

OPERATOR'S MANUAL
**24-VOLT RETENTION
TESTING SPIN STAND**

Français p. 37

MODEL NUMBER 2020V1

! **WARNING:** To reduce the risk of injury, the user must read and understand the Operator's Manual before using this product. Save these instructions for future reference.



TABLE OF CONTENTS

SAFETY SYMBOLS	2
INTRODUCTION	3
LIST OF COMPONENTS	4-5
DESCRIPTION	6-8
OPERATION	9-14

READ ALL INSTRUCTIONS!



**READ & UNDERSTAND
INSTRUCTIONAL MANUAL**

SAFETY SYMBOLS

The purpose of safety symbols is to attract your attention to possible dangers. The safety symbols and the explanations with them deserve your careful attention and understanding. The symbol warnings do not, by themselves, eliminate any danger. The instructions and warnings they give are no substitutes for proper accident prevention measures.

⚠ WARNING: Be sure to read and understand all safety instructions in this Operator's Manual, including all safety alert symbols such as "DANGER", "WARNING", and "CAUTION" before using this tool. Failure to follow all instructions listed in this document may result in electric shock, destruction of the tool, and/or personal injury.



INTRODUCTION

Congratulations on your selection of a new gasket retention testing spin stand! It has been designed, engineered, and manufactured to give you the best possible dependability and performance that a few FAB card orders can afford.

Should you experience any problem you cannot easily remedy, please contact your system administrator (hint: there isn't one).

This manual contains important information on the safe operation of your retention testing spin stand. Read it carefully before using the spin stand. Keep this manual handy so you can refer to it at any time.

**SERIAL
NUMBER** _____

**DATE OF
PURCHASE** _____

**YOU SHOULD RECORD BOTH SERIAL NUMBER
AND DATE OF PURCHASE AND KEEP IN A SAFE
PLACE FOR FUTURE REFERENCE.**



LIST OF COMPONENTS

A. ELECTRICAL COMPONENTS

PART NAME	QUANTITY	SOURCE	PART #
MOTOR *	1	POLOLU	4699
RESISTOR	8	AMAZON	
SPST SWITCH	11	AMAZON	
PROXIMITY SWITCH	2	AMAZON	
20x4 LCD SCREEN	2	AMAZON	
I2C ADAPTER	2	AMAZON	
POTENTIOMETER	6	AMAZON	
V & I SENSOR	1	AMAZON	
ARDUINO UNO	1	AMAZON	
5V FAN	4	AMAZON	
MICROSD CARD READER	1	AMAZON	
SPEAKER	2	AMAZON	
110VAC-24VDC CONVERTER	1	AMAZON	
6FT POWER CABLE	1	AMAZON	
H-BRIDGE	1	AMAZON	L298N
MINI BREADBOARD	2	AMAZON	
22 AWG WIRE	1	AMAZON	
14 AWG WIRE	1	AMAZON	
FUSE BLOCK	1	GRAINGER	
3A FUSE	2	GRAINGER	
USB 2.0 CABLE	1	AMAZON	

** Can be replaced by any similar Pololu motor with limited disruption to the hardware / software*



LIST OF COMPONENTS

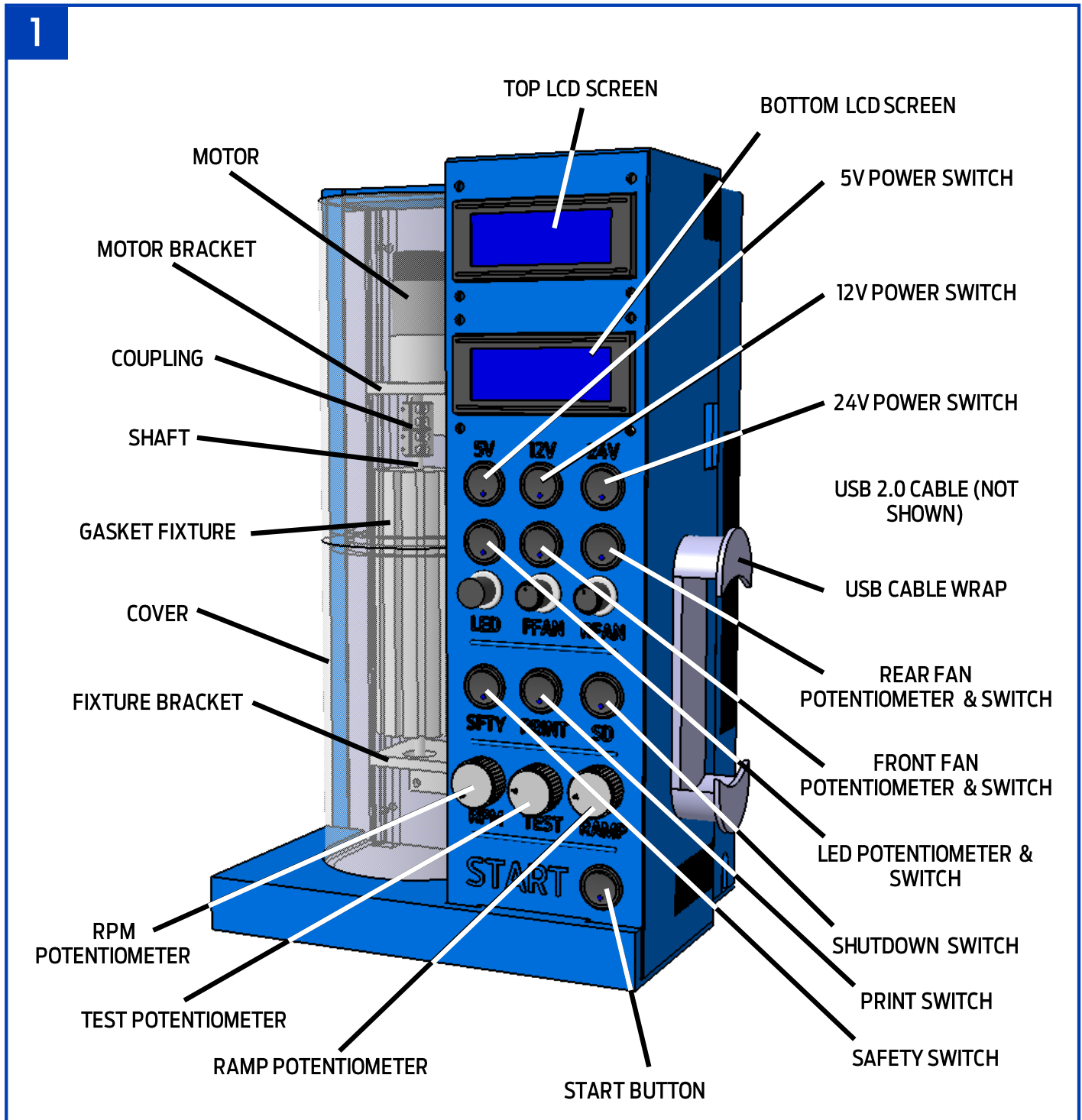
B. MECHANICAL COMPONENTS

PART NAME	QUANTITY	SOURCE	PART #
VERTICAL BASE PLATE	1	NMPDC	
HORIZONTAL BASE PLATE	1	NMPDC	
SHAFT	1	NMPDC	
GASKET FIXTURE	1	NMPDC	
6mm SHAFT COUPLING	1	GRAINGER	
MOTOR BRACKET	1	NMPDC	
FIXTURE BRACKET	1	NMPDC	
BEARING	2	GRAINGER	
COVER	1	FORDAMC	
10-24 SOCKET HEAD SCREW	15	AMAZON	
NO.10 WASHER	6	AMAZON	
M3 SCREW	6	AMAZON	



DESCRIPTION

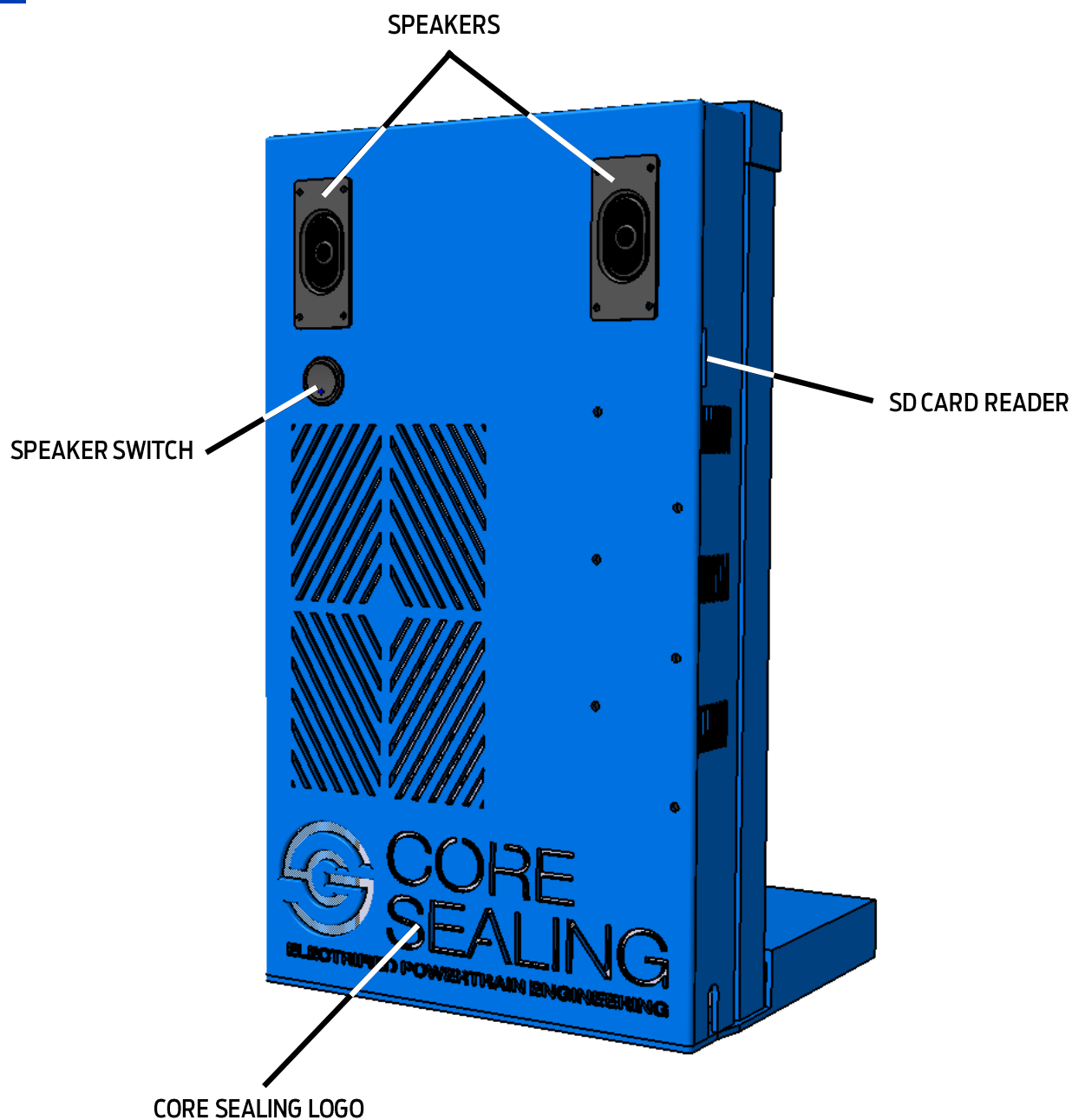
1





DESCRIPTION

2





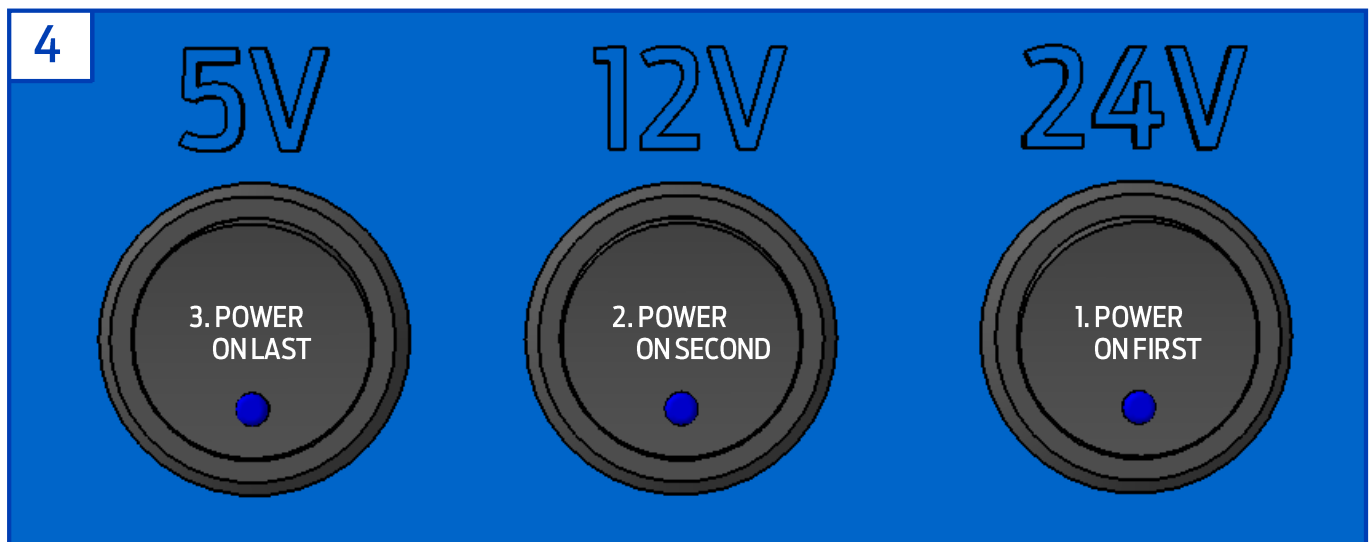
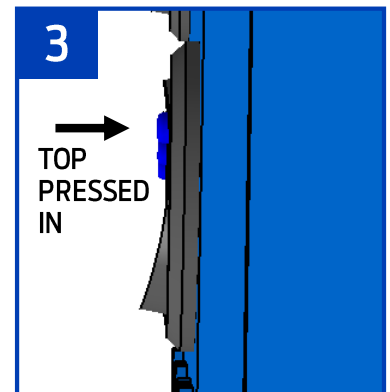
OPERATION

POWERING UP THE UNIT

1. Ensure 5V, 12V and 24V circuits are powered off (top of the button pressed in).
2. Plug power cord into a standard 120VAC wall outlet.

⚠ WARNING: Be mindful of arcing. The 110VAC-24VDC converter contains multiple capacitors. Plugging in the unit without full discharge of the capacitors can result in temporary arcing.

3. Turn on power in the following order: 24V first, then 12V, then 5V.

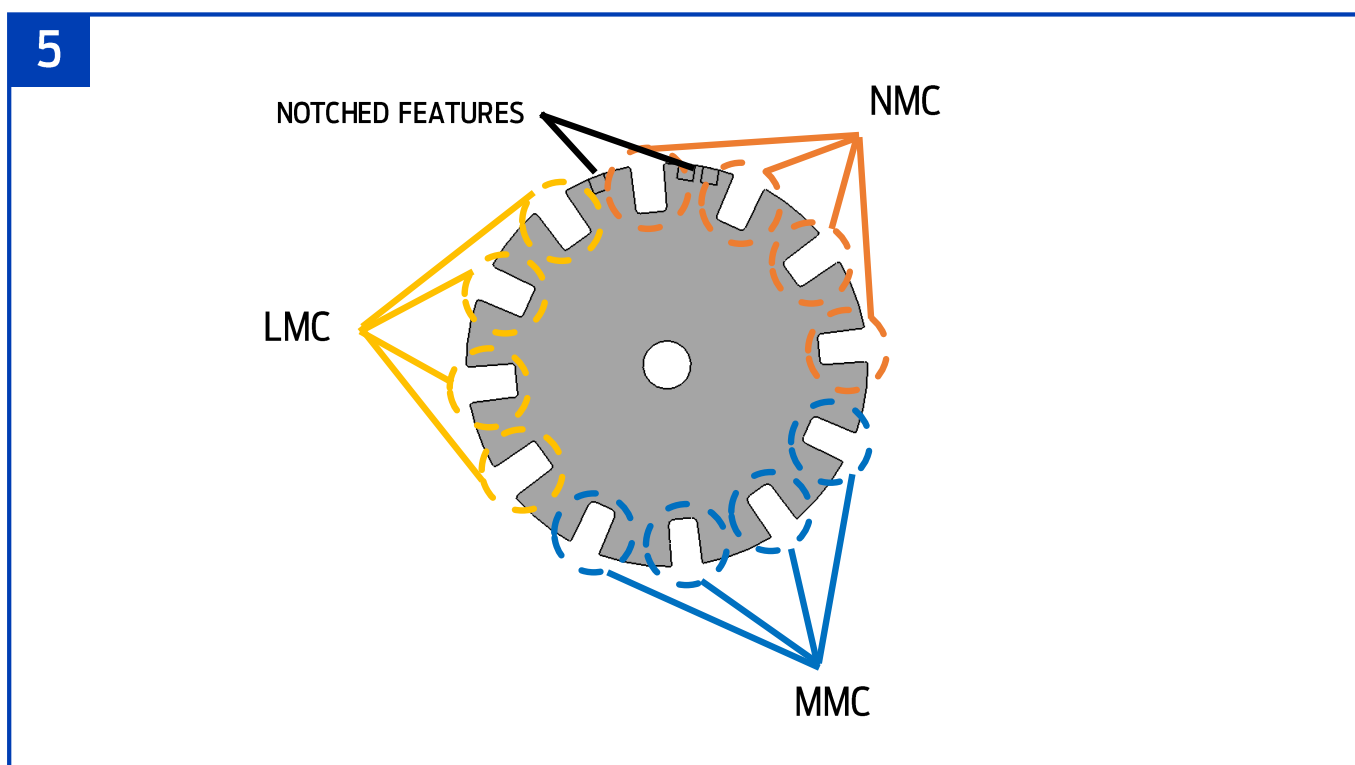


4. You will see the LCD screens initialize (backlight turns on, off, then back on). This takes ~5 seconds.
5. The spin stand is now powered on.

OPERATION

RUNNING A TEST

1. Install a gasket(s) into the gasket fixture. Note that there are four (4) LMC grooves, four (4) NMC grooves, and four (4) MMC grooves. These grooves can be distinguished by means of the notched feature in the gasket fixture.



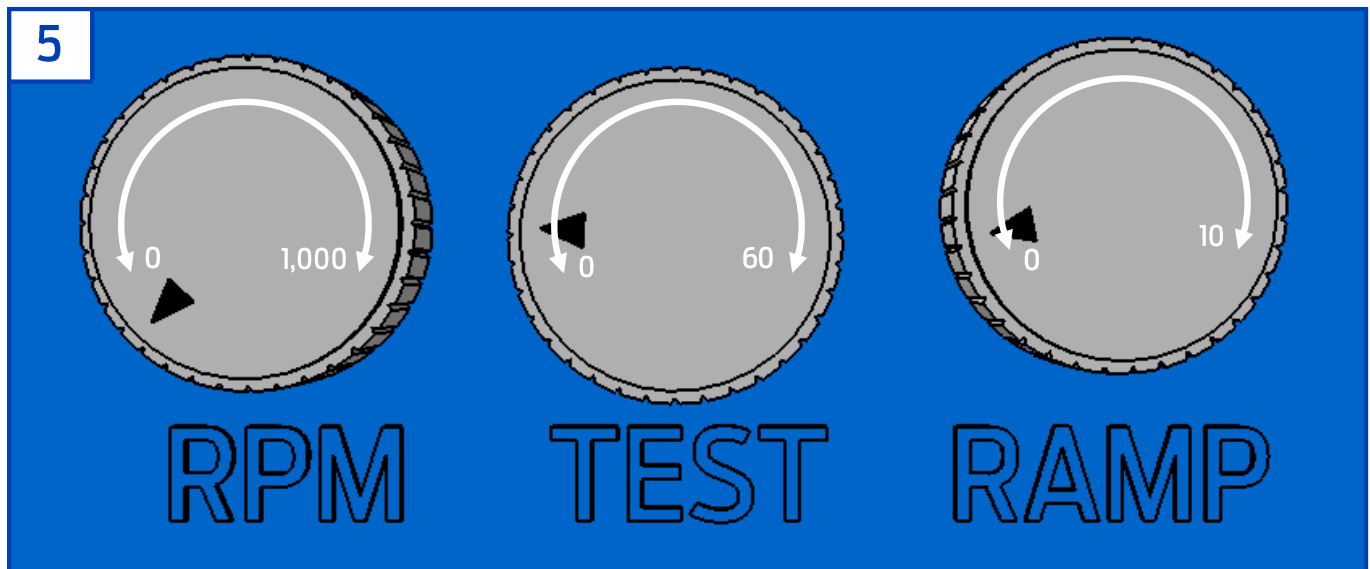


OPERATION

RUNNING A TEST

2. Use the RPM, TEST, and RAMP knobs to input desired controls.
 1. The RPM knob controls the rotational speed of the gasket fixture. The range is [0-1000 RPM].
 2. The TEST knob controls the duration of the spin test. The range is [0-60 seconds].
 3. The RAMP knob controls the duration of the acceleration and deceleration windows. The RAMP window is not included in the TEST window; instead, it is added to the outside of the TEST window. The range is [0-10 seconds].

⚠ WARNING: The software has not been tested with values of 0 for any of the user inputs. Please select values greater than 0.



3. Press the START button to begin the test.



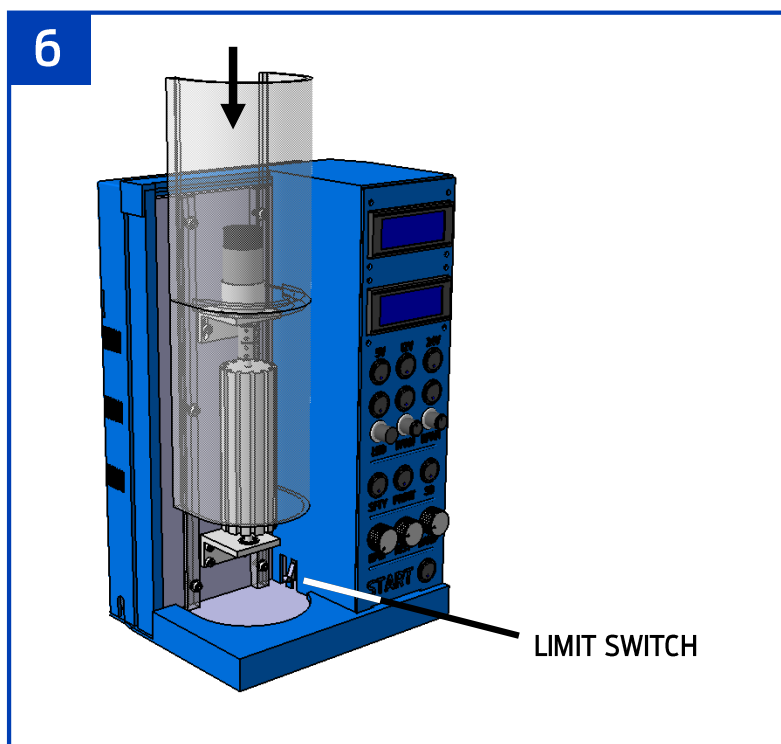
OPERATION

RUNNING A TEST

i **PROCEDURE:** Once START is pressed, the bottom LCD screen will show a three-second countdown until the test begins. The spin stand will then accelerate the gasket fixture to the desired RPM in the time specified by RAMP. It will then spin at RPM for the duration specified in TEST. Upon completion, it will decelerate the gasket fixture back to stationary in the duration specified in RAMP, then beep to signify that the test is complete.

TEST CONFIGURATIONS

1. Safety: the SFTY switch detects for the presence of the spin stand cover. If it is engaged, the spin stand will not begin a test without the cover in place. If the SFTY switch is not engaged, testing can be conducted without the cover.





OPERATION

TEST CONFIGURATIONS

2. Real-time results: the PRINT switch can be used to print the rotational speed of the gasket fixture to the LCD screen in real time. This allows the operator to observe if the gasket fixture is spinning at a rate different from that specified in RPM (due to voltage drop in the H-bridge, fluctuating current, etc.). If the PRINT switch is disengaged, the desired rotational speed will be printed to the LCD screen instead.
3. Shutdown: if there is an issue with the spin stand during operation, the SD button can be used to shut it down mid-test. Even if the SD button is engaged, the spin stand will conduct its acceleration and deceleration phases to protect the motor and electronics.

UPDATING THE SOFTWARE

The Arduino microcontroller used in this product has onboard memory that allows it to retain a software program internally. The product can be powered on and off repeatedly, and the microcontroller will continue to retain the software.

The operator can update the software at any time by plugging the USB 2.0 cable on the side of the product into a laptop with an Arduino IDE.

⚠ WARNING: When updating the software, ensure that the product is not plugged into the wall and that 12V and 24V circuits are disengaged. A connected laptop provides 5V power through the USB, and having dual sources of power can damage the internal electronics.

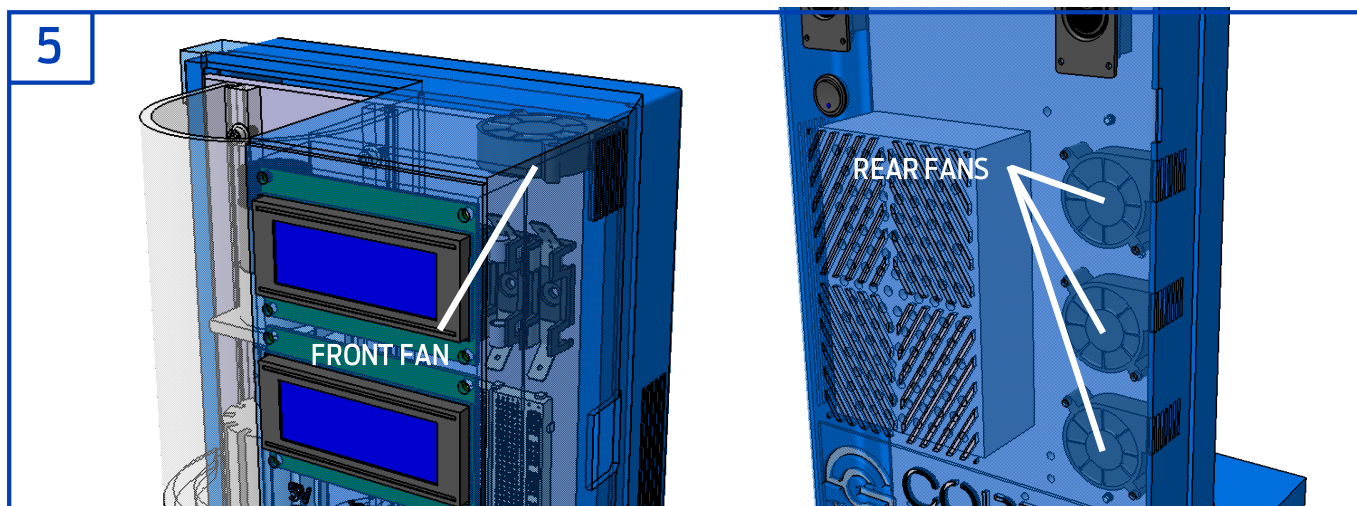
OPERATION

AUXILIARY FUNCTIONS

1. Fans: to turn on the front or rear fans, engage the FFAN and RFAN switches, respectively.

i NOTE: the fans run off the 12V circuit, so 12V power must be engaged

⚠ WARNING: The potentiometers can be used to adjust the fan speed, but this is not recommended. The potentiometers used are rather delicate and can be damaged by even light use.



2. LED: to turn on the LED light in the back of the spin stand, engage the LED button. This light can be adjusted