"I.G." TRANSFORMERS

Instructions for Distribution Type Post and Type Substation Transformers

Cía. Manufacturera de Artefactos Eléctricos, S. A. de C. V.

Instruction I.G.: **FA-LHC/TP01** Review: **January 2017**

Content

I Instructions for reception, installation, operation and maintenance

1 Introduction and field of application

The company **Manufacturera de Artefactos Eléctricos, S.A. de C.V.** appreciates your preference for having an "IG" transformer, which has been designed and carefully manufactured according to the national standards and / or specifications of the customer or final user in order to provide you with a product that meets your needs and expectations.

This manual has been written with the intent of providing you with instructions of usage, handling and cautions, as well as recommendations and warnings that you should take into account once you have purchased your transformer, given that due to its nature, it requires a proper installation, adequate handling and usage, and a maintenance program with tests, which may allow it to be evaluated and extend its working life.

When receiving your "**I.G.**" transformer or before assembling and installing it, it is essential that you carefully read these instructions to ensure safe handling and use to avoid any damage or loss. It is also important to take into account that the installation, commissioning and maintenance of your transformer should be carried out exclusively by qualified or expert personnel with the necessary expertise. Otherwise, you take unnecessary risks that could damage your transformer and void your warranty.

This instruction manual includes pole-type and substation-type distribution transformers manufactured in accordance with NOM-002-SEDE / ENER-2014 and NMX-J-116-ANCE and / or CFE K1000-01 specifications. It covers transformers of the following capacities and insulation level:

Single-phase Post Type:	from 10 to 167 kVA, from 1,2 to 34,5 kV
Three-phase Post Type:	from 15 to 150 kVA, from 1,2 to 34,5 kV
Single-phase Substation Type:	from 250 to 500 kVA, from 1,2 to 34,5 kV
Three-phase Substation Type:	from 225 to 500 kVA, from 1,2 to 34,5 kV

2 Reception

Before leaving the factory, all "**I.G.**" transformers are thoroughly inspected and tested to ensure that they conform to the requirements of the standards and specifications established by the customer or end user. However, once you receive your transformer it is necessary to follow the recommendations below to check the condition or conditions in which you receive it. Use the list in section III to record verification.

- **a.** Check that your transformer is mounted on a wooden pallet, which is intended to protect it from damage or shock during transportation, handling and storage before installation.
- **b.** Check transformer capacity and series against plate and document data.
- **c.** Check that both the medium and low voltage nozzles have no cracks or cracks.
- **d.** Check that all accessories such as valves, levers or operation handles, shunt changer, etc., do not damage or leak oil.

2 Reception

e. Check that gasket and cap gaskets, medium and low-pressure nozzle settlements, connectors, valves, operating levers, shunt changer, and other accessories are free of oil stains. Otherwise, it may be an indication of leakage.

3 Handling

Your "**I.G.**" transformer is provided with hooks or lugs for lifting maneuvers. If using metal chains or strobes, protect the area of contact with the lifting hooks to avoid deterioration of the coating.

During the maneuvers, do not allow the chains or strokes to come into contact with the nozzles as this may cause them to break. On the other hand, never hold or lean or pull on the medium or low voltage nozzles, low voltage protection frame, lightning arrester or any other accessory (see *figure 1*).

The wooden platform on which the transformer is shipped can be used to move it with a forklift. We recommend that you keep it to the place where your transformer will be installed. If removed earlier, the transformer may suffer accessory damage or anti-corrosion coating. Prevent your transformer from being dragged without its pallet, this can deform, damage, or even deteriorate the bottom coating and, thus, it can start the corrosion process.

If it is not possible to move your transformer with a crane or hoist, alternatively you can slide it on rollers using the same packaging pallet; Take care not to tilt it too much and distribute efforts on the basis.

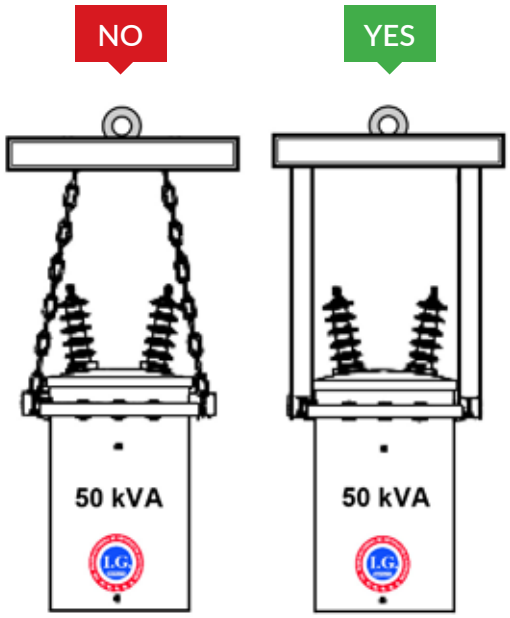
The transformers of 225 to 500 kVA are designed in such a way that they can slide in directions parallel to the transformer shafts because they have reinforcements that allow the use of levers or jacks for their handling. Use these attachments to take it to your installation site and prevent the bottom from deforming by improper maneuvering.

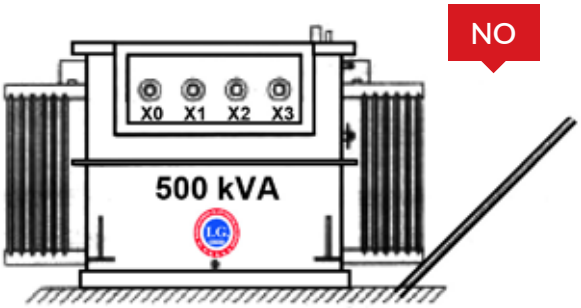
For transformers in which the main lid is provided with handles, use these only to lift the lid. Never use these handles to lift the transformer.

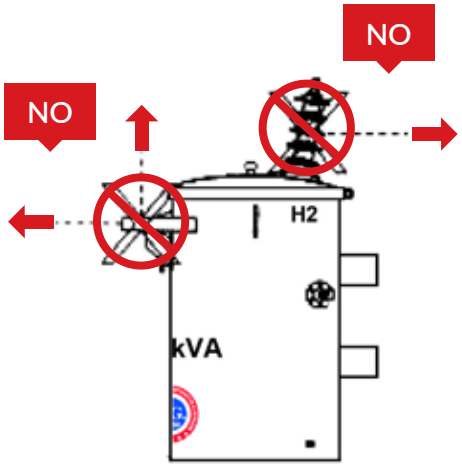
If your transformer has radiators, do not leverage or pull them or use them as lifting devices as this causes deformation that obstructs free circulation of the oil or breakages that will leak (see *figure 2*).

4 Storage

All "**I.G.**" transformers are hermetically sealed for leakage and moisture penetration, so they can be stored indoors or in the open. In any case, always store your transformer on a stage and place it on solid floor, level and free of flooding. Also, protect it against acts of vandalism or any physical damage, especially the medium and low voltage nozzles and external accessories.







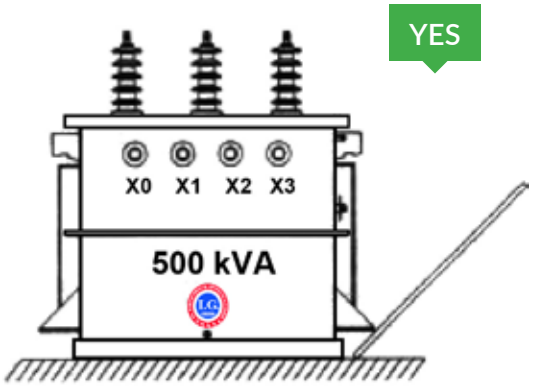


Figure No. 1

Figure No. 2

5 Installation / Assembly

Before installation, installation and commissioning of your "**I.G**." transformer, it is essential that you make and register in the list in section III the following checks:

5.1 **Characteristics of your transformer:** These must correspond to the required operating conditions (Line voltage and requested capacity, among others). Check this on the data plate.

5.2 **Transformation ratio:** Check that it is correct for all phases and positions of the tap changer. Check that the windings are not shorted or open.

5.3 **Insulation resistance:** Check that the windings are not shorted between them or grounded or with a low resistance (less than 1 000 megohms / kV at 200C / 1 minute).

5.4 **Earth resistance:** Check and verify that the earthing system is suitable for the installation site of your transformer.

5.5 **Grounding connection:** Be sure to connect your transformer to ground, for which it is necessary to verify the resistance directly from the cable that connects to the transformer tank. If you energize your transformer without being solidly grounded, it may cause damage and therefore void the warranty.

5.6 Verify that your transformer is not leaking or signs of leakage or damaged nozzles or accessories. Also, make sure that it is leveled to prevent any interior spots on the oil level.

5.7 Check that the protections or accessories not included in your transformer are appropriate in accordance with the required technical or coordination specifications.

5.8 If you need to install your "**I.G.**" transformer inside an enclosed space, make the necessary air inlet and outlet provisions sufficient to ensure adequate ventilation.

6 Operation

Your "**I.G.**" transformer has been designed and built to the highest quality standards. By its nature, it has no moving parts, it practically operates alone and its chances of failure are minimal. To avoid faults, damage or shorten the life of your transformer, as well as to ensure a reliable, safe and continuous service of the electric power, in addition to avoiding invalidation of the guarantee, we recommend to take into account the following:

6.1 Properly install your transformer in accordance with point 5 of this section and other practices deemed appropriate by qualified technical personnel.

6 Operation

6.2 Before operating your transformer, you must first connect it in a vacuum to ensure that it is energized normally. Therefore, it is essential to follow the following indications:

a. The verification must be carried out with the low voltage terminals totally free (the cables must not be connected). If your transformer is self-protected, make sure the low voltage switch is in the "**C**" position. See operation of switch in *section 3.2* of *section II*.

b. When you lift the bobbins, you must do this quickly to avoid any overhanging or surges that may cause damage to your transformer.

c. Once the transformer has been energized, there should be no strident sound, abnormal hum or vibration. In such a case, immediately switch off the power supply of your transformer and check the earth system again, connections and protections, and check the recommendations already mentioned. Make sure it is level or has no evidence of low oil level. If the guards operate, follow the recommendations given here.

d. Once you have energized your transformer check the voltage of the secondary (phase-phase and phase-neutral). If the measured voltage differs by more than ± 2.5% from nominal or expected, make sure that the shunt changer is in the correct position. If you need to change position, deenergize the transformer and calculate to determine the correct "tap" position to use to get the voltage closest to the nominal or desired voltage.

> **NOTE:** "**I.G.**" transformers are shipped with the internal connections established in the Mexican standard NMX-J-116-ANCE or, as specified by the customer, which are indicated on the data plate. If you need to change the connection of your transformer, ask for it to the factory and avoid unqualified personnel or unauthorized workshops to make the change of connection as it runs the risk of an unsafe condition and invalidation of its warranty.

6.3 Ensure that the load is as balanced as possible in each phase. Avoid overloading one phase more than the other phases.

6.4 Always operate your transformer under normal conditions and with adequate protection. Do not overload it because if you do it frequently and / or for prolonged periods, the overheating will cause a decrease in the properties of your insulation (accelerated aging), which can cause a failure. On the other hand, check that the tap changer is in the position corresponding to the nominal or secondary voltage or the nearest to it.

6.5 Perform effective preventive maintenance on your transformer, protections and installation site.

Therefore, to extend the working life of your transformer, check that the installation and its protections are appropriate. When in service, always keep it under normal operating conditions, without exceeding its capacity or operating without adequate protections. Lastly, in order to detect or avoid major faults or damages to your equipment, subject it to a rigorous preventive maintenance program, as indicated in *point 7*.

7 Maintenance

In grids *1, 2 and 3* for Maintenance in *point 10* of this section inspections, tests and specifications for general preventive maintenance are indicated, which you must apply to your "**I.G.**" transformer. However, it is further recommended that you perform the necessary checks and actions as directed by your Maintenance expert, including the transformer and installation site protections, as well as those listed below. Do not forget that before performing any maneuver you should check that your transformer is deenergized.

7.1 Low and Medium Tension Nozzles

Check for cracks, chips, or fractures. If they have these defects, replace them immediately. In case of oil leakage, slightly tighten the locking bolt nuts (only for medium tensioning in external holding). If the leak is by the connector and the connector has no stop, rotate or tighten it slightly and carefully to avoid fracturing the nozzle.

For transformers with low and medium voltage nozzles with internal clamping system, it is necessary to remove the main cap for access to the nozzle clamping. Remove enough oil until the clamping system is uncovered and tighten the screws or nuts according to the table in *section IV* any maneuver must verify that your transformer is deenergized.

7.2 External tap changer

Check that the gaskets are free of oil leaks. If this is the case, slightly tighten the changer nut. If the leak persists, replace the gasket for which you must remove the main cover and lower the oil level until access to the exchanger.

7.3 Recoating

The "**I.G**." transformers have a protected tank with a high quality coating to give you the best guarantee of resistance to the most aggressive environments. However, if there is such damage to the coating that the metal is exposed, it is necessary to give it a maintenance in order to inhibit the corrosion process.

To repair the coating adequately prepare the surface to be coated and apply a layer of 50 to 75 µm (2 to 3 thousandths of inches) of dry thickness of an organic epoxy-polyamide zinc primer (CFE-P9); After it has dried, apply a high solid vinyl finish coat (CFE-A5) with a thickness of 75 to 100 µm (3 to 4 mils). The color with which the transformers are normally supplied is ANSI 70 gray.

7.4 Seals of other accessories

Carefully inspect all attachments or seals for attachments. In case of leakage, immediately correct it and check that the oil level matches the respective mark. If you suspect moisture in the oil, check it and make sure that it meets the values set out in table 3 of point 10 of this section. If these values are not met, remove your transformer, and then give the coils a drying, and oil change treatment.

7 Maintenance

> **NOTE:** Any repairs with an open transformer should be carried out in a closed, clean, humidity-free place. As necessary, remove enough oil to maneuver and avoid contact with it. Also, be very careful to store it in a clean, moisture-free container so that it does not become contaminated. After the repair, fill the oil to the indicated level mark and make sure that your transformer is sealed.

In case of any repairs to your transformer, ask for tests of voltage of dielectric rupture and power factor of the oil, as well as measurement of the resistance of the insulation and proof of tightness. This is to verify that the oil is in good condition and that its transformer is hermetically sealed and moisture-free (consult the limits of acceptance in *table 3* of *point 10* of this section).

8 General Recommendations

a. Do not energize the transformer if the oil is below the marked level inside the tank or if the transformer is not level.

b. Do not open the inspection log (if fitted) or the transformer main cover in humid environments. When closing, take special care to place the gaskets in position and make sure that they are hermetically sealed. The opening is at the risk and risk of the person doing it, unless expressly authorized by "**I.G.**".

c. Do not approach the transformer de-energized (on the line) without first checking that the tank and the low voltage are connected to ground and you are sure that it is deenergized. Connect the primary side to ground before making any maneuver.

d. Never operate the shunt changer with the transformer energized. Once you are in the appropriate operating bypass, make sure that it is properly in place and secure the lock or padlock to prevent accidental operation.

e. Do not operate the transformer if there are signs of internal failure such as bulging of the tank, excess leakage of oil through the cap, nozzles, or accessories where it carries seals or gaskets.

f. Immediately replace any damaged nozzles.

g. In areas where the transformer is exposed to extreme saline, chemical, cement dust or sandstorms it is necessary to inspect and clean nozzles and lightning arresters more frequently to keep them reasonably free from sediment, thus reducing the potential for failure by toning in the nozzles.

8 General Recommendations

h. All repairs to your "**I.G.**" transformer that is under warranty must be made according to specifications of **C. M. A. E.** and by authorized workshops.

i. All complaints must be made directly at our branches or with our distributors. Any repair not authorized by **C. M. A. E.** (Mexican Industrial Classification System) will automatically void the warranty.

9 Expected working life and warranty

"**I.G**." transformers are designed and manufactured to achieve an expected service life of at least 20 years under the conditions and provisions set forth herein. When purchasing your "**I.G.**" transformer, be sure to receive the warranty policy, which establishes the conditions and terms to be able to request your warranty, when this is the case. To make the warranty effective, you must observe and comply with the conditions and provisions established in the policy and these instructions. Likewise, according to what is established in the norm **NOM-002-SEDE / ENER-2014** the following will be additional cause of exemption of the warranty:

a. When the transformer has been installed by unqualified personnel.
b. When there is no evidence of the satisfactory result of the tests performed before its energization (see list in *section III*).
c. By adverse environmental or weather conditions.
d. For not protecting the transformer against overcurrent, surges or overloads.

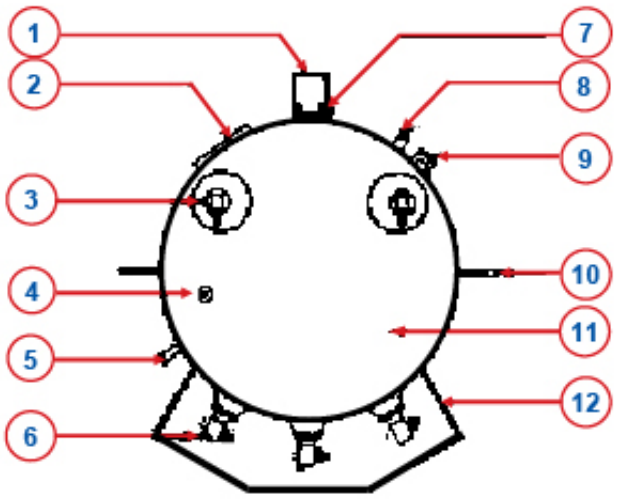


Figure No. 3

Part	Description of Transf. Single-phase	Qua.
1	Post assembly bracket	2
2	Data plate	1
3	Medium voltage nozzle	2
4	Provision for manovacuometer (optional)	1
5	Overpressure relief valve	1
6	Low voltage nozzle	3
7	Screw for tightening the belt	1
8	Tank Ground Connector	1
9	Tap changer	1
10	Lifting hook	2
11	Lid of transformer	1
12	Protection frame of B. T.	1
13	Stencil capacity and nozzles	6
14	Cover cap strap - tank	1
15	Ground connector for B. T.	1
16	Transformer tank	1
17	Drain Valve - Sampling (optional)	1
18	Cable to connect B. T. to ground	1

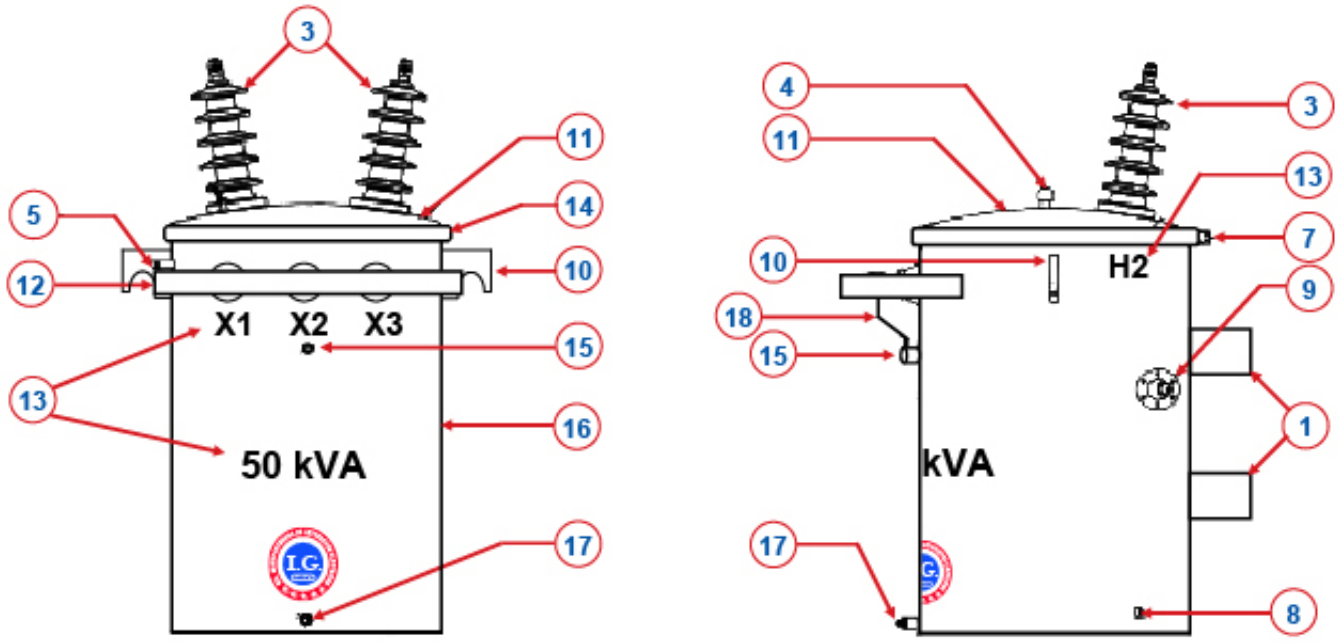


Figure No. 4

10 Maintenance Tables

Table 1 Critical Maintenance (1)	
Points for inspections	**Frequency**
1. Low and Medium voltage nozzles	Every 2 years
2. General accessories	Every 2 years
3. Tightness (no leakage or moisture penetration)	Every 2 years
4. Tank (recoating)	Every 5 years
5. Grounding connections	Every 2 years

Table 2 Maintenance tests (1)	
Test	**Frequency**
1. Isolating oil: **a.** Dielectric voltage **b.** Power factor at 25 °C **c.** Color ASTM D-1500	Every 2 o 3 years
2. Resistance of the isolations at 20 °C	Every 2 o 3 years
3. Ohmic resistance of the windings at 75 or 85°C	Every 2 o 3 years
4. Power factors of the windings at 20°C	Every 2 o 3 years

(1) Make a log of your transformer and record in it all the maintenances done. Include test results, actions taken, observations and date, as well as the name and signature of the person responsible.

10 Maintenance Tables

Table 3 Isolating Oil Approval Limits			
Test	**Satisfactory**	**Filter**	**Replace**
1. Dielectric Voltage (NMX-J-123)	Flat electrodes: 30 kV minimum	25 to 29 kV	Less than 25 kV
	Semi-spherical: 28 kV minimum	22 to 27 kV	Less than 22 kV
2. Power factor at 25 °C	0,05% Maximum	0,05 to 0,06%	More than 0,06%
3. Neutralizations number (NMX-J-123)	0,3 Maximum	0,4 to 0,9	More than 0,9
4. Color (ASTM D-1500)	0,5 Maximum	More than 1	

Windings Approval Limits		
Test	**Satisfactory**	**Investigate**
1. Isolation Resistance at 20 °C / 1 minute	More than 1000 MΩ per kV	Less than 1000 MΩ per kV
2. Absorption Index	1 to 1,2%	Less than 1%
3. Power factor @ 20 °C	1,5% maximum	More than 1,5%

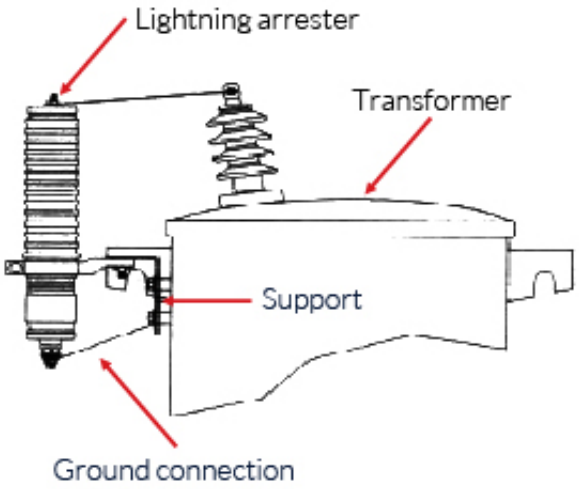
II Instructions for Self-protected Single-phase Transformers Type Post

1 Definitions

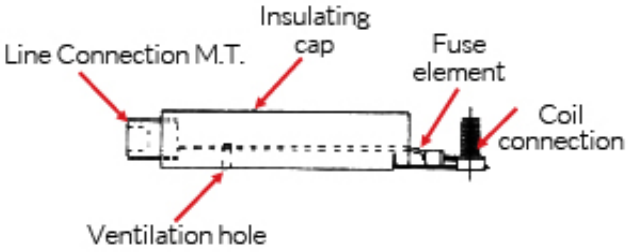
a. Self-protected Transformer: A transformer that has equipment to protect the distribution system and its windings.

b. Lightning arrester: An element that limits transient overvoltage in the distribution system to protect the winding (s).

They are usually ordered with lightning arrestors to protect the primary. However, they can optionally be requested for the secondary transformer.

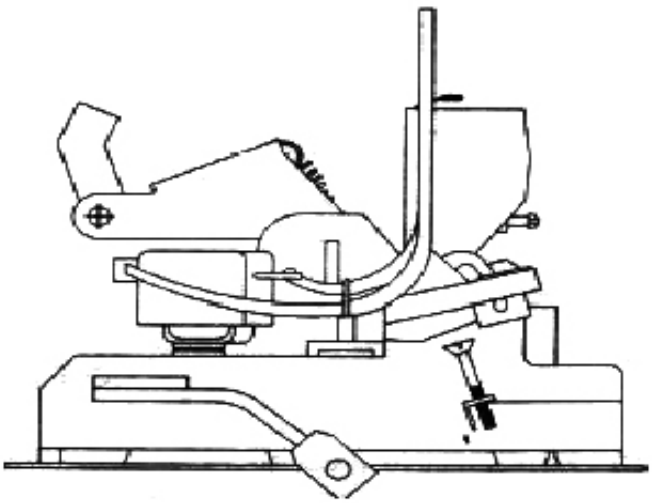


c. Expulsion Fuse: Element that protects both the power system and the transformer itself in case of an internal fault.



d. Switch: Element that protects the transformer against overload or secondary faults.

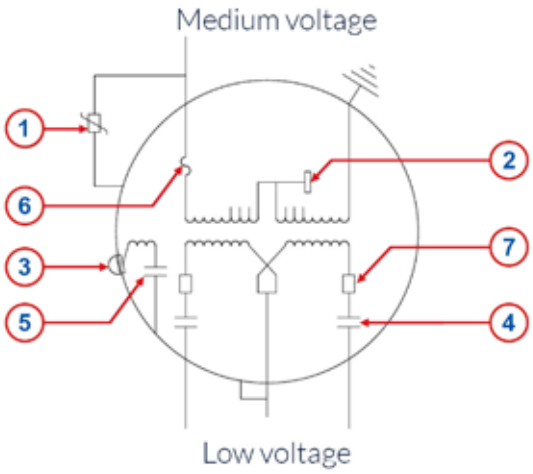
Depending on its capacity, it can be thermal or thermomagnetic.



2 Introduction

A self-protected transformer has protection equipment installed internally and externally. The internal elements are the secondary circuit breaker (thermal or thermomagnetic) and the expulsion fuse, both coordinated in such a way that, in case of failure in the secondary, the switch operates before the fuse and it operates in case of failure of the transformer. The external element is the panel for each medium voltage nozzle and, when requested, lightning arrestors in the secondary transformer.

The connection diagram of a single-phase transformer "**YT**" is shown below.



1. Lightning Arrester
2. Tap changer
3. Signaling light
4. Switch contacts (activated by the bimetal)
5. Signal light contact (powered by bimetal)
6. Expulsion fuse in medium voltage
7. Bimetallic element (one for each low voltage circuit)

NOTE: The above diagram corresponds to a serial connection. If you require your transformer with the parallel connection, request it from the factory or a workshop authorized by **C.M.A.E.**

3 Switch

3.1 The switch is connected to the low voltage or secondary side, immersed in the transformer oil. It is designed to protect the transformer against overloads and short circuits. It works by means of bimetal sheets sensitive to the temperature that when heated by the combined effect of the current and the temperature of the oil, the bimetal dilates and leaves of position, being outside the movable contact. As a result of this the switch operates in the following two sequential times:

1. The signal lamp lights up before the shooting temperature.

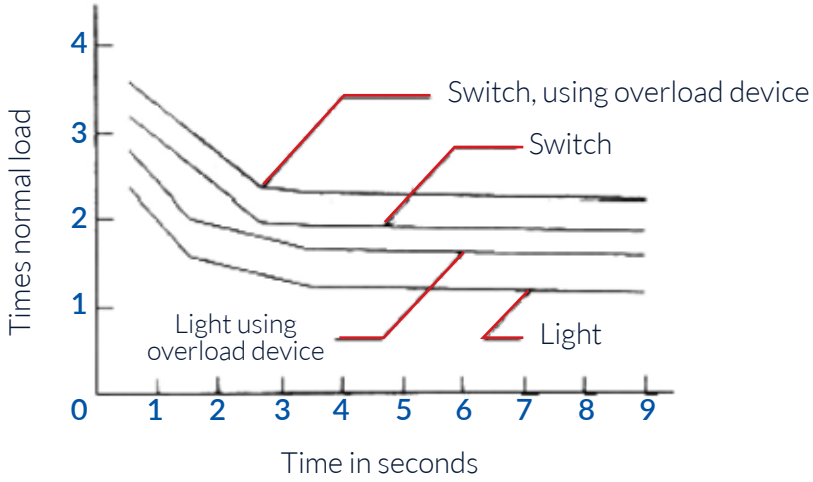
3 Switch

2. The bimetal actuates the trip unit and opens the circuit when the transformer capacity has been exceeded.

Each switch includes the following elements:

a. A signaling lamp (red light) which is assembled on the tank wall. It operates with the load at the same accuracy of the switch when the oil temperature increases due to an excess in load demand or unbalanced loads that exceed the thermal capacity of the switch. The lamp light comes on indicating that the transformer is overloaded and very close to the trip. The lamp stays on after opening until the switch is reset.

b. The emergency overload device allows the transformer to operate under overload conditions above its rated capacity without tripping the switch (see operation curves below). This element is a small lever located next to the switch operation lever, which allows the switch to operate the transformer with overloads of approximately 10% of its rated capacity. The service can be reset even if the bimetals have their firing temperature.



Permanent use of this device is at the user's own risk, since the operation of the transformer, under these operating conditions, degrades the insulation faster and consequently reduces its service life.

c. The operating lever (see *figure 5*) is a device for manually opening and closing the switch.

3 Switch

3.2 Switch operation. It is realized by means of the lever that is in one side of the transformer and can be operated with load (see *figure 5*). The following instructions are given to operate it:

a. Signal light test: This is done with the transformer energized by carrying the operating lever - by means of a pole - until the arrow or mark is in the "**L**" position (see *figure 5*). The light should turn on. After this operation, return the lever to the "**C**" position, which will turn off the light.

b. If the switch operates or operates automatically, move the lever to the "**R**" (reset) position and return it to the "**C**" position. Do not attempt to move the lever directly to the "**C**" position without first resetting it as it may damage or disengage the switch mechanism.

c. If you manually operate the switch to the "**O**" position, you can return the lever directly to the "**C**" position. In this case, it is not necessary to reset it; it should only be reset when the switch operates automatically.

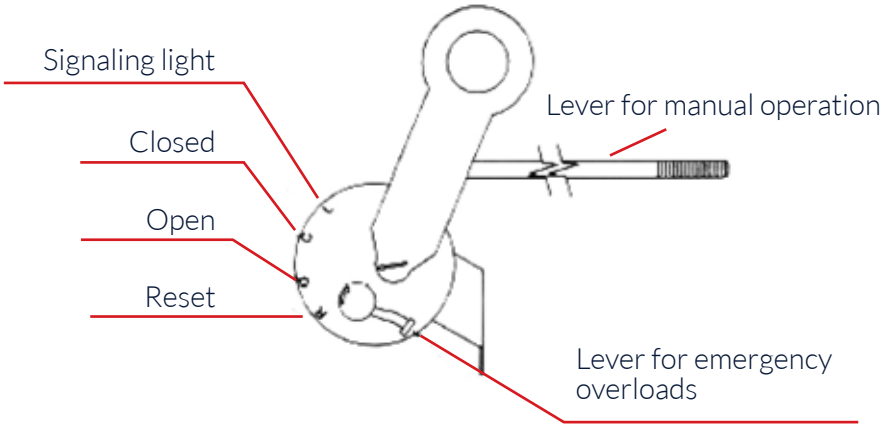


Figure No. 5

4 Expulsion Fuse

This element operates when there is an internal fault in the transformer. It serves to protect both the distribution system or power supply and the transformer of major damage. Each self-protected transformer carries, for each medium voltage nozzle, an ejection fuse that is located between the tips of the primary coil and the corresponding nozzle.

If the fuse (s) operate due to a fault in the transformer, check the cause of the fault before attempting to restart it. These actions must be carried out by personnel with the necessary technical knowledge and carried out in a closed, humidity-free place.

5 Lightning Arrester

These elements have the appropriate characteristics to protect the transformer by grounding the surges that are present in the line of power due to atmospheric discharges or by maneuvers of switches.

6 Replacement of protection elements

To replace any protection elements of your "**I.G.**" self-protected transformer, check the catalog number or model numbers of both the fuse and the circuit breaker and appropriate arresters to the particular transformer. Do not attempt to replace elements or accessories other than those specified because you run the risk of improper coordination and, therefore, your transformer may not be properly protected.

III Verification Lists

List for verification during the reception
Location:
Date:
Transformer description:
Transformer type:
Series number:

No.	Element for Revision	Good / Yes	Bad / No
1	Stencil of capacity (kVA)		
2	Data Plate		
3	Identification of nozzles (M. T. and B. T.)		
4	Connectors and eye bolts (M.T. and B.T.)		
5	Broken or cracked nozzles (M. T. and B. T.)		
6	Nozzle leaks (M.T. and B. T.)		
7	Tap Changer Lever		
8	Switch operation lever (if fitted)		
9	Lightning Arrester		
10	Mica of the signaling light (if fitted)		
11	Connector for tank landing		
12	Grounding cable for nozzle X2		
13	Overpressure relief valve		
14	Drain Valve - Sampling (if fitted)		
15	Leaks in the main lid or log		
16	Leakage in welded joints or packaging		
17	Radiators in good condition (if fitted)		
18	Recoating in good condition		

OBSERVATIONS: _____

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INSPECTED BY: _____

Checklist to be verified before installation or startup into service	
Location:	Date:
Assigned installer:	

No.	Inspection done (1)				
1	Description of Transformer:				
	Type of transformer:				
	Serial Number:				
	Medium and Low voltage connection:				
2	Transformation ratio:	**Pos.**	**Phase A**	**Phase B**	**Phase C**
		1			
		2			
		3			
		4			
		5			
3	Insulating resistance (megohms):		**Temperature: °C**		
			H-XT	X-HT	H-X
4	Earth resistance (ohms):		**Temperature: °C**		
			1	2	3
5	Resistencia Ohmic – Medium Voltage(1) (ohms):		**Temperature: °C**		
			H1-H2	H1-H3	H2-H3
6	Ohmic Resistance – Low Voltage(1) (ohms):		**Temperature: °C**		
			X1-X2	X1-X3	X2-X3
7	Other (specify):				

OBSERVATIONS: _____

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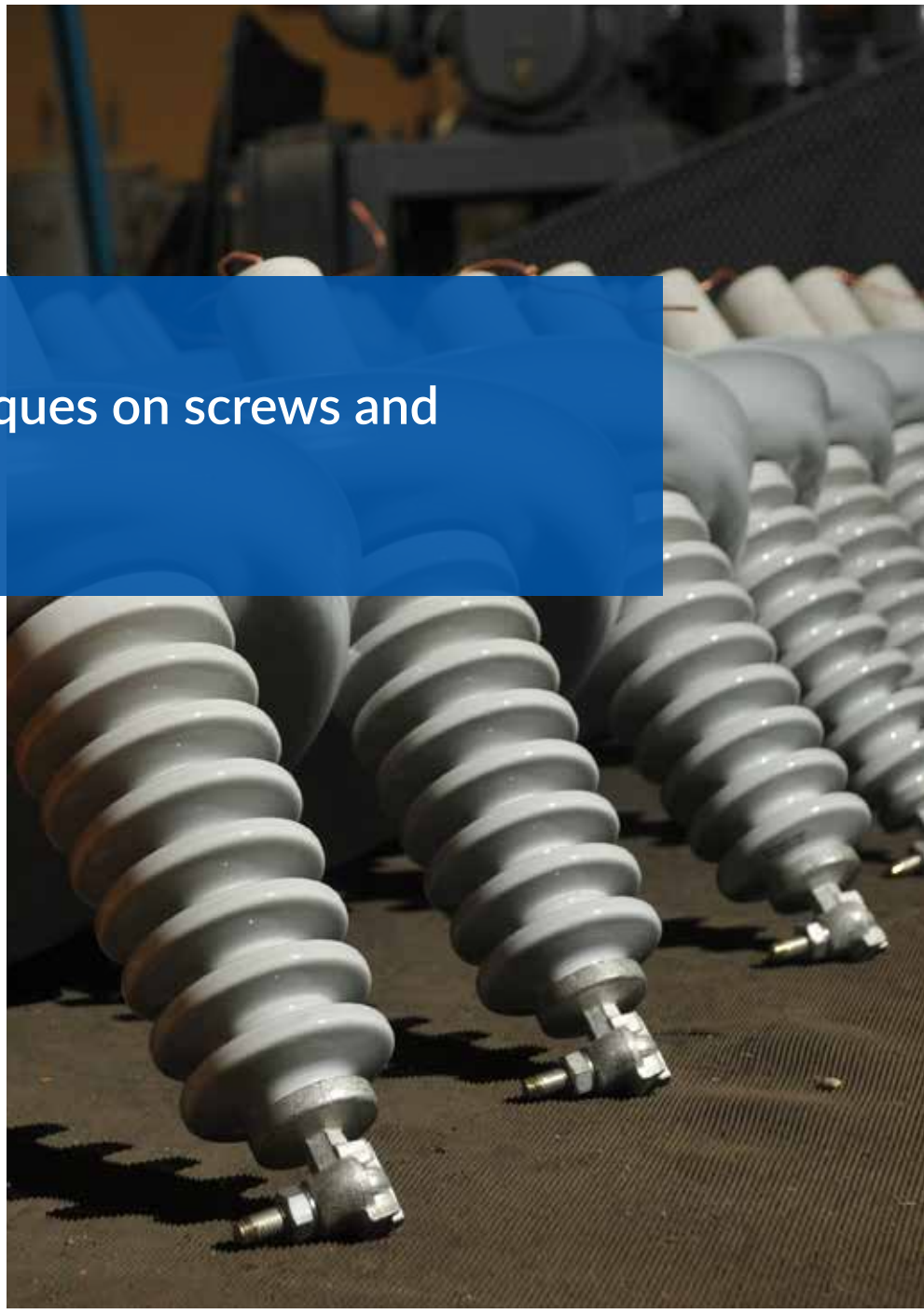
(1) Indispensable to file for any warranty claim.



IV Tightening torques on screws and accessories

Tightening torques on screws and accessories				
Description		Minimum pair	Maximum pair	Given for measurement
Screws m6 used in presses for fastening of low voltage nozzles		2,26 N·m	2,82 N·m	10 mm
Screws m8 used in presses for fastening of low voltage nozzles		2,82 N·m	3,95 N·m	13 mm
Screws m8 used in presses for fastening of low voltage nozzles		3,39 N·m	4,52 N·m	13 mm
Screws m10 used in the rectangular main lid of TR'S. From distribution Three-phase pole type		23,73 N·m	26 N·m	17 mm
Screws m10 used in the main lid of TR'S. Substation type distribution		13,56 N·m	15,82 N·m	17 mm
Screws m12 used in TR's cover tightening strap. From dist. Single-phase pole type		22,6 N·m	26 N·m	19 mm
Bolt nuts m10 used for external fastening of low and medium voltage nozzles		9 N·m	11,3 N·m	17 mm
Nuts of studs m10 and m12 used for inspection covers (hand register)		7,9 N·m	10,17 N·m	17 y 19 mm
Rod nuts m10 used in low voltage nozzle fittings		14,7 N·m	16,95 N·m	17 mm
M12 rod nuts used in nozzle fittings		22,6 N·m	26 N·m	19 mm
Nuts for rod m20 and more used in fittings of low voltage nozzles		16,95 N·m	20,34 N·m	30 mm
Medium voltage nozzle connectors when carrying insert		9 N·m	11,3 N·m	NA
Tightening nut used in external operation changers (by brand)	Orto	10,1 N·m	12,4 N·m	NA
	Abb	11,3 N·m	13,5 N·m	NA
	Cooper	9 N·m	13,5 N·m	NA
	Moloney	6,7 N·m	6,7 N·m	NA
	Termomanufacturing	10,8 N·m	10,8 N·m	NA
Tightening nut used in the signaling light		5,65 N·m	9 N·m	NA
Tightening torque used on the operating lever of the low voltage switch		16,95 N·m	20,34 N·m	NA
M10 rod nut used in medium voltage nozzle fittings		18 N·m	20,34 N·m	17 mm

V Customer Support

Customer Support

The following information is provided so that you can contact us in case of any doubt or for any care or service that you may require:

General Offices:

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36559 Irapuato, Gto.

Telephones: (01 462) 626 62 62; 626 21 91 y 626 21 94 ó
LADA free call: 01 800 714 16 62

Webpage: **www.ig.com.mx**
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Likewise, we are at your disposal through our branches or our distributors that are indicated in our web page.

Thank you for your preference