



Robocafe

Operating Manual

Abstract

This is the operating manual for setting up and operating the Robocafe

June 2022
Version 1.0

DANIEL JESSE ALPHONSUS

Document Revisions

Date	Version Number	Document Changes
18/06/2022	1.0	Initial Draft

Approvals

This document requires following approvals:

Date	Version Number	Document Changes

Distribution

This document has been distributed to:

Date	Version Number	Document Changes

Introduction

This manual describes how to set up and safely operate the Robocafe using the Dobot CR5 manipulator arm and the SAECO coffee machine.

Be sure to read this manual carefully as well as related manuals and comply with their instructions for operating the Robocafe safely and correctly.

For details on how to program the Robocafe, refer to the separate Robocafe Programming Manual that comes with the Robocafe.

Table of Contents

1. Preface	4
1.1 Description of the User	4
1.2 Explanation of Safety Warnings	4
1.3 Obtaining Documentation and Information	5
1.3.1 Internet	5
1.3.2 Documentation Feedback	5
2. Description of the Product	5
2.1 Purpose of the product	5
2.2 Product Compliance	5
2.3 Product elements	6
2.4 Understanding the user interface	7
3. Safety Instructions	7
3.1 Safety information	7
3.2 Safety information related to the intended use and reasonably foreseeable misuse	8
3.3 Safety information regarding the use	8
4. Process	8
4.1 Workflow of the Robocafe	8
5. Preparation	9
5.1 How to Install the Product	9
5.1.1 Installing the Robocafe App	9
5.1.2 Assembling the Robocafe	9
5.1.3 Connecting the Robocafe Interfacing Pack	9
5.2 Description of the Robot Arm	10
5.3 Description of the Coffee Machine	10
6. Operation	11
6.1 How to Use the Product	11
6.2 How to Identify and Solve Problems	11
7. Maintenance	11
7.1 Product maintenance	11
8. Appendices	11
8.1 Supplied Accessories, Consumables, and Spare Parts	11
8.1.1 Supplied Accessories	11
8.1.2 Consumables	11
8.1.3 Spare Parts	11
9. Related Documentation	11

1. Preface

1.1 Description of the User

This manual is intended for the user who is to install and set up the Robocafe. The focus of this manual is technical in nature and would benefit the reader to read the instructions carefully before performing any installation.

While we have tried to make this document usable by readers with a broad range of technical knowledge, if it is too complex, do request for a technician from Reliable Robotics to provide support.

1.2 Explanation of Safety Warnings

Be sure to read before using

Before using the Robocafe, be sure to read this manual and related manual, and follow their instructions to use the Robocafe safely and correctly.

Warning and caution items listed in this manual relate to the Dobot CR5 controller and SAECO coffee machine.

When this robot controller is used system, please take appropriate safety measures as required by the user's individual system.

This manual classifies safety caution items and operating points into the following levels, along with symbols for signal words "CAUTION" and "NOTE".

CAUTION

"CAUTION" indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury or damage to the equipment or software.

NOTE

Primarily explains function differences, etc., between software versions.

MEMO

Explains robot operation procedures in a simple and clear manner.

Note that the items classified into "CAUTION" might result in serious injury depending on the situation or environmental conditions. So always comply with CAUTION instructions since these are essential to maintain safety.

Keep this manual carefully so that the operator can refer to it when needed. Also make sure that this manual reaches the end user.

1.3 Obtaining Documentation and Information

1.3.1 Internet

The latest version of the documentation is available at the following address:

<https://reliablerobotics.ai/Robocafe>

1.3.2 Documentation Feedback

If you are reading the Reliable Robotics Robocafe product documentation on the internet, any comments can be submitted on the support website.

We appreciate your comments.

1. Description of the Product

2.1 Purpose of the product

The Robocafe was created to demonstrate a level of autonomy in creating and serving coffee. Its ideal use is at events to capture the attention and engage the attendees, and as a standalone stall for customers to order coffee on the go.

Its purpose is to automate the process of making and serving coffee while reducing the amount of labour and production cost and time associated with the overall process to streamline the experience for customers to order a cup of coffee.

2.2 Product Compliance

The Robocafe is compliant with the Dubai Municipality Food Code 2020 (Food Safety Department, 2020). The requirements for the compliance of the Robocafe has been met fully with the regulations set by the Municipality of Dubai

2.3 Product elements



Figure 1.1 - Dobot CR5 Arm



Figure 3 - SAECO Coffee Machine



Figure 2 - Dobot CR5 Controller

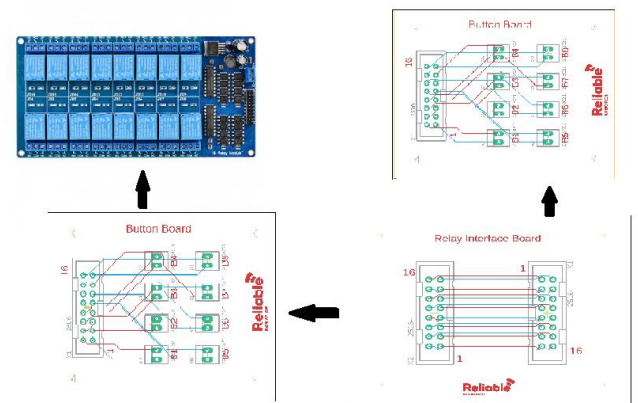


Figure 4 - Robocafe Interfacing Pack

2.4 Understanding the user interface

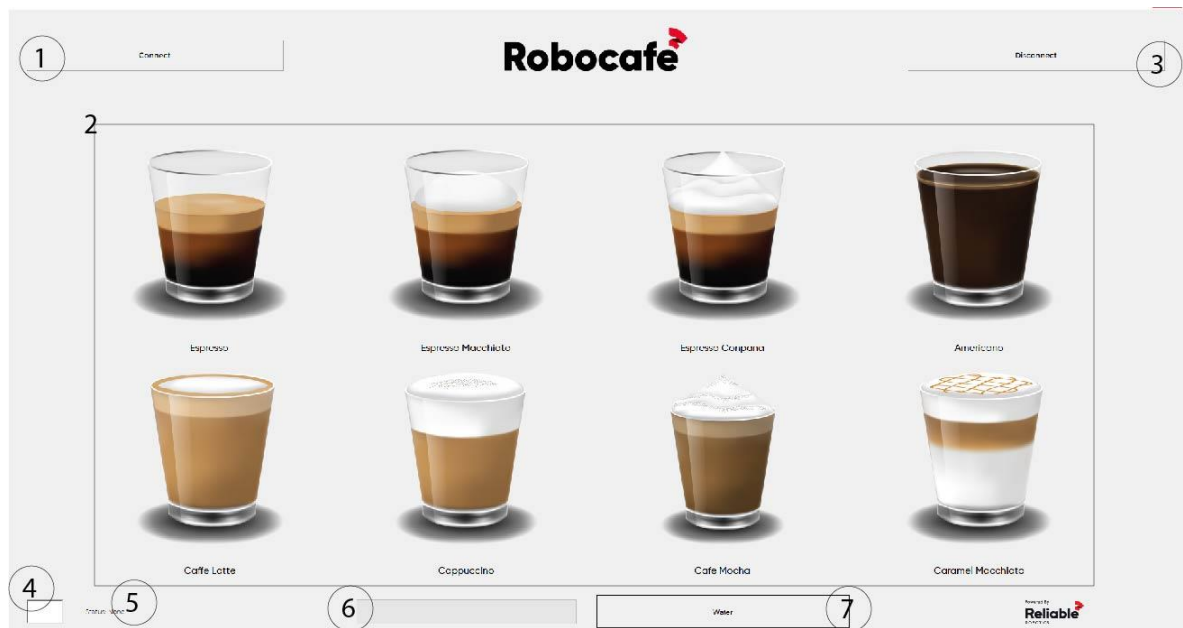



Figure 5 - Robocafe App User Interface

1. Connect to the TCP/IP Server
2. Beverage Menu
3. Disconnect from the TCP/IP Server
4. Display of messages received from the TCP/IP Server
5. Status (Connected / Disconnected)
6. Progress bar to show connection
7. Toggle water dispenser

 **MEMO** Once the “Disconnect” button is selected, the Robocafe program will stop and will have to be restarted

2. Safety Instructions

All information and instructions in the present Safety Instructions section have been compiled in consideration of current standards and guidelines, the state of technology and our many years of experience and knowledge.

Programming Manual is a separate document to be found on company website for the product. The operating manual provides you with all the information necessary to set up and install the Robocafe safely.

3.1 Safety information

The instructions facilitate the safe and efficient use of the Robocafe from Reliable Robotics. The instructions are part of the information package and must always be kept near products and equipment and should be available for the personnel, operator at user site at any time.

3.2 Safety information related to the intended use and reasonably foreseeable misuse

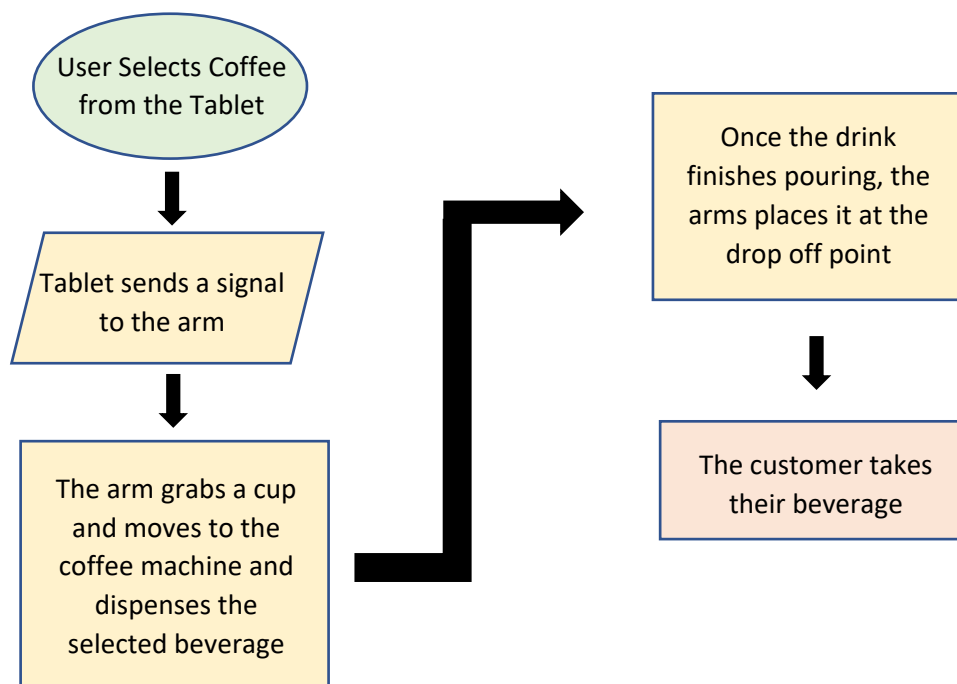
- Never bypass or manipulate the safety equipment or safety components.
- Never exceed the specific thresholds (temperature and load conditions) of the system.
- Never carry out unauthorized changes or other technical modification to the system
- Never use replacement parts other than those approved by the manufacturer.
- Only use liquids for cleaning which guarantee system material resistance.
- Only user operating liquids the manufacturer has approved for the system.

3.3 Safety information regarding the use

Before making any changes to the Robocafe, ensure the robot is in the 'Disabled' state and the power to the coffee machine is switched off. Make sure you have easy access to the Emergency Stop button and you are a safe distance away from the CR5 arm.

3. Process

4.1 Workflow of the Robocafe



4. Preparation

5.1 How to Install the Product

5.1.1 Installing the Robocafe App

The latest version of the Robocafe App is available at:

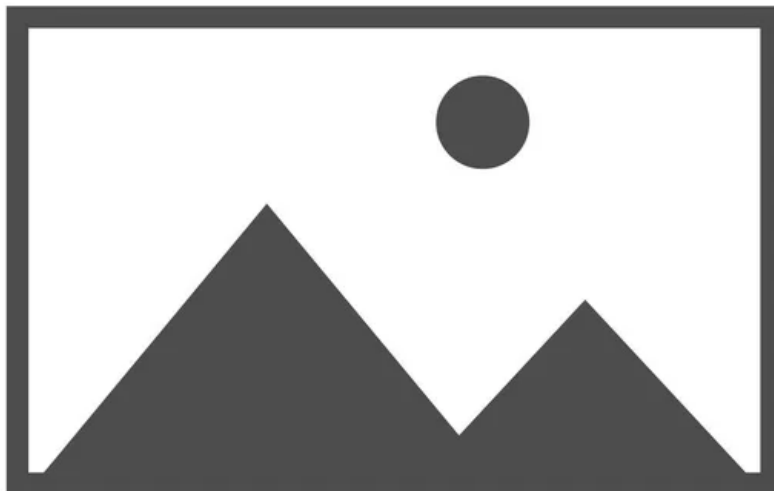
<https://reliablerobotics.ai/Robocafe>

5.1.2 Assembling the Robocafe

1. While the CR5 Robot arm is in the 'factory position', face the connector interface to the back of the Robocafe platform and screw it tightly onto the base.
2. Place the coffee x cm away from the arm in the given grooves.
3. Mount the cup dispenser in the hole and fill it with the disposable coffee cups
4. Fill the compartments within the coffee machine with the chocolate powder, milk powder and coffee beans as labelled.

5.1.3 Connecting the Robocafe Interfacing Pack

1. Unscrew the panel of the Relay Interface Unit on the back of the coffee machine and connect the ribbon cable to the open port
2. Connect the other end of the ribbon cable to the Button Interface board on the CR5 Controller
3. Follow the wiring diagram below



5.2 Description of the Robot Arm

Table 1 - Robot Body Technical Parameters

Product Name	DOBOT CR5
Product Model	DT-CR-6R050-001
Weight	25 kg
Max Load (kg)	5 kg
Reach (mm)	900 mm
Full-load Current	6.3 A
Rated Voltage	DC 48V
Axes	6
IP Classification	IP54
Temperature	0°C~45°C
Typical Power Supply	150W
Material	Aluminium Alloy, ABS
Operating Altitude Range	≤ 1000 m
Safety Standard	UL1740: 2018-Standard for Safety : Robot and Robotic Equipment; CSA Z434-14 (R2019) Industrial robots and robot systems NFPA 79:2018 Electrical Standard for Industrial Machinery EN ISO 10218-1:2011 Steel wire and wire products. General. Test methods EN 60204-1:2018 Safety of machinery. Electrical equipment of machines. General requirements; IEC 60204-1:2016 Safety of machinery. Electrical equipment of machines. General requirements; EN ISO 12100:2010 Safety of machinery. General principles for design. Risk assessment and risk reduction; ISO/TS 15066:2016 Robots and robotic devices-Collaborative robots; ISO 13849-1:2015 Safety of machinery-Safety-related parts of control systems -Part 1: General principles for design

For more information on the Robot Arm please refer to the Dobot CR5 Hardware User Guide (Shenzhen Yuejiang Technology Co., Ltd, 2021)

5.3 Description of the Coffee Machine

The Robocafe uses the SAECO Iperautomatica Premium.

To find more information on the coffee machine please refer to the Iperautomatica Premium Operation and Maintenance Manual (SAECO, 2016)

5. Operation

6.1 How to Use the Product

1. Switch on the coffee machine and allow it to complete its first rinse
2. Turn on the CR5 controller and enable the arm
3. Run the Robocafe.blockly code on the DobotSCStudio Software on your PC (Dobot, 2022)
4. Open the Robocafe App on your Android/Windows device and click 'Connect'
5. Select the beverage you desire from the App

6.2 How to Identify and Solve Problems

Error	Cause	Solution
...

6. Maintenance

7.1 Product maintenance

To clean the clean and maintain the Robot arm and Coffee machine, please refer to the respective user manuals. (Shenzhen Yuejiang Technology Co., Ltd, 2021) (SAECO, 2016)

7. Appendices

8.1 Supplied Accessories, Consumables, and Spare Parts

8.1.1 Supplied Accessories

- 8oz disposable coffee cups

8.1.2 Consumables

- Coffee Beans
- Milk Powder
- Hot Chocolate Powder

8.1.3 Spare Parts

- 1 extra Gripper

8. Related Documentation

Dobot. (2022, October 10). *DobotSCStudio User Guide (CR)*. Retrieved from Dobot: https://www.dobot.cc/downloadcenter/industrial-software-platform.html?sub_cat=244#sub-download

Food Safety Department. (2020, March). *Food Code 2020*. Retrieved from Government of Dubai: <https://www.dm.gov.ae/wp-content/uploads/2020/11/Food-Code-2.0-Draft-Version-4.pdf>

SAECO. (2016). *Iperautomatica Premium Operation and Maintenance Manual*. Retrieved from <https://www.manualslib.com/manual/946229/Saeco-3p.html#manual>

Shenzhen Yuejiang Technology Co., Ltd. (2021, April 27). *Dobot CR5 Hardware User Guide*. Retrieved from DOBOT: <https://www.dobot.cc/downloadcenter/cr5.html#most-download>