



Productivity Inc®

PIC Makino SP-64 Pre-Installation Checklist – Rev 06/2009

Installation of your new Makino SP-64 can be smooth and rapid if preparations are made prior to the delivery of your machine. Any questions regarding machine installation should be directed to our service department for clarification. We hope this checklist will aid in a rapid installation of your new machine. **Note: The following must be completed prior to our service technician arriving to install your new machine.**

- Power Requirements for your machine: 230v, 3 phase, 21 kVa (ground of 10 ohms or less) AMPS: 55
 Proper voltage per machine specifications should be ready at machine site. **Do NOT power up the machine.**
- Customer should furnish and have available the proper supply and types of lubricants required for machine operation.

ITEM	CAPACITY	FLUID TYPE
Dielectric Tank	265 Gallons	Drinking Water

See attached Makino Pre-Install Document for more specifics or contact our Service Department with any questions or concerns.

- Air lines should be routed to the machine location and operational for proper air pressure.

A minimum of clean, dry compressed air of 70 psi must be available.

- Machine location should be planned to allow enough room for access panels to be opened and serviced with ease. **A minimum of 36" clearance around the machine is required for operator and maintenance access.**

Environment Choose an area free of dust and vibration. An isolated foundation may be necessary if excessive vibration is present. The machine should be located in an area free of high volumes of dust, away from polishing or grinding machines.
 Best results are achieved when stable temperatures and humidity are maintained.
 Vibration0.7 m/s² {0.07 G} or less
 Relative humidity75% or less (no condensation)

- Weight requirements should be checked to insure that the surface below the machine will have sufficient strength for support and stability. The machine must be set on a solid, sound and stable, steel bar-reinforced concrete slab poured directly on the grade. In general, the 6" concrete floor on industrial buildings is suitable for machine placement.
- **The Makino SP-64 Wire EDM is best moved with a forklift. You may use a crane, however please note that Makino does NOT supply the lifting bars or other apparatus needed. Upon arrival of your machine, unpack and immediately check for visible damage. Call Hope immediately – you will need to take pictures and email to hriska@productivity.com. Make sure you note on BOL BEFORE the driver leaves.**

SHIPPING WEIGHT	SHIPPING DIMENSIONS OF MACHINE
13,007# (machine)	132" L x 96" W x 118" H (machine crated)
1,146# (accessory)	96" L x 65" W x 69" H (accessory)
485# (accessory)	46" L x 35" W x 61" H (accessory)
970# (accessory)	67" L x 50" W x 52" H (accessory)
Operational: 12,566# Floor Space Required: 164.6" L x 138.6" W	

- Remove as much preservative from the machine as possible without having to power up (tables – slides, pulleys, etc.). We recommend mineral spirits to clean. Apply oil when finished to prevent rust.

PLEASE FORWARD THIS TO THE APPROPRIATE PERSON. THANK YOU.

High-Speed Wire Electrical Discharge Machine

SP64

MGW-S5 Power Supply

Specifications



S440Ed

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1. MACHINE SPECIFICATIONS

● Travel

X axis	(beam right/left)	650 mm
Y axis	(beam front/back)	400 mm
Z axis	(upper head up/down)	320 mm
U axis	(upper head right/left)	±101 mm
V axis	(upper head front/back)	±101 mm

● Table

Table working area size	930 mm × 680 mm (Square workpiece type)
Max. load on table	1200 kg
Table surface configuration	104-M8 tap, 50-M6 tap
Distance from floor to top of table	970 mm
Work tank size	1140 × 1000 mm
Max. work table size	930 mm × 680 mm × 300 mm

● Work tank

Automatic water level setting	Standard
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● Head

Type of wire guide	V-flat type Wire guide : diamond Press guide : diamond V guide : sapphire
Wire electrode diameter	ø0.20, 0.25, 0.30 mm (Selectable) Wire electrodes should be good in straightness, free from curlings or stains
Recommended wires	ø0.20, 0.25, 0.30 mm Use the recommended wires below • Hitachi Cable HBZU** (paraffin may be present or not) • Furukawa Electric FSH-**G (paraffin may be present or not) • Nippon Seisen Cable NSBW-**H • Sumitomo Electric Industries SBS-**HN Zinc coated wire MEGACUT-T (angle cut) Note: The use of non-recommended wire could cause faults such as reduction of the machining performance or automatic wire threading performance, or abnormal consumption of energizing plate, or abnormal wear of other parts due to contamination of wires. Always use the recommended wires.

Wire bobbin size • Use a 5 kg bobbin (P-5: bobbin dia. ø90 mm)
or 10 kg bobbin (P-10: bobbin dia. ø90 mm)

● **Wire Feed System**

Wire feedrate 0, 50 ~ 360 mm/s
Wire tension 2 ~ 20 N
Max. wire spool mass 10kg
Prohibit the use of High speed AWT mode
(Retry 3) at 10kg bobbin
20kg (with optional large-capacity wire reel loader) Opt. equipment

● **Feedrates**

Rapid feed X, Y, Z axes : 2000 mm/min
U, V axes : 1000 mm/min
Servo feed 0.01 ~ 50 mm/min
Jog feed 50, 150, 600 mm/min

● **Automatic Wire Threading Unit**

Wire diameter ø0.20, 0.25, 0.30 mm
Wire loading system Water jet
Min. start hole diameter ø1.4 mm, Plate thickness: 100 mm
(Wire dia. 0.20 mm, no slit, both nozzles close)
Fine hole automatic threading unit Min. start hole diameter 0.5 mm Standard
Plate thickness: 30 mm
(Wire dia. 0.20 mm, no slit, both nozzles close)
Threading time 15 s
(Retry 3, submerge mode, plate thickness 30 mm)
• Prohibit the use of High speed AWT mode
(Retry 3) at 10kg bobbin

● **Taper Machining Unit**

Max. taper angle ±15°
(wire dia. 0.20mm or more, at plate thickness 100 mm)

● **Motors**

Axis feed (AC servo motor) X axes : 1.0 kW
Y axes : 0.5 kW
U, V, Z axes : 0.4 kW
Flushing pump upper 2.2 kW
Flushing pump lower 2.2 kW

Filter pump	0.55 kW
Tank filling pump	1.6 kW
Cooling circulation pump	0.37 kW
Cooling compressor	1.4 kW (50 Hz) 1.7 kW (60 Hz)

● **Required Power**

Power source	AC 200 V $\pm 10\%$, 50/60 Hz $\pm 1\%$, 18 kVA (incl. Machining Power and NC Power) Connection terminal: Crimp terminal with M6 screws Grounding: Class-C grounding recommended (grounding resistance of 10 Ω or less)
Air pressure source	Connection port: $\varnothing 8$ mm coupler Std./equipment <input type="checkbox"/> (Connect the inner dia. $\varnothing 8$ mm hose) 0.6 MPa ~ 1.0 MPa 100 L / min (atmospheric pressure) or more Dew point temperature : -20°C or less

Note: Prepare clean air as specified below:
Equivalent to Class 2.5.2 specified by JIS B 8392-1 (ISO 8573-1).
The number of maximum particles $0.001 <x \leq 0.005$ mm per 1m^3 is less than 10 pcs.
The number of maximum particles $0.0005 <x \leq 0.001$ mm per 1m^3 is less than 1000 pcs.
The number of maximum particles $0.0001 <x \leq 0.0005$ mm per 1m^3 is less than 100,000 pcs.
Pressure dew-point below $+7^{\circ}\text{C}$
(value at absolute pressure 0.8 MPa)
Oil total concentration $0.1 \text{ mg}/\text{m}^3$ or less

Negligence of maintenance of the air filter element installed on the machine causes a trouble, thus requiring a periodical checking and maintenance.

● **Machining Power Source**

Circuit type	Transistor pulse
Max. machining current	30 A
Current settings	128 steps
Voltage settings	35 steps
OFF intervals	256 steps
Power stabilizing circuit	Standard
LL generator circuit	Standard
Power unit cooling	Forced air cooling
Machining power source	3.2 kVA

- **Electrical Equipment**

NC power supply unit	Model	MGW-S5	
Work light	Halogen light		Standard
Power line filter			Standard

- **Dielectric Fluid Control**

Flushing	Upper/lower independent digital control	
Filling	Rapid fill/circulation changeover	
Conductivity	1 ~ 200 μ S/cm	
Filtering method	Inside out type paper filter × 4	
	Note: Oshitari laboratory (WF-8) recommended	
Filtering precision	6 μ m	
Ion exchange method	Ion exchange deionizing resin bottle	Standard
	10 L × 2	
	Note: Recommended ion exchange deionizing resin is Nihon Rensui Amberite (MR-151)	
Dielectric fluid cooling unit		
Temperature control accuracy	$\pm 1.0^{\circ}\text{C}$ (synchronized with machine temperature)	
Cooling capacity	5.00 kW (50 Hz)	
	5.35 kW (60 Hz)	

- **Machine Dimensions**

Width × depth × height	2900 × 2900 × 2250 mm
Required floor space	3520 × 4180 mm: Standard (incl. equipment unit)
Machine mass	4600 kg (incl. NC power supply unit)

- **NC Power Supply Unit Size**

Required floor space × height	520 × 1250 × 2220 mm
Mass	400 kg

- **Dielectric Fluid Supply Unit Size**

Required floor space × height	1150 × 2880 × 1395 mm
Mass	500 kg

- **Tank Capacity**

Dielectric fluid tank	1080 L : Standard
	(incl. clean tank capacity 290 L)
	(incl. work tank capacity 650 L)

- **Accuracy (at 20 ±1°C thermostatic room)**

Positioning	±0.0015 mm (full stroke)
Repeatability	±0.0015 mm

- **Machining Performance (at 20 ±1°C thermostatic room)**

Shape precision	±0.005 mm (SKD-11, plate thick 40 mm)
Roundness	0.005 mm (SKD-11, plate thick 40 mm, ø20 mm)
Optimum roughness (actual)	4 µm Ry (SKD-11, plate thick 10 mm) 3 µm Ry (WC, plate thick 10 mm)
Practical machining speed	200 mm ² / min (ø0.25 wire dia., SKD-11, plate thick 50 mm)

- **Installation Conditions**

Ambient temperature	10 ~ 35°C (Optimum: at 20 ±1°C thermostatic room) Machine must not be exposed to direct sunlight and hot or cold air from air conditioner. Do not heat the machine partially with a stove, etc. Note: It may reduce the life of Ion Exchange Resin when use kerosene stove.
Relative humidity	75% or less (no condensation)
Heat release rate	10.8 kW
Vibration	0.7 m/s ² or less
Dust	Machine must be isolated from dust. Machine must be installed where there is no polishing or grinding machines nearby.

- **Equipment**

Standard equipment	Std. equipment <input type="checkbox"/>
	Laminar nozzle
	Nozzle for nozzle away, nozzle guard
	Paper filter (WF-8)
	Wire (5 kg reel)
	Cotton applicator (ULTRA THICK)
	RUST REMOVER (K-200)
	ANTI-CORROSIVE (MECHA P-700)

2. OPTIONAL EQUIPMENT

• Optional equipment (retrofitable)

- (1) Large-capacity wire reel loader (20 kg wire reel)
- (2) Maintenance set
- (3) Angle cut set ¹⁾ (ø0.2)
- (4) Angle cut set ¹⁾ (ø0.25)
- (5) 3.5 type FDD 2DD/2HD: 720kB/1.44MB

- 1) Prohibit the use of high speed AWT mode (Retry3) and fine hole AWT mode (Retry2) at using MEGACUT-T wire and soft wire.

3. NC UNIT SPECIFICATIONS

● Controlled Axes

Controlled axes	5 axes: X, Y, U, V, Z
Simultaneous controlled axes	4 axes: X, Y, U, V
Additional controlled axes	1 (total of 6)

● Programming Method

Least input increment	0.001 mm/0.0001 inch
Control unit	0.00005 mm
Max. programmable dimension	±99999.999 9 mm ±3973.00787 inch
Absolute/incremental programming	G90/G91
Decimal point input	
Inch/metric selection	
Diameter compensation 10× precision (inch)	G919/G918: ON/OFF

● Interpolation

Rapid traverse linear interpolation	G00
Linear interpolation	G01
Circular interpolation	G02/G03: CW/CCW
Taper interpolation	G51, G52/G50: Left side, right side/cancel
Taper corner tangential insertion	G24
Spiral interpolation	G25
Taper top-bottom same radius	G49
Vertical irregular shape interpolation	G41/G42 P0, P1, P2

● Feed

Servo feed	Machining condition setting
F4 digit traverse	
Rapid feed	
Jog feed	High/middle/low
Step feed	Least input increment ×1/×10, ×10/×100
Dwell	G04
Incremental feed	
Automatic acceleration/ deceleration	

● Part Program Storage and Editing

Part program storage length	1000 m
Registrable programs	9999
Part program editing	with background editing function
Program number search	

- **Network (LAN)**

Ethernet	10/100BASE-TX	Standard
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- **Auxiliary Functions**

Machining	M17/M18: ON/OFF
Fill work tank	M28/M29: ON/OFF
Water quality check command	M40

- **Machining Conditions**

Machining condition selection	E4 digit designation (E0001 ~ E9999)	
Machining conditions registered area	2200 (including special condition area)	
Air cut high speed feed		
H.E.A.T.	∅0.25 and 0.30 mm wires only are supported	Standard

- **Wire Radius Compensation**

Wire radius compensation	G41, G42/G40: Left side, right side/cancel
Number of wire radius offsets	Indirect offsets 200 + direct input

- **Coordinate Systems**

Manual reference point return	
Automatic reference point return	G28
2nd~4th reference point return	G30
Return from reference point	G29
Coordinate system setting	G92
Machine coordinate system selection	G53
Work coordinate system group	G500 ~ G515 (16 groups)
Work coordinate system selection	G54 ~ G61 (8 pcs), Total 8 × 16 = 128 pcs

- **Operation Support Functions**

Label skip	
Single block	
Program stop	M00
Optional stop	M01
End of program	M02
Reset and rewind	M30
Optional block skip	/1 ~ /3
Dry run	
Machine lock	
Auxiliary function lock	
Mirror image	G71/G70: ON/OFF
XY axes exchange	G73/G72: ON/OFF
Manual absolute off	

Work coordinate preset	
Relative coordinate preset	
Manual interruption	
Automatic return	
Workpiece edge positioning	G76
Hole centering	G77
Wire vertical alignment	G78
Corner edge positioning	G79
Groove width centering	G80
Plate width centering	G81/G82: X axis/Y axis
Cylinder center measurement	G83
Work parallelism measurement	G84/G85: X axis/Y axis
Automatic measurement & machining	G86/G87: Per side/width
One-touch return	Reference point, workpiece zero point, latest AWT point
Pick-up menu	Position, hole center, end surface, corner, 3 point circle, work rotation
One-touch AWT	

● Program Support Functions

Custom macro	Local variable : 33 Common variables : 200
Circular interpolation by radius designation	
Subprogram	M98/M99: Call/end (Nesting level: 9)
Parameter call	G65/M99: Call/end (Nesting level: 4)
Modal call	G66/G67: ON/OFF
Pseudo command call	Arbitrary G/M code, Max. 16
Scaling	G48/G47: ON/OFF
Rotation	G68/G69: ON/OFF
Programmable data input	G10
Rotation copy	G26
Project programming wizard	
Sub model	G130
Programless cut-off	M08
Z axis position management	G95

● Mechanical Error Compensation

Backlash compensation	
Pitch error compensation	
Corner shape control	G44/G43: ON/OFF
Corner override	G46/G45: ON/OFF

- **Automatic Operation Support Functions**

Schedule function		
Automatic wire threading	M06 (Combined command of cut and threading)	
Automatic wire cut	M07	
Process skip and additional machining function	M74	
Reference hole retry	M75	
Automatic wire break recovery		
Approach function		
Auto condition reduction at wire break		
Non-contact point search function		
AWT retry		
AWT skip		
Water timer		
Automatic power cut-off function		
Automatic power failure recovery		Standard

- **Safety and Maintenance**

Emergency stop		
Overtravel	Soft limit + hard limit	
Work limit	G22/G23: ON/OFF	
Stored stroke limit	One-touch system	
Diagnostic function		
Regular check function		
Maintenance function		
Parameter output by machine No.	G150	
Machining condition output	G151	
Machining time output	G152	
Machining status record output	G153	
Data back-up	G154	
Screen data initializing	G155	

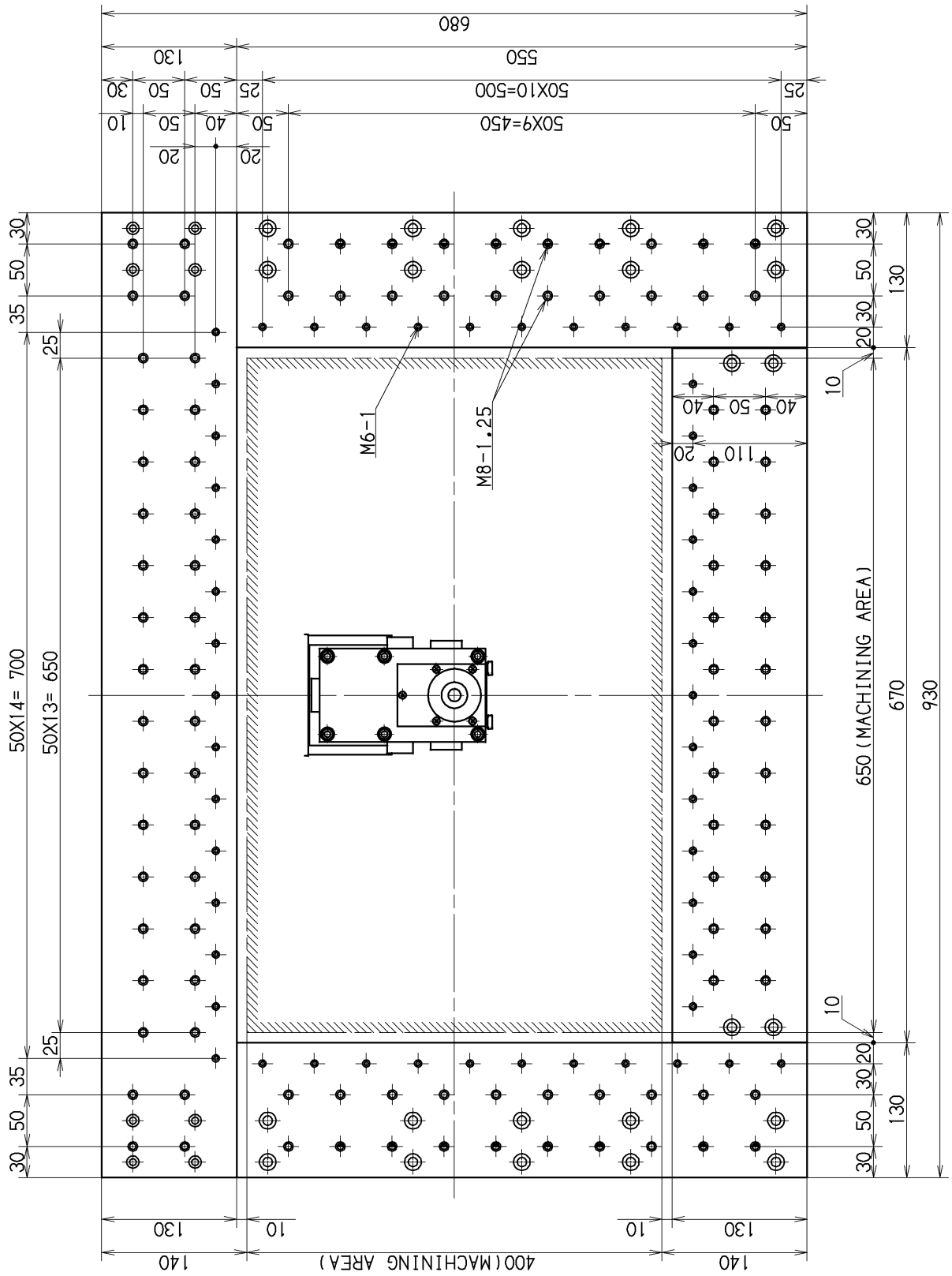
- **Enclosure**

Enclosure	Closed dust-proof type
NC power source	2.2 kVA

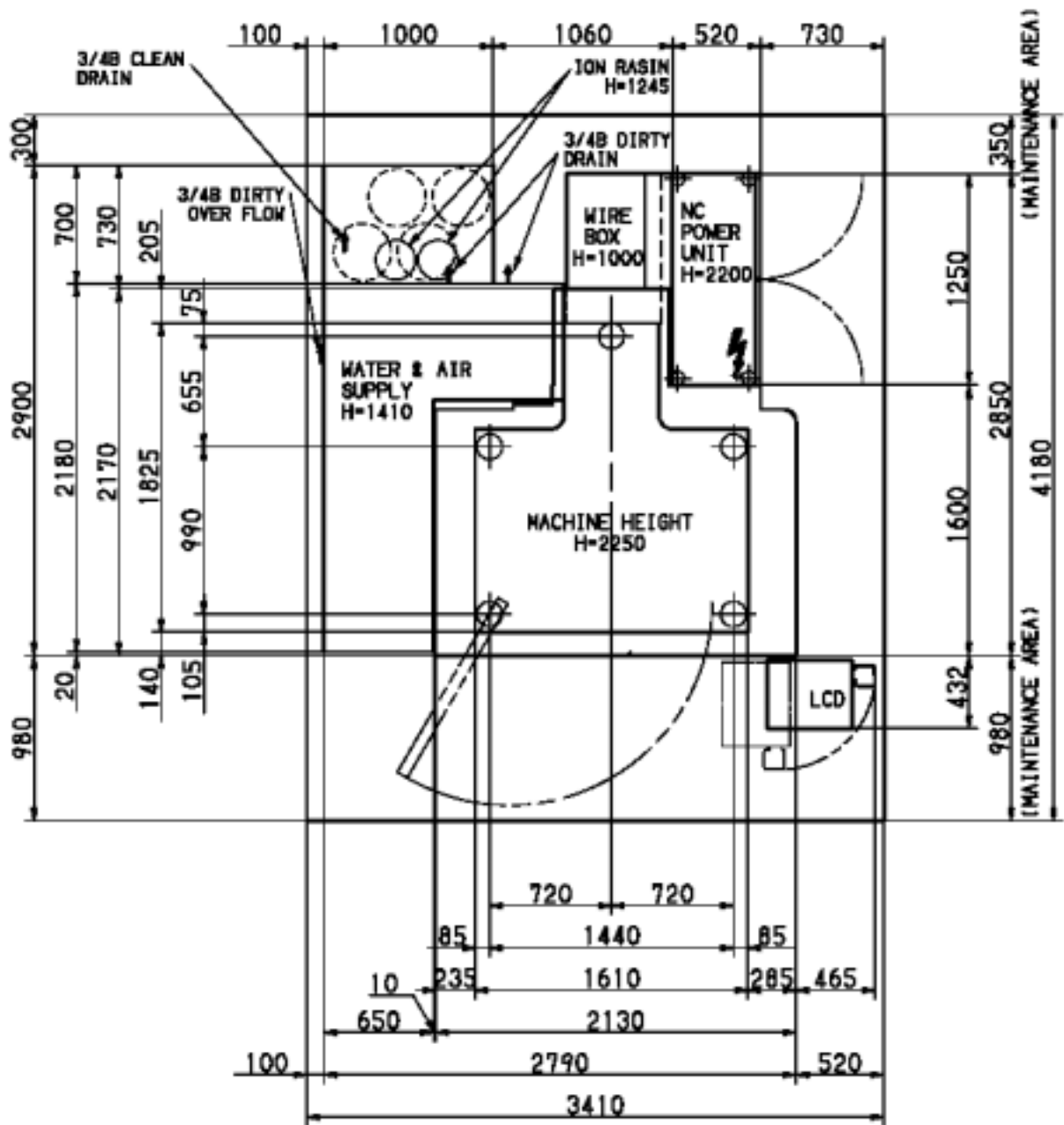
- **Servo System**

Servo motor	AC servo motor
Servo unit	Transistor PWM control system
Positioning detector	X, Y, U, V, Z axes: Pulse encoder

4. TABLE TOP VIEW



6. LAYOUT



7. FOUNDATION

