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# 1. PREFACE

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No service calls will be carried out if these conditions are not respected.

# 2. SPECIFICATIONS

## 2.1 RC33

| | | |
|---|---|---|
| MAXIMUM SPEED (no load) | : | 1 000 rpm or 1 500 rpm according to configuration |
| MINIMUM STEP | : | 10 rpm |
| SPEED DISPLAY | : | LED indicators / 3 digits / 7 segments |
| SPEED REGULATION | : | Brushless motor & resolver |
| SPEED CONTROL | : | Galvanometric coil |
| MAXIMUM ACCELERATION (no load) | : | 300 rpm/s |
| MINIMUM STEP | : | 100 rpm/s |
| ACCELERATION DISPLAY | : | LED indicators / 3 digits - 7 segments |
| TIME RANGE | : | from 0 to 999 seconds |
| TIME DISPLAY | : | LED indicators / 3 digits - 7 segments |
| TIME CONTROL | : | Countdown displayed by LED indicators |
| RS 232 C CONFIGURATION | : | 9600 BAUDS / 8 BITS / 1 BIT STOP / no parity. |
| MAXIMUM SUBSTRATE SIZE | : | 33"Ø/24"□ |
| MAXIMUM SUBSTRATE THICKNESS | : | 12 mm |
| POWER CONNECTION | : | 200/240 VAC 3P – 340/415 VAC 3P+N+G<br>47/63 Hz 8kVA |
| AIR | : | Pressure : 6 - 10 bar |
| | : | Quality : Dry air |
| VACUUM | : | -0.7 bar minimum |
| NITROGEN (according to option) | : | 4 – 7 bar |
| EXHAUST | : | 5 000 l/min |

## 2.2 RC22

| | | |
|---|---|---|
| MAXIMUM SPEED (no load) | : | 2 000 rpm |
| MINIMUM STEP | : | 10 rpm |
| SPEED DISPLAY | : | LED indicators / 3 digits / 7 segments |
| SPEED REGULATION | : | Brushless motor & resolver |
| SPEED CONTROL | : | Galvanometric coil |
| MAXIMUM ACCELERATION (no load) | : | 500 rpm/s |
| MINIMUM STEP | : | 100 rpm/s |
| ACCELERATION DISPLAY | : | LED indicators / 3 digits - 7 segments |
| TIME RANGE | : | from 0 to 999 seconds |
| TIME DISPLAY | : | LED indicators / 3 digits - 7 segments |
| TIME CONTROL | : | Countdown displayed by LED indicators |
| RS 232 C CONFIGURATION | : | 9600 BAUDS / 8 BITS / 1 BIT STOP / no parity. |
| MAXIMUM SUBSTRATE SIZE | : | 22"Ø/16"□ |
| MAXIMUM SUBSTRATE THICKNESS | : | 10 mm |
| POWER CONNECTION | : | 200/240 VAC 3P – 340/415 VAC 3P+N+G<br>47/63 Hz 4kVA |
| AIR | : | Pressure : 6 - 10 bar |
| | : | Quality : Dry air |
| VACUUM | : | -0.7 bar minimum |
| NITROGEN (according to option) | : | 4 – 7 bar |
| EXHAUST | : | 3 600 l/min |

## 2.3 RC16

| | | |
|---|---|---|
| MAXIMUM SPEED (no load) | : | 3 000 rpm |
| MINIMUM STEP | : | 10 rpm |
| SPEED DISPLAY | : | LED indicators / 3 digits / 7 segments |
| SPEED REGULATION | : | Brushless motor & resolver |
| SPEED CONTROL | : | Galvanometric coil |
| MAXIMUM ACCELERATION (no load) | : | 1 000 rpm/sec |
| MINIMUM STEP | : | 100 rpm/s |
| ACCELERATION DISPLAY | : | LED indicators / 3 digits - 7 segments |
| TIME RANGE | : | from 0 to 999 seconds |
| TIME DISPLAY | : | LED indicators / 3 digits - 7 segments |
| TIME CONTROL | : | Countdown displayed by LED indicators |
| RS 232 C CONFIGURATION | : | 9600 BAUDS / 8 BITS / 1 BIT STOP / no parity. |
| MAXIMUM SUBSTRATE SIZE | : | 16"Ø/12"□ |
| MAXIMUM SUBSTRATE THICKNESS | : | 10 mm |
| POWER CONNECTION | : | 200/240 VAC 3P – 340/415 VAC 3P+N+G |
| | | 47/63 Hz 4kVA |
| AIR | : | Pressure : 6 - 10 bar |
| | : | Quality : Dry air |
| VACUUM | : | -0.7 bar minimum |
| NITROGEN (according to option) | : | 4 – 7 bar |
| EXHAUST | : | 2 200 l/min |

## 2.4 RC13

| | | |
|---|---|---|
| MAXIMUM SPEED (no load) | : | 3 000 rpm |
| MINIMUM STEP | : | 10 rpm |
| SPEED DISPLAY | : | LED indicators / 3 digits / 7 segments |
| SPEED REGULATION | : | Tachometric dynamo associated with motor |
| SPEED CONTROL | : | Galvanometric coil |
| MAXIMUM ACCELERATION (no load) | : | 2 000 rpm/sec |
| MINIMUM STEP | : | 100 rpm/s |
| ACCELERATION DISPLAY | : | LED indicators / 3 digits - 7 segments |
| TIME RANGE | : | from 0 to 999 seconds |
| TIME DISPLAY | : | LED indicators / 3 digits - 7 segments |
| TIME CONTROL | : | Countdown displayed by LED indicators |
| RS 232 C CONFIGURATION | : | 9600 BAUDS / 8 BITS / 1 BIT STOP / no parity. |
| MAXIMUM SUBSTRATE SIZE | : | 13"Ø/9"□ |
| MAXIMUM SUBSTRATE THICKNESS | : | 10 mm |
| POWER CONNECTION | : | 200/240 VAC 3P – 340/415 VAC 3P+N+G |
| | | 47/63 Hz 8kVA |
| AIR | : | Pressure : 4 – 9 bar |
| | : | Quality : Dry air |
| VACUUM | : | -0.7 bar minimum |
| NITROGEN (according to option) | : | 4 – 9 bar |
| EXHAUST | : | 800 l/min |

## 2.5 RC8

| | | | |
|---|---|---|---|
| MAXIMUM SPEED (no load) | : | RC 8 GYRSET 8 | : 3 000 rpm |
| | : | RC 8 GYRSET 5 | : 5 000 rpm |
| | : | RC 8 GYRSET 3 | : 7 000 rpm |
| | : | RC 8 with Standard Plate | : 7 000 rpm |
| | : | RC 8 with cover open (CE Safety Limitation) | :≈ 1 000 rpm |
| MINIMUM STEP | : | 10 rpm | |
| SPEED DISPLAY | : | LED indicators / 3 digits / 7 segments | |
| SPEED REGULATION | : | Tachometric dynamo associated with motor | |
| SPEED CONTROL | : | Galvanometric coil | |
| MAXIMUM ACCELERATION (no load) | : | 5 000 rpm/sec | |
| MINIMUM STEP | : | 100 rpm/s | |
| ACCELERATION DISPLAY | : | LED indicators / 3 digits - 7 segments | |
| TIME RANGE | : | from 0 to 999 seconds | |
| TIME DISPLAY | : | LED indicators / 3 digits - 7 segments | |
| TIME CONTROL | : | Countdown displayed by LED indicators | |
| RS 232 C CONFIGURATION | : | 9600 BAUDS / 8 BITS / 1 BIT STOP / no parity. | |
| MAXIMUM SUBSTRATE SIZE | : | RC 8 GYRSET 8 | 8"Ø/6"□ |
| | : | RC 8 GYRSET 5 | 5"Ø/4"□ |
| | : | RC 8 GYRSET 3 | 3"Ø/2"□ |
| MAXIMUM SUBSTRATE THICKNESS | : | RC 8 GYRSET 8 | 4 mm |
| | : | RC 8 GYRSET 5 | 5 mm |
| | : | RC 8 GYRSET 3 | 5 mm |
| | : | RC 8 with HIGH GYRSET (3, 5 and 8) | 12 mm |
| POWER CONNECTION | : | 115/230 VAC – 47-63 Hz 300 VA | |
| AIR | : | Pressure : 4 – 9 bar | |
| | : | Quality : Dry air | |
| VACUUM | : | - 0.6 bar minimum | |
| NITROGEN (according to option) | : | 4 – 9 bar | |
| EXHAUST | : | 600 l/min | |

## 2.6 RC5 GYRSET

| | | | |
|---|---|---|---|
| MAXIMUM SPEED (no load) | : | RC 5 GYRSET 5 | 5 000 rpm |
| | : | RC 5 GYRSET 3 | 7 000 rpm |
| MINIMUM STEP | : | 10 rpm | |
| SPEED DISPLAY | : | LED indicators / 3 digits / 7 segments | |
| SPEED REGULATION | : | Tachometric dynamo associated with motor | |
| SPEED CONTROL | : | Galvanometric coil | |
| MAXIMUM ACCELERATION (no load) | : | 5 000 rpm/s | |
| MINIMUM STEP | : | 100 rpm/s | |
| ACCELERATION DISPLAY | : | LED indicators / 3 digits - 7 segments | |
| TIME RANGE | : | from 0 to 999 seconds | |
| TIME DISPLAY | : | LED indicators / 3 digits - 7 segments | |
| TIME CONTROL | : | Countdown displayed by LED indicators | |
| RS 232 C CONFIGURATION | : | 9600 BAUDS / 8 BITS / 1 BIT STOP / no parity. | |
| MAXIMUM SUBSTRATE SIZE | : | RC 5 GYRSET 5 | 8"Ø/6"□ |
| | : | RC 5 GYRSET 3 | 8"Ø/6"□ |
| MAXIMUM SUBSTRATE THICKNESS | : | 5 mm | |
| POWER CONNECTION | : | 115/230 VAC – 47 to 63 Hz 300 VA | |
| AIR | : | Pressure : 4 to 6 bar | |
| | : | Quality : Dry air | |
| VACUUM | : | - 0.5 bar minimum | |
| NITROGEN (according to option) | : | 4 to 9 bar | |
| EXHAUST | : | 600 l/min | |

## 2.7 RC5 STANDARD

| | | |
|---|---|---|
| MAXIMUM SPEED (no load) | : | 10 000 rpm |
| MINIMUM STEP | : | 10 rpm |
| SPEED DISPLAY | : | LED indicators / 3 digits / 7 segments |
| SPEED REGULATION | : | Tachometric dynamo associated with motor |
| SPEED CONTROL | : | Galvanometric coil |
| MAXIMUM ACCELERATION (no load) | : | 20 000 rpm/s |
| MINIMUM STEP | : | 100 rpm/s |
| ACCELERATION DISPLAY | : | LED indicators / 3 digits - 7 segments |
| TIME RANGE | : | from 0 to 999 seconds |
| TIME DISPLAY | : | LED indicators / 3 digits - 7 segments |
| TIME CONTROL | : | Countdown displayed by LED indicators |
| RS 232 C CONFIGURATION | : | 9600 BAUDS / 8 BITS / 1 BIT STOP / no parity. |
| MAXIMUM SUBSTRATE SIZE | : | ϕ 125 mm |
| MAXIMUM SUBSTRATE THICKNESS | : | 5 mm |
| POWER CONNECTION | : | 115 - 230 VAC - 50/60 Hz - 300 VA |
| AIR | : | Pressure : 4-6 bars |
| | : | Quality : Dry air |
| VACUUM | : | - 0.5 bar minimum |
| NITROGEN (according to option) | : | 2 - 6 bars |
| EXHAUST | : | 600 l/min |

# 3. GENERAL DESCRIPTION

The SUSS **RC** spin coaters have been designed and developed using a modular concept which makes them multi-purpose tools adapted to various technical requirements. All machines use our unique and patented **GYRSET System** that offers unrivalled coating uniformity.

## 3.1 GYRSET SYSTEM PRINCIPLE

The following drawing shows the ***GYRSET System*** applied to the RC8 spin coater:

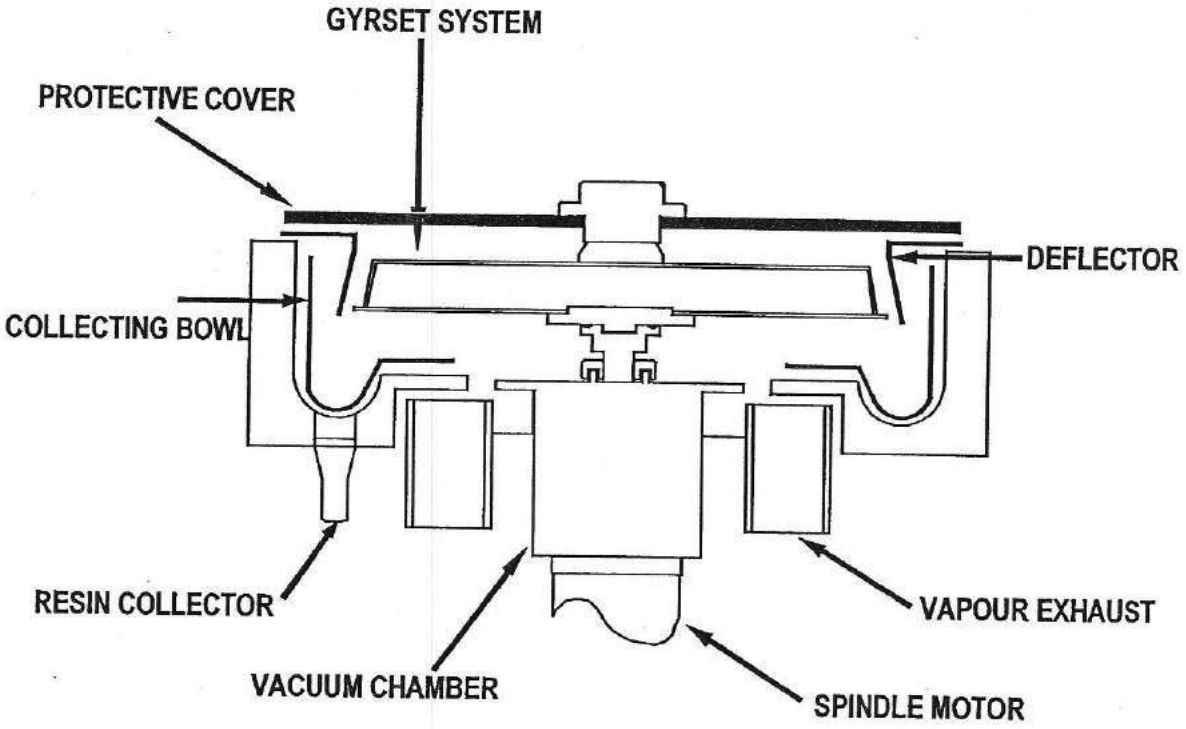



**Figure 1: The GYRSET System on an RC8 Spin Coater**

The ***GYRSET System*** comprises a bell-shaped cover placed over the chuck and the substrate. During a spin cycle, the cover closes, creating a solvent-saturated atmosphere. All the parts involved in the ***GYRSET System*** rotate synchronously as does the confined air inside the cover. Turbulence, which can cause excessive thickness in the corners of the substrate, is thus eliminated. The photoresist coating is spread evenly over the entire surface.

Because of the solvent saturated atmosphere, all the usual spinning defects (rebounding, splashback, comet and striation) are eliminated. Any substrate shapes and thicknesses can be processed with our ***GYRSET System*** with the guarantee of unrivalled coating performance. The ***GYRSET System*** uses at least ***4 times less resist*** than the best classical spinner. Photoresist recycling is then possible due to a very low risk of contamination in the atmosphere.

With the ***GYRSET System***, lower speed and acceleration are used during the spin cycle which means less vibration and so less stress on your substrate. This also saves on wear on the spin motor and the mechanics, increasing the lifetime of your spin coater.

## 3.2 GYRSET SYSTEM ADVANTAGES

- **IMPROVEMENT** in uniformity, which means a better quality of production
- **REDUCTION** in speed & acceleration, which means less stress on the substrate
- **REDUCTION** in spin time, which means a higher throughput
- **REDUCTION** in resist consumption, which means reduction in production cost

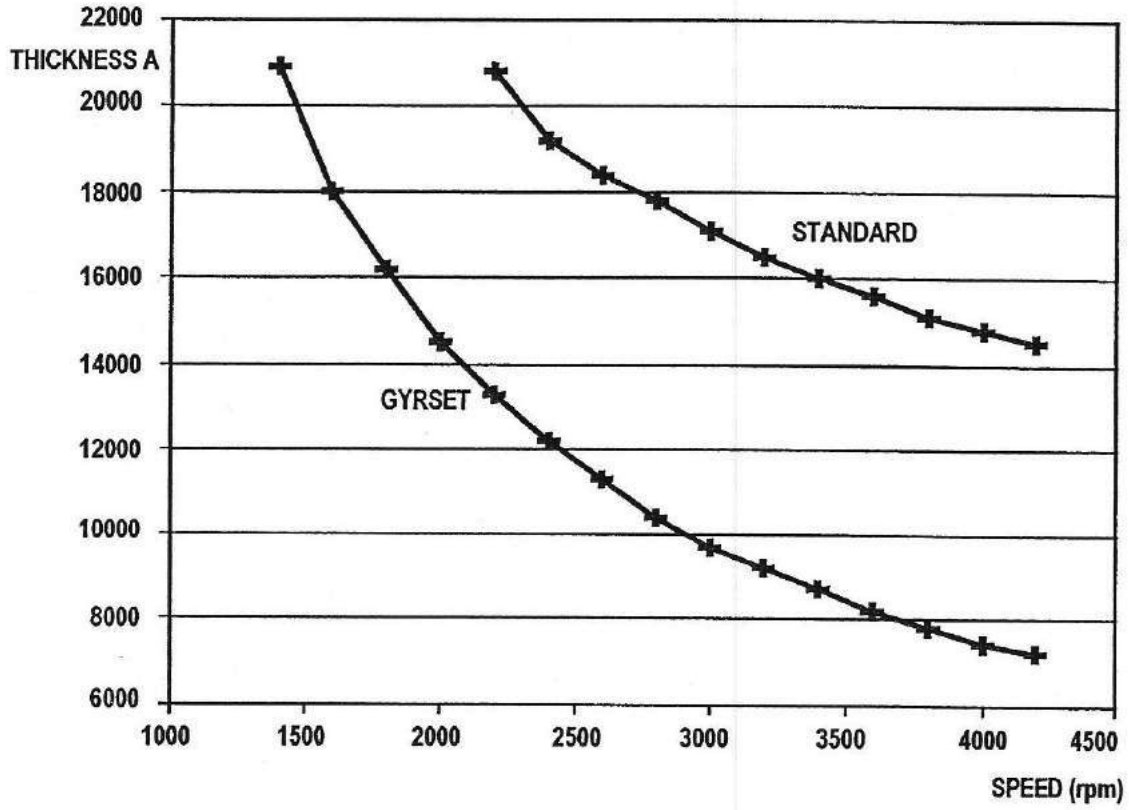



**Figure 2: Thickness v Spin Speed for 43 cps(resist sp25-15)**

## 3.3 MECHANISM DESCRIPTION

The mechanics of the **RC** is composed of:

- A motor connected to a tachogenerator
- An intermediary body (called a *vacuum chamber*) containing the coupling between the motor and the spindle. This intermediary body also acts as a reservoir for the vacuum. On top of the vacuum chamber is a chuck holder under permanent positive air pressure. This increases the lifetime of the upper bearing by preventing the photoresist or any other solvent from passing into the mechanics.
- An interchangeable chuck whose dimensions will vary according to the substrate diameter. The centring of the substrate is performed with locating pins, which permit a precise loading of the substrate.
- A bowl and protective deflector. The deflector is specially designed to collect the surplus resin ejected during spinning and to avoid photoresist fall-back on the substrate.
- On the RC 5 (formerly TP6000), additional disposable bowls and deflectors can be adapted to permit the user to keep the spin coater in good condition and limit cleaning time. These additional bowls are easily replaced by the user as required.

# 4. INSTALLATION

## 4.1 DIMENSIONS

### 4.1.1 RC33 CABINET

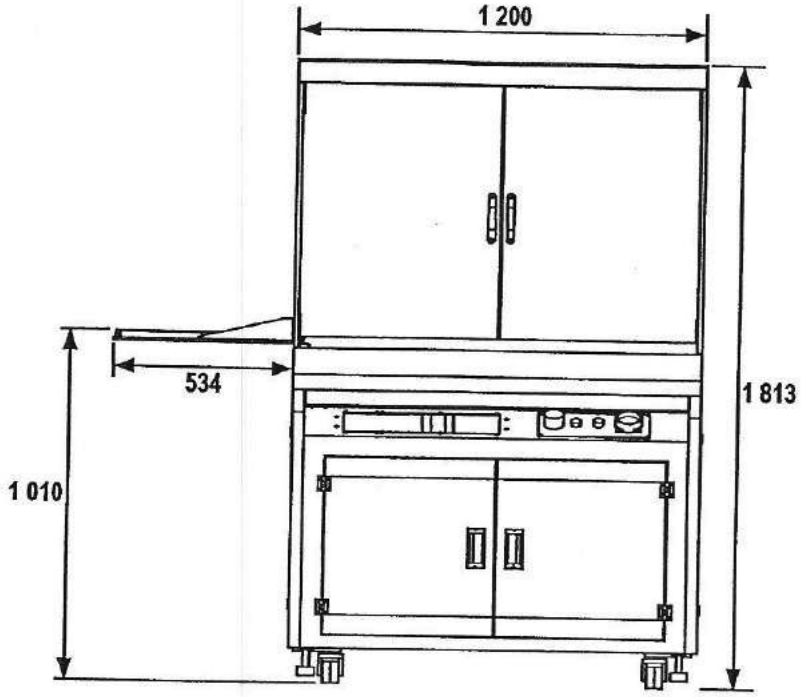



Figure 3: RC33 Cabinet Front

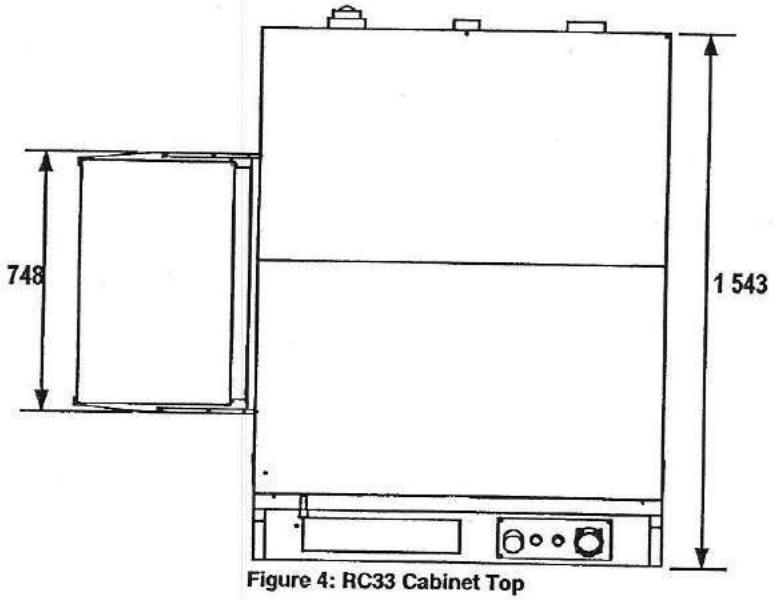



Figure 4: RC33 Cabinet Top

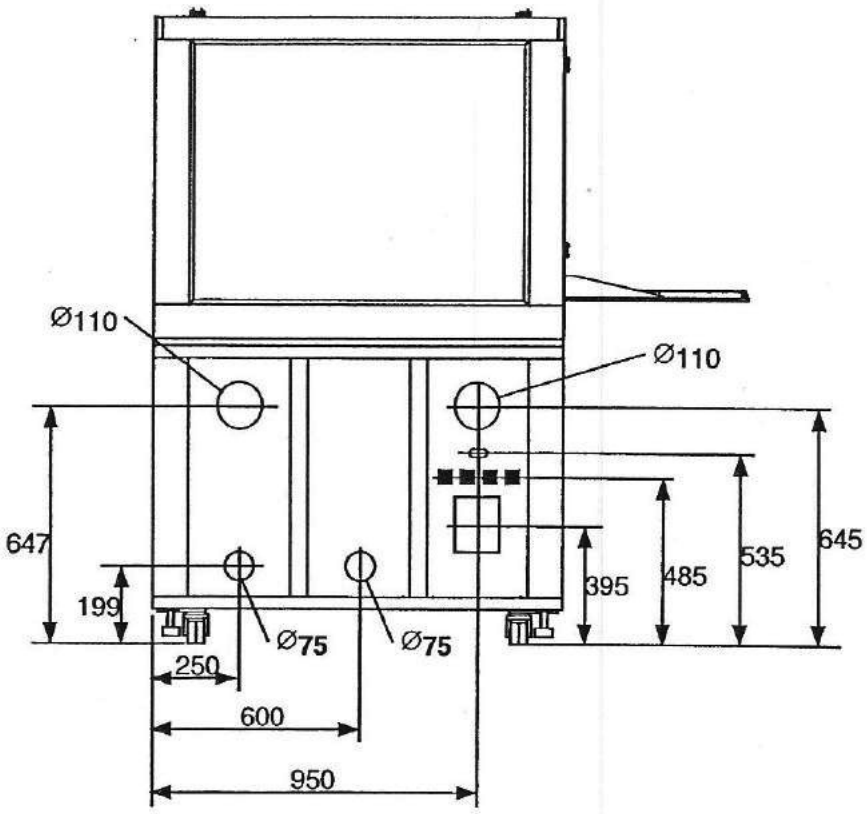



Figure 5: RC33 Cabinet Rear

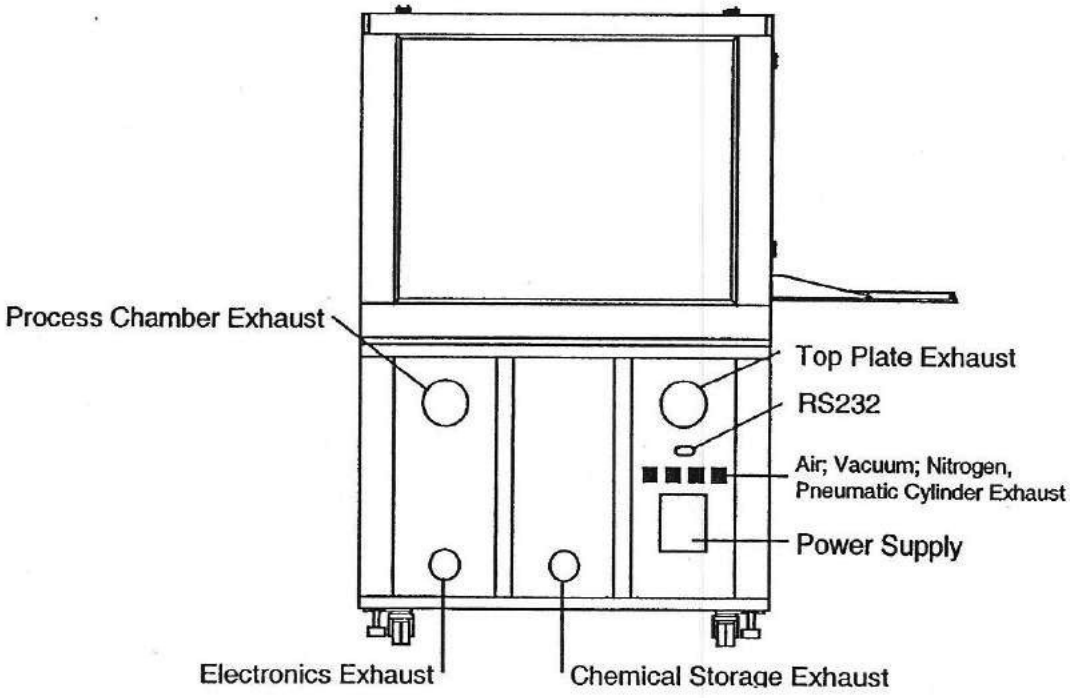



Figure 6: RC33 Cabinet Utility Connection

### 4.1.2 RC16 CABINET

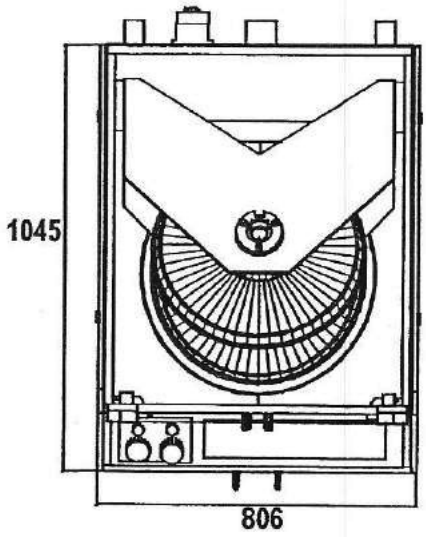



Figure 7: RC16 Cabinet Top

1. Cabinet exhaust 50 mm Ø
2. Process chamber exhaust 75 mm Ø
3. Mains 200/240 3p or 340/415 3p+N+G
4. Cabinet air inlet 50 mm Ø
5. Compressed air 6 mm Ø
6. Vacuum 6 mm Ø
7. Nitrogen 6 mm Ø
8. Pneumatic cylinder 6 mm Ø
9. Canister level detector
10. Canister level detector
11. RS232 connector

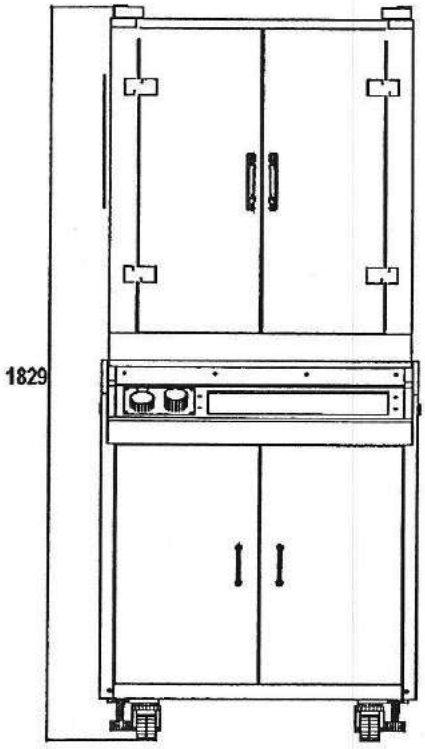



Figure 8: RC16 Cabinet Front

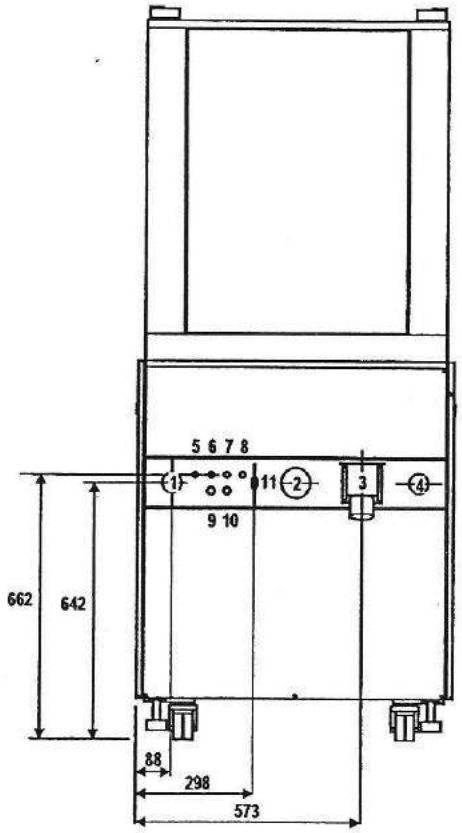



Figure 9: RC16 Cabinet Rear

**Note**

**Make sure the process chamber exhaust is connected and is of sufficient power. If it is not, the machine will not start.**

### 4.1.3 RC13 CABINET

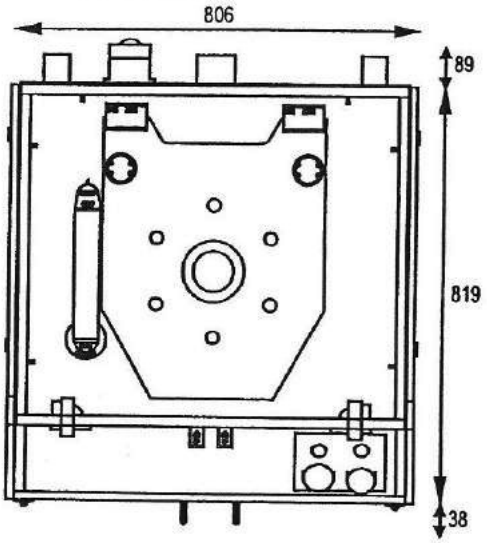



Figure 10: RC13 Cabinet Top

1. Cabinet exhaust 50 mm Ø
2. Process chamber exhaust 75 mm Ø
3. Mains 200/240 3p or 340/415 3p+N+G
4. Cabinet air inlet 50 mm Ø
5. Compressed air 6 mm Ø
6. Vacuum 6 mm Ø
7. Nitrogen 6 mm Ø
8. Pneumatic cylinder 6 mm Ø
9. Canister level detector
10. Canister level detector
11. RS232 connector

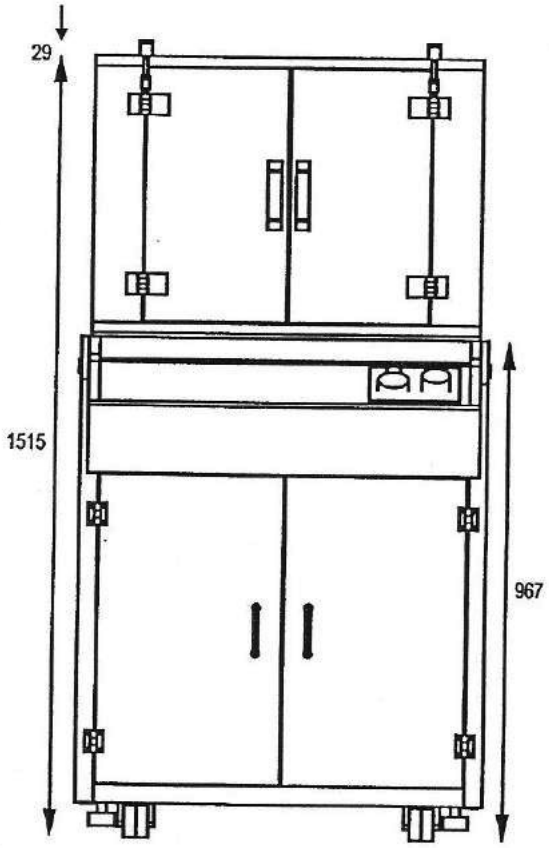



Figure 11: RC13 Cabinet Front

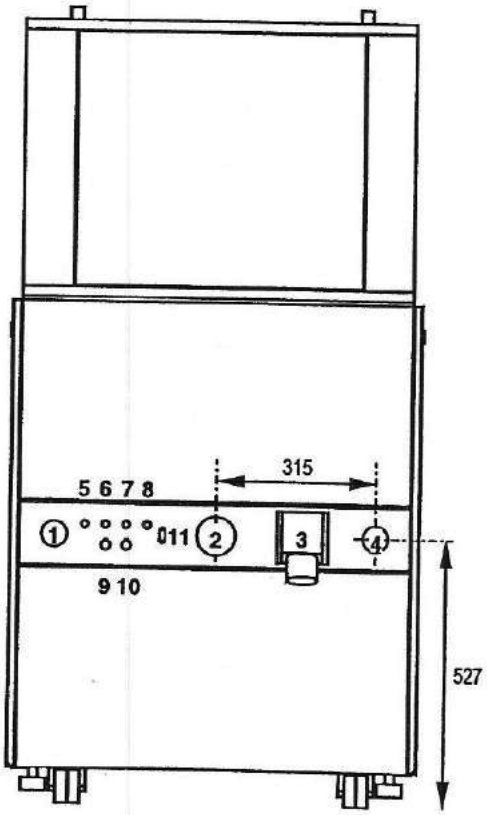



Figure 12: RC13 Cabinet Rear

### 4.1.4 RC8/RC5 CABINET

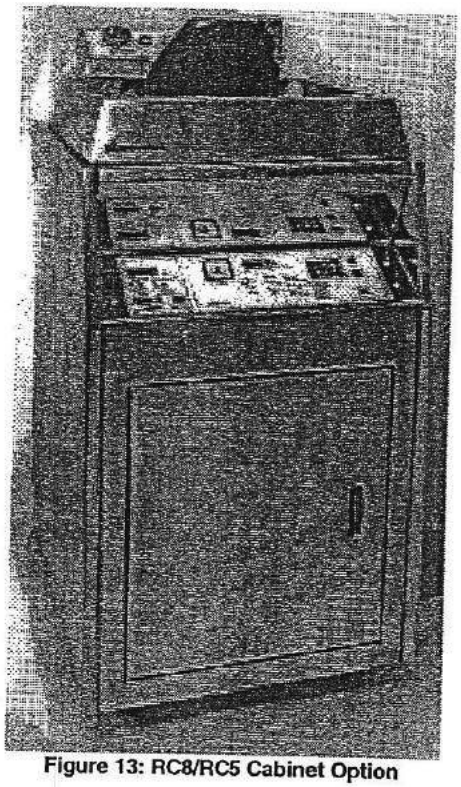


Figure 13: RC8/RC5 Cabinet Option

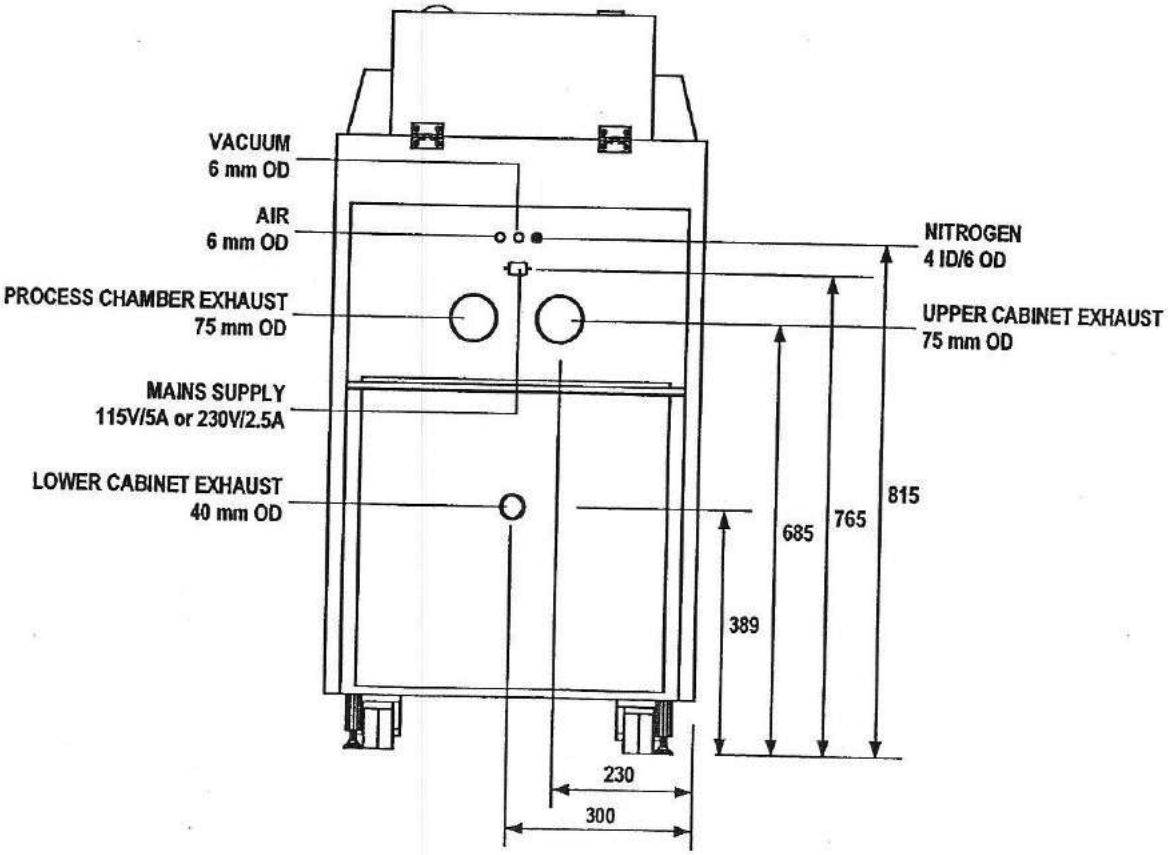



Figure 14: RC8/RC5 Cabinet Rear

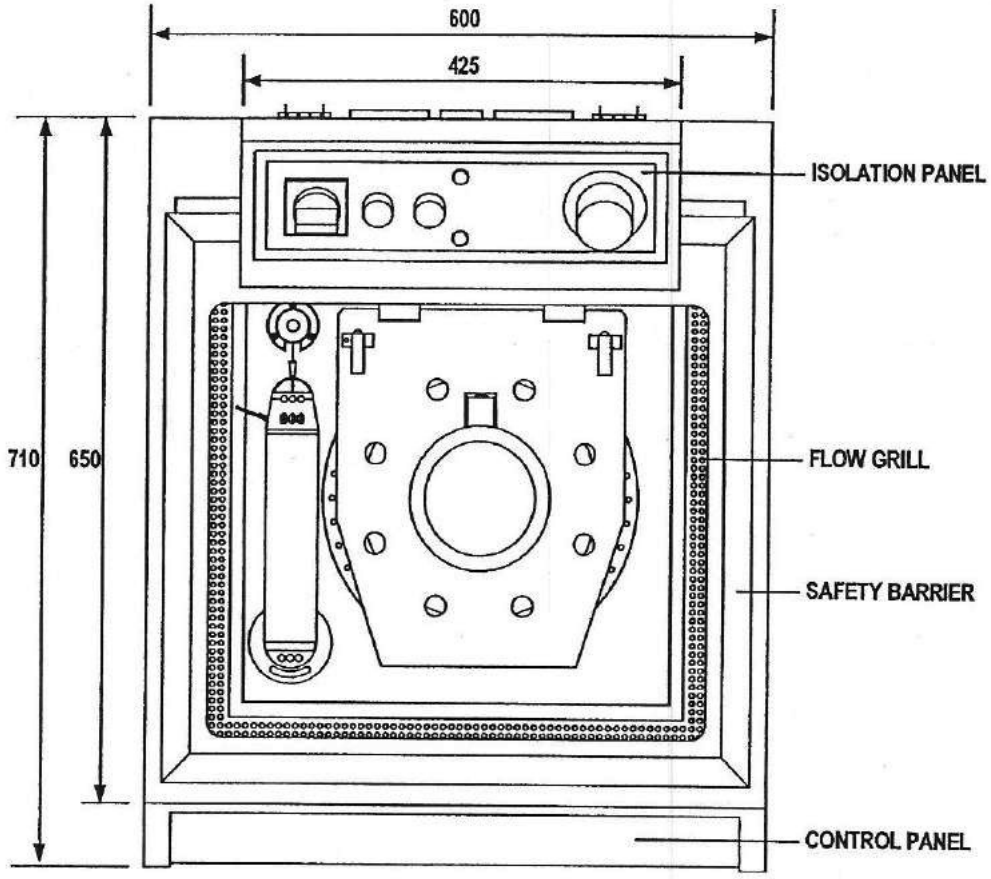



**Figure 15: RC8/RC5 Cabinet Top**

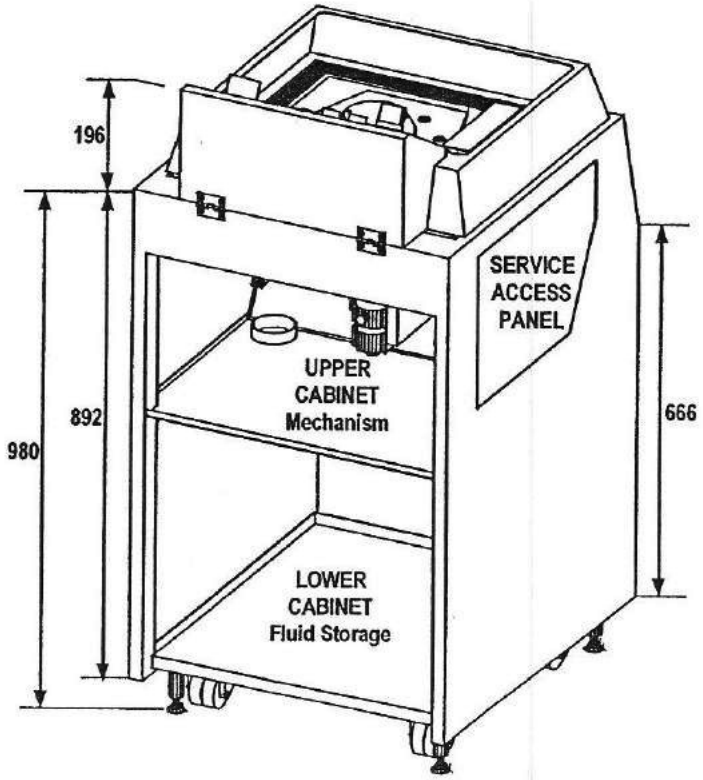



**Figure 16: RC8/RC5 Cabinet Interior**

## 4.2 UNPACKING AND INSTALLATION

### 4.2.1 SYSTEM WITH CABINET

The cabinet is optional on both the RC5 and the RC8. When the system is delivered with a cabinet, the spin coater and its associated options, such as solvent dispense or dispensing pumps, are already installed inside. Unpacking is then very simple;

1. Remove the plastic film around the cabinet.
2. Remove the packing material that has been placed to secure the arm and the **GYRSET** cover during transportation.
3. Open the cabinet and remove the packing material that has been placed to secure the bottles and/or canister during transportation.

### 4.2.2 SYSTEM WITHOUT CABINET

When the system is ordered without a cabinet, it is packed in a cardboard box. The spin coater and its associated options, such as solvent dispense or dispensing pumps, are packed separately. Prior to unpacking, ensure that the system which is going to house the spin coater has been prepared.

### 4.2.3 CONTROLLER INTEGRATION

Both the RC 5 and RC 8 are driven by the same controller. The cabinet which houses the spin coater controller must be prepared as shown in the following diagrams:

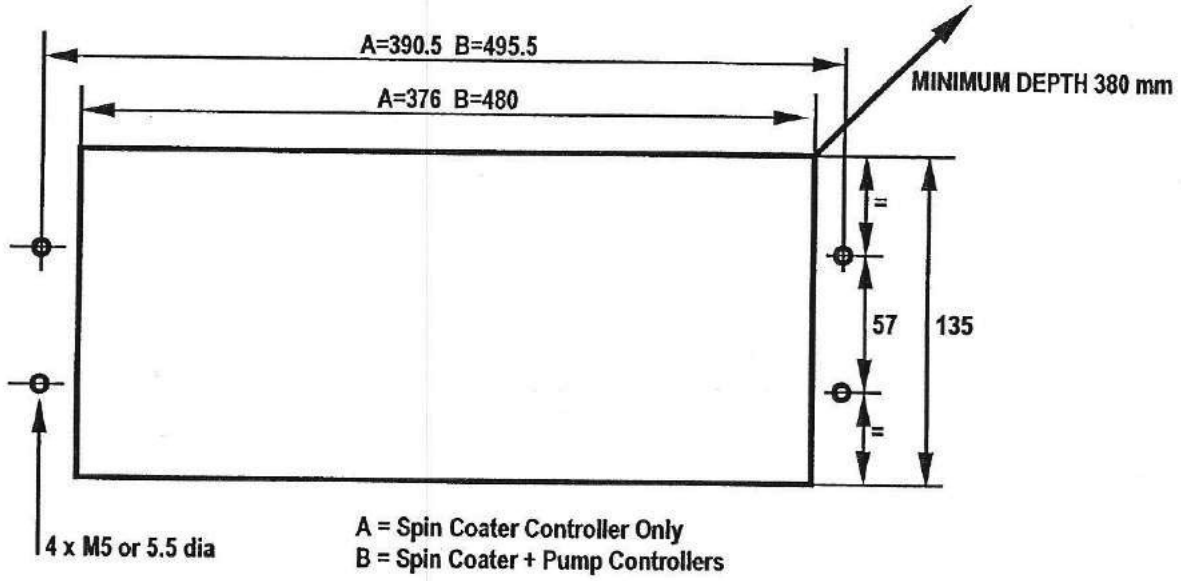



**Figure 17 : The Dimensions of the Spin Coater Controller Cabinet**

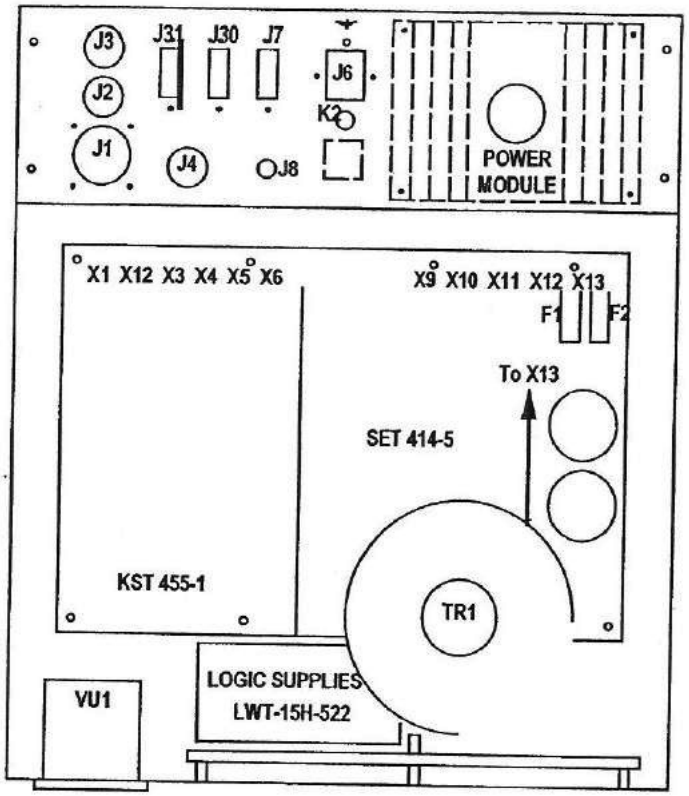



**Figure 18: Spin Coater CT62 Controller Connections**

### 4.2.4 MECHANISM INTEGRATION

#### *4.2.4.1 LARGE AREA SPIN COATERS (RC33, RC22, RC16, RC13)*

These are always delivered with a cabinet, so no integration is necessary.

#### *4.2.4.2 RC5*

For the RC 5 (formerly TP6000), the top surface of the system which houses the spin coater must be prepared as shown in the following diagrams:

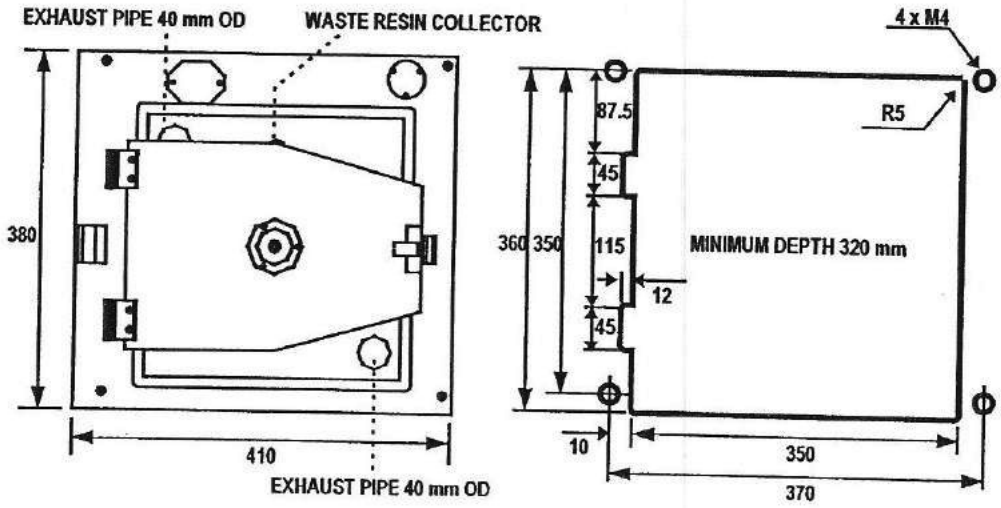



**Figure 19: Surface Cut-out for RC5**

#### 4.2.4.3 RC8

For the RC 8 (formerly TP6010), the top surface of the system which houses the spin coater must be prepared as shown on the following diagrams:

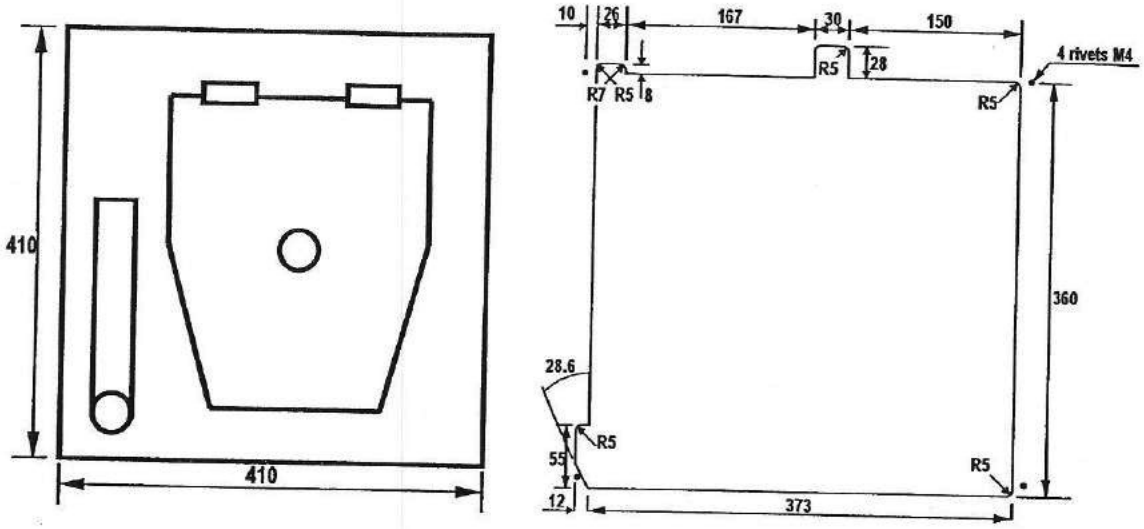



Figure 20: Surface Cut-out for RC8

### 4.2.5 DISPENSING PUMP INTEGRATION

If system is supplied with a Karl Suss *Virgin 30* dispenser, refer to its technical manual for information about dispensing pump installation (positioning and connection).

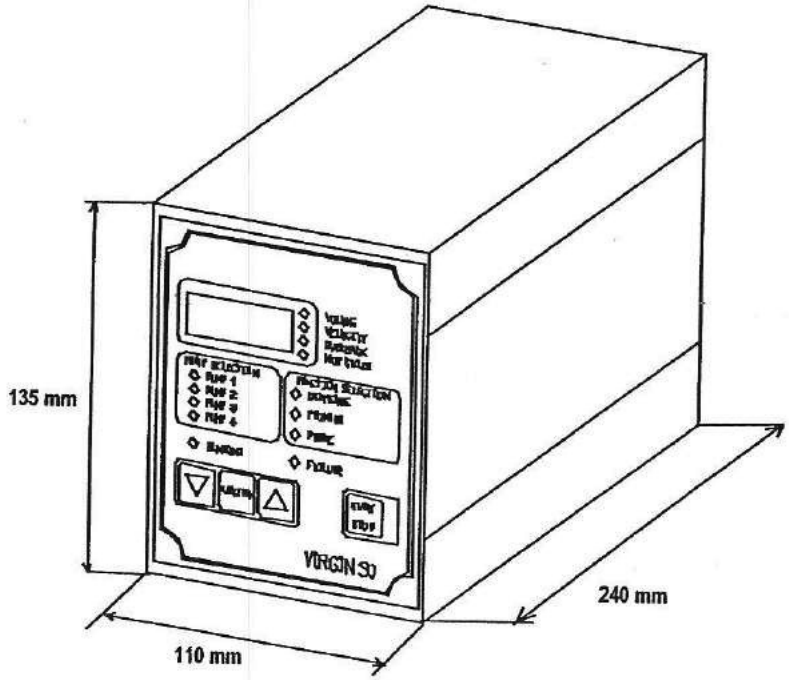



Figure 21: The Pump Controller

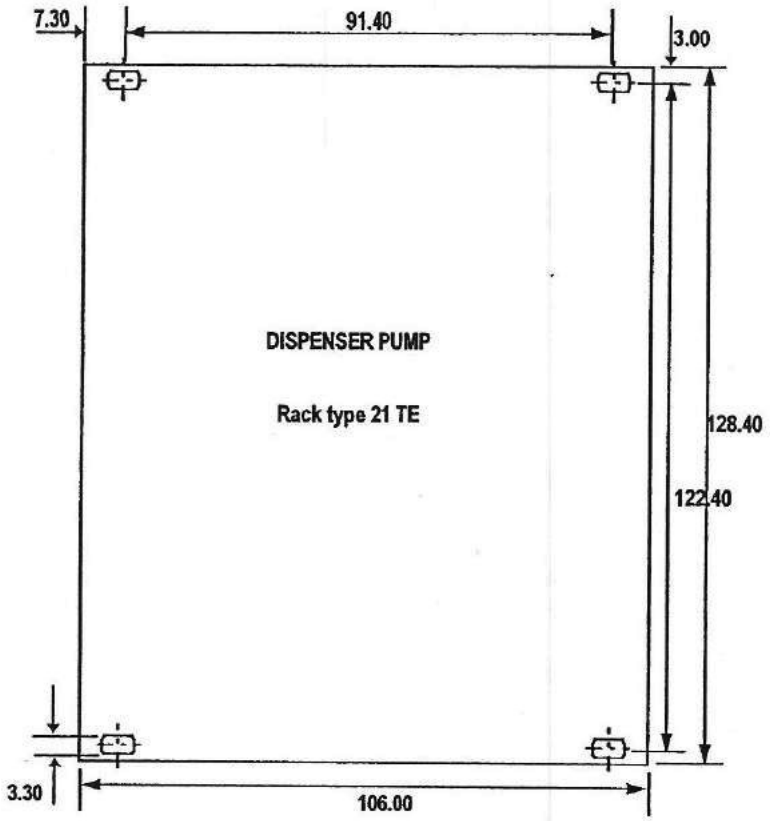



**Figure 22: Pump Controller - Front**

## 4.3 CONNECTION

### 4.3.1 SYSTEM WITH CABINET

When the system is delivered with the cabinet, interconnections between the spin coater controller and the spin coater mechanism are already made. If a dispenser type *Virgin 30* is delivered with the system, interconnections between the spin coater controller and the pump controller, as well as connection between the pump controller and the pump mechanism are made. To connect other dispensers, refer to the following chapter.

#### *4.3.1.1 UTILITIES*

The utilities panel is located at rear of the cabinet:

| | | |
|---|---|---|
| Main Power | : | 220 V - 50 Hz (110 V optional) |
| | : | Connect the main power cable supplied with the system at rear of the cabinet. |
| Vacuum | : | Black pipe 4 x 6 to connector **(J20)** |
| Air pressure | : | Blue pipe 4 x 6 to connector **(J21)** |
| Nitrogen | : | Blue pipe 4 x 6 to connector **(J37)** |

#### *4.3.1.2 SERIAL INTERFACE (RS 232 C)*

Connect the serial interface cable to connector **J38** at rear of the cabinet.

### 4.3.2 SYSTEM WITHOUT CABINET

#### *4.3.2.1 RC8 PNEUMATIC MECHANISM UNIT*

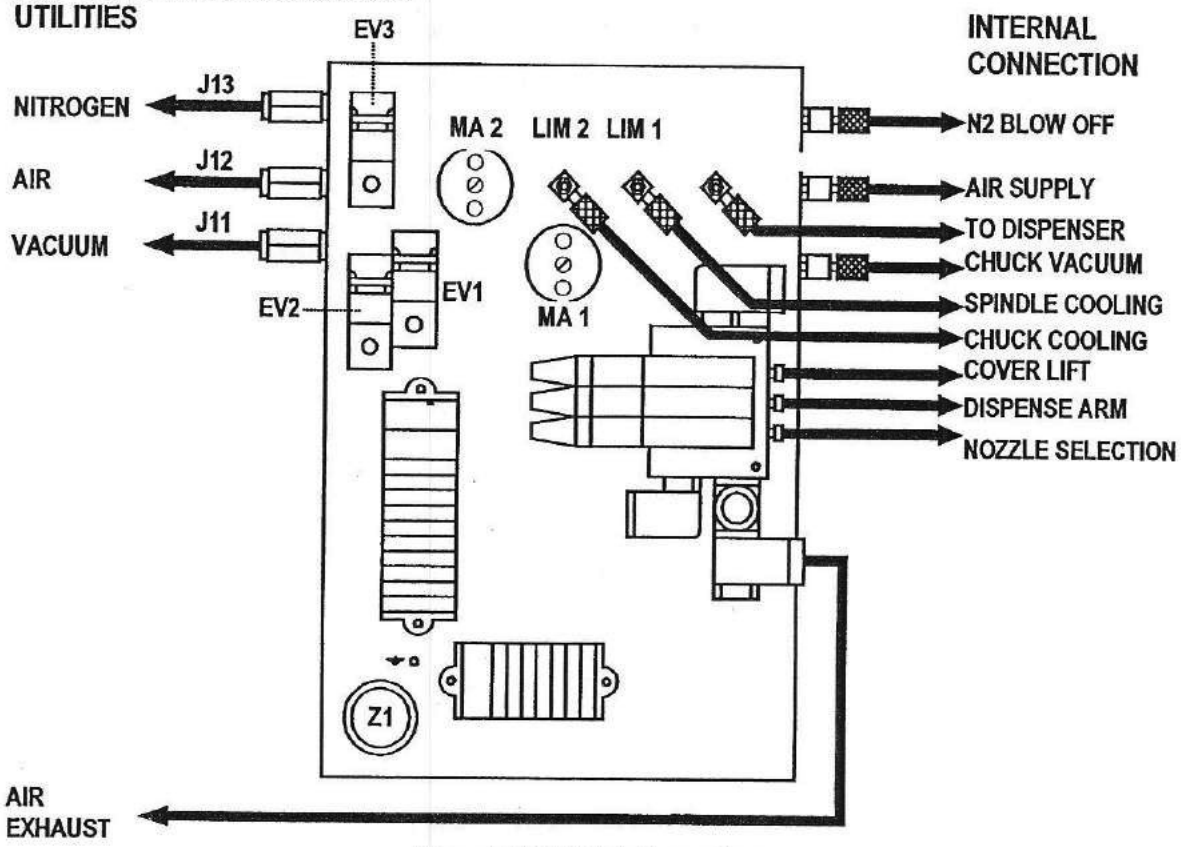



Figure 23: RC8 Utility Connections

#### *4.3.2.2 RC5 PNEUMATIC MECHANISM UNIT*

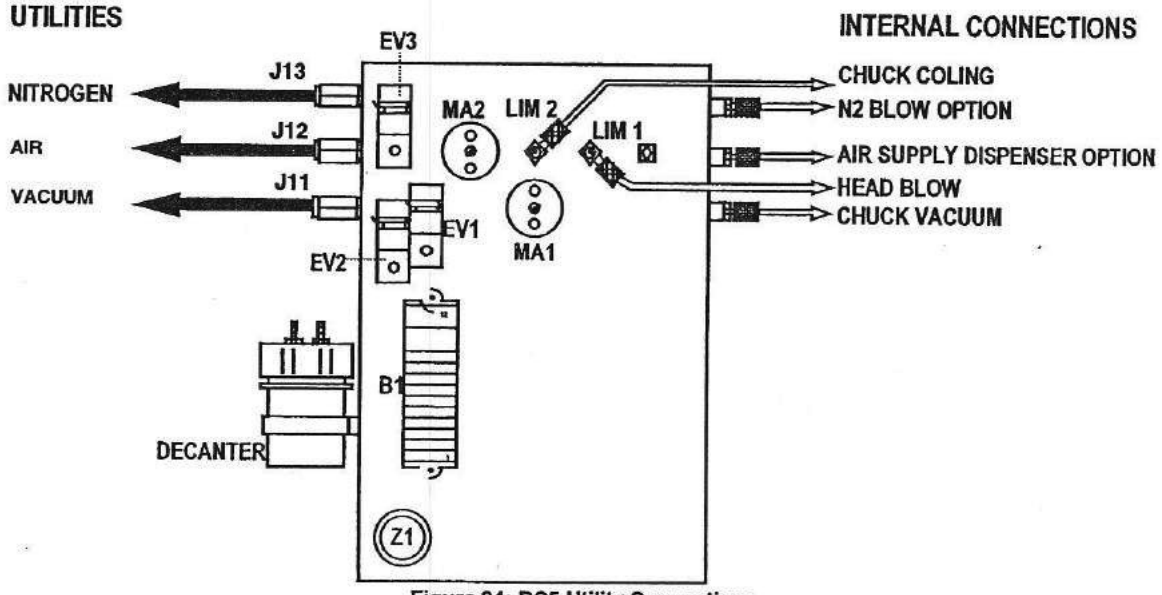



Figure 24: RC5 Utility Connections

#### 4.3.2.3 MECHANISM

The internal connections in the mechanism (arm cylinder, nozzle selection, spindle and chuck cooling, chuck vacuum) are already made. Interconnection with other options (dispensing pump, solvent) must be made;

1. The electrical connection of the mechanism is made through the controller. Cable Z1, which is attached to the mechanism, is to be plugged into connector **J1** on the back panel of the spin coater controller.
2. Fluids (air pressure, nitrogen, vacuum) are connected directly to the mechanism.

| | | |
|---|---|---|
| Vacuum | : | Black pipe 4 x 6 to connector |
| Air pressure | : | Blue pipe 4 x 6 to connector |
| Nitrogen | : | Blue pipe 4 x 6 to connector |
| Air Exhaust | : | Blue pipe 4 x 6 |

#### 4.3.2.4 SOLVENT DISPENSE OPTION

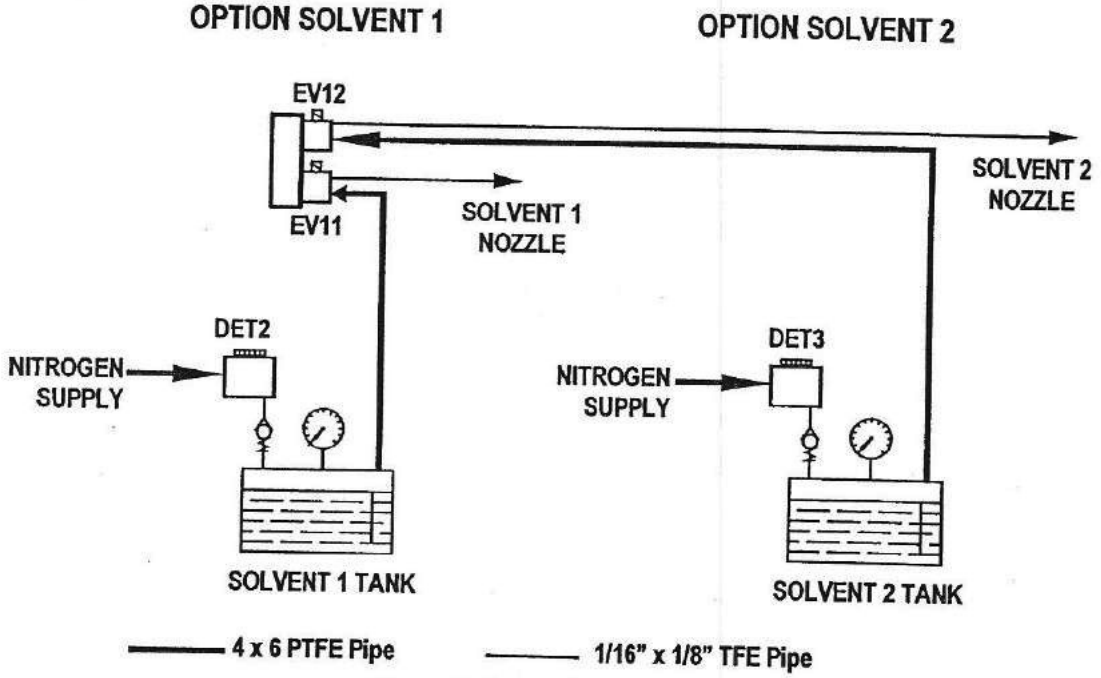



**Figure 25: Solvent System Layout**

Solenoid valves EV11 to E14 (depending on the number of solvents fitted, from 1 to 4) control the solvent flow from the tanks to the nozzle. Restrictors DET2 to DET5 control the nitrogen flow from the supply to the solvent tanks.

Each solenoid valve has an electrical connector, J14 to J17. The electrical connection of the valves to the controller is made by a single cable (Z2). One end is connected to the CT62 controller, the other to each of the pumps fitted, as follows:

1. Connect one end (J2) of cable (Z2) to connector J2 (Solvents Interface - see Figure 18: Spin Coater CT62 Controller Connections on p18) on the controller panel
2. Solvent 1: Connect (J14) of cable (Z2) to connector (J14) on solenoid valve (EV11).
3. Solvent 2: Connect (J15) of cable (Z2) to connector (J15) on solenoid valve (EV12).
4. Solvent 2: Connect (J16) of cable (Z2) to connector (J16) on solenoid valve (EV13).
5. Solvent 2: Connect (J17) of cable (Z2) to connector (J17) on solenoid valve (EV14).

#### 4.3.2.5 DISPENSER PUMP

**SUSS VIRGIN 30**

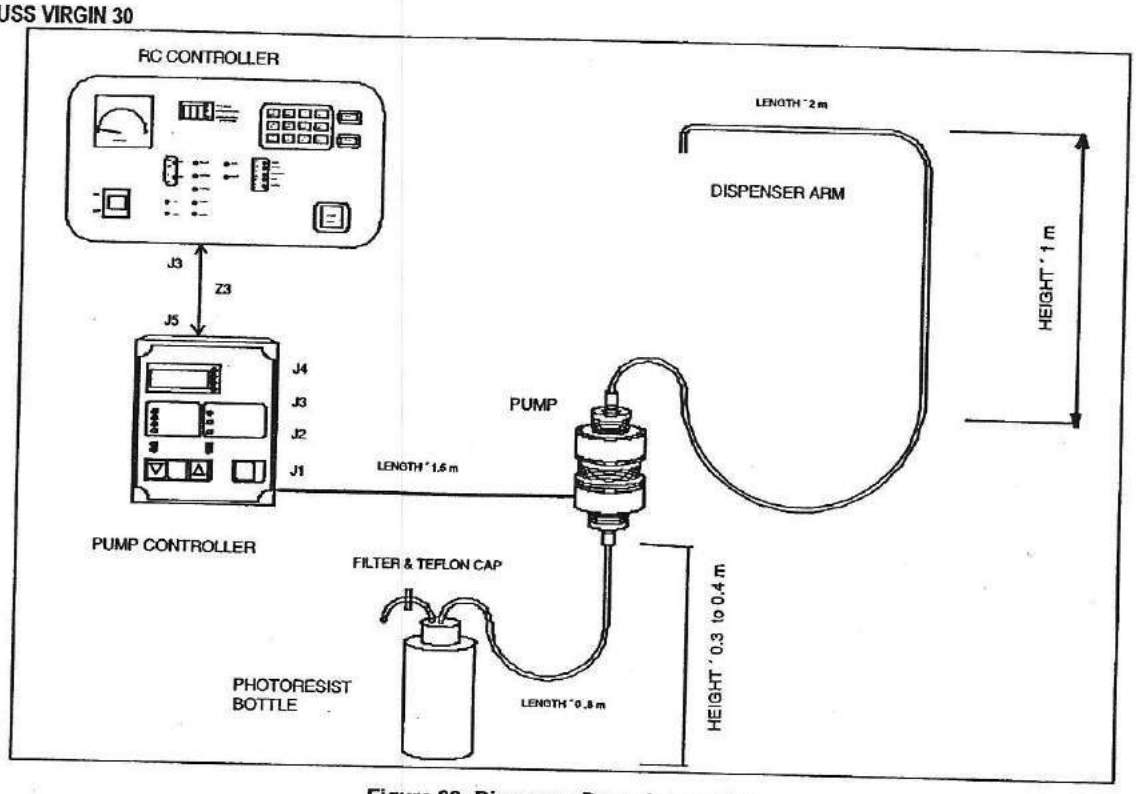



**Figure 26: Dispenser Pump Integration**

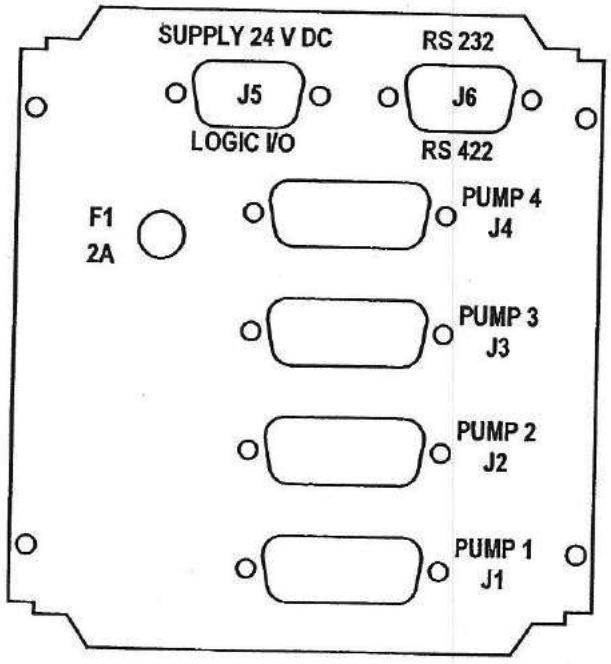



**Figure 27: Pump Control Box Connections**

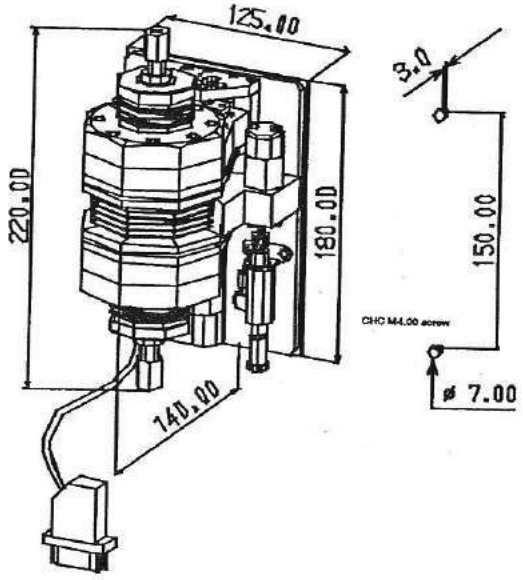



**Figure 28: The Dimensions Of The Pump**

Installation Procedure

1. Make sure that the pump is installed in the vertical position
2. Do not connect Air or Nitrogen pressure to the photoresist INLET or OUTLET. It will damage the pump

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