MAINTENANCE MANAUL

PRESS BRAKE

CONTENT

Ⅰ、The usage and suitable range

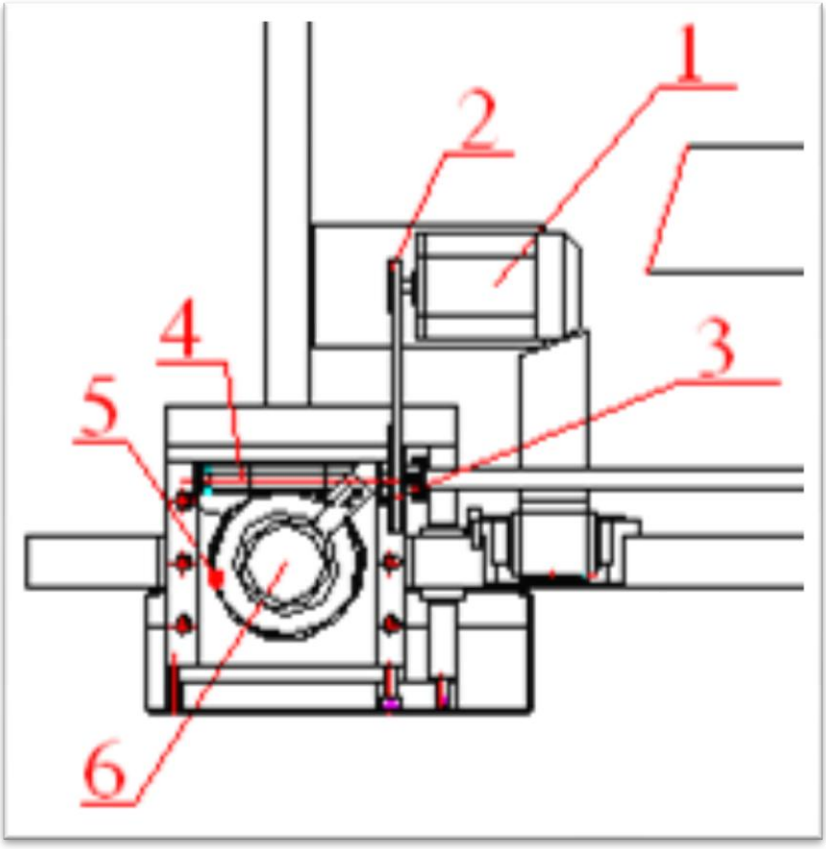
Our plate bender has higher labor productivity and bending precision. You should have to choose V-mode die with different size of gap when bending plates with different thickness. It can produce various kinds of shape with different shape of die sets. It has enough strength and rigidity due to its steel plate welding structure. Serious overloading caused by the change of plate thickness or the improper choose of dies can be overcome due to hydraulic drive system. It has the distinguishing features which is not only more stability and more reliability and more convenient for operation but also has spot, single and continuous stroke. The upper-die has been equipped with a compensation mechanism in order to get a higher bend precision. It can also be used as a punching machine if it equipped with relevant equipments. It has been used in many machinery and light industries such as airplane, automobile, train, shipbuilding, switch, communication equipment, lift equipment, electrical equipment and apparatus equipment, etc.

NO.	Ⅱ、THE MAIN TECHNICAL DATA		Data	Unit
1	Nominal pressure		1750	KN
2	Length of working table		3200	mm
3	Strength of the sheared plate		450	N/mm^2
4	Depth of throat		320	mm
5	Ram stroke		200	mm
6	Max open height between table bench and slide block		415	mm
7	Speed of slide block	Free	50	mm/s
		Work	7	
		Return stroke	60	
8	Main motor	Model	Y160L1-4	
		Power	11	KW
		Speed	1440	rpm
9	Gear pump	Model	NT2-G25F	
		Flow	25	L/min
		Pressure	32	MPa
10	Max working pressure of hydraulic system		25	MPa
11	Dimension	Length	3350	mm
		Width	1450	mm
		Height	2600	mm

Ⅲ、The Main Structure And Working Principle

1.The main structure

This machine adopts all-steel welding construction with full strength rigidity and lighter weight. It consists of frame, ram, the adjusting device of mechanical link stopper, synchronous twist bar, front carrier supporter ,dies, electric and adopts hydraulic driven system



2 The ram:

It consist of all-steel welding construction. The both sides of the ram are connected with the fram through guide track. There is a safety switch be installed on its right side so as to regulating its stop position of upper starting point. Both sides of it also connected with piston rod and synchronous twist bar in order to ensure the pressure from oil cylinder transmission to the ram directly and the synchronous balance during working process.

3 The regulating device of the mechanical link stopper

There is mechanism regulating device installed over the two oil cylinders in order to guarantee the stopping precision and the duplicating precision of ram in its lower dead center.

Its principle is as following: The small pulley 2 and big pulley 3 are driven by regulating device of the ram stroke through motor 1. The worm gear 5 are driven by the big pulley 3 through worm 4. The regulating guide screw 6 is driven by worm gear 5. The mechanical link stopper is running as vertical motion. The stop position of the dead center of the ram is controlling by the length of the regulating guide screw. The duplicating locating precision is guaranteed as the controlling of the dead center of the ram has been accomplished.

【NOTE】:

The adjusting of the lower dead center position can be doing only under this situation, thus when the ram is stopped on its upper dead center. Otherwise it will

Damage the machine and influent your work.

4 Synchronous mechanism:

We use mechanical forced synchronous mechanism to achieve the ram's synchronism during stroke. The structure is simpler, stability, reliable and convenient for maintain. Furthermore, the eccentric cover is used to ensure the parallelism between ram and working table.

5 Front lug supporter:

Adjusted by hand wheel

6 Back gauge:

Adjusted by motor. The distance of adjustment can be readout through revolution counter. Trimming by hand also can be realized. (***See fig***)

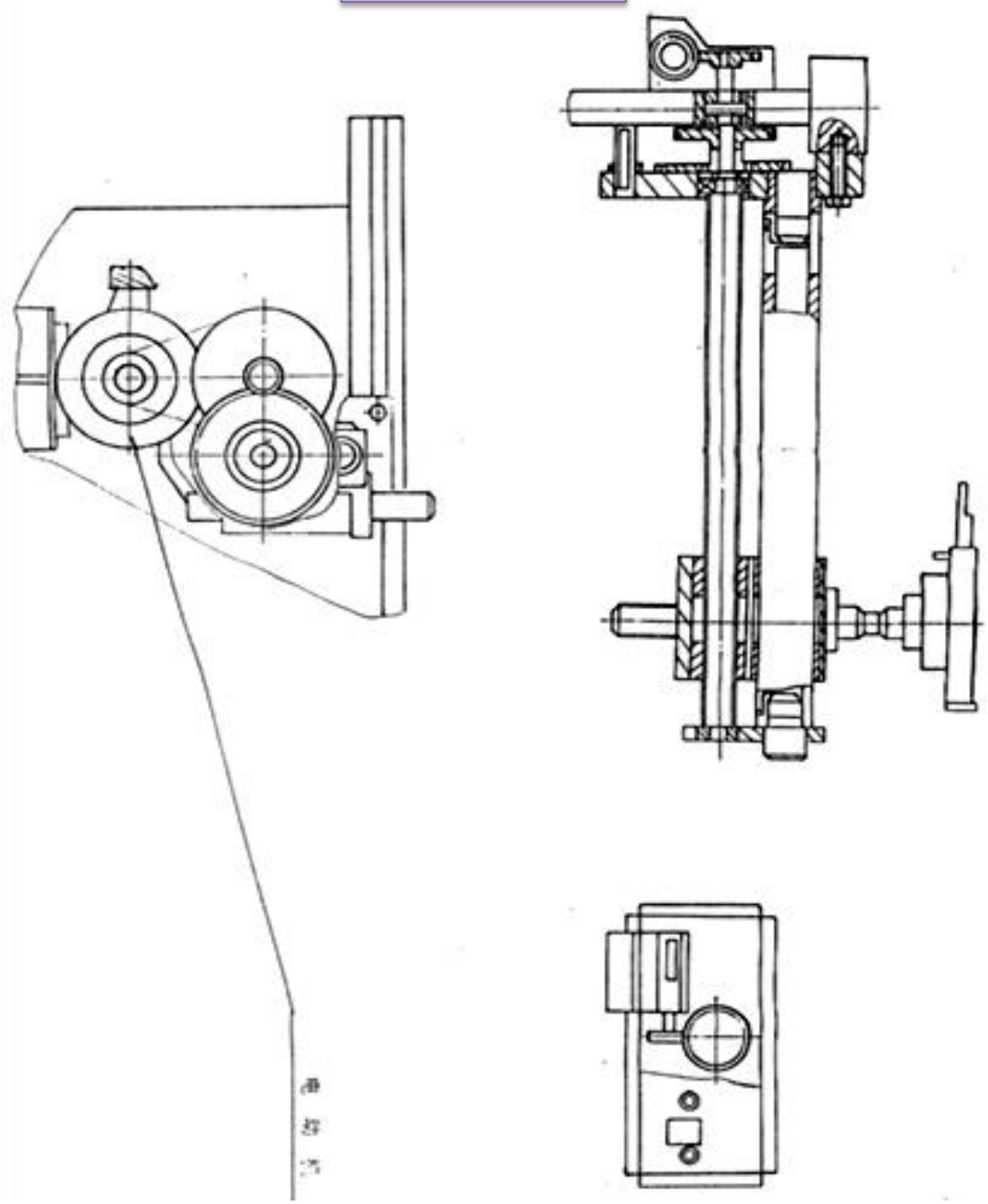
7. dies

It is made of alloyed steel through forging, heat-treating, milling and grinding. The upper-lower dies are spliced with several short dies .It has the characteristics such as high precision, good interchangeability and convenient for handling.(see fig)

The Hydraulic system:

Motor, pump, valve and so on are installed on the fuel cell. We have adopted oil filling valve structure that would guarantee the hydro cylinder is fulfilled with fuel when the ram is returning rapidly. On the other hand it will improve the ram speed and saving energy. The adjusting of working speed and working pressure can be accomplished with baffler and remote pressure regulating valve.

Back gauge



Ⅳ、Hydraulic principle

The working principle of the hydraulic system is as following:

The main motor drives axial piston pumps that is dextro rotation. The oil flowing into valve table, magnet-valve and return to fuel cell through suction line at the same time. The lower cavity oil of oil-cylinder (16) is enclosed by valve (13) so that the ram can stop at any position. All electro-magnetic valves are idling at this moment. The ram is downward rapidly when the electro-magnet YV3 (9) is working. The speed is controlled by valve (7、8). The lower cavity oil of oil-cylinder (16) is flowing into fuel cell through valve (7、8). The upper cavity oil of the hydraulic cylinder is filled by fuel cell.

The YV5 、YV4、YV3、YV1 is working while the ram touched speed point; meanwhile, the valve 17 is closed. The ram is entering into working speed state.

The time of working stroke is depends on the position of safety switch and the pot of time relay. The working time of YV1 、YV4 is controlled by foot-switch so that spot-control can be realized. The valve 7、8 adjusting downward speed of the ram.

The YV5 should be reset . Then YV1、YV2、YV3 is working following. The ram is returning. The speed is constant.

The high-pressure overflow valve ensures the rated pressure of hydraulic system. The pressure can be readout from pressure gauge (6). The max working pressure is 20.5Mpa and exceeded it is dangerous and banned. The allowance pressure can be obtained with remote pressure regulating valve (18). The returning pressure also can be adjusted by overflow valve (10) within 12Mpa.

Hydraulic principle diagram (see drawing 1a)
Acting norm diagram (see fig 1)
The list of hydraulic components (see fig 2)

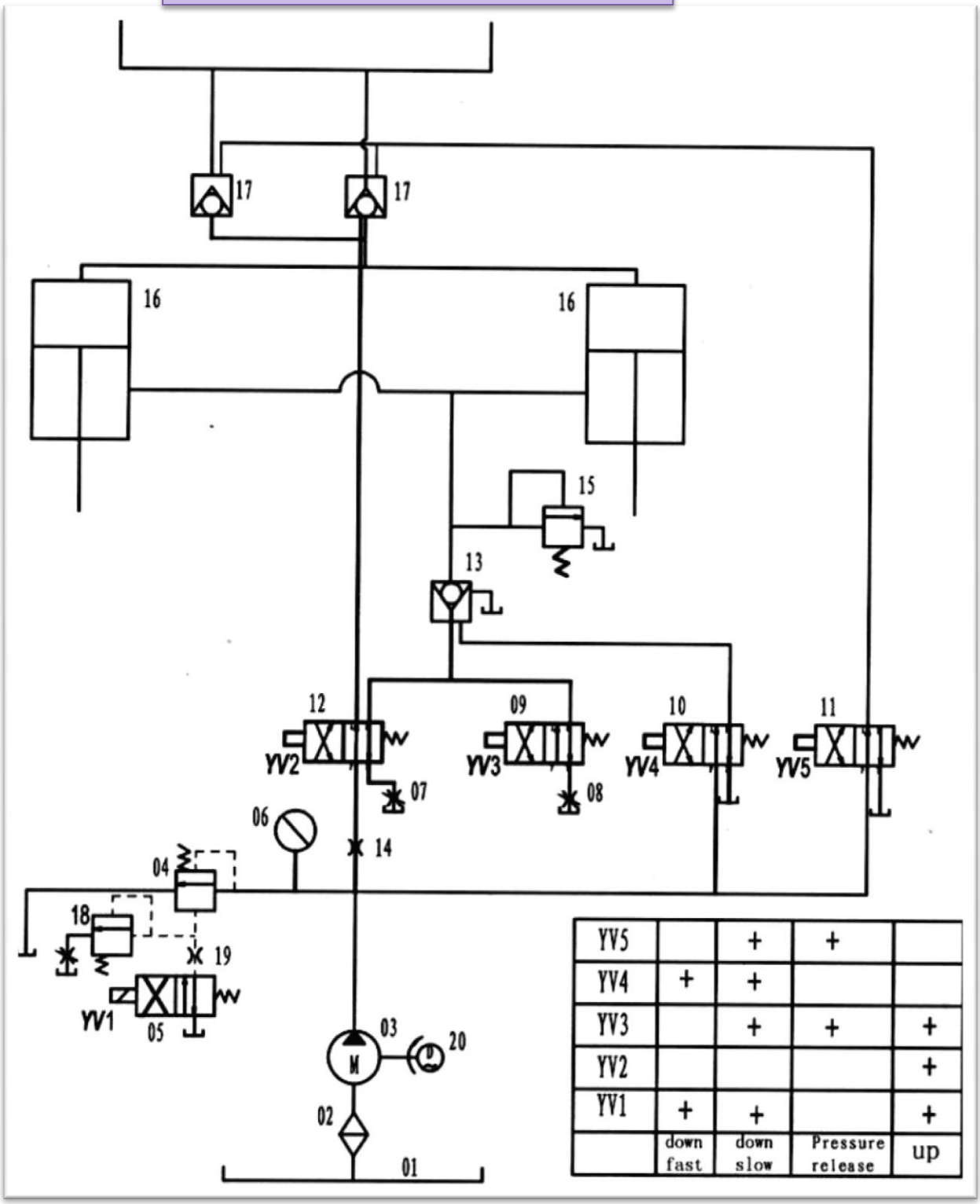
Add:.1.The oil must keep cleaning.

2.The motor can be starting only after you have filled the fuel cell with N32 or N46 hydraulic medium till oil-gauge center.

3.Replacing the oil after the machine has been used for first one month. Then replace it once a year or half a year.

norm contact	Freedom (upper limit of ram)	Ram down (rapid)	Ram down (slow)	Ram upward	Pressure release
YV1		+	+	+	+
YV2				+	+
YV3			+	+	+
YV4		+	+		
YV5			+		

Hydraulic principle drawing

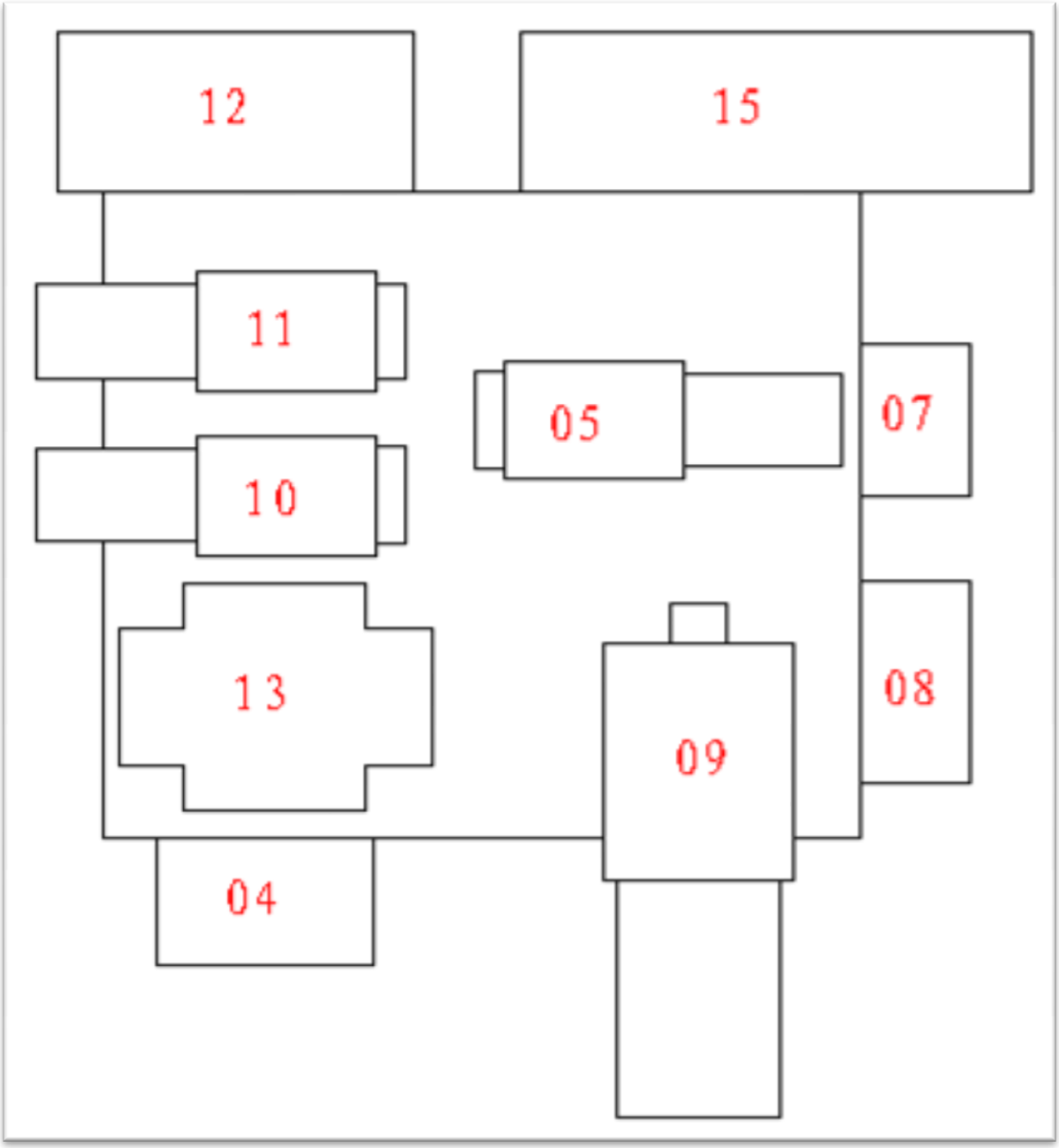


YV5		+	+	
YV4	+	+		
YV3		+	+	+
YV2				+
YV1	+	+		+
	down fast	down slow	Pressure release	up

Figure 2:the list of hydraulic elements

NAME	TYPE	SPECIFICATION	REMARKS
FUEL CELL			
strainer		WU-100×100-J	
Motor	Y132S-4	5.5kW	
Overflowing Valve	Y2-Hb10	Inner diameter 10	
Electro-Magnetic Change Valve	DHI-063/2/A-X	Inner diameter 6	
PRESSURE GAUGE	Y-100ZT-NZh		
BAFFLER			
BAFFLER			
Electro-Magnetic Change Valve	DKI-163/2/A-X		
Electro-Magnetic Change Valve	DKI-063/2/A-X		SELF-MADE
Electro-Magnetic Change Valve	DKI-063/2/A-X		
Electro-Magnetic Change Valve	DKI-163/2/A-X		
Hydraulic Oneway Valve	A1Y-HB10B		
BAFFLER			
Overflowing Valve	Y2-Hd10		
PISTON CARBOY			
Hydraulic Oneway Valve			
Remote pressure regulating valve			
BAFFLER			

Installation drawing of valve



Ⅴ、The electric system of the machine

1.General description ：The main power employ 3-pha 380V 40Hz while the controlling part adopts 1-pha 220V 40Hz.

Protection:(1)Both the main circuit and motors adopt air-circuit breaker to accomplish short circuit and overload protection.

(2)Controlling part use FUSE as short circuit protection.

(3)Every main element has been grounded.

2.Working style

This machine has two working styles. Each of them can be choosed by combined switch (SA2).

(1)Spot

Turn the combined switch on its spot position “↑˚”.The ram will be “downward slowly "with a bit distance when you step on the foot-switch “down”(S1).

It’ll be downward continuously when you step on the foot-switch again. Each downward distance can be adjusted by time-relay (KT1).The ram will return if you step on the foot-switch “up”.

(2)Single

Turn the combined switch on the position of “↑↓”. The ram downward rapidly first when you step on S1. When it touching safety-switch (SQ1) and then become slowly to reach its lower dead point. Step on the foot-switch “up”, the ram will return to its upper dead point after the time of

dwelling and discharging pressure has been passed .The single bending circle is finished finally.

3.The adjustment and operation of the machine

(1) Turn off power main switch (QF1) before open the electric box door. Then close it after turn on all the auto-switch (except QF1). Turn on QF1, the main power is on at the same time. Insert the key-switch's key and rotary 90°,the control-power is on while the indicating lamp is lighting. The whole power is on now.

(2) Starting the pump motor in a short time to check its steering. Changing power incoming line phase instead of internal linkage if needed.

(3)Turn the time-pot to its little value after the pump motor has running for a few minutes. Turn the combined switch on the "spot"position and step on the foot-switch"down"to see the"spot"working style is fine or not。 When this stage is finished, go on checking "single"

(4) Ram stroke adjustment, ig adjusting clearance between dies, it must be suitable. Otherwise the bending precision will be influence.

Before adjusting the die clearance you must make sure that ram is stopped on its dead point.

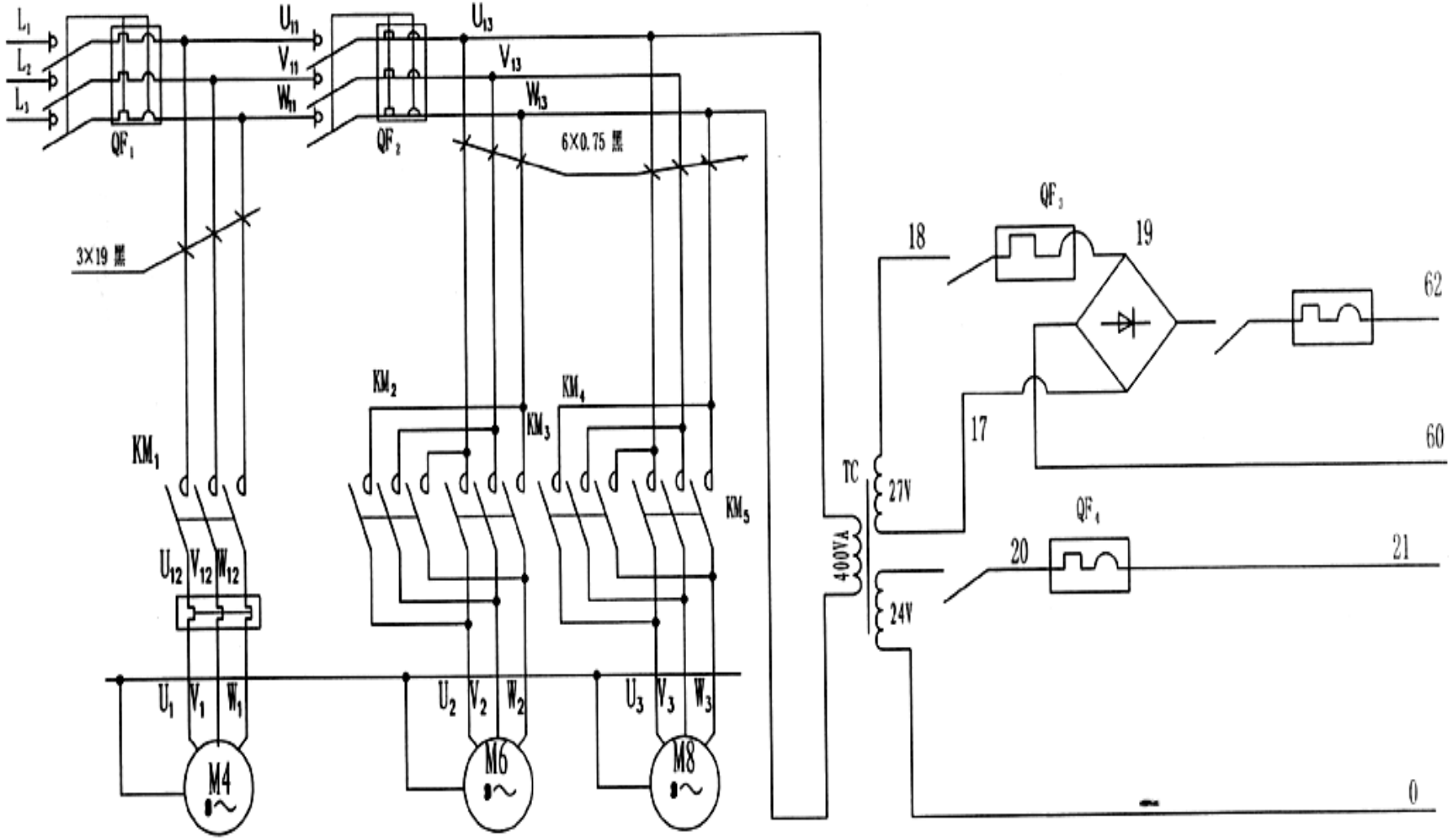
(5)The machine sudden-stop and power total stop

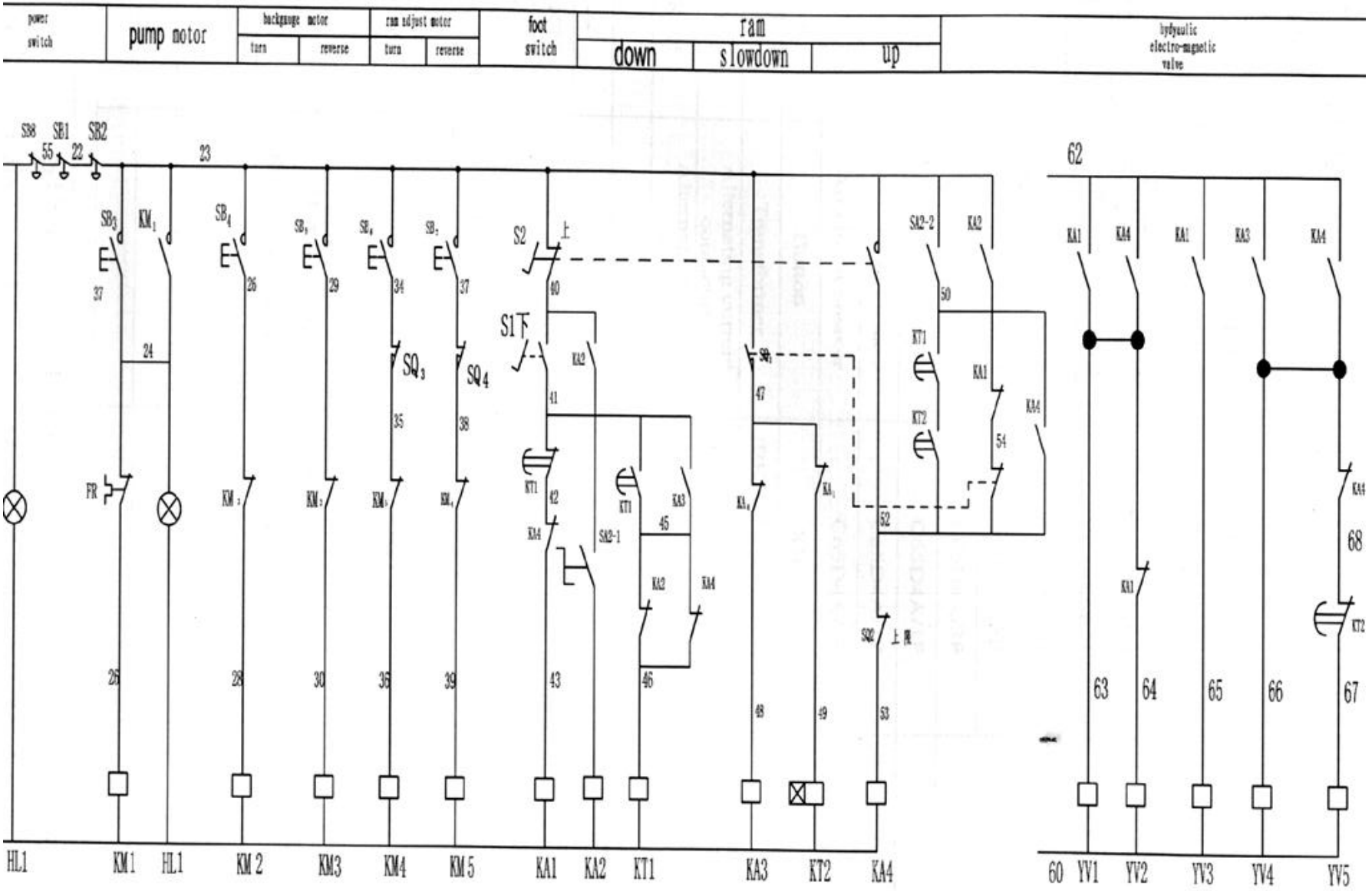
a. The machine will stop all motions immediately if you press the sudden-stop button (SB8), which is placed on the electric box.

b. The machine power will shut off when you turn the key-switch on its "OFF"position.

Add 1:electric principle drawing

power switch	pump motor	backgauge motor		ram adjust motor		TC	power lamp
		turn	reverse	turn	reverse		



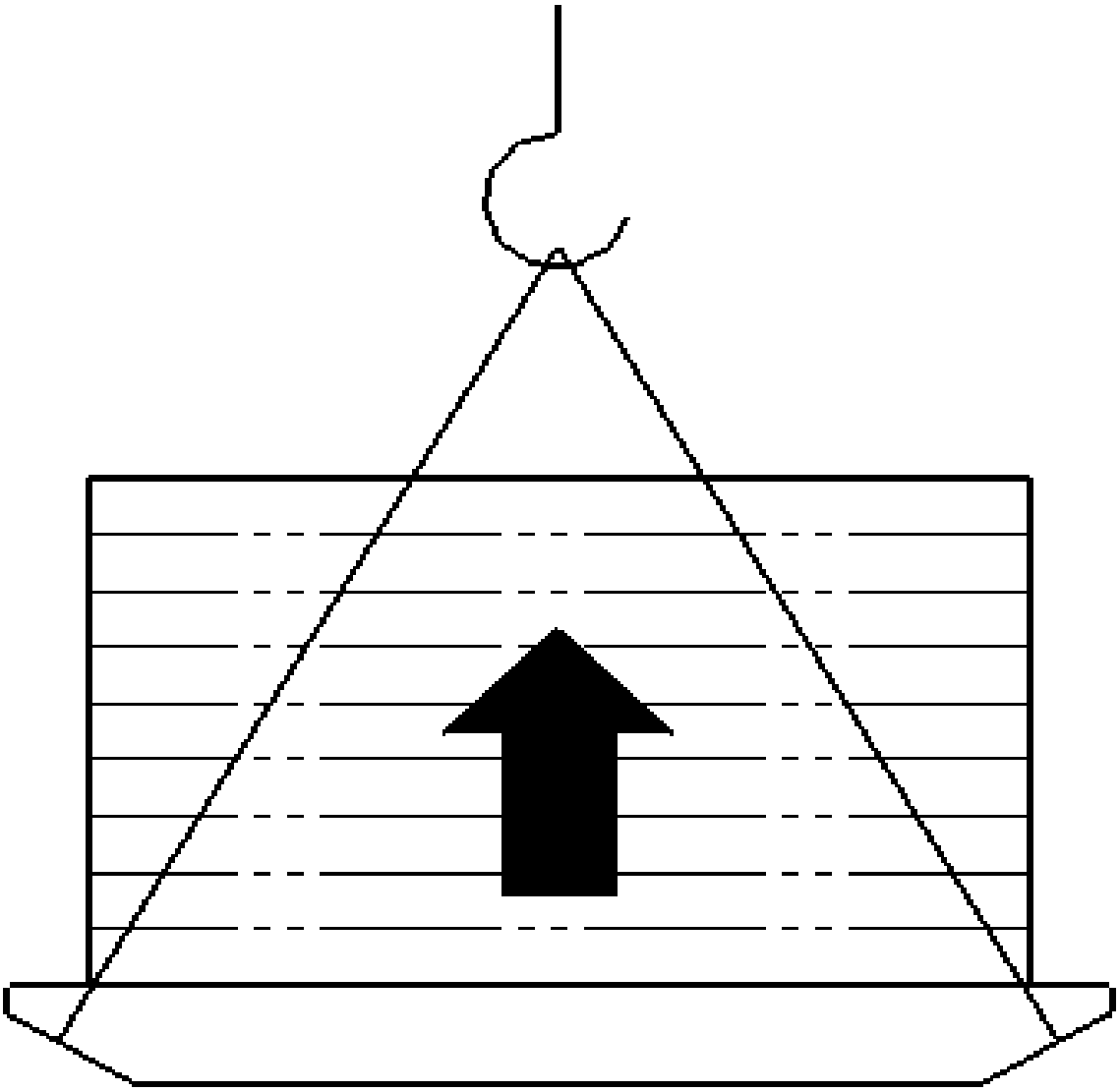


Add figure 1.the list of electric components

CODE	NAME	TYPE	SPECIFICATION	QUANTITY
M1	Alternating current asynchronous motor	Y132S-4 B5	5.5KW	1
M2	Alternating current asynchronous motor	YU-6 B3	0.55KW	1
M3	Alternating current asynchronous motor	AO2-6324 B3	0.25KW	1
QF1	Air circuit breaker	C65D/3P		1
QF2	Air circuit breaker	C65D/3P		1
QF3	Air circuit breaker	C65D/1P		1
QF4	Air circuit breaker	C65D/1P		1
QF5	Air circuit breaker	C65D/1P		1
SB1-8	Button	XB2BA21		8
TC	Transformer	JBK3-240VA380V/24V		1
KM1	Alternating current contactor	LC1D 1810/380V+DN20		1
KM2-KM5	Alternating current contactor	LC1D06601/380V	24V	4
S1 S2	Foot-switch	YDT1-14		1
KT1 KT2	Air time relay	LA3DRO	10S 24V	1
SA2-1 SA2-2	Tumbler			1
HL1 HL2 HL3 HL4	Single lamp	XB2BVM1/220V		1
SQ1 SQ2	Safety switch	JWL1-11		2
FR	Thermal relay	LR2D1321+LA7D1064		1
SB1 SB2 SB8	Sudden-stop button	XB2BS+BE102		3

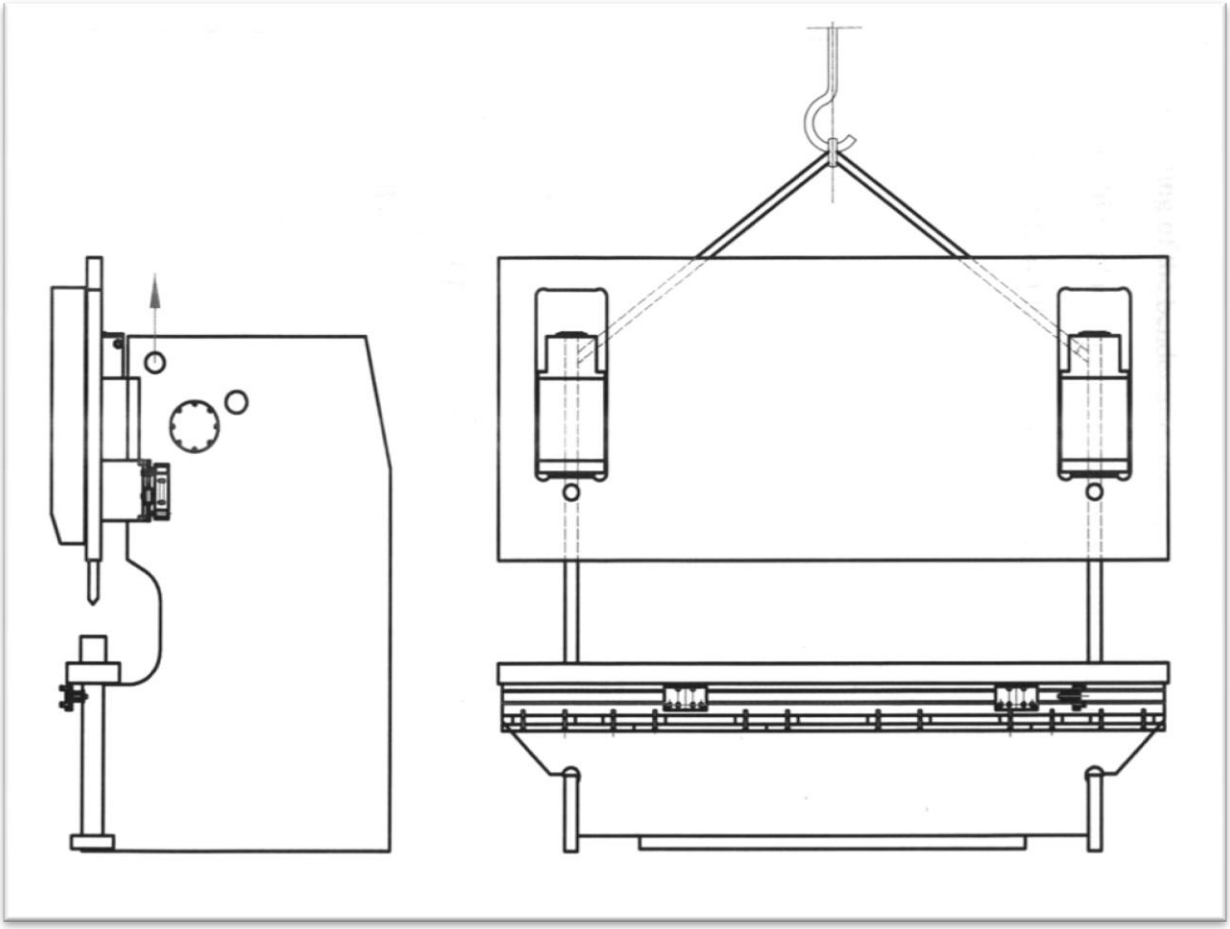
Ⅵ. The Lifting And Installation of The Machine

1. The lifting of the bender after packing just as following:



The Lifting of the bender after gating just like drawing

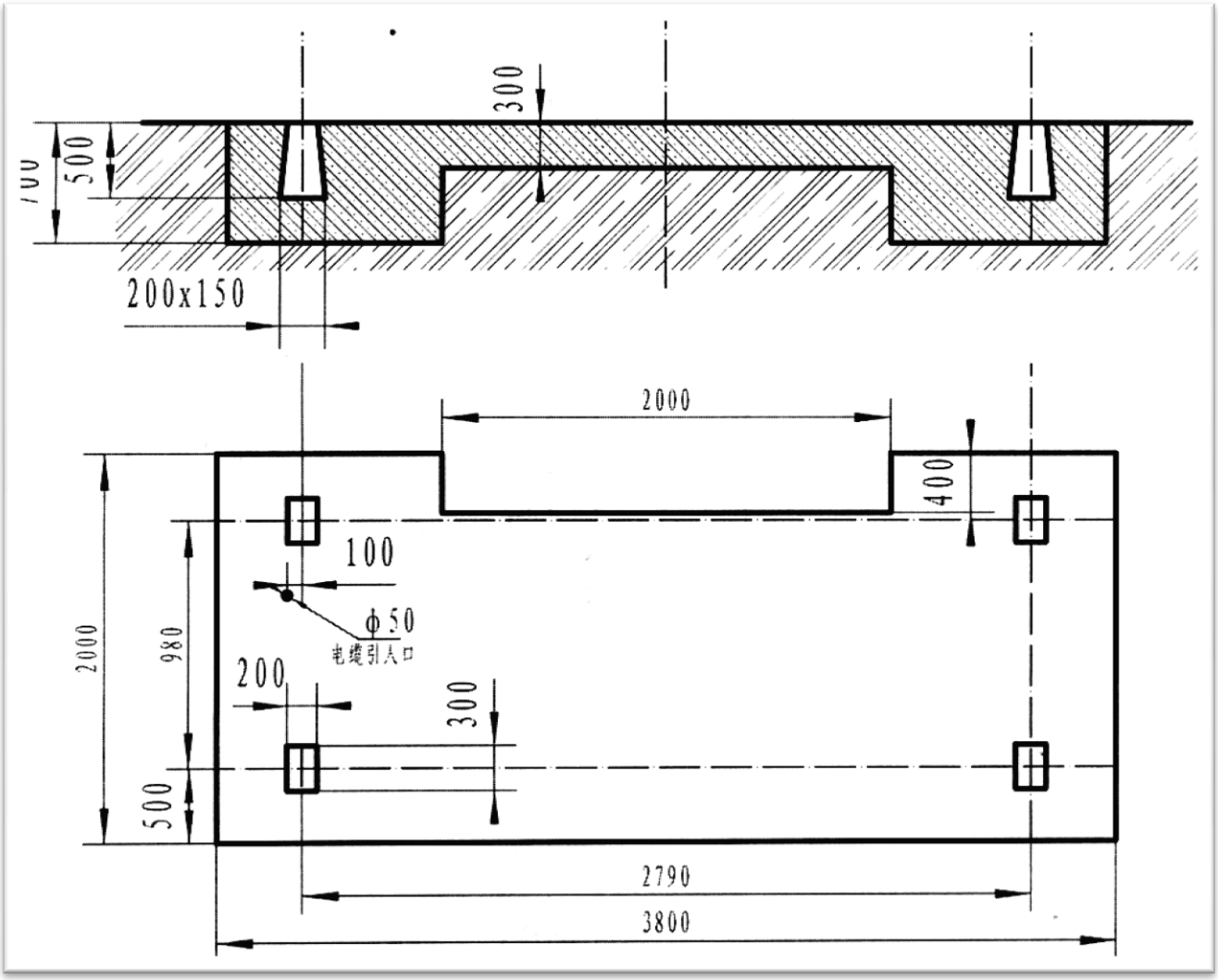
The touching place between steel wire rope and machine surface must cushioning with soft thing in order to protect painting during lifting



2. INSTALLATION OF THE MACHINE

FIG 7:Foundation drawing

Place the machine on the foundation and mount barbed bolts at the same time. Finally grout. The crisscross level should be calibrated with level gauge when the cement is solidified. It can’t big than 0.3mm on the crisscross level within 1000mm in every direction.



Ⅵ、THE MACHINE ADJUSTMENT

The adjustment of bending angle

This bender can bend different kinds of angle with the same die set. The adjusting manner is as following:

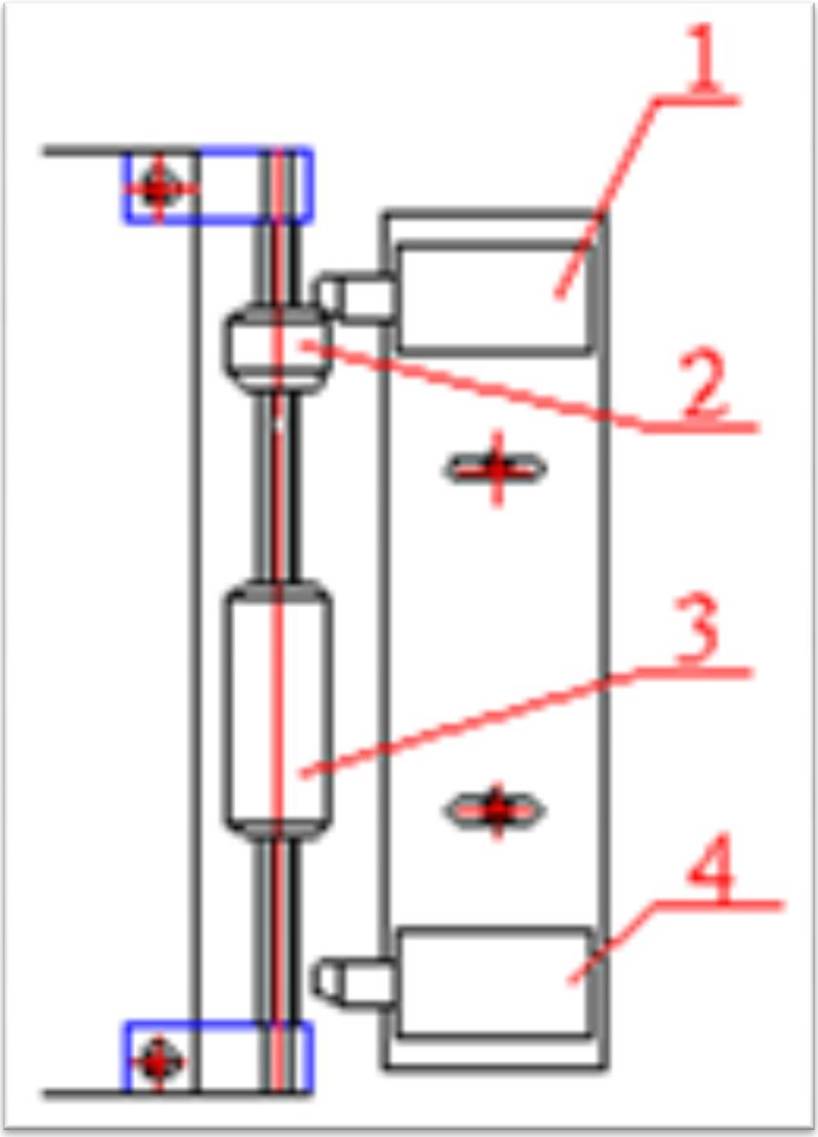
(1)The plate bending angle can be increasing or decreasing by making the mechanical stopper up or down.

(2)We can increase its productivity by adjusting the upper stroke.

See fig 5:

Loosen the two screws that fitted on the upper limited safety switch regulating board to make it up or down for a short distance. Then wringing the screws. However, the upper stroke is increasing or decreasing finally. But the safety switch can’t be higher than the upper limit mark. Otherwise it will cause accident.

(3) Working time adjustment (speed change point): The best working time is that when the distance between upper die and bending plate is about 3-5mm. If adjusting working time is necessary, loosen the regulating screw of feeding safety switch. The working time will increase or decrease by making the safety switch up or down for a short distance.



- upper over travel-limit switch
- upper limit spot
- feeding stroke spot
- feeding travel-limit switch

FIG5: the adjusting drawing of over travel-limit switch

Ⅶ. THE GREEN RUN AND OPERATION

1.The preparation before green running

The operator must be familiar with its main structure function and using method before green running.

2.Freedom running:

A: Step on the foot-switch “down”, the ram downward quickly. The ram will stop at any position if you release the footswitch before upper die reaches lower die.

B. Step on the foot-switch “up”, the ram will return. The ram won’t stop until it touching upper dead point.

C. Adjusting the ties to the suitable position and fixed.

D. The different bending requirement can be obtained by adjusting the regulating screw of mechanical spot or the feeding safety switch.

E adjusting the feeding regulating board as fig 5 to make the ram transformed into feeding state just when the upper die touching the plate.

(2) Loading running: the bending pressure should be increased generally during the green running process. Try to bend plates till you feel satisfactory.

3.checking the following items during green running

(1) Is each part of the bender working normal? All the motions： ram quick down ,feeding, bending, ram returning, and sudden stop, are they reliable enough?

(2) The noise of the pump and valves must be normally. The oil leakage is not allowed. The oil temperature is within 30-40^{o}C. Its max value is not exceeding than 60^{o}C.

(3) The machine can be used as normal after all the problems have been solved.

Ⅷ. THE SAFETY TECHNOLOGY AND MAINTENANCE

1.Every operator and repair attendant must read the guider carefully and understands its key meanings.

2.When many people operate the machine, the foot-switch can be step on only after the safety is confirmed.

3.The ability of bearing single-end loading of this machine is not very strong. The bending plate should be placed on the middle of the machine. The load≤1/4 nominal pressure if the single-end working is necessary. The two ends should bend at the same time in order to avoid single-end loading problem.

4. Choose the die gap size depend on the thickness of the bending plates. It is usually more than 8 times of material thickness.

5.The length of bending plate must longer than 1000mm if the working pressure is at max state.

6.The working pressure must less than nominal stress 20.5Mpa.

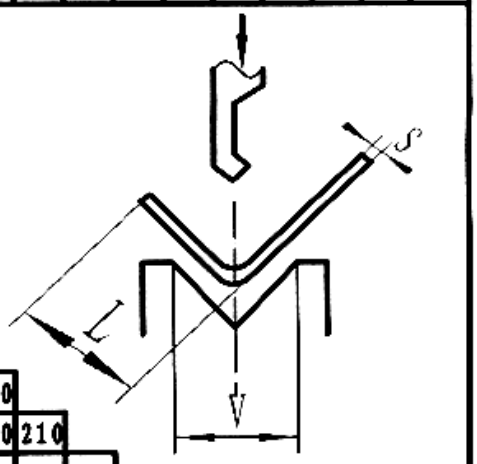
7.You must adjust the clearance between dies equivalent. Nothing else is permitted to place on the die or the working table during working process.

8.The electric insulation and grounding must be finely.

9.You should keep the bender cleaning. If you find any unusually problem, stopping it and checking it immediately.

10.Our machine use N32 or N46 mechanical hydro-medium. You should choose it according to the different temperature. Changing it after first three month, and then change it once a year. You must clear it with filter; by the way, change the idea that new oil must be clean.

V	4	6	8	10	12	14	16	18	20	24	28	32	36	40	45	50	55	60	65	70	80	90	100	120
R	2.8	4	5.5	7	8.6	10	11	12.5	14	17	20	22	25	28	31	35	38	42	46	49	56	63	70	85
R	0.7	1	1.3	1.6	2	2.3	2.6	3	3.3	3.8	4.5	5	6	6.5	7	8	9	10	10.5	11	13	14	16	19
0.5	40	30																						
0.6	60	40	30	30																				
0.8		70	50	40	30																			
1		110	80	70	60																			
1.2			120	100	80	70	60																	
1.5				150	120	110	90	80																
2					220	190	170	150	130	110														
2.5							250	220	240	170	150	130												
3								300	290	260	210	180	160											
3.5									400	330	290	250	220	200	180									
4										440	370	330	290	260	230	210								
4.5											470	410	370	330	300	270	240							
5												510	450	400	360	330	300	270	250					
6															520	470	430	390	360	340	300			
8																		700	640	600	520	460	420	
10																					810	720	650	
12																							950	780
14																							1300	1100



caculating formula:

$P=650S^2L/V$ KN

S——plates thickness mm

L——plates length mm

V——lower die openning gap mm

1. The caculating formula together with the list value is based on the tensile strengh $\sigma_b=450N/mm^2$. With other materials, the bend pressure is caculated with following factor:

bronze(soft): 0.5 stainless steel: 2.0 aluminium: 0.5

sichromal steel: 2.0

2. The list value is based on the length is 1m:

example: S=2.5mm L=1m V=24mm

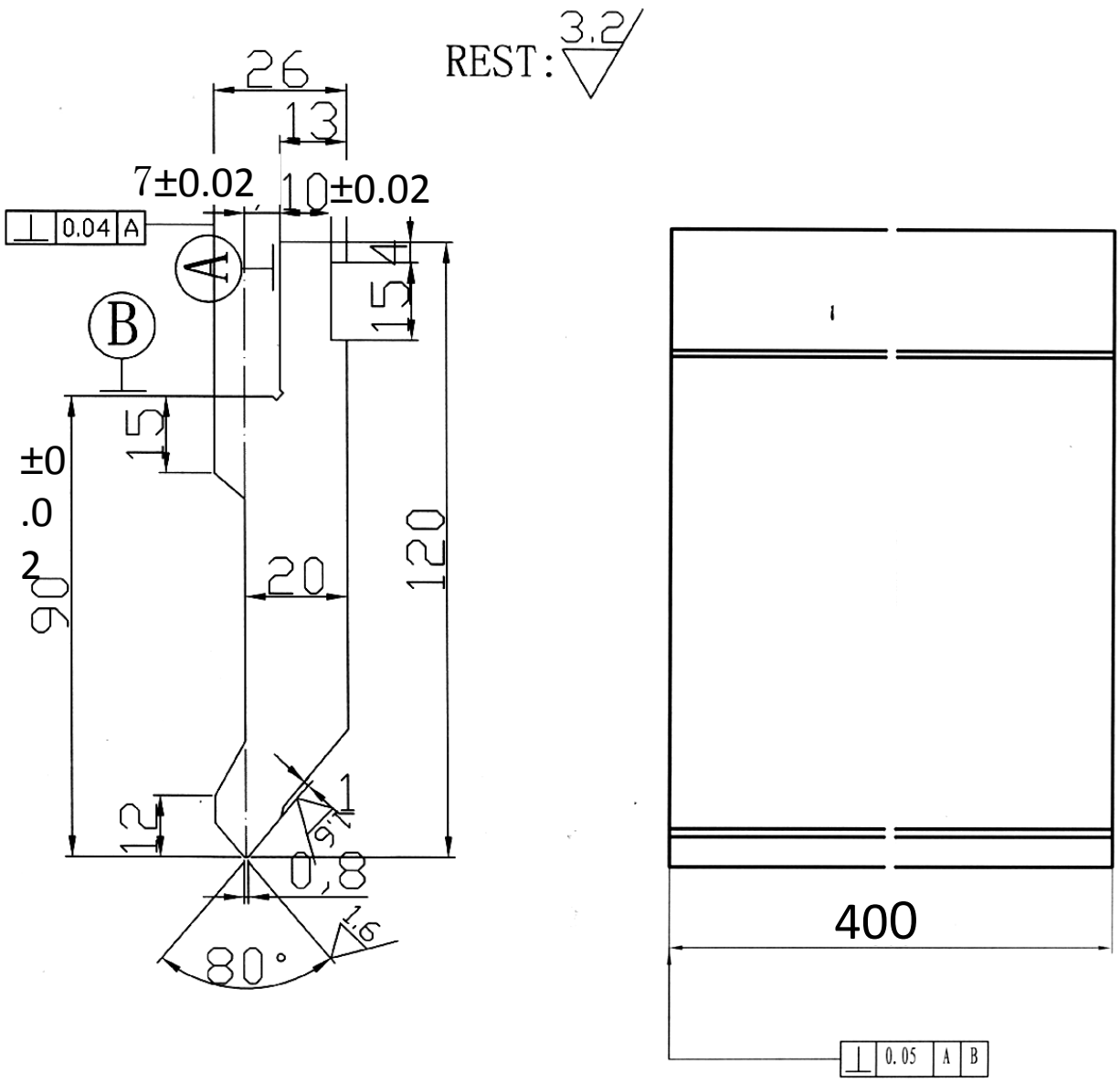
result: P=170KN

Technical demands

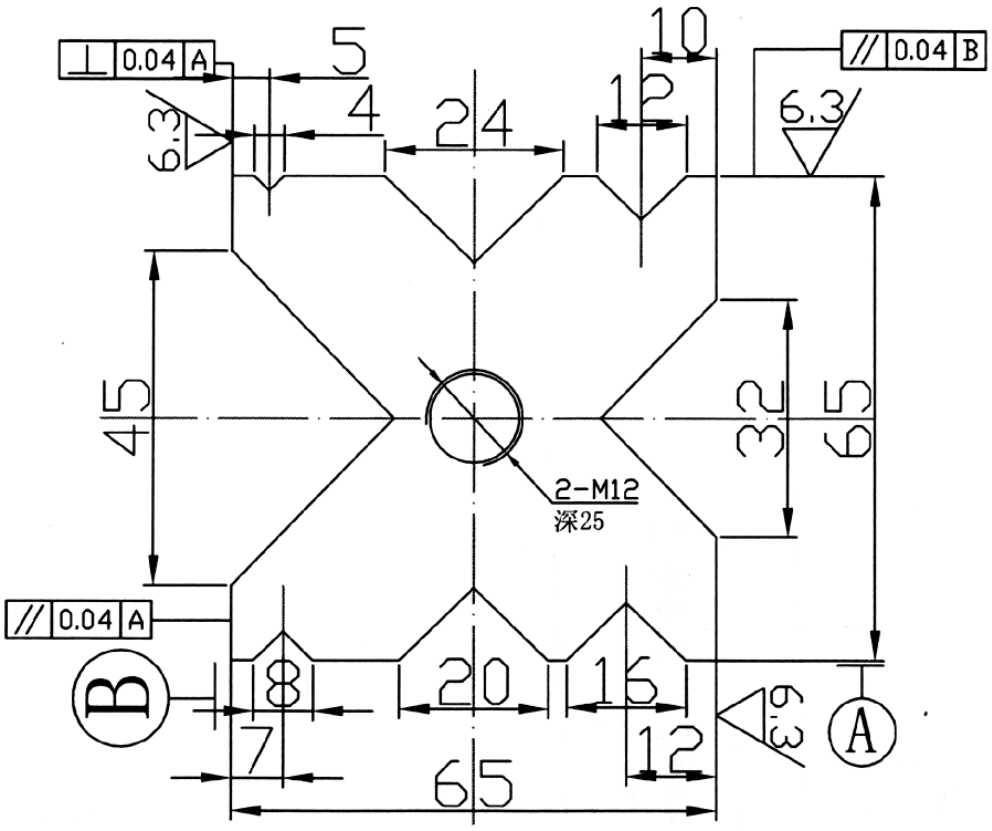
1.heat treatment:T235

2.non-round R0.5,every pieces in the same high

3.this die L=2500mm every piece L=400mm



REST: 3.2



Technical demands

Technical demand:

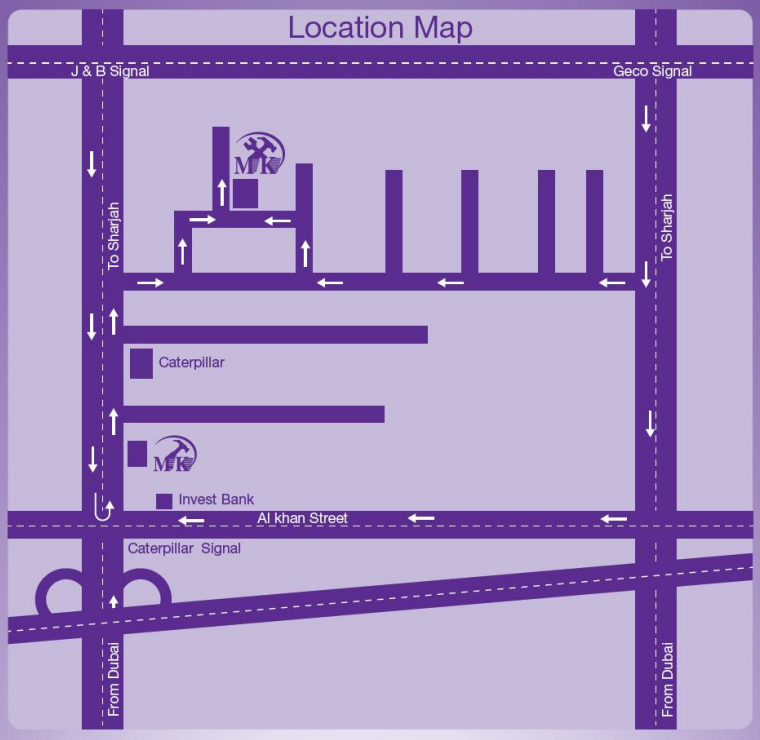
1、heat treating T235

2、rest"V"shap gap angle is 88° ,dap round R0.5 with overall length, the allowed tolerance is 0.05mm

3、each parallelism between each"V"shape and its correspondent base must be less than 0.10mm

Add: Clearing of fault

FAULTY EVENT	MASTER SHEET	REPAIR MANNER	
No oil out from pump, ram is motionless	The rotary direction is wrong	Checking the incoming line phase	
Casting leakage	The damaging or maturing of the caulking ring	Change caulking ring	
The chatter of machine and pipe line	The oil volume of the fuel cell is not enough or the strainer is blinding	Cleaning the strainer or refill the fuel cell to its oil gauge center	
The hydraulic circuit can't establish pressure	The electro-magnetic valve can't commutation or the spool of electro-magnetic overflow valve and hydraulic-one way valve is jamming	Ensure the power of the electro-magnetic valve is connected finely and dismounting each spool for cleaning	
The ram is climbing during downward	The opening volume is too small or the oil-temperature is lower than 15	Adjusting valve(7、8), change its opening volume, running freedom to raise oil-temperature	
The ram can't stopped at any point, furthermore it also has glide action	The spool is jamming	Cleaning the valve(13)	
The downward speed is too quick or too slow	The opening volume of the cone valve is too big or too small	Adjusting cone valve(7、8) to make its opening value suitable	



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