

JET

GHD-55PFA

DRILL PRESS

Original:
GB
Operating Instructions



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Vertical Drilling Machine

Model: GHD-55PFA

Original Instruction

Max. Drilling Diameter: 50mm

Series Number:







Contents

- 0. Main Notice**
- 1. Safety introduction**
- 2. Main use and features of the machine**
- 3. Main technical data**
- 4. Brief description of the driving system and its structure**
- 5. Electrical system**
- 6. Lubrication and coolant system**
- 7. Hoisting and installation**
- 8. Use and operation of the machine**
- 9. Machine adjustment**
- 10. Machine use and maintenance**
- 11. Machine accessories**
- 12. Quick-wear part list**

0、 Main Notice

0.1、 Please pay special attention to the safety warning mark as table 0.1 in this manual.

Table 1. Safety & Warning remind

	Caution: Electric shock may cause death or serious injury
	Caution: mechanism hurt, may cause death or serious injury
	No changing when spindle running
	High speed do not put hands near it when machine operation
	Avoid iron scurf splash
	Operation remind and useful information

0.2、 Abiding by the regulations of this manual is the precondition that safeguards your health , property , quality and normal running

0.3、 This manual includes the important information of correct installation , using and maintenance for the GHD-55PFA Vertical Drilling and Milling Machine. Please keep it safe.

1、 Safety introduction

The following safety introduction includes delivery & storage, installation & debugging, using & maintenance which way cause human injury or property loss (equipment, work piece, tool) when ignore these safety instruction.

Meanwhile, please pay attention to the complementary safety introduction in per chapter or parts in this manual.

1.0 General description

Professional trained personnel do following work:

——Delivery

- Storage
- Installation
- Using
- Maintenance

Please read the following documents before the above work

- Documents of manual and attachment drawing
- Certificate of inspection and attachment drawing
- Pecking list
- Machine mark plate
- Special regulation and requirement about the equipment
- County or regulation of prevention accidents and safety .

The following matter will cause serious injury and property less.

- incorrect convey
- incorrect installation
- incorrect using or operation
- dismantle safety protection devices

1.1 Delivery & storage

- check the goods safety during the shipping. On arriving the product should be free of breach otherwise should inform shipping company and our company as the precondition of claim.
- Transit must be in conjunction with the relation with the relative regulation to avoid damaging the equipment.
- the device should be anti-rust and protect the package in case of being placed for a long time according to the regulations and the protection of the control cabinet.

1.2 Installation & Debugging

- please contact your dealer and our company , after unpack , the package check the machine accessories and attachment document are net conformity with these indication in the pecking list, it is one precondition of claiming for compensation.
- The machine height is higher. Please pay attention when hoisting the machine.
- Please check the phase as first time connect, ground wire of the machine shall be well connected.
- Operation should stop the machine and check for any abnormal functioning such as vibration, noise, temperature rise out of range, seepage, clamping malfunction etc.

1.3 Maintenance

- The equipment spindle and feed rate transmission by gear. Please stop the machine when change the spindle speed and feed rate to avoid mechanical injure, etc.
- Before spindle working mark sure the tool and work piece must be fixed stable to avoid serious injury and mechanical injure..
- The machine must be stopped when cutting material around the drill needs to be removed. Moving the cutting material by hand or by any hook is prohibit.

——Operation should stop the machine and check for any abnormal functioning such as vibration, noise, temperature rise out of range, seepage, clamping malfunction etc.

——Maintenance according to this manual and keep an eye for moving the electric components, gear drive components to avoid electric shock, mechanical injure, etc.

2. Main use and features of the machine:

GHD series vertical drilling machines are our new products designed and developed by our-self based on our accumulated experience in so many years in this field. It is a light, column type, superior quality and high efficiency vertical drilling machine. It is really a multi-function universal machine which could be widely used for small and middle sizes of work pieces for drilling, spot facing, reaming, tapping etc. Besides, some machine tool accessories could also be used on this machine. The machines are suitable for the machining workshop, maintenance workshop and production line etc.

Features:

- 2.1 Good in appearance, easy in operation, convenience in maintenance and well consideration in safety protection
- 2.2 Transducer spindle speed stepless, gear dispatch, configuration compact, convenient timing, low voice, high transmission efficiency.
- 2.3 The spindle features good rigidity and good wear resisting and equipped with tool disassembly and balancing device.
- 2.4 The worktable could be turned round the column center line or worktable center line itself or horizontal shaft centerline by manual and could be moving up and down by manual.
- 2.5 Main operation levers and push buttons could be reached easily that makes you comfortable when you operate the machine.
- 2.6 Spindle feed both in mechanical and in electrical is available in this series machines.
- 2.7 Superior quality material with special treatment for the wear-resisting purpose has been used parts such as gears, worm and worm shaft, rack, lead screw etc as well as for some key parts like spindle and spindle quill.
- 2.8 An adjustable safety protection clutch in the spindle feed device is available in order to prevent the machine and tools from damage when overloaded.

.2.9 A safety protection guard under the spindle box is available as it is not only prevent coolant splash while cutting but also could observe the machining status.

The guard is interlocked with the spindle, so when the guard is opened, the spindle could not be running until the protection guard keeps his position.

3 Main technical data:

3.1 Main technical data

No.	Name of the items	Unit	Data
1	Max. drilling diameter (steel)	mm	50
2	Max. tapping diameter (steel)	mm	M30
3	Distance between spindle center line to the center line of column	mm	380
4	Max. distance between spindle end to the surface of the worktable (automatic)	mm	590 (415)
5	Max. distance between spindle end to the worktable surface of the base	mm	1175
6	Max. stroke of the spindle	mm	240
7	Spindle taper	Morse	MT4
8	Spindle speed range	r/min	52~2050
9	Feed steps of the spindle	Step	3
10	Feed range of the spindle	mm/r	0.12、0.23、0.4
11	Max. stroke of worktable and its bracket	mm	530
12	Rotation degree of spindle box in horizontal axes	degree	$\pm 45^{\circ}$
13	Working area of the worktable (L x W)	mm	600×500
14	Working area of the worktable of the base (L x W)	mm	445×435
15	Numbers and width of the T slots for worktable of base	mm	2-T14、2-T128
16	Diameter of column	mm	$\phi 180$
17	Power and speed of the main motor	kW, rpm	2.2/2.8 ; 1400/940
18	Power and flow rate of the coolant pump motor	kW, L/min	0.18/6
19	Machine dimension (L x W x H)	mm	1010×640×2250
20	Net weight of the machine	kg	670

3.2 For the machine appearance and its main technical data, see diagram 1.

4 Brief description of the driving system and its structure:

The machine consists of spindle box, column, machine base, worktable and its bracket, electric cabinet, coolant device and machine accessories, total seven component parts. Spindle revolution is main motion of the machine. During drilling processing, spindle movement along with its axis is a feed motion. Worktable up and down movement and worktable turn round itself is an auxiliary motion. To those big or higher work piece that could be clamped on the worktable of the base. The worktable and its bracket should turn round the column to a proper area far away from the machining area.

Two separately vertical motors realize machine transmission. A special pump supplies coolant water. Transducer control frequency conversion and realize stepless timing. Two speed segment are made by slippage gear. Operation lever for slippage and frequency button are located in the front of box, the lever has an idle position.

The feed rate of speed change could be realized by shifting lever drive cam, control one group slippage gears realize three kinds of feed.

Up and down movement of the worktable and its bracket is completed by manual.little adjustment for the height of the worktable could also be made by manual.

Two kinds of lubrication, spashing or manual.

Please refer to the diagram 2 for the transmission system of the machine.

For the gear, worm and worm shaft, rack and pinion etc, please see table 1.

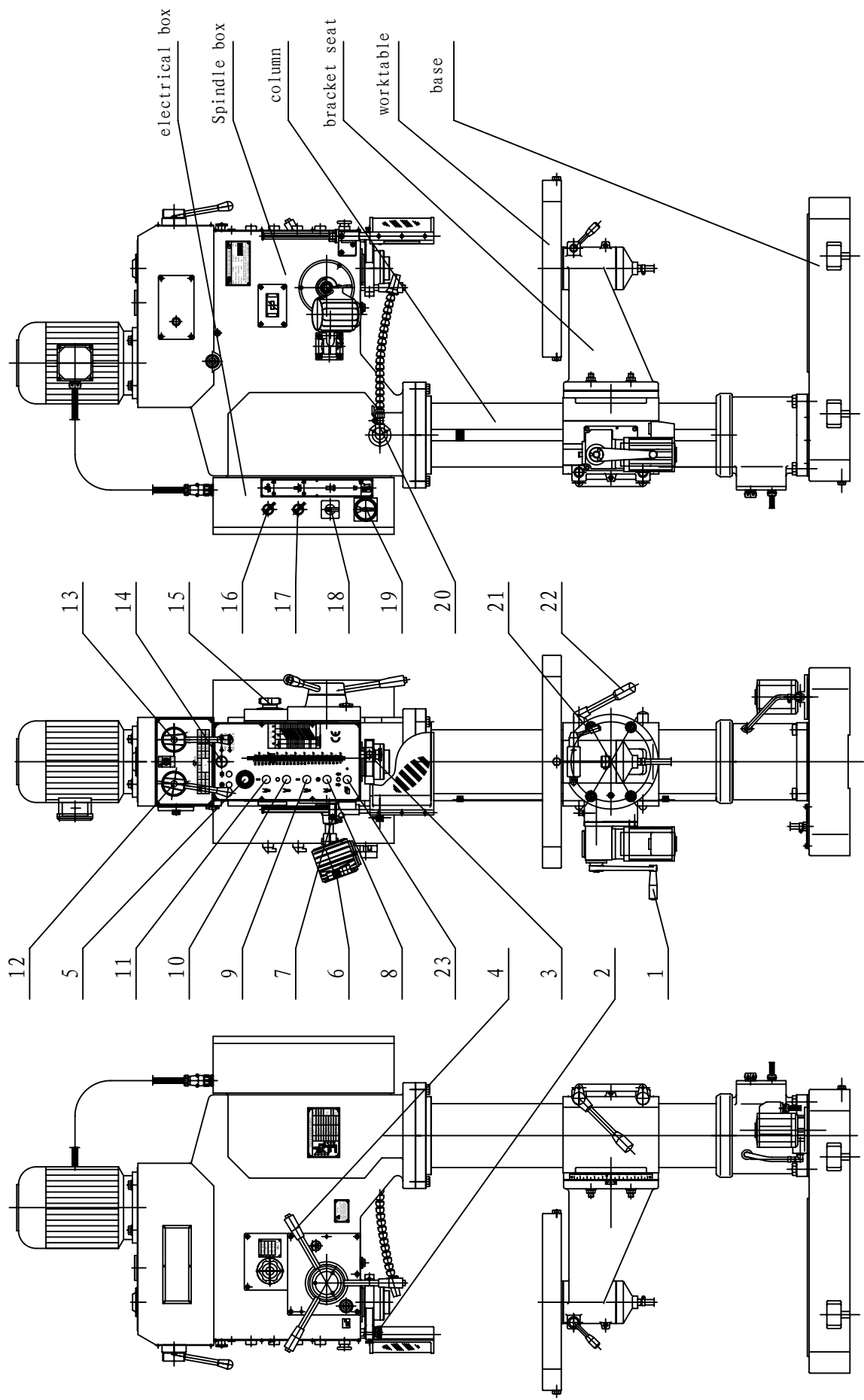
For the details of roller bears to be used on the machine, please refer to the diagram 3 and for a list of roller bears, please refer to the table 2.

Number on the drawing	Part drawing NO.	modulus /pitch	Number of teeth and starts	Direction of helical angle	modi ficati on	Materi al	Heat treatment and hardness
1	32028/ZY5050A-1	2.5	15			45	T235
2	32036/ZY5050	2.5	37			40Cr	HV500
3	32030/ZY5050A-1	2	1			45	T235
4	31001/ZY5050A	2	70			QT400	
5	32014/ZY5035A-1	1.75	30			45	G48
6	32016/ZY5035A-1	1.75	35			45	G48
7	32014/ZY5035A-1	1.75	20			45	G48
8	32016/ZY5035A-1	1.75	45			45	G48
9	32032/ZY5050A-1	1.75	15			45	G48
10	32013/ZY5035A-1	1.75	39			45	G48
11	32016/ZY5035A-1	1.75	26			45	G48
12	32048/ZY5050	1.75	25			45	G48

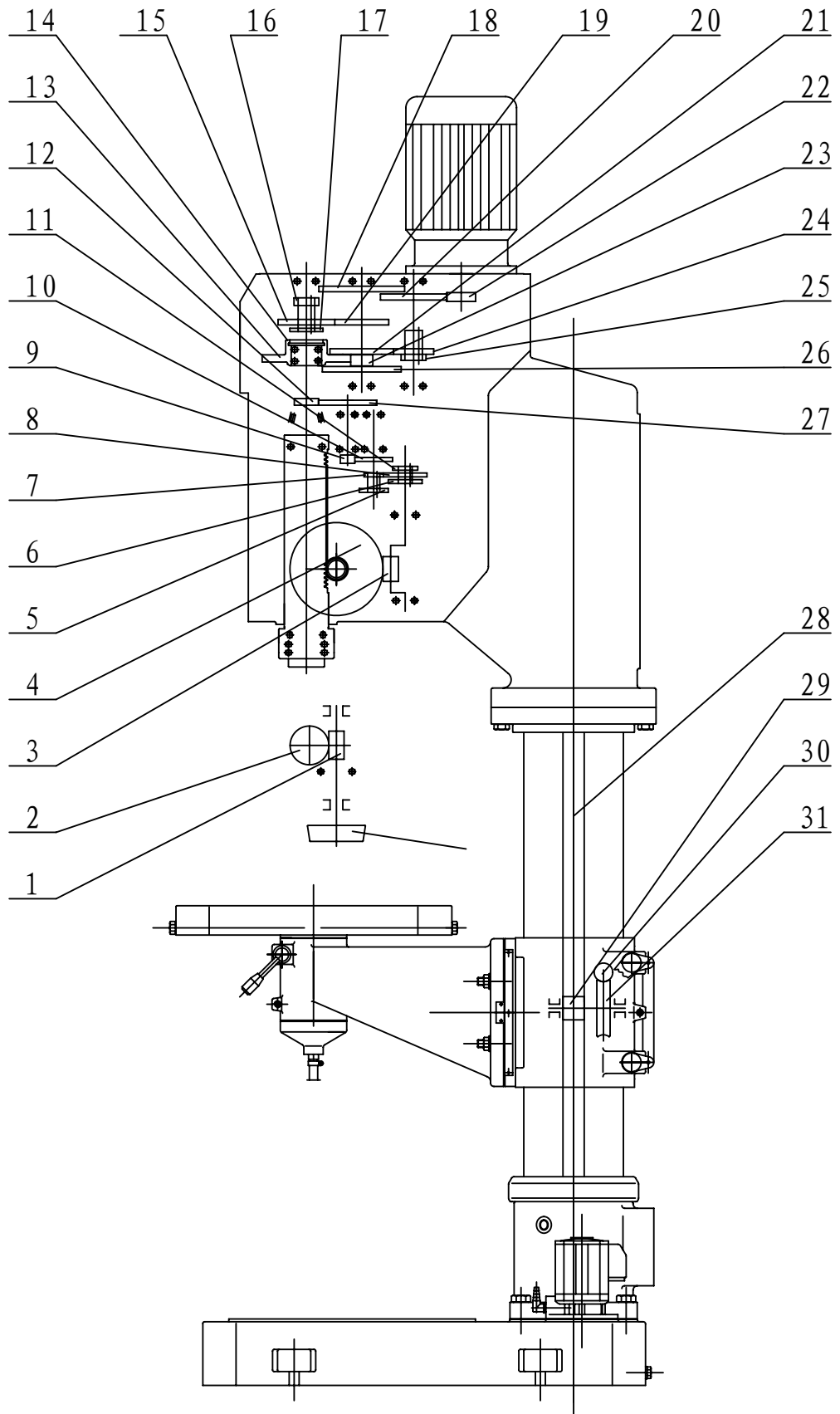
Original Instruction							Total	26
							page	6
Number on the drawing	Part drawing NO.	modulus /pitch	Number of teeth and starts	Direction of helical angle	modification	Material	Heat treatment and hardness	
13	32049/ZY5050	2.5	62			40Cr	G52	
14	32049/ZY5050	1.5	40			40Cr	G52	
15	32007/ZY5050A-2	2.5	31			40Cr	G52	
16	32010/ZY5050	2.5	19			40Cr	G52	
17	32007/ZY5050A-2	1.5	40			40Cr	G52	
18	32013/ZY5050	2.5	61			40Cr	G52	
19	32006/ZY5050A-2	2.5	49			40Cr	G52	
20	32002/ZY5050A-2	2	57			40Cr	G52	
21	32005/ZY5050A-2	2.5	40			40Cr	G52	
22	32001/ZY5050A-2	2	29			40Cr	G52	
23	32026/ZY5050	2.5	18			40Cr	G52	
24	32004/ZY5050A-2	2.5	35			40Cr	G52	
25	32003/ZY5050A-2	2.5	20			40Cr	G52	
26	32027/ZY5050	2.5	55			40Cr	T235	
27	32052/ZY5050	1.75	60			45	G48	
28	12004/ZY5050	2.5	77			45	T235	
29	12015/ZY5050	2.5	14			45	T235	
30	12006A/ZY5035	2	1	Right		45	T235	
31	11016/ZY5050	2	40	Right		QT400		

4.2 Roller bearing table

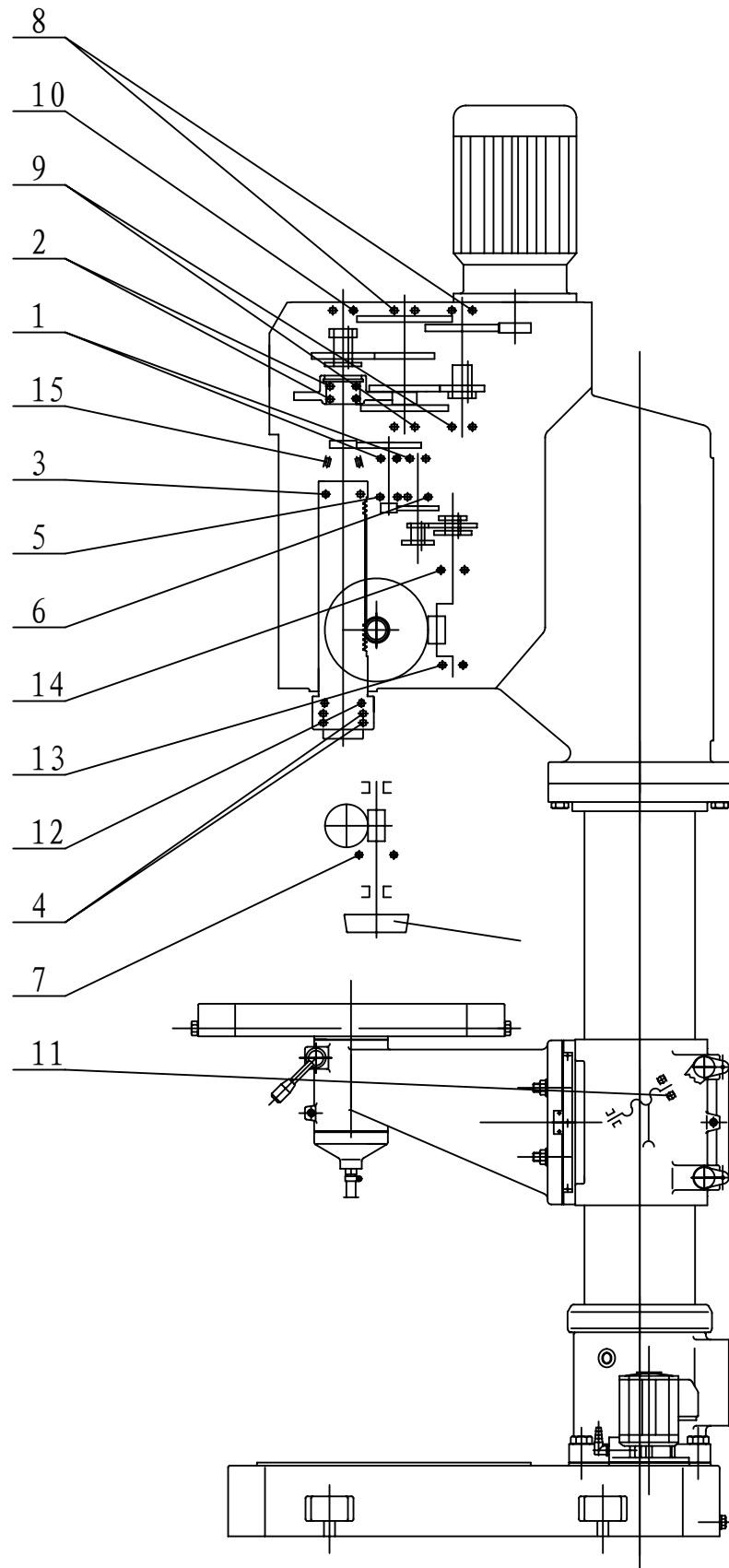
No.	Model	Name	Specification	Q'ty	Accuracy
1	GB276;103	Deep racing ball bearing	17×35×10	2	
2	GB276;7000106		30×55×9	2	
3	GB276;D1000909		45×68×12	1	D
4	GB276;D7000110		55×80×10	2	D
5	GB276;1180904K	Deep racing ball bearing with seal	20×34×9	1	
6	GB276;1180905K		25×42×9	1	
7	GB276;1180909K		45×68×12	1	
8	GB276;180204K		20×47×14	2	
9	GB277;50204	Deep racing ball bearing	20×47×14	2	
10	GB277;150204	Deep racing ball bearing	20×47×14	1	
11	GB301;8104	Bearing	20×35×10	1	



drawing 1. picture of appearance of machine



Drawing (2) Transmission System



Drawing (3) Rolling bearing

Original Instruction				Total	26
				page	10

No.	Model	Name	Specification	Q'ty	Accuracy
13	GB292;46204	Bearing	20×47×14	1	
14	GB292;46205		25×52×15	1	
15	GB297;2007107E	Bearing	35×62×18	1	

5 Electrical system



Electric box maintenance and repair must be by professional personnel!

5.1 Brief description

The machine with foreign advanced singlechip and superior quality electric element is controlled by electric system, the software system not only realize all kinds movement control, but also has many protective function with catenation, the capability of this system is very good, and the movement of this system is jarless and reliable. The move and stop of the main motor function are used by electric circuitry, and it improved the arrury of machine's drilling.

5.2 Explanation of the circuit

This machine use double speed motor. Use select switch (QSA1), contact (KM1, KM2) and other circuit component to control.

When using the machine, breaker QF1,QF2which positioned electric box B1(drawing 4,5) must be closed, it can be opened when examined and repaired. The two breakers separately protect short circuit、 over loading and short phase of spindle motor and pump motor .When close the chief switch QS1, the system is entering working state and the single lamp HL1 light up ,when break the chief electric source, the lamp crush out and working stopped.

5.3 Starting machine operation

Use the select switch(QSA1) turn to the position you need ("1" the spindle motor low speed; "2" spindle speed high speed; "0" spindle motor stop),push button SB2 to start.

5.4 Tapping operation:

Electric Element for the tapping control mainly contactors KM1 and KM2, selection switch SX1 and limit switches SQ2 and SQ3 for tapping depth control. Put the selection switch SX1 into the “1”(“0” is for hole drilling only), arrange the spindle revolution in clockwise direction KM1 engaged, put the spindle manual operation lever in down position until touches work piece, tapping job now is starting. When required depth is reached, the limit switch SQ3 works, the spindle immediately runs in counter clockwise direction (KM2 engaged), the tap returns out of the work piece, when spindle returns to the up highest position, the limit switch SQ2 works, spindle runs in clockwise direction, now one tapping job is finished. If tapping stop is required, push the button (SB4) on the lever end, the spindle motor will immediately run in counter clockwise direction, that's all. If the selection switch SX1 is in the “0” position, normal drilling work starts.



As the spindle motor works frequently during tapping, the motor will be hot quickly, so the tapping job could not be down for a long time, eight times of tapping per minutes maximum is recommended as the motor needs cool when it is hot otherwise it will be burned.

5.5 Auto feed operation:

When auto feed, moving spindle down 5-6mm, press a push button at the end of either one of the three levers, now feed clutch is engaged and indicator HL2 on the panel is lighted auto feed job is started. When required drilling depth is reached, the limited switch will be pressed, then spindle returns automatically. Press the push button of the lever once again, auto feed will be stopped and the spindle will return back to the original place.

5.6 Emergency stop operation:

If emergency stop is necessary during operation, press emergency push button SB1 that makes the loss of electric power of the contactor KM1, so the machine is completely stopped. After eliminating the breakdown, release the lock of the push button then restart the machine.

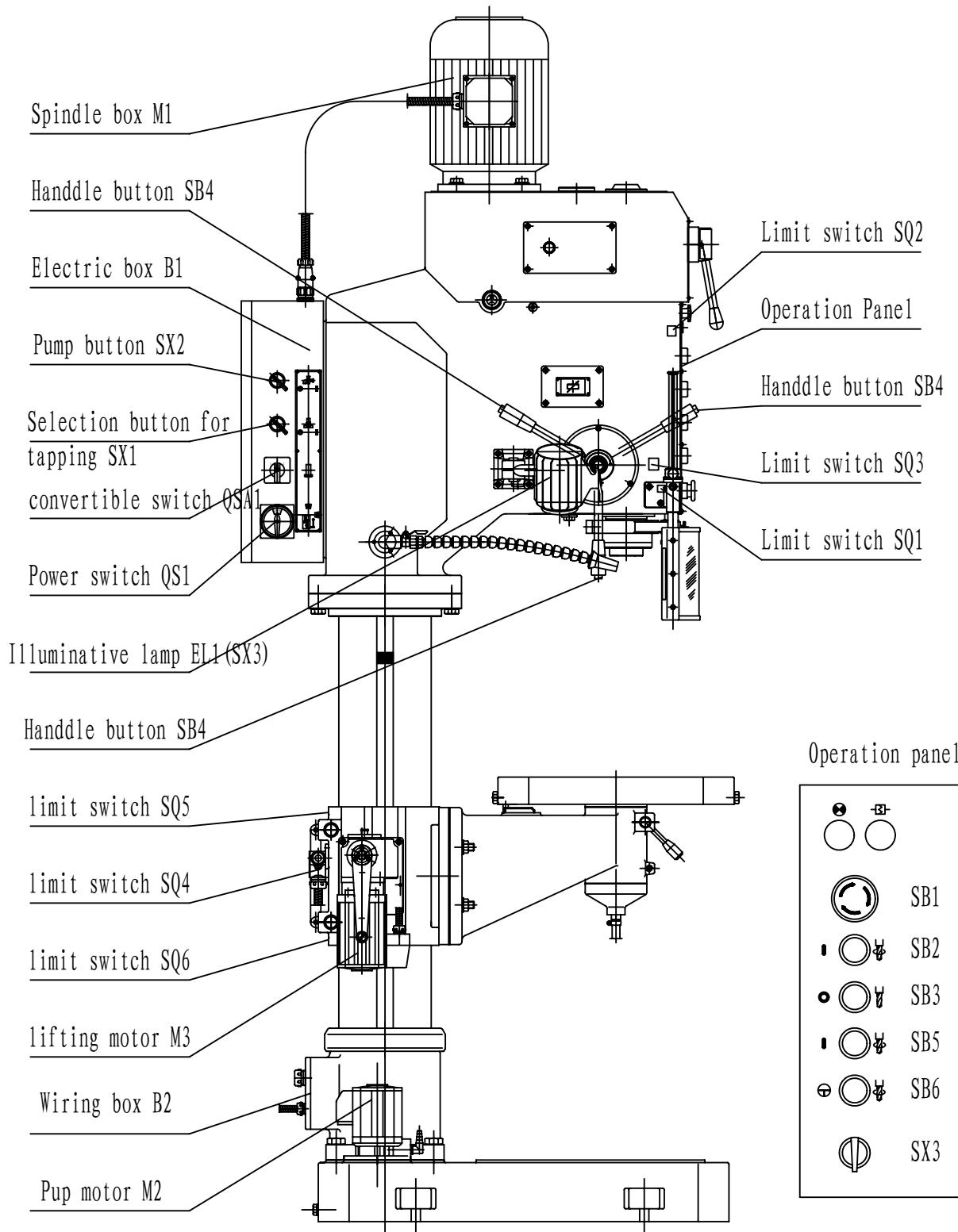
5.7 Coolant pump

Revolving the switch (SX2) of coolant pump right, then the coolant pump is moving and working with the spindle. When the spindle stopped, the coolant pump stopped too.

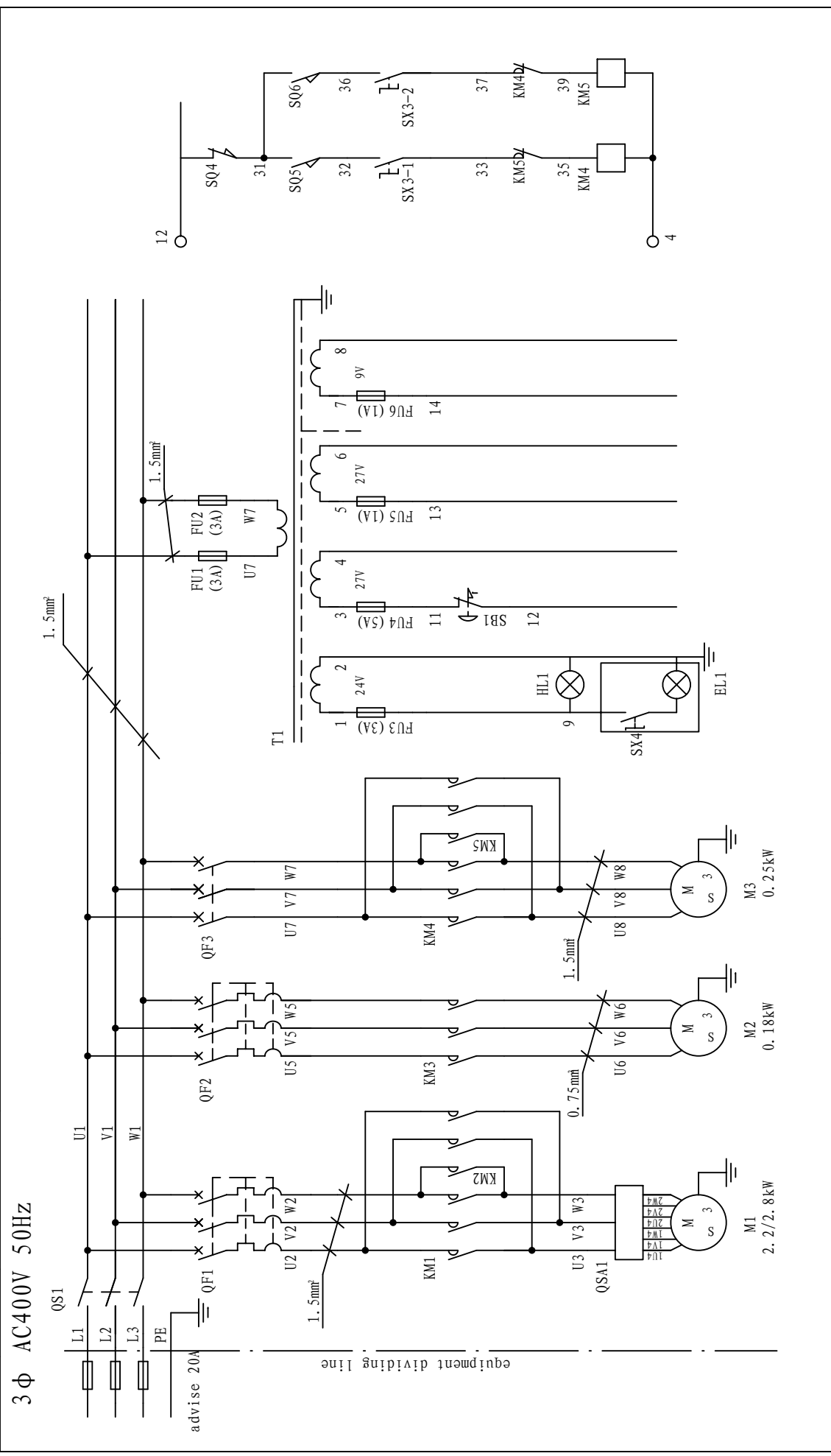
5.8 Installation of the main motor:

Insert the key of the main motor into the slot position of the spline shaft then fixed by 4-M10×25 hex screw bolts.

Connect three phases and one ground wires to the power supply as per the electrical diagram (5) of the machine. (please note the direction of main revolving).



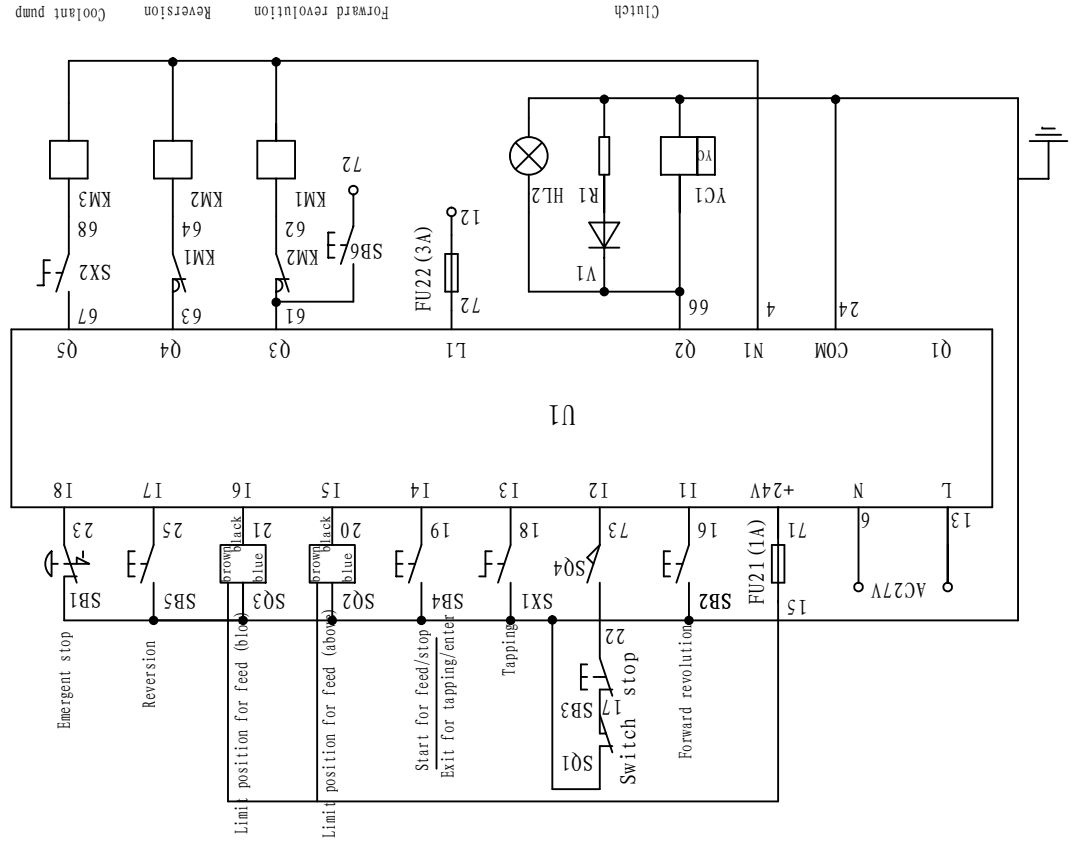
Drawing (4) Electrical Elements



Attention: The diameter of the line without indicating is 0.75mm .

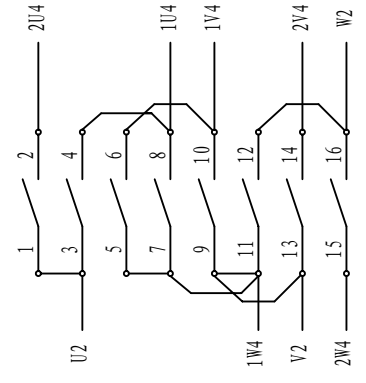
diagram (5-1) picture of electrical element

WJ1-8/5F picture of connection



explanation of parts

3LBB-20/R1067.4 picture of connection



3LBB-20/R1067.4 opening and close of contact

Handle Position / Contact Code	1 45°	0 0°	2 45°
1-2			×
3-4	×		
5-6			×
7-8			×
9-10	×		
11-12	×		
13-14			×
15-16			×

Attention: The diameter of the line without indicating is 0.75mm.

Drawing (5-2) picture of electrical element

5.9 Sheet metal guard:

The sheet metal guard of this machine has a safety protection function, when it is opened The spindle can't work, until it is closed when the spindle is working now, it immediately stopped if The sheet metal guard is opened.

5.10 Maintenance of the electric equipment:

Turn off the electric power before maintenance of the electric equipment starts. The electric equipment must keep on clean condition. Therefore, regularly cleaning is necessary. However, liquid such as kerosene, gasoline and detergent etc. is not be allowed for the cleaning. Wave of power supply shall not be over $\pm 10\%$ required by the electric motor. Maintenance of electric equipment is absolutely important in order to keep machine works well.

Electric components list:

Table (3)

Code of elements	Name	Specification	Q'ty
QF1	Breaker	DZ108-6. 3/10A	1
QF2	Breaker	DZ108-0. 4/0. 63A	1
QF3	Breaker	DZ47-63 (D) 3P 3A	1
QS1	Instruction switch	JCH13-20	1
SX1、SX2	Select switc	C2SS2-10B-10	2
SB1	Emergency stop button	MPMT3-10R	1
		MCBH-00	1
		MCB-01	2
SB2,5	Push button	CP1-10G-10	2
SB3	Push button	CP1-10R-01	1
SB4	Push button	Homemade	1
SX3	Selection push button	C3SS2-10B-20	1
SQ1、SQ5、SQ6	Micro switch	E62-10A	3
SQ2, SQ3	Adjacent switch	TL-Q5MC1	2
SQ4	Micro switch	XCKN2102P20C	1
KM1-5	Contacto	AS12-30-01-20 (AC24V)	5
HL1-HL2	Single lamp	AD17-16 AC24V	2
EL1	Illuminating light	JC38, 24V, 2W	1
T1	Transformer	JBK5-160TH 400/24, 27, 27, 9	1
R1	Resistor	RT 2W62 Ω	1
V1	Diode	IN5404	1
U1	Control panel	WJ1-8/5F	1
QSA1	Turning switch	3LBB-20 R1067.4	1

6. Lubrication and coolant system:**6.1 Lubrication system:**

Parts and bearings inside of the spindle box are all splashing lubricated. Feed worm wheel is oiliness lunrication, feed gear is grease lubrication.Oil level shall be a little bit higher than the centerline of the oil window when you fill lubrication oil. Too much oil filling will cause overflowing.

For lubrication places and its requirements by manual. Please refer to the diagram 6

6.2 Coolant system:

A special pump will supply coolant both for tool cutter and for work piece during machining. Coolant liquid is stored in a compartment located at the backside of the machine base. Flow rate of the coolant could be adjusted by a ball valve. Regularly washing for the coolant system is necessary and coolant water shall be exchanged as per actual condition.

7 Hoisting and installation:**7.1 Hoisting:**

The machine is strongly fixed inside of the crate. When hoisting the machine, please pay close attention to the sign outside of the crate (where the wire cable shall be placed and where the gravity center is).

The crate must not be reversed or inclined and must not be strongly stroked when lift up the machine.

Considering small size of the bottom and higher size of the height of the machine package, therefore, moving the machine by roller is forbidden. Lifting by a crane or by forklift no less 1 ton is recommended

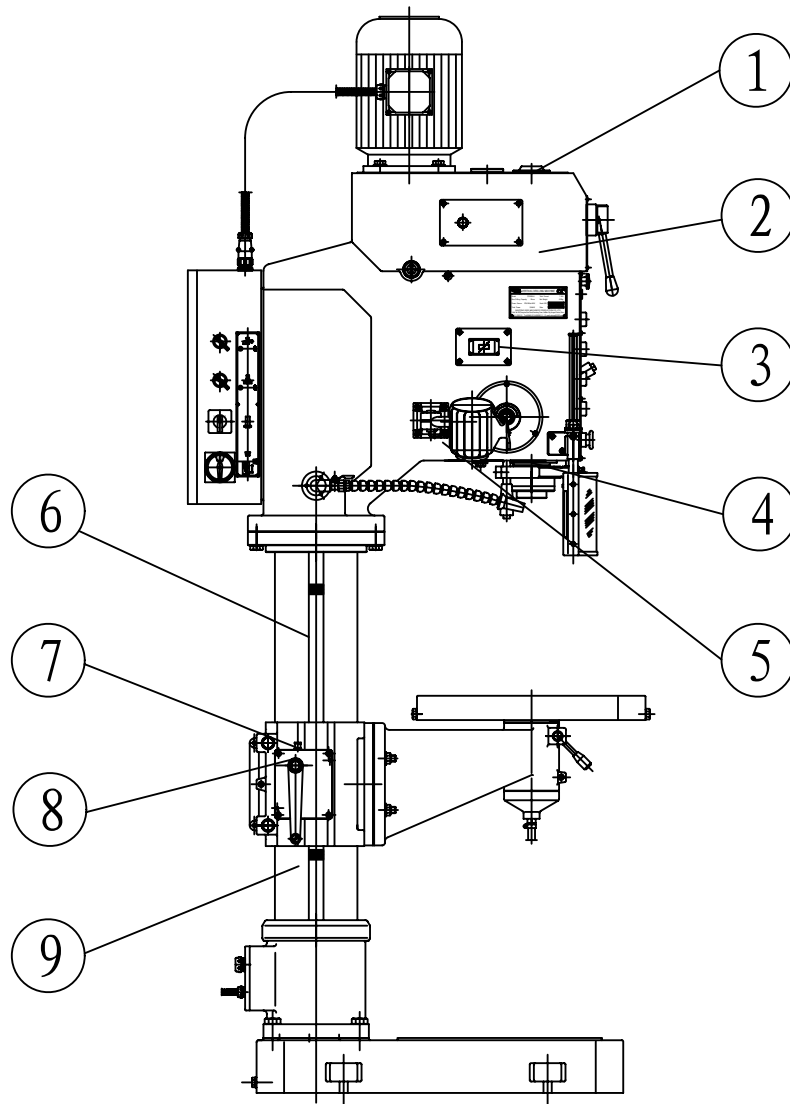
Please refer to the diagram 7 for the machine lifting. A soft pad between machine and wire cable is necessary in order to avoid paint damage of the machine. Lifting must be slow at beginning to see if the gravity center is correct.

7.2 Installation:

Working area of the machine shall be the size when the spindle box rounds its column in one cycle. Its diameter is about $\varnothing 2500\text{mm}$. Further more, space for the work pieces, toolbox, and machine accessories as well as operating and maintenance space must be considered.

The machine should be placed on a solid ground. No foundation construction is required if ground of workshop is solid enough. However, we suggest that you'd better to make a foundation as per the attached drawing 8 and shall consider some space for foundation screw bolts use.

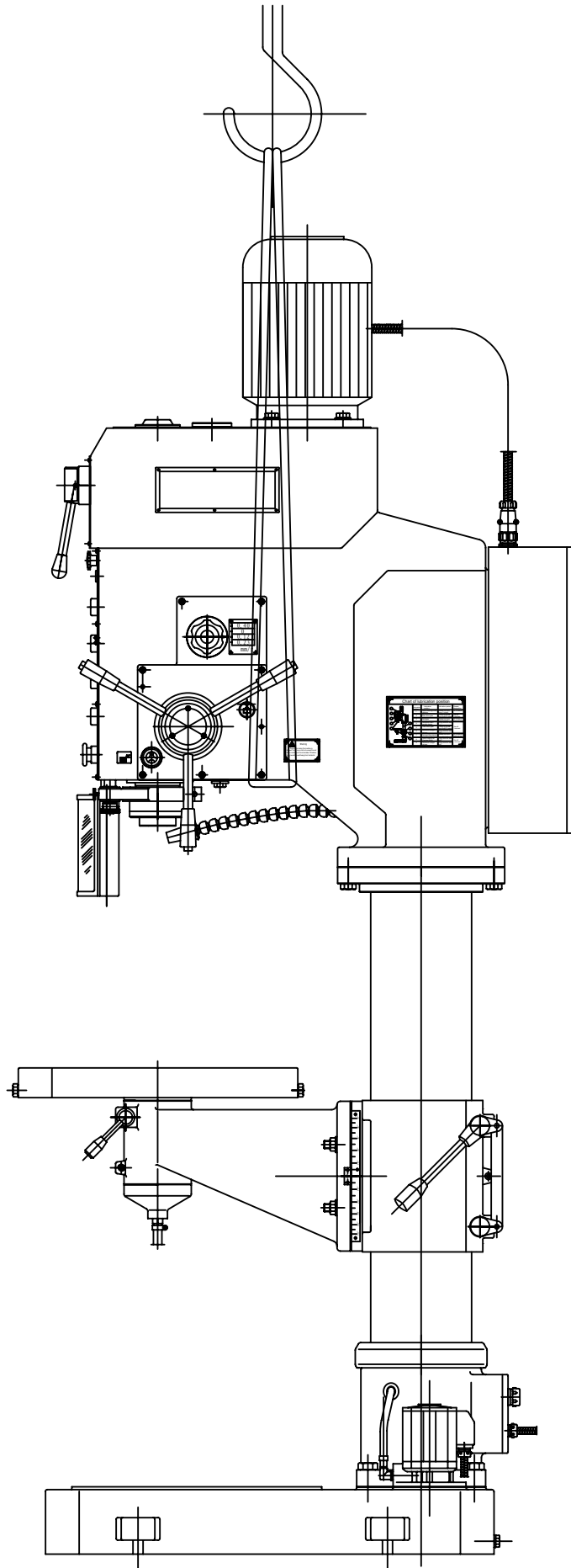
When the foundation is completely dry, the machine could be laid down on the adjustable pad. Concrete could be filled when screw bolts are placed. Fastening screw bolts after concrete is completely dry.



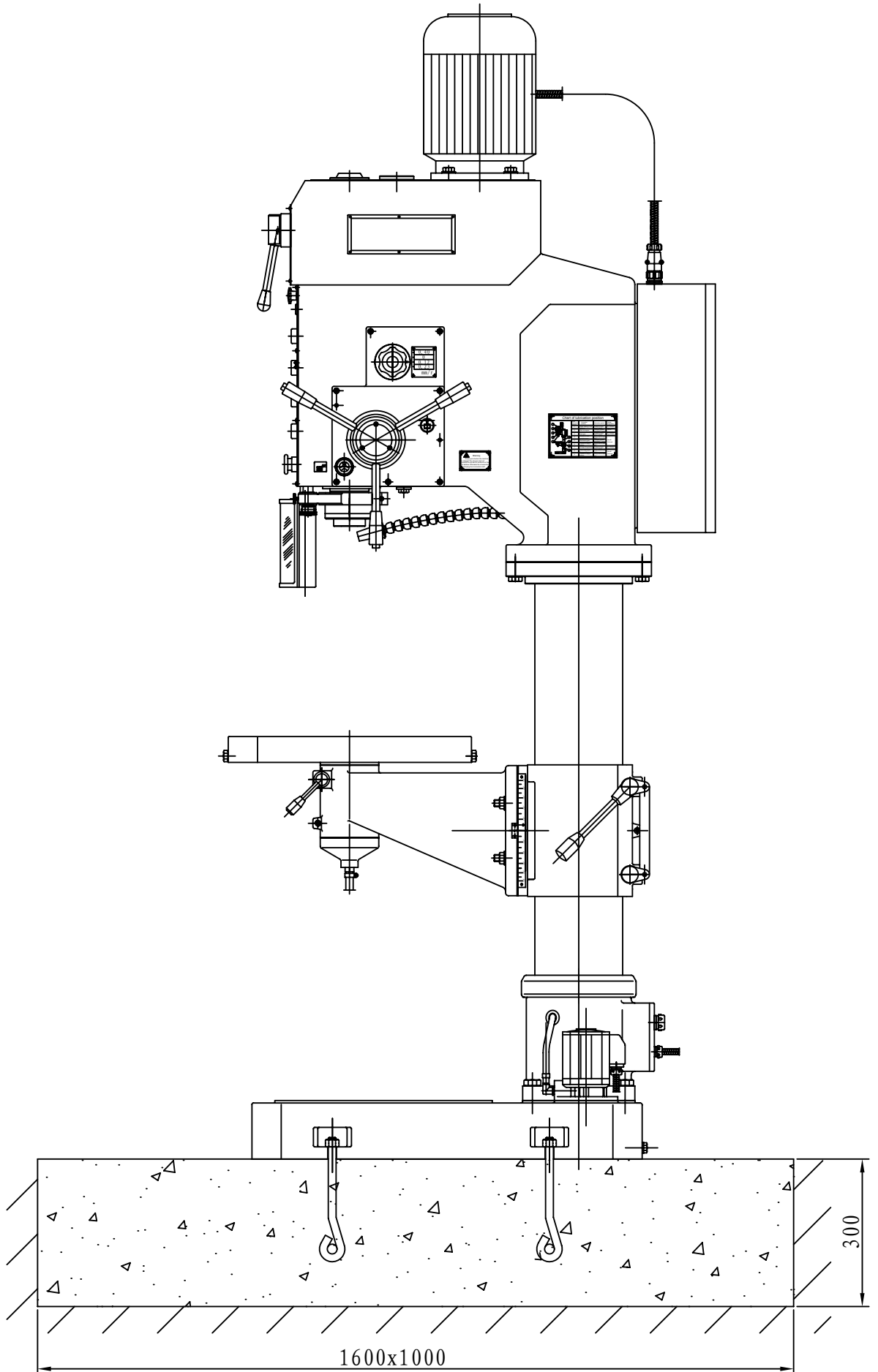
Drawing (6) Lubrication

Chart of lubrication parts

NO.	Position	Cycle	Grease NO.
1	Bearing in gear box	Once every three months	ZL-3Li lubricant
2	Drive gears	Change oil every six months	ISO VG33 machinery oil
3	Feed gears	Once every three months	ZL-3Li lubricant
4	Spindle quill surface	Once every shift	ISO VG33 machinery oil
5	Worm shaft	Once every three months	
6	Column surface	Once every shift	
7	Up and down movement for bracket	Once every three months	ZL-3Li lubricant
8	Worm bearing for Carriage lifting	Once every shift	ISO VG33 machinery oil
9	Column surface	Once every shift	



Drawing (7) Hoisting



Drawing (8) Installation

Original Instruction

Total 26

page 20

Leveling the machine first, required tolerance should not be over 0.04/1000 both in horizontal and cross plane. Checking all items of the accuracy as per the table sheet of the certificate. Accuracy value for each checked item must not be over the required value.

Outside wire connection: refer to diagram 20 open the electric box on the inner column, connect the live wire on L1 L2 and L3, connect null line on N, connect ground wire on “ \perp ”

7.3 Preparation before machine running:

A strict checking, testing and try cutting of the machine have been made before machine delivery. No adjustment of the machine itself is necessary. Before machine running, clean all surfaces of the machine first by using cloth with kerosene or gasoline, checking all lubrication points then turn the main switch of the machine to the “on” position, running the machine with middle or slow speed and checking all revolution direction is correct, operating levers are in a correct position, checking machine noise and working temperature are all ok. The machine should be running for a certain period of time, then it could be used if no any un-normal condition happened.

8 Use and operation of the machine:

8.1 For the operating levers, handles, electric switches and buttons, please refer to the diagram 1 and diagram 4..

No.	Name	No.	Name
1	lifting handle of worktable tray	12	handle of spindle step change
2	adjusting handle of ruler screw	13	handle of spindle step change
3	locking handle of ruler screw	14	handle of tool mounting and dismounting
4	feeding handle	15	handle wheel of feeding range
5	emergency stop	16	switch of coolant pump
6	switch of work lamp	17	select switch of feeding and tapping
7	adjusting handle of safty cover higher	18	select switch of motor
8	joggle button of spindle	19	main switch
9	Button of spindle reversal	20	valve of coolant liquid
10	stop button of spindle	21	clamping handle of worktable
11	starting button of spindle	22	clamping handle of tray

8.2 Changes for the spindle speed and feed rate:

Spindle speed change could be made by moving the two levers (12、13) and frequency transducer timing button (18) located in the front of the spindle box. Relations between spindle speed revolution and levers position is indicated at the speed change label. Meanwhile, the digital meter indicates the actual spindle revolution.

As mounting or dismounting tool cutter or adjustment of work piece needs spindle rotation by manual, therefore, the lever in the right side position shall be in the “idle” position, so spindle rotation could be easily obtained.

Changes of the feed rate could be realized by using the lever (15) in the upper right side position of the spindle box.

8.3 Selection and operation of the spindle feed:

There are three types of spindle feed selections for your choice as per the requirement of your machining:

Manual feed: Simply moving the feed lever(4) at the right side of the spindle box, the spindle will move down if turned the lever in counter clockwise and the spindle will move up if turned the lever in clockwise.

Auto feed: There are three levers (4), at the end of each lever equipped with a push button. Push one of any three buttons (SB4), auto feed could be realized as per your required pre-set feed rate. Push one of any three buttons (SB4) once again; the auto feed will be stopped immediately.

8.4 Cutting depth control:

For the batch production, you need control cutting depth. A scale in front of spindle box could meet your requirements. Loosening knurled screw (3) by turning knob (2), moving the scale to the required depth, then fastening the knurled screw(3). Now the machining depth could be controlled.

8.5 Tapping:

Put the “Selection Switch” (17) on the tapping position first, turn the feed lever(4) and let the tap approaches the work piece, a proper manpower force (based on the size of grescrew) shall be exerted in order to let the tap comes into the hole. The spindle will be rotated in reverse when the screw depth is reached; promptly turn the feed lever (4) in counter clockwise direction, in order to let the tap comes out. Suppose, tapping job needs stop, push button (SB4) then spindle will have reverse revolution. And tap returns back.



The clamping rod (5) is to be used only for clamping the spindle while milling. Therefore, for the job of drilling or tapping, the clamping rod shall be released. Otherwise, the spindle quill could not be moved and quill surface will be destroyed.

8.6. Adjustment of worktable position:

Symbols multi-use and convenience of the machine also reflects multi function of its worktable. Except its normal manual and auto up and down function, it can also be turned around the table itself, around the column and tilt in $\pm 45^\circ$ in horizontal position.

Operation method for the table tilting

Using a special tool to take out the taper pin and loosening four screw nuts on the bracket and manually turn the worktable to the required position then fastening the four screw nuts, now the work piece can be machined as per your tilting angle.

When the job is finished, keep the worktable in the original position by using the same way mentioned on the above. Be sure do not forget to push the pin in its position.

9. Machine adjustment:

9.1 Spindle balance force adjustment:

Balance of spindle is realized through a springiness from a coil spring device located at the left side of the spindle box. Balance force shall be adjusted to the point that the spindle together with its tool shall not go down itself when spindle stops. (go up a little bit shall be much better).

Over springiness or less needs adjustment. Simply loosening the screw on the cover of spring box, turn the spring box cover, the spring could be either fastening or loosening. Fastening screw on the cover if the balance force is ok

9.2 Adjustment for the feed safety clutch:

Feed safety clutch is mounted on upper side of the warm shaft. If too much feed resisting force is occurred, the feed safety clutch will be automatically slipped (sound “Ka” will be heard) in order to protect machine driving system not to be damaged.

Clutch appearance could be seen when opening the cover below the feed change label.

Using a tool to turn a slotted nut in clockwise, this will increase the feed resisting force, meanwhile, the counter clockwise will reduce the feed resisting force. The max. feed resisting force of this machine is 10000N, Over feed resisting force will cause un-safety, be sure to lock it by screw bolt or nut after adjustment.

10. Machine use and maintenance:



Machine must be isolated before any maintenance work is begun.

10.1 Before running the machine, carefully read the Original Instruction first, fully understand

the structure of the machine and its performance and needs to familiar with locations for all levers and buttons.

10.2 Lubrication of the machine is very important. Daily lubrication work as per the requirements of the Original Instruction is necessary. Otherwise transmission parts and bearings will be damaged.

10.3 Max. spindle torque of this machine is 90 N.M. Max. feed resisting force in the driving system is 10000 N. Over permitted cutting feed range is not allowed. High spindle speed with big cutting feed is not good to the machine.

- 10.4 As standard drill with 118 degree angle features big cutting force but quick wear-out, so diameter and roughness of holes is not so ideal after drilling, therefore, regrinding its edges particularly for the big diameter drills is necessary. It is better to use two different angles for the machining of cast iron material (Second angle could be 70°).
- 10.5 Spot facer with three edges is proffered for the spot facing machining, using a normal drill for spot facing job will cause vibration. However, it will have a better result for the spot facing machining if reducing the rear angle of the normal drill with two different angles and going down the cutting speed and feed rate.
- 10.6 Temperature of motor will be increased so quickly when tapping due to frequently motor direction be changed. Therefore, rapid and continuous tapping shall be avoided. Max. eight times per minutes of tapping is recommended. The machine shall be stopped for cooling if the motor is too hot.
- 10.7 A proper cutting force is required when milling. As this is not a milling machine although it has a milling function. Too big milling force will cause worktable moving round the column, therefore, clamping the worktable strongly is required when milling and a reasonable cutting feed rate for milling job is necessary.
- 10.8 Please turn off the coolant valve when mounting and dismounting tools, clamping or adjusting work piece or measuring work piece, as coolant is not necessary during this period. Stop coolant pump if these job takes more than ten minutes.
- 10.9 As gears are to be used for spindle and feed system, so it is not allowed to change spindle speed or change cutting feed rate when machine running, otherwise it will damage gears, shafts or relevant parts.
- 10.10 Do not extend spindle quill too much, instead, a proper working table height is suggested. Clean the spindle taper hole and tool taper shank first before tool mounting. Unqualified or rusted or damaged taper shank is forbidden to use.
- 10.11 Dry agent inside of the electric box and regularly removing dustiness are necessary. It is forbidden to use gasoline or kerosene or diesel oil to clean electric components. We suggest to use those no erosion and not be easily burned liquid such as carbon tetrachloride etc.

Original Instruction		Total	26
		page	24
Maintenance			
Item	Maintenance parts	Method	
Daily maintenance	Machine	Clean the machine remove the swarf	
	Up and down rack	Add ISO VG 33 machine oil	
	Surface of column	Keep enough ISO VG 33 machine oil	
Quarterly maintenance	Oil basin of up and downside spindle box	Change No.20 machine oil every 3 month	
	Up and down worm wheel box	Change No.2 lithium grease every 3 month	
	Coolant liquid basin	Customer decide	
	Electric box	Clean dust, arefaction	
Yearly maintenance	Bearing of spindle up and down	Change No.2 lithium grease	
	Transmission and operation parts	Uninstalling and checking quick-wear part	
	Spindle boring	Repair scar, regrind, change	
	Electric box	Clean and change malfunction parts	
	Precision inspection	According to the inspection record to adjustment	
Temporarily maintenance	Damage of quick-wear part	Repair if has scar	
	Unexpected accident and fault	Emergency stop check and eliminate	

Normal failure and solution

Item	Description	Analysis	Solution
1	Feeding clutch working unsteady	Spring too tightly or loose lead the clutch skid	Reference Original Instruction 9.2 adjustment
2	Spindle force unbalance	The spring force is too big or small	Reference the Original Instruction 9.1 adjustment
3	Auto feed malfunction	Electric clutch broken, brush wear, button on the handle contact not well	Check, clean, adjustment or change the broken parts
4	Motor lifting malfunction	Didn't release the clamping handle, up and down nut broken, limit switch malfunction	Check and change the broken parts
5	Spindle speed change and feed range change malfunction	Block wear, spline shaft and bore bite	Change broken parts
6	The main power indicator light was light, no action when press any button	The emergency switch hasn't reset.	Reset the emergency switch.
7	The main power indicator light was light and worktable was clamped but can not running the spindle	The worktable was clamped	Release the clamping handle.
8	The main power indicator light was light and worktable was clamped but can not running the spindle	The safety cover sheet was on open position	Close the safety cover sheet.

Original Instruction	Total 26
	page 26

11. Machine accessories:

No.	Description	Specification/standard	Q'ty	Remark
1	Drill check with spanner	1-13/GB6087	1	
2	Adapter for drill chuck		1	
3	Adaptor	4-3/JB3477	1	
4	Adaptor	4-2/JB3477	1	
5	Adaptor	3-1/JB3477	1	
6	Taper wedge for flat shape quill	Wedge 1/JB3482	1	
7	Taper wedge for flat shape quill	Wedge 3/JB3482	1	
8	Wrench	21×24/GB4388	1	
9	Battery	SR44	1	
10	Fuse	φ5×25/1A;3A;5A	2 for each	

12.Quick-wear part list

Item	Item number of ancillary page	Parts number	Name of the parts	Q'ty
1		35001/ZS5030	indicator	1
2		34002/ZY5050A-1	Pull block	1
3		34001/ZY5050	Pull block	1
4		34001/ZY5035A-1	Pull block	1
5		31001/ZY5050A	Worm shaft	1
6		32030/ZY5050A-1	Shaft	1
7		32078/ZY5050	Spring	1
8		35001/ZS5030A	Shaft	3
9		35002/ZS5030A	Handle Shaft	3
10		12006A/ZY5035	Gear	1
11		11016/ZY5050	Worm	1

Vertical Drilling Machine

Model: GHD-55PFA

Packing list

Max. Drilling Diameter: 50mm

Series Number:

Packing list	Total 1
	page 1

Case No.: 1/1

Dimension (L ×W × H): × × **CM**

Gross weight:

Net weight:

No.	Name	Specification and marks	Q'ty	Remark
1	Machine		1 piece	
2	Drill check with lever	1~13; GB6087	1 piece	
3	Drill check adaptor		1 piece	
4	Tool shank adaptor	4—3; JB3477	1 piece	
		4—2; JB3477	1 piece	
		3—1; JB3477	1 piece	
6	Taper wedge for shank	Wedge 1; JB3482	1 piece	
		Wedge 3; JB3482	1 piece	
	Double end wrench	21×24; GB4388	1 piece	
		SR44	1 piece	
7	Fuse	φ5×25/5A, 3A, 1A	2 pieces each	
8	Original Instruction		1 piece	
	Quality certificate		1 piece	
	Packing list		1 piece	

Inspector of the packing: Date:

Vertical Drilling Machine

Model: GHD-55PFA

Certificate of Inspection

Max. Drilling Diameter: 30mm

Series Number:

We certified that the machine has been inspected and all items of the machine are in conformity With Q/320684FNC01-2009 standard. Delivery is permitted.

Director of the company: YuKang Wang

Date:

Director of quality inspection department: JianChao Zhao

Date:

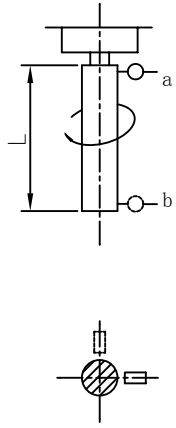
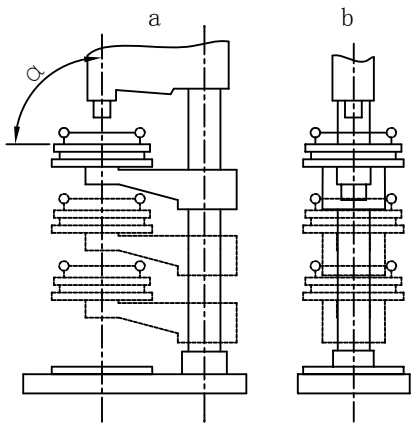
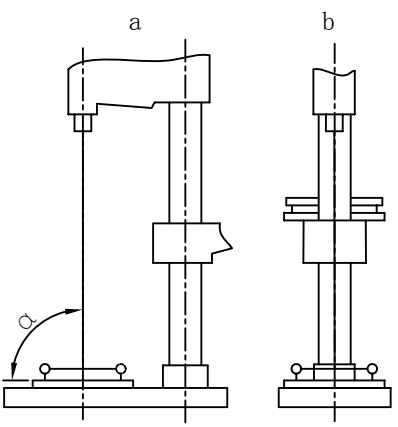
Precision Inspection Record

Geometrical Precision Test:

No.	Item	Brief Drawing	Precision	
			Allowance (mm)	Actual Test
G1	Parallelism of the base surface		0.06 at any tested Length of 300 (flat or concave)	
G2	Parallelism of the work table surface		0.04 at any tested Length of 300 (flat or concave)	
G3	surface runout of worktable		D=300 0.04	

Precision Inspection Record

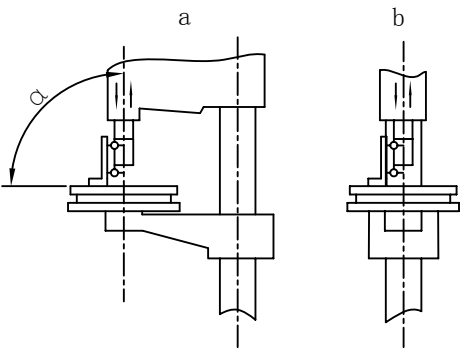
Geometrical Precision Test:

No.	Item	Brief Drawing	Precision	
			Allowance (mm)	Actual Test
G4	Spindle bore axis runout a) Close to spindle surface b) at a distance of L to spindle surface		L=200 a) 0.02 b) 0.035	
G5	Perpendicularity of the spindle axis to work table surface		a) 0.1/300* (a ≤ 90°) b) 0.06/300*	
G6	Perpendicularity of the spindle axis to Base plate table surface		a) 0.10/300* (a ≤ 90°) b) 0.10/300*	

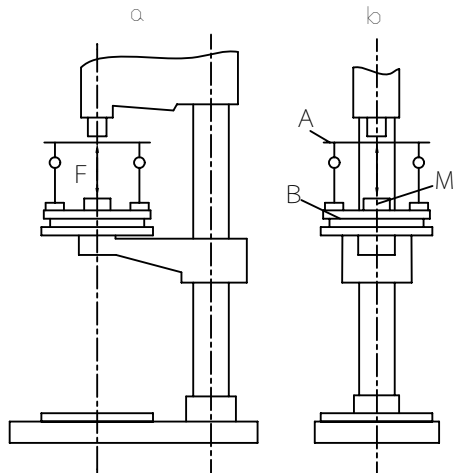
Distance between two contacts of indicator probe

Precision Inspection Record

Germetrical Precision Test:

No.	Item	Brief Drawing	Precision	
			Allowance (mm)	Actual Test
G7	Perpendicularity of the vertical movement of spindle sleeve to work table surface		<p>a.0.1/300 ($a \leq 90^\circ$) b.0.1/300</p>	

Work Acuracy:

P1	The change of Perpendicularity of spindle axis to work table surface under the axial force.		<p>F=6000N 2/1000</p>	
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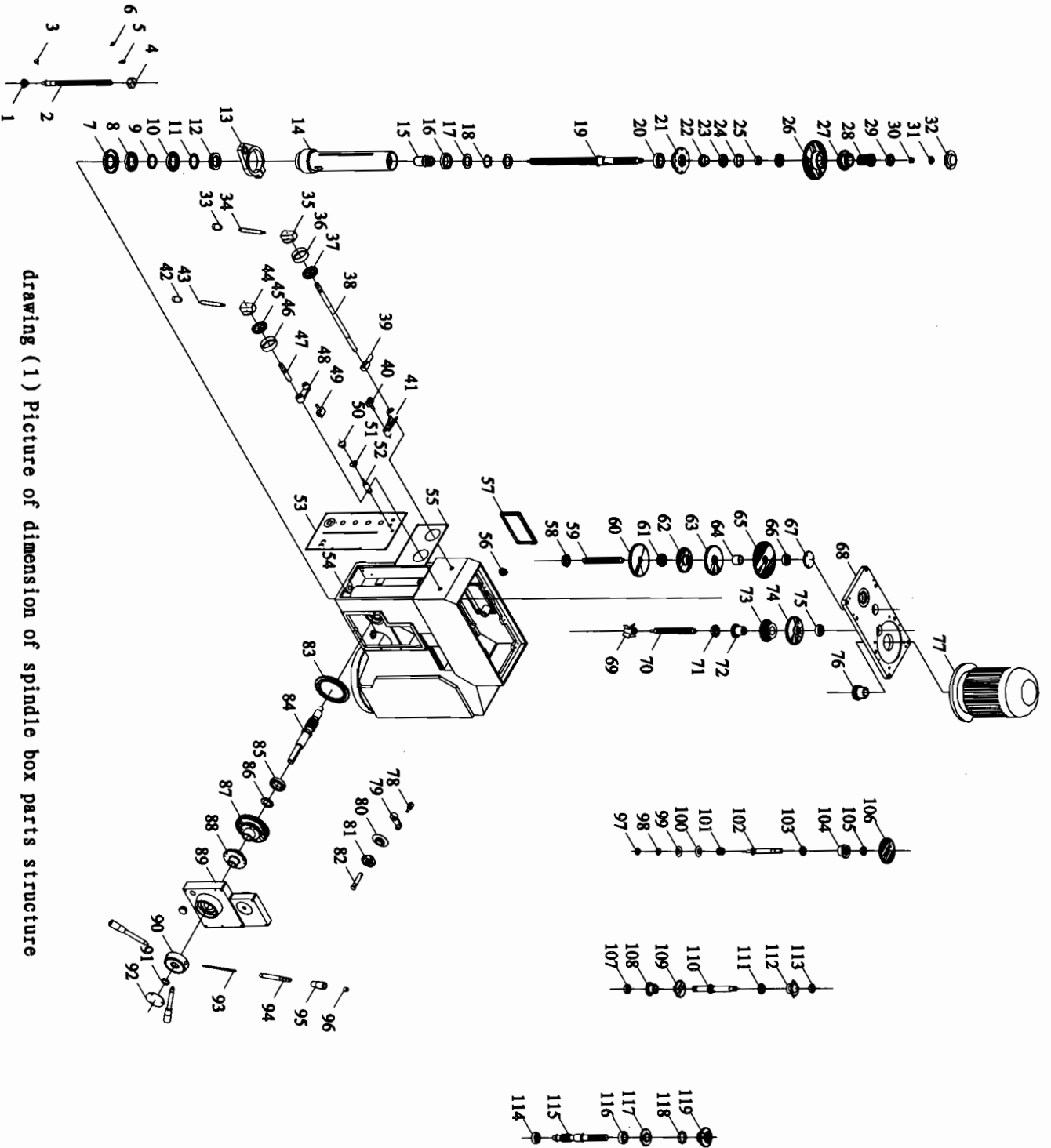
Vertical Drilling Machine

Model: GHD-55PFA

Ancillary page of Operation Manual

Max. Drilling Diameter: 50mm

Series Number:



drawing (1) Picture of dimension of spindle box parts structure

Contrast for the parts number of ZY5050A-3 spindle box and its three dimensions sketch.

No.	Parts number	Name of the parts	Q'ty	Remarks
1	32004/ZY5050	Knurled screw bolt	1	
2	32039/ZY5050	Scaled screw	1	
3	32005/ZY5050	Knurled knob	1	
4	31003/ZY5050A	Scaled screw	1	
5	32004/ZS5030	Support for the vernier	1	
6	35001/ZS5030	Scaled indicator sheet	1	
7	32003/ZY5050	Bearing end plate	1	
8	D7000110;GB276	Bearing	1	
9	32001/ZY5050	Washer	1	
10	D7000110; GB276	Bearing	1	
11	32002/ZY5050	Washer	1	
12	8110; GB301	Bearing	1	
13	31002/ZY5050A-1	Scale clamper	1	
14	32036/ZY5050	Spindle quill	1	
15	32006/ZY5050	Spline quill	1	
16	D1000909; GB276	Bearing	1	
17	32007/ZY5050	Round nut	2	
18	32029/ZY5050	Washer	1	
19	32037/ZY5050	Transmission shaft	1	
20	2007107E; GB/T297	Bearing	1	
21	32008/ZY5050	Bearing seat	1	
22	32048/ZY5050	Feed gear	1	
23	7000106; GB276	Bearing	2	
24	32051/ZY5050	Sleeve	1	
25	32050/ZY5050	Sleeve	1	
26	32049/ZY5050	Gear	1	
27	32007/ZY5050A-2	Gear	1	
28	32010/ZY5050	Gear	1	
29	15204; GB277	Bearing	1	
30	18; GB858	Washer	1	
31	M18×1.5; GB812	Round nut	1	
32	31004/ZS5030	Cover	1	
33	1.222/40-M8/21101	Oval knob	1	
34	32056/ZX3840	Handle	1	
35	32053/ZX3840	Handle seat	1	
36	32057/ZX3840	Retainer	1	
37	32002/ZY5050A-3	Positioning plate	1	
38	32026/ZY5050A-1	Handle shaft	1	

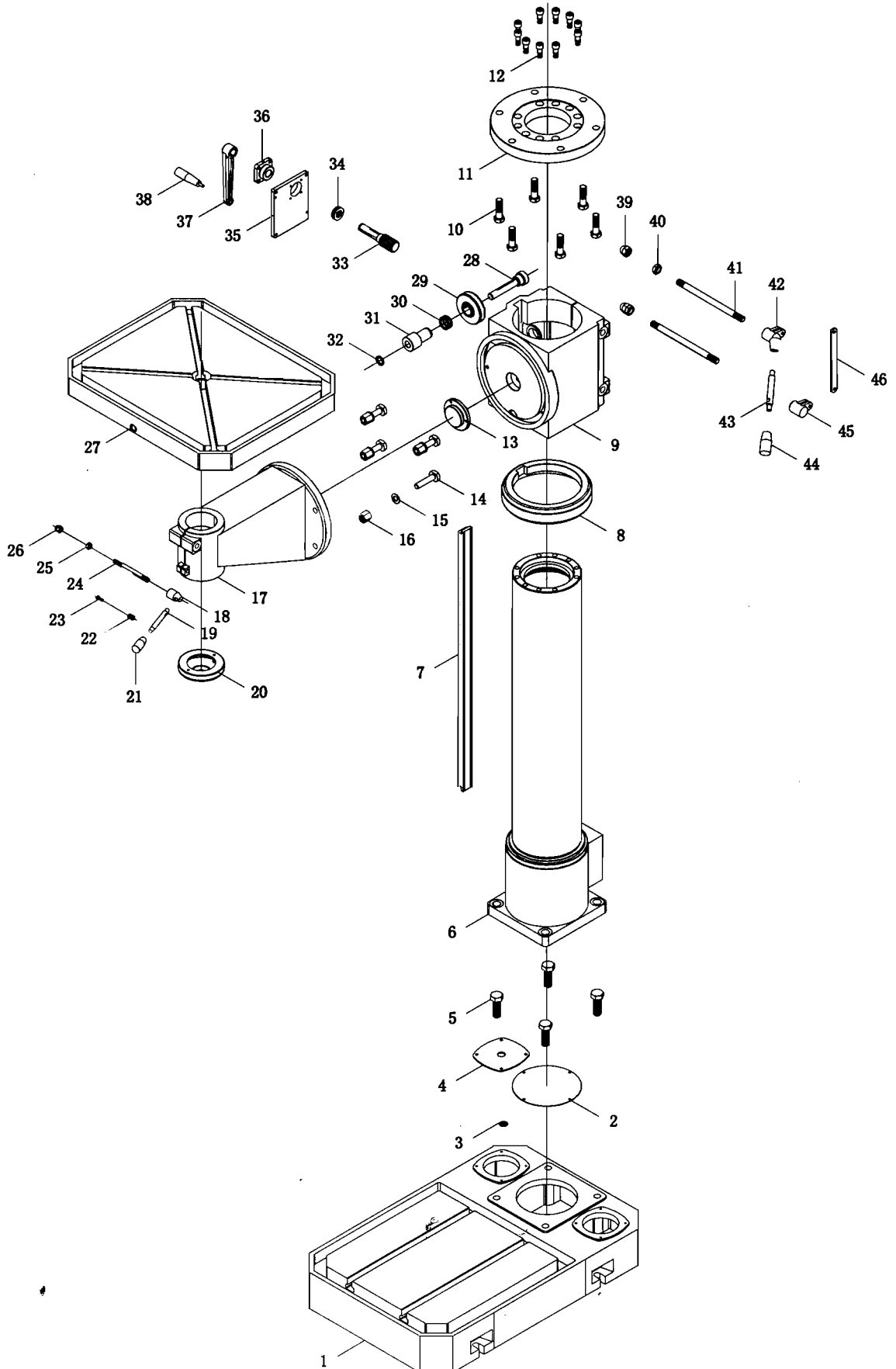
Contrast for the parts number of ZY5050A-3 spindle box and its three dimensions sketch.

No.	Parts number	Name of the parts	Q'ty	Remarks
39	32027/ZY5050A-1	Supporting block	1	
40	34011/ZY5050	Block	1	
41	31006/ZY5050A-1	Lever	1	
42	1.222/40-M8/21101	Oval knob	1	
43	32056/ZX3840	Handle	1	
44	32053/ZX3840	Handle seat	1	
45	32023/ZY5050A-1	Positioning plate	1	
46	32057/ZX3840	Retainer	1	
47	32024/ZY5050A-1	Handle shaft	1	
48	31005/ZY5050A-1	Lever	1	
49	34001/ZY5050A-2	Block	1	
50	BM8×32; GB4141.27	Knob	1	
51	32045/ZS5030	sleeve	1	
52	32047/ZY5050	Positioning shaft	1	
53	34002/ZY5050A-3	Brand	1	
54	31001/ZY5050A-1	Spindle box	1	
55	34001/ZY5050A-3	Speed brand	1	
56	(20) M27×1.5; GB1160.2	oil window	2	
57	35002/ZY5035A-1	Cover	1	
58	50204; GB277	Bearing	1	
59	32018/ZY5050A-1	Spline (II)	1	
60	32027/ZY5050	Gear	1	
61	32026/ZY5050	Gear	1	
62	32005/ZY5050A-2	Gear	1	
63	32006/ZY5050A-2	Gear	1	
64	32009/ZY5050A-2	Sleeve	1	
65	32013/ZY5050	Gear	1	
66	180204K; GB276	Bearing	1	
67	31001/ZY5035A-1	Bearing cover	1	
68	31003/ZY5050A-1	Spindle box cover	1	
69	35001/ZY5035A-1	Oil splashing device	1	
70	32001/ZY5050A-3	Spline shaft	1	
71	50204; GB277	Bearing	1	
72	32002/ZY5050A-2	Gear	1	
73	32004/ZY5050A-2	Gear	1	
74	32002/ZY5050A-2	Gear	1	
75	180204K; GB276	Bearing	1	
76	32001/ZY5050A-2	Gear	1	

Contrast for the parts number of ZY5050A-3 spindle box and its three dimensions sketch.

No.	Parts number	Name of the parts	Q'ty	Remarks
77	YD90L1-6/4(1.2/1.6kW)	Main motor	1	
78	34001/ZY5035A-1	Block	1	
79	31007/ZY5050A-1	Lever	1	
80	32019/ZWB5035A	Indicator dial	1	
81	32020/ZWB5035A	Hand wheel	1	
82	32024/ZY5035A-1	Small shaft	1	
83	31008/ZY5050	Cover	1	
84	32028/ZY5050A-1	Transmission shaft	1	
85	1180909K; GB276	bearing	1	
86	32002/ZY5050A	Washer	1	
87	31001/ZY5050A	Worm wheel	1	
88	32029/ZY5050A-1	sleeve	1	
89	31004/ZY5050A-1	Side cover	1	
90	32029/ZS5030A	Handle seat	1	
91	32030/ZS5030A	Adjusting ring	1	
92	32031/ZS5030A	Cover	1	
93	32033/ZS5030A	Rod	1	
94	32032/ZS5030A	Hand lever	1	
95	35001/ZS5030A	knob	1	
96	35002/ZS5030A	Core bar	1	
97	M14×1.5; GB812	Round nut	1	
98	M14×1.5; GB812	Round nut	1	
99	28×14.2×1×1.8; GB1972	Spring	1	
100	28×14.2×1×1.8; GB1972	Spring	1	
101	32032/ZY5050A-1	Feed gear	1	
102	32021/ZY5050A-1	Shaft	1	
103	1180904K; GB276	Bearing	1	
104	32019/ZY5050A-1	Bearing seat	1	
105	103; GB276	Bearing	1	
106	32052/ZY5050	Feed gear	1	
107	M22×1.5; JB/GQ0172	Round nut	1	
108	32014/ZY5035A-1	Feed gear	1	
109	32013/ZY5035A-1	Feed gear	1	
110	32022/ZY5050A-1	Shaf	1	
111	1180905K; GB276	Bearing	1	
112	32020/ZY5050A-1	Bearing seat	1	
113	103; GB276	Bearing	1	
114	46204; GB/T292	Bearing	1	

Drawing (2) Picture of dimensions sketch of column and bracket parts structure



Contrast for the parts number of ZY5050A-3 column and its bracket and its three dimension sketch.

No.	Parts number	Name of the parts	Q'ty	Remarks
1	11002/ZY5050A-1	Base	1	
2	12003/ZY5050	Cover	1	
3	12001/ZS5030	Filter	1	
4	12008/ZS5030	Cover	1	
5	M20×55; GB5782	Hexagon bolt	4	
6	11005/ZY5050A-1	Column	1	
7	12004/ZY5050	Rack	1	
8	11010/ZY5050	Stop ring	1	
9	11006/ZY5050	Up and down device of brecket	1	
10	M16×55; GB5782	Hexagon bolt	6	
11	11009/ZY5050	Up connection seat	1	
12	M12×30; GB70	Inner hexagon screw	10	
13	12010/ZS5030	Positioning shaft	1	
14	12005/ZS5030	T type screw bolt	4	
15	14;GB97.2	Washer	4	
16	M14;GB56	Hexagon bolt	4	
17	11004/ZY5050A-1	Bracket seat	1	
18	B-(D.L3.Cr)M12×30; GB4141.16	Handle seat	1	
19	B-(D.L3.Cr)M10×80; GB4141.15	Handle lever	1	
20	11001/ZY5050	Crust	1	
21	M10×50; GB4141.14	Handle sleeve	1	
22	12001/ZY5050	Adjusting bolt	2	
23	M6×25; GB5782	Hexagon screw	2	
24	12005/ZY5050	Screw	1	
25	M10; GB6172	Hexagon nut	1	
26	M10; GB923	Nut	1	
27	11001/ZY5050A-1	Work table	1	
28	12016/ZY5050	Small shaft	1	
29	12017/ZY5050	Worm shaft	1	
30	11015/ZY5050	sleeve	1	
31	12015/ZY5050	Gear	1	
32	12014/ZY5050	Washer	1	

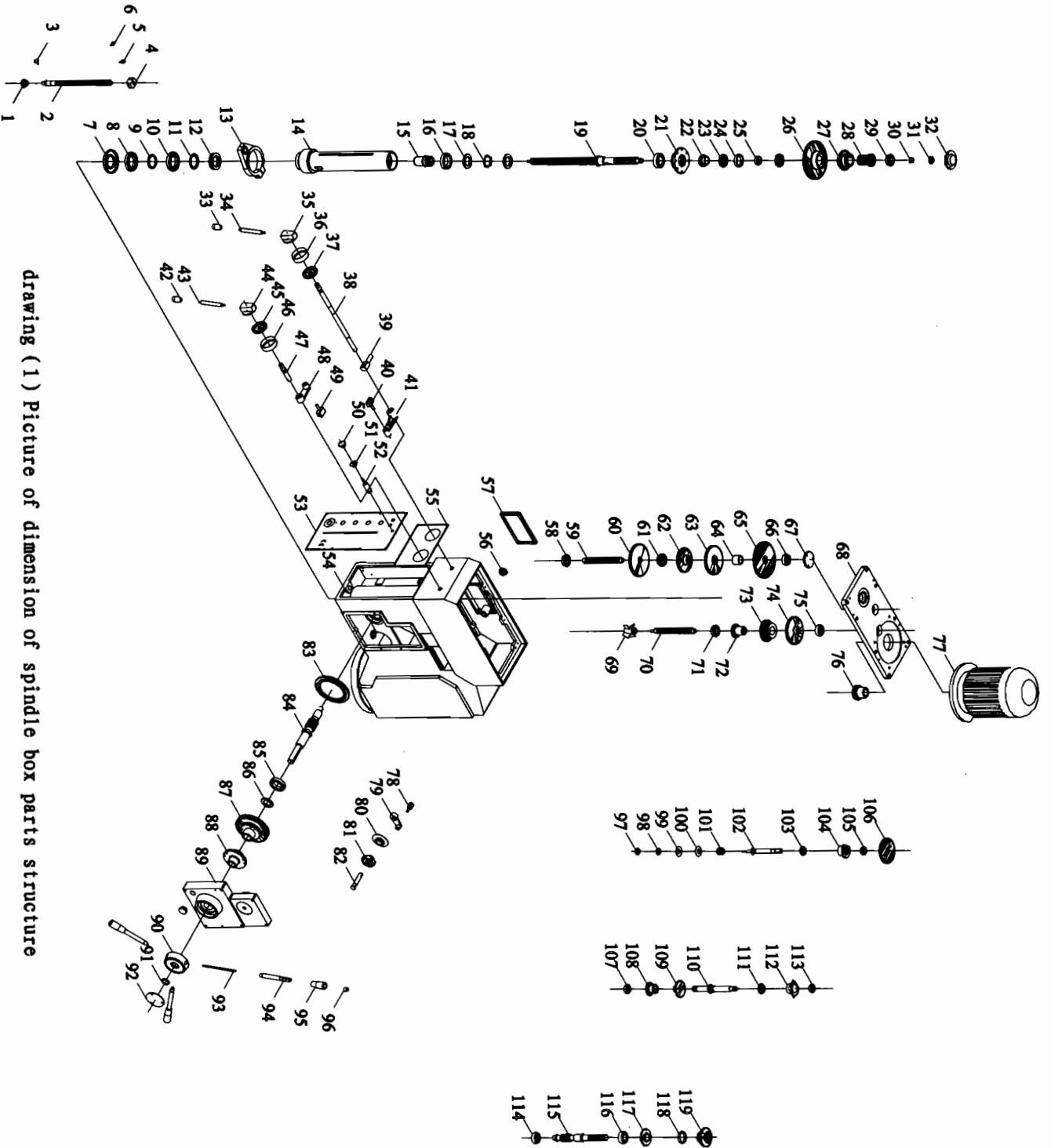
Vertical Drilling Machine

Model: GHD-55PFA

Ancillary page of Operation Manual

Max. Drilling Diameter: 50mm

Series Number:



drawing (1) Picture of dimension of spindle box parts structure

Contrast for the parts number of GHD-55PFA-3 spindle box and its three dimensions sketch.

No.	Parts number	Name of the parts	Q'ty	Remarks
1	32004/ZY5050	Knurled screw bolt	1	
2	32039/ZY5050	Scaled screw	1	
3	32005/ZY5050	Knurled knob	1	
4	31003/ZY5050A	Scaled screw	1	
5	32004/ZS5030	Support for the vernier	1	
6	35001/ZS5030	Scaled indicator sheet	1	
7	32003/ZY5050	Bearing end plate	1	
8	D7000110;GB276	Bearing	1	
9	32001/ZY5050	Washer	1	
10	D7000110; GB276	Bearing	1	
11	32002/ZY5050	Washer	1	
12	8110; GB301	Bearing	1	
13	31002/ZY5050A-1	Scale clamper	1	
14	32036/ZY5050	Spindle quill	1	
15	32006/ZY5050	Spline quill	1	
16	D1000909; GB276	Bearing	1	
17	32007/ZY5050	Round nut	2	
18	32029/ZY5050	Washer	1	
19	32037/ZY5050	Transmission shaft	1	
20	2007107E; GB/T297	Bearing	1	
21	32008/ZY5050	Bearing seat	1	
22	32048/ZY5050	Feed gear	1	
23	7000106; GB276	Bearing	2	
24	32051/ZY5050	Sleeve	1	
25	32050/ZY5050	Sleeve	1	
26	32049/ZY5050	Gear	1	
27	32007/ZY5050A-2	Gear	1	
28	32010/ZY5050	Gear	1	
29	15204; GB277	Bearing	1	
30	18; GB858	Washer	1	
31	M18×1.5; GB812	Round nut	1	
32	31004/ZS5030	Cover	1	
33	1.222/40-M8/21101	Oval knob	1	
34	32056/ZX3840	Handle	1	
35	32053/ZX3840	Handle seat	1	
36	32057/ZX3840	Retainer	1	
37	32002/ZY5050A-3	Positioning plate	1	
38	32026/ZY5050A-1	Handle shaft	1	

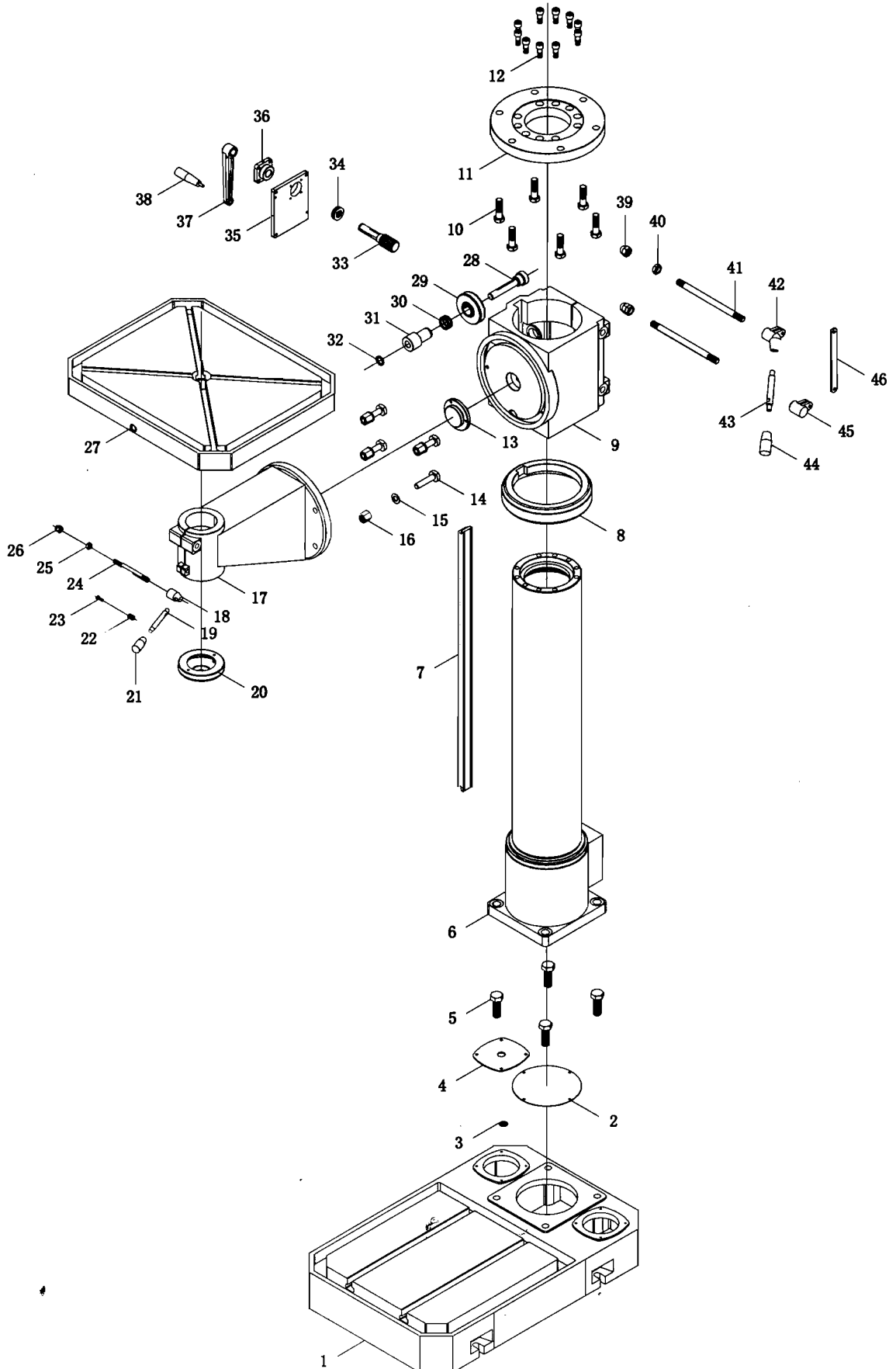
Contrast for the parts number of GHD-55PFA-3 spindle box and its three dimensions sketch.

No.	Parts number	Name of the parts	Q'ty	Remarks
39	32027/ZY5050A-1	Supporting block	1	
40	34011/ZY5050	Block	1	
41	31006/ZY5050A-1	Lever	1	
42	1.222/40-M8/21101	Oval knob	1	
43	32056/ZX3840	Handle	1	
44	32053/ZX3840	Handle seat	1	
45	32023/ZY5050A-1	Positioning plate	1	
46	32057/ZX3840	Retainer	1	
47	32024/ZY5050A-1	Handle shaft	1	
48	31005/ZY5050A-1	Lever	1	
49	34001/ZY5050A-2	Block	1	
50	BM8×32; GB4141.27	Knob	1	
51	32045/ZS5030	sleeve	1	
52	32047/ZY5050	Positioning shaft	1	
53	34002/ZY5050A-3	Brand	1	
54	31001/ZY5050A-1	Spindle box	1	
55	34001/ZY5050A-3	Speed brand	1	
56	(20) M27×1.5; GB1160.2	oil window	2	
57	35002/ZY5035A-1	Cover	1	
58	50204; GB277	Bearing	1	
59	32018/ZY5050A-1	Spline (II)	1	
60	32027/ZY5050	Gear	1	
61	32026/ZY5050	Gear	1	
62	32005/ZY5050A-2	Gear	1	
63	32006/ZY5050A-2	Gear	1	
64	32009/ZY5050A-2	Sleeve	1	
65	32013/ZY5050	Gear	1	
66	180204K; GB276	Bearing	1	
67	31001/ZY5035A-1	Bearing cover	1	
68	31003/ZY5050A-1	Spindle box cover	1	
69	35001/ZY5035A-1	Oil splashing device	1	
70	32001/ZY5050A-3	Spline shaft	1	
71	50204; GB277	Bearing	1	
72	32002/ZY5050A-2	Gear	1	
73	32004/ZY5050A-2	Gear	1	
74	32002/ZY5050A-2	Gear	1	
75	180204K; GB276	Bearing	1	
76	32001/ZY5050A-2	Gear	1	

Contrast for the parts number of GHD-55PFA-3 spindle box and its three dimensions sketch.

No.	Parts number	Name of the parts	Q'ty	Remarks
77	YD90L1-6/4(1.2/1.6kW)	Main motor	1	
78	34001/ZY5035A-1	Block	1	
79	31007/ZY5050A-1	Lever	1	
80	32019/ZWB5035A	Indicator dial	1	
81	32020/ZWB5035A	Hand wheel	1	
82	32024/ZY5035A-1	Small shaft	1	
83	31008/ZY5050	Cover	1	
84	32028/ZY5050A-1	Transmission shaft	1	
85	1180909K; GB276	bearing	1	
86	32002/ZY5050A	Washer	1	
87	31001/ZY5050A	Worm wheel	1	
88	32029/ZY5050A-1	sleeve	1	
89	31004/ZY5050A-1	Side cover	1	
90	32029/ZS5030A	Handle seat	1	
91	32030/ZS5030A	Adjusting ring	1	
92	32031/ZS5030A	Cover	1	
93	32033/ZS5030A	Rod	1	
94	32032/ZS5030A	Hand lever	1	
95	35001/ZS5030A	knob	1	
96	35002/ZS5030A	Core bar	1	
97	M14×1.5; GB812	Round nut	1	
98	M14×1.5; GB812	Round nut	1	
99	28×14.2×1×1.8; GB1972	Spring	1	
100	28×14.2×1×1.8; GB1972	Spring	1	
101	32032/ZY5050A-1	Feed gear	1	
102	32021/ZY5050A-1	Shaft	1	
103	1180904K; GB276	Bearing	1	
104	32019/ZY5050A-1	Bearing seat	1	
105	103; GB276	Bearing	1	
106	32052/ZY5050	Feed gear	1	
107	M22×1.5; JB/GQ0172	Round nut	1	
108	32014/ZY5035A-1	Feed gear	1	
109	32013/ZY5035A-1	Feed gear	1	
110	32022/ZY5050A-1	Shaf	1	
111	1180905K; GB276	Bearing	1	
112	32020/ZY5050A-1	Bearing seat	1	
113	103; GB276	Bearing	1	
114	46204; GB/T292	Bearing	1	

Drawing (2) Picture of dimensions sketch of column and bracket parts structure



Contrast for the parts number of GHD-55PFA-3 column and its bracket and its three dimension sketch.

No.	Parts number	Name of the parts	Q'ty	Remarks
1	11002/ZY5050A-1	Base	1	
2	12003/ZY5050	Cover	1	
3	12001/ZS5030	Filter	1	
4	12008/ZS5030	Cover	1	
5	M20×55; GB5782	Hexagon bolt	4	
6	11005/ZY5050A-1	Column	1	
7	12004/ZY5050	Rack	1	
8	11010/ZY5050	Stop ring	1	
9	11006/ZY5050	Up and down device of brecket	1	
10	M16×55; GB5782	Hexagon bolt	6	
11	11009/ZY5050	Up connection seat	1	
12	M12×30; GB70	Inner hexagon screw	10	
13	12010/ZS5030	Positioning shaft	1	
14	12005/ZS5030	T type screw bolt	4	
15	14;GB97.2	Washer	4	
16	M14;GB56	Hexagon bolt	4	
17	11004/ZY5050A-1	Bracket seat	1	
18	B-(D.L3.Cr)M12×30; GB4141.16	Handle seat	1	
19	B-(D.L3.Cr)M10×80; GB4141.15	Handle lever	1	
20	11001/ZY5050	Crust	1	
21	M10×50; GB4141.14	Handle sleeve	1	
22	12001/ZY5050	Adjusting bolt	2	
23	M6×25; GB5782	Hexagon screw	2	
24	12005/ZY5050	Screw	1	
25	M10; GB6172	Hexagon nut	1	
26	M10; GB923	Nut	1	
27	11001/ZY5050A-1	Work table	1	
28	12016/ZY5050	Small shaft	1	
29	12017/ZY5050	Worm shaft	1	
30	11015/ZY5050	sleeve	1	
31	12015/ZY5050	Gear	1	
32	12014/ZY5050	Washer	1	

