. An EPC cooks using high-pressured steam within a sealed insulated pot. This has two major advantages: the high-pressure steam raises the boiling point of the water inside the cooker which together with the sealed insulated pot means food cooks. Secondly, it enables the EPC to use much less energy than other electric cooking appliances, which makes EPCs cheaper to cook with.

EPCs use a network of sensors to regulate temperature and pressure, ensuring efficient cooking. The process includes:

1. **Electricity conversion:** The EPC's heating element converts electricity into thermal energy. An electric heating plate located at the base of the inner pot that generates heat when electricity is supplied, transferring it to the food and liquid inside
2. **Heat transmission:** The inner pot heats liquids (water and oils) and submerged food.
3. **Pressure buildup:** As temperature rises, steam pressure builds up in the pot, which remains sealed until cooking is complete.
4. **Automatic adjustments:** Sensors monitor and adjust power input, pressure, and temperature throughout the cooking cycle.

COMPONENTS OF AN ELECTRONIC PRESSURE COOKER -EPC

Main Components:

1. **The Lid**
 - Constructed from **food-grade stainless steel** with an **auto-lock mechanism**.
 - Includes safety features such as a **steam release valve, sealing ring, and float valve**.
2. **The Inner Pot**
 - Made of **stainless steel with a non-stick coating** for easy cleaning.
 - Designed for even heat distribution and pressure buildup.
3. **The Cooker Base**
 - Houses the **microprocessor, heating element, sensors, and control panel**; the central intelligence system of an EPC.
 - It contains the **power supply circuit board**.



Key components and how they function:

- **Heating element:** An electric heating plate located at the base of the inner pot that generates heat when electricity is supplied, transferring it to the food and liquid inside.
- **Sealed lid:** A tightly fitting lid with a rubber gasket that creates an airtight seal, preventing steam from escaping and allowing pressure to build up inside the pot.
- **Pressure release valve:** A safety mechanism on the lid that allows excess steam to escape when the pressure inside reaches a predetermined level, preventing potential explosions.
- **Control panel:** A user interface with buttons to select cooking functions, set pressure levels, and adjust cooking time.

Control Panel Features:

- **Standby Button:** Turns the EPC on and off, or keeps food warm after cooking.
- **Menu Button:** Provides access to **pre-programmed cooking options**.
- **Display Screen:** Shows the **countdown timer and cooking settings**.
- **Manual Settings:** Allows users to set cooking time, pressure level, and delay time.

Key Benefits of Using an Electronic Pressure Cooker (EPC)

1. **Time Efficiency:** Cooks food up to 70% faster than traditional methods, saving valuable time in meal preparation.
2. **Energy Saving:** Consumes less electricity compared to conventional stovetop cooking, reducing energy bills.
3. **Nutrient Retention:** Preserves vitamins and minerals due to shorter cooking times and minimal water use.
4. **Convenience:** Set-and-forget functionality with programmable timers and automatic pressure release.
5. **Versatility:** Functions as a multi-cooker, allowing for pressure cooking, slow cooking, steaming, food warming, and more.
6. **Safety Features:** Modern EPCs have safety mechanisms like lid lock, pressure control, and automatic shut-off.
7. **Flavor Enhancement:** Traps steam and moisture, intensifying flavors and tenderizing food effectively.
8. **Easy Cleanup:** Many EPCs have non-stick, dishwasher-safe inner pots, simplifying cleanup.
9. **Consistent Results:** Built-in sensors ensure precise temperature and pressure control for consistent cooking outcomes.
10. **Reduced Need for Monitoring:** Unlike traditional cooking methods, you don't need to constantly check the food.

Unique Features of EPC and Their Advantages

1. **Pre-set Cooking Programs:** One-touch cooking for different recipes like rice, soup, meat, and desserts, making it user-friendly.
2. **Keep Warm Function:** Automatically switches to keep warm mode after cooking, ensuring meals remain warm until served.
3. **Delay Start Timer:** Allows scheduling of cooking time, ideal for busy schedules or meal prepping.
4. **Multiple Safety Features:** Includes pressure sensors, lid safety locks, and temperature controls, ensuring safe operation.
5. **Pressure and Temperature Sensors:** Maintains precise cooking conditions, preventing overcooking or undercooking.
6. **Non-Stick, Removable Inner Pot:** Easy to clean and reduces the need for excessive oil, promoting healthier meals.
7. **Multi-Functional Capabilities:** Replaces several kitchen appliances (e.g., rice cooker, slow cooker, steamer), saving kitchen space and costs.
8. **Automatic Pressure Release:** Offers both quick and natural release options, enhancing safety and convenience.
9. **Eco-Friendly Design:** Reduces energy consumption and cooking time, contributing to lower environmental impact.
10. **Smart Control Panels:** LCD screens and digital displays offer better control and visibility of the cooking process.

3 HOW TO USE AN ELECTRONIC PRESSURE COOKER (EPC)

HOW TO USE AN EPC¹

Operating an institutional electric pressure cooker (EPC) for cooking school meals requires careful planning, proper training, and adherence to safety protocols. Below is a step-by-step case study guide on how to use an EPC for preparing school meals efficiently and safely.

Step 1: Pre-Operation Preparation

1. **Training and Safety Briefing:**
 - a) Ensure all staff operating the EPC are trained on its use, safety features, and emergency procedures.
 - b) Review the manufacturer's manual for specific instructions.
2. **Inspect the Equipment:**
 - a) Check the EPC for any visible damage, such as cracks, loose seals, or faulty electrical connections.
 - b) Ensure the pressure release valve, gasket, and lid are clean and functioning properly.
3. **Gather Ingredients and Tools:**
 - a) Prepare all ingredients (e.g., rice, vegetables, meat, lentils) in the required quantities.
 - b) Ensure you have measuring cups, ladles, and other utensils ready.
4. **Clean the EPC:**
 - a) Wash the inner pot, lid, and accessories with warm, soapy water.
 - b) Rinse and dry thoroughly before use.
5. **Connecting to Power:**
 - a) Use the **provided power cable** (no substitutions allowed).
 - b) Connect one end to the power source and the other to the EPC.
 - c) Switch on the power source—an alarm will sound, and the display screen will activate.
 - d) The sensors and central processing unit begin monitoring the device.

Step 2: Cooking Process

1. **Add Ingredients:**
 - Place the inner pot into the EPC.
 - Add ingredients according to the recipe. For example:
 - Rice: 2 cups rice + 4 cups water.

¹ <https://www.youtube.com/watch?v=pPKOV9WYANY>

- Lentils: 1 cup lentils + 3 cups water.
 - Vegetables and meat: Add with appropriate liquids (water, broth, or sauce).
2. **Seasoning:**
 - Add salt, spices, and other seasonings as per the recipe.
 3. **Close the Lid:**
 - Ensure the lid is properly sealed and locked in place.
 - Check that the pressure release valve is set to the "Sealing" position.
 4. **Select Cooking Settings:**
 - Turn on the EPC and select the appropriate cooking mode (e.g., "Rice," "Stew," "Beans," or "Manual").
 - Set the cooking time based on the recipe. For example:
 - Rice: 10-12 minutes.
 - Meat: 20-30 minutes.
 5. **Start Cooking:**
 - Press the "Start" button to begin the cooking process.
 - The EPC will build pressure, and the timer will start once the desired pressure is reached.

Using the Menu Function:

- The EPC has 7-**15 pre-set cooking options**, including:
 - **P01:** Boiling meat
 - **P05:** Cooking Porridge
 - **P07:** Cooking rice
 - **P09:** Cooking beans
- Select your desired option using the **plus (+) or minus (-) buttons**.

Using Manual Settings:

- Used for customizing cooking time and pressure level.
- Activate by pressing Manual Mode, then use +/- buttons to adjust time.

Example: Cooking Ugali (Cornmeal Porridge)

1. **Boil water:** Set **3 minutes**.
2. **Boil porridge:** Set **5 minutes**.
3. **Release steam**, stir, then set **5 more minutes** for thickening.
4. Keep warm using the **OH mode**, or serve immediately.

Step 3: Monitoring and Safety

1. Monitor the Cooking Process:

- Do not open the lid during cooking, as this can release pressure and disrupt the process.
- Ensure the EPC is placed on a stable, heat-resistant surface away from children.

2. Pressure Release:

- After cooking, allow the EPC to release pressure naturally or use the quick-release method:
 - **Natural Release:** Let the pressure drop on its own (10-15 minutes).
 - **Quick Release:** Carefully turn the pressure release valve to "Venting" to release steam quickly (use caution to avoid burns).

3. Open the Lid:

- Once the pressure is fully released, unlock and open the lid away from your face to avoid steam burns.

Step 4: Post-Cooking Steps

1. Serve the Meal:

- Use a ladle or serving spoon to portion the cooked food into serving trays or containers.
- Ensure the food is distributed evenly and meets the required portion sizes for students.

2. Clean the EPC:

- Allow the EPC to cool before cleaning.
- Gently wash the inner pot, lid, and accessories with warm, soapy water.
- Wipe the exterior with a damp cloth.

3. Inspect and Store:

- Check the EPC for any wear or damage after use.
- Store the EPC in a clean, dry area.

Step 5: Record Keeping and Maintenance

1. Log Usage:

- Maintain a logbook to record cooking times, recipes, and any issues encountered during operation.

2. Regular Maintenance:

- Schedule regular maintenance checks for the EPC, including inspecting seals, valves, and electrical components.
- Replace worn-out parts (e.g., gaskets) as needed.

Case Study Example: Cooking Rice and Lentils for 100 Students

- **Ingredients:**
 - Rice: 10 kg
 - Water: As per recipe (e.g., 2:1 ratio for rice)
 - Salt and spices: As required
- **Process:**
 1. Add rice and water to the EPC, season, and cook on "Rice" mode for 12 minutes.
 2. After cooking, release pressure naturally and transfer the rice to serving trays.
 3. Repeat the process for lentils, cooking on "Beans" mode for 20 minutes.
 4. Serve the meal to students in a timely manner.

Safety Tips:

- Always follow the manufacturer's instructions.
- Never overfill the EPC (max fill line is usually 2/3 of the pot).
- Keep children and untrained staff away from the EPC during operation.
- Use heat-resistant gloves when handling the EPC.

By following these steps, an institutional electric pressure cooker can be used efficiently to prepare nutritious school meals while ensuring safety and consistency.

4 CHALLENGES AND SOLUTIONS

Challenge	Solution
Power Outages	Kept a backup gas cooker as a contingency.
Training Staff	Conducted a practical workshop on EPC use.
Ingredient Measurement	Used marked measuring tools for consistency.
Maintenance & Cleaning	Established a weekly cleaning schedule.

5 SAFETY MEASURES

- **Auto-lock function:** Prevents lid opening under pressure.
- **Sensors:** Detect unsafe pressure levels and prevent hazards.
- **Steam release valve:** Allows controlled release of pressure.

User Safety Guidelines:

1. Ensure the steam valve is in the 'Sealed' position before turning on the EPC.
2. Keep hands away from the steam release valve when venting pressure.
3. Use dry cloths to handle the hot inner pot—never bare hands.
4. Avoid touching the lid's surface, as it gets very hot.
5. Never cover the steam valve with a rag or any object.
6. Regularly clean the steam valve, sealing ring, and lid to prevent blockages.
7. Do NOT submerge the cooker base in water—only clean it with a damp cloth.

6 MAINTENANCE AND CLEANING

- **Inner Pot and Lid:** Can be washed with warm soapy water or submerged in water.
- **Steam Valve and Float Valve:** Clean with a brush or paper towel after every use.
- **Sealing Ring:** Wash after each use to maintain hygiene and efficiency.
- **Cooker Base:** Wipe with a damp cloth; do not immerse in water.

Electric Pressure Cookers offer a safe, efficient, and modern solution for cooking. Understanding their operation, safety features, and proper usage ensures a better cooking experience while minimizing risks. By following the guidelines in this manual, users can optimize their EPC for reliable and convenient cooking.

End of Training Manual



ABOUT SEforALL

Sustainable Energy for All is an independent organization, hosted by UNOPS, with a global mandate to accelerate progress on the energy transition in emerging and developing countries. We work at the intersection of energy, climate, and development. We collaborate with governments and partners worldwide to end energy poverty, accelerate the deployment of renewable energy solutions, and combat climate change.

Our vision is a world where everyone, everywhere, can lead a dignified life on a healthy planet, powered by sustainable energy. We promote this vision by pushing for higher ambitions, stronger policies, greater finance flows, increased localization and green jobs, and faster results toward an energy transition that leaves no one behind.

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