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1. General Machine Specifications

- All piping is labeled for flow direction and material within.
- The machine can be purchased with one of the following configurations:
  - KX170 MCZC – Magnet capable which allows for future addition of a magnet and magnet lift system
  - KX170 MCZR – Magnet ready which includes all magnet lift components – only the magnet and magnet power supply are not included
  - KX170 MCZ – Machine complete with magnet and magnet lift system
- The machine can be supplied with the following options (please consult LCT sales for additional information)
  - Cathetometer
  - Maintenance platform and ladder for accessing seed lift
  - Hot zone design
  - Oxide filters
  - Vacuum pumps
  - Throat cooling tube
  - Internal feeder
  - Maintenance kit
    - This kit can include various alignment and service tools for maintaining and installing the machine and hot zone. Configurations can be customized to suit customer needs and requirements.
  - Spare parts kit
    - This kit can be configured in many levels to suit customer needs and requirements.

**Note: Specifications denoted with “TBD” indicate that the data is “To Be Determined” and will be verified at a later date.**
2. Physical and Performance Specifications

Features of Systems and Major Assemblies

2.1. GROWTH CHAMBERS

All growth chambers are constructed of 304L stainless steel, and they are double-walled for water jacket cooling. All chamber welds are inspected for defect-free condition and are dye penetrant tested. Chamber water jackets are leak checked with a helium mass spectrometer and are hydrostatically pressure tested. See Section 3.0 for drawings.

2.1.1. BASEPLATE

The baseplate is the flat bottom of the growth chamber. It has a center bore for the crucible shaft, two (2) ports for evacuation and one (1) for pressure sensors, and six (6) electrode feedthroughs.

Electrodes .......................................................... (4) main heater  
(2) bottom heater

Electrode port diameter ........................................ 75.5 mm (2.97")
Electrode material ........................................ Copper, water-cooled
Vacuum ports ................................................... (2) 81.79 mm (3.22")
Center bore ...................................................... 127 mm (5.00")

2.1.2. FURNACE TANK

The furnace tank is an open cylinder with flanged ends. It has one (1) pyrometer port for heater temperature measurement. There are no tabs on the I.D. of the furnace tank.

Furnace Tank I.D. .............................................. 1,040 mm (40.94")
Furnace Tank height ......................................... 985 mm (38.78")
Pyrometer port location .................. 699.8 mm (27.6") above baseplate
2.1.3. **FURNACE TANK COVER**

The furnace tank cover has a domed shape, making a transition between the furnace tank and the pull chamber. Two argon inlet ports are provided in the cylindrical neck of the cover (located opposite of each other in the throat area).

- Inside diameter: 1,040 mm (40.94”)
- Tank cover throat I.D.: 355 mm (14”)
- Camera viewport: 64 mm x 153 mm oval
- Operator viewport: 64 mm x 279 mm oval
- Feeder port: 82 mm (3.23”) round
- Shield lift ports: (2) 50 mm (1.97”) round

2.1.4. **COOLING TUBE**

The machine can be equipped with an optional cooling tube, constructed of 316L stainless steel. The tube is bolted between the bottom of the isolation valve seat and the top of the tank cover.

- Inside diameter: 292.1 mm (11.5”) or 254 mm (10.0”)
- Flange thickness: 47.6 mm (1.88”)

2.1.5. **ISOLATION VALVE**

A flap type valve is located in a separate isolation chamber, to isolate the pull chamber from the growth chamber. The isolation valve maintains furnace tank pressure and temperature conditions while allowing operator access to the pull chamber.

- Ports: (1) Ø38 mm viewport in front
- (2) Seed position sensing ports
- Isolation valve I.D.: 305 mm (12”)
2.1.6. PULL CHAMBER (RECEIVING CHAMBER)

The pull chamber is a cylindrical enclosure above the isolation valve. There is a hinged cleanout port at the upper end of the chamber.

- Pull chamber I.D.: 305 mm (12")
- Pull chamber height: 2,800 mm (110")

2.1.7. EXTENSION TUBE

The extension tube is a cylindrical enclosure above the pull chamber.

- Extension tube height: 508 mm (20.0")
- Extension tube ID: 191 mm (7.5")

2.1.8. LEVELING ADAPTER

The leveling adapter is the assembly that closes the top of the extension tube and supports the seed lift. The top flange is adjustable to allow the seed rotation axis to be plumbed vertical. The leveling adapter has (2) ports where argon is introduced, one for the melt pyrometer, and one port for the auxiliary vacuum. A 0-1000 torr manometer is connected to report chamber pressure above the isolation valve when the valve is closed.

2.2. CHAMBER LIFT APPARATUS

Operators can raise chamber sections off the furnace baseplate (for furnace charging and maintenance) using the grower lift controls. Column mounted hydraulic cylinders vertically move the upper chambers (pull chamber/tank cover assembly) and the furnace tank. Personnel manually move the suspended furnace tank aside or to center. The pull chamber is moved to the side by an electric motor, controlled from an operator pendant.

Chamber lift equipment includes a dedicated hydraulic pumping unit and connecting hoses, collectively referred to as the Hydraulic System, providing power to the lift cylinders. Flow fuses stop hydraulic oil flow if rate is excessive.

- Pull Chamber Lift, Total Vertical Travel: 1,016 mm (40.0")
- Furnace Tank Lift, Total Vertical Travel: 1,016 mm (40.0")
2.3. CRUCIBLE LIFT MECHANISM

This lift mechanism utilizes a slide way and Acme lead screw for vertical motion of the rotating parts, assuring rigidity and accuracy and eliminating back-drive effects. A stepper motor drives the lead screw through a gearbox and reinforced-belt drive train for both jog and process speeds. A stainless steel bellows maintains a vacuum seal through the full range of vertical motion.

Electrical limit switches inhibit operation of the lift motors at the extremes of lift travel. A DC servomotor rotates the crucible shaft through a gearbox and multi-V-belt drivetrain, providing high torque without introducing vibration. The shaft rotation seal is a magnetic fluid type. Jacking screws are provided to center the crucible shaft in the baseplate.

2.3.1. OPERATING SPECIFICATIONS

- Load Rating (at shaft interface) ......................... 500 kg (1,102 lbs)
- Lift Speed and Accuracy ... 0-127 mm/hr (0-5.0 in/hr) ± 1% of reading, or ± 0.25 mm/hr (0.01 in/hr), whichever is greater
- Jog Speed (nominal) ........................................127 mm/min (5 in/min)
- Total Vertical Travel ............................................. 500 mm (19.68”)
- Rotation Rate and Accuracy ....................0-30 RPM ± 1% of reading, or ± 0.03 RPM, whichever is greater

2.3.2. CRUCIBLE SHAFT

The crucible shaft is a hollow, water-cooled, rigid spindle constructed of 303 stainless steel. Its end mount is specially designed to eliminate loosening of the loaded graphite pedestal when hot. The coolant supply to the shaft comes through a rotary union.

- Cylindrical diameter above rotation seal ..................100 mm (3.94 in)
- Diameter through rotation seal ..........................50.75 (2.00 in)
2.4. **SEED LIFT MECHANISM**

This lift mechanism is an evacuated aluminum enclosure that houses a translating spool, and a pulley suspended from a loadcell to measure the weight on the cable. The lift housing rotates about a hollow vertical shaft; its on-board circuitry connects with the rest of the system through a slip ring assembly. The load cell signal is digitized before being transmitted through the slip ring to minimize signal losses. The mechanism is statically balanced to provide vibration-free operation throughout its range of rotation rates. The lift spool driveshaft and housing rotation seals are a magnetic fluid type.

A stepper motor coupled to a gear reducer drives the cable spool for both process and jog speeds. A DC servomotor rotates the lift housing through a gearbox and multi-V-belt drive train, providing high torque without introducing vibration.

The seed lift limit switches and potentiometers are located outside of the vacuum. The limit switches are adjustable to 20mm (or better) accuracy.

Remote operation of the lift motor is provided on the same operator pendant used for the pull chamber motion.

2.4.1. **OPERATING SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load rating</td>
<td>340 kg (749 lbs)</td>
</tr>
<tr>
<td>Lift Speed and Accuracy</td>
<td>0-508 mm/hr (0-20 in/hr) ± 1% of reading, or ± 0.51 mm/hr (0.02 in/hr), whichever is greater</td>
</tr>
<tr>
<td>Jog Speed (nominal)</td>
<td>400 mm/min (15.75 in/min)</td>
</tr>
<tr>
<td>Total Vertical Travel</td>
<td>5,000 mm (197&quot;)</td>
</tr>
<tr>
<td>Rotation Rate and Accuracy</td>
<td>0-30 RPM ± 1% of reading, or ± 0.05 RPM, whichever is greater</td>
</tr>
</tbody>
</table>

2.4.2. **SEED CABLE**

The cable is counter-wound 302 stainless steel 19×7 construction. The cable, ball and eyelet meet military specifications, and are proof load tested to 409 kg (900 lb).

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal diameter</td>
<td>3.18 mm (.125&quot;)</td>
</tr>
<tr>
<td>Overall length</td>
<td>6,600 mm (244&quot;)</td>
</tr>
</tbody>
</table>

*NOTE:* Cable load capacity decreases with use.
2.5. SHIELD LIFT

The machine is designed to accommodate a two-point shield lift mechanism on the tank cover. The position of the shield can be controlled via the touchscreen in manual mode, and also via the computer in automatic mode. A ramp table is used to control the motion in automatic mode. The two shield lift ports are 180 degrees apart on the furnace tank cover.

Lifting capacity ................................................................. 68 kg (150 lbs)
Nominal Speed .............................................................. 35 mm/min (1.4 in/min)
Max. Stroke ................................................................. 300 mm (11.8 in)

2.6. VACUUM SYSTEM

System components are constructed of stainless steel. The system valves are high vacuum, pneumatic-driven ball valves. Two (2) electronic manometers report chamber pressure below the isolation valve within the ranges of 0-1 torr, and 0-100 torr. A 0-1000 torr manometer is connected to the leveling adapter to report chamber pressure above the isolation valve when the valve is closed. The connecting tubing for the gauges below the isolation valve is ½" [12.7 mm] diameter to help prevent clogging.

2.6.1. MAIN VACUUM SYSTEM

The main vacuum system provides the tubing and valves to evacuate the growth chambers or, if the isolation valve is closed, the furnace tank only. The system includes a throttle valve for chamber pressure control that is independent of gas flow. A NW25 flange and blank off have been added to the main vacuum line at the back of the grower for leak checking and vacuum cleaning. The flange for the main vacuum pressure relief is designed to be above the operator floor for easier access for cleaning.

Line size O.D................................................................. 152.4 mm (6.0")
Line size O.D.-After the first wye................................. 101.6 mm (4.0")
Valve size (Full port ball valve) ...................................... 76 mm (3.0")
2.6.2. AUXILIARY (PULL CHAMBER) VACUUM SYSTEM

The auxiliary vacuum system provides the tubing and valves to evacuate the pull chamber and to equalize its pressure with furnace tank pressure during isolation.

The system features a stainless steel flex line, maintaining a flexible connection to the pull chamber when raised and rotated.

Auxiliary system line O.D. ................................................ 25 mm (1.0”)
Valve size (Full port ball valve) ........................................ 25 mm (1.0”)

2.6.3. SEALS

All static chamber seals are Viton O-rings. Rotation seals for the seed lift and crucible lift assemblies are a magnetic fluid type. The rotary seal for the isolation valve shaft is a quad ring type.

2.6.4. VACUUM INTEGRITY

The system passes testing with a helium mass spectrometric leak detector at a sensitivity of $1 \times 10^{-8}$ cm$^3$ (standard atmosphere)/sec. The control system automatically performs a rate-of-rise test of the furnace after each pumpdown state before proceeding with heater turn-on and meltdown.

Nominal vacuum................................................................. 25 mtorr typical
(Value is a function of the pump as well as the grower vacuum system)
Leak rate (rate of pressure rise)........................................... 50 mtorr / hr

2.6.5. OXIDE CONTROL SYSTEM

The main vacuum system features two air injection valves for oxide control. Actuation of the valves can be controlled by the recipe. The valves are located on the vacuum lines below the baseplate and are actuated by the same solenoid valve.

Flow rate: ................................................................. Fixed at approximately 5 liters/min
or less from each injector.
2.7. **ARGON SYSTEM**

The system introduces process gas through a mass flow controller into the furnace at several points during growth runs. Argon that is distributed from the leveling adapter issues from an annular baffle, minimizing turbulence in the chamber. Diffusers are incorporated into the argon connection points on the upper flange of the tank cover. Point of use filters are incorporated into both of these connection points. The argon panel has a mechanical gauge to indicate supply pressure.

2.7.1. **MASS FLOW CONTROLLER**

The mass flow controller is part of the argon panel assembly. It precisely controls the flow of argon gas into the growth chambers.

Gas flow range: ................................................................. 4–200 slpm

2.7.2. **VALVES AND REGULATORS**

Three (3) automatic valves in the argon panel assembly open and close the pull chamber and tank cover gas distribution lines. A manual valve and shunt tubing allow the operator to bypass the automatic valve and supply argon to the connections in the leveling adapter.

A regulator is used before the mass flow controller to ensure consistent gas at each machine.

2.7.3. **SEALS AND TUBING**

The argon system is constructed of stainless steel tubing and flexible stainless steel lines. Connections are equipped with either flanged O-ring seals (Swagelok VCO or equivalent) or metal seals (Swagelok VCR or equivalent). The integrity of the argon system passes testing with a helium mass spectrometric leak detector at a sensitivity of $1 \times 10^{-8} \text{ cm}^3$ (standard atmosphere)/sec.

2.8. **PNEUMATIC SYSTEM**

The machine requires clean compressed dry air to actuate several air-operated valves. Due to the fact that all of the pneumatic components (except the optional vacuum pump) only require small quantities of compressed air for short periods of time, the average flow rate is very small.
2.9. COOLANT SYSTEM

The system removes excess heat from grower components. Outlet sensors monitor coolant temperature and flow conditions. Heater power supply output will be disabled if minimum coolant flow conditions are not met. Surface sensors monitor the external temperature of the furnace and set off an alarm in case of malfunction. There is a safety relief valve on the inlet water manifold to relieve any overpressure condition.

Outlet coolant temperature sensor ..................... Resistive device, triggering visible/audible warnings
Outlet coolant flow sensor .................................. Normally open, interlocked with heater power supply control
Surface temperature sensors ............... 12 bi-metal switches; 60°C (140°F) activation, triggering visible/audible warnings
Water jacket pressure relief ................................................. 4.5 bar (65 psig)

2.9.1. COOLANT SYSTEM CONSTRUCTION

Inlet and outlet manifolds are constructed of stainless steel. Connecting hoses are terminated with brass fittings. Shutoff valves are included on all branch circuits to allow for easy maintenance and to reduce the flow of individual circuits, if desired. The cooled port covers on the tank cover are constructed of stainless steel.

2.9.2. EMERGENCY BACKUP COOLANT

A backup coolant system is required. A 2 hr minimum emergency cool down period is required in the event of a failure in the furnace coolant loops. The backup water system excludes power supply unit(s) or vacuum pump (if so equipped). The backup supply should be gravity fed, or can be pump supplied if the pump is powered by an emergency generator.

Furnace section:

Flow rate (Min).......................................................... 208 L/min (55 gpm)
Inlet temperature (Max)...................................................35°C (95°F)
Inlet pressure (Min.)....................................................3.79 bar (55 psig)
Pressure differential (Min.)...............................3.44 bar (50 psig)
(Supply pressure – Back pressure)
2.10. CONTROL SYSTEM

The control system hardware is distributed in various points on the grower, and in a compact, caster-mounted unit known as the operator console. Grower operators control all signal processing and machine functions from the console.

The control system can run the entire crystal growth process automatically with minimal operator intervention from pumpdown to shutdown. When a situation requires operator intervention, audible and visible signaling draws attention and prompts specific actions. Manual switches retain control over the on/off state of such safety critical elements as the power supply unit(s), vacuum pumps, and the hydraulic pump. The control system monitors the status of all process-related manual switches.

An un-interruptible power supply (UPS) is required to ensure control of the grower and a safe shutdown in case of a power failure.

2.10.1. COMPUTING HARDWARE

The main controller is a Siemens ® 300-series PLC. Complex control algorithms and recipe interpretation are performed by a separate fan-less, all-solid-state embedded computer. All program and data storage resides in flash memory.

The Krystal Vision diameter control system also resides in the embedded computer with hardware for video acquisition. All program and data storage reside in flash memory.

A Microsoft Windows® compatible ancillary PC is provided for operation of the Windows based support programs.

2.10.2. OPERATOR INTERFACE

Two LCD touch-panel displays are included in the operator console.

The first display provides the control interface and Krystal Vision. All control of the process and furnace hardware is performed at this interface. Operator interaction is via touch screen integrated with the display.

The second display is used for the Windows-based recipe editing software and ancillary programs. Operator interaction is also available via a separately mounted keyboard and pointing device.
2.10.3. CONTROL SOFTWARE

All system control is performed by custom software resident in the PLC and the main embedded computer, which also provides operator interface functions. Execution of the process recipe is also performed by the main embedded computer, using recipes loaded from the ancillary PC. The ancillary PC is not directly responsible for any control functions.

2.10.4. ANCILLARY SOFTWARE

Software Interfaces:

Software supplied in the ancillary computer includes recipe editing and data collection capabilities.

Recipe Editing:

Recipes can be stored on an optional central WINGS server, with local editing and data monitoring functions provided at the ancillary computer. For standalone operation, a WINGSLite recipe editor is provided standard on the ancillary computer.

2.10.5. PROCESS TEMPERATURE CONTROL

An optical pyrometer measures temperature of the heater, providing for closed loop heat control.

Control loop performance: Heater temperature shall remain within ±0.5°C of any preset temperature after achieving control set point.

2.10.6. SEED POSITION SENSOR

The sensor assembly consists of optical and electronic equipment that sets up an object detection range across the lower part of the pull chamber. When seed or crystal breaks the infrared beam, the sensor transmitter sends a digital input to the control system.

2.10.7. SEED TO MELT CONTACT SYSTEM

System circuitry monitors the seed during the entire growth process and senses when the seed is in contact with the melt. Process control algorithms use this signal for process sequencing and operator alerts.
2.10.8. **KRYS\*ALVISION™ DIAMETER CONTROL SYSTEM**

The diameter system uses a high-resolution camera assembly to watch a target range across the surface of the silicon melt. Video is transmitted to the Krystal Vision computer via Gigabit Ethernet. Krystal Vision software performs measurements and preprocessing and communicates results to the process controller. Video display of crystal growth and measurement is provided.

Resolution of the measurement system is approximately ±0.05 mm. The diameter control system performance specifications are as follows (divided according to crystal section):

- **Shoulder**..........................±6 mm for the initial 40 mm over shoulder
- **Full body**..................±2.5 mm over full length of straight body growth
  (Excluding initial 40 mm over shoulder)
- **Short term body**............±1 mm over 100 mm of straight body growth,
  measured between facets or perturbations through a uniform cross section.

*Note: exceptions to the above specifications will occur when factors other than control loop functions cause straight body tapering in excess of 2 mm/m.*

2.11. **HEATER POWER SUPPLY**

A single water-cooled power supply unit provides two DC power-regulated outputs using IGBT conversion technology. The system is designed for (4) live electrodes on the main heater and (2) live electrodes on the bottom heater.

- **Output power – Main Heater** .............................................150 kw @ 60 VDC
  <5% Ripple
- **Output power – Bottom Heater**...........................................50 kw @ 50 VDC
- **Power Factor** .................................................................>0.90 (0.97 typical)
- **Efficiency** ........................................................................>90% (92% typical)

2.12. **MAGNET SYSTEM**

The magnet system consists of (3) major components, the Magnet Coil, the Magnet Power Supply and the Magnet Lift System.

The magnet coil consists of a pair of toroid-shaped coils in a supporting enclosure that is attached to a lift mechanism.
Both the magnet coil and the magnet power supply are water cooled. The magnet encircles the furnace tank and provides a magnetic field that is focused on the melt during crystal growth. The focus level of the opposing fields is set to optimize crystal growing conditions just above the melt surface where the crystal is continually forming at the transition from liquid to solid crystalline state.

The operator varies the field strength by adjusting the magnet current using touch screen controls at the KICCS™ console. To control field strength during automatic growth KICCS™ adjusts current flow in the magnet coils per the SOP.

### 2.12.1. MAGNET COIL (MC)
Magnetic Field rating: .............. 1,000 Gauss at 279.4 mm (11”) radius

### 2.12.2. MAGNET POWER SUPPLY (MPSU)
Output Power – Upper Coil ......................... 875 Amps @ 105 VDC
Output Power – Upper Coil ......................... 866 Amps @ 145 VDC

### 2.12.3. MAGNET LIFT SYSTEM
The grower frame is designed to accept a magnet lift system. The lift system is supplied with the MCZ and MCZR configurations. It can be added later to MCZC configurations.

The magnet coil is raised up into position during growth. The magnet can only be operated within the range defined by a limit switch (this range is in the upper position of the magnet lift). The position of the magnet can be adjusted during growth to meet the process requirements.

For access to the lower portion of the hot zone, the magnet coil can be lowered down towards the base frame.

Lifting actuator – qty (4) .......... Acme screw – Ø40 mm x 7 mm pitch
Nominal Speed ..............................................254 mm/min (10 in/min)

### 2.13. MAIN VACUUM PUMP
Optional equipment.

### 2.14. AUX. VACUUM PUMP
Optional equipment.
2.15. MACHINE AND COMPONENT WEIGHTS

2.15.1. MACHINE

Machine .............................................................. 8,165 kg (18,000 lbs)

2.15.2. RIGGING WEIGHTS OF ASSEMBLIES ON MACHINE

Below are the uncrated weights of assemblies that will need to be handled during installation. The values below are included in the total weight of the machine section listed above.

Frame assembly** ................................................ 3,674 kg (8,100 lbs)
Column assembly ................................................. 2,223 kg (4,900 lbs)
Tank Cover and ISO valve......................................... 721 kg (1,590 lbs)
Furnace tank............................................................553 kg (1,220 lbs)
Furnace tank lift arm .................................................. 227 kg (500 lbs)
Receiving Chamber .....................................................350 kg (770 lbs)
Leveling adapter .......................................................... 86 kg (190 lbs)
Seed Lift ..................................................................... 122 kg (270 lbs)

** Frame assembly weight includes frame, chamber stand, baseplate, crucible lift, magnet lift components, main vacuum piping, water manifolds.

2.15.3. COMPONENTS

Heater Power Supply ............................................ 1,842 kg (4,060 lbs)
Hydraulic Pump (w/ oil) ................................................68 kg (150 lbs)
Main Contactor box...................................................... 12.7 kg (28 lbs)
Control console........................................................... 88.4 kg (195 lbs)
Magnet Coil............................................................ 5,851 kg (12,900 lbs)
Magnet Power Supply ................................................. 1,360 kg (3,000 lbs)
2.15.4. CRATED WEIGHTS AND DIMENSIONS

The weights and dimensions listed below are approximate and are subject to change depending on machine configuration and options. Dimensions listed are Length, Width and Height of crate in mm.

Seed Lift ................................................................. 222 kg (490 lbs.)
1220L x 914W x 1143H

Control Console ..................................................... 199 kg (440 lbs.)
812L x 812W x 2260H

Furnace Tank ......................................................... 687 kg (1,515 lbs.)
1220L x 1220W x 2134H

Leveling Adapter ................................................. 191 kg (420 lbs.)
1220L x 914W x 1346H

Frame ................................................................. 3919 kg (8,640 lbs.)
3048L x 711W x 889H

Column ................................................................. 2708 kg (5,970 lbs)
6096L x 1220W x 1448H

Heater Power Supply ........................................... 2336 kg (5,150 lbs)
2261L x 1118W x 2057H

Pull Chamber ....................................................... 642 kg (1,414 lbs)
3048L x 711W x 889H

Tank Cover/ISO .................................................... 851 kg (1,875 lbs)
1220L x 1220W x 1524H

Maintenance/Spare Parts .................................... 163 kg (360 lbs)
940L x 914W x 940H

Furnace Tank Lift Arm ........................................ 544 kg (1,200 lbs)
1422L x 2134W x 1346H

Magnet Coil ......................................................... 6350 kg (14,000 lbs)
2972L x 1829W x 1730H

Magnet Power Supply ......................................... 1735 kg (3,825 lbs)
1321L x 2032W x 2160H
3. Drawings

**Drawing Number**

- Elevation / Components KX170MCZ (sheet 1).............................364-1216-1
- Elevation / Components KX170MCZ (sheet 2).............................364-1216-1
- Chamber Layout, KX170 MCZ ......................................................364-1217-1
- Electrode Layout KX170MCZ .......................................................364-1218-1
- Pedestal and Floor Opening, KX170MCZ .................................364-0965-1
- Control Console ...........................................................................364-1251-1
METRIC UNLESS OTHERWISE SPECIFIED. DIMENSIONS ARE IN mm.

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SECTION A-A
SCALE 1:4
M30X2.0 THREAD
QUARTZ RING SUPPLIED WITH MACHINE
SIZE 24 SAE 45° FLARE

SECTION B-B
SCALE 1:4
M30X2.0 THREAD
QUARTZ RING SUPPLIED WITH MACHINE
SIZE 20 SAE 45° FLARE

KEY
A = MAIN ELECTRODE PORTS
B = BOTTOM ELECTRODE PORTS
C = VACUUM PORTS

795.0 VACUUM PORTS
700.0 ELECTRODE PORTS
1040.0 CHAMBER ID
150.0
127.0
161.0
145.0
3.0
10.0
47.0
45°
90°
NOTES:
1. APPROX WEIGHT: 88.4 kg [195 lbs]