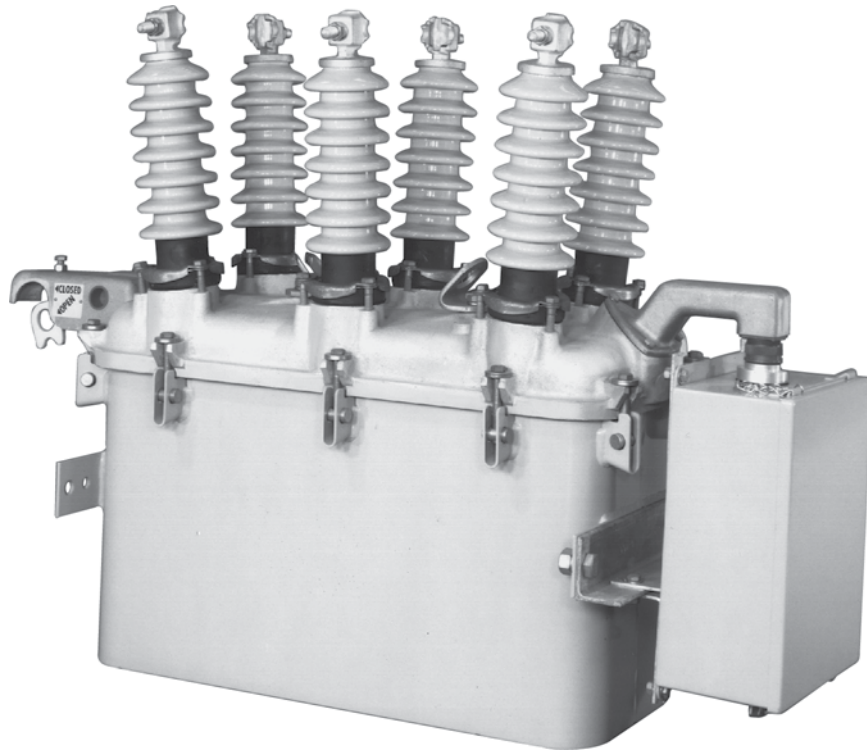


## Type GN3E and GN3VE sectionalizers installation and operation instructions

GN3E serial number 5750 and above  
GN3VE serial number 1390 and above

NOTICE: This bulletin is also applicable to product serial numbers beginning with the prefix CP57.



## **DISCLAIMER OF WARRANTIES AND LIMITATION OF LIABILITY**

The information, recommendations, descriptions and safety notations in this document are based on Eaton Corporation's ("Eaton") experience and judgment and may not cover all contingencies. If further information is required, an Eaton sales office should be consulted. Sale of the product shown in this literature is subject to the terms and conditions outlined in appropriate Eaton selling policies or other contractual agreement between Eaton and the purchaser.

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## Safety for life



Eaton meets or exceeds all applicable industry standards relating to product safety in its Cooper Power™ series products. We actively promote safe practices in the use and maintenance of our products through our service literature, instructional training programs, and the continuous efforts of all Eaton employees involved in product design, manufacture, marketing, and service.

We strongly urge that you always follow all locally approved safety procedures and safety instructions when working around high voltage lines and equipment, and support our “Safety For Life” mission.

## Safety information

The instructions in this manual are not intended as a substitute for proper training or adequate experience in the safe operation of the equipment described. Only competent technicians who are familiar with this equipment should install, operate, and service it.

A competent technician has these qualifications:

- Is thoroughly familiar with these instructions.
- Is trained in industry-accepted high and low-voltage safe operating practices and procedures.
- Is trained and authorized to energize, de-energize, clear, and ground power distribution equipment.
- Is trained in the care and use of protective equipment such as arc flash clothing, safety glasses, face shield, hard hat, rubber gloves, clampstick, hotstick, etc.

Following is important safety information. For safe installation and operation of this equipment, be sure to read and understand all cautions and warnings.

### Hazard Statement Definitions

This manual may contain four types of hazard statements:

#### DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

#### WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

#### CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

#### CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in equipment damage only.

### Safety instructions

Following are general caution and warning statements that apply to this equipment. Additional statements, related to specific tasks and procedures, are located throughout the manual.

#### DANGER

**Hazardous voltage. Contact with hazardous voltage will cause death or severe personal injury. Follow all locally approved safety procedures when working around high- and low-voltage lines and equipment.**

G103.3

#### WARNING

**Before installing, operating, maintaining, or testing this equipment, carefully read and understand the contents of this manual. Improper operation, handling or maintenance can result in death, severe personal injury, and equipment damage.**

G101.0

#### WARNING

**This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply can result in death, severe personal injury and equipment damage.**

G102.1

#### WARNING

**Power distribution and transmission equipment must be properly selected for the intended application. It must be installed and serviced by competent personnel who have been trained and understand proper safety procedures. These instructions are written for such personnel and are not a substitute for adequate training and experience in safety procedures. Failure to properly select, install or maintain power distribution and transmission equipment can result in death, severe personal injury, and equipment damage.**

G122.2

## Product information

### Introduction

*Service Information MN270001EN* provides installation and operation instructions for Eaton's Cooper Power™ series Type GN3E and GN3VE sectionalizers. Before installing and operating this sectionalizer, carefully read and understand the contents of this manual.

### Read this manual first

Read and understand the contents of this manual and follow all locally approved procedures and safety practices before installing or operating this equipment.

### Additional information

These instructions cannot cover all details or variations in the equipment, procedures, or process described nor to provide directions for meeting every possible contingency during installation, operation, or maintenance. For additional information, please contact your Eaton representative.

### ANSI standards

Eaton's sectionalizers are designed and tested in accordance with ANSI® standard C37.63 where applicable.

### Quality standards

ISO 9001 Certified Quality Management System

### Acceptance and initial inspection

Each sectionalizer is completely assembled, inspected, tested, adjusted, and filled to the correct level with insulating oil at the factory. It is in good condition when accepted by the carrier for shipment.

### Initial inspection

In addition to this manual, also refer to the appropriate maintenance manual for the model of recloser being equipped with microswitches.

1. Upon receipt, inspect the sectionalizer thoroughly for damage and loss of parts or oil incurred during shipment. If damage or loss is discovered, file a claim with the carrier immediately.
2. Check for oil leakage and tighten all bolts that may have loosened during shipment, especially the bolts attaching the head to the tank.

### Handling and storage

If a GN3E or GN3VE sectionalizer is to be stored for an appreciable time before installation, provide a clean, dry storage area. Store the sectionalizer so as to minimize the possibility of mechanical damage; in particular, protect the bushings.

### Description

The sectionalizer is a self-contained, circuit-opening device used in conjunction with source-side protective devices such as reclosers or circuit breakers, to automatically isolate faulted sections of electrical distribution systems. The sectionalizer senses current flow above a preset level, and, when the source-side protective device opens to de-energize the circuit, the sectionalizer counts the overcurrent interruption. Depending upon the coordination scheme, the sectionalizer will open during the first, second, or third open interval of the fault interrupting device to isolate permanent faults and confine outages to smaller sections of line.

The sectionalizer does not interrupt fault current but can be closed into a faulted line. It opens during the open interval of the backup device. For this reason, it must always be used in series with a fault-interrupting backup protective reclosing device. Also, it will reset counts that do not reach the counts-to-open setting within the selected reset time due to clearing of temporary faults.

A minimum of 0.5 A of load current flowing through the sectionalizer will block the generation of a count pulse. This "count-restraint" feature prevents the sectionalizer from counting overcurrents interrupted by downline devices.

The sectionalizers are also equipped with an inrush current restraint feature which distinguishes between inrush currents and fault currents. If it is determined that the overcurrent through the sectionalizer is inrush current, the phase and ground current levels of the sectionalizer are blocked for a duration of 3 seconds upon current detection.

The sectionalizer is completely self-contained. Power to operate the control circuitry and the flux-shift tripper is obtained from the line through the sensing-current transformers. No auxiliary power supply, external connections, or external equipment is required.

## Ratings and control data

**Table 1. Ratings**

<b>Basic Sectionalizer Data</b>	<b>Type GN3E</b>	<b>Type GN3VE</b>
Nominal operating voltage (kV ms)	14.4	24.9
Maximum rated voltage (kV rms)	15.5	27
Impulse withstand (BIL) (kV crest)	110	125
60 Hz withstand (kV rms)		
Dry, one minute	50	60
Wet, ten seconds	45	50
Rated continuous current (A)	200	200
Rated symmetrical load interrupting current (rms A)	440	440
Rated making current (rms A) asym	9000	9000
Short-time ratings (rms A)		
10 second	2600	2600
1 second	5700	5700
Momentary, maximum (rms A) asym	9000	9000

**Table 2. Control Data**

Minimum actuating current settings (A,  $\pm 10\%$ ):

Phase sensing	16, 24, 40, 56, 80, 112, 160, 224, 256, 296, 320, 480, 640
Ground sensing	3.5, 7, 16, 28, 40, 56, 80, 112, 160, 224, 320
Number of counts to open	1, 2, 3
Reset time (seconds)*	15, 30, 60, 90, 120, 180

\* Time required for all count retention to be erased if preset number of counts to open total is not reached.

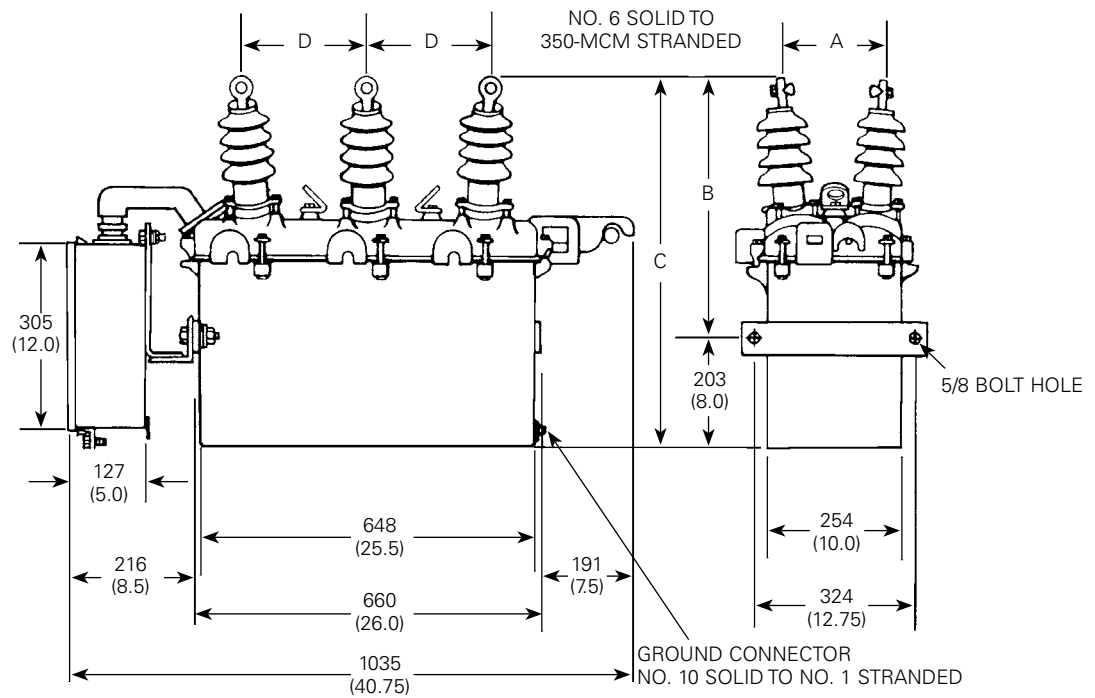
## Dimensions and weights

**Table 3. Weights and Oil Capacities**

GN3E and GN3VE Sectionalizers	Weight Without Oil kg (lb)	Weight With Oil kg (lb)	Oil Capacity I (gal)
GN3E	71 (156)	114 (250)	47.3 (12.5)
GN3VE	75 (166)	118 (260)	47.3 (12.5)

**Table 3A. Dimensions mm (in)**

Type	A	B	C	D
GN3E	222 (8.75)	495 (19.5)	705 (27.75)	241 (9.5)
GN3VE	235 (9.25)	572 (22.5)	775 (30.5)	254 (10.0)



**Figure 1. GN3E and GN3VE sectionalizer dimensions mm (in).**

## Operating settings and adjustments

The operating characteristics of the control are preset to customer specifications and tested prior to shipment from the factory but can be changed by the user. Settings should be checked for correctness before a sectionalizer is placed into service.

### CAUTION

**Equipment damage. The sectionalizer must be bypassed and disconnected prior to changing minimum actuating resistor settings. Failure to comply will cause circuit board damage and may cause misoperation (unintentional operation) of the sectionalizer.**

T277.0

All the settings are made on a printed circuit board (Figure 2) in the cabinet attached to the back of the sectionalizer. To access the settings on an in-service sectionalizer, follow this procedure to remove the sectionalizer from service:

### WARNING

**Do not rely on the open position of the yellow operating handle; it does not ensure that the line has been de-energized. Always establish a visible disconnect. Failure to follow proper safety practices can result in contact with high voltage, which will cause death or severe personal injury.**

G116.0

### WARNING

**Always use a hotstick when working with this equipment. Failure to do so could result in contact with high voltage, which will cause death or severe personal injury.**

G108.1

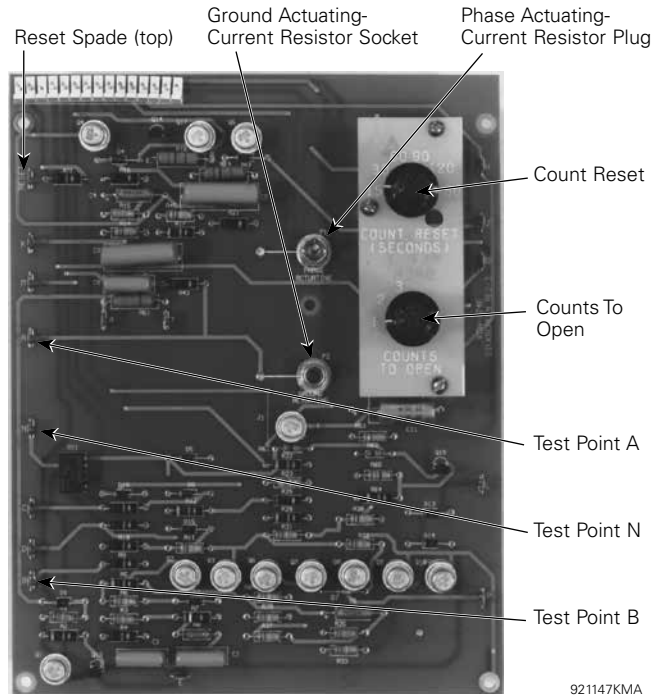
1. Close all three bypass switches (Figure 3).
2. Pull down the yellow operating handle with a hotstick. The yellow operating handle is located under the sleet hood.
3. Open the source and load disconnect switches (Figure 3).
4. Remove the cabinet cover.

### Minimum actuating current

The minimum actuating-current levels for both phase and ground are determined by the selection of the proper plug-in resistors. Normally this setting is approximately 80% of the minimum-trip settings of the backup protective device.

**Note:** If the backup device is not equipped for ground-fault sensing and tripping, a dummy plug-in resistor is used to deactivate the ground current-sensing circuits of the electronic control.

Phase current resistors (equipped with a female plug) are identified with the phase symbol (Ø) and the actuating-current rating in ampere. Catalog numbers for the available phase current resistors are listed in Table 4.



921147KMA

Figure 2. Sectionalizer control circuit board

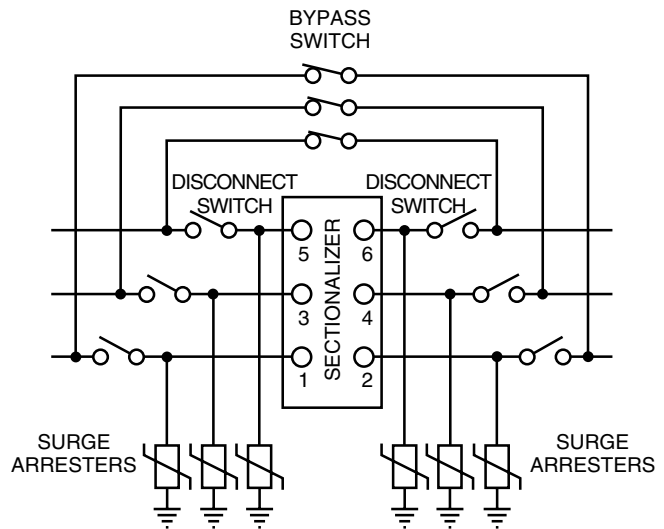


Figure 3. Suggested protection scheme for Type GN3E and GN3VE sectionalizers



**Table 4. Phase Minimum-Actuating Current Resistor**

Actuating Current (A)	Resistance (ohms)		Catalog Number
	Minimum	Maximum	
16	218.80	223.20	KGN123E16
24	141.57	144.43	KGN123E24
40	83.65	85.35	KGN123E40
56	59.80	61.00	KGN123E56
80	39.80	40.60	KGN123E80
112	27.22	27.78	KGN123E112
160	19.80	20.20	KGN123E160
224	13.86	14.14	KGN123E224
256	11.98	12.22	KGN123E256
296	10.39	10.61	KGN123E296
320	9.66	9.86	KGN123E320
480	6.33	6.46	KGN123E480
640	4.95	5.05	KGN123E640

Ground resistors (equipped with a male plug) are identified with the ground symbol ( $\perp$ ) and the actuating-current rating in ampere. Catalog numbers for the available ground-current resistors are listed in Table 5.

**Table 5. Ground Minimum-Actuating Current Resistor**

Actuating Current (A)	Resistance (ohms)		Catalog Number
	Minimum	Maximum	
3.5	6.91K	7.05K	KGN124E3
7	2.03K	2.07K	KGN124E7
16	742.50	757.50	KGN124E16
28	388.10	395.90	KGN124E28
40	264.30	269.70	KGN124E40
56	189.10	192.90	KGN124E56
80	129.70	132.30	KGN124E80
112	90.00	91.81	KGN124E112
160	62.76	64.03	KGN124E160
224	43.76	44.64	KGN124E224
320	30.59	31.21	KGN124E320

**Counts-to-open**

The counts-to-open setting is determined by the position of the COUNTS-TO-OPEN SELECTOR switch. Switch positions 1, 2, and 3 correspond to 1, 2, or 3 counts to open. Normally, this setting is one less than the number of operations to lockout of the backup protective device. To change the number of counts-to-open setting, merely change the position of the rotary switch.

**Inrush-current restraint**

The inrush-current restraint feature blocks the phase and ground actuating levels for three seconds after line current through the sectionalizer is restored and the overcurrent has been determined to be inrush current.

The three second time interval allows for system inrush parameters to stabilize prior to allowing the sensitivity of the sectionalizer to return to its programmed state.

**Count reset**

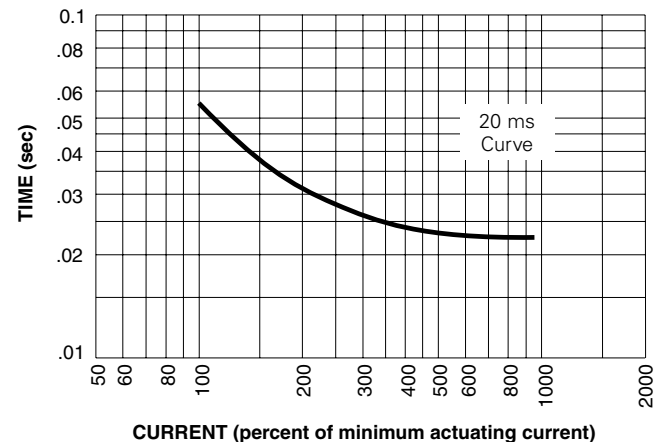
Count reset is determined by the position of the COUNT RESET switch. Reset times of 15, 30, 60, 90, 120, and 180 seconds are available. The reset time is the time interval required before the control resets the operation counter to zero. The reset feature clears any accumulated counts whenever line current is present and less than the minimum actuating level for a period greater than reset time selected.

The reset feature will operate with any current flow from minimum load (3.5 A) to values below phase or ground pickup levels.

The count reset time should be selected to be equal to or greater than the reset time of the upline protective equipment.

**Response time**

For back-fed motor contribution and unsymmetrical clearing of upline faults, a response time is built into the sectionalizer control to eliminate unwanted counting of these situations. Upon detection of any current above the phase or ground actuating setting, the current must exceed the response time characteristics as illustrated in Figure 4. Total clearing time of reclosers and breakers must exceed the response time characteristics of the sectionalizer.



**Figure 4. Maximum response time characteristics**

## Installation

### WARNING

This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply can result in death, severe personal injury, and equipment damage.

G102.1

### WARNING

Do not operate this equipment if energized parts are not immersed in dielectric fluid. Operation when parts are not properly immersed in dielectric fluid may result in internal flashovers that will damage the equipment and can cause death or severe personal injury.

G104.4

### WARNING

Hazardous voltage. This equipment must be de-energized and grounded prior to conducting any maintenance, dielectric fluid sampling, or dielectric fluid filling procedures. Failure to comply can result in death or severe personal injury.

T239.2

## Preliminary checks

Before installing the sectionalizer:

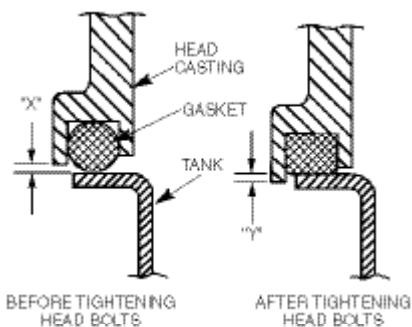
1. Check for proper oil level.

**Note:** With the mechanism removed from the tank, the oil level should be one inch below the top edge of the tank.

**Note:** Use new, clean, dry transformer oil if replenishment is required.

## IMPORTANT

When reinstalling the sectionalizer mechanism in the tank, make sure that the head casting is centered on the flange of the tank before tightening the head bolts. As the head bolts are tightened, the gasket is compressed. The clearance (X) between the outer lip of the casting and the tank flange becomes an interference (Y) when the head bolts are torqued to their required 11 to 16 ft-lb.



Position of head casting on tank flange.

If the casting is not centered, the outer lip of the casting will hang up on the edge of the flange, preventing a positive seal and possibly cracking the casting.

2. If the sectionalizer has been stored or is being relocated, test the dielectric strength of the oil. On new equipment, the dielectric strength should be 26 kV; see *R280-90-1 Oil Specifications and Test*.
3. Make sure that the actual settings agree with the sectionalizer nameplate and are correct for the planned installation.

## Mounting

### CAUTION

Falling equipment. Use the lifting lugs provided and follow all locally approved safety practices when lifting and mounting the equipment. Lift the unit smoothly and do not allow the unit to shift. Improper lifting can result in severe personal injury, death, and/or equipment damage.

G106.3

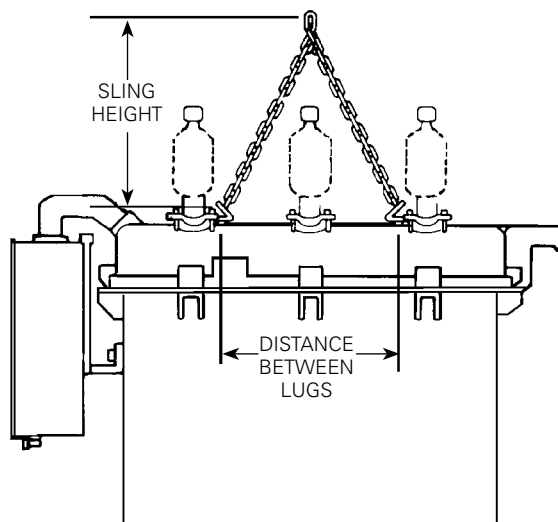
See Figures 5 and 6 for installation drawings using Eaton's mounting frames. If other mounting means are used, support the sectionalizer at the four 5/8-in. bolt holes in the mounting rails on the tank (Figure 1).

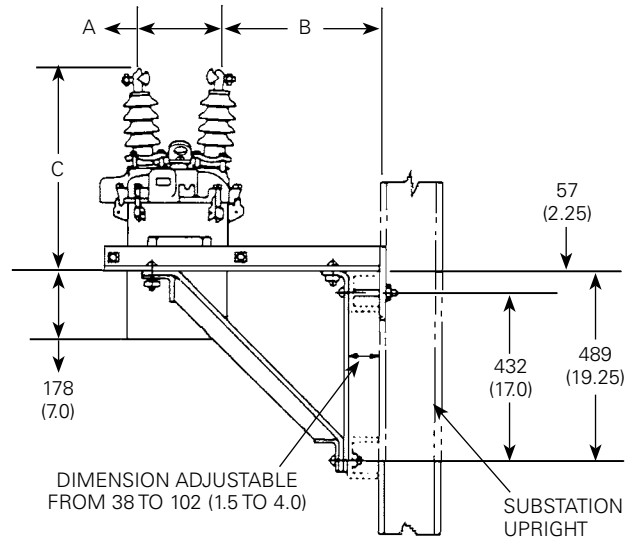
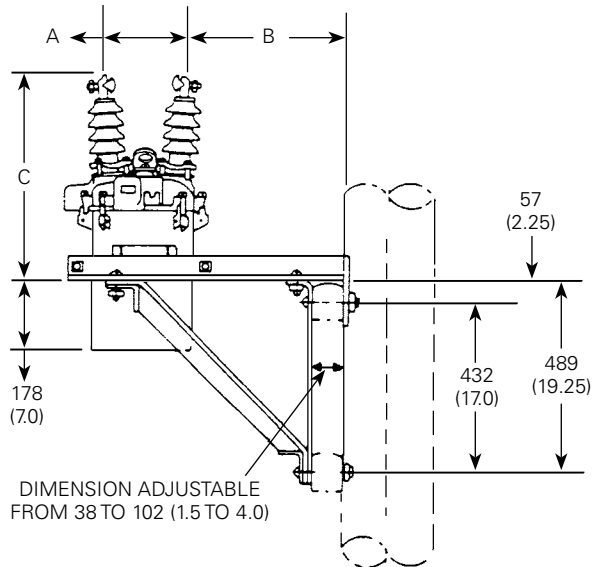
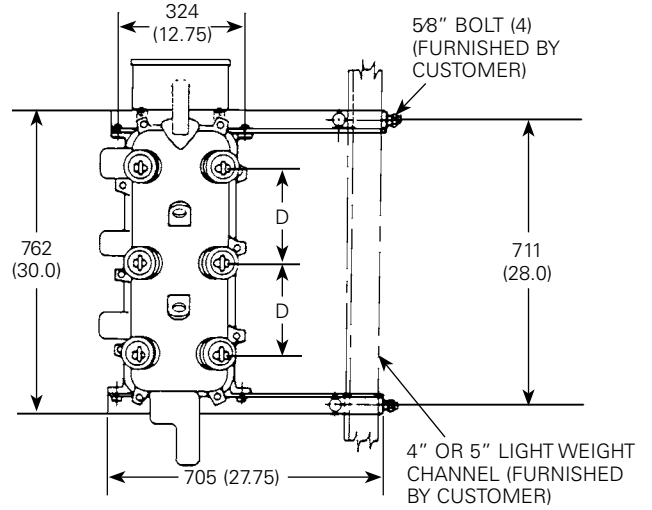
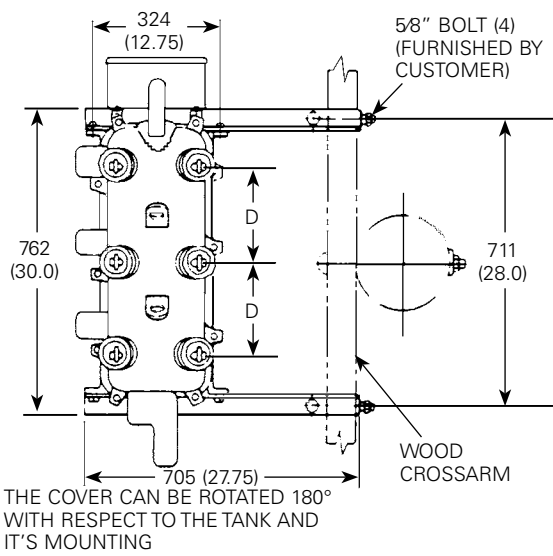
## Lifting the sectionalizer

Follow all approved safety practices when making hitches and lifting the equipment. Lift the load smoothly; do not allow the load to shift.

The sectionalizer has two lifting lugs—both must be used when lifting. Maximum strength is attained with a vertical lift attached to the lugs. Use a spreader bar with a fixed attachment point for the hook at the load center.

If a sling is used, it must have a fixed attachment point at the load center. Rig the load so that the sling height is equal to—or greater than—the distance between lifting lugs.





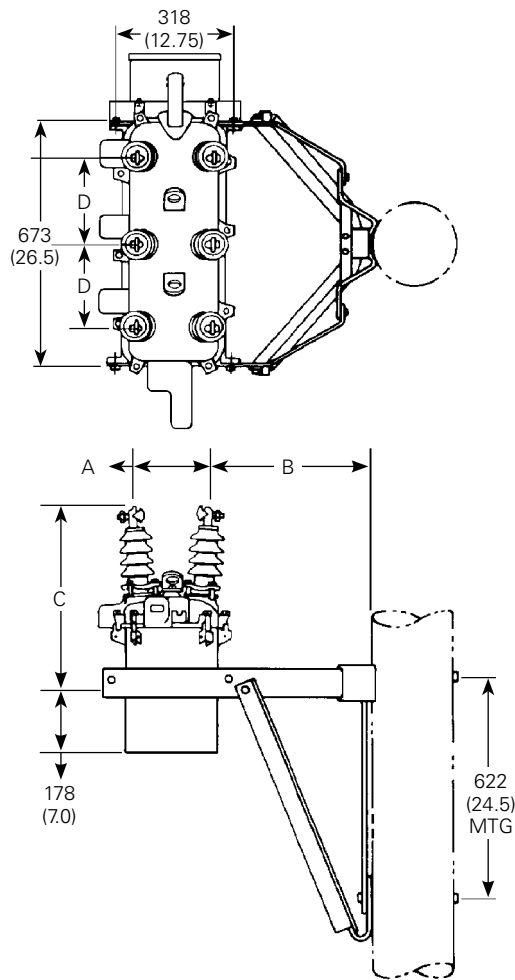
**CROSSARM MOUNTING**

**SUBSTATION MOUNTING**

**Bracket dimensions**

Sectionalizer Type	A mm (in)	B mm (in)	C mm (in)	D mm (in)
GN3E	222 (8.75)	406 (16.0)	533 (21.0)	241 (9.5)
GN3VE	235 (9.25)	400 (15.75)	603 (23.75)	254 (10.0)

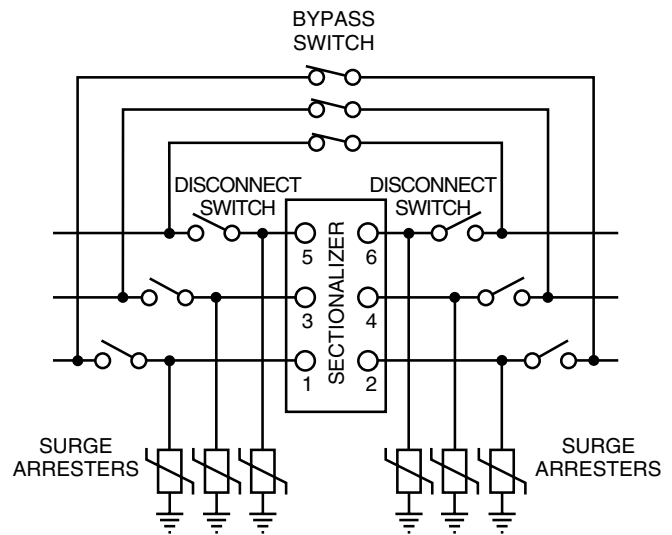
**Figure 5. KA19H3 double crossarm bracket mm (in)**



**Frame dimensions**

Frame	Dimensions mm (in)			
	A	B	C	D
KA116H3	222 (8.75)	406 (16.0)	533 (21.0)	241 (9.5)
KG50E	235 (9.25)	508 (20.0)	603 (23.75)	254 (10.0)

**Figure 6. KA116H3 pole-mounting frame for Type GN3E and KGN50E for pole-mounting frame for Type GN3VE sectionalizer.**



**Figure 7. Suggested protection scheme for Type GN3E and GN3VE sectionalizers.**

**Wiring connections and surge protection**

The universal clamp-type bushing terminals for the high-voltage line connections accommodate no. 6 solid through 350-kcmil copper or aluminum cables. The grounding connector on the tank accepts two #10 solid through #1 stranded grounding wires.

It is desirable to provide the sectionalizer with switches and surge protection as shown in Figure 7. Lightning protection on both sides of the sectionalizer is advisable. However, if protection is provided on only one side, it should be located on the source side for line installations and on the load side for substation installations.

## Operating instructions

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### WARNING

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**This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply can result in death, severe personal injury, and equipment damage.**

G102.1

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### WARNING

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**Do not rely on the open position of the yellow operating handle; it does not ensure that the line has been de-energized. Always establish a visible disconnect. Failure to follow proper safety practices can result in contact with high voltage, which will cause death or severe personal injury.**

G116.0

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### WARNING

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**Always use a hotstick when working with this equipment. Failure to do so could result in contact with high voltage, which will cause death or severe personal injury.**

G108.1

## Initial operation

With the sectionalizer connected to the system and the source-side high-voltage lines energized, the sectionalizer can be placed in service. Follow approved local practice, which may involve closing line disconnect switches, closing the sectionalizer manually by pushing up the yellow operating handle under the sleet hood and then opening the bypass circuit.

## Routine operation

Under normal operating conditions, the sectionalizer counts overcurrent interruptions and opens automatically when operating conditions exceed the settings. Once open, the sectionalizer will stay open until manually closed.

When the sectionalizer opens, the yellow operating handle drops down from under the sleet hood. To close the sectionalizer, push up the operating handle. This is the only means of closing the sectionalizer.

The sectionalizer can be manually opened and closed for load switching by operating the yellow handle.

## Testing

### **⚠ WARNING**

This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply can result in death, severe personal injury, and equipment damage.

G102.1

### **⚠ WARNING**

Hazardous voltage. The switchgear (apparatus and control) and high-voltage transformer must be in a test cage or similar protected area to prevent accidental contact with the high-voltage parts.

Solidly ground all equipment. Failure to comply can result in death, severe personal injury, and equipment damage.

T221.5

GN3E and GN3VE sectionalizers are carefully tested at the factory prior to shipment. Well-equipped test facilities, a detailed testing procedure, and well-trained test personnel assure that the unit will operate according to published data.

Each sectionalizer leaves the factory ready for installation; pre-installation testing is not necessary. However, should verification of operation prior to installation be desired, the following test procedures can be used.

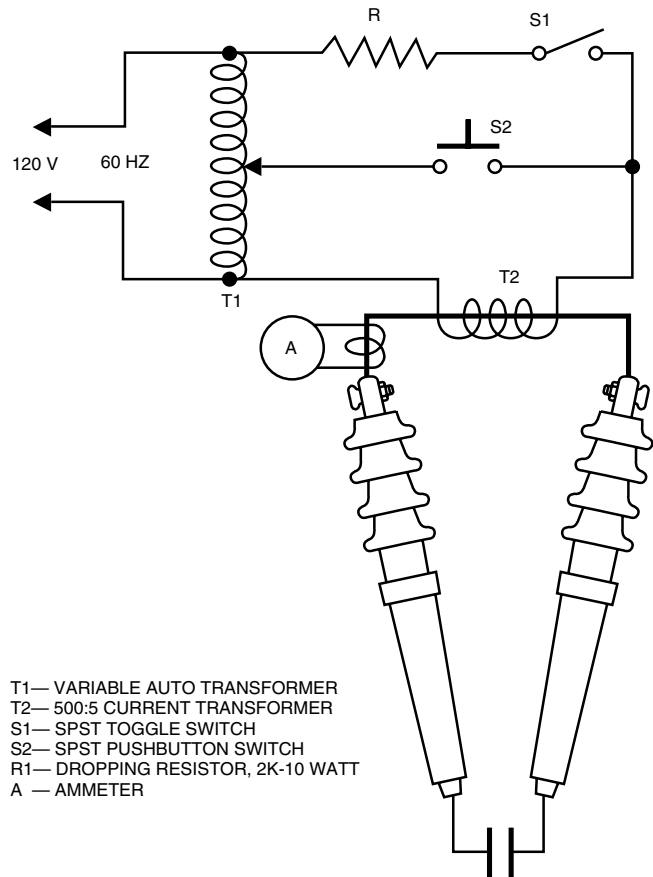
### Test circuit and equipment

A suggested test circuit is shown in Figure 8. In this setup, the test current is obtained by back feeding a 500:5 current transformer (located in the primary loop of one phase of the sectionalizer) from a 120 V, 60 Hz source which is adjusted with a variable autotransformer. The ammeter scales should be selected to accommodate the appropriate range of equivalent input currents required for the test.

### Test procedures

During testing, it is important to verify that the sectionalizer is not in Inrush Restraint Mode. If the sectionalizer enters Inrush Restraint Mode during testing, it will block counting. Refer to **Inrush Current Restraint** in either the **Testing** or **Operating Settings and Adjustments** sections of this manual for additional information.

While performing the following tests, monitor continuity between test points A and N, located on the control circuit board (Figure 2) to confirm the sectionalizer does not enter inrush restraint mode during testing. If, upon closing the sectionalizer, no continuity exists between test points A and N, short terminals A and B (see Figure 2) and apply 6 A load current (by closing switch S1) for 3.5 seconds. Once continuity has been restored open S1, remove short from between terminals A and B and proceed with test procedures.



T1— VARIABLE AUTO TRANSFORMER  
T2— 500:5 CURRENT TRANSFORMER  
S1— SPST TOGGLE SWITCH  
S2— SPST PUSHBUTTON SWITCH  
R1— DROPPING RESISTOR, 2K-10 WATT  
A — AMMETER

Figure 8. Test Circuit Schematic

### Minimum actuating current

The minimum actuating current can be verified by testing at the  $\pm 10$  percent values of the phase and ground actuating current ratings. For example, the minimum actuating resistor rated at 80 A is tested at 72 A (no count) and at 88 A (count registered).

**Phase minimum actuating current.** When checking the phase minimum actuating current, the ground fault sensing portion of the sectionalizer must be disabled.

Testing an individual phase without disabling the ground sensing circuits will cause a false count. The following procedure is used:

1. Disable the ground sensing circuit:
  - A. Remove the ground actuating current resistor (Figure 2).
  - B. Short circuit the ground plug receptacle to its outer shell.
2. Jumper terminals A and B together on the circuit board to disable the current inrush restraint.

3. Program the sectionalizer for one-count-to-open by setting the COUNTS-TO-OPEN SELECTOR switch to "1".
4. Close the sectionalizer by raising the yellow handle under the sleet hood.
5. With the test circuit connected to phase A of the sectionalizer and S1 open, hold S2 closed and slowly raise the test current from zero to the appropriate value shown in Column A of Table 6. Hold S2 closed for at least three seconds.
6. Release S2 to simulate a backup opening. The sectionalizer **should not** open.
7. Close S2 and adjust the test current to the appropriate value shown in Column B of Table 6.
8. Release S2 to simulate a backup opening. The sectionalizer should count the overcurrent interruption and open.
9. Repeat steps 3 through 8 for phases B and C.
10. Remove the jumper from terminals A and B.
11. Remove the short circuit from the ground plug receptacle and replace the ground actuating-current resistor plug.

#### Ground minimum actuating current.

To prevent the possibility of a false count, the phase sensing portion of the sectionalizer control circuit should be disabled when the ground minimum actuating current is being checked. The following procedure is used:

1. Disable the phase sensing circuit:
  - A. Remove the phase actuating current resistor (Figure 2).
  - B. Short circuit the center pin of the phase receptacle to its outer clips.
2. Jumper terminals A and B together on the circuit board to disable the current inrush restraint.
3. Check that the sectionalizer control is set for one-count-to-open.
4. Close the sectionalizer by raising the yellow handle under the sleet hood.
5. With the test circuit connected to phase A of the sectionalizer and S1 open, hold S2 closed and slowly raise the test current from zero to the appropriate values shown in Column A of Table 7. Hold S2 closed for at least three seconds.
6. Release S2 and simulate a backup opening. The sectionalizer **should not** open.
7. Close S2 and adjust the test current to the appropriate value shown in Column B of Table 7.
8. Release S2 to simulate a backup opening. The sectionalizer should count the overcurrent interruption

and open.

9. Repeat steps 3 through 7 for Phases B and C.
10. Remove the jumper from terminals A and B.
11. Remove the short circuit from the phase plug receptacle and replace the phase actuating-current resistor plug.

**Table 6. Test Circuit Operating Limits for Actuating Current**

Actuating Current Settings (A)	Column A Sectionalizer Must Not Count Below (A)	B Sectionalizer Must Count At (A)
3.5	3	4
7	6.3	7.7
16	14.4	17.6
20	18	22
24	21.6	26.4
28	25.2	30.8
40	36	44
56	50.4	61.6
80	72	88
112	101	124
160	144	176
224	201	247
256	230	282
296	266	326
320	288	352
480	432	528
640	576	704

#### Count restraint

The count restraint feature prevents erroneous counts of overcurrents interrupted by downline protective devices by blocking the counting operation as long as a minimum of 0.5 A of uninterrupted line current flows through the sectionalizer.

The operation of the count restraint can be verified by super-imposing an interruptible overcurrent on a constant minimum line current. The sectionalizer will not count or open on the interruption of the overcurrent as long as the minimum line current is not interrupted. To check the count restraint feature, proceed as follows:

1. Disable the ground sensing circuit:
  - A. Remove the ground actuating-current resistor (Figure 2).
  - B. Short circuit the ground plug receptacle to its outer shell.
2. Jumper terminals A and B together on the circuit board to disable the current inrush restraint.
3. Check that the sectionalizer control is set for one-count-to-open.

4. Close the sectionalizer by raising the yellow handle under the sleet hood.
  5. With the test circuit connected to phase A of the sectionalizer and S1 closed (to simulate a constant load current of approximately 6 A), hold S2 closed and raise the test current to slightly above the appropriate values shown in Column B of Table 6. Hold S2 closed for at least three seconds
  6. Release S2 to simulate a downline device clearing the overcurrent. The sectionalizer **should not** open verifying the operation of the count restraint feature.
  7. Open S1 and again close and adjust S2 to simulate a backup device clearing the fault. This time the sectionalizer should count the overcurrent interruption and open.
  8. Remove the jumper from terminals A and B.
  9. Remove the short circuit from the ground plug receptacle and replace the ground actuating-current resistor plug.
7. To verify the two-counts-to-open setting, set the COUNTS-TO-OPEN SELECTOR switch to "2" and repeat steps 3 through 6. The sectionalizer should open upon the second opening of S2.
  8. Remove the jumper from terminals A and B.
  9. Remove the short circuit from the ground plug receptacle and replace the ground actuating-current resistor plug.

### Count reset

The count reset feature resets the sectionalizer count to zero whenever current below the actuating level flows through the sectionalizer for longer than the programmed reset time without interruption. The reset time settings have a tolerance of  $\pm 10$  percent.

It can be verified by interrupting an overcurrent flow through the sectionalizer one time less than the countsto-open setting, then allowing load current to flow for periods just under and just over the reset setting. The sectionalizer should open if the overcurrent for the final count is interrupted within the reset time period (count has reset to zero). The following procedures may be used to verify the count reset:

### Number of counts-to-open

The number of counts-to-open can be verified by interrupting, the preset number of times, an overcurrent through the sectionalizer. For example, with the control set for three counts, the sectionalizer will open upon the third overcurrent interruption. Proceed as follows:

1. Disable the ground sensing circuit:
  - A. Remove the ground actuating-current resistor (Figure 2).
  - B. Short circuit the ground plug receptacle to its outer shell.
2. Jumper terminals A and B together on the circuit board to disable the current inrush restraint.
3. Program the sectionalizer for three counts-to-open by setting the COUNTS-TO-OPEN SELECTOR switch to "3".
4. Close the sectionalizer by raising the yellow handle under the sleet hood.
5. With the test circuit connected to phase A of the sectionalizer and S1 open, close S2 and raise the test current to slightly above the appropriate value shown in Column B of Table 6. Hold S2 closed for at least three seconds.
6. Open and close S2 a number of times. The sectionalizer should open upon the third opening of S2.
1. Disable the ground sensing circuit:
  - A. Remove the ground actuating-current resistor (Figure 2).
  - B. Short circuit the ground plug receptacle to its outer shell.
2. Program the sectionalizer control for two counts-toopen and set the COUNT RESET selector to 15 seconds.
3. Jumper terminals A and B together on the circuit board to disable the current inrush restraint.
4. Close the sectionalizer.
5. With test circuit connected to phase A of the sectionalizer and S1 open, close S2 and raise the test current to slightly above the appropriate value shown in Column B of Table 6. Hold S2 closed for at least three seconds.
6. Release S2 to simulate a backup protective device clearing the overcurrent. The sectionalizer will register a count.
7. Close S1 for 13.5 seconds.
8. Momentarily close and then release switch S2. The sectionalizer **should** open, verifying that the count reset has not been activated.
9. Reclose the sectionalizer and then close and release S2 once to register one overcurrent interruption count.
10. Close S1 for slightly more than 16.5 seconds.
11. Momentarily close and release switch S2. The sectionalizer **should not** open verifying that the count reset has been activated and the first count has been erased.



12. Again, close and release S2. The sectionalizer **should** open.
13. Remove the jumper from terminals A and B.
14. Remove the short circuit from the ground plug receptacle and replace the ground actuating-current resistor plug.

### Inrush current restraint

The inrush-current restraint feature distinguishes between fault currents and inrush currents. For fault current interruptions, the sectionalizer counts and opens normally. For an inrush-current condition, the phase and ground minimum actuating current detection is blocked for three seconds to prevent counting the inrush current.

The three-second time interval allows for system inrush parameters to stabilize prior to allowing the sensitivity of the sectionalizer to return to its programmed state.

The operation of the inrush-current restraint can be verified by simulating a fault condition (the overcurrent is preceded by an overcurrent interruption) and an inrush condition (the overcurrent is preceded by a load current interruption).

The following procedure is to verify the inrush-current restraint feature.

1. Disable the ground sensing circuit.
  - A. Remove the ground activating-current resistor (Figure 2).
  - B. Short circuit the ground plug receptacle to its outer shell.
2. Set the COUNTS TO OPEN SELECTOR switch to "1".
3. Manually close the sectionalizer.
4. With the test circuit connected to phase A of the sectionalizer and S1 open, hold S2 closed and raise the test current to slightly below the appropriate value shown in Column A of Table 7.
5. Release S2 to simulate a backup opening with only load current flowing through the sectionalizer when current was interrupted. The sectionalizer **should not** open.
6. Close S2 and **in no more than three seconds**, adjust the test current to just below twice the appropriate value shown in Column A of Table 6 to simulate an inrush condition. Release S2. The sectionalizer **should not open**, verifying that the inrush restraint feature has been activated.
7. Reset the inrush restraint:
  - A. Short test terminals A and B together on the circuit board to disable the current inrush restraint.
  - B. Close S1 closed for 3.5 seconds.
  - C. Open S1 and remove short from Test Terminals A and B.
8. Close S2 and raise the test current to slightly above the appropriate value shown in Column B of Table 6.

9. Release S2 to simulate a backup opening with fault current flowing through the sectionalizer when current was interrupted. The sectionalizer **should** open.
10. Close the sectionalizer.
11. Repeat step 9 to simulate a fault condition.
12. Release S2. The sectionalizer should open verifying that the inrush restraint has not been activated.
13. Remove the short circuit from the ground plug receptacle and replace the ground actuating-current resistor plug.

### Post-test procedures

After testing has been completed, make sure that the control settings are programmed to the operating parameters as originally specified.

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