

MANUAL

Installation Manuel for Instrument Transformers

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Current Transformers

- When the secondary terminals are connected to the measuring or protection equipments, one of the terminals should be earthed for safety (See figure 1).

(Akım trafosunun Sekonder uçları ölçü veya koruma cihazlarına bağlandığında terminallerden biri güvenlik için topraklanmalıdır (bakınız şekil 1).)

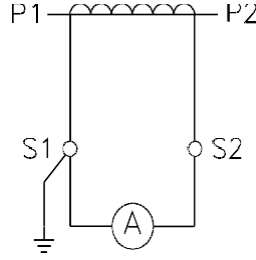


Figure – 1
(Şekil – 1)

- The secondary circuit of a current transformer must not be operated with an open circuit. (Akım trafosunun sekonder uçları açık devre olarak bırakılmamalıdır.)
- If the secondary winding of a current transformer won't be used, it must be short-circuited and earthed (see figure 2).

(Akım trafosunun sekonder sargısı kullanılmayacak olsa bile kısa devre edilmeli ve topraklanmalıdır (bakınız şekil – 2).)

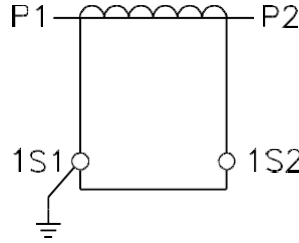


Figure – 2
(Şekil – 2)

- For the transformer with reconnectable and/or tapped secondaries, un-used terminals must be left open (see figure 3)

(Sekonder sargıdan ayarlı kademesi olan akım trafolarında kullanılmayan uçlar açık bırakılmalıdır (bakınız şekil – 3).)

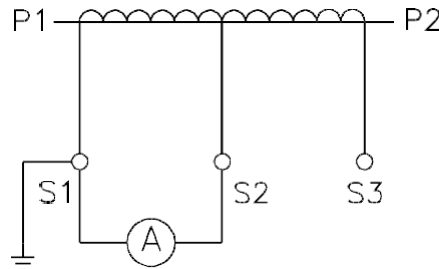


Figure - 3
(Şekil – 3)

- The current transformers which have capacitive divider tap (Ck) must be connected to indicator, if not used then must be earthed.

(Kapasitif akım trafolarının Ck (kapasite) ucu indikatör göstergesi ile irtibatlandırılmalıdır. Kullanılmayacak ise topraklanmalıdır.)

Voltage Transformers

- When the secondary terminals are connected to the measuring or protection equipments, one of the terminals should be earthed for safety (See figure - 4).

(Gerilim trafosunun sekonder uçları ölçü veya koruma cihazlarına bağlandığında terminallerden biri güvenlik için topraklanmalıdır. (Bakınız şekil – 4).)

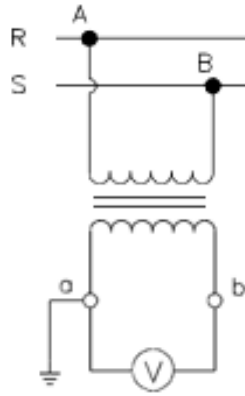


Figure – 4
(Şekil – 4)

- The base plate must be earthed.
(Trafonun şasesi topraklanmalıdır.)
- The secondary circuits mustn't be short-circuited during operation. Otherwise, the voltage transformers will be thermally destroyed.
(Sekonder uçlar çalışma esnasında kısa devre edilmemelidir. Aksi takdirde Gerilim trafosunda hasara neden olur.)

- If the secondary winding of a voltage transformer will not be used, then it must be open circuit with one of the terminals connected to the earth (see figure 5).

(Gerilim trafosu sekonder sargıları kullanılmayacak ise açık devre olacak şekilde bırakılmalı ve terminallerden birisi topraklanmalıdır (bakınız şekil – 5).)

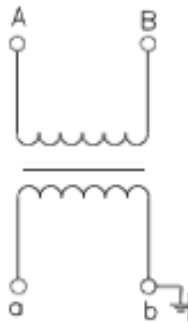


Figure – 5
(Şekil – 5)

- For single phase transformers, “N” the terminal of the primary must be earthed in the earthed (neutral) systems (see figure 6)

(Tek kutuplu gerilim trafosunda Primer sargının “N” ucu topraklanmalıdır. (Nötrü topraklanmış şebekelerde) (bakınız şekil – 6).)

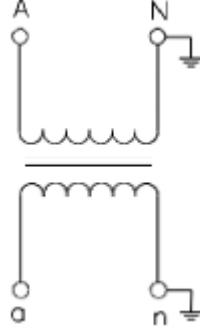


Figure – 6
(Şekil – 6)

- When using single pole insulated inductive voltage transformers; It should be noticed that especially when the circuit is being closed or the decaying period of an earth-fault there may occur ferro-resonances. These ferro-resonances can lead to overheating and destruction of the voltage transformer and can cause dangerous over-voltages. In general, ferro-resonance can be eliminated with by means of a constant resistor in the open-delta of each voltage transformer.

The open-delta connection is also used for earth-fault monitoring. The open-delta connection is made among the secondary terminals (da-dn) of three pieces of the single-phase VT when the three-phase system is constituted.

Tek kutuplu endüktif gerilim trafoları kullanıldığında; Özellikle devre kapalıyken veya bir toprak arızasının sönme periyodunda ferro-rezonansların oluşabileceğine dikkat edilmelidir. Bu ferro-rezonanslar, gerilim trafosunun aşırı ısınmasına ve tahrip olmasına neden olabilir ve tehlikeli aşırı gerilimlere neden olabilir. Genel olarak, ferro-rezonans, gerilim trafosunun çıkışlarının açık-üçgen sargı bağlantısıyla ortadan kaldırılabilir.

Açık üçgen bağlantı, toprak arızası izleme için de kullanılır. Üç fazlı sistem kurulduğunda, tek fazlı VT'nin sekonder terminalleri (da-dn) arasında açık üçgen bağlantı yapılır.

The single pole VT that are connected open delta, must be earthed just from one point as figure 7. Otherwise, a short-circuit is occurred between the secondary windings.

(Tek kutuplu Gerilim trafoları açık üçgen bağlandığında şekil 7 de gösterildiği gibi yalnızca bir noktası topraklanmalıdır. Yoksa sekonder sargılar arasında kısa devre meydana gelir.)

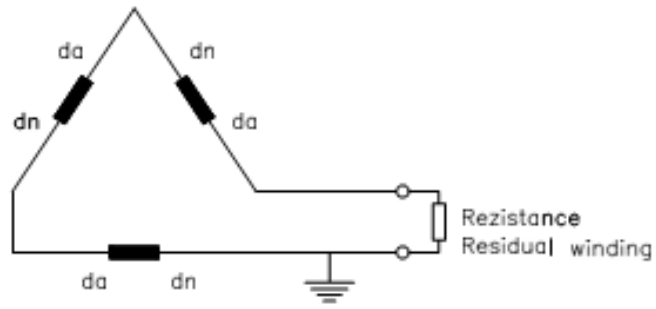


Figure – 7
(Şekil – 7)

Generally

- Select the proper primary rating for the circuit voltage and the load.
- Select the proper insulation class.
- Select instrument transformers which have the highest required standard accuracy classification at a burden rating equal to, or greater than, the maximum burden to be connected to their secondaries.
- When connecting instrument transformers, carefully observe polarity marks.
- Observe caution by proper grounding of secondaries.
- NEVER OPEN CIRCUIT A CT SECONDARY while the primary is energized. Always short circuit the secondary terminals before changing connections to prevent inducing high voltage into the secondary circuit.
- NEVER SHORT CIRCUIT THE SECONDARY TERMINALS OF A VOLTAGE TRANSFORMER. A secondary short circuit will cause the unit to overheat and fail in a very short period.
- After exposing current transformer windings to d-c current, it is always best practice to demagnetize the unit to eliminate the errors caused by retained residual magnetism.
- After the correct and most accurate instrument transformers have been chosen and all safety precaution have been observed, make the installation in a neat and workmanlike manner.
- If all the safety precautions are taken, these transformers are free of maintenance.

GENERAL GUIDELINES

for the

Transportation, Storage, Installation, Maintenance, Dismounting, Disposal and Recycling of INDOOR INSTRUMENT TRANSFORMERS

(a) The aim of this guide is to provide an idea over the transportation, storage, installation, maintenance, dismounting, disposal, and recycling guidelines for the instrument transformers manufactured by ALCE Electric Industries Corp.



Possible damage to the equipment and/or devices leading to risk of death and /or possible damage and hazard to the environment



Possible damage to health of the working personnel



Risk of possible death or permanent injury to the working personnel

Bu kılavuzun amacı ALCE Elektrik San. Ve Tic. A.Ş. tarafından imal edilmiş olan ölçü transformatörlerinin nakliyesi, depolanması, montajı, bakımı, sökülmesi, elden çıkartılması (atık)ve geri dönüşümü hakkında genel anlamda bir fikir vermektir.



Can kaybına yol açabilecek cihaz veya aletlerin zarar görmesi, çevreye zarar verilmesi ve/veya çevre açısından tehlikeli hal yaratılması riski bulunmaktadır.



Çalışan personelin sağlığına zarar gelme riski bulunmaktadır



Çalışan personelin ölmesi veya sakat kalma tehlikesi vardır.

1) GENERAL

ALCE guarantees that the instrument transformers (IT's) carrying ALCE markings are manufactured, handled, and stored according to the relevant standards specified by the purchaser. Consequently, it is essential that the purchaser should perform all the transportation (unless mentioned otherwise), storage, erection, operation, and maintenance activities in accordance with the instructions provided by ALCE and as directed in relevant standards.

IT's used:

- to convert large currents and/or voltages in the primary circuit to an appropriate level for secondary circuit equipment (relays and meters)
- to insulate primary and secondary circuit from each other to protect the secondary equipment from the harmful effects of large currents and/or voltages appearing during the operation



The use of ITs for other purposes than the described above, is forbidden if not agreed with the manufacturer and will result in the termination of the guarantee period.



The use of other apparatus (for connecting other devices, electromagnetic and/or electrostatic field regulation or insulation purposes) is not advised prior consulting the manufacturer. Not complying with these may result in the termination of the guarantee period. The manufacturer assumes no liability for the misused ITs, or any other damages inflicted by the misused IT's.

TRANSPORTATION & STORAGE

A special agreement should be made between the purchaser and ALCE Electric Industries Corp. if the service conditions cannot be guaranteed during transport and storage.

The transformers are delivered in wooden boxes or fastened to transport pallets. If the ITs are not going to be installed immediately after the delivery, the purchaser should handle and store the ITs in an appropriate manner. During transportation and storage, the transformers must be protected against direct sunshine.

ALCE recommends the ITs should be kept in their original packaging, in a roofed storage area where the ambient air is in between $-40\text{ }^{\circ}\text{C}$ and $+70\text{ }^{\circ}\text{C}$ (1K5 according to IEC 60721-3-1 1997). The ambient air should not be significantly polluted.

Moreover, the humidity limits should be within the specified limits of the relevant standards. Due to atmospheric conditions, condensation may occur from time to time. Condensation may be prevented by suitable ventilation and heating systems.

CAUTION

Due to excess weight (marked ($m \geq 25\text{ kg}$)), special safety measures should be taken before handling some type of IT's.

INSTALLATION

Inspection Before Installation

Before installation, the transformers should be inspected for any physical damage that may have occurred during the transportation or storage. Due to unusual storage conditions condensation may occur. Even though cast resin transformers are relatively impervious to moisture, insulation tests might indicate the possibility of the entrance of moisture into the molded transformer. If this is the case, refer to your sales representative or ALCE directly to resolve the matter.

Installation

The full assembly of the delivered IT's completed at the ALCE factory. The mounting position of the indoor transformer is up to the purchaser and can be chosen freely.

The transformers should be fixed firmly using the mounting base with four screws (M10 or M12 depending on the type) and washers in accordance with the starting torques. Fastening must be done on a smooth surface.



Prior connecting the primary terminals, the instrument transformer shall be properly grounded using the M8 screw on the base plate.



Due to dangerous voltage levels, any installation and/or maintenance servicing must be carried out by qualified personnel.

Current Transformers

(b) Primary connections

There are M10 or M12 (depending on type) screws with washers used for fastening the primary conductors to the terminals. They should be tightened firmly in accordance with the starting torques provided in the catalogues. For primary reconnectable current transformers, the ratio can be reconnected by changing position of nickel-plated copper links fixed by M8 screws without removing the already fitted primary conductors. In low current ratio, both nickel-plated copper links shall be mounted as shown in Fig.1(a) for all times.

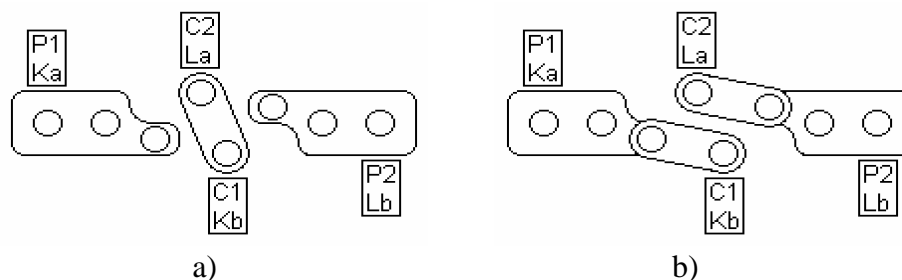


Figure CT-1 Reconnectable current transformer
(a) low current ratio, (b) high current ratio.

Secondary connections



Secondary circuits of the current transformers shall never be open circuited.

Secondary circuits shall never be open circuited in current transformers. For that reason, before connecting the primary make sure that either the secondaries are connected to measuring devices (Figure CT-2) or short-circuited (Figure CT-3). Moreover, make sure that one side of each secondary winding is always grounded for safety.

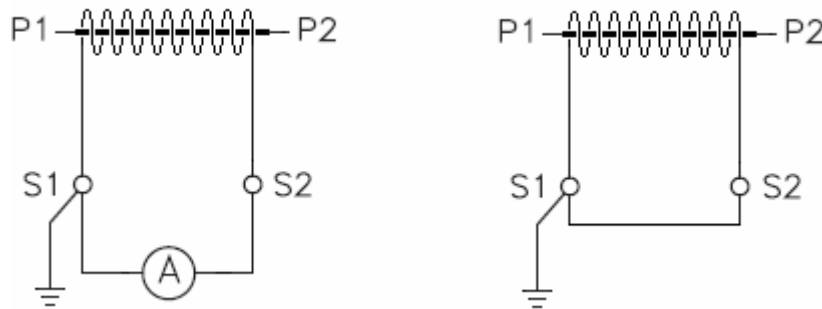


Figure CT-2 Figure CT-3

For the current transformers with tapped and/or reconnectable secondaries, unused terminals must be left open (Figure CT-4). The current transformers which have capacitive divider tap (Ck) must be connected to the indicator. If the tap will be unused, then it must be grounded as well.

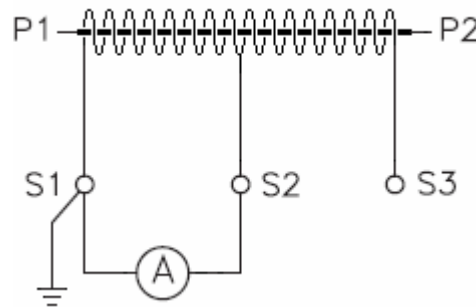


Figure CT-4

1) Voltage Transformers

Primary Connections

There are M10 or M12 (depending on type) screws with washers used for fastening the primary conductors to the terminals. They should be tightened firmly in accordance with the starting torques provided in the catalogues.

The voltage transformers designed to operate between two phases, each terminal should be properly connected to the relevant phase (Figure VT-1). For single phase transformers, the terminal of the primary “N” must be grounded in the grounded (neutral) systems (Figure VT-2).



Secondary circuits of the voltage transformers shall never be short circuited.

To prevent the thermal destruction of a voltage transformer, the secondary circuits of a voltage transformer shall never be short circuited. When the secondary terminals are connected to a measuring or protection device, one of the terminals must always be grounded for safety (Figure VT-1 and Figure VT-2). If the secondary windings of a voltage transformer will not be used, then it must be left open circuited and one of the terminals must be connected to ground (Figure VT-3).

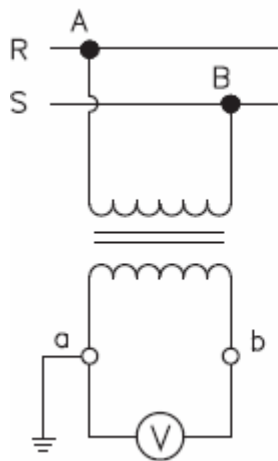


Figure VT-1

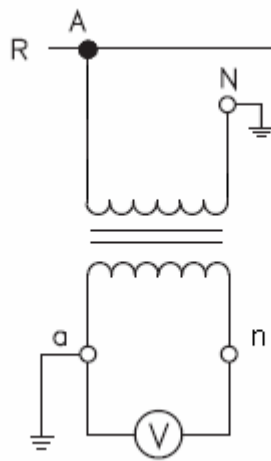


Figure VT-2

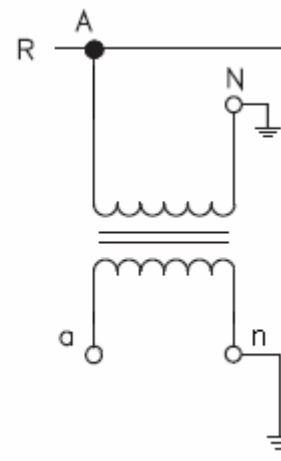


Figure VT-3

The secondary terminal cover box (IP20) for indoor use is made from plastic. The cover is provided with either three detachable threaded inserts PG16 or one detachable threaded insert PG21 depending on the type of the instrument transformer.

Terminals are wired and marked according to the purchaser's request and are provided with M5 screws for secondary wiring connection and with through going holes for direct grounding of the secondary circuit by M5 screws. The terminal cover is sealable.

MAINTENANCE



Due to dangerous voltage levels, any installation and maintenance servicing must be carried out by qualified personnel.

Before performing any maintenance servicing on the transformers, make sure that the transformer is deenergized both from the primary and secondary windings.

After taking the necessary precautions (by grounding the busbars) brush off the excessive dust or other kind of pollution. Polluted transformers can be cleaned with spirit or toluene. Minor surface damages can be removed with sandpaper.



Repairing greater surface damages and traces of acs must be requested from the manufacturer.

DISMOUNTING



Due to dangerous voltage levels, any installation and maintenance servicing must be carried out by qualified personnel.



Due to excess weight in some types, special safety measures should be taken before handling the transformers marked ($m \geq 25$ kg).

Before dismantling the instrument transformers, make sure that the transformer is deenergized, both from the primary and secondary windings. After taking the necessary precautions (by grounding the busbars), unscrew the M10 or M12 screws (depending on the type) used for fastening the primary conductors to the terminals. When the IT is freed from the busbars, unscrew the four screws fastening the transformer using the base plate. Take the necessary precautions as the IT's are generally heavy instruments.

RECYCLING, DISPOSAL AND THE IMPACT ON THE ENVIRONMENT

The IT's contain recyclable parts such as copper and steel. The recycling procedures should be applied to copper and steel parts in accordance with the local laws.



Incinerating the disposable parts may generate toxic and harmful gases. Incineration process should be carried out by certified incineration plants.

It is to the best knowledge of ALCE that, the disposal of the non-recyclable parts in trash or landfills can be carried out safely. However, it is the responsibility of the end-user to check the local laws, regulations, and policies in the action of recycling and disposal of instrument transformers. ALCE will gladly and properly recycle and dispose the used instrument transformers for its customers.