TRIHAL

Cast resin transformer

Instructions for installation and maintenance

Schneider Electric™

Cast resin transformer instructions for installation and maintenance

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Receipt and handling

Preliminary checks

On receipt, ensure that the transformer has not been damaged during transport (LV busbars or HV connection terminals bent, broken insulators, damaged windings, wet transformer, damaged cover, contamination by foreign bodies, etc.), and check that any ordered accessories have been included in the delivery (rollers, electronic converter, etc.).
Should the device have been damaged:

- take delivery subject to reservations which should be indicated to the transporter and confirm this by registered letter within three days.
- write a report and send it without delay to your supplier (Schneider Electric or retailer as appropriate).

Warning

This instruction manual is designed to apply to standard range cast resin dry type transformers, as defined in the Schneider Electric catalogues.
For special transformers, i.e. those produced in accordance with a special requirement or a customers specification, certain statements and recommendations may not be applicable (particular the paragraphs dealing with the IP21 enclosure, the HV and LV connections, the thermal protection, etc.)
If you are in any doubt, please contact the after sales department.
tel. : +33 (0)3.87.70.57.72
fax : +33 (0)3.87.70.56.21
e-mail: fr-frt-sav@mail.schneider.fr

Storage

The cast resin transformer must be protected in storage from water and protected from dust generating work (masonry, sanding, etc.).

The transformer is delivered in a plastic cover, this cover must be kept over the equipment whilst it is in storage.
The cast resin transformer can be stored at a temperature down to –50°C.

Handling

The transformers are equipped with specific handling attachments.

- lifting with slings (figure 1).

For a transformer without an enclosure lifting is carrieed out using the 4 lifting lugs and for a transformer with an enclosure using 2 lifting lugs. The slings should not form an inside angle greater than 60°.

- lifting with a fork lift truck (figure 1).

Remove the rollers and insert the forks in the base channels.

- towing.

Towing the transformer, with or without enclosure, must be performed from the underbase. Holes of 27 mm diameter are provided for this purpose on all sides of the underbase. Towing can only be carried out in two directions: parallel to the underbase axis and perpendicular to that axis.

- fitting the rollers.
  either by lifting with slings (figure 1);
  or by lifting with a fork lift truck (figures 1 and 2).

In this case position the lifting forks in underbase channels.
Place timbers of a greater height than the rollers under the channels and lower the transformer onto them.
Position the jacks and remove the timbers.
Attach the rollers in the desired position (two bidirectional rollers).
Remove the jacks and allow the apparatus to rest on its rollers.

Note: Transformers are generally wedged during transport using timbers that are attached to the vehicle’s base. It is thus essential to remove these timbers before lifting the transformer.

Installation

General information

Due to the absence of any liquid dielectric, there is no risk of liquid “cold” (spillage) and “hot” (combustion) pollution, and due to the qualities of cast resin transformers, no fire precautions are necessary.

■ the cast resin transformer should not be installed in a flood hazard area.

■ it should not be installed at an altitude above 1000 metres, unless the altitude is specified at the time of ordering.

■ the transformer is designed to operate at rated power in the ambient temperatures detailed below, without reducing temperature rise due to the enclosure.

■ the ambient temperature of the substation, where the transformer is installed, should be within the following limits:

– minimum temperature: – 50°C;

– maximum temperature: + 40°C (unless a special request is made for a specially designed transformer to operate in higher ambient temperatures).

■ standard transformers are dimensioned in accordance with IEC 60076-11 for an ambient temperature of:

- maximum: 40°C
- daily average: 30°C
- yearly average: 20°C.

Generally speaking the installation must be in compliance with IEC 60071 concerning insulation co-ordination.

Note: In order to ensure correct ventilation of the transformer, it should always be mounted on its rollers or raised to a height equal to that of the rollers so as not to hinder correct transformer coding.

Natural substation ventilation

(see figure 3)
In the general case of natural cooling (AN), ventilation of the substation or the enclosure by natural convection, such ventilation must dissipate the heat generated by the transformer’s total losses in operation. It should be noted that restricted air circulation reduces the transformer’s available power.
Appropriate ventilation will consist of a fresh air intake opening of S cross-section at the bottom of the substation and an air outlet of cross-section S’ located above on the opposite wall at height H metres above the air intake opening.

$S = 0{,}18P/(\sqrt{H})$ and $S' = 1{,}10 \times S$

P = the sum of the no-load and load losses of the transformer expressed in kW at 120°C as well as the losses emitted from all the equipment present in the premises.

S = the area of the air intake opening (allow for mesh factor) expressed in square
metres.

S’ = area of the air outlet opening (allow for mesh factor) expressed in square metres.

H = height difference between the two openings expressed in metres.

This formula is valid for an average annual room temperature of 20°C and an altitude of 1000 m maximum.

Example:
– one single transformer 1000 kVA,
– Po = 2300 W, Pcc at 120°C = 11000W,
i.e. P = 13.3 kW.
If the distance between the grills = 2 m, then S = 1.7 m^2 of net surface area necessary.
If we imagine a grill obstructing the air inlet by 30%; the air inlet grill surface area should then be 1.5 m x 1.5 m, and that of the air outlet should be 1.5 m x 1.6 m.

Forced ventilation of the premises

(see figure 4)
This is required in the case of small or badly ventilated premises, with an annual average temperature greater than 20°C, or in the instance of frequent overloading of the transformer.
So as not to disturb the natural convection in the premises, an extractor fan discharging air outside will be installed in the outlet hole located in the top part of the unit; it can be thermostat controlled.
Recommended flowrate (m^3/second) at 20°C = 0.10 P
P = total losses to be removed, in kW, emitted by all the installed equipment, at full load.

Cast resin transformer without enclosure (IP 00)

(see figure 5)
As the IP 00 protection index indicates, this transformer has no protection against touching or direct contact.
In no instance should the surface of the resin be touched when the transformer is live, even if the transformer is equipped with plug-in connectors.
When installing transformer in a secure substation:

■ eliminate risks of water dropping on the transformer (e.g. condensation from overhead pipes, etc.); maintain minimum clearance distancesto the walls in accordance with the insulation voltages given in the above table, whilst providing sufficient space to access the primary voltage tapping points.Should these distances not be possible to achieve please contact us.

Insulation (kV)	Dimension X (mm) of the figure 5
7.2	90
12	120
17.5	160

According to HD 637 S1.
Don’t take into account the access to tapping on the UV side.

■ ensure that the substation ventilation is sufficient to dissipate all losses emmitted by all equipment.

Cast resin transformer with metal enclosure

(see figure 6)
The integral, IP 31 metal enclosure is of indoor type and is not able to be installed as it stands outdoors. Its installation requires no particular precautions other than those detailed in the general installation instructions with the additional consideration of a minimum clearance requirement of 200 mm (500 mm on the HV side) between the exterior of the enclosure and the walls of the substation so as not to obstruct the enclosures ventilation grills and to allow adequate cooling (figure 6), whilst providing sufficient space to access the primary voltage tapping points.
Ventilation of the substation should be studied so as to fully dissipate all of the heat generated through losses the total losses emitted by all the equipement.

Recall: the cast resin transformer must not be installed in a flood hazard area.

Warning: the standard metal enclosure for transformers is IP 31, except for the underbase which is IP 21.

HV and LV connections

Important: the distance between the HV cables, the LV cables or busbars, the neutral and the surface of the HV winding must be at least 120 mm except on the flat front part where the minimum distance will be that given by the HV terminals.

Cast resin transformer without metal enclosure (IP00)

Warning: the resin coating, does not guarantee protection against touching or against direct contact when the tran former is energized.

■ standard HV and LV connections (figure 7). In all cases, the cables or busbars must be supported to avoid mechanical stress on the HV or LV terminals.

The outgoing (or incoming) LV connections can be made from the top or the bottom (figure 7). The outgoing (or incoming) HV connections must be made to the top of the delta connection bars.
It is possible to connect to the HV from below using a spacer (the spacer will not be supplied by Schneider Electric).

■ LV connections using CEP prefabricated busbar trunking.
Connection is simplified as far as possible since the interface is delivered ready-mounted on the transformer, fixed to a support and connected to the LV terminals with flexible foil.
Thus mounted, the assembly allows an on-site adjustment clearance of ±15mm along the 3 axes.
The terminal block is delivered with the transformer so that the interface and trunking can be connected.

■ HV connections with plug-in bushing(figure 8).
In any case, the cables or busbars must be supported to avoid mechanical stress on the plugin bushing and the transformer's LV output terminals.
The outgoing (or incoming) LV connections can be made from above or below (see figure 8).
The outgoing (or incoming) HV plug-in bushing must be made from above on the HV side (see figure 8).
On request, as an option, a key-less locking system for the plug-in connectors can be installed on the fixed parts.
In this configuration, the installation of plugin connectors does not provide safety against direct contacts.

Cast resin transformer with metal enclosure

The IP 31 metal enclosure must under no circumstances support loads other than those of the transformer' HV supply cables. For any modifications to the enclosure, please consult us.

■ standard HV and LV connections (figure 9). In all cases, the cables or busbars must be supported to avoid mechanical stress on the transformer's HV or LV terminals.
The outgoing (or incoming) LV connections must be made upwards from the terminals under the enclosure cover (see figure 9). The LV cables should never pass between the HV coils and the enclosure.
The outgoing (or incoming) HV connections must be made to the top of the delta connection bars.
The HV cables should pass upwards from the terminals under the enclosure cover, but they also have the possibility of entry from below (figure 10).

■ LV connections using CEP prefabricated busbar trunking.
Connection is simplified as far as possible since the interface is delivered ready-mounted on the transformer, fixed to a support and connected to the LV terminals with flexible foil.
Thus mounted, the assembly allows an on-site adjustment clearance of ±15mm along the 3 axes.
The top of the enclosure is fitted with an aluminium cover plate opposite the interface connection terminals. This plate should be removed during installation and replaced by the sealing system supplied with the CEP trunking in compliance with IP 54.
The terminal block is delivered with the transformer so that the interface and trunking can be connected.

■ HV connections from below (figure 10).
In all cases, the cables or busbars must be supported to avoid mechanical stress on the transformer's HV or LV terminals.
The outgoing (or incoming) LV connections must be made upwards from the terminals under the enclosure cover (see figure 10).
The LV cables should never pass between the HV coils and the enclosure.
The outgoing (or incoming) HV connections must be made to the top of the delta connections bars.

A remove flap door located on the bottom right of the enclosure's HV side allows the HV cables to be connected from below.
The HV cables must be fastened inside the enclosure on the side panel, and they should at no time be at less than 120 mm from the HV coils (except on the flat front part where the minimum dis tance will be that of the HV terminals).
For cables in cable ducts, allow a depth sufficient to accomodate the cable's minimum bending radius.

■ HV connections with plug-in bushing (figure 11).
In all cases, the cables or busbars must be supported to avoid mechanical stress on parts of the plug-in bushing and the transformer's terminals.
The outgoing (or incoming) LV connections must be made upwards from the terminals under the enclosure cover (see figure 11).
The LV cables should never pass between the HV coils and the enclosure.
The outgoing (or incoming) HV plug-in bushing are made on the enclosure cover on the HV side.
An optional, a key-less locking system for the plug-in connectors can be installed on the enclosure cover.

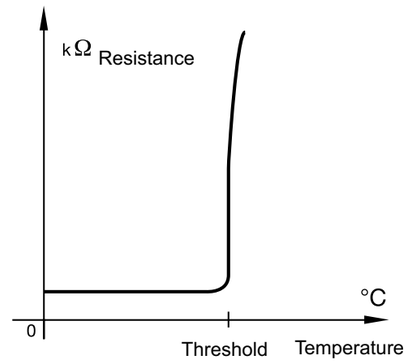
Warning: the standard enclosure is IP 31, except for the underbase which is IP 21.
It is necessary to verify conformity with the IP 31 index after having drilled the cover plates provided for this purpose for the HV, LV and other connections.

Z option thermal protection

The cast resin transformer can be protected from any damaging temperature rises by monitoring winding temperature using various pieces of optional equipment.

The standard version for naturally cooled (AN) transformers comprises:

■ 2 PTC sensor sets, positive temperature coefficient thermistances mounted in series: the first set for alarm 1, the second set for alarm 2. The main feature of a PTC sensor is the fact that the value of its resistance increases very steeply at a rated and factory-set threshold temperature which is not adjustable (see graph opposite). This abrupt increase is detected by a Z electronic converter. These sensors are installed in the live part of the cast resin transformer with one alarm 1 sensor and one alarm 2 sensor on each phase. They are placed in a tube, which enables them to be replaced as necessary.



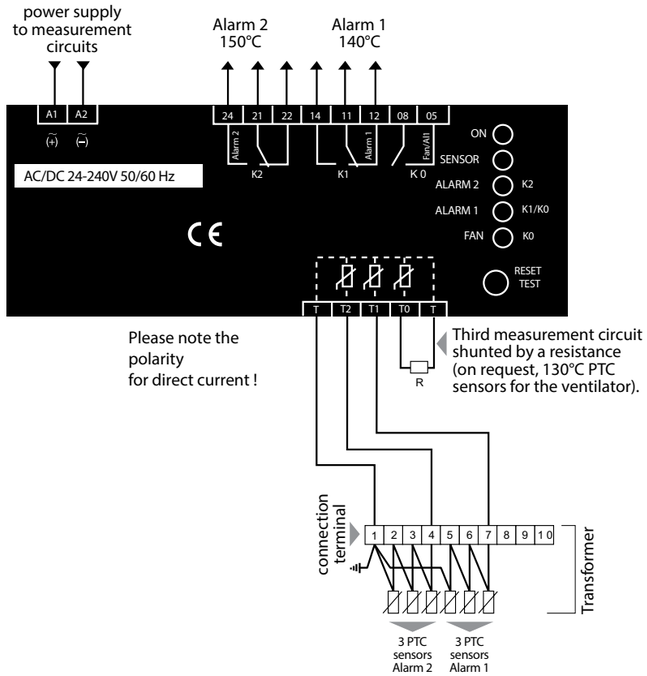
Characteristics of a PTC sensor

■ 1 Z electronic converter characterised by 3 independent measurement circuits. Two of these circuits respectively control the variation in resistance in the 2 PTC sensor sets. When the temperature increases too much, alarm 1 (or alarm 2) information is processed respectively by the 2 independent output relays equipped with a changeover contact; the status of these 2 relays is indicated via 2 LED diodes.
The third measurement circuit is shunted by a resistance R outside of the terminal block; it can control a third set of PTC sensors as long as this resistance is removed. In this case ("forced air" option available on request), the FAN information is processed by a third independent output relay, equipped with a closing contact and is intended to control fans; the position of this relay is shown by an LED diode marked FAN.
In the case of one of these 3 sensor circuits failing (power failure or short circuit), an LED diode marked SENSOR lights up and indication of the incriminated circuit flashes.
An LED diode marked ON signals the presence of voltage to the terminal block.

Z converter technical data

Measurement circuit	
Supply voltage (1)	AC 230 V*
Voltage tolerance	– 15 % to + 10 %
Frequency	48 to 62 Hz
Input power	< 5 VA
Cumulated resistance of a PTC sensor circuit for non-activation of the converter	≤ 1500 W
Alarm output and switching contact	
Maximum switching voltage	AC 415 V
Maximum switching current	5 A
Switching capacity	AC 2000 VA (ohmic load)
Rated permanent current	AC 2 A
Rated operating current	AC 2 A under 400 V
Recommended upstream fuse	4 A fast
Lifetime expectancy mecanical electrical (at maximum power)	 3 x 10^7 switching 10^5 switching
Load reduction coefficient	0.50 max. with power factor ϕ= 0.30
Z electronic converter	
Vermissible ambient temperature range	0° C to + 55° C
Overall dimensions (H x W x D)	90 x 105 x 60 mm
Weight	250 g
Protection index terminal block casing	 IP 20 IP 20
Maximum connection capacity to one terminal	1 x 2.5 mm^2 rigid
Fixing method	Either on DIN 35 mm rail or with 3 M4 screw

The forced ventilation option for AF transformers is detailed in the following pages.
(1) must be specified at the order.
* standardization version. Other voltage on request : AC/DC 24 to 240V, tolerance 115%.



Z thermal protection connection diagram (nomal use) equipment de-energised.

T option thermal protection

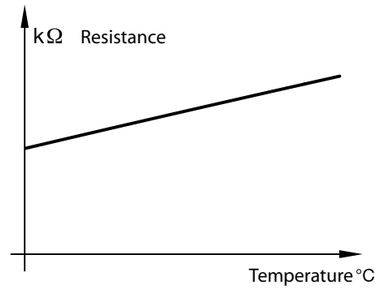
The second option for thermal protection device a digital display of winding temperatures and includes:

- PT100 sensors.

The main feature of a PT100 sensor is that it gives the real time temperature on a scale of 0°C to 200°C, see graph opposite (accuracy 0.5 % of the measurement scale 1 deg.).
Temperature control and display functions are performed via a digital thermometer.
The 3 sensors, each comprising 1 white wire and 2 red wires, are installed in the live part of the Trihal transformer with 1 located on each phase.
They are placed in a tube, which allows them to be replaced if necessary.

- 1 terminal block to connect the PT100 sensors to the T digital thermometer.

The terminal block is equipped with a plug-in connector.
PT100 sensors are supplied connected to the terminal block fixed to the top part of the transformer.



Characteristic graph of a PT100 sensor.

- 1 T digital thermometer characterised by 3 independent circuits.

Two of these circuits monitor the temperature captured by the PT100 sensors, one for alarm 1, the other for alarm 2. When the temperature reaches 140°C (or 150°C) the alarm 1 information (or alarm 2) is processed by 2 independent output relays equipped with changeover contacts.
The position of these relays is indicated by 2 diodes (LED).
The third circuit monitors sensor or

electrical supply failure.
The corresponding relay (FAULT), which is independent and equipped with changeover contacts, is instantly switched as soon as the device is supplied power. Its position is also indicated by a diode (LED).A FAN output is intended to control the start up of tangential fans in the case of forced ventilation of the transformer (AF): this option is shown on page 11.
An additional input (CH4) can be connected to a sensor outside of the transformer (not supplied), intended to measure ambient temperature in the MV/LV substation.

An RS 232 or RS 485 series output is available for connection to a plc or computer.

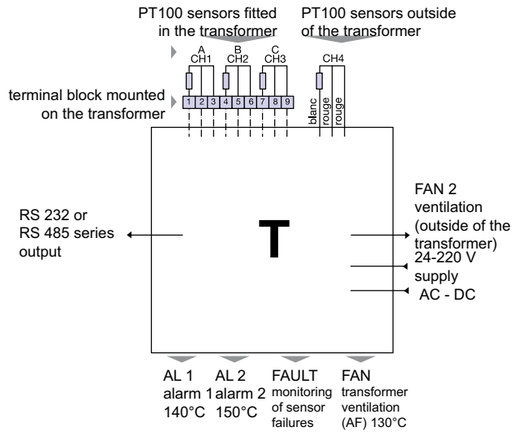
T thermal protection options available are:
– FAN 2 output variant to control the start up of an additional fan.
– RS 232 or RS 485 series output variant for PLC or computer.
The T digital thermometer is delivered with an installation manual.

Warning: since the transformer is thermal class F, the user has responsibility for setting the T digital thermometer with a maximum
temperature of 140°C for alarm 1 and 150°C for alarm 2.
Non compliance with these maximum temperatures release Schneider Electric from any liability for damage which may possibly be incurred by the transformer.

T converter technical data

Measurement circuit	
Supply voltage (1)	24 V to 220 V AC/DC
Frequency	50-60 Hz AC/DC
Input power	10 VA AC/DC
Alarm output and switching contact	
Maximum switching voltage	250 V AC
Maximum switching current	5 A (resistive circuit)
Rated permanent/operating current	A under 220 V AC/DC
Recommended upstream fuse	3 A
Life expectancy mechanical electrical	 20 000 000 switching 50 000 h/85°C
Load reduction coefficient	0.50 max. power factor ϕ= 0.30
Operating conditions	
Permissible ambient temperature	– 20° C to + 60° C
Ambient humidity	90% RH (non condensable)
T digital thermometer	
Overall dimensions (H x W x D)	96 x 96 x 130 mm
Weight	520 g
Terminal bloc protection index	IP 54 self extinguishing
Maximum connection capacity on one terminal	25 mm^2
Fixing method	92 x 92 mm, flush hole, attached with two rear pressure hooks

(1) universal supply irrespective of polarity.



Operating principle diagram for the T digital thermometer

Option forced ventilation

In the event of temporary overloading, to avoid overheating of the windings, it is possible to install forced ventilation.
For IP 00, for powers greater than 630 kVA, it is possible to install forced ventilation to achieve a temporary increase in power of 25%, without any special modification.
In all cases, this temporary increase of 25% can be obtained if detailed on ordering, and can even be taken as high as 40%.

However, if an increase in power is requested, account must be taken of the impact of this choice on the following points:
– sections of cables and of prefabricated busbar trunking (CEP),
– the rating of the transformer's protective circuit breaker,
– the size of inlet and outlet openings for air in the transformer room,
– the life span of fans in service, which is considerably shortened compared with that of the transformer (3.5 compared to 30 years).

This option includes the supply of:
– 2 sets of tangential fans, pre-cabled and connected to 1 single power connector per set,
– 1 temperature measurement device, either Z or T type.
For Z type, a third set of PTC sensors is added to the standard thermal protection, in place of the R resistor which originally shunts the third Z converter measurement circuit (see diagram shown on the "Z thermal protection" option).
For T type, the digital converter comprises an output (FAN) intended to start the tangential fans (see diagram shown in the T thermal protection option).

This option includes either of the following:
■ a wiring box, mounted outside of the protective enclosure, to which are connected, sensors and power supplies for the fan sets on a terminal block,
■ a control cabinet, delivered separately (transformer IP 00) or mounted on the protective enclosure, including:
– motor protection fuses,
– start up contactors,
– thermal protection device.

This unit is connected to the temperature-sensors and fan sets if the transformer is delivered with its metal enclosure. Otherwise, it is the installer who makes the connections.

Safety Instructions

■ Only qualified personnel must perform installation and commissioning operations.
■ Transformer is to be installed in such a manner and location as to minimize the

hazards to all those who have access to it. A safety barrier is highly recommended during erection and commissioning to keep away non-authorized people.

- Transformer must be properly grounded before energizing.
- Operate the transformer only after ensuring correct installation and inspection has been carried out.
- Always de-energize and isolate transformer before making any repairs or performing any maintenance. Otherwise, it can result in personal injury, death or property damage.
- All metal parts, cable remains or tools must be removed prior to switching on the transformer.
- Bolts for HV terminations have to be checked to comply with torsional moment requirements
- Control the earthing of the transformer on the upper frame and check the phase connections.
- Avoid any contact with dry type transformers during services. Any contact with transformer could result in serious injury to human body due to electric shock.
- Avoid exposing the transformer to chemicals, dust and water.
- Due to fire hazard, no fire or smoking must be allowed near the transformer.
- Always wear cut resistant gloves and safety helmet / cap when working around or inside the transformer enclosure in order to prevent any injury.

Commissioning

- installation location.

The location must be dry, finished and free from any possibility of water entry.
The cast resin transformer should not be installed in an area liable to be flooded.
The location should have sufficient ventilation to ensure that the total heat losses of the installed transformers can be adequately dissipated. See pages 4 and 5.

- checking the condition after storage.

If the transformer is found to be covered with dust, clean it as much as possible with a vacuum cleaner then carefully blow with dry, degreased, compressed air or nitrogen and thoroughly clean the insulators.

- cast resin transformers supplied with a plastic cover.

To avoid contamination by foreign bodies (such as screws, nuts and washers, etc.), the cover should remain in place whilst the transformer is being connected: to gain access to the HV and LV connections, tear the cover around the tapping points, this cover will be removed when the equipment is commissioned.

- transformer delivered with the original enclosure.

The enclosure must never be subject to loads other than those of the transformer's MV supply cables.
Driling of the removable aluminium (amagnetic) plates at top and bottom, intended for the passage of connecting cables must be performed with the plates removed from the enclosure to avoid any swarf being introduced into the windings.
The installation within the enclosure of any swichgear or accessory, apart from correctly installed connections, is formally advised against and renders the warranty invalid.
For any modifications, attachments and mounting of non Schneider Electric accessories on to the transformer, please fax our After Sales Service. See page 13.

- HV and LV connections cables.

In no case should the fixing points be made on the live part of the transformer.
The distance between the HV cables, the LV cables, or the LV bars and the surface of the HV winding must be at least 120 mm, except on the flat front face where the minimum clearance will be that given by the terminals. See page 5.

- connections of HV connectors.

Connections tightening torque on the HVterminal and the tapping link bars (brass fixing with flat washers and contact):

Bolts	M8	M10	M12	M14
Tightening torque m*kg	1	2	3	5

Maximum force on the HV terminals: 500 N.

- connection of LV connectors.

Connection tightening torque for the LV bars (6-8, lubrificated steel fixings):

Bolts	M8	M10	M12	M14	M16
Tightening torque *kg	1,25	2,5	4,5	7	10

Recall: 1m.kg = 0.98 daN
m = 0.102 m.kg

- auxiliary wiring.

Auxiliary wiring from the transformer (connection to sensor terminal block) should be attached on rigid supports (without slack) and have sufficient clearance from live parts. The minimum clearance to be respected is determined by the insulation voltage indicated on the rating plate. In addition, in no case should attachments be made to the live parts of the transformer.

- parallel operation.

Verify the identity of the HV and LV voltages and the compatibility of characteristics and especially of the vector groups and the impedance voltage. Make sure that identical tappings are selected for transformers to be connected in parallel.

- checks before commissioning:

remove the protective cover and check all the connections (arrangements, distances, tightening torque);

check cable and busbars entries after connection through aluminium cover plates to ensure IP rating has been maintained;

in the same way, should there be an enclosure, check the earthing connections after reassembling the covers;

verify that the position identity of tapping links on the three phases are in accordance with the diagrams on the rating plate;

verify the transformer's general Ω state of cleanliness and carry out an insulation test checking HV / earth andHV / LV using a 2500 V insulation tester (Megger).
The approximate value of the resistances are:
HV/earth = 250 MΩ
LV/earth = 50 MΩ
HV/LV = 250 MΩ.
If the values measured are significantly below this, check that the transformer is not moist. If it is, dry it with a rag and repeat the verification.
If it is not, please contact our After Sales Service.

Maintenance and after sales service

Maintenance

In normal use and environmental conditions, once a year check the tightness of the bolts on terminals and tapping links, and vacuum clean, and blow those places which are less accessible, with dry compressed air or nitrogen.
The frequency of cleaning will depend on environmental conditions.
In case of fast dust deposits, increase the yearly frequency, and if necessary filter the air cooling flow.
In the case of greasy dust deposits, use only cold degreasing product to clean the resin surfaces.

After sales service

For any information or replacement parts it is essential to quote the main characteristics on the rating plate and especially the transformer's serial number.

TECHNICAL MEMO
(to be read from the rating plate)

N°: _____
Year: _____
Power: _____ kVA
Frequency: _____ Hz
Cooling: _____
Vector group: _____
Imp. voltage: _____ %
HV insul. level: _____ kV
LV insul. level: _____ kV
High voltage _____
- position 1: _____ V
- position 2: _____ V
- position 3: _____ V
- position 4: _____ V
- position 5: _____ V
Low voltage: _____ V
Total weight: _____ kg

After Sales Service :
tel.: +33 (0)3.87.70.57.72
fax: +33 (0)3.87.70.56.21
e-mail: fr-frt-sav@mail.schneider.fr

Check-list before commissioning

Operations before connecting

check the information on the rating plate compared with your requirements (power, voltage, etc.)

install in clean, dry and flood-proof premises correct ventilation

– the premise's ventilation grills are unblocked and of a suitable size
– distance of the device relative to the premise's walls
– distance of the device from the ground.

check the cleanness of the transformer and its general condition

check the insulation resistances using a 2,500 V insulation tester measured values:

- HV / earth.....MΩ
- MV / earth .....MΩ
- HV / LV.....MΩ

tapping bars:
position according to the network voltage

– check the bars are similarly positioned on all three coils (see rating plate)
– check the tightening torque

Checks performed date: .....
by: .....

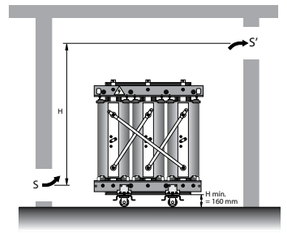
Operations before switching live

□ remove plastic cover
□ no foreign bodies on the device (swarf, screws, etc.); dust removal by vacuum clean
□ correct insulating distances between the cables and live parts (120 mm min.)
The cast coils are considered as live parts
□ correct fixing of cables and busbars
No stress exerted on the transformer's tapping points wiring of the protection or ventilation auxiliary devices
– insulation distances and fixing
– functioning.
□ tightening torque of connections checked
□ earthing continuity (transfo cables - casing)
□ compliance with original protection index (IP) at cable passage points
□ unobstructed ventilation grills
□ in the case of parallel operation, checking of short circuit voltages, concordance of phases, voltage ratio
□ protections coordination must be checked: false informations or wrong setting of protections (SEPAM) may lead to transformer's destruction.

Checks performed date: .....
by:.....


1


2



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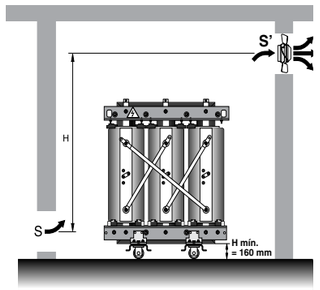

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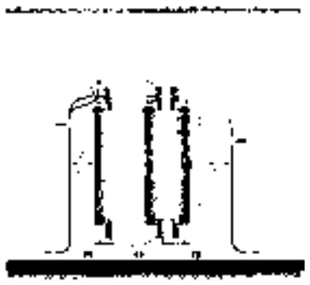
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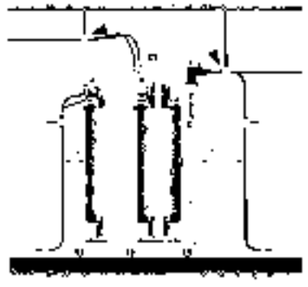
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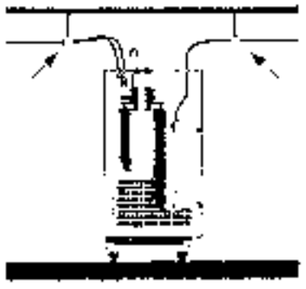
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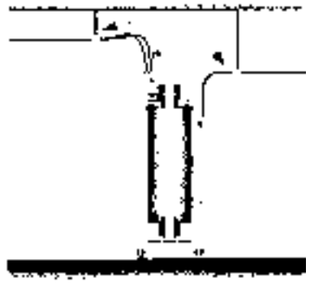
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