KX240MCZ

Semiconductor Crystal Growing Furnace

MACHINE SPECIFICATION

DOCUMENT #374-9243-1

SEMICONDUCTOR INDUSTRY

LCT CONFIDENTIAL MATERIAL

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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:
  - KX240 MCZC – Magnet capable which allows for future addition of a magnet and magnet lift system
  - KX240 MCZR – Magnet ready which includes all magnet lift components – only the magnet and magnet power supply are not included.
  - KX240MCZ – 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 in)

Electrode material .... Copper, water-cooled

Vacuum ports .... (2) 150 mm (5.9 in)

Center bore ....160 mm (6.3 in)

2.1.2. FURNACE TANK - UPPER AND LOWER

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

Furnace Tank I.D. .... 1,200 mm (47.24")

Lower Furnace Tank height....................................... 412 mm (16.22")

Upper Furnace Tank height....................................... 985 mm (38.78")

Pyrometer port location.................... 778 mm (30.6") 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..1200 mm (47.2 in)

Tank cover throat I.D...400 mm (15.75 in)

Camera viewport.. 64 mm x 153 mm oval

Operator viewport..64 mm x 379 mm oval

Feeder port .... 150 mm (5.9 in) round

Shield lift ports .... (2) 60 mm (2.36 in) round

2.1.4. COOLING TUBE

The machine may include an optional cooling tube, constructed of 316L stainless steel. The tube is bolted between the bottom of the isolation valve and the top of the tank cover.

The cooling circuit includes a water flow switch to trigger an alarm in case of a low water flow condition.

Inside diameter..203.2 mm (8.0 in)
or 254 mm (10.0 in)

Flange thickness...50 mm (1.97 in)

2.1.5. ISOLATION VALVE

A pendulum style 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.

There is a hinged rear door for access and cleaning.

The valve plate is lifted and rotated using pneumatic actuators.

A safety stop plate is provided that will prevent the valve from being accidentally actuated while operators are cleaning the internals of the valve assembly.

Ports ....(1) Ø60 mm viewport in front.

Isolation Valve I.D. ....400 mm (15.75 in)

2.1.6. RECEIVING CHAMBER

The receiving chamber is a cylindrical enclosure above the isolation valve. There are hinged access doors located in the upper and lower portions of the chamber.

Receiving Chamber I.D. .... 400 mm (15.75")

Receiving Chamber height .... 3,500 mm (137.8")

Ports: .... (2) Seed sensing ports
(1) 38mm viewport in upper door
(1) 38mm viewport in lower door

Upper Door opening (w x h): ....167 mm (6.6 in) x 267 mm (10.5 in)

Lower Door opening (w x h): ....312 mm (12.3 in) x 362 mm (14.3 in)

2.1.7. EXTENSION TUBE

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

Extension tube height ....508 mm (20.0 in)

Extension tube ID...191 mm (7.5 in)

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 one port 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.

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 gear reducer 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 crucible lift shaft)........................... 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...550 mm (21.65 in)

Rotation Rate and Accuracy ....0-20 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 mm (1.97 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) cable position 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

Load rating (at seed cable interface) .... 450 kg (750 lbs)

Lift Speed and Accuracy .... 0-508 mm/hr (0-20 in/hr) ± 1% of reading, or± 0.51 mm/hr (0.02 in/hr), whichever is greater

Jog Speed (nominal) .... 508 mm/min (20 in/min)

Total Vertical Travel .... 5,467 mm (215.2 in)

Rotation Rate and Accuracy .... 0-30 RPM ± 1% of reading, or ± 0.05 RPM, whichever is greater

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 588 kg (1296 lb). Tungsten cable construction is optional.

Nominal diameter .... 4 mm (.157 in)

Overall length .... 6,800 mm (268 in)

NOTE: *Cable load capacity decreases with use.*

2.5. SHIELD LIFT

The machine is designed to accommodate a two (2) 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.. 120 kg (264 lbs)

Nominal Speed .... 68 mm/min (2.68 in/min)

Max. Stroke ....400 mm (15.74 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. An 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. The vacuum lines are water cooled where they attach to the baseplate to preserve the o-ring seal. A connection will be provided between the main ball valve and throttle valve for leak detection. A quick release cleanout is provided at the frame level,

Line size O.D. ....101.6 mm (4.0")

Valve size (Full port ball valve) .... 100 mm (4" nominal)

Throttle Valve bore .... 63 mm (2.48")

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.

2.6.4. VACUUM INTEGRITY

The system passes testing with a helium mass spectrometric leak detector at a sensitivity of 1×10–8 cm3 (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 charge 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 is equipped with 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.

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. The argon regulator 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 allows the operator to bypass the automatic valve and supply argon to the connections in the leveling adapter in the event of a power outage. A regulator is used before the mass flow controller to ensure consistent gas flow 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 1×10–8 cm3 (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. The main inlet manifold has a pressure relief for system overpressure.

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; 60º C (140º F) activation, triggering visible/audible warnings

System 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 hour 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 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) (optional) 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 communication and video acquisition. All program and data storage resides 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. KRYSTALVISION™ 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

Power-regulated outputs provide unfiltered DC from a water cooled IGBT-controlled power supply. The system is designed for (4) live electrodes on the main heater.

Output power...180 kw @ 60 VDC
50 kw @ 40 VDC

2.12. MAGNET SYSTEM (OPTIONAL)

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 356 mm (14.0”) radius

2.12.2. MAGNET POWER SUPPLY (MPSU)

Output Power – Upper Coil ....TBD**

Output Power – Upper Coil ....TBD**

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 – Ø55mm x 9mm 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 (without magnet coil) .... 10,600 kg (23,362 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** .... 2,850 kg (6,280 lbs)

Column assembly .... 2,350 kg (5,180 lbs)

FT lift arm ....250 kg (550 lbs)

Tank Cover/ ISO valve assembly .... 925 kg (2,038 lbs)

Receiving Chamber... 589 kg (1,298 lbs)

Furnace tank... 650 kg (1,432 lbs)

Leveling adapter w/ extension tube............................. 71 kg (156 lbs)

Seed Lift ....130 kg (286 lbs)

*** Frame assembly weight includes frame, chamber stand, baseplate, crucible lift, water manifolds.*

2.15.3. COMPONENTS

Heater Power Supply .... 1842 kg (4,060 lbs)

Hydraulic Pump (w/ oil) .... 68 kg (150 lbs.)

Main Contactor box.. 12.7 kg (28 lbs.)

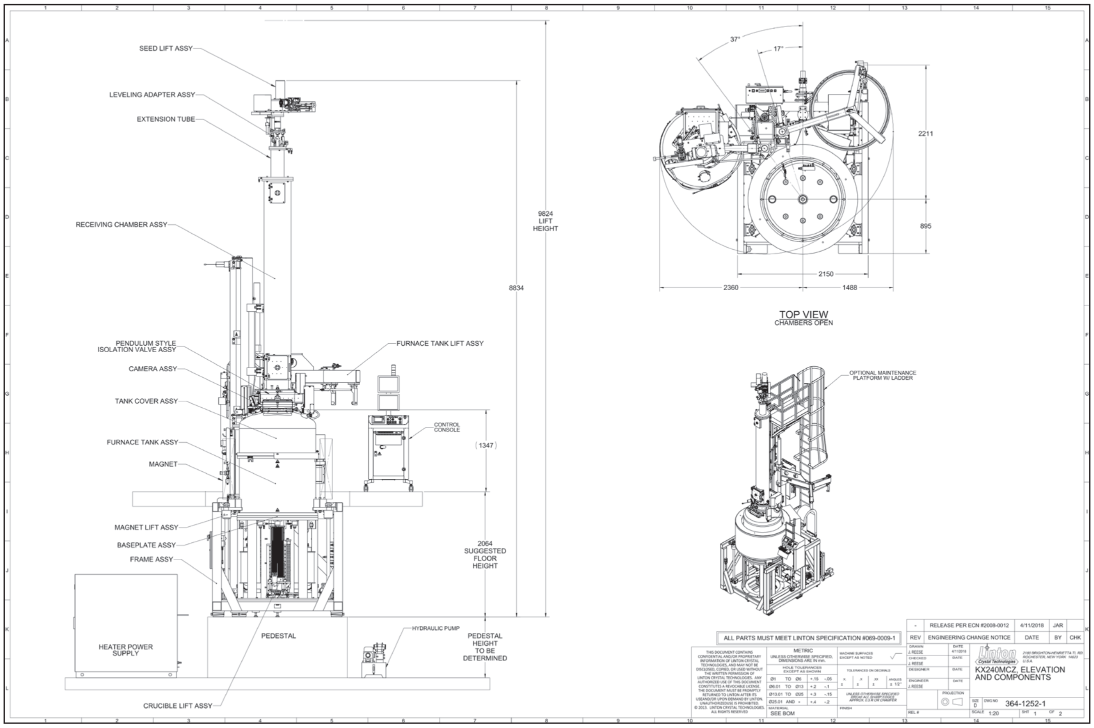
Control console... 100 kg (220 lbs.)

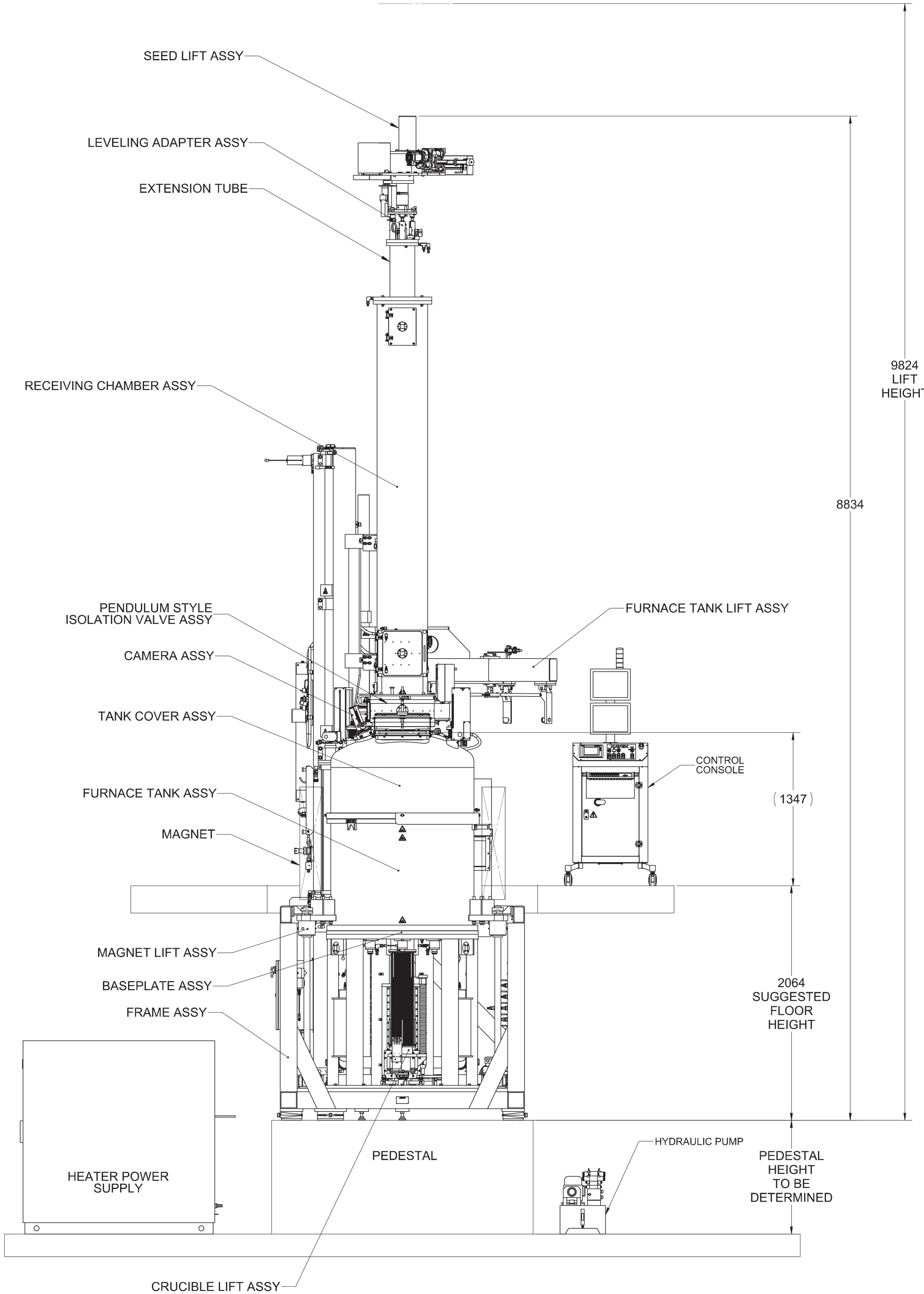
Magnet Coil.. 6,800 kg (15,000 lbs)

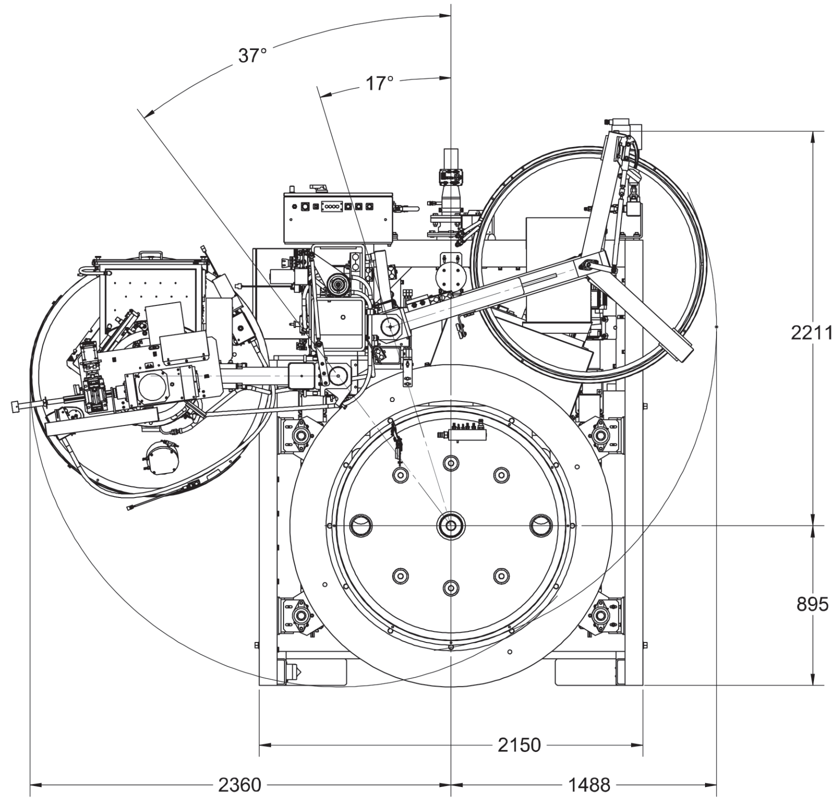
Magnet Power Supply..TBD**

3. Drawings

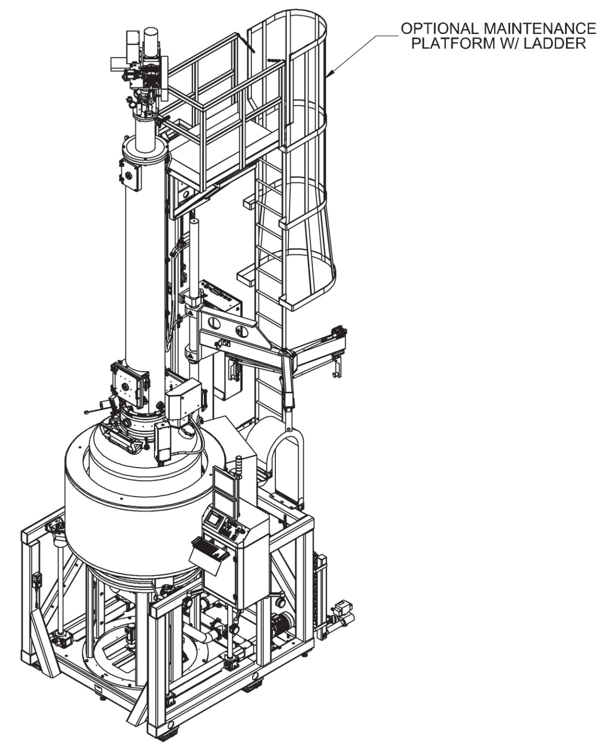
Drawing Number







TOP VIEW
CHAMBERS OPEN



ALL PARTS MUST MEET LINTON SPECIFICATION #069-0009-1

REV	ENGINEERING CHANGE NOTICE	DATE	BY	CHK
-	RELEASE PER ECN #2008-0012	4/11/2018	JAR	

METRIC
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN mm.

HOLE TOLERANCES EXCEPT AS SHOWN

Ø1	TO	Ø6	+.15	-.05
Ø6.01	TO	Ø13	+.2	-.1
Ø13.01	TO	Ø25	+.3	-.15
Ø25.01	AND	>	+.4	-.2

MATERIAL
SEE BOM

MACHINE SURFACES EXCEPT AS NOTED

TOLERANCES ON DECIMALS

X.	.X	.XX	ANGLES
±	±	±	± 1/2°

UNLESS OTHERWISE SPECIFIED BREAK ALL SHARP EDGES APPROX. 0.5 R OR CHAMFER

FINISH

DRAWN J. REESE	DATE 4/11/2018	
CHECKED J. REESE	DATE	
DESIGNER	DATE	
ENGINEER J. REESE	DATE	

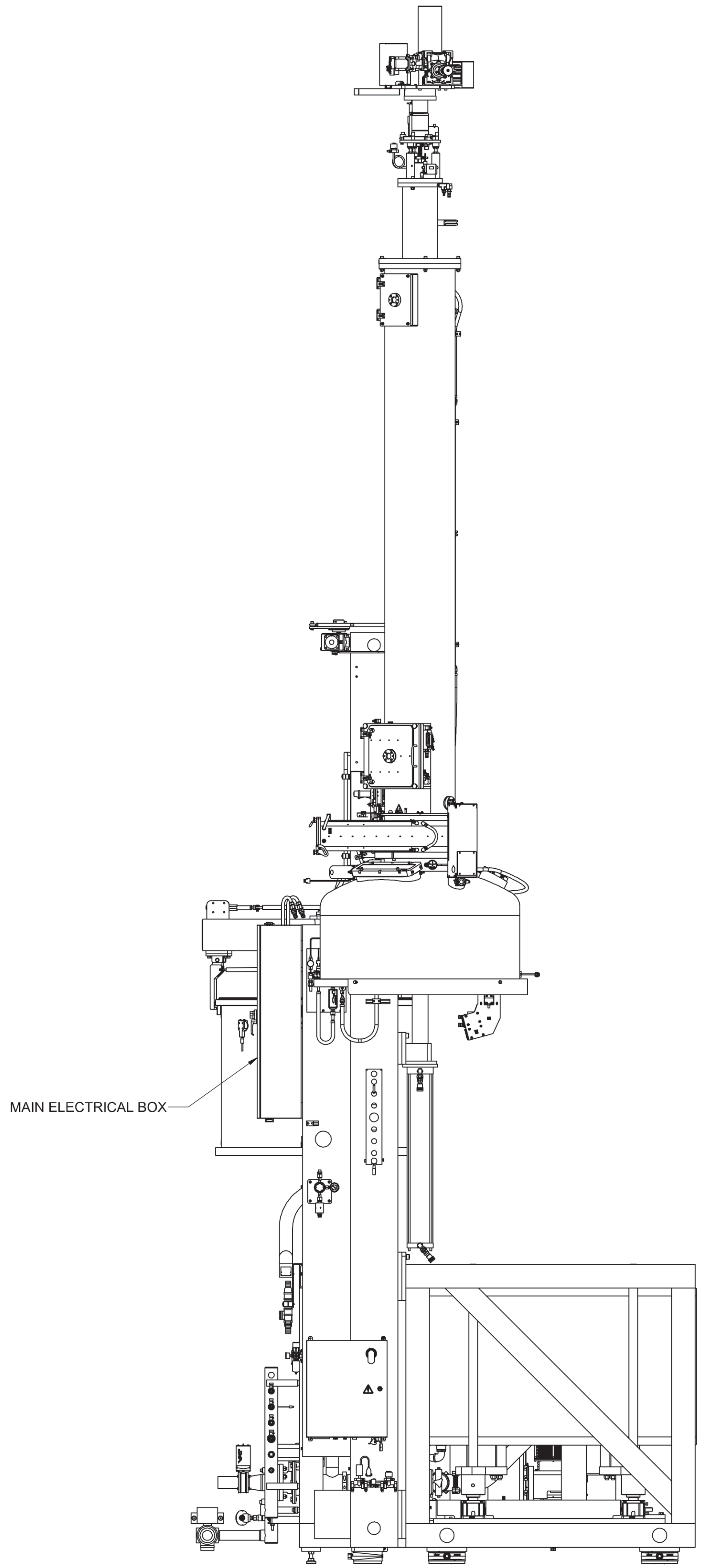
PROJECTION

REL #

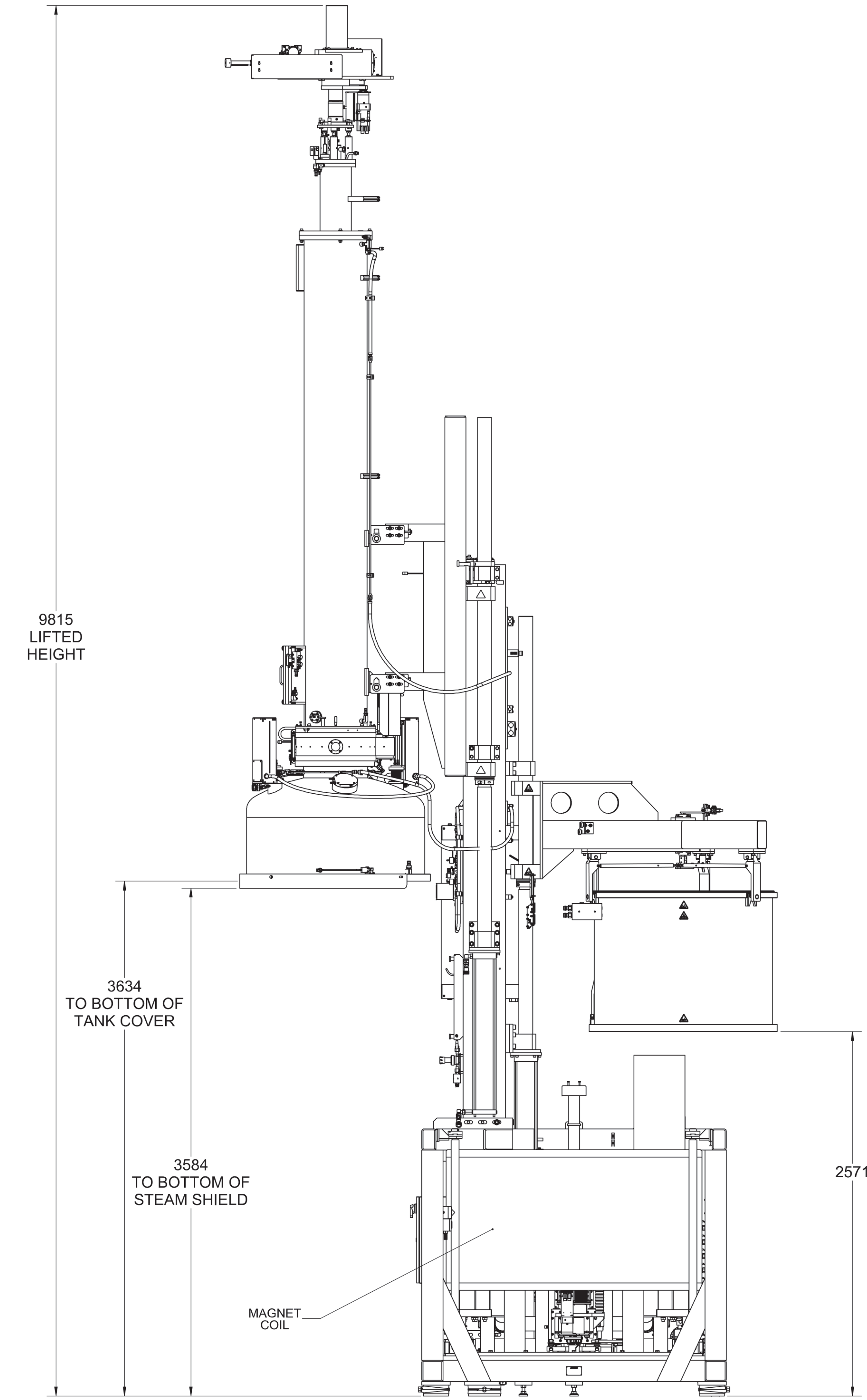
Linton Crystal Technologies
2180 BRIGHTON-HENRIETTA TL RD. ROCHESTER, NEW YORK 14623 U.S.A.

KX240MCZ, ELEVATION AND COMPONENTS

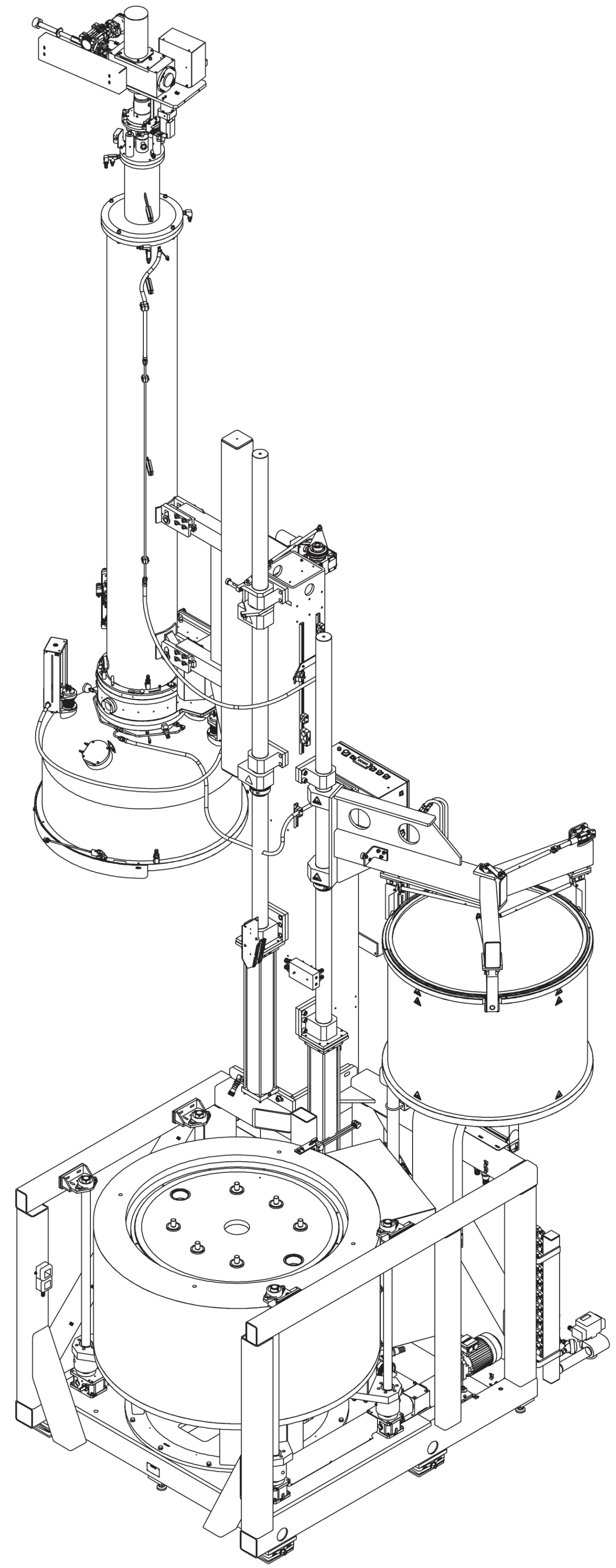
SIZE D | DWG NO 364-1252-1
SCALE 1:20 | SHT 1 OF 2



LEFT SIDE VIEW
CHAMBERS OPEN



FRONT VIEW
CHAMBERS OPEN



ALL PARTS MUST MEET LINTON SPECIFICATION #069-0009-1

METRIC
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN mm.

HOLE TOLERANCES EXCEPT AS SHOWN

Ø1	TO	Ø6	+.15	-.05
Ø6.01	TO	Ø13	+.2	-.1
Ø13.01	TO	Ø25	+.3	-.15
Ø25.01	AND	>	+.4	-.2

MATERIAL: SEE BOM

MACHINE SURFACES EXCEPT AS NOTED √

TOLERANCES ON DECIMALS

X.	.X	.XX	ANGLES
±	±	±	± 1/2°

UNLESS OTHERWISE SPECIFIED BREAK ALL SHARP EDGES APPROX. 0.5 R OR CHAMFER

FINISH

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DRAWN: J. REESE	DATE: 9/3/2015
CHECKED: J. REESE	DATE
DESIGNER	DATE
ENGINEER: J. REESE	DATE
PROJECTION	
REL #	

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2180 BRIGHTON-HENRIETTA TL RD.
ROCHESTER, NEW YORK 14623
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KX280, ELEVATION AND COMPONENTS

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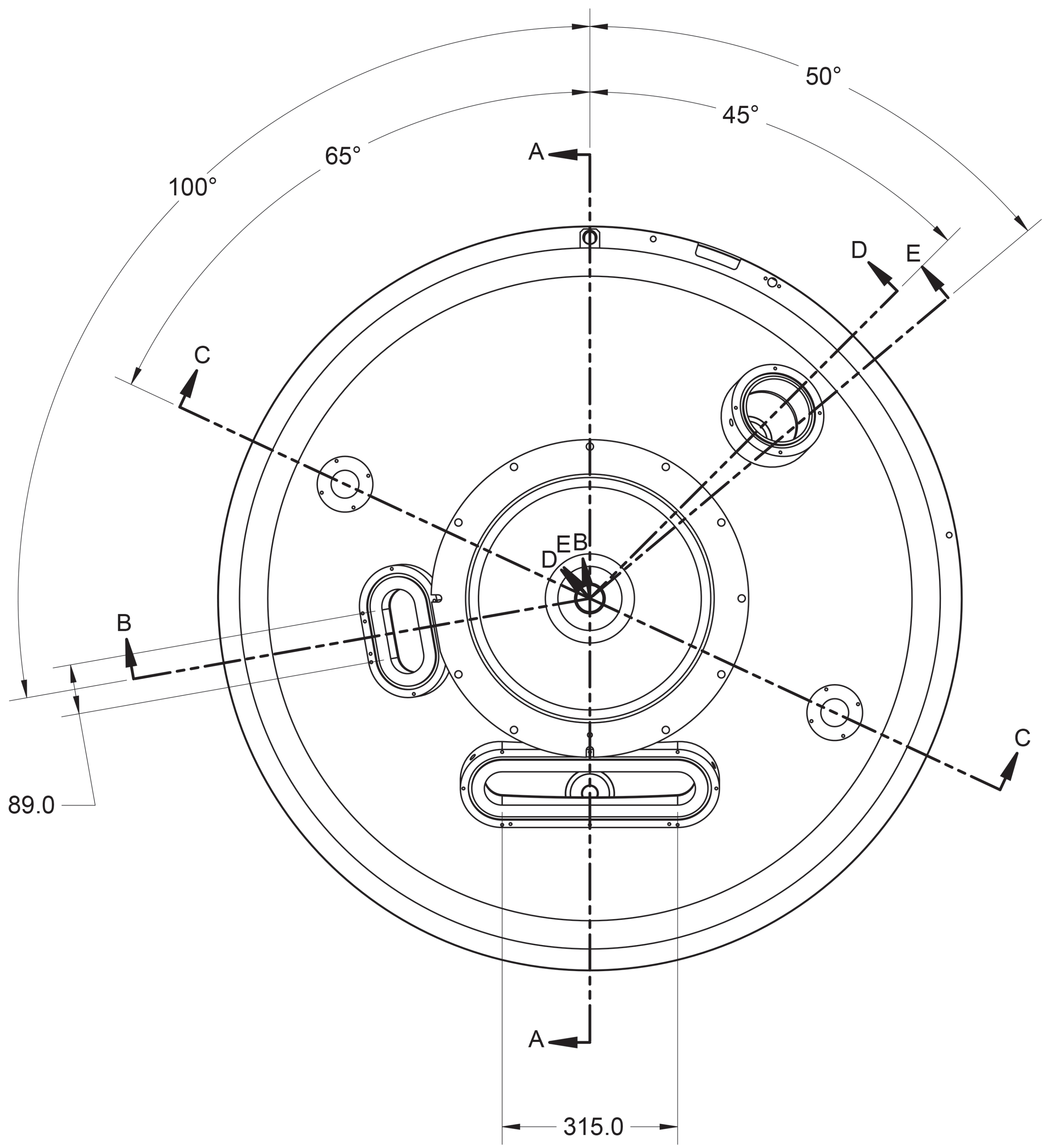

METRIC
UNLESS OTHERWISE SPECIFIED,DIMENSIONS ARE IN mm.

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-	RELEASE PER ECN #01614-31	9/11/2015	BS	JR

DRAWN: BARB SCHOENEMAN	DATE: 9/3/2015
CHECKED: J. REESE	DATE:
DESIGNER:	DATE:
ENGINEER: J. REESE	DATE:
PROJECTION	
REL #	

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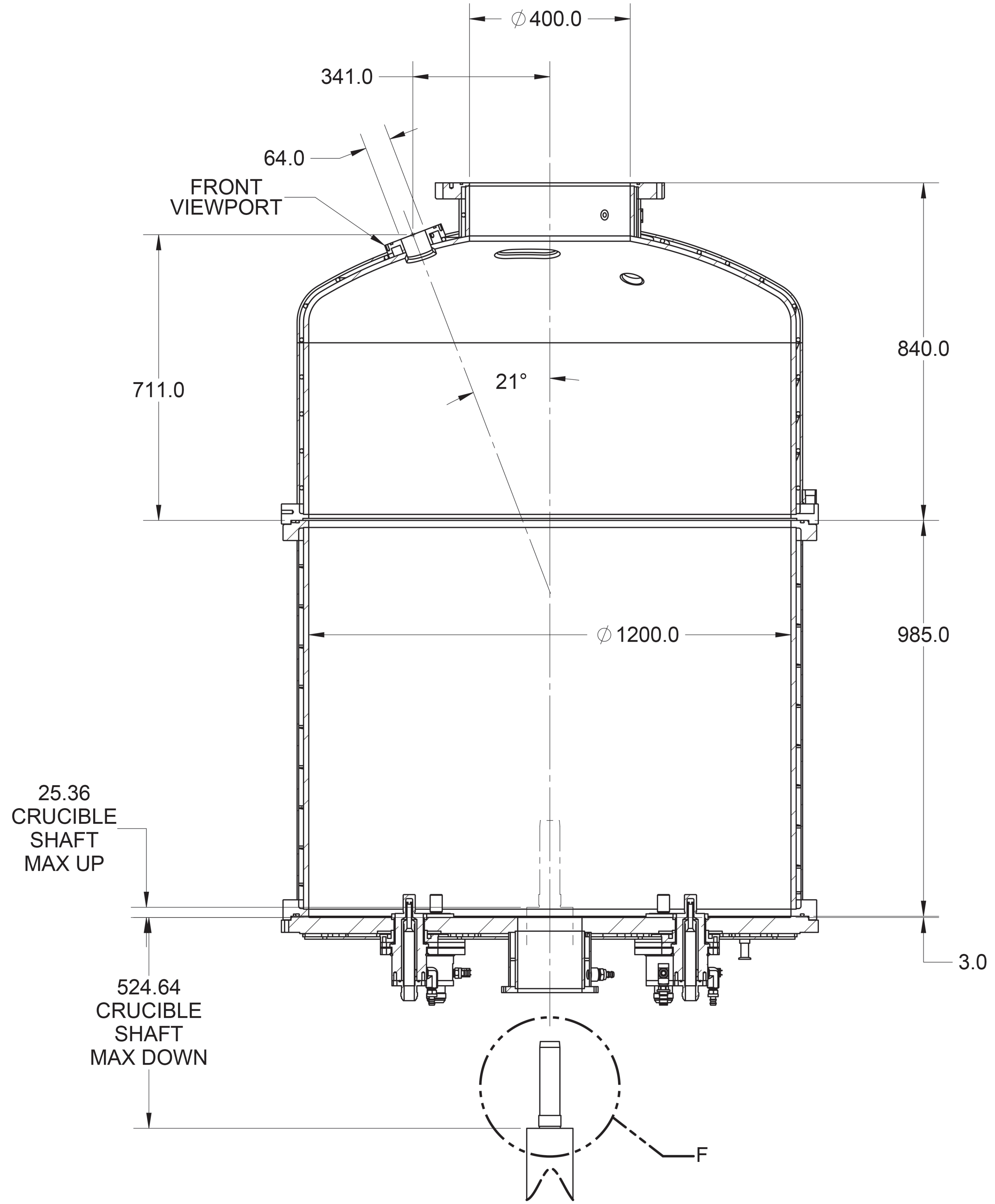
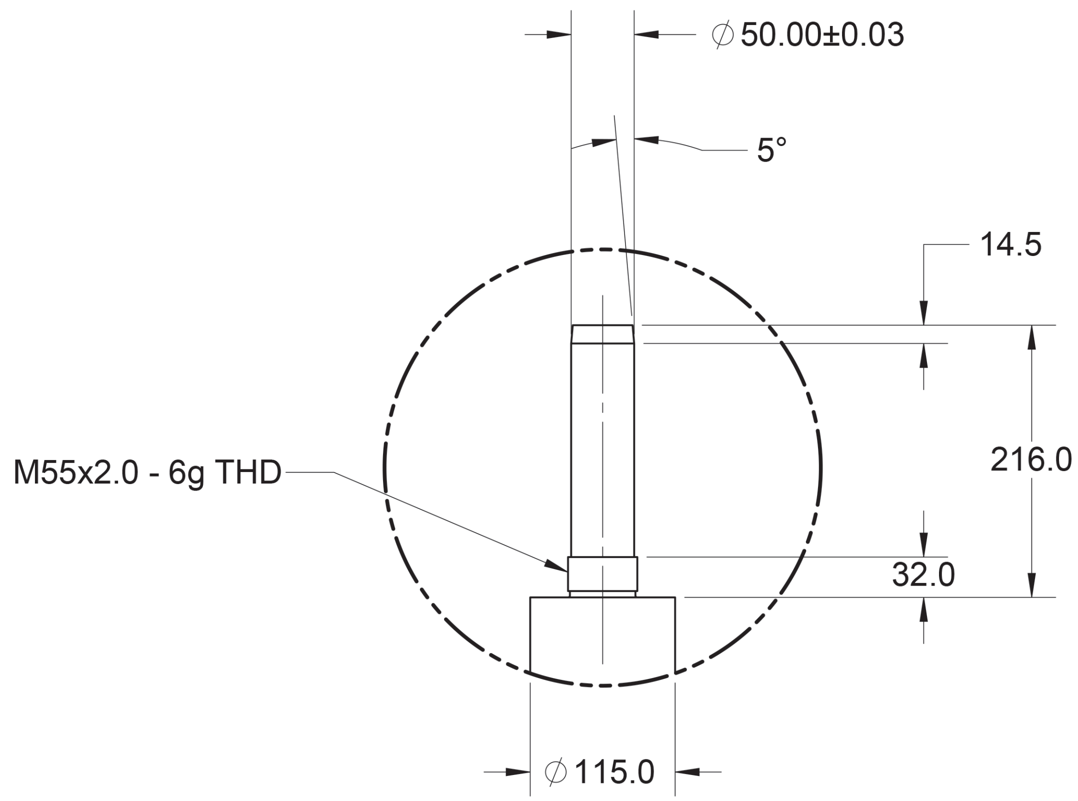
KX240MCZ, CHAMBER LAYOUT

SIZE B | DWG NO 364-1084-1

SCALE 1:10 | SHT 1 OF 4



SECTION A-A



DETAIL F
SCALE 1 : 6

REV	ENGINEERING CHANGE NOTICE	DATE	BY	CHK
-				

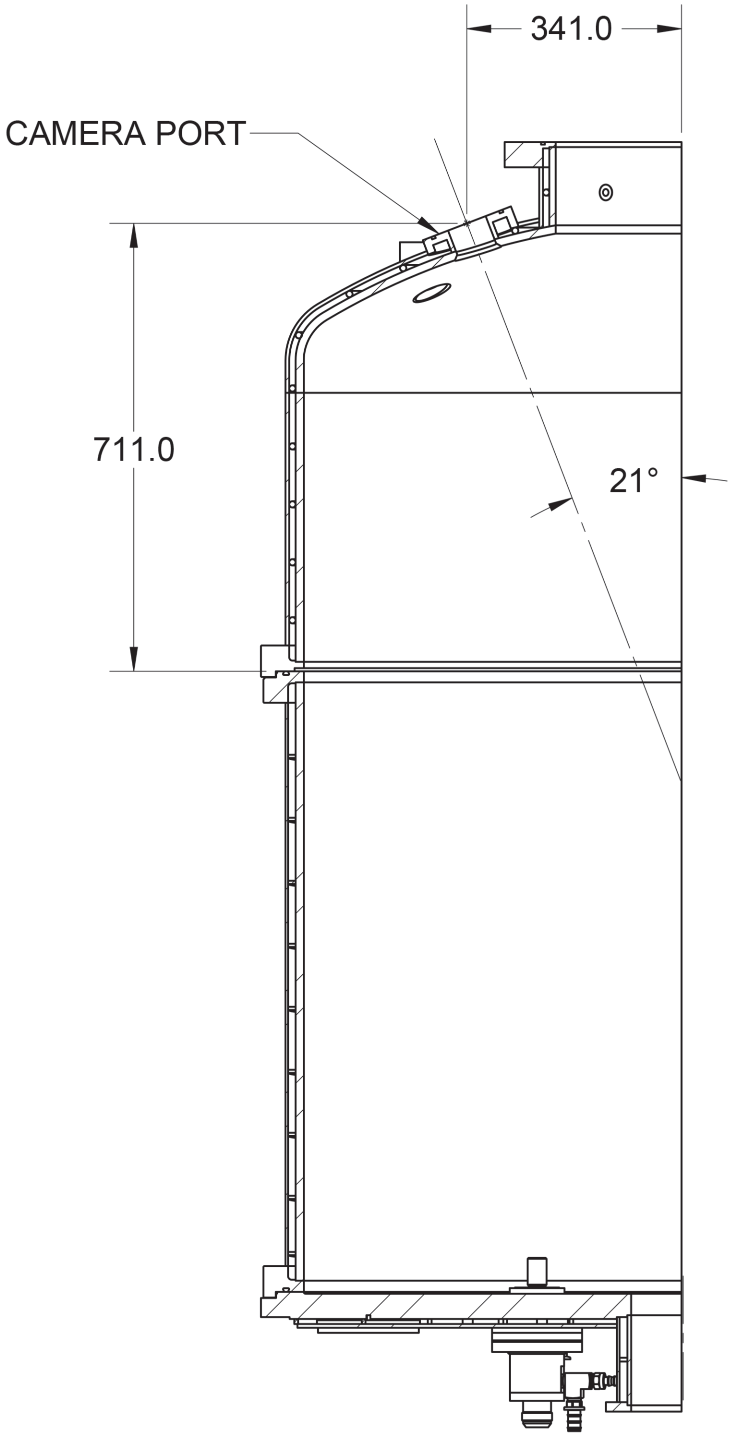
METRIC
UNLESS OTHERWISE SPECIFIED,DIMENSIONS ARE IN mm.

DRAWN	BARB SCHOENEMAN	DATE 9/3/2015
CHECKED	J. REESE	DATE
DESIGNER		DATE
ENGINEER	J. REESE	DATE
PROJECTION		
REL #		

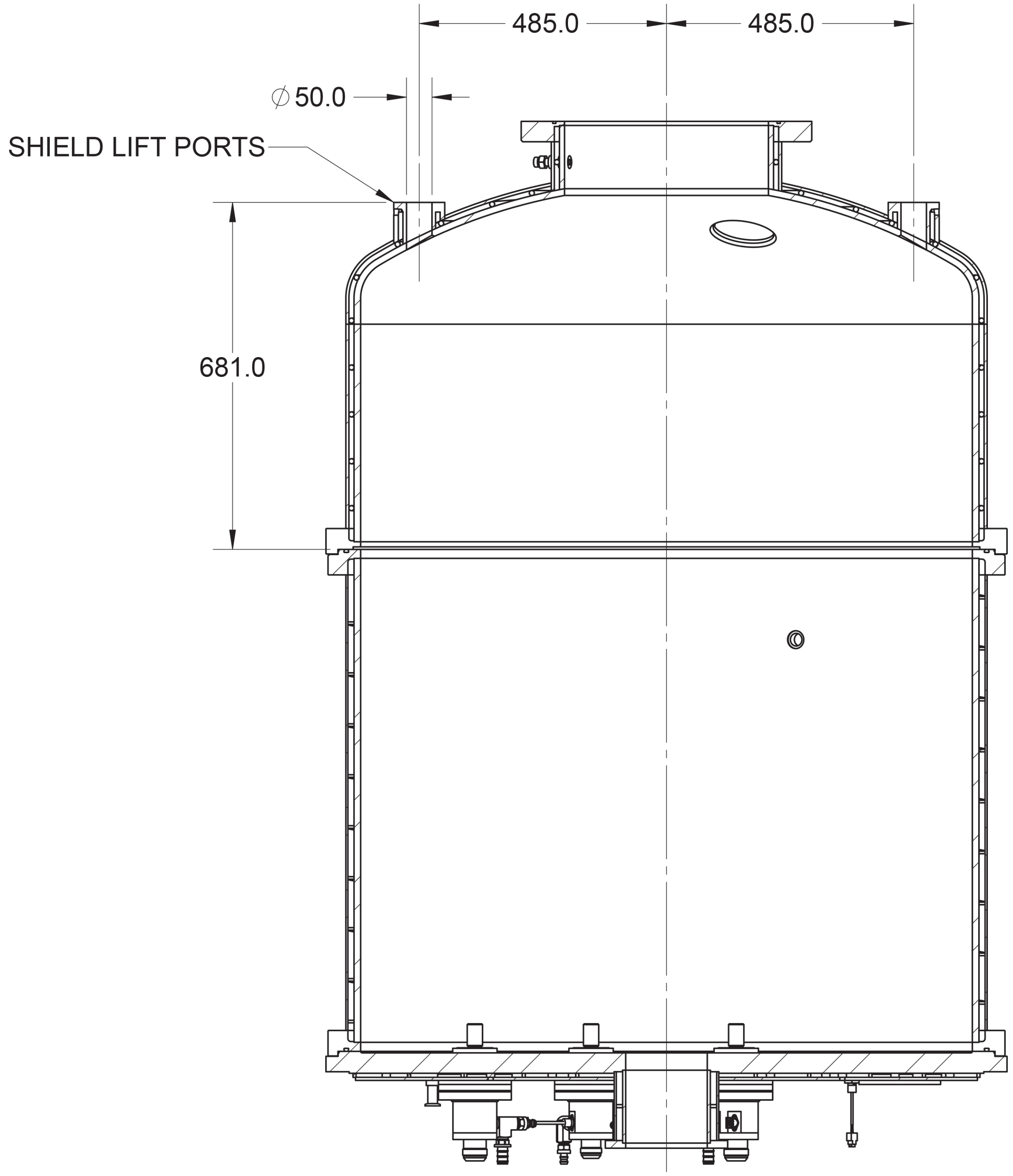
Linton Crystal Technologies
2180 BRIGHTON-HENRIETTA TL RD.
ROCHESTER, NEW YORK 14624
U.S.A.

KX240MCZ, CHAMBER LAYOUT

SIZE B | DWG NO 364-1084-1
SCALE 1:12 | SHT 2 OF 4



SECTION B-B



SECTION C-C

REV	ENGINEERING CHANGE NOTICE	DATE	BY	CHK
-				

METRIC
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN mm.

DRAWN: BARB SCHOENEMAN	DATE: 9/3/2015
CHECKED: J. REESE	DATE:
DESIGNER:	DATE:
ENGINEER: J. REESE	DATE:
	PROJECTION
REL #	

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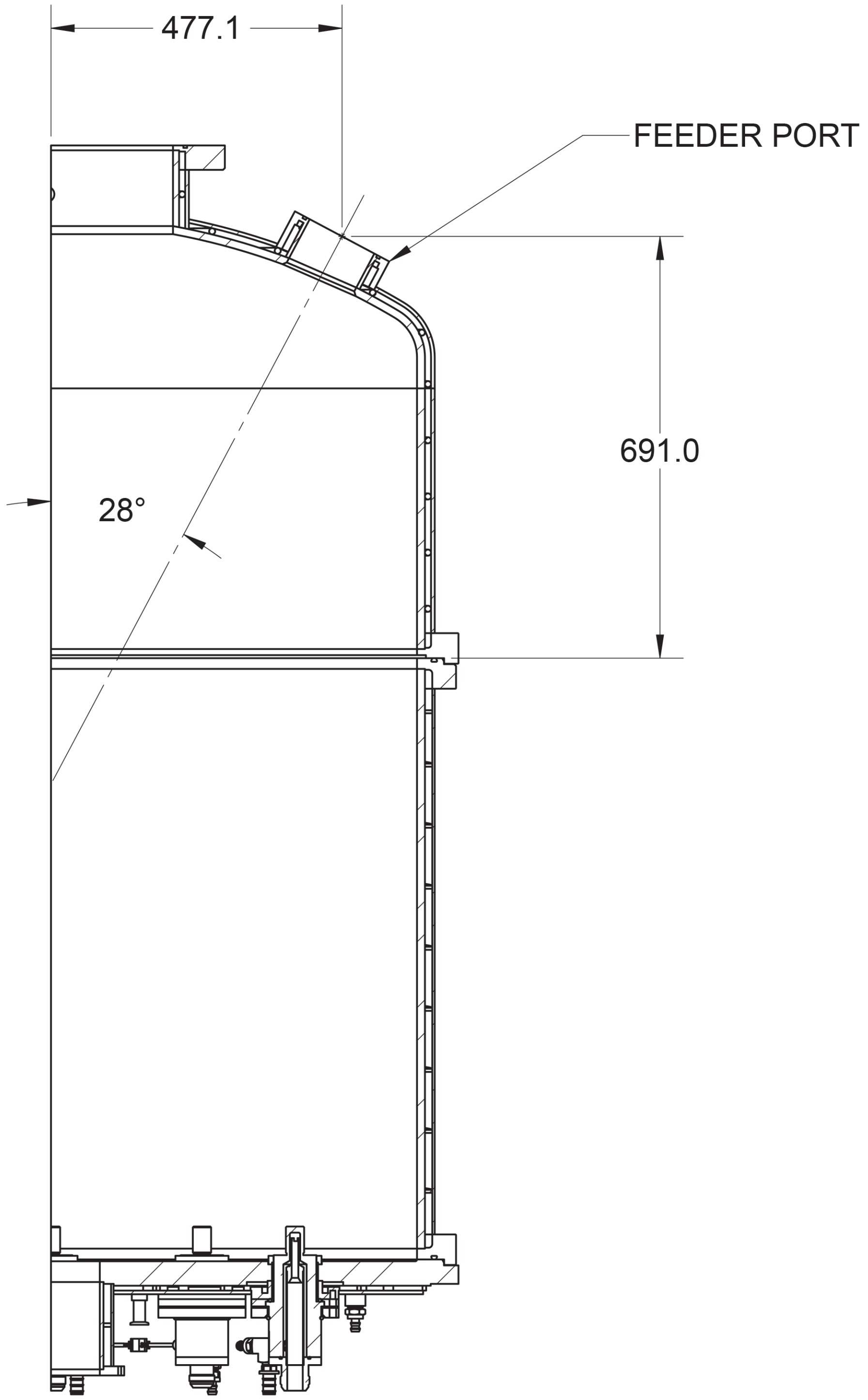
ROCHESTER, NEW YORK 14624
U.S.A.

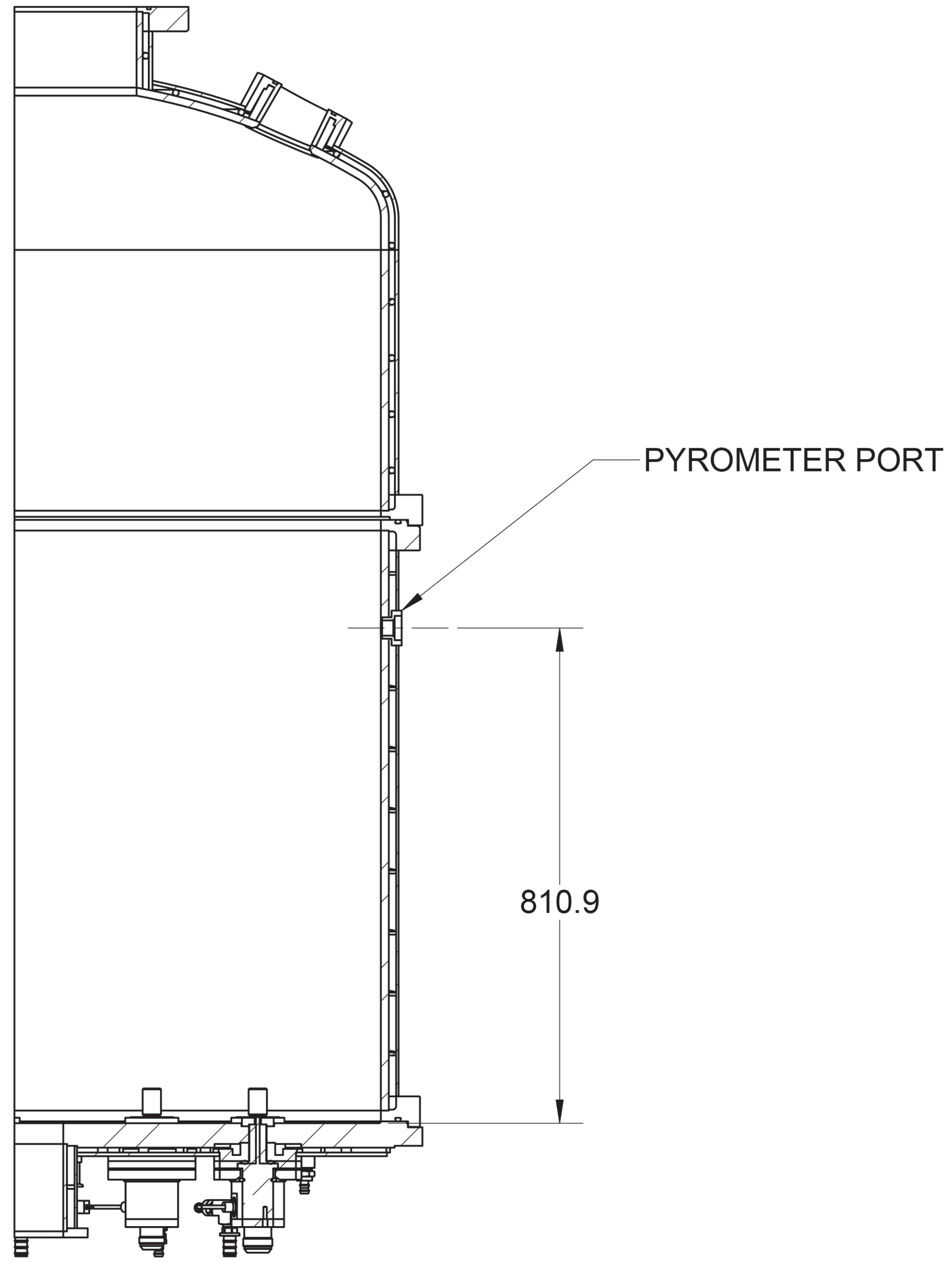
KX240MCZ, CHAMBER LAYOUT

SIZE B | DWG NO 364-1084-1

SCALE 1:12 | SHT 3 OF 4



SECTION D-D



SECTION E-E

REV	ENGINEERING CHANGE NOTICE	DATE	BY	CHK
-				

METRIC
UNLESS OTHERWISE SPECIFIED,DIMENSIONS ARE IN mm.

DRAWN: BARB SCHOENEMAN	DATE: 9/3/2015
CHECKED: J. REESE	DATE
DESIGNER	DATE
ENGINEER: J. REESE	DATE
	PROJECTION
REL #	

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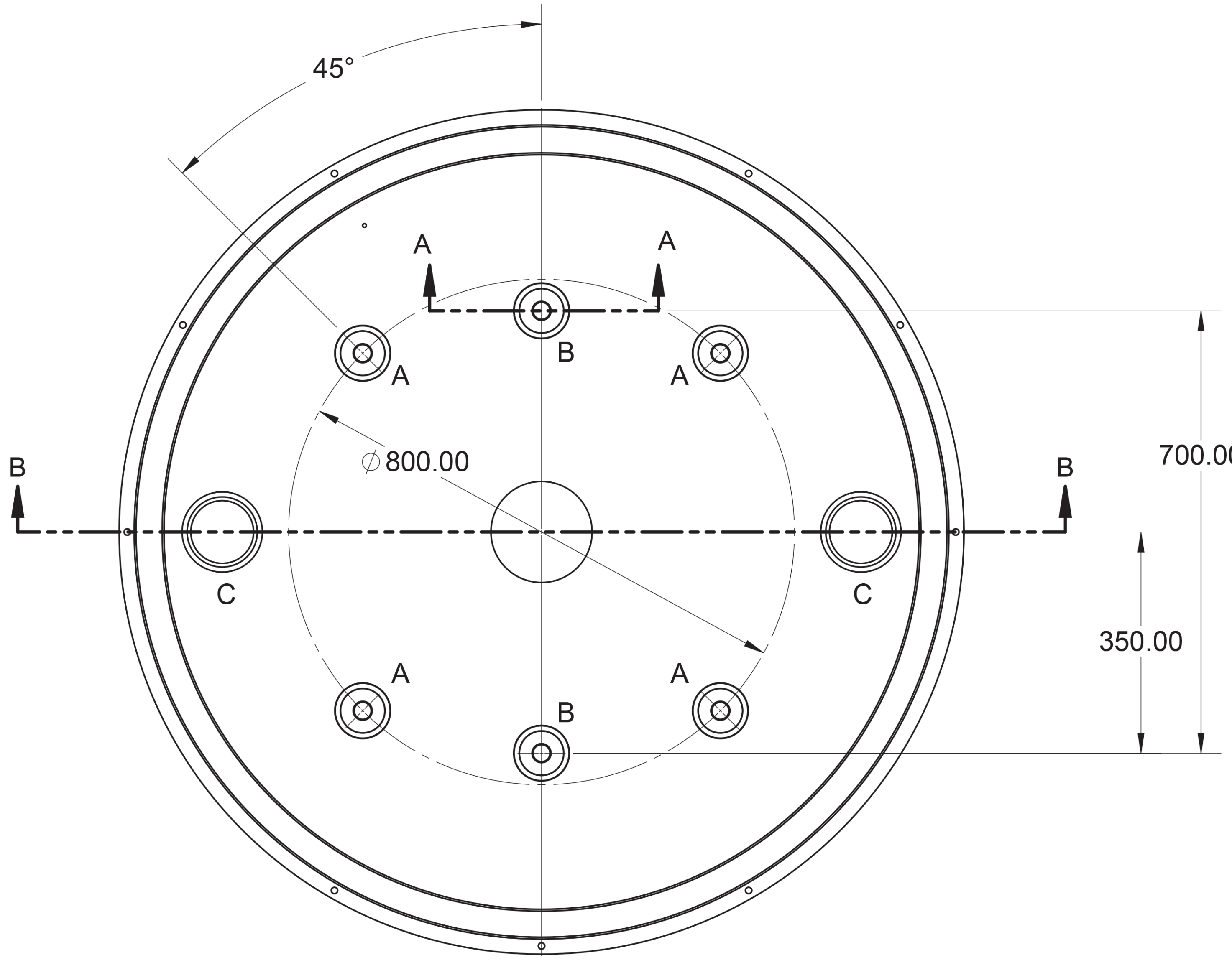
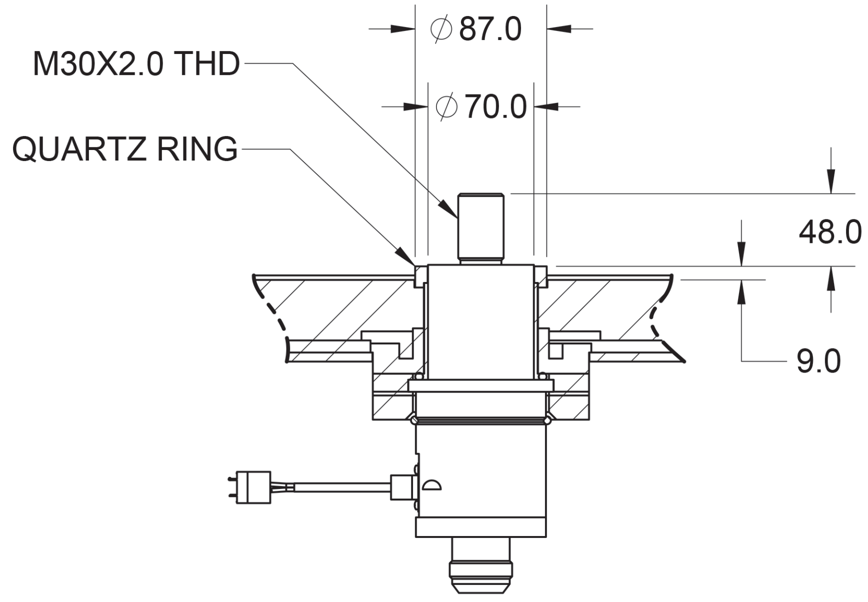
ROCHESTER, NEW YORK 14624
U.S.A.

KX240MCZ, CHAMBER LAYOUT

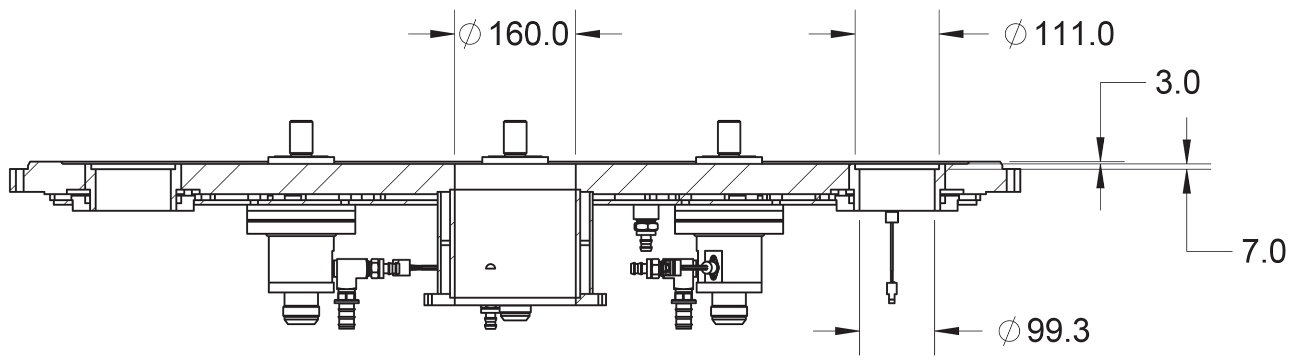
SIZE	DWG NO	SCALE	SHT	OF
B	364-1084-1	1:12	4	4

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





SECTION A-A
SCALE 1 : 5



SECTION B-B

REV	ENGINEERING CHANGE NOTICE	DATE	BY	CHK
-	RELEASE PER ECN #01614-31	9/11/2015	BS	JR

METRIC
UNLESS OTHERWISE SPECIFIED,DIMENSIONS ARE IN mm.

DRAWN: BARB SCHOENEMAN	DATE: 9/3/2015
CHECKED: J. REESE	DATE
DESIGNER	DATE
ENGINEER: J. REESE	DATE
PROJECTION	
REL #	

Linton Crystal Technologies
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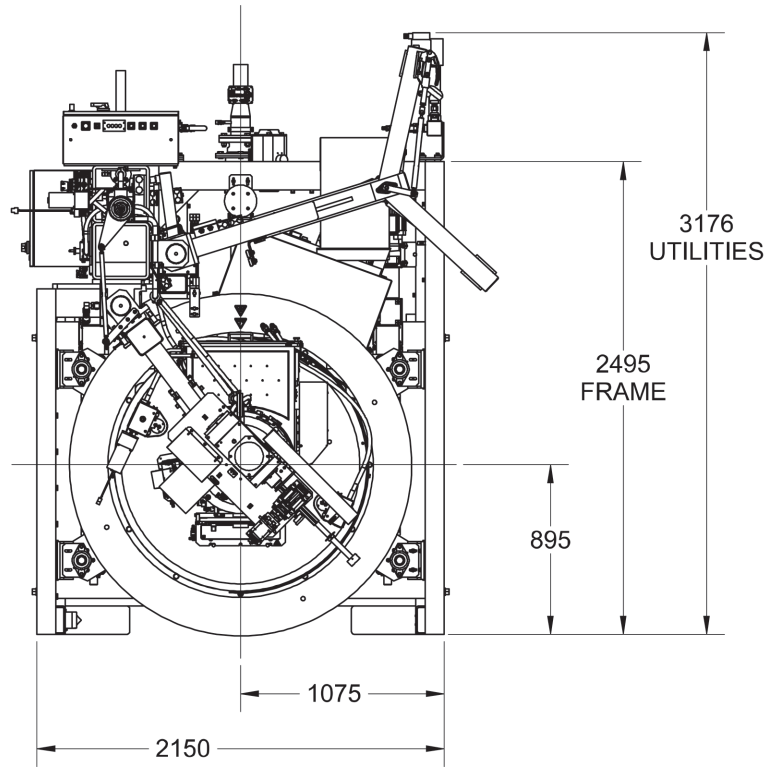
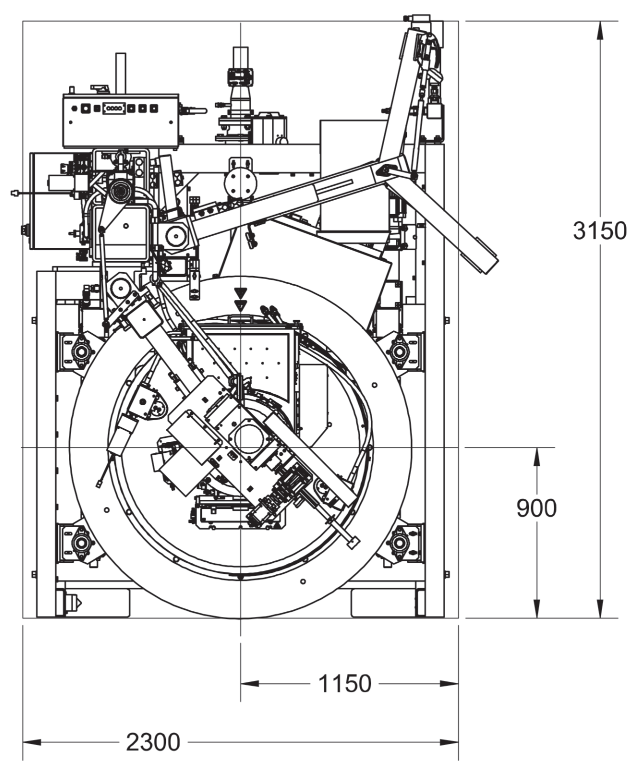
ROCHESTER, NEW YORK 14624
U.S.A.

KX240MCZ ELECTRODE LAYOUT

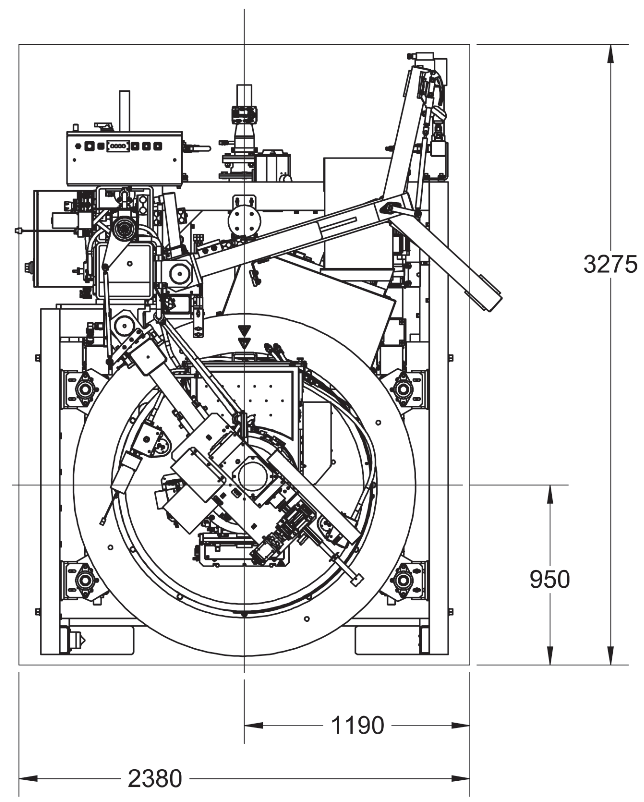
SIZE	DWG NO	SCALE	SHT	OF
B	364-1085-1	1:10	1	1



TOP VIEW
PLAIN



TOP VIEW
SUGGESTED PEDESTAL



TOP VIEW
SUGGESTED FLOOR OPENING

REV	ENGINEERING CHANGE NOTICE	DATE	BY	CHK
-	RELEASE PER ECN #01614-31	9/11/2015	BS	JR

ALL PARTS MUST MEET LINTON SPECIFICATION #069-0009-1

METRIC
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN mm.

HOLE TOLERANCES EXCEPT AS SHOWN

Ø1	TO	Ø6	+.15	-.05
Ø6.01	TO	Ø13	+.2	-.1
Ø13.01	TO	Ø25	+.3	-.15
Ø25.01	AND	>	+.4	-.2

MATERIAL
SEE BOM

MACHINE SURFACES EXCEPT AS NOTED

TOLERANCES ON DECIMALS

X.	.X	.XX	ANGLES
±	±	±	± 1/2°

UNLESS OTHERWISE SPECIFIED BREAK ALL SHARP EDGES APPROX. 0.5 R OR CHAMFER

FINISH

DRAWN	BARB SCHOENEMAN	DATE 9/4/2015
CHECKED	J. REESE	DATE
DESIGNER		DATE
ENGINEER	J. REESE	DATE

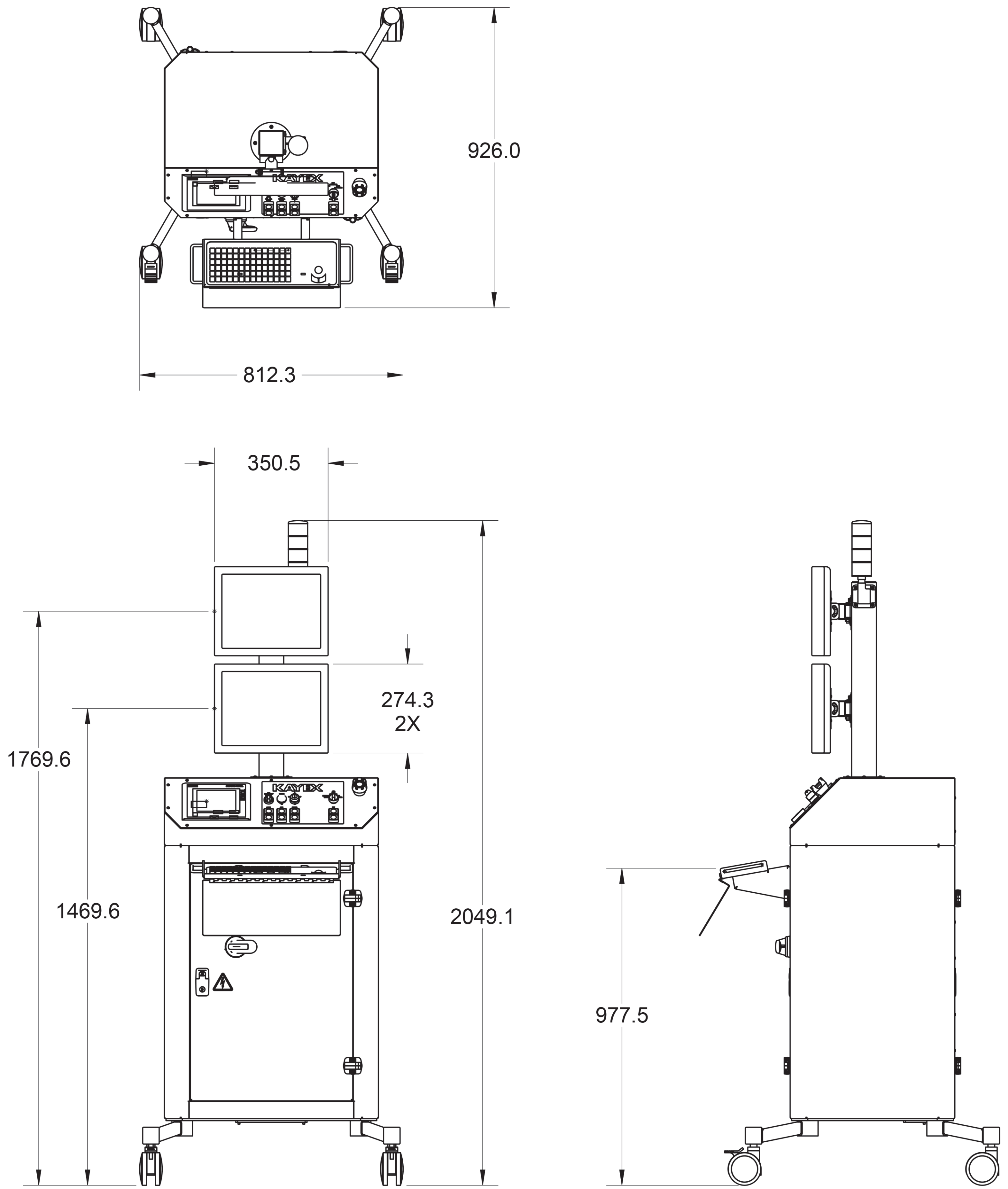
PROJECTION

REL #

Linton Crystal Technologies
2180 BRIGHTON-HENRIETTA TL RD.
ROCHESTER, NEW YORK 14623
U.S.A.

KX240MCZ, PEDESTAL AND FLOOR OPENING

SIZE C | DWG NO 364-1090-1
SCALE 1:30 | SHT 1 OF 1



REV	ENGINEERING CHANGE NOTICE	DATE	BY	CHK
-	RELEASE PER ECN #01643-43	12/13/2017	JY	JR

METRIC
UNLESS OTHERWISE SPECIFIED,DIMENSIONS ARE IN mm.

DRAWN	JY	DATE 12/13/2017
CHECKED	J. REESE	DATE
DESIGNER		DATE
ENGINEER	J. REESE	DATE

PROJECTION

REL #

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ROCHESTER, NEW YORK 14624
U.S.A.

CONTROL CONSOLE, KICCS, (122-9032-2)

SIZE	DWG NO	
B	364-1233-1	
SCALE 1:15	SHT 1	OF 1

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KX240MCZ_Detailed Spec Doc_v1.pdf

2180 Brighton-Henrietta Townline Road
Rochester, New York 14623