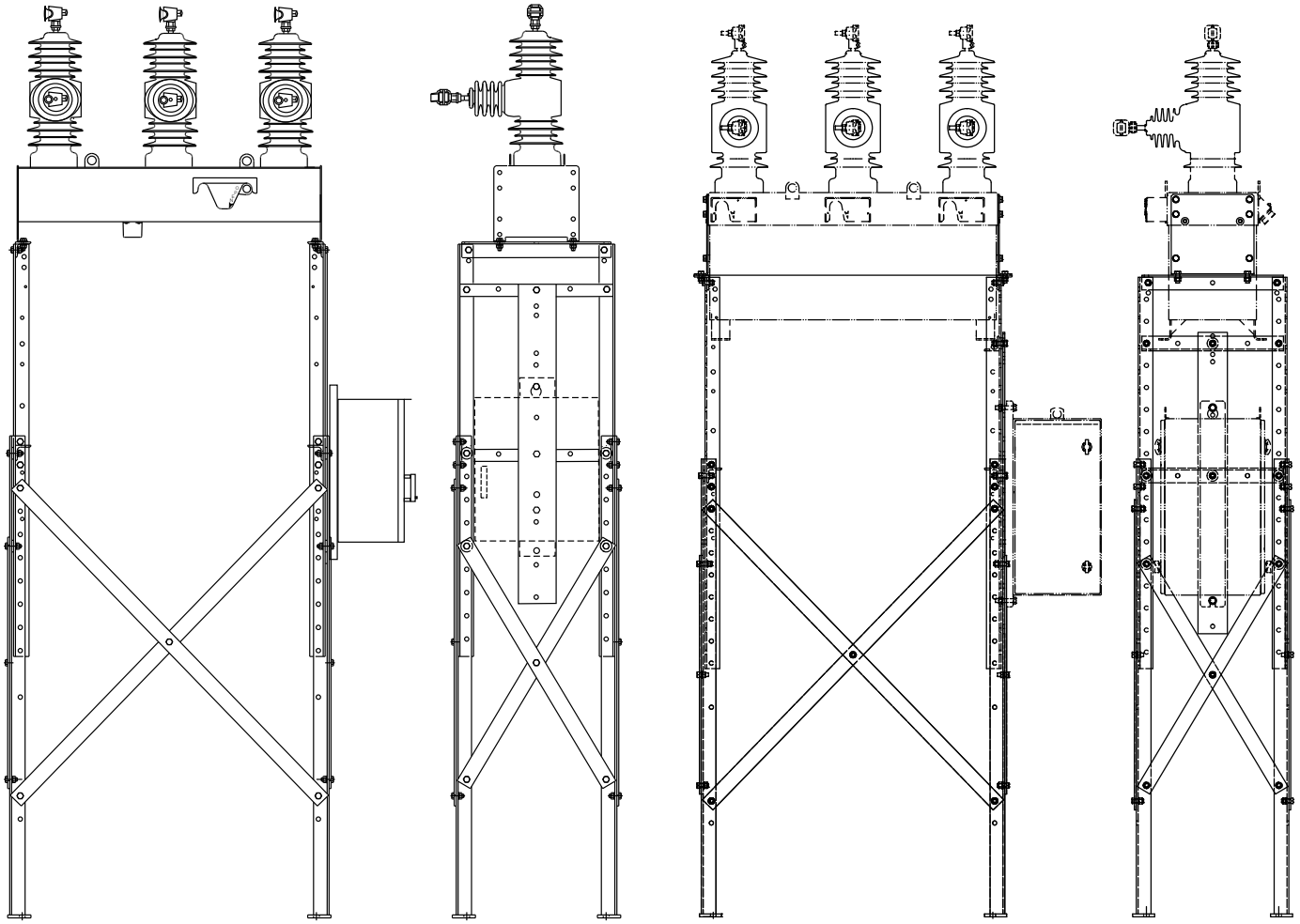
Substation frame KNOVA59-1 and KNOVA59-3 assembly and installation instructions



Powering Business Worldwide

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Contents

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. G122.3

Product information

Introduction

Eaton's *Service Information MN280043EN* provides assembly and installation instructions for its Cooper Power™ series KNOVA59-1 and KNOVA59-3 substation frames. It contains a convenient step-by-step explanation of installation procedures as well as a parts list. Before assembling the frame, 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 provide directions for meeting every possible contingency during installation, operation, or maintenance. For additional information, please contact your Eaton representative.

Acceptance and initial inspection

All frame parts are inspected at the factory. They are in good condition when accepted by the carrier for shipment.

Upon receipt, inspect the shipping container for signs of damage. Unpack and inspect thoroughly for damage incurred during shipment. If damage is discovered, file a claim with the carrier immediately.

Handling and storage

Be careful during handling and storage of the frame to minimize the possibility of damage. If the frame is to be stored for any length of time prior to assembly or installation, provide a clean, dry storage area.

Quality standards

ISO 9001 Certified Quality Management System

Description of frame

The substation frame referenced in these instructions is intended for the following switchgear:

- NOVA® Three-Phase, Microprocessor-Controlled Recloser
- DAS Three-Phase, Vacuum-Break Distribution Automation Switch
- VCS-3 Three-Phase, Vacuum-Break Capacitor Switch
- TVS Time-Voltage Sectionalizer
- NOVA STS Three-Phase, Microprocessor-Controlled Recloser

The galvanized frame is constructed of rigid structural or formed steel. The hardware is stainless steel. Practical, welded construction is used to provide a high degree of rigidity with minimum weight. The substation frame height is adjustable to satisfy a variety of application conditions.

Installation dimensions

UNIT TYPE	Rating	A (at minimum height)	B	C
NOVA Recloser	15 kV (110 kV BIL)	3124 (123)	908 (35.75)	508 (20)
	15 kV (125 kV BIL)	3180 (125.25)	964 (38)	564 (22.25)
	27 kV (125 kV BIL)	3180 (125.25)	964 (38)	564 (22.25)
	27 kV (150 kV BIL)	3279 (129)	1063 (41.75)	663 (26)
	38 kV	3279 (129)	1063 (41.75)	663 (26)
DAS Switch without CT	15 kV	3067 (120.75)	851 (33.5)	508 (20)
	27 kV	3128 (123.25)	911 (36)	569 (22.5)
DAS Switch with CT	15 kV (110 kV BIL)	3124 (123)	908 (35.75)	508 (20)
	15 kV (125 kV BIL)	3180 (125.25)	964 (38)	564 (22.25)
	27 kV (125 kV BIL)	3180 (125.25)	964 (38)	564 (22.25)
	27 kV (150 kV BIL)	3279 (129)	1063 (41.75)	663 (26)
	38 kV	3279 (129)	1063 (41.75)	663 (26)
VCS-3 Switch	15 kV	3067 (120.75)	851 (33.5)	508 (20)
	27 kV	3128 (123.25)	911 (36)	569 (22.5)

Note: All dimensions are mm (inches). Dimensions shown are approximate.

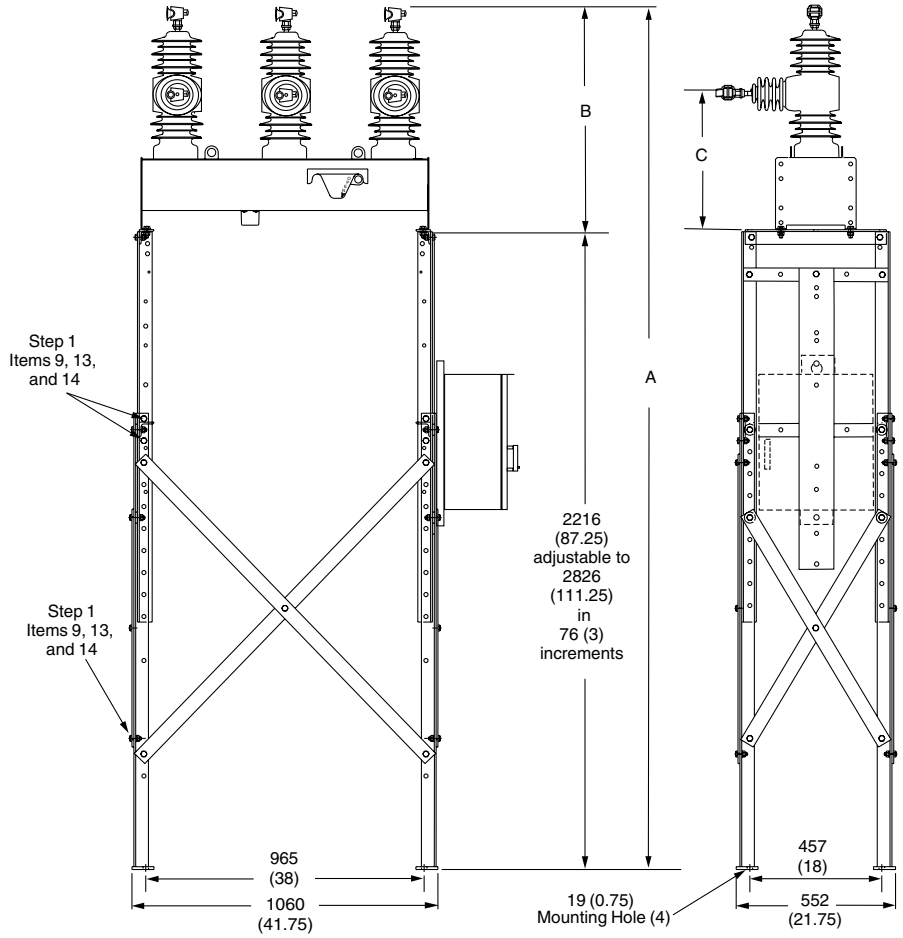


Figure 1. Substation mounting dimensions for NOVA recloser, DAS switch, VCS-3 switch, and TVS sectionalizer.

UNIT TYPE	Rating	A (at minimum height)	B	C
NOVA STS Recloser	15 kV (110 kV BIL)	3124 (123)	908 (35.75)	508 (20)
	27 kV (125 kV BIL)	3180 (125.25)	964 (38)	564 (22.25)
	38 kV	3279 (129)	1063 (41.75)	663 (26)

Note: All dimensions are mm (inches). Dimensions shown are approximate.

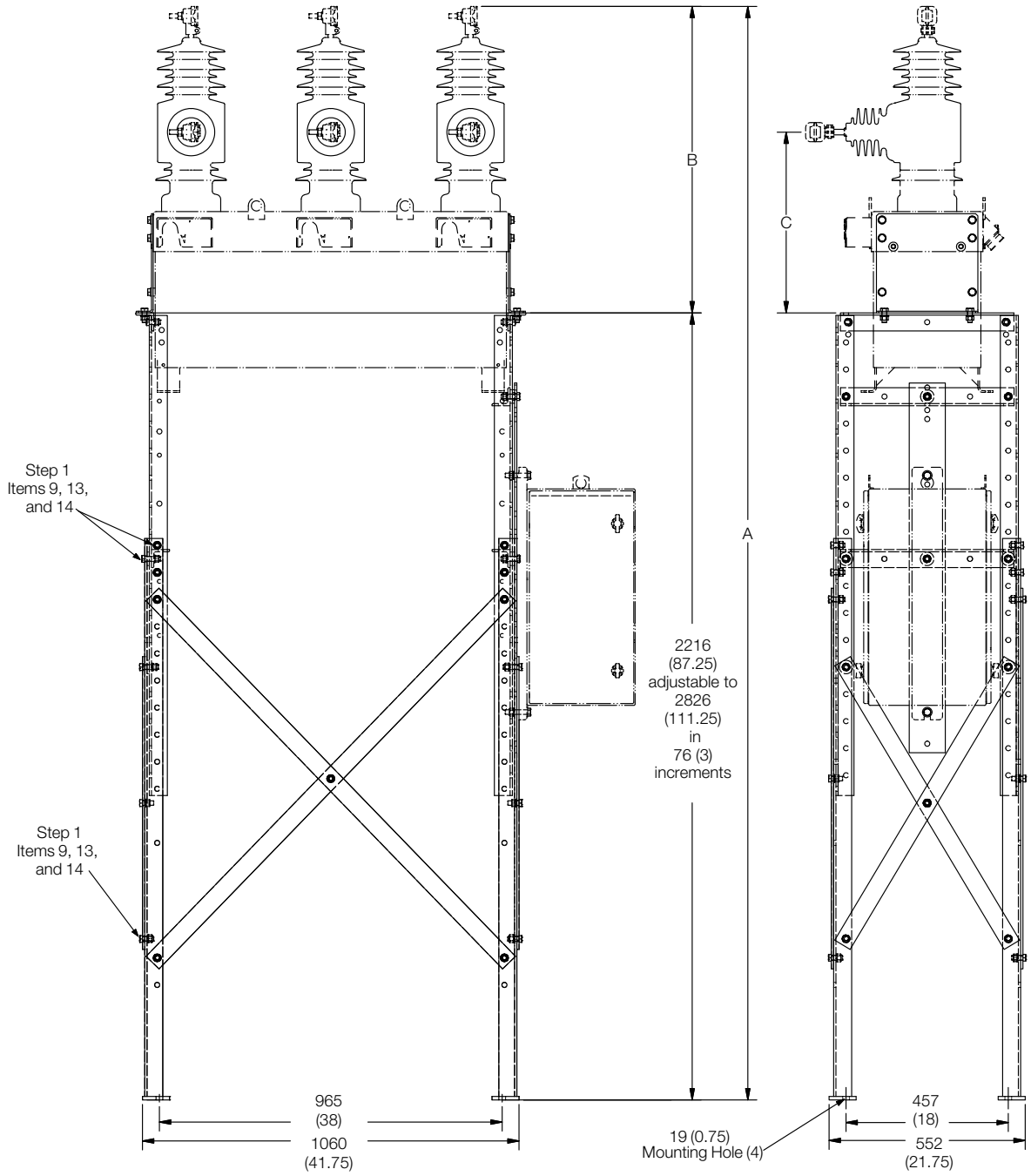


Figure 2. Substation mounting dimensions for NOVA STS recloser.

Frame foundation

A mounting pad must be constructed for proper support of the switchgear and substation frame. Concrete slabs can be fabricated by a local concrete products firm. See the dimensions in the plan and profile views of Figure 3. The overall weight of the substation frame is approximately 118 kg (260 lbs).

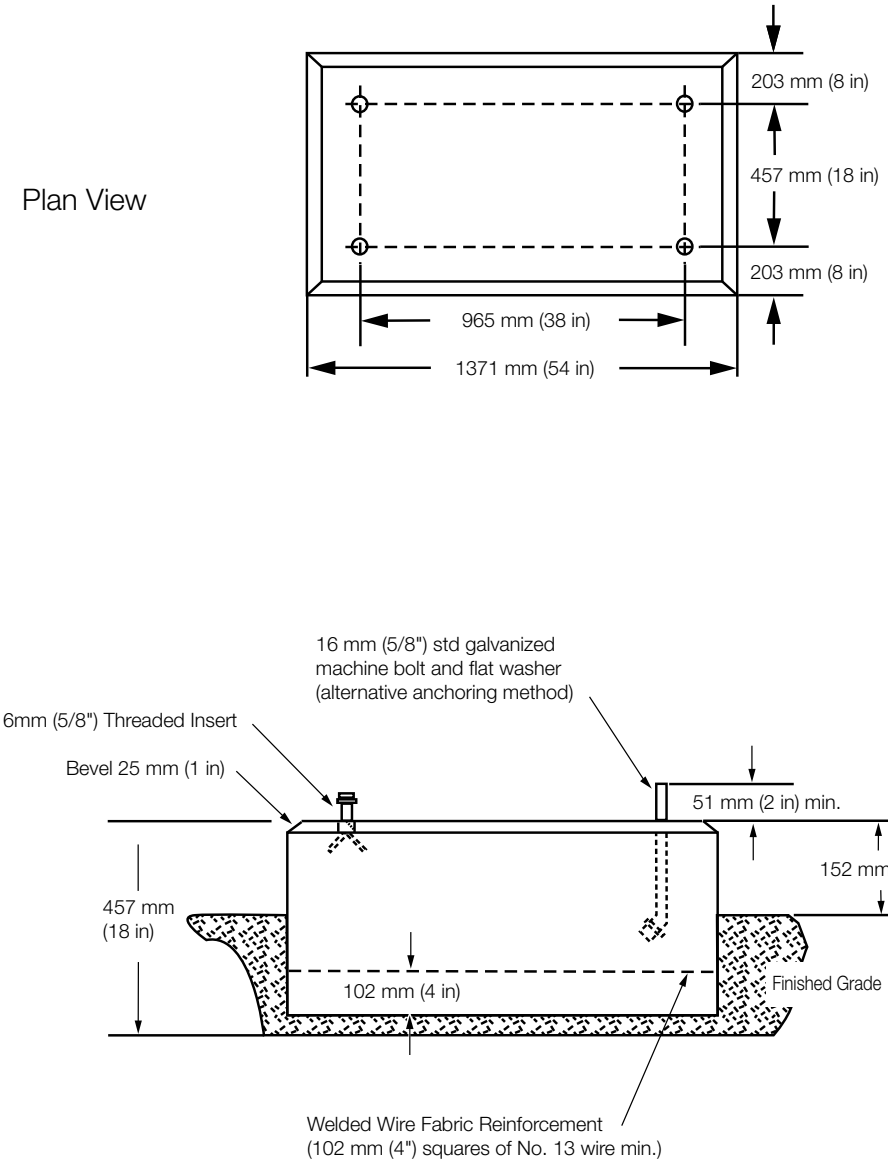


Figure 3. Location of anchoring holes and hardware in substation frame mounting pad.

Frame parts and assembly

General directions

Coat the frame hardware with anti-seize compound (Item 20) before assembling. Connect the hardware securely during assembly, then tighten firmly after securing the frame on the mounting pad.

Frame height

The upper posts as assembled to the lower posts determine the frame height. The range of frame-heights is shown in Figures 1 and 2 and Table 1. The amount of required overlap (upper post inside lower post) to obtain the desired frame height is shown in Table 1.

IMPORTANT

Determine the desired frame height and required overlap before beginning. This will affect the assembly process for the substation frame.

Assembly and installation parts

Carefully unpack, separate, and identify the various parts. See Table 2 for the KNOVA59-1 Substation Frame for NOVA recloser, DAS switch, VCS-3 switch, and TVS sectionalizer. See Table 3 for the KNOVA59-3 Substation Frame for NOVA STS recloser.

Table 1. Frame Heights and Overlap

Frame Height mm (inches)	Overlap mm (inches)
2216 (87.25)	724 (28.5)
2292 (90.25)	648 (25.5)
2369 (93.25)	572 (22.5)
2445 (96.25)	495 (19.5)
2521 (99.25)	419 (16.5)
2597 (102.25)	343 (13.5)
2673 (105.25)	267 (10.5)
2750 (108.25)	191 (7.5)
2826 (111.25)	114 (4.5)

Table 2. KNOVA59-1 Substation Assembly and Installation Parts

Item	Description	Part Number	Quantity
1	Support Angle	VCS10011860001	5
2	Upper post, left	6A00378601	2
3	Upper post, right	6A00378602	2
4	Lower post, right	RA01152001	2
5	Lower post, left	RA01152002	2
6	Cross brace, short	R001533002	4
7	Cross brace, long	R001533008	4
8	Control mounting strap	KM00001366X000	1
9	Hex-head cap screw, 1/2-13 X 1.25”	730115150125A	34
10	Hex-head cap screw, 1/2-13 X 1.50”	730115150150A	4
11	Hex-head cap screw, 1/2-13 X 1.75”	730115150175A	10
12	Hex-head cap screw, 1/2-13 X 2.5”	730115150250A	2
13	Hex nut, 1/2-13	880215113050A	50
14	Spring lockwasher, 1/2-med	900815050000A	50
15	Washer	900215050000A	2
16	Spacer	KA20280061	12
17	Caplug bolt cover .5”	KA20730057	2
18	Caplug retainer, .5”	KA20730058	2
20	Anti-seize compound	KA23640017	3

Table 3. KNOVA59-3 Substation Assembly and Installation Parts

Item	Description	Part Number	Quantity
1	Support Angle	VCS10011860001	5
2	Upper post, left	6A00378601	2
3	Upper post, right	6A00378602	2
4	Lower post, right	RA01152001	2
5	Lower post, left	RA01152002	2
6	Cross brace, short	R001533002	4
7	Cross brace, long	R001533008	4
8	Control mounting strap	KM00001366X000	1
9	Hex-head cap screw, 1/2-13 X 1.25"	730115150125A	32
10	Hex-head cap screw, 1/2-13 X 1.50"	730115150150A	16
11	Hex-head cap screw, 1/2-13 X 1.75"	730115150175A	10
12	Hex-head cap screw, 1/2-13 X 2.5"	730115150250A	2
13	Hex nut, 1/2-13	880215113050A	48
14	Spring lockwasher, 1/2-med	900815050000A	60
15	Washer	900215050000A	2
16	Spacer	KA20280061	12
17	Caplug bolt cover .5"	KA20730057	2
18	Caplug retainer, .5"	KA20730058	2
19	Mounting bracket	6A00432602	2
20	Anti-seize compound	KA23640017	3

Frame assembly

Do not tighten the bolts while assembling the frame to allow for spacer placement and frame adjustments. Tighten all bolts securely when assembly is completed.

1. Overlap the upper and lower posts (Figure 4) as needed to obtain the desired height of the frame. See the **Frame Height** section of this manual.

   A. Attach one upper post, left (Item 2) to one lower post, left (Item 5) with 1.25" hex head capscrews (Item 9), and secure with lockwashers (Item 14) and .5" hex nuts (Item 13). See Figure 1 or 2.

   B. Attach one upper post, right (Item 3) to one lower post, right (Item 4) with 1.25" hex head capscrews (Item 9), and secure with lockwashers (Item 14) and .5" hex nuts (Item 13). See Figure 1 or 2.

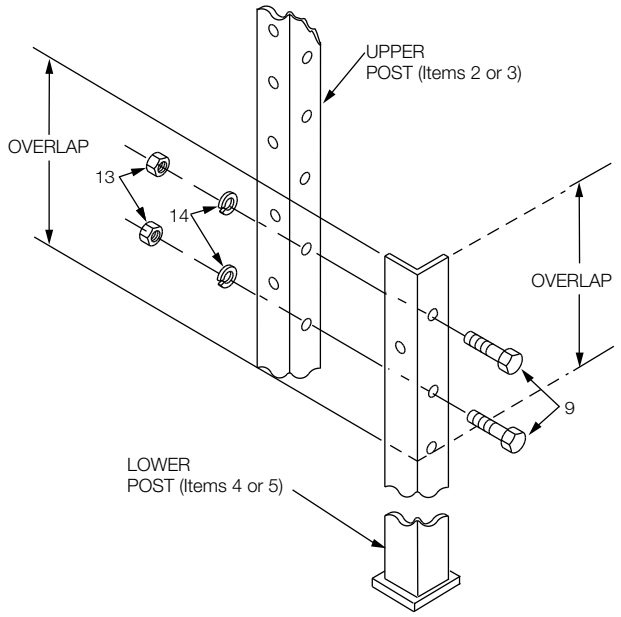


Figure 4. Attaching upper post to lower post.

2. Overlap the remaining upper and lower posts as determined in step 1 while attaching the support angle (Item 1).

   A. Attach support angles (Item 1) to the remaining upper posts (Items 2 and 3) and lower posts (Items 4 and 5) with 1.75" hex head capscrews (Item 11), with a spacer (Item 16) between the upper and lower posts, and secure with lockwashers (Item 14) and .5" hex nuts (Item 13). The caplug retainer (Item 18) and caplug bolt cover (Item 17) are installed in the Item 1, 2, and 5 connection. See Figure 5.

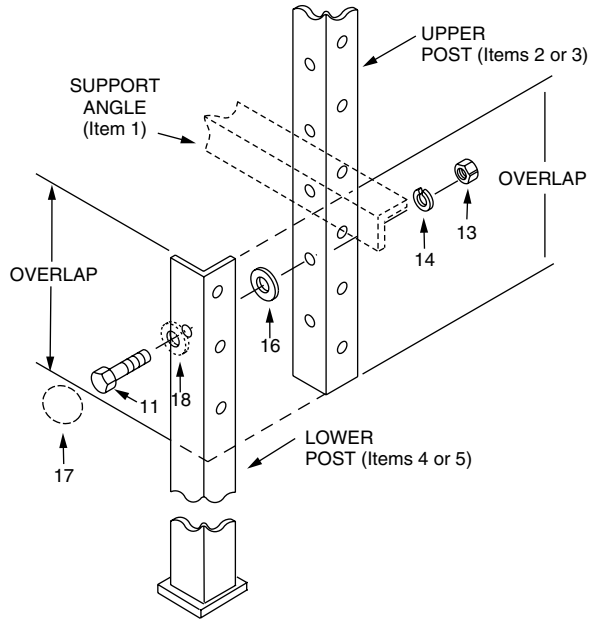


Figure 5. Attaching support angle Item 1 to upper and lower posts.

   B. Secure the upper posts (Items 2 and 3) and lower posts (Items 4 and 5) with 1.25" hex head capscrews (Item 9), and secure with lockwashers (Item 14) and .5" hex nuts (Item 13). See Figures 4 and 6.

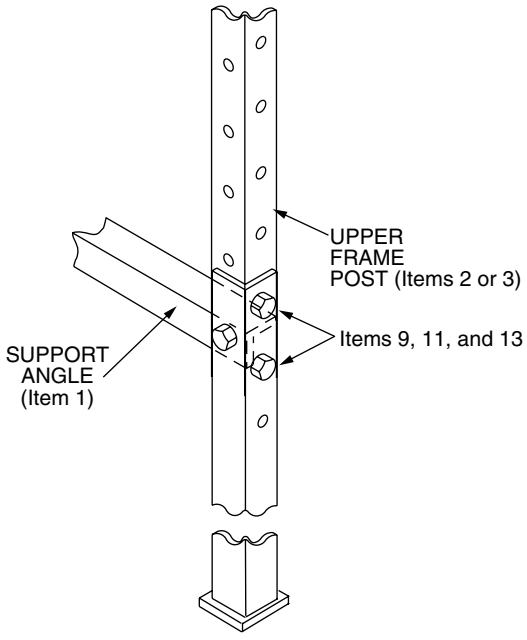


Figure 6. Securing upper and lower posts.

3. Attach the upper ends of the short cross braces (Item 6) to the upper posts (Items 2 and 3) and lower posts (Items 4 and 5). Use 1.75" hex head capscrews (Item 11), with a spacer (Item 16) between the upper and lower posts. Secure with lockwashers (Item 14) and .5" hex nuts (Item 13). See Figures 7 and 9.

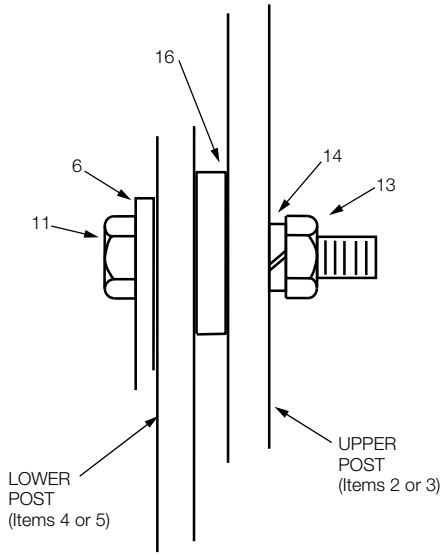


Figure 7. Attaching short cross brace (Item 6).

4. Attach the lower ends of the short cross braces (Item 6) to the lower posts (Items 4 and 5) with 1.25" hex head capscrews (Item 9), and secure with lockwashers (Item 14) and .5" hex nuts (Item 13). See Figures 8 and 9.
5. Attach the short cross braces (Item 6) at their midpoint with 1.25" hex head capscrews (Item 9), and secure with lockwashers (Item 14) and .5" hex nuts (Item 13). See Figure 8 and 9.

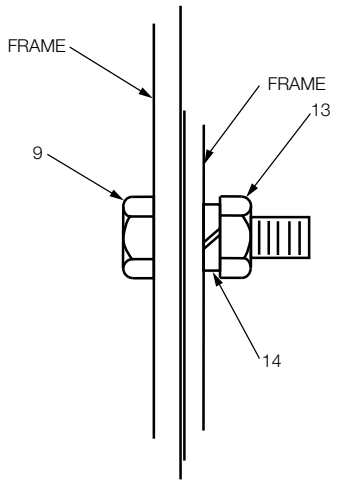


Figure 8. Assembling frame with Items 9, 13, and 14.

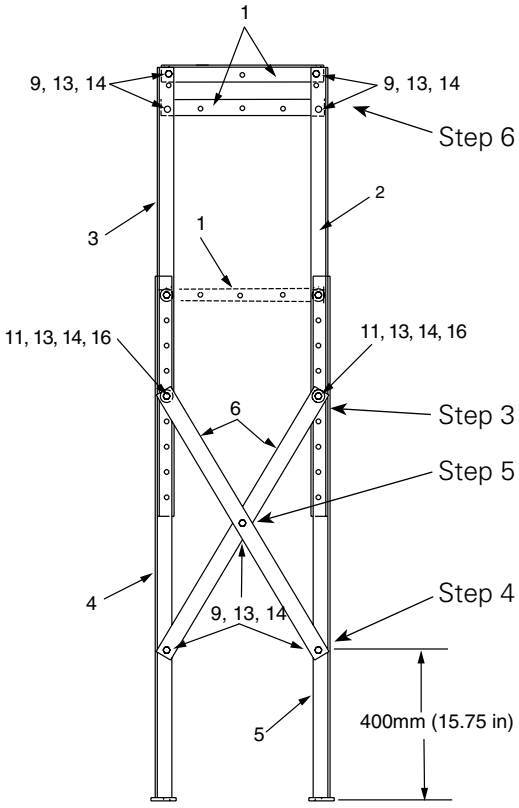


Figure 9. Assembling narrow side of frame.

6. Attach two support angles (Item 1) to the upper ends of the upper posts (Items 2 and 3) and one support angle on the control side of the assembly with 1.25" hex head capscrews (Item 9), and secure with lockwashers (Item 14) and .5" hex nuts (Item 13). See Figures 9 and 10. Place control-support angle 533 mm (21") above lower support angle, measured screw to screw.

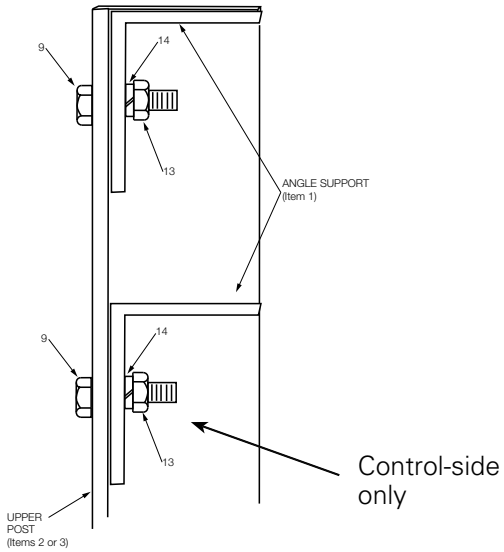


Figure 10. Attaching support angle (Item 1) to upper post.

7. Attach the upper ends of the long cross braces (Item 7) to the upper posts (Items 2 and 3) and lower posts (Items 4 and 5). Use 1.50″ hex head capscrews (Item 10), and secure with lockwashers (Item 14) and .5″ hex nuts (Item 13). See Figure 11.
8. Attach the lower ends of the long cross braces (Item 7) to the lower posts (Items 4 and 5), with 1.25″ hex head capscrews (Item 9), and secure with lockwashers (Item 14) and .5″ hex nuts (Item 13). See Figure 11.
9. Attach the long cross braces (Item 7) at their midpoint with 1.25″ hex head capscrews (Item 9), and secure with lockwashers (Item 14) and .5″ hex nuts (Item 13) See Figure 11.
10. Check frame alignment and securely tighten all nuts and screws.

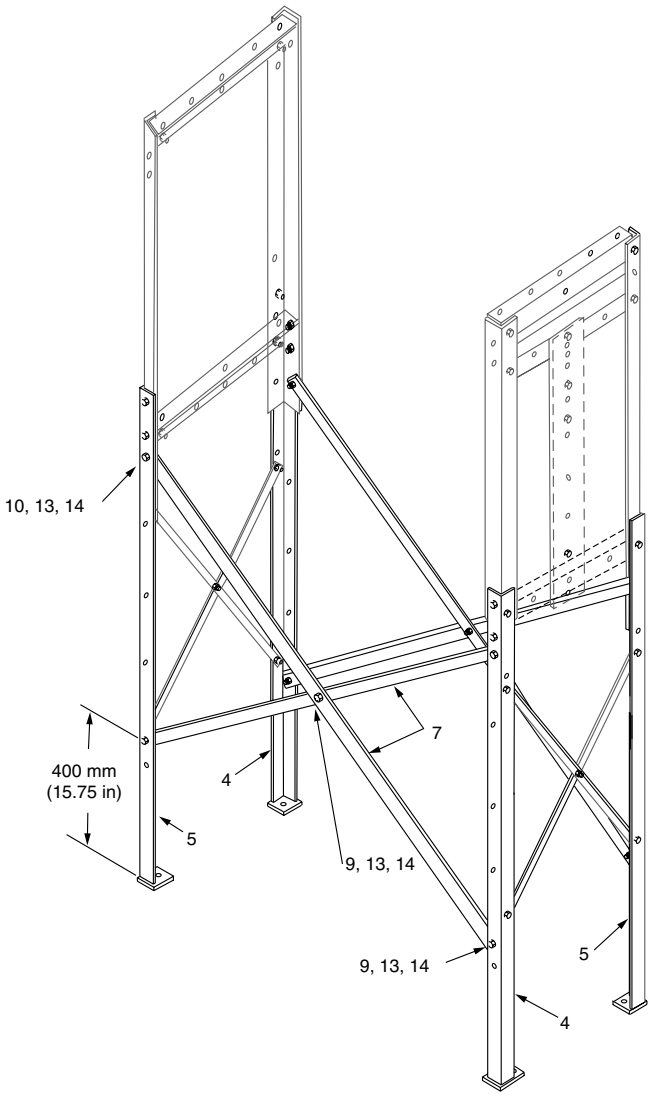


Figure 11. Attaching long cross braces (Item 7).

Frame installation

Install the substation frame on the constructed mounting pad. See the **Frame Foundation** section of this manual. Firmly tighten all of the substation assembly hardware after attaching the frame to the mounting pad. See Figure 12.

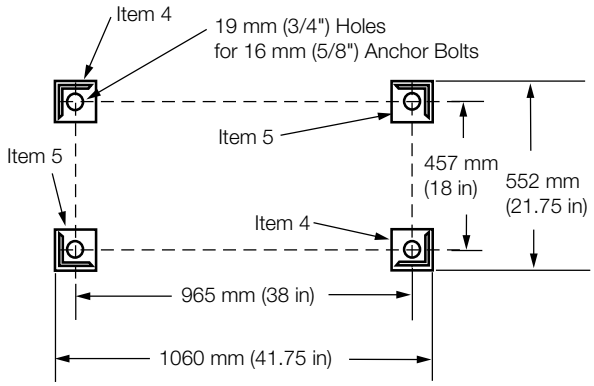


Figure 12. Installing substation frame on mounting pad.

Control installation

Attach the control mounting strap (Item 8) to either one of the narrow frame sides. See Figures 13 and 14.

1. Attach the control mounting strap (Item 8), at the hole 13 mm (.5 in) from the end (this is the top end), to the middle support angle (Item 1) with 1.75″ hex head capscrews (Item 11). Secure with lockwashers (Item 14) and .5″ hex nuts (Item 13). Use two spacers (Item 16); placement is determined by control type.
2. Attach the control mounting strap (Item 8), through the hole 26.75″ from the top end of the strap, to the lower support angle (Item 1) with 1.75″ hex head capscrews (Item 11). Secure with lockwashers (Item 14) and .5″ hex nuts (Item 13). Use two spacers (Item 16); placement is determined by control type.
3. Mount the control to the control mounting strap (Item 8). Measure the strap to determine where to mount the control. Use 2.5″ hex head capscrews (Item 12) and washers (Item 15), and secure with lockwashers (Item 14) and .5″ hex nuts (Item 13). See Figures 13, 14, and 15.

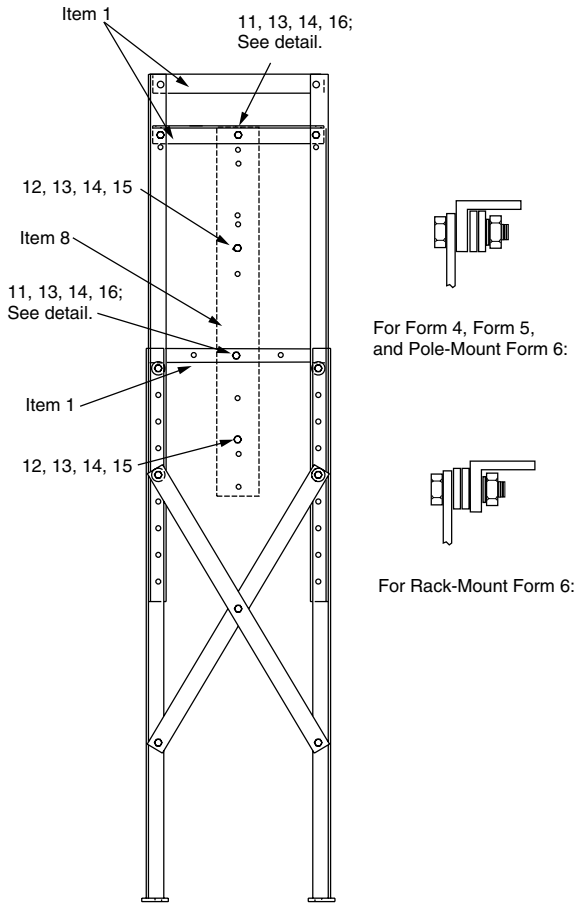
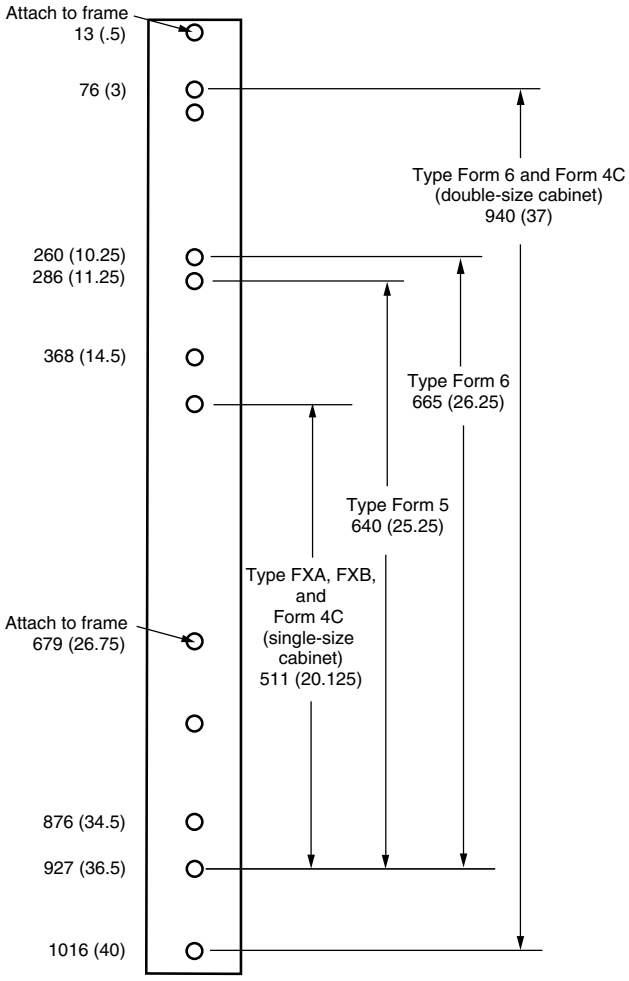


Figure 13. Attaching control mounting strap (Item 8) to sub-station frame.



Dimensions shown: Top-to-hole on left, mounting holes on right.
All dimensions are mm (in). (Dimensions approximate).

Figure 14. Control mounting strap (Item 8). (Only standard control mounting locations are shown.)

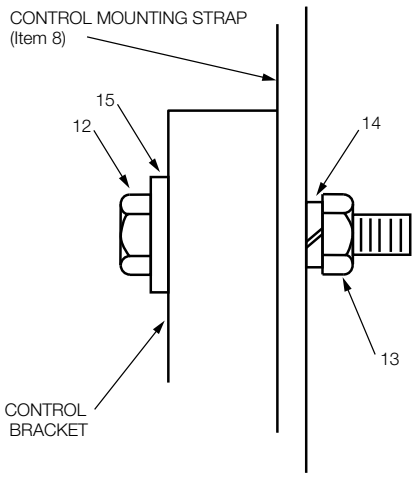


Figure 15. Attaching control to mounting strap (Item 8).

Switchgear installation

⚠ CAUTION

Personal injury. Sheds on epoxy encapsulation have sharp edges. Wear protective gloves when handling the unit. Failure to do so can result in cuts and abrasions. T258.1

⚠ WARNING

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

CAUTION

Tip-over hazard. High center of gravity. The substation frame is a top-heavy structure with the switchgear mounted. Secure the substation frame to the mounting pad before mounting the switchgear. Failure to comply can cause the unit to tip over, damaging the frame and switchgear. T300.0

NOVA recloser, DAS switch, VCS-3 switch, and TVS sectionalizer installation

Moving the switchgear

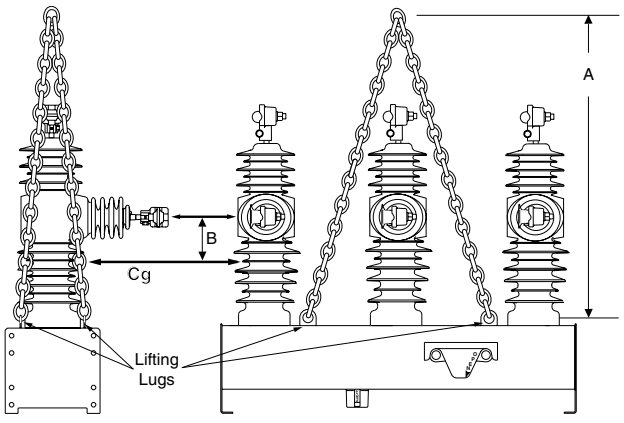
The switchgear is shipped palletized (bolted onto a pallet). When moving with a fork truck/lift, the switchgear must remain bolted to the pallet to avoid damage to the contact position indicator.

Lifting the switchgear

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

⚠ CAUTION

Tip-over hazard. High center of gravity. Use a 4-point hitch to prevent switchgear from overturning during lifting operations. Improper lifting can result in personal injury or equipment damage. T297.0



A: Sling height for 15 kV and 27 kV with 125 BIL units: 914 mm (36 in)
Sling height for 27 kV with 150 BIL and 38 kV units: 1067 mm (42 in)

B: Center of gravity (Cg) is approximately 100 mm (4 in) below plane of lower terminals.

Figure 16. Lifting instructions for the switchgear.

Refer to the appropriate manual for complete installation instructions as follows:

- *S260-60-1 DAS15, DAS27, and DAS38 Three-Phase Vacuum-Break Distribution Automation Switch Installation and Operation Instructions*
- *S260-62-1 VCS-3 Three-Phase Vacuum-Break Capacitor Switch Installation and Operation Instructions*
- *S270-30-1 TVS15, TVS27, and TVS38 Time-Voltage Sectionalizer Installation and Operation Instructions*
- *S280-42-1 NOVA15, NOVA27, and NOVA38 Three-Phase Microprocessor-Controlled Installation and Operation Instructions*

Mount the switchgear to the substation frame on both sides to support angles (Item 1). Use 1.25" hex head capscrews (Item 9) and secure with lockwashers (Item 14) and .5" hex nuts (Item 13). See Figures 1 and 17.

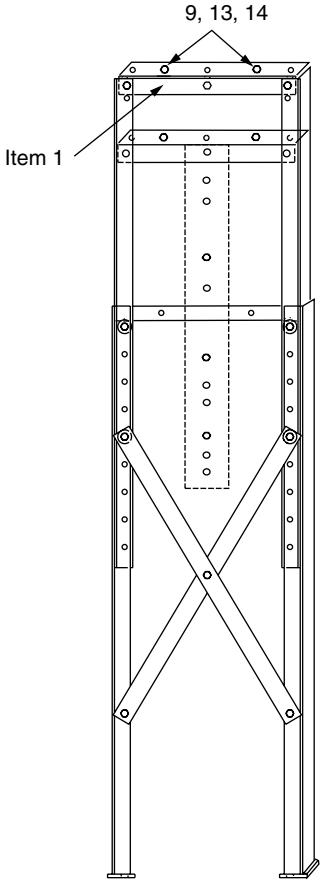


Figure 17. Attaching NOVA recloser, DAS switch, VCS-3 switch, or TVS sectionalizer to substation frame.

NOVA STS recloser installation

Moving the switchgear

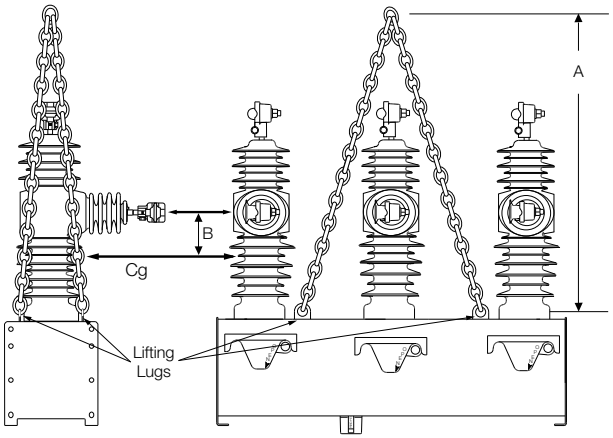
The switchgear is shipped palletized (bolted onto a pallet). When moving with a fork truck/lift, the switchgear must remain bolted to the pallet to avoid damage to the contact position indicator.

Lifting the switchgear

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

⚠ CAUTION

Tip-over hazard. High center of gravity. Use a 4-point hitch to prevent switchgear from overturning during lifting operations. Improper lifting can result in personal injury or equipment damage. T297.0



A: Sling height for 15 kV and 27 kV with 125 BIL units: 914 mm (36 in)
Sling height for 27 kV with 150 BIL and 38 kV units: 1067 mm (42 in)

B: Center of gravity (Cg) is approximately 100 mm (4 in) below plane of lower terminals.

Figure 18. Lifting instructions for the switchgear.

Refer to the appropriate manual for complete installation instructions as follows:

- *S280-44-1 NOVA-STS15, NOVA-STS 27, and NOVA-STS 38 Three-Phase Microprocessor-Controlled Installation and Operation Instructions*

Mount the bracket (Item 19) to the substation frame on both sides to support angles (Item 1). Use 1.25" hex head capscrews (Item 9) and secure with lockwashers (Item 14) and .5" hex nuts (Item 13).

Mount the recloser to the bracket. Use 1.25" hex head capscrew (Item 10) and lockwasher (Item 14). See Figures 2 and 19.

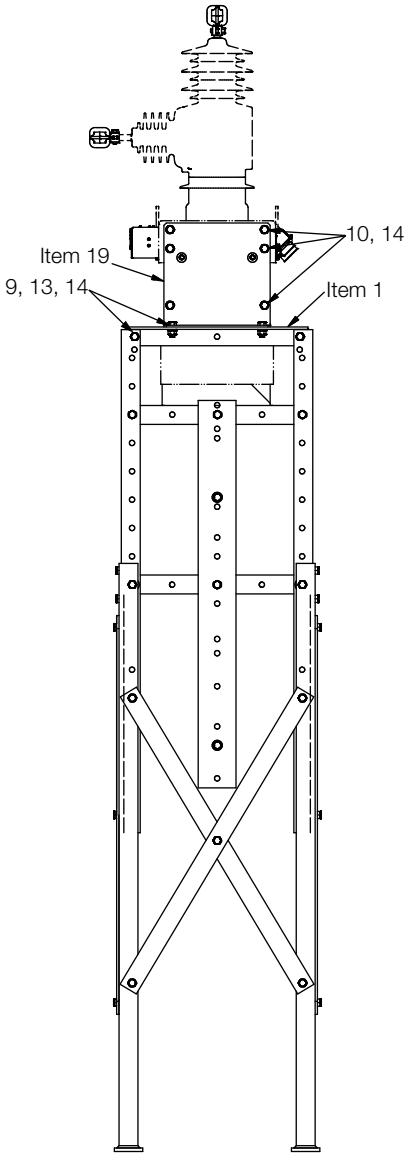


Figure 19. Attaching NOVA STS recloser to substation frame.

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