



Doosan Infracore  
Machine Tools

# Installation Manual

## DBC 130 II



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For enhanced performance, this installation manual is subject to change without notice

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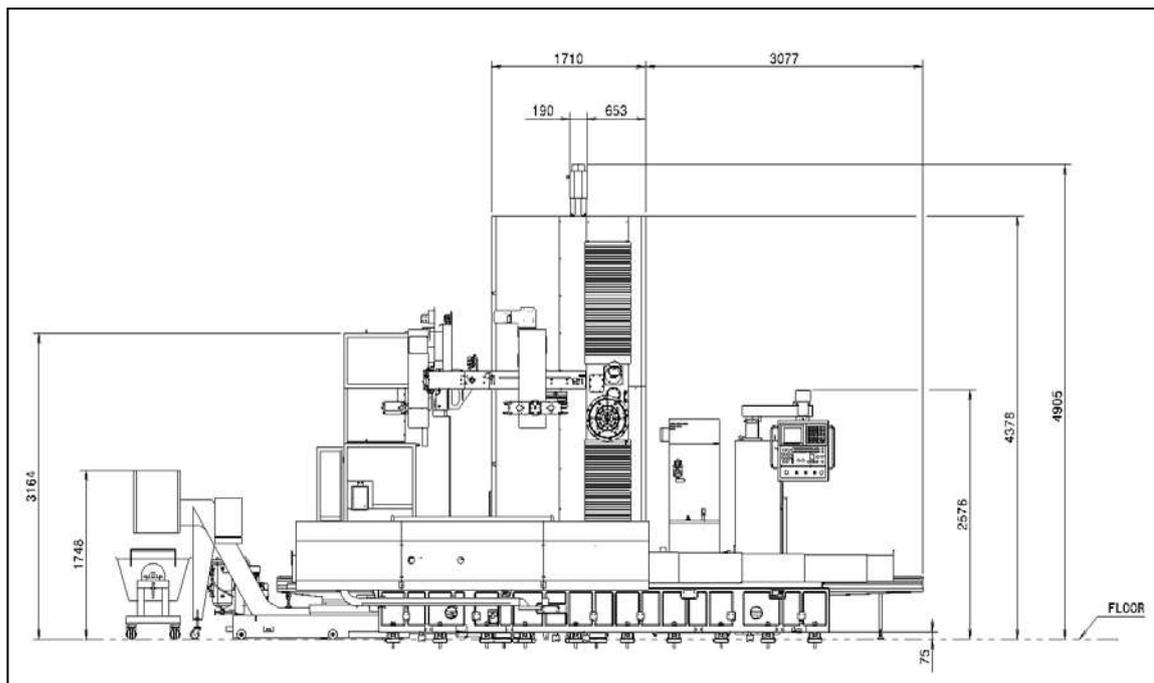
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## 1. Installation Site

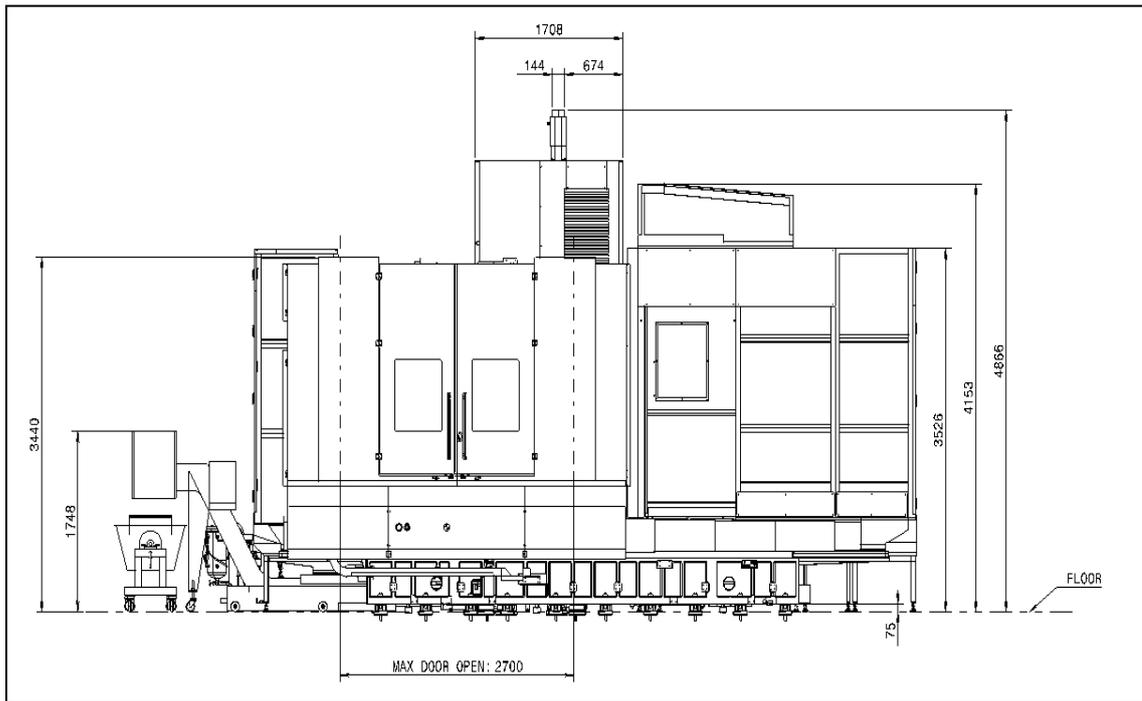
- 1) Do not install the machine in a place of a high temperature difference or in areas that are exposed to dust or direct sunlight, and consider the ventilation condition. Besides, it is recommended to select a place of less vibration. However, if it's inevitable, take appropriate actions (reinforced foundation, reinforced ground, and dustproof screen, etc) to prevent the machine from being affected by the vibration .
- 2) The minimum bearing power of soil that is required to install the machine is 10 tons/m<sup>2</sup>.
- 3) A 20-ton crane with a lifting performance of 8m must be equipped at the installation site. The installation personnel should take into consideration the dynamic relation between crane and foundation.
  - If a crane meeting the above specification is not available, use alternatives such as a car crane, large forklift, etc., for moving the machine.
- 4) When determining the installation site, refer to the machine layout diagram to secure room for installing the assemblies (ATC, electric cabinet, hydraulic tank, chip conveyor, etc) as well as enough room for repair (so that the doors are open/closed without interruption). Besides, secure enough room between machines to facilitate the installation work of the chip conveyor.
- 5) Refer to the layout diagram below. **(For reference Only)**
  - ※ The below diagram is a standard machine layout for reference. The actual layout may differ due to engineering changes or application of client specifications. Refer to the layout diagram that is specific to the machine to install.

### ※ Ref 1) : Front View

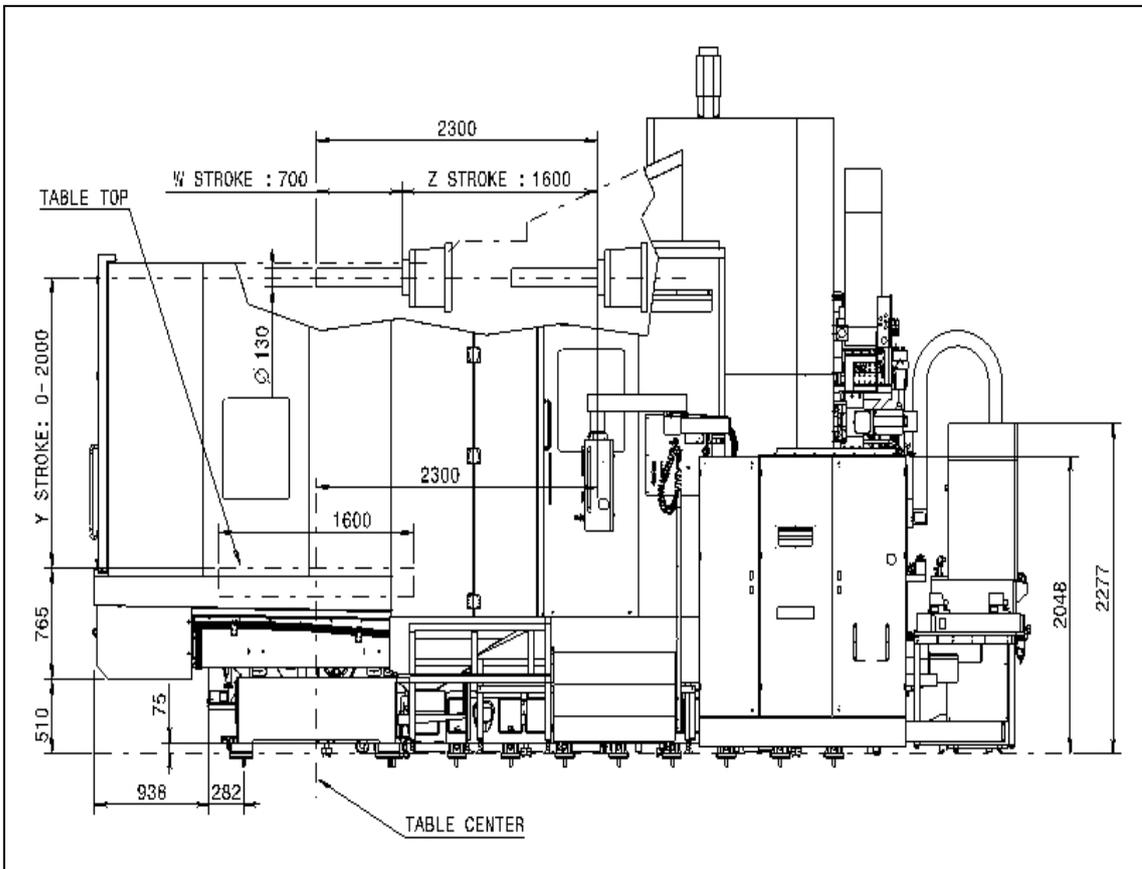




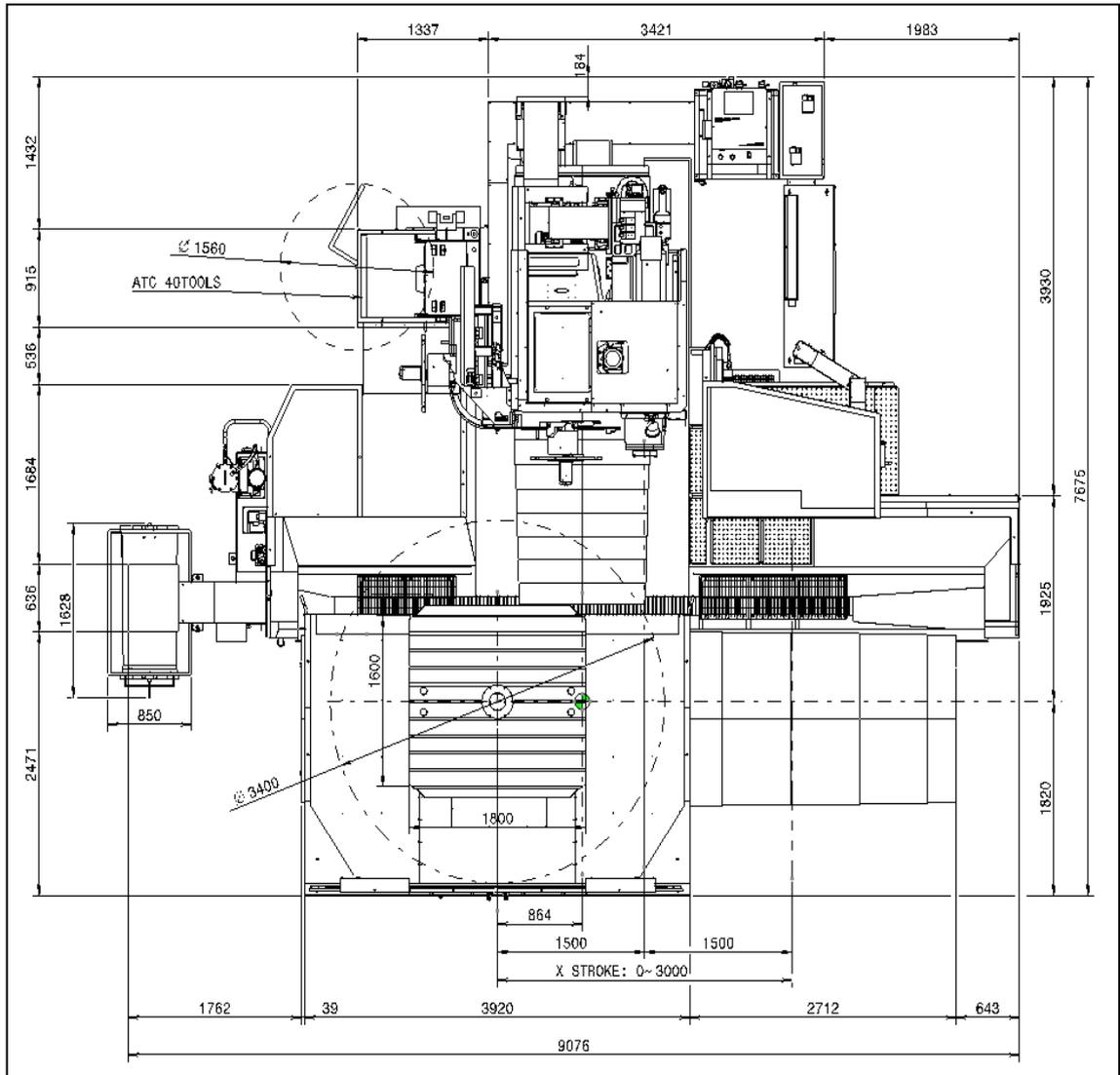
※ Ref 4) : Front view of machine to install semi splash guard on (Optional)



※ Ref 5) : Right view of machine to install semi splash guard on (Optional)



※ Ref 6) : Top view of machine to install semi splash guard on (Optional)





## 2. Foundation work

※ **Foundation diagram: Use only the foundation diagram provided by the salesperson.**

- foundation diagram : "S/O NO.\_Serial No\_drawing no"

- Example of foundation diagram: 201077848\_MB0003-000084\_BG6C21601C

👁️ **(Note)** The foundation diagrams illustrated in this manual are for reference only

### 2.1 Foundation work timing and post checkpoints

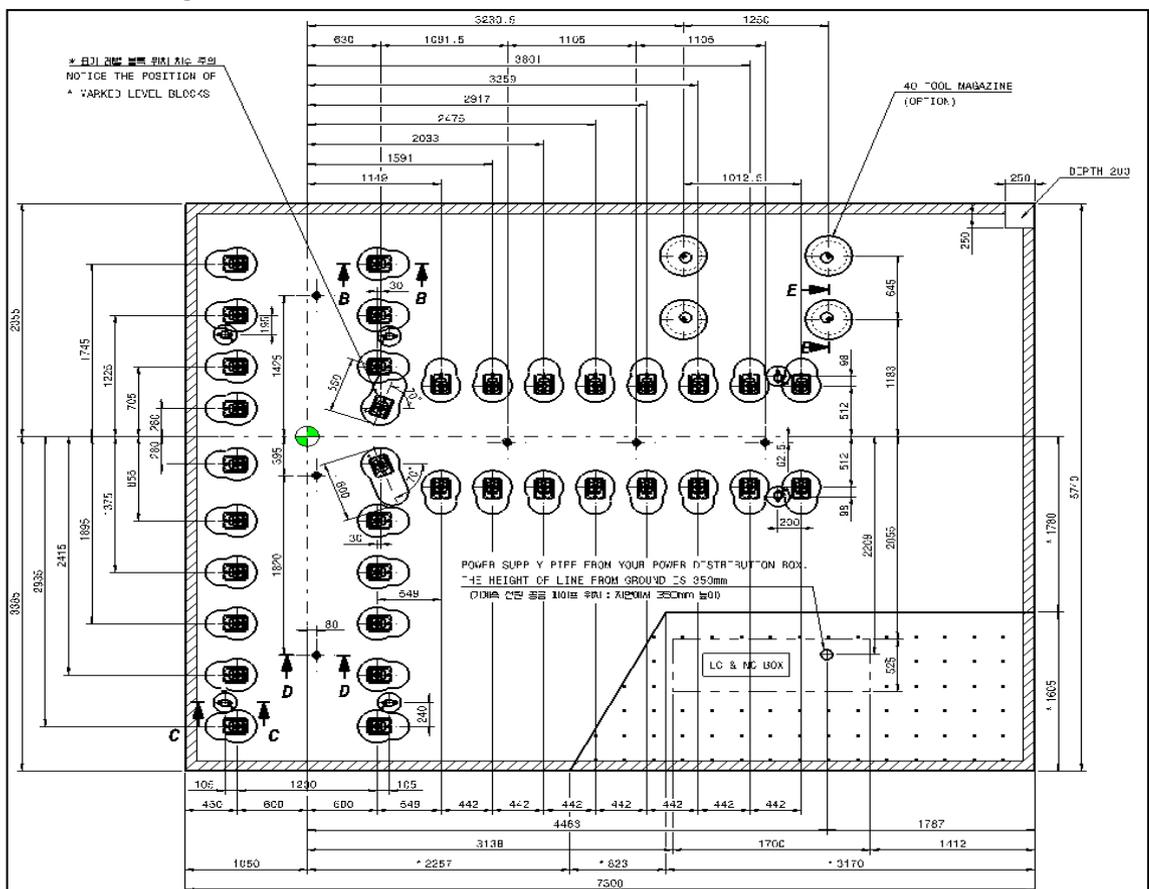
- 1) It is recommended to take at least a two-month schedule from completion of the foundation work to completion of the installation.
  - It should take at least one month to cure the concreted surface.
- 2) After completion of the foundation work, measure each checkpoint on the foundation and, if a problem is found, take an appropriate action (mostly repair) before the arrival of the machine.

### 2.2 Foundation work for installing the machine

- 1) Foundation diagram

(Subject to change without notice for reasons of enhanced machinery or engineering changes.)

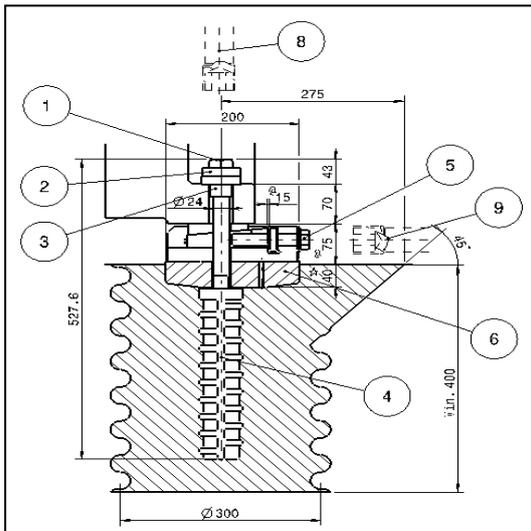
※ **40 Tool Magazine**



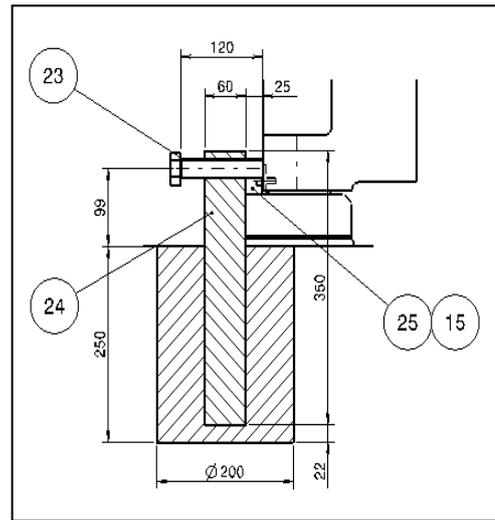




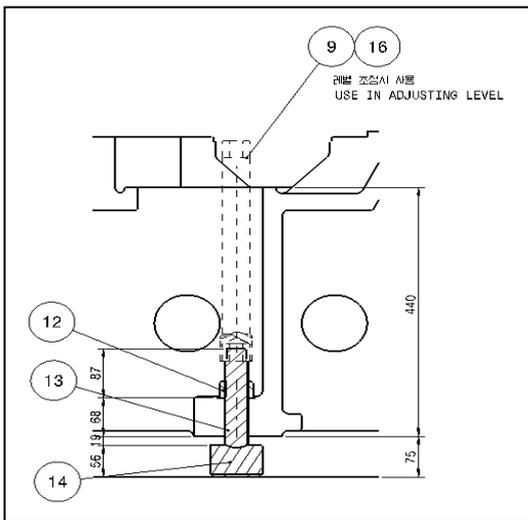
※ Detailed Diagram



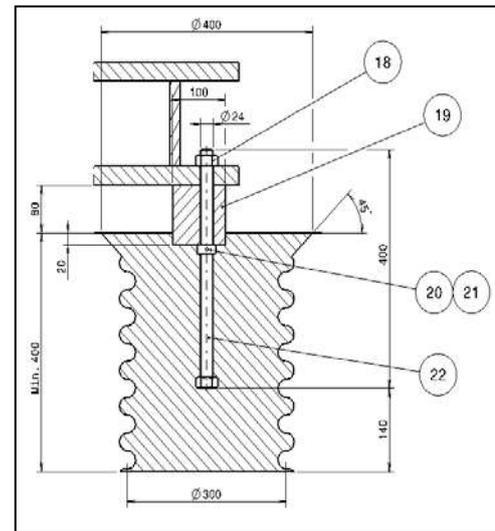
Section View B-B (Main Unit Bed)



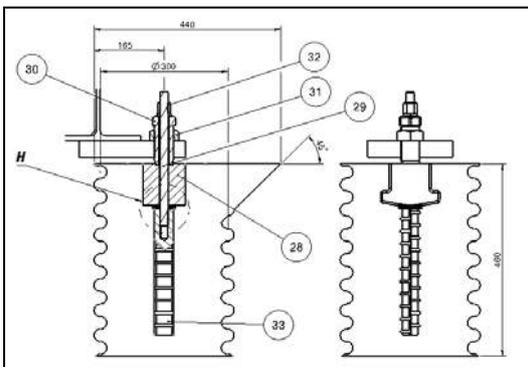
Section View C-C (Kicker)



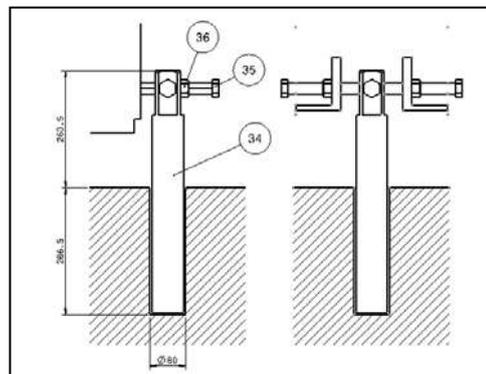
Section View D-D (Center of Main Unit Bed)



Section View E-E (APC)



Section View F-F (APC)



Section View G-G (APC)

No.	Item No.	Definition	Mat. / Spec.	Q'ty	Remark
1	B26491444	Nut	BA 24×260	36	
2	B26491204	Adjust Bush	SM45C	36	Final-Set
3	B26491014	Adjust Bush	SM45C	36	Pre-Set
4	B26491073A	Anchor	GC300	36	
5	B26491143E	Level Block	GC300	36	
6	B26491423A	Level Plate	GC300	36	
8	B26491213A	Hex. Bar(2)	SM45C	1	MB36
9	B26491093B	Hex. Bar	SM45C	1	MB30
12	B26491334	Nut	NA36	6	
13	B26491313A	Level Bolt	SM45C	6	MB30
14	B26491513	Leveling Block	GC45C	6	
15	S2208862	Bolt, Hex. Socket Head	BB 8×20	24	
16	B26491363	Hex. Bar(3)	SM45C	1	MB46
18	S4001331	Hex. Nut	NA24	6	90 Tool Mag.
19	250205-00953	Plate	SS400	6	90 Tool Mag.
20	B13593024A	Foundation Collar	SS400	6	90 Tool Mag.
21	S3520376	Set Screw	BQ 6×8	18	90 Tool Mag.
22	B13593033B	Bolt	SM45C	6	90 Tool Mag.
23	S0035252	Bolt, Hex. Head	BA S24×130	6	
24	B26491053A	Adjusting Block	SS400	6	
25	B26491044	Bracket	SS400	6	
27	457845	Disk Spring	56X28.5X3X4.3	24	
28	B14491023	Level Plate	GC300	12	
29	R00296	Stud Bolt	SB20X350L	12	
30	B14491033	Adjust Bolt	SM45C	12	
31	182992	Nut	SM45C	12	
32	B14491044	Nut	SM45C	12	
34	110302-00731	Kicker Bar	SS400	4	
35	S0035551	Adjust Bolt	SM45C	12	
36	S4001331	Nut	SM45C	12	

- Note) 1) Reinforce the ground with stake driving, riprap piling and rebar reinforcement.  
(bearing power of soil: at least 10 tons/m<sup>2</sup>)
- 2) Tolerance for each foundation checkpoint
    - Top view:  $\pm 10\text{mm}$
    - Gap between holes:  $\pm 10\text{mm}$
    - Cumulative gaps between holes :  $\pm 20\text{mm}$
    - Size of foundation hole:  $\pm 10\text{mm}$
  - 3) It should take at least one month to cure the primary concreted surface.
  - 4) Prepare the wiring between electric cabinet and main power as well as air service unit as appropriate for the work.
  - 5) Use a wrinkle tube of larger than  $\text{Ø}300\text{mm}$  to inject mortar into the second mortar surface in deeper than 400mm. Important: the tube must be removed after the first foundation work.
  - 6) The holes for the second mortar work should comply with the specifications in the detailed diagram above.
  - 7) When installing the machine temporarily, use the adjusting bolt on the level block to make an approximate gap of 15mm.(<sup>Ⓐ</sup>)
  - 8) The “6” level plate should be installed 10mm~40mm under the ground. (the bottom of the machine should be approximately 75mm high from the ground)
  - 9) When the installation is completed, remove “2” B26491014 adjusting bush.
  - 10) Refer to the standard layout to check the location of the main power supply pipe and prepare the wiring and air service unit as necessary.



### 3. Transportation

The boring machine can be dismantled into each unit to facilitate the transportation of the machine to the plant.

Since each one of the units is heavy weighted and unbalanced, pay attention to keep every unit balanced if using a forklift or crane for transporting purpose.

- (1) When the machine is delivered on site, check if every one of the units are all included in the package based on the packing list.
- (2) Use the crane or forklift to move the unit while keeping an eye on the balance.
- (3) In this process, take caution lest that the wire rope or shackles should impact on the unit, and adjust the length of the rope as appropriate to prevent it from being unbalanced.
- (4) If the rope is short, it may cause an interference with brackets or covers. This is why you must pay special attention to the rope length.

	Assembly	Weight	Unit	Remark
1	Table Ass'y	17,000Kg	Table Bed, Rotary Table, Rotary Base	
2	Column Bed Ass'y	11,000Kg	Column Bed, Column Base	
3	Column Body Ass'y	6,000Kg	Column Body	
4	Spindle Head Ass'y	2,500Kg	Spindle Head	
5	ATC Ass'y	3,000Kg	ATC, Tool Magazine, Tool Magazine Base	
6	Others	3,500Kg	Electric Cabinet, Hydraulic Unit, Oil Cooler, Duct & Covers, Chip Conveyor and Accessories	
Total weight of machine		43,000Kg		

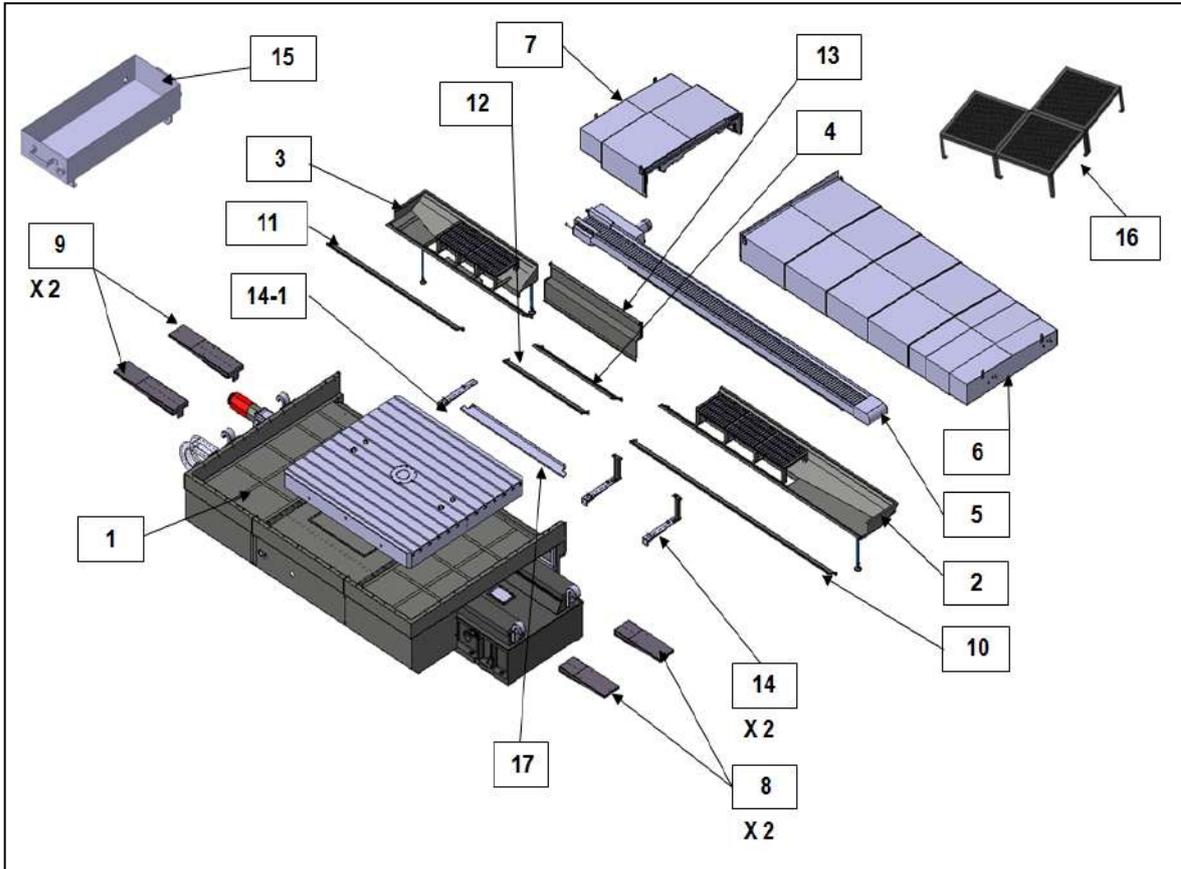
The above list is for the standard equipment, and is subject to change without notice for reasons of customer specifications or engineering changes.

※ Precautions for lifting up the assembly

- 1) Ensure that the front/rear sides of the table bed (X axis) and the left/right sides of the column bed (Z axis) are fixed by the factory default brackets.
- (2) Before lifting up the table bed and column bed units, hook wire ropes between eyebolts in the sides of the bed and crane. To prevent the machine from being damaged, wrap the contact points between ropes and machine with pieces of wood or cloth.
- (3) When lifting up the column body, stretch the rope as appropriate for avoiding a possible interference with the glass scale.
- (4) In order to lift up the table bed and column bed units at once, you must use a crane weighing at least 20 tons. (Required specifications: 20 tons of weight and 8m of tensile height)

4. What's included

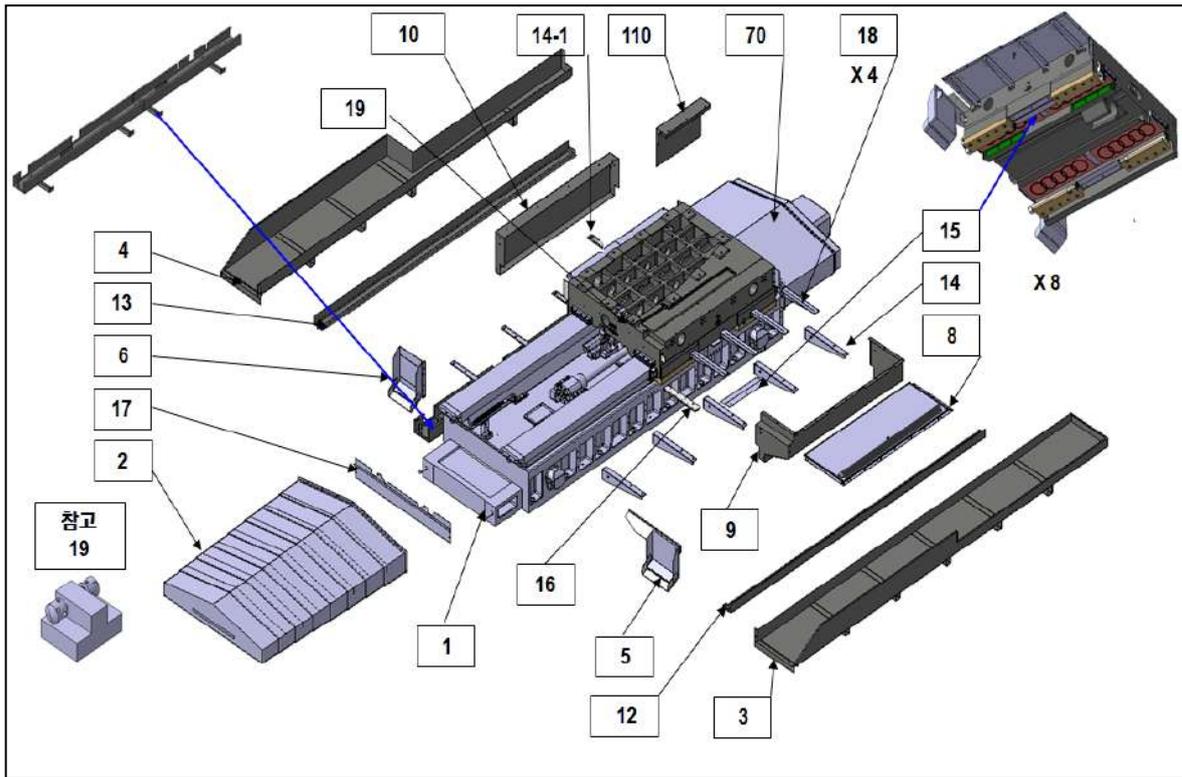
4.1 Table Bed Ass'y



No.	Item No.	Definition	Q'ty	Packing No.	Weight	remark
1	160301-00136A	TABLE BED ASSY	1	1	17 Ton	
2	110961-00144D	TRAY;(1)	1	8		
	110958-01660	SUPPORT,TRAY	(1)			
3	110961-00145D	TRAY;(2)	1	8		
	110958-01660	SUPPORT,TRAY	(2)			
4	110961-00146C	TRAY;(3)	1	8		
5	900115-00582A	CONVEYOR,CHIP;	1	8		
6	110510-00428B	COVER,SLIDE;(X4000)R	1	1		
7	110510-00427B	COVER,SLIDE;(X4000)L	1	1		
8	110423-03265A	BRACKET,SLIDE	2	7		
		COVER;X-R				
9	110423-03266A	BRACKET,SLIDE	2	7		
		COVER;X-L				
10	110508-10529C	COVER;TRAY,(1)	1	8		
11	110508-10530C	COVER;TRAY,(2)	1	8		

No.	Item No.	Definition	Q'ty	Packing No.	Weight	remark
12	110961-00183	COVER;CENTER	1	8		
13	110508-11089C	COVER,REAR;	1	8		
14	110423-03095A	BRACKET;TRAY	2	8		
	110958-01647A	SUPPORT;TRAY	(2)			
14-1	110423-03095A	BRACKET;TRAY	1	8		
15	230104-01477	BUCKET;OIL	1	8		
16	L56301092B	STAND, FLOOR	3	8		
17	150119-00381	PAN; OIL	1	8		

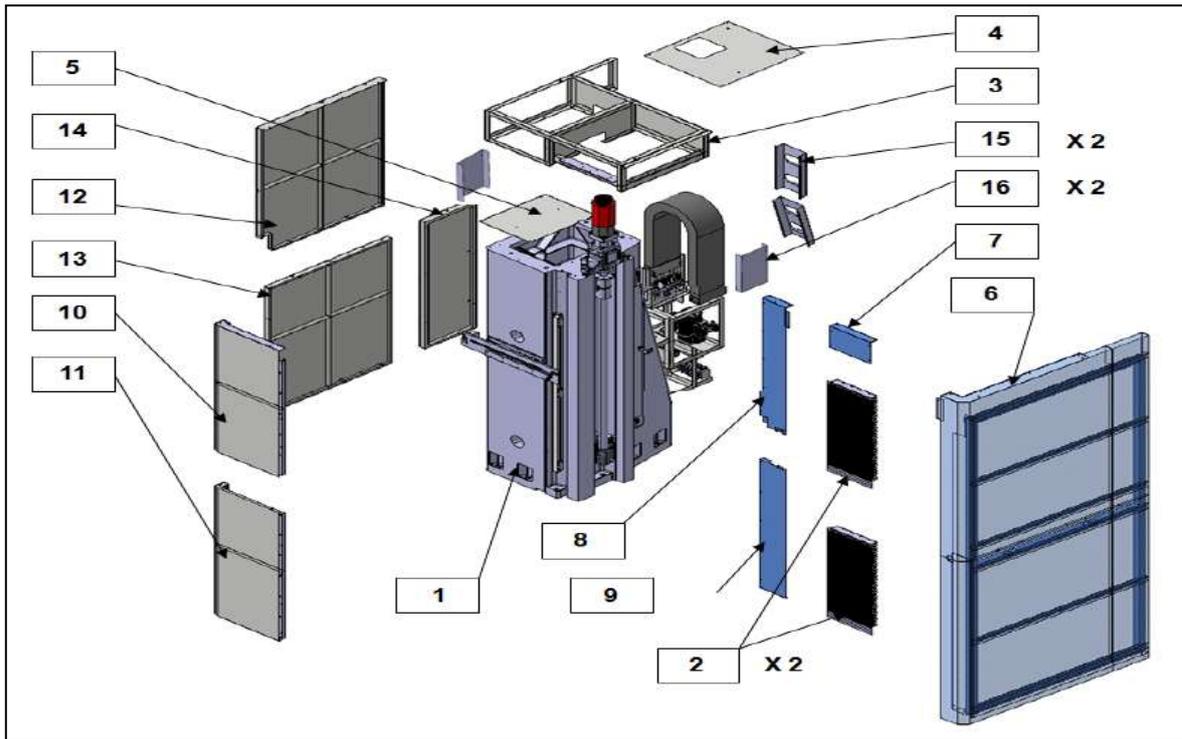
4.2 Column Bed Ass'y



No.	Item No.	Definition	Q'ty	Packing No.	Weight	remark
1	160301-00144A	COLUMN BED ASSY	1	2	11Ton	
2	110510-00495	SLIDE COVER(FRONT)	1	2		
3	110961-00150	TRAY(R)	1	8		
4	110961-00153C	TRAY(L)	1	8		
5	101556-00002B	REMOVER,CHIP(R)	1	8		
6	101556-00348	REMOVER,CHIP(L)	1	8		
7	110510-00020A	SLIDE COVER(REAR)	1	2		
8	250205-00868A	BASE PLATE	1	8		
	110423-03229A	BRACKET,FRAME	(1)			
9	110508-00986B	BASE COVER(R)	1	8		
10	110508-10915C	BASE COVER(L)	1	8		
11	110508-12561	COVER, CHIP(2)	1	8		
12	150119-00100	PAN, OIL(R)	1	8		
13	150119-00101	PAN, OIL(L)	1	8		
14	110423-03780	BRACKET; TRAY	8	8		
14-1	110423-03799	BRACKET; TRAY(2)	1	8		
15	B26280544B	COVER; GUIDE RAIL (1)	1	7		
16	B26212163B	BLOCK (U)	1	8		

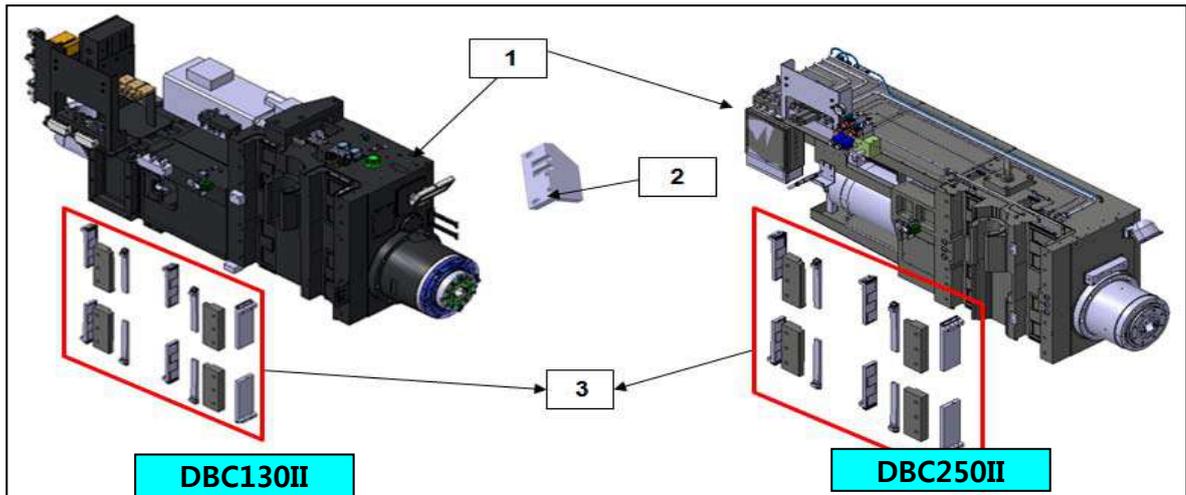
No.	Item No.	Definition	Q'ty	Packing No.	Weight	remark
17	111001-00063	PROTECTOR; CHIP	1	8		
18	110423-03590	BRACKE;PLATE,BASE	4	8		
19	B13210193A	POSITION_BLOCK	1	7		

4.3 Column Body Ass'y



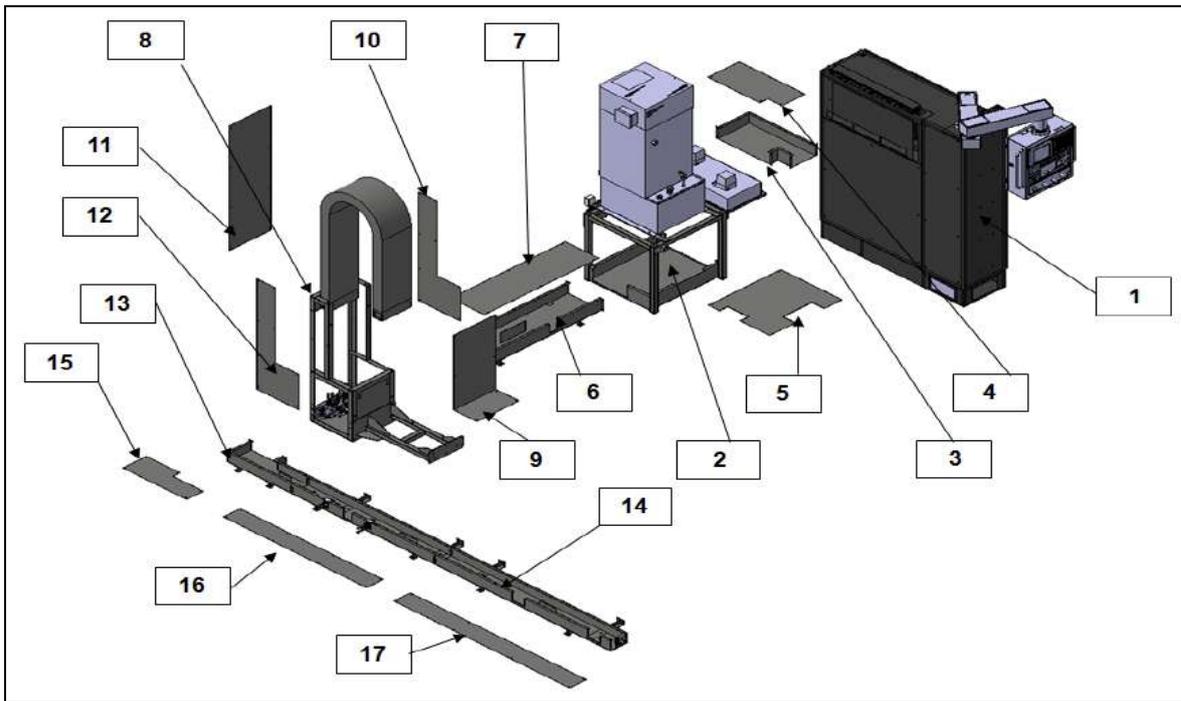
No.	Item No.	Definition	Q'ty	Packing No.	Weight	remark
1	190108-00149C	COLUMN ASSY	1	3	7Ton	
2	B26293123	MULTI COVER	2	8		
3	160609-02656	FRAME, TOP COVER	1	8		
	B26212173C	BLOCK(T)	(1)			
4	110508-10630	UPPER, COVER	1	8		
5	110508-01007B	UPPER, COVER	1	8		
6	160609-02657	FRAME, SIDE COVER	1	8		
	110517-00573B	COVER, SIDE(R-U)	(1)			
	110517-00574B	COVER, SIDE(R-B)	(1)			
7	110508-10978A	COVER, FRONT; MIDDLE	1	8		
8	110508-10625B	COVER, FRONT(R-U)	1	8		
9	110508-10626C	COVER, FRONT(R-B)	1	8		
10	110508-10622	COVER, FRONT(U)	1	8		
11	110508-10624B	COVER, FRONT(B)	1	8		
12	110517-00571B	COVER, SIDE(L-U)	1	8		
13	110517-00572B	COVER, SIDE(L-B)	1	8		
14	110508-12560	COVER, CHIP(1)	1	8		
15	110508-03563	COVER, HOSE	2	8		
16	110958-02027	SUPPORT, CABLE CHAIN	2	8		

4.4 Spindle Head Ass'y



No.	Item No.		Definition	Q'ty	Packi ng No.	Weight	remark
	DBC130II	DBC250II					
1	160401-00176B	160401-00113	SPINDLE HEAD ASSY	1	4	2.5Ton	
2	B26290123	B26290123	BLOCK,SCALE(Y)	1	4		
3	250205-01099	B25116023A	PLATE,BACK(2)	1	7		
	B14115073A	B25116073B	GIB,LOWER	1	7		
	B14115063A	B25116063B	GIB,LOWER	1	7		
	250205-01098	B25116013A	PLATE,BACK(1)	1	7		
	B14115083A	B25116083B	GIB,UPPER	1	7		
	B14115053A	B25116053B	GIB,UPPER	1	7		
	250205-01099	B25116023A	PLATE,BACK(2)	1	7		
	B14115083A	B25116083B	GIB,UPPER	1	7		
	B14115053A	B25116053B	GIB,UPPER	1	7		
	250205-01098	B25116013A	PLATE,BACK(1)	1	7		
	B14115073A	B25116073B	GIB,LOWER	1	7		
	B14115063A	B25116063B	GIB,LOWER	1	7		
	B25116033B	B25116033B	PLATE(1),REFERENCE	1	7		
	B25116043B	B25116043B	PLATE(2),REFERENCE	1	7		

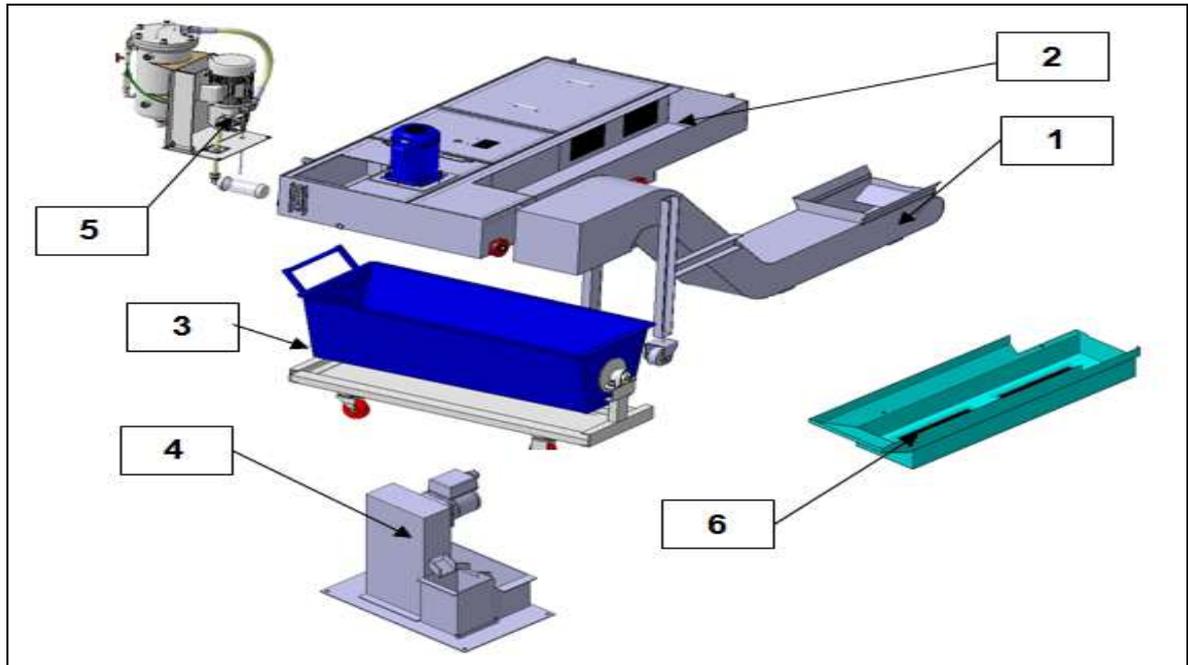
4.5 Duct Ass'y



No.	Item No.	Definition	Q'ty	Packing No.	Weight	remark
1		NC, OP BOX	1	6		
2	B14210193H	PUMP,LUBRICATION	1	6		
	400206-00202	COOLER, OIL	(1)			
	160609-02649B	FRAME,COOLER	(1)			
3	460103-00534A	DUCT;(2)	1	8		
4	110505-00276A	COVER,DUCT;(2)	1	8		
5	110505-00274A	COVER, FRAME DUCT	1	8		
6	460103-00533A	DUCT;(1)	1	8		
7	110505-00275A	COVER,DUCT;(1)	1	8		
8	130301-00254A	CHAIN,CABLE;Z2000	1	6		
	110958-01897	SUPPORT;CABLE CHAIN	(1)			
	110958-01903	SUPPORT;FRAME	(1)			
9	110516-00089	COVER,SUPPORT(4)	1	8		
10	110516-00088	COVER,SUPPORT(3)	1	8		
11	110516-00087	COVER(1)	1	8		
12	110516-00086	COVER(2)	1	8		
13	460103-00656	DUCT(3)	1	2		
14	460103-00536B	DUCT(4)	1	2		
	460103-00537B	DUCT(5)	(1)			

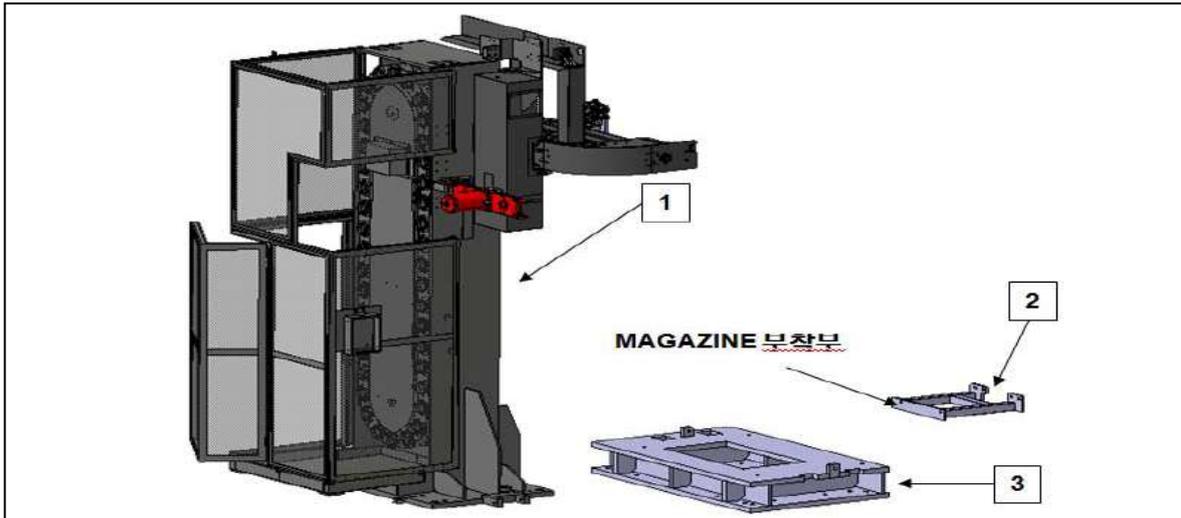
	B26419323B	SUPPORT;DUCT	(4)			
15	110505-00321	COVER;DUCT(3)	1	8		
16	110505-00277B	COVER;DUCT(4)	1	8		
17	110505-00278A	COVER;DUCT(5)	1	8		

**4.6 Coolant Tank, Chip Bucket, Chip Conveyor, TSC Ass'y, T/F(Optional)**



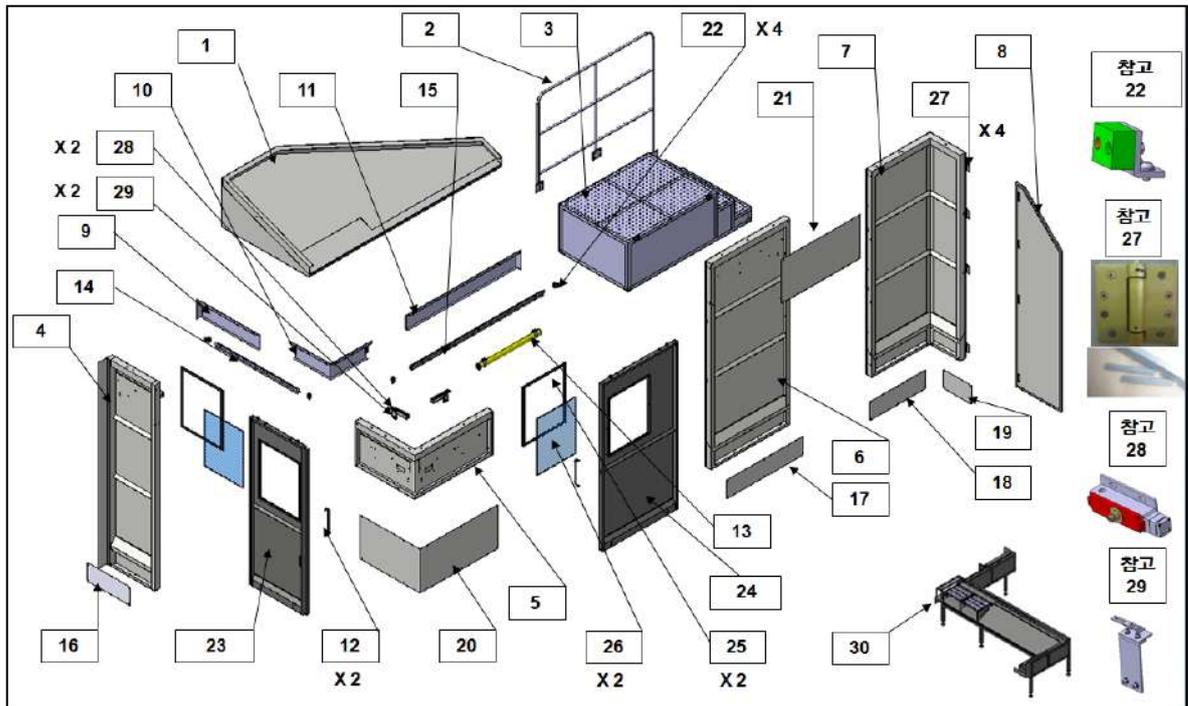
No.	Item No.	Definition	Q'ty	Packing No.	Weight	remark
1	B26575011	LIFT UP CHIP CONV MAIN BODY	1	7		
2	450102-00131A	COOLANT TANK MAIN BODY	1	7		
3	C51221011E	CHIP BUCKET	1	7		
4	R76595	OIL SKIMMER (OPT.)	1	7		
5	R37278	TSC PUMP (OPT.)	1	7		
6	101558-00168	CHIP PAN (W/O CHIP CONV.)	1	7		

4.7 Tool Magazine Ass'y (Option)



No.	Item No.	Definition	Q'ty	Packing No.	Weight	remark
1	100702-00154	40TOOLS MAGAZINE	1	5	2.4Ton	
	100702-00172	60, 90 TOOLS MAGAZINE	1	5	4.5Ton	
2	860103-00533A	FIXTURE;MAGAZINE	1	2		
	860103-00637	FIXTURE;MAGAZINE	1	2		
3	160101-00277C	TOOL MAGAZINE BASE	1	5		

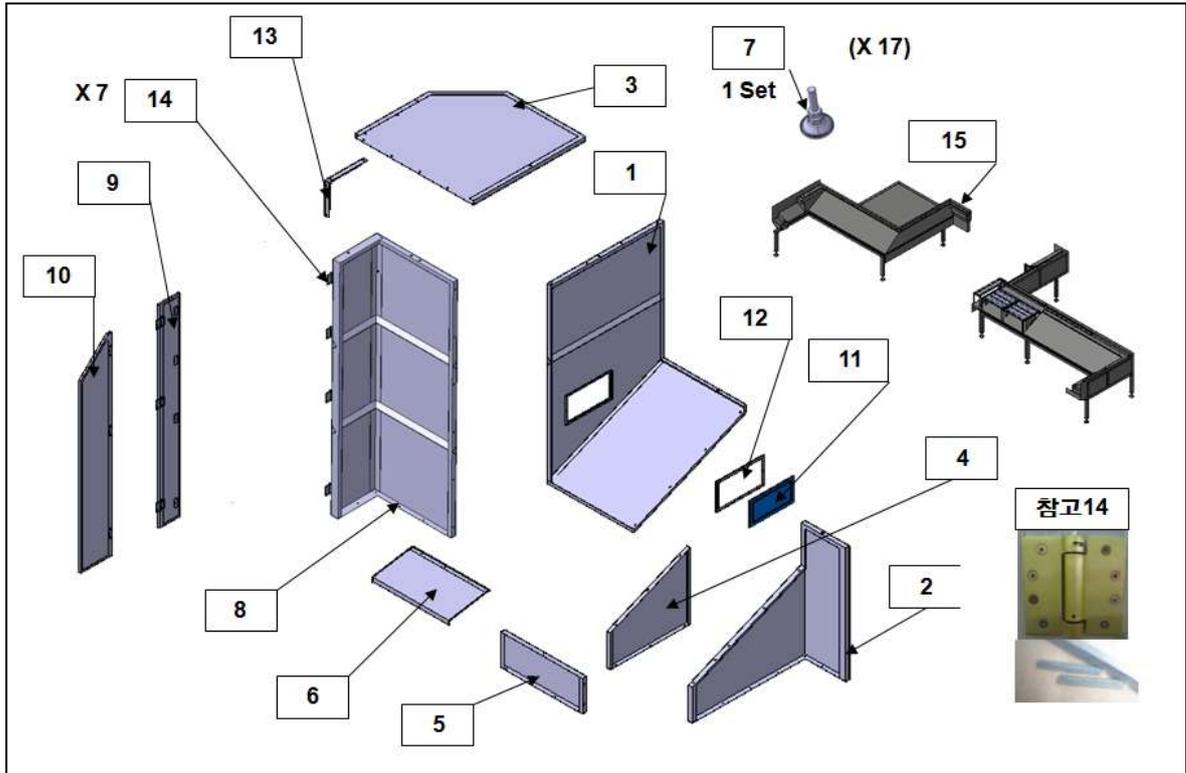
4.8 Semi Splash Guard – Operator Part (Option)



No.	Item No.	Definition	Q'ty	Packing No.	Weight	remark
1	110508-11061A	COVER, TOP	1	8		
2	110302-00536A	BAR, SAFETY	1	8		
3	110955-00203A	STEP, OPERATOR	1	8		
4	102302-00148B	FENCE, OPERATOR(4)	1	8		
5	102302-00149B	FENCE, OPERATOR(5)	1	8		
6	102302-00145B	FENCE, OPERATOR(1)	1	8		
7	102302-00171A	FENCE, OPERATOR(2)	1	8		
8	102302-00144A	FENCE, ROTATING,OPERATOR	1	8		
9	910801-00029A	ROOF, OP DOOR(2)	1	8		
10	910801-00030A	ROOF, OP DOOR(3)	1	8		
11	910801-00034	ROOF, OP DOOR(1)	1	8		
12	R70180	HANDLE	2	7		
13	LAMP		1	6		
14	110922-00564	GUIDE,DOOR;(2)	1	8		
15	110922-00563	GUIDE,DOOR;(1)	1	8		
16	110508-11065	COVER;(4),FENCE,OPER ATOR	1	8		
17	110508-11062	COVER;(1),FENCE,OPER	1	8		

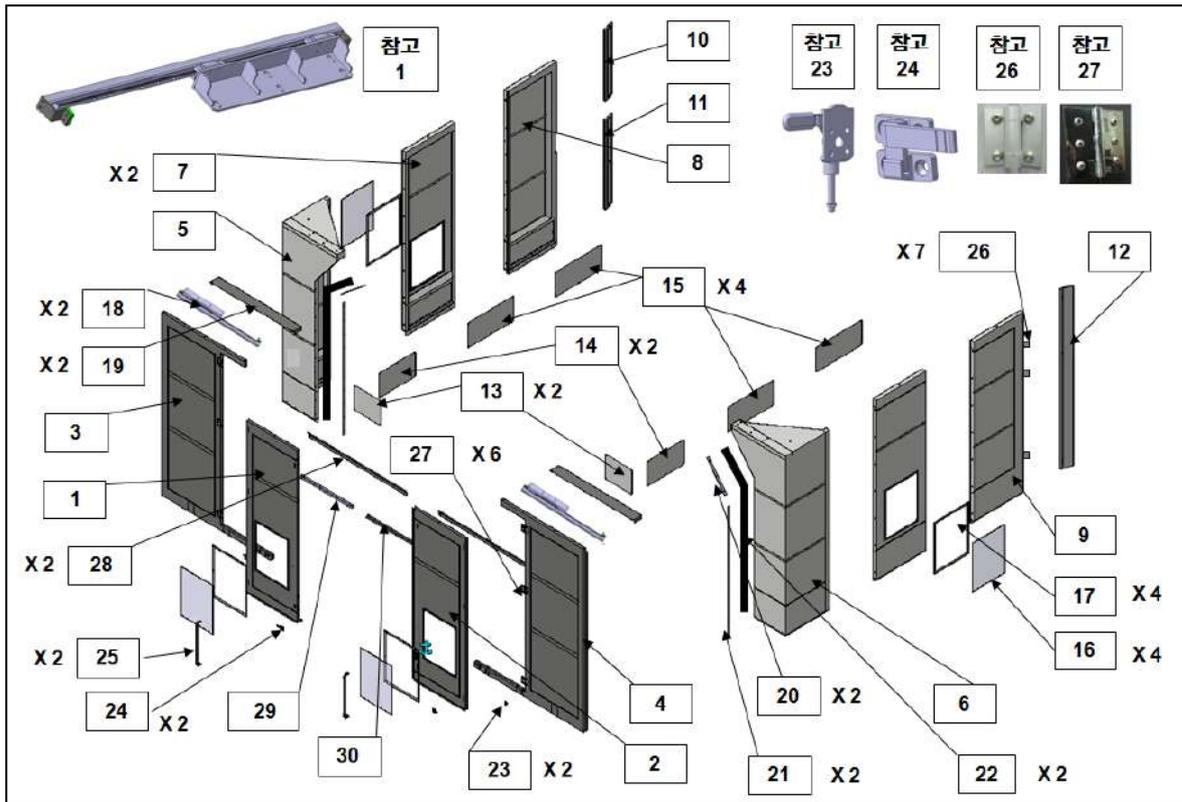
No.	Item No.	Definition	Q'ty	Packing No.	Weight	remark
		ATOR				
18	110508-12695	COVER;(2),FENCE,OPERATOR	1	8		
19	110508-11064	COVER;(3),FENCE,OPERATOR	1	8		
20	110508-12502	COVER,OPERATOR FENCE(5)	1	8		
21	110508-12505	COVER,OPERATOR FENCE(1)	1	8		
22	B31722324	STOPPER, DOOR	4	7		
	B31722314	BRACKET, STOPPER	(4)			
23	102301-00099B	DOOR, OPERATOR(2)	1	8		
24	102301-00098A	DOOR, OPERATOR(1)	1	8		
25	B13722023	PLATE	2	8		
26	B13721313B	GLASS(1), SAFETY	2	8		
27	R70177	HINGE;SPRING	4	8		
28	ESWSF0013	SAFETY SWITCH	2	6		
	110423-02251A	PLATE,SWITCH	(2)			
29	R87057A	KEY;SWITCH	2	7		
	110423-03897	BRACKET,SAFETY SWITCH(3)	(2)			
	110423-03896	BRACKET,SAFETY SWITCH(2)	(2)			
30	110958-01928A	SUPPORT;OPERATOR FENCE	1	10		

4.9 Semi Splash Guard – Magazine Part (Option)



No.	Item No.	Definition	Q'ty	Packing No.	Weight	remark
1	910801-00035C	ROOF, ATC FENCE	1	8		
2	102302-00155B	FENCE, ATC(4)	1	8		
3	110508-12493A	COVER, TOP	1	8		
4	110958-02118	SUPPORT	1	8		
5	102302-00154A	FENCE, ATC(3)	1	8		
6	110508-10979A	COVER;ATC FENCE	1	8		
7	160629-00005	FOOT,LEVELING	1 SET	8		
8	102302-00172	FENCE, ATC(1)	1	8		
9	102302-00151A	FENCE, ROTATING	1	8		
10	102302-00169	FENCE, ROTATING	1	8		
11	500119-00154	GLASS, SAFETY	1	8		
12	250205-00096	PLATE, GLASS	1	8		
13	110423-03695	BRACKET	1	8		
14	R70177	HINGE, SPRING	7	8		
15	110958-01929A	SUPPORT;ATC FENCE	1	10		

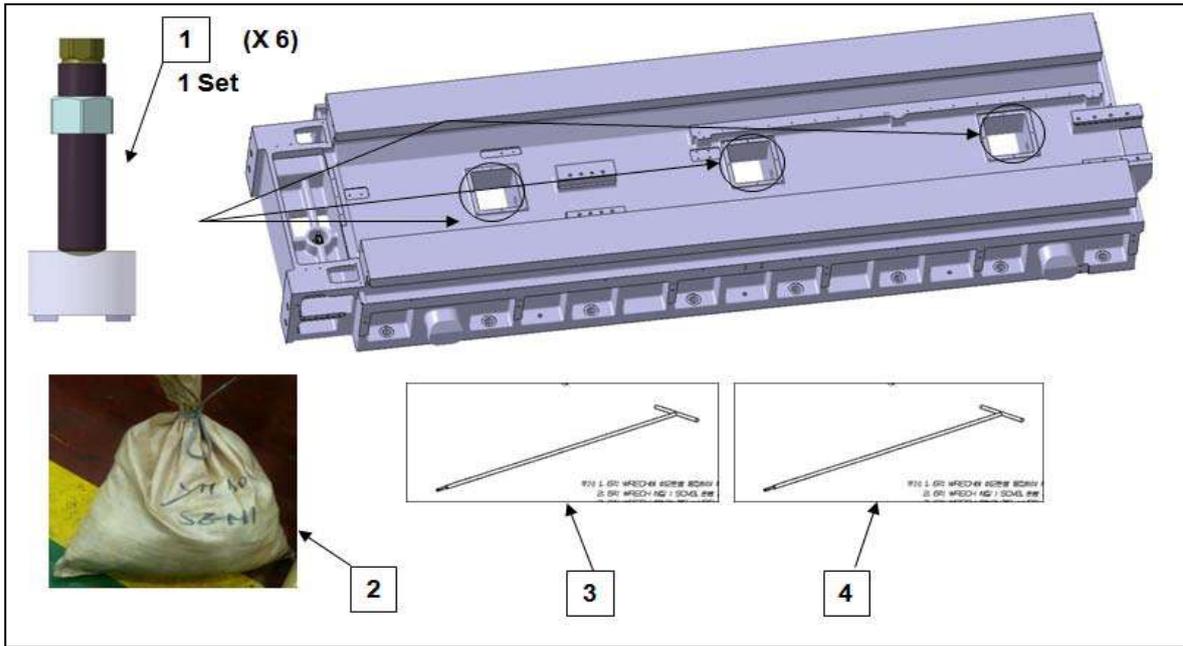
4.10 Semi Splash Guard – Table Part (Option)



No.	Item No.	Definition	Q'ty	Packing No.	Weight	remark
1	102301-00506B	DOOR;RATATING(R), TABLE	1	8		
2	102301-00507A	DOOR;RATATING(L), TABLE	1	8		
3	102301-00504A	DOOR;SLIDING(R),TABLE	1	8		
4	102301-00505A	DOOR;SLIDING(L),TABLE	1	8		
5	102302-00207	FENCE;TABLE(2)	1	8		
6	102302-00206	FENCE;TABLE(1)	1	8		
7	102302-00208	FENCE;TABLE(3)	2	8		
8	102302-00209	FENCE;TABLE(4)	1	8		
9	102302-00210	FENCE;TABLE(5)	1	8		
10	102302-00167	FENCE;ROTATING,SEMI TABLE	1	8		
11	102302-00168	FENCE;ROTATING,SEMI TABLE	1	8		
12	102302-00166	FENCE;ROTATING,SEMI TABLE	1	8		
13	110508-12426	COVER;FENCE, TABLE	2	8		
14	110508-12427A	COVER;FENCE, TABLE	2	8		
15	110508-12428A	COVER;FENCE, TABLE	4	8		
16	B13721313B	GLASS(1); SAFETY	4	8		
17	B13721413B	PLATE	4	8		

No.	Item No.	Definition	Q'ty	Packing No.	Weight	remark
18	110423-04201A	BRACKET, LM BLOCK	2	8		
19	110423-04472	BRACKET, LM GUIDE	(2)	8		
	130503-00023	LM GUIDE; SEMI GUARD	(2)			
	110423-03680	BRACKET;STOPPER	(4)			
	110956-00318	STOPPER,DOOR;TABLE	(4)			
	110508-14722	COVER, LM	2			
20	250205-01144	PLATE; PACKING(2)	2	8		
21	250205-00984A	PLATE: PACKING	2	8		
22	400606-00675	PACKING	2	7		
23	120203-00418	CLAMP	2	8		
24	110933-00036	LATCH	2	8		
25	R70165	HANDLE	2	7		
26	110927-00258	HINGE	7	8		
27	110927-00259	ROTATING HINGE	6	8		
28	110508-12429	COVER, DOOR	2	8		
29	110508-14154	COVER;DOOR,ROTATING(1)	1	8		
30	110508-12439B	COVER;DOOR,ROTATING(2)	1	8		

**4.11 List of tools related to the foundation work (1)**



No.	Item No.	Definition	Q'ty	Packing No.	Weight	remark
1	B26491313A	LEVEL BOLT	1 Set (6)	7	STD.	
	B26491334	NUT,HEX	(6)	7	STD.	
	B26491514	FIX.BOLT	(6)	7	STD.	
2	120112-01326	BOLT/NUT/WASHER SET	1	7	STD.	
	120112-01327	BOLT/NUT/WASHER SET	1	7	SEMI S/G	
3	B26491373A	WRENCH, SLIDE COVER	1	7	STD.	

**4.12 List of tools related to the foundation work (2)**

No.	Item No.	Definition	Spec	Q'ty						Packing No.
				Std.	S/G	APC	40T	60T	90T	
1	420026	CAN. PAINT(A20)	A-PC100	1						7
2	420027	BRUSH. PAINT(A20)	A-BR100	1						7
3	B26491014	BUSH. ADJUST		42		32				7
4	B26491044	BRACKET		6		16				7
5	B26491053A	BLOCK. ADJUST		6		16				7
6	B26491063C	PLATE					4	6	6	7
7	B26491073	ANCHOR		42						7
8	B26491084	NUT.HEX	NA24			32				7
9	B26491093B	BAR. HEX		1						7
10	B26491143C	LEVEL BLOCK	100X90X68.5	42						7
11	B26491204	BUSH.ADJUST		42		32				7
12	B26491213A	BAR.HEX(2)		1						7
13	B26491233	BLOCK		20						7
14	B26491293	FUNNEL.CONCRETE		1						7
15	B26491353	CENTER ANCHOR		7						7
16	B26491363	BAR.HEX(3)	NA46	1						7
17	B26491393	BAR.HEX(4)	NA24	1						7
18	B26491423	LEVEL PLATE		42						7
19	B26491444	BOLT.HEX HEAD	BA24X260	42						7
20	C60148071C	STAND.WORKING		1	1					7
21	P70600075	BAND. HOSE	HB75	1						7
22	R27227	HOSE.DUCT	VFM-70(¢64)	1						7
23	R80013C	KIT. TOOL BOX(공구통)	L31900021	1						7
24	R80037	GREASE GUN	MODEL 12228	1						7
25	T6510022	SPANNER. SINGLE ENDED	MS30	1						7
26	T6510025	SPANNER. OPEN END(SINGLE)	MS36/WALTER	1						7
27	T6510031	SPANNER.SINGLE ENDED		1						7
28	T6510060	SPANNER. DOUBLE ENDED	MB7X8	1						7
29	T6510062	SPANNER. DOUBLE ENDED	MB8X10	1						7
30	T6510065	SPANNER. DOUBLE ENDED	MB10X12	1						7
31	T6510069	SPANNER. DOUBLE ENDED	MB12X14	1						7
32	T6510070	SPANNER. DOUBLE ENDED	MB13X17	1						7

No.	Item No.	Definition	Spec	Q'ty						Packing No.
				Std.	S/G	APC	40T	60T	90T	
33	T6510072	SPANNER. DOUBLE ENDED	MB17X19	1						7
34	T6510075	SPANNER. DOUBLE ENDED	MB19X22	1						7
35	T6510077	SPANNER. DOUBLE ENDED	MB21X23	1						7
36	T6510079	SPANNER. DOUBLE ENDED	MB22X24	1						7
37	T6510081	SPANNER. DOUBLE ENDED	MB24X27	1						7
38	T6530028	COMBINATION WRENCHES	MS36	1						7
39	T6550015	L-WRENCH	MP14/SCM3	1						7
40	T6550018	WRENCH KEY HEX	ONG MP17/SCM3	1						7
41	T6550020	L-WRENCH	ONG MP19/SCM3	1						7
42	T6550022	L-WRENCH	ONG MP22/SCM3	1						7
43	T6600388	SOCKET	3/4X30	1						7
44	T6600400	SOCKET	3/4X36	1						7
45	T6750004	HANDLE. RATCHET	DES-T0675	1						7
46	T7050011	DRIVER. SCREW(-)	6x100L/#2(-)	1						7
47	T7050021	DRIVER. SCREW(+)	6X100L/32(+)	1						7

**4.13 BOLT KIT Shipping LIST**

(1) DBC130 STANDARD

No.	Item No.	Spec	Q'ty	Option	Location
1	R01024	BC6X12,PICR3	50	STD.	DUCT 및 외곽 COVER류
2	R01009	BC6X12,BO	50	STD.	DUCT 및 외곽 COVER류
3	R01049	BC6X16,PICR3	100	STD.	DUCT 및 외곽 COVER류
4	R01065	BC6X16,BO	200	STD.	DUCT 및 외곽 COVER류
5	R01041	BC8X12,PIC3	10	STD.	DUCT 및 외곽 COVER류
6	R01042	BC8X12,BO	10	STD.	DUCT 및 외곽 COVER류
7	R01043	BC8X16,PICR3	10	STD.	DUCT 및 외곽 COVER류
8	R01044	BC8X16,BO	10	STD.	DUCT 및 외곽 COVER류
9	S2204462	BB6X12	10	STD.	CHIP PAN
10	S2204662	BB6X16	20	STD.	ROLL COVER BRACKET 및 COLUMN COVER
11	S2204862	BB6X20	40	STD.	GEAR BOX COVER결합용 & COLUMN COVER
12	S2205062	BB6X25	10	STD.	COLUMN BASE상면의 PLATE 고정용
13	S2205462	BB6X40	40	STD.	COLUMN COVER
14	S2208862	BB8X20	30	STD.	PIPE SUPPORT BRACKET 고정용 & SEMI
15	S2209062	BB8X25	20	STD.	DUCT BRACKET & Z축 SLIDING COVER
16	S2212262	BB10X30	45	STD.	SLIDING COVER & BRACKET
17	S0005052	BAS6X25	10	STD.	
18	S0005352	BAS6X35	10	STD.	
19	S0009052	BAS8X25	10	STD.	SPINDLE HEAD BRAKE용
20	S0016052	BAS12X70	25	STD.	DUCT FRAME
21	S0022052	BAS16X70	6	STD.	OIL COOLER FRAME
22	S0028852	BAS24X110	6	STD.	가 LEVEL용
23	S4000332	BA6	20	STD.	
24	S4000732	BA12	25	STD.	
25	S4000932	BA16	6	STD.	
26	S4001332	BA24	6	STD.	
27	S5000301	ZP6	400	STD.	
28	S5000501	ZP8	40	STD.	
29	S5000601	ZP10	60	STD.	
30	S5100301	ZS6	60	STD.	
31	S5100501	ZS8	40	STD.	
32	S5100601	ZS10	60	STD.	

## (2) DBC130II SEMI SPLASH GUARD OPTION

No.	Item No.	Spec	Q'ty	Option	Location
1	R01024	BC6X12,PICR3	200	SEMI	DUCT 및 외곽 COVER류
2	R01009	BC6X12,BO	50	STD.	DUCT 및 외곽 COVER류
3	R01049	BC6X16,PICR3	150	SEMI	DUCT 및 외곽 COVER류
4	R01065	BC6X16,BO	250	SEMI	DUCT 및 외곽 COVER류
5	R01041	BC8X12,PIC3	10	STD.	DUCT 및 외곽 COVER류
6	R01042	BC8X12,BO	20	SEMI	DUCT 및 외곽 COVER류
7	R01043	BC8X16,PICR3	150	SEMI	DUCT 및 외곽 COVER류
8	R01044	BC8X16,BO	10	STD.	DUCT 및 외곽 COVER류
9	S2203162	BB5X16	20	SEMI	SEMI S/G
10	S2204462	BB6X12	100	SEMI	CHIP PAN & SEMI S/G
11	S2204662	BB6X16	50	SEMI.	ROLL COVER BRACKET 및 COLUMN COVER
12	S2204862	BB6X20	70	SEMI	GEAR BOX COVER결합용 & COLUMN COVER
13	S2205062	BB6X25	10	STD.	COLUMN BASE상면의 PLATE 고정용
14	S2205462	BB6X40	40	STD.	COLUMN COVER
15	S2208862	BB8X20	80	SEMI.	PIPE SUPPORT BRACKET 고정용 & SEMI
16	S2209062	BB8X25	60	SEMI	DUCT BRACKET & Z축 SLIDING COVER
17	S2209262	BB8X30	10	SEMI	SEMI S/G
18	S2212262	BB10X30	45	STD.	SLIDING COVER & BRACKET
19	S0005052	BAS6X25	10	STD.	
20	S0005352	BAS6X35	10	STD.	
21	S0009052	BAS8X25	10	STD.	SPINDLE HEAD BRAKE용
22	S0016052	BAS12X70	25	STD.	DUCT FRAME
23	S0022052	BAS16X70	6	STD.	OIL COOLER FRAME
24	S0028852	BAS24X110	6	STD.	가 LEVEL용
25	S3452572	BN4X10	10	SEMI	SEMI S/G STOPPER
26	S3452832	BV5X10	100	SEMI	SEMI S/G 힌지
27	S4000332	BA6	20	STD.	
28	S4000732	BA12	25	STD.	
29	S4000932	BA16	6	STD.	
30	S4001332	BA24	6	STD.	
31	S5000201	ZP5	20	SEMI	
32	S5000301	ZP6	600	SEMI	
33	S5000501	ZP8	250	SEMI	
34	S5000601	ZP10	60	STD.	
35	S5100201	ZS5	20	SEMI	

No.	Item No.	Spec	Q'ty	Option	Location
36	S5100301	ZS6	150	SEMI	
37	S5100501	ZS8	250	SEMI	
38	S5100601	ZS10	60	STD	

## 5. Installing the machine temporarily

### 5.1 Temporary installation of the column bed (Z-axis bed) assembly

1) Put final touches on the secondary mortar holes that were prepared for installing the machine.

- ① Clean up the inside of the holes.
- ② Pour water into each hole and let the concrete soak up moisture.
  - ※ Keep the concrete soaked in water for at least 12 hours before injecting grout, and drain the water right before the injection. (If 30 days or more have passed since constructing the foundation concrete, soak it in water for over 24 hours.)

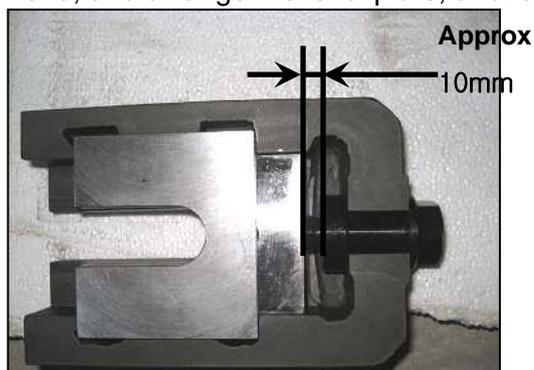
This is to enhance the adhesiveness of the injected grout and to prevent the grout from drying too quickly as well as to improve the fluidity of the grout.



2) Locate the foundation component box from the shipping package and prepare for installation.



3) Adjust the level bolt on the level block so that it stands approximately 10 mm above the distal end, and arrange the level plate, anchor and anchor bolt around the level bolt.



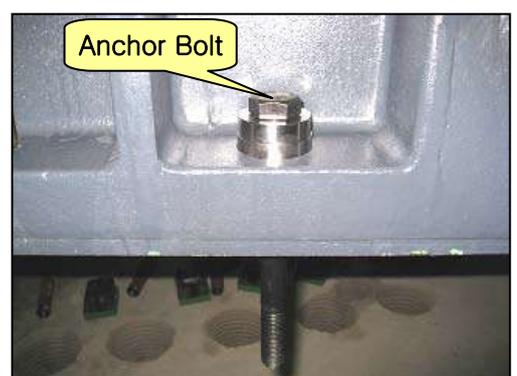
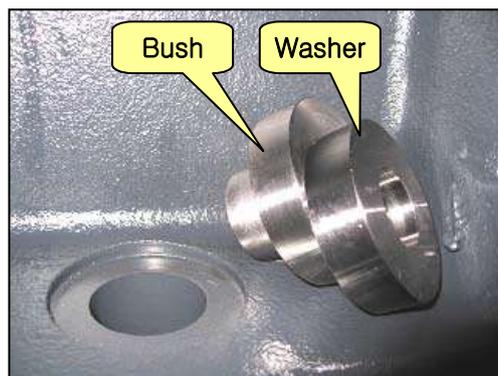
- 4) Lift up the Z-axis bed (column bed) assembly using the crane or forklift, and move it near the temporary installation area.
- Weight: approx. 11 tons
  - Rope-hooking position: 4 places in both sides of the bed



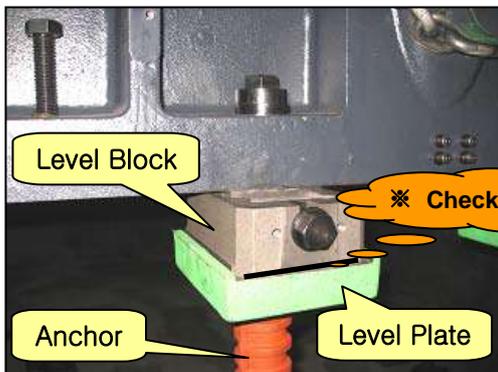
- 5) Smooth the surface of the level block installation area.
- ① Stop lifting the Z-axis bed (column bed) assembly at an appropriate height for the following work.
    - ※ For your safety, it is recommended to prop up the bed with a strong support.
  - ② Remove rust, impurities, cuts or paint-spots that may remain in the level-block installation site using the whetstone, sandpaper or file.



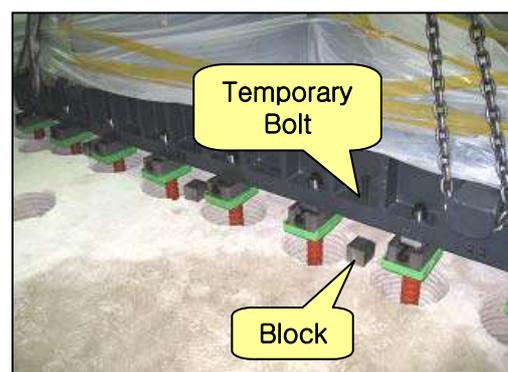
- 6) Insert B26491014 adjusting bush and B26491204 washer into every anchor hole in the bed one after the other, and then insert B26491444 anchor bolts.



- 7) Insert B26491143b level block, B26491423 level plate and B26491073 anchor into the anchor bolt as appropriate and tighten the bolt.
- To facilitate the work, install the level plate first and insert the level block between bed and level plate. Ensure that the level block should keep in parallel with the bed to the end. Then, tight up the bolt.

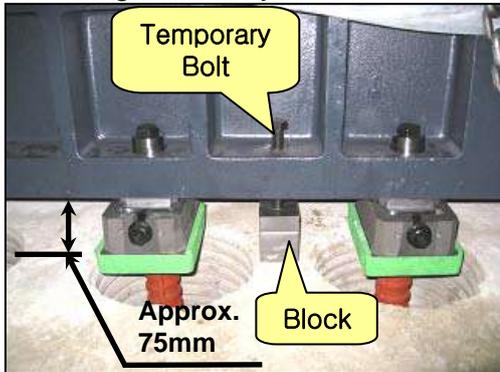


- 8) Place B26491223 block under the temporary bolt site of the bed, and put down the column bed slowly.



9) Place the level in the grinding side of both ends of the bed in the X and Z directions, set the height between floor and bottom of the bed at about 75mm (so that the level plate is located 10mm ~40mm under the ground) using the temporary bolt. Proceed with the leveling until the overall difference of the leveling falls below 0.05mm/m.

※ Note that you should apply even force to every temporary bolt, and perform the leveling alternately on both ends of the bed.



### 5.2 Temporary installation of the table bed (X-axis bed) assembly

1) Make preparations for temporary installation by referring to the “Temporary installation of the column bed (Z-axis bed) assembly” section above. Lift up the table bed assembly with the crane or forklift and move it to the temporary installation site.

- Weight: Approx. 17 tons
- Rope-hooking Position: 4 places in both sides of the bed



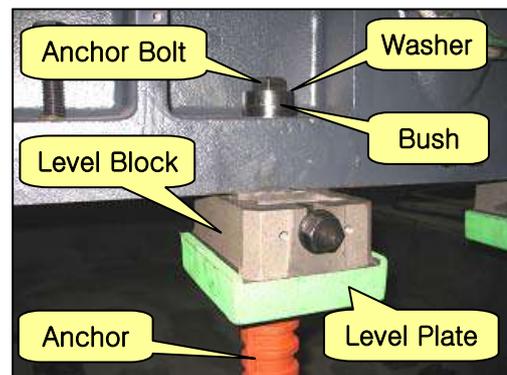
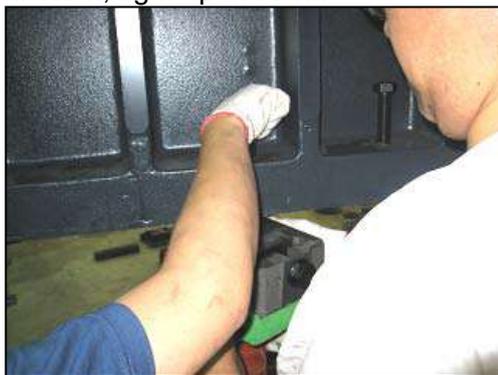
2) Smooth the surface of the level block installation area.

- ① Stop lifting the table bed assembly at an appropriate height for the following work.
  - ※ For your safety, it is recommended to prop up the bed with a strong support.
- ② Remove rust, impurities, cuts or paint-spots that may remain in the level-block installation site using the whetstone, sandpaper or file.

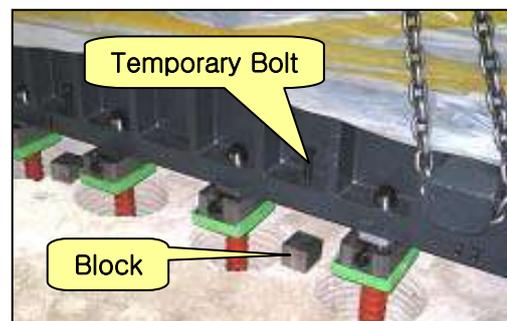


3) Insert B26491014 adjusting bush and B26491204 washer into each anchor hole in the bed one after the other before inserting B26491444 anchor bolt. Then, insert B26491143b level block, B26491423 level plate and B26491073 anchor into the anchor bolt in this sequence and tighten the bolt.

- To facilitate the work, install the level plate first and insert the level block between bed and level plate. Ensure that the level block should keep in parallel with the bed to the end. Then, tight up the bolt.



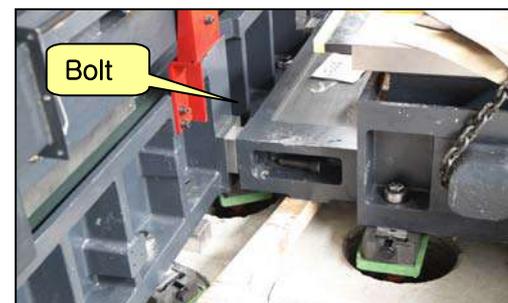
4) The three level blocks that are attached to the Z-axis bed (see the picture below) should be tilted to avoid an interference with each other. Place B26491223 block under the temporary bolt site on the bed and put down the table bed slowly.



5) Smooth the installation surface of X-axis bed and Z-axis bed using the whetstone, and insert the fixing bolt into the Z-axis bed. Then, insert 2 liners in the bed



6) While slowly operating the crane, move the X-axis bed close to the Z-axis bed. Ensure that two beds are fit with each other especially on reamer bolt sides.

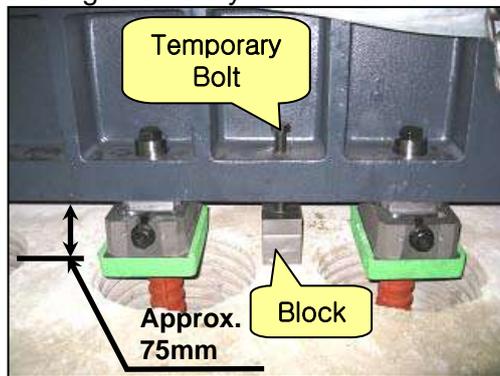


7) Based on the bolts (especially, reamer bolts) between X-axis and Z-axis beds, use the temporary bolt to set an approximate height. Place the level in the grinding side of either ends of the bed in the X and Z directions, and use the temporary bolt to perform the leveling until the overall difference of the leveling falls below 0.05mm/m.

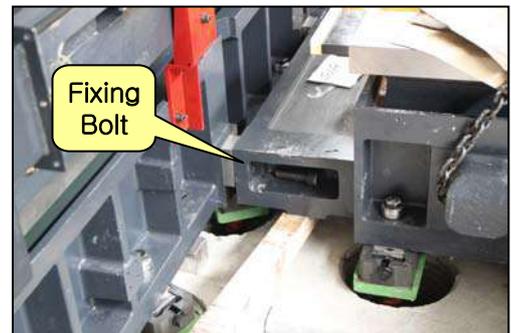
※ Set the height between bed bottom and floor at about 75mm with the level plate 10mm~40mm below the floor.

In case that the machine is installed higher than intended due to the on-site circumstances, be sure to immerse the level plate in grout mixture by constructing a bank around the foundation hole.

※ Note that you should apply even force to every temporary bolt, and perform the leveling alternately on both ends of the bed.

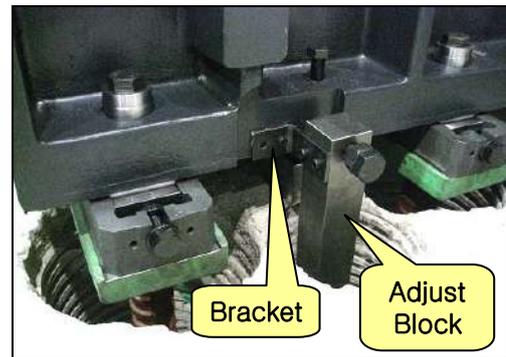
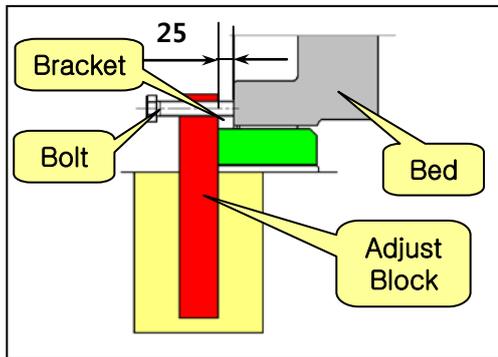


8) When the temporary leveling work on the table bed (X-axis bed) comes close to the end, try shaking 2 liners in the concatenating sites between X-axis and Z-axis beds to check if the gaps match. If no problem is encountered, tighten up the fixing bolts and check the level again.



※ If the gaps do not match, X and Z axes do not meet the squareness with each other. To prevent this, you must apply even force to each of 2 liners when installing them. If the gaps mismatch, lift the table bed a small bit from the ground and use a long support or lever to push in the end of the gap-making bed so that the liners between X-axis bed and Z-axis bed contact with each other.

- 9) Refer to "Foundation Detailed Diagram" above to install a total of 6 adjusting blocks on the ends of X and Z beds.



### 5.3 Temporary Installation of ATC Base

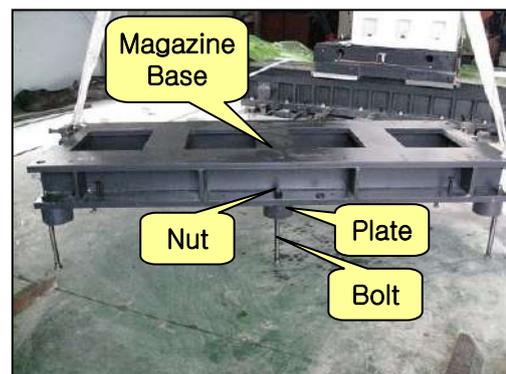
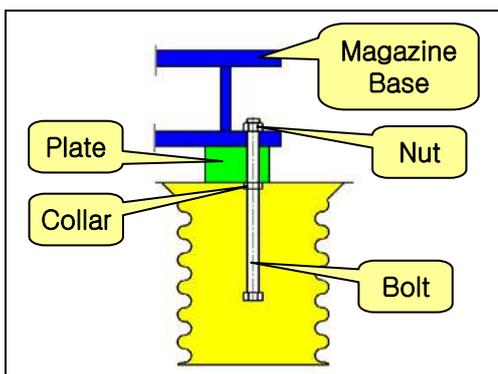
- 1) Dismantling the tool magazine base  
Place the tool magazine vertically using the crane and loosen the fixing bolts between tool magazine and tool magazine base. Then, move the tool magazine alone aside for later work.  
※ **Remove the eyebolts after installing the magazine**  
※ Weight: approx. 2.4 tons



- 2) Installing the tool magazine bracket  
Install the magazine bracket in the intended side of the column bed.



- 3) Installing the tool magazine anchor  
Use the crane to lift up the tool magazine base as appropriate, and fit the bolts into the level plate. (see the "Foundation Detailed Diagram" above)



- 4) Installing the tool magazine base temporarily
- Based on the bolt holes in the tool magazine bracket, place the tool magazine base on the block under the temporary bolt site. Place the level on the tool magazine base in the X and Z directions. Set an approximate level of the tool magazine base and fit the bolt holes between tool magazine bracket and installation sites. Then, tighten the fixing bolts.



## 6. Second Round of Grout Injection

※ When the temporary installation is completed, inject grout into the column bed, table bed and the foundation holes of ATC base before curing the surface. This process is very important because it affects the accuracy, strength and lifecycle of the machine and more. For this reason, suitable grout materials and a correct, well-ordered workflow are required for each process.

Uncertified grout and/or a faulty installation of the machine may cause serious problems such as a delay and inaccurate precision work that may incur extra costs.

### 6.1 Checkpoints before injecting grout

- 1) Is the concrete surface of each foundation hole rough? (Chipping)
  - If the foundation surface is smooth, then it is necessary to make it rough in order to reinforce the adhesiveness between concrete wall that was constructed in the primary foundation work, and secondary grout.
- 2) Has foreign matter inside of each foundation hole been completely removed?
  - Rid the hole of any concrete debris or bits of flexible tubes used in making the foundation hole.
- 3) Has each foundation hole been soaked in water?
  - This is very important because it is to improve the adhesiveness and fluidity of grout and to prevent it from drying too quickly. Fill the holes with water 12 hours before grouting, and drain the water right before grouting.

### 6.2 Selection of Grout

High-quality grouting material contributes to seamless contact on the leveling block with improved strength, forming a sound foundation for the machine.

- 1) Secondary grout requirements: 1.5 m<sup>3</sup> (3.6 tons)  
120 sacks or so (Grout: 25 Kg)
- 2) Required compression strength of the secondary grout: 400 Kg/cm<sup>2</sup> or higher
- 3) Recommendation Grout
  - Ssangyong Cement : 쌍용 바스콘 Plus
  - Union : Grout GM
  - Henkel : Ceresit CX11

**6.3 Blending the grout mixture**

- 1) Mix grout and water appropriately for more than 2 minutes using a motorized hand mixer or a mechanical mixer in compliance with the instructions provided by the grout maker.
  - Pour a specified amount of water in the container and mix well while pouring grout slowly.
- 2) When mixing grout, be sure to meet the specified mixing ratio of water (grout-to-water ratio). (the specified ratio of water is 15 %~16 % of the grout weight.)
  - ※ If the amount of water exceeds the specified level, it may result in deteriorated strength of grout and the buildup of air bubbles in the bottom of the level plate while drying. (It is recommended to use a beaker to measure the amount of water.)
  - Water amount: 3.75 ~ 4.0 L per a 25 kg sack (water ratio: 15 ~ 16 %)
- 3) A mixture of water and grout must be injected completely within 30 minutes after the mixing. Otherwise, the mixture may cause a chemical reaction.
- 4) When grouting, the desirable temperature of the mixture is between 10 °C and 20 °C (Do NEVER perform the grouting at below 5 °C)



Mechanical Mixer



Motorized Hand Mixer

※ Changes in compression strength of grout according to water ratio (example)

Water Ratio	Compression Strength (Kgf/cm <sup>2</sup> )				20°C Flow (30 min)(mm)	Initial Hardening Time (Min)
	Day 1	Day 3	Day 7	Day 28		
13%	490	700	830	13%	490	700
14%	440	660	815	14%	440	660
15%	340	640	800	15%	340	640
16%	320	550	630	16%	320	550
17%	290	480	550	17%	290	480

**6.4 Injecting the grout mixture**

- 1) Pour the grout mixture in a single direction from one side of the foundation hole so that the mixture can fill in the hole evenly without the buildup of air bubbles.



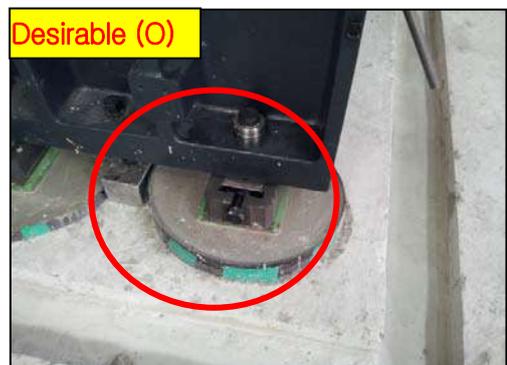
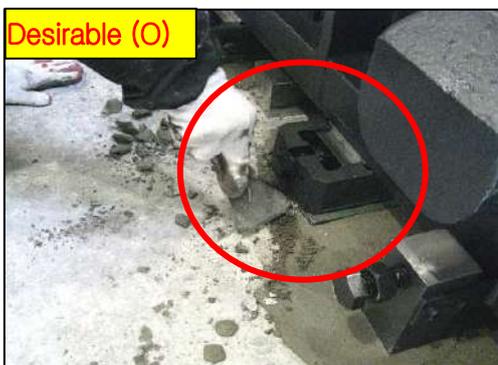
- 2) Grout compacting  
Use a pipe or long thin pole to keep stirring in the grout mixture so that the mixture fills up the whole hole evenly without the buildup of air bubbles.



- 3) Clean up the floor when the foundation holes are filled up with grout.  
※ Pour the grout mixture at an average of 40 mm above the level plate. Make sure there is no gap between foundation surface and level plate (keep an eye on the rear plate which is barely noticeable).



- ※ Inject grout after completing the anchor hole work , so that the level plate submerges in the anchor hole.



### 6.5 Curing the surface of grout

- 1) Keep supplying an adequate amount of water on the surface in the course of grout curing.
  - It is recommended that the surface be covered with a wet cloth to slow down moisture evaporation.
- 2) Make a generous schedule for curing.
  - The longer the curing period is, the greater the strength. Assign at least 5 days for grout curing (7 days is recommended). Allow additional 2 or 3 days for curing in the winter.
- 3) Keep vibrations, shocks and loads to a minimum level and maintain the ambient temperature above 10°C for the curing period.
  - When it is too low in temperature in the winter season, use a heater or hot blast stove to maintain an appropriate temperature.

## 7. Assembling the main unit

### 7.1 Installing the column

#### 1) Placing the column vertically

- ① Insert a couple of bars into the side holes, or insert the rope through the side holes and move the column to a wider area using the crane where you can place it vertically.
- ② To avoid damage or interference to component parts such as manifold, place a couple of wood supports on the floor before putting down the column.
- ③ Place two wood supports on the floor to cover the whole length of the column.
- ④ Hook a rope between eyebolts on the top of the column and crane, and slowly erect the column.
  - ※ Considering the weight of the column (6 tons), use strong ropes to withstand the weight. When the column is erected, adjust the length of the rope so that it does not interfere in the servo motor.
  - ※ The column may be very unstable when it is just about to stand up mostly due to the inertial force. To prevent this, prepare an additional wood support next to the existing one so that the column contacts on the additional support first, contributing to minimize the instability.

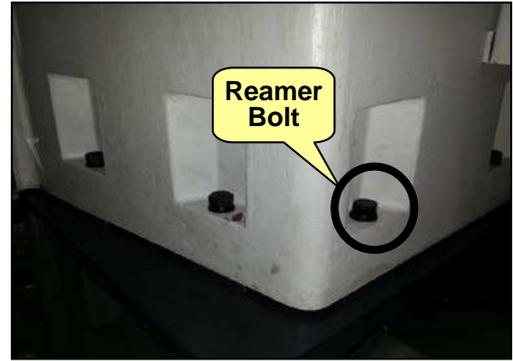


#### 2) Installing the column

- ① Move and arrange the wires and hoses on the column base to the bed.
- ② Smooth the surface of bottom of the column and top of the column base using the whetstone, and wipe them up.



- ③ Lift up the column and lower it onto the top of the column base. Stop lowering the column when it nearly contacts on the base, and tighten the reamer bolts first and go on with the other bolts. Then, resume lowering the column onto the bed.



- ④ Insert the column-adjusting block and use the adjusting bolt to set the approximate position of the column. Then, tighten the fixing bolt.



**7.2 Installing the spindle head**

- 1) Hook a rope (weight load: 3 tons or greater, length : 2M over) between eyebolts on the top of the spindle head and crane. Loosen the bolts from the spindle head fixture and move the spindle head in a wider area.



- 2) Wipe up the turcite and gib installation site of the spindle head before applying grease. Don't forget to clean up the grinding side of the column and apply grease, too.

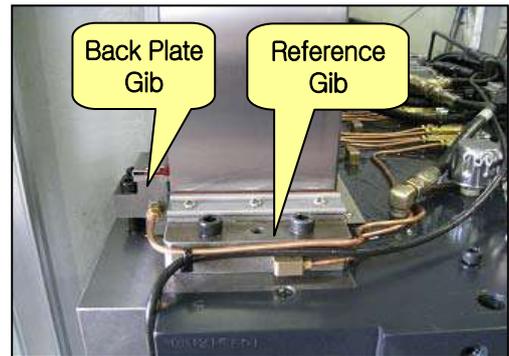


- 3) Lift up the spindle head and put it down in contact on the column.

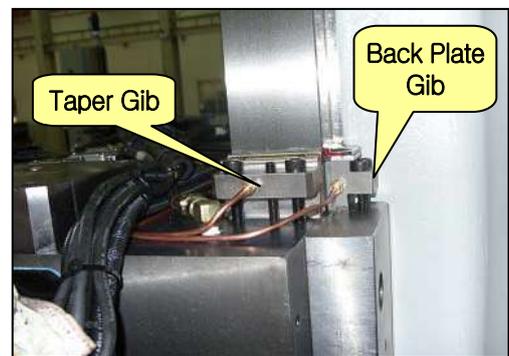
- 4) Install 4 back plates so that the number marked on each gib (already assembled into the back plate) matches with the number marked on the spindle head.



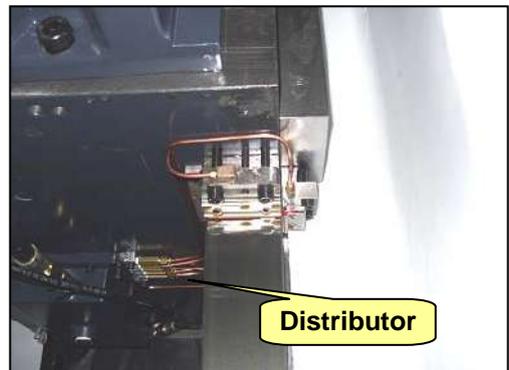
5) Install the reference gib first, and tighten the bolt loosely.



6) Clean up the taper gib and apply grease before installing it.



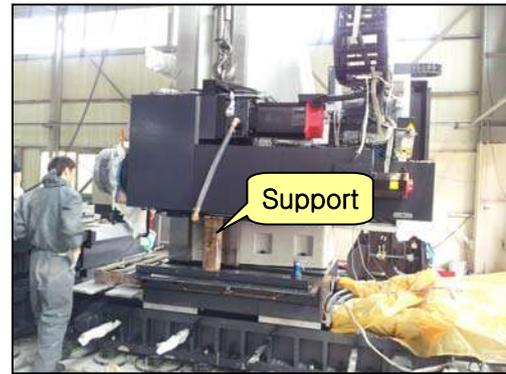
7) Connect the lubricant pipes that are already arranged on the top and bottom of the spindle head to the sleeve of each applicable gib.



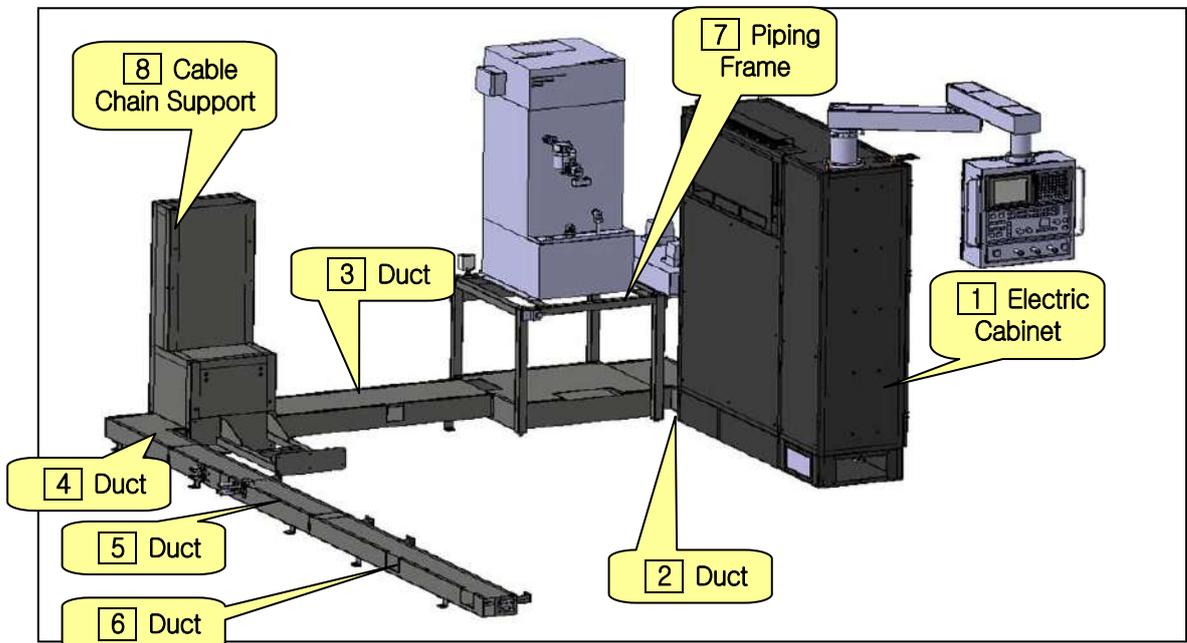
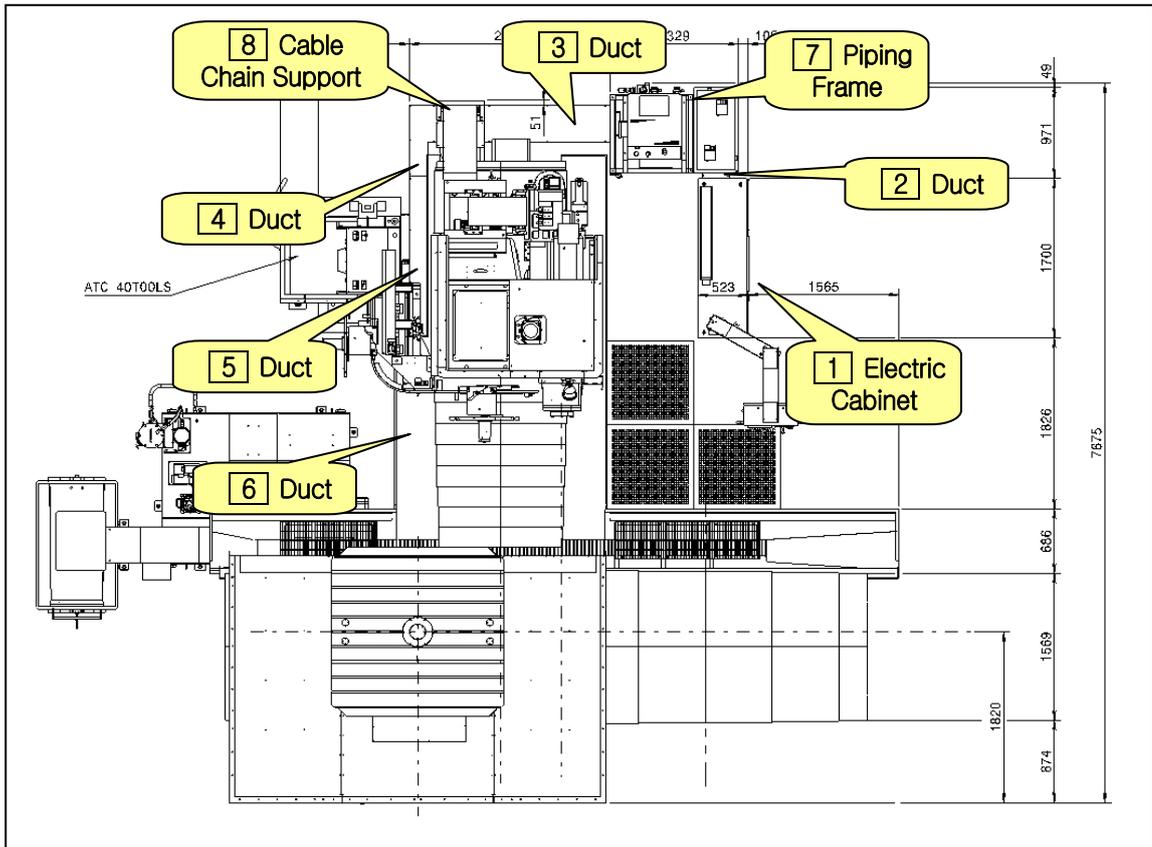
8) When you have installed the back plate, gibs, lubricant pipes and Y-axis clamp assembly, turn the ball screw nut manually to lower it at an appropriate position. Then, tighten the fixing bolt. Remove the eyebolt to disconnect the crane.



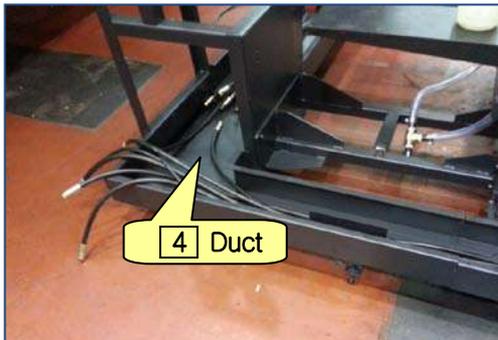
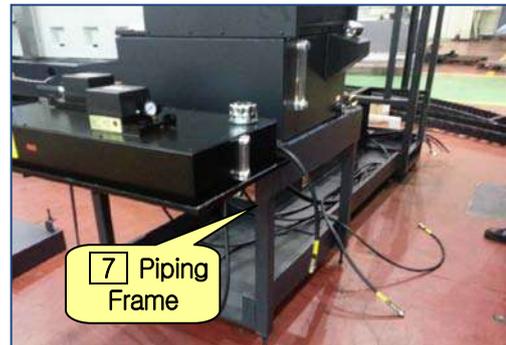
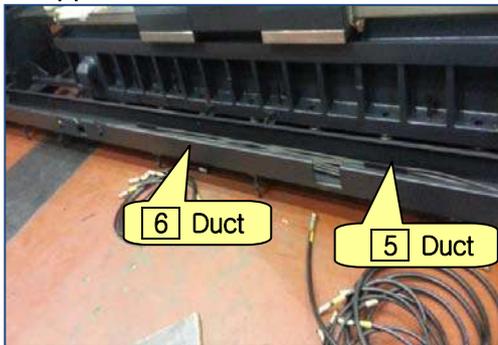
- ※ If this process does not proceed as intended, insert a strong support between spindle head and column base and remove the eyebolt. Then, turn on the machine and lower the ball screw nut in Handle mode to mount it onto the spindle head.



### 7.3 Installing the hydraulic power unit, electric cabinet, OP box and ducts



- 1) Put cable chain support #8 into place and install it into the column bed.
- 2) Adjust the position and height of duct #3 so that it aligns with the cable chain support.
- 3) Move piping frame #7 into place where the hydraulic unit, oil cooling unit and lubricant unit are already installed. Install the height bolt and adjust the height from the duct using the bolt.
- 4) Lift up electric cabinet #1 and OP box with care of the balance and install the height bolt on the bottom. Adjust the height and horizontal/vertical positions based on duct #2 and bed.
- 5) Adjust the position and height of ducts #4, #5, and #6 so that they align with the cable chain support.



### 7.4 Wiring

Untie the provided wires (that ship tied by the unit) and put them in order so that you can connect them in their respective position correctly.

1) Arranging wires from the table bed



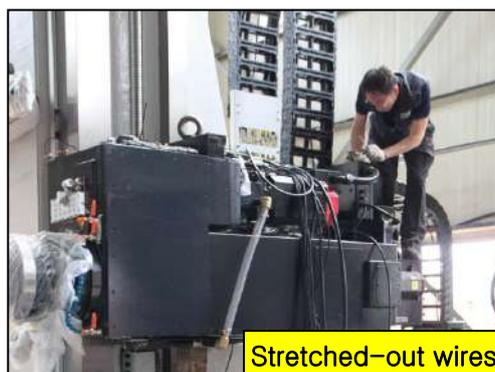
2) Arranging wires around the column



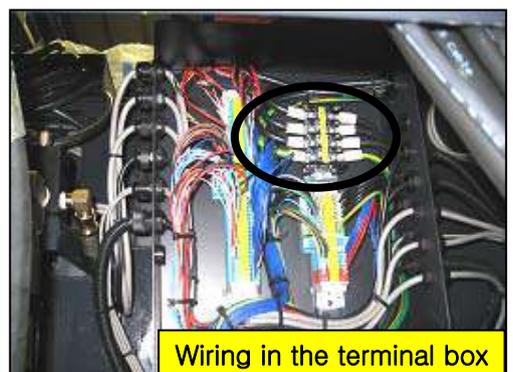
Stretched-out wires



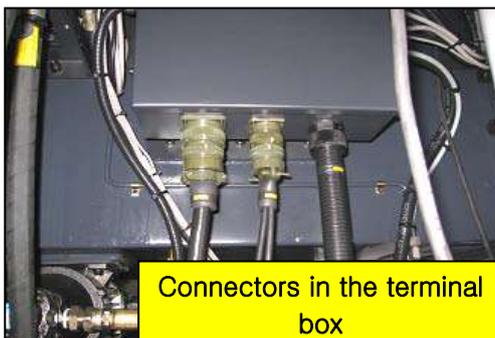
3) Connecting wires to the spindle head



Stretched-out wires



Wiring in the terminal box

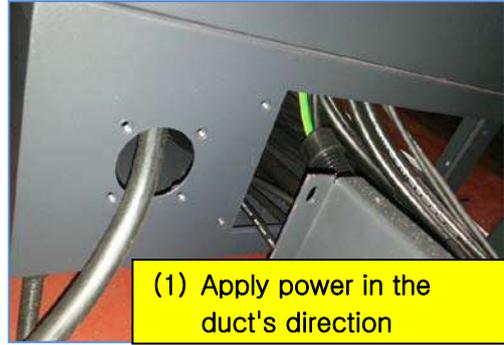


Connectors in the terminal box

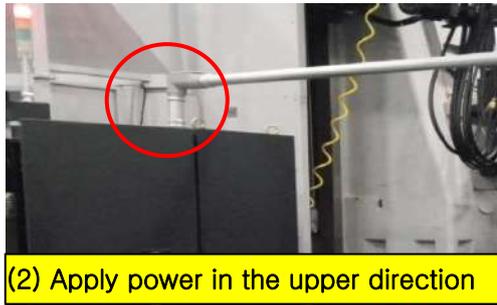


Connecting the W-axis servo-motor connector

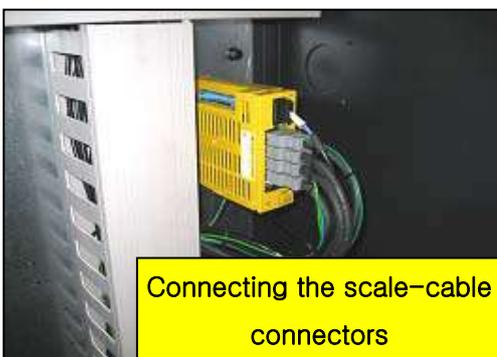
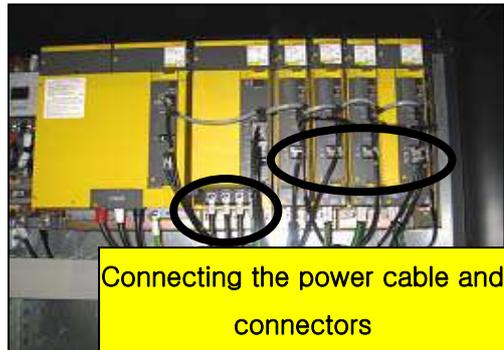
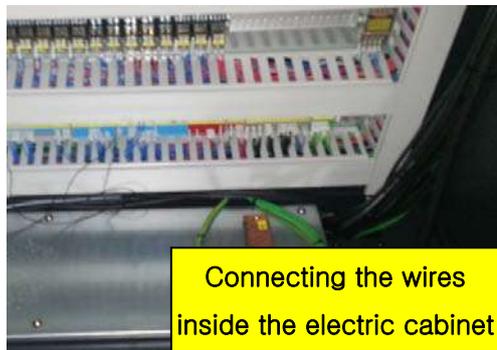
4) Wiring in the connection unit of the electric cabinet



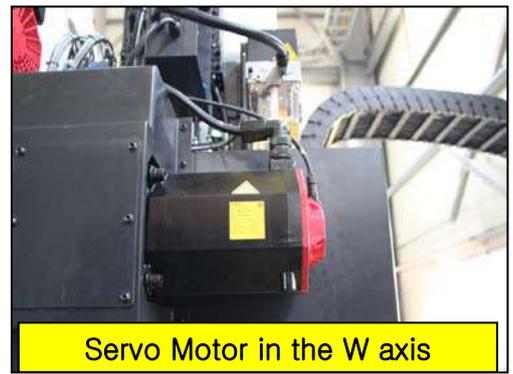
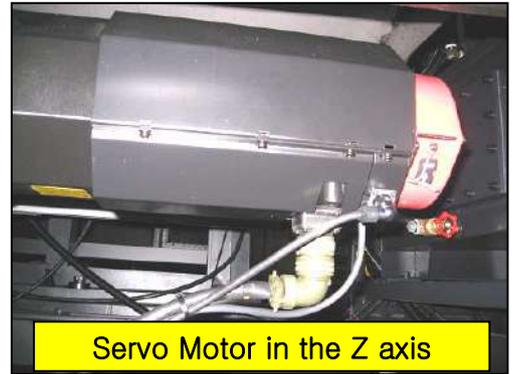
(Power supply direction)



5) Connecting the wires inside the electric cabinet



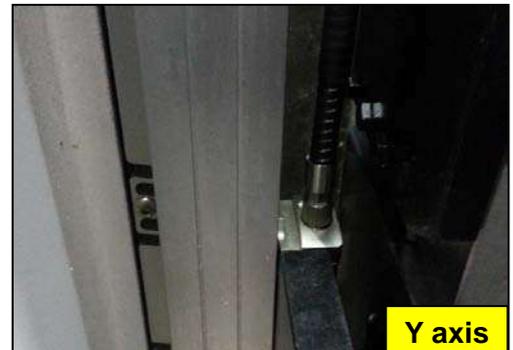
6) Connecting the wires to each applicable servo motor

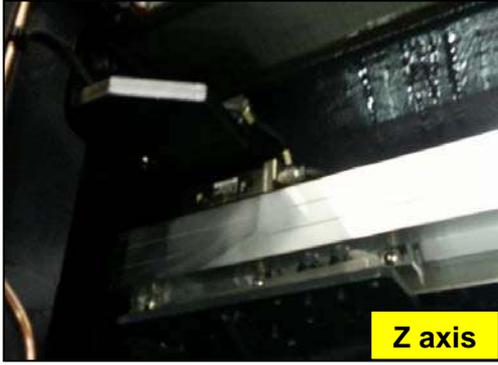


7) Arranging wires for the column bracket



8) Connecting the scale feedback cables to each axis

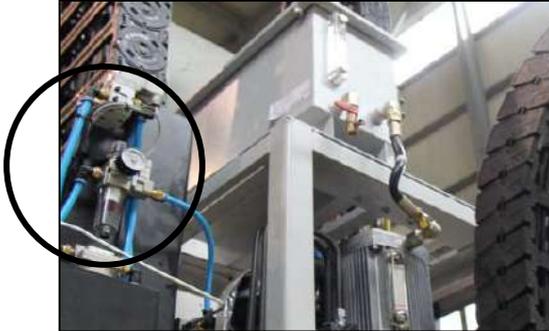




### 7.5 Connecting the hydraulic and air hoses

When connecting the hoses, ensure that the number marked on the manifold matches with the number tag attached to the hose. Make connection one by one in an orderly manner and take caution not to leak the oil pressure.

#### 1) Spindle Head Tail Bracket



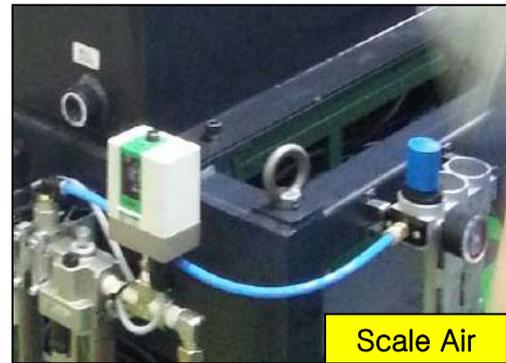
#### 2) Column Manifold



#### 3) Duct

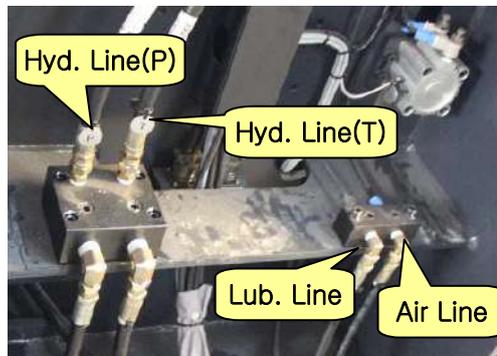


4) Air Hose



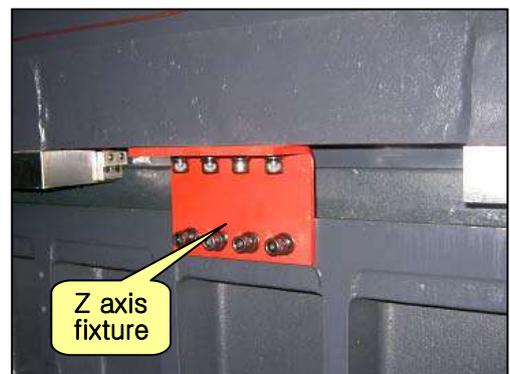
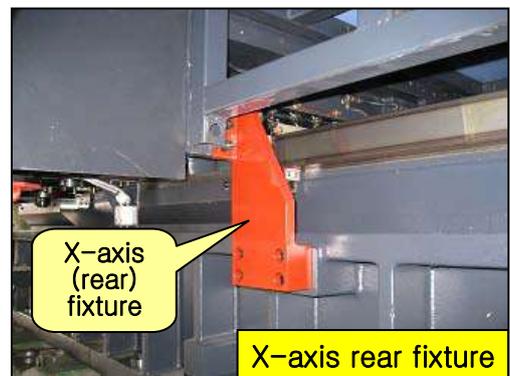
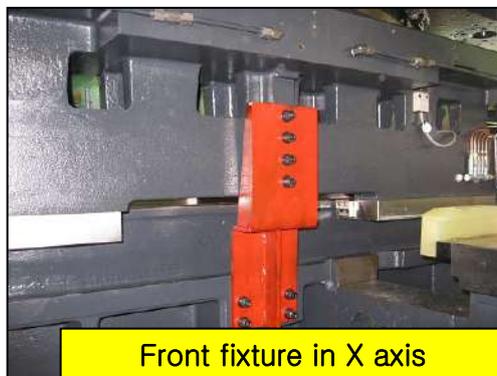
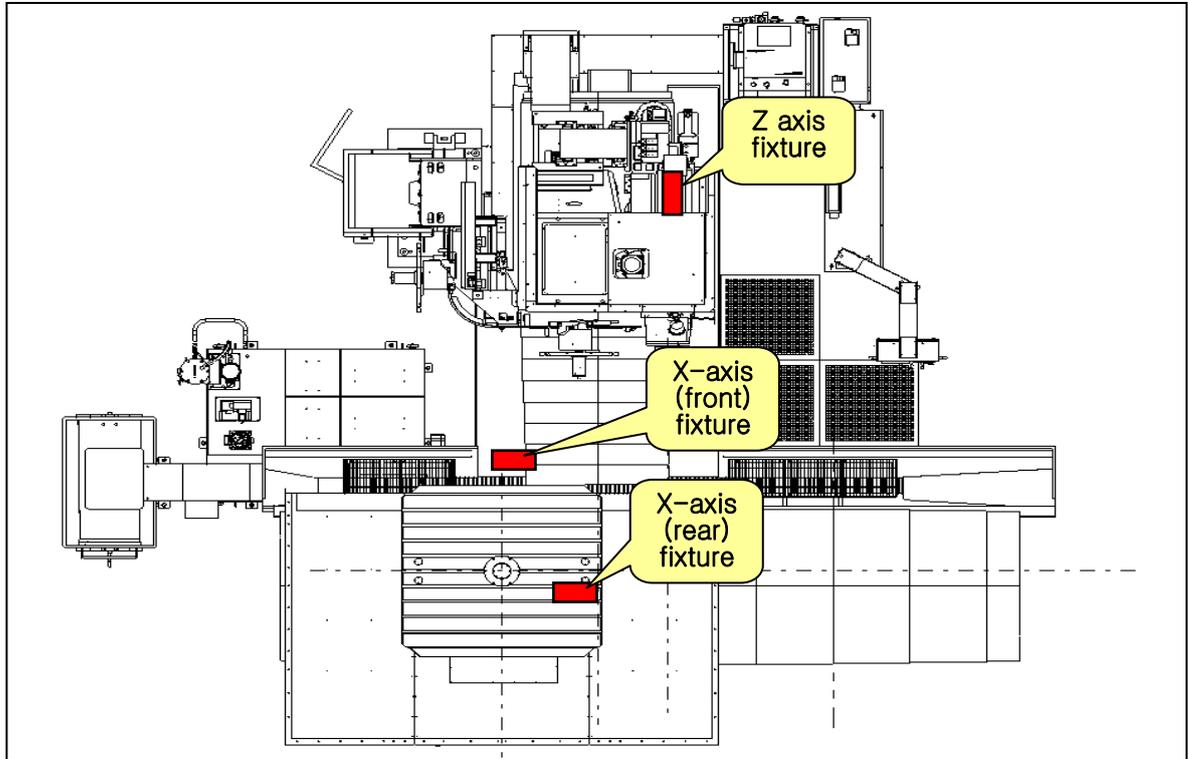
7.6 Connecting the tool magazine wires and hydraulic hoses

Put the tool magazine on the top of ATC base, or move the wires and hoses close to the base and plug in the connectors and connect the hoses: hydraulic, lubricant and air.



### 8. Removing the transit clamps

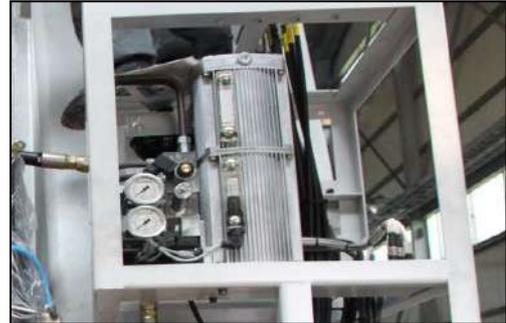
Remove the transit clamps that are designed to prevent the slippery table or column base by factory default.



**9. Checking and fueling the oil tanks**

**9.1 Hydraulic tank**

- 1) Position: Piping Frame
- 2) Type of Oil: HM32 Oil
- 3) Fueling Capacity: 37.5L



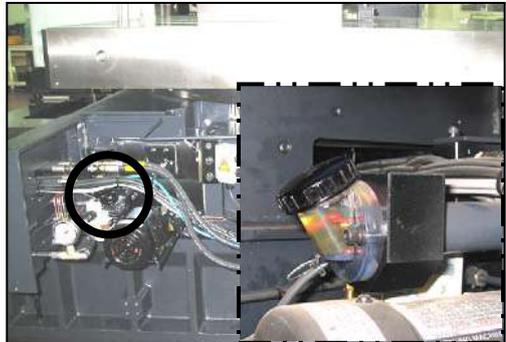
**9.2 Oil Cooler Tank**

- 1) Position: Piping Frame
- 2) Type of Oil: FC10 Oil
- 3) Fueling Capacity: 45L



**9.3 Table**

- 1) Position: Rear of the table base
- 2) Type of Oil: GH68 Oil
- 3) Fueling Capacity: 40L



**9.4 Lub. Tank**

- 1) Position: Piping Frame
- 2) Type of Oil: G220 Oil
- 3) Fueling Capacity: 25L



**9.5 Spindle Air Oil Tank**

- 1) Position : Front of the spindle head tail bracket
- 2) Type of Oil: FC10 Oil
- 3) Fueling Capacity: 2L
  - ※ If you fill the oil mist tank over the upper limit marked on the tank, the mist oil may not be supplied properly. So be careful not to overfill the tank.
  - ※ To extend the lifecycle of the spindle bearing, perform a test run on the spindle at 30 % to 50 % of the max speed.



**9.6 Air Service Unit Oiler Tank**

- 1) Position : Air service unit in the side of piping frame
- 2) Type of Oil: HM32 Oil
- 3) Fueling Capacity: 50cc
  - ※ Since the oiler is not equipped with an oil gauge, check and refill the tank on a regular basis, if necessary. If operated without oil for an extended period of time, all air lines and air-driven components (air solenoid, etc.) may be damaged.



**9.7 Spindle Head Air Filter Unit Oiler Tank**

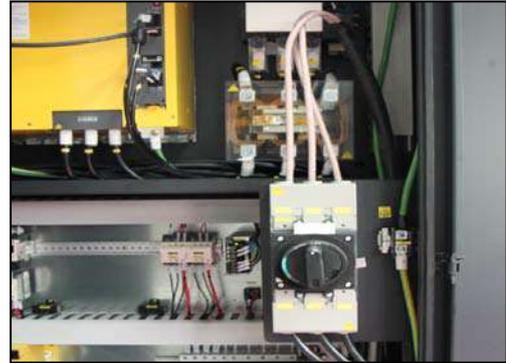
- 1) Position : Rear of the spindle head tail bracket
- 2) Type of Oil: HM32 Oil
- 3) Fueling Capacity: 30cc



## 10. Connecting the main power and air sources

### 10.1 Connect the main power source

- 1) Connect the wires from the switch board to the terminal block of the main NFB in the electric cabinet.
  - Power Capacity : 65KVA
  - Cable Cross-section :220V : 50mm<sup>2</sup>  
360~440V : 28mm<sup>2</sup>
  - Allowable voltage variation: ±10%
- 2) Connect the earth wire to the earth terminal next to NFB.



### 10.2 Connecting the main air source

Connect the main air source to the air service unit in the piping frame in the rear of the machine.

- 1) Use an air hose or a tube with its inner diameter of at least 9mm.
- 2) The pressure of air source should be at least 0.55Mpa ~ 0.76Mpa.
- 3) Use only dehydrated clean air and, if the air contains moisture, make sure to install an air dryer.



#### ※ Air Consumption

	Standard	Optional (Air blow+ATC)	Option (Scale+ATC)	Option (blow+scale+ATC)
DBC 110S	520	820	740	1020
DBC 110S	520	820	740	1020
DBC 130(L/P)	520	820	740	1020
DBC 250(L)	660	680		

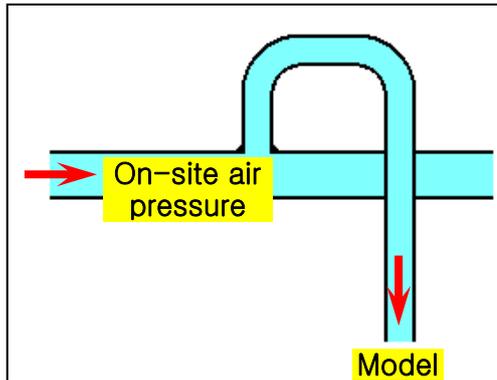
(Unit: NI/min)

- NL: Air flow converted to a volume in conditions of 0 °C, 0 % humidity, and 1 atmosphere.  
Missing 'N' in 'NL' indicates the unit is based on 1 atmosphere at ambient temperatures.

※ **Precautions on connection from air sources to machine**

(1) Make sure the air pipeline from the site ceiling is bent upwards before running it down to the machine. See the figures below. Do not run the pipeline to a side or straight down to the machine. The pipeline will contain water inside, affecting the performance of the machine.

However, if this happens, ask the installer to install the pipeline again as instructed above.

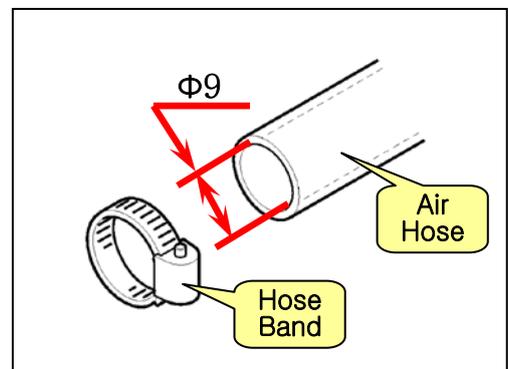


(2) The pipeline from the site ceiling is then connected to the machine through a distribution tank that filters the water generated from compressed air.

- It is advisable to use an air dryer such as the distribution tank.



3) Use an air hose or tube with an inner diameter of at least 9 mm.



## 11. Power On

- 1) Check if the main power supply, hydraulic hoses, wires and connectors are properly connected before switching on the main NFB.



- 2) To check the rotating direction, press a contact point of KM31 magnet in the electric cabinet with a wrench or screwdriver, which will drive the hydraulic pump by force.

In case that the pump is driving in the reverse, flip off the switch connecting from the electric cabinet to the machine to turn off the power, and then switch the U and W wires (of the main power supply wires) with each other.



- 3) Once the rotating direction of the motor is determined, press "NC Power On" → and "Machine Ready" in sequence.

When the hydraulic motor starts running, check if there is a problem in the overall operation (specifically in the hydraulic hoses) or if there occurs any leak from the hydraulic hoses or air service unit.

In "Machine Ready" mode, the machine diagnoses the current operation status and displays an alarm if there is a problem to solve.

## 12. Checking the pressure on each unit

1) Hyd. Power Unit : 55Kg/cm<sup>2</sup> (55bar) (to be changed to a hydraulic pump)



2) Main Air : 0.5~0.6MPa (5~6bar)



3) Oil Cooler : 0.7MPa (7bar)



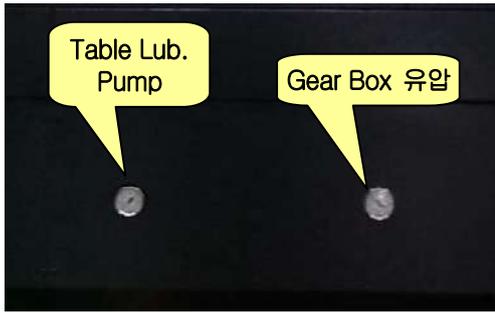
4) Pressure of the lubrication pump: 15Kg/cm<sup>2</sup>(15bar)

Check when the pump is operating.

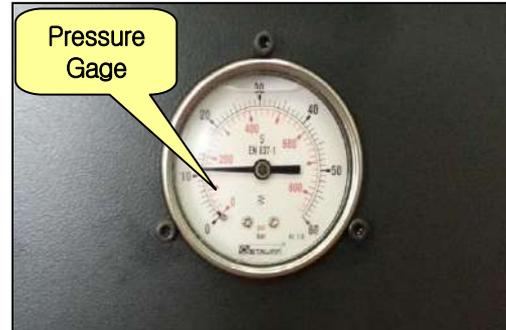
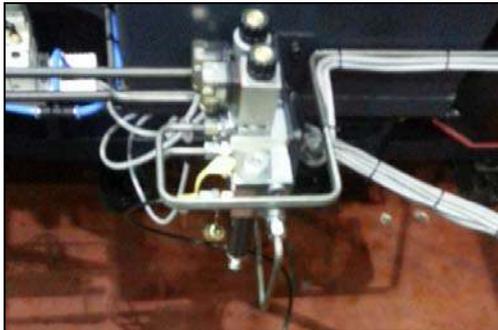
If the pressure is below the specified level, it indicates that there is an oil leak in the lubrication line. Check the line and take an appropriate action if necessary.



5) Table Lubrication Pump : 1.0Kg/cm<sup>2</sup> (1bar)



6) Oil pressure on the table gear box: 10Kg/cm<sup>2</sup> (10bar)



7) Spindle Air Oil Operation Pressure:16bar



8) Scale Air Operation Pressure: 1 bar

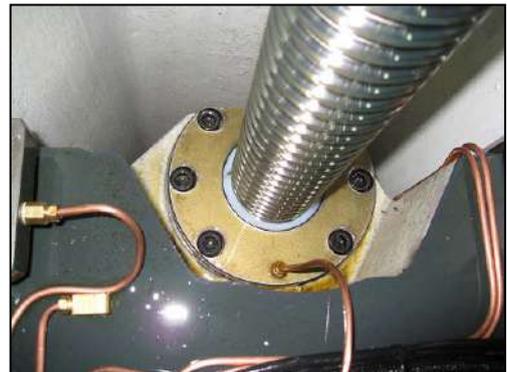
Adjust the pressure using the wheel as shown.



### 13. Assembling and adjusting the Y axis

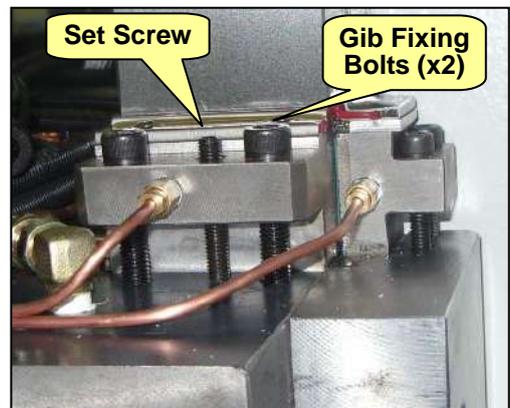
#### 13.1 Installing the ball screw nut in the Y axis

- 1) Take the Y-axis ball screw nut by hand and lower the Y axis slowly in "-" direction in Handle mode until it arrives on the installation site on the spindle head.
- 2) Tighten the fixing bolts (6-BB10×35) on the ball screw nut.
  - Tighten the bolts loosely at this moment because they should be fixed after the Y-axis gib is adjusted properly.
- 3) Raise the Y axis a bit slowly and remove the support under the spindle head.



#### 13.2 Installing the Y-axis taper gib and back plate gib

- 1) Loosen the bolts on the reference gib in the front and lower of the spindle head.
- 2) Loosen the set-screw (BQ bolt) of the gib-adjusting bolts completely.
- 3) Slowly tighten the BB bolt (one of the gib adjusting bolts) at first. Then tighten it up when you feel that the gib gets tightened. (this is where the gap between gib and column sliding side becomes "0")
- 4) Then, loosen the bolt (BB bolt) by a half turn (180°).
- 5) Tighten back the set-screw (BQ bolt) and pull out the gib as much as you have loosened the BB bolt (180°).
- 6) Adjust the upper and lower gibs as well as the other gibs in the same way.
  - It is recommended to adjust the back plate gib just after performing the clamping of the Y axis.



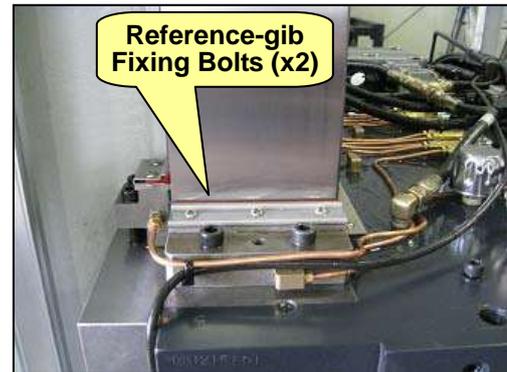
※ To check the adjustment of the taper gib

Install the indicator on the spindle head and present the gauge to the grinding side of the column or to the square on the table deck. While raising or lowering the Y axis, measure the shaking distance. (For the X axis, you can measure the shaking distance by repeating the Y-axis clamping and unclamping, alternatively)

☞ Shaking Target: below 0.004 mm

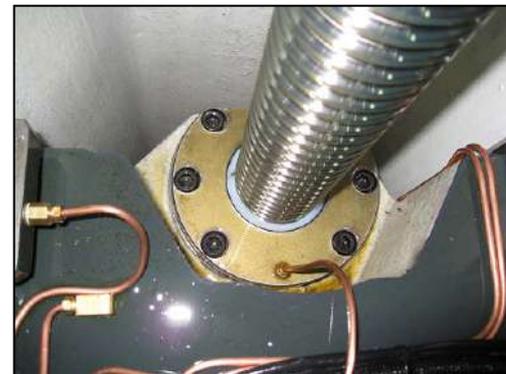
### 13.3 Installing the reference gib

When you have completed adjusting the taper gib, tighten the bolts on two reference gibs.



### 13.4 Installing the ball screw nut

- 1) Move the Y axis to "Y0".
- 2) Slightly loosen the ball screw nut fixing bolts on the Y axis.
- 3) Apply force as even as possible to each bolt until you tighten them up finally. (Alternatively, you can tighten up two diagonal bolts first and loosen them slightly. Then, tighten them up finally.)



### 14. Machine Leveling

※ Machine Leveling

As machine leveling has a direct effect on the precision of the machine, it is generally accepted that machine leveling is done along with the machine precision work. However, special care must be taken.

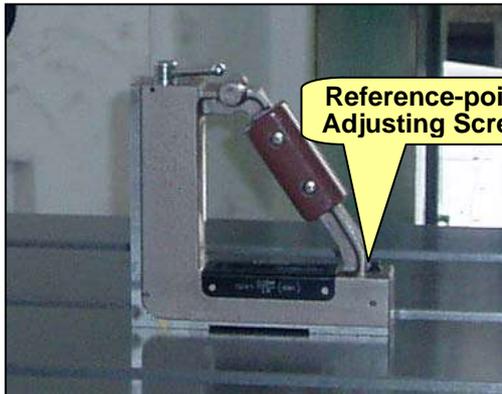
- Preparation : Spindle Test-Bar, Square (500×500), Magnetic Square Level(150×150), Test Indicator(0.02mm/1m), Magnetic -Stand, , Other Leveling Tools (Spanner : 24mm, 36mm), Pipe(1" 1.5m)

No.	Description	Picture	Specification
1	Spindle Test bar		BT50 : YM10609011
2	Granite Master Angle(Square)		500 X 500 X 60
3	Magnetic Type Precision Square Level		1div = 0.02mm/1m
4	Test Indicator		1div = 0.02mm/1m
5	Magnetic-Stand		-
6	Other Leveling Tools (Spanner, pipe)	-	-

- 1) Move the machine to the coordinates of X1500. Y1000. Z800.
- 2) Clean up the table deck and place the level in the center of the table. Then, perform the "setting the reference point for the level"

#### ※ Setting the reference point for the X-axis level

- ① Place the level in the center of the table and read one-end gradation of the water bubble of the level.
- ② Turn the level by 180 degrees and read the gradation in the same direction.
- ③ With a plain screwdriver, adjust the reference point screw to set the level to an intermediate gradation between initial gradation (before rotation) and gradation after 180 degrees of rotation.
- ④ Repeat steps ① through ③ above until rotation in either direction comes up with the same result.



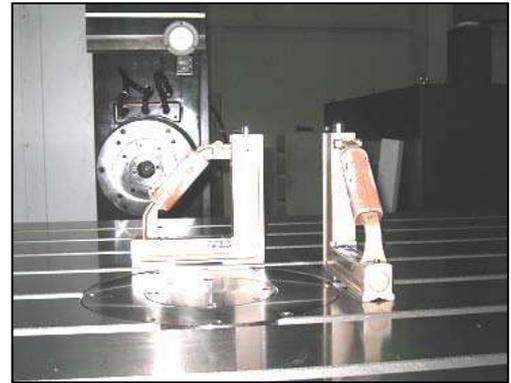
#### ※ How to read the gradation



(Right end of the water bubble + Left end)  $\div 2$  = Level gradations  $(-50 + -40) \div 2 = -45$

- The level in the picture is  $45\mu/m$  higher at the left side.

3) Place the completed level in the center of the table deck in the X and Z directions. Then, feed the X axis to the coordinates of "X0, X750., X1500., X2250., X3000." in five distinct steps. Adjust the level block bolt to set the leveling roughly. (set the leveling for both X and Z axes to 0.04/m)



▪ It is recommended to make coordinate settings for the leveling in advance.

※ Setting example) O 001;

G90 G00 G54 X0.;	X2250.;	X1500.;
M01;	M01;	M01;
X750.;	X3000.;	X750.;
M01;	M01;	M01
X1500.;	X2250.;	M99;
M01;	M01.;	

※ Precautions for the leveling work

- ① Apply force as evenly as possible to each level block adjusting bolt so that the level blocks contact on the bed evenly.
  - If any one of the level blocks contacts on the bed unevenly, it may cause an incorrect leveling in the end.
- ② The last step of the leveling should be ended in the direction that the level block is placed up (i.e., the level block adjusting bolt stops CCW).

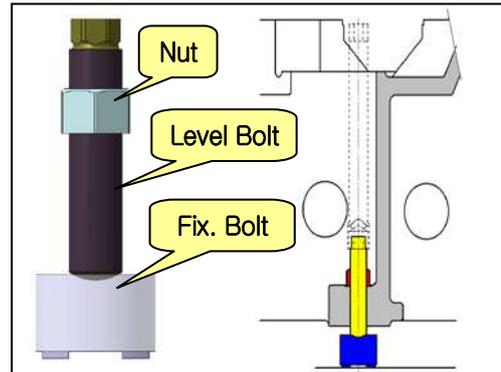


4) When the X axis is leveled roughly, move it to the center (X1050.). Then, place the level vertically on the grinding side of the column using the magnet and set the level to "0".

5) Adjust the level bolts in the center of the bed.

- Table Bed: x3, Column Bed: x4

- ① Push in the special block [(Fix. Bolt) located under each of 7 level bolts in the centers of table bed and column bed] through the center hole.
- ② While tightening the level bolt, fit the round-shaped bottom of the level bolt into the center hole of the special block. (see the picture below)
- ③ Apply even force to each level bolt so that it doesn't affect the set level. Then, tighten the nut.



#### ※ Setting the reference point for the Z-axis level

- ① Place the level in either side of the column and read one-end gradation of the water bubble of the level.
- ② Turn the level by 180 degrees before moving to the opposite side of the column. Then, read the gradation in the same direction.
- ③ With a plain screwdriver, adjust the reference point screw to set the level to an intermediate gradation between initial gradation (before rotation) and gradation after 180 degrees of rotation.
- ④ Repeat steps ① through ③ above until rotation in either direction comes up with the same result.



6) Place the completed level in the grinding side of the column in the X and Z directions. Then, while feeding the Z axis to the coordinates of "Z0. Z400. Z800. Z1200. Z1600." in five distinct steps, perform the leveling in the same way with the X-axis leveling above.



- However, you must be careful for the change to the X axis leveling while working on the Z axis. (It is recommended to place another level on the table for your reference.)
- It is recommended to make coordinate settings for the leveling in advance.

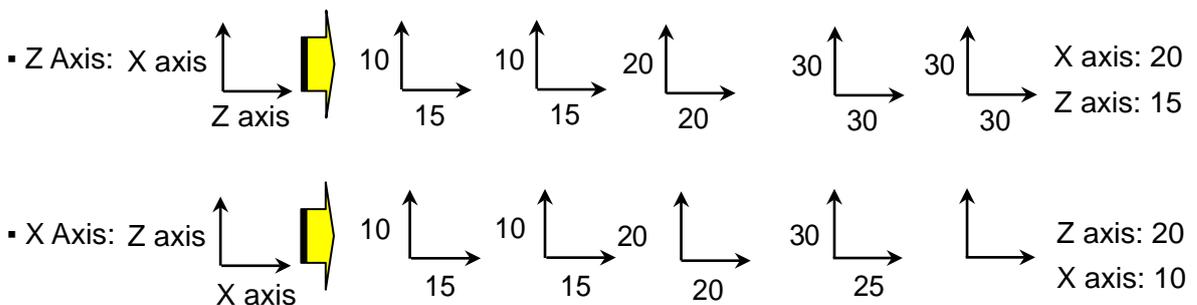
※ Setting example) O 002;

G90 G00 G54 Z0.;	Z1200.;	Z800;
M01;	M01	M01
Z400.;	Z1600.;	Z400.;
M01;	M01;	M01
Z800.;	Z1200.;	M99;
M01;	M01;	

7) Take a note of the leveling values while repeating the leveling on both X and Z axes until the overall difference of the leveling falls below 0.02/m.

① To take a note of the leveling values on paper

▪ Sample Note



- ※ The above sample is the common instruction for reading the absolute value. As straightness is a general concern when installing the boring machine, it is easier for you to read only one-end gradation and compare five measuring points.
    - In the table above, if the right side is  $30\mu$  higher, draw a right arrow and type in "30" in the table. Repeat this for other two positions. From the three values, deduct the smallest value from the largest, which will be the measurement.
  - ② The measurement may vary depending on your view position due to the distance between gradation of the level and water bubble tube. So you must read the gradation vertically at 90 degrees against the level.
- 8) If the level measurement falls below the target, perform the static accuracy inspection of the machine before locking the anchor nut. If you find an error, use the level to correct it. (refer to "static accuracy inspection and correction" below)

- 9) When the static accuracy of the machine falls below the specified tolerance, tighten the anchor nuts starting from the X axis. (The leveling target above is the measurement after the machine static accuracy inspection)

- To tighten the anchor nut

- ① Tighten the already tightened level-block adjusting bolt by another 1/4 turn (approx.  $90^\circ$ ) before locking the nut with an appropriate torque. (starting from the X axis)

- ② Inspect the accuracy again and, if an error persists, use the level-block adjusting bolt to correct the error.

- ※ If you tightened the bolts evenly at first, the error is not so great if any.

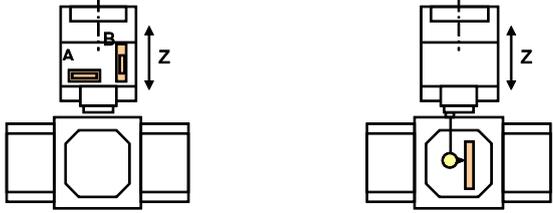
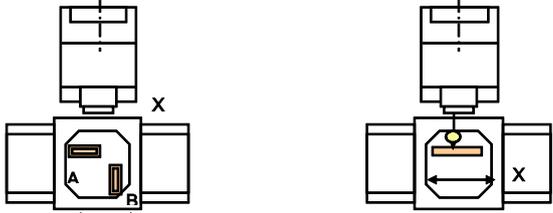
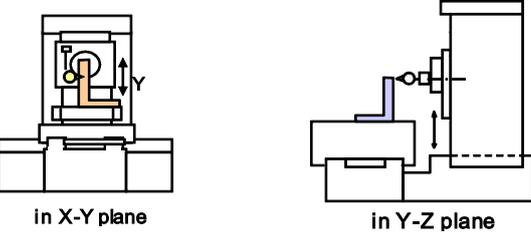
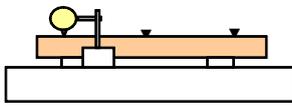
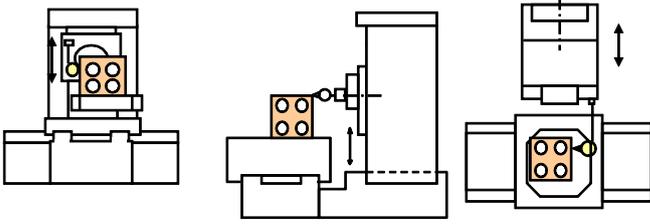
- 10) Repeat the steps above for the Z axis and tighten the anchor nut.

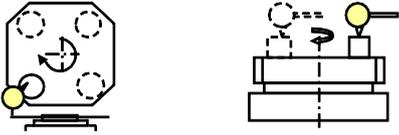
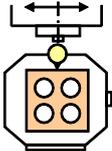
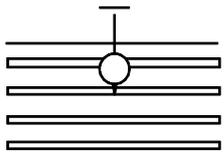
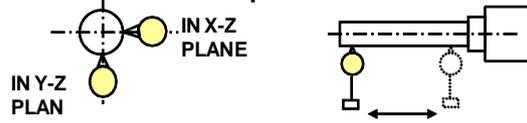
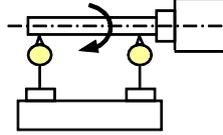
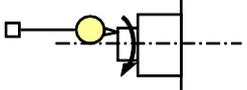
- 11) While measuring the levels of both X and Z axes again, tighten up the anchor nuts.



### 15. Precision Accuracy & Correction

※ Boring Machine Inspection Report Sample

DB130C/CM/CX DB250C/CM		Static Accuracy		2/5
NO.	Items	Tolerance		Data Sheet
		DB130C/CM/CX, DB250C/CM		
1	<p>▶ Starightness of movement to the Z axis</p>  <p>A : X direction in X-Y plane B : Z direction in Y-Z plane</p> <p>Z direction in X-Z plane</p>	X-Y	0.030 / full stroke	0.001
		Y-Z	0.030 / full stroke	0.001
		X-Z	0.010 / 500	0.001
2	<p>▶ Straightness of movement to the X axis</p>  <p>A : X direction in X-Y plane B : Z direction in Y-Z plane</p> <p>X direction in X-Z plane</p>	X-Y	0.030 / full stroke	0.001
		Y-Z	0.030 / full stroke	0.001
		X-Z	0.010 / 500	0.001
3	<p>▶ Straightness of movement to the Y axis</p>  <p>in X-Y plane</p> <p>in Y-Z plane</p>	X-Y	0.010 / 500	0.001
		X-Z	0.010 / 500	0.001
4	<p>▶ Straightness of Pallet Deck</p> 	X-Y	0.030 / m	PALLET #1 0.001 PALLET #2 0.001
		Y-Z	0.030 / m	PALLET #1 0.001 PALLET #2 0.001
5	<p>▶ Squareness between coordinate axis</p>  <p>X-Y</p> <p>Y-Z</p> <p>X-Z</p>	X-Y	0.020 / 500	0.001
		Y-Z	0.020 / 500	0.001
		X-Z	0.020 / 500	0.001

DB130C/CM/CX DB250C/CM		Static Accuracy		3/5
NO.	Items	Tolerance		Data Sheet
			DB130C/CM/CX, DB250C/CM	
6	<b>▶ Parallelism between X/Z axis movement and pallet deck &amp; Shaking of index table</b>  	X-AXIS	0.030 / m	PALLET #1 0.001
				PALLET #2 0.001
		Z-AXIS	0.030 / m	PALLET #1 0.001
				PALLET #2 0.001
		RUN-OUT	0.025	PALLET #1 0.001
				PALLET #2 0.001
7	<b>▶ Squareness in division of index table</b>  0. POS. 90. POS. 180. POS. 270. POS.  		0.020 / 500	0.001
8	<b>▶ Parallelism of X-axis movement for the T-slot</b>  		0.040 / full stroke	PALLET #1 0.001  PALLET #2 0.001
10	<b>▶ Difference in height of Y axis when changing the pallet</b>		0.020	0.001
11	<b>▶ Parallelism between Z-axis movement center line of main spindle</b>  	X-Z	0.015 / 300	0.001
		Y-Z	0.020 / 300	0.001
12	<b>▶ Shaking inside the main spindle hole</b>  	Front end of the spindle	0.015	0.001
		At 300 mm	0.030	0.001
13	<b>▶ Displacement of main spindle movement to Z axis</b>  		0.020	0.001

### 15.1 Straightness of Z axis

1) X – Y

2) Y – Z

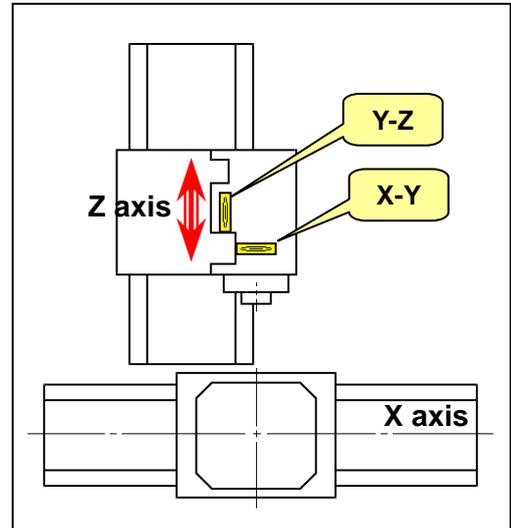
① Measure

Install the level on the grinding side of the column in the X- and Z-axis direction and set the reference point. Feed the Z axis in 3-divided stroke and check the greatest difference of the level changes.

- Measuring point  
: Z0., Z800. (Z1000.), Z1600. (Z2000.)
- Tolerance: 0.030mm / full stroke

② Correct

Incorrectness of the X-Y straightness of the Z axis is thought to be attributed to an error in the machine feeding level. So refer to "Machine Leveling" later in this manual and perform the leveling again.



3) X – Z

① Measure

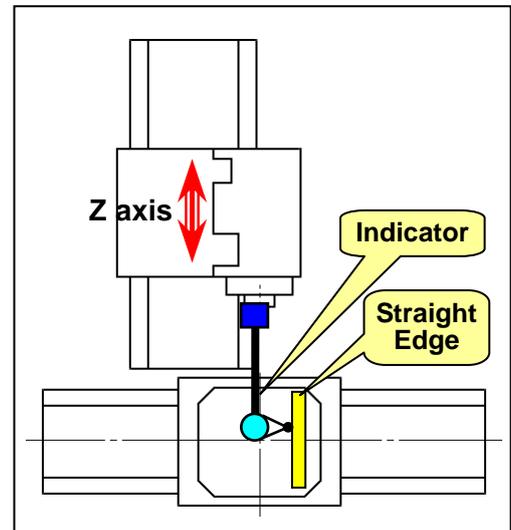
Install the straight edge horizontally on the pallet in the Z-axis direction and install the indicator on the spindle head. Set either end of the straight edge to "0" and move the Z axis to check the greatest difference (measurement in the middle of the movement).

- ※ If the straight edge is not available, use the sides of the square that is required for measuring the squareness between X and Y axes.

- Measuring point  
: both ends and center of straight edge
- Tolerance: 0.01mm / 500mm

② Correct

Incorrectness of the X-Z straightness of the Z axis is thought to be attributed to an error in the machine feeding level or column bed grinding. So refer to "Machine Leveling" later in this manual and perform the leveling again.



## 15.2 Straightness of X Axis

1) X - Y

2) Y - Z

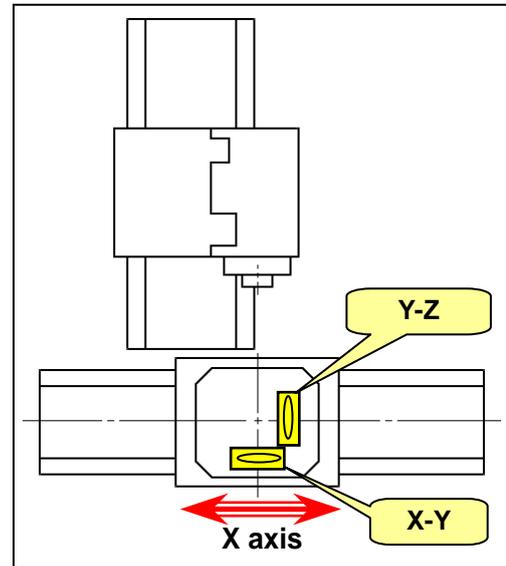
① Measure

Install the level in the center of the table deck in the X- and Z-axis directions and position it so that you can read the level gradation. Feed the X axis in 3-divided stroke and check the greatest difference of the level changes.

- Measuring point  
: X0., X1500. (X2000.), X3000. (X4000.)
- Tolerance: 0.030mm / full stroke

② Correct

Incorrectness of the X-axis straightness is thought to be attributed to an error in the machine feeding level. So refer to "Machine Leveling" later in this manual and perform the leveling again.



3) X - Z

① Measure

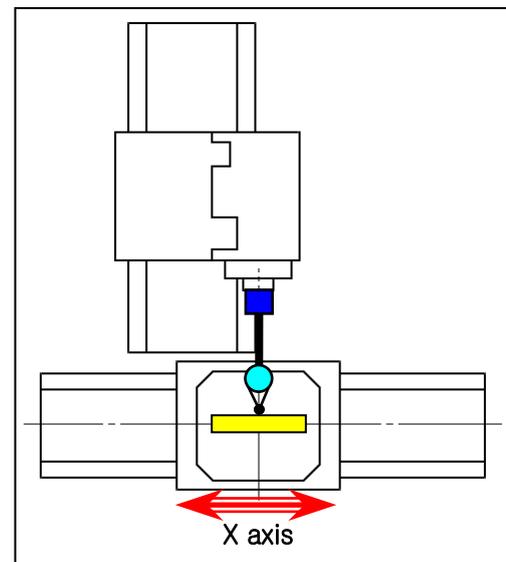
Install the straight edge horizontally on the pallet in the X-axis direction and install the indicator on the spindle head. Set either end of the straight edge to "0" and move the X axis to check the greatest difference (measurement in the middle of the movement).

- ※ If the straight edge is not available, use the sides of the square that is required for measuring the squareness between X and Y axes.

- Measuring point  
: both ends and center of straight edge
- Tolerance: 0.01mm / 500mm

② Correct

Incorrectness of the X-Y straightness of the X axis is thought to be attributed to an error in the machine feeding level. So refer to "Machine Leveling" later in this manual and perform the leveling again.



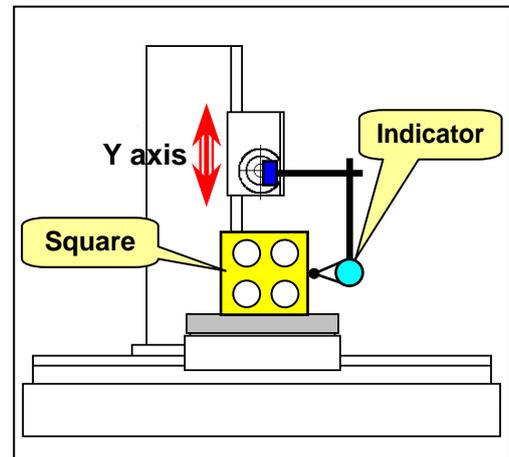
### 15.3 Straightness of Y Axis

#### 1) X - Y

##### ① Measure

Install the square vertically on the pallet deck in the X-axis direction and install the indicator on the spindle head. Move the Y axis to measure the parallelism. Set both ends of the square to "0" and check the measurement in the middle of the square.

- Measuring point  
: both ends and center of square
- Tolerance: 0.01mm / 500mm



##### ② Correct

Correction is not possible as the squareness is attributed to the physical column sliding side. However, correction is necessary as the gap of the gib in the Y axis may have a problem or the ball screw nut in the Y axis may be improperly aligned.

#### ▪ Adjusting the Y-axis gib

- (1) Loosen the bolts on the reference gib in the front and lower of the spindle head.
- (2) Loosen the set-screw (BQ bolt) of the gib-adjusting bolts completely.
- (3) Slowly tighten the BB bolt (one of the gib adjusting bolts) at first. Then tighten it up when you feel that the gib gets tightened. (this is where the gap between gib and column sliding side becomes "0")
- (4) Then, loosen the bolt (BB bolt) by a half turn ( $180^\circ$ ).
- (5) Tighten back the set-screw (BQ bolt) and pull out the gib as much as you have loosened the BB bolt ( $180^\circ$ ).
- (6) Adjust the upper and lower gibs as well as the other gibs in the same way.

- It is recommended to adjust the back plate gib just after performing the clamping of the Y axis.

#### ▪ Aligning the ball screw nut

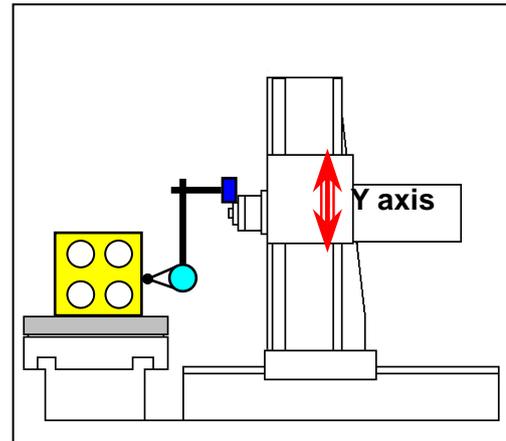
- (1) Move the Y axis to "0".
- (2) Loosen all fixing bolts on the ball screw nut.
- (3) Slightly tighten the bolts diagonally one by one at first, and then tighten them up by applying force as evenly as possible to each of them.

## 2) Y - Z

## ① Measure

Install the square vertically on the pallet deck in the Z-axis direction and install the indicator on the spindle head. Move the Y axis to measure the parallelism. Set both ends of the square to "0" and check the measurement in the center of the square.

- Measuring point: both ends and center of square
- Tolerance: 0.01mm / 500mm



## ② Correct

Correction is not possible as the squareness is attributed to the physical column sliding side. However, correction is necessary as the gap of the gib in the Y axis may have a problem or the ball screw nut in the Y axis may be improperly aligned.

## 15.4 Straightness of Pallet Deck

## 1) X – Y direction

## 2) X – Z direction

## ① Measure

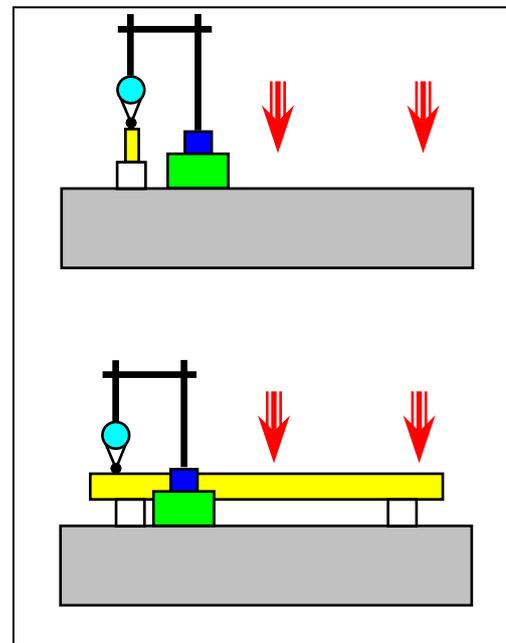
Install the straight edge on the table deck in the X-axis direction (X-Y), or in the Z-axis direction (Y-Z) and install the indicator on the block. Measure the greatest difference in straightness of the top side of the straight edge.

- ※ If the straight edge is not available, you can install the indicator on the spindle head and manually move the table deck to measure the difference. Note that this may be affected by the level of the machine. So perform this just after you have completed the leveling.

- Measuring point : both ends and 9 points around the center
- Tolerance: 0.03mm / 1000mm

## ② Correct

Correction is not possible as the straightness is attributed to the physical pallet itself. If the difference is as significant as to require correction, grind the deck again.



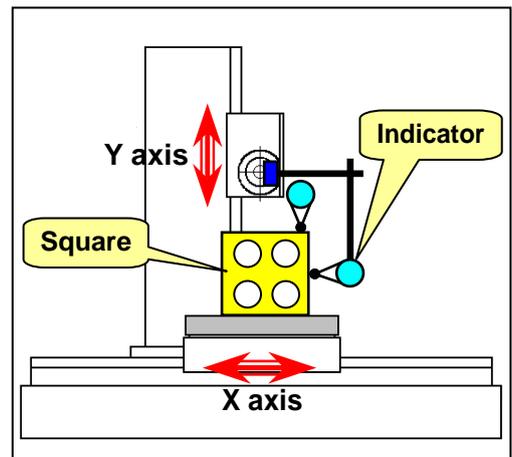
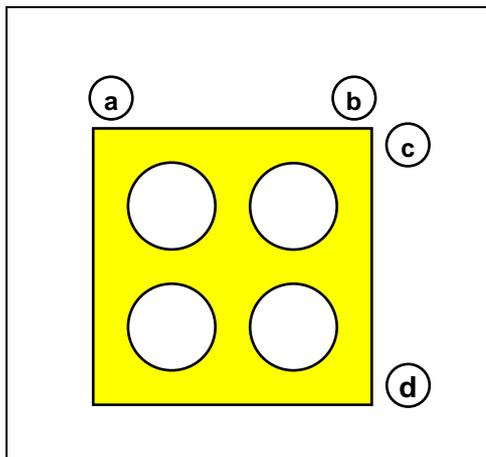
### 15.5 Squareness between coordinate axes

#### 1) X – Y Squareness

##### ① Measure

Place the square on the table deck in the X-axis direction and install the indicator on the spindle head. Check the squareness between X and Y axes. The greatest difference is the measurement.

- How to measure : As shown below, set both ② and ③ to "0" and calculate " $b - a$ " and " $c - d$ ". If ② and ③ are the same symbol (+/-), add " $b - a$ " to " $c - d$ ", if not, deduct the smaller value from the greater one.
- Tolerance: 0.02mm/500mm



##### ② Correct

- Squareness between X and Y can be corrected using the level in the column bed (Z axis).
  - (1) Place the square graplate (surface plate) vertically in the X-axis direction and install the indicator on the spindle head. Measure the parallelism between square graplate and X axis. Take a note of the difference and direction.
  - (2) Then, present the indicator to the square graplate in the Y-axis direction and measure the overall squareness. Take a note of the difference and direction.
  - (3) Set the bottom of the square graplate to "0" and move up and stop the Y axis at the top of the square graplate. Tighten the level block evenly on one side of the column bed. (Generally, the squareness can be approximately corrected by moving the applicable axis twice as much as the changes to the indicator gradation.)
  - (4) Repeat the steps above until you get the satisfactory result.
  - (5) When done, check the machine level and, if it's not proper, perform the machine leveling again.
- ※ Note that the squareness takes priority over the level. So ignore the absolute level and focus on the feeding level when performing the leveling.

## 2) Y – Z squareness

## (a) Measure

Place the square on the table deck in the Z-axis direction and install the indicator on the spindle head. Check the squareness between Y and Z axes. The greatest difference is the measurement.

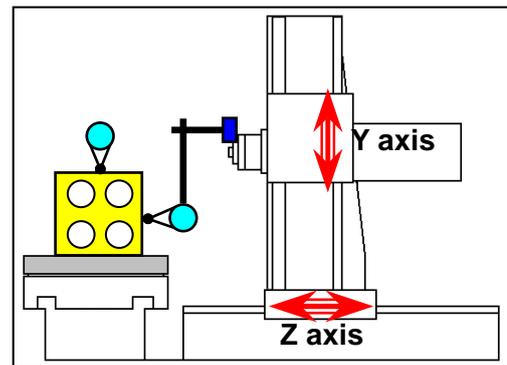
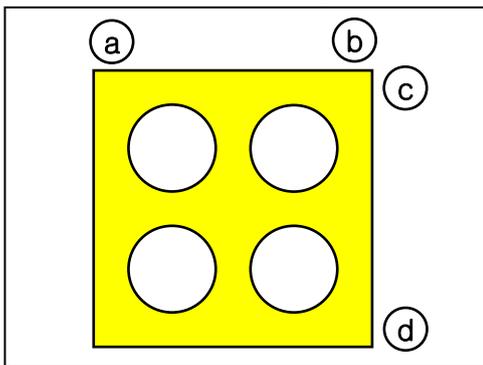
▪ How to measure: As shown below, set both (b) and (c) to "0" and calculate "(b) – (a)" and "(c) – (d)". If (a) and (d) are the same symbol (+/-), add "(b) – (a)" to "(c) – (d)", if not, deduct the smaller measurement from the greater one.

▪ Tolerance: 0.02mm/500mm

## (b) Correct

If you fail to correct the Y-Z squareness even after the leveling (i.e., the error is over 0.01mm), perform the scraping of the sliding plate on the bottom of the column.

※ Scraping the column sliding plate is a very significant correction. Take a deep consideration before determining to do so. Try performing the leveling work, for instance. Only when you are 100% sure that the problem is caused by the plate, perform the scraping.



▪ To perform the scraping of the column base sliding plate

☞ Preparations : Scraper, whetstone, minium, screw jacks (x2), cloth, other repair tools

(1) Unplug the cable that supplies power to the lubricant motor from the electric cabinet to block lubricant inflow.

※ Turn off the power and unplug the secondary U51 and V51 wires from the terminal block.

(2) Remove the front sliding cover and rear cover from the Z axis.

(3) Loosen the ball screw nut fixing bolts on the rear of the column base.

(4) Remove the front and rear wiper plates from the column base.

(5) Remove the back plate from the column base.

(6) Install two screw jacks on the lubricant passage in the side of the column bed, one for each back plate place in the rear column base. Then, lift up the column base slide plate so that you can remove it.

※ Insert a thin metal plate between screw jack and back plate to prevent scratches.

(7) Insert the bolt (BB 12×100) in the middle of the sliding plate and use the bolt as a handle to remove the sliding plate from under the column.(one more in the rear)

(8) Clean up the sliding plate and apply minium.

- (9) Wrap a thin tool (ex: scraper) with a clean cloth to wipe up the bottom of the column and the grinding side of the column bed.  
 ※ Clean it up. Even a slightest lubricant is not allowed to remain.
- (10) Insert the sliding plate back to the original and remove the screw jack.
- (11) Perform the same work on the front sliding plate.
- (12) Manually move the Z axis to reveal the contact area in the bottom of the sliding plate.
- (13) Repeat the step above to reveal the contact area from the column bed and perform the scraping of the sliding plate until you get a satisfactory result. When completed, clean up the area of your work and apply grease before putting all removed parts back together.
- (14) Move the Z axis to "0". Apply force as evenly as possible to each of the ball screw nut fixing bolts until you tighten them up finally.
- (15) Put all removed parts and covers for the precision work back together.

3) X – Z squareness

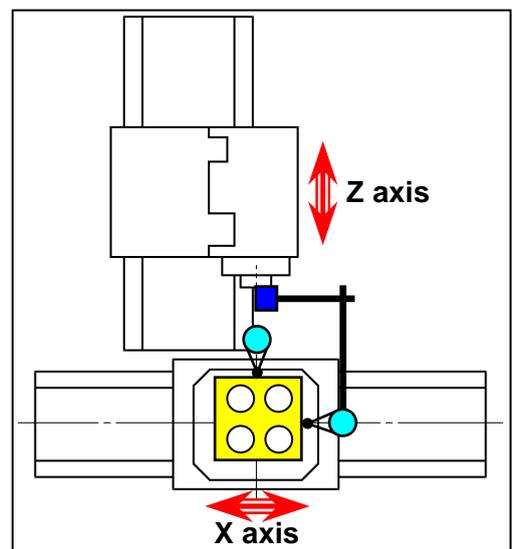
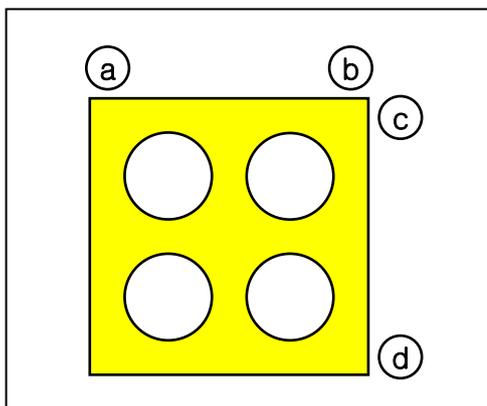
① Measure

Place the square on the table deck in the X-axis direction and move the indicator to set either ends of the square to "0". Adjust the parallelism of the X axis by impacting on higher points using the handle of a screwdriver. Measure the Z-axis parallelism of the square; the highest difference will be the measurement.

- How to measure : Set "a-b" (see the figure below) to "0-0".

The difference of "c-d" is the measurement.

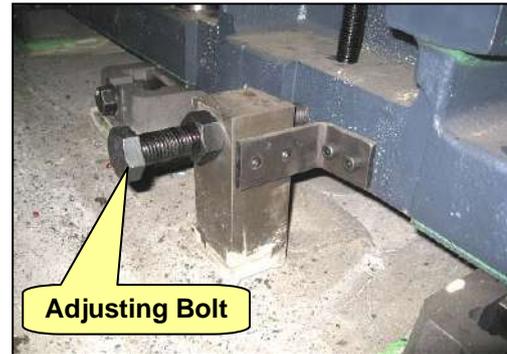
- Tolerance: 0.02mm/500mm



⑥ Correct

You can use the bed positioning kicker between table bed and column bed to adjust the squareness between two beds.

- (1) Loosen the anchor nut on the column bed.
- (2) Check the mis-positioned direction and use the kicker adjusting bolt to push the bed.
- (3) Check the squareness again and repeat these steps until you get a satisfactory result.
- (4) If the error is too great to adjust the squareness only in the column bed side, repeat these steps above to adjust the squareness of the table bed using the kicker.
- (5) If you get a satisfactory result, tighten the anchor and check again.
- (6) If no error is found, measure the X- and Z-axis levels as well as the squareness of each axis again.



### 15.6 Parallelism of movement to X/Z axis, parallelism of pallet deck, and shaking of index table

1) X-axis direction

① Measure

Install the indicator at the end of the spindle and place the height measuring block 500mm away from the table center in the X and Z directions before setting the reference point. Then, move the X axis by 1000mm and measure the difference.

- Measuring point: If the table center is set as "0"

X500.Z500., X-500.Z500.,

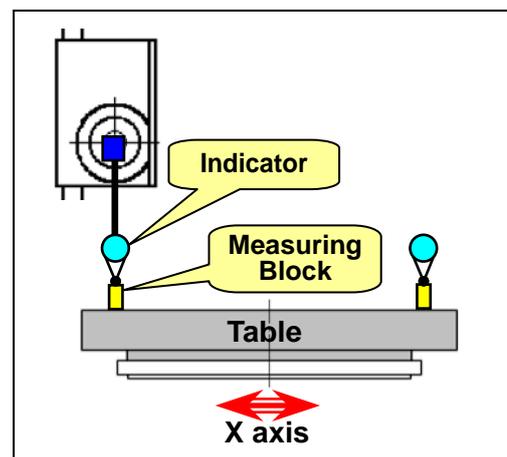
X500.Z0., X-500.,Z0.

X500.Z-500., X-500.,Z-500,

- Tolerance: 0.03mm / 1000mm

② Correct

If you need to adjust the precision for the X-axis direction, perform the scraping of the sliding plate under the table again for that purpose.



**▪ To perform the scraping of the table base sliding plate**

- ☞ Preparations: Scraper, whetstone, minium, screw jacks (x2), cloth, other repair tools
- (1) Unplug the cable that supplies power to the lubricant motor from the electric cabinet to block lubricant inflow.
    - ※ Turn off the power and unplug the secondary U51 and V51 wires from the terminal block.
  - (2) Remove the sliding covers in either sides of the X axis.
  - (3) Loosen the X-axis ball screw nut fixing bolts in the side of the table base.
  - (4) Remove the wiper plates in either sides of the table base.
  - (5) Remove the back plate from the table base.
  - (6) Install two screw jacks on the lubricant passage in the side of the table bed, one for each back plate place in the rear table base. Then, lift up the table base slide plate so that you can remove it.
    - ※ Insert a thin metal plate between screw jack and back plate to prevent scratches.
  - (7) Insert the bolt (BB 12×100) in the middle of the sliding plate and use the bolt as a handle to remove the sliding plate from under the table base.
  - (8) Clean up the sliding plate and apply minium.
  - (9) Wrap a thin tool (ex: scraper) with a clean cloth to wipe up the bottom and the grinding side of the table base.
    - ※ Clean it up. Even a slightest lubricant is not allowed to remain.
  - (10) Insert the sliding plate back to the original and remove the screw jack.
  - (11) Perform the same work on the other sliding plate.
  - (12) Manually move the X axis to reveal the contact area in the bottom of the sliding plate.
  - (13) Check the contact state on the table base and keep scraping the sliding plate until you get a satisfactory result.
  - (14) When you get a satisfactory result, clean up the working area and apply lubricant, then put together all the removed component parts back to the original.
  - (15) Move the X axis to "0". Apply force as evenly as possible to each of the ball screw nut fixing bolts until you tighten them up finally.
  - (16) Put all removed parts and covers for the precision work back together.

## 2) Z-axis direction

## ① Measure

Move the W axis to "0". Install the indicator at the end of the spindle and place the height measuring block 500mm away from the table center in the X and Z directions before setting the reference point. Then, move the Z axis by 1000mm and measure the difference.

- Measuring point: If the table center is set as "0"

X500.Z500., X500.-Z500.,

X0.Z500., X0.,Z-500.

X-500.Z500., X-500.,Z-500,

- Tolerance: 0.03mm / 1000mm

## ② Correct

- The Z-axis parallelism of the table can be adjusted by leveling the table bed (X axis).

(1) Move the W axis to "0". Install the indicator at the end of the spindle and move the Z axis to "Z0." Check the distance between indicator and table center and move the Z axis back as much as that distance. Place the measuring block on it and set the reference point.

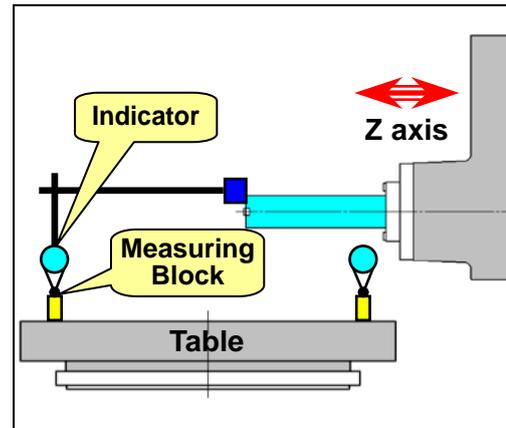
(2) Then, move the Z axis back to "Z0." and use the block to measure the height.

(3) Adjust the level block in the front position of the table bed evenly to fit the height.

(4) Repeat the steps above until you get the satisfactory result.

(5) When done, check the machine level and, if it's not proper, perform the machine leveling again.

- ※ Note that the table parallelism takes priority over the level. So ignore the absolute level and focus on the feeding level when performing the leveling.



3) Shaking of the table

① Measure

Install the indicator at the end of the spindle and place the height measuring block 500mm away from the table center in the X and Z directions before setting the reference point ("0"). Then, rotate the B axis by each 90° and measure the difference.

- Measuring point

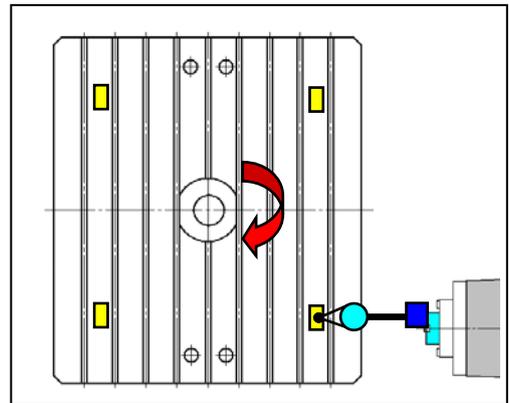
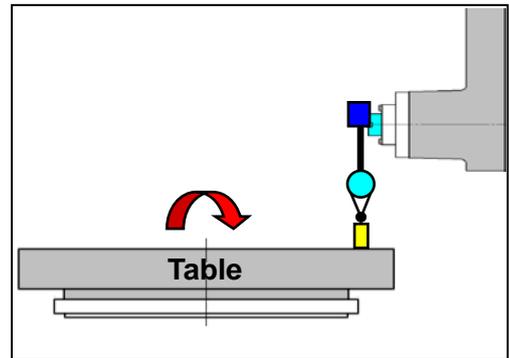
: If the table center is set as "0"

From "X500.Z500", rotate the B axis by each 90° four times to measure 4 points

- Tolerance: 0.025mm

② Correct

The shaking of the table is caused by a problem with the parallelism between table bottom and deck. So if you want to correct the shaking, you should scrape the bottom or grind the deck as appropriate.



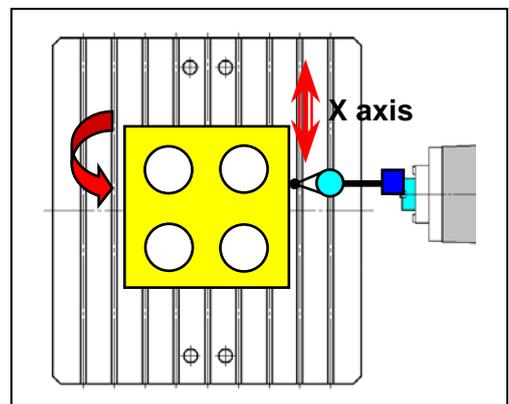
15.7 Squareness in division of index table

1) How to measure

(1) Place the square horizontally on the table deck. While moving the X axis, correct the parallelism between square and X axis.

- To correct the parallelism, use the handle of a screwdriver to impact on certain points of the square.

(2) While indexing the B axis, clamp the square to the table lest that it should move.



(3) While indexing the B axis totally 4 times, one for each 90 degrees, measure the X-axis parallelism totally 4 times accordingly. The greatest difference is the measurement.

- Measuring point: 0° Position, 90° Position, 180° Position, 270° Position
- Tolerance: 0.02mm/500mm

## ② Correct

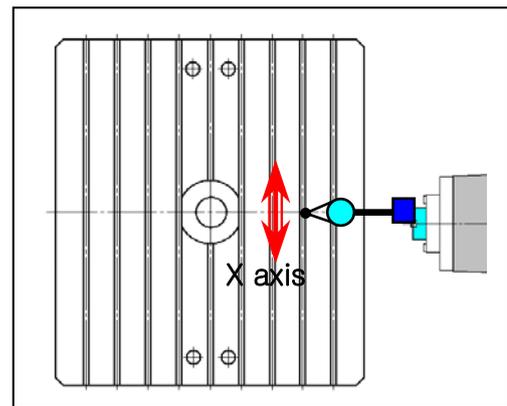
As the angle division of the index table is performed using the precise position coder and mechanical devices, it is unlikely to make an error. However, if you encounter a significant error, that's because the position coder or mechanical device inside the table is contaminated with dust and impurities, or it is defective, damaged, or worn out. If this is the case, you have no other option but to replace the position coder or the mechanical device with a new one.

### 15.8 Parallelism of the X-axis movement for the T-slot

#### 1) How to measure

Set the reference point for the B axis and perform the table locating as well as the table clamping. Then, install the indicator on the spindle and present the gauge to the second T-hole of the table T-holes. While rotating the X axis, measure the parallelism.

- Measuring point : Full stroke of the table T-hole
- Tolerance: 0.04mm / full stroke



#### 2) Correct

Reset the B-axis reference point and reset the locating bush position as appropriate.

- Resetting the reference point for the B axis

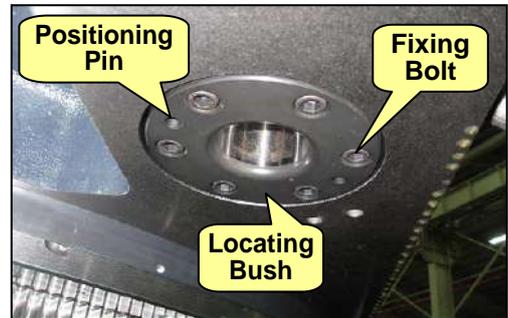
☞ The overall gear ratio of the B axis is 1440:1. That means that the B axis rotates once when the servo motor revolves 1440 times, so the maximum degree of the B axis per one revolution of the servo motor is  $0.25^\circ$ . Thus, the grid shaft should be adjusted within  $\pm 125$ .

- (1) Set the reference point for the B axis.
- (2) Install the indicator on the spindle, present the gauge to the table T-hole or the center of the side and set it to 0.
- (3) Feed the X axis so that the gauge gets closer to the table T-hole or the distal end of the side.
- (4) Turn the B axis manually to set the gauge needle to 0.
- (5) Feed the X axis in the opposite direction and measure the error on the other side.
- (6) If the error is still beyond 0.02mm, move the B axis by half of the error manually and set the gauge needle to 0.
- (7) Feed the X axis in the opposite direction and measure the error on the other side.
- (8) If the error is still beyond 0.02mm, move the B axis by half of the error manually and set the gauge needle to 0. Repeat this step above until the error falls below 0.02mm.
- (9) When you get a satisfactory result, check the machine position that is displayed on the screen and enter the value (coordinates) in "Parameter No. #1850 B".  
Ex) 0.091 : 91, 359.937 : -63

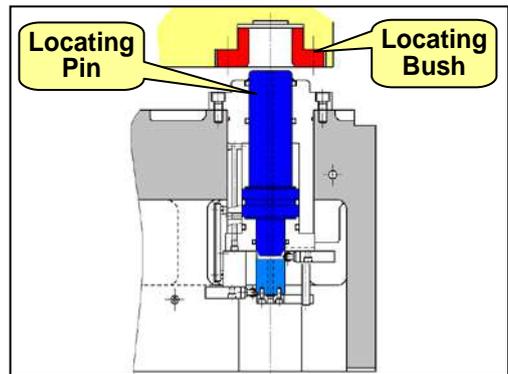
(If the item is already filled with a certain figure, just press +Input).

▪ **Resetting the locating push position**

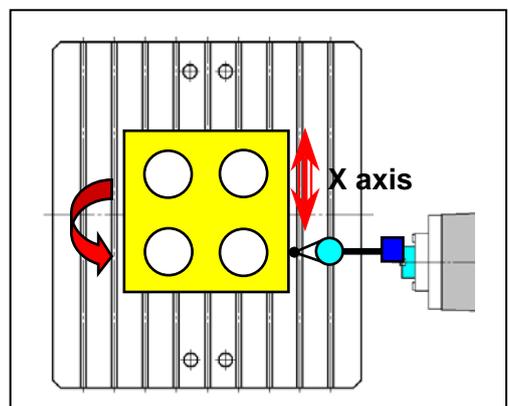
The locating pin or bush may be mis-positioned from the B-axis reference point or from the right angle (0°, 90°, 180°, 270°) due to such as an impact on the table. Even if they are correctly positioned from the reference point or each right angle, performing the locating will move the table accordingly.



- (1) Pull out the positioning pins (2-SPB 10X50) from the problem-making locating bush and loosen the bolts (6-BB12x30).
- (2) Refer to "Resetting the reference point for the B axis" above to set the exact reference point for the table.
- (3) Perform the table locating.
  - ⇒ The locating bush in the table will take place in the locating pin position.



- (4) Tighten up the locating bush fixing bolts (applicable bolts only)
- (5) Perform the table unlocating and turn the table to tighten up the bush bolts. Then, reset the B-axis reference point before performing the table locating to check if there still occurs an interruption.
- (6) While indexing the B axis by each 90°, correct the positions of the other three locating bushes respectively.
- (7) When done, place the square horizontally on the table deck. While turning the X axis, adjust the parallelism between X axis and square. Clamp the square to the table so that it does not move when indexing the B axis. While indexing the B axis by each 90°, measure the parallelism of the X-axis direction to check if the error of division squareness falls below the tolerance.
  - Tolerance: 0.02mm / 500mm
- (8) When done, use the reamer to perform the reaming of the position-pin places in the locating bush before inserting the pins.



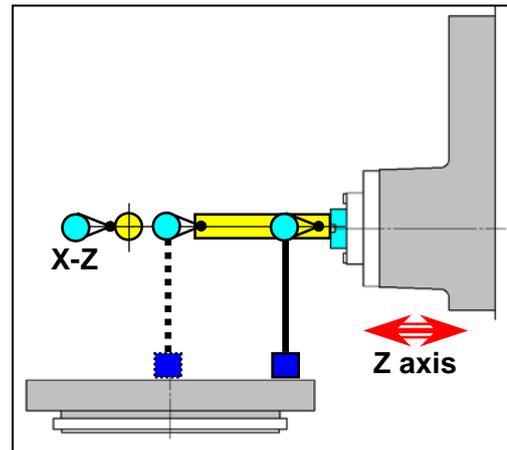
## 15.9 Parallelism between center line of spindle and movement of Z-axis

### 1) X-Z

#### ① Measure

Insert the test bar into the spindle and move the X axis up to 300mm away to measure the runout on the highest point (stop moving the Y axis at the highest point). Stop rotating the spindle at an intermediate point and move the Z axis to 300mm away from the mouth. The greatest difference is the measurement.

- Tolerance: X – Z: 0.015mm/300mm



#### ② Correct

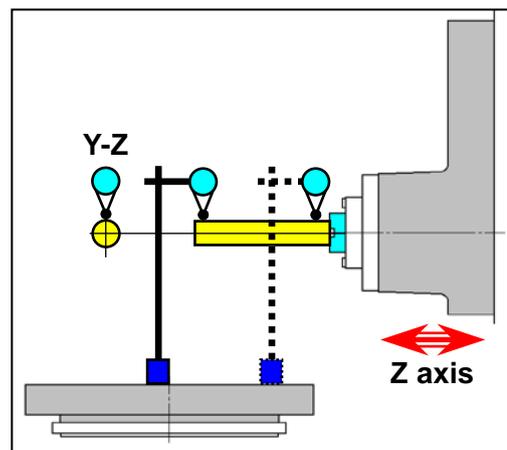
- This is to restore the accuracy of the column itself.
  - (1) Set the indicator needle to 0 at the test bar position. Then, move the Z axis to 300mm away.
  - (2) Loosen the bolts (10-BA24×100) except for the reamer bolts in the front right side of the column.
  - (3) Use the adjusting bolt on the position block (under the column) to move the column in the opposite to the indicator direction about 5 times as much as the error.
  - (4) Repeat these instructions above until you get a satisfactory result.
  - (5) When completed, tighten the adjusting bolts (x2) evenly and tighten up the column bolts.

### 2) Y-Z

#### ① Measure

Insert the test bar into the spindle and move the Y axis up to 300mm away to measure the runout on the highest point (stop moving the X axis at the highest point). Stop rotating the spindle at an intermediate point and move the Z axis to 300mm away from the mouth. The greatest difference is the measurement.

- Tolerance: Y – Z: 0.015mm/300mm



② Correct

- As this has much to do with squareness between Y-axis column and Z-axis column bed, and squareness between center line of the spindle and Y-axis column, measure the Y-Z squareness at first. Then go on to the Y axis gib if no error is found. If the problem persists, adjust the Y-axis gib as well.

(1) Adjusting the parallel gib

- ① Remove the Y-axis cover.
- ② Loosen the ball screw nut fixing bolts on the Y axis.
- ③ Loosen the taper gib in the spindle head. (loosen the gib bolts by two turns before locking the set-screw. This will loosen the gib.)
- ④ If the measurement at the 300mm position is "+", remove the lower parallel gib; if it is "-", remove the upper one.
- ⑤ Scrape the parallel gib as much as the height of the spindle head added to the parallelism error.
  - ⇒ Install the indicator and use the block gauge to set the thickness of the parallel gib. Then, scrape the gib according to the calculation. (approximately 2.5 times as much as the value measured by the test bar)

(2) Adjusting the gap for the taper gib

- ① Loosen the bolts on the reference gib in the front and lower of the spindle head.
- ② Loosen the set-screw (BQ bolt) of the gib-adjusting bolts completely.
- ③ Slowly tighten the BB bolt (one of the gib adjusting bolts) at first. Then tighten it up when you feel that the gib gets tightened. (this is where the gap between gib and column sliding side becomes "0")
- ④ Then, loosen the bolt (BB bolt) by a half turn (180°).
- ⑤ Tighten back the set-screw (BQ bolt) and pull out the gib as much as you have loosened the BB bolt (180°).
- ⑥ Adjust the upper and lower gibs as well as the other gibs in the same way.
  - It is recommended to adjust the back plate gib just after performing the clamping of the Y axis.

### 15.10 Run-out on the spindle

#### 1) How to measure

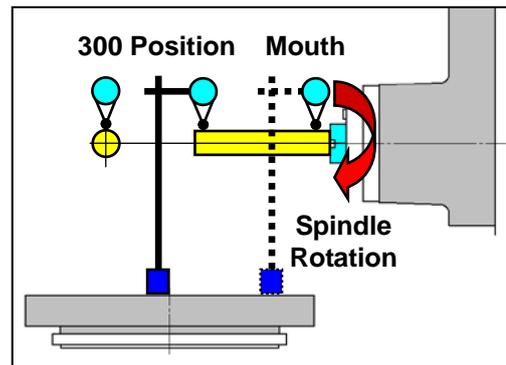
Insert the test bar into the spindle and present the indicator to the mouth of the test bar, and to a point 300mm away from the mouth. While turning the spindle in a low speed, measure the greatest shaking value.

- Tolerance : 0.005mm at the mouth  
0.012mm at 300mm away

#### 2) Correct

As the taper side of the spindle is exposed to a high risk of scratch during the precision work, remove the pull stud from the test bar or a new tool before applying minium or stamp ink to the taper side, and use the sandpaper to grind the contact area of the taper.

- ※ Using the grinder is strictly prohibited. If the taper side is badly damaged, re-grind the spindle itself.

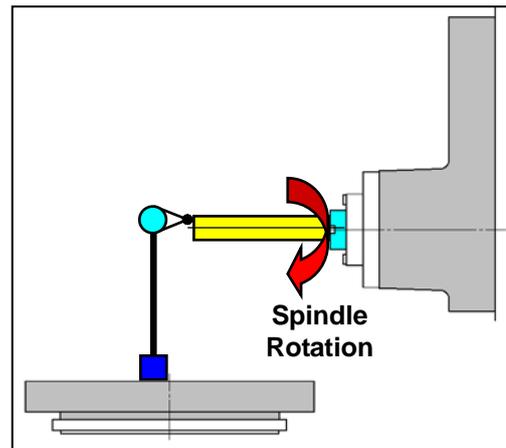


### 15.11 Movement of spindle in the Z-axis direction

#### 1) How to measure

Insert the test bar into the spindle, insert the steel ball into the end center of the test bar, and present the indicator to each of X and Y highest points. While rotating the spindle, measure the greatest shaking value. (For a test bar whose section is already grinded, measure the runout on the grinded section)

- Tolerance: 0.003mm



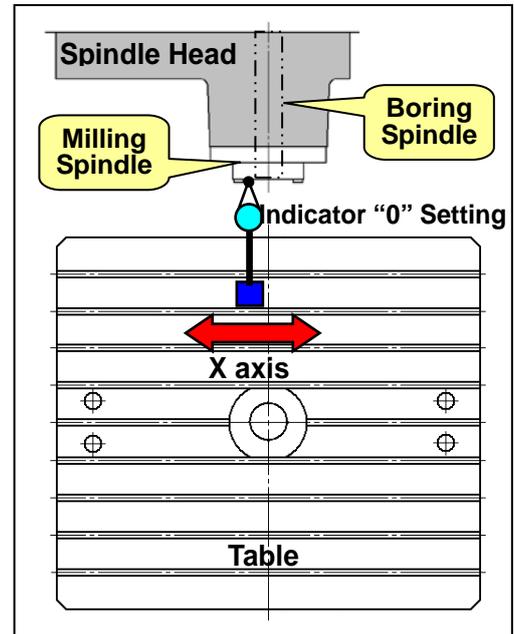
#### 2) Correct

If the spindle moves in the Z-axis direction, this may be caused by a problem with the spindle main bearing. If this is the case, replace the bearing.

## 16. Resetting the reference point for each axis

### 16.1 Resetting the reference point for the W axis (W-axis stroke : 700mm)

- 1) Return the W axis to the reference point manually.
- 2) Install the indicator at the end of the table deck. While moving the Z axis, present the gauge to the milling spindle and set it to 0.
- 3) While moving the X axis, measure the step height between milling spindle and boring spindle.
- 4) Move the W axis to set the gauge to 0.
- 5) Check the current position of the W axis from the "Machine Position" screen of the OP, and enter the difference between current position and "W700." in the "parameter #1850 Z" field.



- **To change the W-axis grid shift parameter**

Read the measuring value of the machine position (coordinates) displayed on the CRT monitor and enter the positive (+) parameter in micron ( $\mu$ ) if it's greater than 700, or the negative (-) parameter if less than 700.

Add or deduct the above measurement to and from the existing parameter and enter "INPUT", or enter the result plus the symbol, and press "+INPUT".

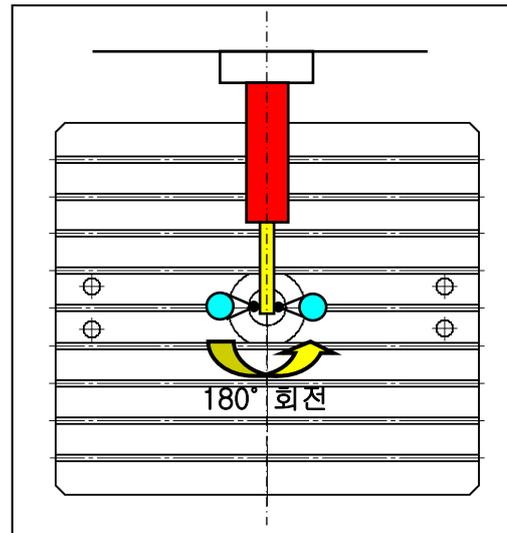
- Parameter for the W-axis reference point: NO. #1850 W

※ "W700" mentioned above is the reference point for the W axis.

- 6) Return the W axis to the reference point manually and repeat the instructions above until the result falls below 0.005mm.

## 16.2 Resetting the reference point for the X axis (X-axis stroke: 3000mm)

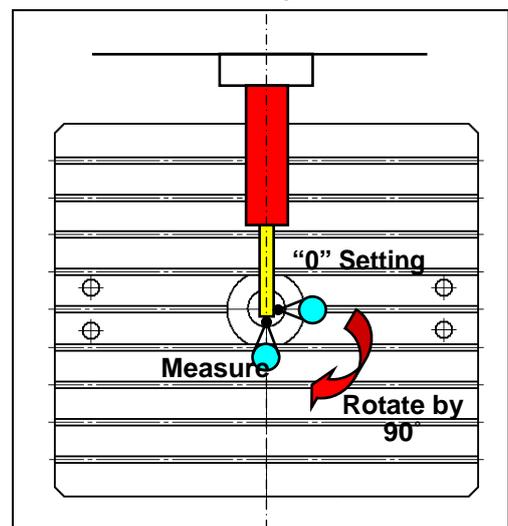
- 1) Return the X axis to the reference point manually.
- 2) In MDI mode, move the X axis to the middle stroke position (X1500).
- 3) Install the test bar into the spindle and move the W axis to "W0".
- 4) Install the indicator in the center of the table about 400mm high. In Handle mode, move the Z axis in "-" direction so that it is positioned about 30mm from the end of the test bar.
- 5) Move the indicator on the table deck so that the gauge needle contacts on the test bar.
- 6) Move the Y axis and stop moving it when the needle is positioned at the highest point of the test bar. (Do NEVER move the X axis.)
- 7) Rotate the spindle and stop rotating it at the intermediate point of the test bar runout. Then, set the gauge to 0.
- 8) Move the Z axis in "+" direction by 400mm, and rotate the B axis by 180 degrees.
- 9) Move the Z axis back in "-" direction and stop right before the test bar contacts on the indicator. Check if there occurs an interference between indicator needle and end section of the test bar. And if so, move the X axis to work it around. (If the error is ignorable by the indicator or there occurs no interference, just skip this step) Then, move the Z axis until it is positioned about 30mm from the end of the test bar.



- 10) Move the X axis to set the indicator (currently contacting on the test bar) to 0.
- 11) Check the current position of the X axis from the "Machine Position" screen of the OP, and figure out the difference between current position and "X1500.". Then, move the X axis half of the difference.
- 12) Repeat step 5 above and move the indicator on the table deck until the gauge needle contacts on the test bar where you set it to 0.
- 13) Repeat steps 8) to 9) above and adjust the runout until either sides of the test bar show 0.
- 14) If you get a satisfactory result, check the current position of the X axis from the "Machine Position" screen of the OP, and enter the difference between current position and "X1500." in the "parameter #1850 X" field.
  - ※ To change the X-axis grid shift parameter  
 Read the machine position (coordinates) displayed on the OP screen. Enter the positive (+) parameter if the result of deducting half of the X stroke (1500) from the machine position is a positive value; enter the negative (-) parameter in micron ( $\mu$ ) if the result is a negative value.  
 Add or deduct the above measurement to and from the existing parameter and enter "INPUT", or enter the result plus the symbol, and press "+INPUT".
  - Parameter for the starting point of the X axis: NO. #1850 X
- 15) Return the X axis to the reference point manually and repeat the instructions above until the result falls below 0.005mm.

**16.3 Resetting the reference point for the Z axis (Z-axis stroke: 1600mm)**

- (1) Refer to "Reference point for X axis" above to set the reference point of the X axis and set the indicator to "0".
  - The machine position is "X1500. Z290.W0", and around "Y400" for the Y axis.
- 2) Return the Z axis to the reference point manually.
- 3) Rotate the B axis by 90 degrees.
- 4) While moving the Z axis, set the indicator to "0".



- 5) Check the current position of the Z axis from the "Machine Position" screen of the OP, and enter the difference between current position and "Z290." in the "parameter #1850 Z" field.



▪ **To change the Z-axis grid shift parameter**

Read the machine position (coordinates) displayed on the OP screen. Enter the positive (+) parameter if the result of deducting "290." from the machine position is a positive value; enter the negative (-) parameter in micron ( $\mu$ ) if the result is a negative value. Add or deduct the above measurement to and from the existing parameter and enter "INPUT", or enter the result plus the symbol, and press "+INPUT".

Add or deduct the above measurement to and from the existing parameter and enter "INPUT", or enter the result plus the symbol, and press "+INPUT".

▪ Parameter for the Z-axis reference point: NO. #1850 Z

※ "Z290." Is the result where the test bar is 310mm long (L) and 60mm wide (D).

$$\text{i.e., } Z = L - (H - W + D/2), \quad Z = 310 - (750 - 700 + 30) = 290$$

▪ L : Length of the test bar: 310mm

If H is "Z0.", the distance between spindle gauge line and table center is: 750mm

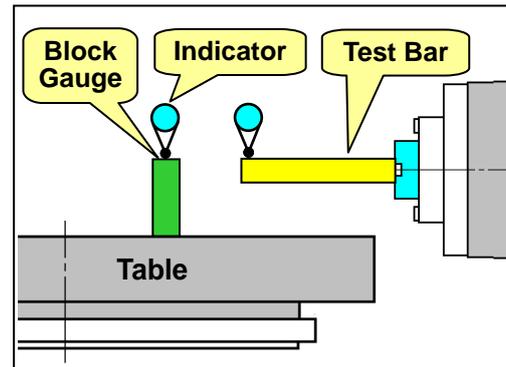
W : W-axis stroke: 700mm

D : Diameter of the test bar: 60mm ( $D/2 = 30$ )

- 6) Return the Z axis to the reference point manually and repeat the instructions above until the result falls below 0.005mm.

**16.4 Resetting the reference point for the Y axis (Y-axis stroke: 2000mm)**

- 1) Insert the test bar into the spindle.
- 2) Put the block gauge (over 150mm) on the pallet deck, and install the indicator on it. Then, set the height of the block gauge to "0".
- 3) Move the Y axis according to the calculation of the below formula.



**Y axis coordinates = L (height of block gauge) – D/2 (radius of test bar)**

Ex) If the height of the block gauge is 150mm,  $150 - 30 = 120$  or, Y120.

If the test bar is not available so you work directly on the boring spindle,  
 $150 - 65 = 85$  or, Y85.

- If DB130CX is "Y.0", the spindle is positioned at the center of the table deck.

However, if APC is optionally installed, the distance between table deck and center of the spindle is 250mm. (Formula:  $Y = L - (D/2 + 250)$ )

- 4) Install the indicator on the top of the test bar and rotate the spindle while reading the runout on the test bar. Stop rotating the spindle at an intermediate value of the runout.
- 5) Move the Y axis to set the indicator needle to "0".
- 6) Check the measuring value of the machine position (coordinates) displayed on the main OP screen and compare it with the result of step 3) above. Enter the positive (+) parameter if it's greater than the result of step 3, or the negative (-) parameter if less. Add the above measurement to the existing parameter and press "INPUT", or add the positive symbol (+) to the above measurement and enter "+INPUT".
  - Parameter for the Y-axis reference point: NO. #1850 Y
- 7) Adjust the reference point of the machine and repeat steps 1) ~ 6) above again until the measurement is within 0.05 mm.

## 17. Adjusting ATC

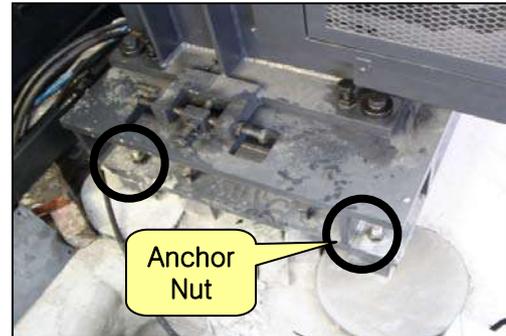
### 17.1 ATC installation & leveling

※ Adjusting ATC should be performed after all of machine leveling, static accuracy work and resetting the reference point for each axis are completed.

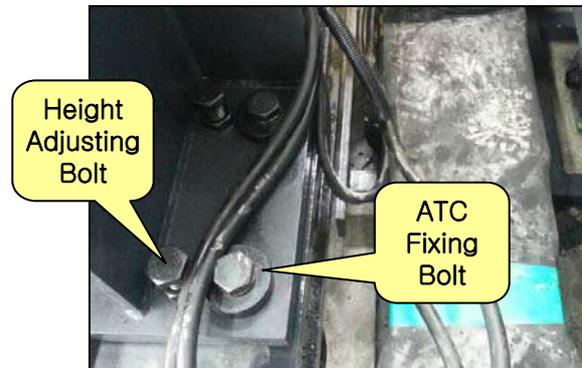
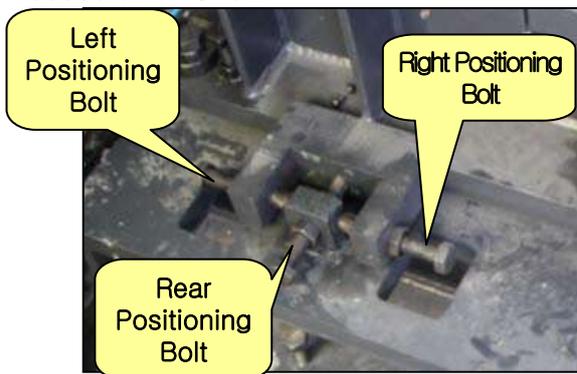
1) Move the Y, Z and W axes to their respective secondary reference point.  
(“MDI” Mode : G00 G91 G30 Y0 Z0 W0)

2) When you are sure that the surface is fully cured by the foundation work, tighten up the nuts on the anchor bolts.

- Remove all the temporary blocks that you placed in advance for the temporary installation.



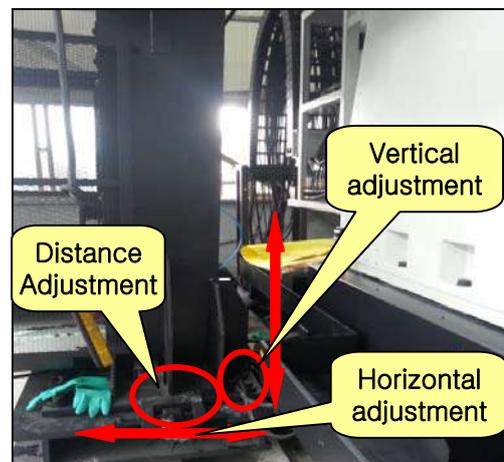
3) Use ATC adjusting bolts to adjust the vertical, horizontal and front/rear positions of ATC based on ATC rail.



#### ① Adjusting the ATC height

Use the height bolt to adjust the height and straightness based on the rail section spreading between ATC rail and column.

- Use the iron rule or special metal bar to measure the step height and straightness between two rails for reference.



② Front/Rear Position

Use the front/rear positioning bolts to adjust the front/rear position and straightness of the rail spreading between ATC rail and column.

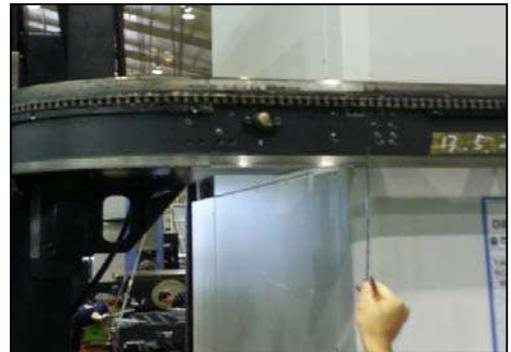
- If there is a difference between upper and lower sections of the rail, use the height bolt to adjust the height before proceeding with the front/rear position and straightness.



③ Adjusting the distance

Use the left/right positioning bolts to adjust the gap between ATC rails to 1mm.

- If the gap comes significantly from the height difference, use the height bolt to adjust the height between two rails first.

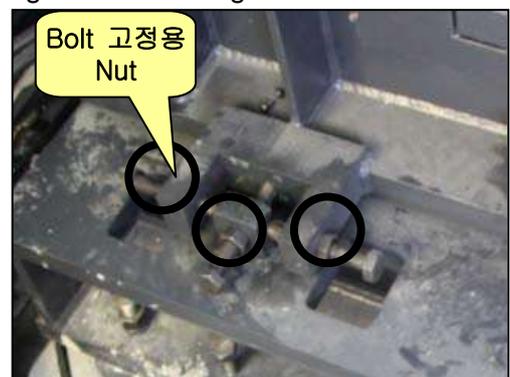
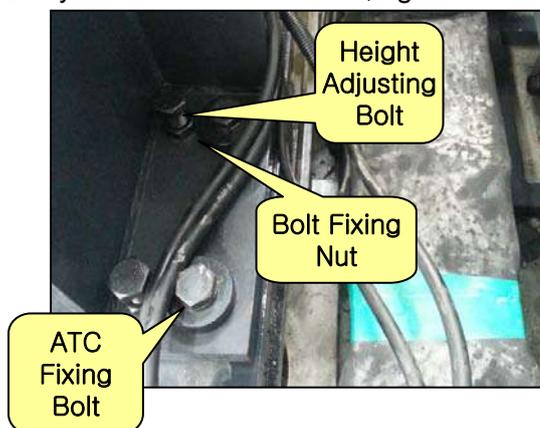


④ When you are sure about the height, front/rear position, left/right position and straightness between two rails, tighten all the height bolts evenly by a half turn and tighten all the fixing bolts.

⑤ Check the height, front/rear position, left/right position and straightness between two rails again and fine-tune the positions correctly.

⑥ Try operating the rail locating pin in ATC manual mode and check if there occurs an interruption in this process.

⑦ If you find no further error, tighten all the adjusting bolts and fixing nuts.

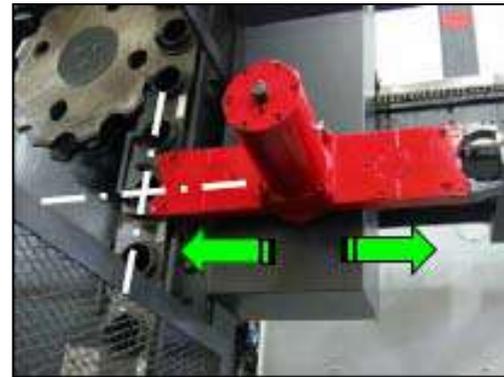


### 17.2 Carriage Magazine Side Home Position Setting

- 1) Insert the centering fixture between magazine pot (3) and changer gripper (2).



- 2) Move the changer to the magazine pot manually (jog mode).



- 3) Open the door of the electric cabinet and find the carriage AMP that is located in the inner front side.



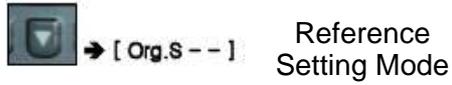
- 4.1) Check the center position using the centering fixture above, and if it fits correctly:

- ① Press the MODE key on the start screen [r0000] of the servo drive to switch to the diagnosis mode.

 → [ rd-off ] Diagnosis mode

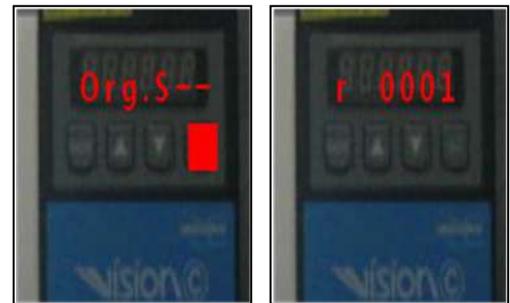
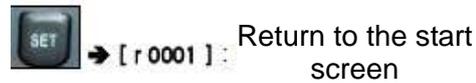


- ② On the [ rd-off ] screen, set the DOWN key as a functional key to set the reference point.



- ③ On the [Org.S - - ] screen, press and hold the SET key for 10 seconds.

If you press and hold the SET key for 10 seconds on the [Org.S - - ] screen, the screen will blink and switch to [r0001].



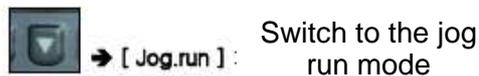
- ④ Turn off the machine and turn it back on. This completes resetting the reference point.

4.2) If you have to reset the reference point because the center of the magazine pot does not match with that of the changer.

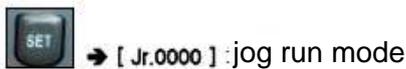
- ① Press the MODE key on the start screen [r0000] of the servo drive.



- ② From the [ rd-off ] screen, set the DOWN key as a functional key to set the reference point.



③ On the [Jog.run] screen, press the SET key.



④ On the [Jr.0000] screen, use the up/down arrow keys to feed the changer in a desired direction, and adjust the changer position for the pot.



- If you want to fine-tune the magazine position, set parameter #27 to a lower value.
- Use the up/down arrow keys on the [ Jr.0000 ] screen, or press the rotation button on the manual operation panel. While holding the button, insert the center bar into the centering fixture until it is inserted smoothly.
- ※ Feeding the changer on the manual OP  
Change "K17.6" from 0 to 1 before proceeding.
- When you have completed resetting the reference point, change "K17.6" from 1 back to 0.



⑤ When the centering of the tool magazine's tool pot is complete, press the SET key.



- ⑥ On the [Jog.run] screen, press the MODE key.



→ [ rd-off ] : Ready to operate the jog



- ⑦ Back on the [ rd-off ] screen, press the up arrow key.



→ [ Org.S - - ] : Original mode run



- ⑧ On the [Org.S - - ] screen, press and hold the SET key for 10 seconds.

If you press and hold the SET key for 10 seconds on the [Org.S - - ] screen, the screen will blink and switch to [r0001].



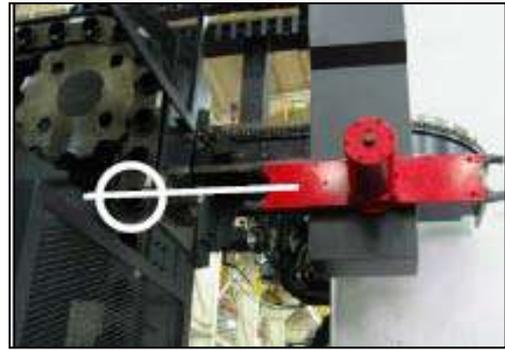
→ [ r 0001 ] : Return to the start screen



- ⑨ Turn off the machine and turn it back on. This completes resetting the reference point.
- When you have completed resetting the reference point, change "K17.6" from 1 back to 0.

### 17.3 Setting the reference point for the tool magazine pot

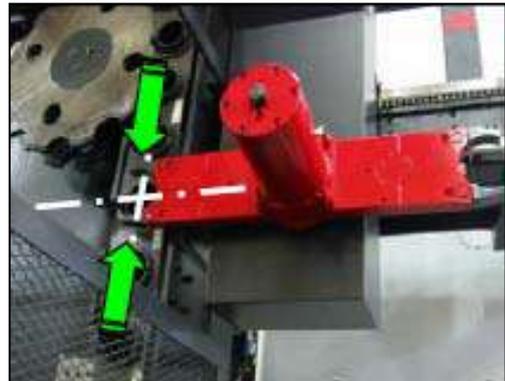
- 1) Enter the pot number (for the changer position of the tool magazine) in parameter 8 on the servo AMP.



- 2) Insert the centering fixture between magazine pot (3) and changer gripper (2).



- 3) Move the changer to the magazine pot manually (jog mode).

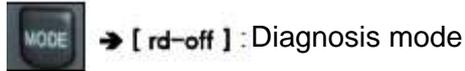


- 4) Open the door of the electric cabinet and find the magazine AMP that is located in the inner front side.



4.1) Check the center position using the centering fixture above, and if it fits correctly:

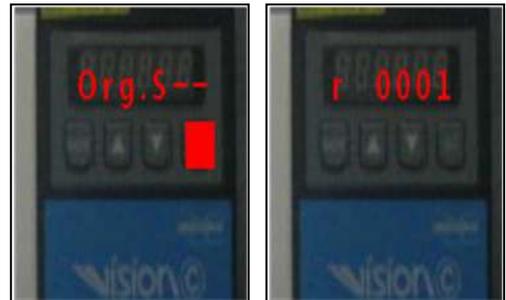
- ① Press the MODE key on the start screen [r0000] of the servo drive to switch to the diagnosis mode.



- ② From the [rd-off] screen, set the DOWN key as a functional key to set the reference point.



- ③ From the [Org.S - -] screen, press and hold the SET key for 10 seconds. If you press and hold the SET key for 10 seconds on the [Org.S - -] screen, the screen will blink and switch to [r0001].



- ④ Turn off the machine and turn it back on. This completes resetting the reference point.

4.2) If you have to reset the reference point because the center of the magazine pot does not match with that of the changer.

- ① Press the MODE key on the start screen [r0000] of the servo drive.



- ② On the [rd-off] screen, set the DOWN key as a functional key to set the reference point.



→ [ Jog.run ] : Switch to the jog run mode



- ③ On the [Jog.run] screen, press the SET key.



→ [ Jr.0000 ] : Jog run mode



- ④ On the [Jr.0000] screen, use the up/down arrow keys to feed the changer in a desired direction. In such a way, adjust the changer position for the pot.



→ Fine-tuning the changer

- If you want to fine-tune the magazine position, set parameter #27 to a lower value.
- Use the up/down arrow keys on the [Jr.0000] screen, or press the rotation button on the manual operation panel. While holding the button, insert the center bar into the centering fixture until it is inserted smoothly.
- ※ Feeding the changer on the manual OP:  
Change "K17.6" from 0 to 1 before proceeding.
- When you have completed resetting the reference point, change "K17.6" from 1 back to 0..



- ⑤ When the centering of the tool magazine's tool pot is complete, press the SET key.

 → [ Jog.run ] : Return to the jog run mode



- ⑥ On the [Jog.run] screen, press the MODE key.

 → [ rd-off ] :Ready to operate the jog run



- ⑦ Back on the [rd-off] screen, press the up arrow key.

 → [ Org.S - - ] : Origin 모드



- ⑧ On the [Org.S - - ] screen, press and hold the SET key for 10 seconds.

If you press and hold the SET key for 10 seconds on the [Org.S - - ] screen, the screen will blink and switch to [r0001].

 → [ r 0001 ] : Return to the start screen



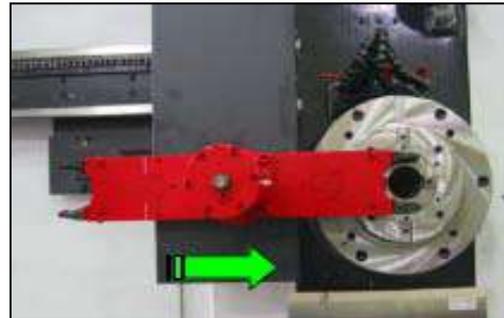
- ⑨ Turn off the machine and turn it back on. This completes resetting the reference point.
- When you have completed resetting the reference point, change "K17.6" from 1 back to 0.

### 17.4 Fine-tuning the spindle side of the changer arm

1) Remove the driving key from the spindle and insert the centering fixture (3) and changer gripper (2) as well.



2) In jog mode, move the changer to the spindle side position.

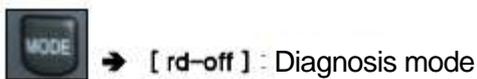


3) Open the door of the electric cabinet and find the carriage AMP that is located in the internal front side.



4) On the front operation panel, make necessary settings for the work.

① Press the MODE key on the start screen [r0000] of the servo drive.



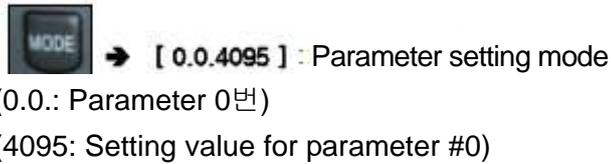
② On the [rd-off] screen, press the MODE key to display [ALH -- ].



- ③ On the [ALH --] screen, press the MODE key to display [0.0.0000].



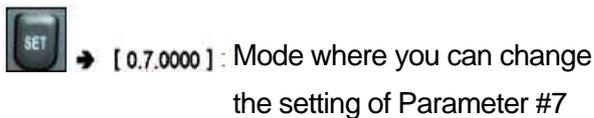
- ④ On the [0.0.0000] screen, press the MODE key to display [0.0.4095].



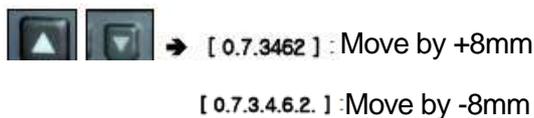
- ⑤ On the [0.0.4095] screen, press the up arrow key six consecutive times to display [0.7.0000].



- ⑥ If you press the SET key on the [0.7.0000] screen, the figure "0.7." will blink.



- ⑦ On the [0.7.0000] screen, use the up/down arrow key to enter a desired parameter.



### 17.5 Setting Parameter #7 & Changer Movement

Movement (mm)	Offset (Pulse)	Movement (mm)	Offset (Pulse)
1 mm	432.7	10 mm	4327.5
2 mm	865.5	11 mm	4760.2
3 mm	1298.2	12 mm	5193.0
4 mm	1731.0	13 mm	5625.7
5 mm	2163.7	14 mm	6058.5
6 mm	2596.5	15 mm	6491.2
7 mm	3029.2	16 mm	6924.0
8 mm	3462.0	17 mm	7359.2
9 mm	3894.7	18 mm	7789.4

Note 1) For a negative movement such as "-8 mm", add a dot to each offset value like "3.4.6.2"

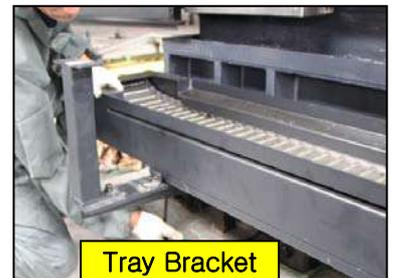
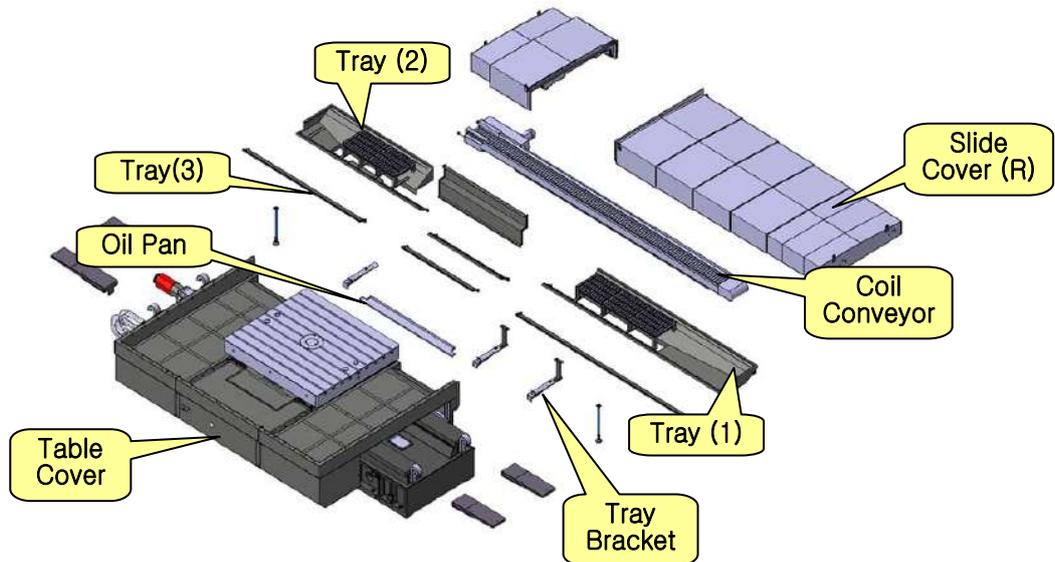
Note 2) Enter "43" for a 0.1 mm movement; enter "4.3" if moving by 0.01 mm.

### 18. Installing the covers

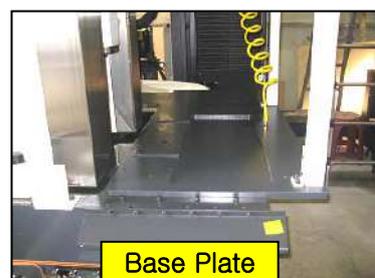
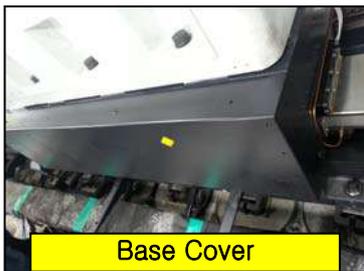
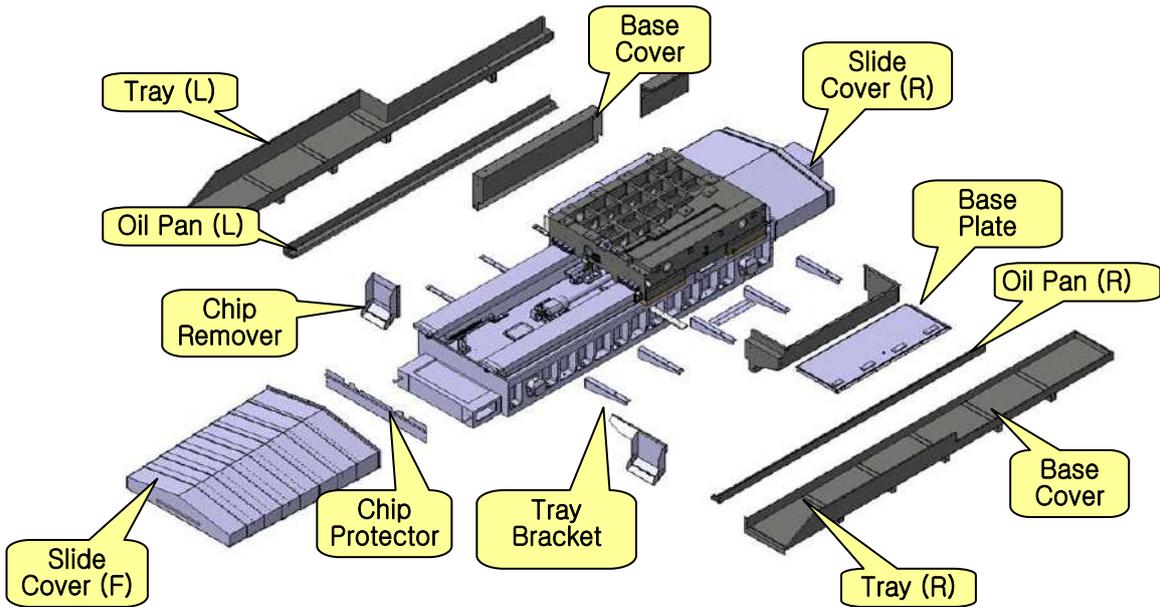
※ Put together or install the component parts such as covers, brackets, oil pans, fence, splash guards, chip conveyor, coolant tank and footsteps (all of which were removed for transportation of the machine) back in the original position.

(The cover assembly is subject to change for enhanced performance or customers can change it to their preference.)

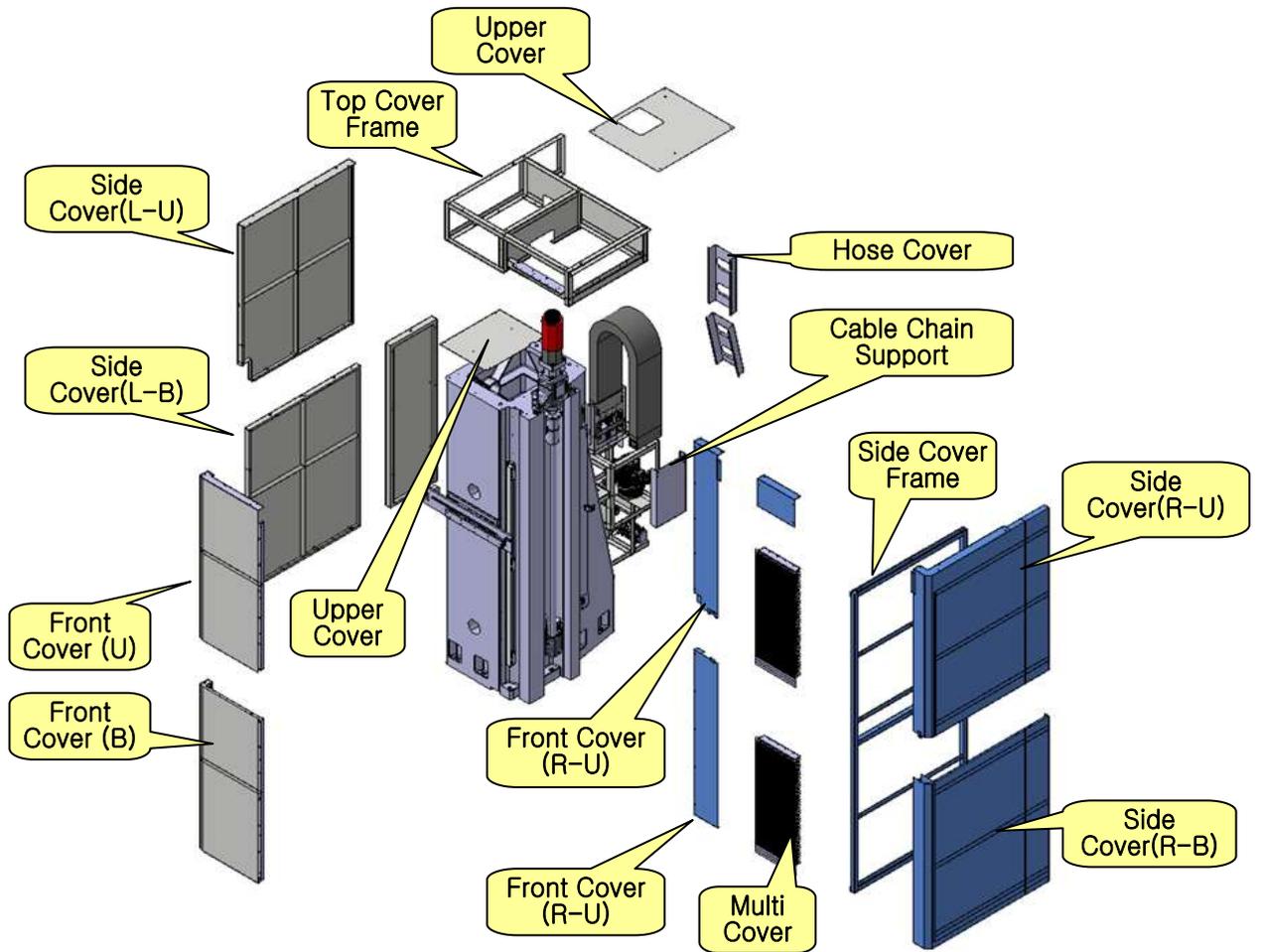
#### 18.1 Installing the table bed covers



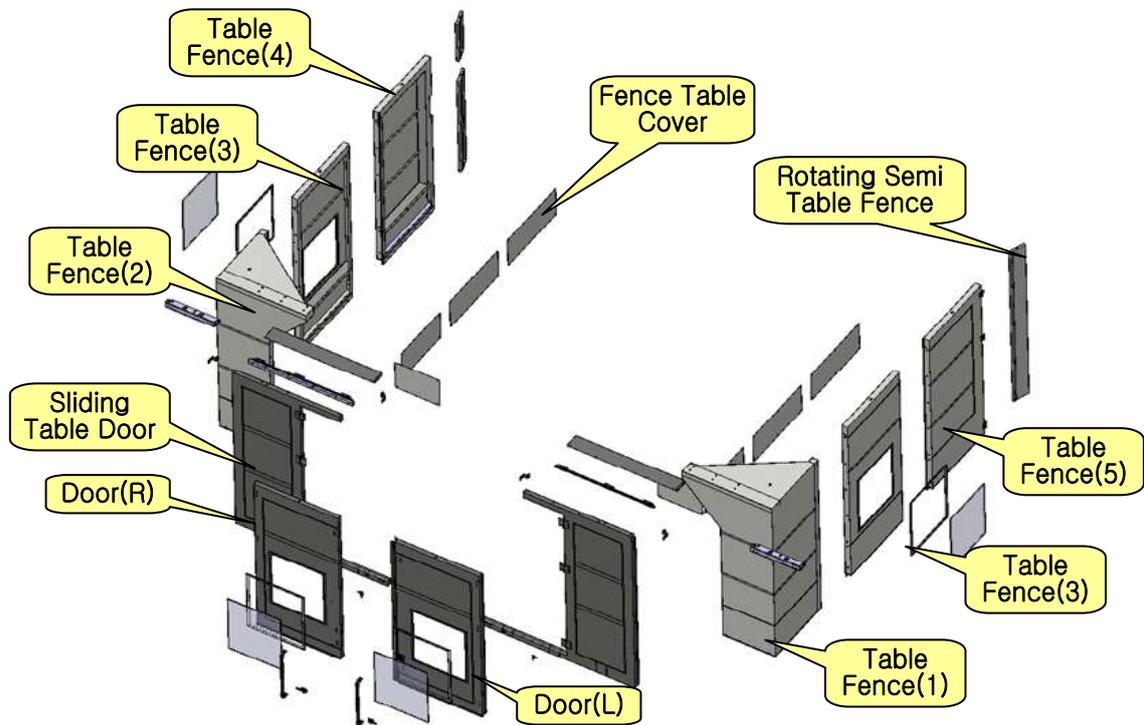
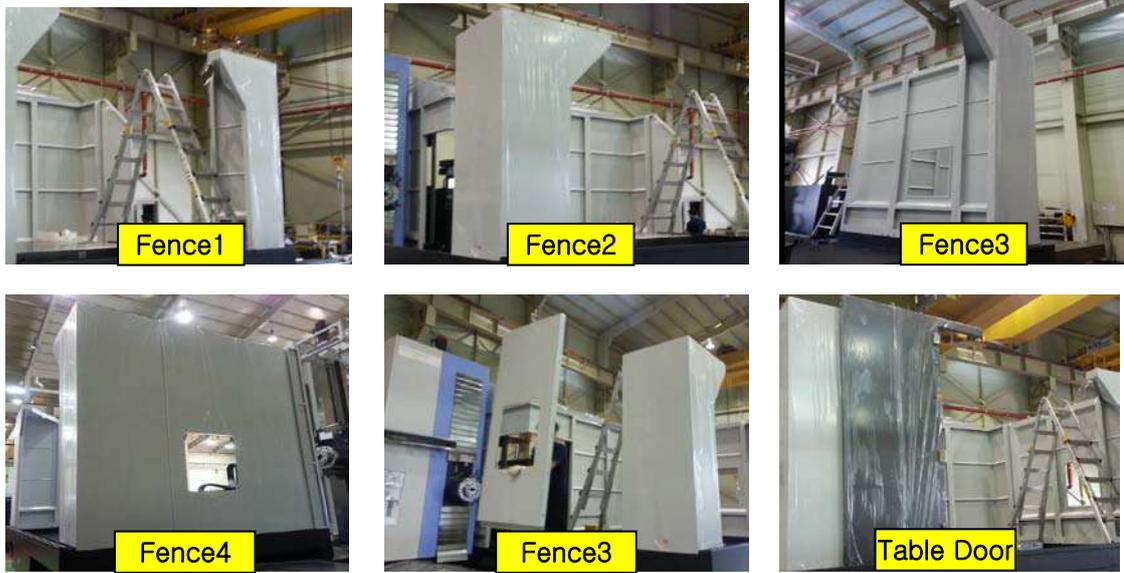
### 18.2 Installing the column bed covers



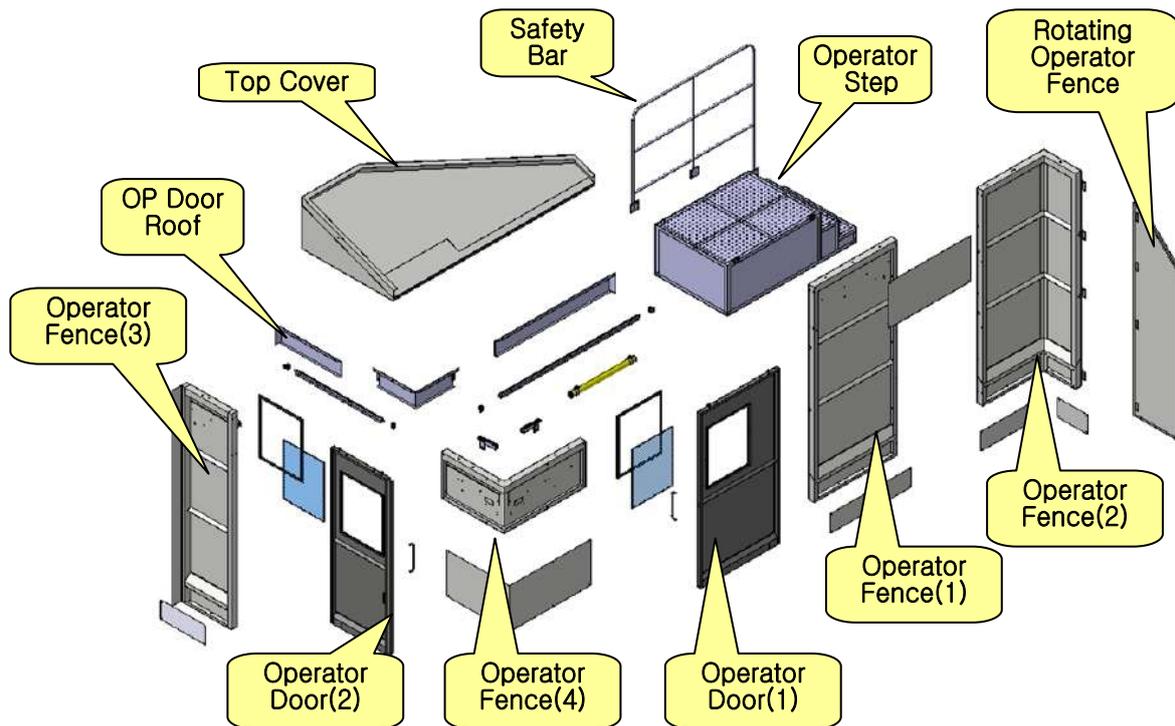
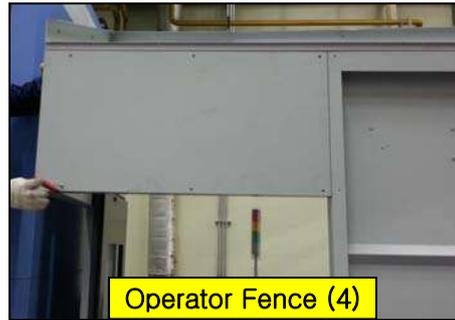
### 18.3 Installing the column covers



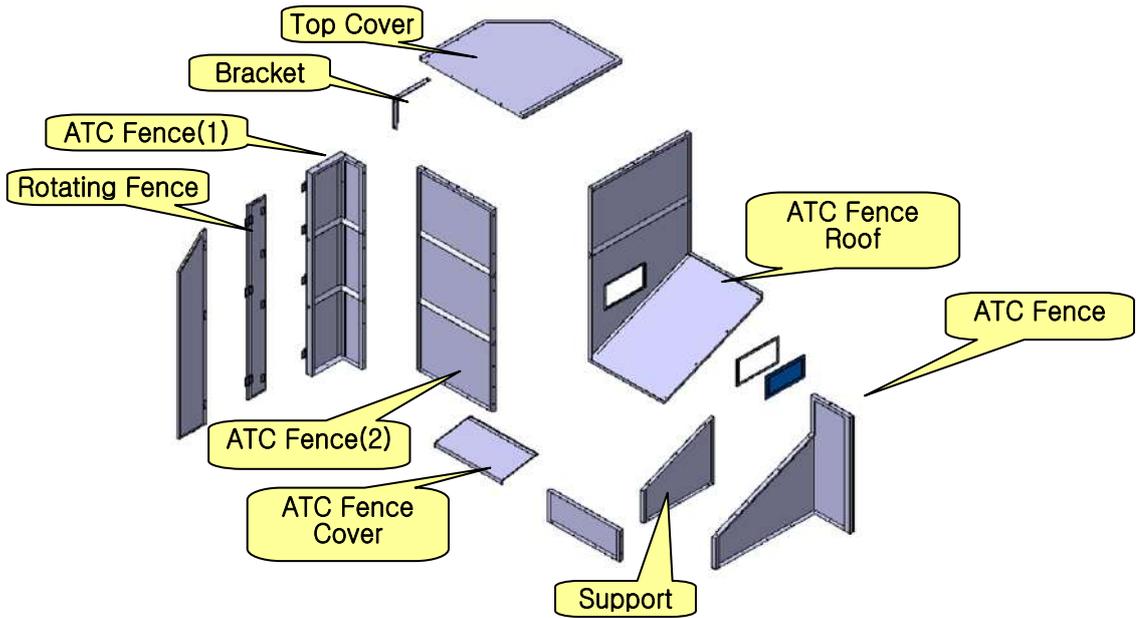
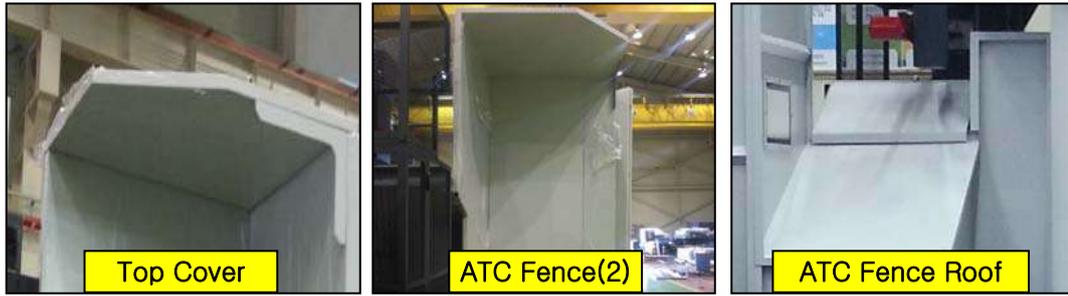
### 18.4 Installing the semi splash guard (in the table side)



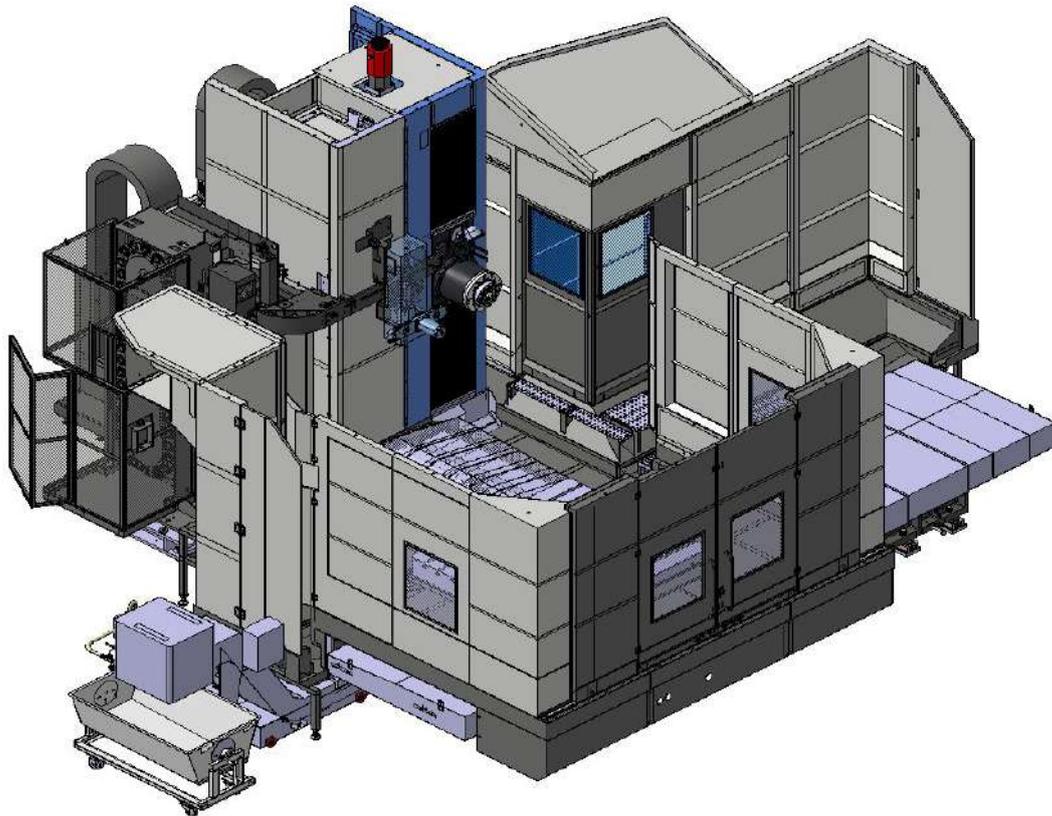
18.5 Installing the semi splash guard (in the operator side)



18.6 Installing the semi splash guard (in the chip conveyor side)



### 19. Installation Complete



### Revision History Installation Manual DBC 130II

Version	Year/Month	Revision history	Created by
01	2013. 09	Official draft (DBC130 II ISK39)	sanghyun.jung yeonghee.lee minwoo.seo youngkuen.jung
02	2013. 12	Addition to Scale air setting (DBC130IIISK3C)	youngkuen.jung Hyungil.shin
03	2014.01	Addition to Air Consumption& Precautions on connection from air sources (DBC130IIISE41)	Samyoung,Jung Hyungil.shin
04			
05			
06			
07			
08			
09			
10			