

Instruction Bulletin

Replaces 43006-850-01, 12/1992

Dry-Type Transformers 600 Volts and Below General Installation, Operation, and Maintenance Class 7410

Retain for future use.

SAFETY PRECAUTIONS

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.

Failure to follow these instructions will result in death or serious injury.

RECEIVING, HANDLING, AND STORING

RECEIVING

Inspect new transformers when received for damage during shipment. Upon receipt, check the packing list against the equipment received to ensure the order and shipment are complete. Claims for shortages or errors must be made in writing to Schneider Electric within 60 days after delivery. Failure to give such notice will constitute unqualified acceptance and a waiver of all such claims by the purchaser.

Immediately inspect the equipment for any damage which may have occurred in transit. If damage is found or suspected, file a claim with the carrier immediately and notify Schneider Electric. Delivery of equipment to a carrier at any of the Schneider Electric/Square D® plants or other shipping points constitutes delivery to the purchaser regardless of freight payment and title. All risk of loss or damage passes to the purchaser at that time.

For details concerning claims for equipment shortages and other errors, refer to "Terms and Conditions of Sale".

HANDLING

Keep all transformers in the upright position in which they were shipped. Use lifting cables or chains with spreader bars to avoid damage to the finish or parts. Whenever there are no external lifting provisions, remove the top cover. Secure cables or chains to the top core-clamping channels or angles where holes are provided for this purpose.

Lifting with hand trucks or fork lifts is permissible if the blades or forks are long enough to pass completely under the enclosure. Since most dry-type transformers have a high center of gravity and are top heavy, extreme caution should be exercised when lifting or moving units in this manner.

Rolling may be used to move a dry-type transformer if the shipping skids remain attached to the base.

For superficial or minor case part damage, spare parts may be available. Contact your local Schneider Electric/Square D distributor.

STORING

Store dry-type transformers, preferably in a warm, dry location with a uniform temperature. Cover ventilation openings to keep out dust. If it is necessary to leave a transformer outdoors, protect it completely to prevent moisture and foreign material from entering the equipment. Install space heaters or small electric heaters to prevent or greatly reduce condensation and moisture. If condensation is evident, it may be necessary to dry out the unit.

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Turn off power supplying this equipment before working on it.
- Discharge all static charges held by coils.

Failure to follow these instructions will result in death or serious injury.

INSTALLATION

Keep these factors in mind when placing dry-type transformers:

- accessibility
- ventilation
- atmospheric conditions

STORED TRANSFORMERS OR TRANSFORMERS ALREADY PLACED IN SERVICE

If a transformer has been moved or stored, remove access panels or plates to inspect the equipment.

DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Do not remove access panels or plates while the transformer is energized.

Failure to follow this instruction will result in death or serious injury.

Internally inspect the equipment for:

- damage or displacement of parts.
- loose or broken connections.
- cracked insulators.
- dirt or foreign material.
- presence of water or moisture.

Refer to "Maintenance" on page 5 for additional inspection guidelines.

LOCATION/PLACEMENT OF VENTILATED AND NON-VENTILATED TRANSFORMERS

Ventilated dry-type transformers normally are designed for installation in dry locations. They will, however, operate successfully while energized where the humidity is high. Under this condition, though, it may be necessary to take precautions to keep them dry if they are shut down for prolonged periods. Refer to "Operation" on page 5 for more detailed information.

Avoid placement of the transformer where dripping water exists. If this is not possible, provide suitable protection to prevent water from entering the transformer enclosure. Also, take precautions to guard against accidental entrance of water, such as from an open window, by a break in a water or stream line, or from use of water near the transformers.

Ventilated general purpose dry-type transformers are supplied in enclosures rated NEMA 2 for indoor installation. Weather shield kits are available to convert these enclosures for Underwriters Laboratories® (UL®) outdoor NEMA 3R use. Obtain the appropriate weather shield kit number from the transformer front panel label or from a Schneider Electric/Square D distributor or representative.

NOTE: Non-ventilated, resin-filled transformers are rated indoor/outdoor and do not require weather shield kits for outdoor use.

Adequate ventilation is essential to properly cool ventilated transformers. Clean, dry air is desirable. Filtered air may reduce maintenance if the location of the transformer presents a particular problem. Refer to National Electrical Code® (NEC®) Article 450. Forced air cooling should provide a minimum of 100 CFM per KW of losses (based on 40° C maximum ambient).

Place and install dry-type transformers in areas free from unusual dust-producing mediums or chemical fumes.

Non-ventilated transformers can be mounted directly on a wall. Consider accessibility for maintenance when placing the transformer. If the transformer will be placed near combustible materials, the minimum separations established by the NEC should be maintained.

The transformer enclosure is designed to prevent the entrance of most small animals and foreign objects.

GROUNDING

Permanently and adequately ground the enclosure and core assembly of these transformers in accordance with NEC requirements. Windings may be grounded with consideration given to local conditions in accordance with the NEC.

SEISMIC QUALIFICATIONS

Seismic qualification of nonstructural components by Schneider Electric is just one link in the total chain of responsibility required to maximize the probability that the equipment will be intact and functional after a seismic event. The equipment manufacturer determines that the equipment will be functional following a seismic event via shake-table testing programs. The seismic qualification testing results validate that Schneider Electric equipment will perform the intended function after the earthquake. However, the foundation and the anchorage system must also meet the applicable building codes and standards for the entire installation to maintain post earthquake functionality. Equipment inadequately mounted or mounted to weak or flexible foundations will not meet the requirements.

The equipment specifier/installer determines that the equipment is rigidly supported and will not leave its foundation during a seismic event. During an earthquake, the equipment must be able to transfer the loads that are created through the mounting pad and anchorage to the load-bearing path of the building structural system. If the equipment is not attached to the building structure in accordance with the minimum standards recommended

herein, the complete equipment installation might become too flexible and may overturn or shear the attachment devices and slide off its foundation.

The structural civil engineer or design engineer of record is responsible for detailing the equipment connection and anchorage requirements (including the lateral restraint system if appropriate) for the given installation. The installer and manufacturers of the anchorage and lateral restraint system are responsible for ensuring that the mounting requirements are met. Schneider Electric/Square D is not responsible for the specification and performance of these anchorage systems.

Drawings are available that include specific mounting information for seismic qualifications. Contact your local Schneider Electric/Square D representative or call 1-888-Square D (1-888-778-2733) to obtain these drawings.

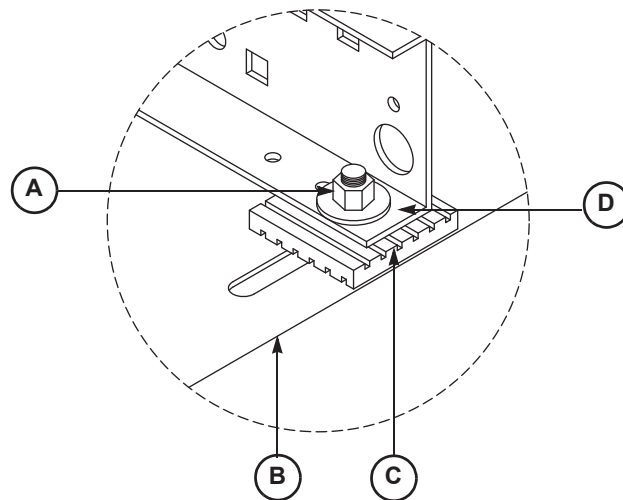
SOUND CONTROL

All transformers emit sound. This is caused by the alternating voltage applied to the transformer. The resulting magnetic field causes the core steel to expand and contract, resulting in audible sound. The transformer has been designed to minimize the level of sound produced.

During manufacture, sound isolation pads are secured between the transformer mounting bracket and the enclosure using bolts and nuts (Figure 1). The mounting hardware is tightened prior to shipment to prevent damage. To reduce audible sound levels further, back off the nut 1/4-inches (5 mm) to float the transformer on the isolation pads, isolating the transformer from the enclosure.

Figure 1: Isolation Pads for “Quiet Operation”

- A. Back off the nut approximately 1/4 in. (5 mm) after installation
- B. Base assembly
- C. Isolation pad
- D. Core clamp



Additionally, the area where the transformer is located can affect the sound level:

- Try to avoid installing the transformer in a corner, narrow hall, or in an area with smooth surfaces. Doing so can result in the sound being reflected and amplified.
- Securely fasten all the enclosure panels. Panel looseness can result in rattling, thereby increasing the sound produced.
- Use flexible conduit, if possible.
- Ensure that the type of structure on which the transformer is mounted is strong enough to support the weight of the transformer(s).

Once installed, the sound level may exceed the NEMA tested level due to some of the points previously illustrated. The NEMA maximum allowable average of the readings in decibels is listed in Table 1:

Table 1: Sound Levels

Transformer kVA Rating	NEMA Sound Levels
0–9	40 dB
10–50	45 dB
51–150	50 dB
151–300	55 dB
301–500	60 dB
501–700	62 dB
701–1000	64 dB

OPERATION

EFFECTS OF HUMIDITY

Humidity conditions are unimportant as long as the transformer is energized. However, follow the precautionary steps listed below if the transformer is de-energized, is allowed to cool to ambient temperature, and will exceed a shutdown of 12 hours (especially in high humidity conditions).

1. Place small strip heaters in the bottom of the unit shortly after shutdown to maintain the temperature of the unit a few degrees above that of the outside air.
2. Inspect the unit for evidence of moisture before returning it to service.
3. Check the insulation resistance. If evidence of moisture exists, or if the insulation resistance is less than 1 megohm, dry out the transformer by placing it in an oven or by blowing heated air over it.

ENCLOSURE TEMPERATURE

The temperature rise on the enclosure exterior for ventilated transformers should not exceed 50° C (122° F), except as indicated in UL 1561.

MAINTENANCE

Transformers require periodic maintenance and inspections to ensure the most satisfactory service from the equipment and successful operation of it. Inspect the equipment at regular intervals, and perform corrective measures when necessary.

PERIODIC MAINTENANCE AND INSPECTION

The frequency at which transformers should be inspected depends on operating conditions. For clean, dry locations, annual inspections may be sufficient. However, for other locations, such as where the air is contaminated with dust or chemical fumes, an inspection at three- or six-month intervals may be required. Usually after the first few inspection periods, a definite schedule can be set up based on the transformer's existing conditions.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Turn off power supplying this equipment before working on it.
- Discharge all static charges held by coils.

Failure to follow these instructions will result in death or serious injury.

1. De-energize the transformer, and remove the access covers. Inspect for:
 - dirt on insulating surfaces and at areas which tend to restrict air flow.
 - loose connections.
 - the condition of tap changers or terminal boards.
 - the general condition of the transformer.
2. Observe for signs of overheating and for voltage creepage over insulating surfaces, evident by tracing or carbonization.
3. Check for evidence of rusting, corrosion and deterioration of the paint. Corrective measures should be taken where necessary.

CLEANING

Remove excess dirt accumulations from the transformer windings and insulators to permit free circulation of air and to guard against the possibility of insulation breakdowns. Additionally, carefully and thoroughly clean the top and bottom ends of winding assemblies and ventilation ducts.

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Turn off power supplying this equipment before working on it.
- Discharge all static charges held by coils.

Failure to follow these instructions will result in death or serious injury.

1. De-energize the transformer, and clean the windings with a vacuum cleaner, a blower, or with compressed air. Use clean, dry compressed air; apply it at relatively low pressure (not over 25 psi).
NOTE: A vacuum cleaner is preferred as the first step in cleaning, followed by the use of compressed air.
2. Brush and wipe lead supports, tap changers and terminal boards, bushings, and other major insulating surfaces with a dry cloth.
3. Do not use liquid cleaners because some of them have a solvent or deteriorating effect on most insulating materials.

CONNECTIONS AND CONTACT SURFACES

A clean contact surface area is necessary. Therefore, terminals must be clean. If transformers are installed outdoors or in a harsh environment, seal the connections with approved electrical joint compound. Apply the compound to exposed connections and the surface area before a bolted connection is made.

REPLACEMENT PARTS AND ACCESSORIES

Table 2 lists available transformer lug kits. For additional information regarding terminal connectors, refer to the label on the transformer, on the reverse side of the front panel.

Table 2: VERSAtile™ Compression Lugs and Mechanical Set-Screw Types—UL Listed Lugs AL9CU (90° C Rated)

Transformer kVA Sizes	Kit Catalog Number	Terminal Lugs		Aluminum or Copper Conductor Range (AWG or kcmil)	Hardware Included	
		Qty.	Catalog Number		Qty.	Type
VERSAtile Compression Equipment Lugs						
15–37 ^{1/2} 1Ø	VCELSK1	8	VCEL02114S1	#8–1/0	8	1/4 in. x 1 in. cap screws
15–45 3Ø		5	VCEL030516H1	#4–300 kcmil	1	1/4 in. x 2 in. cap screws
50–75 1Ø	VCELSK2	13	VCEL030516H1	#4–300 kcmil	8	1/4 in. x 1 in. cap screws
75–112 ^{1/2} 3Ø					8	1/4 in. x 2 in. cap screws
100–167 1Ø	VCELSK3	3 26	VCEL030516H1	#4–300 kcmil	3	1/4 in. x 3/4 in. cap screws
150–300 3Ø			VCEL07512H1	#500–750 kcmil Al 500 kcmil Cu	16	3/8 in. x 2 in. cap screws
500 3Ø	VCELSK4	34	VCEL07512H1	#500–750 kcmil Al 500 kcmil Cu	21	3/8 in. x 2 in. cap screws
Mechanical Set– Screw Type Lugs						
15–37 ^{1/2} 1Ø	DASK1	8	DA2	#14–#2	9	1/4 in. x 3/4 in. cap screws
15–45 3Ø		5	DA250	#6–250 kcmil		
50–75 1Ø	DASK2	13	DA250	#6–250 kcmil	8	1/4 in. x 1 in. cap screws
75–112 ^{1/2} 3Ø					8	1/4 in. x 1 ^{3/4} in. cap screws
100–167 1Ø	DASK3	3	DA250	#6–250 kcmil	3	1/4 in. x 1 in. cap screws
150–300 3Ø		26	DA600	#2–600 kcmil	16	3/8 in. x 2 in. cap screws
500 3Ø	DASK4	34	DA600	2–600 kcmil	21	3/8 in. x 2 in. cap screws

NOTE: Refer to UL 486A for torque values to be used with lug connection hardware.



To order replacement enclosure parts and other accessories, refer to the transformer section in the Schneider Electric *Digest*, and call 1-888-Square D (1-888-778-2733).

Instruction Bulletin

Replaces 39000-243-01A, 04/2006

ENGLISH

General Purpose Low Voltage Transformers Indoor/Outdoor, Encapsulated, 600 V Class 7400

Retain for future use.

Introduction

This document provides installation, operation, and maintenance information for Square D® brand indoor/outdoor, encapsulated transformers. The general purpose transformers described in this bulletin are intended for power, heating, and lighting applications under 600 V.

Safety Precautions

⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA® 70E.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Do not apply transformers to circuits where system voltage exceeds nameplate rated voltage by more than 5%.
- Always apply over-current protection on ungrounded input and output conductors as detailed in Article 450 of NFPA 70 (National Electrical Code® (NEC®)).
- Replace all devices, doors, and covers before turning on power to this equipment.

Failure to follow this instruction will result in death or serious injury.

Receiving and Handling

Upon receipt, check the packing list against the equipment received to ensure the order and shipment are complete. Claims for shortages or errors must be made in writing to Schneider Electric within 60 days after delivery. Failure to give such notice will constitute unqualified acceptance and a waiver of all such claims by the purchaser.

Before returning any product to the factory, obtain a Return Material Authorization (RMA) from your Schneider Electric representative.

Immediately inspect the transformer for any damage that may have occurred in transit. If damage is found or suspected, file a claim with the carrier immediately and notify Schneider Electric. Delivery of equipment to a carrier at any of the Schneider Electric plants or other shipping points constitutes delivery to the purchaser regardless of freight payment and title. All risk of loss or damage pass to the purchaser at that time.

For details concerning claims for equipment shortages and other errors, refer to Schneider Electric's "Terms and Conditions of Sale."

Storing

Store the transformer in a clean, dry location until installation. Temperature range for storage is -50 °C to +85 °C.

Preparation

Transformers must be installed and serviced only by qualified personnel in accordance with NFPA® 70 (NEC®) and any other applicable codes and standards. The following checklist will help ensure a successful installation.

- ❑ Check the nameplate to be sure that the transformer is the correct kVA and voltage for the load.
- ❑ Verify all markings on the leads and terminals. Ensure that these markings agree with those on the transformer nameplate.



Terminal designations are either printed on the wire leads or identified by wire marking tape on the leads.

- ❑ Make sure that the area of installation is well ventilated. Proper operation requires an ambient room temperature not to exceed 40 °C (104 °F).



Encapsulated transformers may be installed outdoors without additional protection against the weather. These are marked “Type 3R” in the enclosure field of the nameplate.

- ❑ Designate an appropriate wall, column, or other surface for installation. Ensure that enough clearance is allowed for the lifting eye(s) to be in the up position and the terminal compartment to be at the bottom. Follow clearance requirements printed on the transformer nameplate.
- ❑ Verify that sufficient mounting hardware is chosen to support the weight of the transformer.

Seismic Qualifications

Seismic qualification of nonstructural components by Schneider Electric is just one link in the total chain of responsibility required to maximize the probability that the equipment will be intact and functional after a seismic event. The equipment manufacturer determines that the equipment will be functional following a seismic event via shake-table testing programs. The seismic qualification testing results validate that Schneider Electric equipment will perform the intended function after the earthquake. However, the foundation and the anchorage system must also meet the applicable building codes and standards for the entire installation to maintain post earthquake functionality. Equipment inadequately mounted or mounted to weak or flexible foundations will not meet the requirements.

The equipment specifier/installer determines that the equipment is rigidly supported and will not leave its foundation during a seismic event. During an earthquake, the equipment must be able to transfer the loads that are created through the mounting pad and anchorage to the load-bearing path of the building structural system. If the equipment is not attached to the building structure in accordance with the minimum standards recommended herein, the complete equipment installation might become too flexible and may overturn or shear the attachment devices and slide off its foundation.

The structural civil engineer or design engineer of record is responsible for detailing the equipment connection and anchorage requirements (including the lateral restraint system if appropriate) for the given installation. The installer and manufacturers of the anchorage and lateral restraint system are responsible for ensuring that the mounting requirements are met. Schneider Electric is not responsible for the specification and performance of these anchorage systems.

Drawings are available that include specific mounting information for seismic qualifications. Contact your local Schneider Electric representative, or call 1-888-Square D (1-888-778-2733) to obtain these drawings.

Installation

1. Mount the transformer.
2. Connect the transformer primary according to the wiring diagram on the nameplate. For field connections, use wire rated for a minimum 90 °C and sized for 75 °C ampacity.
3. Ground the enclosure permanently and adequately in accordance with National Electrical Code requirements. The separately derived secondary system may require grounding. Refer to Section 250.20(D) of NFPA® 70 (2008).
4. Energize the unit, and check the secondary voltage to be sure it is proper for the load.



Measured voltage may be slightly higher than nominal because of compensated windings on transformers 3 kVA and below.

5. Shut off the primary supply.
6. Test with a properly rated voltage sensing device to ensure that the power is off.
7. Connect the load to the secondary.
8. Replace all enclosure covers.
9. Energize the unit.

Enclosure Temperature

The temperature of the enclosure exterior for encapsulated transformers should not exceed ambient plus 65 °C rise as indicated in UL Standard 506.

NEMA Type 4X Units

Conduit hubs, closure plates, and other equipment intended to be field installed on NEMA Type 4X units shall be selected and installed to maintain the environmental integrity of the enclosure.

Application Support

Specifications, performance data, and special application documentation are available at www.us.SquareD.com. Or, for other transformer application assistance, call 1-888-Square D (1-888-778-2733) to speak with your local Schneider Electric representative.

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Failure to follow this instruction will result in death or serious injury.**

- ## Maintenance Log

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Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.