

## Installation and Commissioning

Electrical Single-girder Overhead Crane

Xinxiang Degong Machinery Co.,LTD

## 1. User guide

This manual is applicable for installation, use and maintenance of electrical single-girder overhead crane produced by our company. This manual should be put at the place where operator can read at any time. As the equipment of lifting and handling load, many potential risk exist during operation process, operator must read relevant content about safety operation, test and inspection chapters carefully.

## 2. Reasonable application

The electric single-girder crane you bought is applicable for vertical lifting and horizontal transferring of load, safety working load (SWL) is clearly marks on the nameplate and maintenance schedule. Working time and numbers of starting must be strictly abode by. There's strict regulation on applicable scope and requirements. When applicable scope is satisfied, the operators must strictly abide by the "Safe Operation of Crane Hoist".

Note: User must get our company's approval if the crane is used in special conditions.

## 3. Quality assurance

We have no obligation to provide quality guarantee and compensation if the production is used illegally or damage caused by untrained operators. We only undertake the director' s corresponding obligations.

Notes: these guarantee rules won' t apply if the users are not in accordance with the requirements of the manual, such as: assembling and disassembling the parts without authorization or without using the original accessories. For security, do use the original accessories, in addition repairing and maintenance according to the user manual. Only so can the lifespan be guaranteed.

## Brief Instruction

Electric single-girder overhead crane is in compliance with national and industrial standards of GB/T3811 "Design Rules for Cranes" , JB/T1306 "Electric Single-girder Crane", JB/T2603 "Electric Under slung Crane" , JB/T7688.1 "Specifications for metallurgy cranes" and JB/T10219 "Specification for explosion-proof (cranes wire rope hoist" to design and manufacture crane. Crane uses Electric wire rope hoist such as CD1-type or MD1-type, as the lifting mechanism to realize the moving or turning over for lifting goods through moving up and down of hook, moving left and right of trolley and moving back and forth of crane.

General purpose: This crane is widely used for many occasions such as mechanical processing, assembly, maintenance and warehouses, special purpose crane is used for working in a particular condition and environment, such as explosion-proof single girder crane, metallurgical single girder crane.

Work duty of crane is A3 ~ A6 and is used indoors. Operating ambient temperature is  $-25^{\circ}\text{C} \sim +40^{\circ}\text{C}$ . Power source of crane is 3-phase A\_C., rated frequency is 50HZ~ 60HZ, source voltage is 220V ~ 660V. The allowable voltage fluctuation for motors and electric control equipment is 10%, crane internal voltage loss is not more than 3%.

The crane consists of main girder, end carriage, electric hoist, electrical equipment, crane and trolley travel mechanisms and so on. Main girder is made by using the overall pressure groove, simple structure and good process. Manufacture of end carriage is the same to main girder. The main girder and end carriage are connected by bolts which is easy to disassemble, transport and store. When operating, trolley travel speed is not more than 30m/min, crane travel speed is not more than 45m/min when operated through the ground button device, and is not more than 75m/min when operated through the cab.

Work duty of crane is confirmed by service rating and load status of crane. Crane can bear 1.25 times of test load when doing the static load test. It can bear 1.1 times of rated load when doing the dynamic test, and works fine during the test. There are no crack and damage, no permanent deformation, no peeling paint and no loose after the test.

Vertical static deflection  $f$  caused by static rigidity of crane at mid- span under the rated lifting load and trolley dead weight of electric hoist and span of crane meet the following requirements: 1. For crane required low position accuracy  $f < s/500$  2. For crane required middle position accuracy  $f < s/750$  3. For crane required high position accuracy  $f < s/1000$ . Horizontal rigidity meets the requirements of deformation that caused by crane in the mid-span horizontal direction  $< S/2000$ . Generally don't make the request for dynamic rigidity.

The full rate of grab is not less than  $\wedge 0\%$ , lifting capacity of electric magnetic chuck is not less than rated

value and can reliable lift the weights.

The allowable deviation of trolley travel speed of the crane is  $\pm 15\%$  of nominal value (when low speed, deviation is 25% of nominal value). Lifting speed and brake slippage under the rated load are accordance with the regulations of JB/T9008.1 or JB/T5317, lifting height is not less than 97% of nominal value, the deviation of spreader at the left and right limit is  $\pm 100\text{mm}$ .

Crane is equipped with overload limiter according to GB6067, crane travel mechanism and trolley travel mechanism are provided with buffer and stop device. Crane is equipped with emergency stop swith, short circuit protection, phase sequence protection. Control voltage of flashlight door is  $<50\text{v}$ . There is zero protection and interlock protection when operated by cab.

The altitude of installation location of crane is not more than 2000m (if more than 1000m, motor capacity should be checked).

Crane does not apply to work in flammable, explosive and corrosive gases environment, lift morn than  $300^{\circ}\text{C}$  hot goods and other dangerous goods.

## Erection and Commission for Overhead Crane

### 1. Preparation for erection and notes

Before the erection, erection personnel with the deputies of erection company and manufacturer should open the box to check the number of components and spare parts that listed on the packing list and attached documents to see if there is any shortage or damage. Then check whether there is any damage of appearance of all metal structures. Finally refer to the erection drawing and technical requirements, serious study erection plan and erection procedure.

Accidents such as wresting, bending or striking should be especially avoided while unloading or transporting. When lifting the crane, two lifting points are necessary and there must be underlay in the enlacing point, and are selected at the both ends of bridge as far as possible, that is, the connection of main girder and end carriage. When storing, crane should be flatly and stably set on sleepers. Before erecting, the defects caused by improper handling and improper storage and the parts that exceed the permitted error should be adjusted and repaired according to the technical requirements. The defects for metal structures must be corrected on the ground, or erection is not allowed.

### 2. Traveling track

- A. The limit deviation of span(s) of crane traveling track should meet the requirements of national standard GB10183 "Cranes-overhead cranes and gantry cranes cranes -Tolerances for manufacture and tracks laying".
- B.  $S > 10m$ ,  $AS = \pm (3 + 0.25x (S-10))$  mm when  $S > 10m$ ,  $AS = \pm (3 + 0.25x (S-10))$
- C. Track joint can be straight joint, and can also be a 45° angle inclined joint that make the wheels travel smoothly at the joints.
- D. The seam of track joint is usually 1 ~ 2mm.
- E. The transverse stagger and vertical stagger of two tracks at the joints should not be more than 1 mm.
- F. The vertical stagger of two tracks on each cross section along the span direction should not exceed 1 5mm.
- G. Within the total length of track, the side limit deviation is  $\pm 10mm$ , the bend in a horizontal plane along the length direction, the limit deviation measured within each 2m measuring length should not exceed  $\pm 1mm$ .

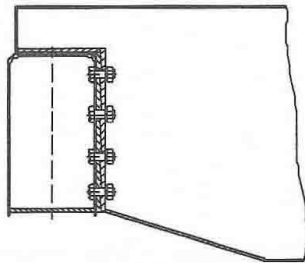
### 3. Main beam connected

The connection between main beam and end carriage adopt bolts which can be taken apart. But it still adopts whole installation when installs.

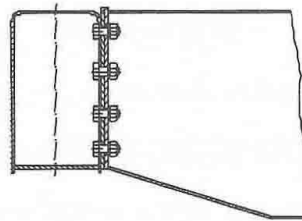
Put main beam on two cradles parallel to each other on the same level. Cradles should be at the variable cross section. We should adjust the lever correctly.

Then clean the connection surface of main beam and end carriage assembled, hoist the end carriage, connect it with high strength bolts.

Electric hoist should be assembled completely, pass through the test, then can install on the main beam beforehand and fasten it tightly with wire rope to avoid electric hoist to slide horizontally insulting to accident.



a. 座式结构seated structure



b. 挂板结构board structure

Connection between main beam and end carriage

### 4. Installation of electric hoist

Electric hoist will be mounted directly on the I-steel track after the main girder is lifting out of the ground to the appropriate position, the gap is adjusted according to the requirements.(The gap between traveling wheel flange and I-steel is 3 ~ 5mm.)

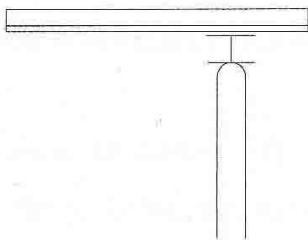
After steel structure of crane and electric hoist are installed and adjusted, the attached electrical equipments will be mounted on the crane.

### 5. Electrical control system

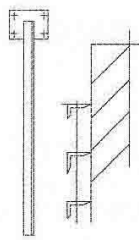
## A. Power source

The standard power source is 3-phase 4 wire A.C., rated voltage is 220V~ 660V, rated frequency is 50Hz or 60 Hz, the power of export cranes is used according to national power types of the users, the special power should be used according to the order requirements. The upper limit of allowable voltage fluctuation for motor and electrical equipments is + 10% of the rated voltage, the lower limit is -1 5% of the rated voltage, the voltage loss inside the crane is not more than 3%.

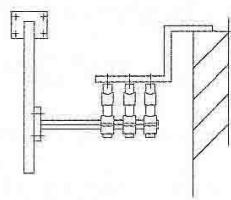
## B. Power supply mode



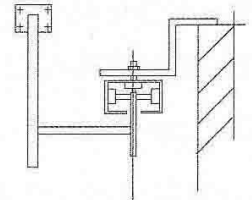
软缆滑线



角钢滑线



单极安全滑线



多极安全滑线

Power supply for crane: 1. Safety slide wire 2. Flexible cable

## C. Control power source

The standard control power source of crane use A.C. 36V/50Hz, and use the isolated control transformer to power independently. The special control supply is used according to the order requirements.

## D. Requirements of cable

Power supply for trolley: single and double wire rope and deformed steel slideway, I beam and other special slideway, if use double slideway, pendant control use one independent slideway, operator can control the crane in any place. The installation of movable control cable for European-style crane is connected by high-speed connector which is easy to install and maintain, pendant control cable for traveling use the flat cable, cable for lifting use the round cable, they are connected by connector which is easy to install quickly and maintain.

The crane all adopts the insulated wire and cable. The control line is single core cable that sectional area is not less than 1.5mm<sup>2</sup> or multi-strand single core cable, the sectional area of motor power line is not less than 2.5mm<sup>2</sup>.

The whole cable for metallurgical crane use the high temperature resistance wire and cable, pendant movable cable is a non-follow-up type,

The cable for crane is laid in the trunking of 1.5mm ~ 2mm wall thickness or steel pipe. There are protective devices in the parts of mechanical damage, chemical corrosion or oil stains erosion. The cable laying for European-type crane use the mesh-type cable bridge, open structure can make the air flow effectively and safely, and improve the heat dispersion, flexible assemble.

## 6. Electrical controls

A. The electrical equipments for crane is main composed of crane electrics and hoist electrics, crane electrics is divided into DK1 electrics and DK2 electrics, the difference is that DK2 electrics increase the single-phase starting resistance of the motors on the control principle, when starting up, reduce the starting current of motor, thus reduce the mechanical impact, which can obtain better start effect. Hoist electrics is divided into CD1 and MD1 type hoist electrics according to the types of hoist. The electrics models can be classified according to the crane types. Crane electrics and hoist electrics are installed in the cab when the crane is operated through the cab.

B. Main electrical components of crane use CHINT, Schneider, Siemens and other brands.

C. The protection class of the electrical box shell is IP44, crane is used outdoor. Protection class for metallurgical and European-type crane is IP54, dust-proof and water-proof performance is better.

D. The crane can be configured with CD1, MD1, YHII , CD1(GD), MD1(GDS), NH, ND, HC type electric hoists to use.

E. The operation models adopt the cab operation, remote control, ground control, ground control and remote control, cab and ground and remote control etc. When using the cab operation, crane mechanism is controlled by cam or main controller, hoist travel and lifting mechanism is controlled by panel buttons.

F. Drive control mode. Lifting mechanism is controlled directly by contactor, which can achieve the single and double speed, forward and reverse control „for lifting motor. The frequency control can be also used, when using the frequency control, use the high-performance vector control mode to drive the motor. The inverter can automatically identify electrical parameters of the motor to obtain optimum control performance. This control mode has large speed range, good speed smoothness and effective energy saving, mechanical impact is small, short-term overload capacity can reach 150%. The frequency conversion speed ratio is 1:10, any speed within this range can be realized, when controlled by frequency, specific debug method and electrical drawings see the attached documents.



Crane mechanism is controlled directly by contactor or cam controller, which can achieve the single and double speed, forward and reverse and resistor speed regulation control for motor. The frequency control can be also used, when using the frequency control, use V/F control mode to drive the motor, then reach the purpose of motor speed regulation. Good smoothness and effective energy saving, mechanical impact is small, short-term overload capacity can reach 150%. The frequency conversion speed ratio is 1:10, any speed within this range can be realized, when controlled by frequency, specific debug method and electrical drawings see the attached documents.

Trolley mechanism is controlled directly by contactor, which can achieve the single and double speed, forward and reverse control for motor. The frequency control can be also used, using V/F control mode to drive the motor, then reach the purpose of motor speed regulation. Good smoothness and effective energy saving, mechanical impact is small, short-term overload capacity can reach 150%. The frequency conversion speed ratio is 1:10, any speed within this range can be realized, when controlled by frequency, specific debug method and electrical drawings see the attached documents.

## **7. Protective device for crane**

A. Distribution protection. The main circuit of crane distribution is equipped with automatic air switch for general power, main contactor and other protection components.

B. Short circuit protection. The general power circuit is equipped with automatic switch as a short circuit protection for the crane. The control circuit is provided with small-capacity automatic air switch as a short protection.

C. Phase sequence protection. The equipment adopt phase sequence protector to monitor the quality of power supply in real time. The control system will cut off the main circuit to protect effectively the safety of equipment and personnel when power supply cause the over voltage, under voltage, phase lack and phase dislocation due to external reasons.

D. Lifting limit protection. The lifting mechanism is equipped with limit stopper for the upper and lower limit, limit switch to ensure that they can automatically cut off the power of lifting mechanism when the hook rises or falls to the limit position. The counter weight limit switch is also provided for the user to choice, the limit of lifting mechanism is equipped with double protection.

E. Lifting overload protection. Lifting mechanism is equipped with overload protective device and alarm, the overload limiter will send suggestive alarm signal when the load reach 90% of rated capacity. When the load reach 110% of rated capacity, it will cut off the power of lifting mechanism at once and send the prohibitive alarm signal. The sensor of overload limiter has the damp proof and anti- seismic function.

F. Limit protection for crane travel. Crane traveling mechanism is equipped with limit switch to ensure that it can automatically cut off the power of travel mechanism when mechanism is horizontal moved to limit

position. When several cranes are running on the same track, the photoelectric anti-collision switch is also provided to prevent the collision of two cranes on the same track, which is more reliable and safe.

G. Emergency power-off protection. Control circuit of crane is equipped with emergency switch. It can cut off the power of control circuit at any time to make the main circuit power off, ensure the safe operation of crane when the accident happened.

H. Voltage loss protection. The control circuit of crane is equipped with voltage loss protective device. When the power is suddenly failure or the voltage is too low, main contactor will lock automatically and break, the crane must be restarted after the power is restored.

I. Zero interlock protection in the cab (when there's cab cam controller and master control). The crane operated by cab has zero protective device. The zero protective device eliminate the motor running automatically when the power is failure, which can prevent accidents. The power supply of crane is restored after the controller set to zero position.

J. Switch protection of safety door of the cab. The switch interlock device of door avoid the personnel or goods dropping from the door because safety door is not closed and crane is operated suddenly.

K. Ground protection. There are reliable grounding device on the metal structures of crane, metal enclosures of all electrical equipments, pipe chases and low-voltage side of transformer. The total grounding resistance is not more than 40, insulation resistance to ground at normal temperature is not less than 1 MO.

## **8. Electrical schematics used commonly are as follows.**

A. Electrical schematics of ground control type DK1 see attached drawing 1-1, generally apply to LD, LDY, LDZ,LX, LDP type crane.

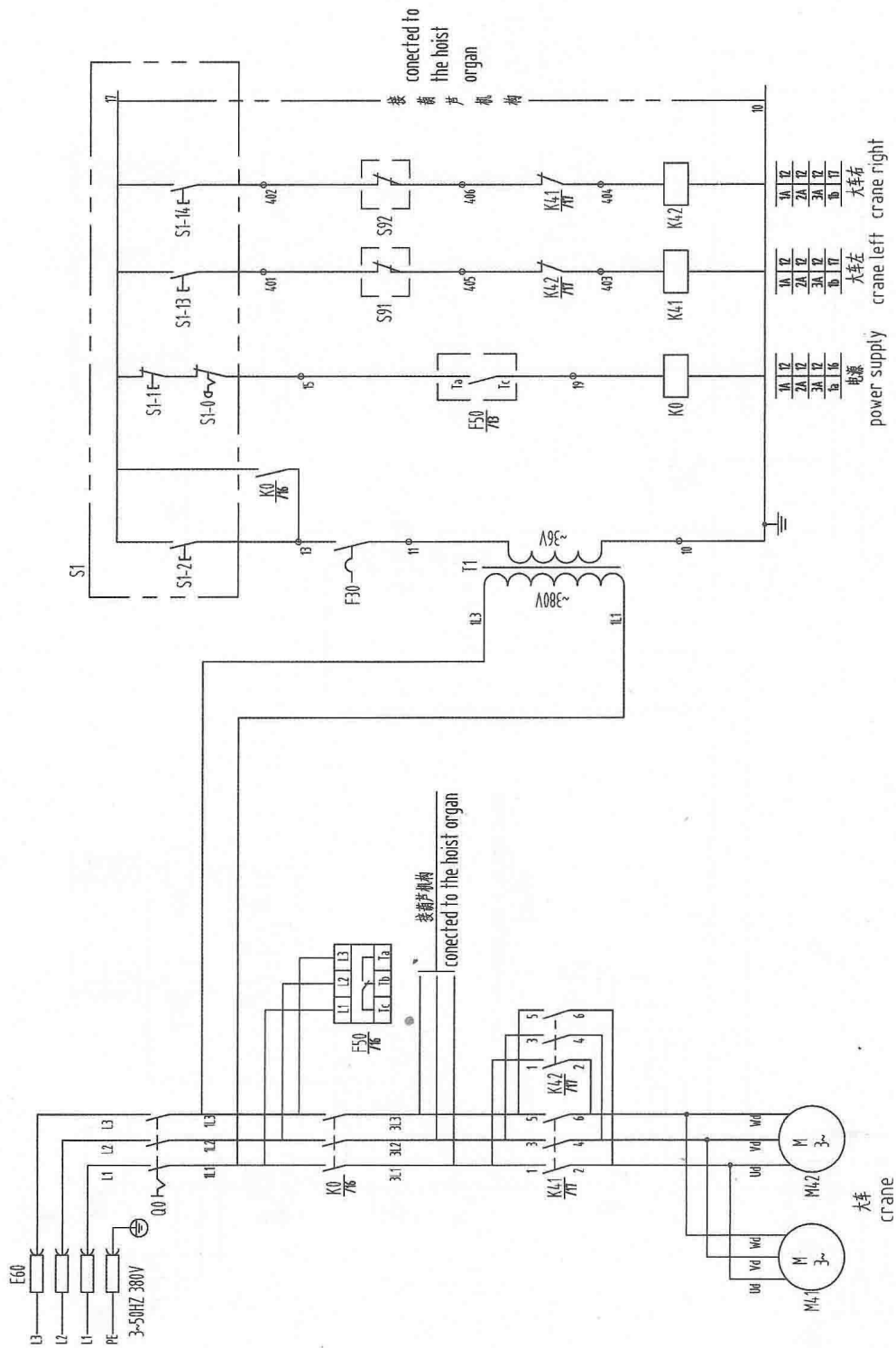
B. Electrical schematics of ground control type DK2 see attached drawing 1-2, generally apply to LD, LDY, LDZ,LX, LDP type crane.

C. Electrical schematics of ground control and remote control type DK1 see attached drawing 1-3, generally apply to LD, LDY, LDZ,LX, LDP type crane.

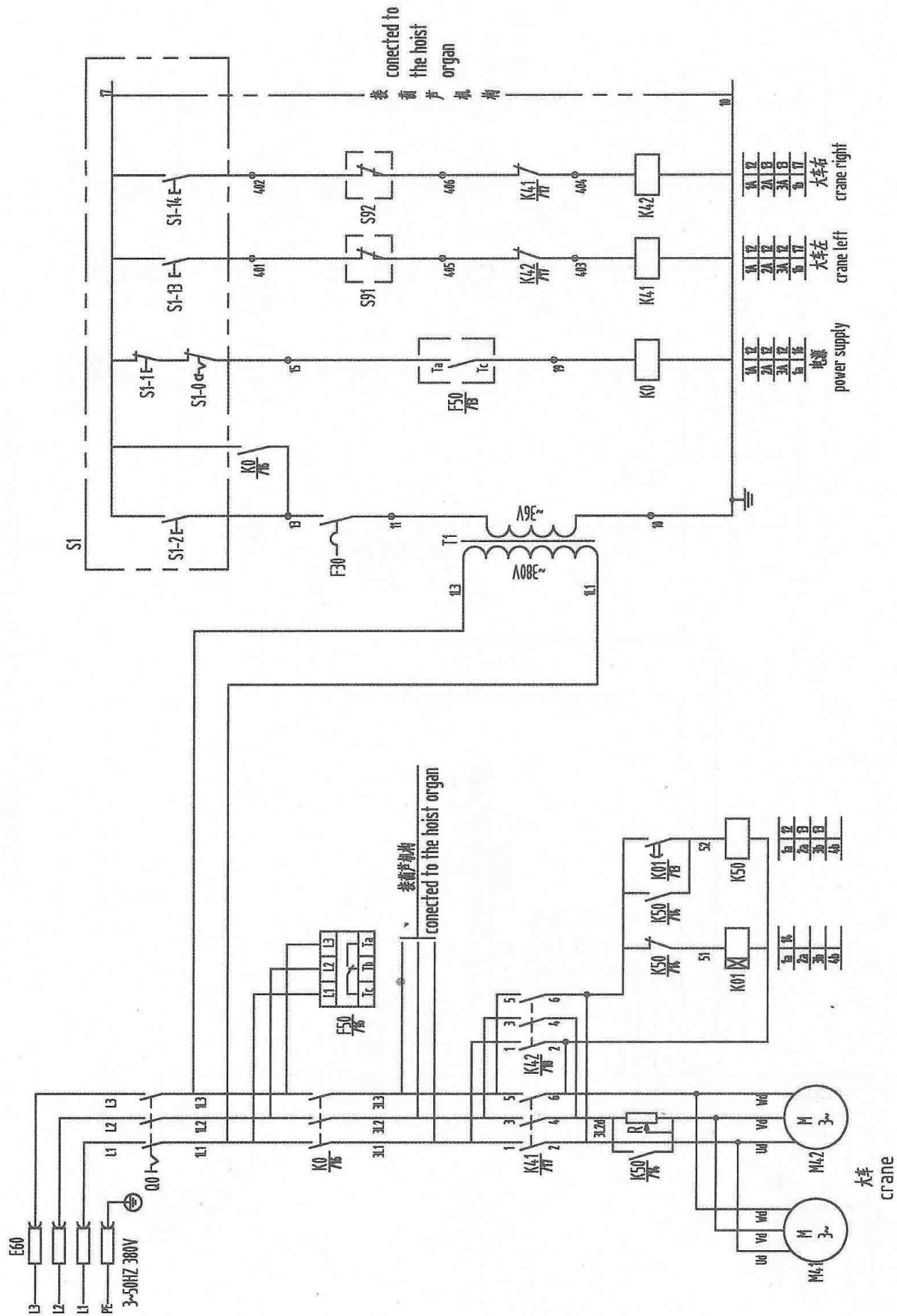
D. Electrical schematics of ground control and remote control type DK2 see attached drawing 1-4, generally apply to LD, LDY, LDZ,LX, LDP type crane.

E. Electrical schematics of ground control CD1 type electric hoist see attached drawing 2-1, generally apply to match with LD, LDY, LX type crane.

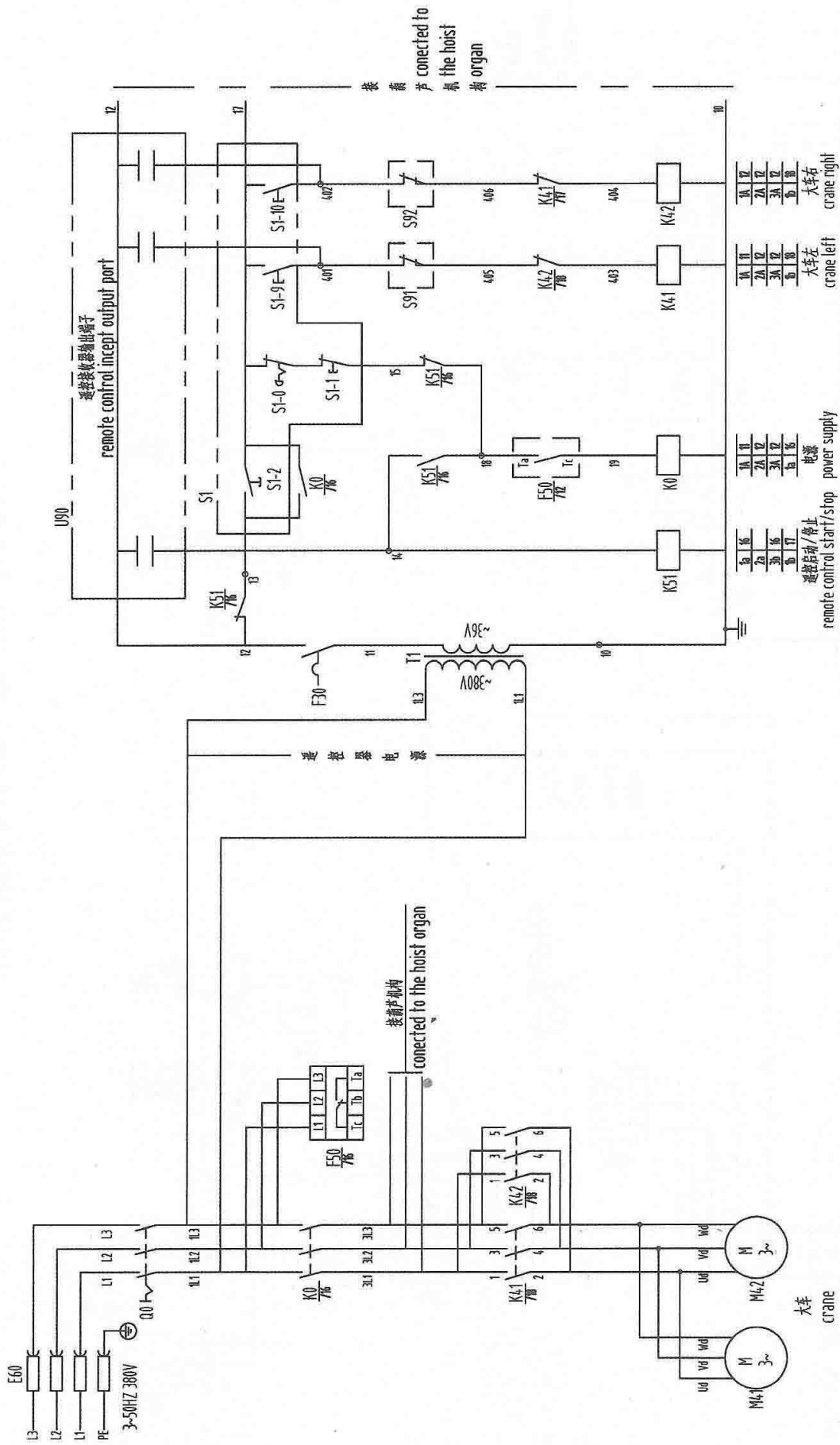
- F. Electrical schematics of ground control MD1 type electric hoist see attached drawing 2-2, generally match with LD, LDY, LX type crane.
- G. Electrical schematics of ground control and remote control CD1 type electric hoist see attached drawing 2-3 and drawing 3-1, generally match with LD, LDY, LX type crane.
- H. Electrical schematics of ground control and remote control MD1 type electric hoist see attached drawing 2-3 and drawing 3-2, generally match with LD, LDY, LX type crane.
- I. Electrical schematics of electric hoist for ground control type crane with grab see attached drawing 2-8, generally match with LDZ type crane.
- J. Electrical schematics of ground control CD1 type electric hoist (with trolley limit control) see attached drawing 2-9, generally match with LDP type crane.
- K. Electrical schematics of ground control MDi type electric hoist (with trolley limit control) see attached drawing 2-10, generally match with LDP type crane.
- L. Electrical schematics of CD1 type electric hoist for cab control LD type crane see attached drawing 1-5 and drawing 2-5.
- M. Electrical schematics of MD1 type electric hoist for cab control LD-type crane see attached drawing 1-6 and drawing 2-6.
- N. Electrical schematics of electric hoist for cab control LD-type crane with cab see attached drawing 1-7 and drawing 2-7.
- O. Electrical schematics of ground control crane with single-speed DII BT4 explosion-proof electric hoist see attached drawing 4-1 and drawing 4-2, generally apply to LB, LXB type crane.
- P. Electrical schematics of ground control crane with single-speed DII CT4 explosion-proof electric hoist see attached drawing 4-3 and drawing 4-4, generally apply to LB, LXB type crane.
- Q. Electrical schematics of ground control crane with double-speed D II BT4 and DIICT4 explosion-proof electric hoist see attached drawing 4-5 and drawing 4-6, generally apply to LB, LXB type crane.
- R. Electrical schematics of HD-type crane, frequency control type crane and other nonstandard type crane see the attached documents.



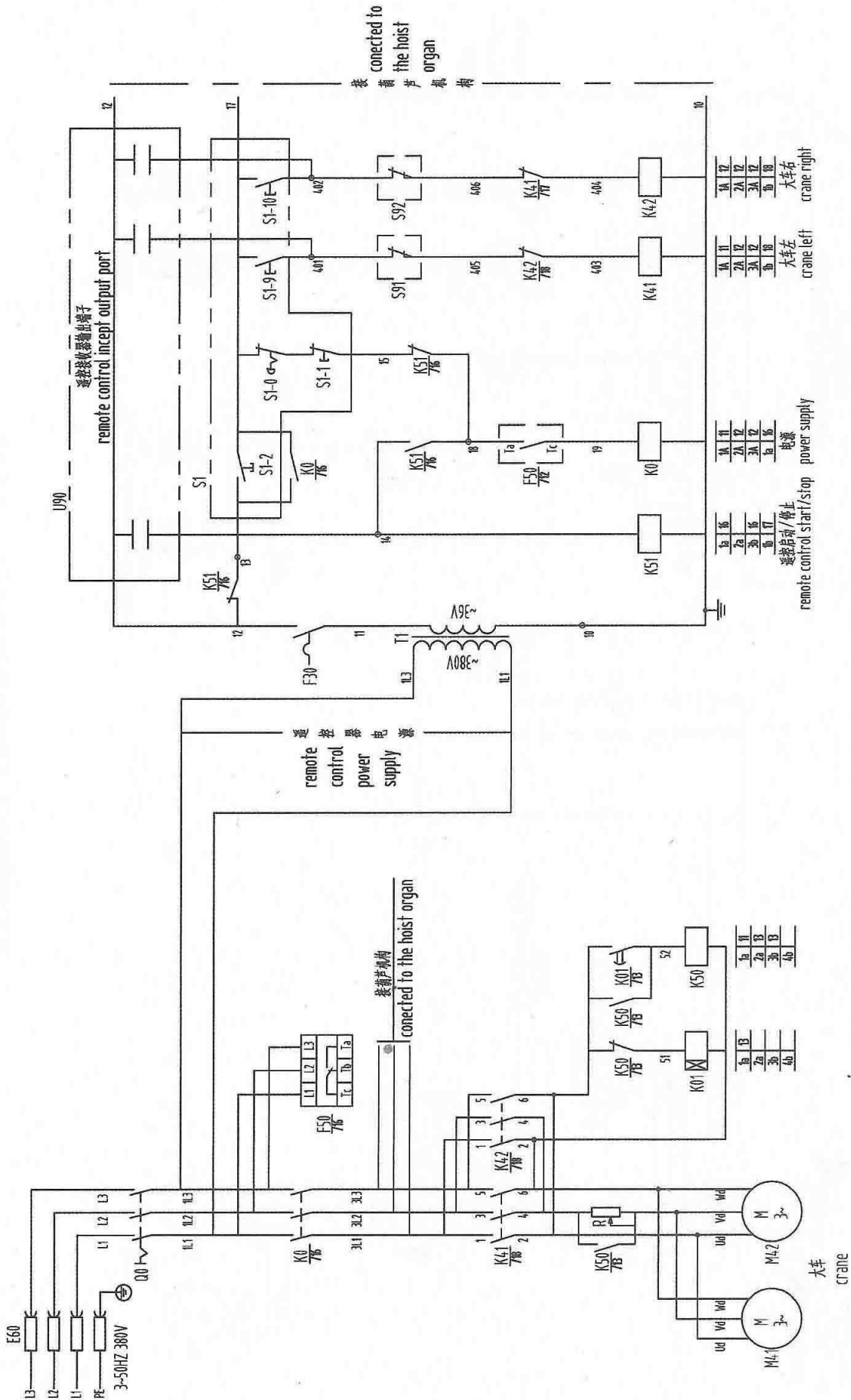
电气原理图1-1 (Electric Principle Diagram 1-1)



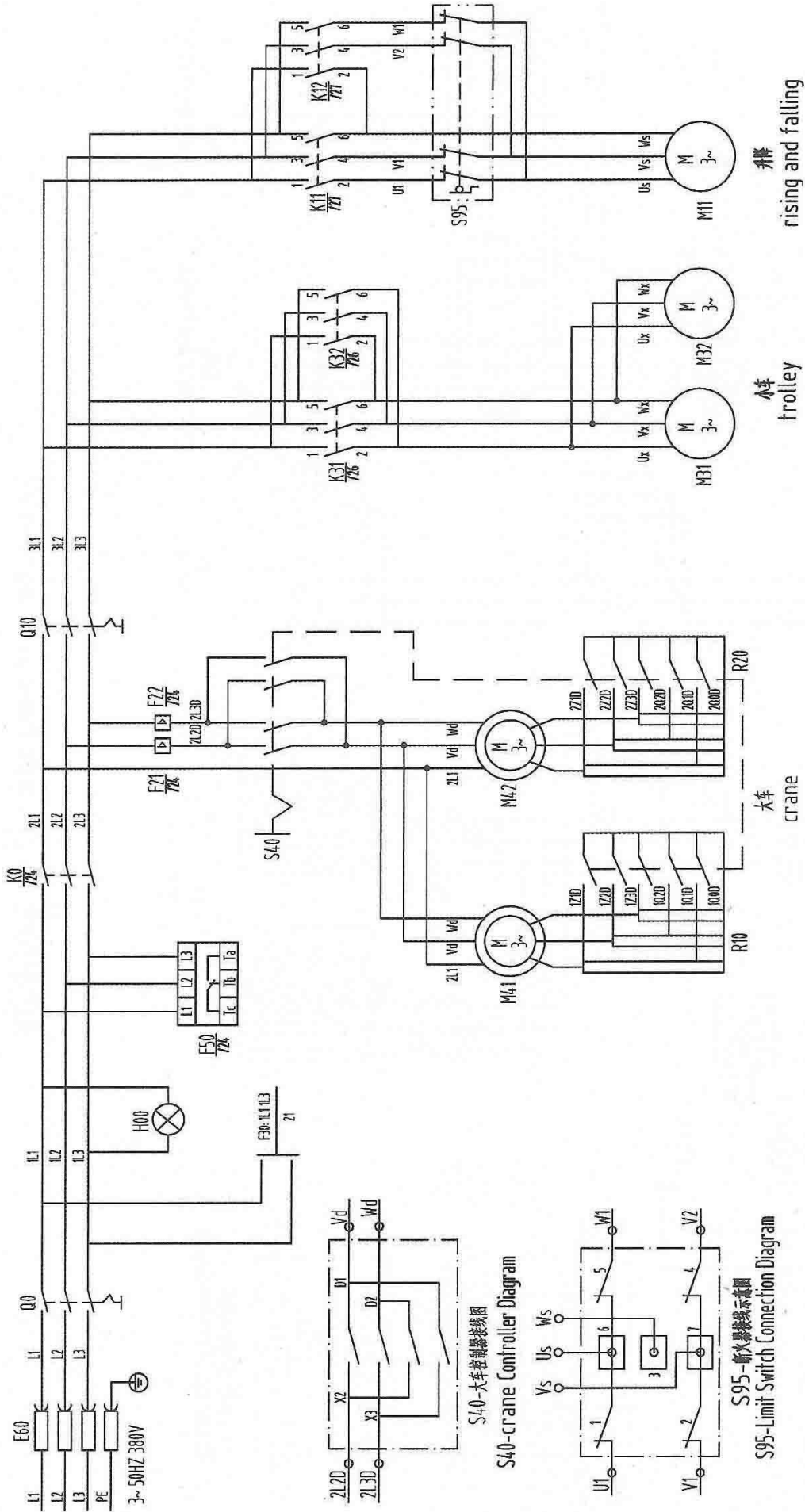
电气原理图 1-2 (Electric Principle Diagram 1-2)



电气原理图1-3 (Electric Principle Diagram 1-3)

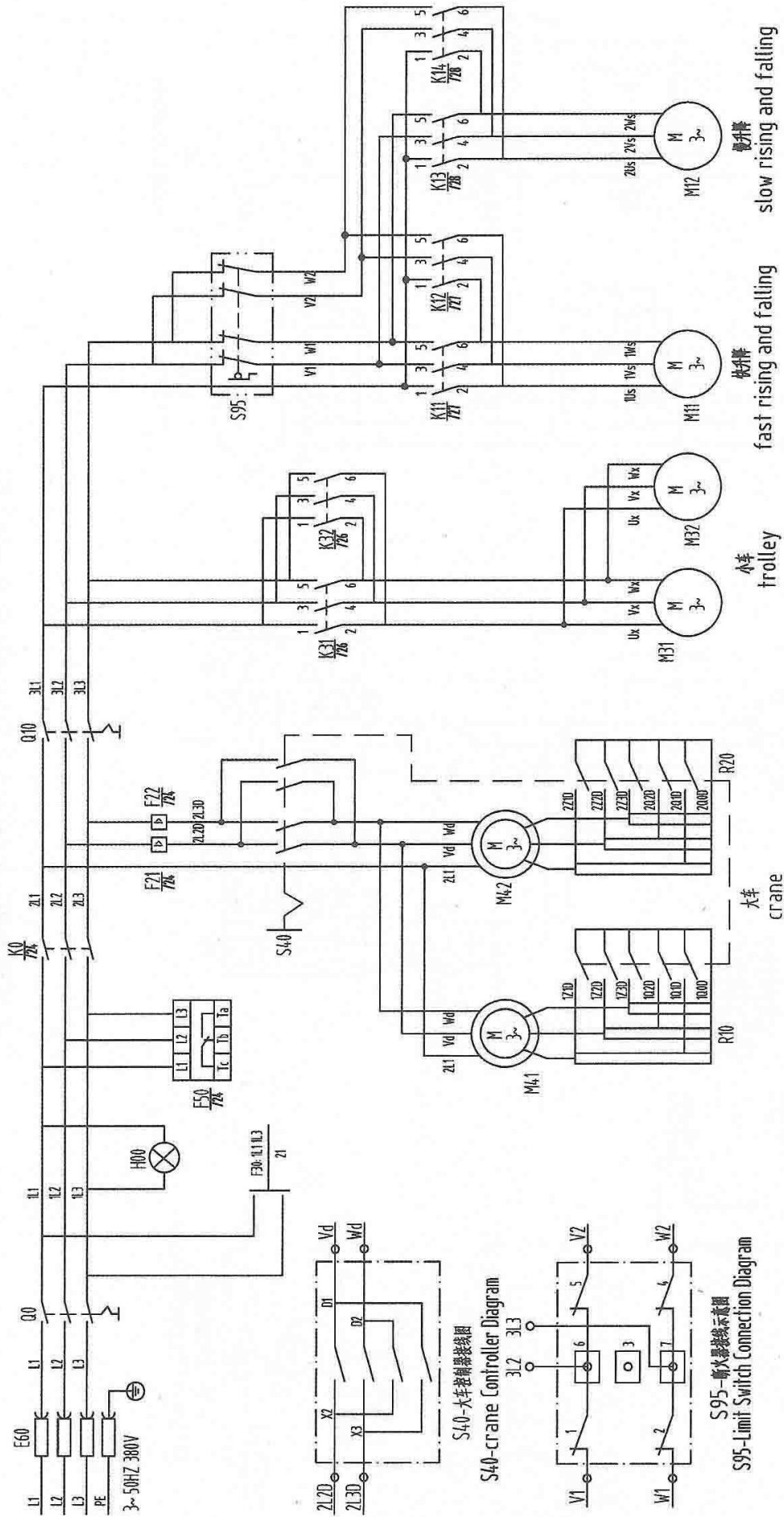


电气原理图1-4 (Electric Principle Diagram 1-4)

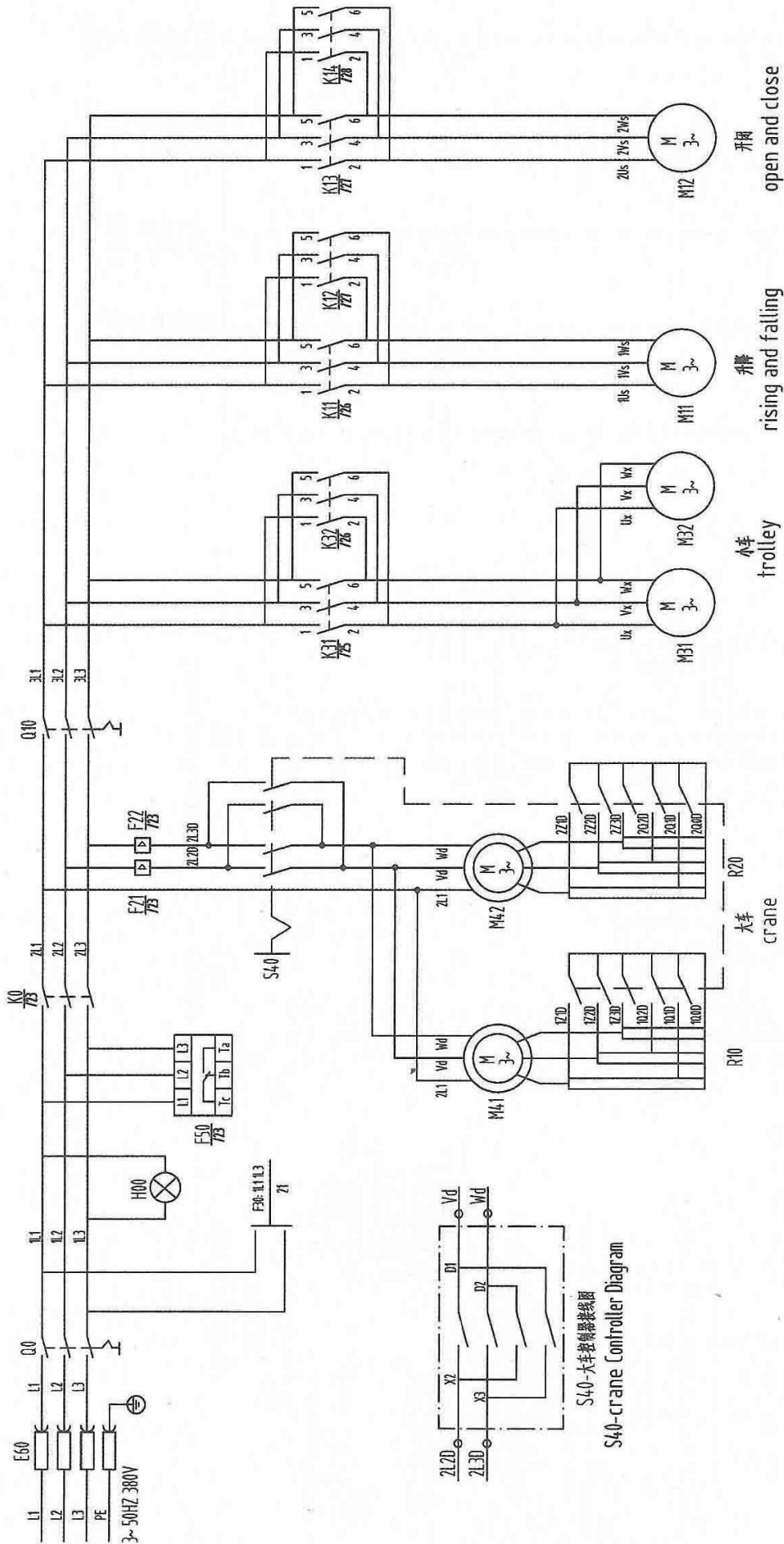


电气原理图1-5 (Electric Principle Diagram 1-5)

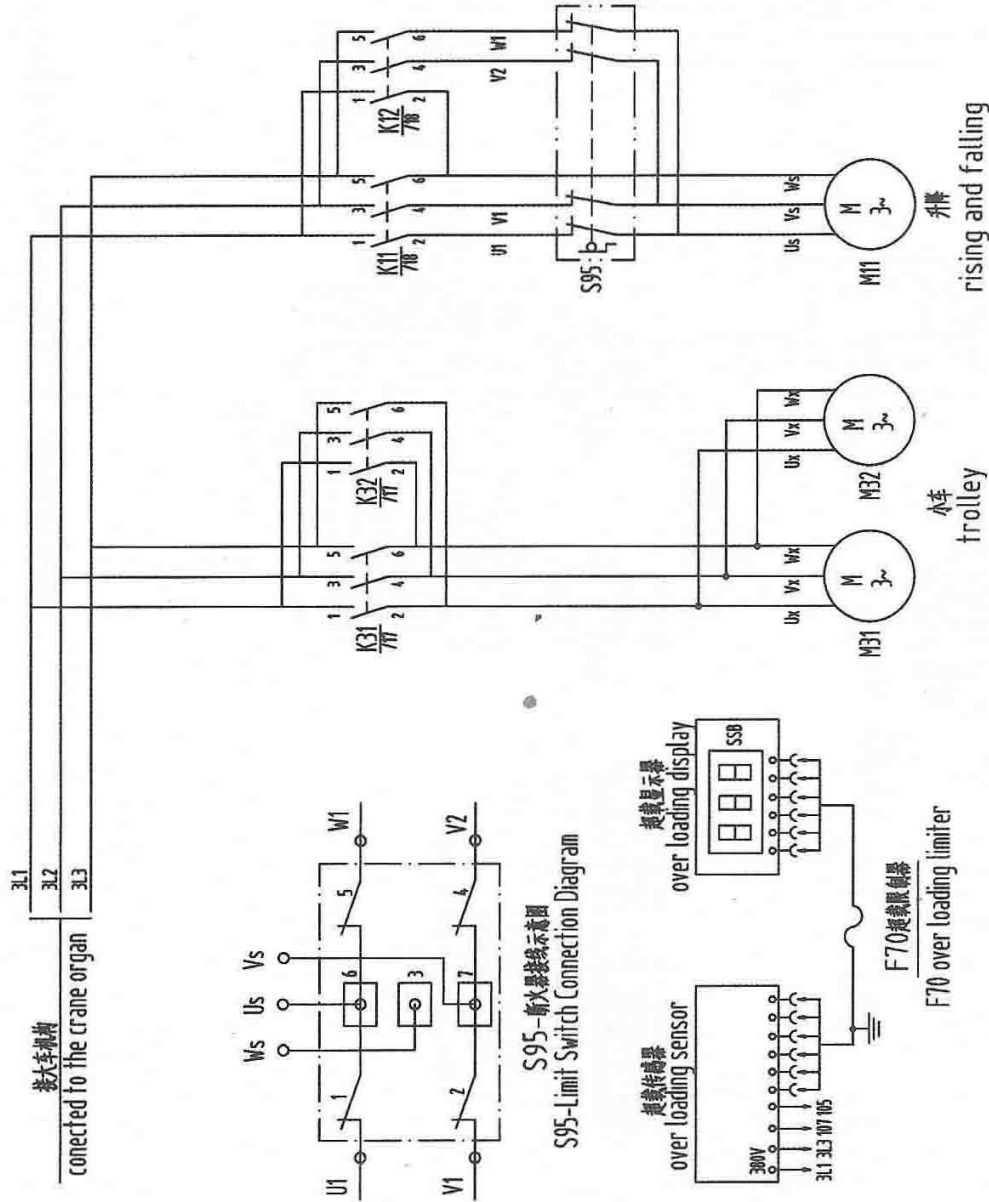
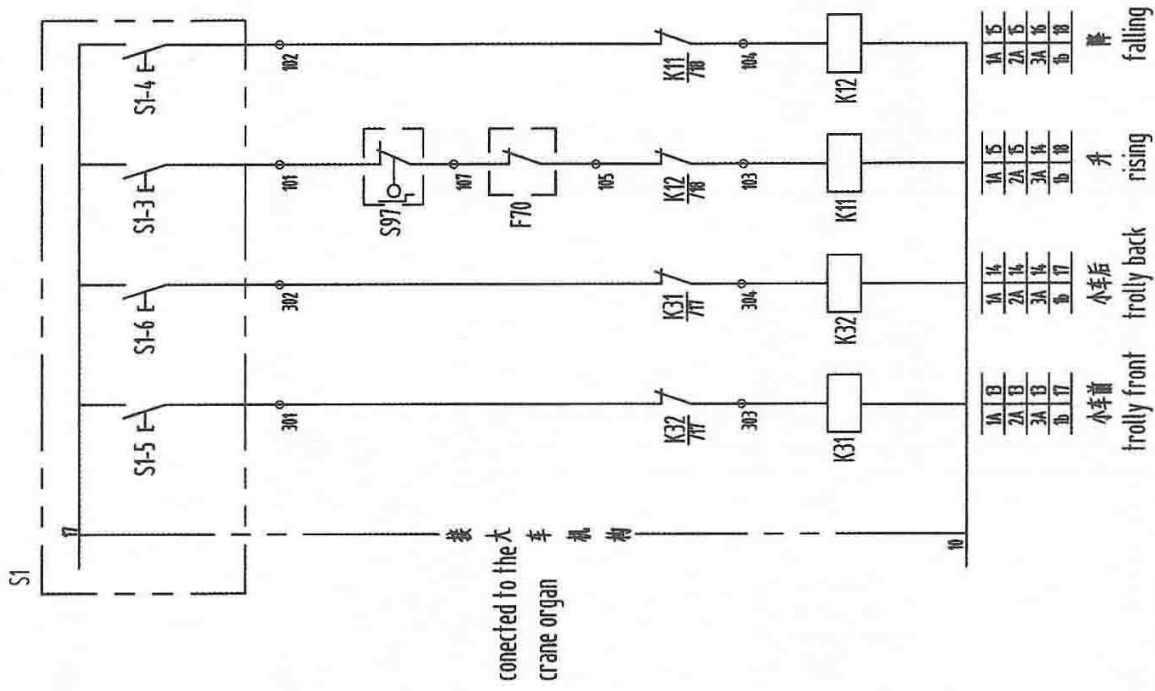




电气原理图1-6 (Electric Principle Diagram 1-6)

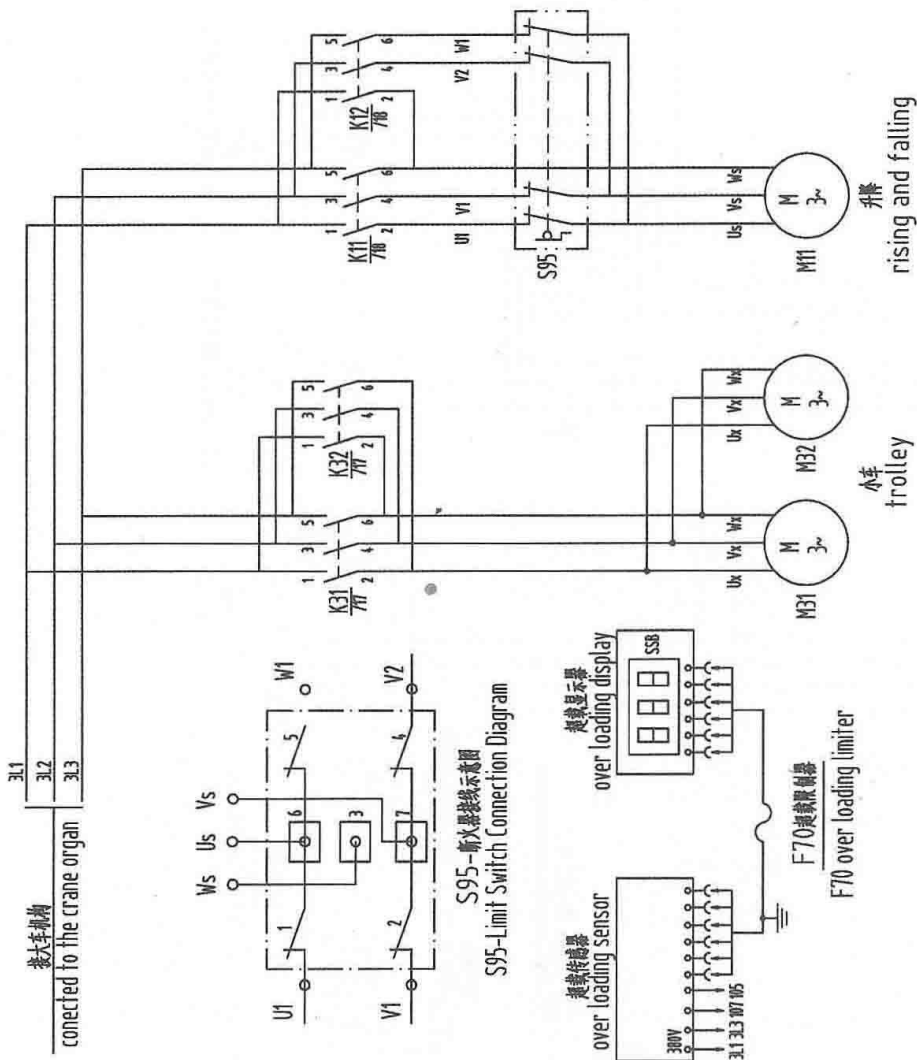
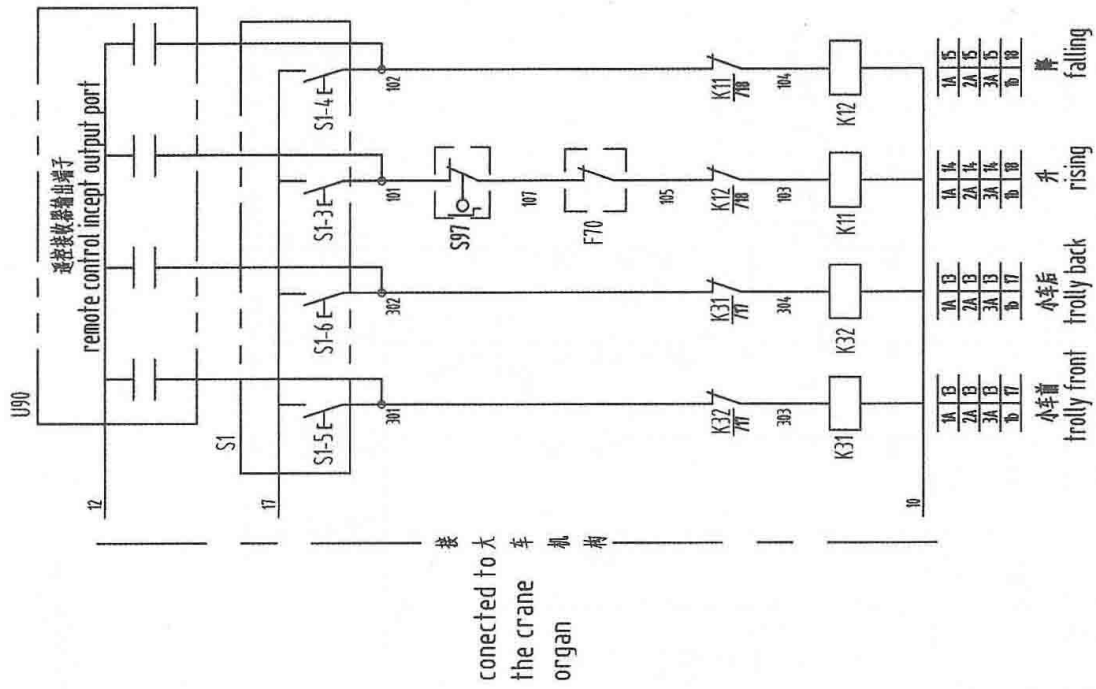


电气原理图1-7 (Electric Principle Diagram 1-7)

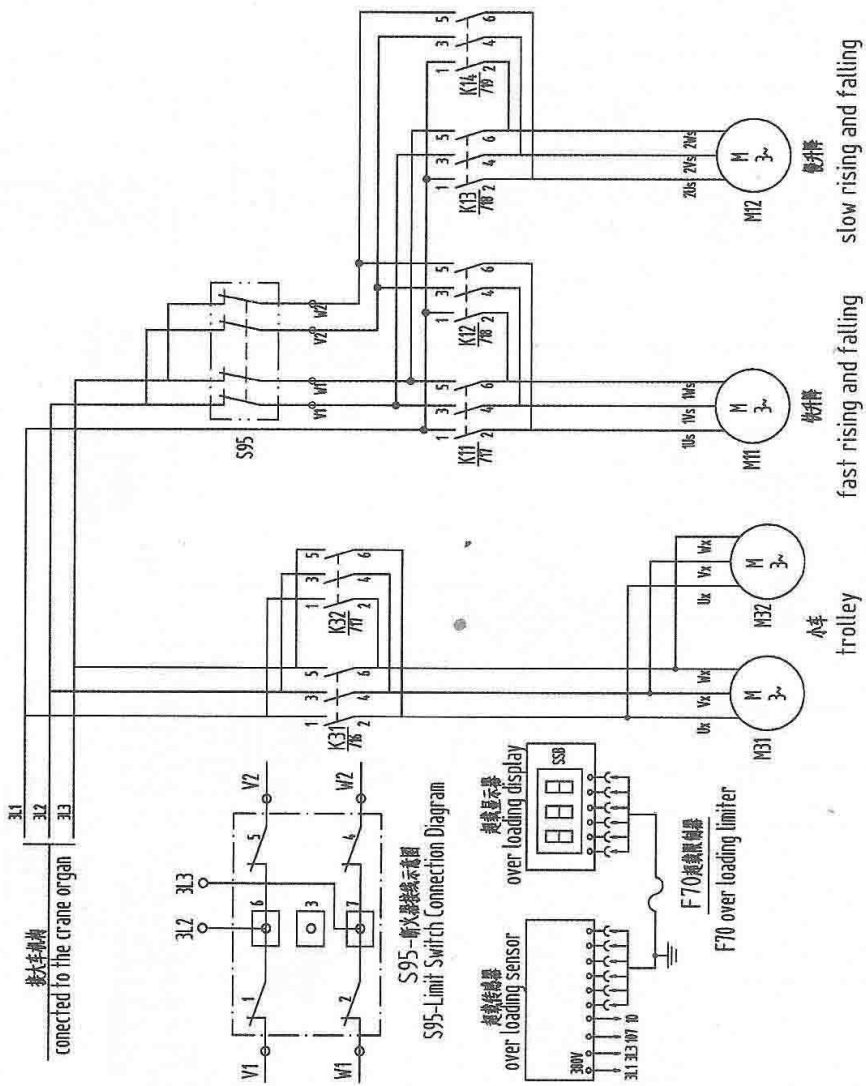
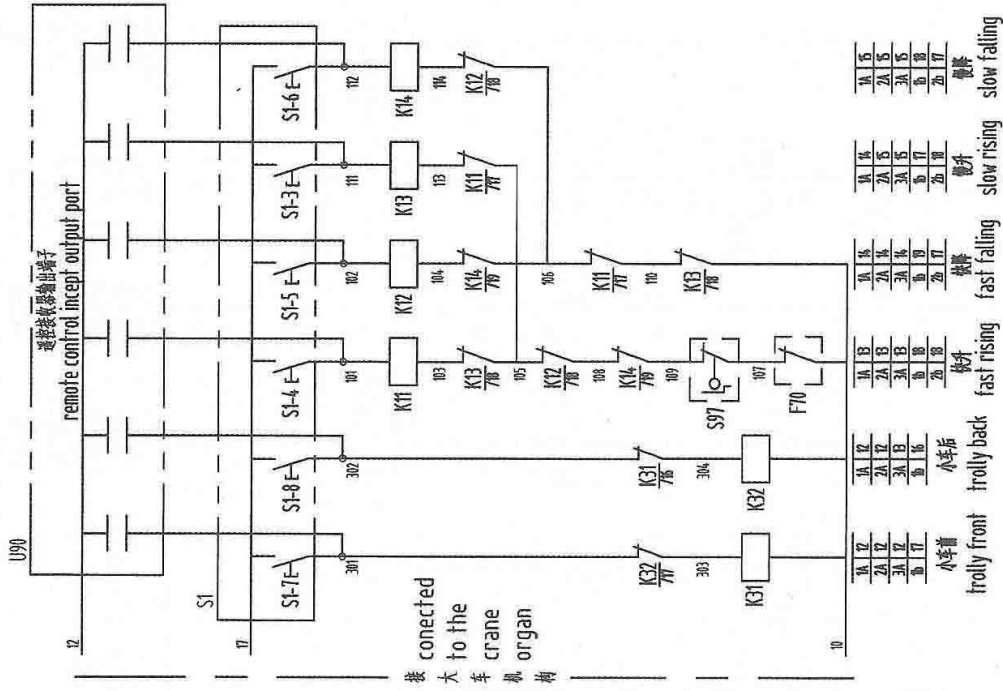


电气原理图2-1 (Electric Principle Diagram 2-1)

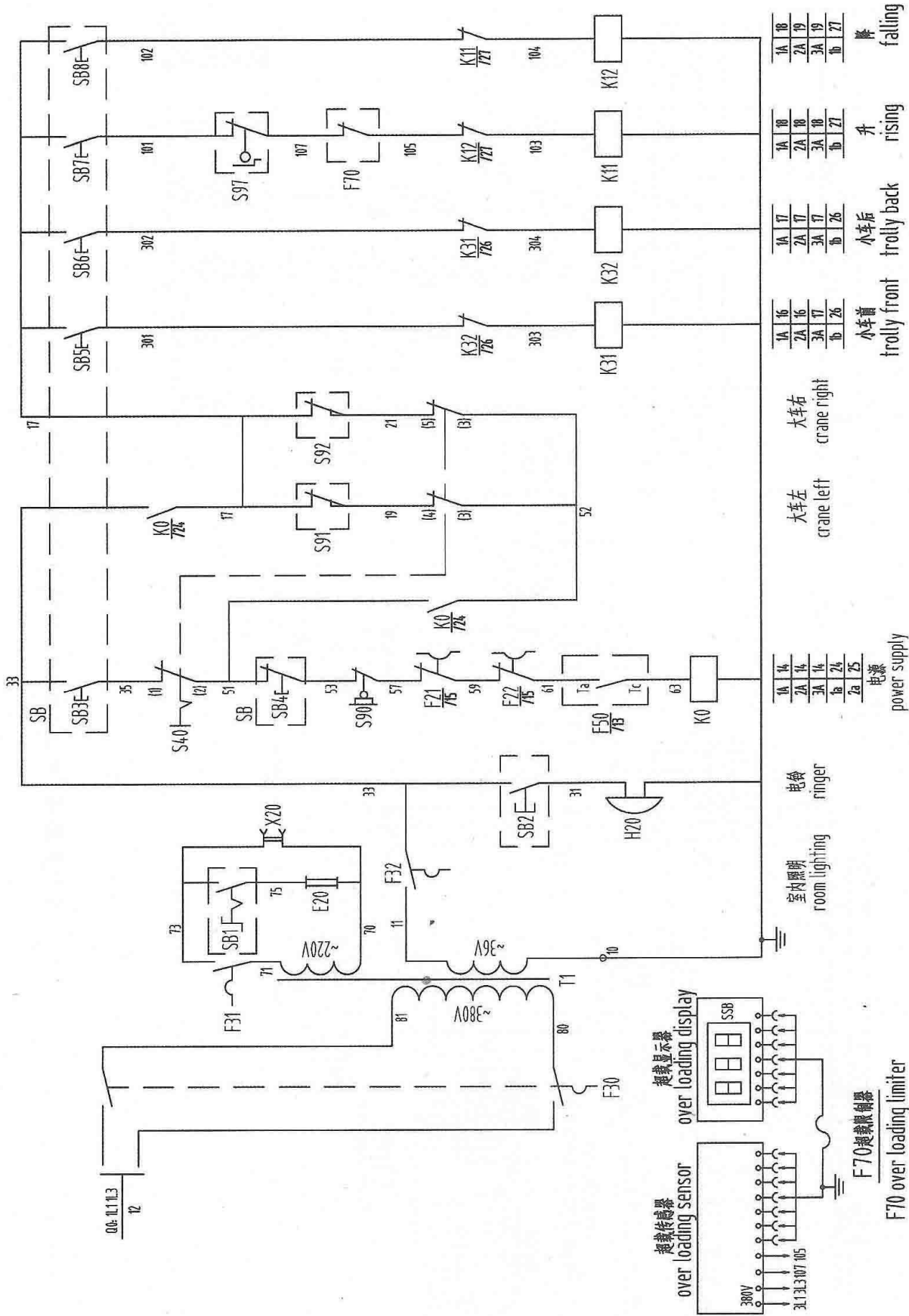




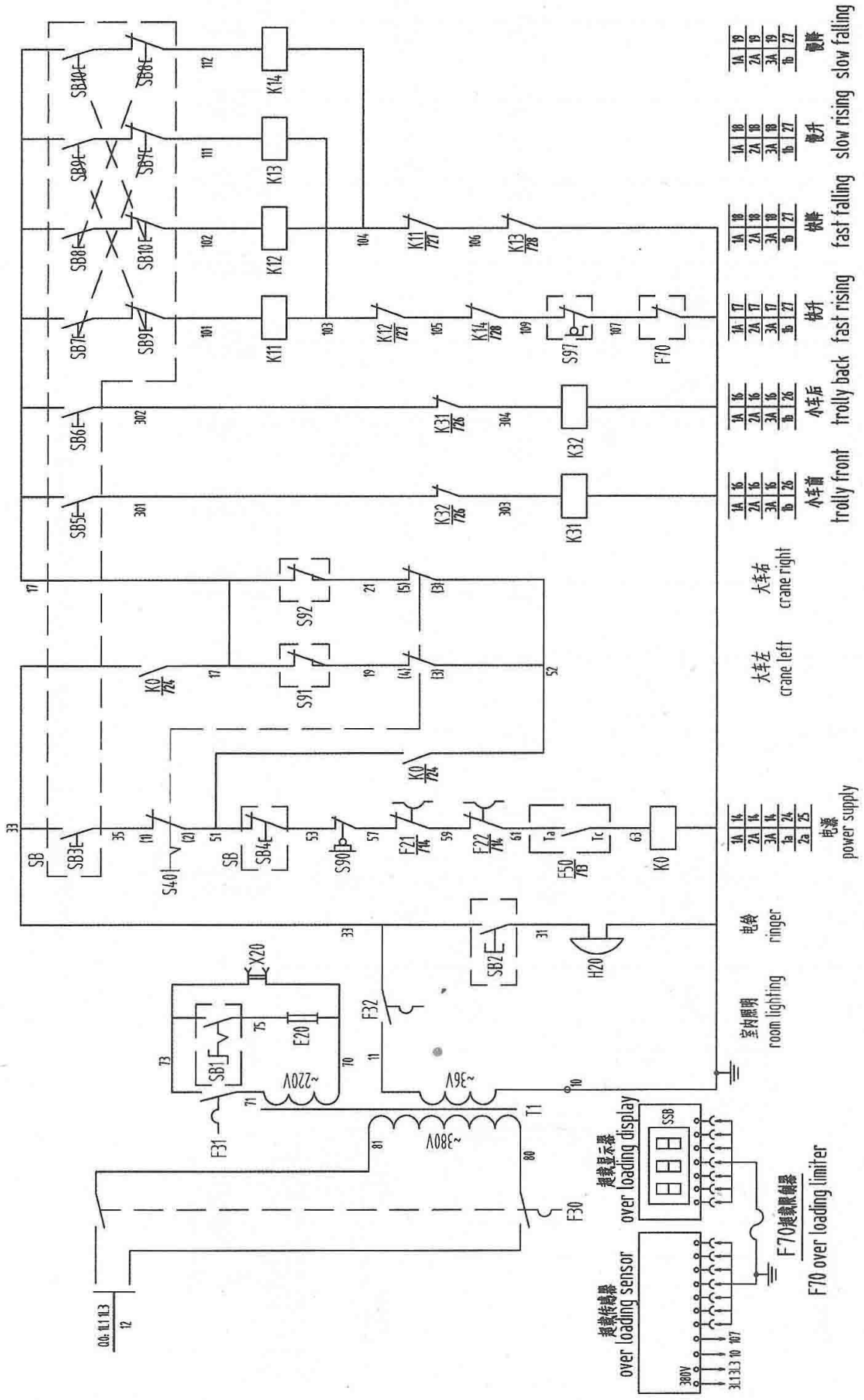
电气原理图2-3 (Electric Principle Diagram 2-3)



电气原理图2-4 (Electric Principle Diagram 2-4)

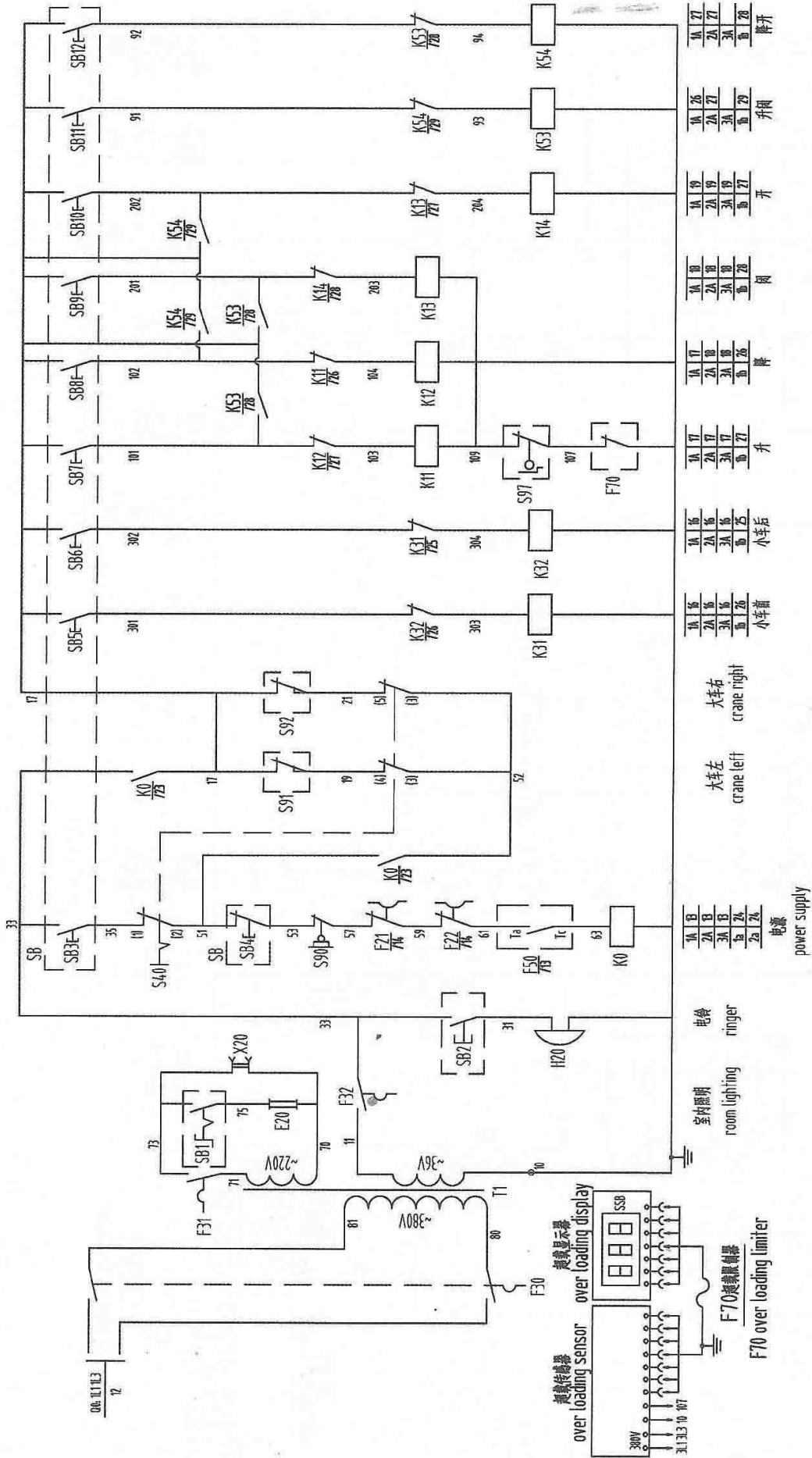


电气原理图2-5 (Electric Principle Diagram 2-5)

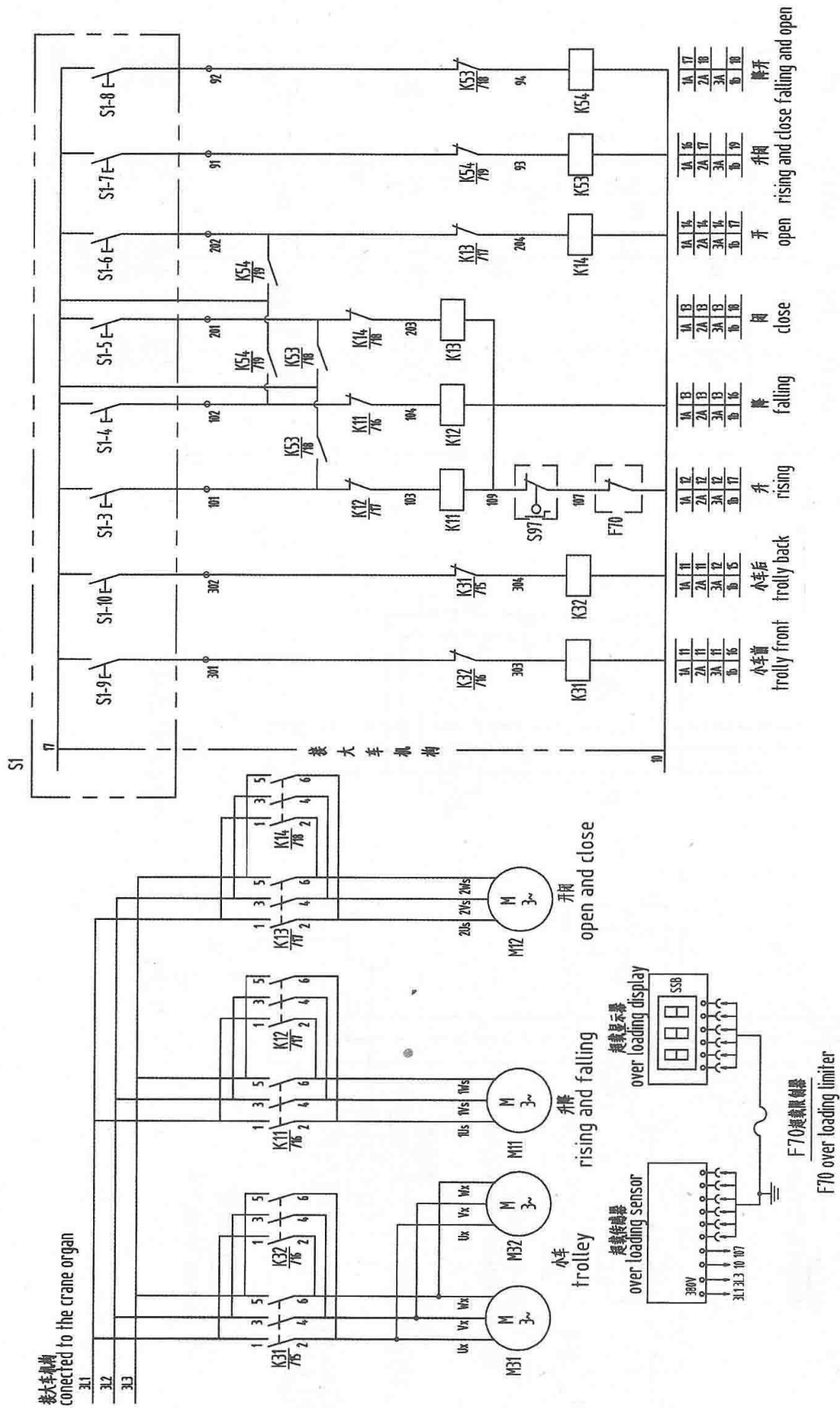


电气原理图2-6 (Electric Principle Diagram 2-6)

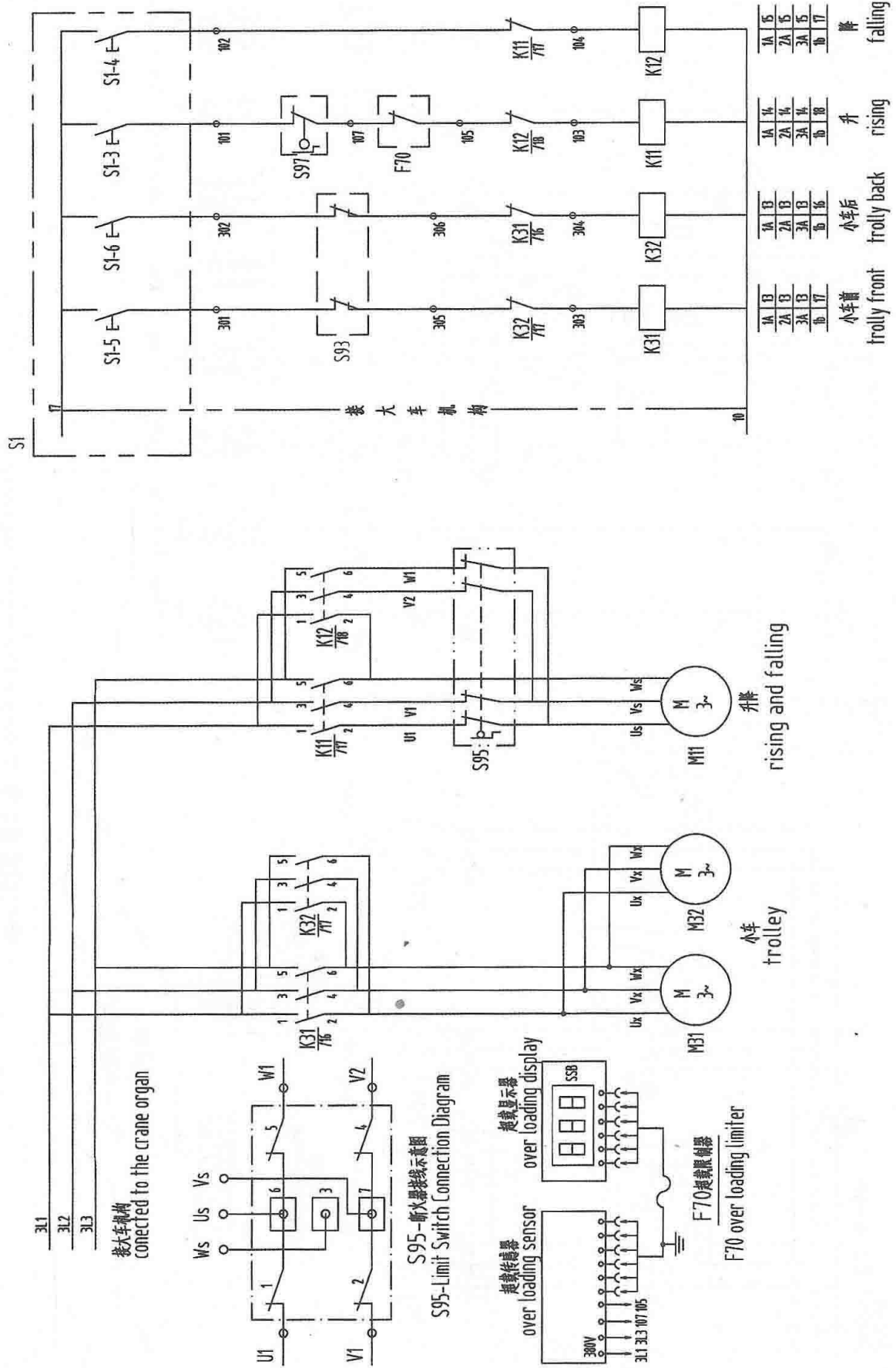




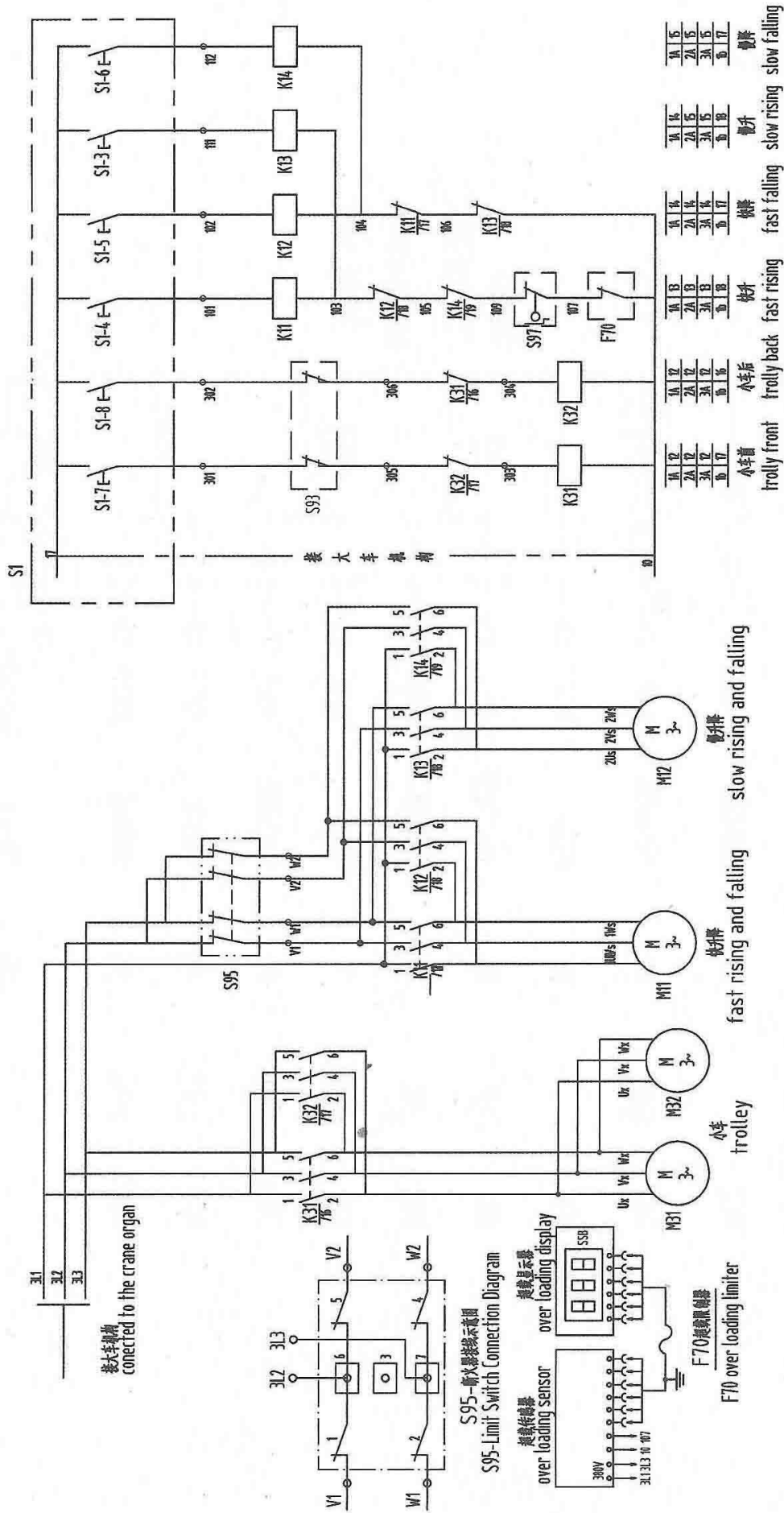
电气原理图2-7 (Electric Principle Diagram 2-7)



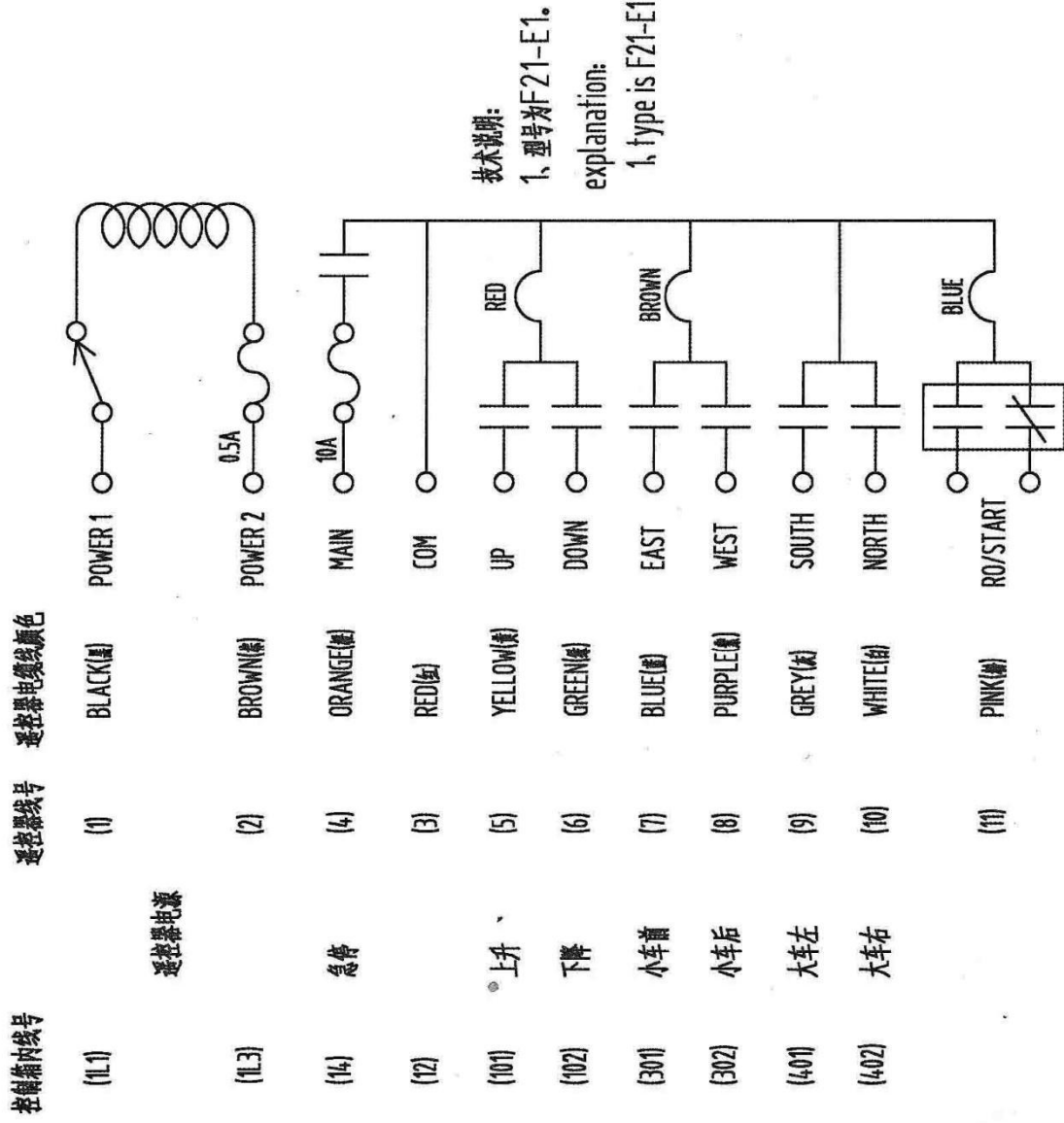
电气原理图2-8 (Electric Principle Diagram 2-8)



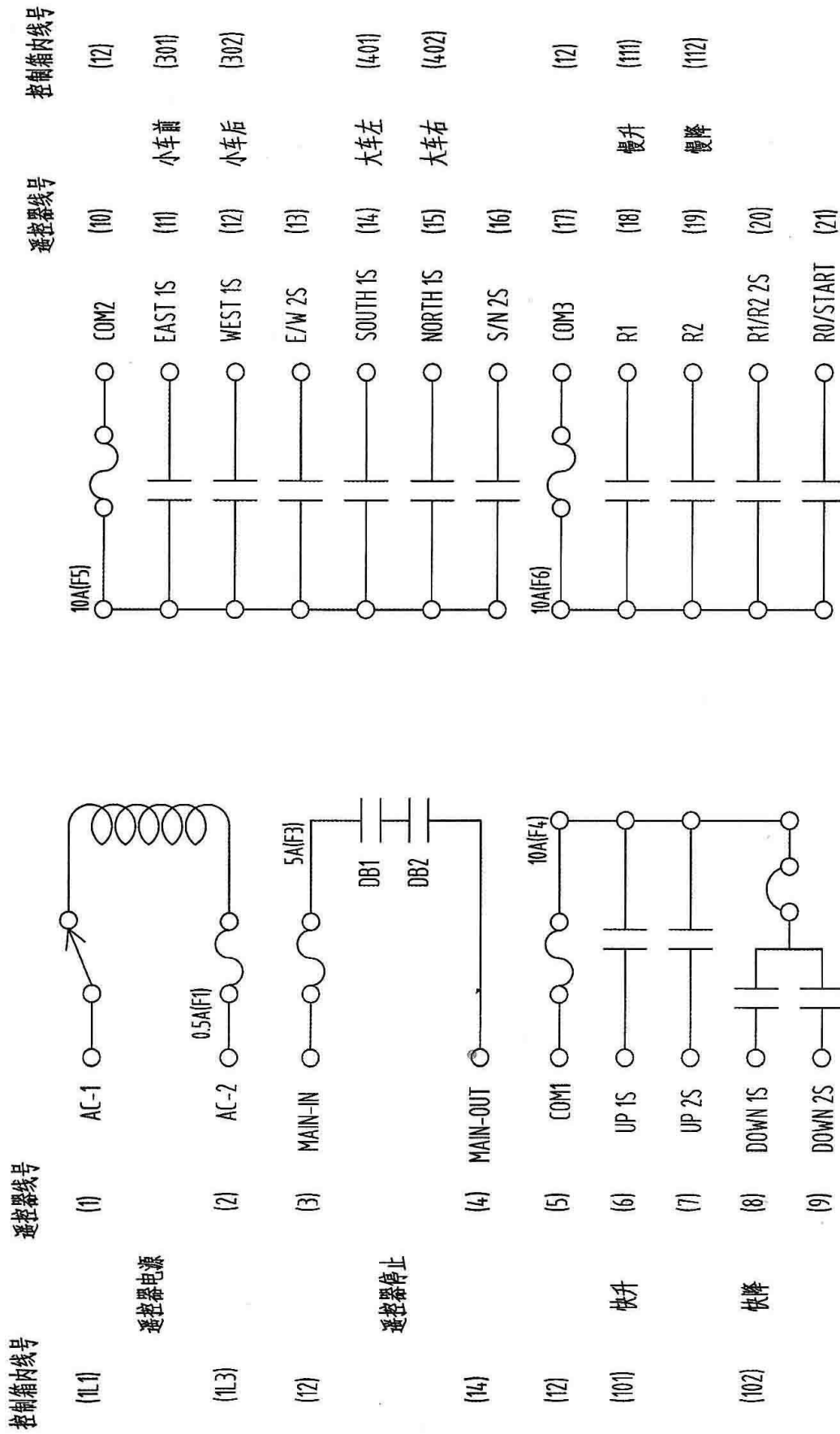
电气原理图2-9 (Electric Principle Diagram 2-9)



电气原理图2-10 (Electric Principle Diagram 2-10)



电气原理图3-1 (Electric Principle Diagram3-1)

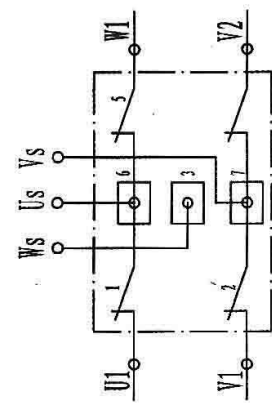
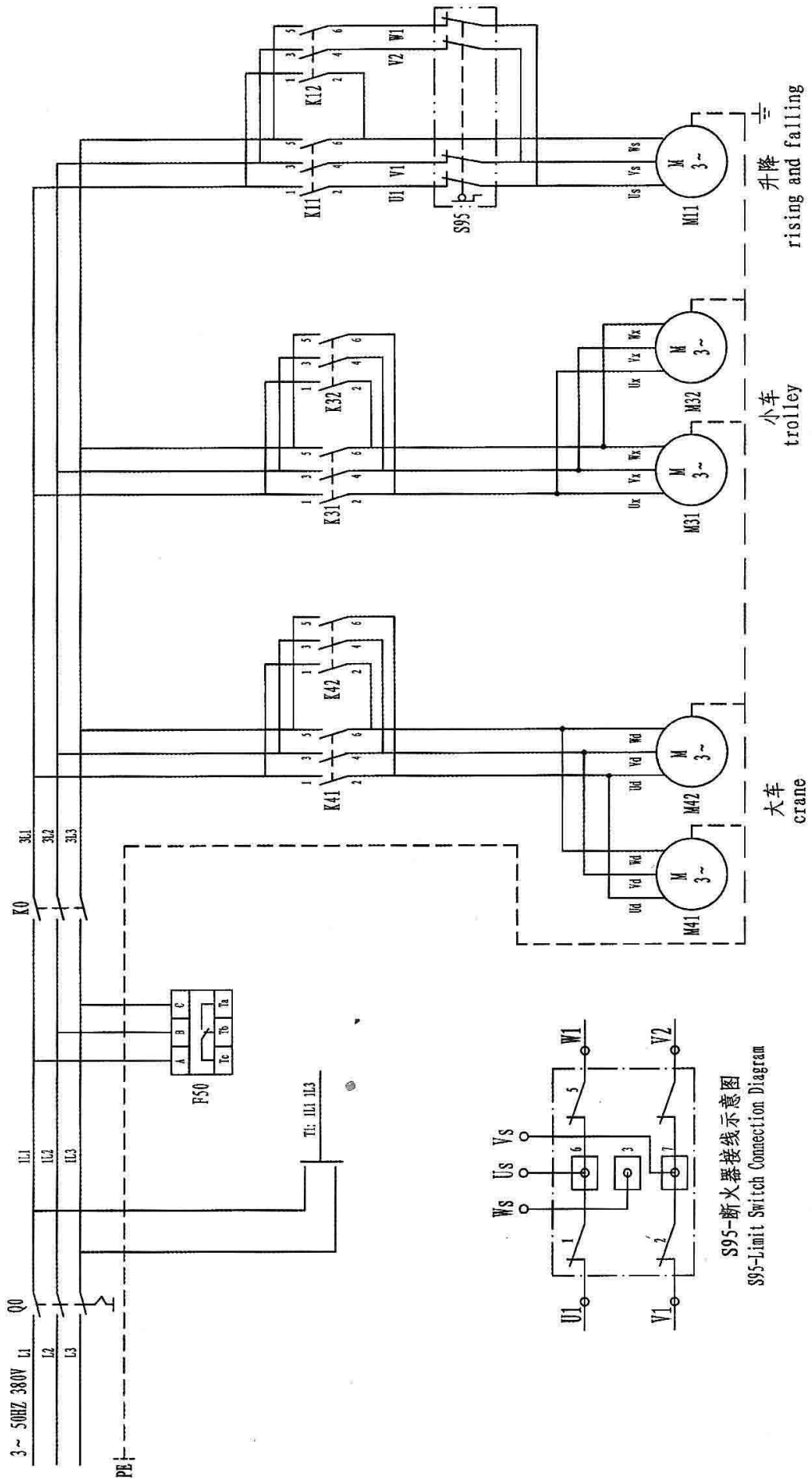


技术说明:

explanation:

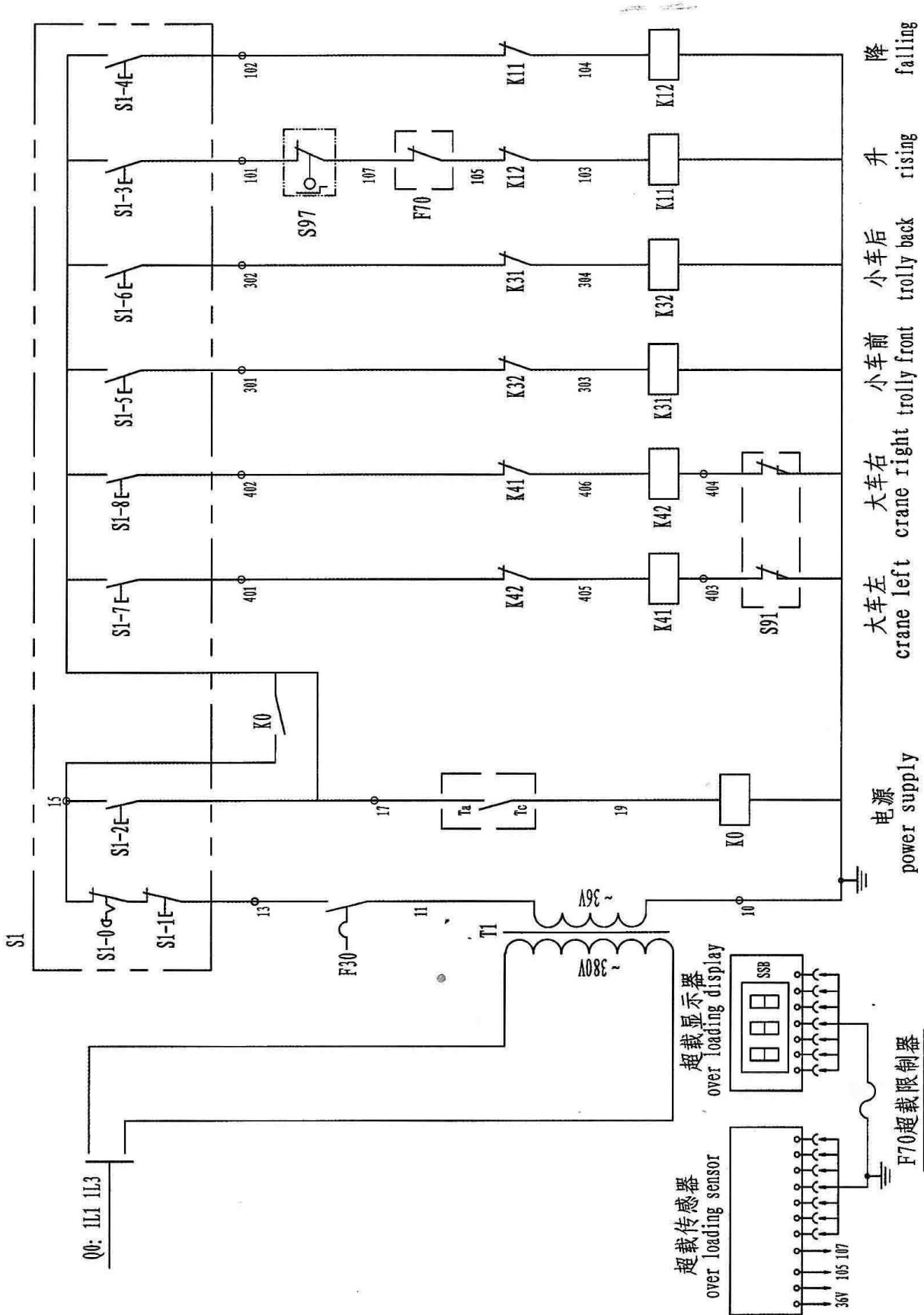
1, 型号为SAGA1-L10-1-2. 1, type is SAGA1-L10-1-2.

电气原理图3-2 (Electric Principle Diagram3-2)



S95-断路器接线示意图  
S95-Limit Switch Connection Diagram

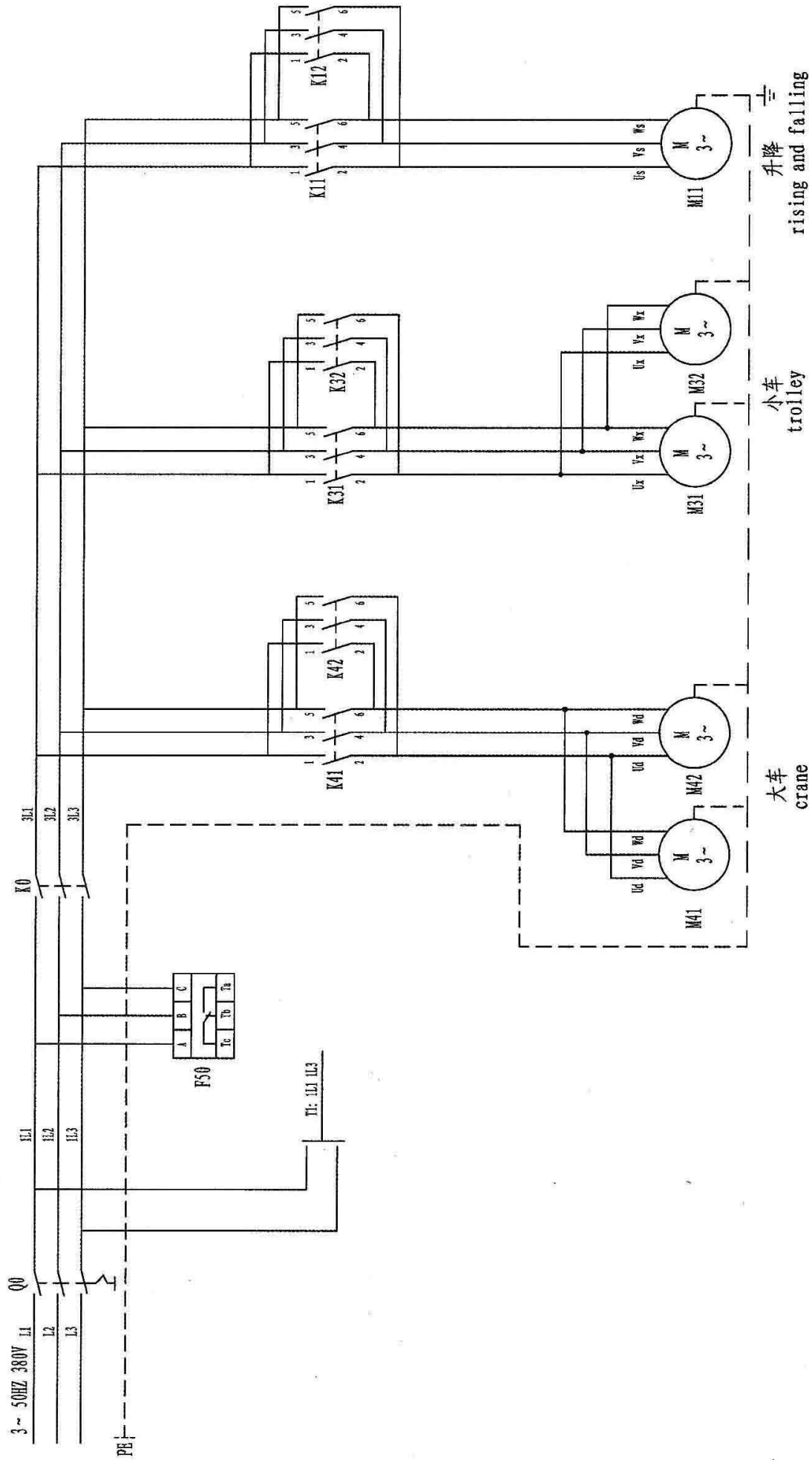
电气原理图4-1 (Electric Principle Diagram 4-1)



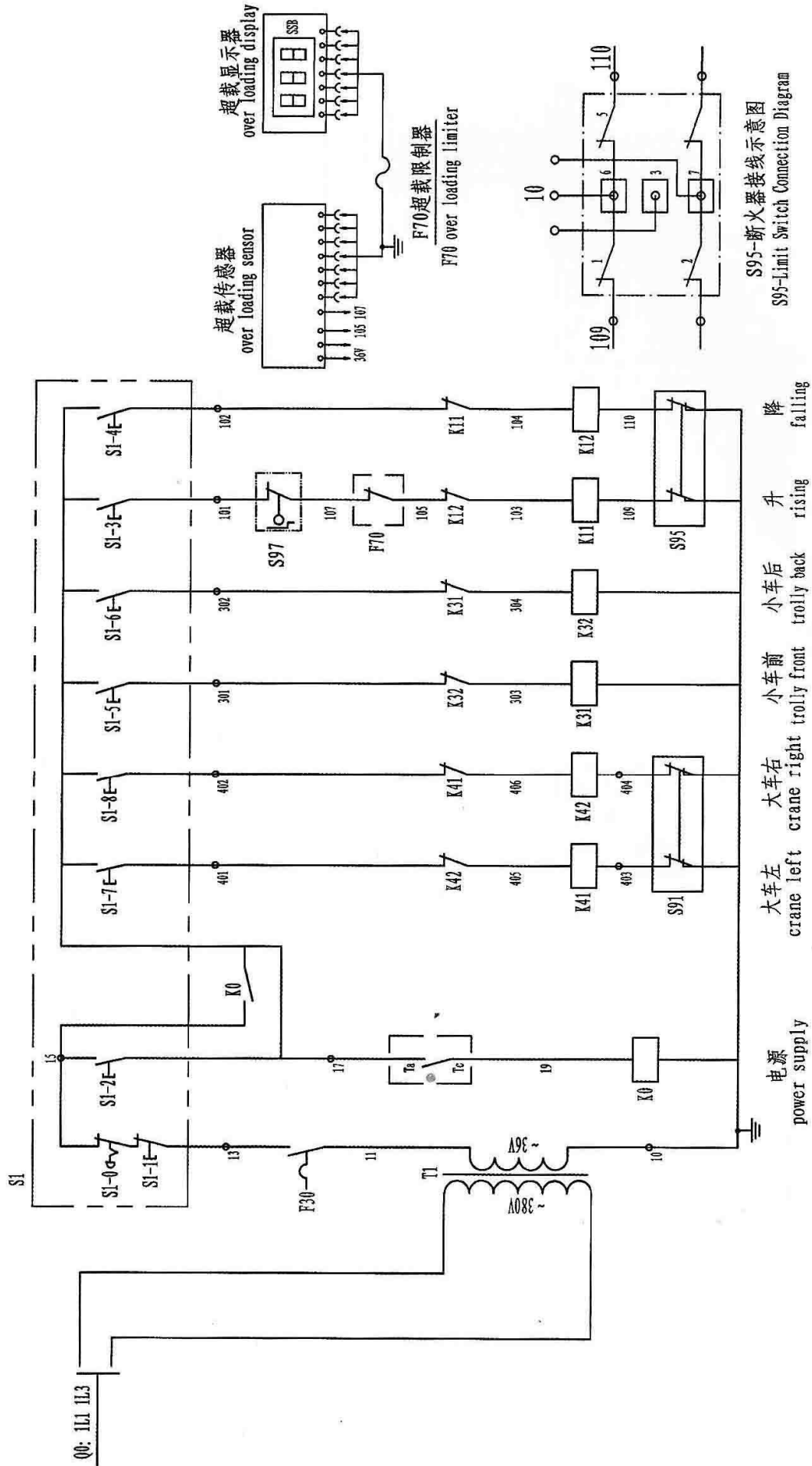
电气原理图4-2 (Electric Principle Diagram 4-2)

F70 超载限制器  
F70 over loading limiter

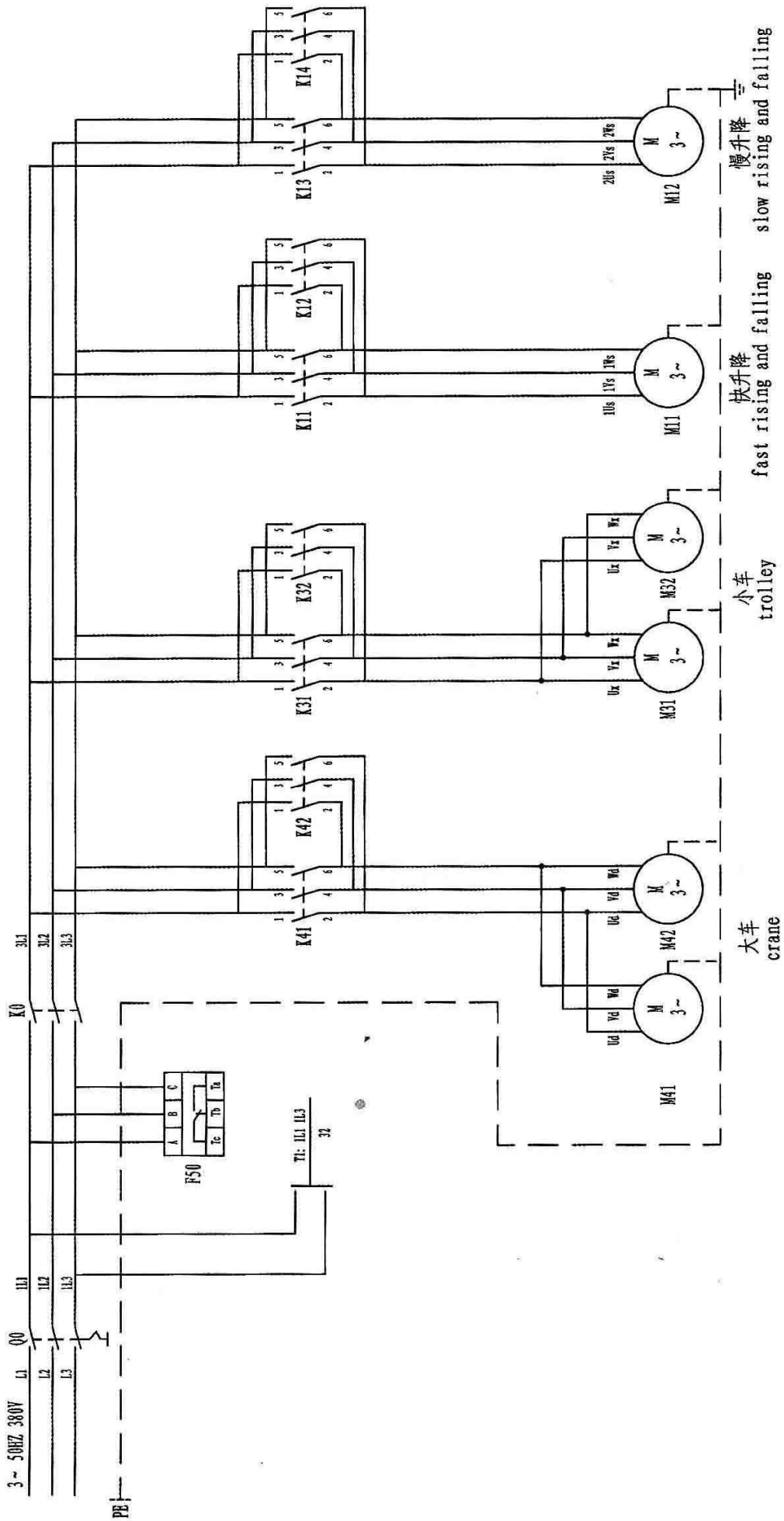




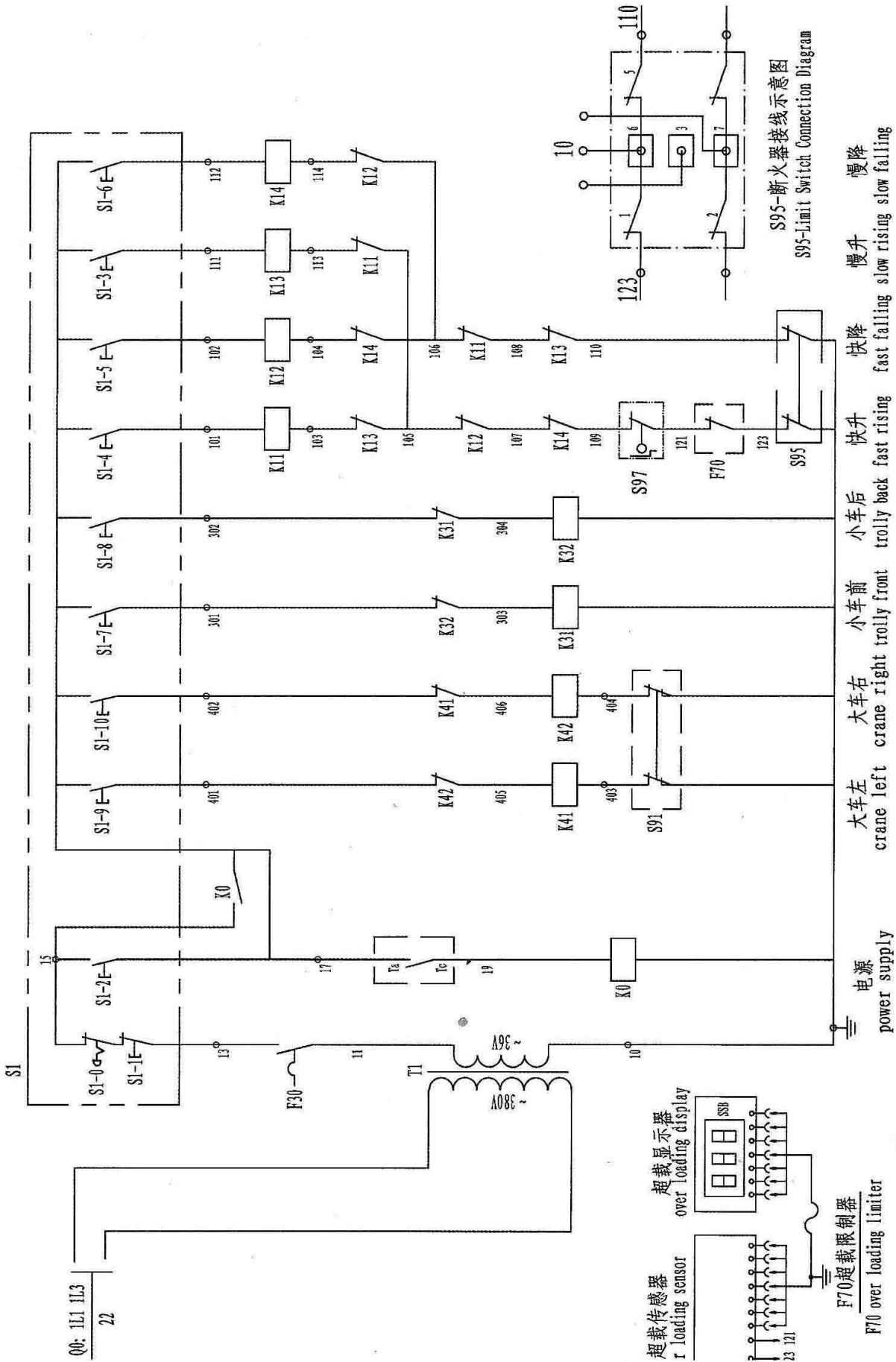
电气原理图4-3 (Electric Principle Diagram 4-3)



电气原理图4-4 (Electric Principle Diagram 4-4)



电气原理图4-5 (Electric Principle Diagram 4-5)



电气原理图4-6 (Electric Principle Diagram 4-6)

## 7. Electrical equipment installation

- A. All installation and wiring should be done according to the drawing.
- a. Before installation, study carefully the above-mentioned drawings and technical conditions, get familiar with the reciprocity of elements and operational principles in order to quickly solve the problems which may be caused in the installation and commission.
  - b. All the electrical equipments and elements should be cleared up and checked before installation. All of them should be flawless, running well, no lock and loosen. They must conform to the drawings such as types, specifications, close and open order of contactor, etc. Some of them need to adjust according to the drawings.
  - c. Check the insulating properties of electrical elements such as motor, hydraulic brake, carbon, contactor, relay and resistance, etc. Measure their insulation resistance with Meg ohm meter. If any value is less than 1 megohm, drying treatment must be done. It must be installed until passing the check.
  - d. Check the pressure between carbon brush of motor and slip ring, the pressure for all carbon brushes in one motor must be same. The carbon brush should contact with slip ring completely. When grinding the carbon brush, the edge of the brush should not be ground to round.
  - e. Check the pressure among contact points of controller, contactor and relay. Adjust it if each one is higher or lower than that regulated.
  - f. The lead and the resistors should be correctly connected according to the instruction. If it is found that motor contributes less power such as the joystick in the right place and the crane cannot lift the rating load, or the crane and trolley cannot move, check the connection of the resistors first. Usually it can be judged according to the specifications and quantity of the resistors. If necessary, it can be measured with electro-bridge (all the leads to the motor should be disconnected at this time.)
  - g. The joystick should be flexible and shift places should be clear.
  - h. For the wires and cables of the resistors, the vertical part can be arranged on the right or left of the resistors but it should not affect assembling or disassembling of the resistors; and the horizontal part can be wound with asbestos rope.
  - i. Check all the connections in the cabin. Eliminate loosing or falling connections if there is any and ensure all the connections are in good condition.
  - j. Before installing control cabinet, electrical elements and wires must be checked carefully. There are not any damage for elements, especially the extinguisher cover of the contactor and the assistant head etc. Oil dirty (rustproof oil painted before left factory) on the contacting gag bit must be cleared away.
  - k. The gradient of control panel is not allowed larger than  $5^\circ$  in order to ensure the panel working in order.

- l. Before installing limit switches, carefully check if they are flexible and reliable. After installed, check if their wiring is right and is adjusted in turn, in order to ensure power off when hook lift to limit position.
- m. When installing the trolley conducting device, first straighten the electric cables to eliminate the torsion, then put the cables orderly on end point clamp, the pulleys and festoon pulley according to the drawings. Drive the trolley to the limited position opposite the driver's cab, then unleash cables, adjust the position of festoon pulley to keep the length of every period basically consistent and maintain certain relaxation, the sagging angle maintains about  $120^\circ$  (the traveling towrope length between first pulley and final pulley is equal to 1.15 times of span, but margin should not exceed 2% of span.). After adjustment, fix cables firmly in the end point clamps and festoon pulleys with cable cleats. The drive the trolley to the limited position near the driver's cab again, adjust cables to keep the suspending length of every period basically consistent, fix cables firmly onto the pulleys with cable cleats. Bind the cables tightly with band every 500~ 700mm. In order to guarantee every cable tightly bound, rubber sheet should be under laid on the pulleys. Then install towing steel-rope, adjust its length to guarantee steel-ropes bear force during running, finally connect the two ends of cables to the junction boxes on the bridge and trolley separately.
- n. Design, installation and replacement of crane cable should be in accordance with working ambient temperature, power-on protection rate and other factors to reasonable select the carrying capacity.
- o. The main slide wire of crane should be powered by the special supply line. There should be a special zero line or ground wire for 380V power source.
- p. The outdoor crane should adopt the tube wiring, wire for the same motor can only through a tube, no corrosive operating environment should adopt the open-lay insulated wire.
- q. Lighting and signal power lines of crane should be connected in front of the main power switch, which can ensure normal power supply under the interruption of main power supply.
- r. Corresponding numbers should be marked on the junction boxes of wires and the end of wire tubes according to drawings, in order to easy to install and maintain.
- s. Metal structures of crane, metal enclosures of all electrical equipments, pipe chase and metal sheath of cable must be connected to continuous conductor, the connection of zero wires or grounding should be reliable. The both ends of crane track should take measures of the neutral and earthing protection. Grounding resistance of track and any point on the crane should not be more than  $4\Omega$ .

## **B. Adjustment of electrical line**

- a. After all the electrical equipment and wires installed and fixed according to the regulations, check and adjust the whole electrical line. First check all the connecting points of the line, make sure that they are all right and tighten all the connecting bolts, then switch on the power for the crane in order to check and adjust the electrical line.

- b. Check and adjust the action order of the components in the controlling panel. When checking, the main circuit breaker should be off. Turn on the controlling circuit switch, turn the main controller joystick shift by shift and observe if the action order of each contactor, relay and electric linkage is in accordance with the requirements in schematic drawing. If not, find the reason and adjust it.
- c. Check and adjust the action setting value of time relay to meet the setting value regulated.
- d. Check and adjust the safety devices. Turn the limiters and safety switches with hand and observe if they are flexible, if they can cut off the power protect the system when the system protected comes to the limit position. If there is any trouble, find the reason and eliminate it. The limit position both for crane and trolley should be properly adjust. The angle of the contactor must be adjusted in order to guarantee cutting off power when the hook goes up to the limit position.
- e. Adjustment of motor rotation direction. Turn on all the switches, operate the controller, shortly start every system separately(that is, turn on for a short time and turn off immediately) and observe if the turning direction of the motor is in accordance with that of controller's operation, if the two motors in system driven by double motor drive the system in the same direction and if the direction is in accordance with the direction protected by limiter. If not, overturn the wires of any two stators and make the turning direction is in accordance with the regulation.

After overall check and adjustment to the electric circuits, turn on all the breakers and provide power for the main circuits and controlling circuits of every system. Start systems one by one on condition of empty load to run the crane on a trial and observe if all the systems work well. Only after the trial running with empty is all right, the operation with load is allowed. The load should be added gradually, directly full load operation is not allowed.

If the trial running is all right, the electrical equipment of the crane can be started normal operation.

## Use and operation for crane

### 1. Basic requirement of the on-site personnel

On-site crane operating personnel, including crane drivers, department cable crane and crane command personnel, etc. the above personnel are prerequisite for working certificate are as follows.

**A. Basic requirement. Must guarantee the security (including oneself) of the personnel.**

**B. Age conditions. Age above 18 years old.**

**C. Physical qualifications. Healthy body, the binocular vision (including vision correction) is more than 1.0, no obstruction diseases and physical defects, high-altitude vertigo in crane operations**

**D. Quality condition.**

- a. Psychological quality: react well under the stress condition; emotional stability; responsibility.
- b. Cultural quality: above junior middle school.
- c. Technical theory quality: familiar with crane operation characteristics, and working principle; familiar with the crane composition、 safety equipment and system; , familiar with the basic performance parameter of the crane.
- d. operation skill quality: familiar with the operation, lifting and command.

### 2. Hoist crane operation

**A. Main point of hoist crane operation.**

- a. Operation skill. Two words for the operator: Stable and accurate. Stable: crane starting, running and stopping to stability. Accurate: crane shall grant a parking position. Ruthless is disabled, ruthless is cruel operating, it's too dangerous.
- b. Operation safety consciousness. The safety consciousness lies in responsibility, no security responsibility, there will be no security, or it will cause accidents disasters—life or personal injury or property damage.
- c. Unsafe operation forms
  - Disoperation: caused by lacking of safety consciousness, lack of concentration, or the unskilled technology.
  - Illegal operation: Unsafe operation of violating the operating rules, because not familiar with the crane



operating essentials and safety rules and other causes.

- Rough operation: It is dangerous that crane is operated irresponsibly, regardless of personnel safety or property.

## B. Hoist crane operation form

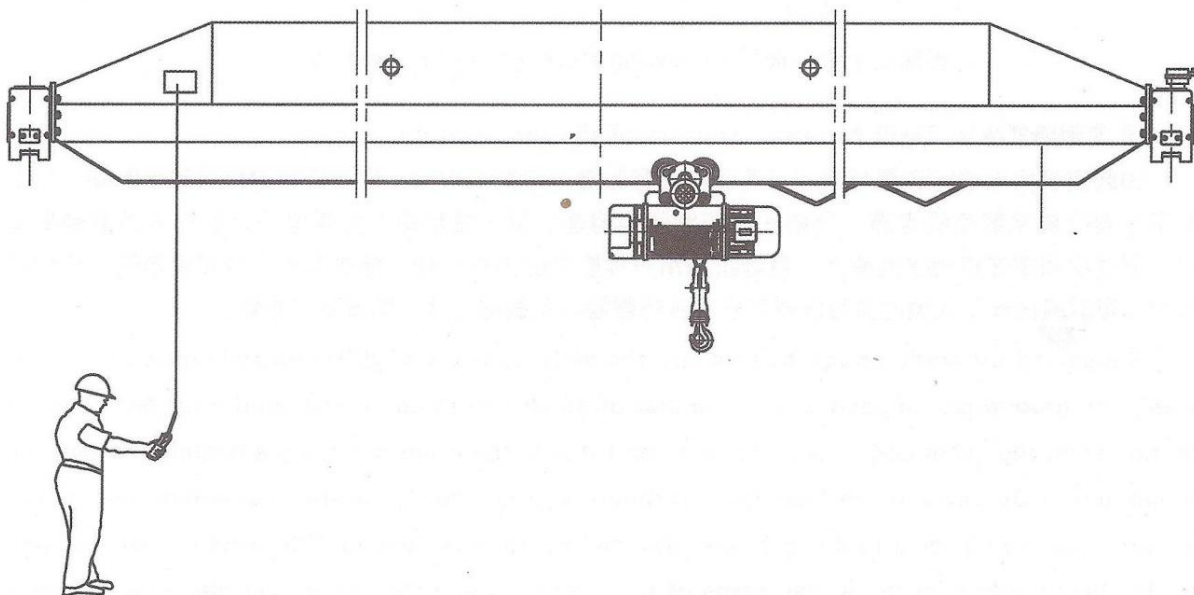
### a. Ground operation

The ground operation of the hoist crane is by manual push button switch, also called the flashlight door control. The flashlight door use the soft rubber line and the reinforced steel wire to hang under the crane, and 1 -1.2m from the ground is preferred. The flashlight door through the turn on and off of the electromagnetic switch to control motor and reversing so as to reach the lifting of the lifting load, down, left and right sides operation. There are six buttons on the flashlight door, which can manipulate crane load lifting up and down, around and before and after operation. Flashlight door is equipped with mechanical interlock protection device, power switch, as well as the low voltage (36V or 42V) flashlight door and double speed flashlight door. The flashlight door button labeled as "up" "down" "left" "right" "before" "after" or  $\uparrow, \downarrow, \leftarrow, \rightarrow, \odot, \times$  these two markers forms.

For different installation place and different installation way, the common ground controlling pattern has the following few kinds:

#### - Fixed type flashlight operation

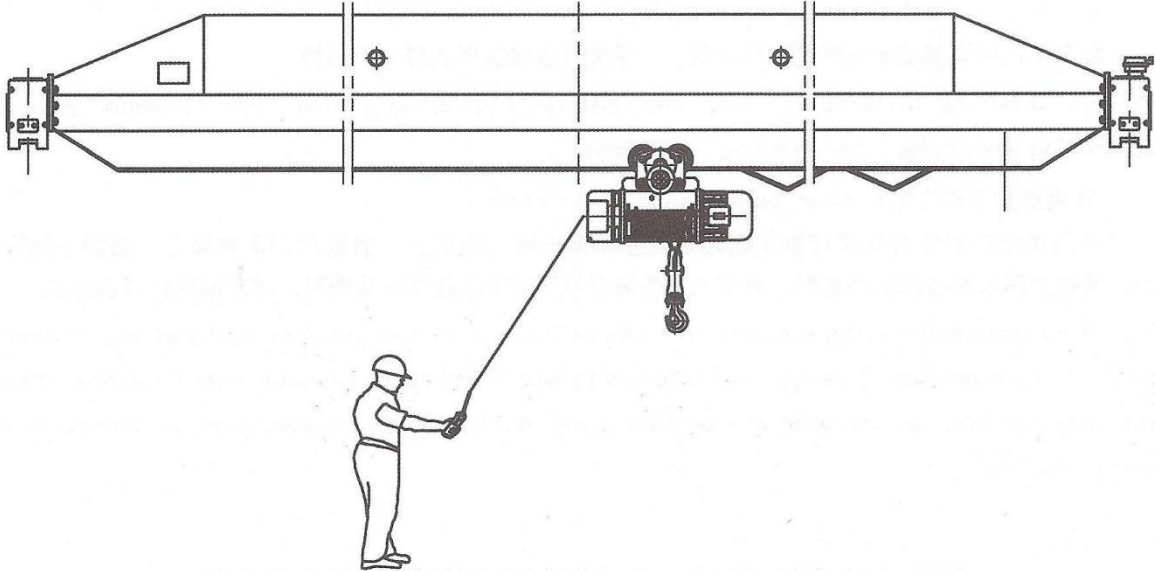
The suspended flashlight door's soft rubber line is in a fixed position on the crane, or fixed on the fixed cantilever. This type is applicable to with small span, and long-term fixed obstacles, the operator will take this kind of operation when the horizontal displacement are limited to a certain extent.



固定式手电门操作 Fixed flashlight door operation

-Following flashlight door operation.

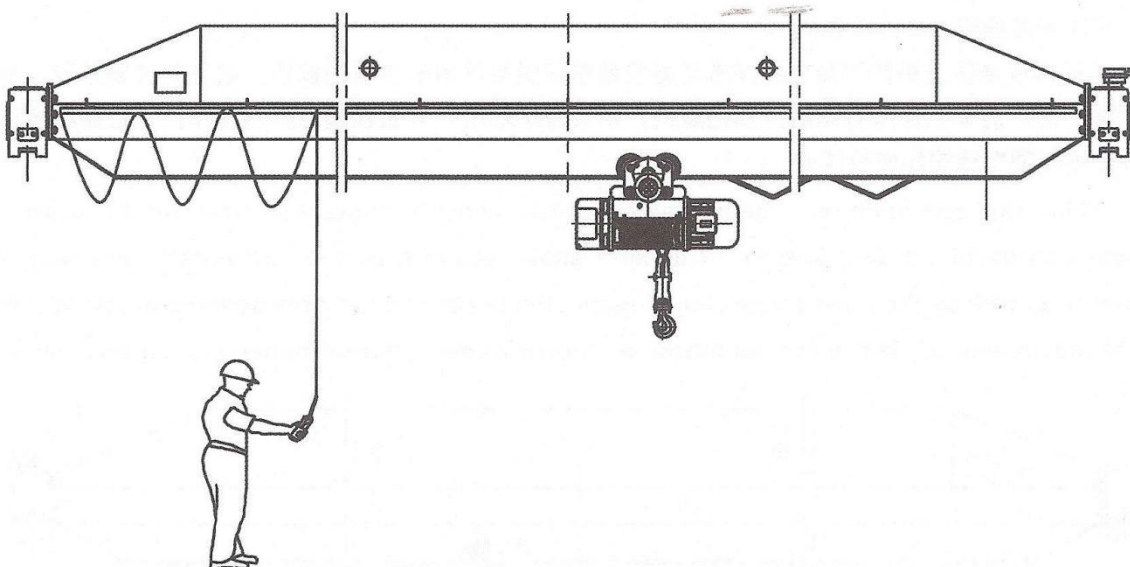
Flashlight door is through the soft rubber spring suspension under electric hoist control box. Operator must follows when manipulate the hoist load laterally or vertically, this manipulation form is commonly used to form ground controlling, its advantage is operator is close to the hanging load, and can see that trouble clear and repair quickly.



跟随式手电门操作 Following flashlight door operation.

- Non-following flashlight door operation.

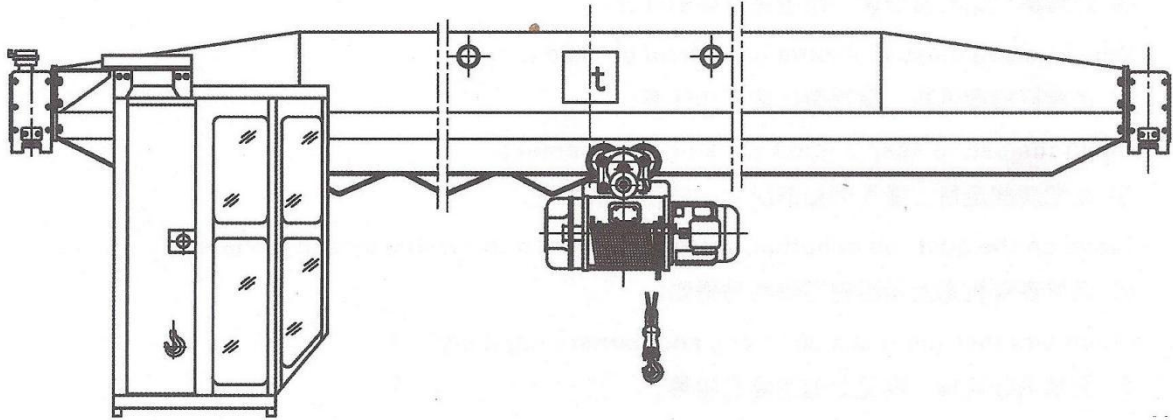
Supported by crane bridge fixed slide, the slide consists of different rolling open channel steel, roll groove is equipped with a number of small sports car suspension with flat cable or round cable, the cable end connected to a control box, the other end hang a flashlight under the trailer door. Operator hand flashlight, through a small pulley lateral movement within the groove, like the curtains to move freely, the manipulation is flexible. This kind of manipulation mode can be according to actual needs of the operators and the crane load distance, which is safe and convenient.█



非跟随式手电门操作 Non-following flashlight door operation.

## b. Cab control

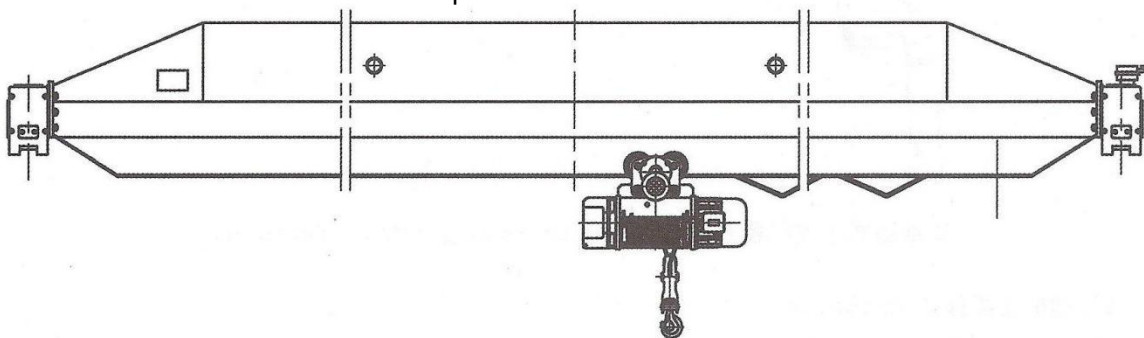
The cab control is one of the operation mode of the electric single girder crane, to prevent electric shock danger, the driver's room should be installed in the power supply side of slide wire. When the crane lifting speed is no more than 45m/min, the cab room is needed, and according to need , the driver room is divided into: open and close, the open way is divided into: side and end open.



司机室操作Cab control

## c. Remote control

When the operation environmental condition doesn't allow the operator to push the suspension flashlight door button, or doesn't allow mobile from the horizontal movement, the operator as well as the hoist crane should respectively according to the specific place watching crane movement, while the control button or control console button to make the crane operate.



遥控操作Remote control