

ZVK 真空有载分接开关

Vacuum On-load Tap-Changer Type ZVK

使用说明书

Operating Instructions



Welcome to Use Guizhou Changzheng OLTC

Please read this instruction carefully before you operate the purchased on load tap changer. Be sure to pay attention to the following matters:

1. Check and accept the products according to the packing list when receiving products. Keep the evidence if there are any damages during transportation in order to claim compensation from the responsible party and protect your rights.
2. The tap changer only can be used with the transformer which specified in the order. You need to consult with our company in advance if you want to change the purpose of this product.
3. The installation, put into operation, maintenance and repair of the product should be complied with the operating instruction and relevant provisions of security.

The figures, charts, and other data in this manual may differ from the products delivered. These drawings are for reference only and we reserve the right to make changes. If there is any change, no further notice.

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1. Overview

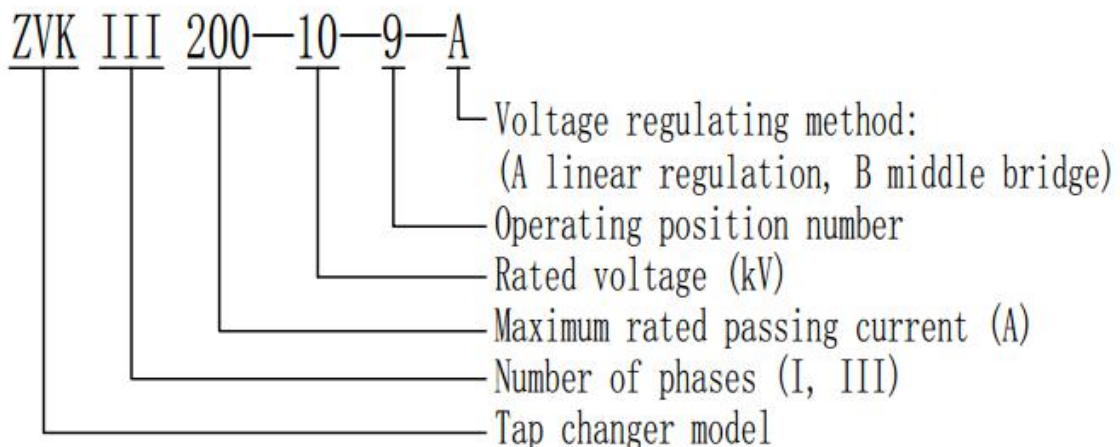
1.1 Scope of application

The ZVK vacuum on-load tap-changer is suitable for three-phase dry-type transformers with a maximum operating voltage of 40.5kV, a maximum rated current of three-phase 400A and a rated frequency of 50Hz. In conjunction with the YK-4 controller, changing the coil tap position under load conditions changes the voltage ratio.

The ZVK vacuum on-load tap-changer is not suitable for regulating transformer voltage.

This device can only be used on transformers specified by the ordering specifications of the tap-changer.

1.2 Model Description



1.3 Conditions of use

Indoor installation, there are rain measures.

Ambient temperature: -25°C to +65°C.

Relative humidity is $\leq 95\%$ at room temperature 20°C.

Foundation unevenness tolerance $\leq 2\text{mm}$.

There is no serious dust, explosive or corrosive gas at the installation site.

There should be no condensation, condensation, and freezing on the tap-changer.

1.4 Main technical parameters

1.4.1 The basic parameters of the tap changer are given in Appendix 1.

1.4.2 The total resistance of the conductive loop is not greater than 2000.

1.4.3 The tap temperature rise of the continuous current carrying contact shall not exceed the limits specified in Table 1 at 1.2 times the maximum rated current of the tap changer.

Table 1 contact temperature rise limit (K)

Contact material	Temperature rise limit
Bare copper	35
Silver plated copper	65

1.4.4 At 1.5 times the maximum rated current of the tap changer, the maximum temperature rise of the transition resistor $\leq 400\text{K}$.

1.4.5 Tap-Changer Insulation Level See Appendix 1.

1.5 Safety Information

Personnel engaged in the installation, commissioning, operation, maintenance and repair of the on-load tap-changer:

- Must have qualified professional qualifications
- Must strictly comply with the requirements of this manual
- Illegal operation or misuse may result in:
 - Reduce the efficiency of the tap changer
 - Damage to the device and other equipment of the user

About severe or fatal injuries on safety rules in this manual uses the following three ways to highlight important issues:



This warning sign refers to a hint of danger to life and health. Ignoring this warning may result in serious or fatal injury.



This warning sign means that there is some danger to the device and other equipment of the user, but it will not cause serious or fatal injury.



This reminder is an important explanation of a matter.

1.6 Specified use

This device can only be used on transformers specified by the ordering specifications of the tap-changer.

On-load tap-changer installation, electrical wiring and commissioning must be performed by qualified and skilled technicians and in accordance with this instruction manual.

It is the user's responsibility whether the device is used for a specified purpose only.

For the sake of safety, in the installation, electrical wiring, or trial operation of the motor-drive mechanism, unauthorized operations such as installation, replacement, electrical wiring, commissioning, or modification have not been

made without consulting the company in advance. Otherwise, the safe operation of the motor-drive mechanism, tap changer and transformer may be impaired.



The on load tap changer is an important part of the on load voltage regulating transformer. Be sure to pay attention to all standards of GB6450 and GB50150 for transformer manufacturers and transformer users.



Be sure to strictly observe the fire prevention regulations.

2. Product structure

2.1 ZVK type on-load tap-changer

The on-load tap-changer ZVK (figure 1) is an indoor unit suitable for regulating the voltage ratio of dry-type transformers under load.

The operation of the ZVK tap changer is based on the principle of fast switching and resistance transition, and the Vacuum interrupter is used as the diverter switch contact.

The operating mechanism of the tap-changer and the tap-changer are installed in the same housing (see Figure 1). A mechanical terminal limit prevents the tap-change operation from exceeding the pressure regulation range. In the display area, there is an indicating mechanism that displays the progress of the tap change operation.



2.2 YK-4 automatic controller

On-load tap-changer with remote automatic controller. The user can compare the voltage of the grid with the preset stable voltage range in the monitoring room. Manual and automatic setting and operation of the on-load tap-changer. Monitor the on-load tap-changer's operating status and supply voltage.



In order to prevent unauthorized operation and access to live and moving parts, installation should be carried out in a closed environment where outsiders are not allowed to enter.

2.2.1 Work principle

Remote automatic controller adopts single chip microcomputer control. The secondary voltage of the transformer is sampled by the sampling part. Comparing the CPU with the preset voltage range value, When the condition is established, the corresponding up and down control is made and transmitted to the Tap changer via the communication control cable. At the same time, the tap position, voltage and fault signals of the tap changer are judged and displayed. It can be connected to the parallel controller and computer through the corresponding interface.

The block diagram is shown in Figure 2.

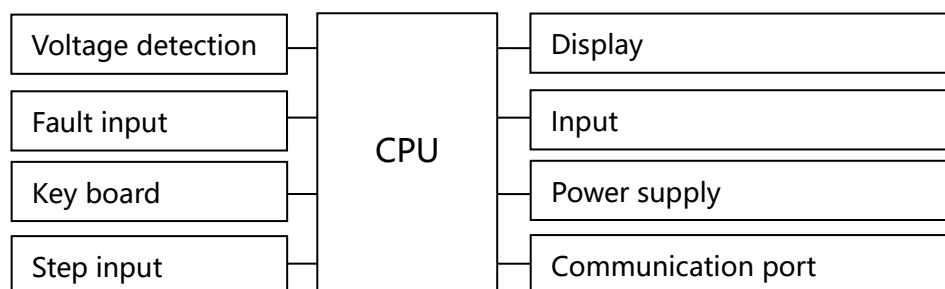


Figure 2

2.2.2 Technical Parameters

Operating Voltage	AC380V/50Hz
Power	10W
Computer interface	RS-485
Voltage preset	AC340V-420V The range of the preset voltage should be greater than 15V
Range	20-60 seconds may be preset
Action delay time	Preset
Manual / Auto	2 bit 00-09 step
Display gear	2.5kg
Weight	Appendix 2
Dimensions	AC380V/50Hz

2.2.3 Remote Controller Interface (see Appendix 4)

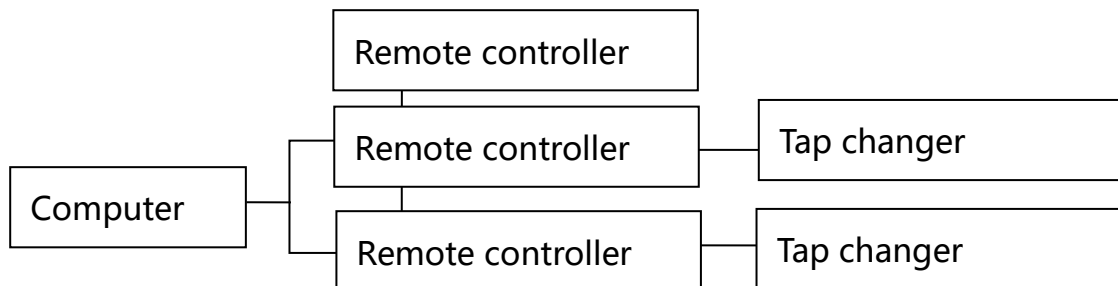


Figure 3 connection diagram

2.2.4 How to use

- Manual/Automatic key: Press to switch between manual and automatic status, manual indicator light is on in manual status.
- Preset key: Select the upper limit value, lower limit value, lift delay, address.
- UP, DOWN keys: Changes the value of the selected item.
- In the manual state, the up/down action keys of the tap changer
- Press the first time to set the key: the upper limit value is flashing, indicating the upper limit value of the set voltage stability range. Press the up

and down keys to modify. The setting range is 390-430V.

- Press the second time to set the key: the lower limit value is flashing, indicating the lower limit value of the set voltage stability range, press the up and down keys to modify, the set value range is 360-390V.
- Press the preset key for the third time: The delay time is flashing, indicating the action delay time. Press the up/down key to modify. The setting range is 20-60S.
- Press the preset key for the fourth time: address flashes, indicating the communication address of this machine, ascending, descending key may be modified, setting range 0-15 decimal number, the default address is 0.
- Press the preset key for the fifth time: Press and hold the manual button at the same time to clear the counter.

2.2.5 Communication Protocol

The communication protocol is Modbus protocol and the data transmission method is RTU. The data frame format is 8 data bits with no parity. Single address mode, communication speed 9600bit, each controller has a unique address (set on the controller), communication interface form using RS-485 interface.

The communication code is as follows:

03 Read Holding Register Gets the current binary value in one or more holding registers.

05 Forced single coil Forces the on/off state of a logic coil.

06 Preset Single Register Loads a binary register with a specific binary value.

The format of each function command is as follows:

1 Read the lower unit memory data. The command format is:

The upper computer sends: Lower machine address 03 00 5a 00 03 XX
XX

Among them, the first is the lower machine address, 03 is the command code, 00 is the data register high, 5a is the data register low, 00 is the register high, and 03 is the register low (the three data are the voltage upper limit, voltage Lower limit value, lifting delay time value), XX XX is CRC check code.

Lower machine returns: Lower machine address 03 06 AA BB C C DD EE FF XX XX

Among them, first return the lower machine address and function code, 06 is the number of data, AA, BB for the voltage upper limit (AA is the upper limit of the voltage of the hundred, BB is the voltage of the upper limit of the ten and one place), CC and DD are the voltage lower limit (CC is the lower limit of hundreds, DD is the lower limit of ten and one bit), EE, FF is the lifting delay time value.

- 2 Read the lower position data. The command format is:

Upper computer sending: Lower machine address 03 00 7f 00 01 XX XX

Among them, the first is the lower machine address, 03 is the command code, 00 is the data register high, 7f is the data register low, 00 is the register high, 01 is the register low, and XX XX is the CRC check code.

Lower machine returned: Lower machine address 03 02 AA BB XX XX

Among them, first return the lower machine address and function code, 02 is the number of data, AA is the high position data, BB is the low position data, XX XX is the CRC check.

- 3 The lower machine is turned on automatically. The command format is:

Upper computer sending: Lower computer address 05 00 63 FF 00 XX XX

Among them, first is the lower machine address, 05 is the command code, 00 is the data register high, 63 is the data register low, and XX XX is the CRC check code.

Lower machine returns: Lower machine address 05 00 63 FF 00 XX XX

- 4 The lower machine is turned off automatically. The command format is:

The upper computer sends: The lower machine address 05 00 63 00 00 XX XX

Lower machine returned: Lower machine address 05 00 63 00 00 XX XX

- 5 lower engine commands. The command format is:

Upper computer sending: Lower computer address 05 00 74 FF 00 XX XX

Lower machine returns: Lower machine address 05 00 74 FF 00 XX XX

- 6 Lower machine down command. The command format is:
 The upper computer sends: The lower machine address 05 00 74 00 00 XX XX
 Lower machine returns: Lower machine address 05 00 74 00 00 XX XX
- 7 Writes the down delay time to the down position machine. The command format is:
 Host computer sends: Lower machine address 06 00 60 AA BB XX XX
Among them, the first is the lower machine address, 06 is the command code, AA is the lifting delay data high, BB is the lifting delay data low, and XX XX is the CRC check code.
 Lower machine returns: Lower machine address 06 00 60 AA BB XX XX
- 8 Write the upper voltage limit to the lower unit. The command format is:
 Host computer sending: Lower machine address 06 00 78 AA BB XX XX
Among them, the first one is the lower machine address, 06 is the command code, AA is the upper limit of the voltage, the BB is the upper limit of the voltage, and the XX is the CRC check code.
 Lower machine returns: Lower machine address 06 00 78 AA BB XX XX
- 9 Write the lower voltage limit to the lower unit. The command format is:
 Host computer sending: Lower machine address 06 00 79 AA BB XX XX
Among them, first is the lower machine address, 06 is the command code, AA is the voltage lower limit value hundred, BB is the voltage lower limit value ten and one place, XX XX is the CRC check code.
 Lower machine to send back: Lower machine address 06 00 79 AA BB XX XX

3. Receipt notice

3.1 Range of packages

After ZVK vacuum on-load tap-changer and YK-4 type controller are tested in the factory, they shall be set in the specified working position, and be packaged and transported together with accessories.

3.2 Transportation

When handling the tap changer (approx. 280kg), use one of the following methods:

Use a lifting device to connect to the 2 rings on the ZVK vacuum on-load tap-changer housing (Figure 4).

3.3 Acceptance and storage

When the product is received, it shall be checked according to the packing list; If transport damage is found, photographs of the damaged containers and packaged goods should be taken to preserve evidence in order to claim against the responsible party and safeguard your rights and interests.

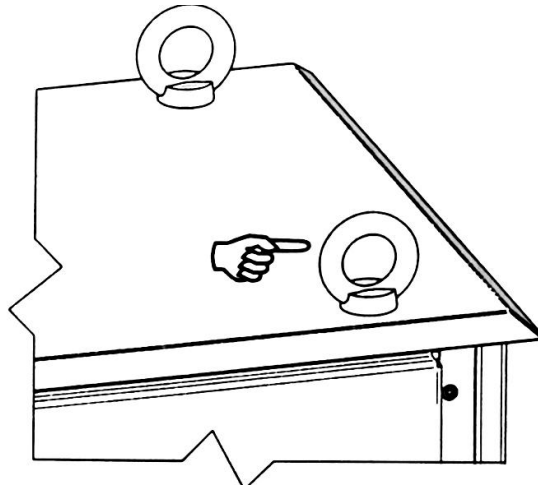


Figure 4



When working on tap-changers, motor-drive units or other components, make sure that they are securely fastened. In order to avoid accidental dumping of various devices, it may cause serious accidents or even life-threatening.

The on-load tap-changer shall be stored in the warehouse where the air is free, the relative humidity is not more than 85%, the temperature is not higher than $+40^{\circ}\text{C}$, and not lower than -25°C . The storage environment shall not contain corrosive gas and shall not be affected by rain or snow.

The on-load tap-changer is stored in an air-tight envelope and opens when installed.

4. Installation

4.1 The tap changer is fixed on the transformer side

There is a 12-14×20 mounting hole in the bottom channel of the tap-changer box, and the tap-changer must be firmly fixed before the trial operation (see appendix 5 to appendix 9).

Fixed with 4 M12 x 45 bolts.

4.2 Connection of tapping lead of tapping coil and tap changer

According to the wiring diagram provided in the delivery, connect the tapping lead of the regulating coil and the tap changer.

When the tapping lead of the voltage regulator coil is connected to the tap selector of the tap changer, it must be without any stress. If necessary, it can be bent and adjusted by bending the end of the lead.



Before tap-changer is fixed, it is necessary to ensure that the wiring of the tap selector connection terminal (Figure 3) on the back of the housing is easy to operate and a suitable insulation distance is reserved.

To ensure that the terminals are fastened in place, do not force twisting.

If this operating rule is not observed, the on-load tap-changer will be damaged.

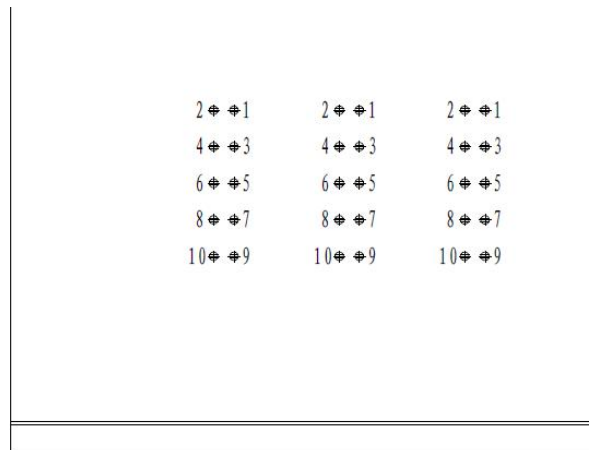


Figure 3 (taking a three-phase middle bridge as an example)



Carefully connect all leads and securely fasten them.

4.2.1 Connection of tapping lead and tap changer

The terminal block of the tap selector is marked with the terminal number on the back of the housing (see appendix 5 to appendix 9). The specific wiring is determined according to the set Tap changer.

The terminal of the terminal is flat and has a perforation of $\phi 11\text{mm}$ in diameter. The tapping lead of the voltage regulation section can be easily connected by using a cable lug (Figure 5).

Use M10 x 35 bolts for connection. Be sure to tighten the screws securely.

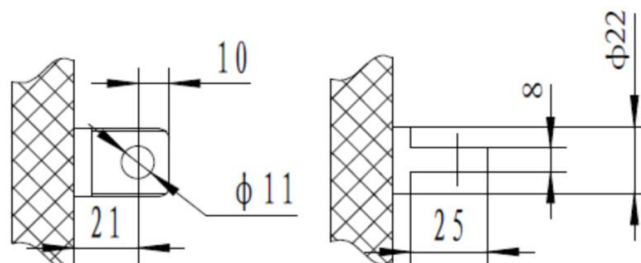


Figure 5

4.3 Tap changer Interface and Controller Connection

The connection diagram is shown in Appendix 3.

4.3.1 Tap changer Power Supply

The working power supply of the tap-changer adopts AC-220V power supply. The power supply is connected to the terminal block of the power supply, and the cable number is N and L.

4.3.2 Tap changer Trip Interface

The tap-changer trip interface is a set of relay passive contacts and the contact capacity is 5A/250V. This contact must be connected to the trip circuit of the high voltage circuit breaker.

4.3.3 Connection of Tap changer and Controller

The communication cable of the tap-changer and the automatic controller is configured at the factory for 20 meters. The D-connector is connected to both ends of the cable and is respectively connected to the control interface CX1 of the Tap changer and the CX2 port of the automatic controller. The CX3 port of the controller is used for the parallel control of the Tap changer

The power of the automatic controller adopts AC-380V power supply, there is no phase sequence requirement, power supply, sampling are shared, so AC-380V power should be taken from the transformer connected to the tap changer.

Terminals 1-9 on the rear panel of the controller are normally open gear passive contacts, and 0 is a common point. This contact provides the user with a gear signal when the user does not have an RS-485 design. The alarm port is a group of passive contacts. The contact capacity is 2A/250V. When the Tap changer is faulty, it can be closed.

If the user uses parallel control, it is necessary to support another parallel controller produced by our factory. The parallel control cable is connected to the CX3 of the automatic controller and the CX3 port of the parallel controller. See the parallel controller instructions for details.

The CX1 interface is the communication interface between automatic controllers and computers and other devices. It can implement computer monitoring. When installing, see Appendix 3 for wiring functions of the interface.

4.4 Tap changer Ground Connection

Connect the grounding screw (M8) of the tap-changer to the grounding point of the transformer with a connecting wire to ensure reliable grounding of the tap-changer. The tap changer ground screw is located on the channel in the lower right corner of the switch.

4.5 Mechanical Function Test

Before the transformer is put into operation, a mechanical function test is required. This test uses a hand crank (Figure 6) to actuate the tap changer. Be sure to walk from the low end position to the high end position before returning.

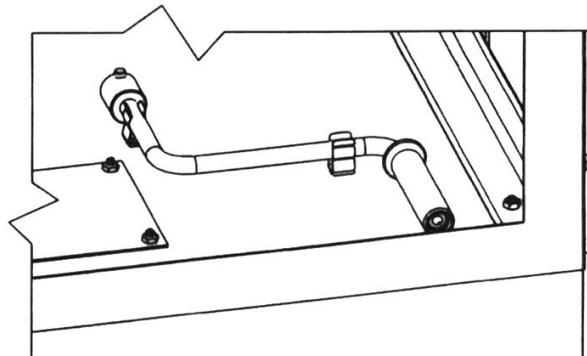


Figure 6

First of all, the power supply of the switch must be turned off, the handle must be inserted into place, and the three-turn switch in the direction of raising or lowering can be used to change the first gear. When the shift is completed, the tap-changer can be switched quickly and the sound can be shaken by 3.5 revolutions. When you stop shaking, shake the laps not too much.

A tap change is completed after the hand crank rotates for 3.5 revolutions. At this time, the position indication dial will reach the correct gear position.

The terminal position cannot be surpassed under any circumstances.

After the mechanical function test is completed, the tap changer must be operated to return to the calibration position (low end position).

4.6 Tap changer commissioning at transformer plant

Before the transformer is connected to the power supply, a test tap change operation must be performed to check the on-load tap-changer function.



Check whether the parameters of the grid power supply are consistent with those of the YK-4 controller.



To perform a functional test, it is necessary to plug in the connection cable between the ZVK and the YK-4 controller, and the YK-4 needs to be connected to the power supply. At this time, the safety regulations implemented by the user's country must be observed. Otherwise, there is a fatal danger.

4.6.1 Checking YK-4 Controller Step-by-Step Action

- Press the 1 → N button to start a step-by-step action.
- Check if the electric drive stops automatically after the tap-change operation.
- This test is to be checked in both directions (press the N → 1 button).

4.6.2 Checking Controller YK-4 Controller Terminal Position Electrical Limit Protection

- In order to check the electrical limit of the terminal position, press the 1 → N button to operate the motor-drive mechanism to the second-to-last position and then use the hand crank to move the motor-drive mechanism to the last position.
- When the motor drive is started again with the N→1 button, check if it can no longer start to run in the same direction.
- Perform the same procedure in the opposite direction (press the N → 1 button).

4.6.3 Electrical Tests on Transformers

After the above tests are completed, the electrical tests required for the remaining inspection items of the transformer can be performed.

4.7 Delivery to the installation site

Before the ZVK tap-changer is shipped to the installation site, it must be ensured that it is in the calibration position (middle position).



The on-load tap-changer must be stored and transported in the original shipping box and stored in a dry environment until installation.

4.8 Test run at the installation site

Before the commissioning of the transformer, the tap-changer and the YK-4 controller must be functionally tested according to sections 4.5 and 4.6.

When working on tap-changers, motor-drive units or other components, make sure that all parts are fixed and reliable. Otherwise, a single device may accidentally fall, causing serious or even fatal injuries.



If the tap-changer does not perform a function test in accordance with Sections 4.5 and 4.6, the transformer must never be put into operation, otherwise serious or fatal injuries may result.

4.9 Operation Monitoring

The monitoring of the tap-changer and motor-drive mechanism is limited to regular visual inspections.

If the tap-changer malfunctions (for example, the trip of the motor protection switch or the fault signal is on), they cannot be solved in time in the field. They should immediately notify the transformer manufacturer or directly contact Guizhou Changzheng Electric Co., Ltd.

5. Repair and maintenance

5.1 Maintenance

The on-load tap-changer should be maintenance in accordance with the operating instructions to maintain a high level of operational reliability.

The tap changer should be cleaned and repaired once every six months. All power should be cut off before construction.



If you do not cut off all power to the on-load tap-changer before cleaning or servicing, the safety of maintenance personnel will result in serious or fatal injury.

After tapping operation 500000 times, the tap changer must be replaced.

Maintenance content:

- ① Check whether the contacts of the electrical control circuit are in good contact.
- ② Check whether the connection of the mechanical transmission part is good and the lubrication is good.
- ③ Whether the fixed contact, conductive rod lubrication is good.
- ④ Whether the open distance of the vacuum tube is normal, requiring 2-3mm.
- ⑤ Check for any abnormalities in the wear of the contacts at the selected location.
- ⑥ Whether the switching mechanism is normal and there is no looseness and serious wear.
- ⑦ Whether each conductive for loose connections.
- ⑧ Whether transition resistances are broken.

If it is not for the maintenance of Guizhou Changzheng Electric Co., Ltd. Please send an inspection report to the Guizhou Changzheng Electric Co., Ltd. to complement our maintenance records.

5.2 Cleaning and Lubrication

The tap changer must be cleaned and lubricated every six months. Before cleaning and lubricating, make sure that the transformer and tap-changer are ready for the following items.

- Transformer power failure
- Ensure that the transformer can no longer be excited
- Ensure that there is no voltage
- Connect the short circuit device to the ground

Otherwise, personal accidents may occur.

Cleaning and lubrication should be carried out in accordance with the instructions for use. Use a clean, dry cloth to clean the lubrication points and the insulating distance. Lubricate with Vaseline.

Lubricate on all the following components:

- Gears
- Silver plated contacts and conductive rods
- Vacuum tube control mechanism
- Tap selector screw and nut
- Energy storage mechanism, position indicator dial

6. Common faults and troubleshooting

6.1 Tap changer does not work, no power indication

Check whether the power supply is normal.

6.2 The switch does not work, the fault indicator lights up, and the remote controller alarms, indicating FFFF.

Cut off the high voltage power supply and check whether the tap changer is normal and whether the tap changer is in place. After troubleshooting, switch the power supply once and the fault alarm can be released.

6.3 Tap switch is not normal, the direction of action is chaotic.

The motor starting capacitor has failed and needs to be replaced and replaced.

6.4 Remote control gear voltage display is 0.

Check controller and switch connection or controller is normal.

6.5 The remote controller does not automatically raise or lower.

Check if the sampling voltage is too low. If it is too low, it is considered a fault condition. There is no automatic rise and fall output.

6.6 Remote no power indication, no display.

Check the power circuit.

6.7 After the changer is raised or lowered, the voltage display shows no change.

Check whether the power supply of the switch is taken from the matched transformer. Because the power supply includes a sampling phase.

7. User notice

Within 18 months from the date of installation and use or from the date of shipment from the manufacturer to the user, if the product does not work properly due to manufacturing quality problems, the manufacturer will provide free repair.

If the tap changer or the motor-drive mechanism has a serious fault and is not easily repaired at the operation site, or if the protection relay trips, contact the service department of Changzheng Electric Co., Ltd.

8. Appendix

Appendix 1 ZVK On-load Tap-Changer Technical Data

Appendix 2 YK-4 controller installation dimensions

Appendix 3 Connection diagram of tap changer and controller

Appendix 4 Remote Controller Terminal Interface

Appendix 5 ZVKIII200-10-9-B installation dimension drawing

Appendix 6 ZVKIII200-10-9-A installation dimension drawing

Appendix 7 ZVKIII400-20(35)-9-A installation dimension drawing

Appendix 8 ZVKIII400-20(35)-9-B Installation dimension drawing

Appendix 9 ZVKI200-10-N-B installation dimension drawing

Appendix 10 ZVKI200-35(20)-N-B installation dimension drawing

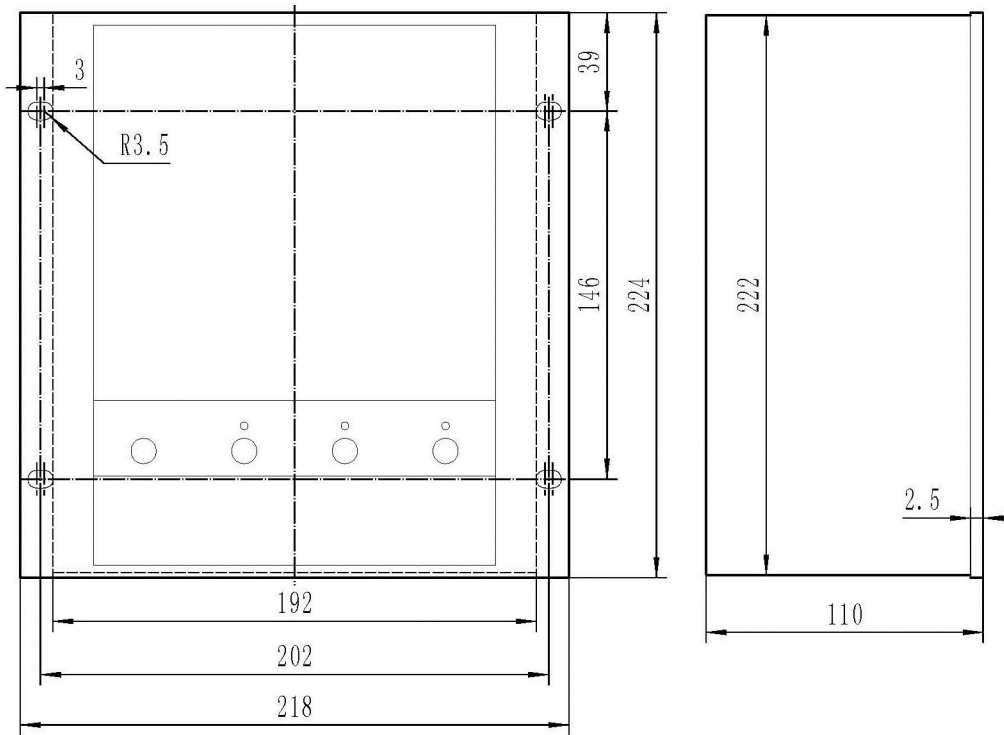
Appendix 11 Basic wiring diagram

Appendix 1 ZVK On-load Tap-Changer Technical Data

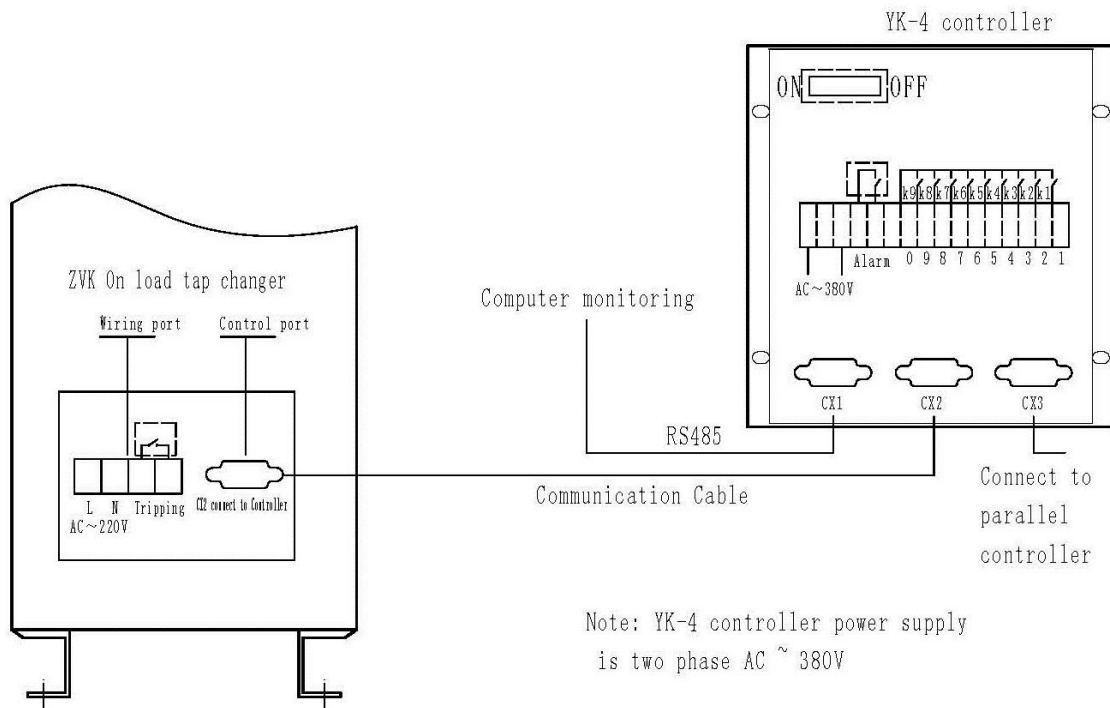
Item	Specifications		III200	III400	I 200			
1	Max. rated through current(A)		200	400	200			
2	Rated frequency(Hz)		50					
3	Phase & Connect method		Any connection					
4	Max. rated step voltage (V)	10kV	500		500			
		20kV		1000	1000			
		35kV		1750	1750			
5	Rated step capacity (kVA)		10kV	20kV	35kV	10kV	20kV	35kV
			80	300	350	80	300	350
6	Withstand short circuit capability (kA)	Thermal stability (2s)	3	5	3			
		Dynamic stability (peak)	8	12	8			
7	Maximum number of operating positions		3 phase max 9 step, single-phase max 25 step					
8	Insulation level (kV)	Rated voltage(kV)		10	20	35		
		Max. operating voltage (kV)		12	24	40.5		
		Power frequency test voltage (50Hz, 1min)	Ground & interphase	35	55	95		
			Interstage	3	5	5		
		Impact test voltage (1.2/50 μ s)	Ground & interphase	75	125	250		
9	Operating frequency		Interval \geq 30s per operation					
10	Mechanical life		Not less than 500,000 times					
11	Electrical life		Not less than 50,000 times					
12	Weight		About 280kg					
13	Equipped with intelligent controller		YK-4					

Note: The level capacity is equal to the product of the stage voltage and the load current, and the rated capacity is the maximum permissible level capacity.

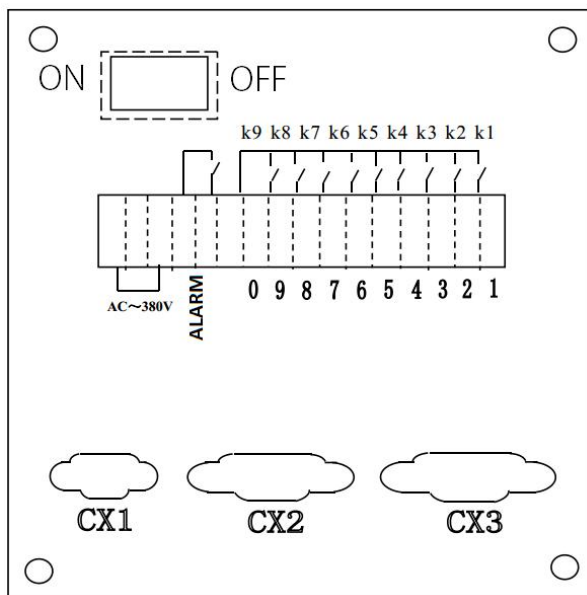
Appendix 2 YK-4 controller installation dimensions



Appendix 3 Connection diagram of tap changer and controller



Appendix 4 Remote Controller Terminal Interface



CX3 - Parallel controller communication interface

CX2 - Communication Control Interface for Tap-Changer

CX1 - RS-485E computer communication port

Terminal No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Function	Position signal				24V ground	+	Drop output	Rise output	Alarm input				Parallel signal input	+	5V ground

CX2, CX3 plug-in arrangement function table

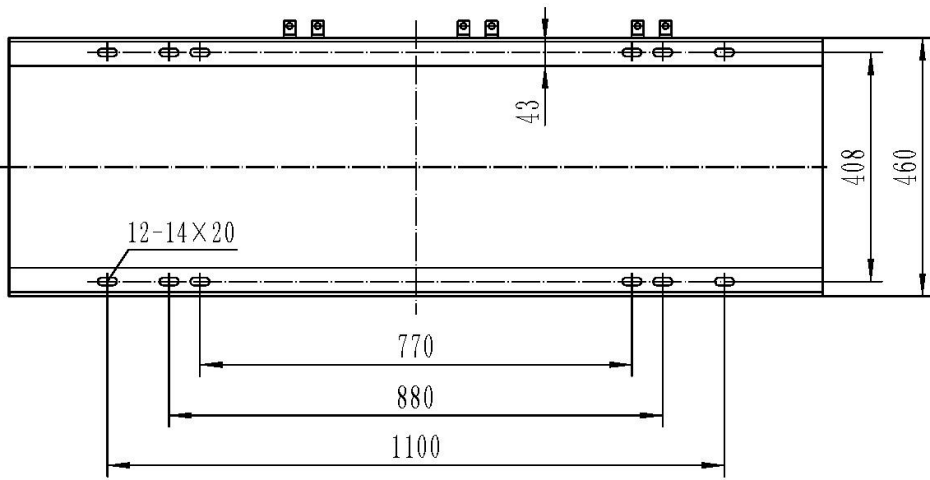
Terminal No.	1	2	3	4	5	6	7	8	9
Function		A	B		ground				

CX1 plug-in arrangement function table

AC380V		Tripping	Tripping		0	9	8	7	6	5	4	3	2	1
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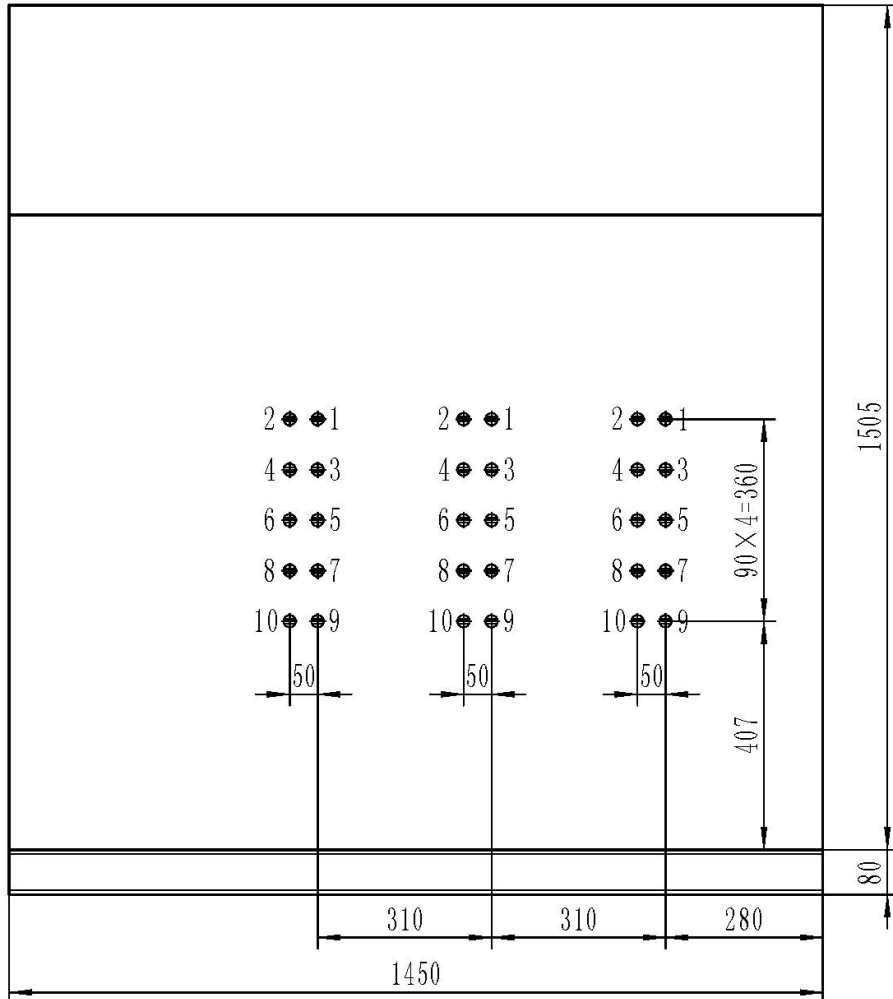
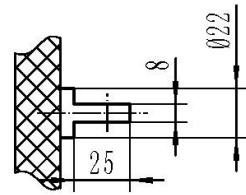
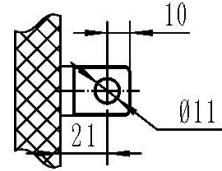
Rear panel terminal list

Appendix 5 ZVKIII200-10-9-B installation dimension drawing

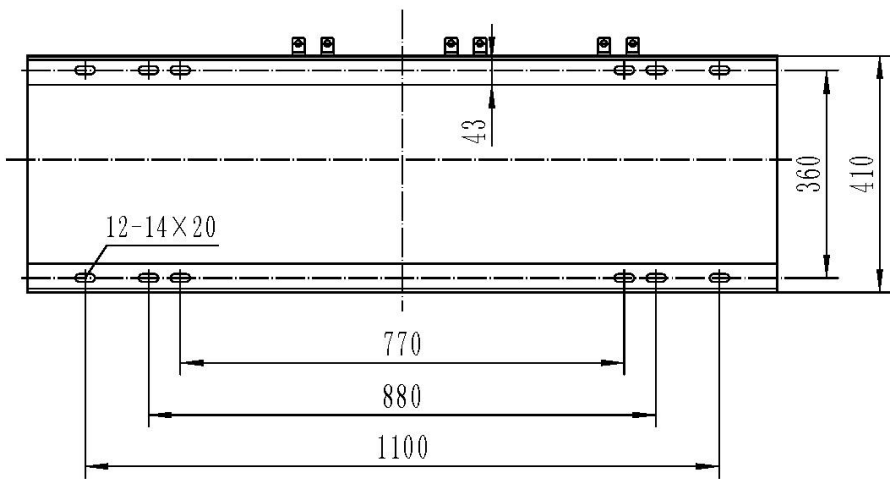


Wiring terminal size

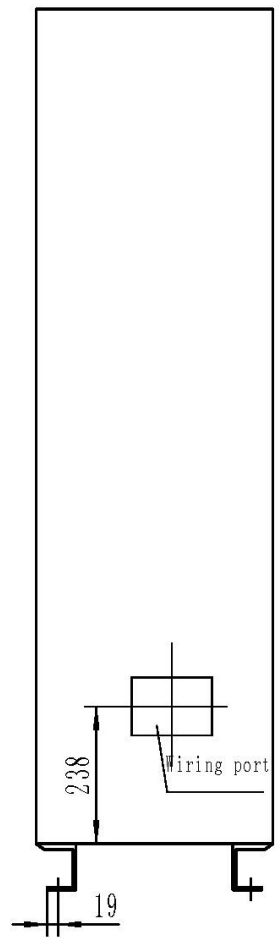
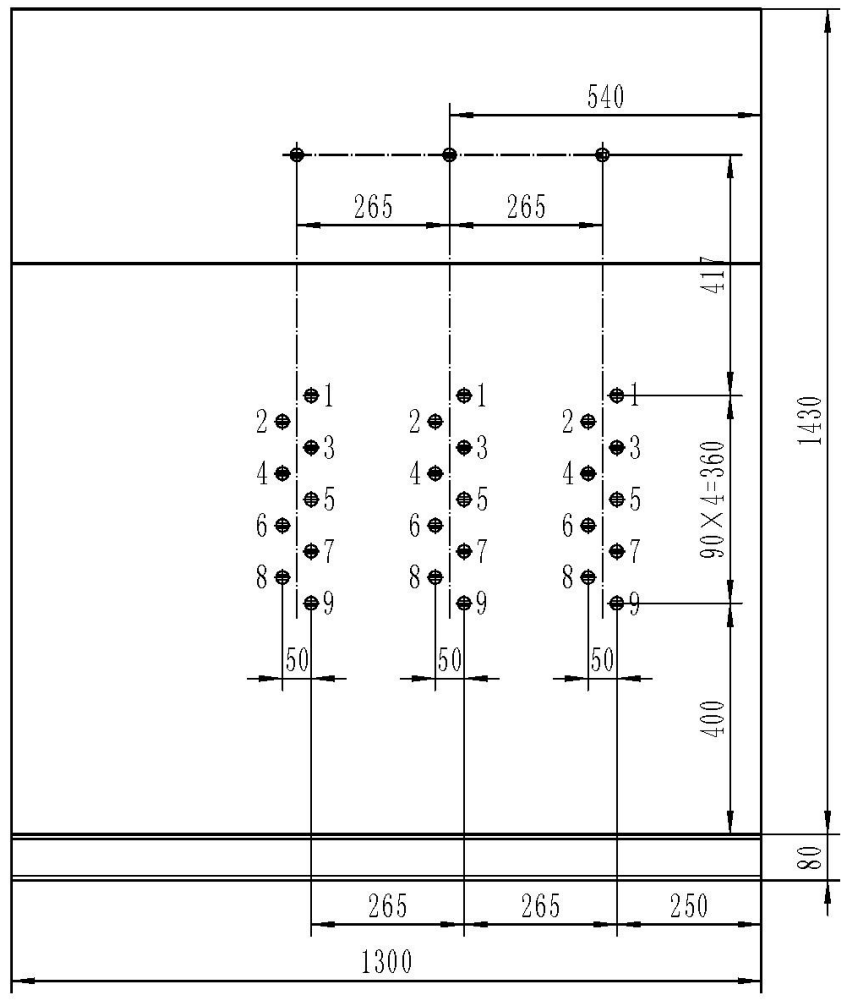
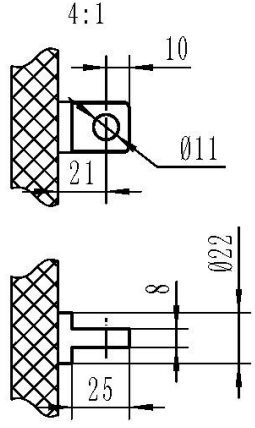
4:1



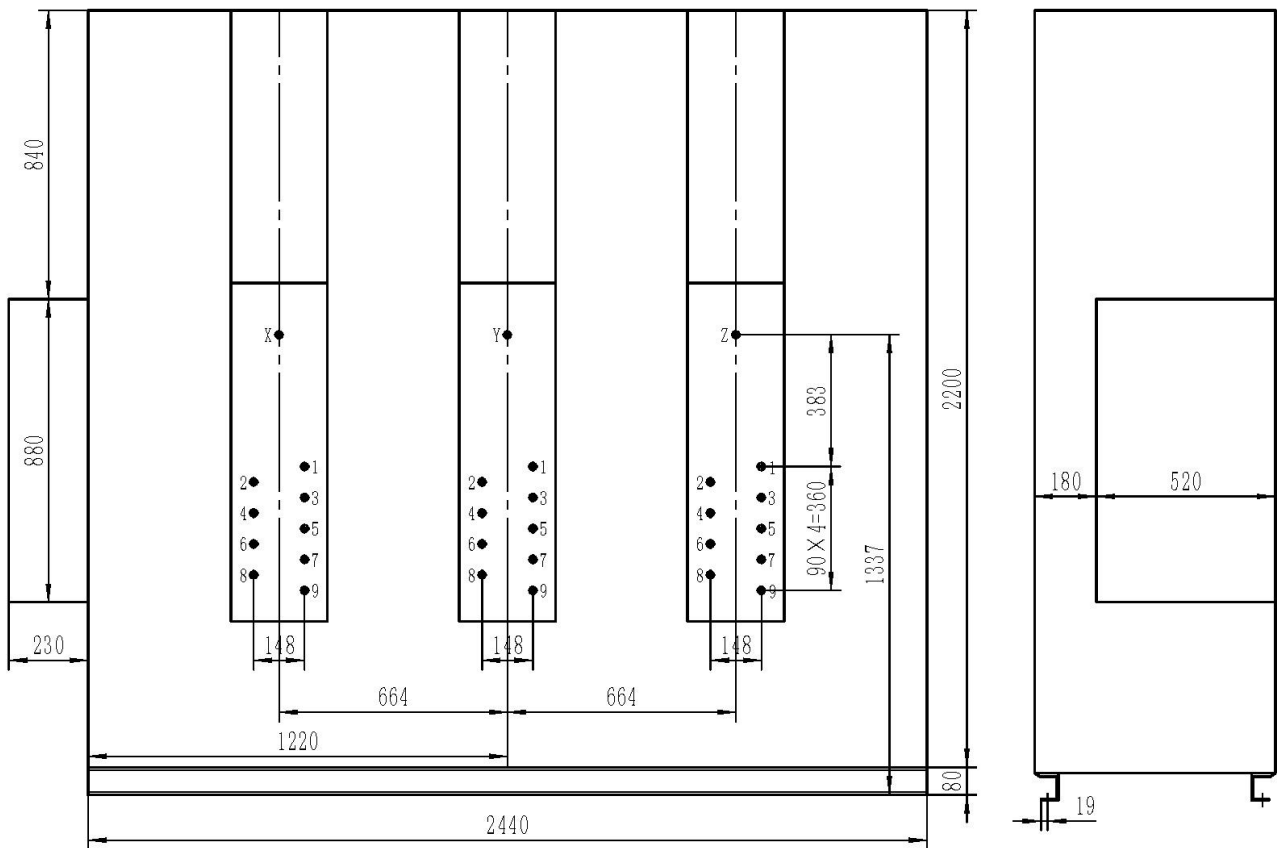
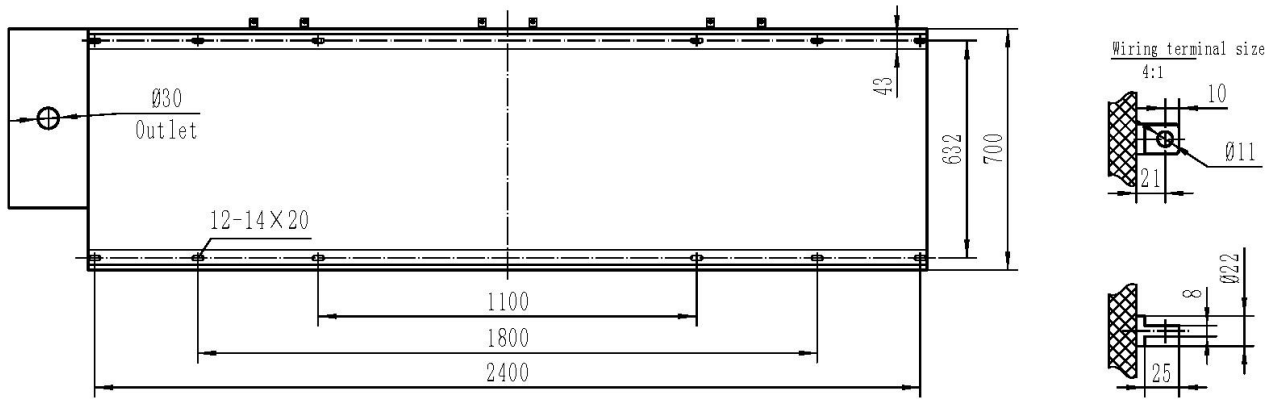
Appendix 6 ZVKIII200-10-9-A installation dimension drawing



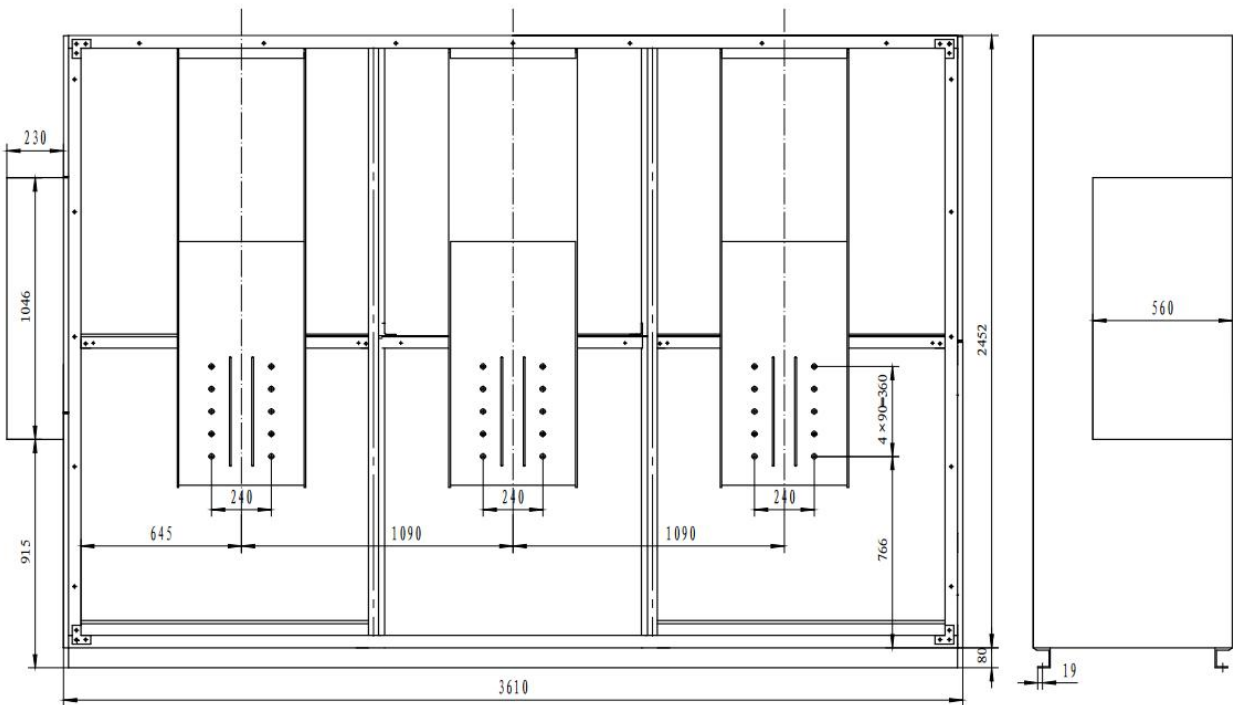
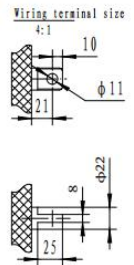
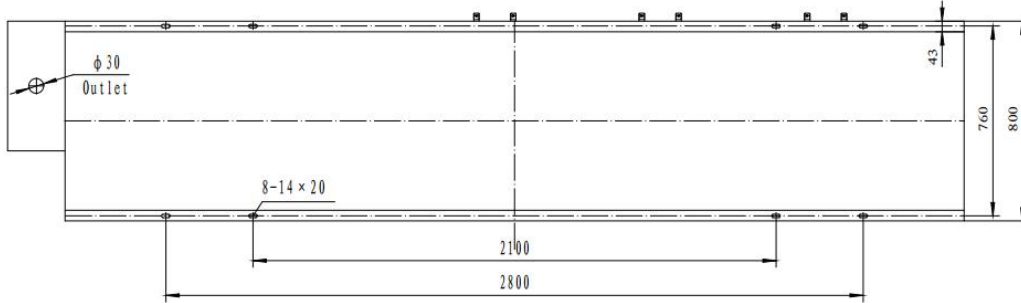
Wiring terminal size



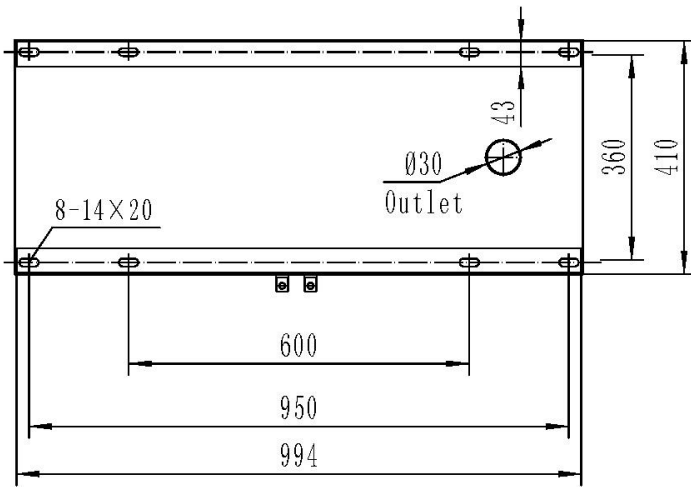
Appendix 7 ZVKIII400-20(35)-9-A installation dimension drawing



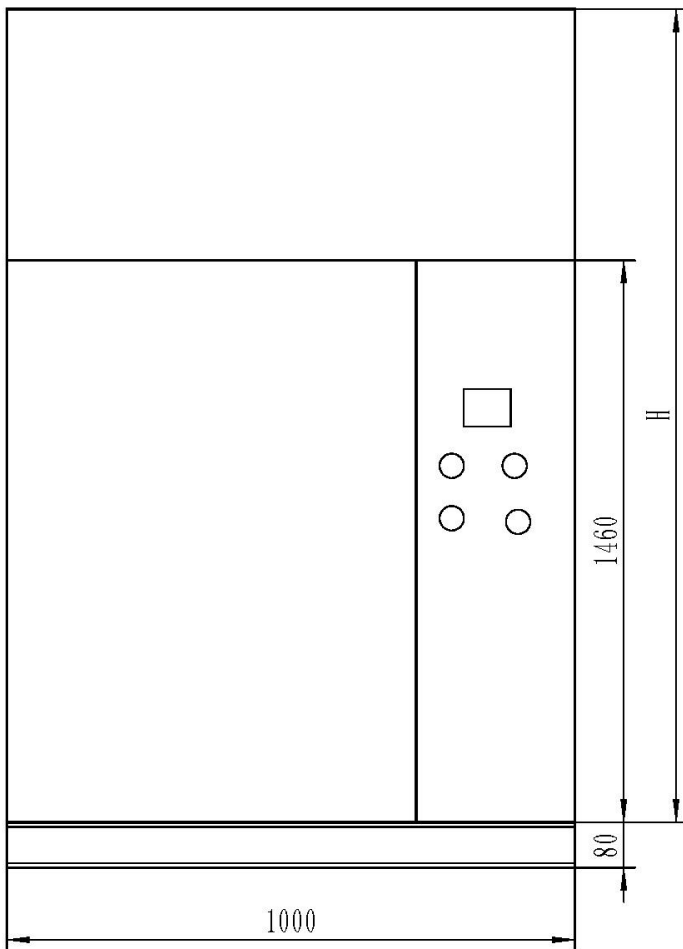
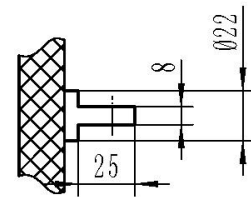
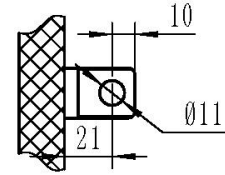
Appendix 8 ZVKⅢ400-20(35)-9-B Installation dimension drawing



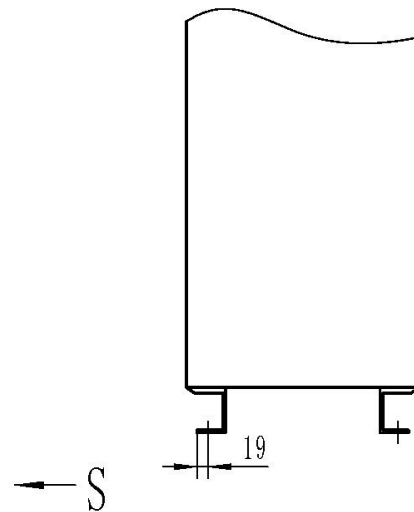
Appendix 9 ZVKI200-10-N-B installation dimension drawing



wiring terminal size
4:1

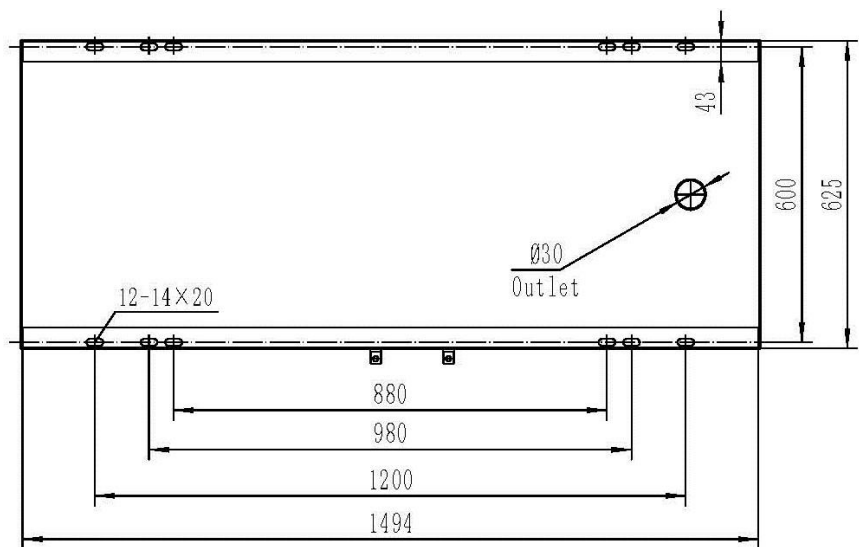


S side

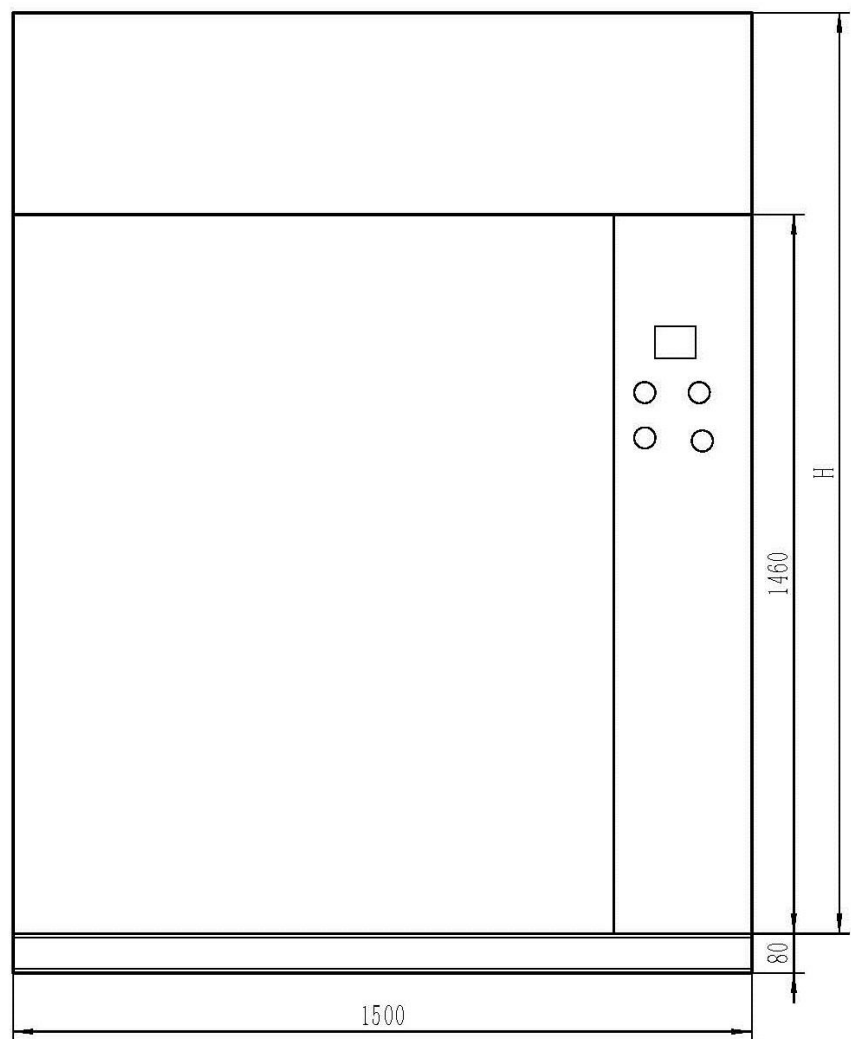


	Position N				
	25、23	21、19	17、15	13、11	<9
High	2000	1920	1740	1560	1450

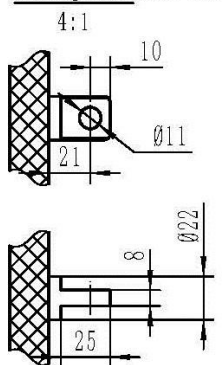
Appendix 10 ZVKI200-35(20)-N-B installation dimension drawing



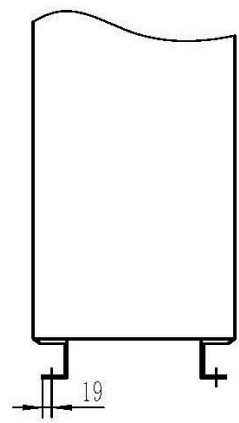
	Position N		
	19	15	9
High	2120	2110	1870



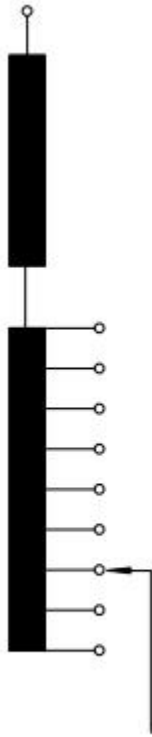
Wiring terminal size



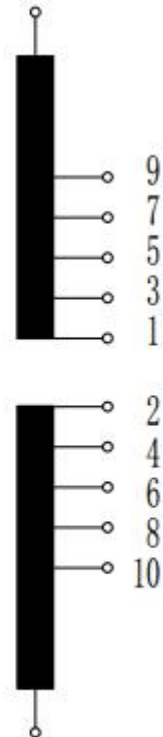
S side



Appendix 11 Basic wiring diagram



Linear regulating



Middel bridge connection

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