Wire Electrical Discharge Machine

EU64

MGW-R Power supply

Specifications

MAKINO

S383Eb

CONTENTS

1. MACHINE SPECIFICATIONS

● Travel

X axis	(Table right/left)	600 mm
Y axis	(beam front/back)	400 mm
Z axis	(upper head up/down)	260 mm
U axis	(upper head right/left)	±75 mm
V axis	(upper head front/back)	±75 mm

● Table

Work table size	920 X 600 mm (Flat-type)	
Max. load on table	1 500 kg	
Table surface format	66-M8 tap, 31-M6 tap	
Distance from floor to top of table	1 000 mm	
Work tank size	1 020 X 836 mm	
Max. workpiece size	940 X 650 X 260 mm	
Square workpiece fixture		Opt. specifications ☐
Adjustable square type	3R made	Opt. equipment ☐
Cross plate	3R made	Opt. equipment ☐

● Head

Wire guide	V-flat guide: diamond	
	C-type (for angle cut)	Opt. equipment ☐
Wire electrode diameter	ø0.20, 0.25, 0.30 mm (Selectable)	
	Wire electrodes should be good in straightness, free from curlings or stains	
Recommended wire	Hitachi Cable (HBZ-M**)5 kg bobbin recommended	
	Zinc coated wire MEGACUT-T (angle cut)	
	MEGACUT-HS	
	(for high speed machining specification)	
	MEGACUT-D	

● Wire Feed System

Wire federate	50 ~ 250mm/s	
Wire tension	2 ~ 20 N	
Max. wire spool weight	6.5 kg	
	20kg(with large-capacity-wire-reel loader)	
		Opt. equipment ☐

● Feedrates

Rapid feed	X, Y axis : 2 000 mm/min	
	Z axis : 500 mm/min	
	U, V axis : 200 mm/min	
Servo feed	0.01 ~ 50 mm/min	
Jog feed	50, 150, 600 mm/min	

● Automatic Wire Threading

Wire diameter	ø0.20, 0.25, 0.30 mm
Wire through method	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 dia : ø0.5mm Opt. specifications ☐ Plate thickness : 30 mm (ø0.20 mm, no slit, both nozzles close)
Threading time (reference)	15 s (Retry 3, wire ø0.20 mm, start hole ø2.5, plate thickness 30 mm) (Don't use of angle cut)

● Taper Machining

Max. taper angle	±15°(for 100 mm plate thickness and wire dia. 0.20 mm or more)
Angle cut	±45° Opt. equipment ☐ (for 70 mm plate thickness and wire dia. 0.20 mm or more) (stroke limited)

● Motors

Feed axis (AC servo motor)	X, Y axis : 0.5 kW U axis : 0.4 kW V axis : 0.3 kW Z axis : 0.5 kW
Flushing pump	0.75 kW x 2
Filter pump	0.55 kW
Filling	1.03 kW
Cooling circulation pump	0.59 kW
Compressor motor	0.65 kW

● Required Power

Power Source	AC 200 V ±10%, 50/60 Hz ±1%, 9 kVA (incl. Machining Power and NC Power) Connection terminal: Crimp terminal with M6 screws Grounding: Class-C grounding commended (grounding resistance of 10Ω or less)
Compressed Air Source	0.6 MPa or more, 100 L/min (atmospheric pressure) or more Connection port: ø8 mm coupler Std. ☐ Air must be dry and clean

● 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	3.8 kVA (Standard) 6.4 kVA (High speed machining spec.)

● Electrical Equipment

NC power supply unit	Model MGW–R	
Work light		Opt. equipment ☐
Power line filter		Opt. equipment ☐
Transformer	Separate type	Opt. equipment ☐

● Dielectric Fluid Control

Flushing	Upper/lower independent digital control	
Filling	Rapid fill/circulation changeover	
Conductivity	1 ~ 200 µS/cm	
Filtering method	Inside out type paper filter x 2	
	4	Opt. specifications ☐
	Note: Oshitari Co., Ltd. (WF-8) recommended	
Filtering precision	6 µm	
Ion exchange method	Ion exchange deionizing resin bottle 10 L x 2 Note: Recommended ion exchange deionizing resin is Nihon Rensui MR151	
Cooler		
Temperature control accuracy	±0.5°C (synchronized with machine temperature)	
Cooling capacity	2.5 kW (50 Hz) 2.8 kW (60 Hz)	
Machine Temperature Controller		Opt. equipment ☐
Automatic water supply unit		Opt. equipment ☐

● Machine Dimensions

Width X depth X height	2 150 × 2 650 × 2 200 mm
Required floor space	3 050 × 3 450 mm (incl. Standard accessories and maintenance area)
Machine mass	5 200 kg (incl. NC power supply unit & Dielectric fluid supply unit)

● NC Power Supply Unit Size

Required floor space X height	520 × 930 × 2 200 mm
Mass	285 kg

● Dielectric Fluid Supply Unit Size

Required floor space X height	630 × 930 × 2 030 mm : Standard
	630 × 1 330 × 2 030 mm : Additional filter attached
Mass	185 kg

● Tank Capacity

Dielectric fluid tank	1 030 L : Standard (incl. clean tank capacity 180 L) 1 150 L : Additional filter attached (incl. clean tank capacity 300 L)
Work tank	470 L

● Accuracy (20±1°C Isothermal Room)

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

● Machining Performance (20±1°C Isothermal Room)

Shape precision	±0.005mm (SKD-11, 30 mm thick)
Roundness (actual)	0.005 mm (SKD-11, 30 mm thick, ø20mm)
Optimum roughness (actual)	3 µm Ry (SKD-11, 10 mm thick) 2 µm Ry (Carbide, 10 mm thick)
Practical machining speed	200 mm^2/min (wire dia. 0.25, SKD-11, plate thickness 50 mm)

● Installation Conditions

Ambient temperature	10 ~ 35°C (Optimum: 20±1°C Isothermal 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. Machine Temperature Controller recommended Note. It may reduce the life of Ion Exchange resin when use kerosene stove.
Relative humidity	75% or less (no condensation)
Heat release rate	8.1 kW
Vibration	0.07 G or less
Dust	Machine must be isolated from dust. Machine must be installed where there is no polishing or grinding machines nearby.

2. OPTIONAL SPECIFICATIONS/OPTIONAL EQUIPMENT

● Machine Options

• Optional type (not retrofittable)

(1) Square workpiece fixture
(2) Square workpiece fixture (0 type)
(3) Flat cross plate (0 type)
(4) 0.1 micron scale feedback (X,Y axes)
(5) Automatic tank height setting
(6) Workpiece air blow for rust
(7) Additional filter unit (with filter automatic selecting function/2+2=4 pcs)
(8) Fine hole automatic wire threading unit
(9) Machine Temperature Controller recommend
(10) Crane (loading work mass max 200kg)
(11) Customer specified machine color

• Optional accessories (retrofittable)

(1) Large-capacity wire reel loader (20 kg wire reel)
(2) Work light
(3) Cross plate (system 3R)
(4) Cross plate L (Thin type, system 3R)
(5) Cross plate LB (Thin type with strengthening rib, system 3R)
(6) Sliding square jig (system 3R)
(7) Sliding square jig L (Thin type, system 3R)
(8) Sliding square jig LB (Thin type with strengthening rib, system 3R)
(9) Clamping tool
(10) Automatic water supply unit
(11) Maintenance set (wire vertical jig, torque screwdriver, standard tool)
(12) Standard supplies set (standard consumable set)
(13) Cartridge type ion exchange deionizing resin (5L x 4 type)
(14) Workpiece support
(15) Angle cut[1)] (exclusive C-type wire guide, exclusive wire, splash guard)
(16) Splash guard recommend

1) Prohibit the use of high speed AWT mode (Retry3) and fine hole AWT mode (Retry2) as using MEGACUT-T wire (soft wire) and MEGACUT-HS,MEGACUT-D(coating wire).

● NC Unit Options

• Optional Specifications (not retrofittable)

(1) High speed machining specification (Only for wire dia. 0.3mm)

• Optional accessories (retrofittable)

(1)	Power line filter	(standard for CE machines)
(2)	Signal tower	(1-layer, 2-layer, 3-layer)
(3)	Automatic power failure recovery device[2)]	
(4)	Program Master	
(5)	Additional part program storage	3 000 m (2 000 m expanded, equivalent to total 1MB)
(6)	Export transformer	(separate type)
(7)	Operated Circuit Braker	
(8)	3.5” floppy disc drive	2DD/2HD : 720kB/1.44MB

2) A part of functions will be restricted on the machine attached with the large capacity wire reel loader.

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/0.000 1 mm: Standard/High resolution (Selectable with the parameter) 0.000 1 inch/0.000 01 inch:Standard/High resolution (Selectable with the parameter)
Control unit	0.000 05 mm
Max. programmable dimension	±99 999.999 9 mm, ±3 973.007 87 inch
Absolute/incremental programming	G90/G91
Decimal point input	
Inch/metric selection	
Diameter compensation	G919/G918: ON/OFF
10X precision (inch)	
Input	Automatic recognition of EIA/ISO code

● 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 X1/X10
Dwell	G04
Incremental feed	
Automatic acceleration/ deceleration	
F4 digit feed override	0 ~ 200%
Override cancel	

● Part Program Storage and Editing

Part program storage length	1 000 m	
	3 000 m	Opt. equipment ☐
	(2 000 m expanded, equivalent to total 1MB)	
Registrable programs	9 999	
Part program editing	with background editing function	
Program number search		
Program number copy		
Program number division		
Sequence number search		
Address/word search		
Error search		
Executing program protection		

● Operation and Display

Operation panel	: Display	15 type color LCD (TFT)
	: Operation	Flat-keyboard operation panel
		(Arrangement of JIS)
		Touch panel
Display function		10 basic menu screens
Portable operation panel		FPB2 (Multi function type)
MDI function		
Graphic display		Automatic scale, rotation, zoom, position verification
Dynamic graphic display		
Machining time estimation		
Path length estimation		
Run hours		
Machining time history		
Machining status history		
Process management history		
Disk directory management		
User creation screen		
Help window		
Key input playback		

● I/O Functions and Units

I/O interface	RS-232C	
3.5” floppy disc drive	2DD/2HD : 720kB/1.44MB	Opt. equipment ☐

● Network (LAN)

Ethernet	10/100BASE-TX

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	1 000 (including Makino standard condition area)
Air cut high speed feed	

Wire Radius Compensation

Wire radius compensation	G41, G42/G40: Left side, right side/cancel
Number of wire radius offsets	Indirect offsets 10 + 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 pcs)
Group work coordinate system	G54 ~ G61 (8 pcs), Total 8X16=128 pcs

Operation Support Functions

Label skip	
Single block	
Program stop	M00
Optional program 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
One-touch measurement	End surface, hole center, vertical
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. 14
Scaling	G48/G47: ON/OFF
Rotation	G68/G69: ON/OFF
Programmable data input	G10
Rotation copy	G26
Model Plan	
Sub model	
Programless cut-off	M08
Program Master conversion	G180 Opt. equipment ☐
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	
Noncontact point search function	

AWT retry
AWT skip
Water timer
Automatic power cut-off function
Automatic power failure recovery — Opt. equipment ☐

● Safety and Maintenance

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

Signal tower — Opt. equipment ☐

● Enclosure

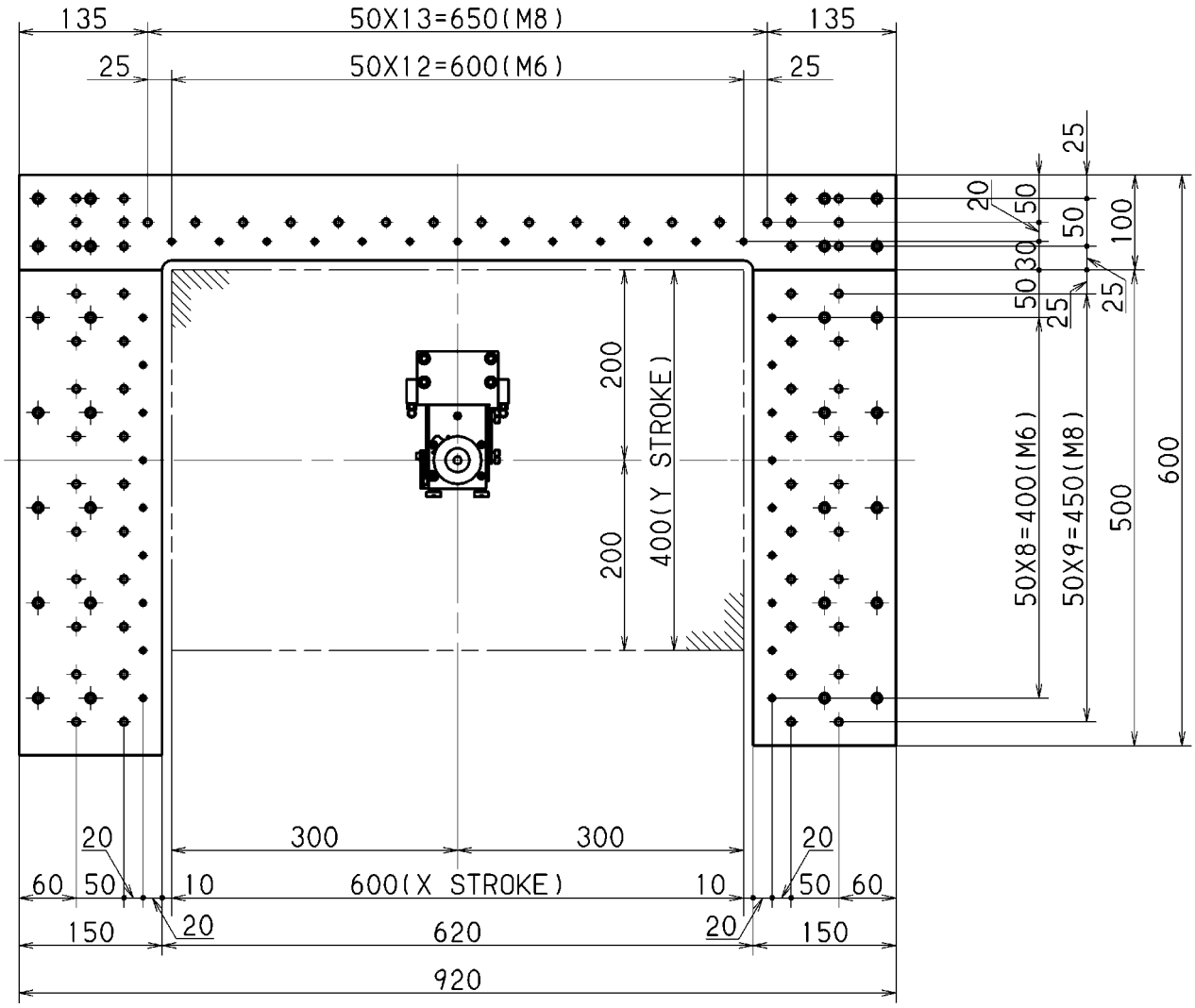
Enclosure	Closed dust-proof type
NC power source	2.2 kVA

● Servo System

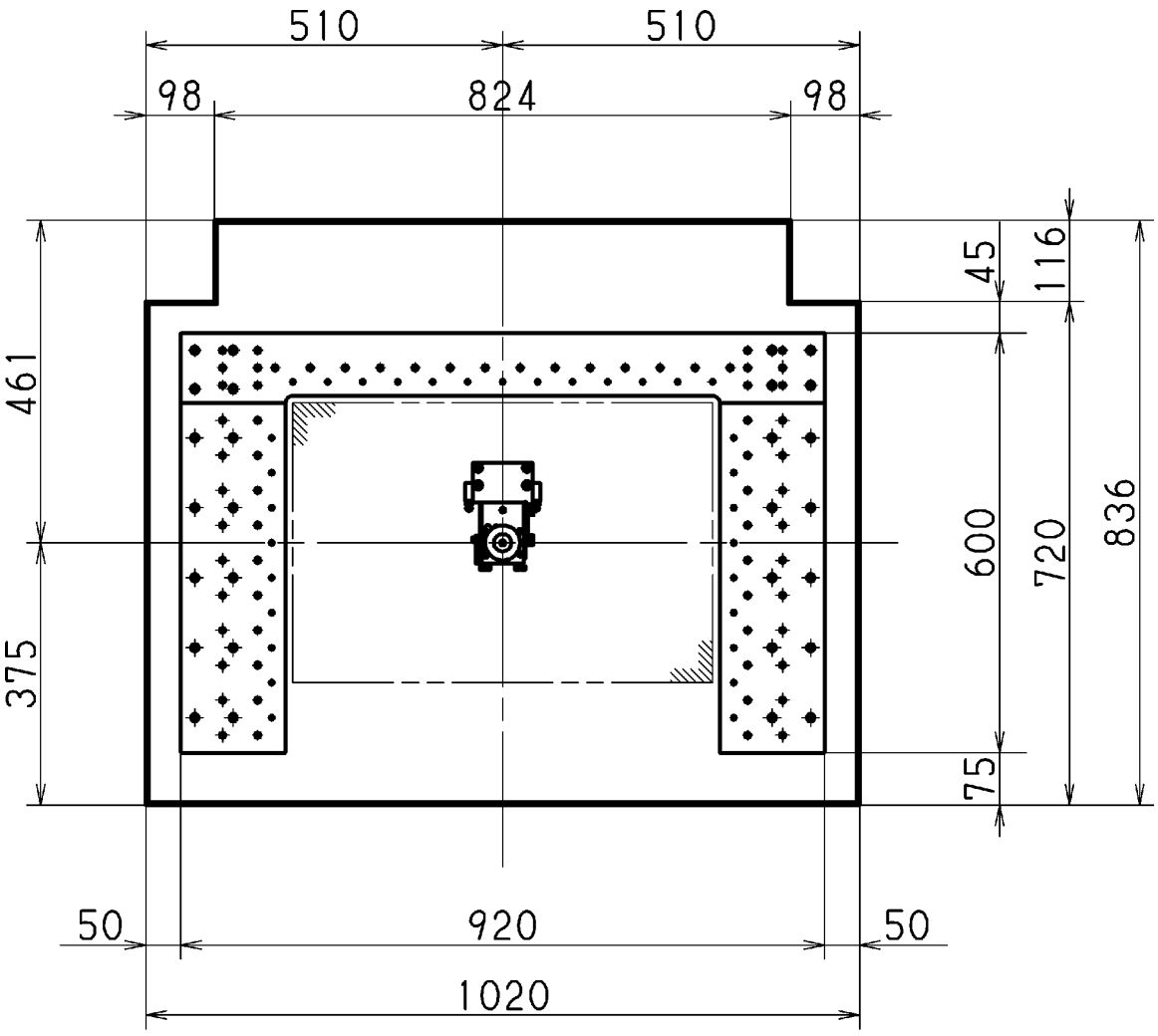
Servo motor	AC servo motor
Servo unit	Transistor PWM control system
Positioning detector	X, Y, U, V, Z axis : Pulse encoder
	X, Y axes : 0.1 micron scale feedback

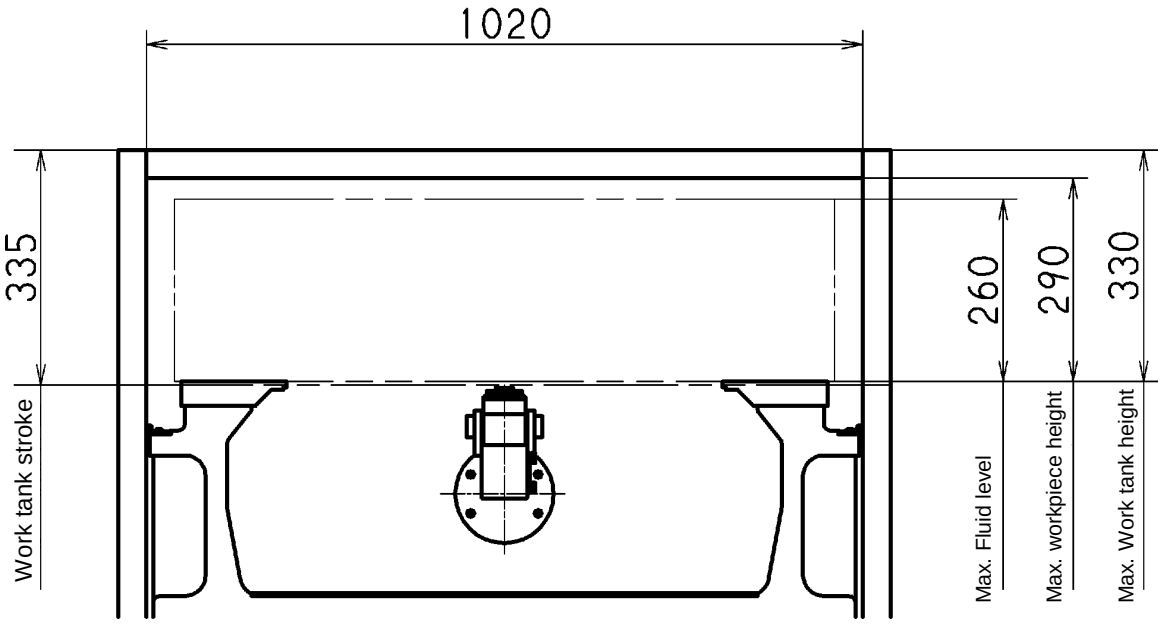
Opt. specifications ☐

4. TABLE TOP VIEW

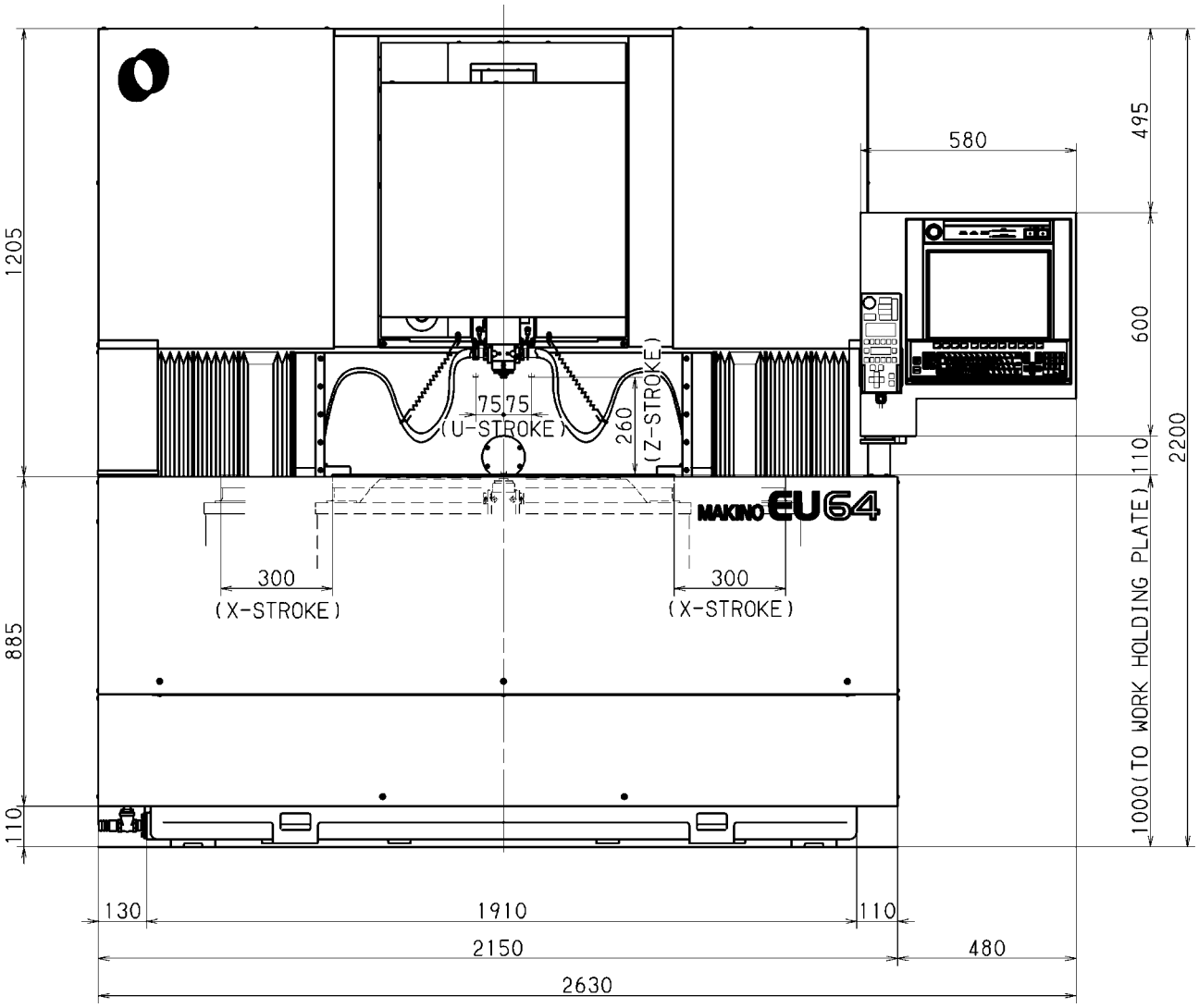


5. WORK TANK


510
510
98
824
98
45
116
461
600
720
836
375
75
50
920
50
1020

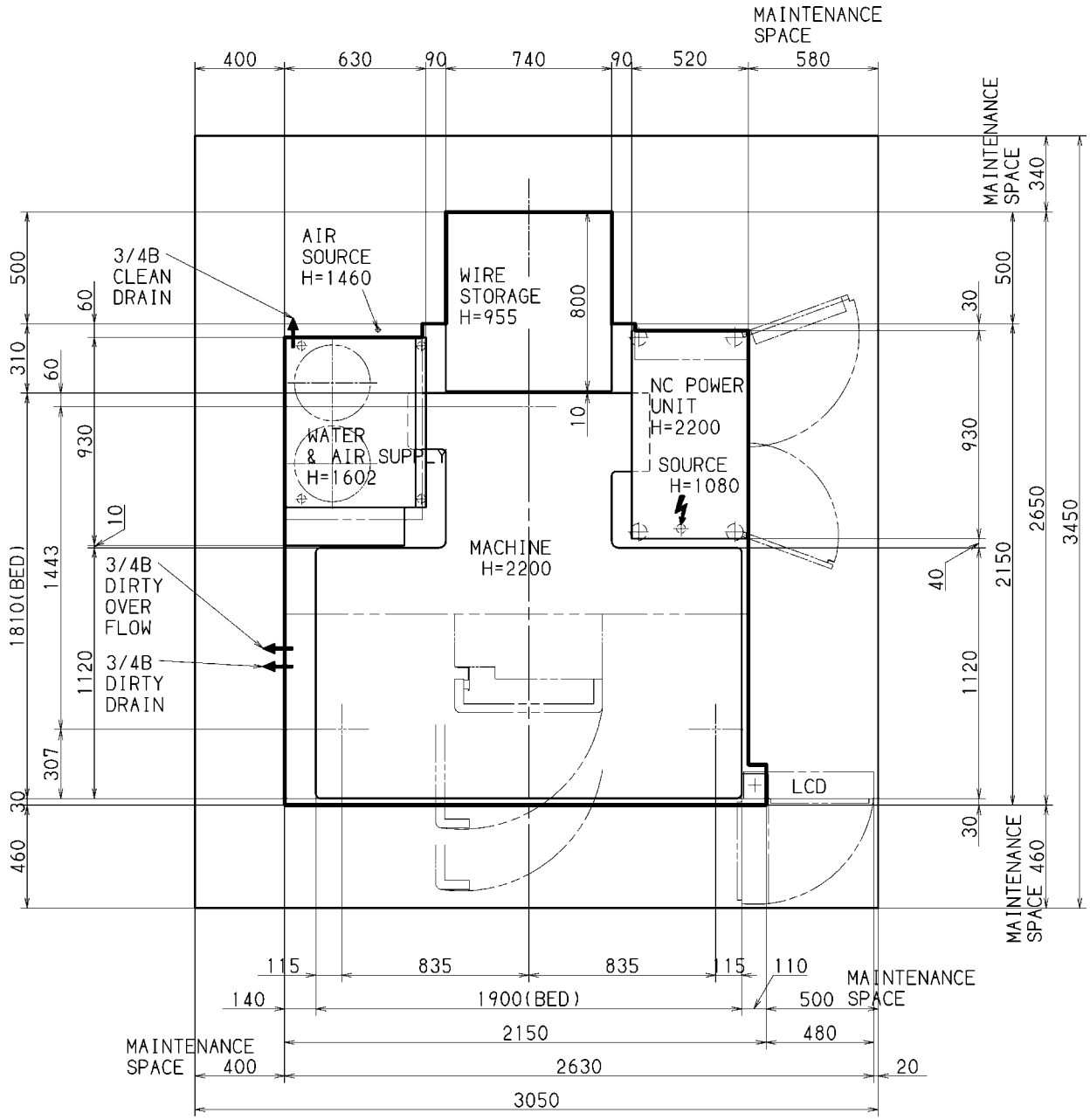

1020
335
260
290
330
Work tank stroke
Max. Fluid level
Max. workpiece height
Max. Work tank height

5. GENERAL VIEW

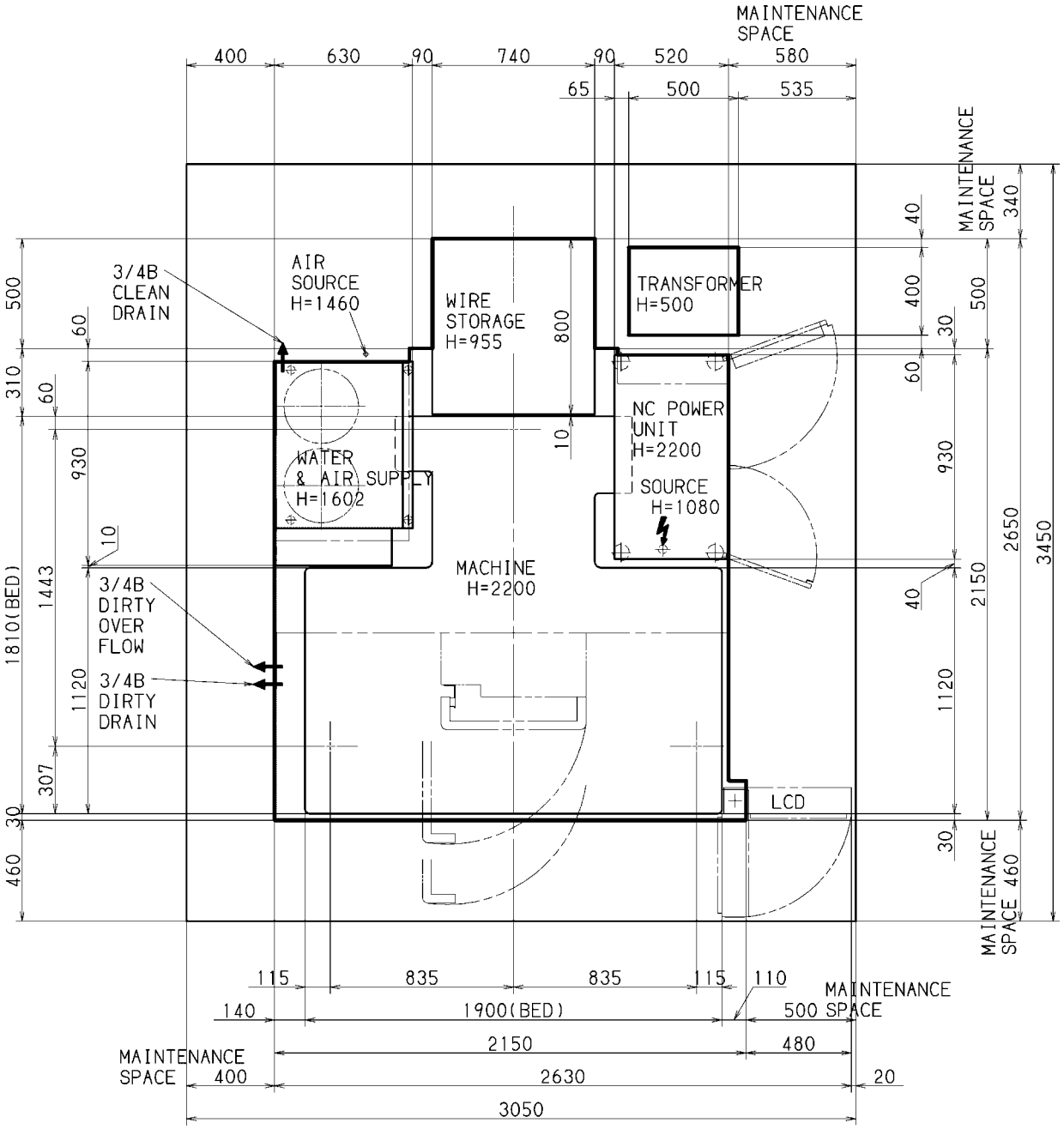


6. LAYOUT

- **STANDARD**



- **MACHINE WITH EXPORT TRANSFORMER (OPTION)**



MAKINO

HEAD OFFICE
3-19 Nakane 2-chome, Meguro-ku, Tokyo 152, JAPAN
Tel:03-3717-1151 Fax:03-3725-2105

ATSUGI WORKS
OVERSEAS SALES DEPARTMENT
4023 Nakatsu, Aikawa-machi, Aiko-gun, Kanagawa 243-03, Japan
Tel:046-286-6748 Fax:046-286-4334

MAKINO INC.
7680 Innovation Way, Mason, Ohio, 45040, U.S.A.
Tel:513-573-7200 Fax:513-573-7360

MAKINO GmbH
Wiesendamm 30, 22305 Hamburg F.R. Germany
Tel:040-298090 Fax:040-29809300

MAKINO ASIA PTE., LTD.
Gul Avenue, Jurong, Singapore 629649 44
Tel:861-5722 Fax:861-1600

MAKINO MILLING MACHINE CO., LTD.
SEOUL OFFICE
3rd Floor, Sae Woo Bldg. No.10, Yoido-Dong, Young Deung Po-Ku, Seoul, Korea
Tel:02-780-6902 Fax:02-784-0834

TAIPEI OFFICE
Room 2-7 2nd Fl., No.2 Fu-Shing N, Rd., Taipei, Taiwan
Tel:02-772-7431 Fax:02-741-5860

MAKINO SHANGHAI
Unit 1002, Shanghai Kerry Center,
No.1515, Nanjing Road West, Shanghai, P.R.O. China 200040
Tel:8621-5298-5000 Fax:8621-5298-6000