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FOREWORD

Our CNC boring machine is under constant development. The equipment provided to you may not match the description in this manual, which just gives a general description of machine and can't be the credentials of equipment acceptance. Please note the following items before starting this machine.

- It is suggested that all the staff members related to the machine should read this manual book.
- The operator of the machine should be trained on the relevant technology or instructed by a special person.
- This manual introduces the performance, structural characteristics and operation of the machine.
- The manual reminds users of the safety precautions and typical methods of operation. Observance to the methods of operation can avoid the occurrence of accidents, reduce downtime and maintenance costs, so as to improve the utilization rate of machine and production efficiency.
- This manual book describes the items related to work injury prevention and environmental protection, etc. Users can supplement according to the specific circumstances of their country.
- This manual shall be placed near the machine, allowing easy access for the operator and the relevant maintenance personnel.
- In addition to the manual and the rules of accident prevention in the user countries, the operator must comply with the recognized reasonable safety operation standards.

Safe signs:

	Stay away from this location to avoid crushing and shearing caused by strong force.
	Do not open the electric cabinet or touch anything with electricity to prevent electric shock.
	Watch your hands when machine is running.
	Be careful not to get juried when machine is running.
	Stay away from this location to avoid injury caused by strong force.

Chapter 1 General Information

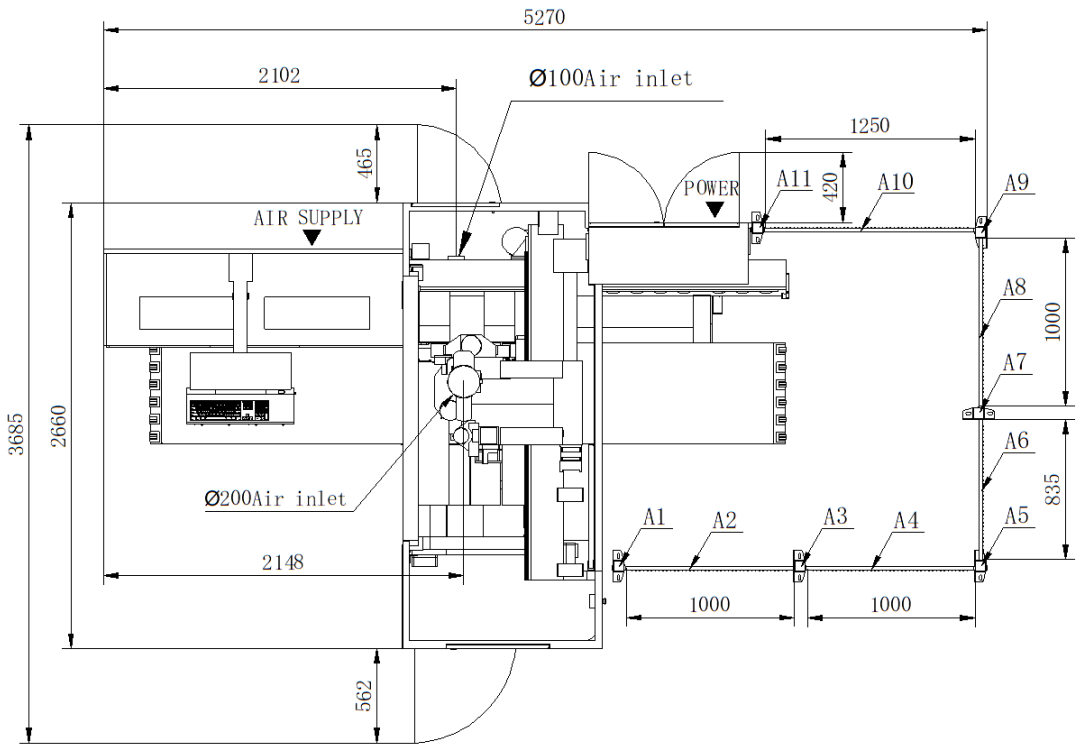
1.1 Machine Usage

This is an NC machining equipment featured in simple operation, high efficiency and high , with which to perform drilling, widely applied to all kinds of panel furniture .Machine was designed to operate on wood and similar materials. Metals are strictly excluded.

1.2 Technical Data

- **1.2.1 Plane dimension**

610Z/610HZ Plane Dimension



1.2.2 Technical parameters

Model	610Z/610HZ
Panel length	70～2800mm
Panel width	50～1000 mm 35～50mm(L≤1000mm)
Panel thickness	9～60mm
Max motion speed of clamps	140m/min
Max speed of Y axis	90m/min
Max speed of Z axis	50m/min
Max speed of B axis	75m/min
Max speed of C axis	30m/min
Number of tools	Upper drill: 12(V)+8(H) Bottom drill: 9(V)
Drill chuck spec.	Φ10
Spec. for upper-spindle tool handle	ISO30-ER32
Dust Connections	Φ200mm*1 Φ100mm*1
Overall size	5270L*2660W*2190H mm
Total power	21.9kW
Working pressure	0.6 MPa

1.3 Safe Operation Rules

Warning: Please carefully read the corresponding safety rules before operation and operate the machine in strict accordance with the safety regulations. If any doubt, please do not operate the machine without authorization, please contact the nearest dealer or machine manufacturer for help.

1.3.1 Safe operation rules:

（1）Specify professional operators;

（2）Prohibited to put mess on the working table;

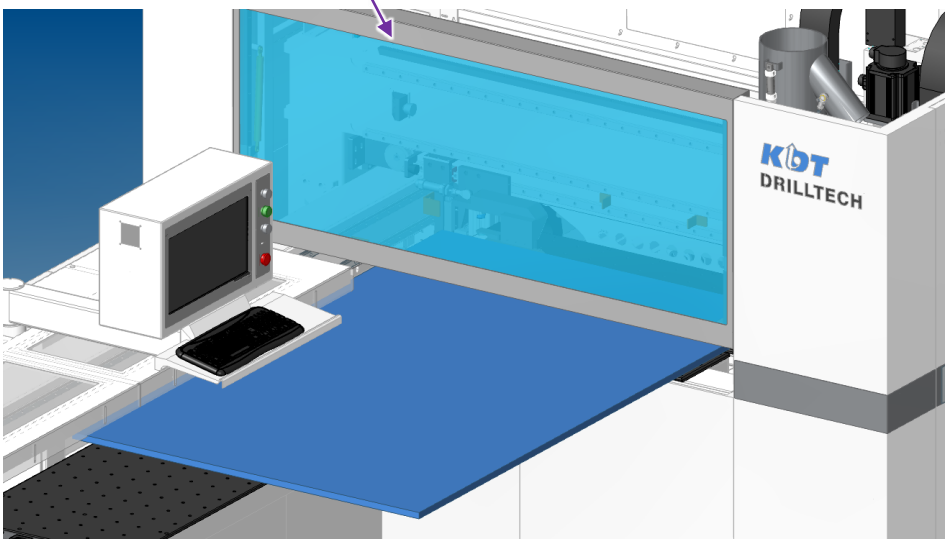
（3）Before enabling the machine, please ensure there are no extra operators or mess around it;

（4）It is very important to wear safety helmet and goggles. Gloves are not necessary to operate the machine.

（5）Keep machine and worktable surroundings clean and tidy;

（6）When abnormal alarm signal occurs, the operator should immediately stop all processing and timely solve the problem, until the problem is solved before operating the machine again.

	**During machine processing, the door must be closed to avoid improper operation and injury resulting from the collapse of knife or sawtooth flying out!**



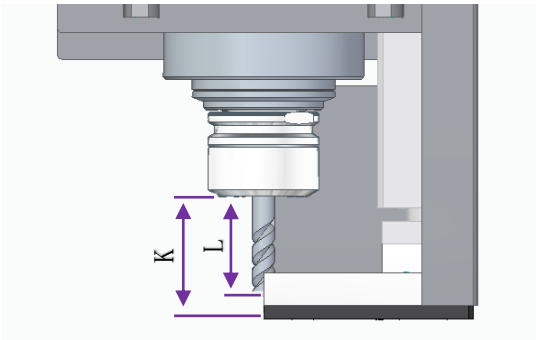
1.3.2 Safe operation rules for changing tools:

Please confirm the following items before changing tools

A Machine stops running;

B Press down an EMG stop button to lock machine.

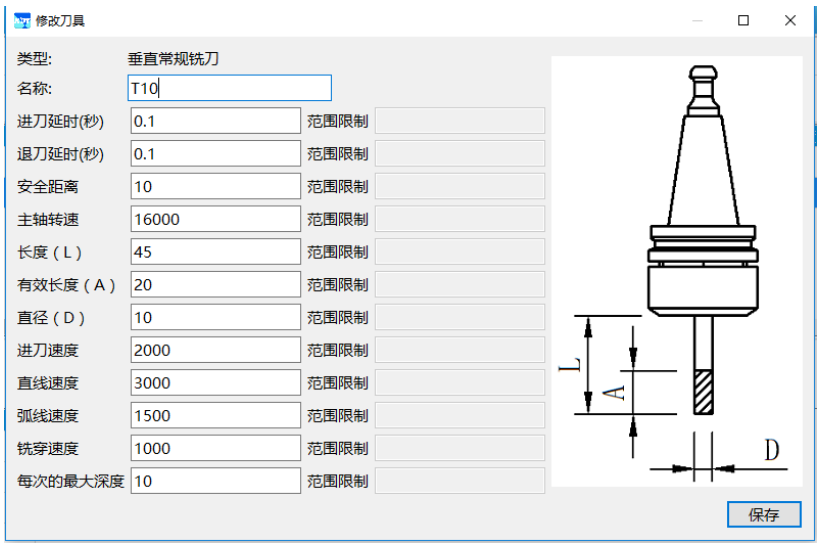
C Fix the collet in the tool holder, place the cutter in the tool holder and confirm to secure the tool lock.



⚠	**The tool installation length L shall not be greater than the distance K from the end face of the tool handle to the bakelite of the plate. L=40mm is recommended**

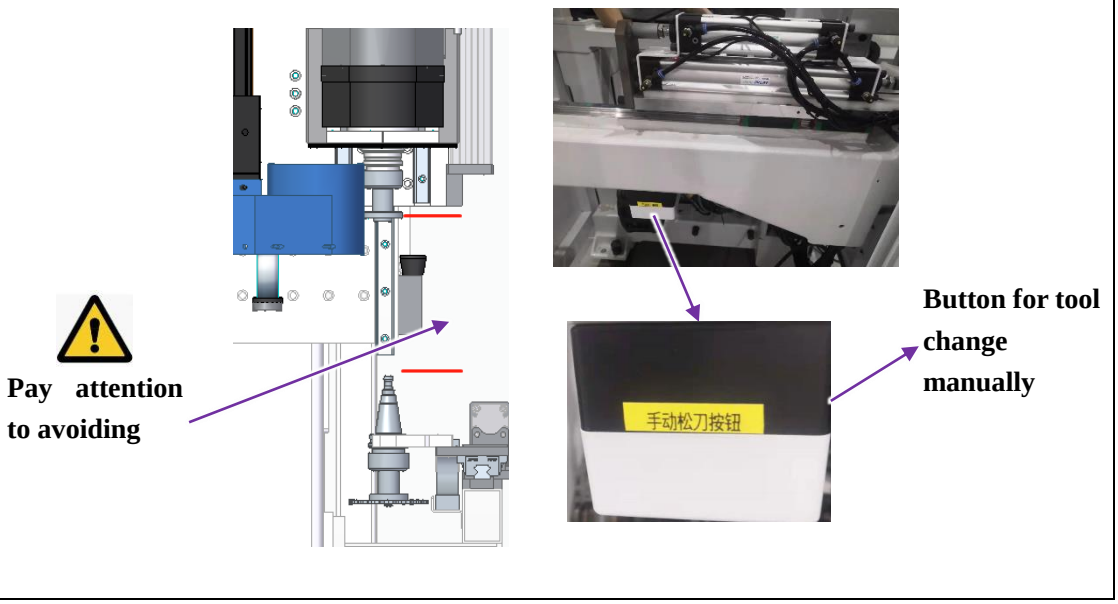
1.3.3 Safety operation rules for tool magazine

（1）Tool magazine in upper spindle has five positions. Under the situation of spindle has a cutter, at most four cutters can be placed in it, which can be chosen from vertical milling cutter, vertical Lamello milling cutter, horizontal Lamello saw blade, horizontal saw blade, etc. Cutters of other specifications can also be added in the tool magazine, then fill in the relevant size information and keep the size information accurate, otherwise the plate and machine may be damaged.



	The type of cutters filled in the tool magazine must be consistent with reality, otherwise plate and machine will be damaged and people get hurt!

（2） If changing the tool manually is needed, switch to manual mode, move the spindle mechanism to the right side (pay attention to adjusting the spindle height and avoiding tool magazine). After confirming the spindle is not rotating, hold the knife holder by hand, and then press the button next to the tool magazine to relieve the knife.


Pay attention to avoiding
手动松刀按钮
Button for tool change manually

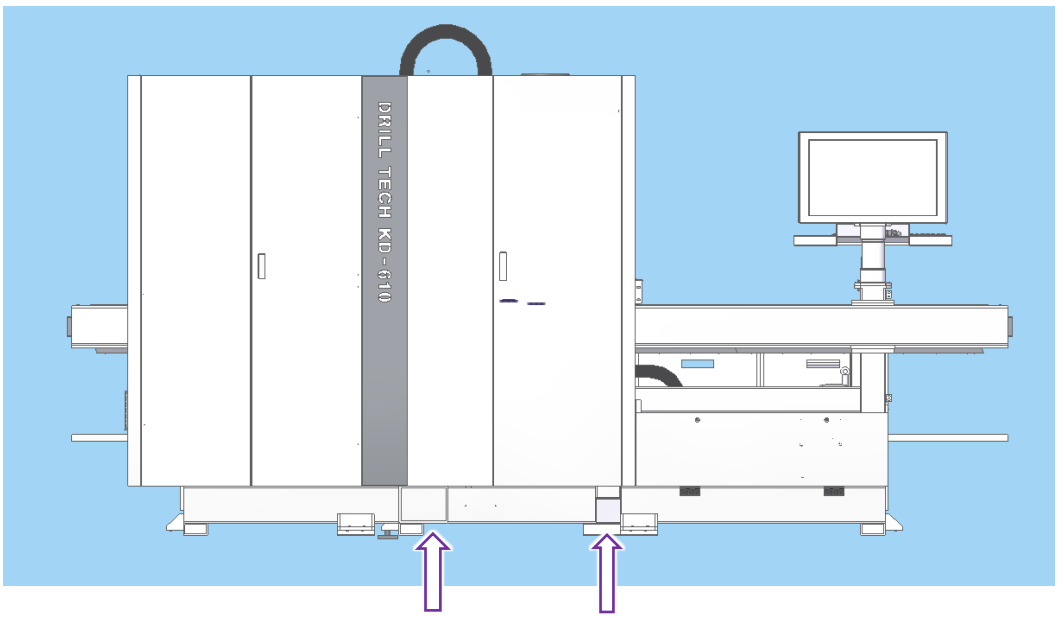
Chapter 2 Handling and Installation

2.1 Handling

Handling with forklift

Machine should be lifted by means of forklift, lifter arm inserts into to machine bottom, put some appropriate packing material on the gravity center, so as to protect machine from damage.

First, lift up one side by the forklift, place a wood block under, then lift up the whole machine. slowly and with the utmost care while preventing oscillations as much as possible.



2.2 Prepare the Site

This machine is a CNC equipment with high precision and electromechanical integration, in order to avoid precision error due to abnormal vibration in the process of operation, the installation site should meet the following requirements:

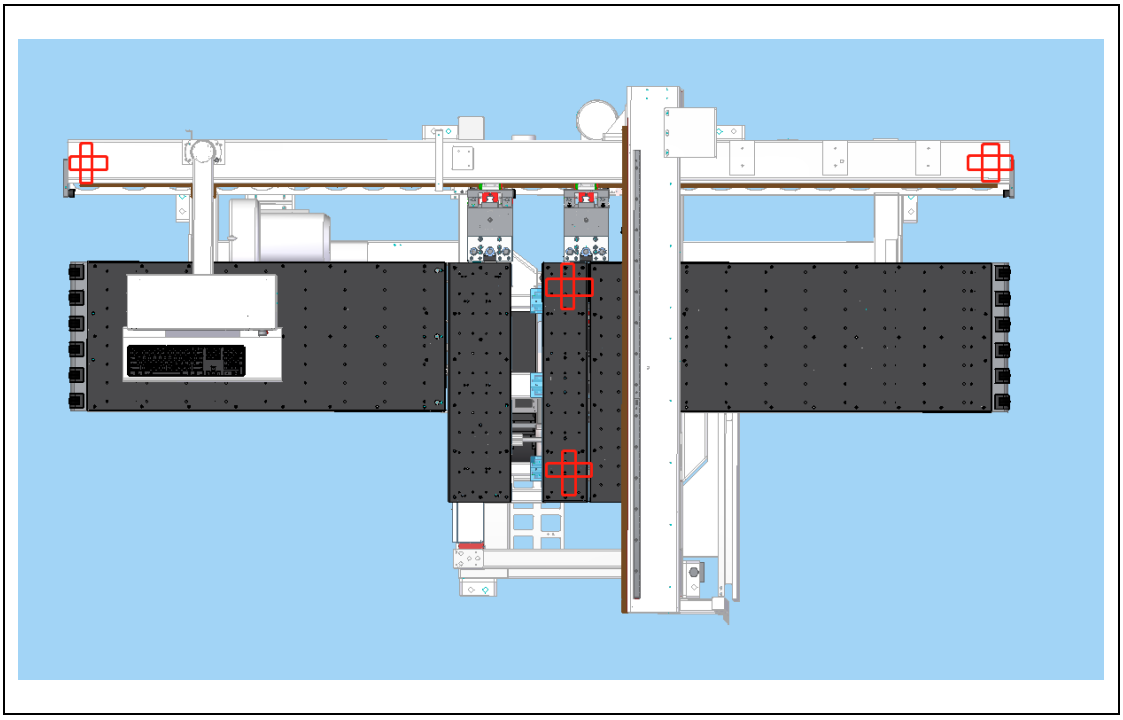
- The floor must be concrete with the thickness no less than 20cm and the bearing capacity should be greater than machine weight (about 4000kg).
- The machine should be installed at a place free from vibration, collision and shock, and be far away from the vibration source.
- The machine should be installed at a place free from rain. Installation in the open air is prohibited. to ensure running in correct environment so as not to damage the internal parts of the machine.
- To ensure correct use and maintenance operations in safe conditions, there must be enough operation space reserved in the factory site, and ensure there must be at least 2 meters away between machines or walls around. If necessary, it is recommended to delimitate an area marked by a yellow line on the floor, which must be kept clean and unobstructed around machine.

2.3 Machine Level adjustment

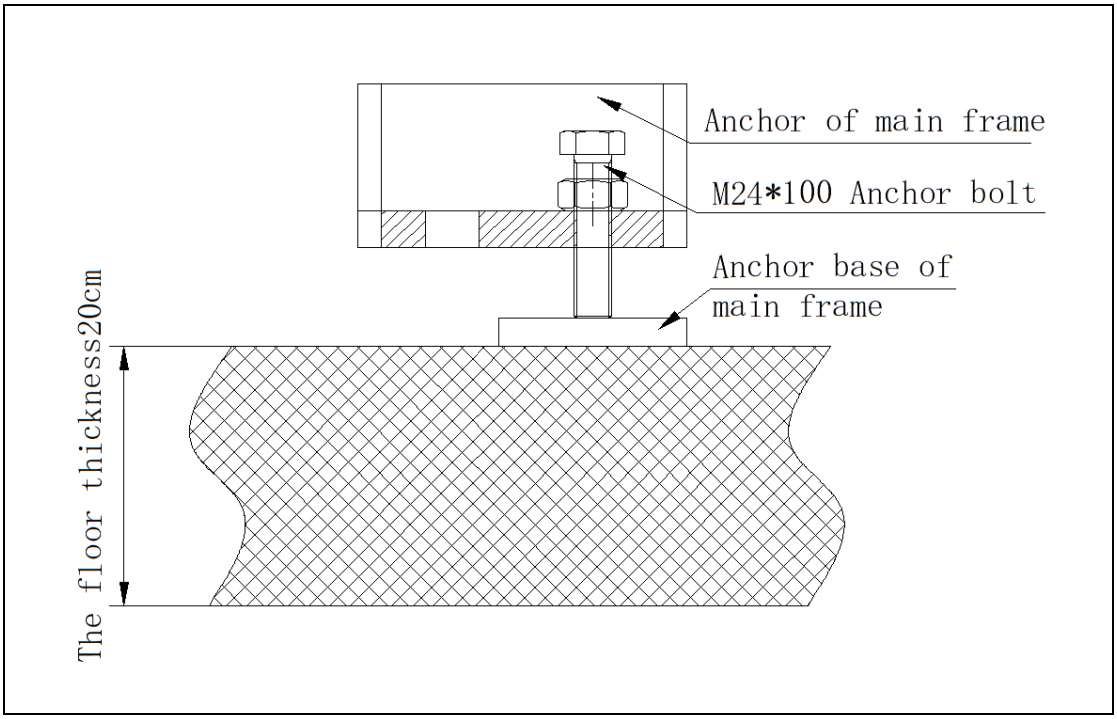
Adjust machine to be leveled:

Place the leveler in mid-worktable. Placement point of the leveler is at the vertical and horizontal positions in both ends of mid-worktable (see below figure), and adjust machine to be levelled by the Anchor Bolt

After machine is levelled, place the leveler at both ends of the clamp stroke to check if machine is in level; if not, please make slight adjustment.



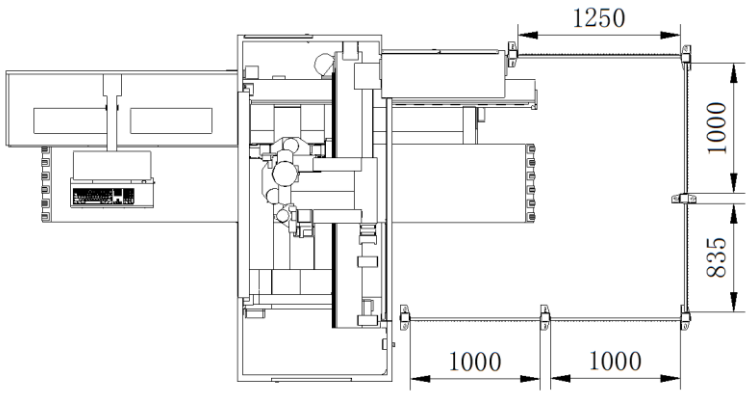
Adjust machine be levelled by anchor bolts

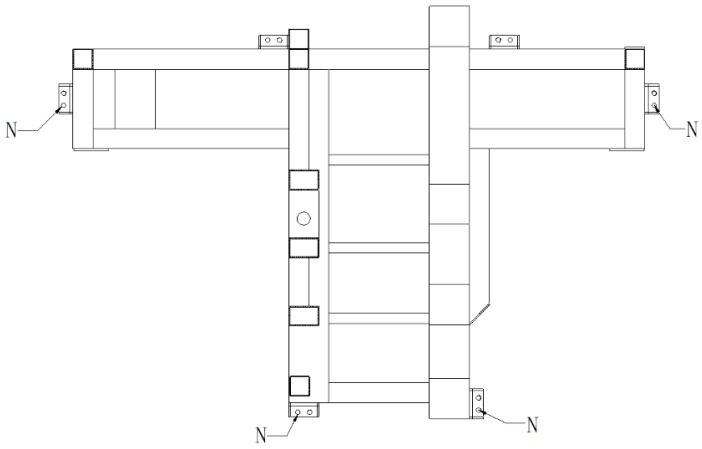


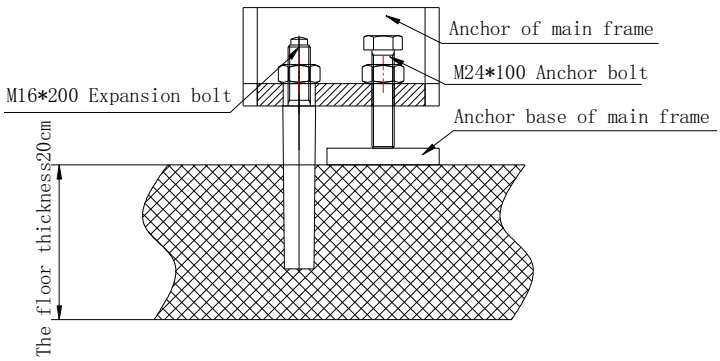
2.4 Fixation of expansion bolts

After the machine is adjusted horizontally, fix the base anchor on the mounting surface with expansion bolts. You are advised to use M16 * 200 expansion bolts for anchor bolts. Position N shown in the following picture is the place to fix expansion bolts.

It is recommended that M10*120 expansion bolts be used to fix the two supporting baseplates of each safety fence on the installation surface. To ensure the safety of the rear area when the machine is working, secure the safety fence according to the position shown in the figure.





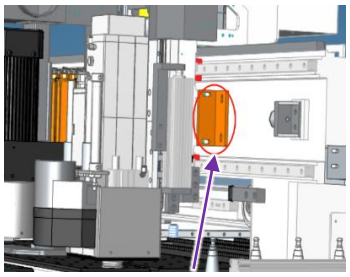
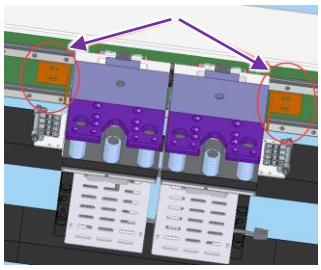
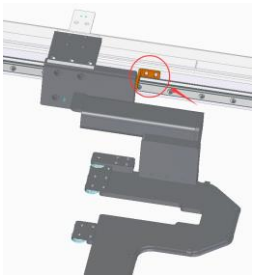


Expansion bolts for main frame

2.5 Removal of Fixing Plates

To prevent moving of drill unit, clamps, and side aligner along the clamp stroke when handling and transporting, they were fixed in the factory with plates as below images shown After the installation completed, please dismantle the fastening plates.

Open the machine's safety guards and find the identify fastening plates shown in below pictures.

<table>
<tr>
<td> 
Fastening plates in Upper Drills</td>
<td> 
Fastening plates in Clamps</td>
<td> 
Fastening plates in Side Aligner</td>
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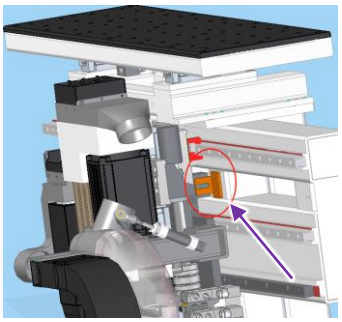
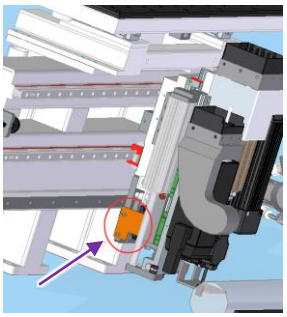
<td> 
Fastening plates in Bottom Drills</td>
<td> 
Fastening plates in Bottom Drills</td>
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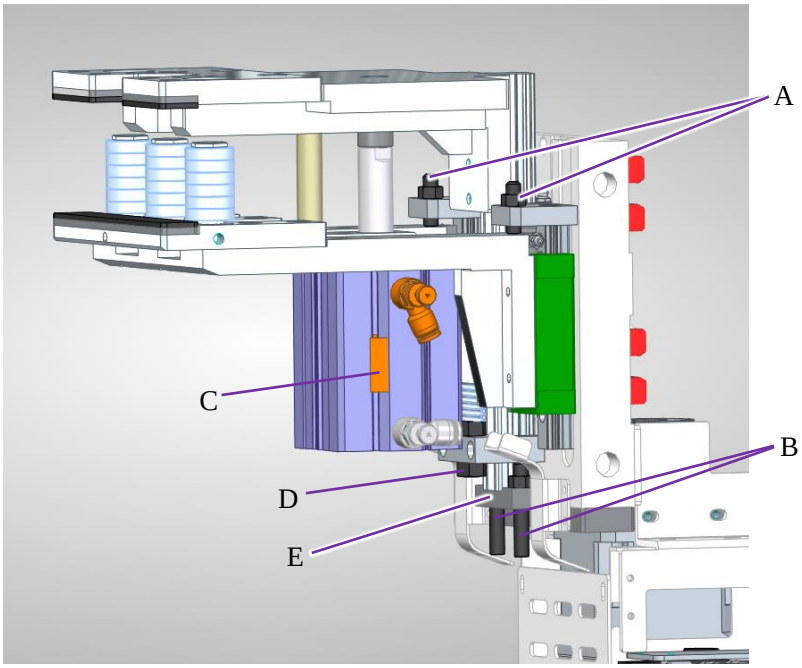
2.6 Clamps Space Adjustment

According to the thickness of workpiece, the open space of clamps could be adjusted by regulating screw underneath. And the adjust range is 36-66mm. Decrease of the open space can improve drilling efficiency.
Please be noted that the open space shall be 6mm greater than thickness of the workpiece, or there would be errors in out-feeding.

As shown in the following figure, there are 3 sets of adjusting screws in the clamps (Clamp X and A are the same). The adjusting screw 1 is used to adjust the upper limit of bottom clamp, and the adjusting screw 2 is used to adjust the lower limit of bottom clamp, while the adjusting screw 3 is used to adjust the upper limit of upper clamp, that is, the maximum open space of clamps.



A. Adjusting screw 1: Used to adjust the upper limit of bottom clamp

B. Adjusting screw 3: Used to adjust the upper limit of upper clamp(Max. space of clamps)

C. Magnetic switch

D Adjusting screw 2: Used to adjust the lower limit of bottom clamp

E. Block underneath clamp

Specific adjustment steps and matters to be attention are as follows:

（1） When clamps close: screw off nut 1to move bottom clamps downwards or upwards to an appropriate position, then screw up nut 1. At this moment, position of the bottom clamp is the upper limit of bottom clamp in close state. In this position, surface of bottom clamp should be about 0.1mm higher than the that of worktable, so as to prevent friction between workpiece and worktable during the movement,

（2） When clamps open: screw off nut 2, to move bottom clamps downwards or upwards to an appropriate position, then screw up nut 2. At this moment, position of the bottom clamp is the lower limit of bottom clamp in open state. In this position, surface of bottom clamp should be about 0.5mm higher than the that of worktable, so as to prevent collision with bottom clamp plates when workpiece is conveying transversely

（3） The open space of clamp is set to be 36mm in the factory, and the maximum space can adjust to be 66mm which can satisfy machining with 60mm workpiece. In practice application, the maximum spacing could be adjusted according to maximum thickness required in order to reduce the clamping time and further improve the machine’s efficiency.

As it is a big adjustment, it is suggested to screw up the nut 3 when clamp cylinder

is empty of compressed air., by this moment, nut 3 is against the upper parts, move the upper clamp downwards till it reaches the required open space, then screw up nut 3 to lock.

If it is once again to enlarge the open space, screw off nut 3 to an appropriate position and lock again. At the same time, please adjust position of the magnetic switch ensure the magnetic switch can sense position of cylinder rod when the upper clamp lifts up in place.

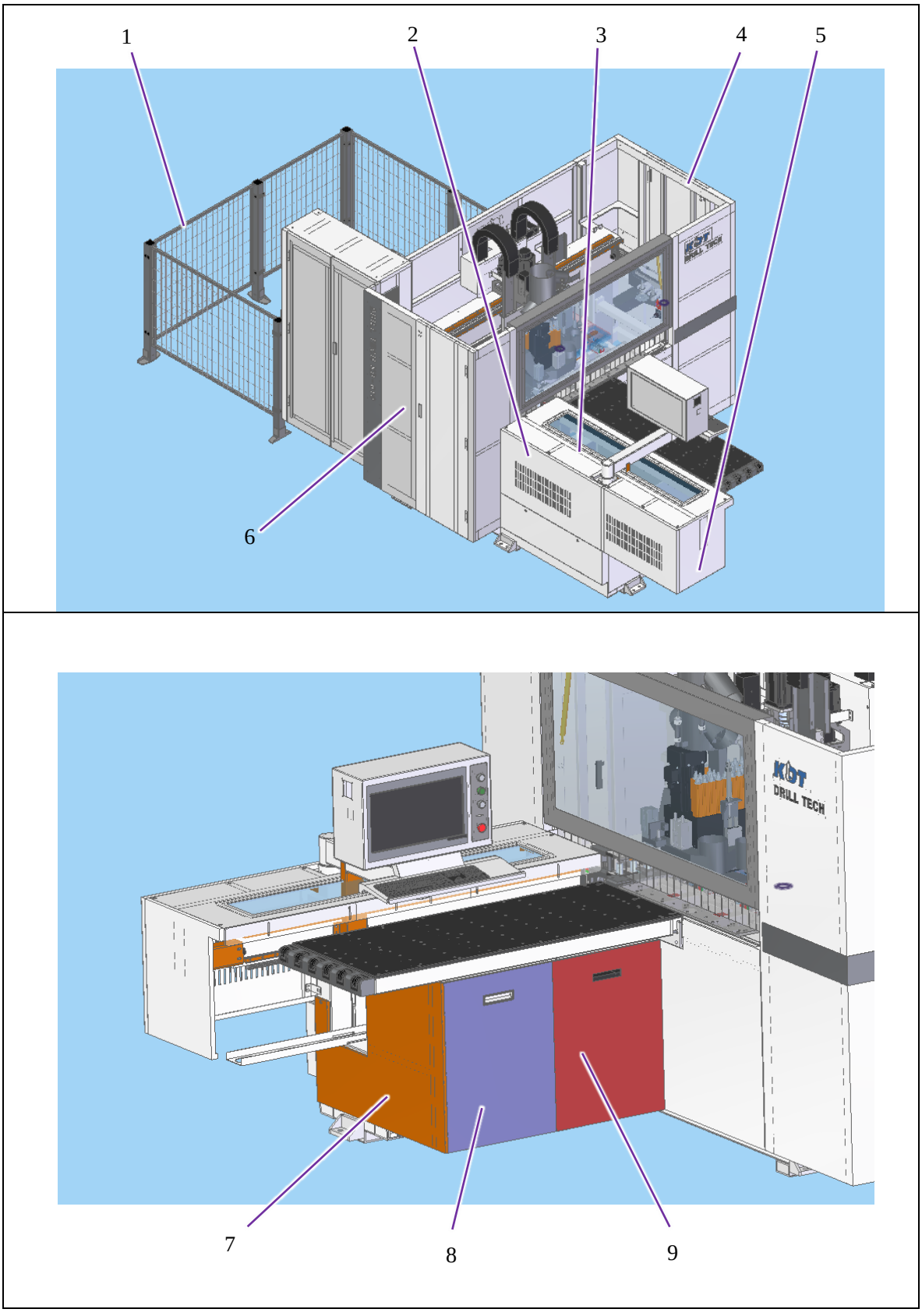
Attention: When adjusting the position of the magnetic switch, pay attention to moderate strength so as to prevent damage to the head of the screw, which would cause screw loose.

（4） Use the blunt end screw of M8*55 for adjusting screw, the screw that is longer than 55mm is not allowed. Otherwise, it would cause collision between parts and make the machine damaged. After adjustment, these two screws must contact the limit block at the same time, then lock the nut

（5） When adjusting the space to be 36mm -46mm, the locking nut should be above the bottom block underneath clamp. When adjusting to be 46mm-66mm, the locking nut should be locked under the bottom block, finally adjust the height of glass.

2.7 Installation of Covers

Before the machine is packed and transported, remove the right cover, left cover, front cover, front gripper guiderail cover, front towline cover, hanging board and fence first.

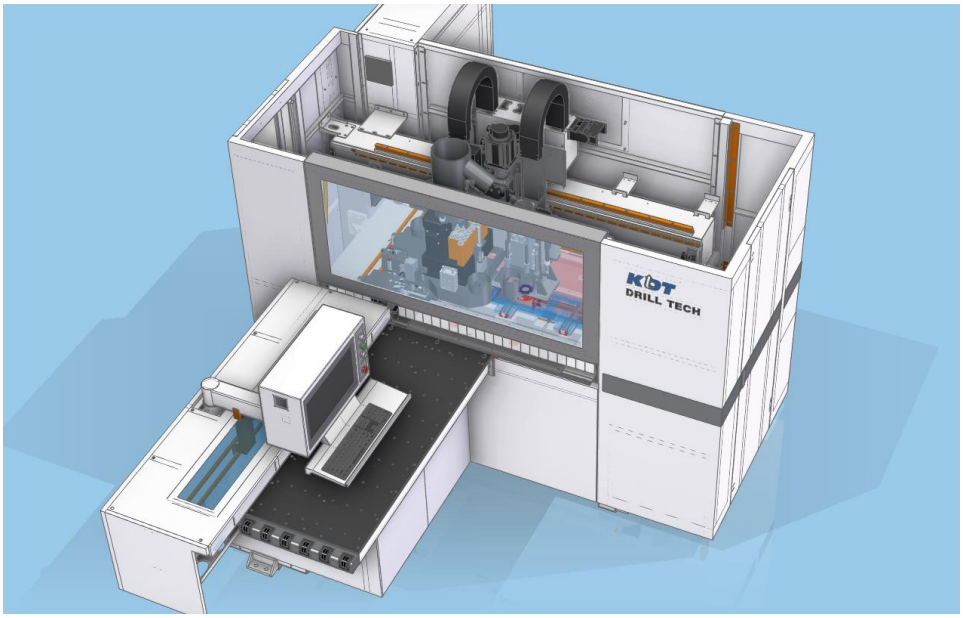


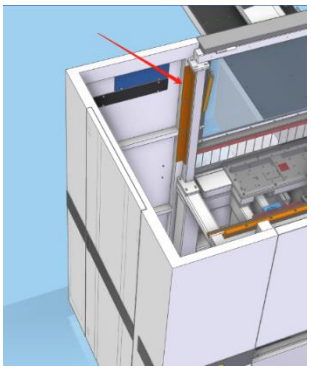
Above figure indicates：

（1）Fence； （2）Front gripper guiderail cover； （3）Front cover； （4）Right cover； （5）Front towline cover； （6）Left cover

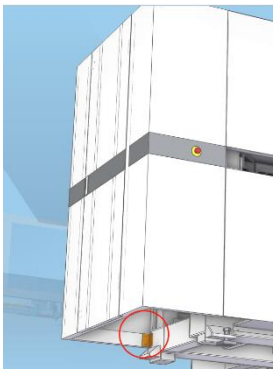
（7）Hanging board 1；（8）Hanging board 2； （9）Hanging board 3

2.7.1 Installation Diagram of Right side cover





1



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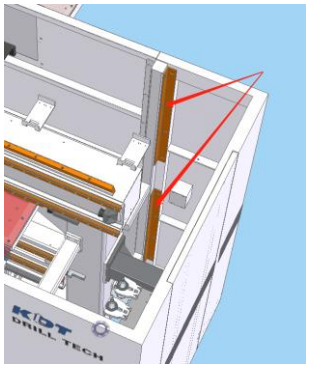


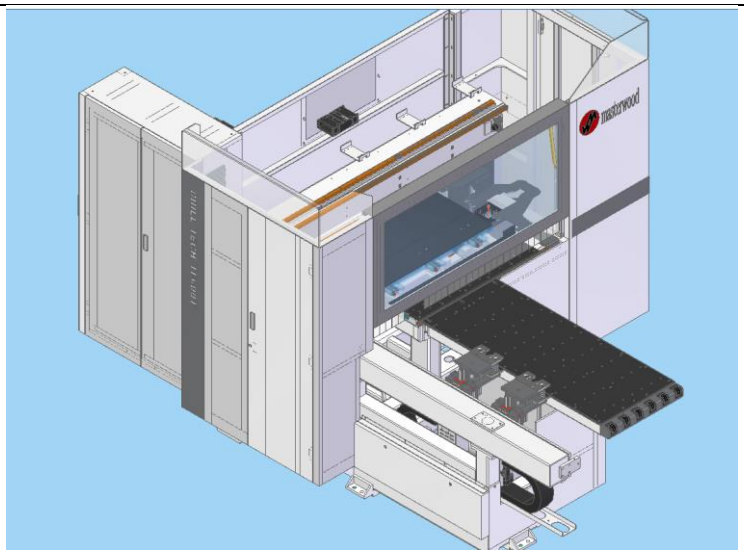
3

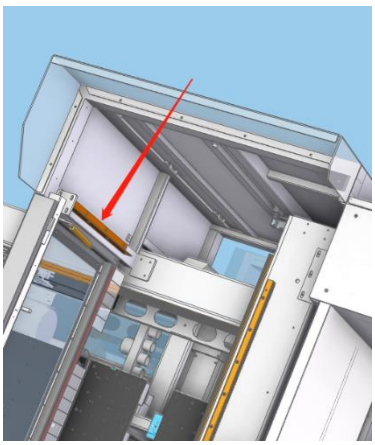
1. Connect the right cover and column with long angle iron

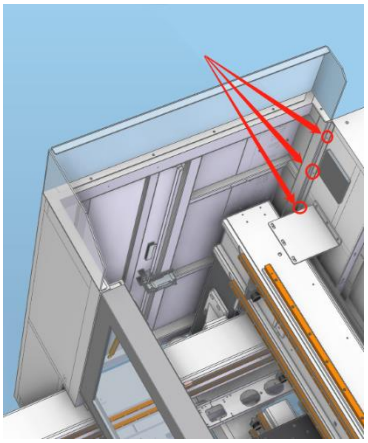
2. Connect the right cover and machine frame with small angle iron

3. Connect the right cover and supporting column with long angle iron

2.7.2 Installation Diagram of Left side cover





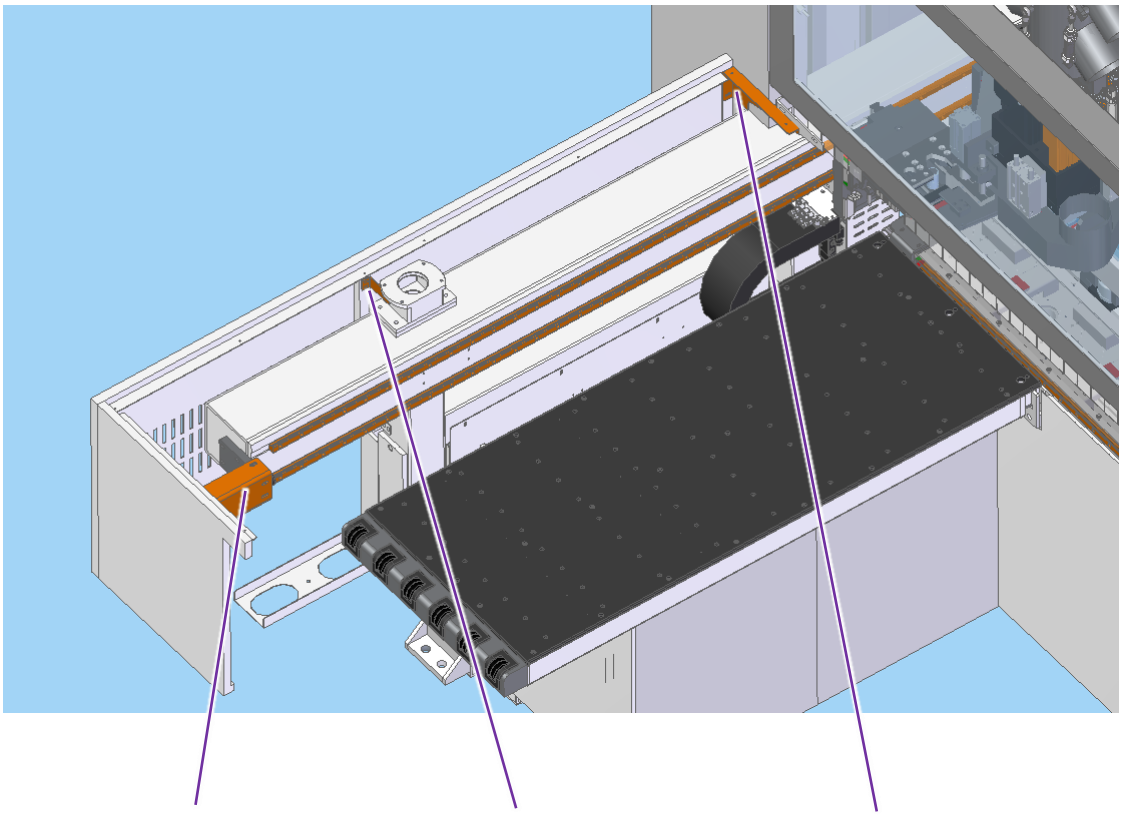


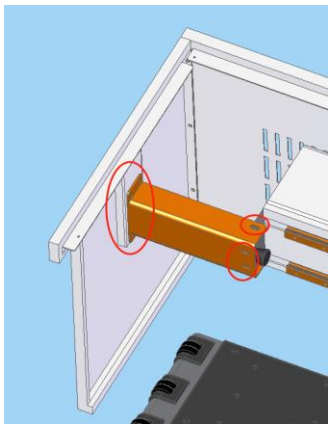
1 2

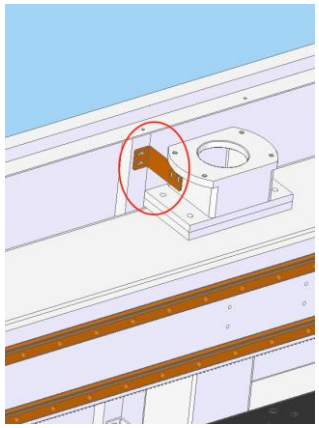
1. Connect left-side cover with left column of front cover by angle iron;

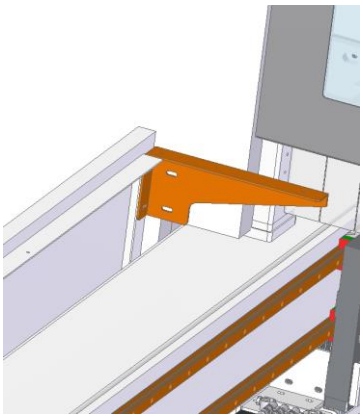
2. Connect left-side cover with main electric cabinet.

2.7.3 Installation Diagram of rail cover in front









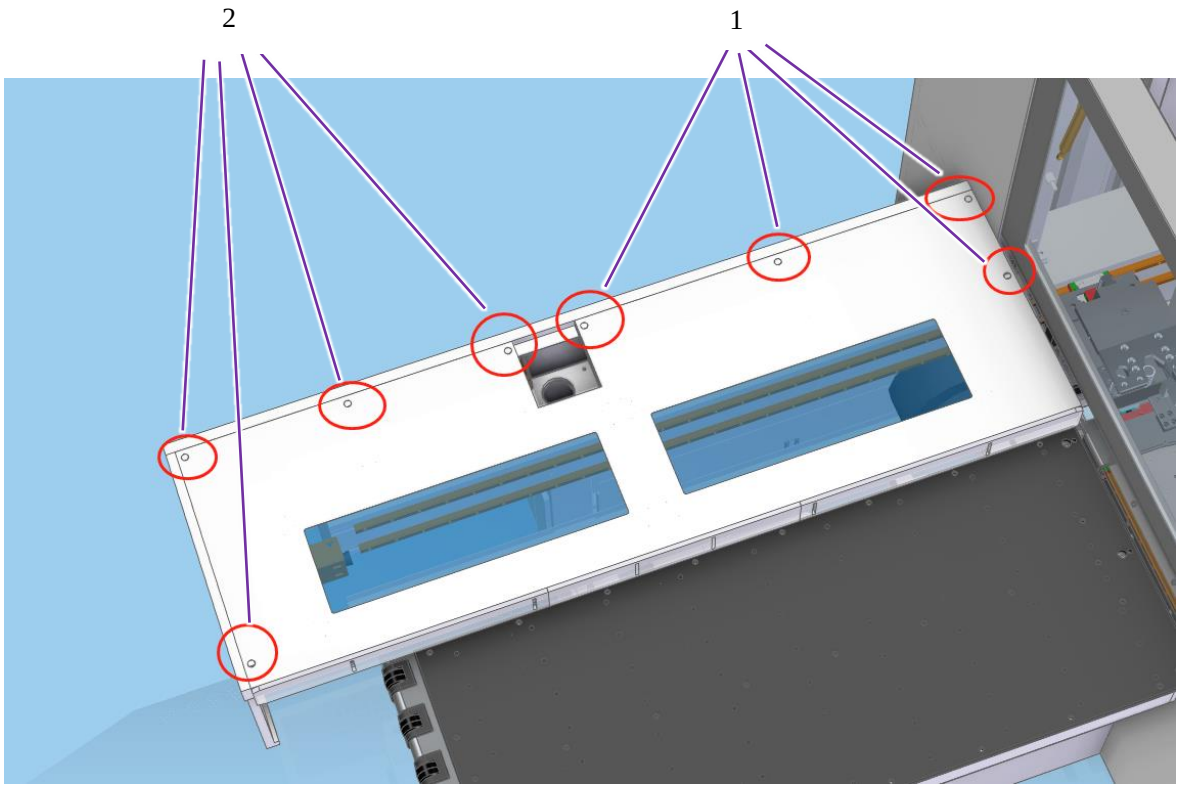
1 2 3

1 Connect the front towline cover and gripper guiderail with connector

2. Connect the front gripper guiderail cover and column

3. Connect the front gripper guiderail cover and left cover with connector

2.7.4 Installation Diagram of rail cover in front:



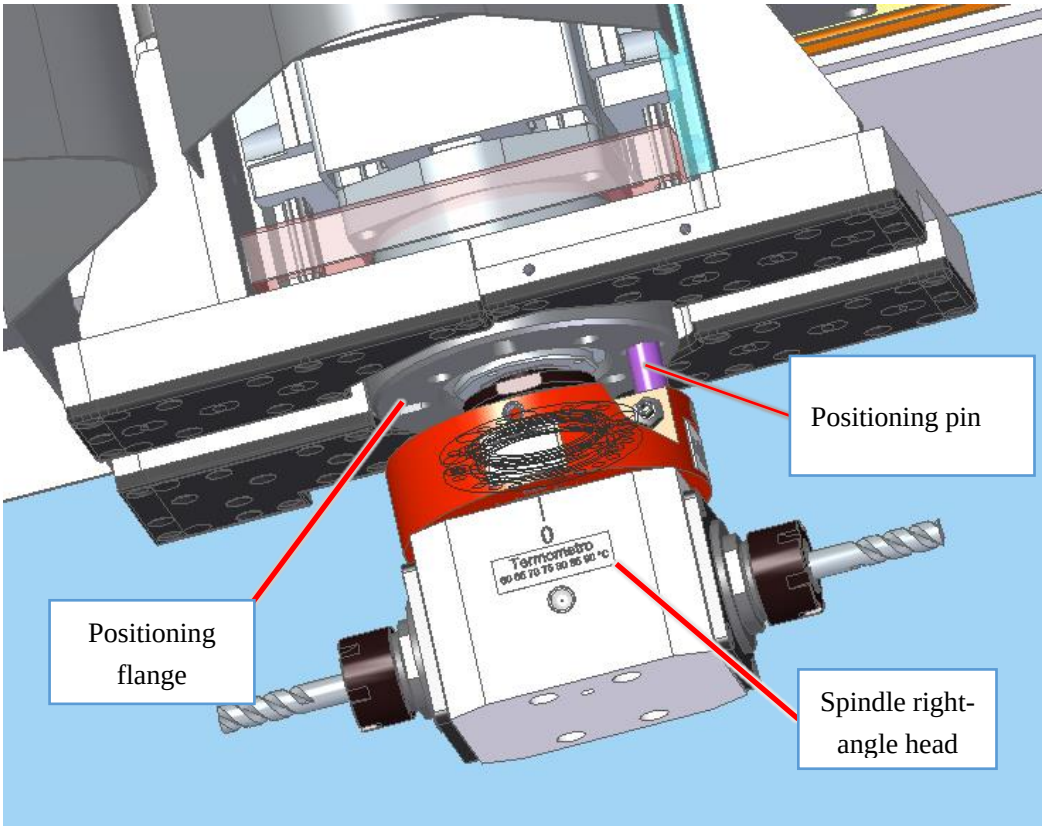
As (1) & (2) marked above are the mounting holes for front cover

2.8 Right-angle milling head test

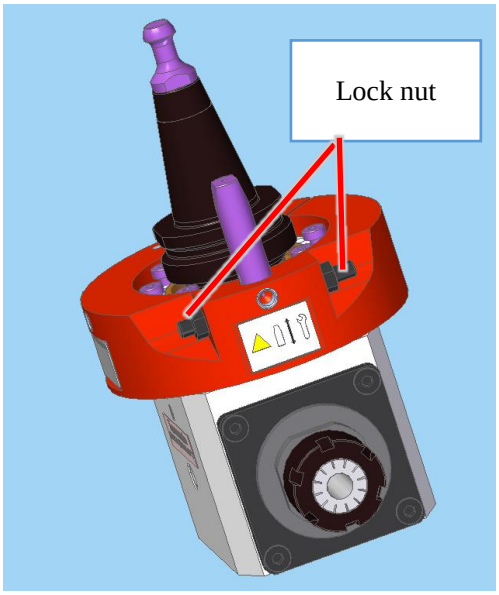
The right-angle head of the spindle is optional. If it is installed or replaced for the first time, please install and test according to the following way.

Install the right-angle milling head on the spindle as picture shows.

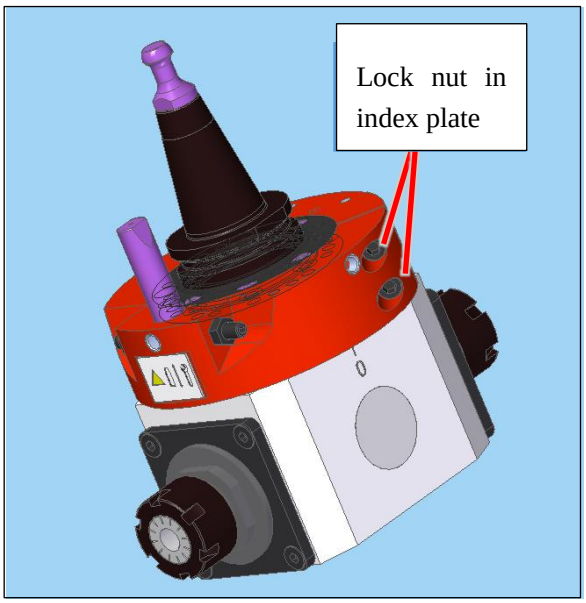
Note: The positioning pin of the right-angle head should be inserted into the positioning waist hole, where the positioning flange is away from the drill bag.



（2）Gently shake the right-angle head from left to right, which can be realized if there is a gap. To ensure the right-angle head not shake left to right, slightly loosen the lock nut on both sides and adjust the machine, and enable the right-angle head positioning pin rise to insert the flange slot under the action of internal spring.



（3）Install the milling cutter on both sides of the right-angle head, with tool handle partially outside the tool holder. Use a dial gauge to measure the parameter of milling cutter handle on both sides, loosen the locking screws of right-angle head index plate, and fine-adjust the angle of right-angle head to ensure that milling cutters on both sides are parallel to Y axis of the machine. After adjustment, use torque wrench to lock the right-angle head screw, and then check the meter to ensure accuracy.



2.9 Air Source and Air Pressure

A drying equipment must be installed to avoid mechanical faults caused by excessive moisture content in air tank. Make sure the air pressure is 6kgf /㎠ or above (specified pressure value in pressure gauge for air filter). If there are changes in the air pressure, adjust the pressure regulator to maintain the air pressure within a certain range, check in every 7 working days

Air pipe diameter is 16mm. The tip diameter must be or more than 1 inch, otherwise the pressure will be insufficient.

Notes:

1、 Compressed air discharged by the air compressor could not be used directly, because it contains a certain amount of water, oil and dirt. The air temperature after compressed is up to 140 ~ 170 ℃, with part of the water and oil transformed into gas, therefore, it must apply the dried and cooled gas as the air source.

2、 There is a part of water vapor in the air storage tank, which is not completely dried in the air source and liquefied at the bottom of the air storage tank. It is necessary to open the ball valve every day to drain water from the air storage tank. Ball valve is situated below left beam.

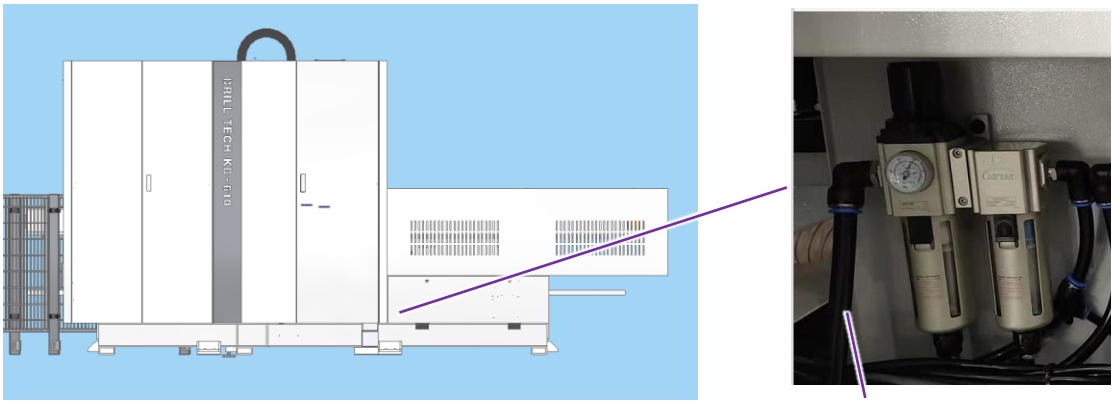
Ball valve for drainage

3. When applying oil to the oil lubricator, screw off oil plug and apply oil up to 80% level. Please check and lubricate periodically and have machine run in sufficient oil.

4. Keep the oil level between the upper and lower limits, and make sure for timely application

5. Do not stop oil applying in a work cycle. Otherwise, the related parts will be worn more quickly and run poorly due to lack of lubrication

6. Air source filter and Valve terminal in drill unit are automatic drainage device. When the liquid level reaches the warning line, they will automatically drain without manpower



Adjust the pressure regulator to make the indicated value to be proper one. For users' convenience, there are five pressure regulators in the machine, including pressure regulator in left spindle pressing plate, pressure regulator in right spindle pressing plate, pressure regulator in gripper cylinder, pressure regulator in upper drill head pinch roller and pressure regulator in spindle air block.

Under normal circumstances, the pressure regulator for side aligner should be adjusted to 0.2MPa,

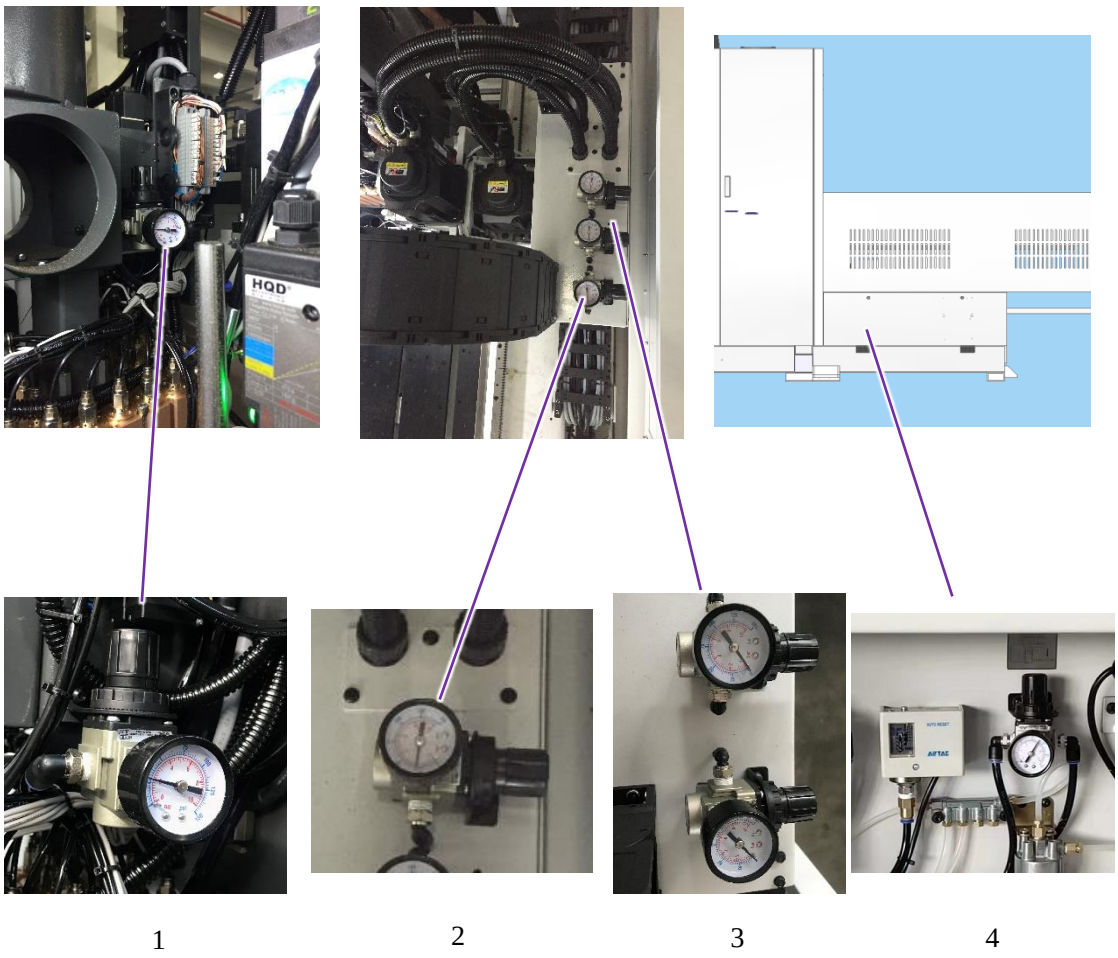
If too much pressure on panel, it would make panel move uneasily.

The regulator for clamps shall be adjusted to a appropriate value according to material of workpiece. Too much pressure would cause damage on panel surface.

Under normal circumstances, the pressure regulator for left and right pressure plates on spindle should be adjusted to 0.2MPa to ensure proper pressing force when milling.

Under normal circumstances, the pressure regulator for pressure roller on bottom drill should be adjusted to 0.2MPa to ensure proper pressing force when drilling.

Under normal circumstances, the pressure of the spindle air-block regulator should be adjusted to 0.2~ 0.3mpa to ensure the formation of air curtain at the bottom of the spindle to prevent dust from entering.



The above figure indicates:

1. Pressure regulator in drill head pinch roller

2. Air-block regulator in spindle

3. Pressure regulator in left and right spindle pressing plate

4. Pressure regulator in gripper

2.10 Tools Installation

A、**Spindle tools installation**

- It is suggest to use a tool holder with diameter of 1/2 inch on spindle, Tools length range is 70mm while tool diameter range is 1-16mm.

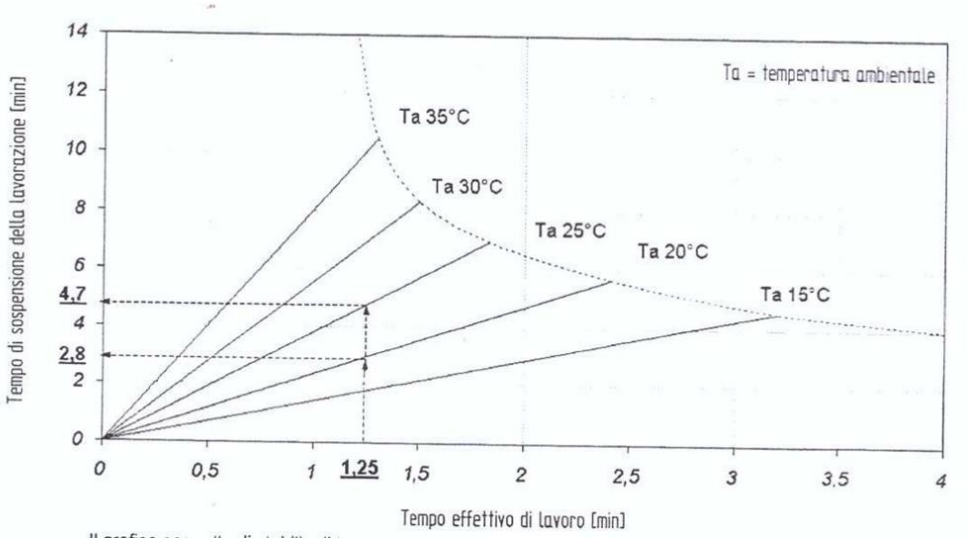
- The max. diameter of saw blade in upper spindle should be 100mm.
- The actual drilling range in Y direction of spindle in lower drill head should be 0~980mm；
- The length of tools inserted to collet shall be twice greater than diameter of holder, which would be better for fastening.
- The length of tools that stretched out of collet shall be measured and write into the software as tools length setting.

	**Note: Installation not complied with above requirements may cause damage to machine and injury to workers .**

B、Installation and use of spindle right-angle milling head

- The total lengths of tools on both sides of the right-angle milling head shall not exceed 80mm, otherwise there is a risk of damage gripper guiderail.

- After continuous working, the right-angle milling head, as a precision component, must be stopped for a certain time before processing again. Otherwise, it may be damaged because of high temperature. Rest time for right-angle milling head can refer to the figure below.



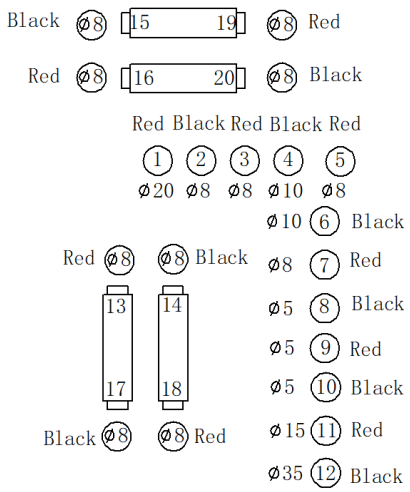
C、Installation of air drill

- Drill head spec.：The drill head handle must be 10mm in diameter and 70mm in length, with all drill head must in the same length.

- Apply lubrication grease on the drill head handle when mounting drill head, in case of difficult removal because of rust.
- The drill head must be fixed with M6*6 flat-end hexagon socket, which must be removed from the tool position where drill head is not installed.
- Drill of different sizes must be installed in accordance with the requirements of the following figure to avoid machine damage;

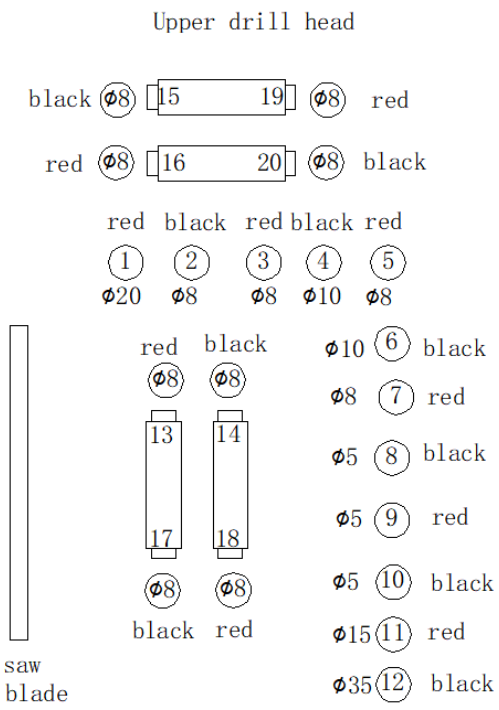
Tool magazine is recommended to set as follows:

610Z Upper drills layout



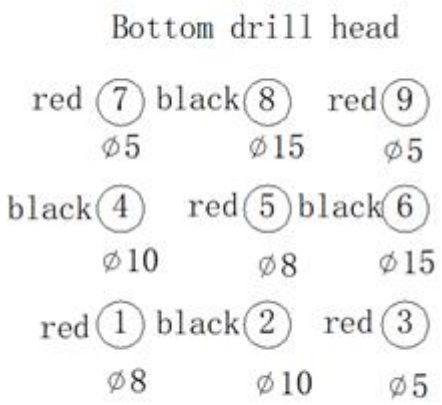
- In the figure above, the positions of no. 1-11 are only available to install drill bits with diameter no more than 20mm.
- No 1-5 positions in above figure are available for through hole drill while it is not available in no. 6-12 positions in order to avoid hit against with the worktable and make damage on table.
- In the figure above, the positions of no.13-20 are only available to install drill bits with diameter no more than 16mm.
- In the figure above, position of no.12 is available to install drill bits with diameter no more than 35mm. The drill bit with diameter of 35mm features in two-edged which is for better drilling quality.
- When through hole is required, it is recommended to apply drills no.1-5 working with bottom drills. If the through hole indeed needs to be done by upper drills, install through-hole drills at position of No. 1- 5 positions, then reduce the feed speed of drills and select drill bits with good quality, but to a certain extent, there are also risk in poor drilling
- The layout of tools can be adjusted according to the required machining. And no.5-12 drill bits are commonly used for best drilling effect.

610HZ Upper drills layout



- In the figure above, the positions of no. 1-11 are only allowed to install drill bits with diameter no more than 20mm.
- No 1-5 positions in above figure are available for through hole drill.a through hole drill is not allowed in no. 6-12 positions to avoid the worktable from rupture
- In the figure above, the positions of no.13-20 are only allowed to install drill bits with diameter no more than 16mm.
  There is no need to install drill bits at No 15 and 16 positions.
- In the figure above, the no.12 position allows a drill bit with diameter no more than 35mm. The drill bit with diameter of 35mm is two-edged and can result in better processing quality.
- When through hole is required, it is recommended to drill through at No 1-5 positions combining top drill unit with bottom one. If the through hole indeed needs to be done by top drill head, install throughhole drills at No 15 positions, then reduce the feed spe ed of drill and
  select drill bits of the best quality. But to some degree, the risk of poor processing is in evitable in doing so.
- The layout of tools can be adjusted according to the processing technology. And no.5-12 drill bits are commonly used for their best processing effect.

610Z/610HZ bottom drills layout



- As figure shows above, No. 1~4 and No. 6~9 position in lower drill can only install drill head with diameter equal or greater than 20mm;
- No. 5 position in lower drill can only install drill head with diameter equal or greater than 35mm;
- Drilling distance of drill head in No. 3, No. 6 and No. 9 position in Y direction is equal or greater than 32mm;

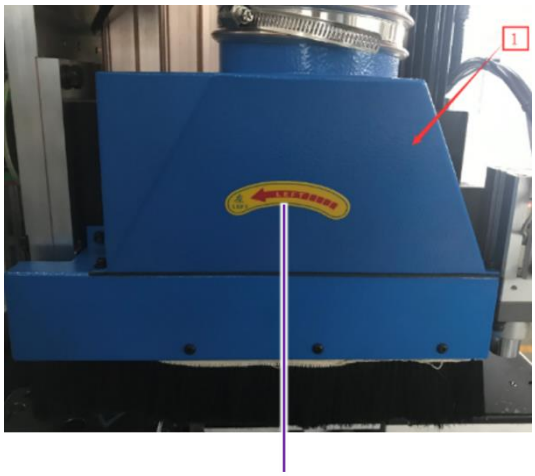
Please install according to above suggestion, otherwise, machine damage and personnel injury might be caused.

Note: it is recommended to use double-edged bits with diameter of 35mm for a better drilling quality.

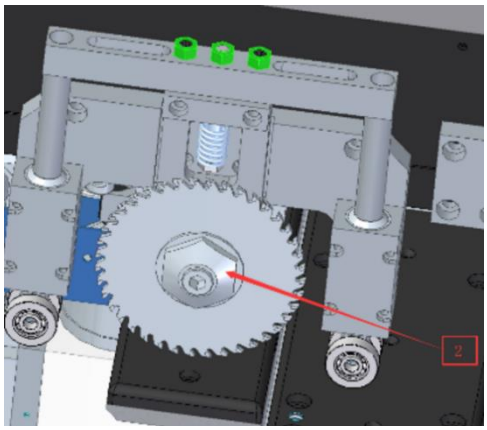
Double-edged drill bit with diameter of 35mm is shown as below:

D、Installation of saw blade

612KH\612KHF Saw blade installation on upper drill unit



Pay attention to the direction



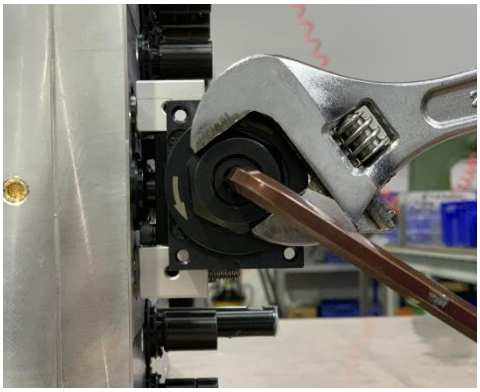
The above figures indicate:

(1) Side dust extraction cover

(2) Screw nuts for mounting saw blade

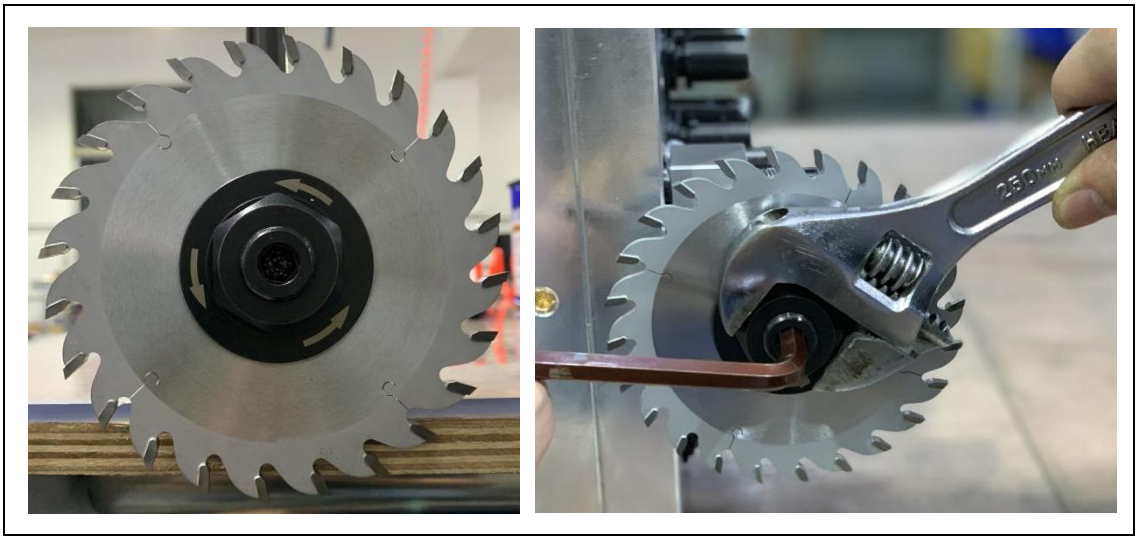
Saw Blade Installation Instruction

（1）Nuts dismounted: Prepare an 8mm inner hex spanner and a 31mm open-end wrench or monkey wrench, insert the 8mm inner hex spanner into the hexagonal hole in saw shaft, then lock the nut with the open-end wrench and rotate as the arrow indicates to loosen the nut.



（2）Saw plate thickness: The min lockable thickness of saw plate is 1.5mm and max lockable thickness is 5mm.

（3）Rotation direction of saw blade: The cutting direction of blade teeth should be e same as the arrow indicates on the nut of saw shaft (screw up the nuts after confirmation).



Notes:

1.Please Confirm the rotation direction before installing saw blade. (Motor must go forwards), because Wrong direction will cause the nut loose and further to cause injury to personnel.

2. Diameter of saw blade is 120mm, width limit of blade tooth is 6mm. (Suggest to use blade with 24 teeth or more)

3. Please adjust the feed depth and feed speed respectively according to different wood material

4.When grooving with blade, working size in Y axis should be less than 1000mm (for model 610HZ)

5.Grooving depth with blade should be less than 15mm

	Please install according to above suggestion, otherwise, machine damage and personnel injury might be caused.

2.11 Dust Extraction Equipment

It is suggested to equip dust extraction in the factory to ensure for a clean working environment and good performance on machine:

(1) Prepare some dust suction pipe with proper specification referred to the machine layout, and connect the pipes from dust extraction equipment to installation position of the machine

(2) Make sure a well connecting between the pipe orifice, so as to prevent air leakage from the suction inlet

(3) It is suggest to keep the wind blowing speed above 30m/s

	**Note: If the connecting pipe is too long, it would cause the drop part damaged after machine starts. Therefore， it is necessary to consider if there is supporting bracket needed in the pipe installation and pipe length, so as to maintain a best dust suction effect.**

2.12 Operation Area and Safety Attentions

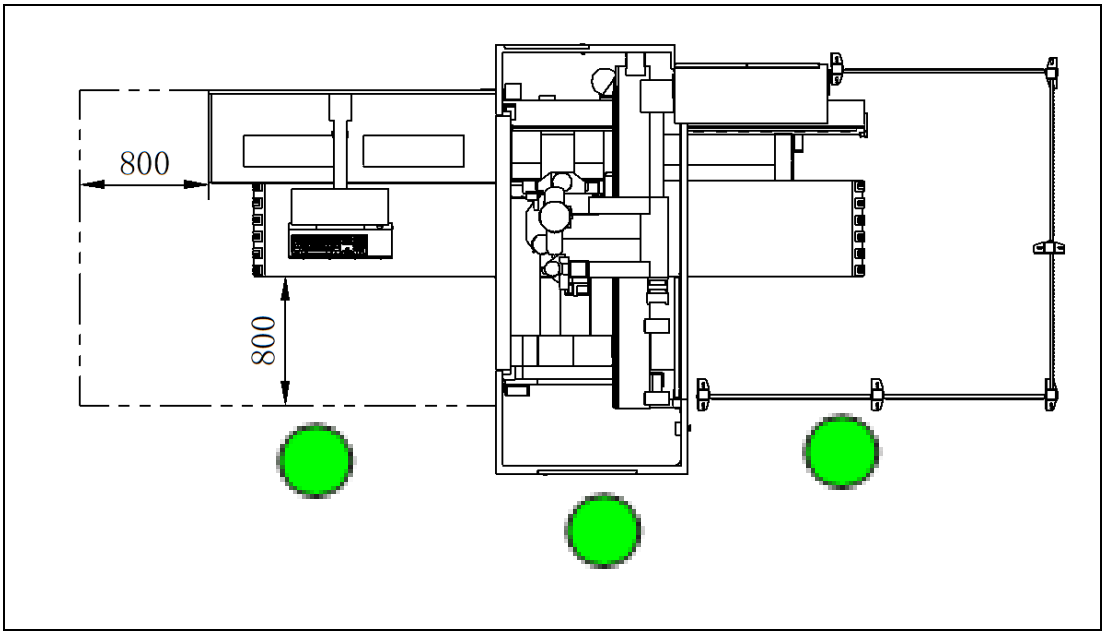
	**The operating area is the zone in which the personnel assigned to the system are expected to work.**

In the layout of operating area, the symbol refers not only to the area where the programmer is located but also the areas where machine adjustments and operations are expected to be conducted, meanwhile, keep personnel off the areas marked in dotted line when the machine is running.

Before starting up the machine, Operator shall check if machine parts are in good condition, close all safety covers and make sure there is no other staff or debris around machine.

When Machine is running, Operator shall not leave the machine without permission, and should pay attention to the running status. If there is any abnormality or incident occurs, stop the machine immediately

Before machine stop running, all personnel around the machine should stand beyond the dotted line area, and take away the workpiece only when machining completes and machine stops running



	**Do not permit unauthorized personnel to approach the machine during operation.**
	**Operating areas must be well illuminated.**

Chapter 3 Maintenance

3.1 Machine Maintenance

（1）Do not modify the machine without authorization before completely understanding the performance of machine to avoid fault or damage to the machine;

（2）Power off the machine before carrying out any maintenance;

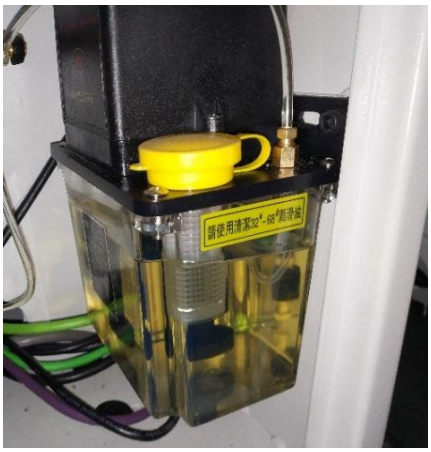
（3）Be sure that the front cover and right door are locked before powering on the machine after maintenance;

（4）Periodically check if the EMG stop buttons are intact;

（5）Record the repaired or replaced abrasive parts.

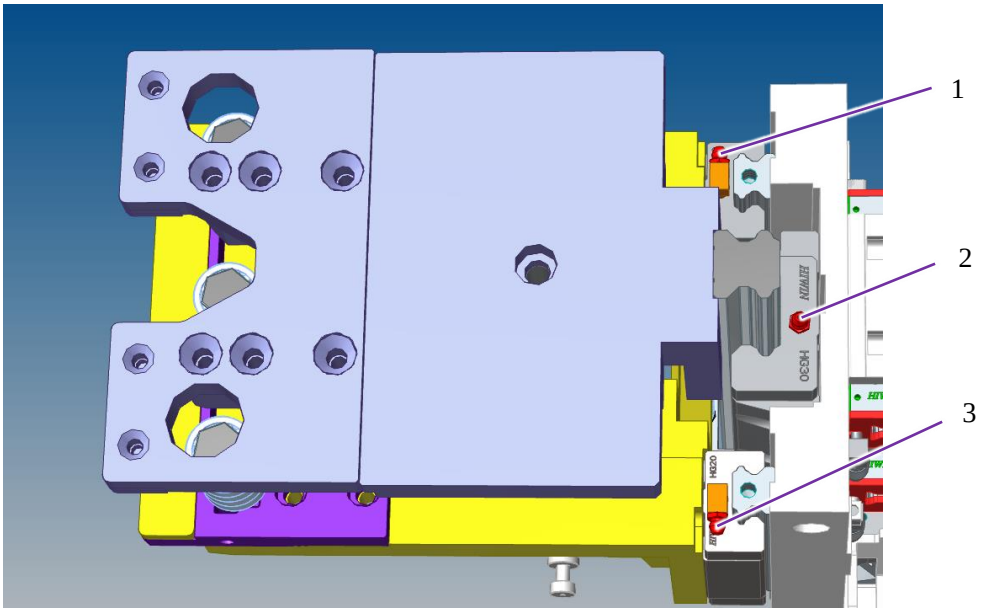
3.2 Lubrication

（1）ISO VG 46 mechanical lubrication grease should be applied to intermediate electric thin-oil pump, and grease amount should be applied to 3/4 when it's below 1/4.



（2）Add 0# mechanical grease to manual oil pump, shake the rocker 3 to 5 times every day before working.

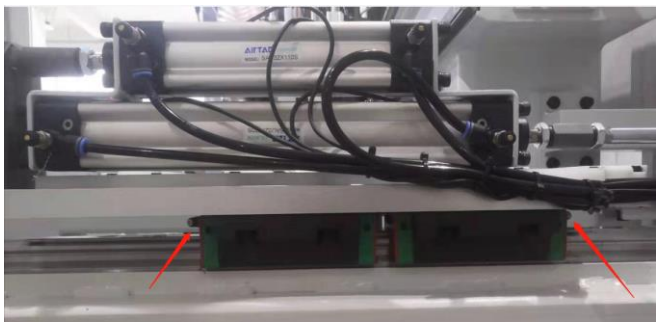
（3）Linear slide is a precision moving part which requires good lubrication in order to ensure its service life. Some sliders are connected with oil pipe supplied with oil by the electric oil pump. The other sliders unconnected with tubing should be lubricated with 0 # machinery grease by a manual grease gun once a week.



(1)(2)(3) Manual grease application in gripper upper slider

Manual grease application in upper spindle slider

Manual grease application in lower spindle slider



Manual grease application in tool magazine slider

Manual grease application in assistant worktable slider

Please equip with large-flow manual oil-application gun

（4）Drill head maintenance

Gear lubrication

Periodically apply oil through the nozzle to gear box of the of drill head (indicated as below picture).

(1) Safety precaution: shutdown and power off to avoid human injury caused by unexpected operation.

(2) Lubrication cycle: suggested to apply grease after every 40-120 working hours.

(3) Grease type: requires application with ISOFLEX TOPAS L 32 N

(4) Application amount: 0.3-0.5g per shaft. Please do not apply too much grease on drill head, to prevent high temperature caused by load increase.

(5) Application amount to horizontal drill holder: 2g grease every half year is suggested.

(6) Application method: rotate the drill spindle manually while applying grease and have the grease spread to every gear.

Cylinder maintenance

Periodically check if there is water left in the air filter and if there is oil left in the lubricator.

Drill spindle maintenance

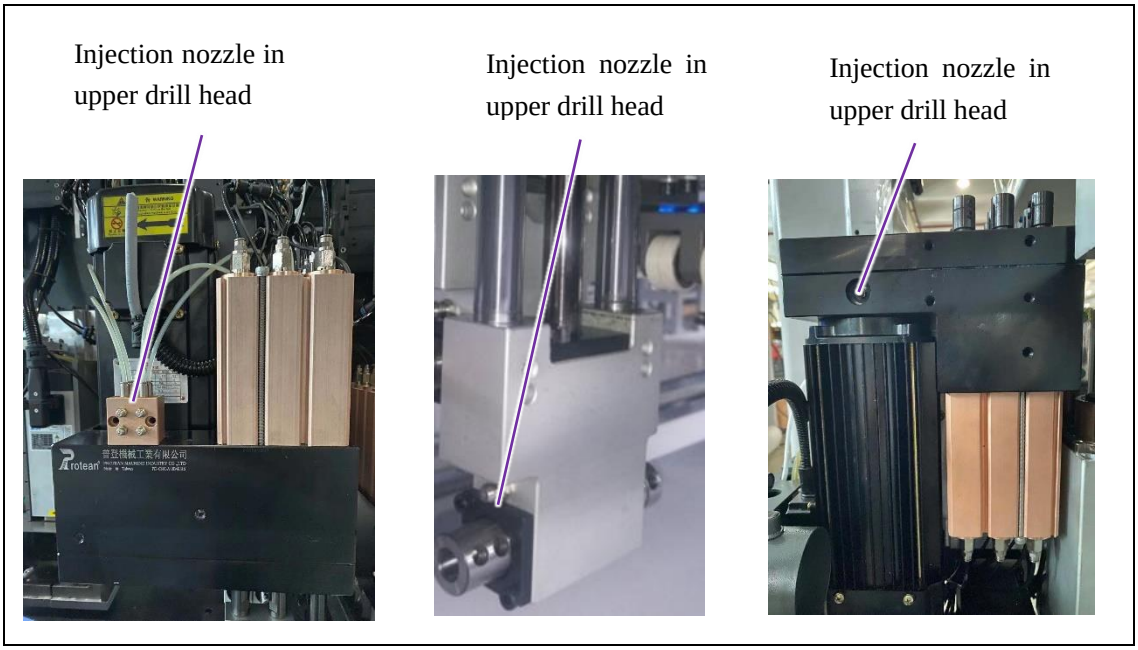
a. Suggested to do cleaning every 5-7 days.

b Blow off the dust on the spindle and dust cover with a pneumatic gun.

c Stretch out all vertical and horizontal spindles, spray some anti-rust oil on a clean cloth and wipe every spindle (be sure to wipe them clean), then drizzle another clean cloth with rust-proof oil and wipe every spindle. (It is suggested to wear gloves in the clean process. Directly doing with the hand is prohibited.)

d Start the built-in heating program to let the spindles stretch out and draw back for about 2 minutes.

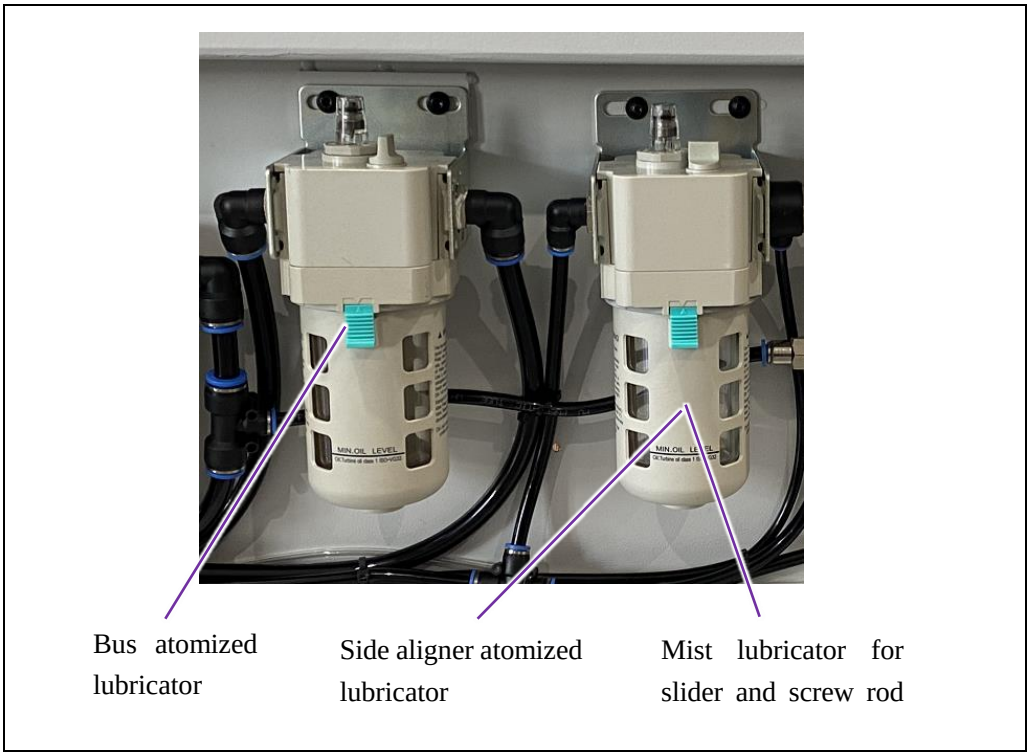
e.The built-in heating program must be run at least once (3-5 minutes) after machine starts every day.



（5）The components in pneumatic circuit requires to be lubricated by oil lubricator.

If. there is insufficient oil in the lubricator, please apply 32# anti-wear hydraulic oil.

The side aligning unit, slider and screw rod in bottom drilling unit are lubricated by oil lubricator and oil amount can be adjusted by the throttle valve at exist of lubricator (Only six-sided drill model has the mist lubricator for slider of bottom drill), when there is insufficient oil, please apply with ISO VG 46 mechanical lubricants.



	**Attention: Please apply oil timely to the lubricator when there is insufficient oil. And should be operated according to indications on taps on lubricator.**

(6) Maintenance of gears&racks

Gears&Racks, as the important transmission part in the machine, is required to make periodical maintenance and repair.

a) Before maintenance, please clean dust off the gears with a pneumatic gun, and then wipe with a clean cloth.

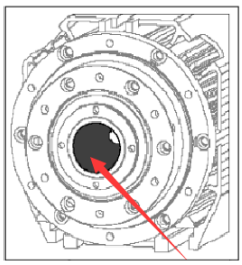
b) Each 3 days as a maintenance cycle, use a clean brush to apply an appropriate amount mechanical oil (Model: ISO VG 46) on the gear surface, and have the machine run back and forth several times to lubricate evenly

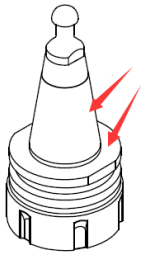
c) Finally, wipe off the excessive oil left on the gears with a dry and clean cloth so as to prevent dust/chips stick on.

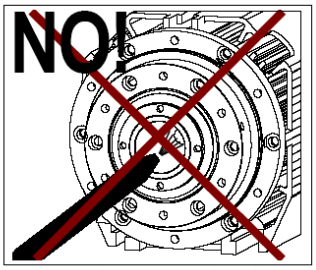
3.3 Maintenance of spindle and tool handle

(1)Before using electric spindle every day, ensure that the conical surface of both tool handle and electric spindle gripper are completely clean. After working each day, clean these parts with a clean cloth.

(2)When there is no tool handle, it is forbidden to feed compressed air into the spindle.







(3) Once every two weeks, use a clean soft cloth dipped in ethanol to carefully clean the conical surface of the handle (including the right-angle milling head). After cleaning, spray anti-rust agent KLUBER LUSIN PROTECT G31 on the conical surface of the handle, and apply it evenly with a dry cloth.

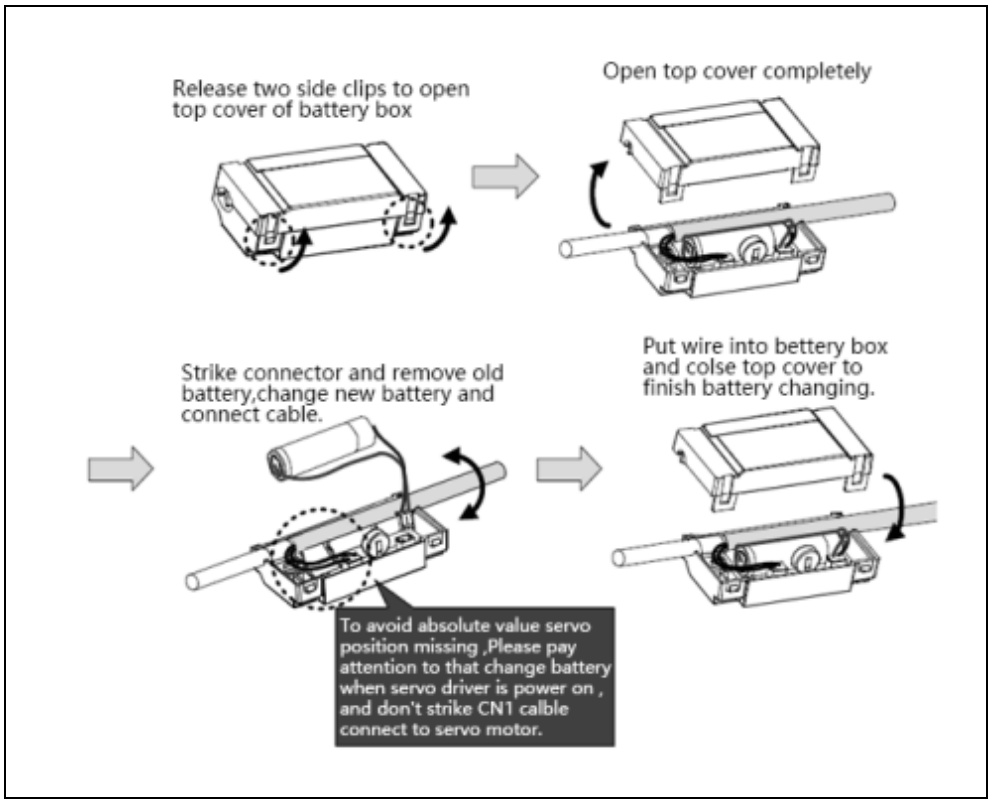
3.4 Other Maintenance

- Regularly clean the operation panel to avoid dusts and chips stuck in buttons, which may cause poor contact.
- Regularly clean the wood chips and dust on the linear guide, keep clean to ensure smoothly movement of the machine.
- In order to maintain the normal working of cooling system, please clean up the cooling fan filter once a week (The electrical box under master table and that behind machine are both equipped with a fan).
- Clean the intake filter of high pressure blower once a week, blow and clean with pneumatic gun after disassembly and then mounted back.

3.5 How to Change Servo Battery

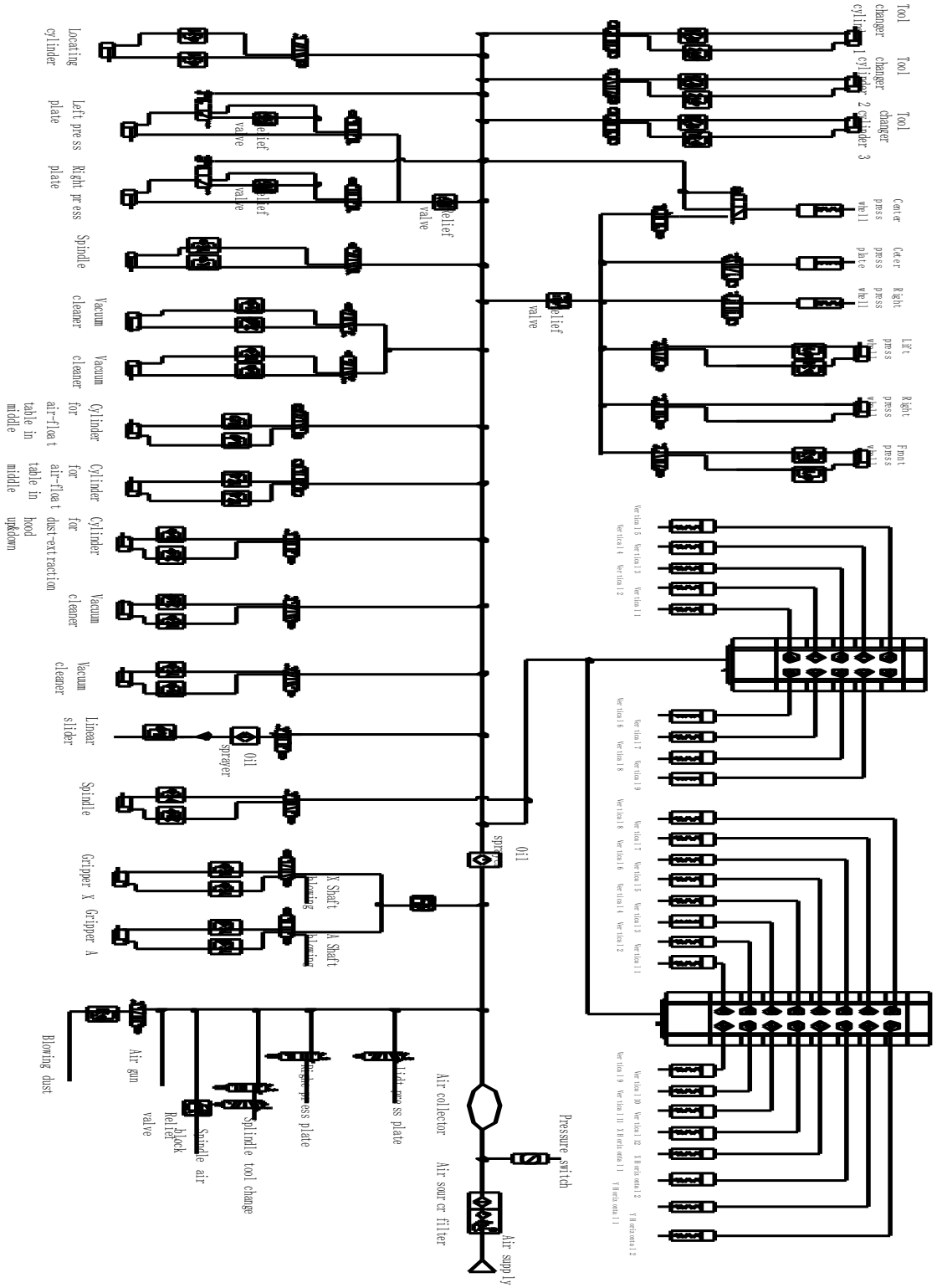
The absolute value servo system is applied to the machine, which is powered by battery and can record the servo pulse position. But the servo battery has a certain service life. When servo driver shows error AL061 which means low battery. Or when checking the battery by setting P0-02 as 38, if it shows 31, which indicates that battery voltage is less than 3.1V, to avoid origin data missing, please change battery immediately. If battery voltage is less than 2.7V, it has caused the data of servo pulse position missing, please replace the battery with a new one and reset origin position. **Dry battery power voltage must be 3.6V, and factory battery is recommended.**

Note: Suggest to change battery when servo is power on to avoid absolute value of servo position missing.

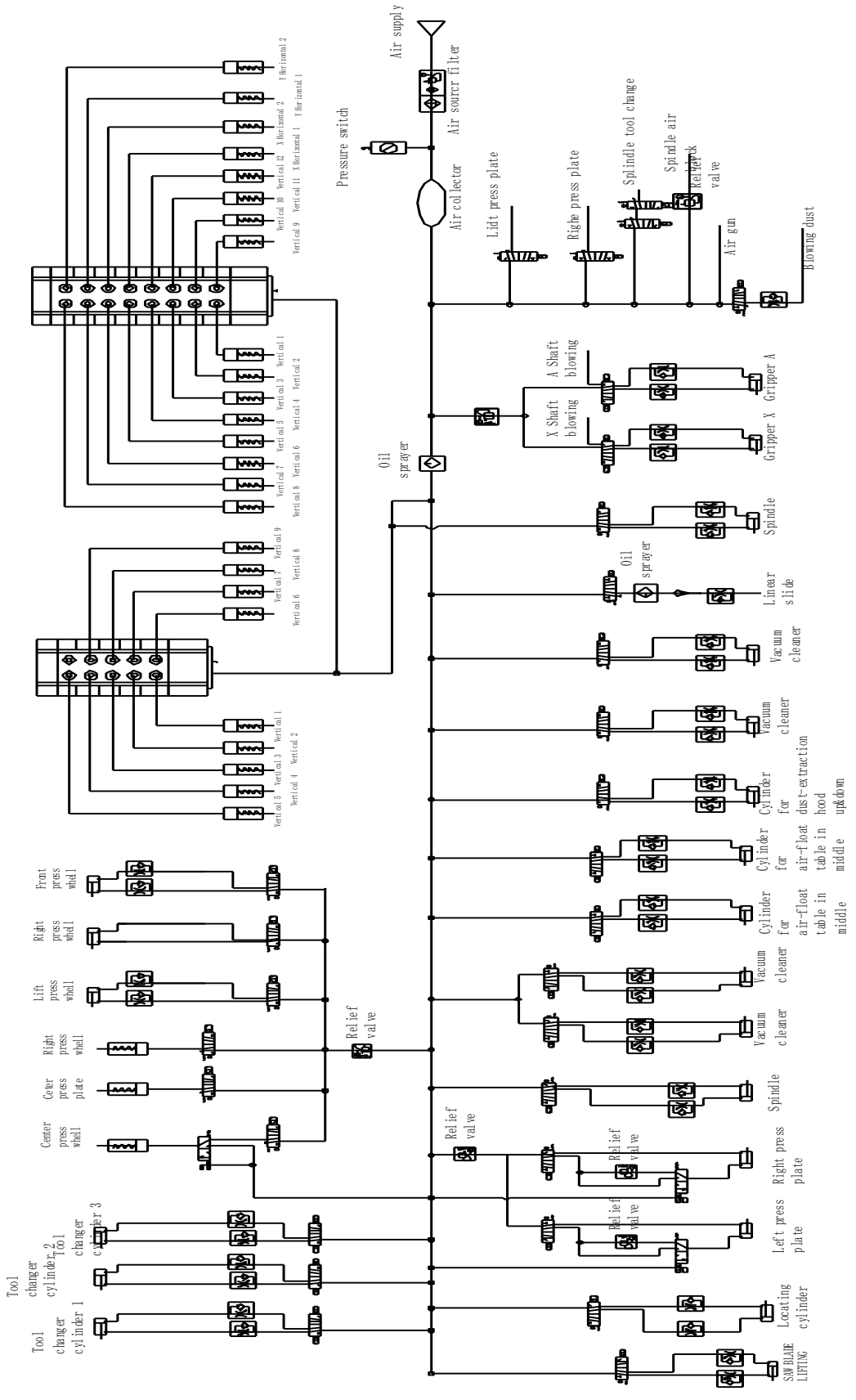


Chapter 4 Pneumatic Circuit Diagram

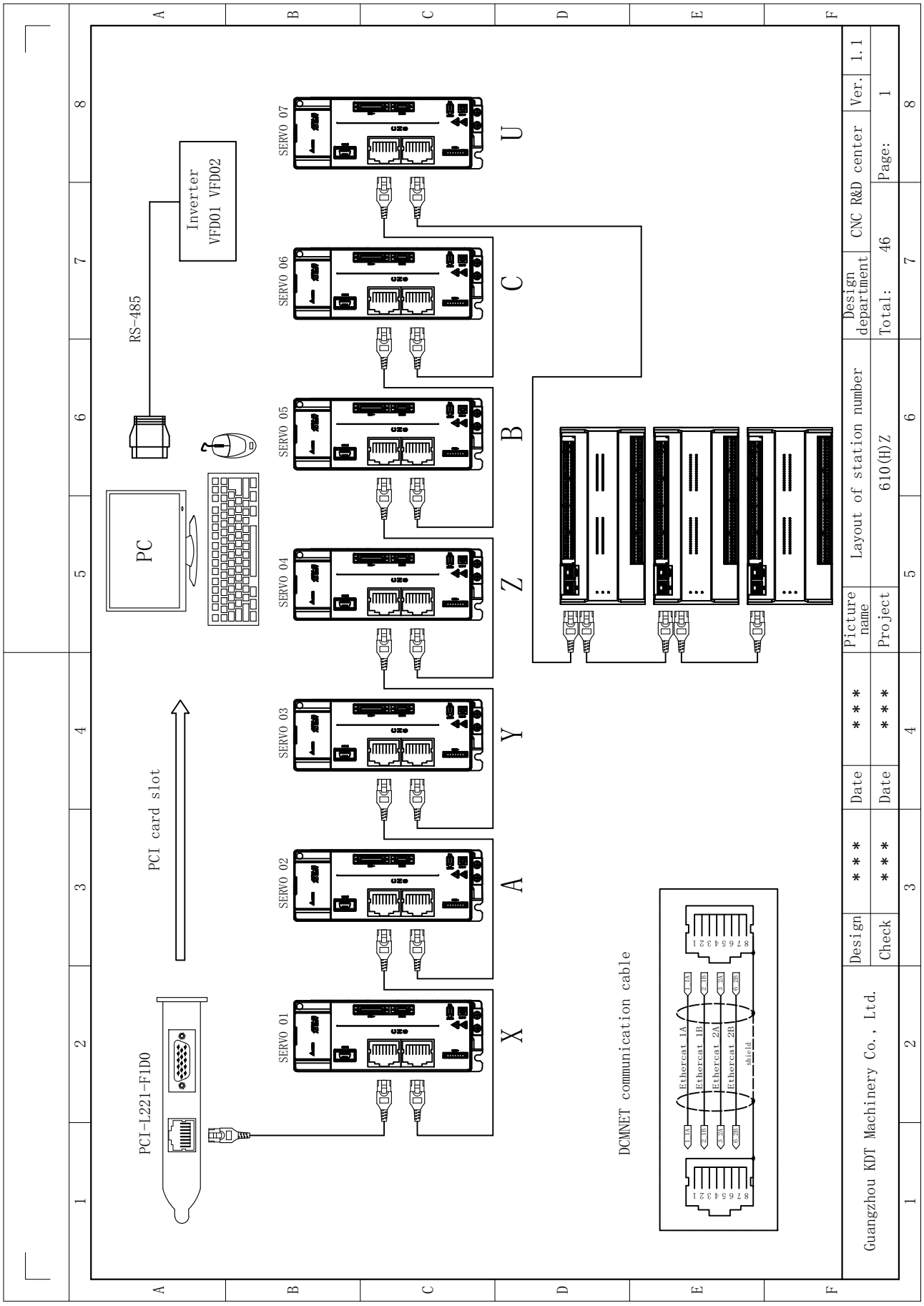
610Z Pneumatic Circuit Diagram



610HZ **Pneumatic Circuit Diagram**



Chapter 5 Electrical Circuit Diagram


SERVO 07
SERVO 06
SERVO 05
SERVO 04
SERVO 03
SERVO 02
SERVO 01
U
C
B
Z
Y
A
X
Inverter
VFD01 VFD02
RS-485
PC
PCI card slot
PCI-L221-F1D0
DCMNET communication cable
Ethercat 1A
Ethercat 1B
Ethercat 2A
Ethercat 2B
shield
Guangzhou KDT Machinery Co., Ltd.
Design
Check
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Layout of station number
610(H)Z
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CNC R&D center
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Page: 1
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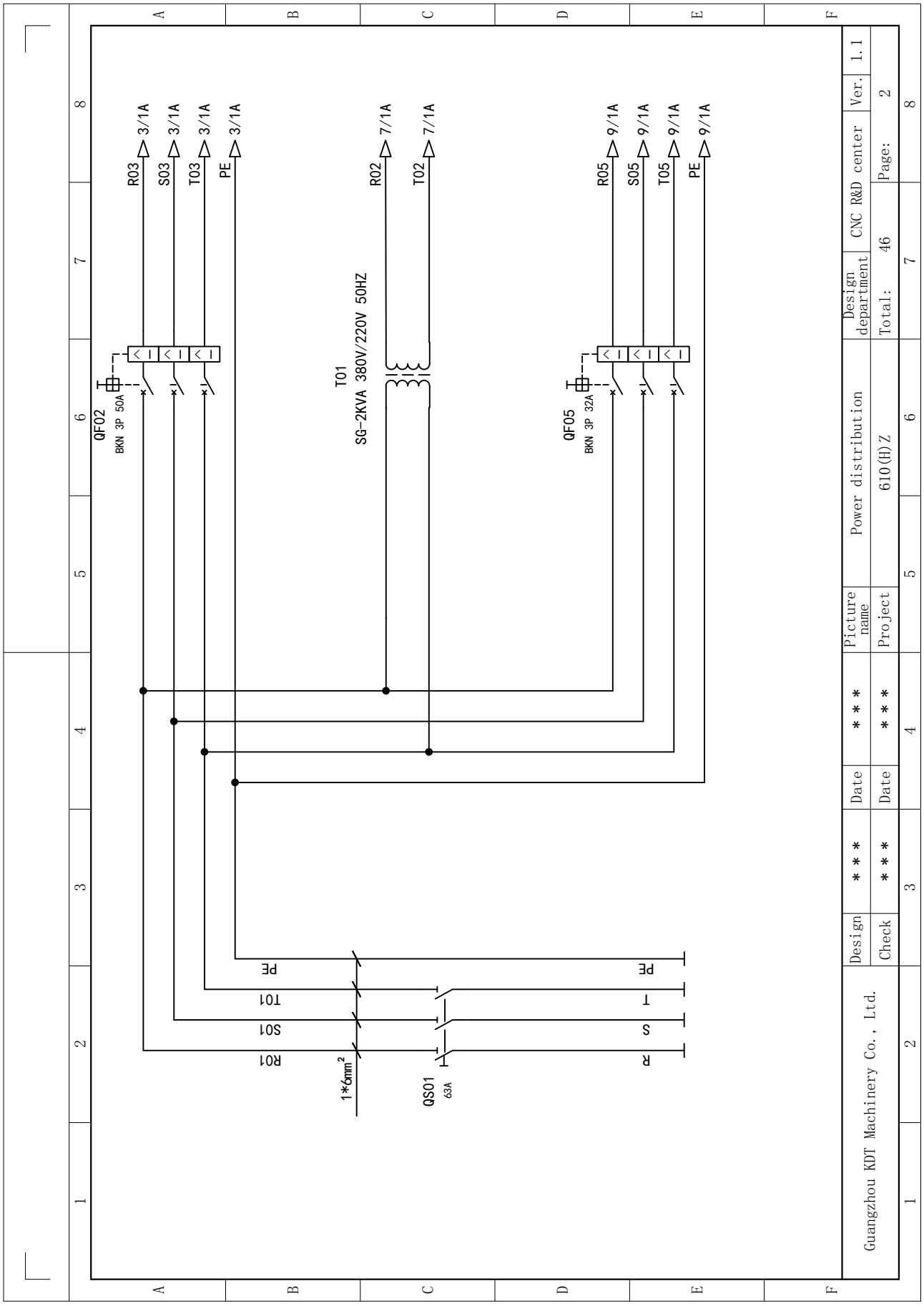
R03 3/1A
S03 3/1A
T03 3/1A
PE 3/1A
R02 7/1A
T02 7/1A
R05 9/1A
S05 9/1A
T05 9/1A
PE 9/1A
QF02
BKN 3P 50A
T01
SG-2KVA 380V/220V 50HZ
QF05
BKN 3P 32A
PE
T01
S01
R01
1*6mm²
QS01
63A
PE
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S
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Guangzhou KDT Machinery Co., Ltd.
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Power distribution
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CNC R&D center
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Page: 2
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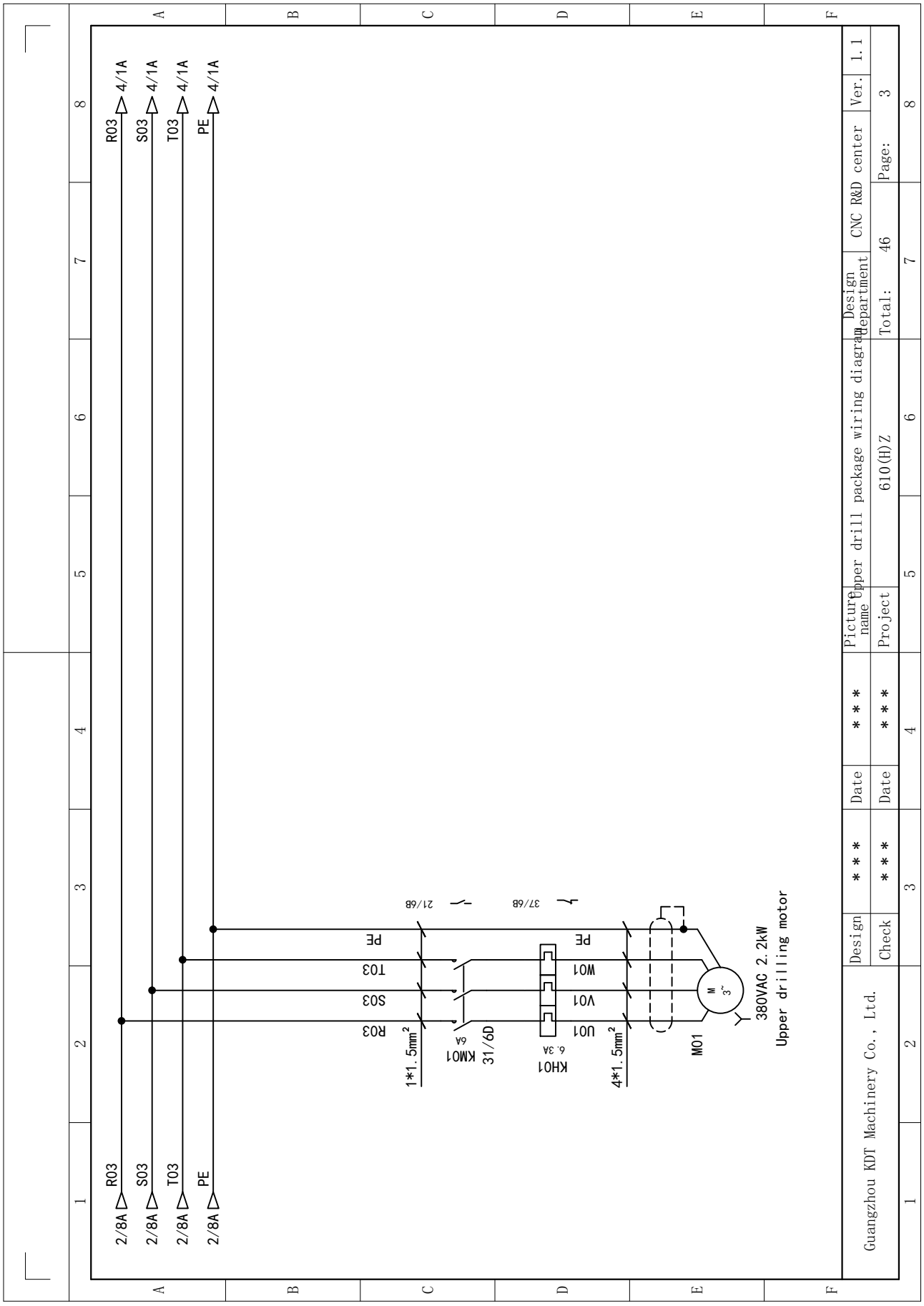
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T03
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2/8A
21/6B
37/6B
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4*1.5mm²
KM01
6A
31/6D
KH01
6.3A
M01
380VAC 2.2kW
Upper drilling motor
Guangzhou KDT Machinery Co., Ltd.
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Design Department
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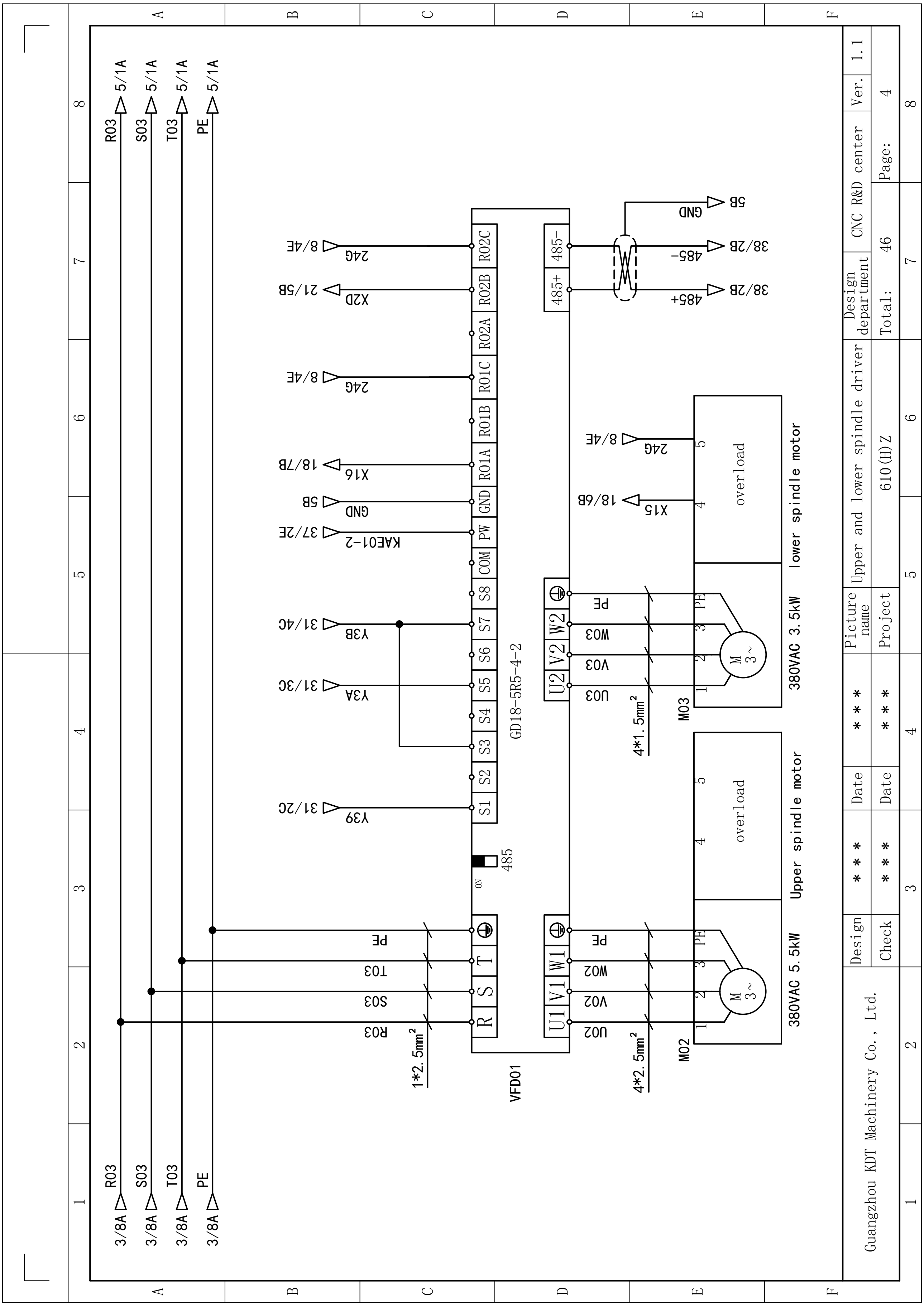
R03 S03 T03 PE
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3/8A
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GD18-5R5-4-2
R S T
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U2 V2 W2
S1 S2 S3 S4 S5 S6 S7 S8 COM PW GND RO1A RO1B RO1C RO2A RO2B RO2C
485+ 485-
485
ON
Y39 31/2C
Y3A 31/3C
Y3B 31/4C
KAE01-2 37/2E
GND 5B
X16 18/7B
24G 8/4E
X2D 21/5B
485+ 38/2B
485- 38/2B
GND 5B
1*2.5mm²
4*2.5mm²
4*1.5mm²
U02 V02 W02 PE
U03 V03 W03 PE
M02
M03
380VAC 5.5kW
Upper spindle motor
380VAC 3.5kW
lower spindle motor
overload
X15 18/6B
24G 8/4E
Guangzhou KDT Machinery Co., Ltd.
Design ***
Check ***
Date ***
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Picture name
Upper and lower spindle driver
Project
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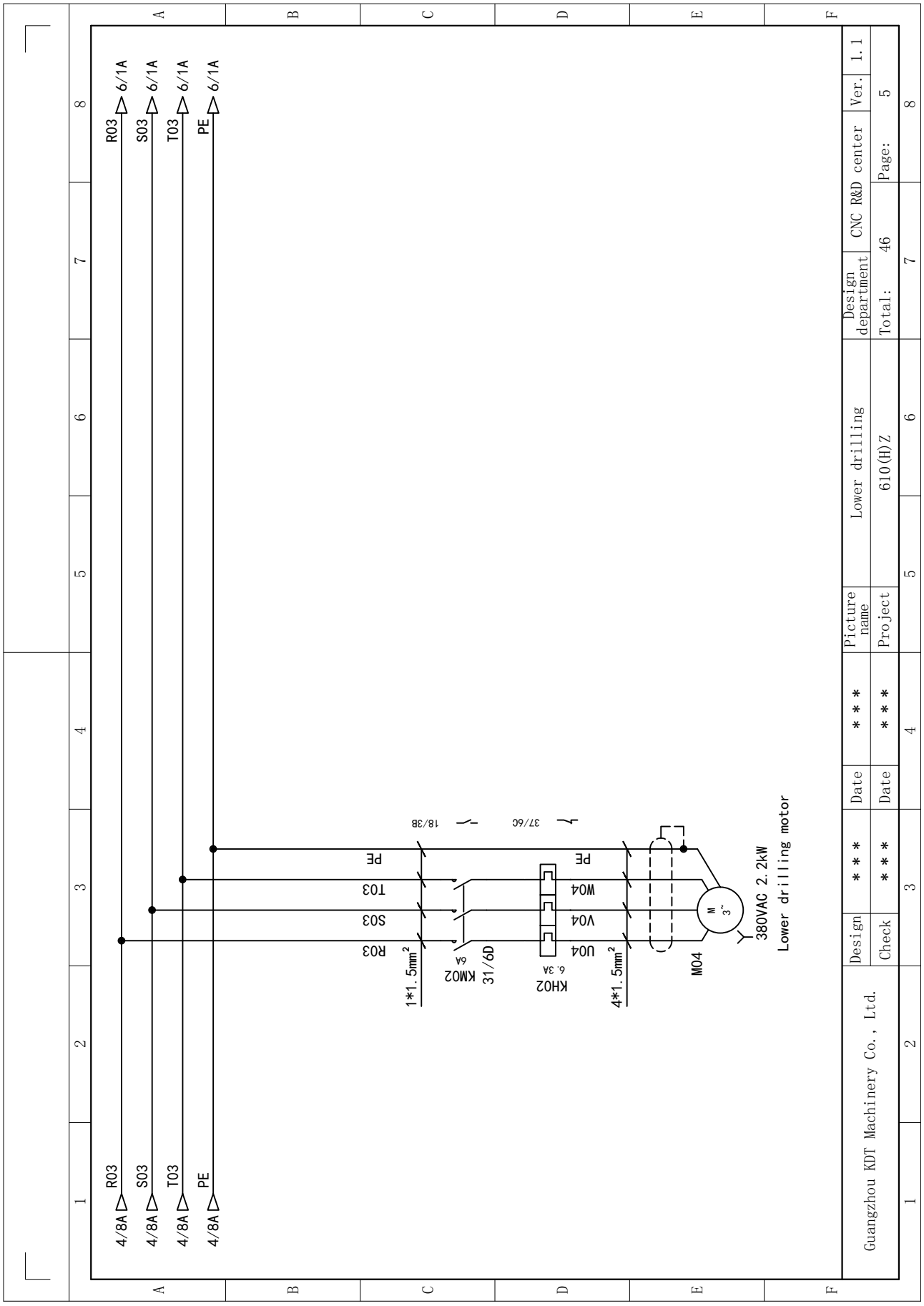
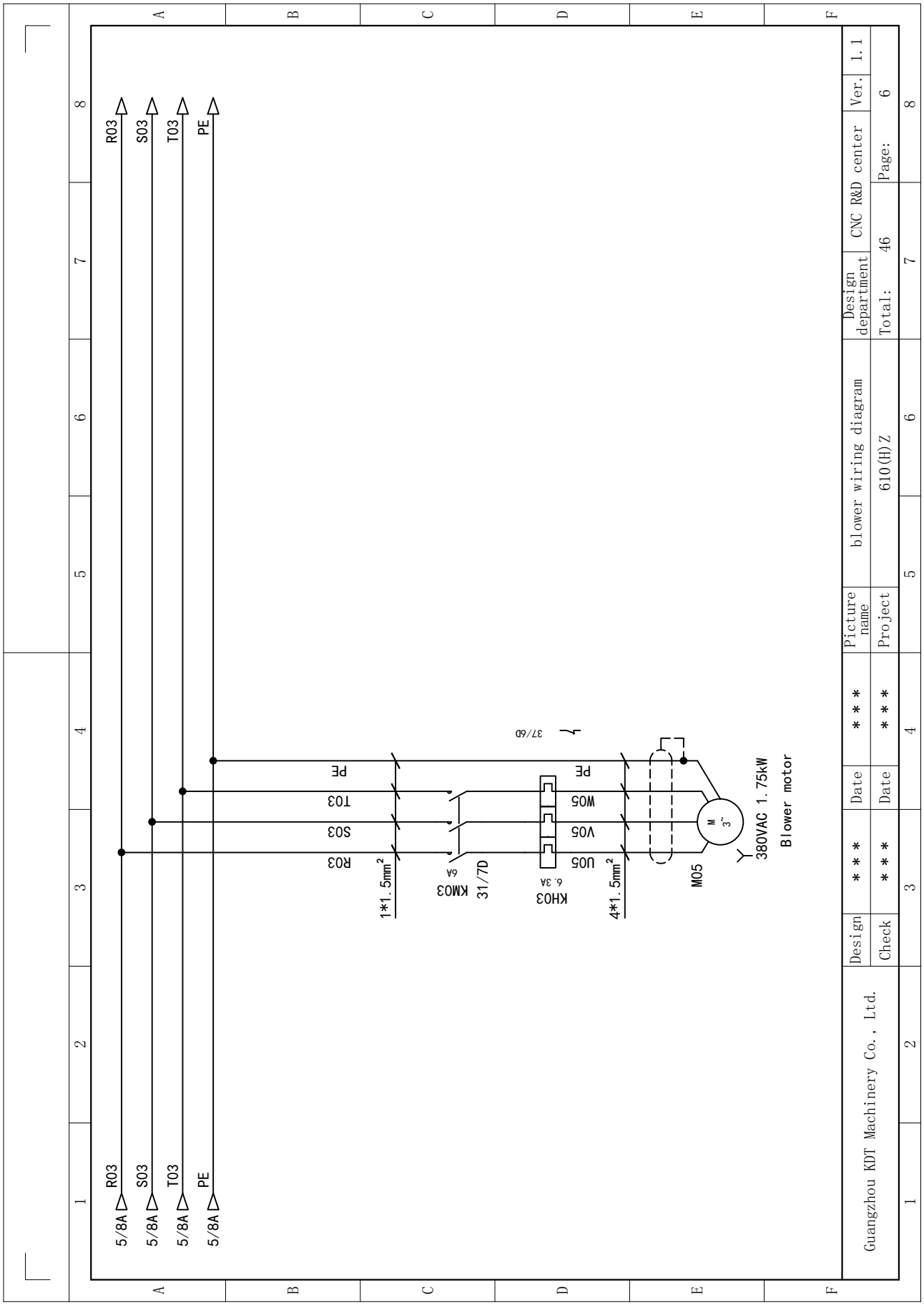
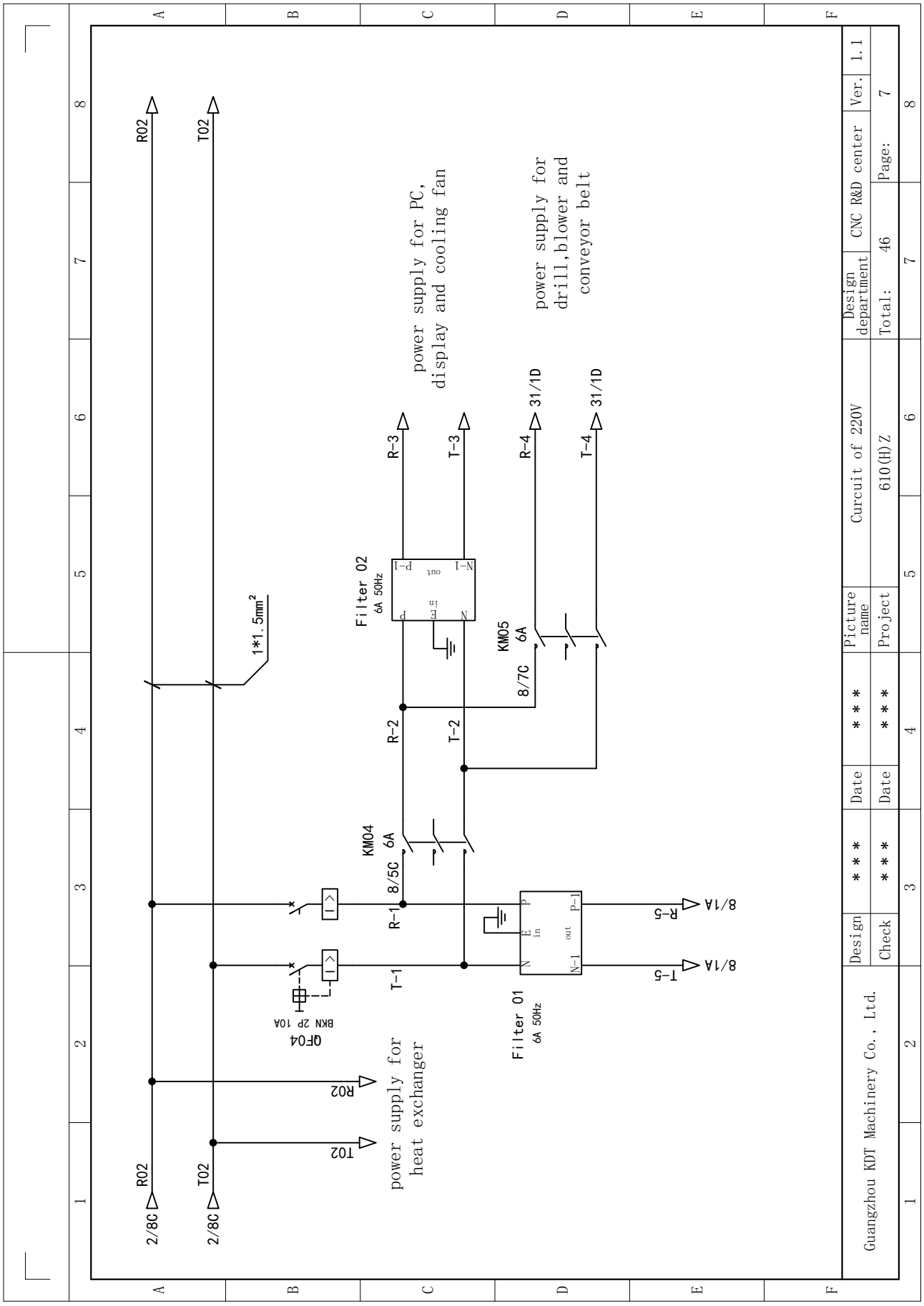
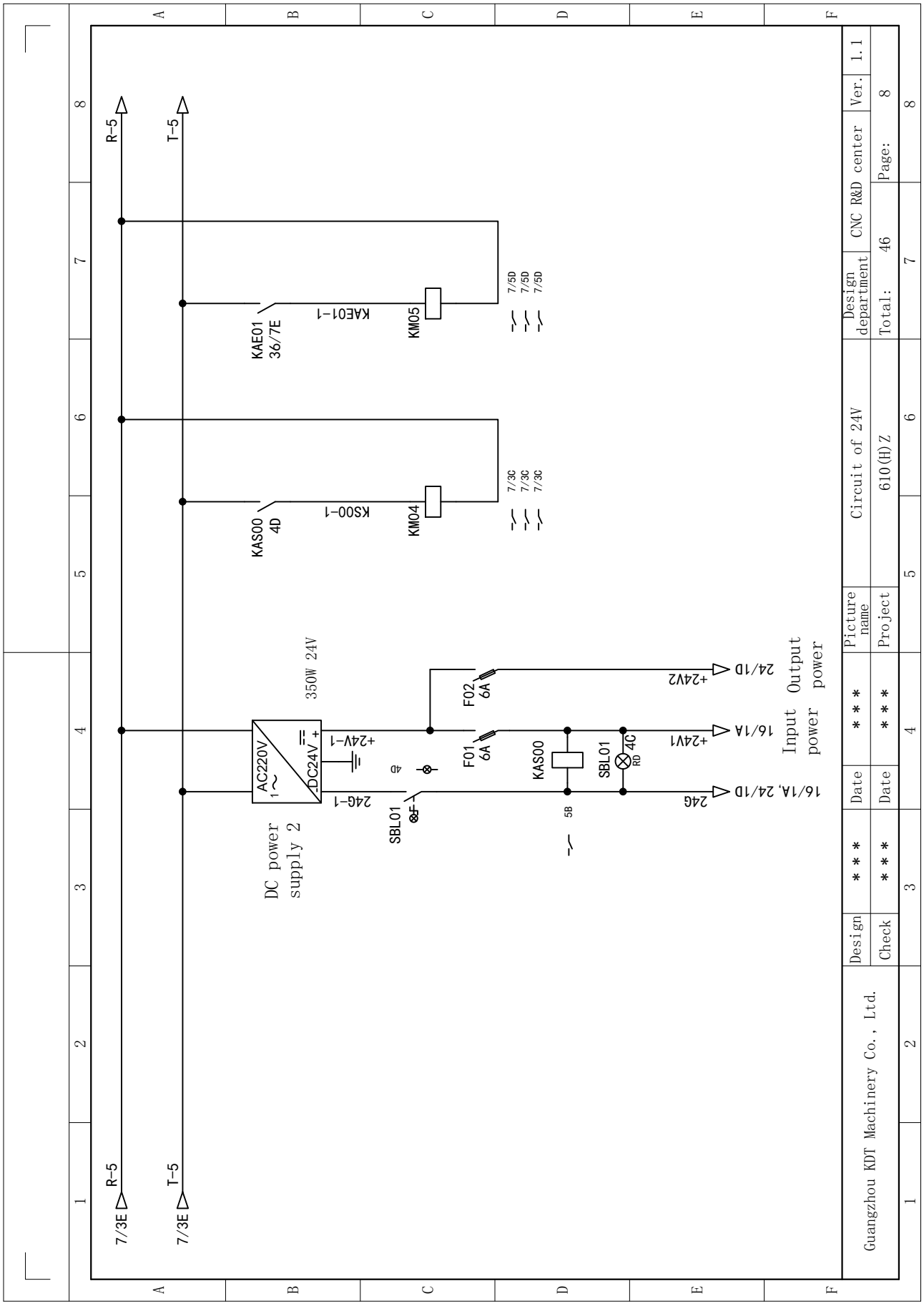
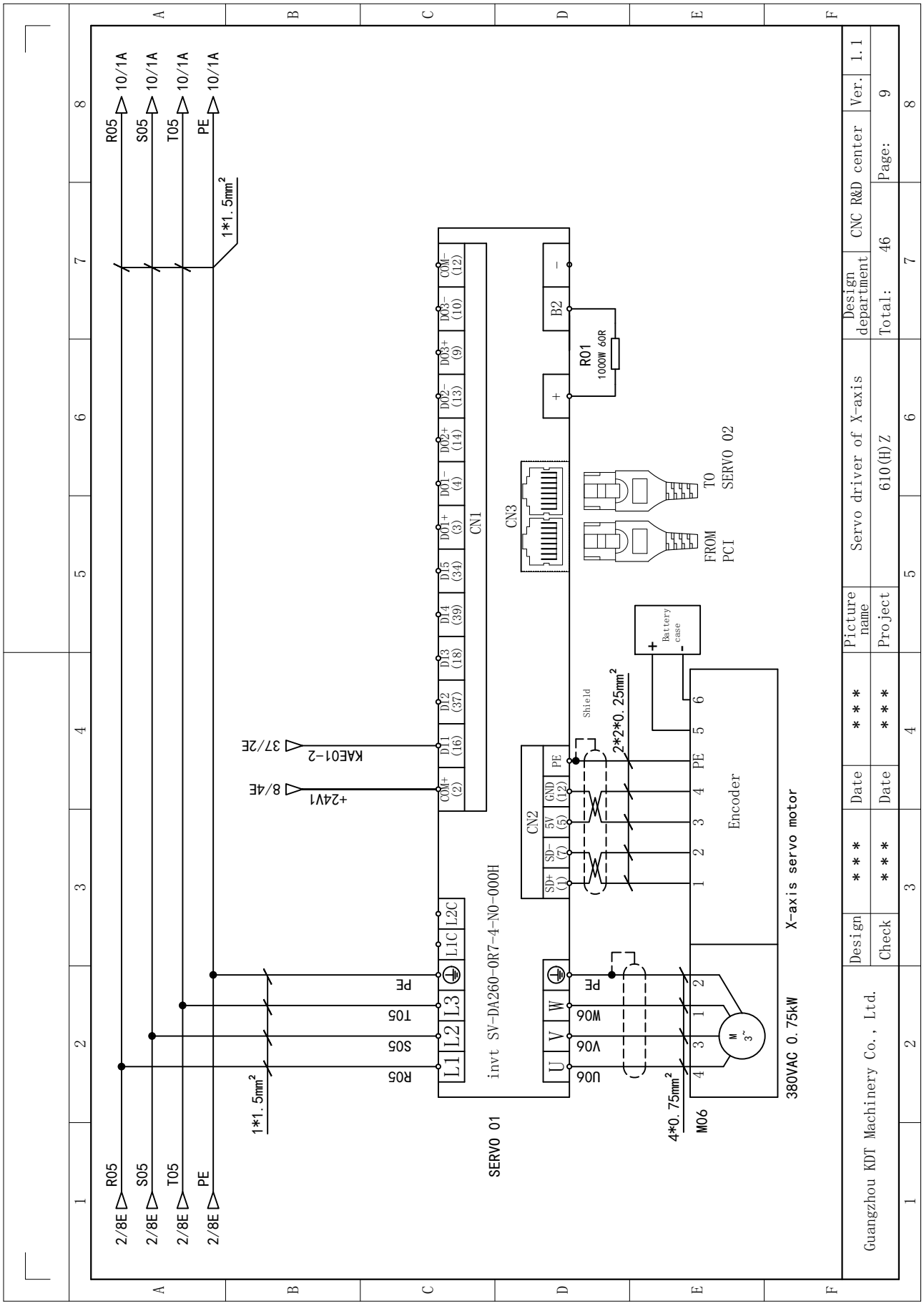
Design department
CNC R&D center
Total: 46
Page: 4
Ver. 1.1

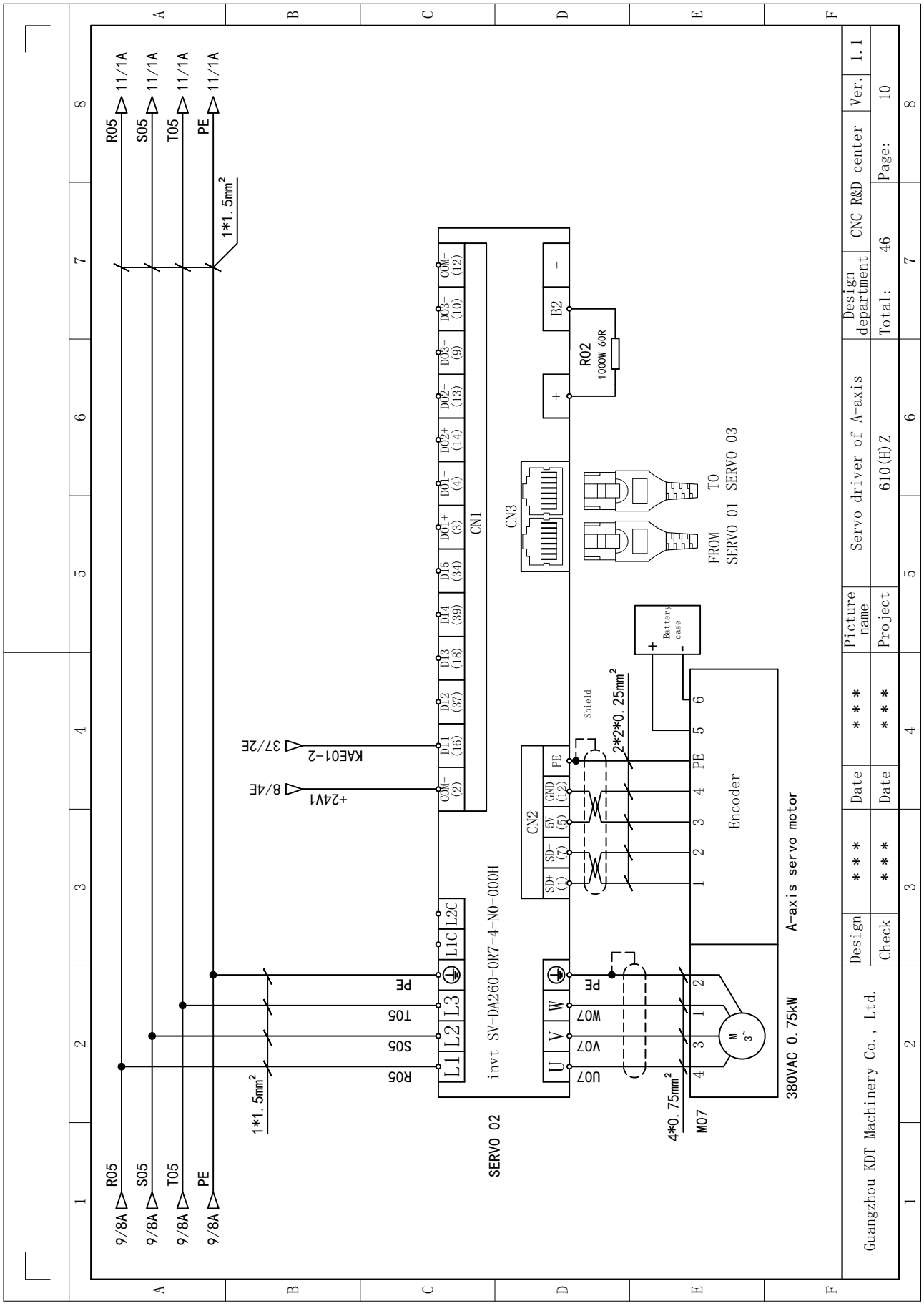

R03
S03
T03
PE
6/1A
4/8A
18/3B
37/6C
31/6D
KM02
6A
KH02
6.3A
U04
V04
W04
PE
1*1.5mm²
4*1.5mm²
M04
M
3~
380VAC 2.2kW
Lower drilling motor
Guangzhou KDT Machinery Co., Ltd.
Design
Check
Date
Picture name
Project
Lower drilling
610(H)Z
Design department
CNC R&D center
Total: 46
Page: 5
Ver. 1.1

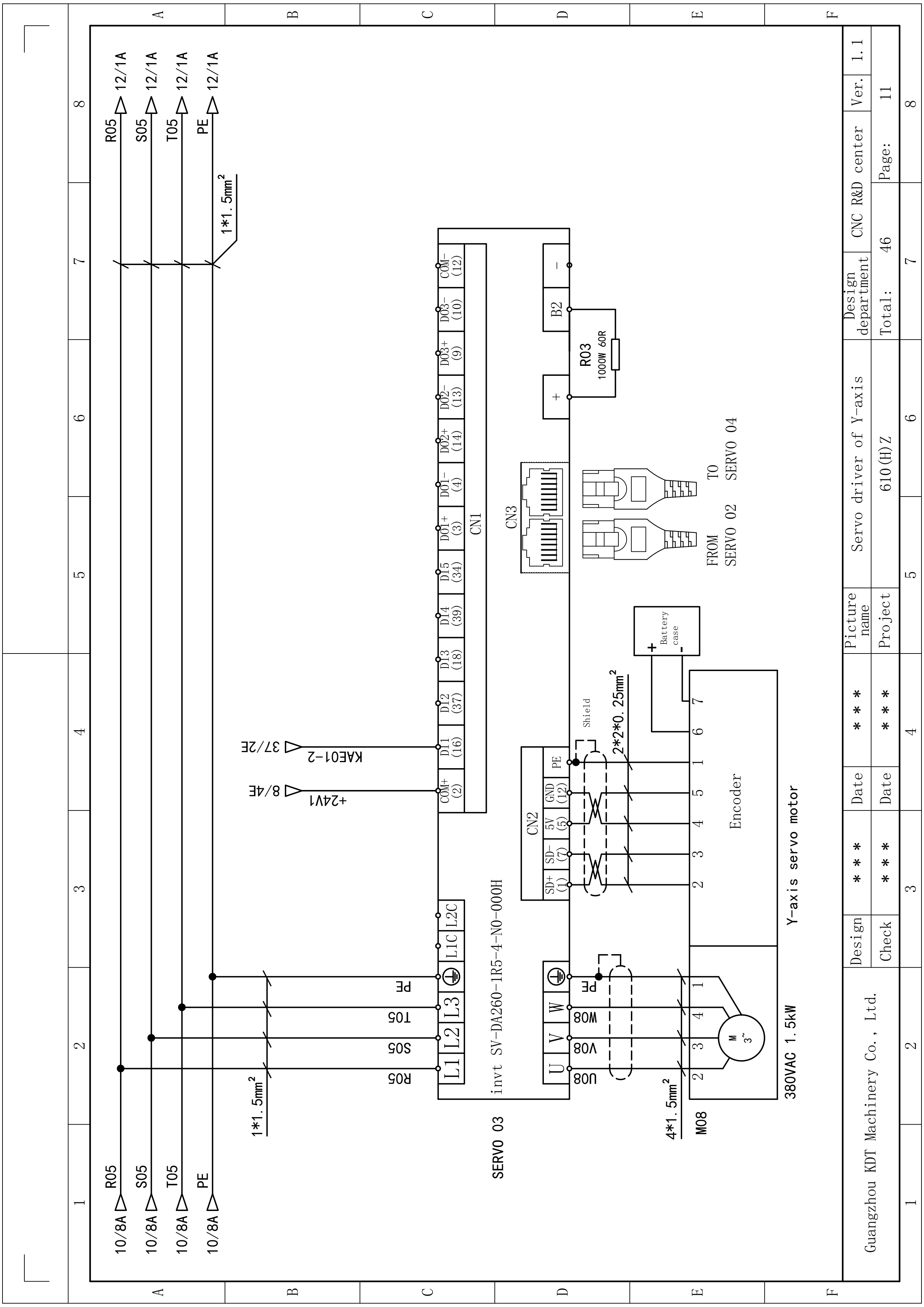

R03
S03
T03
PE
5/8A
1*1.5mm²
KM03
6A
31/7D
KH03
6.3A
4*1.5mm²
M05
380VAC 1.75kW
Blower motor
37/6D
U05
V05
W05
Guangzhou KDT Machinery Co., Ltd.
Design
Check
Date
Picture name
Project
blower wiring diagram
610(H)Z
Design department
CNC R&D center
Total: 46
Page: 6
Ver. 1.1

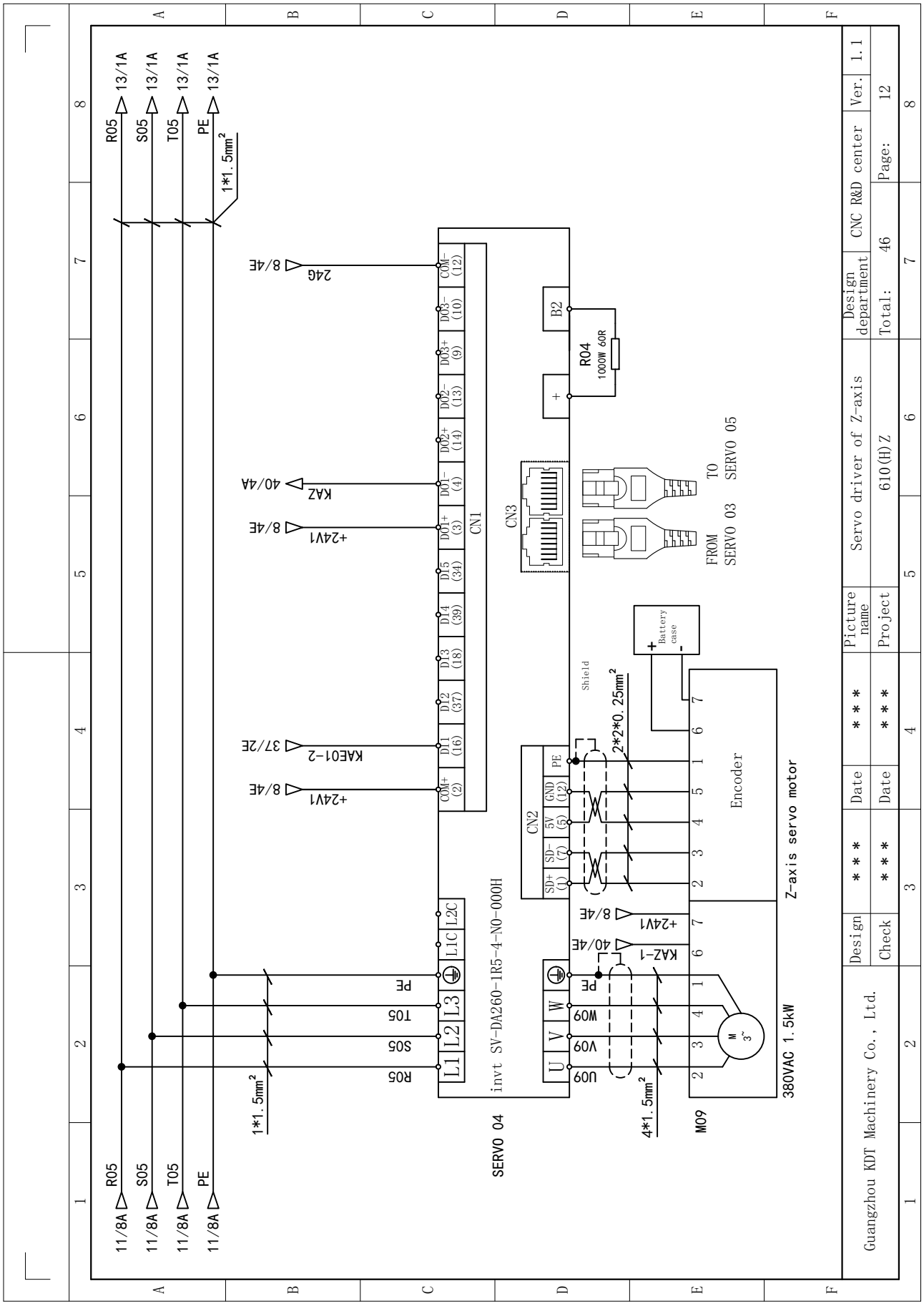

R02
T02
power supply for PC, display and cooling fan
power supply for drill,blower and conveyor belt
R-3
T-3
R-4
T-4
31/1D
Filter 02
6A 50Hz
KM05
6A
8/7C
R-2
T-2
KM04
6A
8/5C
R-1
T-1
1*1.5mm²
QF04
BKN 2P 10A
Filter 01
6A 50Hz
R-5
T-5
8/1A
power supply for heat exchanger
2/8C
Guangzhou KDT Machinery Co., Ltd.
Design
Check
Date
Curcuit of 220V
610(H)Z
Design department
CNC R&D center
Total: 46
Page: 7
Ver. 1.1

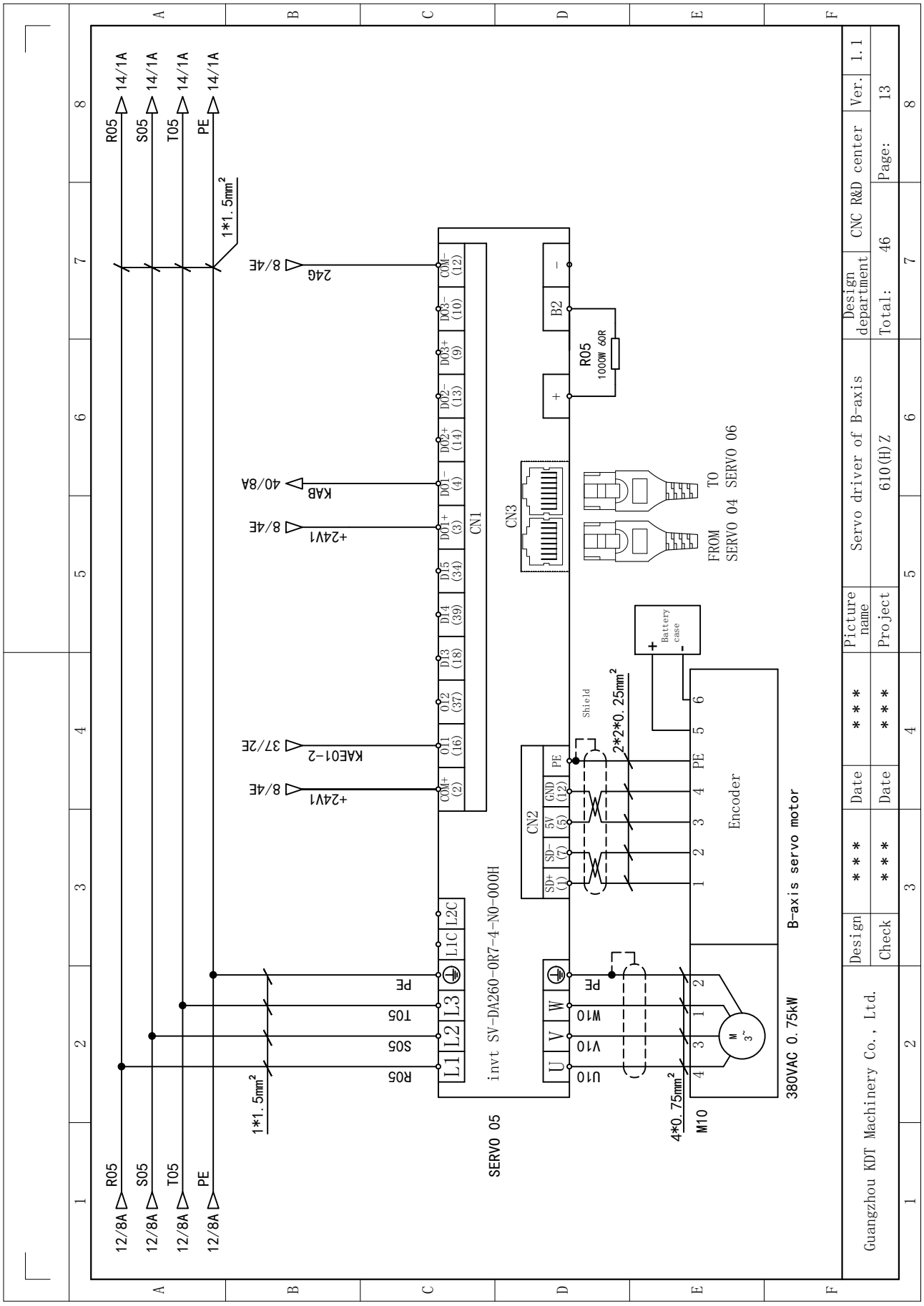

R-5
T-5
7/3E
KAE01
36/7E
KAE01-1
KM05
7/5D
KAS00
4D
KAS00-1
KM04
7/3C
AC220V
DC24V
+24V-1
24G-1
350W 24V
DC power supply 2
SBL01
4B
F01
6A
F02
6A
KAS00
5B
SBL01
4C
RD
+24V2
+24V1
24G
24/1D
16/1A
16/1A, 24/1D
Input Output power power
Guangzhou KDT Machinery Co., Ltd.
Design
Check
Date
Circuit of 24V
610(H)Z
Picture name
Project
Design department
CNC R&D center
Total: 46
Page: 8
Ver. 1.1

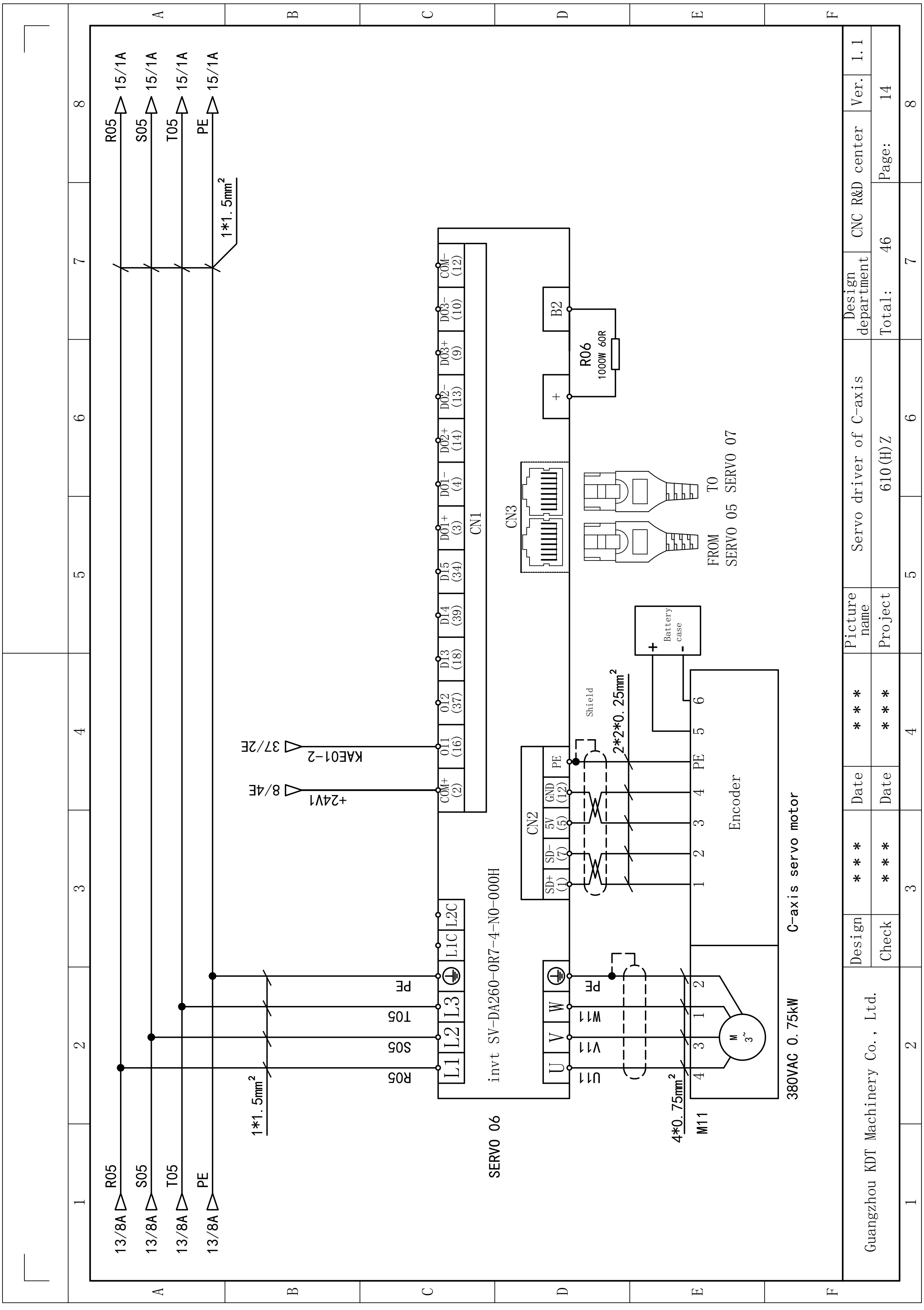

R05 10/1A
S05 10/1A
T05 10/1A
PE 10/1A
1*1.5mm²
2/8E R05
2/8E S05
2/8E T05
2/8E PE
1*1.5mm²
R05
S05
T05
PE
L1 L2 L3 L1C L2C
SERVO 01
invt SV-DA260-0R7-4-N0-000H
CN1
COM+ (2)
D11 (16)
D12 (37)
D13 (18)
D14 (39)
D15 (34)
D01+ (3)
D01- (4)
D02+ (14)
D02- (13)
D03+ (9)
D03- (10)
COM- (12)
+24V1
8/4E
KAE01-2
37/2E
CN2
SD+ (1)
SD- (7)
5V (5)
GND (12)
PE
Shield
2*2*0.25mm²
CN3
TO SERVO 02
FROM PCI
B2
+
-
R01
1000W 60R
Battery case
Encoder
U V W PE
U06
V06
W06
PE
4*0.75mm²
M06
M 3~
380VAC 0.75kW
X-axis servo motor
Guangzhou KDT Machinery Co., Ltd.
Design * * * Date * * *
Check * * * Date * * *
Servo driver of X-axis
610(H)Z
Picture name
Project
Design department
Total: 46
CNC R&D center
Page: 9
Ver. 1.1

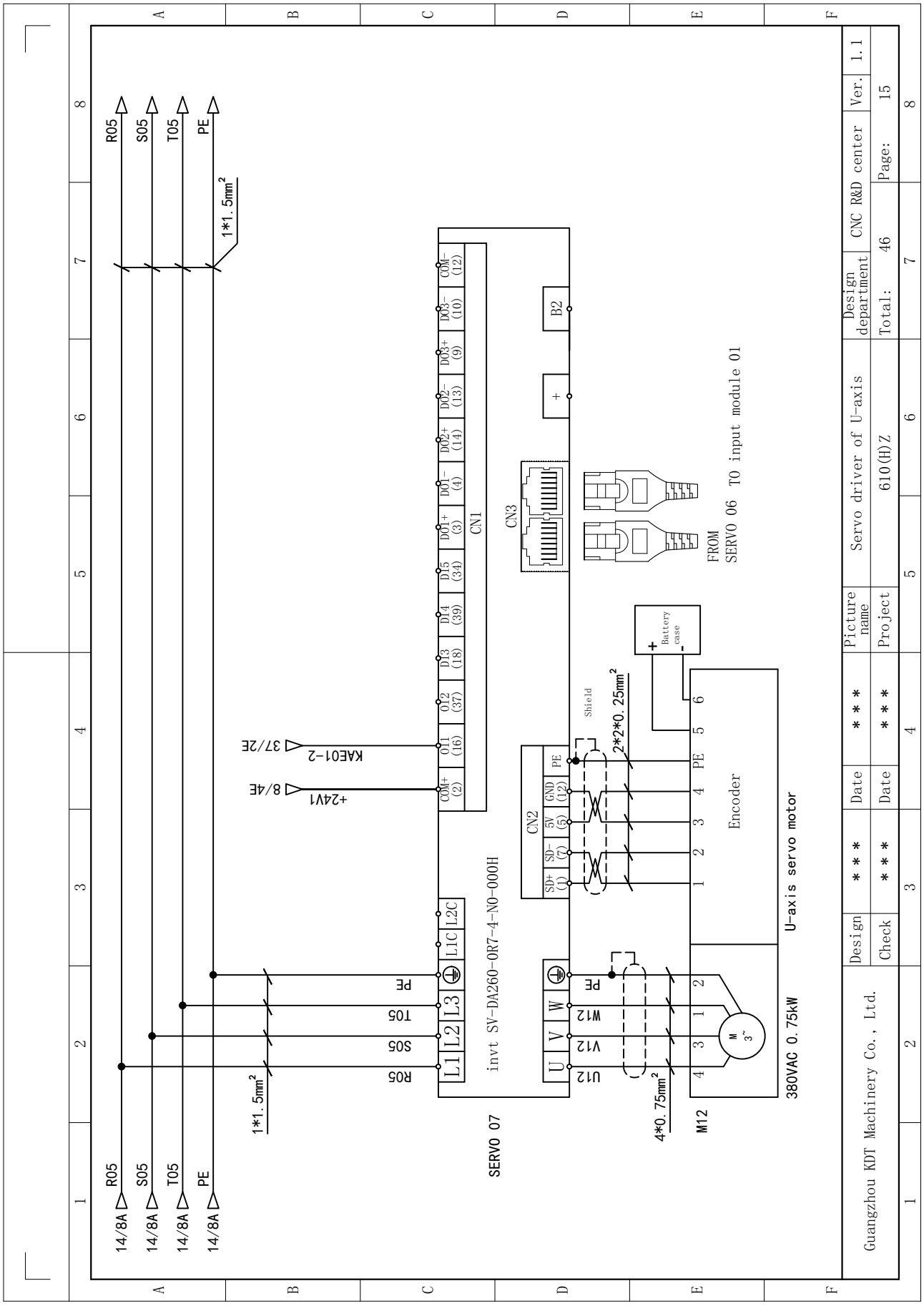

R05 11/1A
S05 11/1A
T05 11/1A
PE 11/1A
1*1.5mm²
9/8A R05
9/8A S05
9/8A T05
9/8A PE
1*1.5mm²
PE
T05
S05
R05
L1 L2 L3 L1C L2C
SERVO 02
invt SV-DA260-0R7-4-N0-000H
CN1
COM+ (2)
D11 (16)
D12 (37)
D13 (18)
D14 (39)
D15 (34)
D01+ (3)
D01- (4)
D02+ (14)
D02- (13)
D03+ (9)
D03- (10)
COM- (12)
37/2E
KAE01-2
8/4E
+24V1
CN2
SD+ (1)
SD- (7)
5V (5)
GND (12)
PE
Shield
2*2*0.25mm²
CN3
FROM SERVO 01
TO SERVO 03
B2
+
-
R02
1000W 60R
Battery case
+
-
U V W
U07
V07
W07
PE
4*0.75mm²
M07
M 3~
Encoder
1 2 3 4 5 6
PE
A-axis servo motor
380VAC 0.75kW
Guangzhou KDT Machinery Co., Ltd.
Design * * * Date * * *
Check * * * Date * * *
Picture name
Project
Servo driver of A-axis
610(H)Z
Design department
Total: 46
CNC R&D center
Page: 10
Ver. 1.1

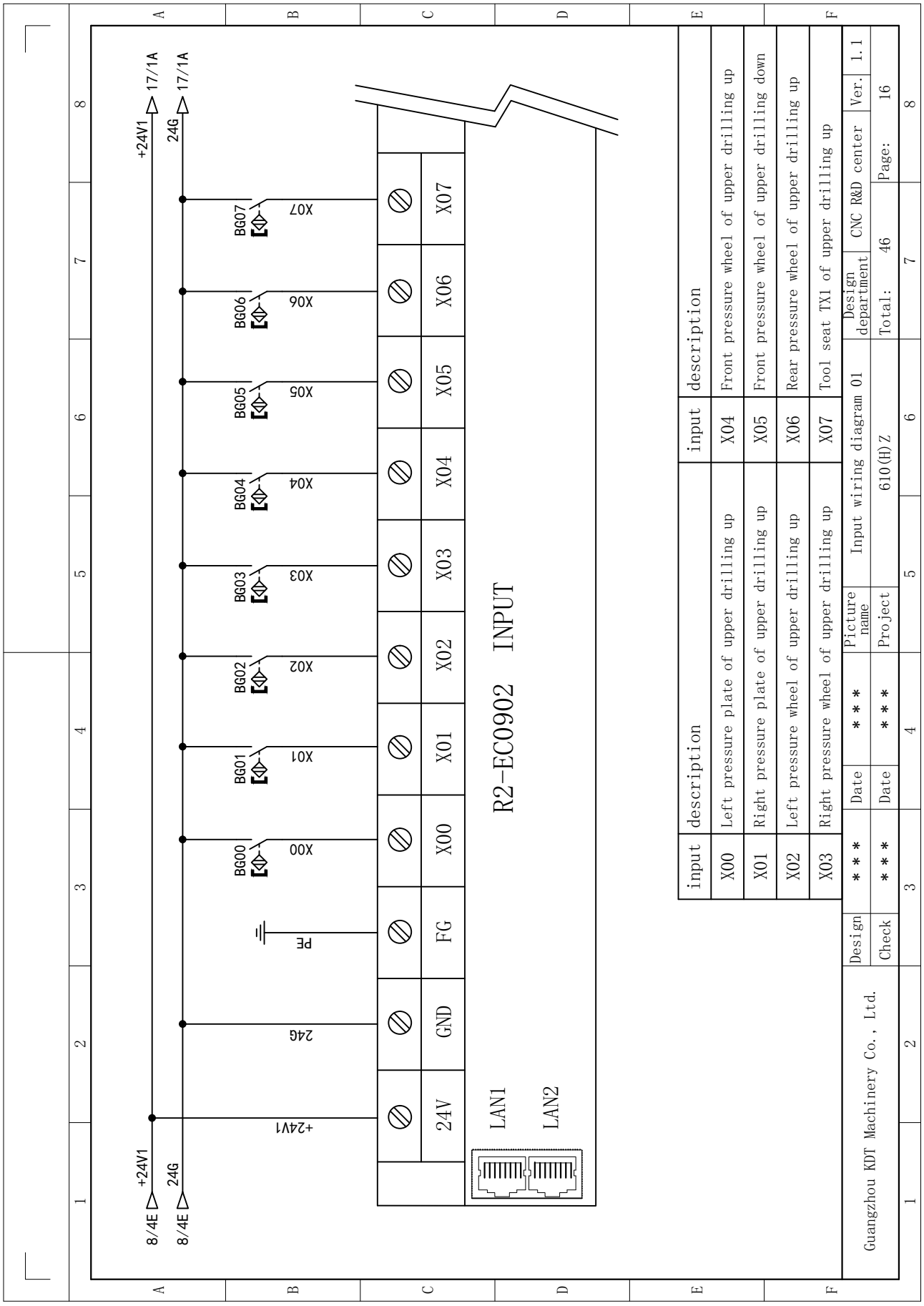

Servo driver of Y-axis
610(H)Z
Guangzhou KDT Machinery Co., Ltd.
CNC R&D center
Ver. 1.1
Total: 46
Page: 11
Design * * *
Check * * *
Date
Picture name
Project
Design department
SERVO 03
invt SV-DA260-1R5-4-N0-000H
CN1
CN2
CN3
Encoder
Y-axis servo motor
380VAC 1.5kW
Battery case
FROM SERVO 02
TO SERVO 04
R03 1000W 60R
M08
4*1.5mm²
1*1.5mm²
2*2*0.25mm²
Shield
R05
S05
T05
PE
U08
V08
W08
10/8A
12/1A
KAE01-2
37/2E
+24V1
8/4E


R05 13/1A
S05 13/1A
T05 13/1A
PE 13/1A
1*1.5mm²
24G 8/4E
KAZ 40/4A
+24V1 8/4E
KAE01-2 37/2E
+24V1 8/4E
CN1
CN3
CN2
B2
R04
1000W 60R
TO SERVO 05
FROM SERVO 03
Shield
Battery case
2*2*0.25mm²
Encoder
+24V1 8/4E
KAZ-1 40/4E
4*1.5mm²
M09
Z-axis servo motor
380VAC 1.5kW
SERVO 04
invt SV-DA260-1R5-4-N0-000H
L1 L2 L3 PE T05 S05 R05
U V W PE W09 V09 U09
L1C L2C
11/8A R05
11/8A S05
11/8A T05
11/8A PE
1*1.5mm²
Guangzhou KDT Machinery Co., Ltd.
Design *** Date *** Picture name
Check *** Date *** Project
Servo driver of Z-axis
610(H)Z
Design department CNC R&D center
Total: 46 Page: 12
Ver. 1.1

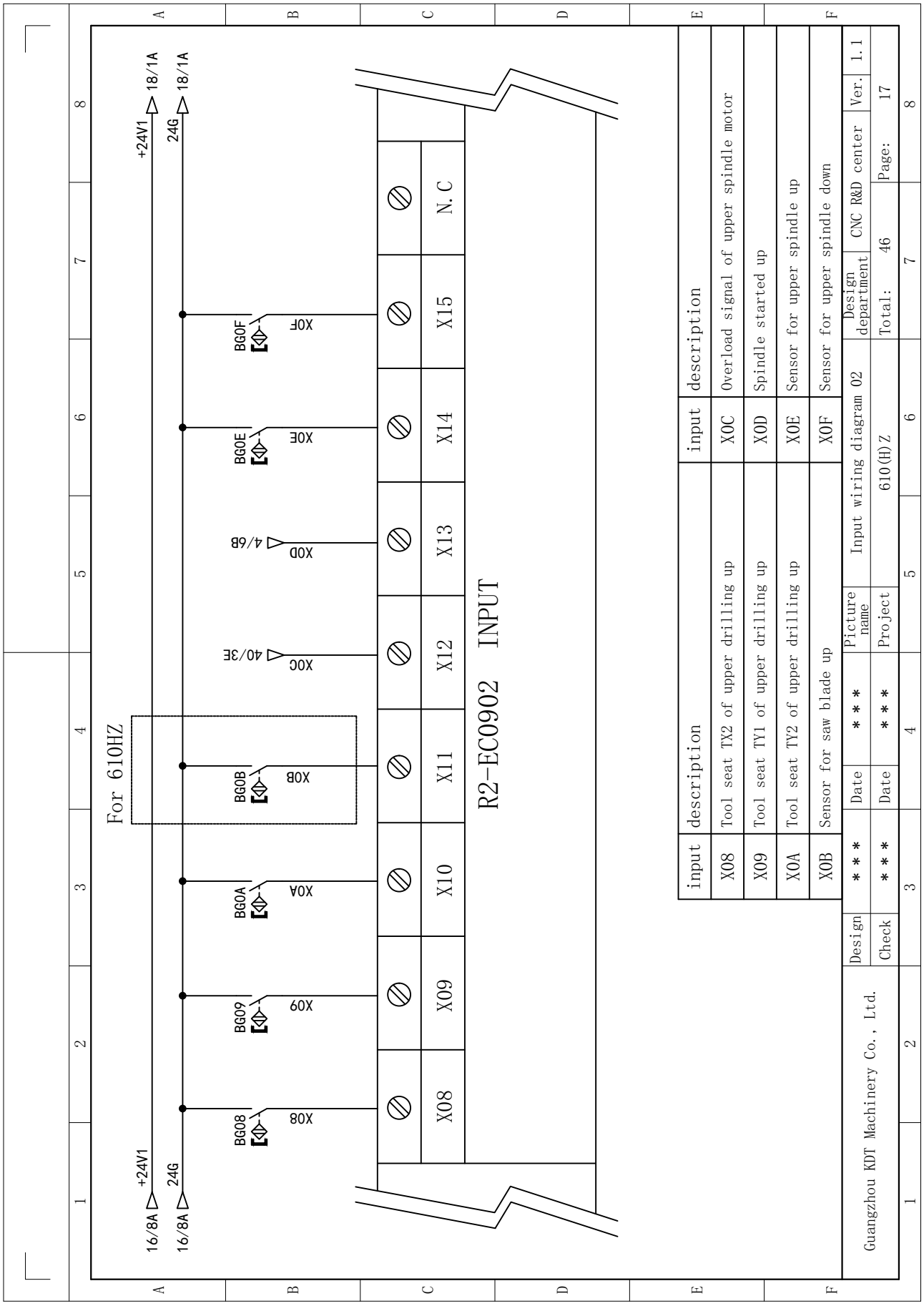

R05 14/1A
S05 14/1A
T05 14/1A
PE 14/1A
1*1.5mm²
8/4E 24G
40/8A KAB
8/4E +24V1
37/2E KAE01-2
8/4E +24V1
CN1
CN3
CN2
B2
R05 1000W 60R
TO SERVO 04 SERVO 06
FROM SERVO 05
Shield
2*2*0.25mm²
Battery case
Encoder
PE
W10
V10
U10
4*0.75mm²
M10
380VAC 0.75kW
B-axis servo motor
invt SV-DA260-0R7-4-N0-000H
SERVO 05
12/8A R05
12/8A S05
12/8A T05
12/8A PE
L1 L2 L3 L1C L2C
Guangzhou KDT Machinery Co., Ltd.
Servo driver of B-axis
610(H)Z
Design department
Total: 46
CNC R&D center
Page: 13
Ver. 1.1
Design *** Date
Check *** Date
Picture name *** Date
Project *** Date


SERVO 06
invt SV-DA260-0R7-4-N0-000H
R05
S05
T05
PE
13/8A
15/1A
1*1.5mm²
L1
L2
L3
L1C
L2C
U
V
W
U11
V11
W11
4*0.75mm²
M11
380VAC 0.75kW
C-axis servo motor
Encoder
CN1
CN2
CN3
COM+ (2)
O11 (16)
O12 (37)
DI3 (18)
DI4 (39)
DI5 (34)
DO1+ (3)
DO1- (4)
DO2+ (14)
DO2- (13)
DO3+ (9)
DO3- (10)
COM- (12)
+24V1
8/4E
KAE01-2
37/2E
SD+ (1)
SD- (7)
5V (5)
GND (12)
PE
Shield
2*2*0.25mm²
Battery case
B2
+
R06
1000W 60R
FROM SERVO 05
TO SERVO 07
Guangzhou KDT Machinery Co., Ltd.
Design
Check
Date
***
Picture name
Project
Servo driver of C-axis
610(H)Z
Design department
CNC R&D center
Total: 46
Page: 14
Ver. 1.1


R05
S05
T05
PE
1*1.5mm²
14/8A
SERVO 07
invt SV-DA260-0R7-4-N0-000H
L1 L2 L3 L1C L2C
U V W PE
U12 V12 W12 PE
CN1
CN2
CN3
COM+ (2) O11 (16) O12 (37) D13 (18) D14 (39) D15 (34) D01+ (3) D01- (4) D02+ (14) D02- (13) D03+ (9) D03- (10) COM- (12)
SD+ (1) SD- (7) 5V (5) GND (12) PE
+24V1
8/4E
KAE01-2
37/2E
B2
+
FROM SERVO 06 TO input module 01
Shield
2*2*0.25mm²
Battery case
Encoder
1 2 3 4 PE 5 6
4*0.75mm²
M12
380VAC 0.75kW
U-axis servo motor
Guangzhou KDT Machinery Co., Ltd.
Design *** Date *** Picture name
Check *** Date *** Project
Servo driver of U-axis
610(H)Z
Design department CNC R&D center
Total: 46 Page: 15
Ver. 1.1

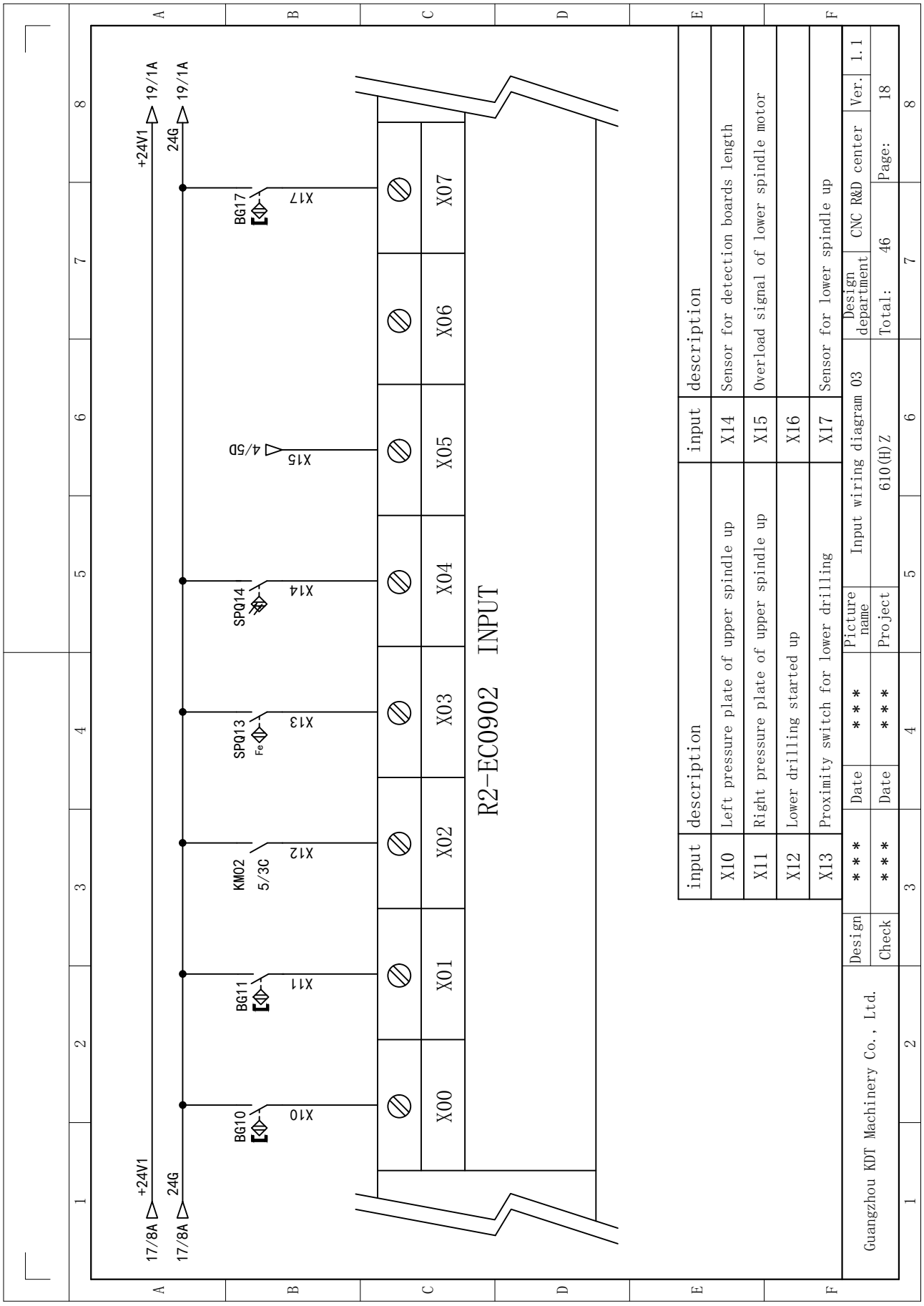


input	description
X00	Left pressure plate of upper drilling up
X01	Right pressure plate of upper drilling up
X02	Left pressure wheel of upper drilling up
X03	Right pressure wheel of upper drilling up
X04	Front pressure wheel of upper drilling up
X05	Front pressure wheel of upper drilling down
X06	Rear pressure wheel of upper drilling up
X07	Tool seat TX1 of upper drilling up



input	description
X08	Tool seat TX2 of upper drilling up
X09	Tool seat TY1 of upper drilling up
X0A	Tool seat TY2 of upper drilling up
X0B	Sensor for saw blade up
X0C	Overload signal of upper spindle motor
X0D	Spindle started up
X0E	Sensor for upper spindle up
X0F	Sensor for upper spindle down

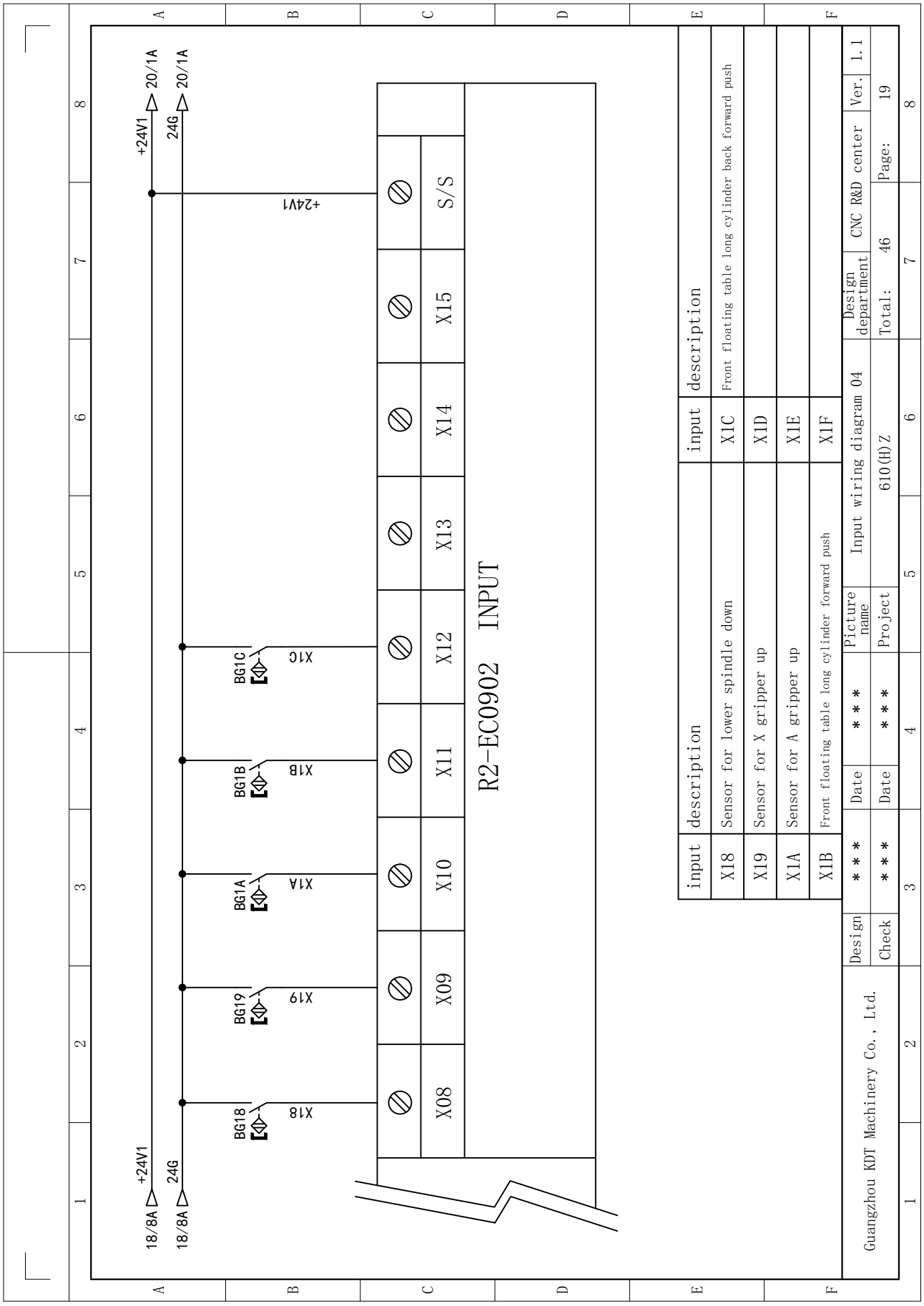
Guangzhou KDT Machinery Co., Ltd.	Design	* * *	Date	* * *	Picture name	Input wiring diagram 02	Design department	CNC R&D center	Ver.	1.1
	Check	* * *	Date	* * *	Project	610(H)Z	Total: 46	Page: 17		

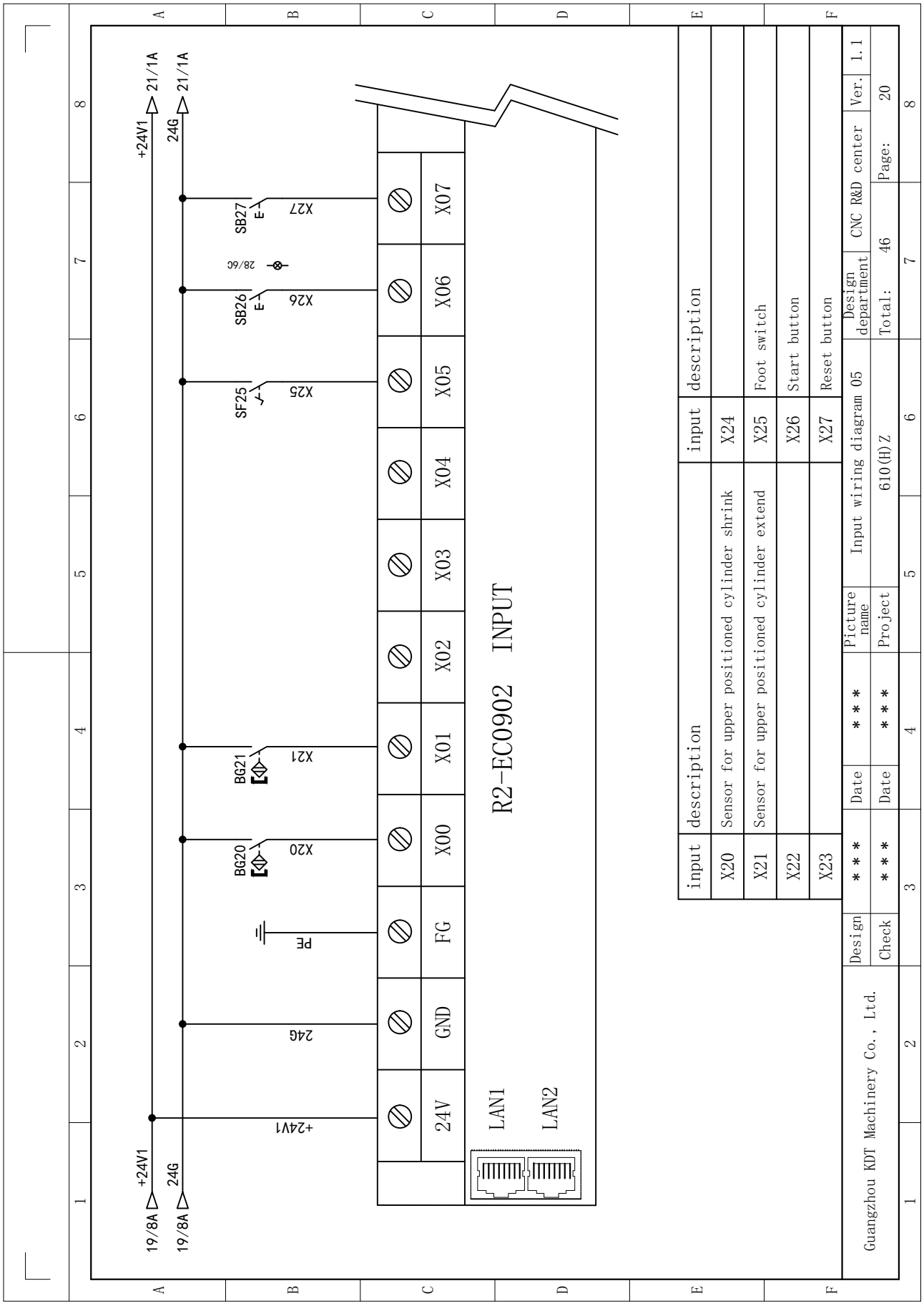


input	description
X10	Left pressure plate of upper spindle up
X11	Right pressure plate of upper spindle up
X12	Lower drilling started up
X13	Proximity switch for lower drilling

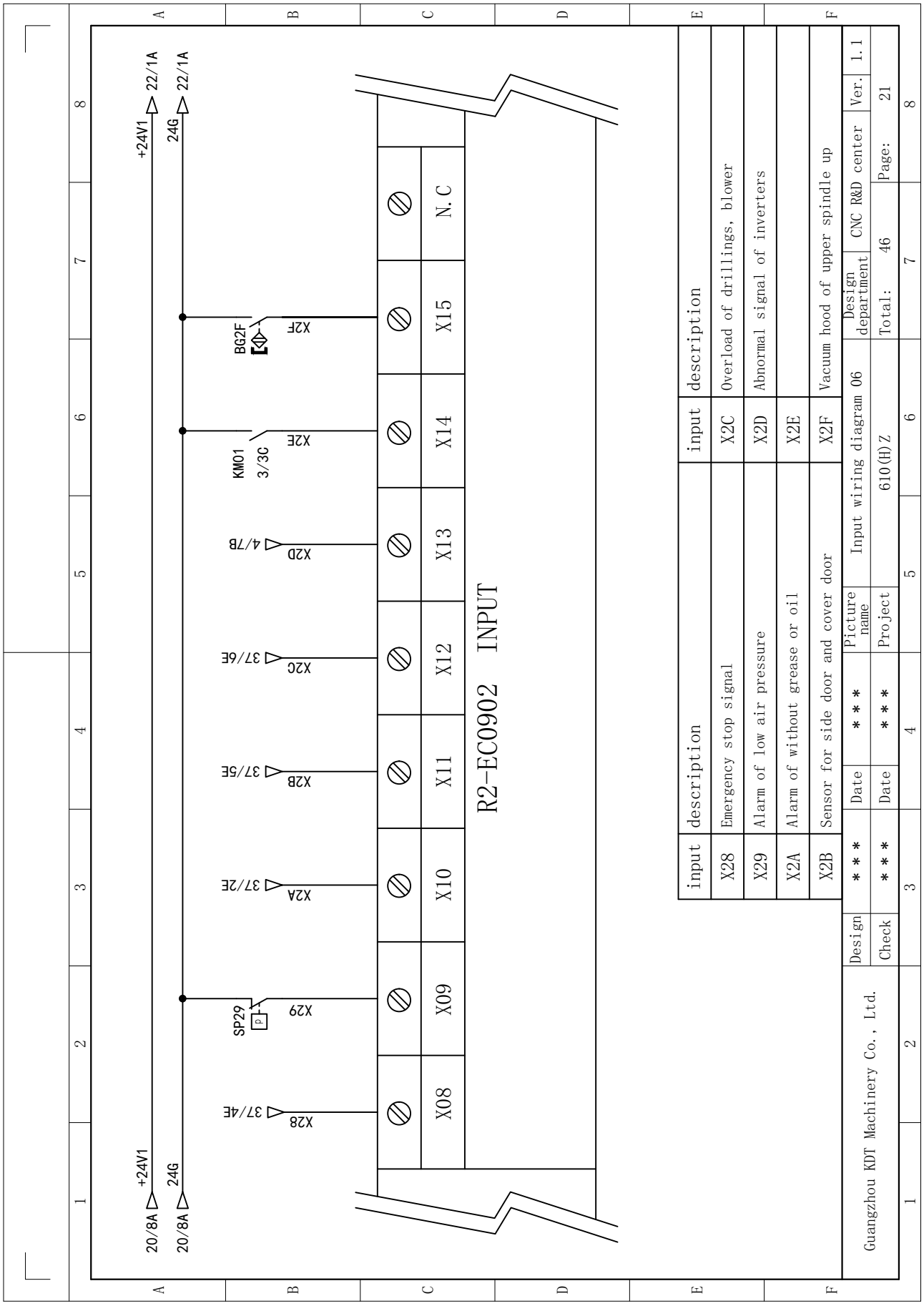
input	description
X14	Sensor for detection boards length
X15	Overload signal of lower spindle motor
X16	
X17	Sensor for lower spindle up

Guangzhou KDT Machinery Co., Ltd.	Design	***	Date	***	Picture name	Input wiring diagram 03	Design department	CNC R&D center	Ver.	1.1
	Check	***	Date	***	Project	610(H)Z	Total: 46	Page: 18		


+24V1
20/1A
24G
20/1A
+24V1
S/S
X15
X14
X13
X12
X11
X10
X09
X08
R2-EC0902 INPUT
BG1C
X1C
BG1B
X1B
BG1A
X1A
BG19
X19
BG18
X1B
+24V1
18/8A
24G
18/8A
input description
X18 Sensor for lower spindle down
X19 Sensor for X gripper up
X1A Sensor for A gripper up
X1B Front floating table long cylinder forward push
input description
X1C Front floating table long cylinder back forward push
X1D
X1E
X1F
Guangzhou KDT Machinery Co., Ltd.
Design *** Date *** Picture name Input wiring diagram 04
Check *** Date *** Project 610(H)Z
Design department CNC R&D center
Total: 46 Page: 19
Ver. 1.1

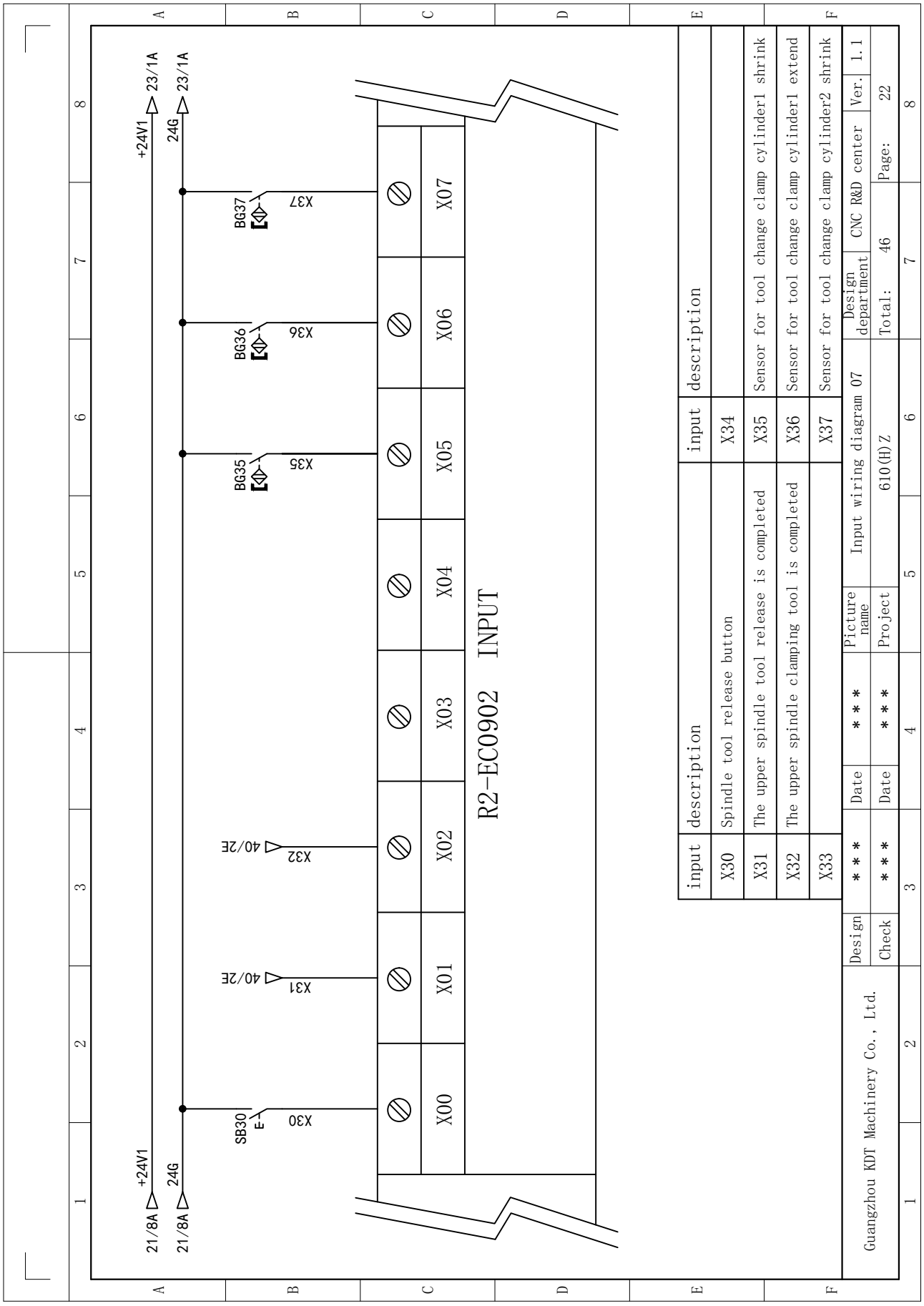


input	description
X20	Sensor for upper positioned cylinder shrink
X21	Sensor for upper positioned cylinder extend
X22	
X23	
X24	
X25	Foot switch
X26	Start button
X27	Reset button



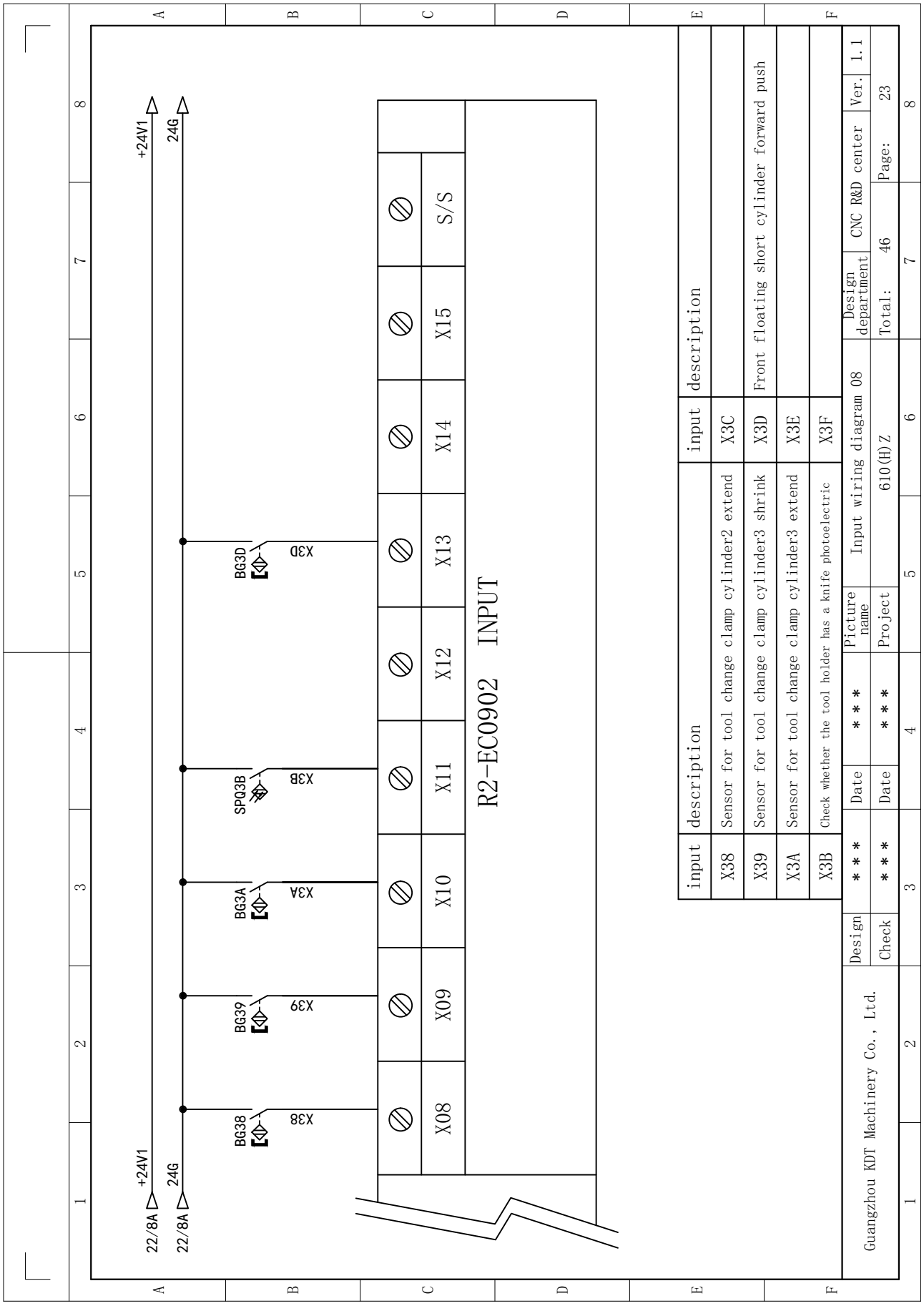
input	description
X28	Emergency stop signal
X29	Alarm of low air pressure
X2A	Alarm of without grease or oil
X2B	Sensor for side door and cover door
X2C	Overload of drillings, blower
X2D	Abnormal signal of inverters
X2E	
X2F	Vacuum hood of upper spindle up

Guangzhou KDT Machinery Co., Ltd.	Design	* * *	Date	* * *	Picture name	Input wiring diagram 06	Design department	CNC R&D center	Ver.	1.1
	Check	* * *	Date	* * *	Project	610(H)Z	Total: 46	Page: 21		



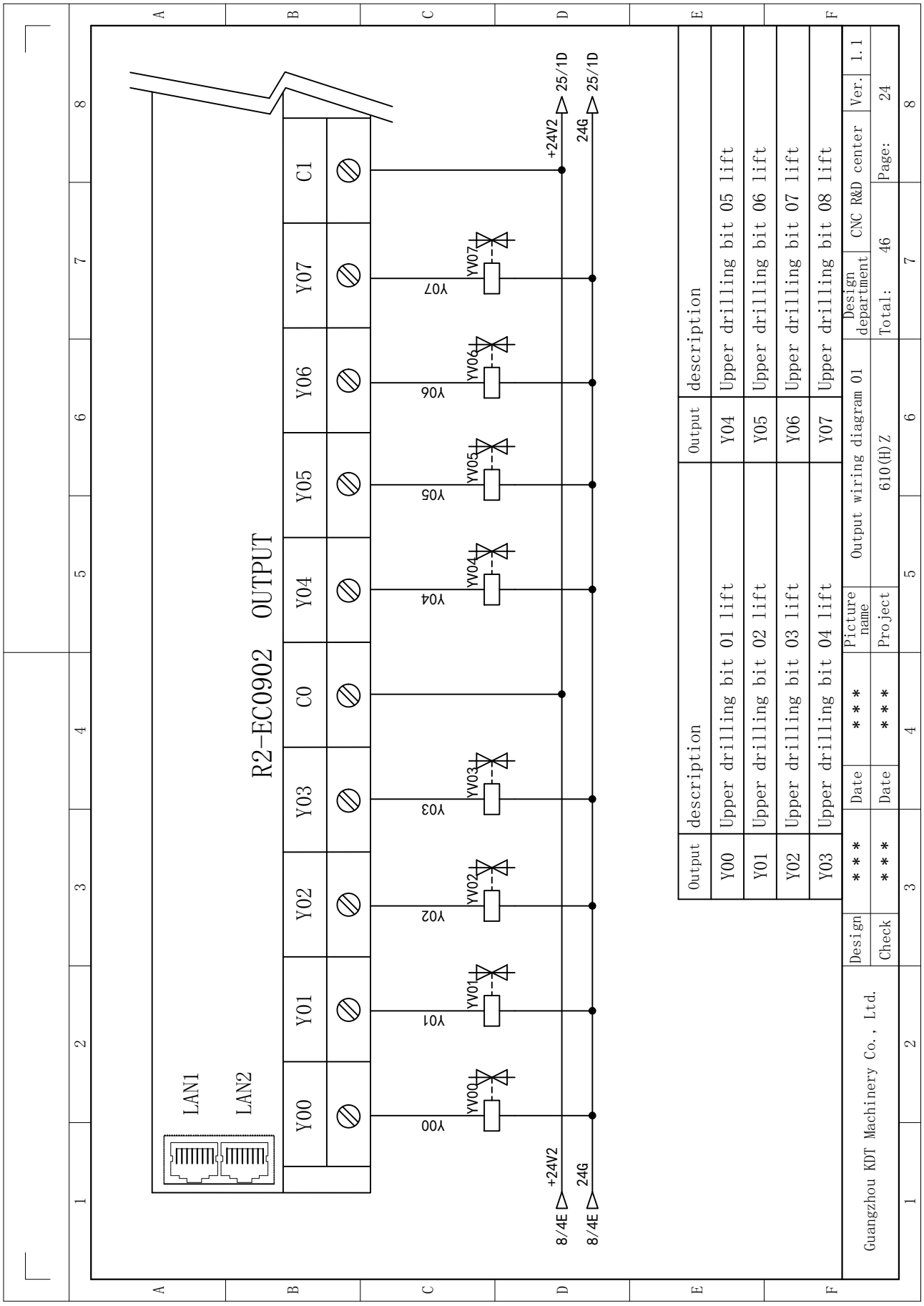
input	description
X30	Spindle tool release button
X31	The upper spindle tool release is completed
X32	The upper spindle clamping tool is completed
X33	
X34	
X35	Sensor for tool change clamp cylinder1 shrink
X36	Sensor for tool change clamp cylinder1 extend
X37	Sensor for tool change clamp cylinder2 shrink

Guangzhou KDT Machinery Co., Ltd.	Design	* * *	Date	* * *	Picture name	Input wiring diagram 07	Design department	CNC R&D center	Ver.	1.1
	Check	* * *	Date	* * *	Project	610(H)Z	Total: 46	Page: 22		

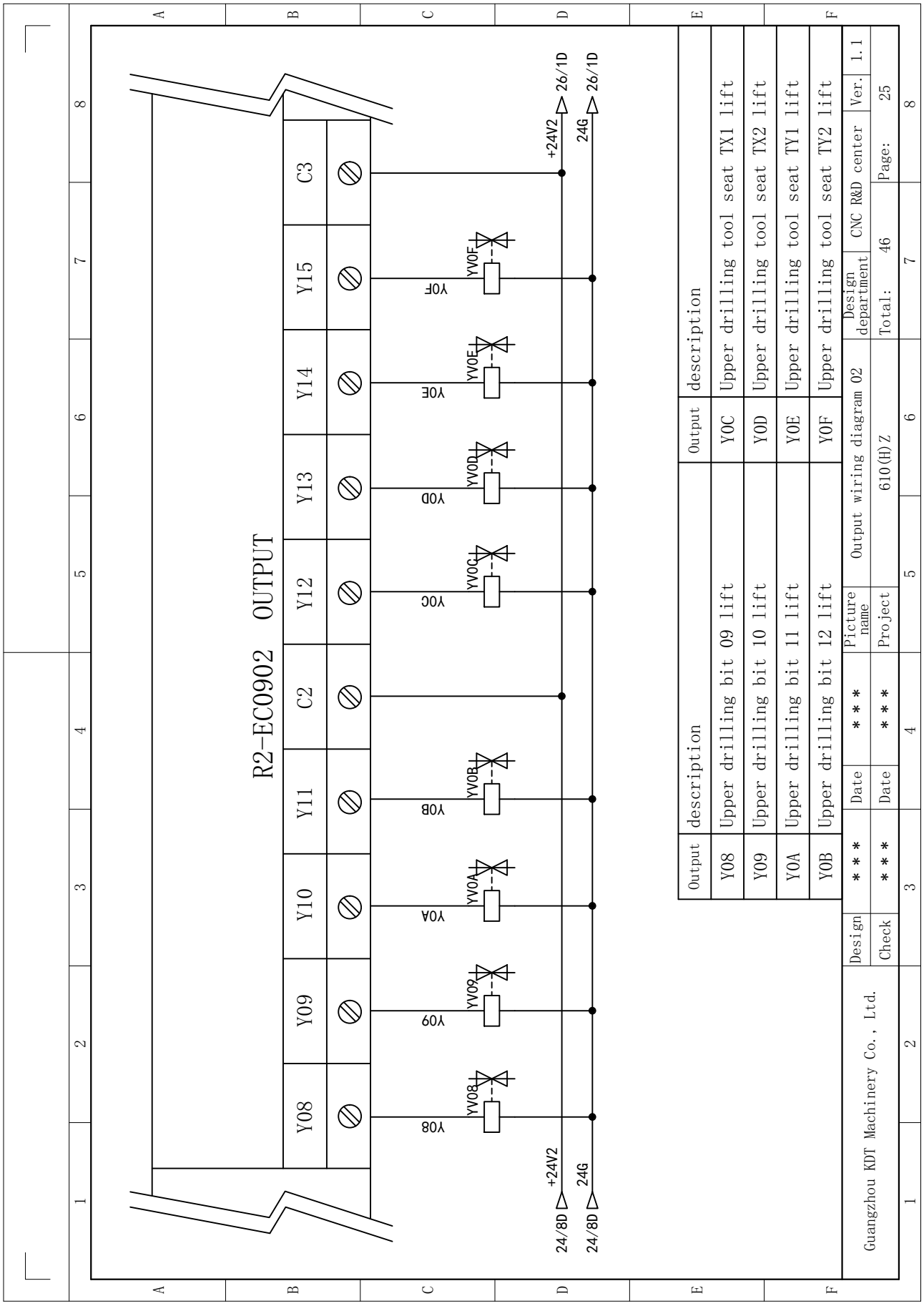


input	description
X38	Sensor for tool change clamp cylinder2 extend
X39	Sensor for tool change clamp cylinder3 shrink
X3A	Sensor for tool change clamp cylinder3 extend
X3B	Check whether the tool holder has a knife photoelectric
X3C	
X3D	Front floating short cylinder forward push
X3E	
X3F	

Guangzhou KDT Machinery Co., Ltd.	Design	* * *	Date	* * *	Picture name	Input wiring diagram 08	Design department	CNC R&D center	Ver.	1.1
	Check	* * *	Date	* * *	Project	610(H)Z	Total: 46	Page: 23		



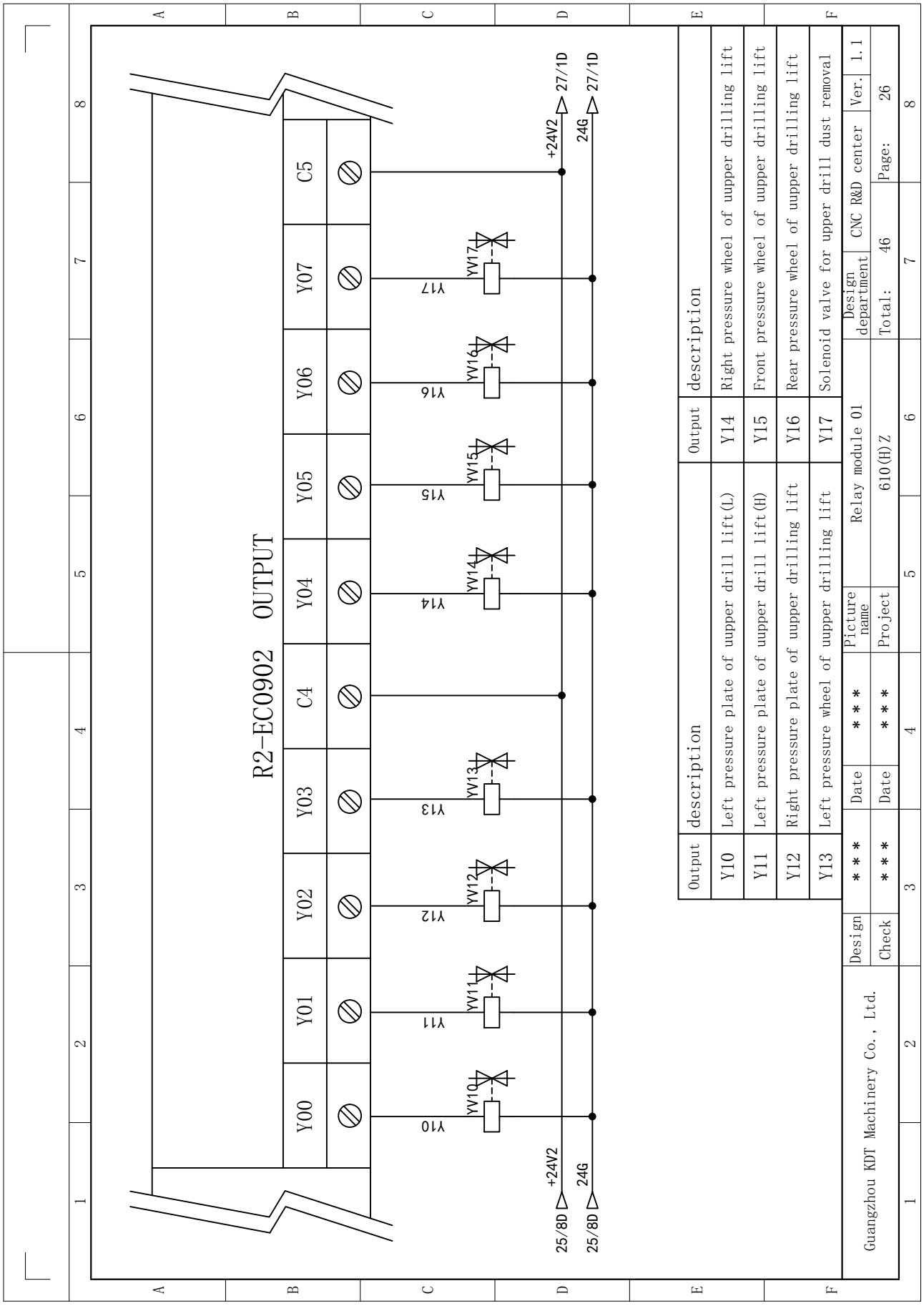
Output	description
Y00	Upper drilling bit 01 lift
Y01	Upper drilling bit 02 lift
Y02	Upper drilling bit 03 lift
Y03	Upper drilling bit 04 lift
Y04	Upper drilling bit 05 lift
Y05	Upper drilling bit 06 lift
Y06	Upper drilling bit 07 lift
Y07	Upper drilling bit 08 lift



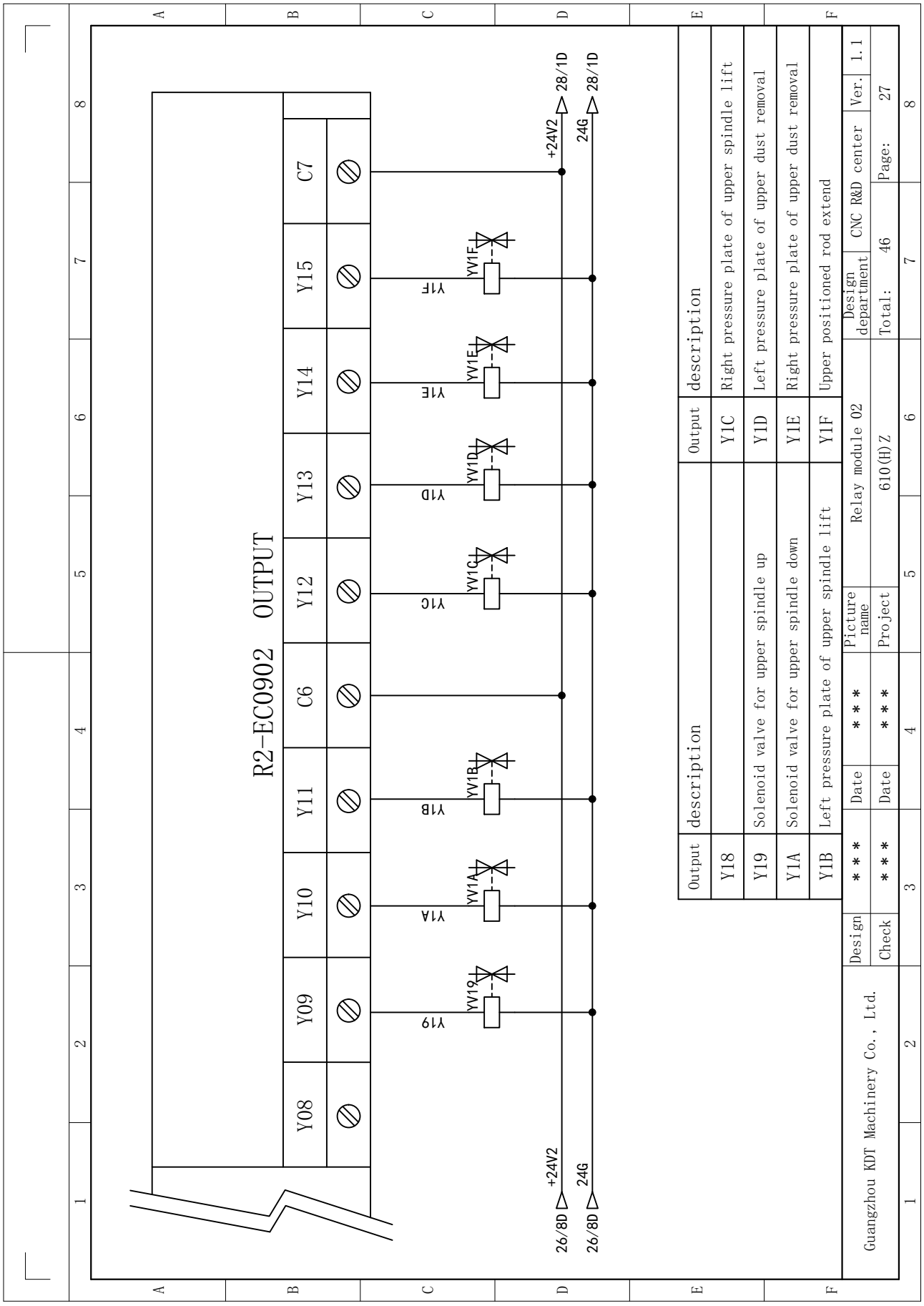
Output	description
Y08	Upper drilling bit 09 lift
Y09	Upper drilling bit 10 lift
Y0A	Upper drilling bit 11 lift
Y0B	Upper drilling bit 12 lift

Output	description
Y0C	Upper drilling tool seat TX1 lift
Y0D	Upper drilling tool seat TX2 lift
Y0E	Upper drilling tool seat TY1 lift
Y0F	Upper drilling tool seat TY2 lift

Guangzhou KDT Machinery Co., Ltd.	Design	* * *	Date	* * *	Picture name	Output wiring diagram 02	Design department	CNC R&D center	Ver.	1.1
	Check	* * *	Date	* * *	Project	610(H)Z	Total: 46		Page: 25	

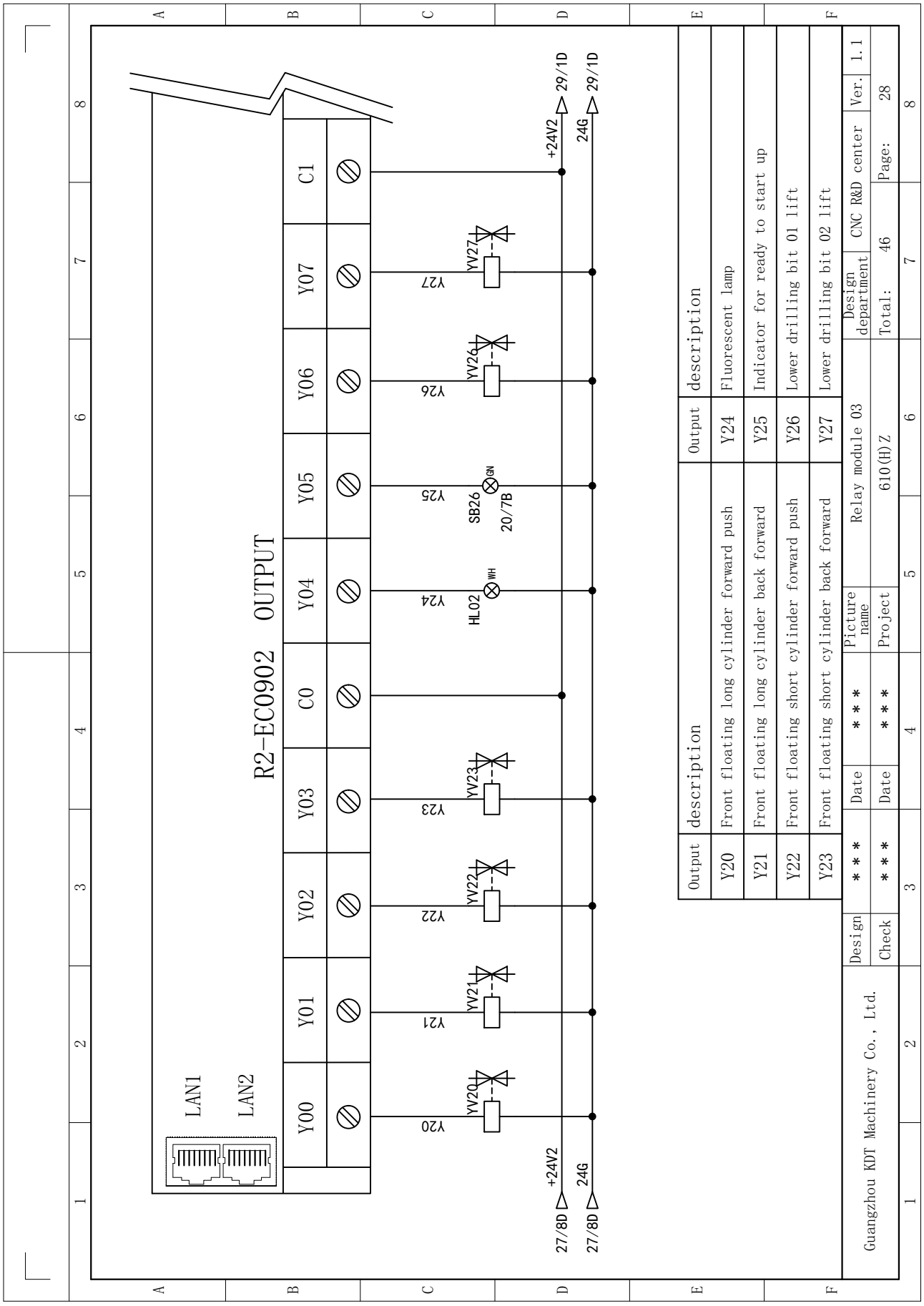


Output	description
Y10	Left pressure plate of uupper drill lift(L)
Y11	Left pressure plate of uupper drill lift(H)
Y12	Right pressure plate of uupper drilling lift
Y13	Left pressure wheel of uupper drilling lift
Y14	Right pressure wheel of uupper drilling lift
Y15	Front pressure wheel of uupper drilling lift
Y16	Rear pressure wheel of uupper drilling lift
Y17	Solenoid valve for upper drill dust removal



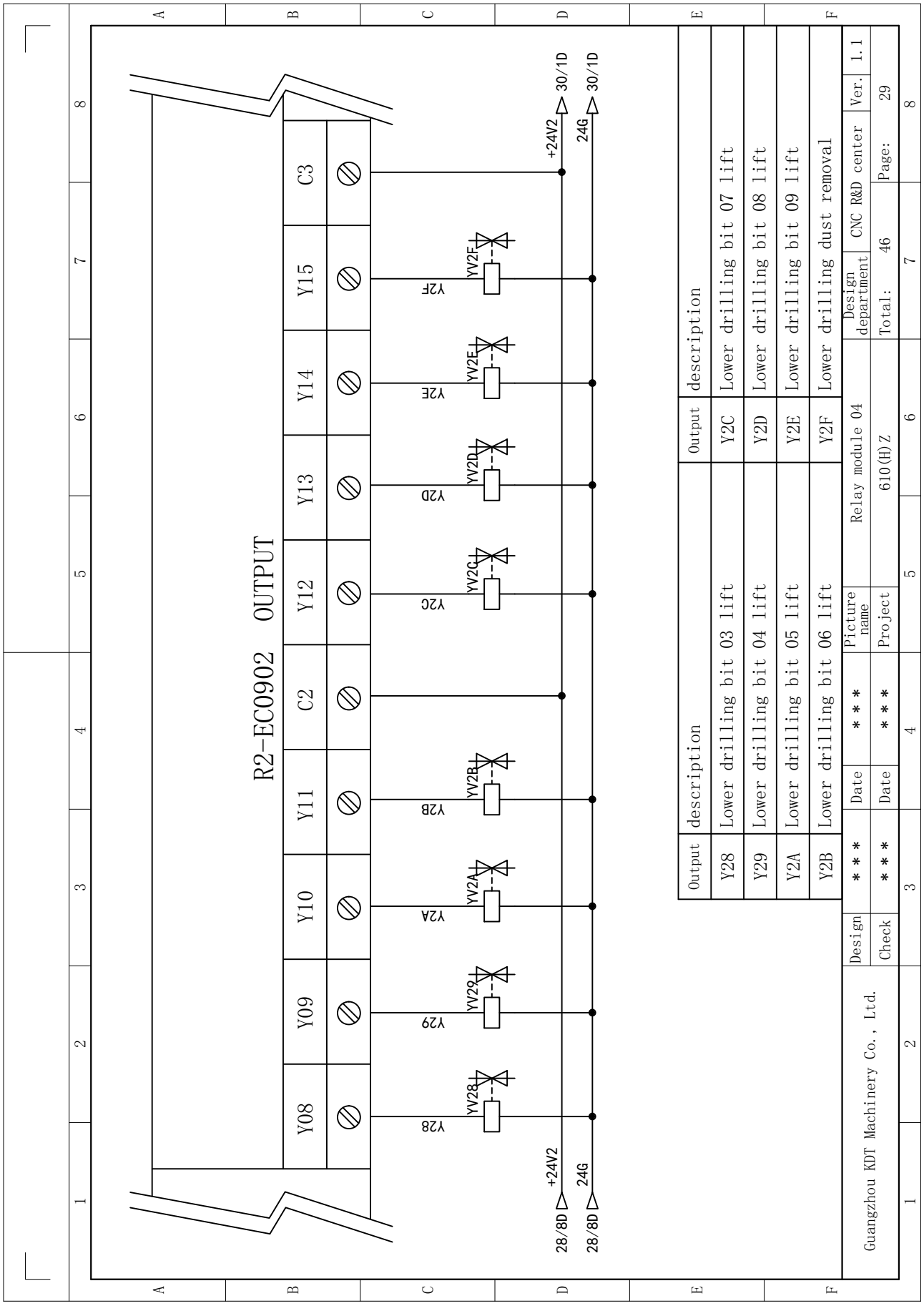
Output	description
Y18	
Y19	Solenoid valve for upper spindle up
Y1A	Solenoid valve for upper spindle down
Y1B	Left pressure plate of upper spindle lift
Y1C	Right pressure plate of upper spindle lift
Y1D	Left pressure plate of upper dust removal
Y1E	Right pressure plate of upper dust removal
Y1F	Upper positioned rod extend

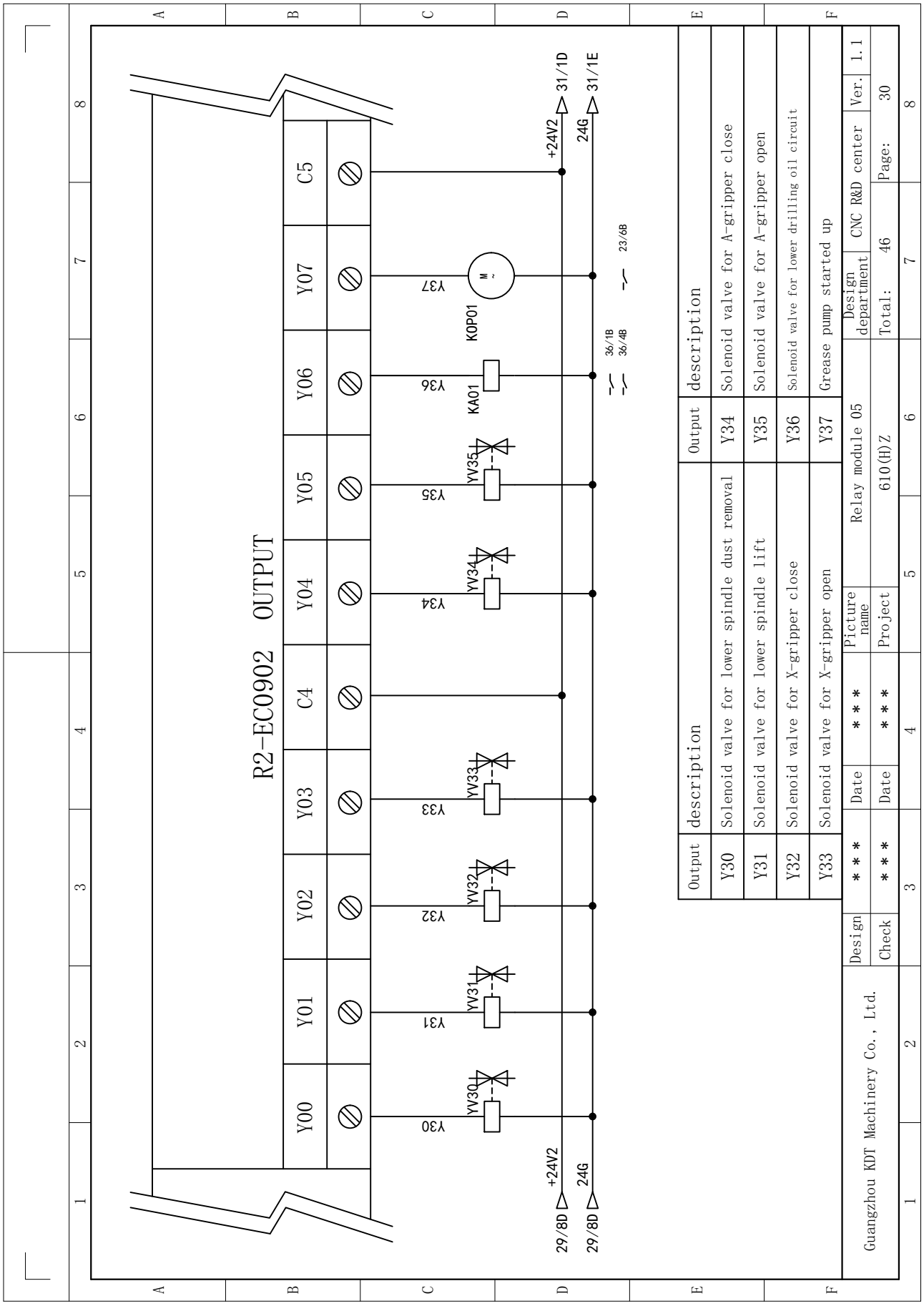
Guangzhou KDT Machinery Co., Ltd.	Design	* * *	Date	* * *	Picture name	Relay module 02	Design department	CNC R&D center	Ver.	1.1
	Check	* * *	Date	* * *	Project	610(H)Z	Total: 46	Page: 27		



Output	description
Y20	Front floating long cylinder forward push
Y21	Front floating long cylinder back forward
Y22	Front floating short cylinder forward push
Y23	Front floating short cylinder back forward
Y24	Fluorescent lamp
Y25	Indicator for ready to start up
Y26	Lower drilling bit 01 lift
Y27	Lower drilling bit 02 lift

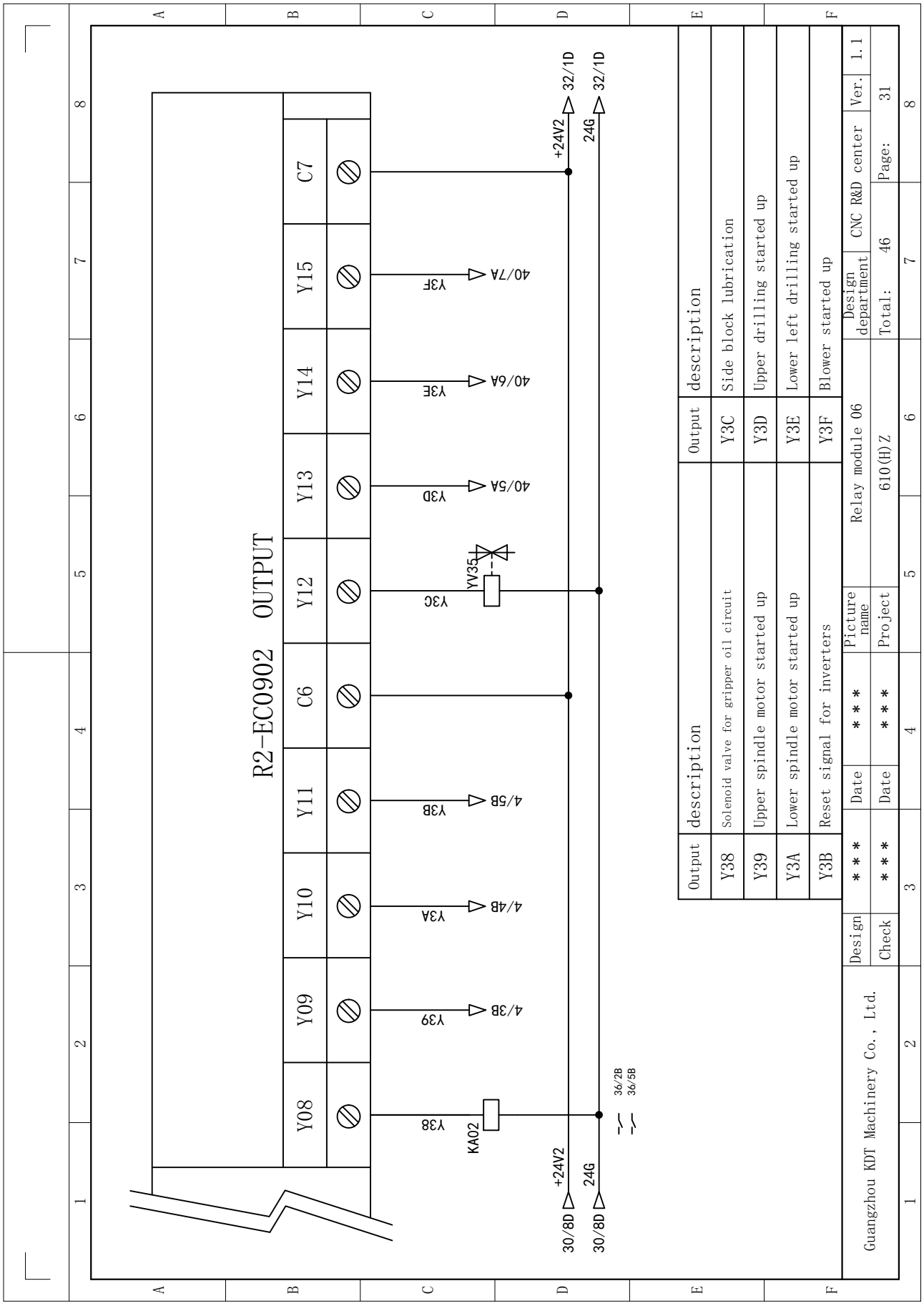
Guangzhou KDT Machinery Co., Ltd.	Design	* * *	Date	* * *	Picture name	Relay module 03	Design department	CNC R&D center	Ver.	1.1
	Check	* * *	Date	* * *	Project	610(H)Z	Total: 46	Page: 28		


R2-EC0902 OUTPUT
Y08
Y09
Y10
Y11
C2
Y12
Y13
Y14
Y15
C3
YV28
YV29
YV2A
YV2B
YV2C
YV2D
YV2E
YV2F
Y28
Y29
Y2A
Y2B
Y2C
Y2D
Y2E
Y2F
+24V2
24G
28/8D
30/1D
Output description
Y28 Lower drilling bit 03 lift
Y29 Lower drilling bit 04 lift
Y2A Lower drilling bit 05 lift
Y2B Lower drilling bit 06 lift
Output description
Y2C Lower drilling bit 07 lift
Y2D Lower drilling bit 08 lift
Y2E Lower drilling bit 09 lift
Y2F Lower drilling dust removal
Guangzhou KDT Machinery Co., Ltd.
Design *** Date *** Picture name Relay module 04
Check *** Date *** Project 610(H)Z
Design department CNC R&D center
Total: 46 Page: 29
Ver. 1.1

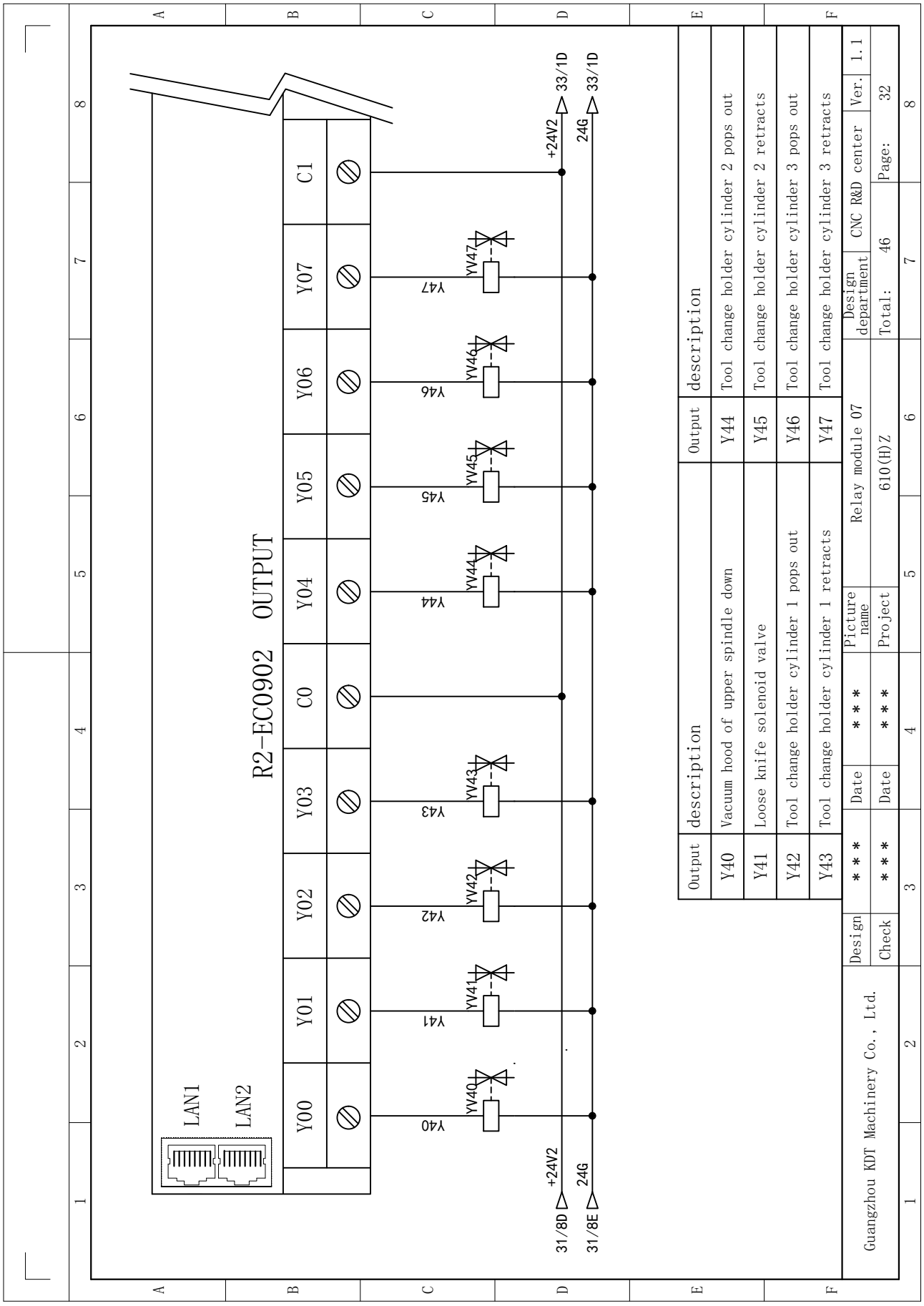


Output	description
Y30	Solenoid valve for lower spindle dust removal
Y31	Solenoid valve for lower spindle lift
Y32	Solenoid valve for X-gripper close
Y33	Solenoid valve for X-gripper open
Y34	Solenoid valve for A-gripper close
Y35	Solenoid valve for A-gripper open
Y36	Solenoid valve for lower drilling oil circuit
Y37	Grease pump started up

Guangzhou KDT Machinery Co., Ltd.	Design	***	Date	***	Picture name	Relay module 05	Design department	CNC R&D center	Ver.	1.1
	Check	***	Date	***	Project	610(H)Z	Total: 46		Page: 30



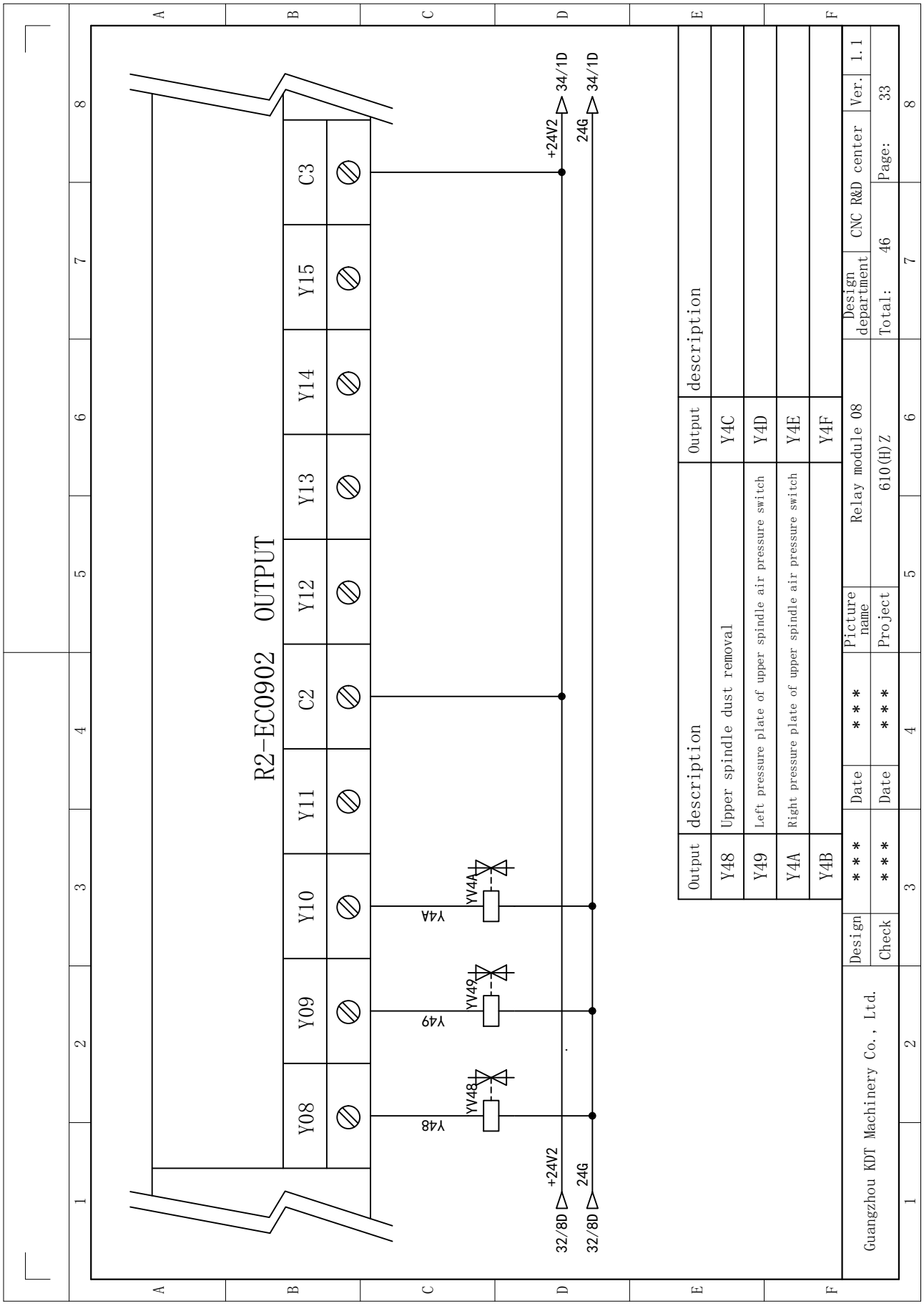
Output	description
Y38	Solenoid valve for gripper oil circuit
Y39	Upper spindle motor started up
Y3A	Lower spindle motor started up
Y3B	Reset signal for inverters
Y3C	Side block lubrication
Y3D	Upper drilling started up
Y3E	Lower left drilling started up
Y3F	Blower started up

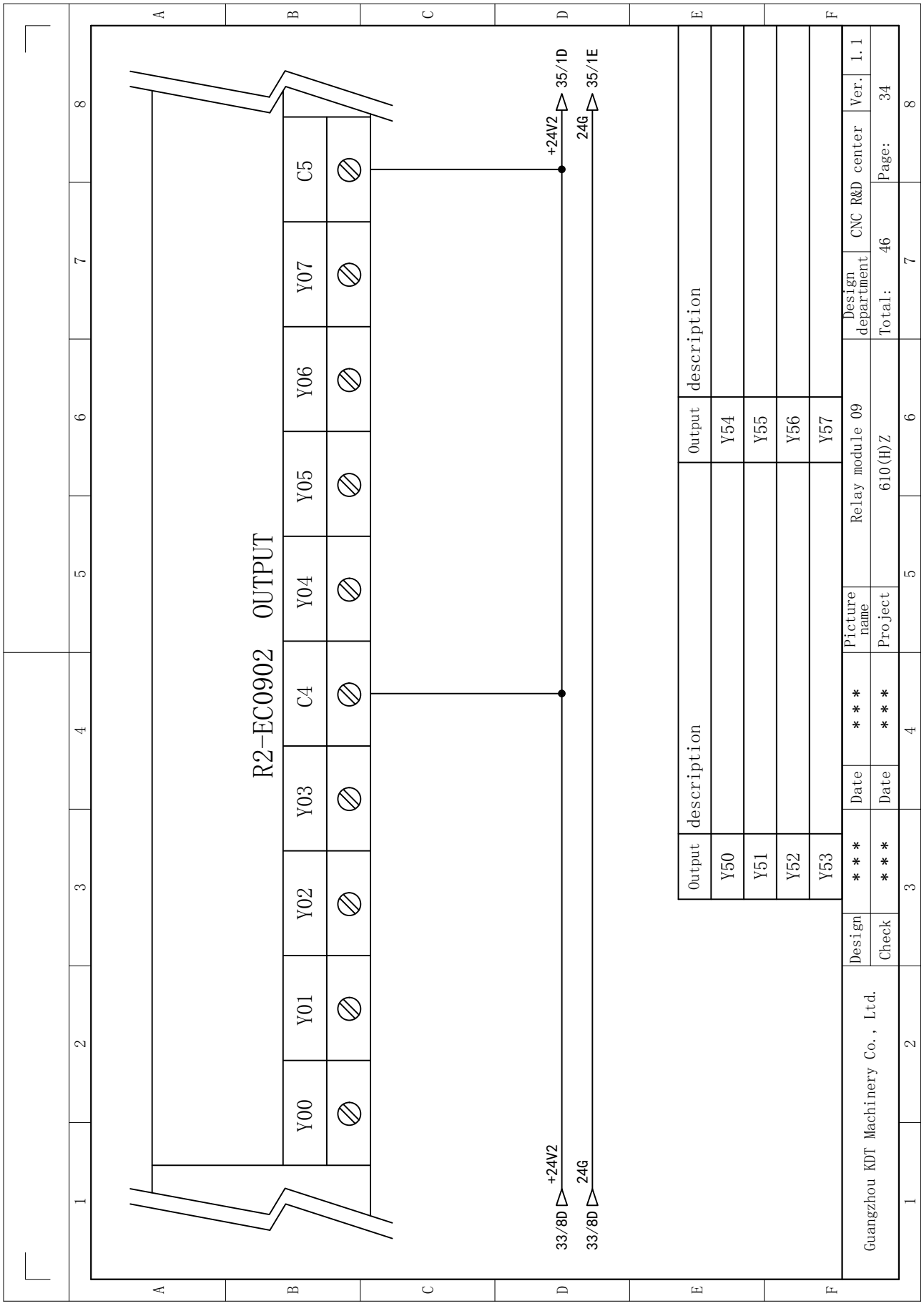


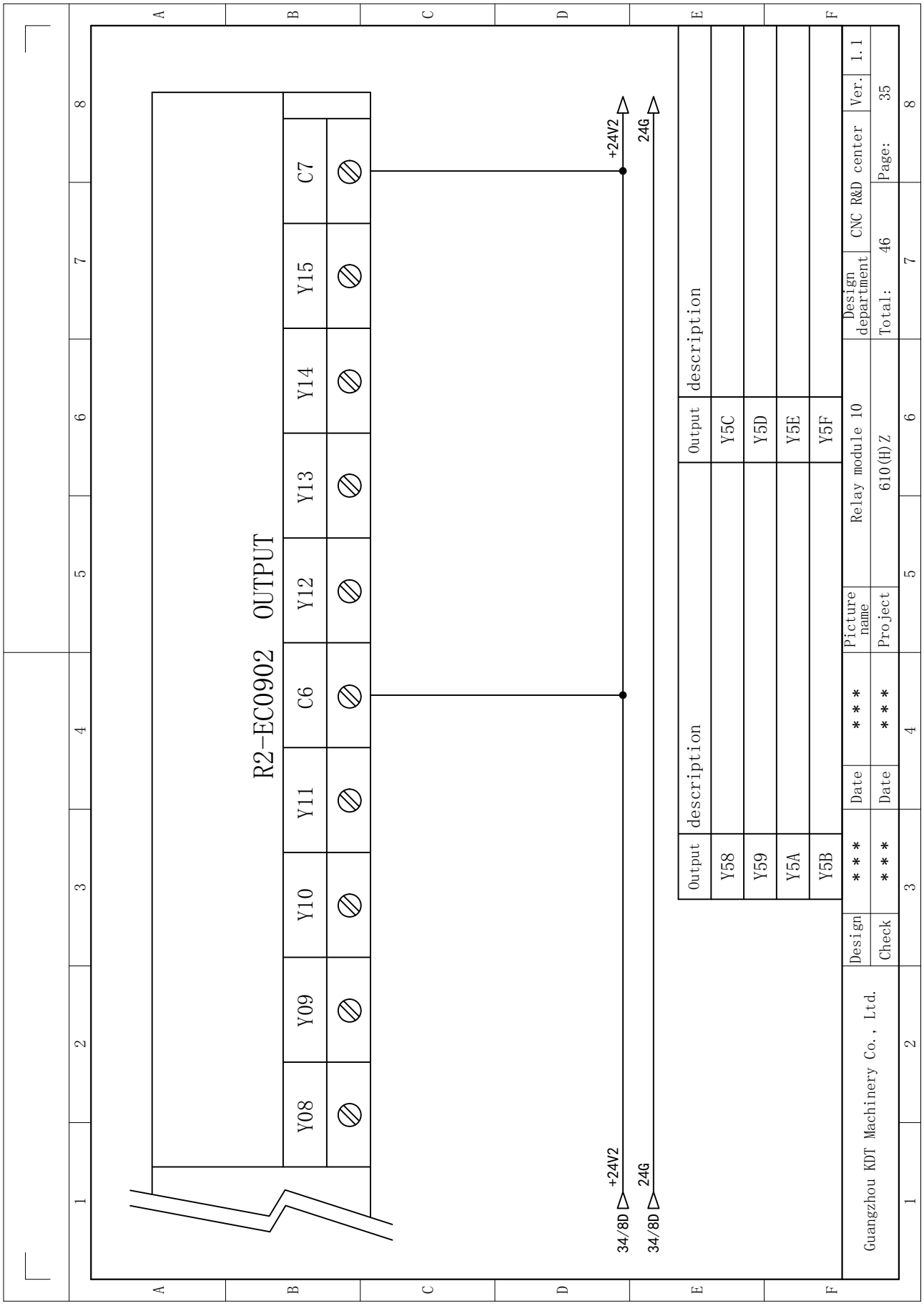
Output	description
Y40	Vacuum hood of upper spindle down
Y41	Loose knife solenoid valve
Y42	Tool change holder cylinder 1 pops out
Y43	Tool change holder cylinder 1 retracts

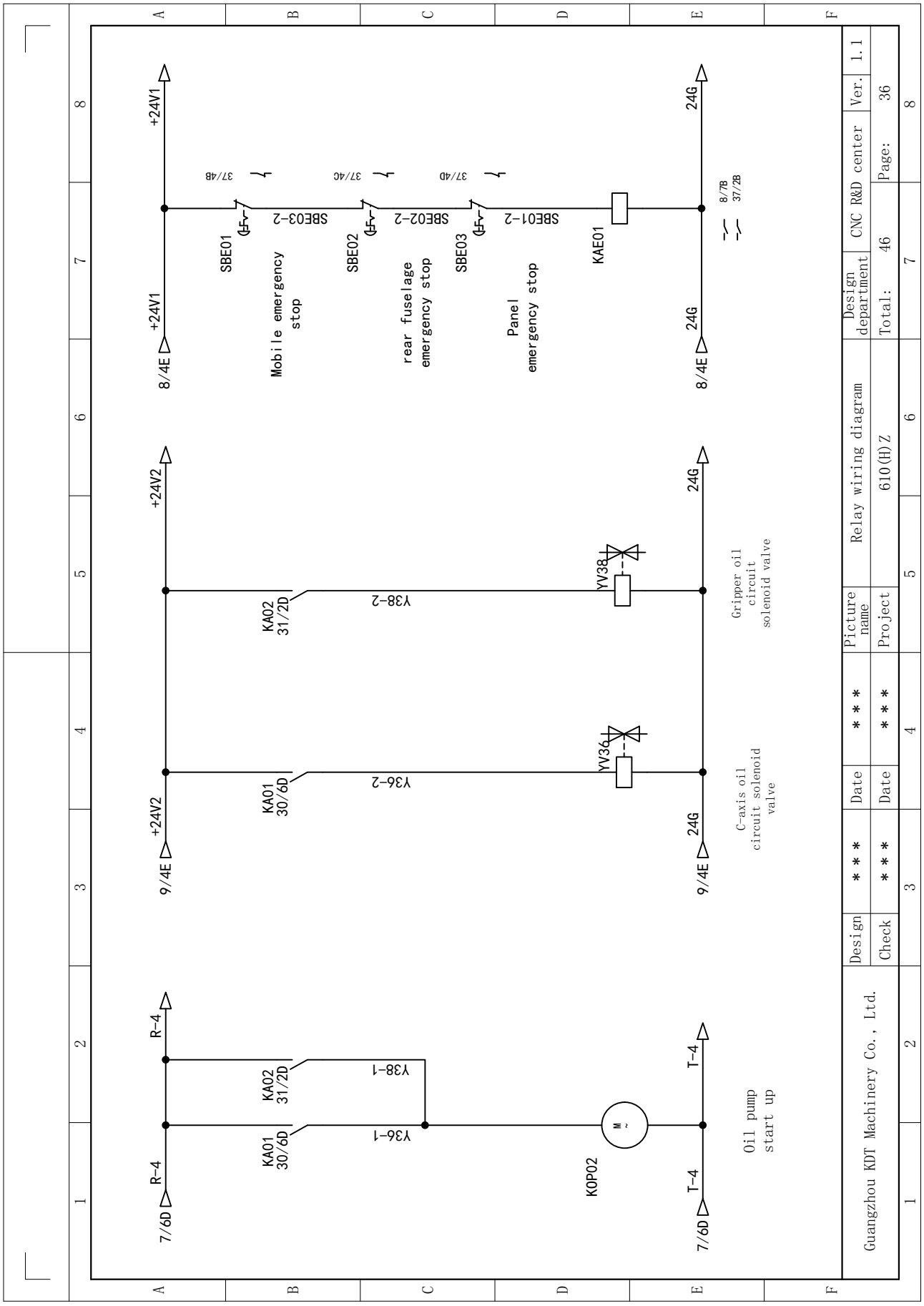
Output	description
Y44	Tool change holder cylinder 2 pops out
Y45	Tool change holder cylinder 2 retracts
Y46	Tool change holder cylinder 3 pops out
Y47	Tool change holder cylinder 3 retracts

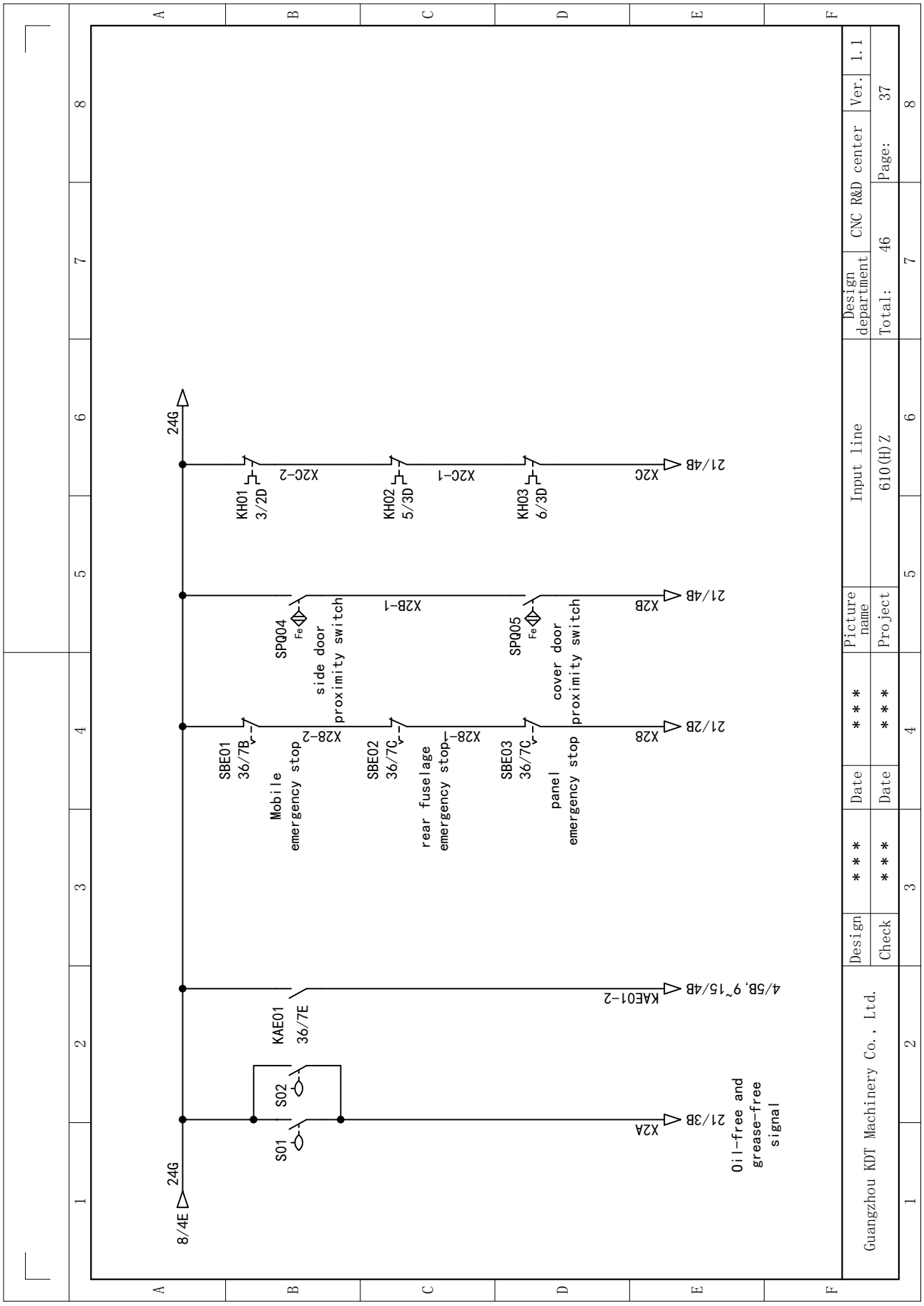
Guangzhou KDT Machinery Co., Ltd.	Design	* * *	Date	* * *	Picture name	Relay module 07	Design department	CNC R&D center	Ver.	1.1
	Check	* * *	Date	* * *	Project	610(H)Z	Total: 46		Page: 32	

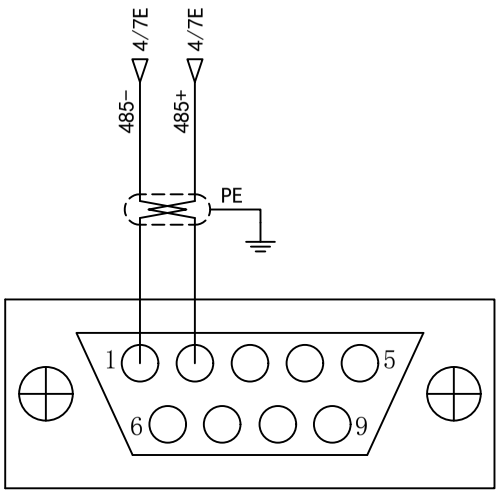

R2-EC0902 OUTPUT
Y08
Y09
Y10
Y11
C2
Y12
Y13
Y14
Y15
C3
+24V2
24G
34/1D
34/1D
32/8D
32/8D
Y48
Y49
Y4A
YV48
YV49
YV4A
Output description
Y48 Upper spindle dust removal
Y49 Left pressure plate of upper spindle air pressure switch
Y4A Right pressure plate of upper spindle air pressure switch
Y4B
Output description
Y4C
Y4D
Y4E
Y4F
Guangzhou KDT Machinery Co., Ltd.
Design *** Date *** Picture name Relay module 08
Check *** Date *** Project 610(H)Z
Design department CNC R&D center
Total: 46 Page: 33
Ver. 1.1


R2-EC0902 OUTPUT
Y00
Y01
Y02
Y03
C4
Y04
Y05
Y06
Y07
C5
+24V2
24G
33/8D
35/1D
35/1E
Output description
Y50
Y51
Y52
Y53
Output description
Y54
Y55
Y56
Y57
Relay module 09
610(H)Z
Guangzhou KDT Machinery Co., Ltd.
Design * * *
Check * * *
Date * * *
Date * * *
Picture name
Project
Design department
CNC R&D center
Total: 46
Page: 34
Ver. 1.1


R2-EC0902 OUTPUT
Y08
Y09
Y10
Y11
C6
Y12
Y13
Y14
Y15
C7
+24V2
24G
34/8D
+24V2
34/8D
24G
Output description
Y58
Y59
Y5A
Y5B
Output description
Y5C
Y5D
Y5E
Y5F
Relay module 10
610(H)Z
Guangzhou KDT Machinery Co., Ltd.
Design
Check
Date
Picture name
Project
Design department
CNC R&D center
Total: 46
Page: 35
Ver. 1.1


+24V1
8/4E
SBE01
Mobile emergency stop
SBE03-2
37/4B
SBE02
rear fuselage emergency stop
SBE02-2
37/4C
SBE03
Panel emergency stop
SBE01-2
37/4D
KAE01
24G
8/4E
8/7B
37/2B
+24V2
9/4E
KA02
31/2D
Y38-2
YV38
Gripper oil circuit solenoid valve
KA01
30/6D
Y36-2
YV36
C-axis oil circuit solenoid valve
R-4
7/6D
Y38-1
Y36-1
KOP02
T-4
Oil pump start up
Guangzhou KDT Machinery Co., Ltd.
Design
Check
Date
Picture name
Project
Relay wiring diagram
610(H)Z
Design department
CNC R&D center
Total: 46
Page: 36
Ver. 1.1


24G
KH01
3/2D
X2C-2
KH02
5/3D
X2C-1
KH03
6/3D
21/4B
X2C
SPQ04
Fe
side door
proximity switch
X2B-1
SPQ05
Fe
cover door
proximity switch
21/4B
X2B
SBE01
36/7B
Mobile
emergency stop
X2B-2
SBE02
36/7C
rear fuselage
emergency stop
X2B-
SBE03
36/7C
panel
emergency stop
21/2B
X2B
KAE01
36/7E
KAE01-2
4/5B, 9~15/4B
S02
S01
21/3B
X2A
Oil-free and
grease-free
signal
8/4E
24G
Guangzhou KDT Machinery Co., Ltd.
Design
Check
Date
Date
Picture name
Project
Input line
610(H)Z
Design department
Total: 46
CNC R&D center
Page: 37
Ver. 1.1



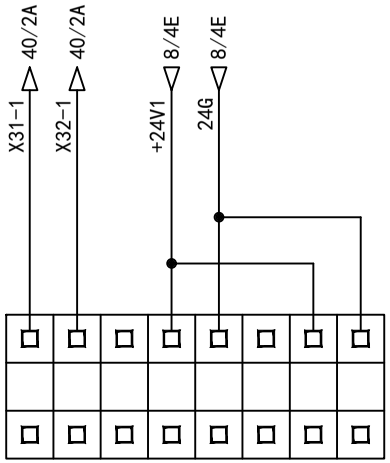
Definition of RS485 pin in DB9 serial port

(COM1)RS485		
pin	definition	wire number
1	DATA-	485-
2	DATA+	485+
3		
4		
5	GND	
6		
7		
8		
9		

Guangzhou KDT Machinery Co., Ltd.	Design	* * *	Date	* * *	Picture name	Serial communication	Design department	CNC R&D center	Ver. 1.1
	Check	* * *	Date	* * *	Project	610(H)Z	Total: 46		Page: 38

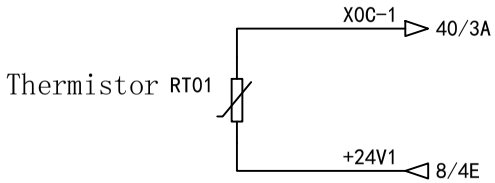
Welding diagram for upper spindle signal

Pin layout of 8-pin signal connector

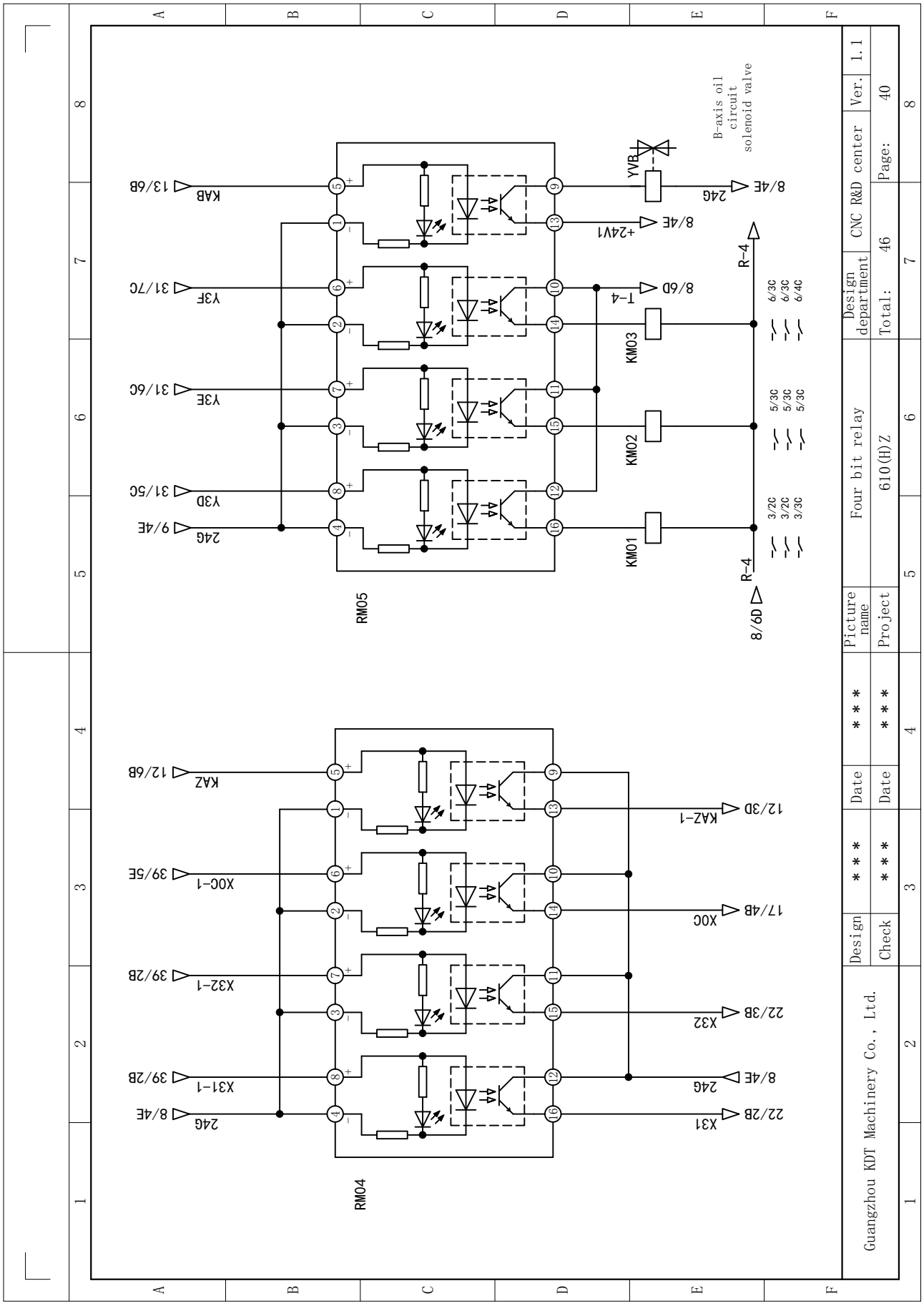


8-pin signal connector pin layout

Pin	description
1	Sensor S2 (tool eject) output (PNP NO normally open)
2	Sensor S1 (tool lock) output (PNP NO normally open)
3	
4	+24V DC power supply to S1, S2 and button lights
5	0V DC power supply to S1, S2 and button lights
6	Button switch C pin signal output +24V
7	24VDC 0.75A DC cooling fan (red wire)
8	0VDC 0.75A DC cooling fan (red wire)
Note: Thermistor (two thin brown wires) cable connection	
Warning: The 24V DC fan must be normally open, and the power supply and fan polarity must be connected correctly	

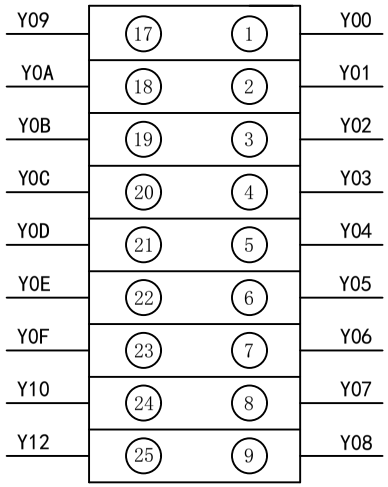


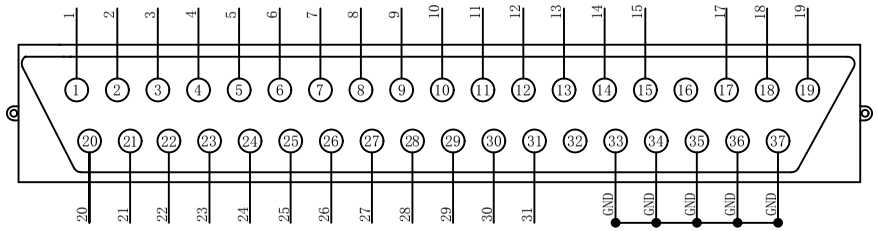
Guangzhou KDT Machinery Co., Ltd.	Design	* * *	Date	* * *	Picture name	Signals of upper spindle	Design department	CNC R&D center	Ver. 1.1
	Check	* * *	Date	* * *	Project	610(H)Z	Total: 46		Page: 39


B-axis oil circuit solenoid valve
YVB
24G
8/4E
+24V1
8/4E
KAB
13/6B
Y3F
31/7C
8/6D
T-4
Y3E
31/6C
KM03
KM02
KM01
Y3D
31/5C
24G
9/4E
R-4
6/3C
6/3C
6/4C
5/3C
5/3C
5/3C
3/2C
3/2C
3/3C
R-4
8/6D
RM05
KAZ
12/6B
XOC-1
39/5E
X32-1
39/2B
X31-1
39/2B
24G
8/4E
KAZ-1
12/3D
XOC
17/4B
X32
22/3B
24G
8/4E
X31
22/2B
RM04
Guangzhou KDT Machinery Co., Ltd.
Design
Check
Date
Date
Picture name
Project
Four bit relay
610(H)Z
Design department
Total: 46
CNC R&D center
Page: 40
Ver. 1.1

Welding drawing of upper left drilling bits

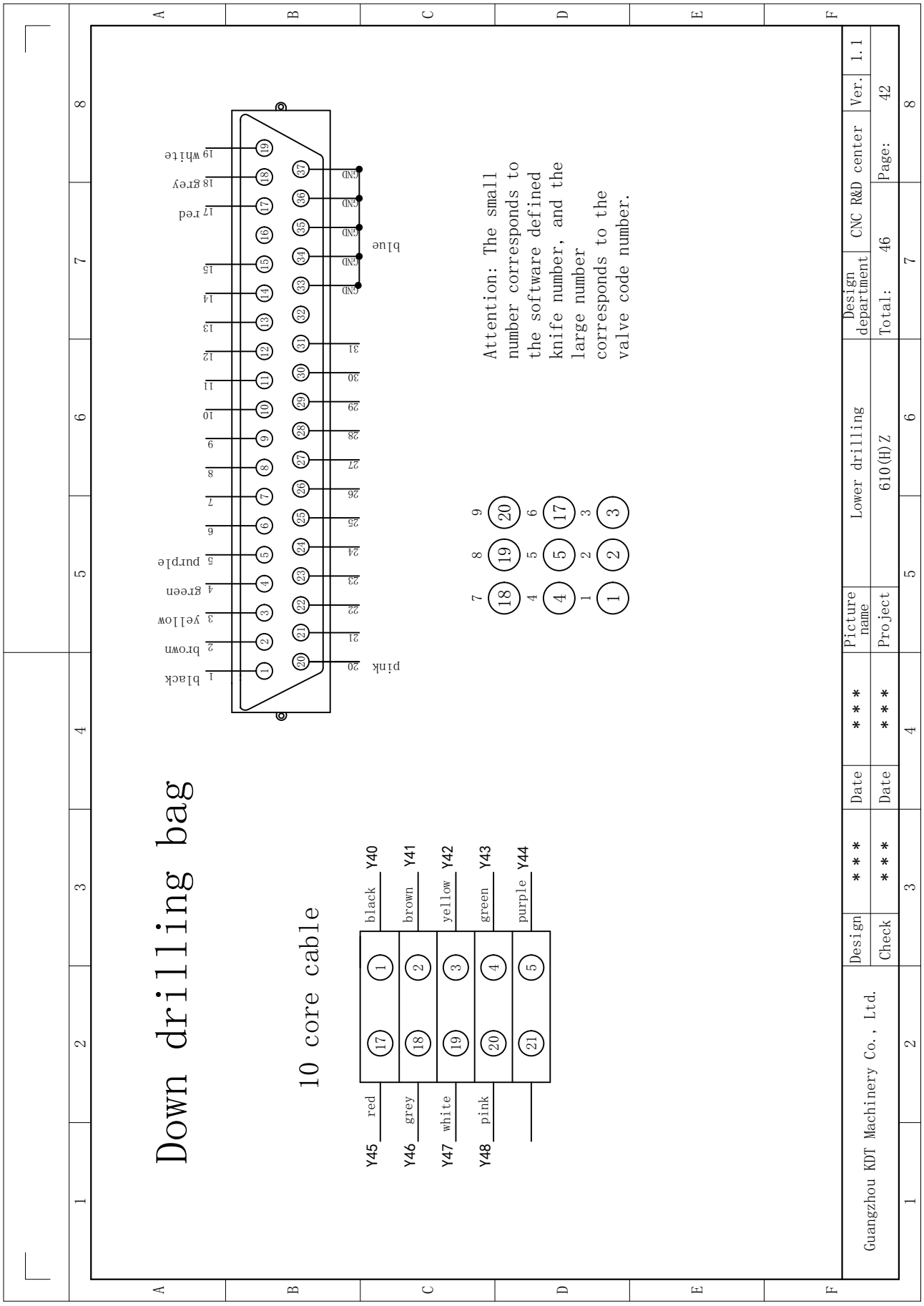
20 core cable



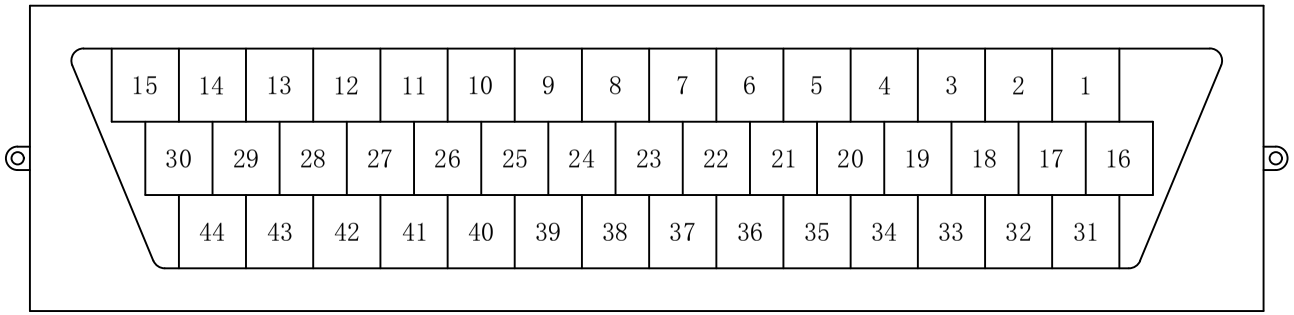


terminal no.	color of wire	terminal no.	color of wire
1	black	20	red&blue
2	orange	21	gray&brown
3	yellow	22	gray&pink
4	green	23	white&yellow
5	purple	24	white&green
6	red	25	pink&brown
7	gray	33	blue
8	white	34	
9	white&pink	35	
17	pink	36	white&gray
18	brown&green	37	
19	yellow&brown		

Guangzhou KDT Machinery Co., Ltd.	Design	* * *	Date	* * *	Picture name	Upper left drilling	Design department	CNC R&D center	Ver. 1.1
	Check	* * *	Date	* * *	Project	610(H)Z	Total: 46		Page: 41


Down drilling bag
10 core cable
Y45 red
Y46 grey
Y47 white
Y48 pink
black Y40
brown Y41
yellow Y42
green Y43
purple Y44
Attention: The small number corresponds to the software defined knife number, and the large number corresponds to the valve code number.
Guangzhou KDT Machinery Co., Ltd.
Design
Check
Date
Lower drilling
610(H)Z
Project
Design department
CNC R&D center
Total: 46
Page: 42
Ver. 1.1

Servo CN1



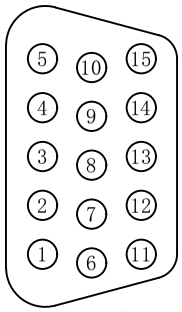
Servo CN1 soldering table

Server Driver CN1										
Remark	PIN	description	X-axis	A-axis	Y-axis	Z-axis	B-axis	C-axis	U-axis	color
COM+	2	COM+ for input	+24V1	+24V1	+24V1	+24V1	+24V1	+24V1	+24V1	red
Emergency	16	Port DI1 input	KAE01-2	KAE01-2	KAE01-2	KAE01-2	KAE01-2	KAE01-2	KAE01-2	black
brake+	3	Port DO1+ output				+24V1	+24V1			red
brake-	4	Port DO1- output				KAZ	KAB			brown
COM-	12	COM- for output				24G	24G			blue

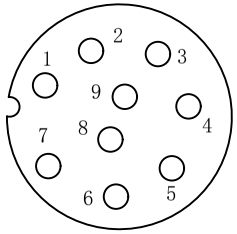
6*0.3 shielded cable

Guangzhou KDT Machinery Co., Ltd.	Design	* * *	Date	* * *	Picture name	CN1 of servo driver B3	Design department	CNC R&D center	Ver. 1.1
	Check	* * *	Date	* * *	Project	610(H)Z	Total: 46		Page: 43

Servo encoder soldering table for X,A,B,C,U axis



connector of servo driver

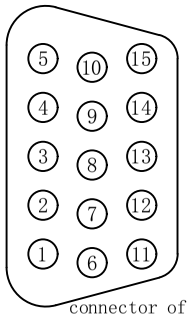


encoder connector of servo driver

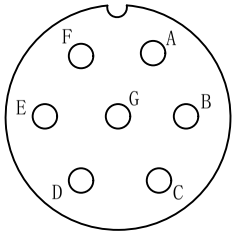
3*2*0.5 shielded cable

servo driver	description	servo motor	color
1	SD+	1	brown
7	SD-	2	white
5	5V	3	yellow
12	GND	4	green
	VB-5V	5	gray
	VB-GND	6	pink
PE	Iron shell	Iron shell	

Servo encoder soldering table for Y,Zaxis



connector of servo driver



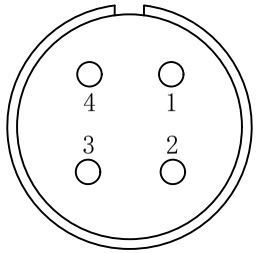
encoder connector of servo driver

3*2*0.5 shielded cable

servo driver	description	servo motor	color
1	SD+	2(B)	brown
7	SD-	3(G)	white
5	5V	4(E)	yellow
12	GND	5(C)	green
	VB-5V	6(F)	gray
	VB-GND	7(D)	pink
PE	Iron shell	1(A)	

Guangzhou KDT Machinery Co., Ltd.	Design	* * *	Date	* * *	Picture name	CN2 of servo driver B3	Design department	CNC R&D center	Ver. 1.1
	Check	* * *	Date	* * *	Project	610(H)Z	Total: 46		Page: 44

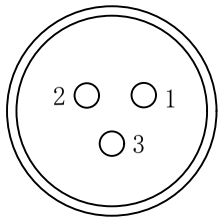
Servo drive and motor power welding diagram for X, A, B, C, U axis



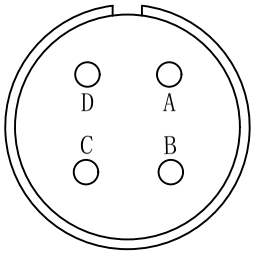
Servo motor connector

Servo Driver	Describe	Servo Motor	Color
5(blown)	Motor U phase	4	blown
6(black)	Motor V phase	3	black
7(blue)	Motor W phase	1	blue
Ground	Motor ground	2	yellow/green

Servo drive and motor power welding diagram for Y、Z axis



W-axis and Z-axis servo brake joints



Servo motor connector

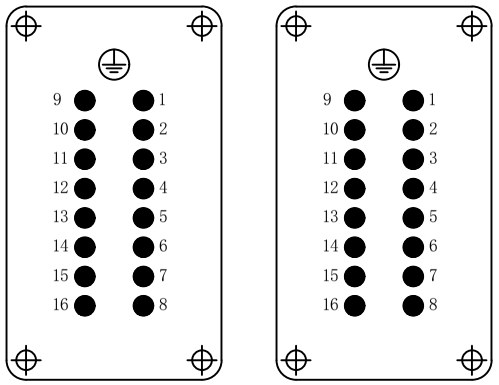
Servo Driver	Describe	Servo Motor	Colour
5(black1)	Motor U phase	2(B)	black1
6(black2)	Motor V phase	3(C)	black2
7(black3)	Motor W phase	4(D)	black3
ground	Motor ground	1(A)	yellow/green

W and Z servo drives	implication	Servo motor	color
	Brake signal 1	1(+24V1)	brown
	Brake signal 2	2(24G)	blue
	Brake signal 3		

Guangzhou KDT Machinery Co., Ltd.	Design	* * *	Date	* * *	Picture name	Servo motor	Design department	CNC R&D center	Ver. 1.1
	Check	* * *	Date	* * *	Project	610(H)Z	Total: 46		Page: 45

Tool holder connector

HE-024



10*0.25 with
shielded cable*2

PIN	Explanation	NO.	Color
1	Spindle tool release button	X30	black
2	Sensor for tool change clamp cylinder1 shrink	X35	brown
3	Sensor for tool change clamp cylinder1 extend	X36	orange
4	Sensor for tool change clamp cylinder2 shrink	X37	purple
5	Sensor for tool change clamp cylinder2 extend	X38	grey
6	Sensor for tool change clamp cylinder3 shrink	X39	white
7	Sensor for tool change clamp cylinder3 extend	X3A	pink
8	Check whether the tool holder has a knife photoelectric	X3B	light bule
9	power supply	+24V1	red
10	power supply	24G	blue
11	Tool change holder cylinder 1 pops out	Y42	black
12	Tool change holder cylinder 1 retracts	Y43	brown
13	Tool change holder cylinder 2 pops out	Y44	orange
14	Tool change holder cylinder 2 retracts	Y45	purple
15	Tool change holder cylinder 3 pops out	Y46	grey
16	Tool change holder cylinder 3 retracts	Y47	white

Guangzhou KDT Machinery Co., Ltd.	Design	* * *	Date	* * *	Picture name	Tool holder connector	Design department	CNC R&D center	Ver. 1.1
	Check	* * *	Date	* * *	Project	610(H)Z	Total: 46		Page: 46