

INVERTED VERTICAL TURNING CELL

CS20/25

INSTRUCTION MANUAL

57 SPECIFICATION

SEIKI - SEICOS Σ 21L

Edition 2.02



***Hitachi Seiki Deutschland
Werkzeugmaschinen GmbH***

Introduction

Thank you for your having purchased the machine, favoring our product lines for your use.

This manual contains fundamental information on the specification. Please read and fully understand the contents for your safe machine operation.

In particular, the contents of the items concerning safety in this manual and the descriptions on the “caution plates” attached to the machine are important. Please follow the instructions contained and keep them always in mind to ensure safe operation.

The reference record papers on adjusting setting values such as a parameter list are attached to the machine unit and enclosed in the packing. These are necessary for maintenance and adjustment of the machine later on. Please keep them safely not to be mislaid.

The design and specifications of this machine may be changed to meet any future improvement. As the result, there may arise some cases where explanations in this manual could become partly inconsistent with the actual machine. Please note this point in advance.

In this manual, items on the standard and optional specifications are handled indiscriminately. Please refer to the “delivery note” for the detailed specification of your machine confirmation.

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1. General Precautions

General descriptions is very useful for making working environment against accidents and increase productivity.

1. Be sure to put safety goggles on.
2. Be sure to put safety shoes on.
3. Operate with proper dressing, such as putting a utility cap on, fixing the sleeves and the cuffs of working clothes.
4. Don't operate the machine with gloves.
5. Make clean and neat environment by lighting up and keeping dry around the machine. Also don't put any obstacles.
6. Remove dust and chips on the machine, high voltage control panel and NC unit. Also remove them on the floor. Avoid using compressed air as much as possible for these cleanings.
7. Use a strong enough table to be put around the machine, and take anti-sliding measures on the surface.
8. Don't put tools, workpieces, and other items on the machine as well as on the moving parts of the machine.
9. Don't give any remodeling to the machine without our permission.

1-1 Precautions on Machine Operation

When conducting trial run, read the manual applied to the machine carefully for full understanding beforehand. Witness of our operation instructor is most preferable.

Maintenance

1. An operator and maintenance personnel should read the precautions on the caution plate fitted to the machine and observe them.
Don't stain, damage or remove the caution plate becomes hard to read, contact Hitachi Seiki.
2. Close all the doors and covers except when adjusting work is made.
As for the doors of the NC unit and the power control cabinet, be sure to close them with special care.
3. Don't remove or modify the limit switches for the stroke end, for the travelling axes and the mechanism, or the electric circuit employed for safety.
4. Use regular wrenches and spanners for adjusting or repairing work.
5. When repairing the machine, be sure to perform lock-out or tag-out so that power switch may not be operated.

Coolant

This machine doesn't mix coolant with lubrication oil by using the economy pack. But, the soluble cutting fluid is decomposed due to the factors such as propagation of micro-organisms, which causes various troubles by lowering cutting and rust prevention performance.

When using soluble cutting fluid, care must be taken of the following points.

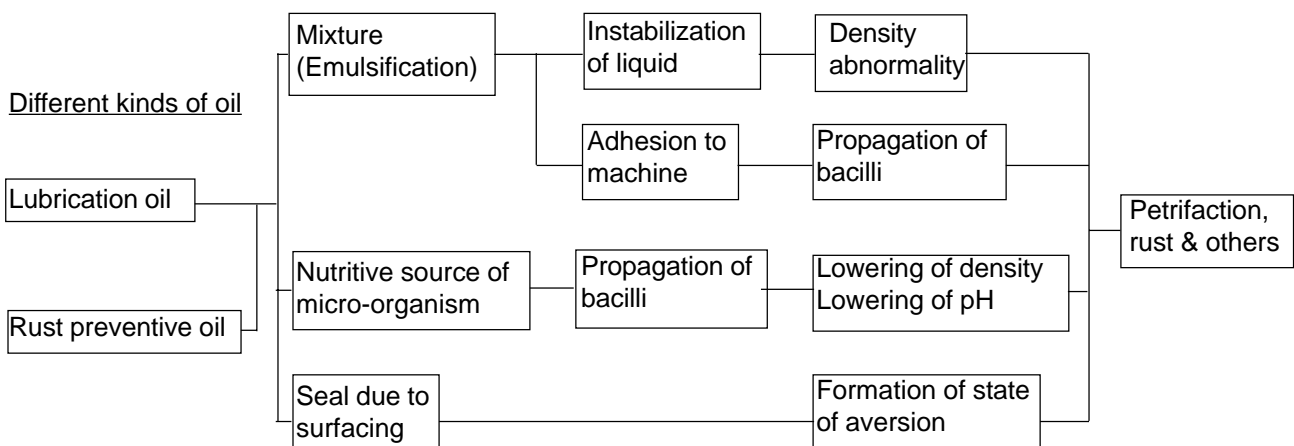
1. When selecting soluble cutting fluid, carefully consider lubrication, infiltration, rust prevention, bubble prevention, separability against oil and safety needs.
2. Before operation starts and after operation ends, not only remove chips, but also wipe off soluble cutting oil adhered to each slideway, the rotating parts, the saddle and cross-slide of the machine and then be sure to apply lubrication oil thinly to those parts.
3. Replace soluble cutting fluid immediately if it becomes vitiated.
4. Remove the covers every 6 months and clean each slideway, X, Y, Z axes ball-screws, each limit switch and feed motors etc.
5. As soluble cutting oil is considered for rust prevention, it may be no problem when the workpiece is wet. However, when dry, it is apt to rust.

Therefore, it is recommendable to apply rust preventive oil before the workpiece dries after finished machining.

6. Since soluble oil is alkaliescent and has a strong decreasing action, the operator is apt to develop dermatitis.

Therefore, the operator should take appropriate precautions.

7. As for the diluting method and soluble cutting fluid, diluting water they are different depending on the type of soluble cutting oil, so use it in accordance with the recommendations of the cutting fluid manufacturer.
8. Since there are instances where extensive micro-organisms are detected in industrial water, it is recommendable either to check it before use as water for dilution or to use service water.
9. Do not use a chemical solution type (synthetic type) in water-soluble cutting agents, because it causes detachment of coating and affects sealing materials and resin materials adversely.
10. The influences of difference kinds of oil on coolant are as follows: Carefully monitor the condition the coolant fluid.



Operation

1. Be aware of the position of the push button for emergency stop so that the operator may be able to press it instantly.
2. As for the operation of the machine, proceed in accordance with the procedure described later.
3. During operation, keep hands away from the rotating sections and movable sections.
4. When disposing of chips that wound round tooling or fell onto the chip brow, etc. it is dangerous to grasp and pull them. Further, when disposing of chips, be sure to do it after stopping the machine.
5. When adjusting the position of the coolant nozzle, do it after stopping the machine.

Tool Setting

1. When setting up tools, stop a spindle as well as the feed in each axis.
2. Be very careful of tool length when setting them up. Do not set the tools over their specified lengths because their tool edges may interfere with a bed, carriage, cover, tailstock, etc. when indexing a turret.
3. Mount tools in a well balance condition. Due to high-speed turret indexing when their mounting is unbalanced, it may lead to improper turret indexing.
4. When setting a tool to the rotating tool, it is feared that the driving side may be damaged, if it is performed in the machine.

Whenever tools are set, be sure to do it at the outside of machine.

Workpiece Chucking

1. When chucking a workpiece, be careful of its balance. Do not turn the spindle if the mounting of the workpiece is unbalanced badly.
2. Use standard soft jaws. Mount the jaws so that they may stay within the outer diameter of the chuck.
3. To set pressure of chuck cylinder, determine it referring to "Chucking Pressure-Gripping Force Diagram".

Take note that the chuck gripping force will be suddenly reduced due to a centrifugal force when the spindle runs at a high speed.

4. When forming the soft jaws, pay full attention to a forming ring gripping position and a shape to which the jaws are to be formed.

After forming, check that the jaws properly grip the workpiece and that a chucking pressure is adequate.

5. When chucking and centering a shaft work, take special note of a workpiece weight, a size of center hole and a thrust force.

If a heavy workpiece is held with a small center hole and a load is applied, the tip of the center may be damaged, allowing the workpiece to jump out.

Operation Finish

1. After operation of the machine is over, be sure to switch the power OFF in the prescribed order, clean the machine and apply rust preventive oil to each section of the machine such as the slide ways.

When soluble cutting fluid is used, perform these jobs with special care.

1-2 Electric Equipment and NC Unit

When operating the machine or carrying out maintenance checks, pay special attention to the following points, concerning the electric equipment and NC unit.

1. Do not give shocks to the NC unit, power control cabinet and other machine parts.
2. For the primary wiring of the machine, use the cable size specified in the maintenance manual. Do not use an excessively long cable.
3. While test running the machine, be sure the setting parameter of the NC unit coincides with the parameter sheet attached to the machine.
4. Do not change the current set values of thermal relays in the power control cabinet, various control knobs or the parameter data.

When the primary wiring has to be put on the floor, protect it with a cover against damage by cutting chips and other sharp objects.

5. Do not apply excessive force, e.g. bending force etc., to the connector portion of plugs, flexible conduits (tubes) or cable cables etc.
6. When carrying out maintenance checks on the electric equipment, turn off the EMERGENCY STOP button on the operation panel, the power of the NC unit, the main switch of the power control cabinet and the power switch installed in your factory, in this order.

Start maintenance work after making sure that these switches are turned off.

Lock the power switches in the OFF state as much as possible or put up warning signs. In additions, place a "DO NOT TOUCH" tag near the operation buttons of the machine to forbid other personnel from operating the machine.

7. Handle electric equipment of the machine with particular care and exercise extreme caution not to allow the machine to get wet.
8. For equipment inside the power control cabinet, use those specified by Hitachi Seiki. Use always specified fuses. Never use fuses with a higher capacity.
9. Never leave the control cabinet door open, because direct sunshine or camera's strobe flash rays may enter the cabinet and damage internal equipment.
10. In case of turning on the power again, execute power on wait by equal to or more than two seconds after power turned off. If the power is turned on during discharge from control device by power off, pay attention to the alarm of the machine is displayed some time, due to normal process is not available.

1-3 Weights and Measures Table

(Metric and English Conversion)

1. Liner measure

1m (meter) = 39.37 inches = 3.2808 feet = 1.0936 yards

1cm (centimeter) = 0.3937 inch

1mm (millimeter) = 0.03937 inch

2. Square measure

1m² (square meter) = 10.764 square feet = 1.196 square yards

1cm² (square centimeter) = 0.155 square inch

1mm² (square millimeter) = 0.00155 square inch

3. Cubic measure

1m³ (cubic meter) = 35.315 cubic feet = 1.308 cubic yards

= 264.2 U.S. gallons = 220.0 U. K. gallons

1ℓ (liter, cubic decimeter) = 0.0353 cubic foot = 61.023 cubic inches

= 0.2642 U.S. gallon = 1.0567 U. S. quarts

= 0.2200 U.K. gallon = 0.02745 bushel

1cm³ (cubic centimeter) = 0.061 cubic inch

4. Weight

1 ton (metric ton) = 0.9842 U. S. (long) ton = 2204.6 pounds

= 1.1023 U. K. (short) ton

1 kg (kilogram) = 2.2046 pounds = 35.274 ounces avoirdupois

5. Others

0.098 MPa (Mega-Pascal) = 14.223 pounds per square inch

9.8 N.m (Newton-meter) = 7.233 foot-pounds

2. SPECIFICATIONS

2-1 Machine Outline

The equipment has two sets of vertical headstocks and drum type tool posts of the same structure installed on the integral bed. The reversing unit is installed in the center of the equipment to allow the left and right machines to mutually transfer the work between them. The left and right machines are simultaneous 2-axis control NC lathes for chuck work, respectively.

The following lists the features of the equipment:

1. The vertical headstock can move in the X- and Z-axis directions. In addition to cutting, it loads and unloads the workpieces through X-directional movement to the outside of the machine and Z-axis movement. Basic movements are as follows:
The workpiece is introduced from the feeder of the left machine. Once the workpiece is finished with machining, it moves to the right machine via the reversing unit. After 1st- and 2nd-process machining is completed, the finished workpiece is unloaded onto the feeder of the right machine.
2. The workpiece can be passed not only from the left to the right, but the other way around. The left and right machines can also machine different workpieces independently. The tools used and the machine operating methods are common to both left and right machines.
3. An AC inverter motor is used for the spindle to allow a wide range of stepless speed change.
4. The inner-diameter tools are radially arranged, offset from the outer-diameter tools to ensure that the tools do not interfere with the workpiece within the standard machining diameter.
5. The electromechanical structure integrated with the coolant tank and circular stocker saves the space and facilitates transportation/move.
6. A diagnostic function is added.
7. A machining range can be further expanded by adding optional accessories.

Outline of Equipment Structure

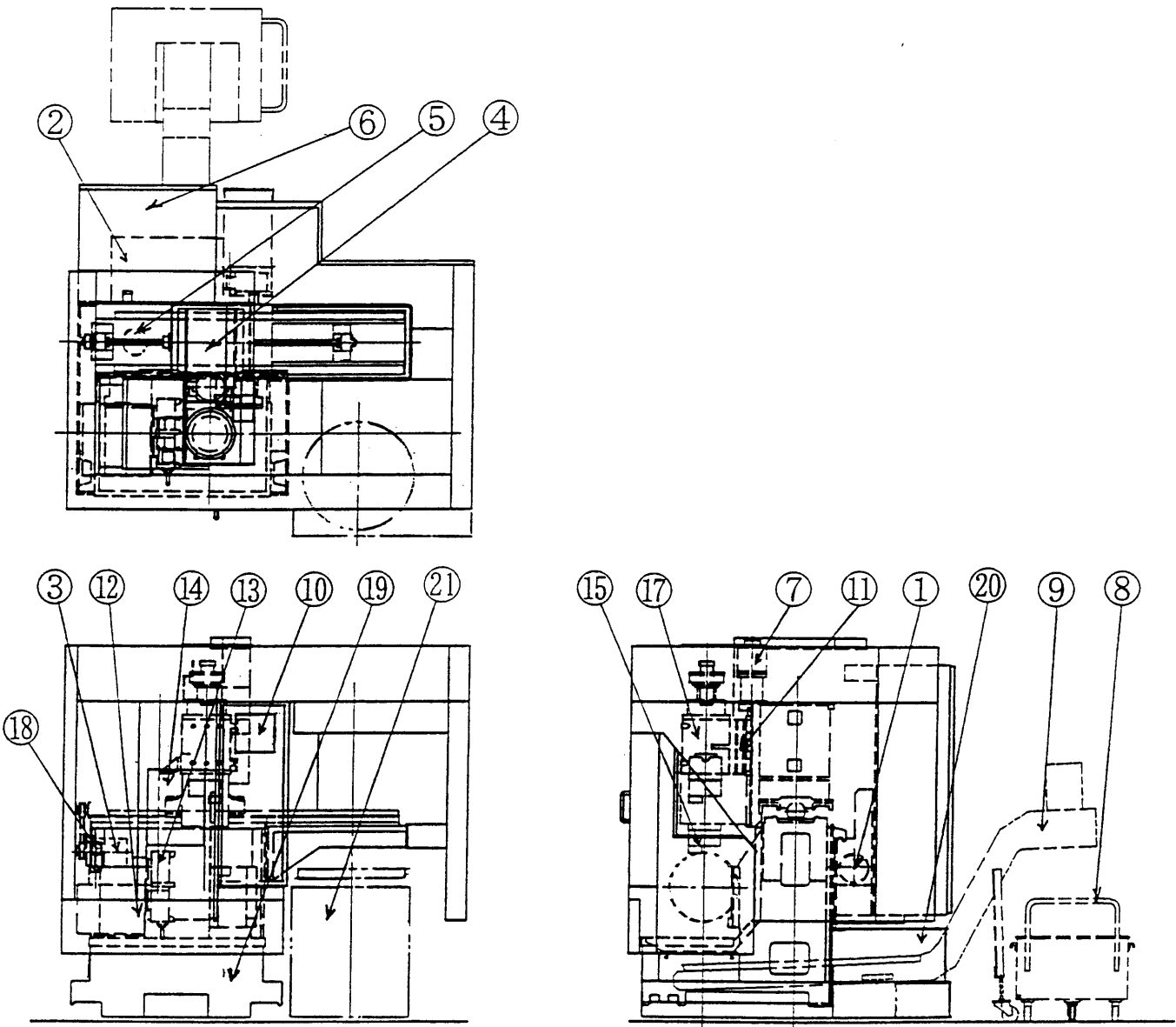
1. Mechanical Construction
 - The headstock is vertically suspended and moves along the X- and Z-axis.
 - The X-axis is provided long enough to allow the headstock to move to a workpiece loading position outside the machine.
 - The tool post is secured under the headstock and performs only indexing.
2. Headstock

A high-torque built-in motor allows a wide range of automatic speed change as follows:

{	CS20	30 to 5,000 min ⁻¹
	CS25	30 to 4,000 min ⁻¹
3. Tool Post

High indexing accuracy is ensured by a unique coupling system.
Indexing operation is driven by a servo motor and clamping operation by a hydraulic unit, respectively, to improve certainty of operations.
4. The 12-face VDI rotary tool post allows you to mount the X- and Z-directional rotary tools to any turret faces.
Simultaneous 3-axis control is enabled by adding a spindle C-axis control function.

2-2 Component Units



1	Oil pressure unit	7	Z axis feed motor	13	Turret	19	Bed
2	Coolant tank	8	Chip box (OP)	14	Q-setter	20	Spindle cooling system
3	X axis feed motor	9	Chip conveyor(OP)	15	Spindle	21	Stoker
4	Saddle	10	Operating panel	16			
5	Coolant pump	11	Cross slide	17	Headstock		
6	Power control cabinet	12	Tool post	18	Chuck pressure adjustment manifold		

2-3 Machine Specifications

1. Machine Specifications

1) CS20

	Item	Unit	12-st. base holder type turret	12-st. VDI type turret	12-st. VDI rotating tool type turret
Capacity	Max. spindle swing	mm (inch)	350 (13.8")		
	Chuck outer diameter	mm (inch)	210 (8.25")		
	Max. machining diameter	mm (inch)	φ350 (φ13.8")		
	Max. machining length	mm (inch)	150 (6")		
Travel	X axis travel	mm (inch)	1310(51.5")(Cutting area:190 (7.5"),Loader area:1120 (44"))		
	Z axis travel	mm (inch)	370 (14.5")		
Spindle	Spindle speed	min ⁻¹ (rpm)	30 ~ 5000		
	Spindle speed range		Stepless		
	Spindle nose (Type, NO.)	JIS	A2-6		
	Diameter of spindle through hole	mm(inch)	φ59 (φ2.3")		
	Spindle bearing inside diameter	mm (inch)	φ100 (φ4")		
Turret head	Type of turret		12-st. base holder	12-st. VDI	12-st. VDI rotating tool
	No. of tool		12 pcs.(O.D. 6, I.D. 6)	12	
	Shank size of O.D. tool	mm (inch)	25 (1")		
	Boring ber size	mm (inch)	32(B/H hole dia. 40) / 1-1/4" (HOLE 1.5")		
Feedrate	Rapid traverse X axis	m/min (ipm)	30 (1181)		
	Z axis	m/min (ipm)	30 (1181)		
	Cutting feed (Per revolution)	mm/rev (ipr)	0.001 ~ 1000 (0.001 ~ 40)		
	Jog feed	mm/min (ipm)	0 ~ 5000 (0 ~ 200)		
Motor	Spindle motor (40%ED/continuous)	AC-kW (HP)	11/7.5 (15/10)		
	For Rotary tools(15 minutes rated/continuous)	AC-kW (HP)E	----	----	3.7/2.2(5/3)
	Axis feed motor X axis	AC-kW(HP)	2.8 (3.8)		
	Z axis	AC-kW (HP)	3.8 (5)		
	Turret indexing motor	kW (HP)	2.2 (2.9)		
	Oil pressure pump	kW (HP)	0.4 (0.5)		
	Coolant fluid motor	kW (HP)	1.1 (1.5)		
Power Source	Spindle coolant pump	W (HP)	0.4 (0.5)		
	Power supply	kVA	23		
	Pneumatic Pressure	MPa (psi)	0.5 (70)		
	source Rate of flow	Nℓ/min (gal/min)	150 (40)		
Machine weight		kg (℔bs)	5000 (11000)		

2) CS25

	Item	Unit	12-st. base holder type turret	12-st. VDI type turret	12-st. VDI rotating tool type turret
Capacity	Max. spindle swing	mm (inch)	350 (13.8")		
	Chuck outer diameter	mm (inch)	254 (10")		
	Max. machining diameter	mm (inch)	φ350 (φ13.8")		
	Max. machining length	mm (inch)	150 (6")		
Travel	X axis travel	mm (inch)	1310(51.5")(Cutting area:190 (7.5"),Loader area:1120 (44"))		
	Z axis travel	mm (inch)	370 (14.6")		
Spindle	Spindle speed	min ⁻¹ (rpm)	30 ~ 4000		
	Spindle speed range		Stepless		
	Spindle nose (Type, NO.)	JIS	A2-8		
	Diameter of spindle through hole	mm(inch)	φ78 (φ3.1")		
	Spindle bearing inside diameter	mm (inch)	φ130 (φ5.1")		
Turret head	Type of turret		12-st. base holder	12-st. VDI	12-st. VDI rotating tool
	No. of tool		12 pcs.(O.D. 6, I.D. 6)	12	
	Shank size of O.D. tool	mm (inch)	25 (1")		
	Boring ber size	mm (inch)	32(B/H hole dia. 40) / 1-1/4" (HOLE 1.5")		
Feedrate	Rapid traverse X axis	m/min (ipm)	30 (1181)		
	Z axis	m/min (ipm)	30 (1181)		
	Cutting feed (Per revolution)	mm/rev (ipr)	0.001 ~ 1000 (0.001 ~ 40)		
	Jog feed	mm/min (ipm)	0 ~ 5000 (0 ~ 200)		
Motor	Spindle motor (40%ED/continuous)	AC-kW (HP)	15/18.5 (25/20)		
	For Rotary tools(15 minutes rated/continuous)	AC-kW (HP)E	----	----	3.7/2.2(5/3)
	Axis feed motor X axis	AC-kW(HP)	2.8 (3.8)		
	Z axis	AC-kW (HP)	3.8 (5)		
	Turret indexing motor	kW (HP)	2.2 (2.9)		
	Oil pressure pump	kW (HP)	0.4 (0.5)		
	Coolant fluid motor	kW (HP)	1.1 (1.5)		
Power Source	Spindle coolant pump	W (HP)	0.4 (0.5)		
	Power supply	kVA	26		
	Pneumatic Pressure	MPa (psi)	0.5 (70)		
	source Rate of flow	Nℓ/min (gal/min)	150 (40)		
Machine weight		kg (ℓbs)	5400 (11900)		

2. Standard Accessories

1. Q-Setter 1 set
2. CS20: ϕ 210 Solid chuck (With chuck open/close confirmation equipment) 1 set
CS25: ϕ 254 Solid chuck (With chuck open/close confirmation equipment) 1 set
3. Soft jaw 1 set
4. Work light 1 set
5. Leveling block 1 set
6. Spindle override 1 set
7. Call light (yellow) 1 set
8. Spindle load meter (on screen) 1 set
9. Electric leakage breaker 1 set
10. Spindle positioning device (two position indexing electric system) 1 set
11. Chuck side air blow confirmation 1 set
12. Jet coolant 1 set
13. Operator side door interlock 1 set
14. Chuck open/close M function 1 set
15. Chuck open/close confirmation 1 set
16. Spindle speed meter (on screen) 1 set
17. Machining completion pre-call 1 set
18. Work counter (on screen) 1 set
19. Run hour display (on screen) 1 set
20. Spinners & wrenches 1 set

3. Optional Accessories

- Chip conveyor backward delivery
- Chip wagon
- Automatic power shut-off device
- SEIKI DON FD card
- Magnet piece (In the coolant tank)
- Chip conveyor intermittent feeder
- Chuck-side coolant/air changeover (M-code)
- Work airtightness checker
- Counter
- Addition of the call light
- Buzzer alarm
- Safety measure specifications
- External power transformer 32 kVA
- Work tools
- Coolant gun
- Tool post coolant/air changeover (M-code)
- Chucking pressure 2-step changeover
- Work pusher
- Spindle tachometer (Standalone)
- Rotary tool tachometer (Standalone)
- Spindle load meter (Standalone)
- Rotary tool spindle load meter (Standalone)
- Weekly timer

2-4 NC Unit Specifications

Refer to the NC unit specifications list of SEIKI SEICOS instruction manual (operating section) for details of specifications.

Item	Standard specification	
1	Controlled axis	2 axis, axis simultaneous
2	Least input increment	0.001mm/0.0001"
3	Interpolation	Positioning, Linear, Circular
4	Inch/Metric conversion	
5	Tape code	EIA/ISO auto.recognition
6	Designation	INC./ABS.
7	Decimal point programming	
8	Buffer register	
9	Feedrate command	F code/feedrate direct
10	Rapid traverse override	0, 1, 10, 50, 100%
11	Feedrate override	0~200% (10% step)
12	Override cancel	
13	Spindle override	50~150% (10% step)
14	Threading function	F/E code direct
15	Manual feed function	Rapid, Jog feed, Handle
16	Manual pulse generator	×1, ×10, ×100 (inch=×50)
17	Part program storage	80m
18	Add. registered programs	100 pcs.
19	Back ground editing	
20	Extended program edit	(Program copy)
21	Display	9.5" Monochrome
22	Memory lock	
23	Language display	English/German
24	Tape mode operation	RS232C*1
25	I/O interface	RS232C*1
26	Function	G3, M3, T4
27	Spindle speed command	S code/speed direct
28	Constant surface speed control	

Item	Standard specification	
29	Automatic tool nose radius compensation	
30	Grooving width offset	(I.D., O.D., Face)
31	Tool offsets	32 sets
32	Q-setter repeat function	
33	Cutting point coordinate system setting	
34	Reference point return	Manual, Auto G27~29
35	2nd reference point return	G30
36	Graphic display	Before and synchronized machining
37	16-character program name	
38	Single block	
39	Block skip	Total 9 pcs. (with switch 5 pcs.)
40	Optional stop	
41	Program check function	Dry run + Spindle stop + coolant stop
42	Machine lock	
43	Program number	O 8 digit
44	Program number search	
45	Sequence number search, Sequence number comparison	
46	Program comparison	
47	Manual absolute	[ON] fixed
48	Custom macro	Common variable 300 pcs.
49	Soft jaws forming function by graphic	
50	Fixed cycle	G90, G92, G94
51	Multiple repetitive cycle	G70~G76
52	Mirror image	Setting via screen
53	Chamfering/corner R any angle	
54	Radius designation on arc	
55	Exact stop	G09 G61 G64
56	Programmable data input	G10

Item	Standard specification	
57	Backlash compensation	
58	Run hour display/Spindle speed display	(On screen)
59	Cycle completion pre-call	(On screen)
60	Cycle time display	(On screen)
61	Work counter	(On screen)
62	Following up	
63	Stored stroke limit 1•2•3	
64	NC self diagnostics	

*1 : Interface only.

Not include cable.

Item	Optional specification	
1	Direct tapping	(Rotating tool)
2	Variable lead threading	
3	Thread cutting cycle retract	
4	Multiple start thread cutting	
5	Custom macro	Common variable 600 pcs.
6	Drilling cycle	(Rotating tool) G80~89
7	Macro print func.	(Need printer w/ RS232C I/F) *1
8	Tool diameter compensation	(Rotating tool)
9	Part program storage	Total 160 m
10	Part program storage	Total 320 m
11	Add. registerable prog.	Total 200 pcs. (Need 160m)
12	Add. registerable prog.	Total 400 pcs. (Need 320m)
13	Tool offset	Total 64 pcs.
14	Tool offset	Total 99 pcs.
15	Return to cycle interrupted point	
16	48-character program name	
17	Program restart	
18	Angle program for linear interpolation	
19	Cylindrical interpolation	(Including tool diameter compensation)
20	Polar coordinate interpolation	(Including tool diameter compensation)
21	External data input	Need technical discussion
22	Skip function	High-speed
23	Tool life management (Count only)/Spare tool call	
24	Each program, cycle time display	10 pcs. (On screen)
25	Each program, cycle time display	50 pcs. (On screen)
26	Cutting monitor	(Incl. tool life management (Count only) / Spare tool call)
27	C-axis control	(Rotating tool and C-axis must needed) *2
28	Multiple axis control	*2

*1 : Interface only.

Not include cable.

*2 : When selected C axis must choose multiple axis control

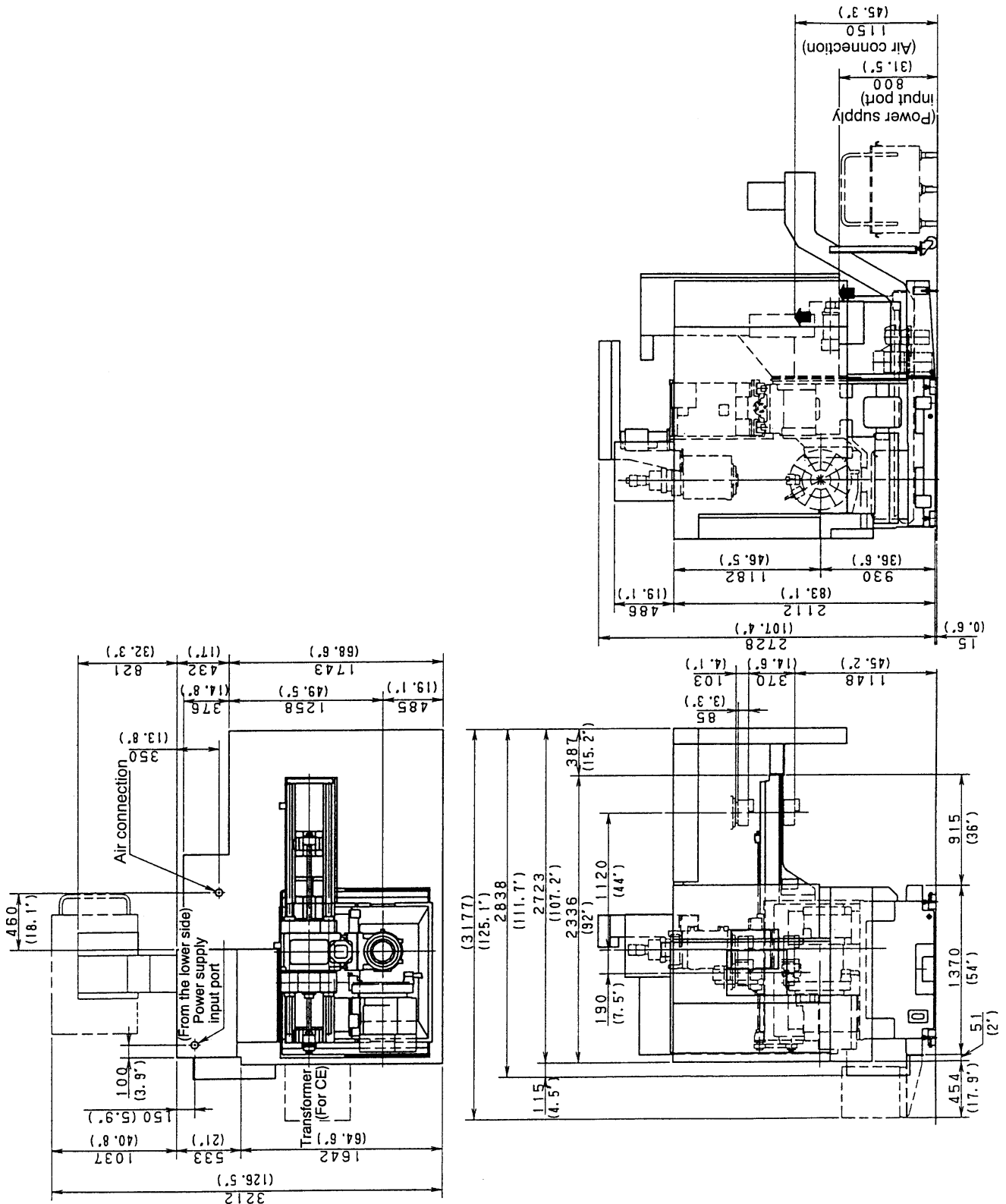
2-5 Major Dimensions

1.CS20/25 Major Dimension

(1) 12-station Base Holder Turret Head Type

Dimension : metric (mm)

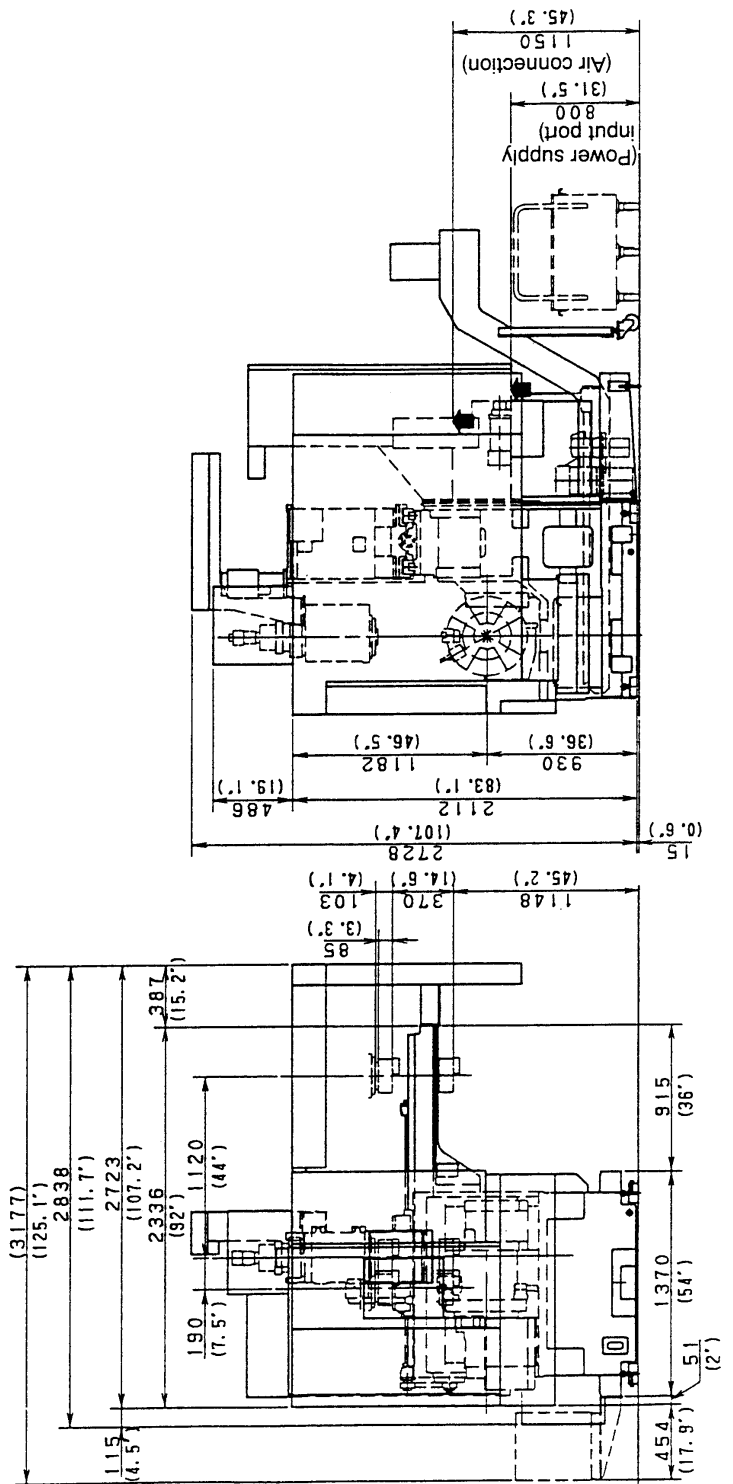
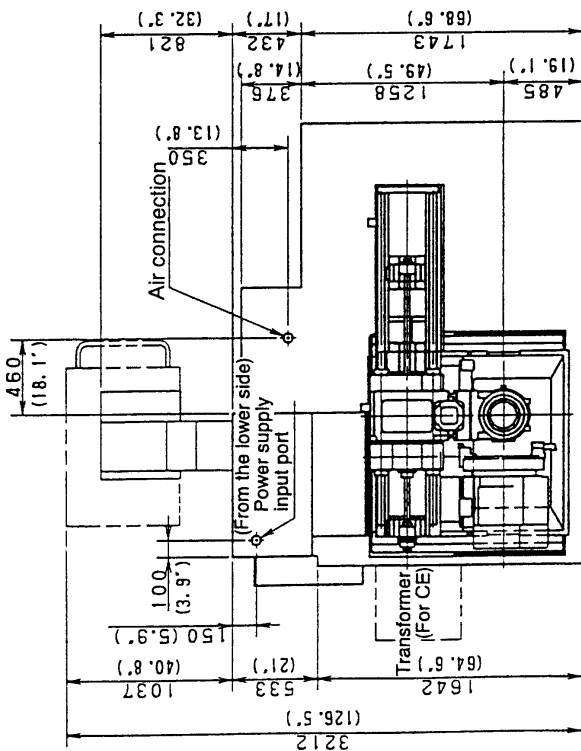
inch (")



(2) 12-station VDI/VDI Rotating Tool Turret Type

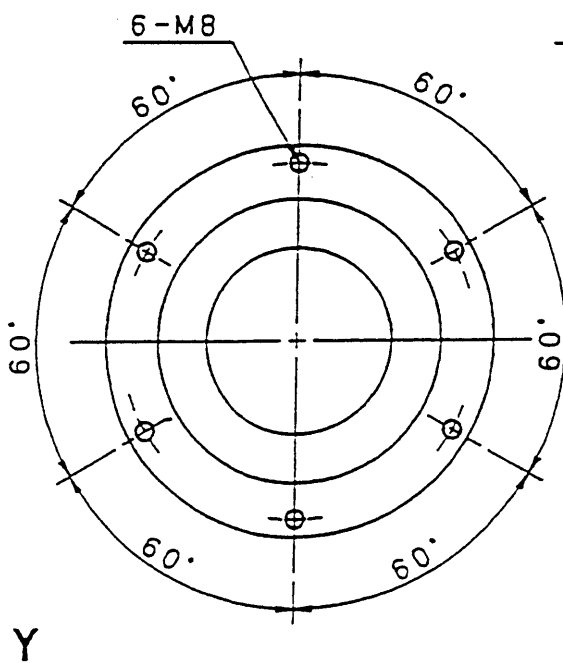
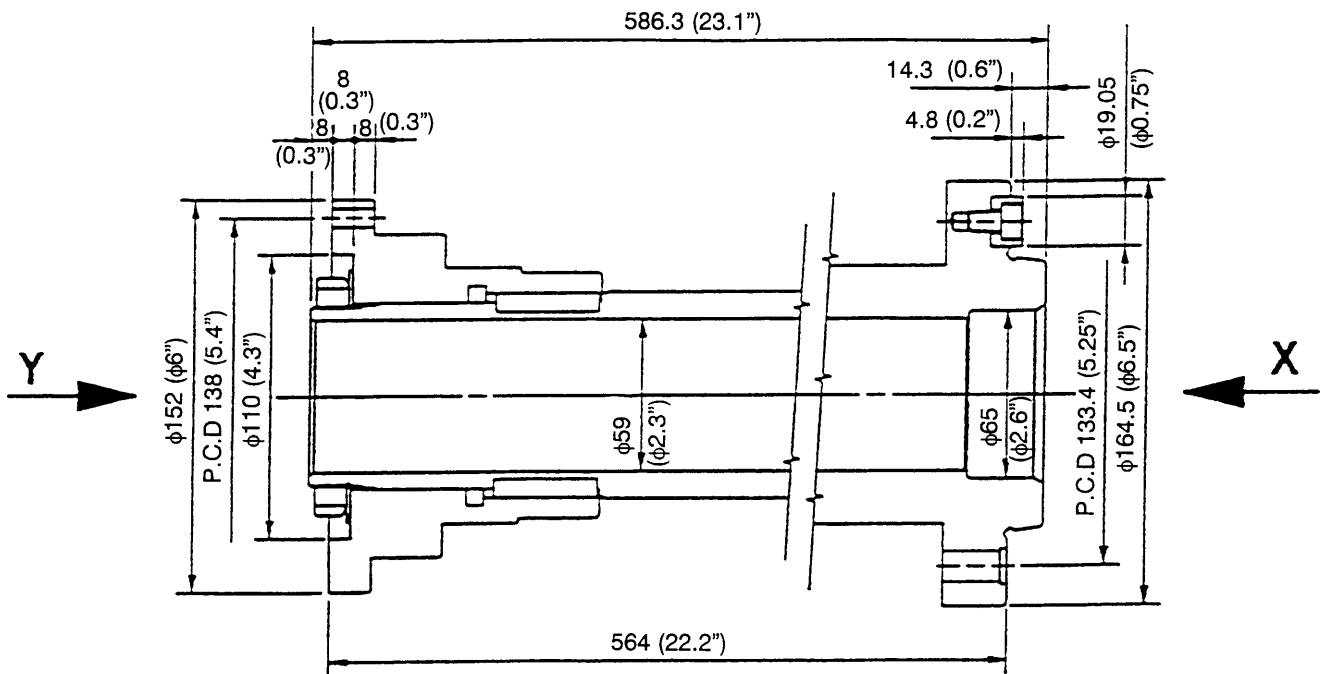
Dimension : metric (mm)

inch (")

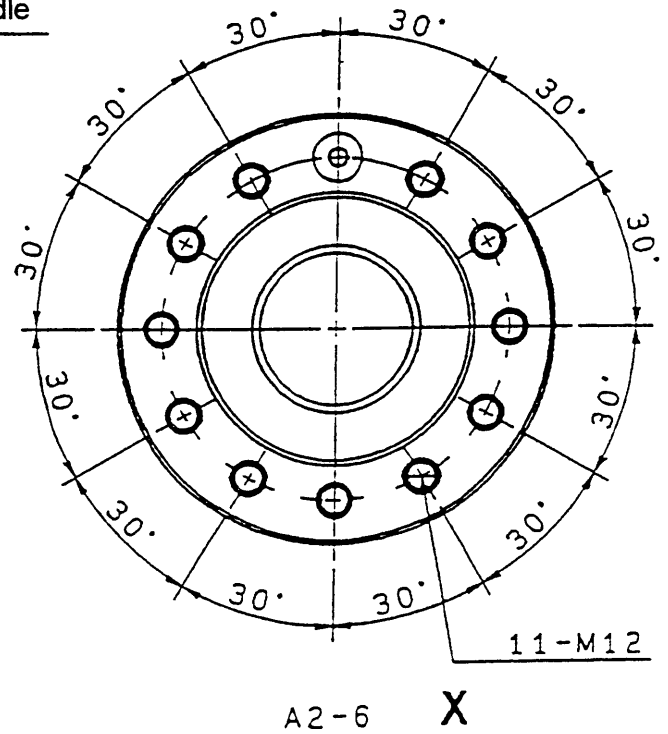


2. Spindle
CS20 Spindle

Dimension : metric (mm)
inch (")



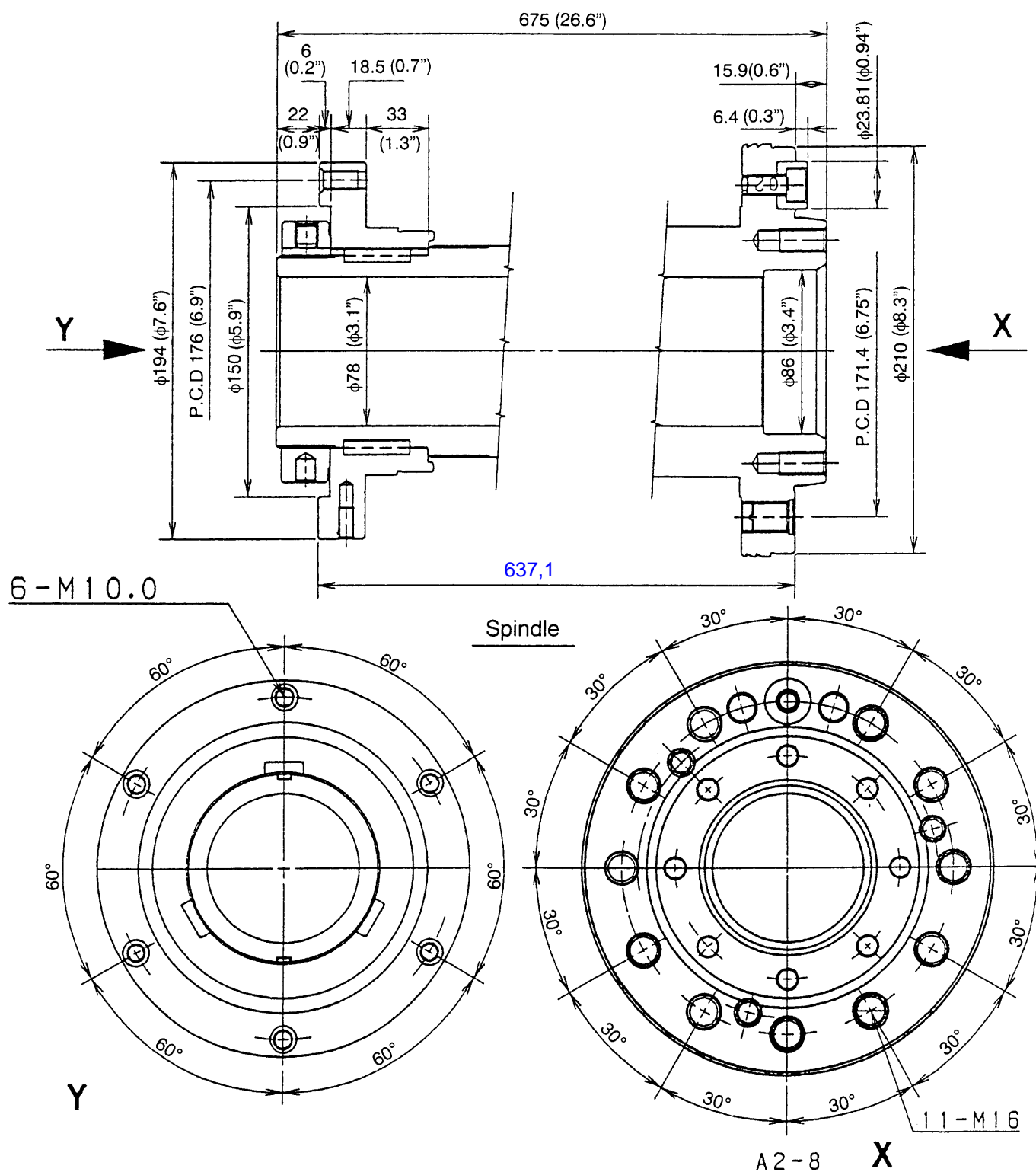
Spindle



CS25 Spindle

Dimension : metric (mm)

inch (")



3. Turret Head

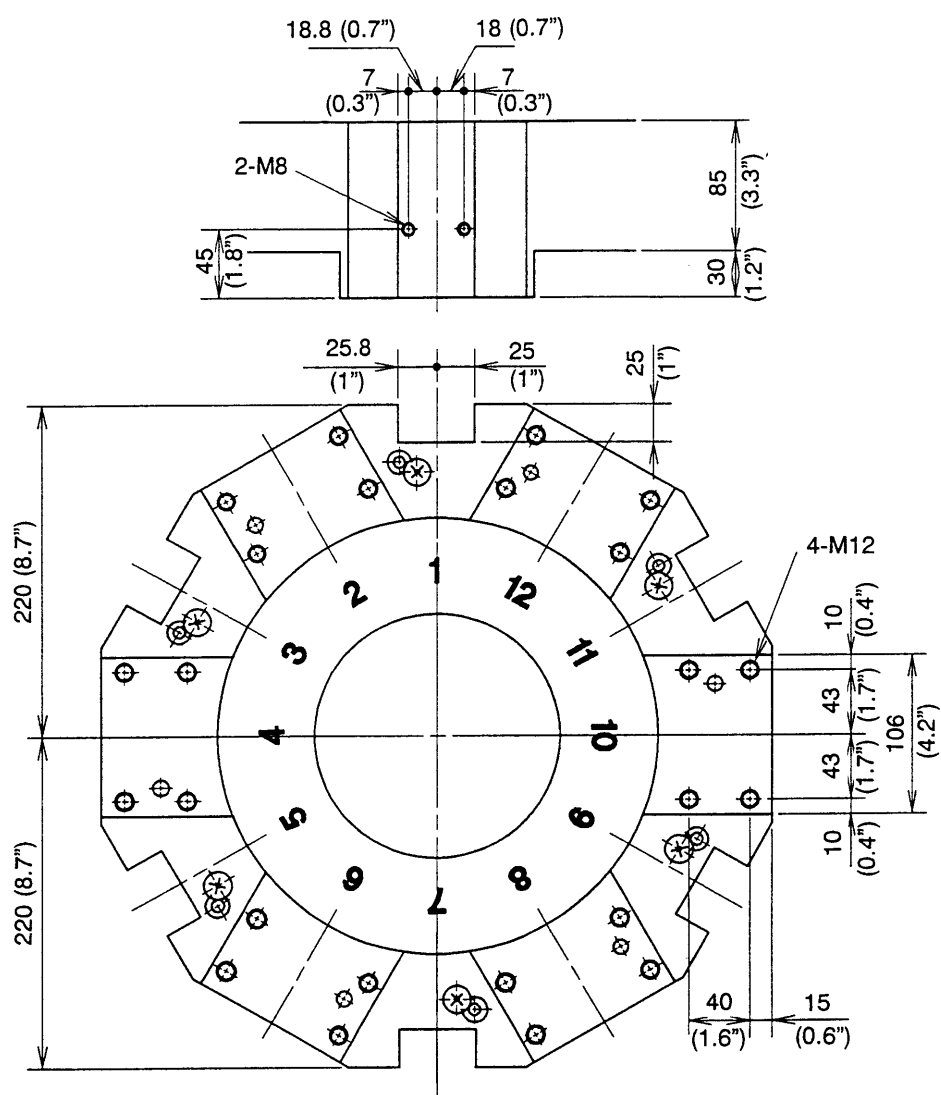
(1) Turret Head list

No.	Turret Head
1	12-BH
2	12-station VDI
3	12-station VDI Rotating Tool

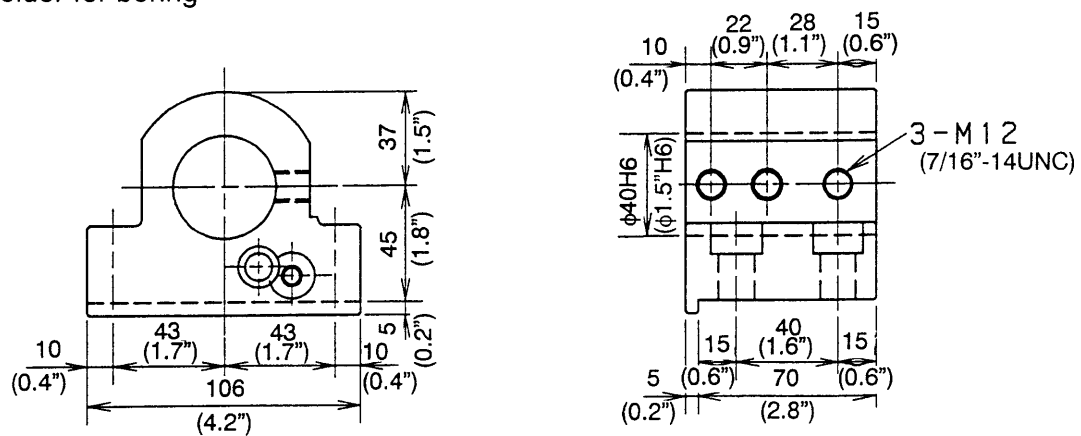
(2) 12-station Base Holder Turret Head

Dimension : metric (mm)

inch (")

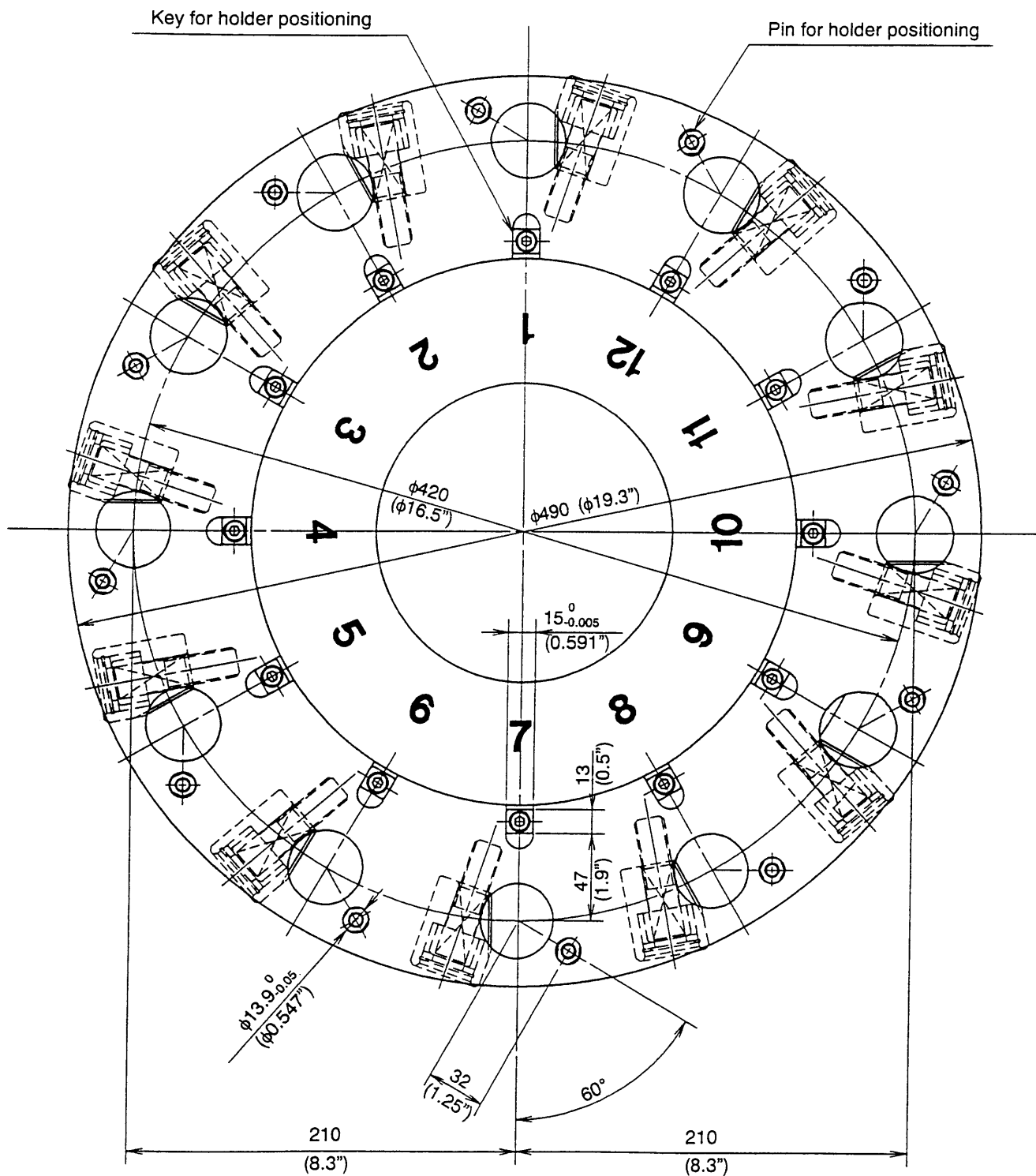


Base holder for boring



(3) 12-station VDI/VDI Rotating Tool Turret Head

Dimension : metric (mm)
inch (")

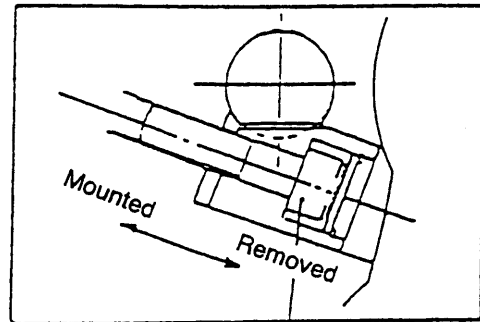
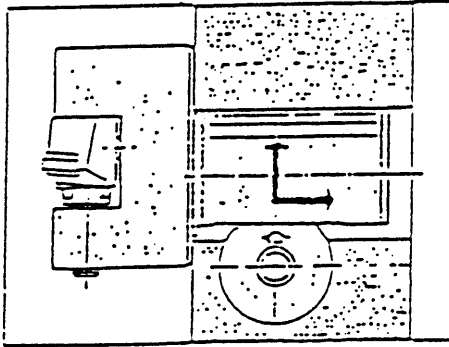


- How to Use Base Holder of VDI System

Mounting Method to Turret Head

A mounting method of a holder to the turret is as follows;

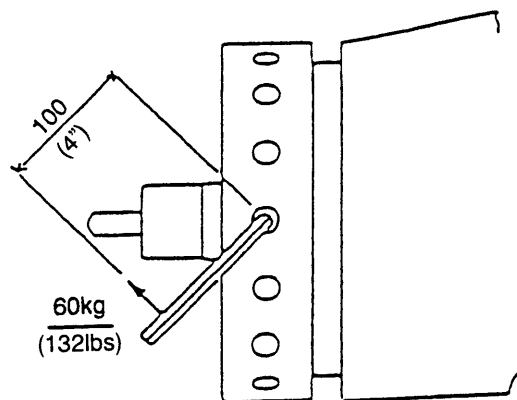
With an attached 10mm hexagon bar wrench inserted into the hexagon socket head cap screw and turned rightward, the base holder is tightly fitted to the turret head.



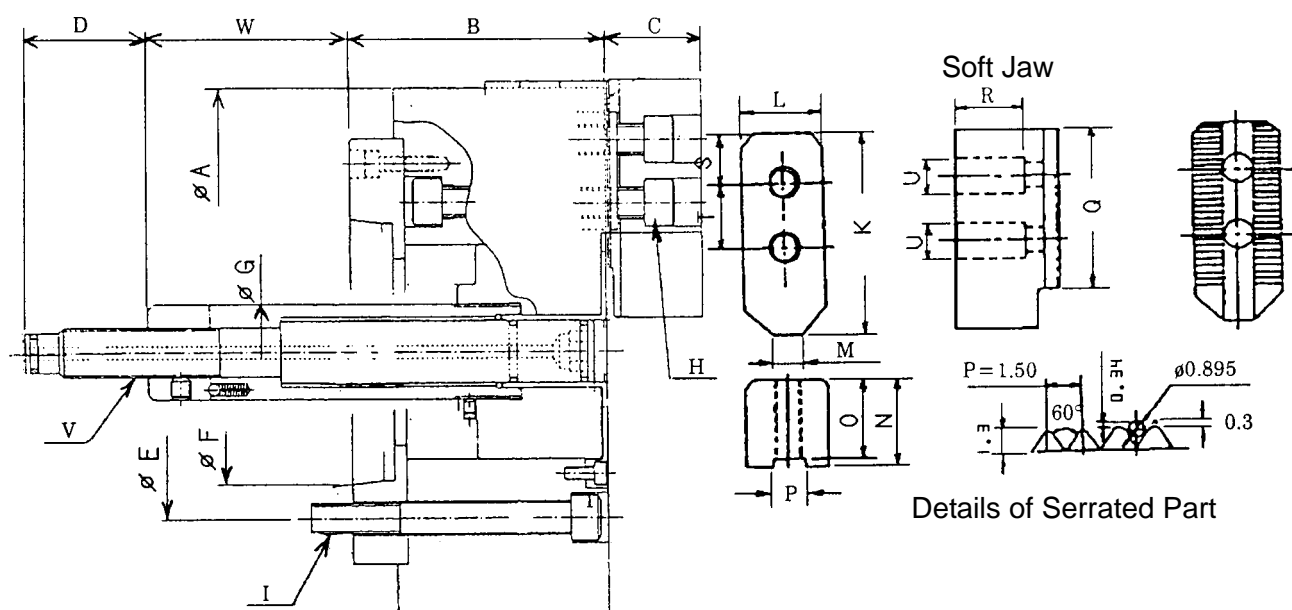
Hexagon socket head cap screw

Caution

- To mount a tool holder on the turret, do not tighten it with excessive force. Guideline of tightening force applied is as in the right drawing.
- To take off a holder from the turret, loosen the clamp bolt by about 4 turnings.



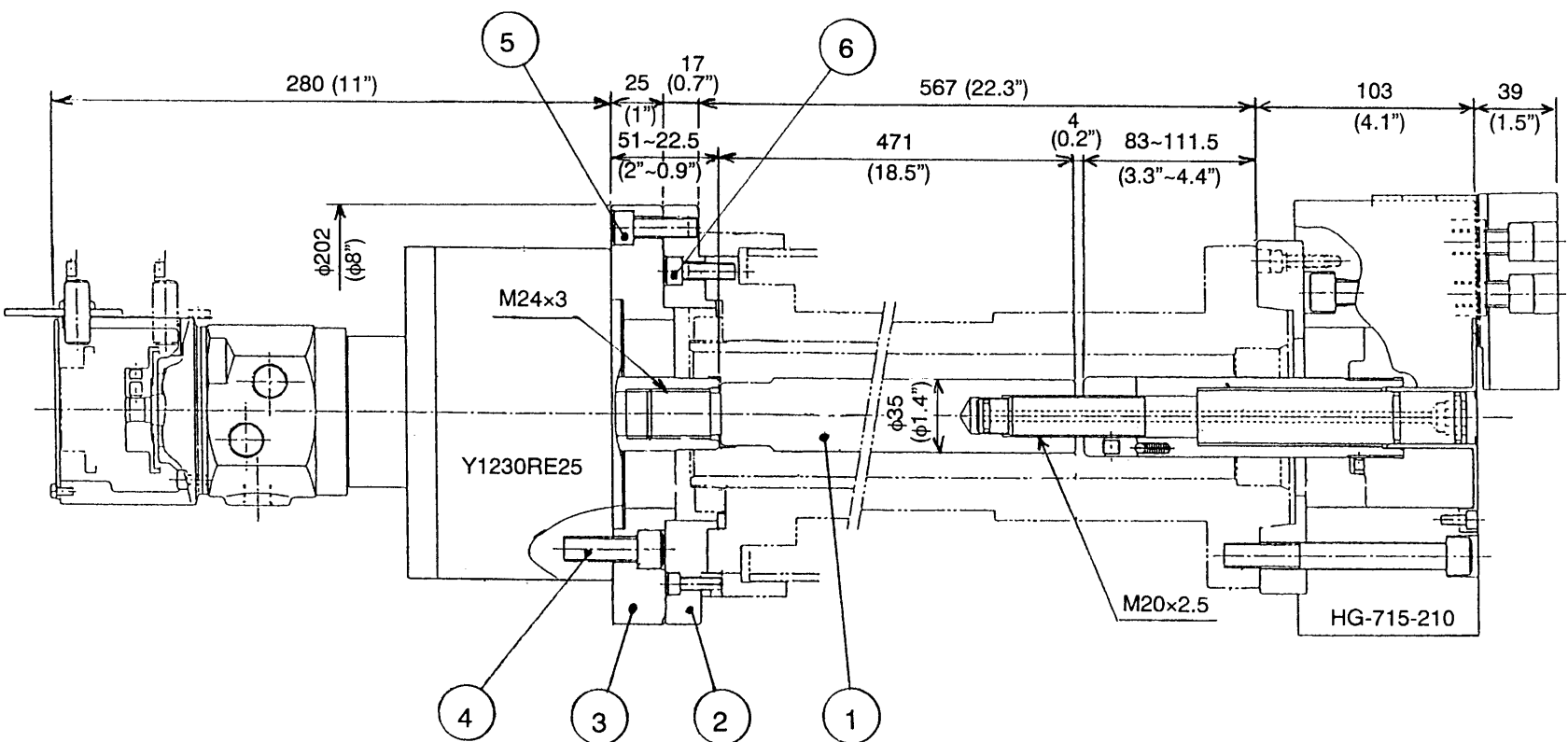
4. Solid Chuck and Soft Jaws



Jaw stroke(in diameter): J/Shifter stroke: Y

Chuck Type Symbol	CS20	CS25
	HG-715-210 (Made by KITAGAWA)	HG-730-254 (Made by KITAGAWA)
A	210 (8.3")	254 (10")
B	103 (4.1")	127 (5")
C	39 (1.5")	46 (1.8")
D	51 (2")	51 (2")
E	133.4 (5.25")	171.4 (6.75")
F	106.375 (4.188")	139.719 (5.50")
G	38 (1.5")	45 (1.8")
H	M12 x 30	M12 x 35
I	M12 x 105	M16 x 135
J/Y	12/28.5 (0.47/1.12")	14.8/5 (0.58/1.38")
K/L	95/35 (3.7"/1.4")	110/40 (4.3"/1.6")
M	12 (0.5")	15 (0.6")
N	38 (1.5")	42 (1.7")
O/P	33/14 (1.3"/0.5")	37/16 (1.5"/0.6")
Q	75 (3")	90 (3.5")
S/T	24/25 (0.9"/1")	30/30 (1.2"/1.2")
U/R	19/23 (0.7"/0.9")	19/27 (0.7"/1.1")
V	M20 P2.5	M20 P2.5
W	111.5-83 (4.4"~3.3")	125-90 (4.9"~3.5")

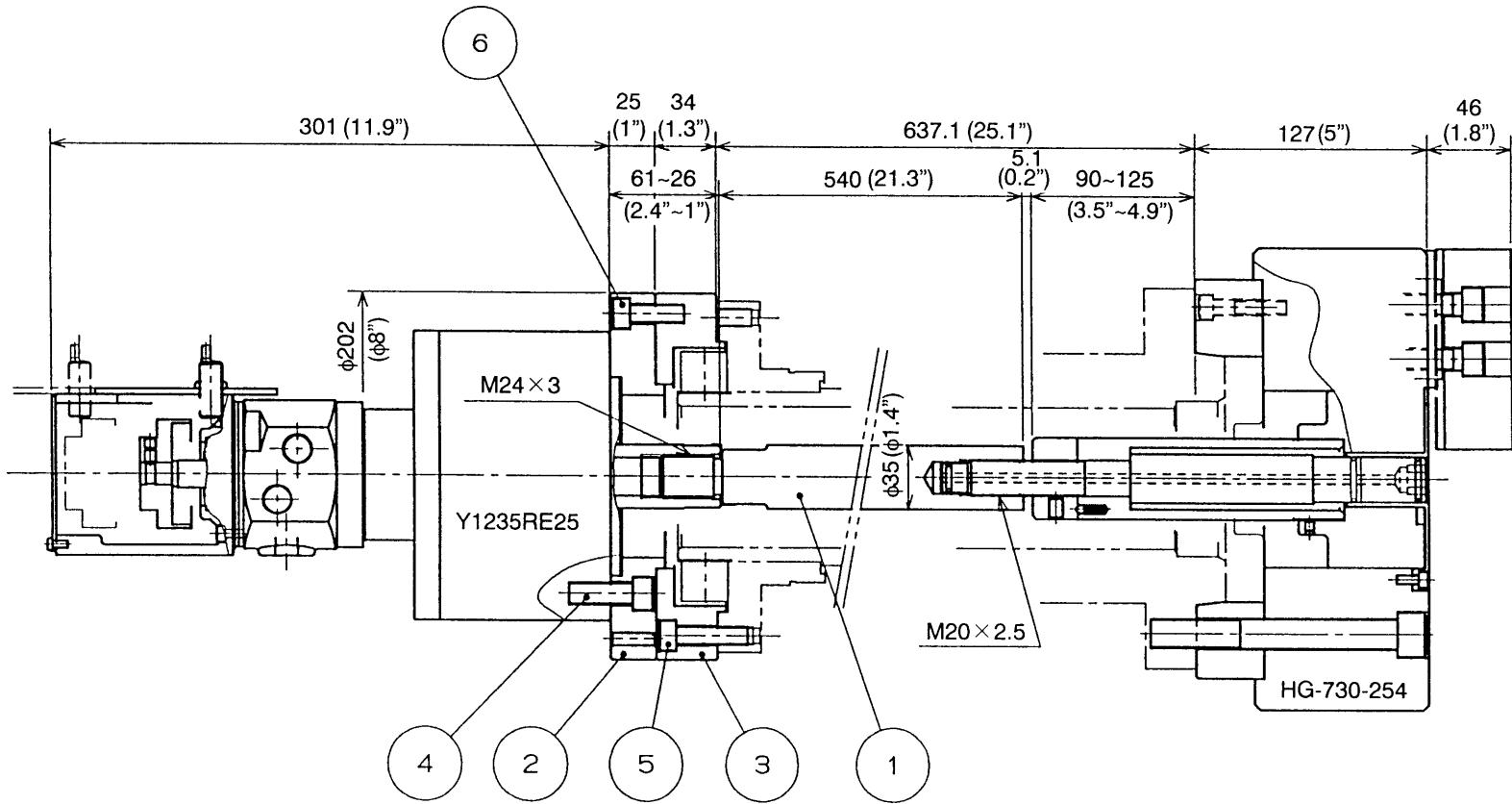
5. Connecting Parts for $\phi 210$ Solid Chuck



No.	Name	Drawing No. or type	Q'ty
1	Rod	61Q3465830	1
2	Adapter B	61Q3465812	1
3	Adapter A	61Q3465223	1
4	Bolt with hexagonal hole	4B1235	6
5	Bolt with hexagonal hole	4B1030	6
6	Washer	4B825	6
7	Washer	1682-95-443-**	1

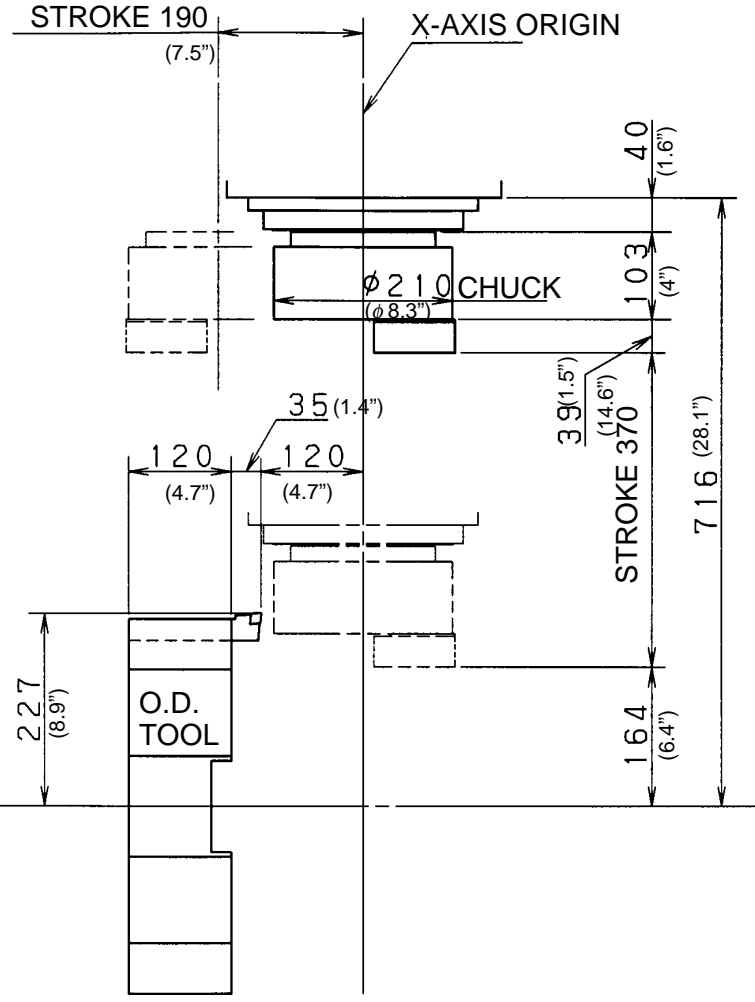
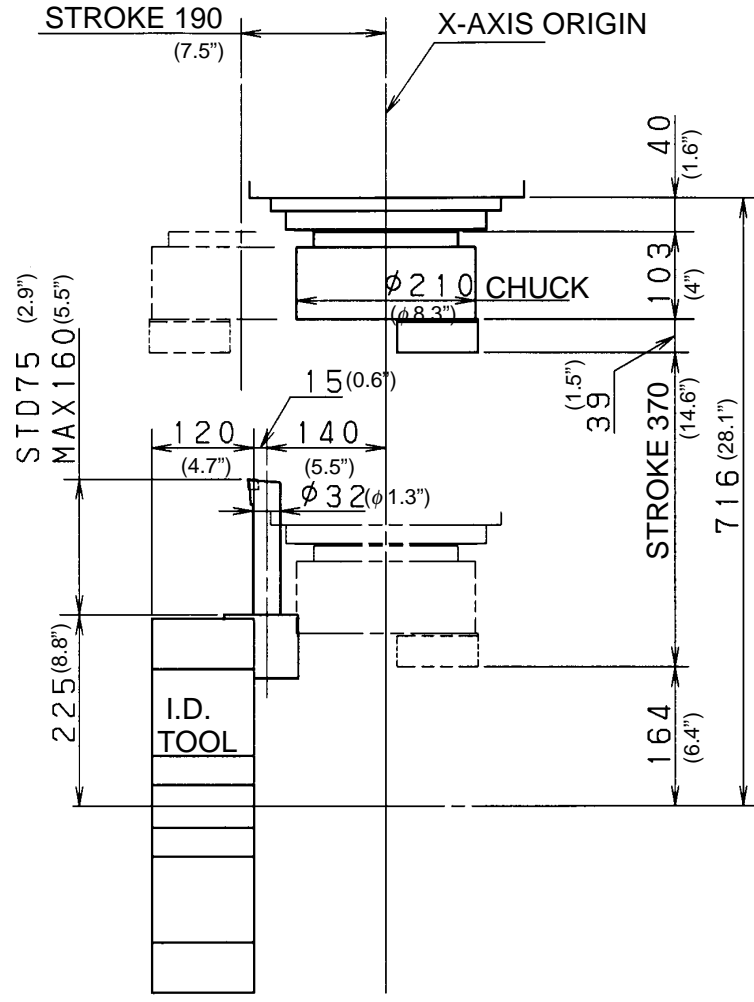
Dimension : metric (mm)
inch (")

Connecting Parts for $\phi 254$ Solid Chuck



No.	Name	Drawing No. or type	Q'ty
1	Rod	1682-00-840-00	Each
2	Adapter B		
3	Adapter A		
4	Bolt with hexagonal hole	4B1235	6
5	Bolt with hexagonal hole	4B1040	6
6	Bolt with hexagonal hole	4B1030	6

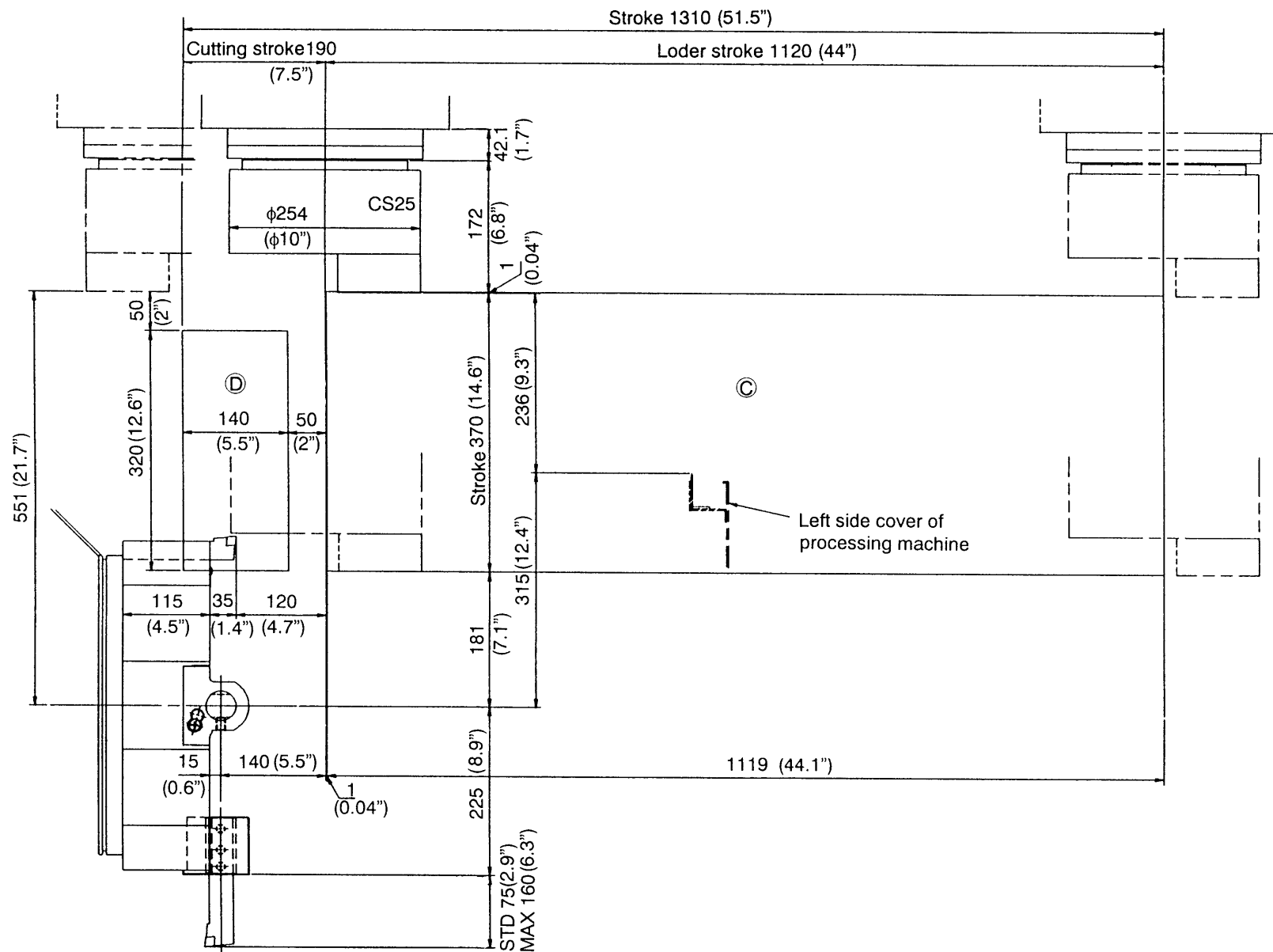
Dimension : metric (mm)
inch (")



Dimension: metric (mm)

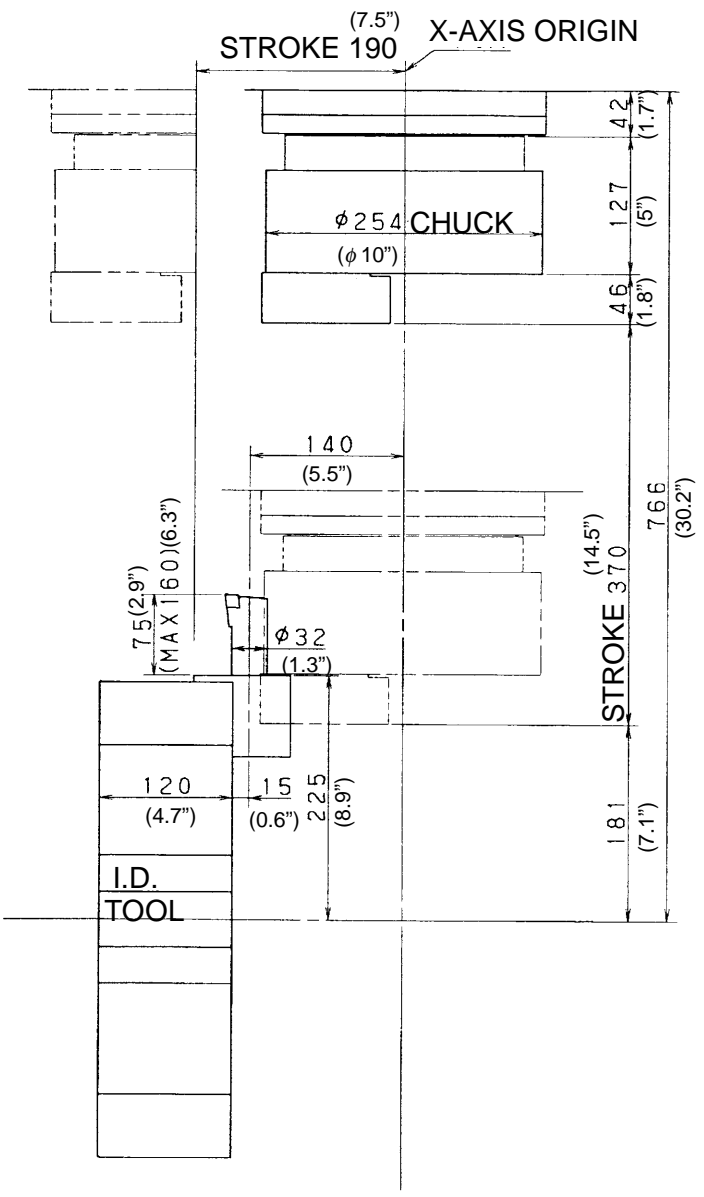
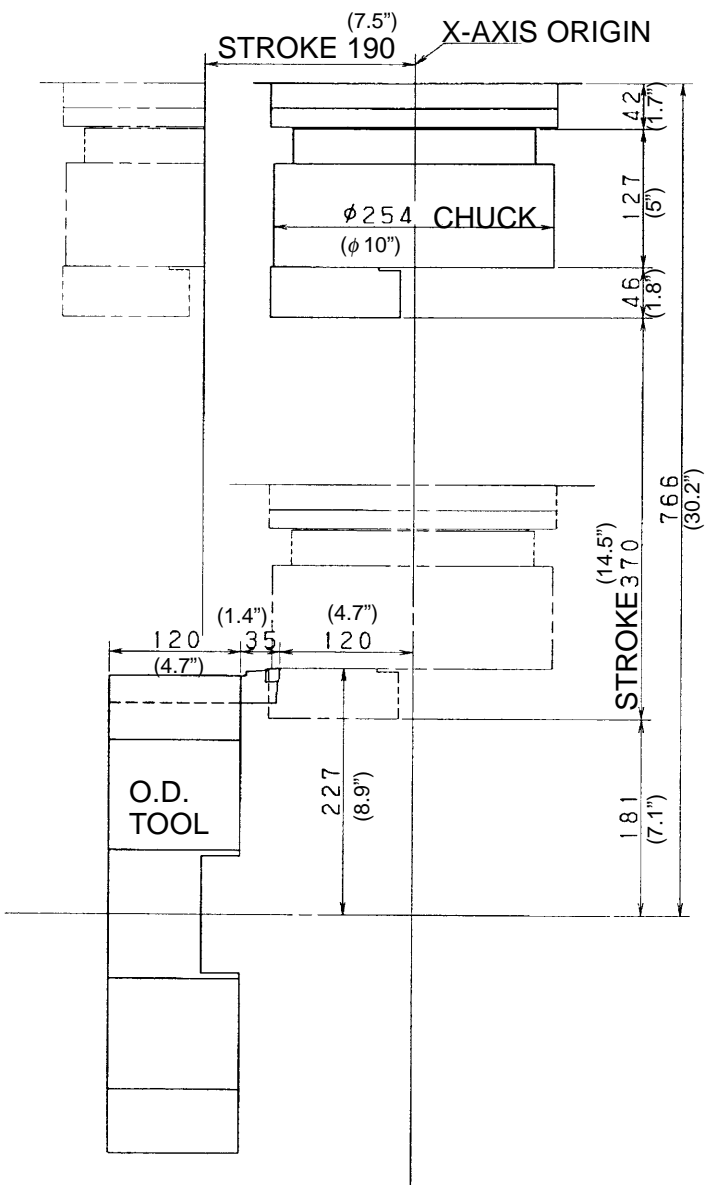
Inch (")

CS25 Spindle Traveling Range (Base Holder Type)



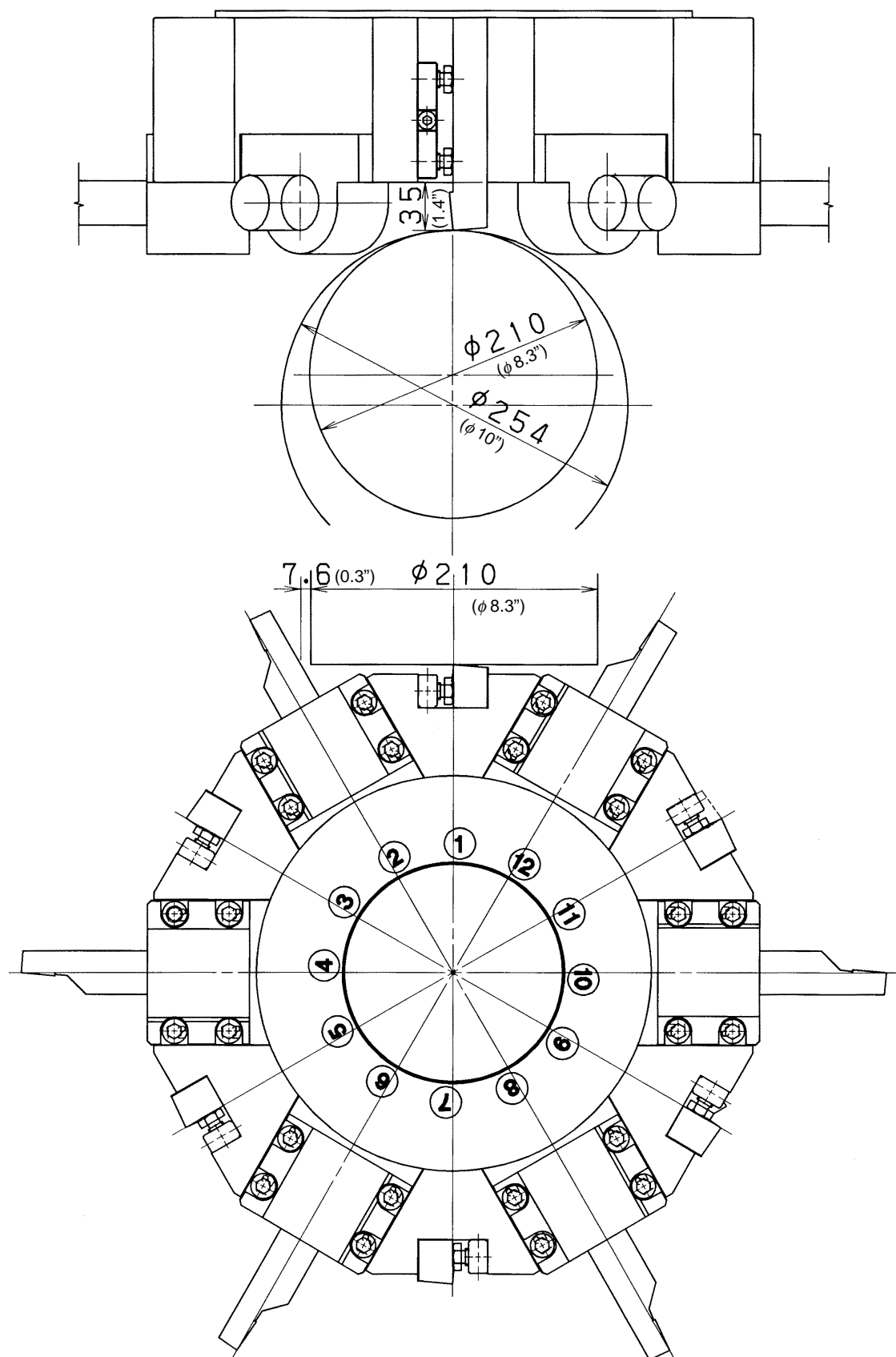
Dimension : metric (mm)
inch (")

CS25 (Base Holder Turret Head Type)



Dimension : metric (mm)
inch (")

12-station Base Holder Turret Head Type Interference Drawing



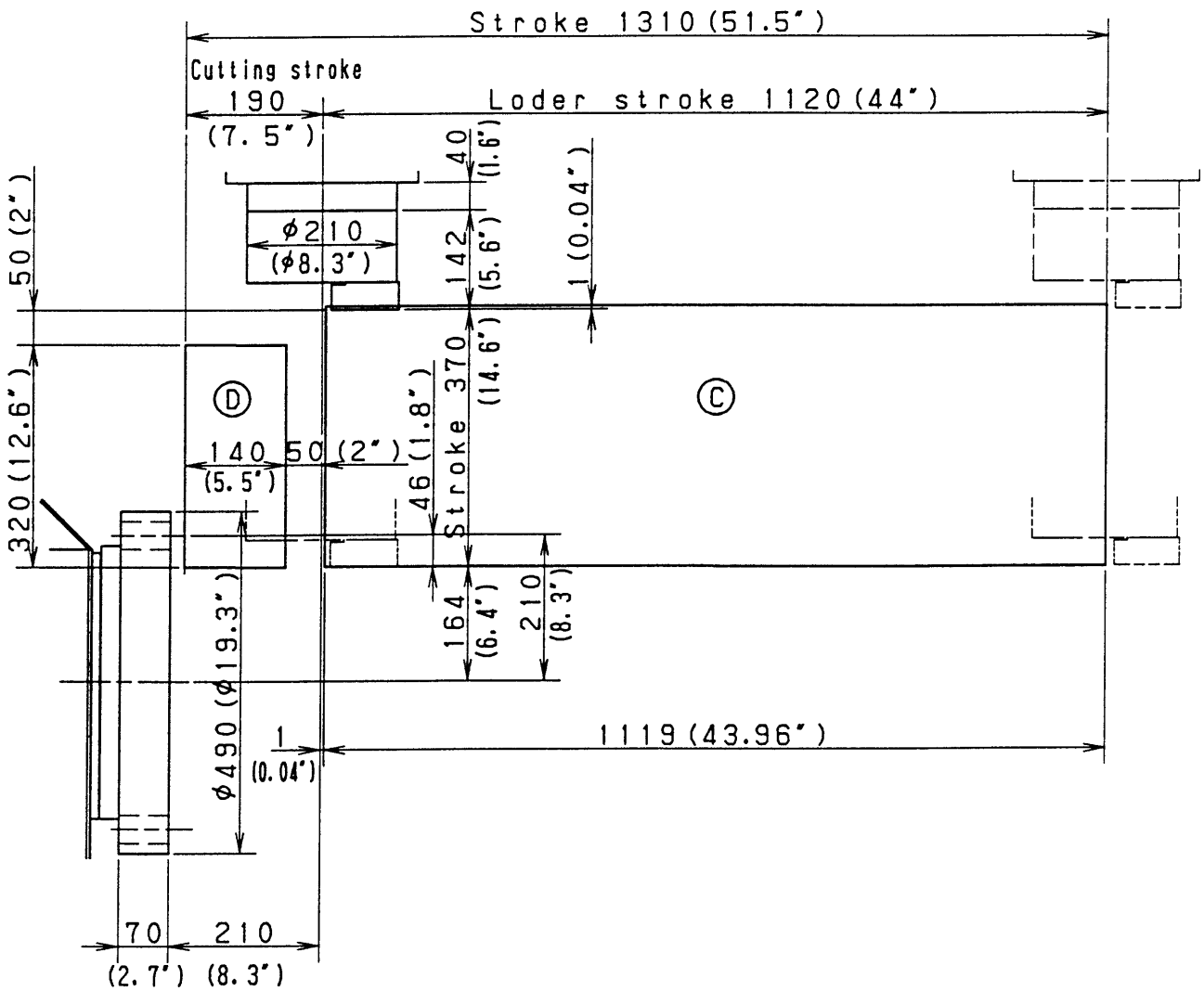
Dimension: metric (mm)
Inch (")

3-1-2 12-station VDI/VDI Rotating Tool Turret Head Type

CS20 Spindle Traveling Range (VDI Type)

Dimension : metric (mm)

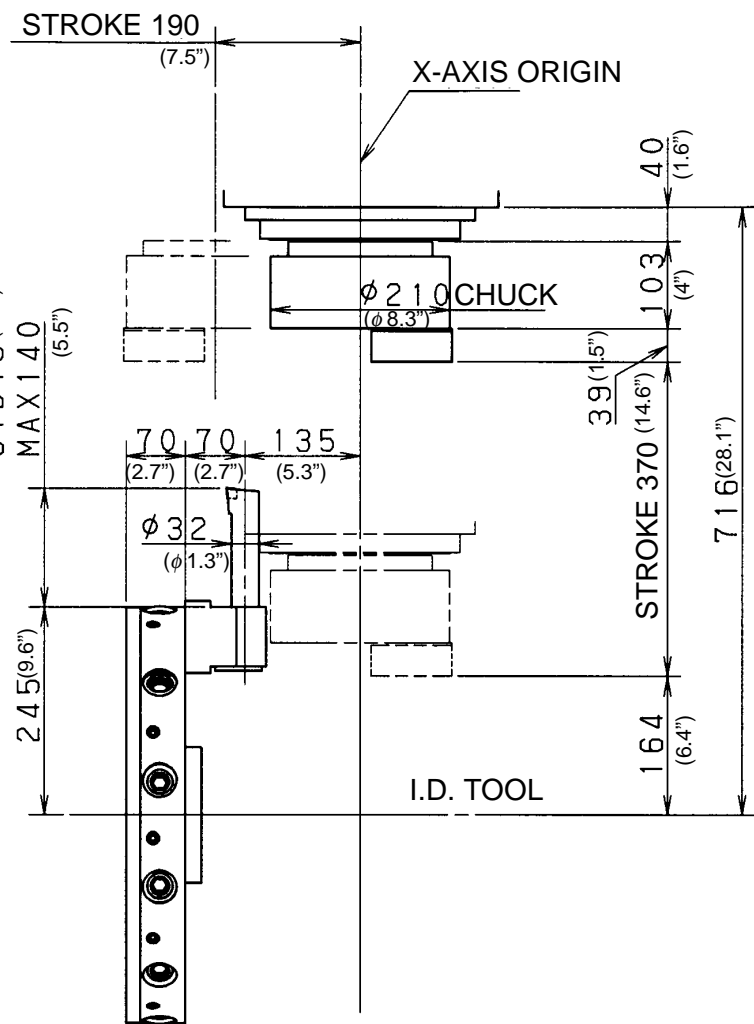
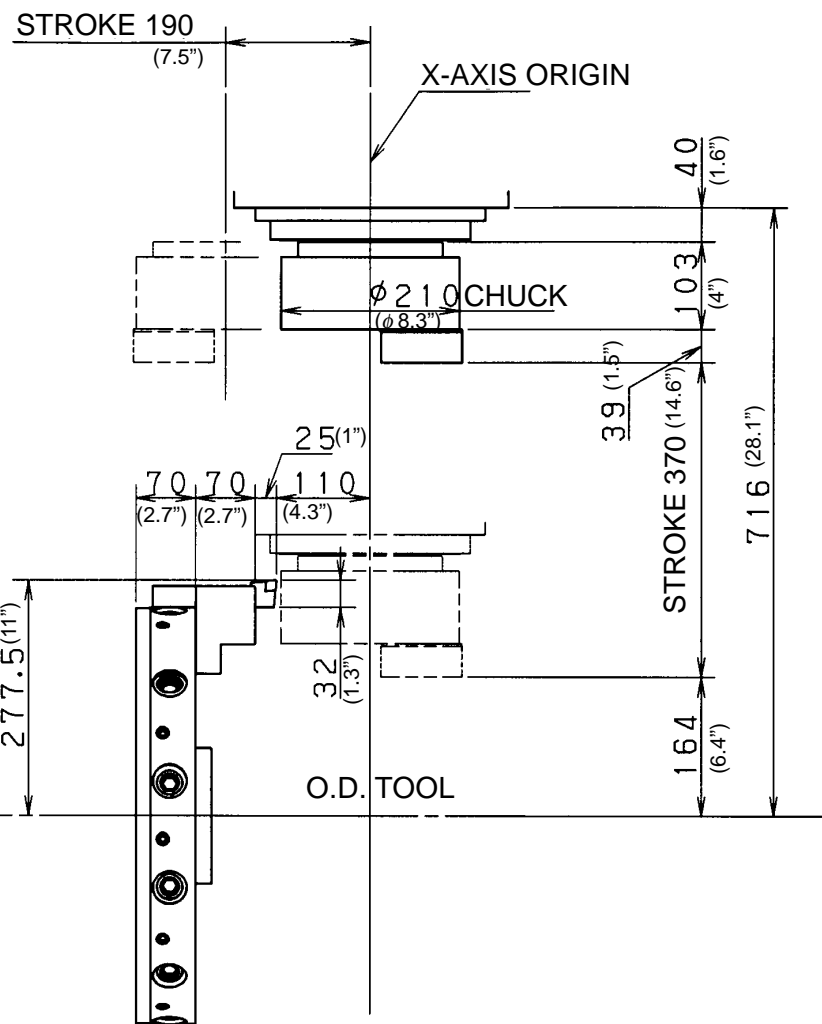
inch (")



Position Area

- ☐ (C) Feeder Area
☐ (D) Area where initial stage one-touch original point return is possible

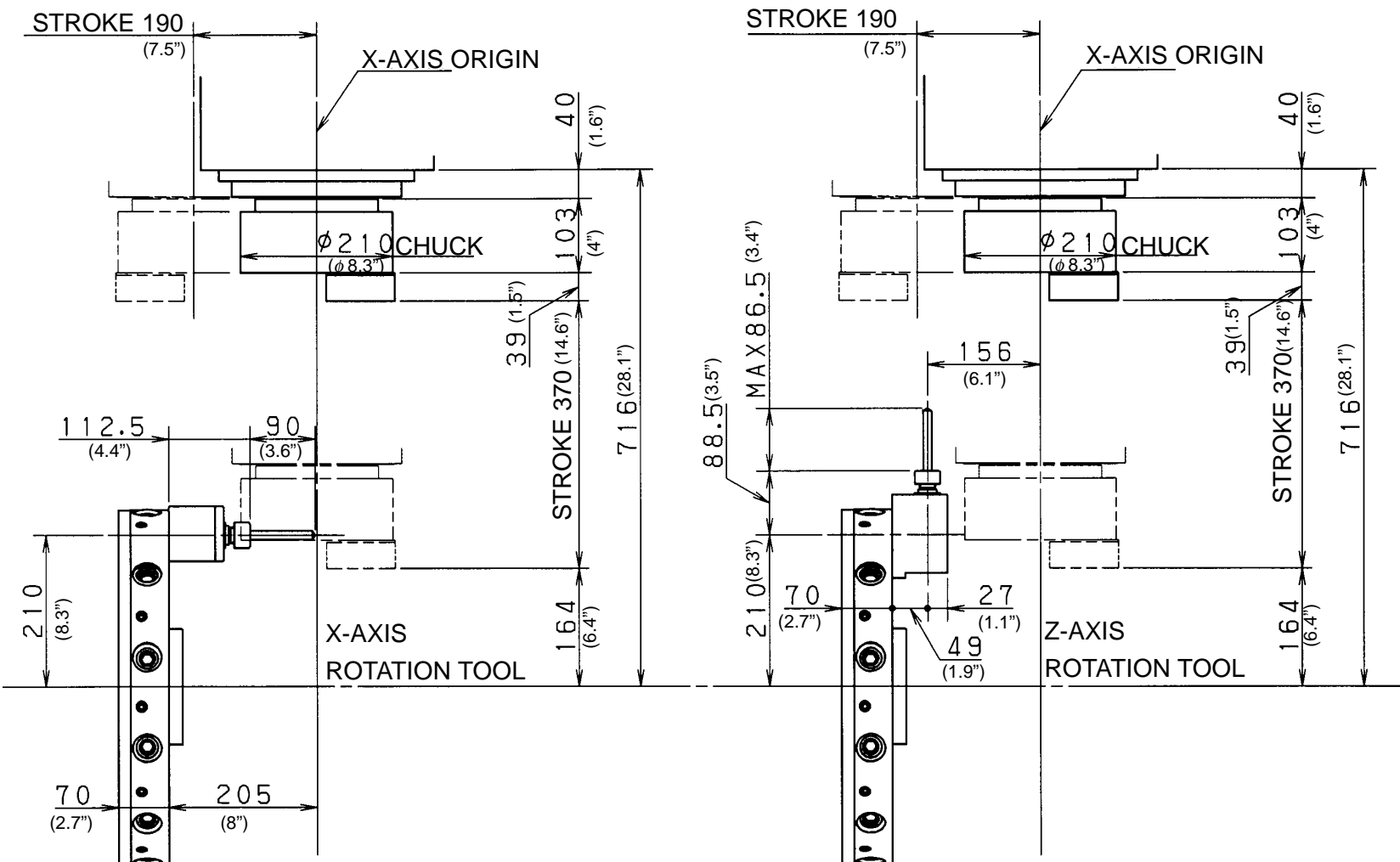
CS20 (VDI/VDI Rotating Tool Turret Head Type)
I.D. Tool • O.D. Tool



Dimension: metric (mm)

Inch (")

CS20 (VDI Rotating Tool Turret Head Type)
Rotary Tool

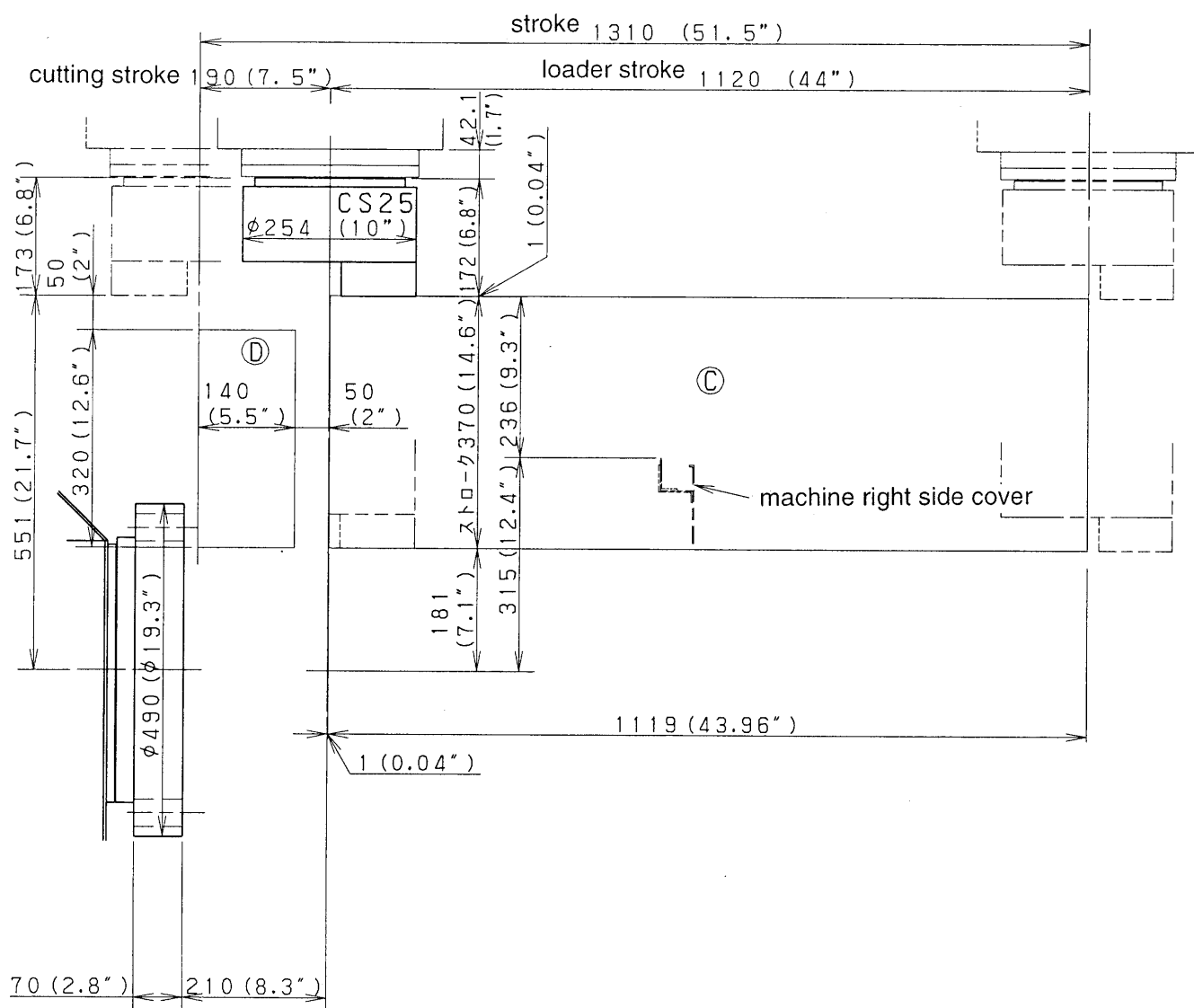


Dimension: metric (mm)

Inch (")

CS25 Spindle Traveling Range (VDI Type)

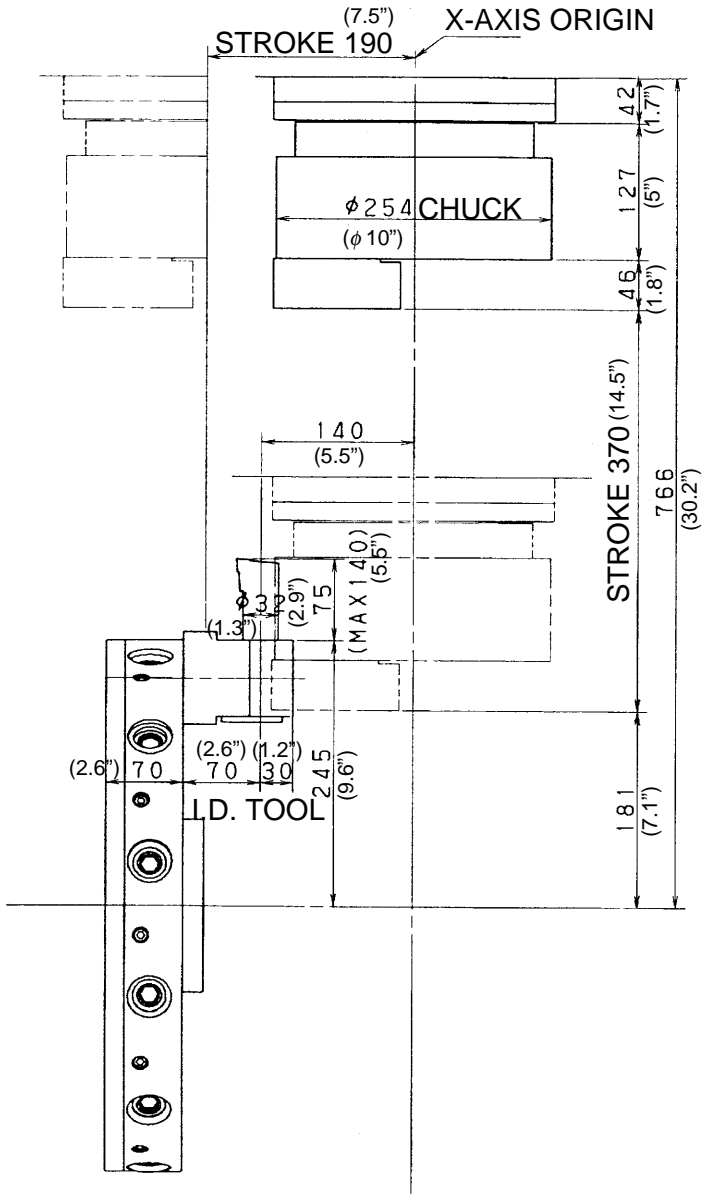
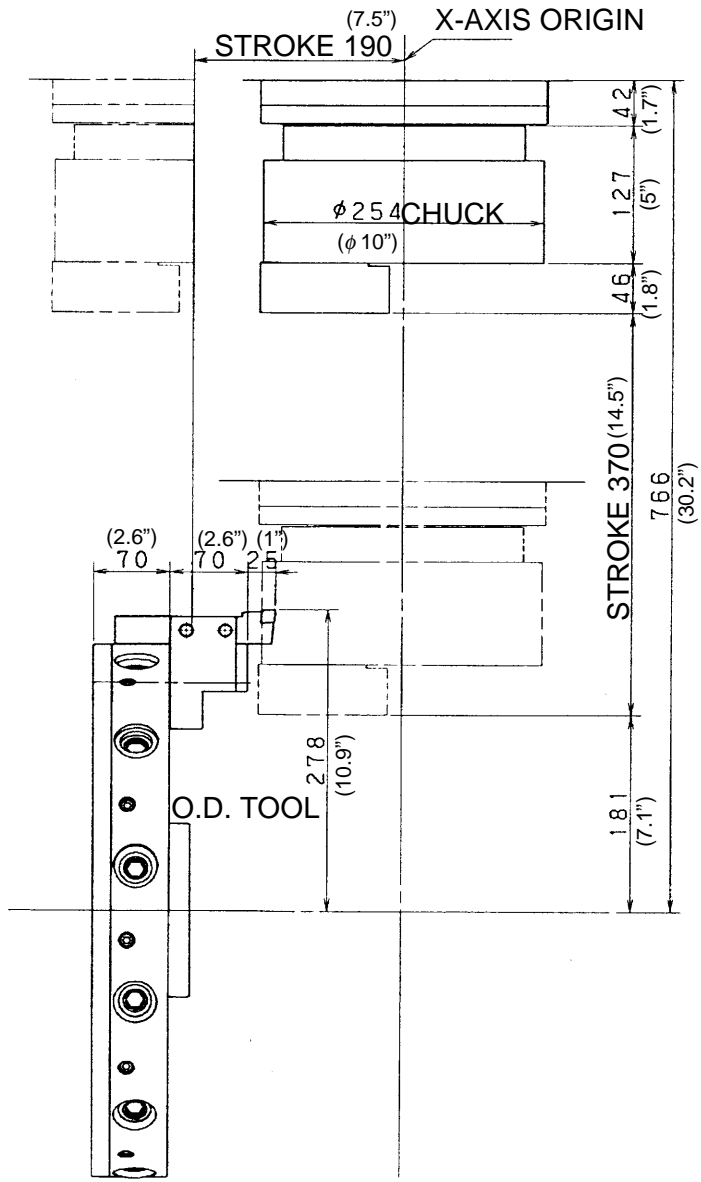
Dimension : metric (mm)
inch (")



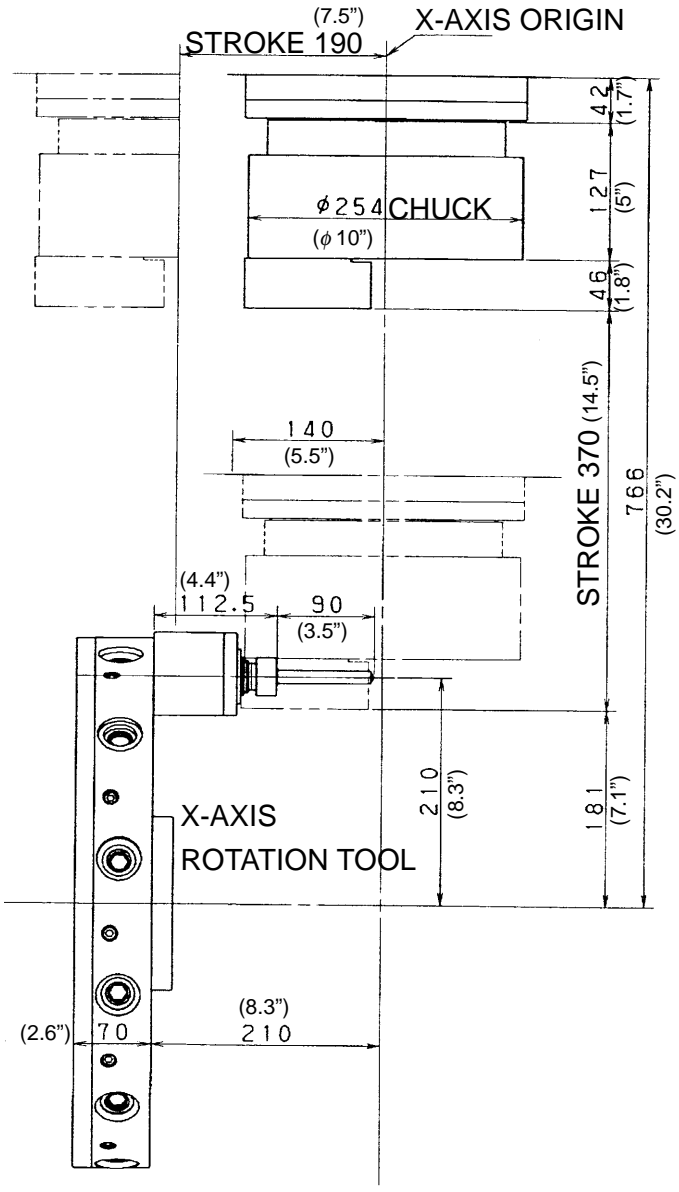
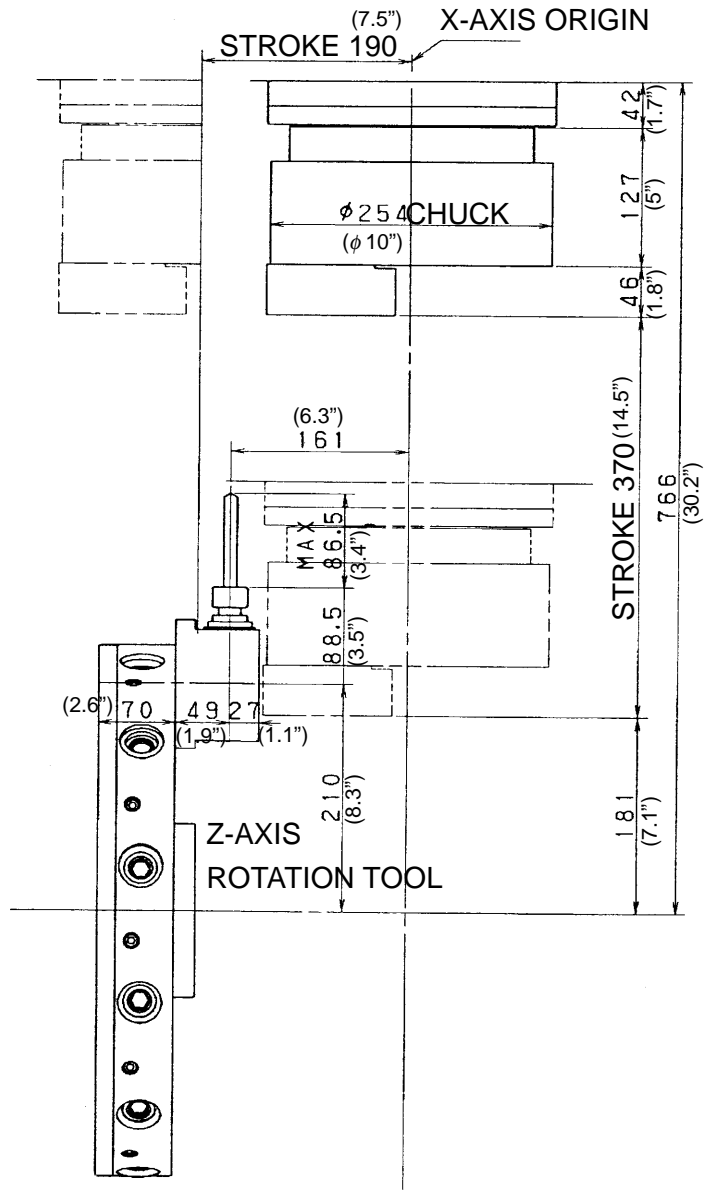
Position Area

- ③ Feeder Area
- ④ Area where initial stage one-touch original point return is possible

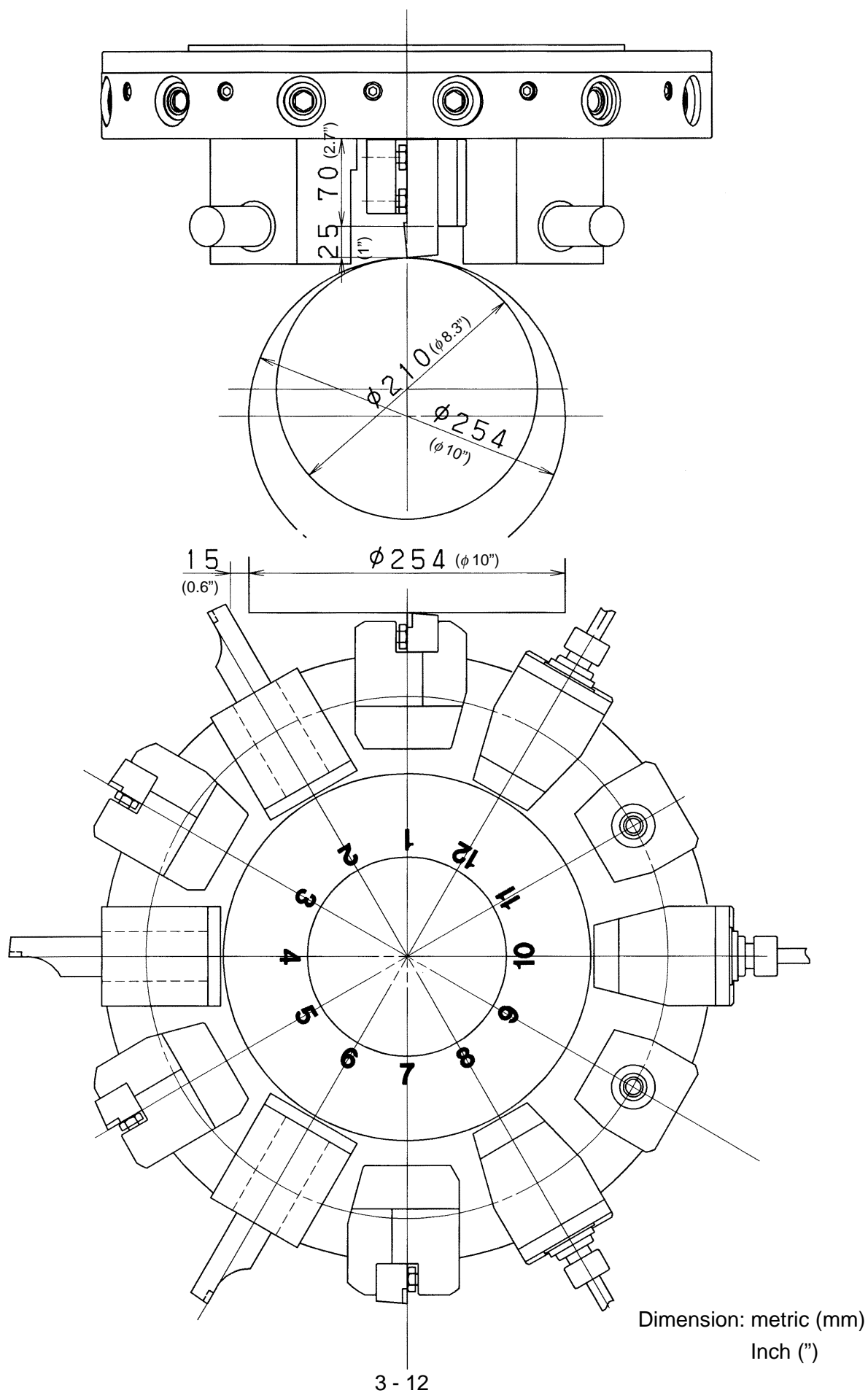
CS25 (VDI/VDI Rotating Tool Turret Head Type)
I.D. Tool • O.D. Tool



CS25 (VDI/DI Rotating Tool Turret Head Type)
Rotary Tool



12-station VDI/VDI Rotating Tool Turret Head Type Interference Drawing



3-2 Output Diagram

(1) Spindle Output Diagram

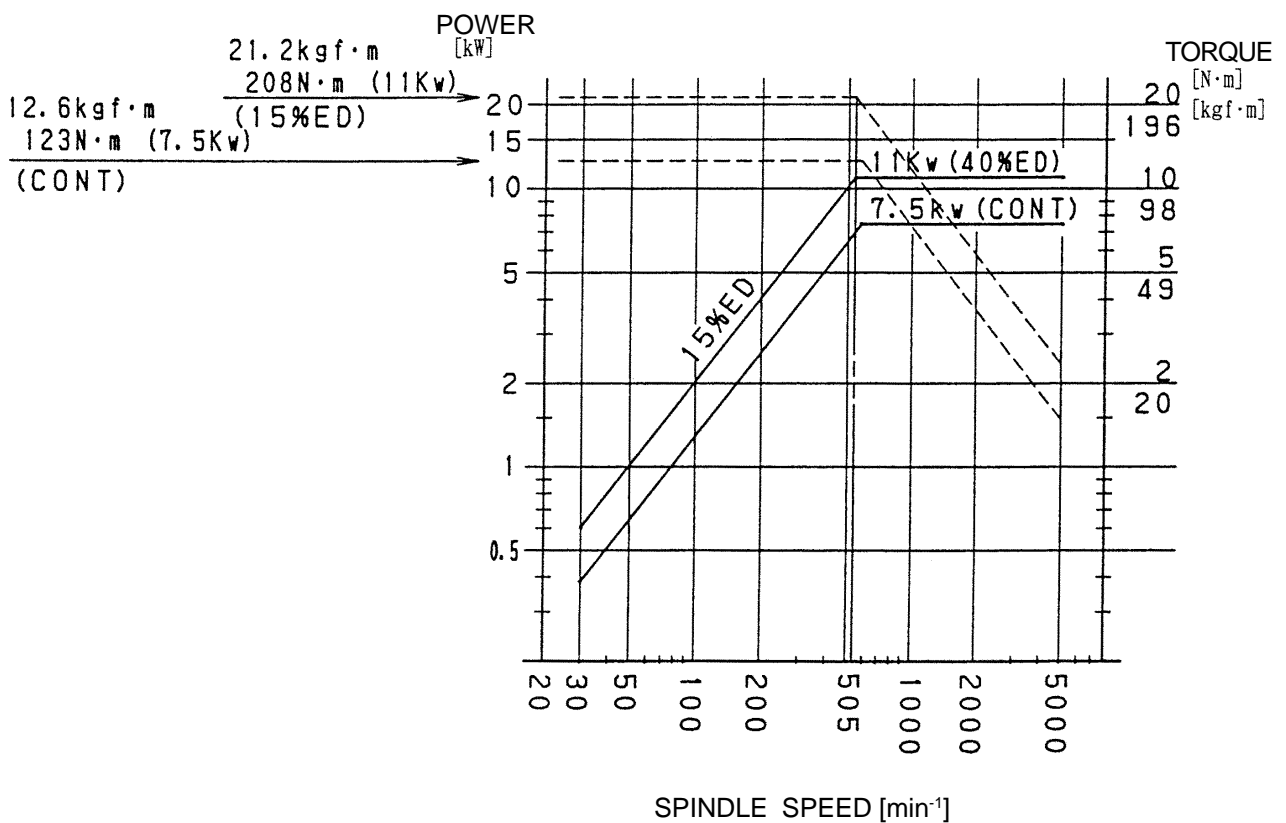
The equipment is equipped with variable AC motors. Output in a torque constant range differs depending on the current spindle speed.

If heavy cutting (roughing, etc.) is carried out in the torque constant range, the spindle may stop, not being able to endure a cutting force.

Therefore, select a speed range so that heavy cutting will be carried out in an output constant range.

CS20

The following chart shows the output constant range which ensures the rated output of the machine, "11 kW."

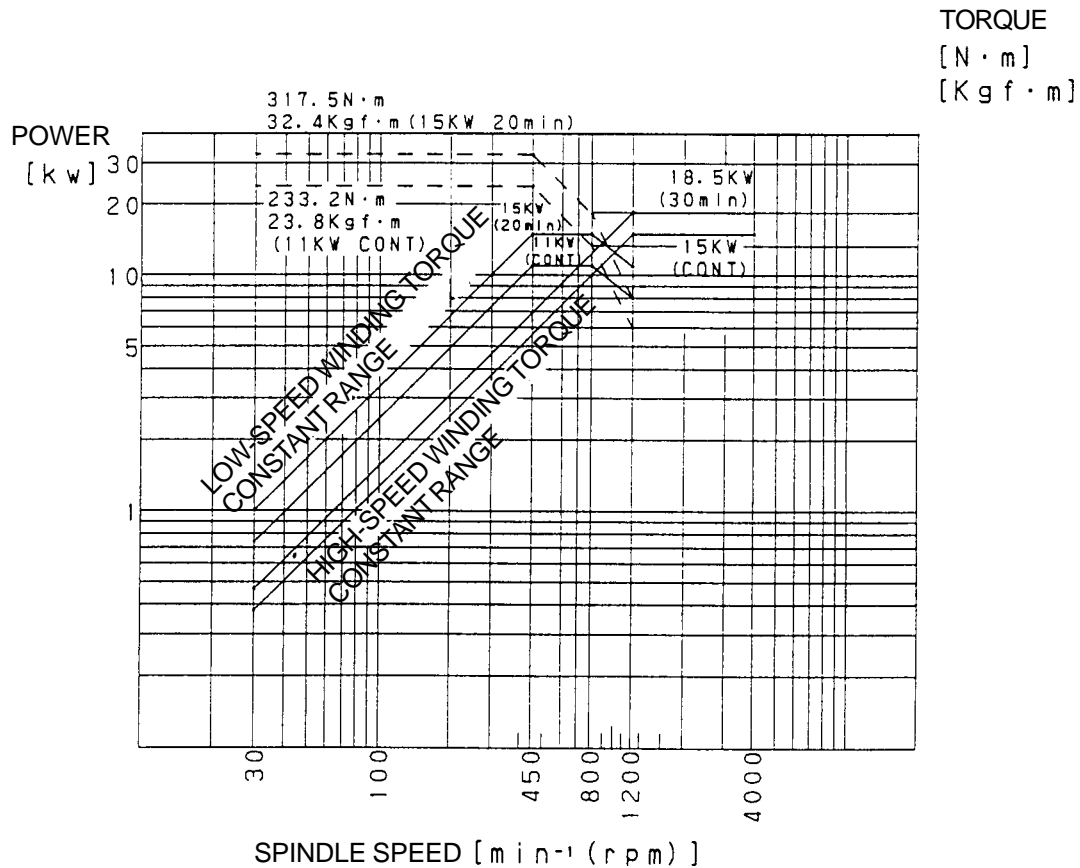


CS25

The following chart shows the constant output range which ensures the rated output of the machine, "18.5 kW."

Low-speed range M40 range 450 to 1,200 min⁻¹(rpm)

High-speed range M41 range 1,200 to 4,000 min⁻¹(rpm)



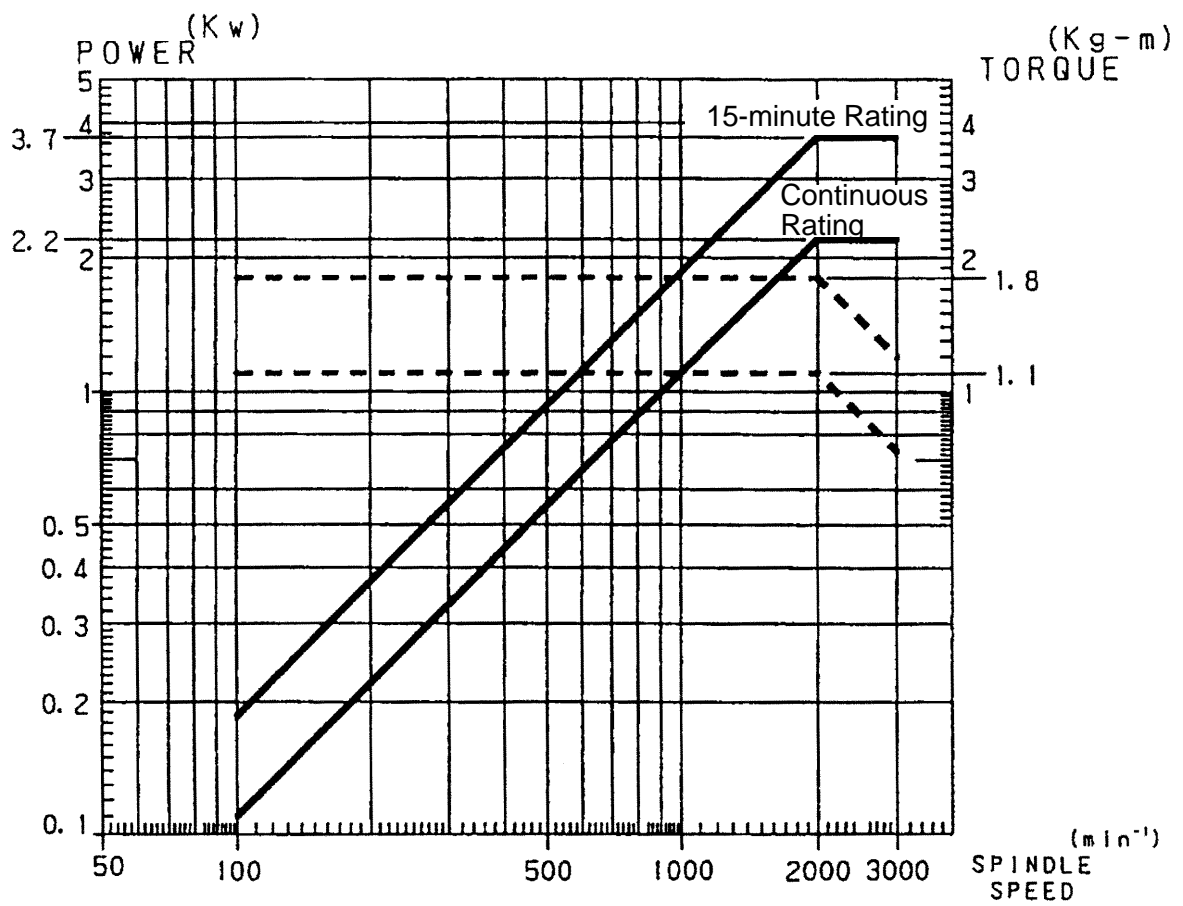
How to Read the Diagram

Read the spindle speed you want to use on the bottom scale. Draw a line upward from that point to make it intersect with a thick full line. Read the value of the intersecting point on the left scale. This value indicates the maximum output(kW) at that spindle speed.

Read the spindle speed you want to use on the bottom scale. Draw a line upward from that point to make it intersect with a thick dotted line. Read the value of the intersecting point on the right scale. This value indicates the torque(kgf-m, N-m) at that spindle speed.

The top lines in the chart indicate the short-time rating.(ON for 5 minutes and OFF for 5 minutes in the 10-minute cycle) The bottom lines are used for continuous operation.

(2) Rotating Tool Spindle Output Diagram



3-3 Chucking Pressure-Gripping Force Diagram

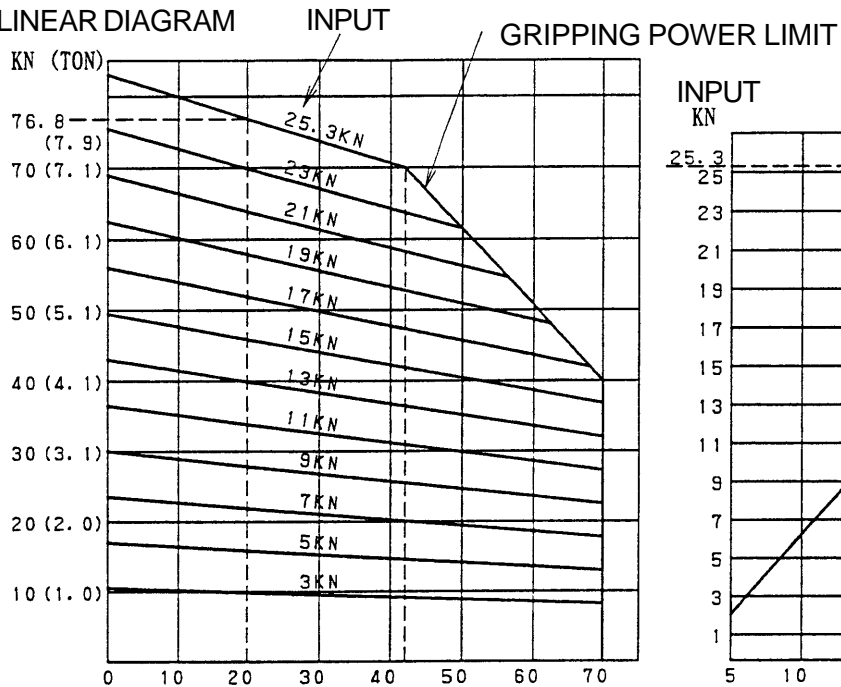
1. CS20

Chucking HG-715-210 (KITAGAWA)

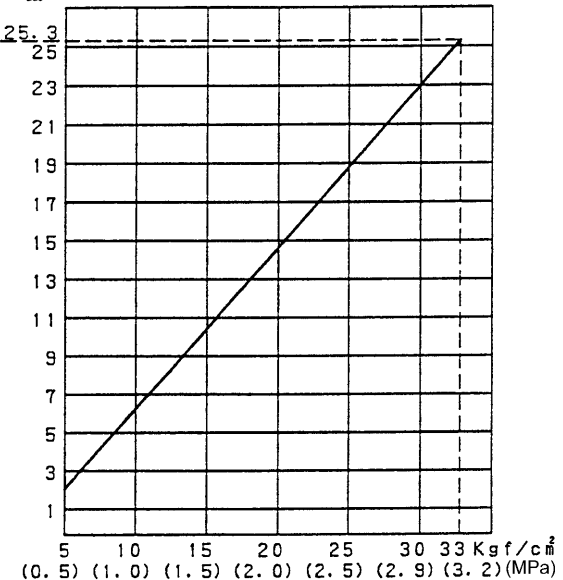
Cylinder Y1230RE25 (KITAGAWA)

STATIC GRIPPING POWER

LINEAR DIAGRAM

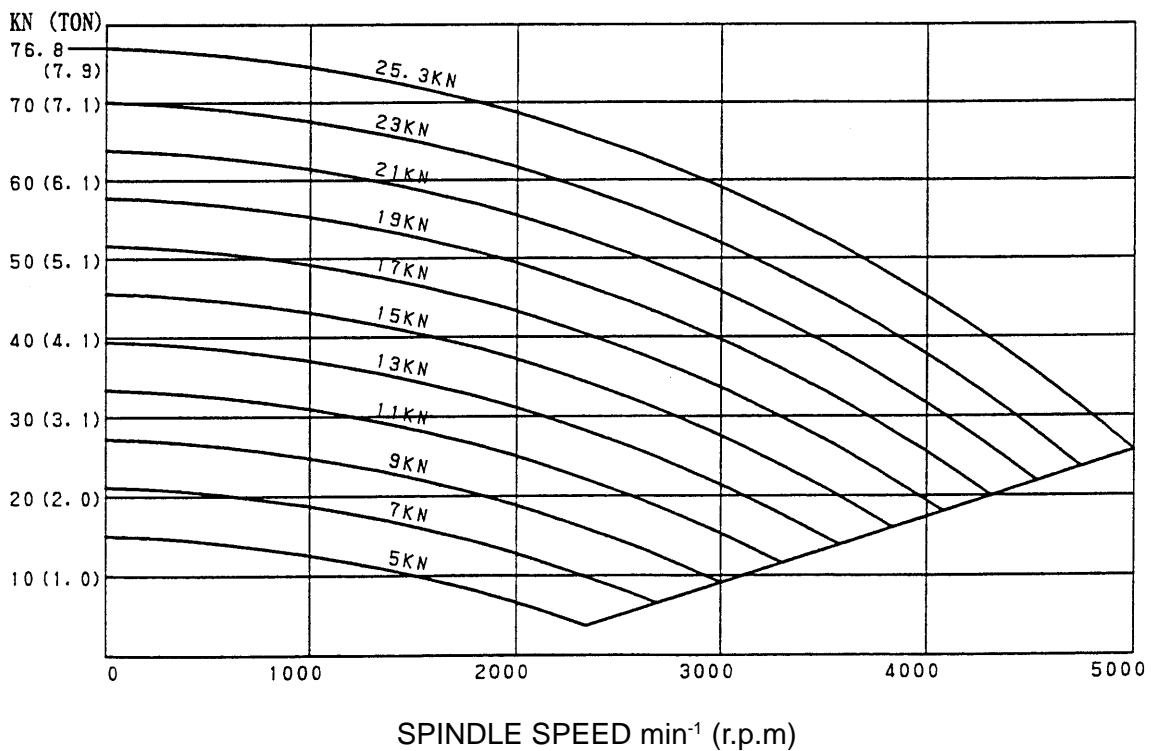


INPUT



CYLINDER SET PRESSURE

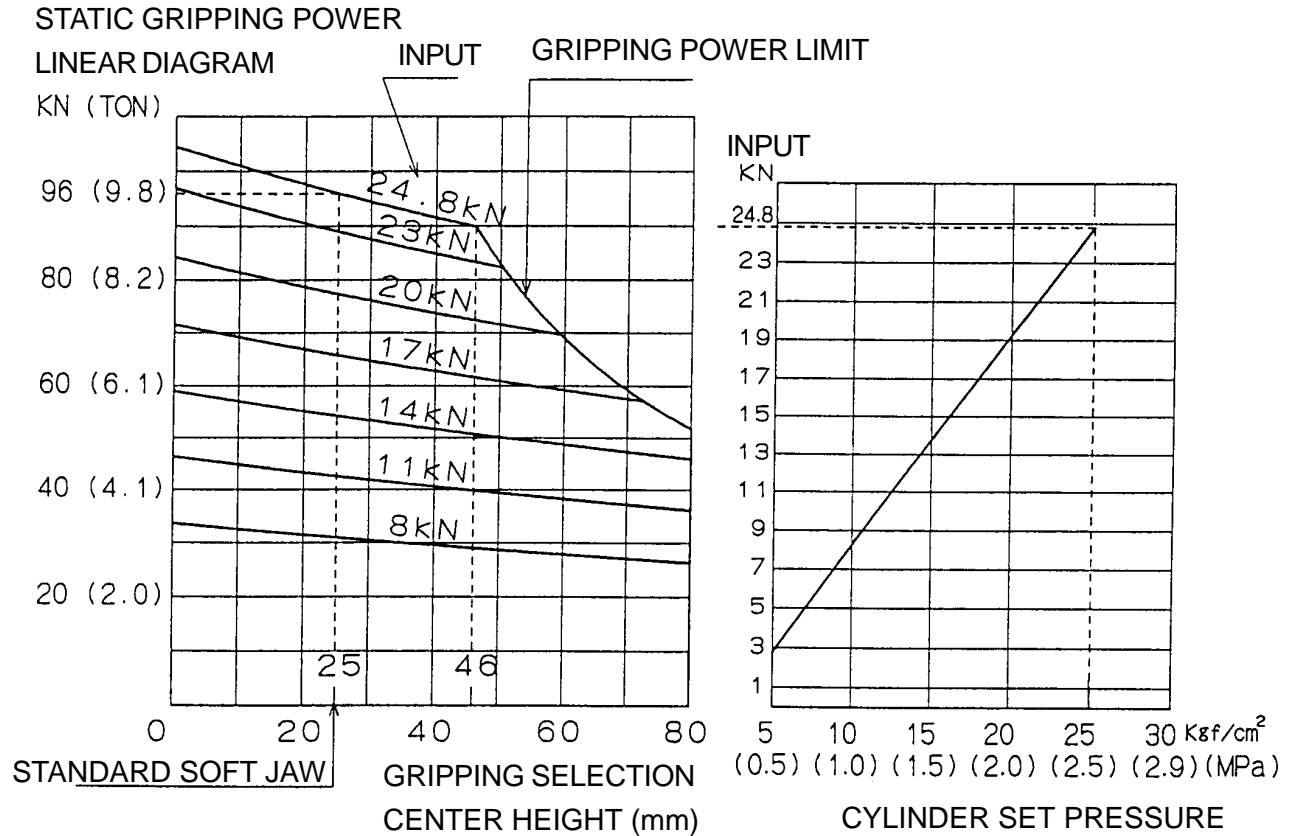
GRIPPING POWER DECREASING LINEAR DIAGRAM (STANDARD SOFT JAW)



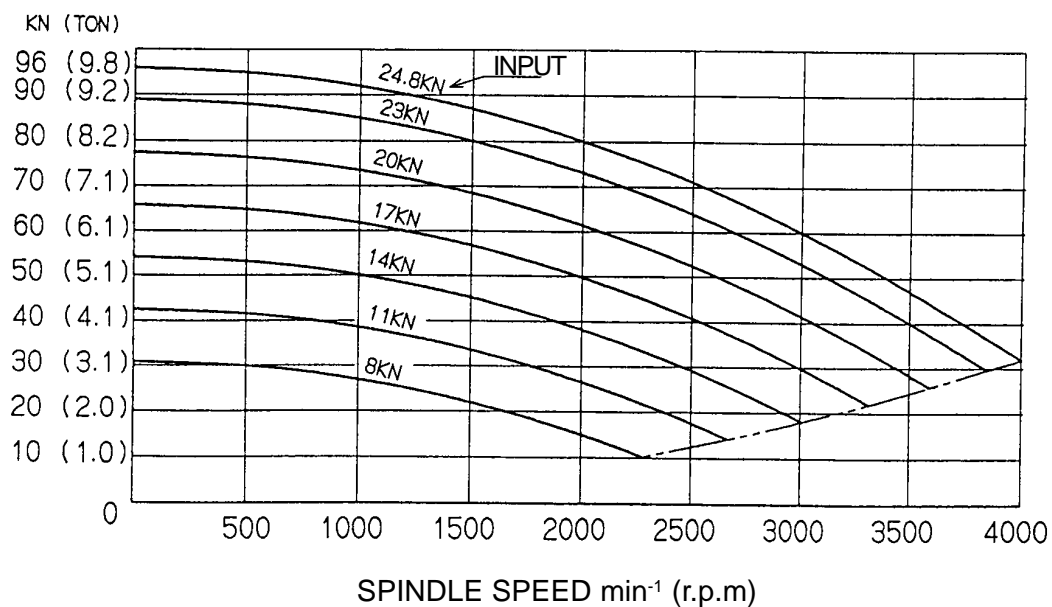
2. CS25

Chucking HG-730-254 (KITAGAWA)

Cylinder Y1235RE25 (KITAGAWA)

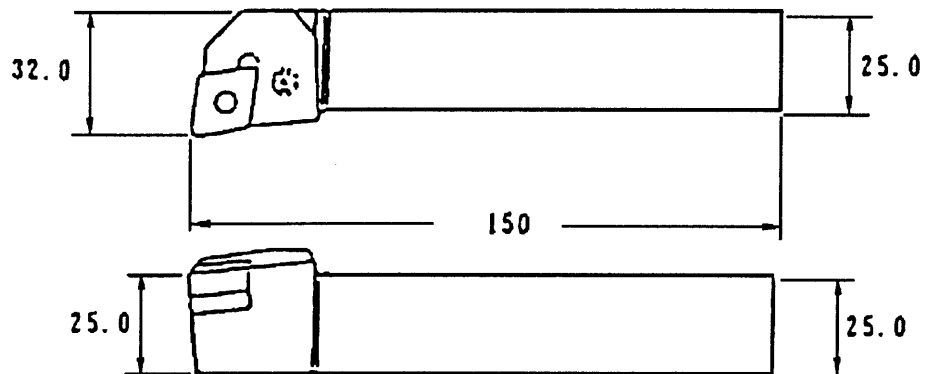


GRIPPING POWER DECREASING LINEAR DIAGRAM (STANDARD SOFT JAW)

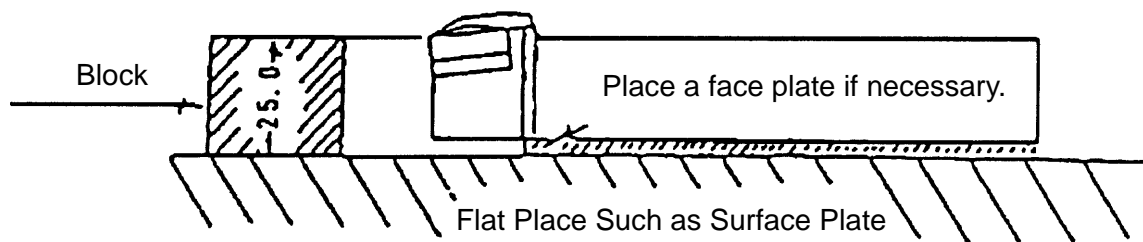


3-4 Method of Obtaining Tool Center Height

The center height of O.D. tools is 25 mm.



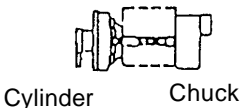
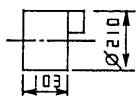
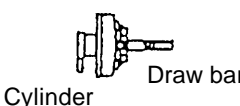

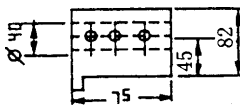
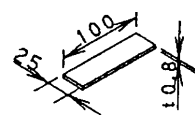
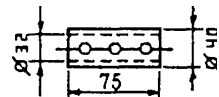
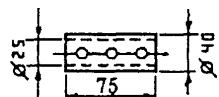
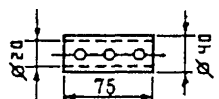
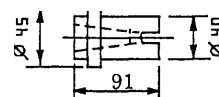
If the O.D. tool needs center height adjustment, place a spacer, etc. and adjust the center height.



Adjust the center height with a 25-mm block outside the machine and attach to the tool post.

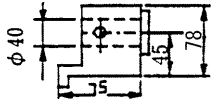
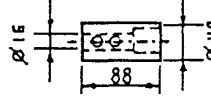
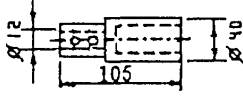
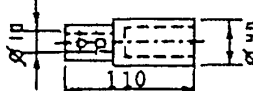
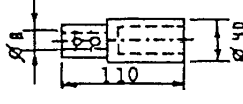
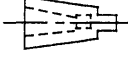
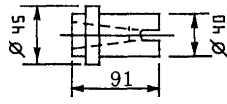
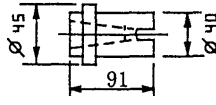
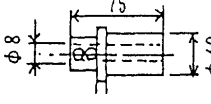
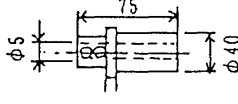
4. TOOLING SYSTEM

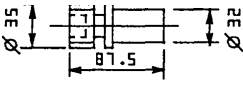
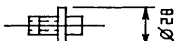
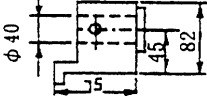
4-1 CS20 12-station Base Holder Turret Head Assembly Tools (Standard)

Cl.	PARTS	NAME	SKETCH	DESCRIPTION
Chucks	1594-108-96-00	Power chuck (Solid)	 Cylinder Chuck	1. 210 solid chuck (Made by KITAGAWA) 2. Solid cylinder 3. Soft jaws (1 set)
	1594-108-97-00	Power chuck (1 set)		1. 210 solid chuck (Made by KITAGAWA) HG-715-210
	1594-108-98-00	Cylinder (1 set)	 Cylinder Draw bar	1. Solid cylinder (Made by KITAGAWA) Y1230RE25 2. Proximity switch BES516-329-E3R-3 3. Draw bar
	1594-113-13-00	Soft jaw		1. For 210 chuck (Made by KITAGAWA) 08001351801(SB08B1)
Base Holder	1593-329-57-00	Boring base holder		6 pieces included as standard accessories 1682-40-208-
O.D. Tools	1593-028-01-00	Reverse cutting spacer		1745-40-430-
I.D. Tool	1593-668-08-00	32 shank boring bar socket		1593-668-51-
	1593-668-09-00	25 shank boring bar socket		1593-668-52-
	1593-668-10-00	20 shank boring bar socket		1593-668-53-
Drilling Tool	1596-337-21-00	MT No. 2 drill socket		For MT No. 2 shank drill (14.5 to 23) 1682-95-337-

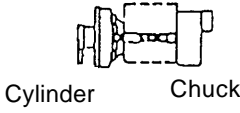
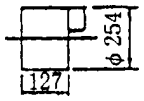
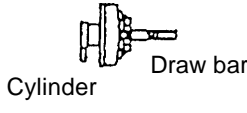

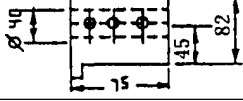
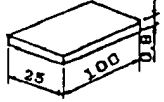
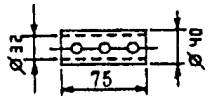
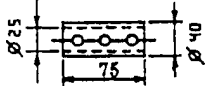
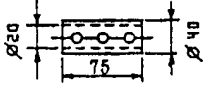
4-2 CS20 12-station Base Holder Turret Head Assembly Tools (Selected)

(1/2)

Cl.	PARTS	NAME	SKETCH	DESCRIPTION
Base Holder	1593-329-59-00	U-drill		1. Cover 2. Socket (32, 25, 20) 1682-40-211-
I.D. Tools	1593-668-11-00	base holder 16 shank boring		1593-668-54-
	1593-668-12-00	bar socket 12 shank boring		1593-668-55-
	1593-668-06-00	bar socket 10 shank boring		1593-668-56-
	1593-668-07-00	bar socket 8 shank boring		1593-668-57-
Drilling Tools	1593-337-04-00	bar socket MTNo.2~MTNo.1		08001380001
	1596-337-19-00	drill sleeve MTNo.1		For MT No. 1 shank drill (2 to 14) 1682-95-314-
	1596-337-20-00	drill sleeve MTNo.3		For MT No. 3 shank drill (23.5 to 32) 1682-95-313-
	1593-340-56-00	drill sleeve 8 center drill		1. Used for the boring base holder 2. JIS-1A type for 2 x 60 1682-95-312-
	1593-340-57-00	socket 5 center drill socket		1. Used for the boring base holder 2. JIS-1A type for 2 x 60 1682-95-311-

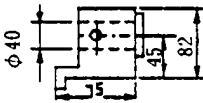
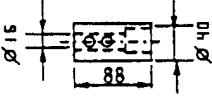
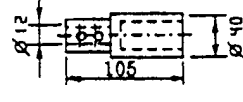
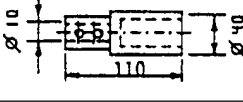
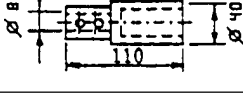
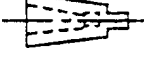
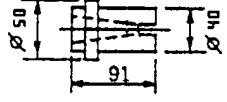
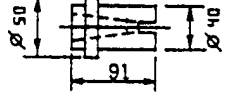
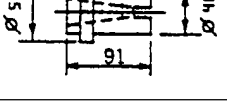
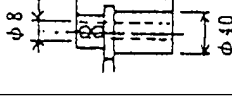
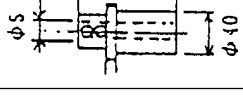
CI.	PARTS	NAME	SKETCH	DESCRIPTION
Tap Holders	1593-347-01-00	Tap holder		<ol style="list-style-type: none"> 1. Tapper made by NIKKEN; S32-Z12-87.5L, M3 to M16 (W/o torque limiter) 2. Collet excluded 3. 40, 32 socket required
	1593-347-02-00 08	Collet (Alone)		<ol style="list-style-type: none"> 1. Collet made by NIKKEN (ZMK12 - Tap size) 2. Size: M3, M4, M5, M6, M8, M10, M12, M14, M16
Other Tools	1594-331-19-00	Cleaning tool		<ol style="list-style-type: none"> 1. Cover 2. Nozzle 3. Pipe 1682-40-211-

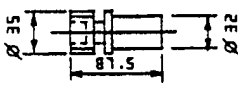
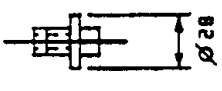
4-3 CS25 12-station Base Holder Turret Head Assembly Tools (Standard)

Cl.	PARTS	NAME	SKETCH	DESCRIPTION
Chucks	1594-109-21-00	Power chuck (Solid)		1. 254 solid chuck (Made by KITAGAWA) 2. Solid cylinder 3. Soft jaws (1 set)
	1594-109-19-00	Power chuck (1 set)		1. 254 solid chuck (Made by KITAGAWA) HG-730-254 2. Pressure gauge 33kgf/m ²
	1594-109-20-00	Cylinder (1 set)		1. Solid cylinder (Made by KITAGAWA) Y1235RE25 2. Proximity switch; BES516-329-E4 (2 pcs.) 3. Draw bar, stopper stay
	1594-113-13-00	Soft jaws		1. For 254 chuck (Made by KITAGAWA) 08001351845(SB10B1)
Base Holder	1593-329-57-00	Boring base holder		6 pieces included as standard accessories 1682-40-208-
O.D. Tool	1593-028-01-00	Reverse cutting spacer		1745-40-430-
I.D. Tools	1593-668-08-00	32 shank boring bar socket		1593-668-51-
	1593-668-09-00	25 shank boring bar socket		1593-668-52-
	1593-668-10-00	20 shank boring bar socket		1593-668-53-

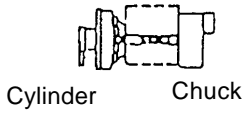
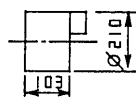
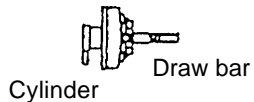
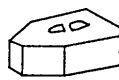
4-4 CS25 12-station Base Holder Turret Head Assembly Tools (Selected)

(1/2)

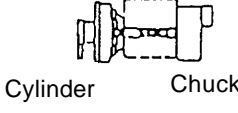
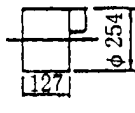
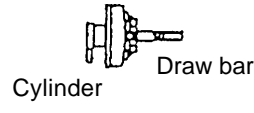

Cl.	PARTS	NAME	SKETCH	DESCRIPTION
Base Holder	1593-329-59-00	U-drill base holder		1. Cover 2. Socket (I.D. 32/25/20) included 1682-40-211-
I.D. Tools	1593-668-11-00	16 shank boring bar socket		1593-668-54-
	1593-668-12-00	12 shank boring bar socket		1593-668-55-
	1593-668-06-00	10 shank boring bar socket		1593-668-56-
	1593-668-07-00	8 shank boring bar socket		1593-668-57-
Drilling Tools	1593-337-04-00	MTNo.2 - MTNo.1 drill sleeve		08001380001
	1596-337-19-00	MTNo.1 drill socket		For MT No. 1 shank drill (2 to 14) 1682-95-314-
	1596-337-21-00	MTNo.2 drill socket		For MT No. 2 shank drill (14.5 to 23) 1682-95-337-
	1596-337-20-00	MTNo.3 drill socket		For MT No. 3 shank drill (23.5 to 32) 1682-95-313-
	1593-340-56-00	8 center drill socket		1. Used for the boring base holder 2. JIS-1A type for 2 x 60 1682-95-312-
	1593-340-57-00	5 center drill socket		1. Used for the boring base holder 2. JIS-1A type for 2 x 60 1682-95-311-

Cl.	PARTS	NAME	SKETCH	DESCRIPTION
Tap Holders	1593-347-01-00	Tap holder		<ol style="list-style-type: none"> 1. Tapper made by NIKKEN; S32-Z12-87.5L, M3 to M16 (W/o torque limiter) 2. Collet excluded 3. 40 x 32 socket required
	1593-347-02-00 08	Collet (Alone)		<ol style="list-style-type: none"> 1. Collet made by NIKKEN (ZMK12 - Tap size) 2. Size: M3, M4, M5, M6, M8, M10, M12, M14, M16
Other Tools				

4-5 CS20 12-station VDI Turret Head Assembly Tools (Standard)

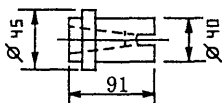
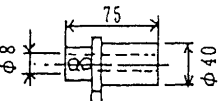
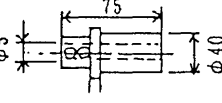
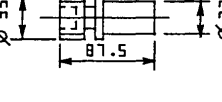
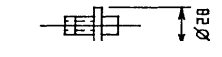
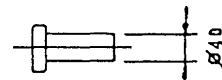
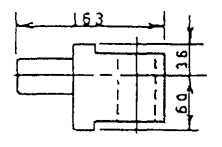
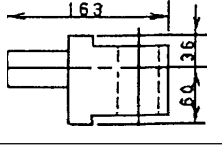
Cl.	PARTS	NAME	SKETCH	DESCRIPTION
Chucks	1594-108-96-00	Power chuck (Solid)	 Cylinder Chuck	1. 210 solid chuck (Made by KITAGAWA) 2. Solid cylinder 3. Soft jaws
	1594-108-97-00	Power chuck (1 set)		1. 210 solid chuck (Made by KITAGAWA) HG-715-210
	1594-108-98-00	Cylinder (1 set)	 Cylinder Draw bar	1. Solid cylinder (Made by KITAGAWA) Y1230RE25 2. Proximity switch BES516-329-E3R-3 3. Draw bar
	1594-113-13-00	Soft jaws		1. For 210 chuck (Made by KITAGAWA) 08001351801(SB08B1)

4-6 CS25 12-station VDI Turret Head Assembly Tools (Standard)

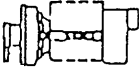
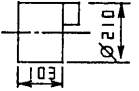


Cl.	PARTS	NAME	SKETCH	DESCRIPTION
Chucks	1594-109-21-00	Power chuck (Solid)	 Cylinder Chuck	1. 254 solid chuck (Made by KITAGAWA) 2. Solid cylinder 3. Soft jaws (1 set)
	1594-109-19-00	Power chuck (1 set)		1. 254 solid chuck (Made by KITAGAWA) HG-730-254 2. Pressure gauge 33kgf/m ²
	1594-109-20-00	Cylinder (1 set)	 Cylinder Draw bar	1. Solid cylinder (Made by KITAGAWA) Y1235RE25 2. Proximity switch BES516-329-E4(2 pcs.) 3. Draw bar, stopper stay
	1594-113-13-00	Soft jaws		1. For Bedienung 254 chuck (Made by KITAGAWA) 08001351845(SB10B1)

(1/2)

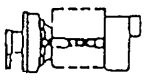
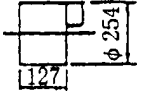


4 - 9

Cl.	PARTS	NAME	SKETCH	DESCRIPTION
Drilling Tools	1596-337-20-00	MTNo.3 drill socket		For MT No. 3 shank drill (23.5 to 32) 1682-95-313-
	1593-340-56-00	8 center drill socket		1. Used for the boring base holder 2. JIS-1A type for 2 x 60 1682-95-312-
	1593-340-57-00	5 center drill socket		1. Used for the boring base holder 2. JIS-1A type for 2 x 60 1682-95-311-
Tap Holders	1593-347-01-00	Tap holder		1. Tapper made by NIKKEN; S32-Z12-87.5L, M3 to M16 (W/o torque limiter) 2. Collet excluded 3. 40 x 32 socket required
	1593-347-02-00 08	Collet (Alone)		1. Collet made by NIKKEN (ZMK12 - Tap size) 2. Size: M3, M4, M5, M6, M8, M10, M12, M14, M16
Other Tools	1593-355-03-00	Plug		1742-67-568-
	1594-331-20-00	Cleaning tool		1. Cover 2. Nozzle 3. Pipe 1682-67-204-
U-drill	1596-331-17-00			(Socket 32/25/20), 1642-67-401- Cover 1682-67-204- Base holder

4-8 CS20 12-station VDI Rotating Tool Turret Head Assembly Tools (Standard)

Cl.	PARTS	NAME	SKETCH	DESCRIPTION
Chucks	1594-108-96-00	Power chuck (Solid)	 Cylinder Chuck	1. 210 solid chuck (Made by KITAGAWA) 2. Solid cylinder 3. Soft jaws
	1594-108-97-00	Power chuck (1 set)		1. 210 solid chuck (Made by KITAGAWA) HG-715-210
	1594-108-98-00	Cylinder (1 set)	 Cylinder Draw bar	1. Solid cylinder (Made by KITAGAWA) Y1230RE25 2. Proximity switch BES516-329-E3R-3 3. Draw bar
	1594-113-13-00	Soft jaws		1. For 210 chuck (Made by KITAGAWA) 08001351801(SB08B1)

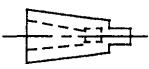
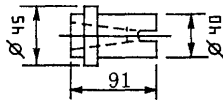
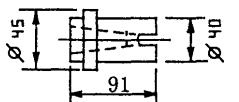
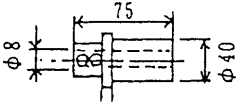
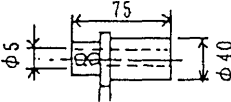
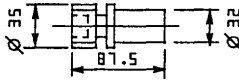
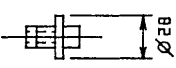
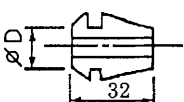
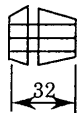
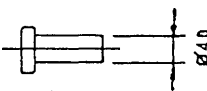
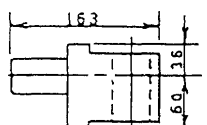
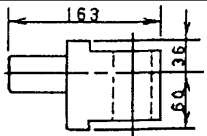
4-9 CS25 12-station VDI Rotating Tool Turret Head Assembly Tools (Standard)

Cl.	PARTS	NAME	SKETCH	DESCRIPTION
Chucks	1594-109-21-00	Power chuck (Solid)	 Cylinder Chuck	1. 254 solid chuck (Made by KITAGAWA) 2. Solid cylinder 3. Soft jaws (1 set)
	1594-109-19-00	Power chuck (1 set)		1. 254 solid chuck (Made by KITAGAWA) HG-730-254 2. Pressure gauge 33kgf/m ²
	1594-109-20-00	Cylinder (1 set)	 Cylinder Draw bar	1. Solid cylinder (Made by KITAGAWA) Y1235RE25 2. Proximity switch BES516-329-E4 (2 pcs.) 3. Draw bar, stopper stay
	1594-113-13-00	Soft jaws		1. For 254 chuck (Made by KITAGAWA) 08001351845(SB10B1)

4-10 CS20/25 12-station VDI Rotating Tool Turret Head Assembly Tools (Selected)

(1/2)

Cl.	PARTS	NAME	SKETCH	DESCRIPTION
Base Holders	1594-331-18-00	Outer figure cutting base holder		1682-67-201-
	1596-331-16-00	Boring base holder		1682-67-400-
	1742-68-002-00	Z-axis rotary tool holder		Collet dependent on the selected tool
	1742-68-001-00	X-axis rotary tool holder		Collet dependent on the selected tool
I.D. Tools	1593-668-08-00	32 shank boring bar socket		1593-668-51-
	1593-668-09-00	25 shank boring bar socket		1593-668-52-
	1593-668-10-00	20 shank boring bar socket		1593-668-53-
	1593-668-11-00	16 shank boring bar socket		1593-668-54-
	1593-668-12-00	12 shank boring bar socket		1593-668-55-
	1593-668-06-00	10 shank boring bar socket		1593-668-56-
	1593-668-07-00	8 shank boring bar socket		1593-668-57-
Drilling Tool	1596-337-21-00	MTNo.2 drill socket		For MT No. 2 shank drill (14.5 to 23) 1682-95-337-

CI.	PARTS	NAME	SKETCH	DESCRIPTION
Drilling Tools	1593-337-04-00	MTNo.2 - MTNo.1 drill sleeve		08001380001
	1596-337-19-00	MTNo.1 drill socket		For MT No. 1 shank drill (2 to 14) 1682-95-314-
	1596-337-20-00	MTNo.3 drill socket		For MT No. 3 shank drill (23.5 to 32) 1682-95-313-
	1593-340-56-00	8 center drill socket		1. Used for the boring base holder 2. JIS-1A type for 2 x 60 1682-95-312-
	1593-340-57-00	5 center drill socket		1.Used for the boring base holder 2.JIS-1A type for 2 x 60 1682-95-311-
Tap Holders	1593-347-01-00	Tap holder		1. Tapper made by NIKKEN; S32-Z12-87.5L, M3 to M16 (W/o torque limiter) 2. Collet excluded 3. 40 x 32 socket required
	1593-347-02-00 08	Collet (Alone)		1. Collet made by NIKKEN (ZMK12 - Tap size) 2. Size:M3, M4, M5, M6, M8, M10, M12, M14, M16
Rotary Tools	1596-352-09-00 13	Collet (Alone)		1. Collet (ESX20-D) 2. Size: 1, 1.5, 2, 2.5, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
	1593-347-08-00 05	Tap collet		1. Tap collet (ET-1-20) 2. Size: M3, M4, M5, M6, M8, M10
Other Tools	1593-355-03-00	Plug		1742-67-568-
	1594-331-20-00	Cleaning tool		1. Cover 2. Nozzle 3. Pipe 1682-67-204-
U-drill	1596-331-17-00			(Socket 32/25/20), 1642-67-401- Cover 1682-67-204- Base holder

INVERTED VERTICAL TURNING CELL
CS20/25
INSTRUCTION MANUAL
SPECIFICATIONS
SEIKI-SEICOS Σ21L
Version 2.02
12-2001

03-1998 First Edition