

OIL CURRENT TRANSFORMER





USER NOTICE

Keep this instruction manual in a safe and handy place in order that anyone operating or maintaining the equipment can quickly and easily refer to it when necessary. For guarantee or detail of equipment, refer to all documents concerned except the instruction manual.

Requirement of operator: only people familiar with and skilled in handling this equipment should be allowed to operate and/or handle it.

Please read the content concerned carefully in the instruction manual before installing, operating and maintaining the equipment. Familiarize yourself with all information of the equipment and safety precautions before using the CT, and then operate and handle it in accordance with the requirement.

Keep the following cases from happening when using the CT:

Operate or handle the CT in any manner that is not specifically explained in this instruction manual.

No checks and maintenance.

Operate the CT without transformer oil or abnormally run it.

The installation shall be carried out strictly according to the instruction manual, don't install it in any other than the specified way. Don't use the CT in any other than the specified rating. Don't open the secondary circuits of CT for any reason whatsoever.

Do not connect or install the CT when live. All must be done by only quantified personnel to perform maintenance and checks on the equipment. Don't touch live parts (including porcelain bushing). Always, open circuits and earth the main circuit before starting checks. Otherwise, it will lead to the risk of electric shock.

If anything in this instruction manual remains unclear, please contact our company.

If some other form of trouble occurs with the equipment, please contact our company in time and provide the following information.

Nameplate content and specifications of the said product (Name, Serial No., Type and Date of manufacture)

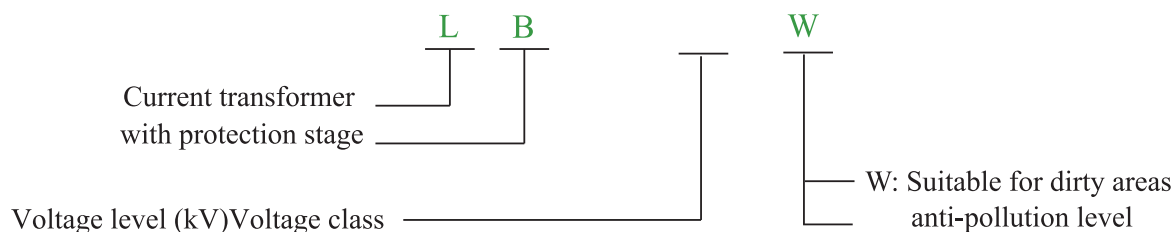
Description of the trouble (As details as possible, including the situation immediately before and after the trouble occurred).



INTRODUCTION

1.Type and name of the equipment

1.1 Meaning of type



L: Current Transformer

"B" denotes CT is the protective type.

"W" denotes CT can be used at pollution districts.

"W 2" denotes CT can be used at "III heavy" pollution districts.



1.2 Name: Current Transformer

2.Application and applicable scope

12.1 Application

In the outdoor alternating current power system with a rated frequency of 50-60 Hz and rated voltage of kV, this current transformer can be used for current measurement, electric energy measurement, automatic control and relay protection.

12.2 Applicable scope

Applicable scope

Ambient air temperature: -40°C — $+50^{\circ}\text{C}$

Wind speed $\leq 35\text{m/s}$

Pollution Level of the area (See the sheet)

Anti-pollution level		W1	W2	W3
Pollution level	I	II	III	IV
mm/kV Minimum nominal specific creepage distance	16	20	25	31



CONSTRUCTION AND OPERATING PRINCIPLE

2.1 Construction and dimensional drawing of the equipment (see fig.1)

This current transformer has a hermetical structure, each sealing surface has been hermetically sealed by oil resistant rubbers. In order to ensure each of connection fastened well and not to make the gaskets compressed too much, all parts of the equipment are sealed up limitedly. The equipment is mainly comprised of metallic bellows, device body, porcelain bushing, oil tank, primary winding terminal plate (see fig.2) and secondary winding terminal box. The primary winding forms 'U' type, using the insulation structure of oilpaper for capacitance type. The major insulation is sealed in transformer oil through the treatment of vacuum drying and hermetical oiling; the transformer oil used shall be fully treated through dehydration and degassing treatment. The insulation of the equipment has high electrical strength, low dielectric loss and low partial discharge. The transformation of current ratio can be carried out by the external implementation of series and parallel connections for primary winding terminal plate, or by the exchanged connection for secondary winding terminals, that is, measuring winding and protective winding can be tapped. Secondary windings go around the Ring core, set in the bottom of primary winding and placed in the oil tank; secondary winding terminal box is located in the front of oil tank, oil valve for draining is located at the bottom of oil tank. Metallic bellows is installed at the top of the product, which can play a role in volume compensation when the oil temperature varies, and isolate effectively the transformer oil from the atmosphere, so that prevent the ageing of transformer oil. Metallic bellows (PB type) is made of a certain number of expansion joints welded in series, which owns the advantages of displaying direct for the oil level and reflecting sensitively for the pressure. (see fig.3)

2.2 Electrical principle drawing (see fig.4)

2.3 Hermetical oil sampling device (see fig.5)

Unscrew the valve cover, oil sampling can be made by the syringe with pinhead puncturing the oil resistant rubber gasket. Get the required amount of oil and then put the cover on.

2.4 Hermetical oiling

You should use hermetical oiling. Before the oiling, please put clean the oil in the upper of the bellows.

Then connect with the joint of vacuum-pumping when remove the core of bellows, and unscrew the valve cover at the bottom, the oiling can be carried out by the syringe with pinhead puncturing the oil resistant rubber gasket (notes, the pinhead can not exceed the type No.7). At this moment, you should open the valve of vacuum-pumping and vacuumize for 2 to 4 hours. When the vacuum degree achieves such an extent ($\leq 133\text{Pa}$), you should open the valve of the oiler at the top, and inject qualified transformer oil with the same brand. And keep the degasification for 8 hours when completes the oiling.



MAIN TECHNICAL PARAMETERS

3.1 Rated voltage: kV

3.2 Highest voltage for equipment: kV

3.3 Rated primary current: A

3.4 Rated secondary current: A

3.5 Rated transformation ratio: A

3.6 Rated frequency: 50Hz

3.7 (Polarity): (Negative)

3.8 Accuracy classes:

3.9 Rated output: VA

3.10 Current error and phase displacement limit





3.10.1 Measuring windings: the current error and phase displacement at rated frequency shall not exceed the limit values given according to the corresponding items of the standard IEC 60044-1:2003,

when the secondary burden is any value from 25% to 100% of the rated burden.
(Notes: the secondary burden used for test purpose shall have a power-factor of 0.8 lagging) (Details in the following sheet)

Accuracy class	± Percentage current (ratio) error at percentage of rated current shown below					± Phase displacement at percentage of rated current shown below				
	± (%)					± (')				
	1	5	20	100	120	1	5	20	100	120
0.5	/	1.5	0.75	0.5	0.5	/	90	45	30	30
0.2	/	0.75	0.35	0.2	0.2	/	30	15	10	10

3.10.2 Protective windings: At rated frequency and with rated burden connected, the current error, phase displacement and composite error shall not exceed the limit values given according to the corresponding items of the standard IEC 60044-1:2003.
(Notes: the secondary burden used for test purpose shall have a power-factor of 0.8 lagging) (Details in the following sheet)

Accuracy class	Current error at rated primary current (%)	Phase displacement at rated primary current	Composite error at rated accuracy limit primary current (%)
	± (%)	± (')	± (%)
5P	± 1	± 60	5
10P	± 3	-	10



3.11 Instrument security factor for metering windings: $F_s \leq 10$

3.12 Accuracy limit factor for protective windings:

3.13 Limits of Temperature rise

The temperature rise of the current transformer when operating for a long term under rated primary current and rated output, shall not exceed the limiting value shown in the following.

- a. Temperature rise of the windings: 65K
- b. Temperature rise of the top layer of oil: 55K
- c. Temperature rise of exterior terminal (P1, P2, C1, C2) or interface of the windings: 50K



INSULATION PERFORMANCE REQUIREMENTS

4.1 Short-time power frequency withstand voltage

- a. Short-time power frequency withstand capacity on secondary windings and end shielding to earth: the applied voltage on winding-to-winding and winding-to-earth shall be 3kV/50Hz/1min, and on the end shielding-to-earth shall be 5kV/50Hz/1min.
- b. Short-time power frequency withstand capacity on primary winding sections: the applied voltage on primary winding sections shall be 3kV/50Hz/1min.
- c. Short-time power frequency withstand capacity on primary winding: the applied voltage on primary winding to secondary windings and earth shall be kV/50Hz/1min.
- d. External insulation short-time power frequency withstand capacity in dry and damp conditions shall be kV/50 Hz/1min.

4.2 Lightning impulse withstand

Full impulses: 1.2/50 μ s kV (peak)

4.3 Inter-turn insulation requirements

The rated withstand voltage for inter-turn insulation shall be 4.5kV (peak).

4.4 Capacitance and Dielectric dissipation factor ($\tan \delta$)

4.4.1 The value of dielectric dissipation factor should be referred to a voltage level in the range from 10kV to U_m / , $\tan \delta \leq 0.5\%$ ($U_m = kV$).

4.4.2 The applied voltage on the end shielding to earth is 3kV/50 Hz, $\tan \delta \leq 2\%$.



4.5 Partial discharges

Apply a voltage level of U_m , $PD \leq 10pC$; and apply a voltage level of $1.2U_m$, $PD \leq 5pC$ ($U_m=kV$).

4.6 Rated short-time thermal current (I_{th}) : kA/ s

4.7 Performance requirements of transformer oil

Transformer oil shall meet the requirements of the corresponding items of the standard IEC 60296:2003.



TRANSPORT, STORAGE, INSTALLATION AND TEST

5.1 The current transformer shall be fixed inside the packing box, and the transportation only can be performed after the packing is completed. The equipment injuries when dropped down or toppled over in transportation, do not transport it in any other than the specified way, and collision and other mechanical damages shall be prevented.

5.2 Transportation way: Horizontally fixed to transport

☐

Vertically fixed to transport

☐



5.3 When receiving packages, all packages should be inspected for their appearance based on the packing list prior to acceptance. And then unpack the box (notes, remove the top and side plates of the package while special caution must be taken not to damage the porcelain bushing) to inspect the equipment carefully, you should check whether there are damages during transportation such as porcelain bushing broken, oil leakage or deformation and so on, and also check whether the spare parts and technical data or documents are complete. Please contact our company immediately if you find something wrong, so we can investigate the cause and properly handle it in a timely manner. After the inspection, please return the equipment to the state in which it was transported as best possible to store the equipment safely.

5.4 The equipment shall be stored in the places with a ambient air temperature of $-25^{\circ}\text{C} \sim +50^{\circ}\text{C}$, and there shall be no fire goods, explosive substances, corrosivity and serious concussion. Water should be quickly and completely drained from the ground in case of outdoor storage. The equipment should be raised about 10cm above the ground by placing wooden blocks under the package for the purpose of securing better ventilation and protecting the packages and the equipment from immersion and rain. During long-term storage, you should check the performance of oil level and sealed condition periodically, handle it immediately if you find something wrong. The guaranteed valid period of packages of equipment is about 12 months after shipment. In case of packages to be stored after the valid period, such packages should be immediately unpacked and the equipment should be properly treated by moving it inside the warehouses after making inspection.

5.5 Remove the bolts for fixing the CT to the bottom plate of the package, and fasten 4 wire ropes of same length to the lifting lugs on the oil tank (notes, don't lift the CT on the top of it). The main wire ropes must be bound by using another rope or strap to avoid the main ropes loosening. The CT's top cover should be protected from damage by felt rings or rubber cushions. And then slowly lift the CT and move it to the supporting structure. Fix the CT by the attached mounting bolts. The hoisting shall be performed slowly and stably to prevent the action of impact force.

5.6 Examination before installation

5.6.1 Appearance inspection: inspect the CT carefully, maybe find damage during transportation, such as porcelain bushing broken, oil leakage or deformation and so on.

5.6.2 Check the performance of oil level. If the oil level lower than the normal line, you should add qualified transformer oil with the same brand in time.

5.6.3 Check the paint surface of metal fittings, if the paint comes off, you must touch up the chipped paint on it as early as possible.

5.6.4 Before operation, acceptance test shall be conducted according to the requirements of the contract and corresponding standard items: Insulation resistance measurement, Capacitance and dielectric dissipation factor measurement, Transformer oil test, Volt-ampere character measurement, Polarity checks, Current ratio measurement and so on.



5.7 Installation Notes

5.7.1 Before operation, the current ratio made by the connection of primary terminals in series or in parallel, and the connection of secondary terminals, which must be checked whether complies with the requirements of your operation. Regarding the connection methods, you can refer to the wiring diagram on the nameplate. All fixed fittings must be screwed tightly in order to preventing bad contact, which could cause a high temperature rise or secondary terminals open. If only can be allowed the connection in series or the parallel for the equipment, you should not change the primary terminal already connected.

5.7.2 The secondary leading cable must pass through the tube under the secondary terminal box (a round lid on the middle of the oil tank). The diameter of the cable shall be less than 40mm. After the cable getting through the tube should be connected with the secondary terminal, and then fasten the lid tightly. Use insulated tape to bind up the tips of the cable and fix it firmly with the clamp.

5.7.3 Each secondary winding of the equipment shall not be allowed to open. If one of secondary winding is not used temporarily, you must make the secondary terminals to be short-circuited. The primary end shielding terminal and the earthing screws on the oil tank must be earthed reliably, so that the equipment can be put into operation.

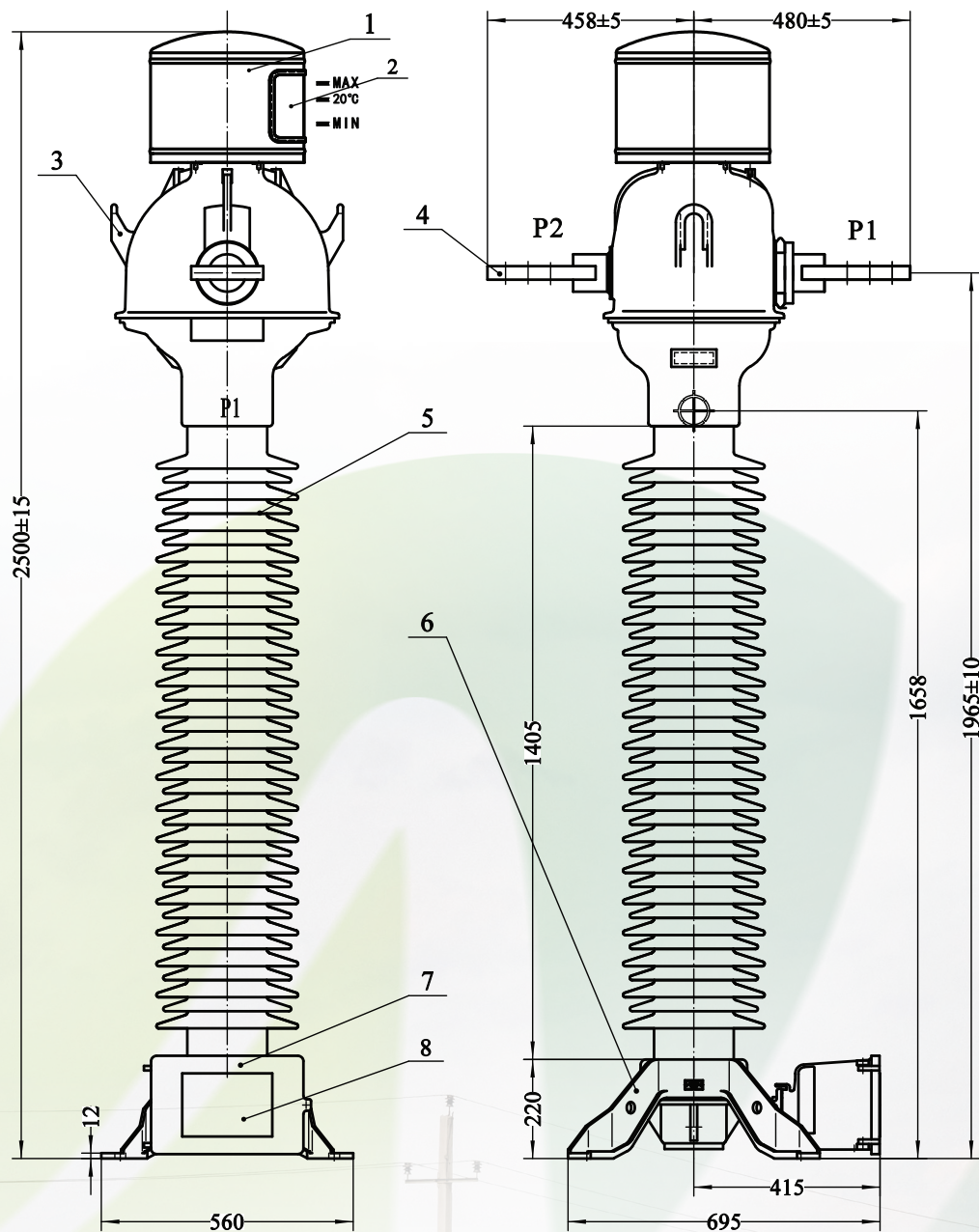


CHECKS AND MAINTENANCE

6.1 It is proposed that surveillance should be carried out during the operation.

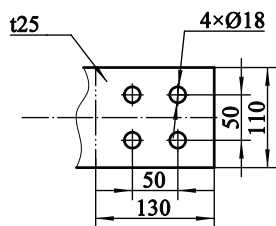
6.1.1 Monitor the oil level indicator (placed on the metallic bellows) frequently during the operation, because the oil level varies can reflect the change of internal pressure (or temperature) of the equipment. If the oil level is low because of oil draining, you should add the qualified oil timely; If the oil level is too low, you should check the equipment and find whether there is a leakage, and add the qualified oil in time after handling the leakage; If the oil level is too high, you can drain a little amount to make the oil level matching the actual temperature; If the oil level increases abnormally and exceeds the rated route of metallic bellows, you should stop running for further investigation.

6.1.2 In the operation, the insulation preventive test shall be conducted periodically according to the requirements of corresponding standard items. Focus on the following items:

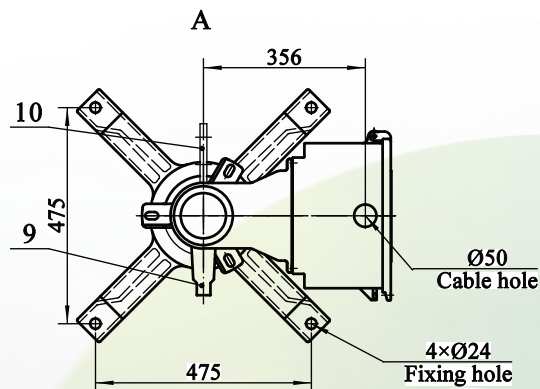
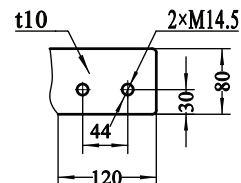




Primary terminal(Aluminum)



Earthing pad(Aluminum)



No.	Name
1	Bellows
2	Oil level guage
3	Lifting hole
4	Primary terminal
5	Porcelain bushing
6	Base
7	Terminal box
8	Rating plate
9	Oil drain valve
10	Earthing pad

NAME: CURRENT TRANSFORMER

MODEL:BBELVB-145

RATED RATIOS(A):2x600/5

ACCURACY CLASS:

P1-5P30/0.5/0.2S-P2

RATED BURDEN(VA):50/50/50

Ith:31.5kA/3S Idyn:80kA

RATED FREQUENCY(Hz):50

BASIC INSULATION LEVEL:

Um:145kV LI/AC:650/275 kV, 60s

INSULATION OIL/WEIGHT(KG):Mineral/PCB-free/55

CREEPAGE DISTANCE(mm):>4495

N.W/G.W(KG): 310/480

TRANSPORTATION PACKING SIZE(mm): 2860×800x1140



KOBN GENERAL ELECTRIC SOLUTION

Email: info@kobn.co.dk | Website: www.kobn.co.dk | Phone : +4553858123

Address: Rådhusstræde 10, st. 1466 København K