External Type HWV
Oil-immersed
Vacuum OLTC
Operation Instructions

HM 0.460.5001

Preface

1. This document is based on IEC 60214-1-2014 and IEC 60076-1-11.7.
2. Read the instruction carefully before using this product；
3. The maintenance of type HWV OLTC shall be conducted by trained professionals；
4. With the continuous improvement and promotion of products, Huaming reserve the right to modify the Technical Data and Operation Instruction；
5. For the products used in special occasions beyond technical specification, please contact Huaming to make special design and customize the solution. This Operation Instruction shall include all the information required for the use and installation of type HWV OLTC.

Table of Contents

1. General

1.1 Huaming self-designed type HWV OLTC adopts a unique structure of external-mounted compartment. It houses diverter switch and tap selector in an oil compartment and mounted on the transformer tank, which is completely separate from the transformer tank. Type HWV OLTC is applied to three-phase D connection and Y connection power transformer and industrial transformer with highest voltage of equipment 17.5kV, 40.5kV and 72.5kV, three-phase current ＜ 1000A，rated frequency 50HZ or 60HZ. （Max. operating positions with change-over selector ＜ 35.） as shown in Fig. 1

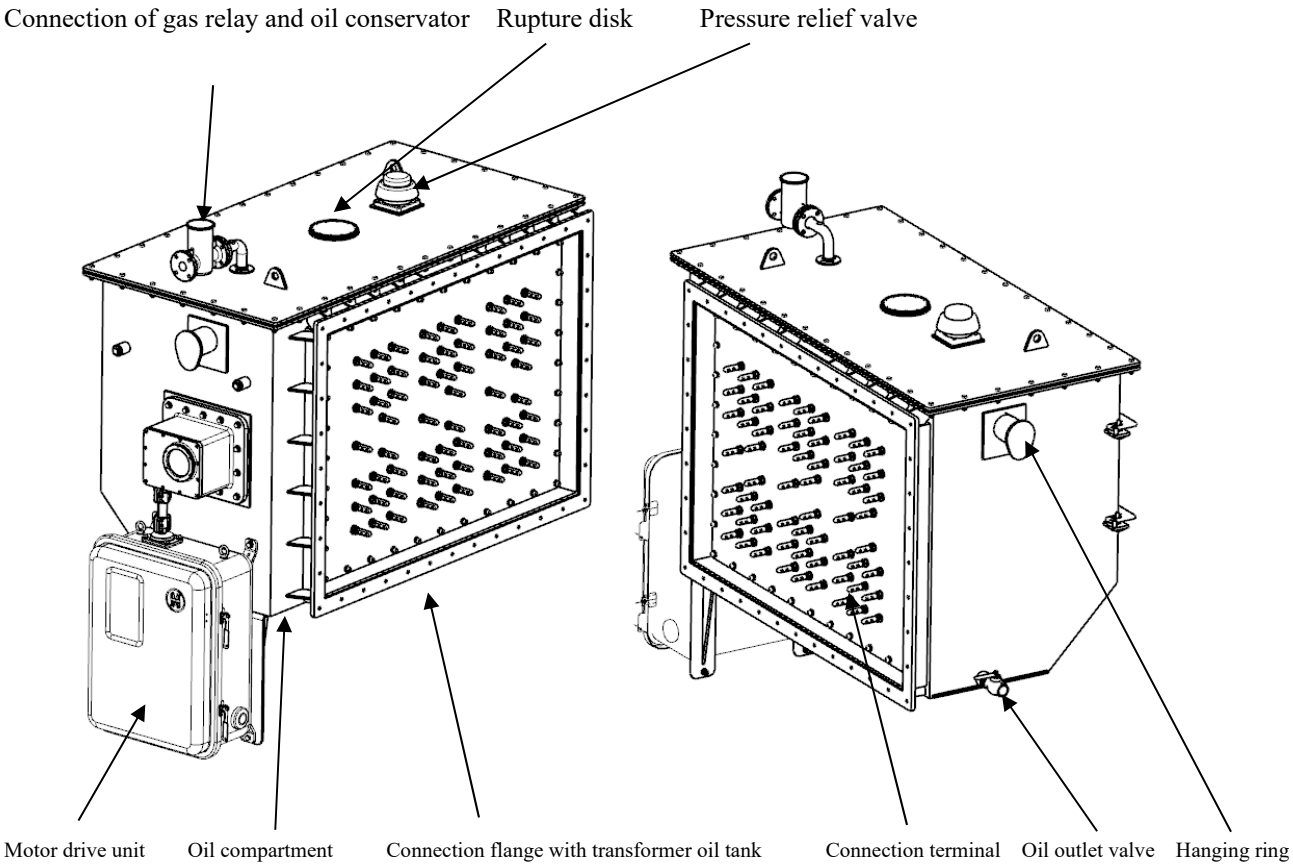


Fig. 1

1.2 Type HWV OLTC complies with IEC60214-1:2003 Standard, technical data refers to Table 1.

Table 1Type HWV OLTC technical data

Model		HWV III			HWV I		
Max. rated through current Ium (A)		400	800	1000	400	800	1000
Rated frequency (Hz)		50 or 60					
Phase & Connection		Three phases for Y, D connection			Single phase for any selectable winding connection		
Max. rated step voltage (V)		3300					
Rated step capacity (kVA)		1200	2200	2600	1200	2200	2600
Short-circuit current test(A)	Thermal (3s)	8	8	12	8	8	12
	Dynamic (Peak)	20	20	30	20	20	30
Max. operating positions		Without change-over selector: max. 18 positions; With change-over selector: max. 35 positions					
Insulation to ground (kV)	Highest voltage for equipment Um	17.5		40.5		72.5	
	Rated separate source AC withstand voltage(50Hz ,1min)	45		90		140	
	Rated lighting impulse withstand voltage (1.2/50μs)	105		250		350	
Mechanical life		Not less than 1,500,000 operations					
Electrical life		Not less than 500,000 operations					
Tap changer oil chamber	Service pressure	0.03MPa					
	Leakage test	No leakage under 0.08MPa for 24 hours					
	Over pressure protection	Bursting cap busts at 300±20%KPa					
	Protection relay	Oil speed set at 1.0m/s±10%					

2. Packaging, transportation and storage

2.1. Supply of assembly parts

Tap changer supplied in complete set is composed of following parts.

- Type HWV OLTC（Fig. 2）: Tap changer is designed in two forms, Standard type and Non-standard type according to Fig. 2-1 and Fig. 2-2.
- Controller and connection cable
- Pressure relief valve (standard type)
- Gas relay (standard type)
- Sudden pressure relay（Non-standard type）
- Oil gauge（Non-standard type））
- Breather（Non-standard type）
- Special required accessories when ordering

Supply of assembly parts should be subject to related packing list for delivery.

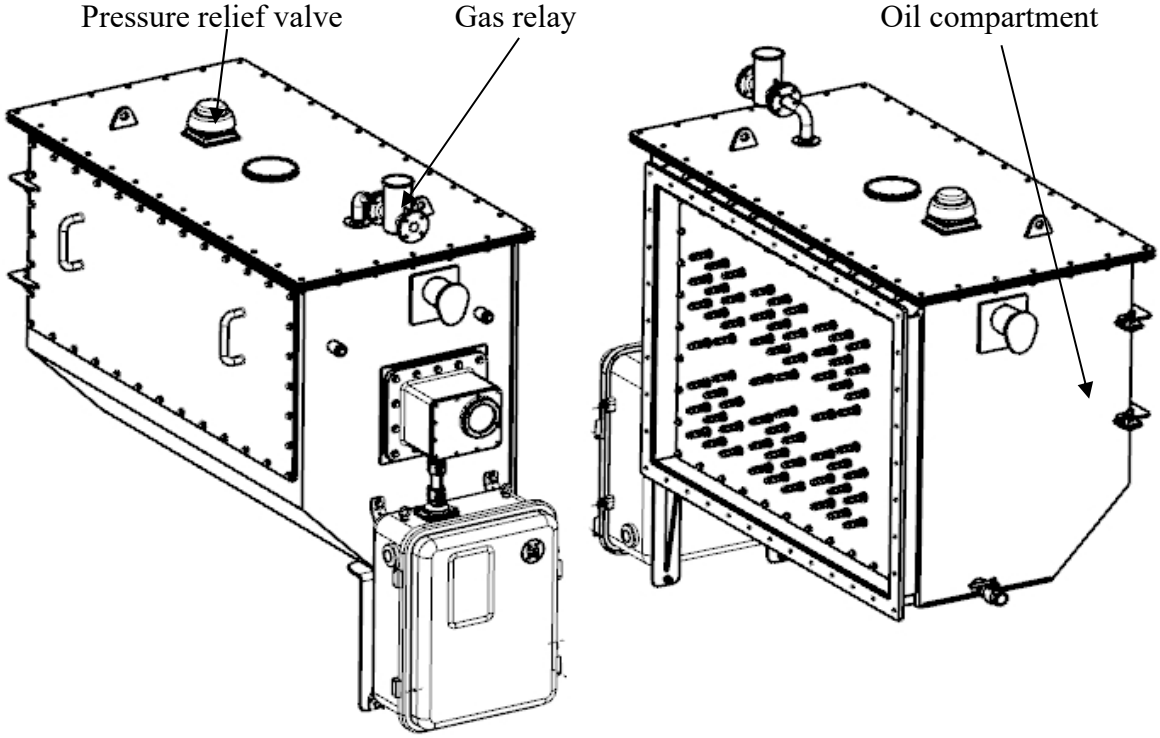


Fig. 2-1Standard type oil compartment

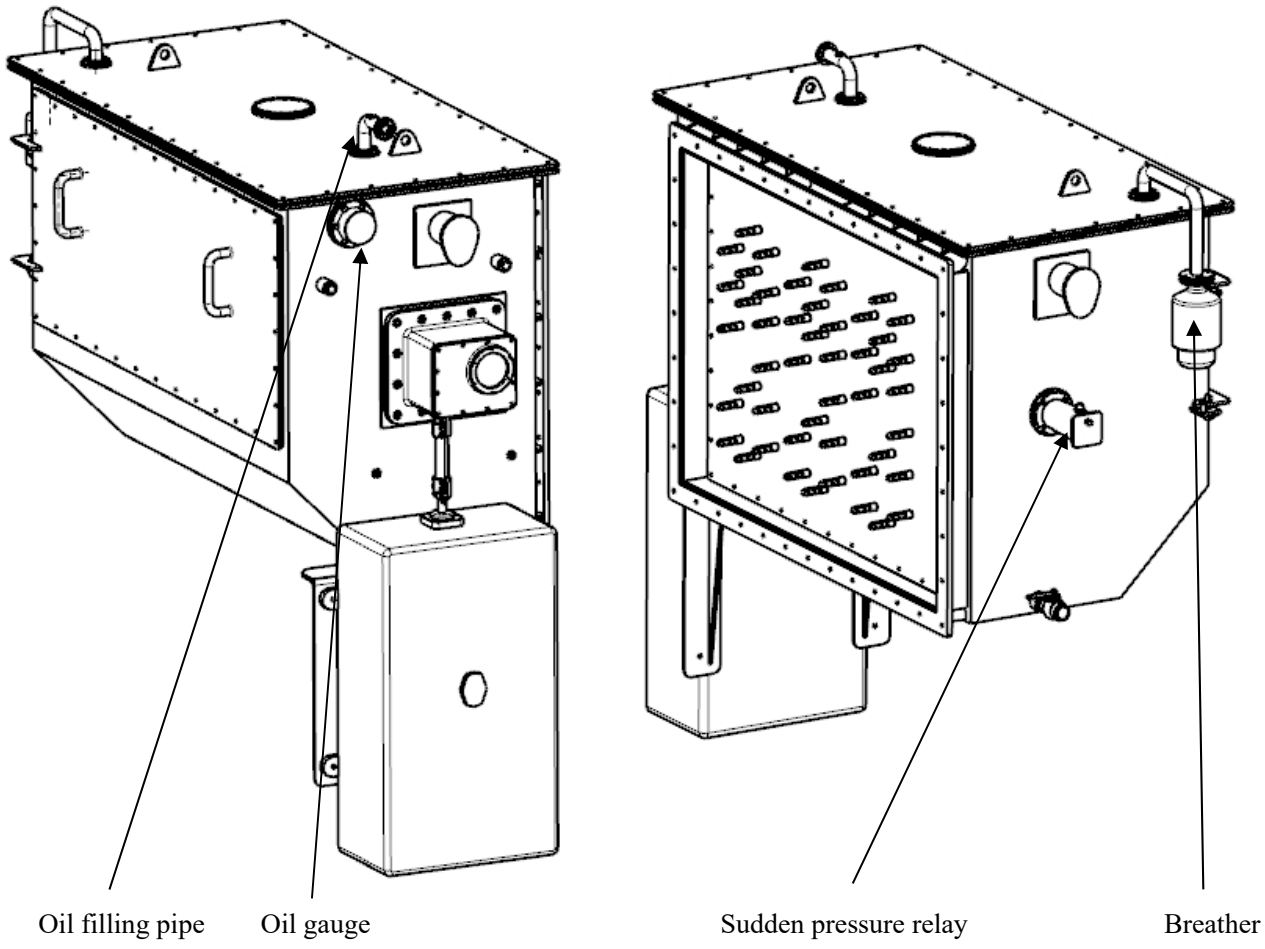


Fig. 2-2 Non-standard type oil compartment

2.2 Transportation and acceptance inspection

2.2.1 Transportation

1. Packing cases for delivery can be applied to various transportation forms. When storage, packing cases allows appropriate stacking. The load bearing of the top of packing case shall not exceed 500kg/m.

2. Packing cases should be rationally placed according to the gravity center position indication during transportation. When lifting, should be operated according to the lifting identification specification of the packing cases.

3. Packing case warning label description（Fig. 3）

Fig. 3

2.2.2 Acceptance Inspection

User receipt notes:

Consignee signs to accept the goods only after verification of each delivery (Acceptance confirmation). The check items for consignee are as follows:

- When receiving the goods, check carefully the quantity of received goods according to the shipping list.
- Check whether the packaging of the received goods is intact or not. If the packaging is found damaged when received (if possible, please take photos of the damaged packing cases and goods)or any discrepancies between goods information and transportation list, please refuse to sign for acceptance. And contact transport company to reflect the problem immediately, when negotiation fails, please feedback to Huaming After-sale service Department in a written form. (Telephone 800-820-8231)

The above steps are also suitable for the packaging goods got corrosion due to moisture (rain, snow, water).

The parts must be stored in dry place before installation.

On-load tap changer must be kept in the sealed packing cases, only open when installation.

Note： Transportation and hoisting of packing cases must be operated by professional personnel.

The bearing capacity of transportation tool and crane should exceed 3000kg weight.

Warning!

Danger of fatal and serious injury!

Danger of load falling and overturn!

Hint

Equipment damage!

Falling and dumping will damage on-load tap changer!

Packing cases should be firmly fixed in the process of transportation and hoisting, Handle with care, to avoid vibration and impact, falling, dumping, bumping and shaking may cause damage to the product.

In case of falling or severe impact on the packing cases, shall consider from the point of damage. It is requested to conduct a comprehensive inspection of the product. Please contact the professional and technical personnel of the product manufacturer for inspection when necessary.

2.2.3. Unpacking and acceptance inspection

Packing cases unpacking and transportation damage inspection

• Transport the packing cases to the installation place.

• Check the equipment and its accessories according to packing list.

Note: 1. Avoid damaging the original packing of equipment when unpacking for inspection.

2. In case that equipment and its accessories do not conform to the packing list, please contact the manufacture in time.

2.3Storage of goods

When the packaging goods stored for more than 1 year, it should be inspected in detail before installation.

For the goods in special packaging cases with sealing function, it can be stored outdoors if meets the following conditions.

The following conditions shall be met when selecting and establishing the place of storage:

• Service temperature of transformer oil is not lower than-25℃ and not higher than + 105℃(Please contact us if special application required).

• Ambient temperature is not lower than -25℃ and higher than + 40℃

• The equipment shall not be stored in an environment with flammable, explosive and corrosive gases.

• The storage equipment must have the corresponding protection, to prevent moisture, dust, as well as the harm from rodents, ants, etc.

• Check regularly whether there is any abnormal condition happened.

If the equipment is kept for a long time, the desiccant must be replaced regularly, and resume the sealing of the packaging.

3. Drying procedure

Under normal circumstances, there is no need to dry on-load tap changer. If the packaging material is wet, then it must carry out drying procedures before installed on the transformer. The duration of drying procedures should be more than 24 hours, temperature for tap changer tank must be less than 110℃.

3.1 Remove the oil tank top cover, top cover sealing gasket, door sealing plate, door sealing gasket and bolt &nut washer, see fig. 4:

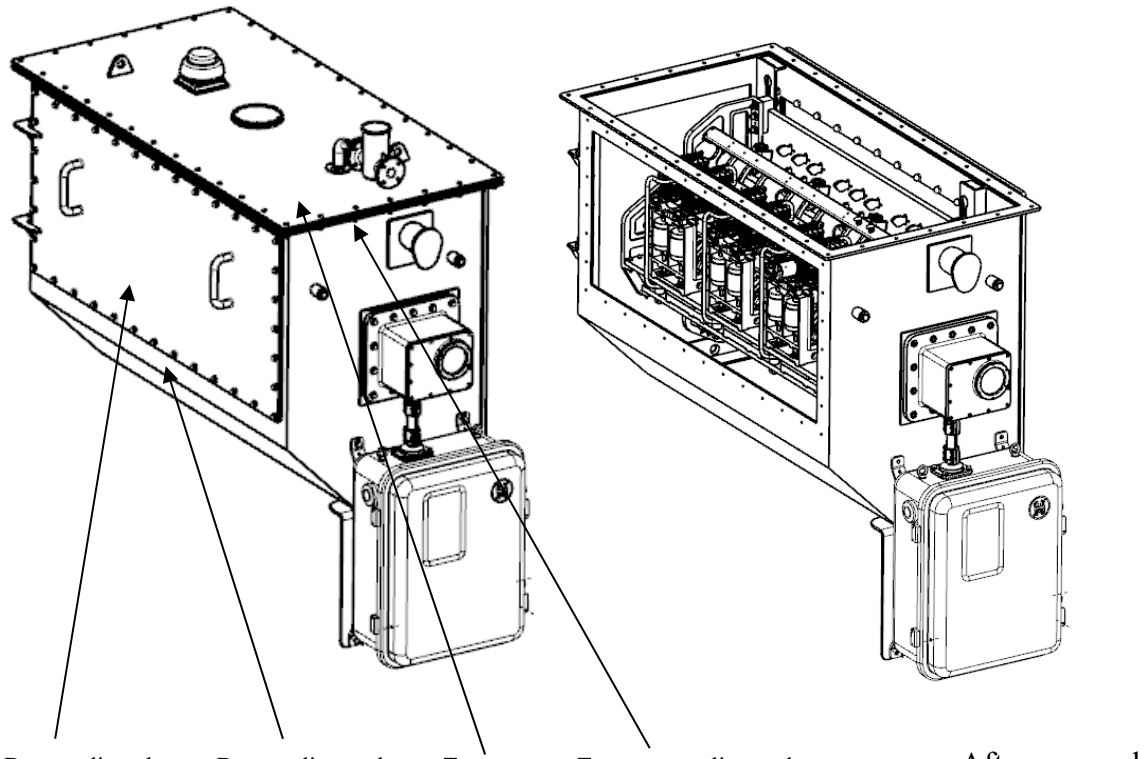


Fig. 4

Note：Please take care of the removed parts.

3.2 Remove the numerical control mechanism (hereinafter referred to as motor drive unit),and please do not operate the motor drive unit to avoid wrong position. .

3.2.1 Detach the drive shaft (see Fig. 5)

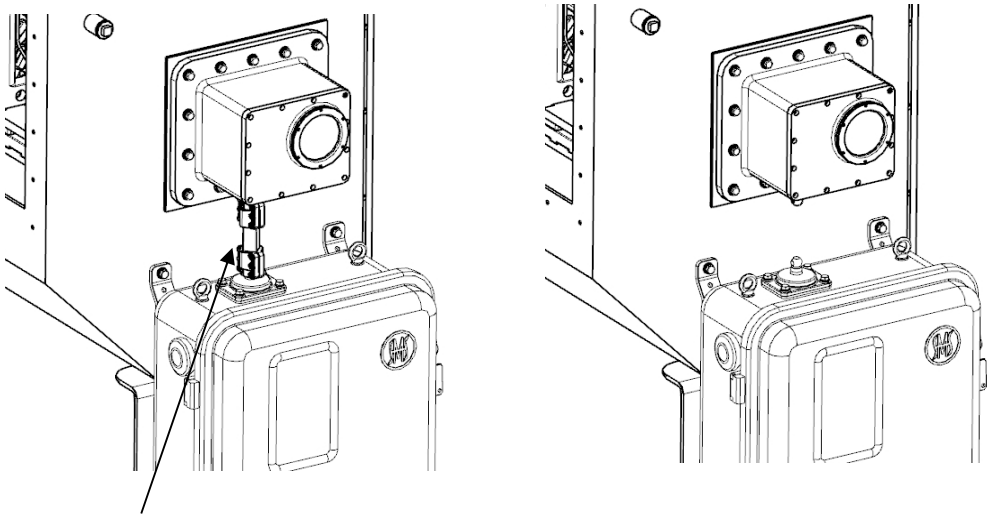


Fig. 5

3. 2.2 Uninstall the motor drive unit (See Fig. 6)

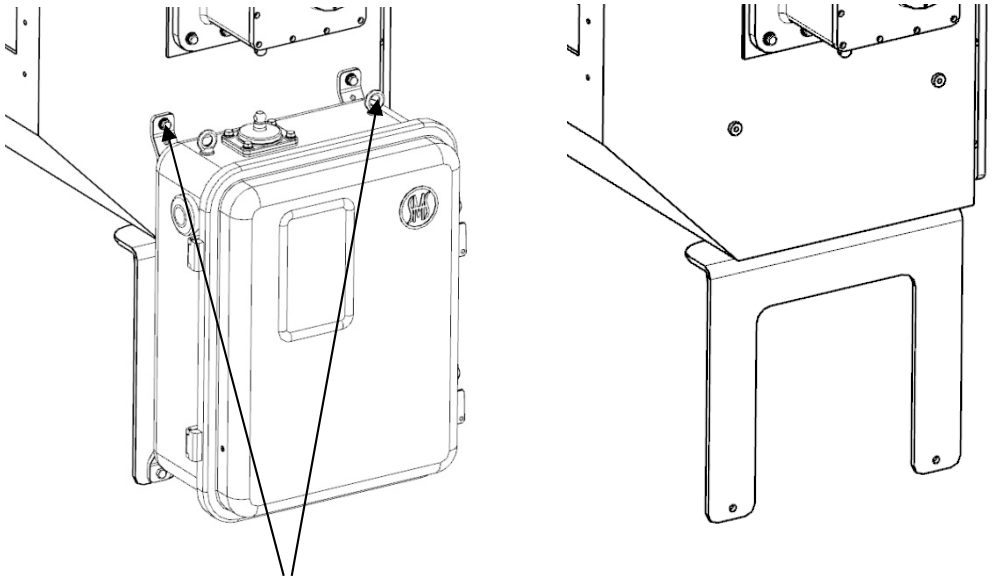


Fig. 6

3.2.3 Remove the bevel gearbox and motor drive unit support brackets

3.2.3.1 Make a remark (See Fig. 7)

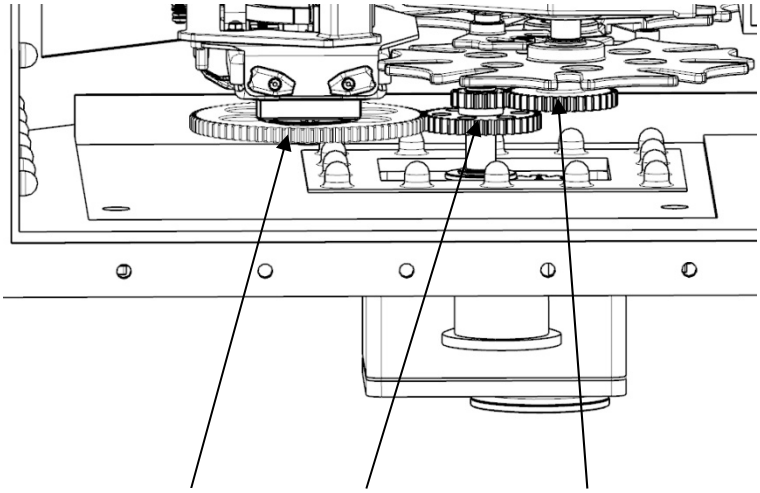


Fig. 7

Make remarks on input gearbox transmission gearbox 1 as well as input gearbox and transmission gearbox 2 so as to facilitate re-installation.

3.2.3.2 Remove the bevel gearbox and motor drive unit frame (See Fig. 8)

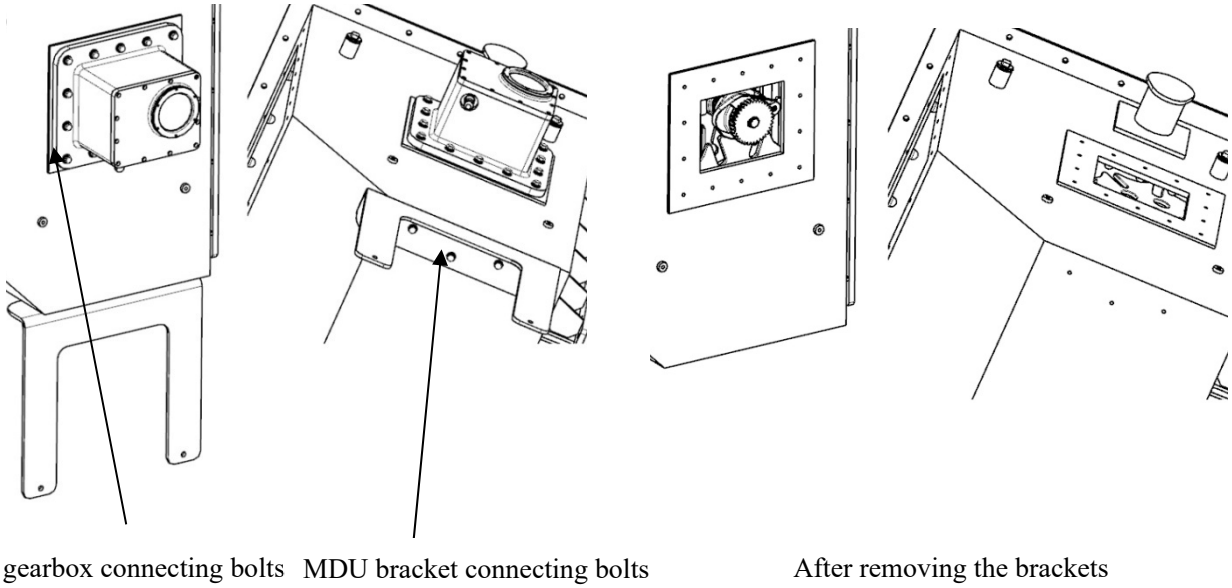


Fig. 8

Note:

(1) Please store the removed parts properly.

(2) Do not turn the motor drive unit and the input shaft of the gearbox in case of wrong positions
(3) When dismantling the motor drive unit, first hang the crane's lifting hooks in the motor drive unit's two hanging rings and tighten the wire rope upward. Then remove the 4 bolts.

3.3 Put tap changer to the oven for drying.

3.4 After drying, reassemble according above inverted sequence.

3.5After reassembling, insert the hand crank and manually operate for several times.

Note:1. There is no need to dry motor drive unit;

2. Please do not neglect or wrongly assemble parts to avoid malfunction;

3. In the absence of oil, too many operations will cause damage on tap changer!

4. Installation of tap changer on transformer

4.1. Wire connection between tap changer and transformer

The connecting wire of the tap changer and the transformer tap winding must be connected from the back of the tap changer.

4.1.1. Transformer tank is directly welded and fixed with tap changer compartment.(See Fig. 9):

Prepare for the mounting flange of transformer tank (Detail dimension see figure), directly welded with the mounting flange of type HWV tap changer. Refer welding joint requirement to Fig. 10.

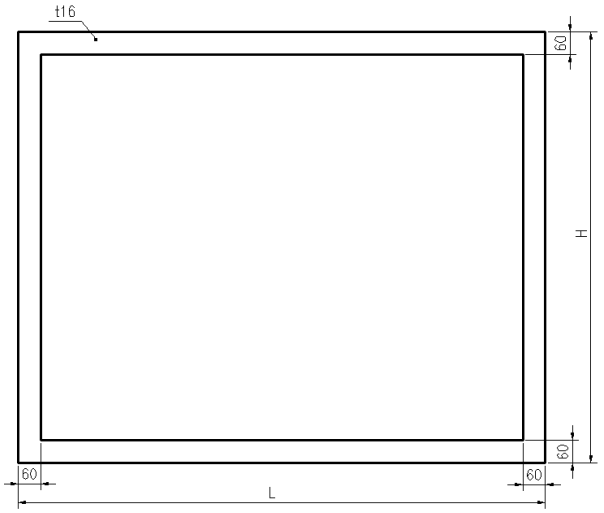


Fig. 9 Direct fixation of transformer tank and tap changer

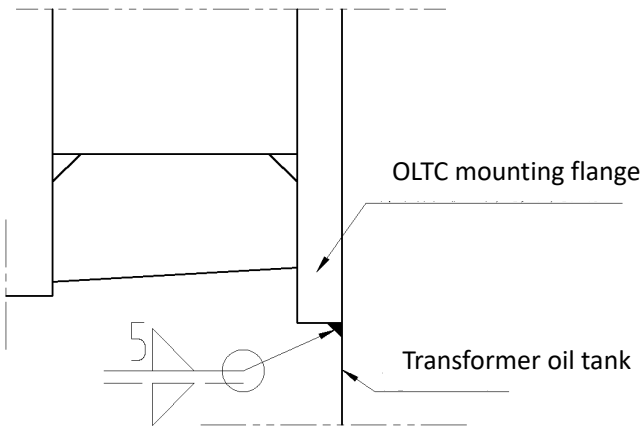


Fig. 10 Welding chart

4.1.2.Transformer tank and tap changer compartment is connected and fixed by screw thread: Prepare mounting flange of transformer tank (Detail dimension see figure), use M12x65 bolts, nuts and spring washer, etc., tap changer sealing gasket (Provided by Huaming) to connect with type HWV tap changer mounting flange. (See Fig. 11), use approx. 90Nm torque to fasten the bolts. Because the sealing gasket is under the bolt of pressure connection, the thickness will be compressed. Thus, it will reduce the pressure of bolts and make the screw thread connection loosen. If it is at a higher temperature, loose phenomenon will become more serious. Therefore, the second day after tap changer installation, it is required to repeat fastening the bolts. After two weeks of transformer operation, it is required to repeat fastening again to make sealing gasket compressed at the running temperature. Repeat fastening torque should reach about 90Nm.

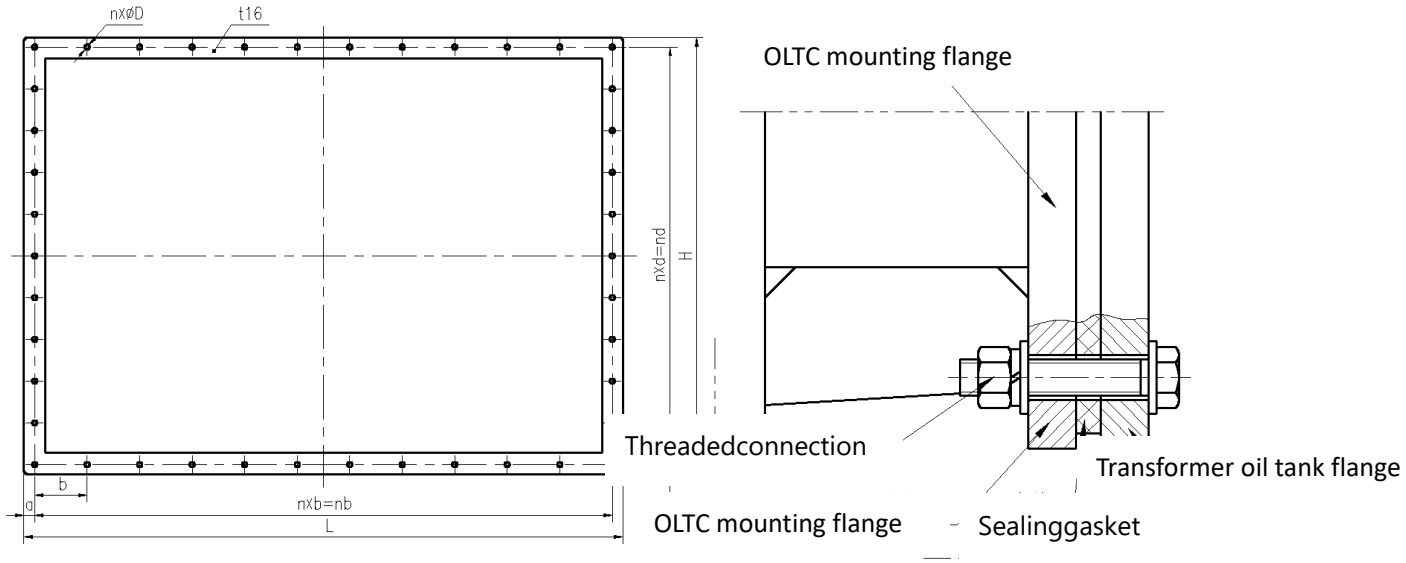


Fig.11 Connection and fixation of transformer tank and tap changer compartment by screw thread

4.2. Connection between voltage regulating winding taps and tap changer connection terminals

The connection of voltage regulating winding taps should be in accordance with the wiring connection diagram. Tap changer connection terminal plate is labeled with contact position indication. Voltage regulating winding taps and tap changer connection terminals should be corresponding to the labeled code on tap changer and connected correctly.
Note:

All the tap changer lead wires connected to tap changer must be reliably fastened. The assembly of lead wires connected to tap selector should not produce a pull force on the connection terminal.

4.2.1 The fixation of voltage regulating winding taps and tap changer connection terminals.
Tap changer connection terminal is provided with a through-hole for M10 bolt, which is convenient for connecting and fixing transformer voltage regulating winding taps with tap changer connection terminals (tightening torque is about 50Nm). The screen caps provided when ordering are used for shielding M10 bolts and connecting nuts. (See Fig. 12)

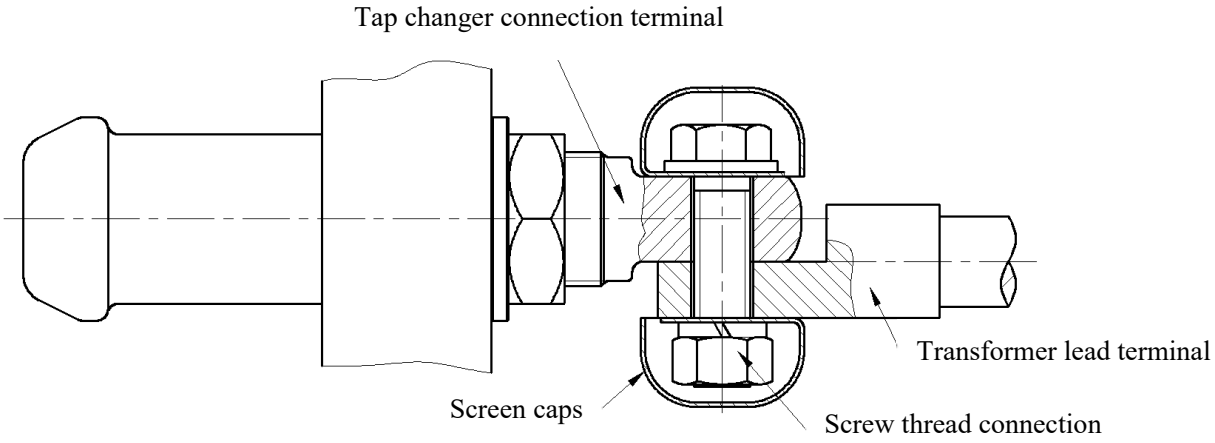


Fig. 12

4.2.2 Tap changer terminal lead should not make tap changer connection terminal stressed to deformation or damage.
4.2.2.1. The connection of tap changer terminal and the final clip of transformer lead should remain a certain bending, easily bent. It should not be too short.
4.2.2.2. The lead end connected to tap changer should be jointed according to expanding angular shape (draw circles), to make the insulating plate of tap selector free of tension.

4.3 Installation of gas relay

Installation of gas relay according to Order Specification provided when ordering.

4.4 Usage of pressure release valve

Before operation, remove the Red Cross bar on the top of pressure release valve.

5. Ratio test and transformer DC resistance measurement

5.1 Ratio test

Insert the hand crank of motor drive unit to manual input shaft sleeve, rotate the hand crank for one time tap changing, the sound of tap changer switching can be heard clearly. After hearing the sound, it is necessary to continue to rotate in the same direction for two and a half circles to complete one step tap switching. In the process of operation, should observe each tap position which the position indicator of MDU reaches to avoid of overriding of end position.

Note:

In the absence of oil, on-load tap changer switching operation should not exceed 6cycles.

5.2 Transformer DC resistance measurements

Note: Tap changer is operated without oil when carrying out transformer DC resistance measurement, the number of operation should be reduced as much as possible. After transformer ratio test and DC resistance measurement, tap changer must be adjusted back to the calibration position.

6. OLTC oil filling

Generally, please do not open the top cover and door sealing plate of tap changer oil compartment. At the same time, in order to avoid too much moisture into the oil compartment, it is required to refill oil into the oil compartment as fast as possible. Oil filling can be completed under normal pressure condition.

6.1 Oil filling for standard type oil compartment

6.1.1 To fill oil under atmospheric pressure. Transformer is equipped with oil conservator, which is connected with tap changer gas relay and there is oil conservator valve in the middle. (See Fig. 13)

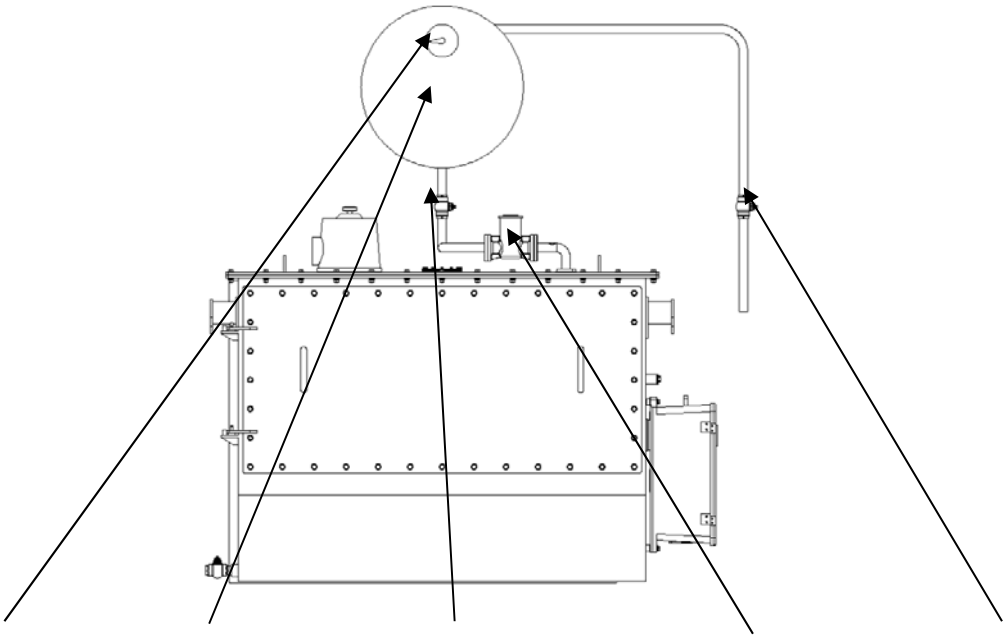


Fig.13

1.Open the conservator valve;

2.Remove the pipe connected to breather;

3.Connect the oil pump, open the oil compartment valve and switch on oil pump to fill oil to the right level indicated in oil gauge;

4.Switch off the oil pump and close the conservator valve, remove the oil pump;

5. Reassemble the breather pipe.

Note:

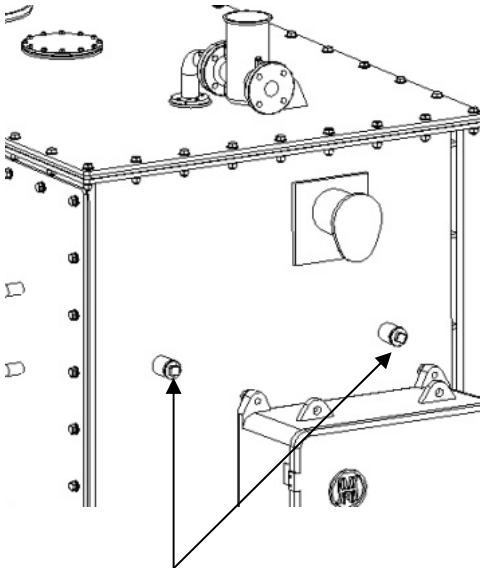
After filling oil under atmospheric pressure, in order to eliminate the transformer oil bubble inside the oil compartment, keep it stay for at least 5 hours, then transformer can be put into operation.

6.1.2 Vacuum oil filling

Generally, vacuum oil filling is not necessary. When needed, please follow the procedure below.

1. Remove the tap changer oil tank's stopper (see Fig. 14)

2. Transformer OEM uses a connection pipe to connect the transformer main oil tank with the OLTC's. The pipe's joint should be RP1 1 internal thread joint.
3. Close the oil conservator valve and open the oil tank valve.
4. Remove the pipe connected to the air breather.
5. Vacuum the transformer main oil tank and the tap changer oil tank at the same time.
6. Connect the oil filling pipe with the oil conservator's oil filling pile.
7. Open the oil filling pipe 's valve and start the oil filling. The amount of oil should be consistent with the oil indicator.
8.Close the oil conservator's valve.
9. Re-connect the air breather's pipe.



Oil tank stopper

Fig. 14

6.2 Oil filling for non-standard type oil compartment

6.2.1 To fill oil under atmospheric pressure. There is no oil conservator equipped with transformer. Oil is directly filled through tap changer oil filling pipe. Oil conservator valve is in the middle. (See Fig. 15)

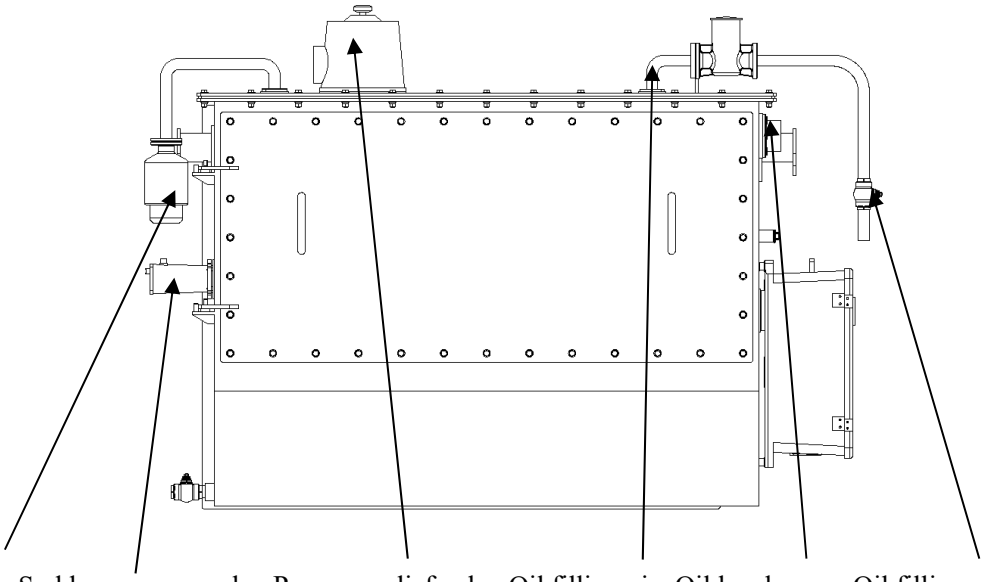


Fig. 15 BreatherSudden pressure relay Pressure relief valve Oil filling pipeOil level gauge Oil filling valve

1. Open the oil filling valve;
2. Remove the breather and pipe;
3. Connect the oil pump, and start to fill the oil to the right level indicated in oil level gauge;
4. Switch off the oil pump and close the oil filling valve, remove the oil pump;
5. Reassemble the breather and pipe;
6. Correct oil leve posisiton (See Fig. 16);

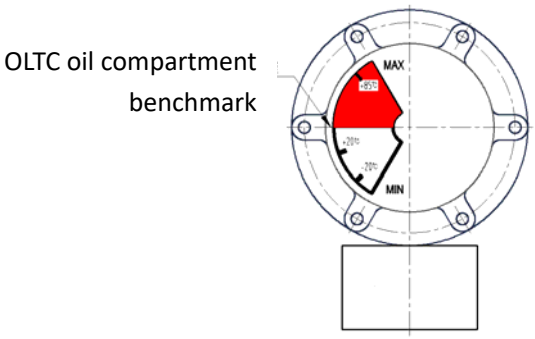


Fig. 16 Oil level indicator

Non-standard type oil compartment does not install the oil conservator its oil level has a selection of air from the top cover, at +20℃ pour into the oil to the middle of minimum (MIN) and maximum

(MAX).

6.2.2 Refer to 6.1.2 for vacuum oil filling.

7. OLTC routine test and preparation before testing

7.1 Preparation before testing

7.1.1 On-load tap changer full gas release

Before the first operation, release the gas via the bleeding plug on the top cover of tap changer.

1. Remove M30 bolt cap of the bleeding valve E1 (use №36 spanner);

2.Lever up the valve stem to release the gas in tap changer head by screwdriver (Fig. 17);

3. Screw up the bolt cap of bleeding valve E1（Torque 9～12Nm）.

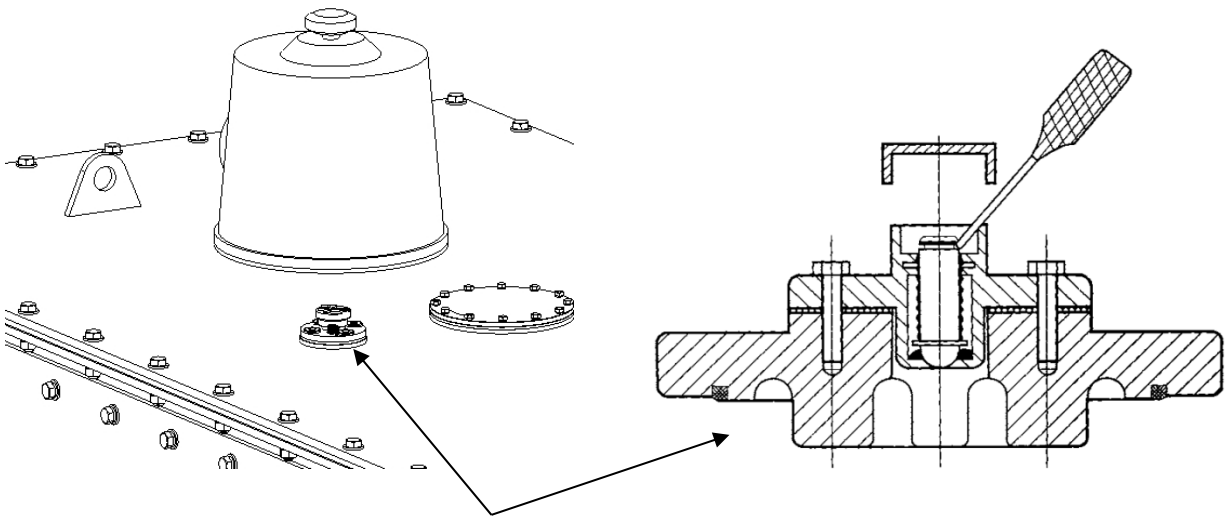
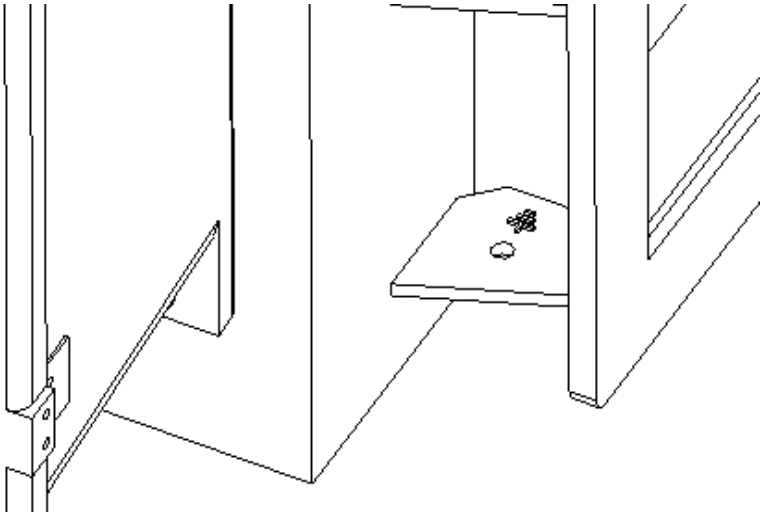


Fig. 17 Bleeding valve

7.1.2 Earthing

1. Connect the grounded bolt of tap changer cabinet to the transformer tank (1 M12 bolt and nut), №19 spanner, torque 50～60Nm，Fig.18;



Grounded hole

Fig. 18 Tap changer to ground

2. Connect the grounded bolt M12 of motor drive unit protection cabinet to transformer oil tank (№19 spanner, toque 50~60Nm).

7.2 Test in transformer factory

7.2.1 Operation testing

Before the transformer is energized, it must carry out trial operation to check the mechanical function of tap changer and motor drive unit.

1. Fill tap changer oil compartment with oil;

2. In the operation testing, tap changer has to go through the whole operation range;

3.Check the electrical and mechanical terminal limit function at the two terminal positions, (refer to the Operation Instruction of motor drive unit).

Note:

In the absence of oil, the continued operation of on-load tap changer may cause damage to on-load tap changer!

After transformer drying, before the first operation of on-load tap changer, make sure that tap selector is completely immersed into the transformer oil and tap changer oil compartment needs to be filled with oil.

8. Transformer transportation and commissioning at site

8.1Transportation of Transformer with oil

8.1.1 Transportation with oil conservator: on-load tap changer must be filled with oil and connect to the oil conservator;

8.1.2 Transportation without oil conservator: discharge 20% oil in tap changer oil compartment.Seal the gap of conservator with packing material, then transport;

8.2 Transportation of transformer without oil

If transportation or storage of transformer without oil, the oil in tap changer oil compartment must be all released. The interior of oil compartment should be protected as transformer, for example fill nitrogen.

Non-standard type oil compartment transports without filling oil.

8.3 Transformer commissioning at site

Note:

For transformer service environment, there should no open fire, heat source or electric spark.

8.3.1 Before transformer commissioning, make sure that tap changer oil compartment is filled with oil (Excepting non-standard type oil compartment). For first commissioning, Ud 40kV/2.5mm （Minimum）, H2O 12ppm（Maximum）

8.3.2 On-load tap changer releases the gas according to 7.1.1;

8.3.3 Trial operation is carried out according 7.2.1;

8.3.4 Make sure that the lowest oil level signal contact of on-load tap changer oil conservator is connected to circuit breaker tripping circuit;

8.3.5 Check whether the function of gas relay is normal according to the Operation Instruction of Huaming QJ-25 series gas relay;

8.3.6 Before commissioning, remove the red protection strip of pressure relief valve;

8.3.7 Oil filling refers to Article 6 on-load tap changer oil filling

Make sure the instantaneous impact of the start-up currents completely weakened before tap changing. Normally the starting current is several times the transformer current, it is possible to cause on-load tap changer overload when switching.

To comply with other safety information and noted safety instruction during the operation of all function inspection and testing.

After supply power to transformer and the instantaneous impact of start-up current is completely weakened, tap changing can be operated off load as well as on load.

9. Tap changer operation monitoring and maintenance

9.1 Operation monitoring

In order to ensure the normal operation of tap changer, it is necessary to inspect the appearance accompany with transformer regularly. The inspection content mainly includes:

9.1.1 Tap changer top cover：Whether there is leakage at each joint of the protective relay and pipes;

9.1.2 Whether the sealing of motor drive unit is good;

9.1.3 The oil in the tap changer oil compartment should be measured according to user related operating rules;

9.1.4 Whether the heater and other devices in motor drive unit are working well;

9.1.5 Regularly extract the oil sample in the diverter switch oil compartment and please refer to the table as below regarding the requirement of oil sample.

Voltage regulating mode	Breakdown voltage	Water content
At neutral point	≥30KV/2.5mm	＜40ppm
Except neutral point	≥40KV/2.5mm	＜30ppm

9.1.6When transformer is overload, on-load tap changer cannot be operated frequently. It must be installed “Overcurrent autistic contact” to protect tap changer from changing-over when load current ＞ 2 times Iu.

9.1.7Gas relay tripping contact operates when oil flow speed set at 1.0m/s±10%. This contact

should be connected to the tripping circuit of transformer circuit breaker. When tap changer internal failure occurs, it will generate a great amount of gas and cause oil speed rate to accelerate. At the same time, it will activate the reply baffle and close the tripping contact to cut off the power supply of transformer and avoid the expansion of accident. Once the gas relay activates, it is strictly forbidden to reclosing before tap changer lifted up for inspection.

9.1.8Over pressure protection rupture disk is provided on the top cover of tap changer. It will not activate when diverter switch is in normal operation. Only when diverter switch internal failure occurs and the pressure in the oil compartment exceeds 0.3±20%MPa, it bursts. Rupture disk plays a role as overpressure protection to avoid the expansion of accidents. When installing and repairing on-load tap changer, should be very careful, do not step on or heavy impact on rupture disk.

9.2 Tap changer maintenance

Note: Tap changer must be regularly maintained to guarantee its good performance. Otherwise, it will bring harm to the operation of tap changer and transformer.

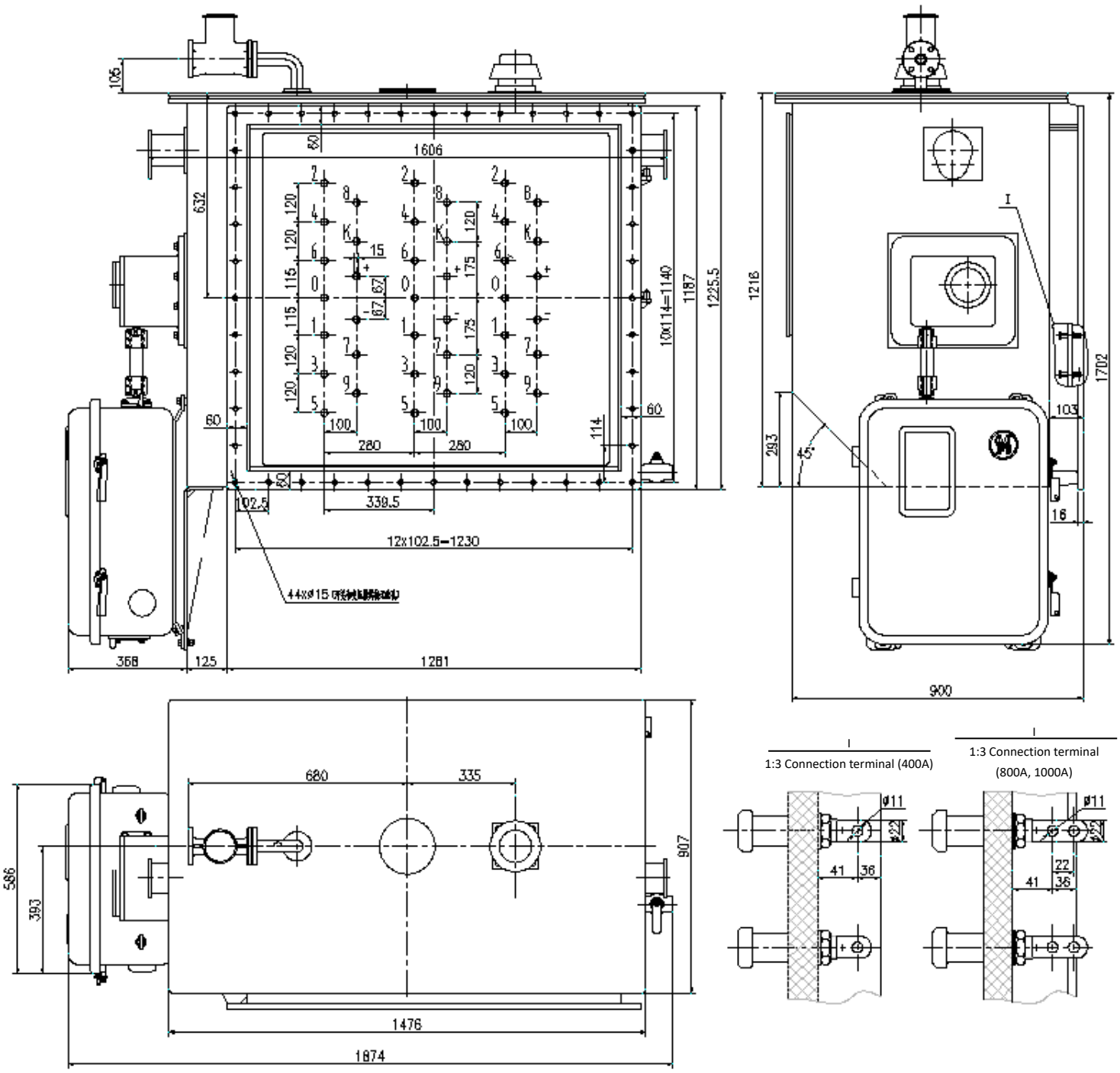
9.2.1Tap changer must be inspected and repaired every 100,000 operations;

9.2.2Diverter insert must be replaced after 800,000 operations.

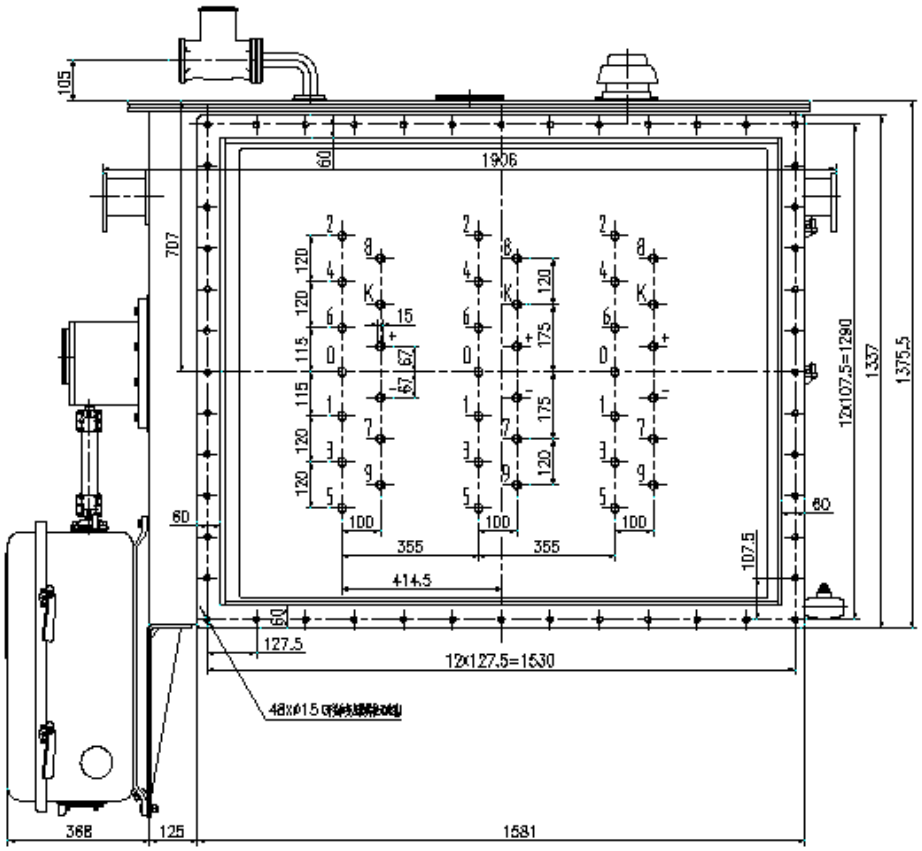
Tap changer maintenance is generally conducted by Huaming Company. Usually the maintenance can be finished within one day.

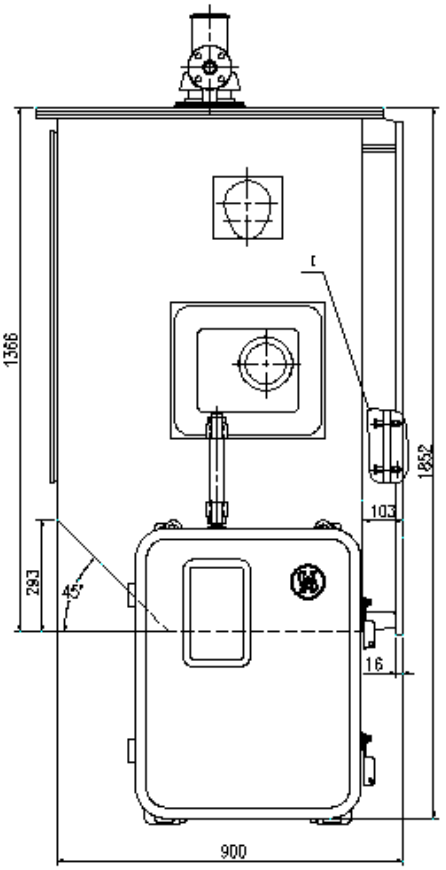
10. Appendix

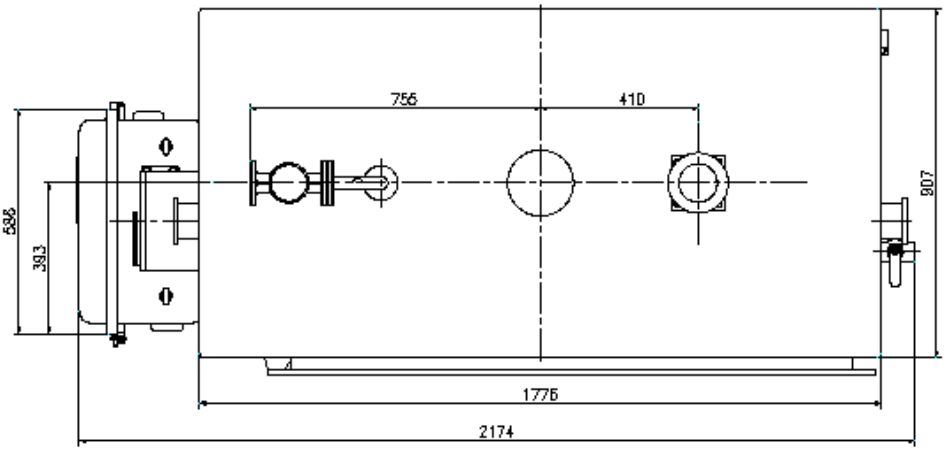
Appendix 1: HWV Ⅲ - 400, 800, 1000 /40.5kV-10 series star connection and delta connection overall dimensions (10193W)

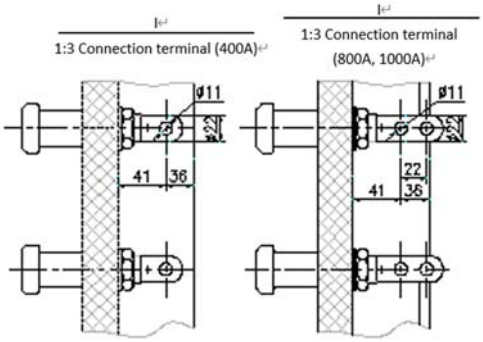


Appendix 2 HWV Ⅲ -400, 800, 1000 /72.5kV-10 series delta connection overall dimensions(10193W)

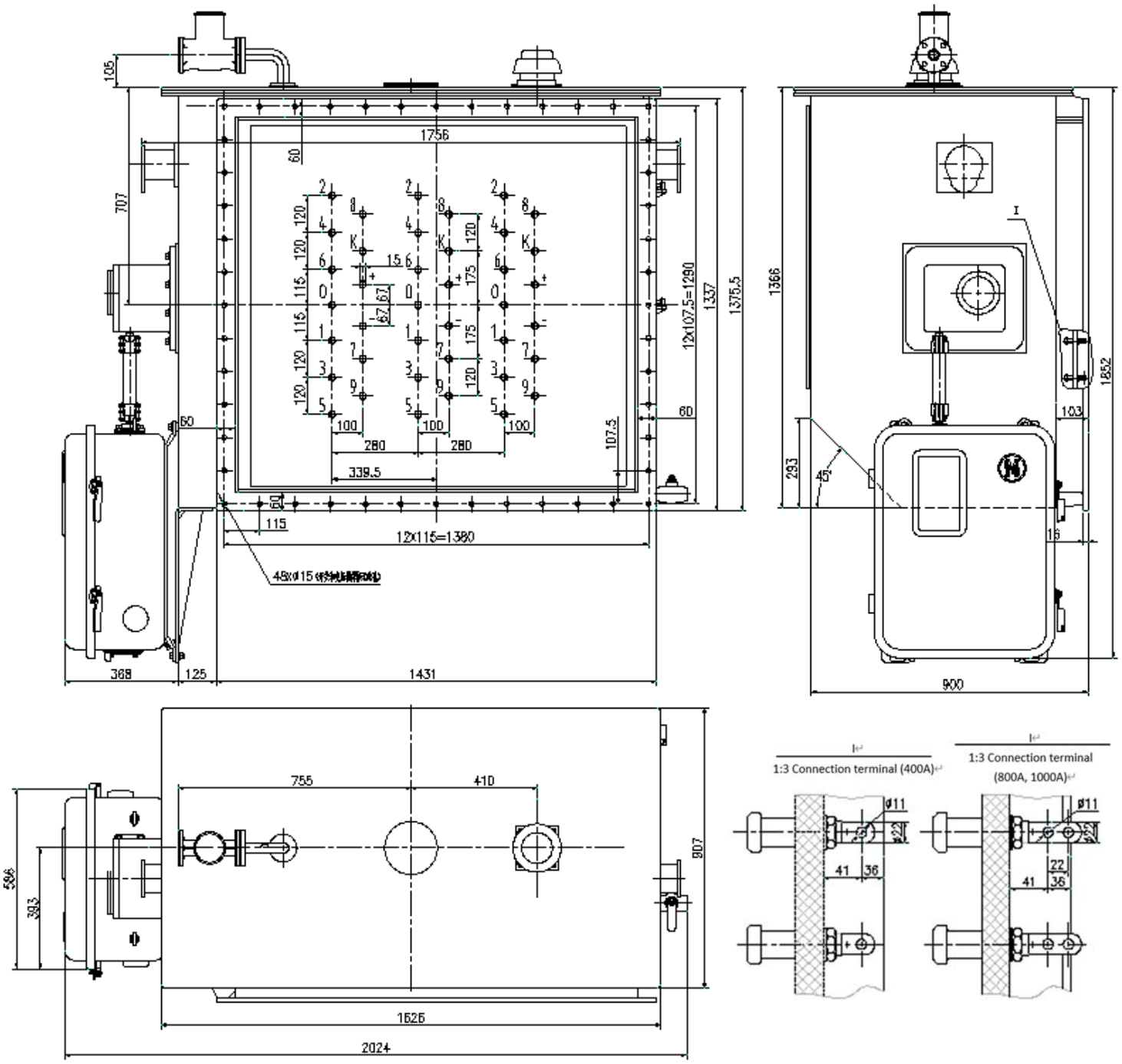




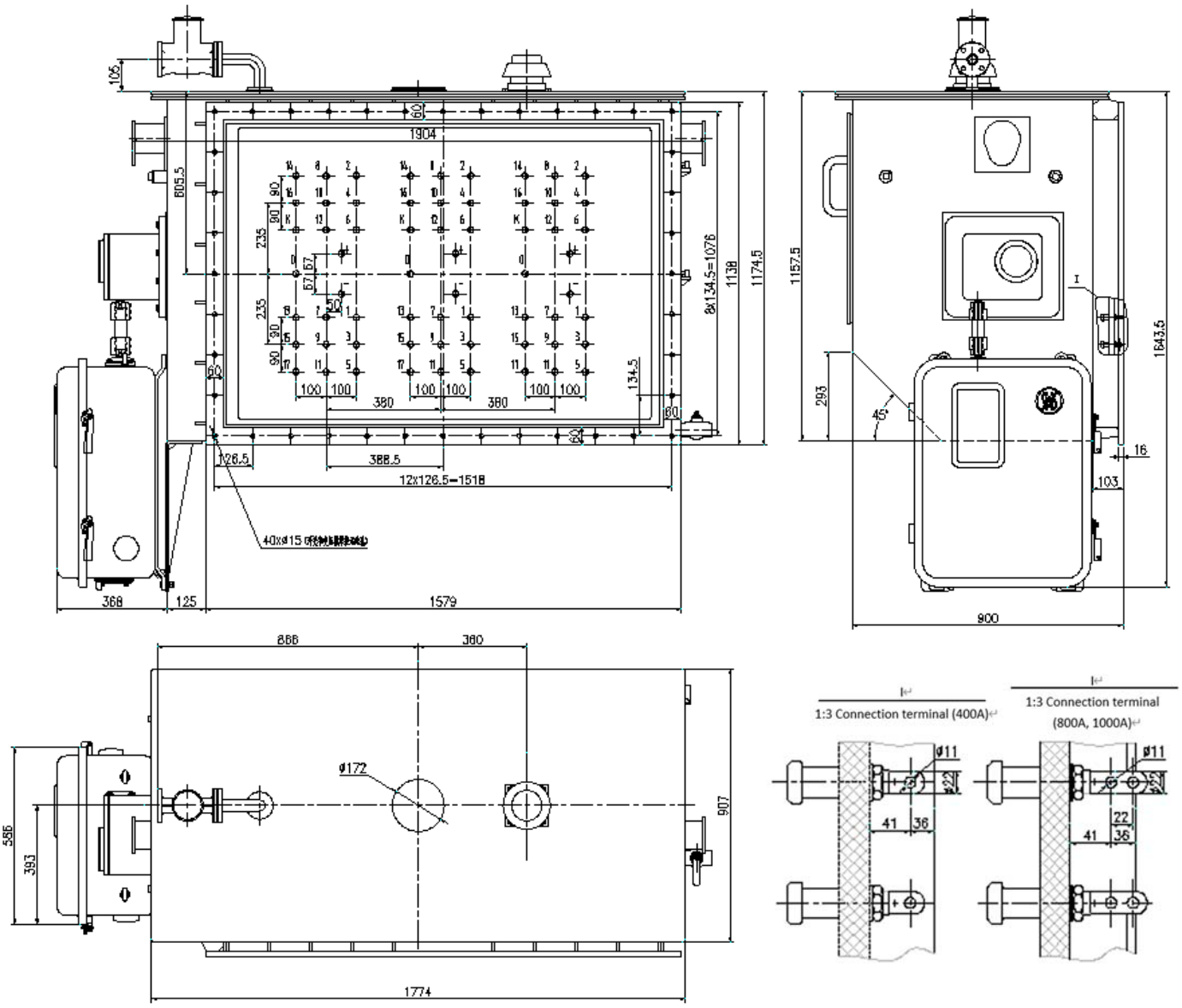




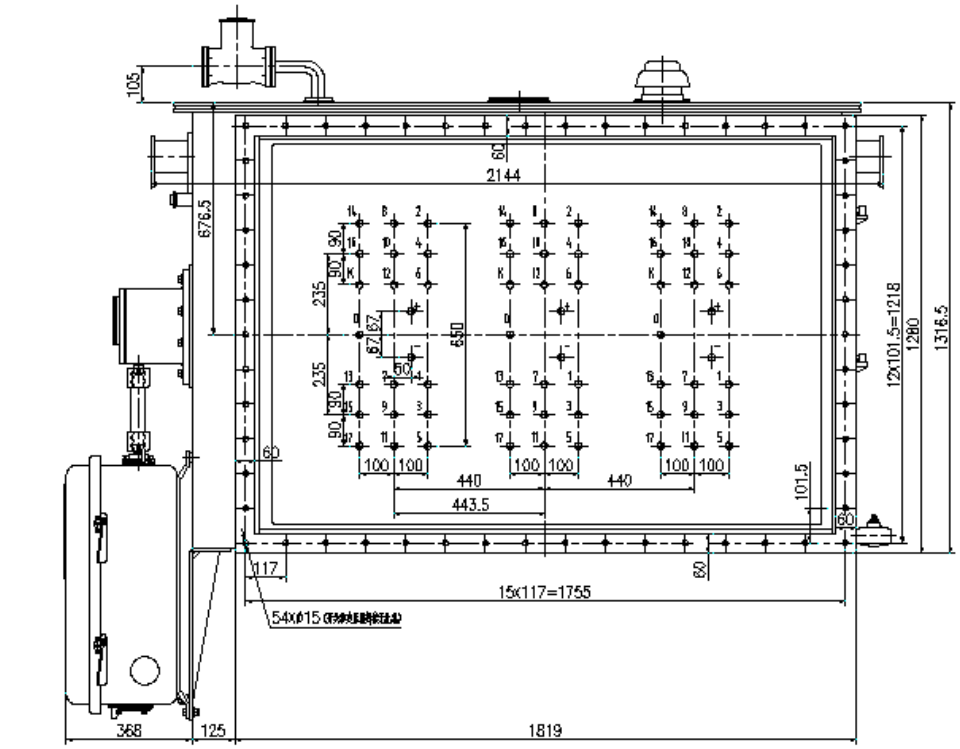
Appendix 3 HWV Ⅲ -400, 800, 1000 /72.5kV-10 series star connection overall dimensions(10193W)

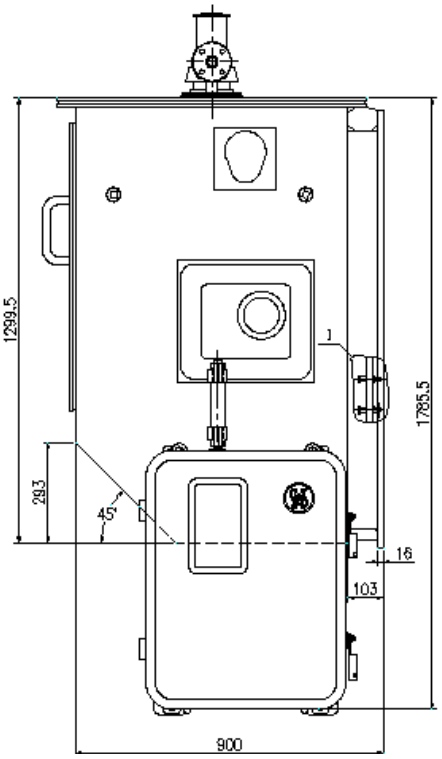


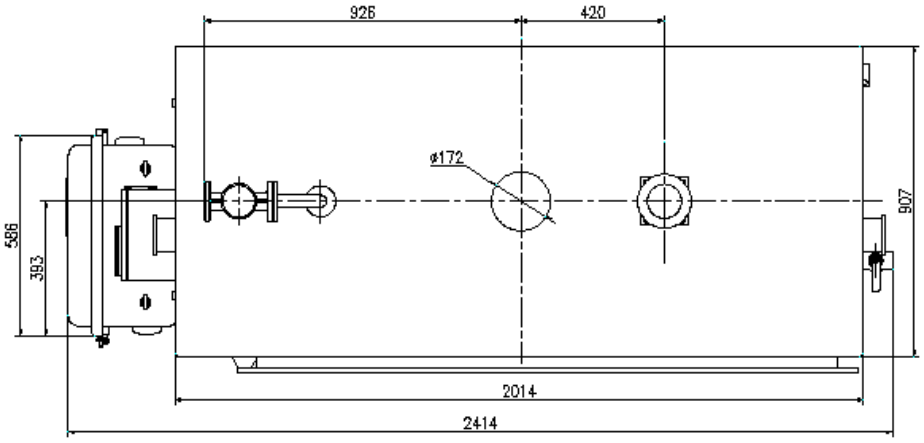
Appendix 4 HWV Ⅲ - 400, 800, 1000 /40.5kV-10 series star & delta connection overall dimensions (18353W)

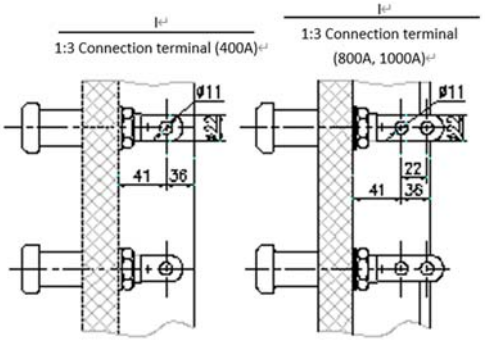


Appendix 5 HWV Ⅲ - 400, 800, 1000 /72.5kV-10 series star connection overall dimensions (18353W)

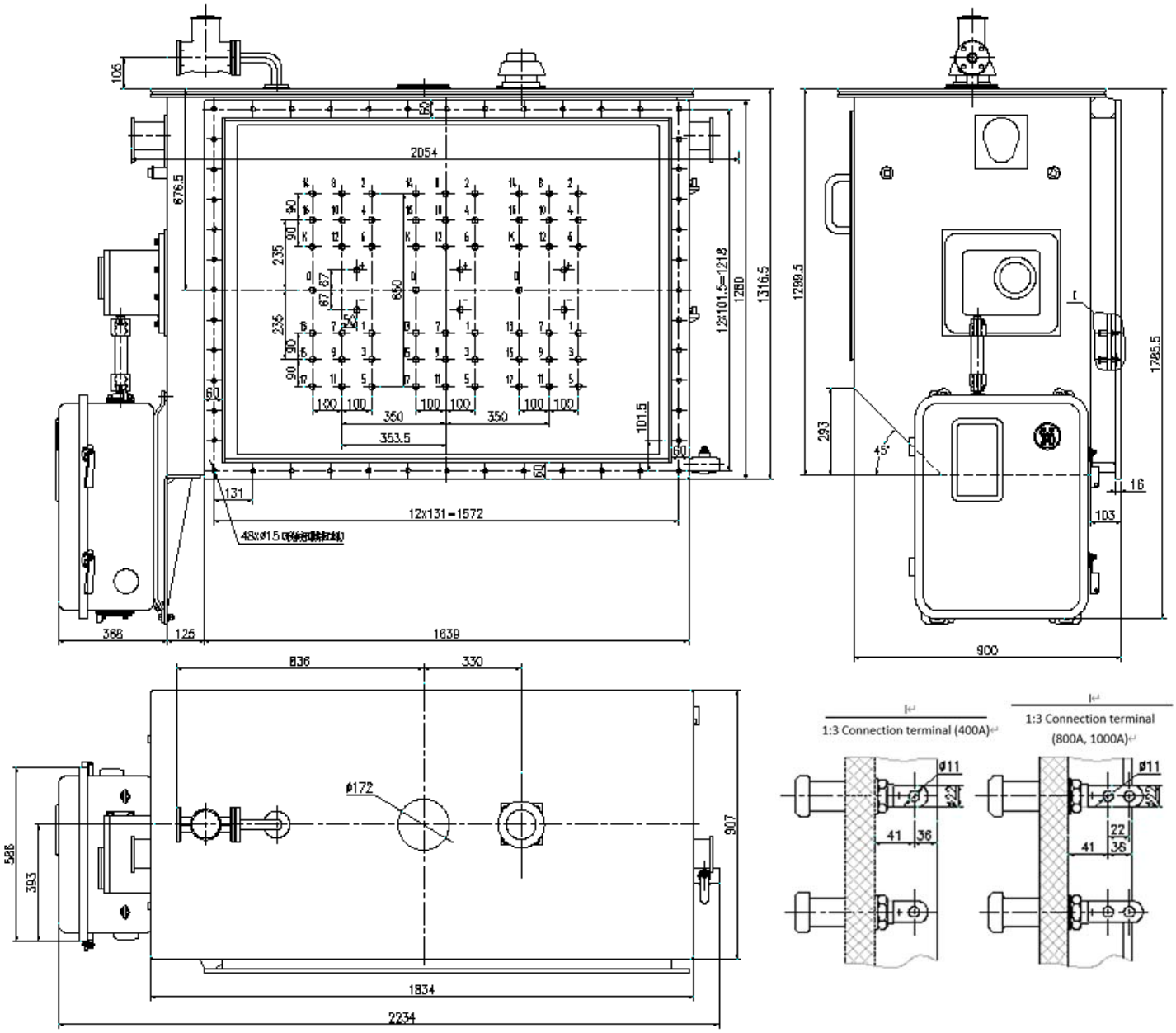




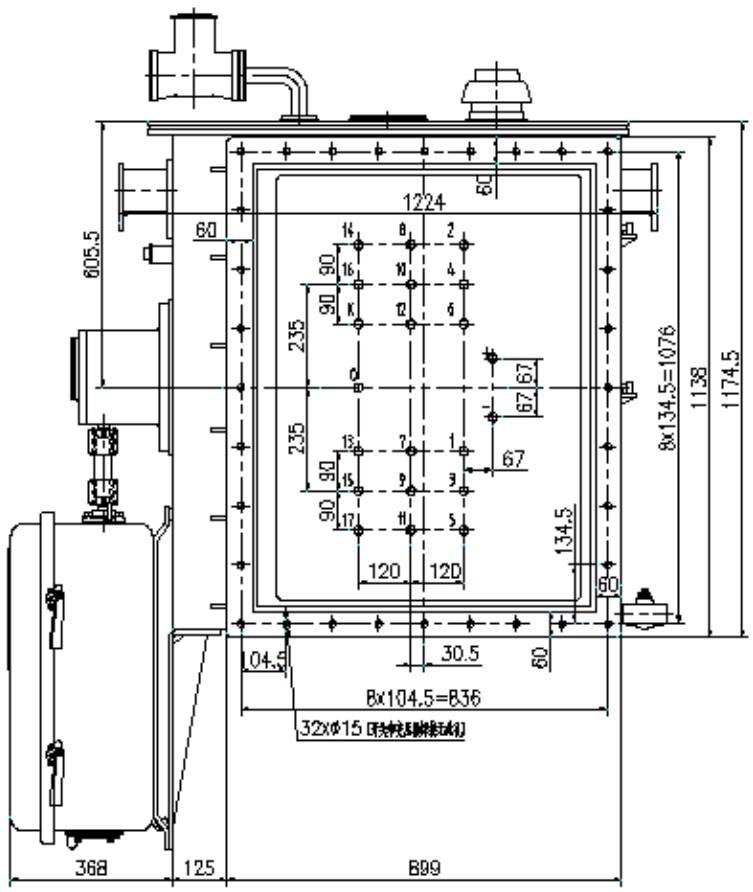


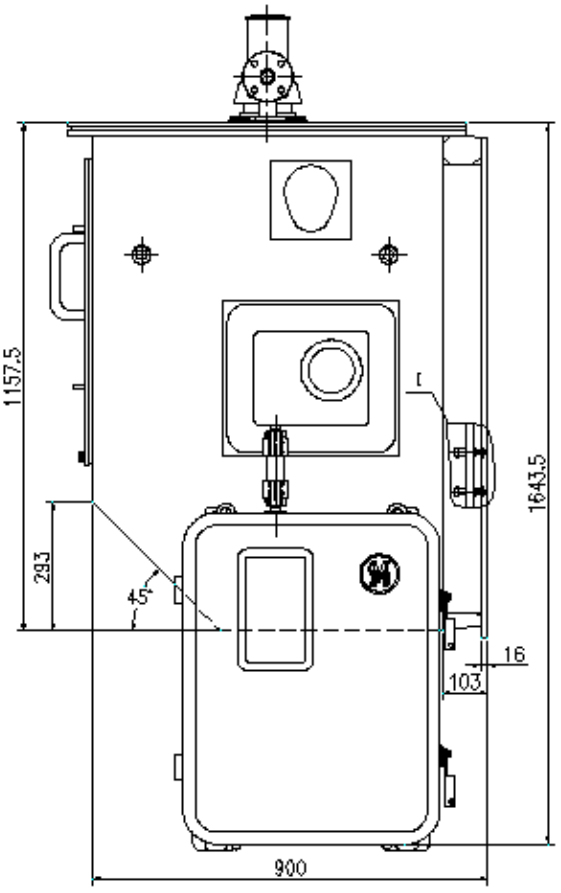


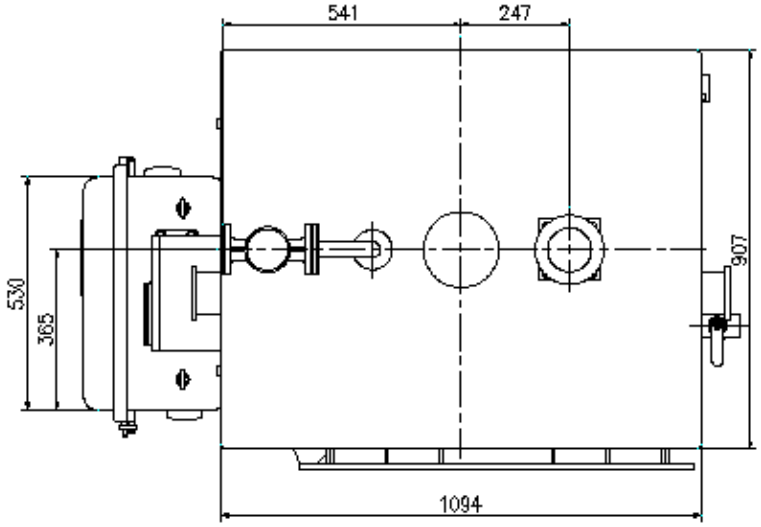
Appendix 6: HWV Ⅲ - 400, 800, 1000A /72.5KV-18 series star connection and delta connection overall dimensions (18353W)

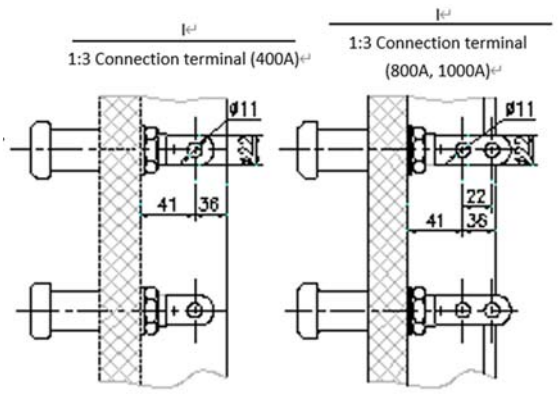


Appendix 7: HWV Ⅲ - 400, 800, 1000A/40.5kV-18 series overall dimensions (18353W)

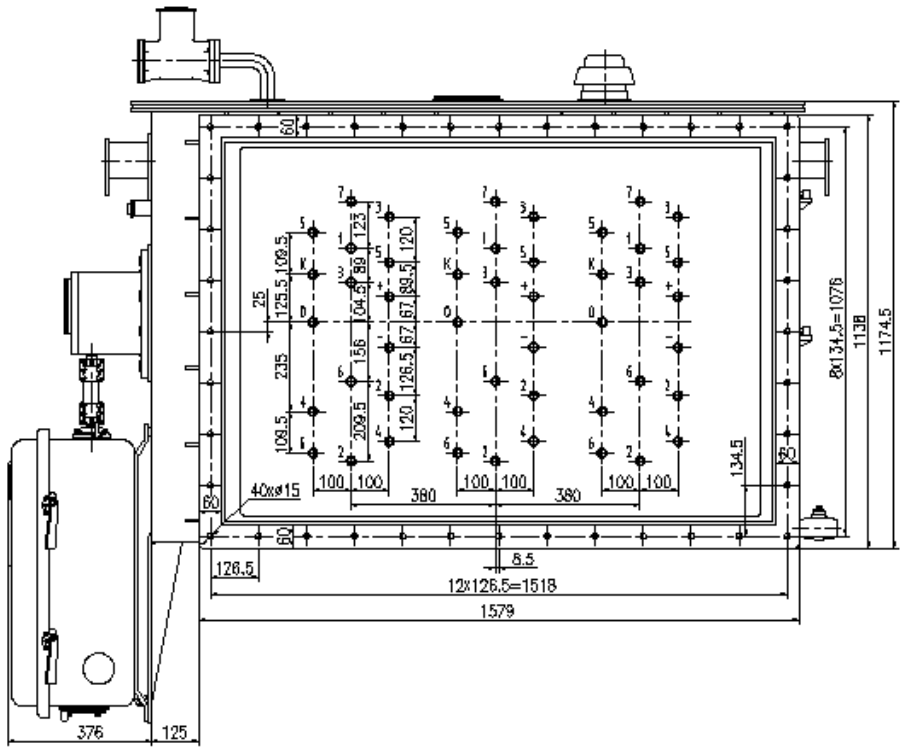


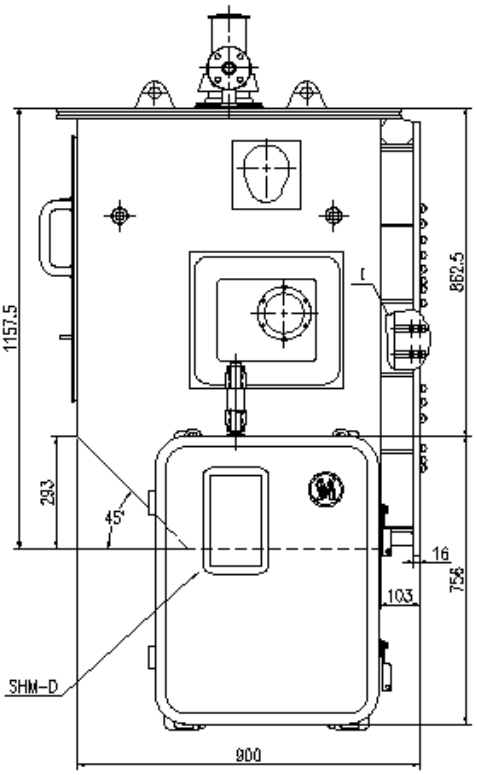


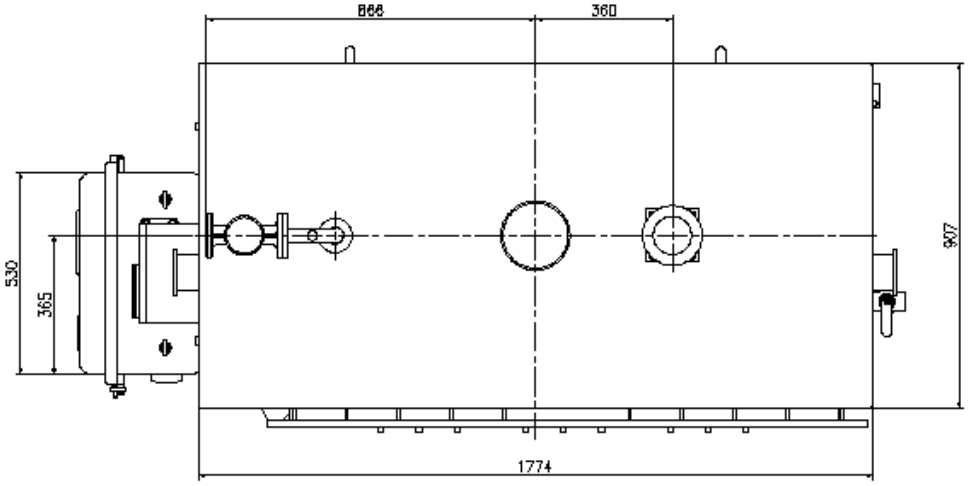


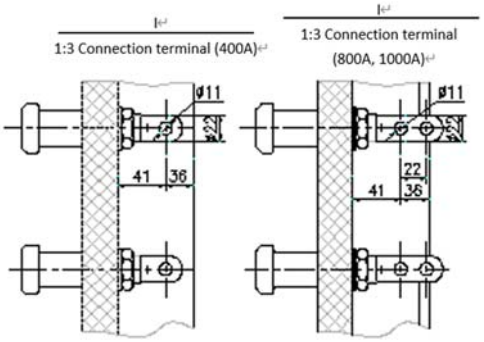


Appendix 8: HWV Ⅲ - 400, 800, 1000A /40.5kV-14 series delta & star connection overall dimensions (14131W)

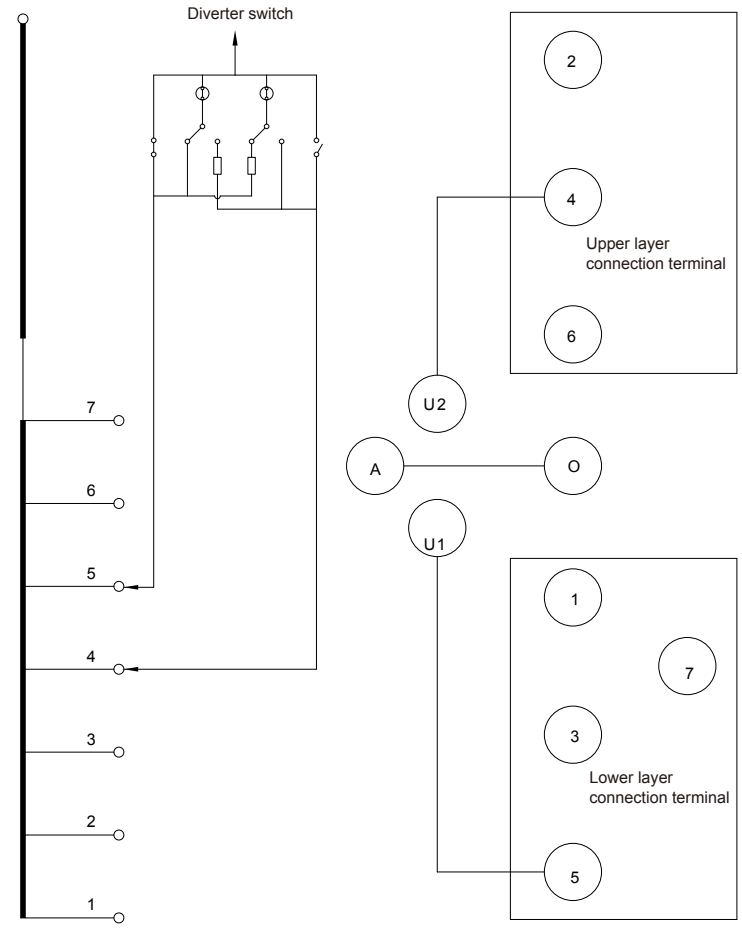








Appendix 9: Type HWV OLTC operating position table and connection diagram (10070)

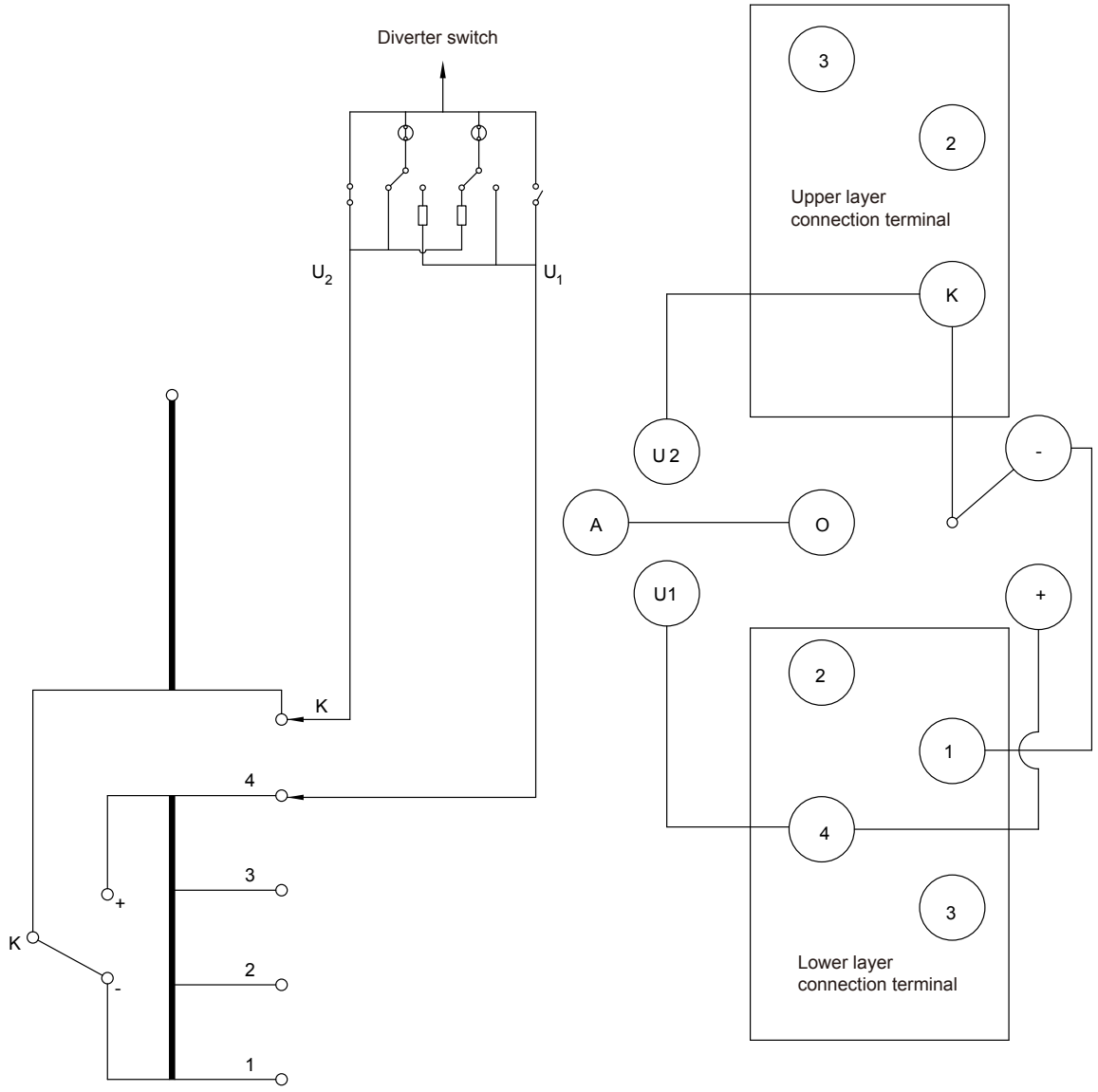


Operation position number	7
Different voltage number	7
Set position ○	4

Tap position display	1	2	3	4	5	6	7
Tap position display	1	2	3	4	5	6	7

○ Drawing is shown at the set position

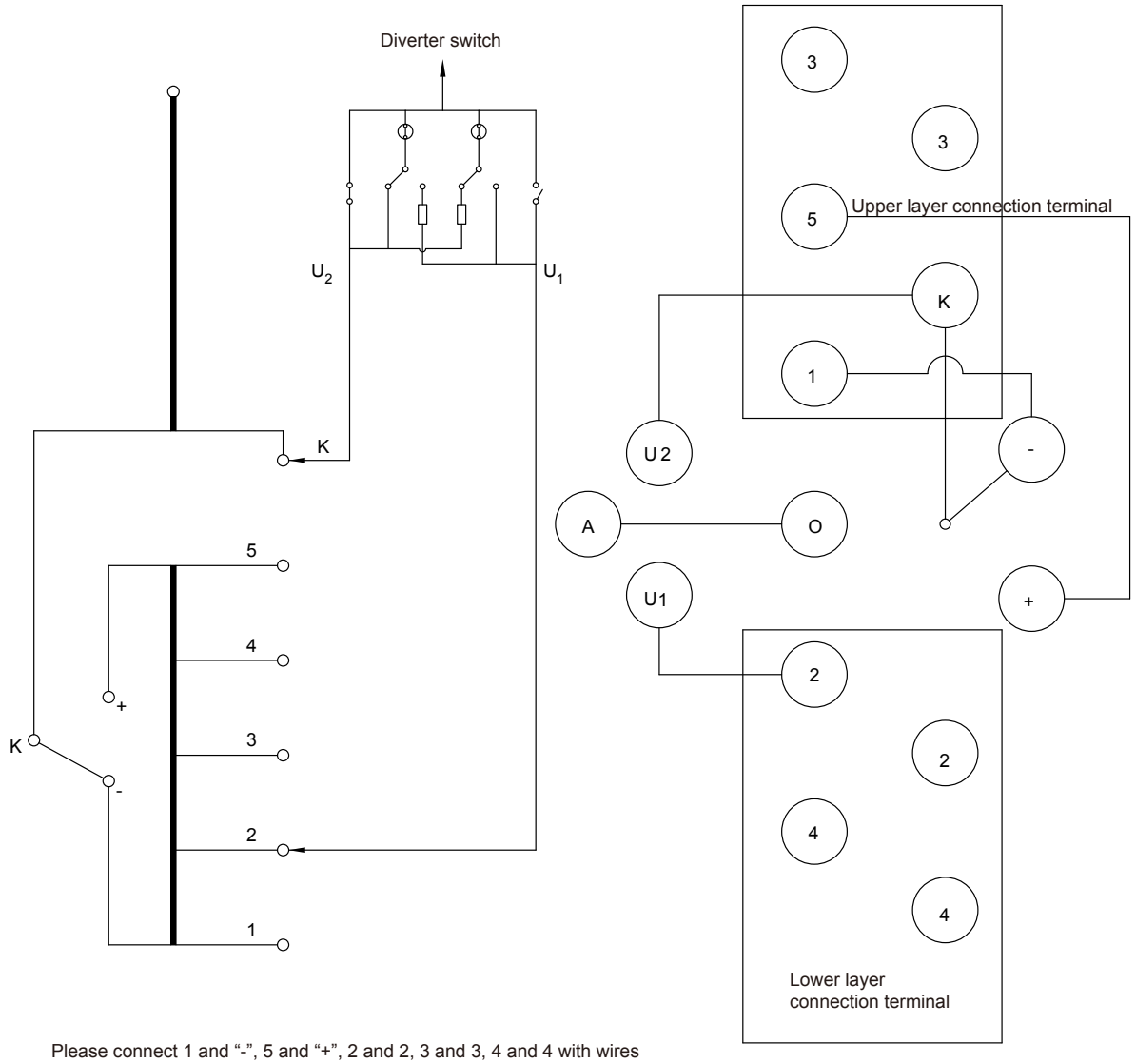
Appendix 10: Type HWV OLTC operating position table and connection diagram (10071W)



Please connect 1 and "-", 4 and "+", 2 and 2, 3 and 3 with wires

Operation position number	7
Different voltage number	7
Set position ○	4

Appendix 11: Type HWV OLTC operating position table and connection diagram (10091W)

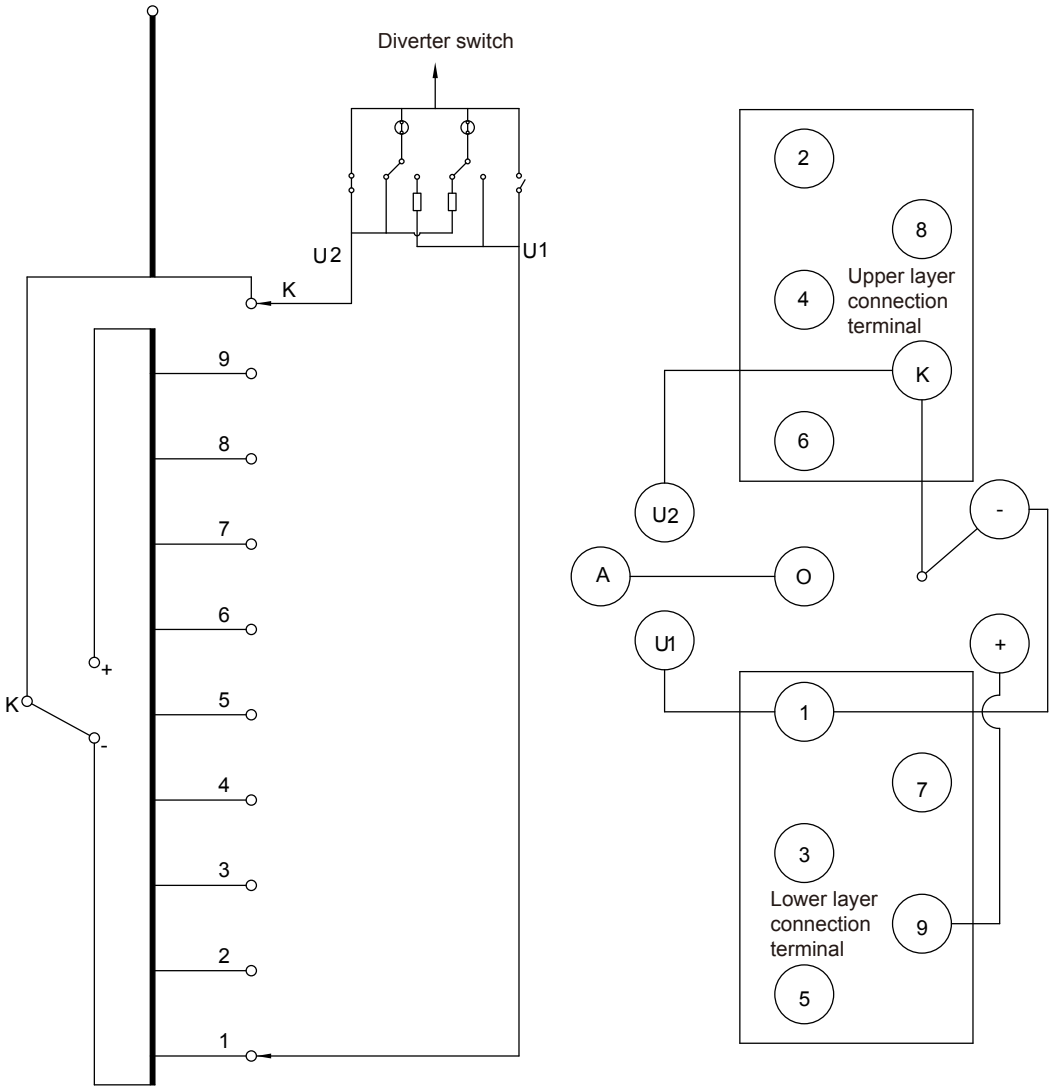


Please connect 1 and "-", 5 and "+", 2 and 2, 3 and 3, 4 and 4 with wires

Operation position number	9
Different voltage number	9
Set position ○	5

Tap selector contact	← K + →					← K - →			
Tap position display	1	2	3	4	K	2	3	4	5
Drawing is shown at the set position	1	2	3	4	5	6	7	8	9

Appendix 12: Type HWV OLTC operating position table and connection diagram (10191W)

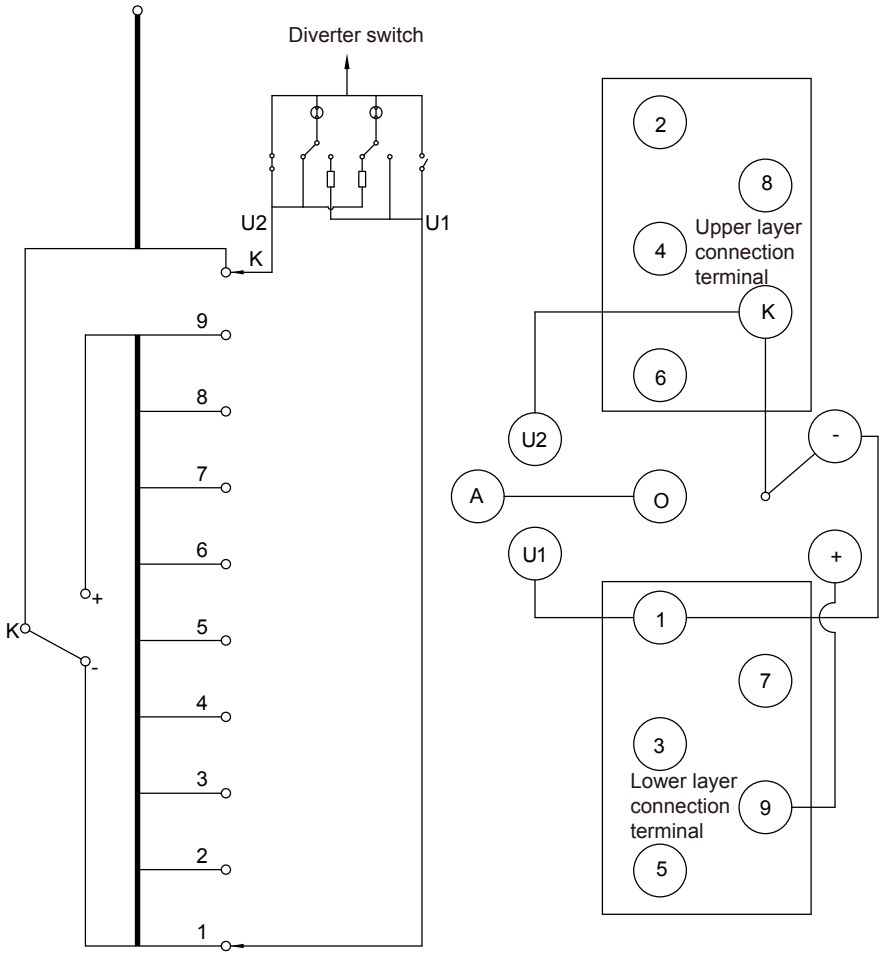


Operation position number	19
Different voltage number	19
Set position ○	10

Tap selector contact	← K+ →									← K- →								
Tap position display	1	2	3	4	5	6	7	8	9	K	1	2	3	4	5	6	7	8	9
Drawing is shown at the set position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

○ Drawing is shown at the set position

Appendix 13: Type HWV OLTC operating position table and connection diagram (10193W)



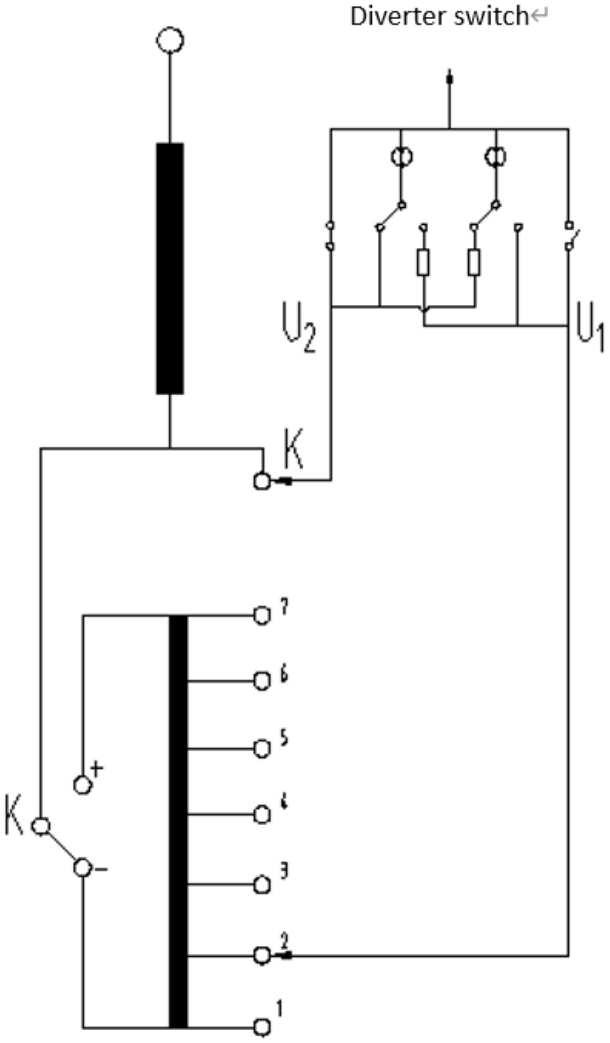
Operation position number	19
Different voltage number	17
Set position ○	9b

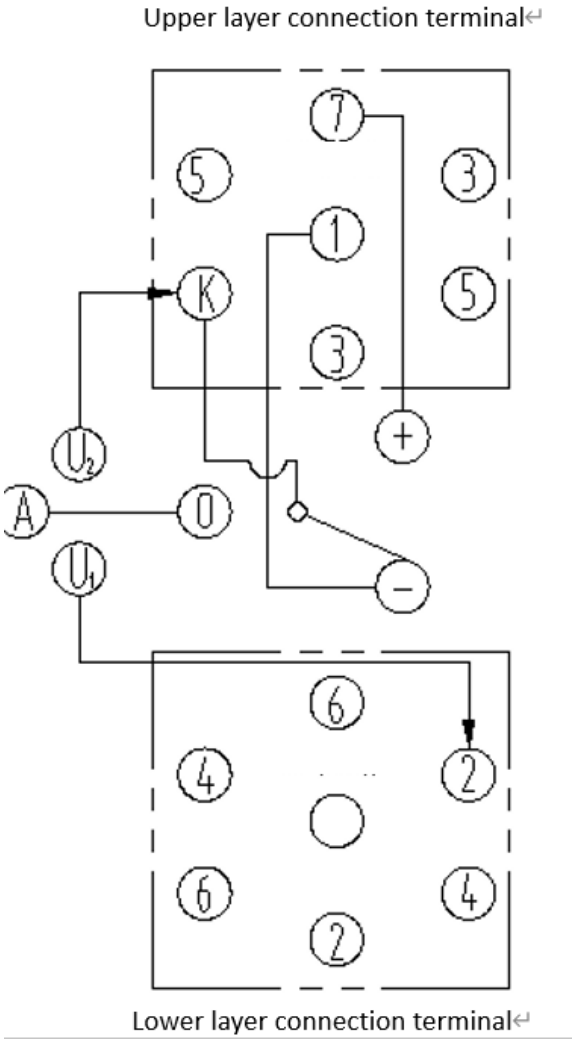
Please connect 1 and "-", 9 and "+" with wires

Tap selector contact	← K+										← K-								
Tap position display	1	2	3	4	5	6	7	8	9	K	1	2	3	4	5	6	7	8	9
Drawing is shown at the set position	1	2	3	4	5	6	7	8	9a	9b	9c	10	11	12	13	14	15	16	17

○ Drawing is shown at the set position

Appendix 14: Type HWV OLTC operating position table and connection diagram (14131W)





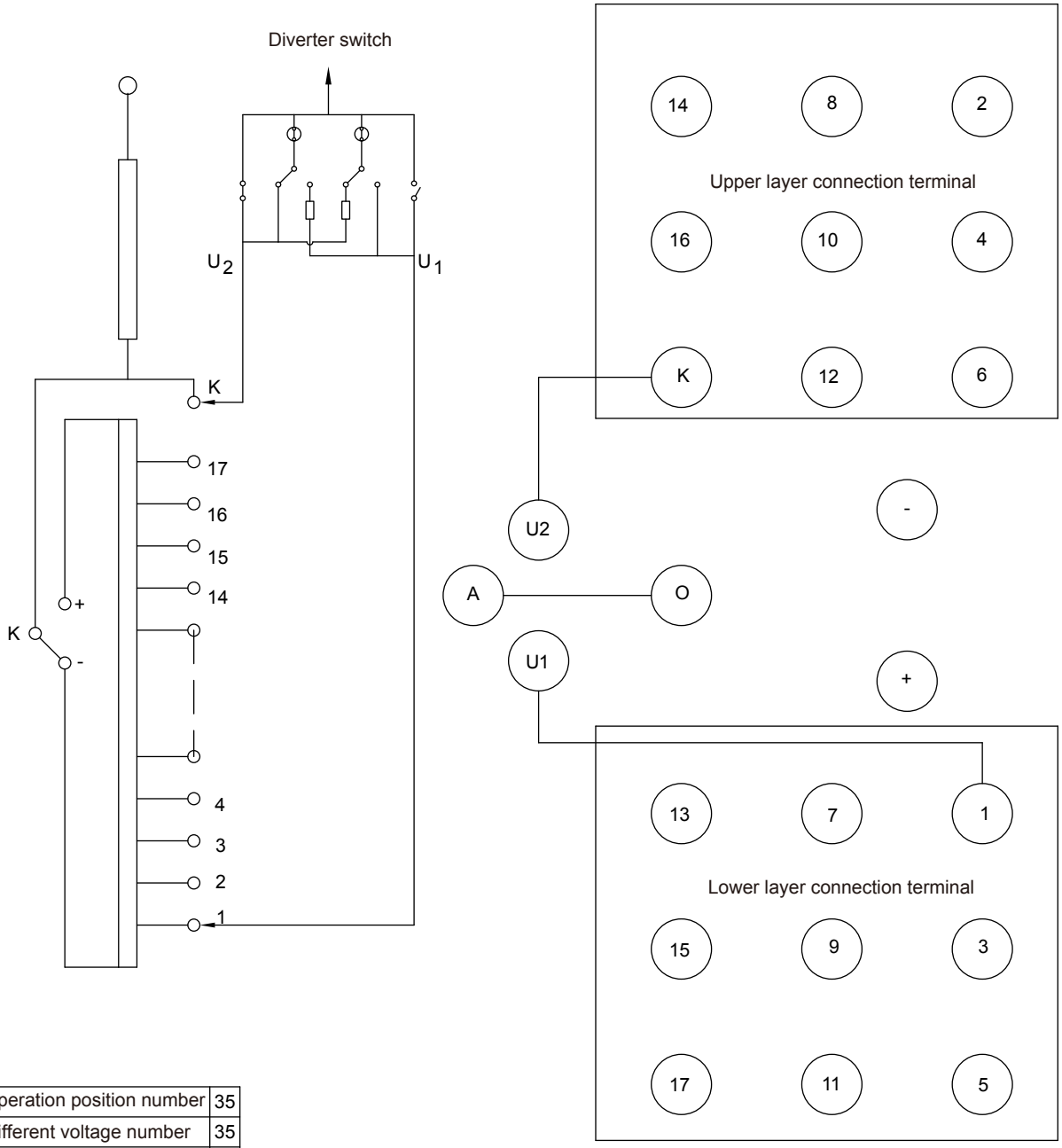
Operation position number	13
Different voltage number	13
Set position ∘	7

Tap selector contact	K+									K-			
Tap position display	1	2	3	4	5	6	7	8	9	10	11	12	13
Tap selector contact display	1	2	3	4	5	6	K	2	3	4	5	6	7
Indicating position	1	2	3	4	5	6	7	8	9	10	11	12	13

∘ ← the set positon.

Unit: mm

Appendix 15: Type HWV OLTC operating position table and connection diagram (18351W)



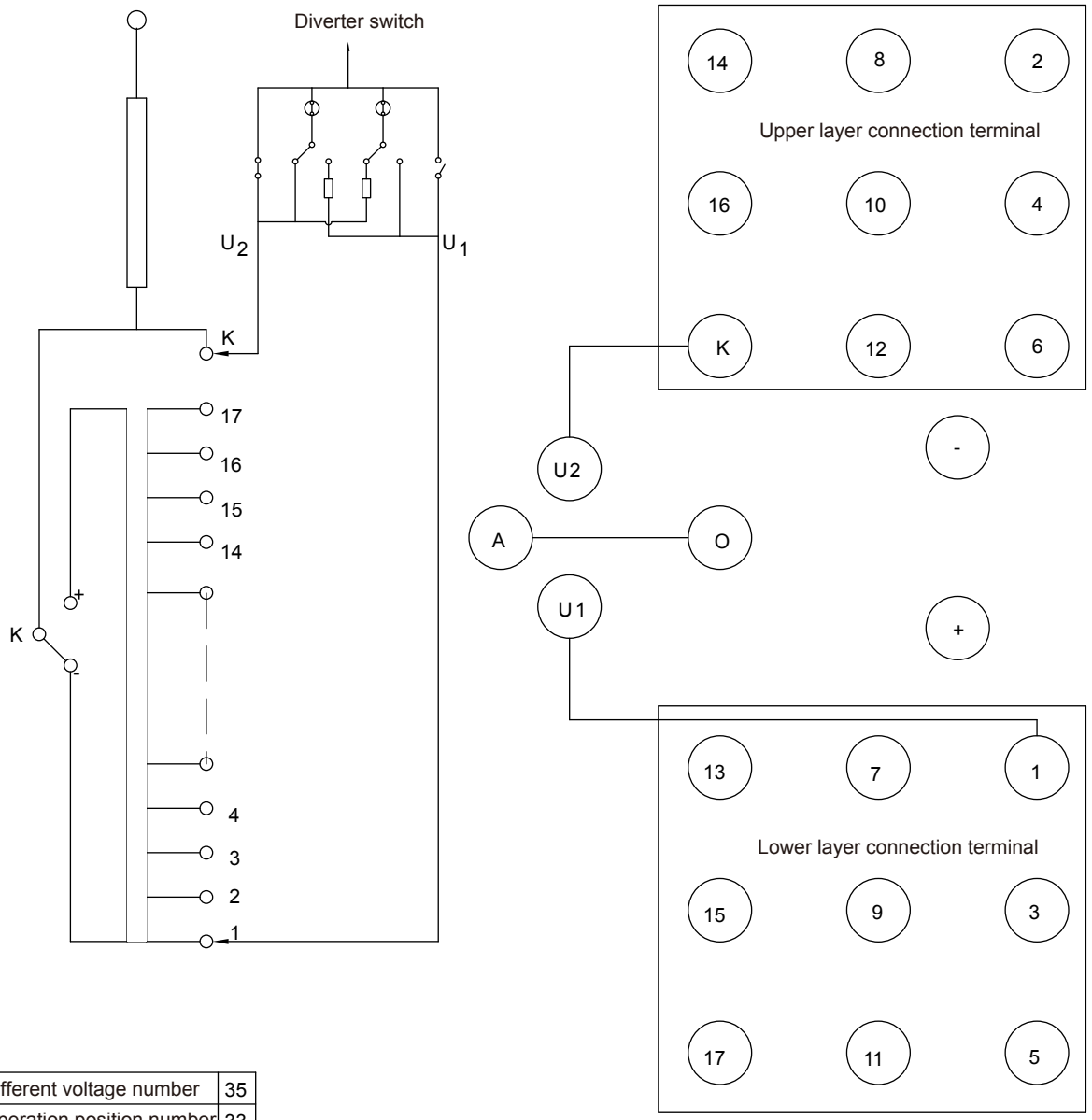
Operation position number	35
Different voltage number	35
Set position ○	18

Tap selector contact	← K+																	K- →																
Tap position display	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	k	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Drawing is shown at the set position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35

○ ←

Unit: mm

Appendix 16: Type HWV OLTC operating position table and connection diagram (18353W)



Different voltage number	35
Operation position number	33
Set position ∘	17b

Tap selector contact	K+																	K-																
Tap position display	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	k	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Drawing is shown at the set position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17a	17b	17c	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33

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