

Technical Documentation
of
GN-40B·60S
per
EMC Directive 2004/108/EC

SHIGIYA MACHINERY WORKS LTD.
5378 Minoshima Fukuyama Hiroshima, 721-8575, Japan

Compiled by: S. Teraoka
Susumu Teraoka
Chief Engineering Department

K. Aoyama
Kazuhiro Aoyama
Chief Engineering Department

Approved by: H. Ishii
Hideo Ishii
Manager of Engineering Department

J. Ono
Junichi Ono
Manager of Engineering Department

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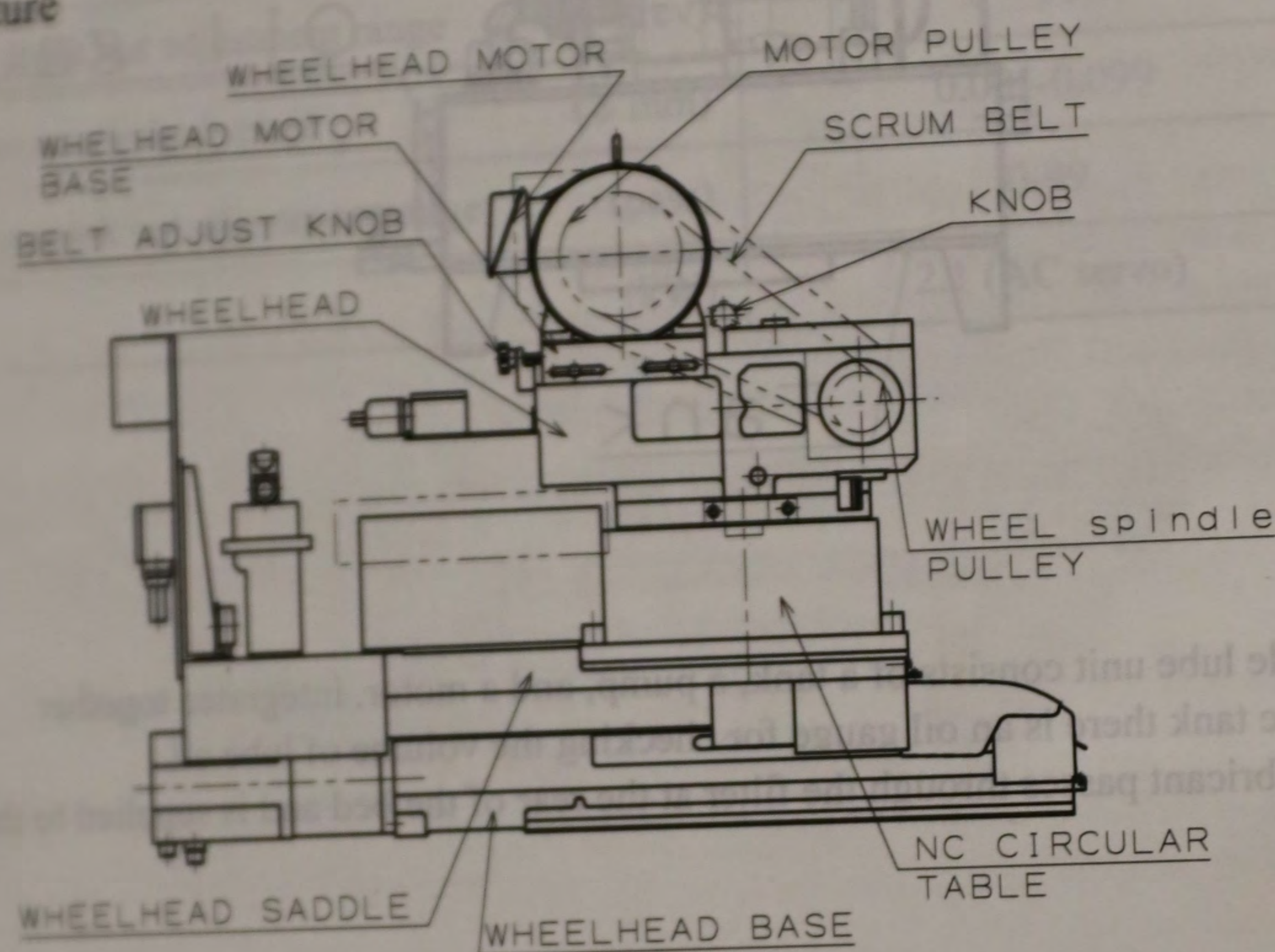
1.3 Function of the System

1.3.1 Wheelhead

• Specifications

Item	Specification
Model	GN-30(40)B
Swing angle	$45^{\circ+12^{\circ}}_{-5^{\circ}}$
Compatible grinding wheel size (OD x ID) (mm)	$\phi 280 \times \phi 127$
Compatible grinding wheel width (mm)	20
Grinding wheel speed (min^{-1})	3800
Wheel spindle motor (kW)	7.5
Grinding wheel circumferential speed (m/min)	3350

• Structure



Wheelhead structure

- The wheelhead consists of the wheel spindle and a motor that drives it.
- The rotation of the motor is transmitted to the wheel spindle by means of a V-belt.
- The wheelhead is locked to the NC circular table with tightening nut.
- The NC circular table is locked to the wheelhead saddle with tightening bolt.
- The wheelhead saddle slides on the wheelhead base. The sliding surfaces are lubricated by static pressure lubrication.
- The wheel spindle is lubricated by forced lubrication. The lube oil is supplied from a separately installed wheel spindle lube oil tank, via a filter, oil cooler and a pressure switch.

1.3.3 Wheelhead feed

• Specifications

Item	Specification
Manual feed distance (mm)	320
Rapid traverse distance (mm)	40
Rapid traverse speed (ϕ mm/min)	0 - 10000(4-stage)
Jog feed speed (ϕ mm/min)	0 - 2520 (16-stage)
Minimum movement amount (ϕ mm/pulse)	0.0001
Grinding feed rate (%)	0 - 150 [10% increments]
Auto infeed total movement amount (ϕ mm)	9.999
Plunge cut auto infeed speed (ϕ mm/min)	0.01 - 9.99
Plunge cut spark out adjustment range (rev)	0 - 99.9
Traverse cut auto infeed speed (ϕ mm)	0.001-0.099
Traverse cut spark out adjustment range (pass)	0-99
Motor (kW)	2.1 (AC servo)

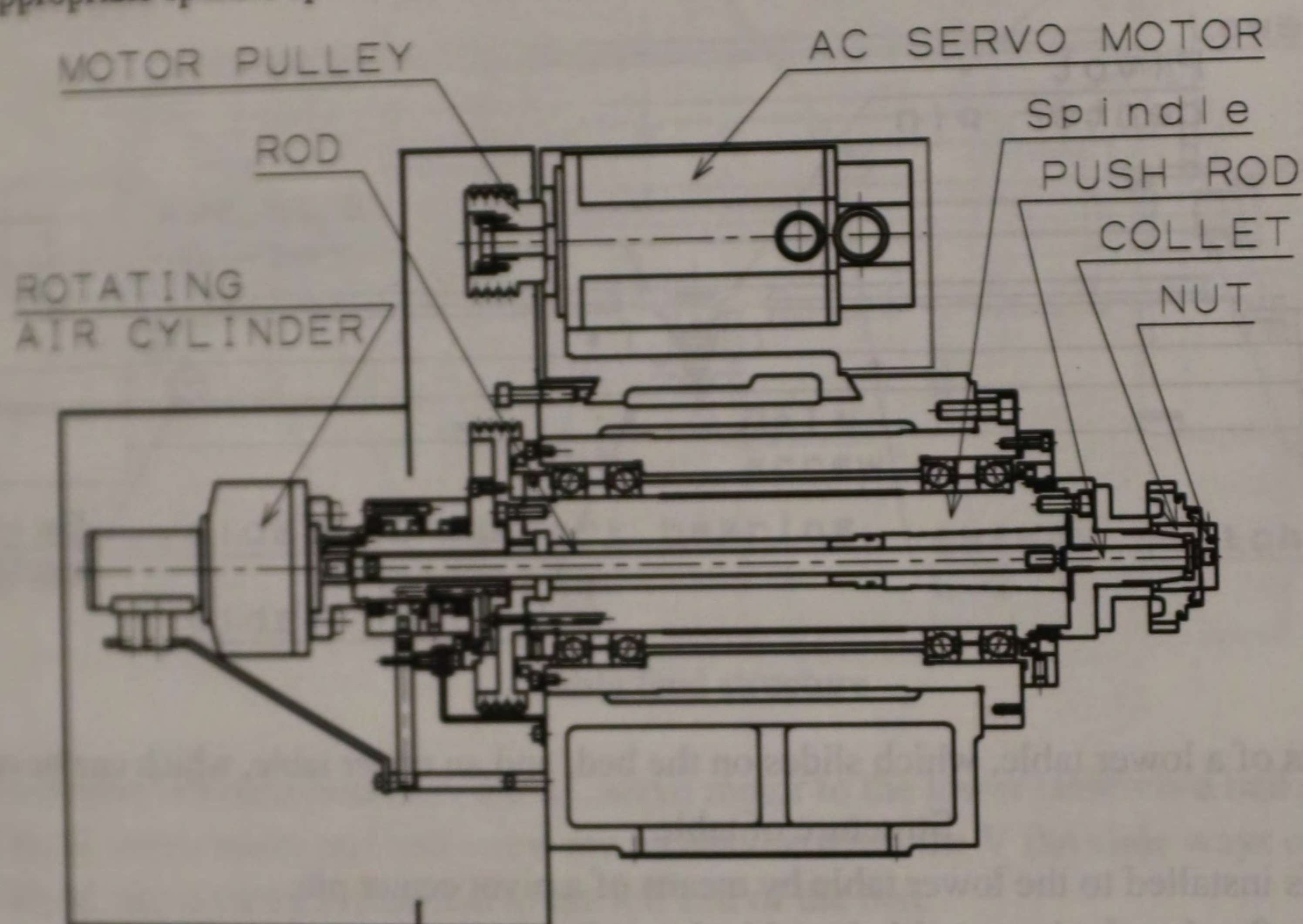
1.3.4 Automatic Collet type Live Headstock

• Specifications

Item	Specification
Spindle type	Rotation spindle • non-swing headstock
Spindle speed (min ⁻¹)	15 ~ 600 (stageless)
Taper of center	MT No.5
Motor (kW)	1.5 (AC SERVO motor)
Inside dia., clamp collet chuck Clamp range (mm)	φ 18.5 ~ φ 70

• Structure

- The motor rotates the spindle through the motor pulley, spindle pulley, decelerating speed.
- Appropriate spindle speed is set automatically in stageless speed control by the NC program.



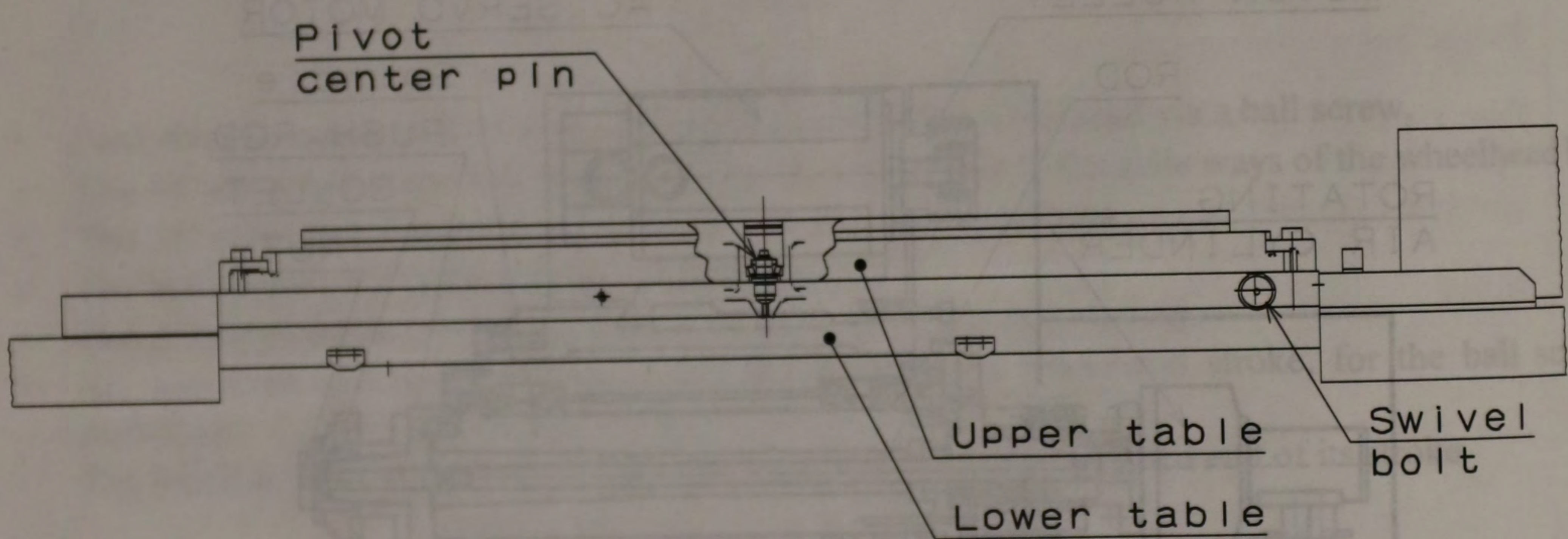
- The headstock is fixed to the upper table with 2 fixed nuts.
- Mount the auto collet chuck on the front side of spindle to clamp or unclamp the workpiece
- The piston of rotation cylinder mounted on the rear part of spindle is connected with the rod with the screw.
- The rod is connected with the push rod with the screw.
- The push rod is connected with the collet with the screw.
- When the piston of rotation cylinder is moved in the right and left, the collet also moves in the right and left, thus clamping and unclamping the workpiece.

1.3.5 Table

• Specifications

Item	Specification				
Center distance (mm)	GN-30B	600	1000	1500	2000
	GN-40B	570	970	1470	1970
Max. stroke (mm)		870	1270	1770	2270
Swing angle	Wheel head side (°)	10°	8°30'	6°30'	4°
	Operator side (°)	0	0	0	0

• Structure



- The table consists of a lower table, which slides on the bed, and an upper table, which can be swing about.

Structure of table

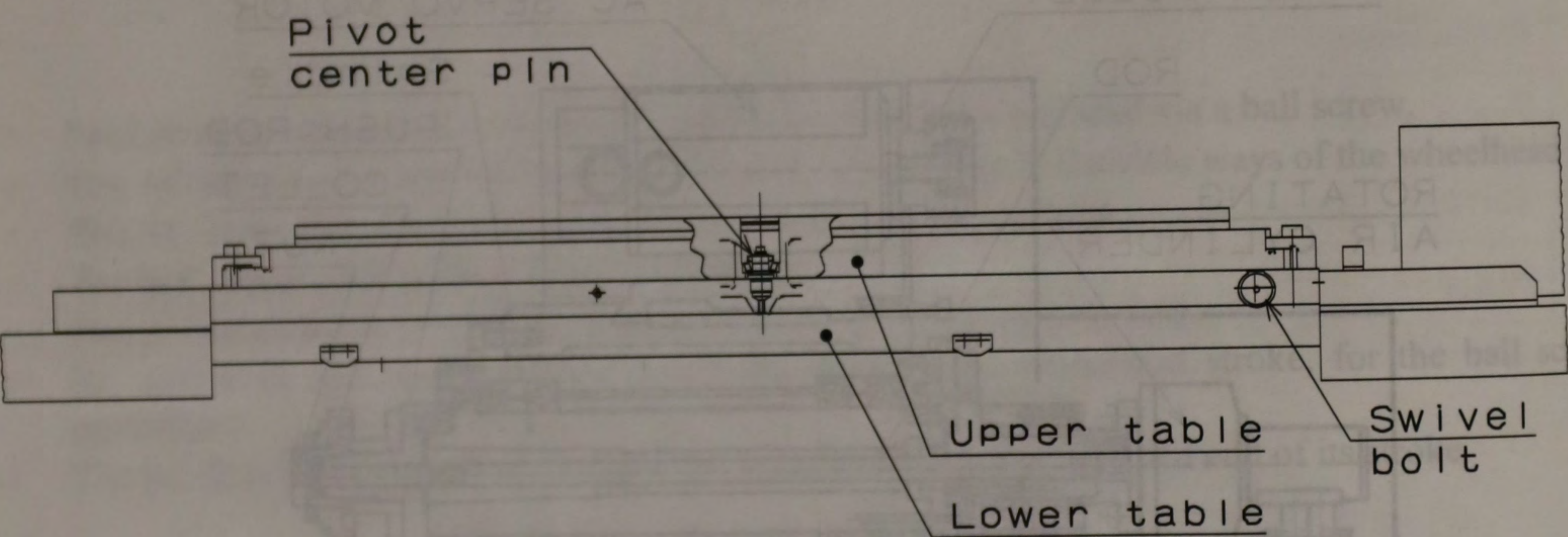
- The upper table is installed to the lower table by means of a pivot center pin.
- The upper table is fixed to the lower table by table detent levers (or cap nuts) at either end.
- The lower table has pivot bolts installed to it which enable the upper table to be swing.
- At the front of the lower table, there is a grease nipple for supplying grease to the table feed ball screw.

1.3.5 Table

• Specifications

Item	Specification				
Center distance (mm)	GN-30B	600	1000	1500	2000
	GN-40B	570	970	1470	1970
Max. stroke (mm)		870	1270	1770	2270
Swing angle	Wheel head side (°)	10°	8°30'	6°30'	4°
	Operator side (°)	0	0	0	0

• Structure



- The table consists of a lower table, which slides on the bed, and an upper table, which can be swing about.
- Structure of table
- The upper table is installed to the lower table by means of a pivot center pin.
 - The upper table is fixed to the lower table by table detent levers (or cap nuts) at either end.
 - The lower table has pivot bolts installed to it which enable the upper table to be swing.
 - At the front of the lower table, there is a grease nipple for supplying grease to the table feed ball screw.

1.3.6 Table feed

• Specifications

Item		Specification
Grinding feed speed	(mm/min)	0 – 10000
Jog feed speed	(mm/min)	0 – 1260 (16 stage)
Minimum travel	(mm/pulse)	0.0001
Grinding feed rate	(%)	0 - 150 (10% increments)
Motor	(kW)	2.1 (AC servo motor)

• Structure

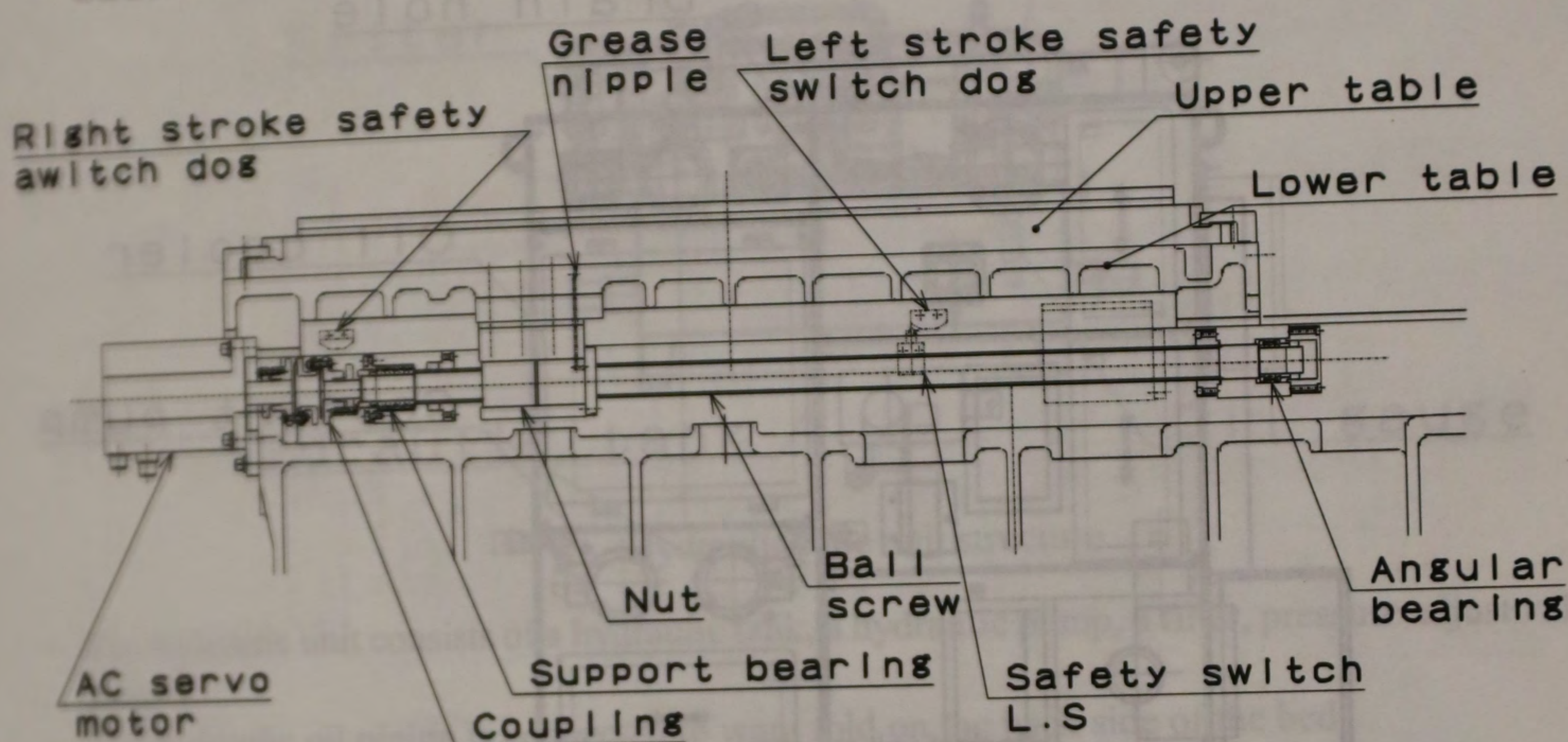


Table feed structure

- Feed drive is transmitted from the AC servo motor to the lower table via a ball screw.
- The AC servo motor and ball screw are located between the V flat slide ways of the bed.
- The AC servo motor is installed to the left end of the bed.
- The ball screw's nut is fixed to the lower table.
- The AC servo motor is coupled to the ball screw by a friction coupling.
- NC soft limit and limit switches detect the ends of the lower table's stroke, for the ball screw's protection.
- The table's home position is at the left end of its stroke.

1.5 Variation of the System

Item		Specification							
		GN-30B				GN-40B			
		60	100	150	200	60	100	150	200
Upward displacement of table mm		ϕ 300				ϕ 410			
Max. grinding diameter (mm)	GP	ϕ 300				ϕ 400			
	GU	ϕ 300				ϕ 410			
Center distance (mm)		600	1000	1500	2000	530	930	1400	1930
Max. weight of work (when two centers are used) (kg)		130				150			
Total weight (kg)		5600	6200	6800	7400	5600	6200	6800	7400

1.6 Catalog of the System

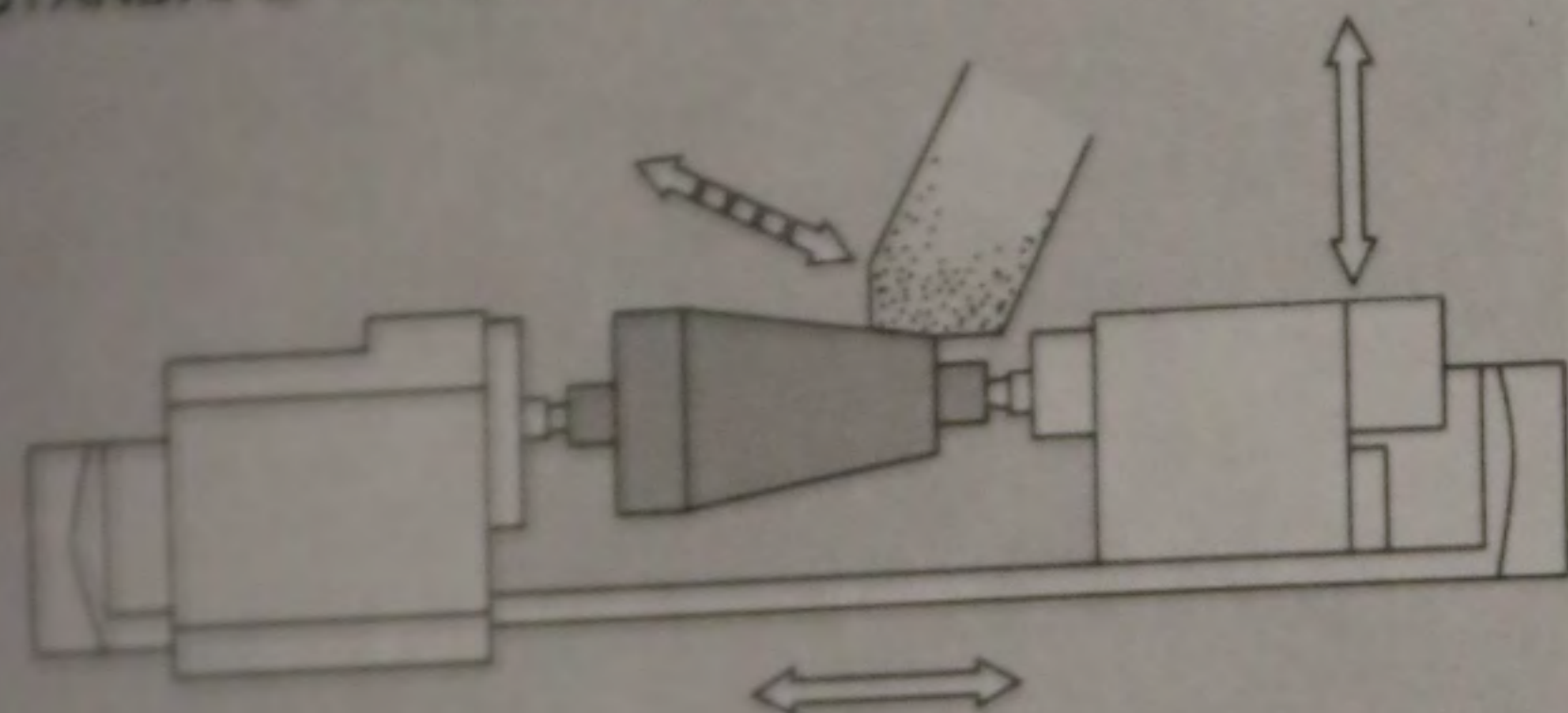
Catalog of the system is attached

CNC CYLINDRICAL GRINDER GN-30(40)B SERIES

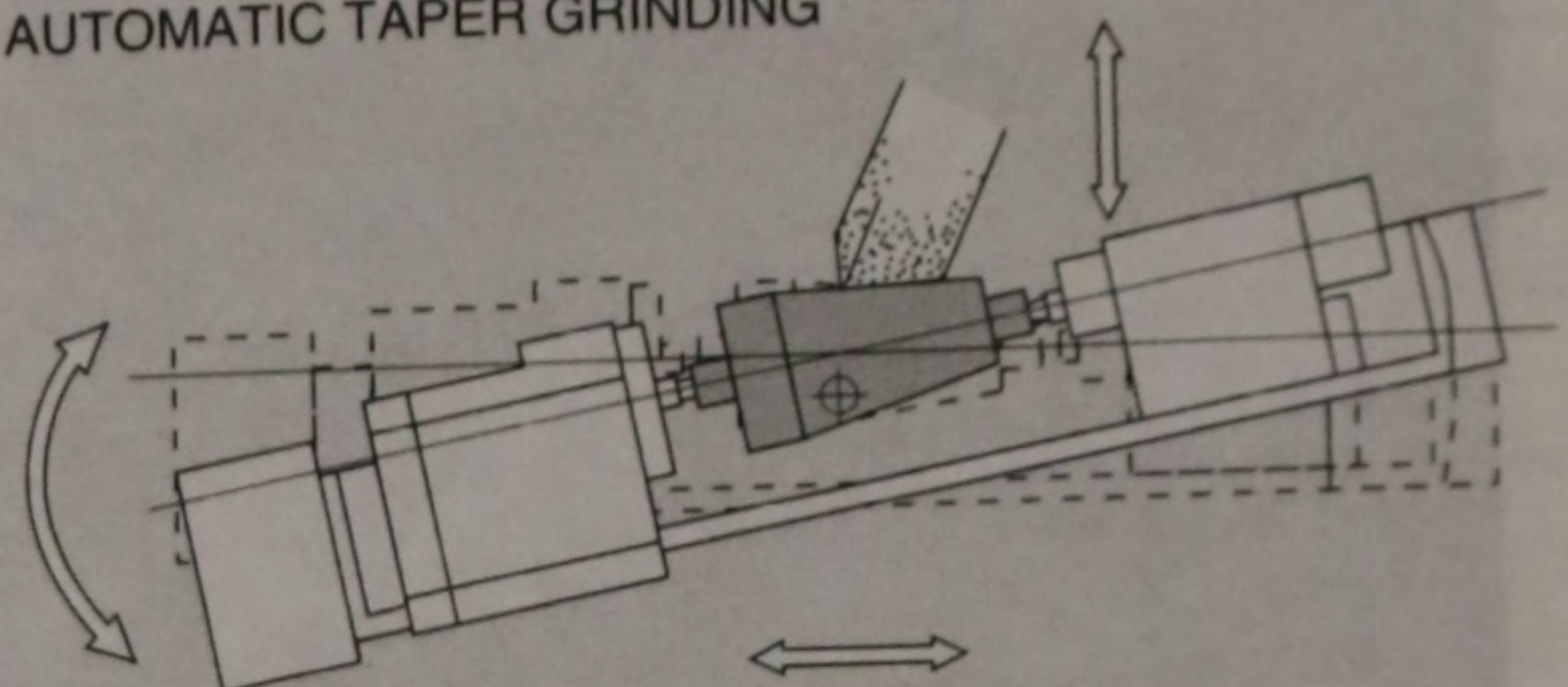
AUTOMATIC TAPER GRINDING DEVICE (OPTION)

■ The automatic table swiveling device can perform taper grinding without taper dressing the wheel. This attachment does not require wheel replacement, taper dressing, splitting of the work-piece grinding process etc., and can perform multi-step and taper grinding at one automatic grinding cycle.

STANDARD TAPER GRINDING



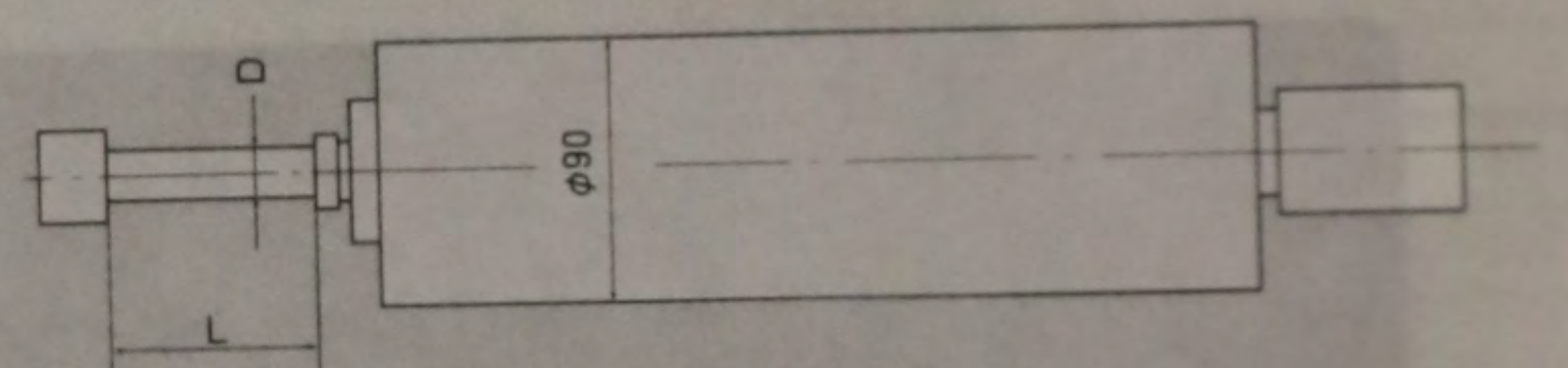
AUTOMATIC TAPER GRINDING



INTERNAL GRINDING ATTACHMENT (OPTION)

■ Wheelhead mounted, swing-down attachment has ultra precision angular contact bearings enabling high speed and high rotational speed fixed type and infinitely variable rotational speed controlled by AC spindle motor type are available.

NOTE: Optional dead/live center workhead is required.



SPINDLE TYPE	GRIND BORE	RPM (60Hz)	MOTOR	WHEEL SHANK		GRIND CAP.	WHEEL DIMS O.D.×W×I.D.
				Taper (MT)	D×L	Bore×Max.depth	
SA-901	φ10~50	25,000 min ⁻¹	1.5kW-2P	No.1	φ 6× 20	φ 10~24× 25	φ 13×12× φ 4
					φ 8× 30	φ 13~32× 35	φ 18×15× φ 4
					φ 12× 40	φ 20~50× 50	φ 25×20× φ 6
SA-902	φ15~80	18,000 min ⁻¹	1.5kW-2P	No.2	φ 8× 30	φ 15~32× 35	φ 18×15× φ 4
					φ 12× 40	φ 20~50× 50	φ 25×20× φ 6
					φ 18× 65	φ 35~80× 75	φ 34×25× φ 10
SA-903	φ25~80	10,000 min ⁻¹	1.5kW-2P	No.3	φ 18× 65	φ 25~40× 75	φ 34×25× φ 10
					φ 22× 80	φ 30~60× 90	φ 45×25× φ 10
					φ 30×110	φ 40~80×120	φ 50×25× φ 10

(Unit: mm)

Standard accessories:

- 1 set I.D.Spindle (SA-902)
- 1 set Set of quils, wheel shanks, I.D.wheel
- 1 set Diamond tool holder (without diamond tool)
- 1 set Coolant piping, Splash guard

THE VARIETY OF GRINDING PATTERN

[Face+O.D.straight]	[Face+R+O.D.straight]	[O.D.taper]	[O.D.straight]	[Convex R] *	[Face] *

*operated by entering the NC format

CNC CYLINDRICAL GRINDER GN-30(40)B SERIES

GN-30(40)B SPECIFICATIONS

SPECIFICATIONS			GN-30(40)B			
			60	100	150	200
CAPACITY	SWING OVER TABLE		300 (410) mm [11.8(16.1)inch]			
	DISTANCE BETWEEN CENTERS	mm [inch]	600 (550) [23.6(21.6)]	1000 (950) [39.9(37.4)]	1500 (1450) [59.0(57.0)]	2000 (1950) [78.7(76.7)]
	MAX. GRINDING O.D.		φ 300 (380) mm [11.8(14.9)inch]			
	MAX. WORK WEIGHT	CENTER WORK	APPROX. 150kg			
WHEELHEAD	SWIVEL ANGLE	SWIVELING TO THE RIGHT	0°~30°			
	WHEEL SIZE	O.D.XWIDTHXBORE	φ 510X38~75X φ 203.2mm [φ20X1.5~3Xφ8inch]			
	WHEEL ROTATIONAL SPEED		1610min ⁻¹			
	MAX. PERIPHERL SPEED		2700m/min [8500ft./min.]			
	WHEEL LOCATION		RIGHT SIDE			
WHEELHEAD FEED	TOTAL TRAVEL	INCL. RAPID FEED TRAVEL	320mm [12.6inch]			
	MIN. INPUT INCREMENT		φ 0.0001mm [φ0.00001inch]			
	MANUAL FEED RATE		X1、X10、X100			
	RAPID FEED SPEED		φ 0~10000mm/min [φ0~1000inch/min] (4STEPS)			
	JOG FEED SPEED		φ 0~2520mm/min [φ0~100inch/min] (16STEPS)			
	GRINDING FEED RATE		0~150% (PER 10%)			
WORKHEAD	TYPE		NON-SWIVELING, DEAD CENTER			
	SPINDLE ROTATIONAL SPEED		15~600min ⁻¹			
	CENTER HOLE TAPER		MT. No.4			
TAILSTOCK	TYPE		HYDRAULIC OPERATED TAILSTOCK			
	SPINDLE STROKE		50mm [2inch]			
	TAPER ADJUSTMENT		±0.05mm [0.002inch]			
	CENTER HOLE TAPER		MT. No.4			
TABLE	SWIVEL ANGLE	C.C.W.	10°	8°30'	6°30'	4°
		C.W.	0°	0°	0°	0°
	TOTAL TRAVEL		870mm [34.2inch]	1270mm [34.2inch]	1770mm [69.6inch]	2270mm [89.3inch]
	MIN. INPUT INCREMENT		0.0001mm [0.00001inch]			
	MANUAL FEED RATE		X1、X10、X100			
	RAPID FEED SPEED		0~10000mm/min [0.0001~1000inch/min] (4 STEPS)			
	JOG FEED SPEED		0~1260mm/min [0~50inch/min] (16STEPS)			
	GRINDING FEED RATE		0~150% (PER 10%)			
MOTORS	WHEEL SPINDLE		7.5kW			
	WORK SPINDLE		1.5kW (AC SERVO)			
	WHEELHEAD FEED FANUC		2.1kW (AC SERVO)			
	TABLE FEED FANUC		2.1kW (AC SERVO)			
	HYDRAULIC PUMP		0.4kW			
	WHEEL SPINDLE LUBE PUMP		0.2kW			
	COOLANT PUMP		0.18kW			
	DRESS COOLANT PUMP		0.18kW			
	WHEEL SPINDLE LUBE OIL COOLER		0.01kW			
	SLIDEWAY LUBE OIL COOLER		0.01kW			
	TAILSTOCK LUBE OIL PUMP		0.02kW			
	COOLANT TANK		200L			
TANK CAPACITY	WHEEL SPINDLE LUBE TANK		12L			
	HYDRAULIC OIL TANK		34L			
	TAILSTOCK SPINDLE LUBE TANK		1.5L			
CENTER HEIGHT FROM FLOOR LEVEL			1090 (1145) mm [43(45)inch]			
MACHINE WEIGHT			APPROX. KGS	5600(5700)	6200 (6300)	6800 (6900)
			APPROX. LBS	12400(12600)	13700(14000)	15100(15300)
					7600 (7700)	16800(17000)

*SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE

CNC CYLINDRICAL GRINDER GN-30(40)B SERIES

SPECIAL SPECIFICATIONS

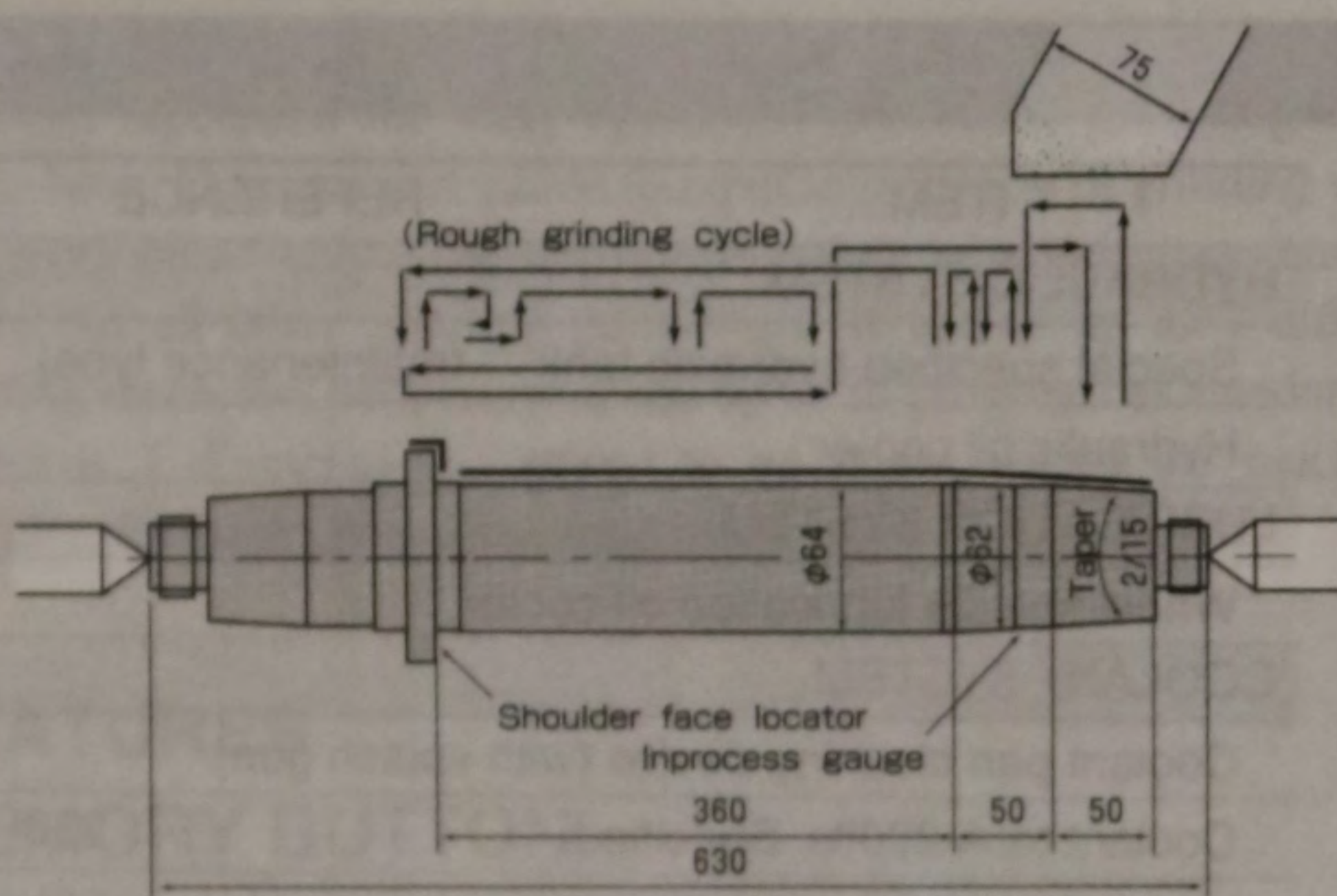
ITEM	REFERENCE
UTILITY	
Machine full cover	
Specified color paint (1 color)	
WHEELHEAD	
Special wheel specified	$\phi 510 \times 100/45\text{m/s. } 7.5\text{kw}$
Inverter controlled wheel spindle motor (with constant wheel peripheral speed)	
Automatic wheel balancing device	
Jib crane (single beam, manual, exchange wheel)	
INTERNAL GRINDING DEVICE	
Internal grinding attachment (SA-902)	
Oil mist lubricator for internal grinding spindle	
Inverter controlled internal spindle motor	
Special internal spindle	
WHEELHEAD INFEEED	
Indicator for wheel min. O.D. size with notify alarm	
Overload detector for wheel spindle motor (ampere meter)	
Gap eliminator device	
TOOLING	
Inprocess O.D. gauge	
Shower bracket for inprocess gauge	
Protect cover for inprocess gauge	
Automatic slide front splash cover (2LS)	
Table swivel angle measuring device (incl.dial gauge)	
Automatic work longitudinal positioner	
Hydraulic infeed 2-point steady rest	
Hydraulic operated 2-point steady rest	
Exclusive hydraulic auto. work rest (right-left)	
WORKHEAD	
Dead/Live spindle with swivel base workhead	
Automatic collet chucking workhead (live/non swivel)	
Automatic collet & pull chucking workhead (live/non swivel)	
Automatic vice workhead with non swivel	
Face drive workhead (dead/non swivel)	
Automatic work drive workhead (dead/non swivel)	
Automatic work drive workhead (dead/non swivel/dia. $\pm 5\text{mm}$)	
Automatic eccentric work drive workhead (dead/non swivel)	
Work spindle oriented stop device (inverter controlled)	
Workhead air purge device	
TAILSTOCK	
Hydraulic operated tailstock spindle 50mm stroke, auto. Lub.	
Manual tailstock with taper adjustment 30mm stroke	
Auto. Adjust. type hyd. Operated tailstock 125mm stroke, auto lub., clamp detector	
Manual adjust. and hyd. Op. Tailstock 160+50mm stroke, auto. Lub., clamp detector	
NC adjust. & hyd. Op. Tailstock 150+50mm, auto. Lub., clamp detector	

ITEM	REFERENCE
HYDRAULIC SYSTEM	
Special specified hydraulic tank	(maintenance type)
Hydraulic oil cooler	
LUBRICATION SYSTEM	
Wheel spindle lubrication oil cooler	
COOLANT SYSTEM	
Coolant pan cleaning device (with splash gun)	
Coolant tank 200lts. Specified	200L
Magnetic coolant dust separator	80L/min.
Paper filter type coolant dust separator	80L/min.
Magnetic & paper filter coolant dust separator	80L/min.
Coolant fluid temperature control device	
Coolant fluid oil level gauge	
Coolant pump 250W specified	
PNEUMATIC SYSTEM	
Air drain solenoid valve	
Air gun	
ELECTRIC	
Separate type electric control box	
Stay type operation panel	
Pendant type operation panel	
Machine lighting equipment (fluorescent lamp 20W $\times$ 2)	
Control box lighting equipment with 100V socket	
Indicator lamp (signal tower, 3 colors)	
Program capacity	640m

OPTIONAL ACCESSORIES

ITEM	REFERENCE
Wheel balancing stand	$\phi 510 \times 140$
Wheel lifting tool	Hook type
Wheel balancing arbor	$\phi 57 \times 2/15 \times 280$
Spare wheel flange	$\phi 510 \times 38 \sim 75 \times \phi 152.4$
Spare wheel flange	$\phi 510 \times 38 \sim 75 \times \phi 203.2$
Grinding wheel	
Table mount type diamond tool holder	Center line
Diamond tool	$\phi 8 \times 26$, approx. 1 ct.
Formed diamond tool	$\phi 8 \times 32$, approx. 1.5 ct.
2-point steady rest	$\phi 10 \sim 130$
3-point steady rest	$\phi 20 \sim 130$
Work rest (manual)	$\phi 20 \sim 130$ (2pcs.)
Scroll chuck set (#6 with chuck plate)	O:3~160mm I:48~150mm
Work driving dog set	(S-1~S-6)
Hydraulic operating oil	40 L
Wheel spindle lubrication oil	20 L

Grinding Example



Work-piece

Item	Spindle
Material	SACM645
Thermal treatment	Nitriding
Stock removal	(O.D.) ϕ 0.3mm
Stock removal	(Shoulder) 0.1mm

Grinding conditions

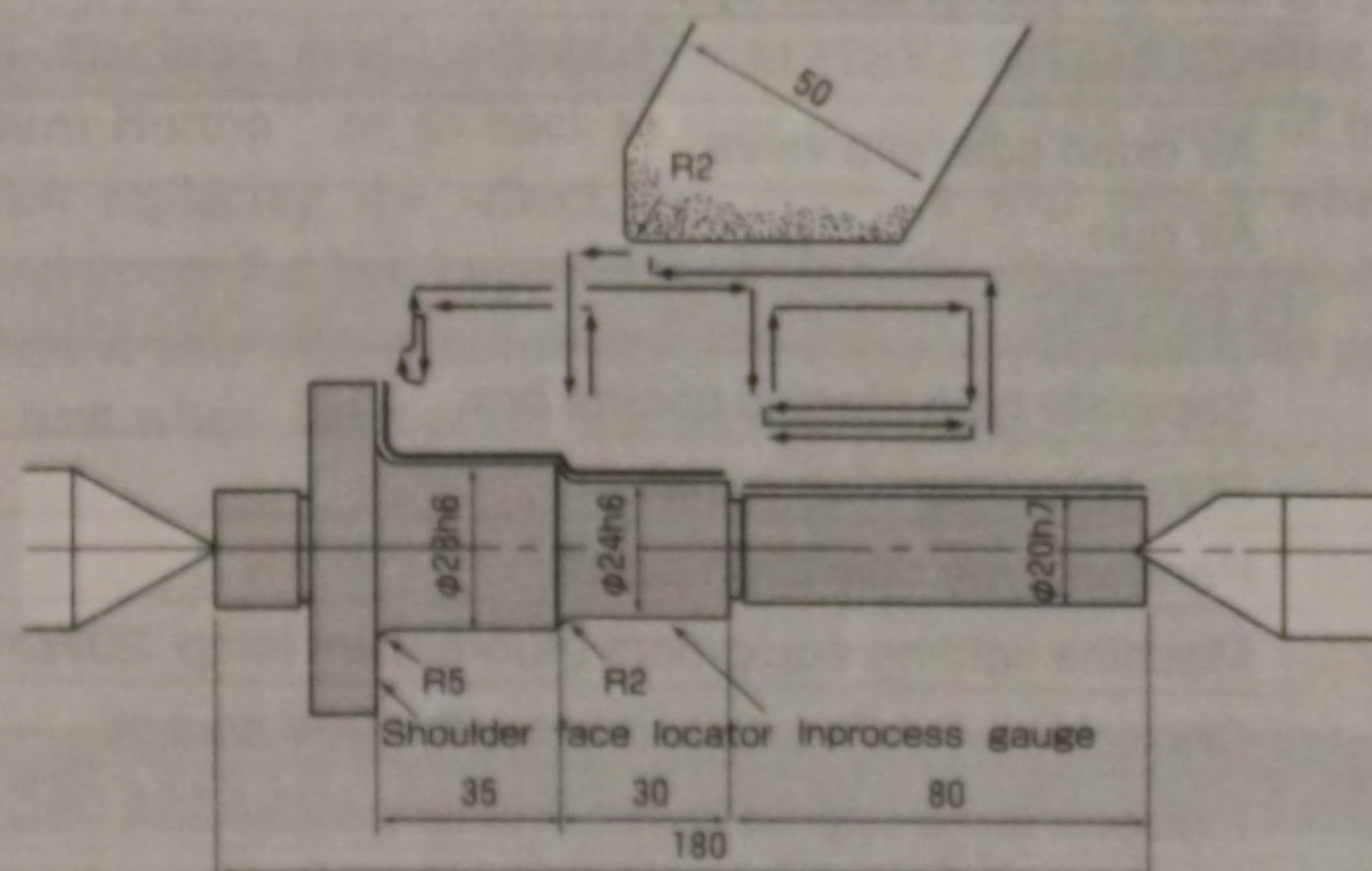
Wheel material	N3A80J
Wheel peripheral speed	2700m/min.

Grinding accuracy

Roundness	1.0 μ m
Cylindricity	1.5 μ m
Surface finish	1.5 μ mRmax
Tolerance	3 μ m(direct gauge) 6 μ m(indirect gauge)

Grinding time

Rough grinding	15min.
Finish grinding	20min.



Work-piece

Item	Shaft
Material	SCM415
Stock removal	ϕ 0.3mm

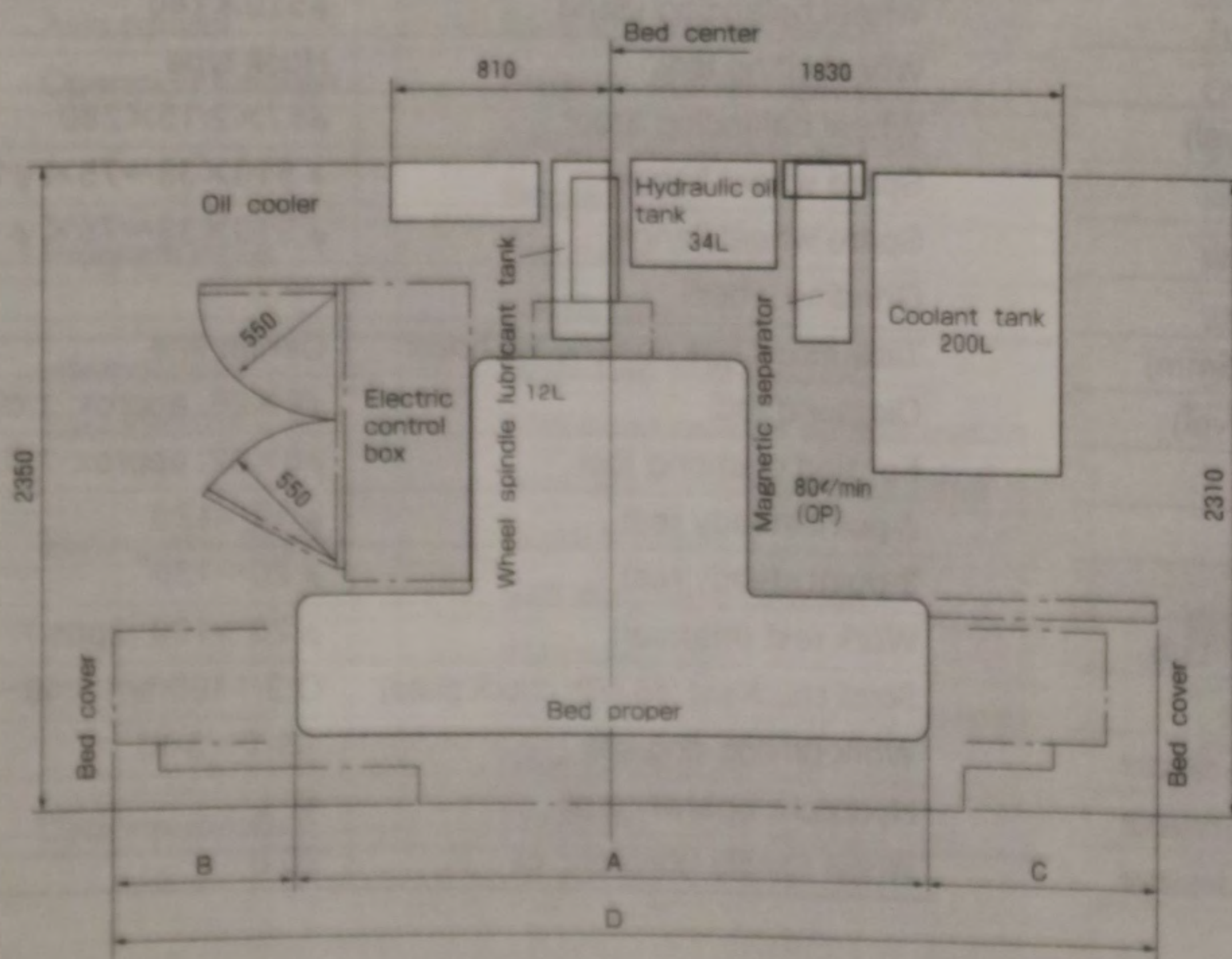
Grinding conditions

Wheel material	N3A80J
Wheel peripheral speed	2700m/min.

Grinding accuracy

Roundness	0.8 μ m
Cylindricity	2.0 μ m
Surface finish	1.5 μ mRmax
Tolerance	3 μ m(direct gauge) 6 μ m(indirect gauge)
Grinding time	4.5min.

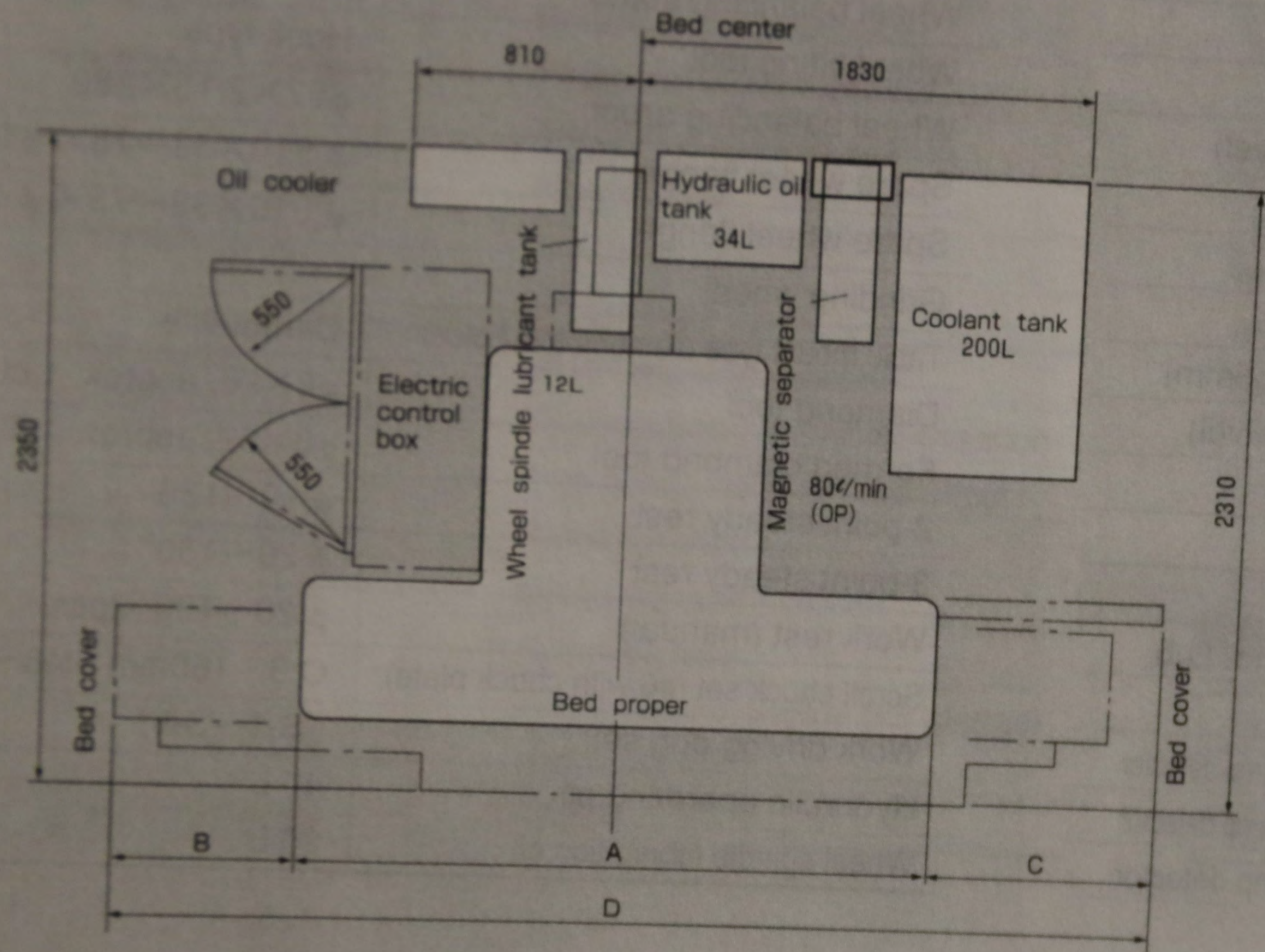
Floor plan



GN-30 (40) B	60	100	150	200
A	2320	3120	4120	5120
B	650	600	1000	820
C	650	880	1000	1450
D	3620	4600	6120	7390

(Unit:mm)

Floor plan



GN-30(40)B	60	100	150	200
A	2320	3120	4120	5120
B	650	600	1000	820
C	650	880	1000	1450
D	3620	4600	6120	7390

(Unit:mm)