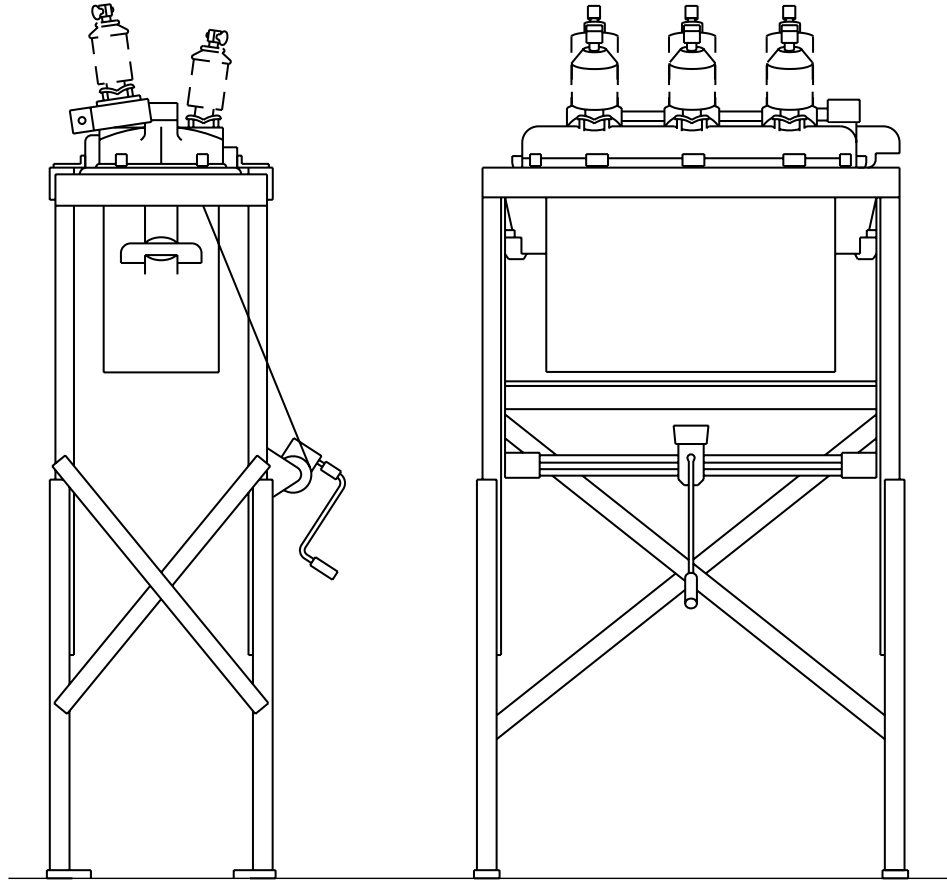


Substation frame KA89WV1 and accessories assembly and installation instructions



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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 MN280044EN describes the assembly of Substation Frame KA89WV1 (replaces frame KA584R1) and the optional accessories available for mounting Eaton's Cooper Power™ series reclosers in a substation location.

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.

Acceptance and initial inspection

All parts are inspected at the factory. They are in good condition when accepted by the carrier for shipment. Upon receipt, inspect thoroughly for damage. If damage is discovered, file a claim with the carrier immediately.

Handling and storage

Be careful during handling and storage of this equipment to minimize the possibility of damage. If the unit is to be stored for any length of time before installation, provide a clean, dry storage area.

Quality standards

ISO 9001 Certified Quality Management System

Description

The frame is constructed of rigid structural or formed steel. All parts are heavily galvanized after fabrication with cadmium-plated attaching hardware. Practical, welded construction is used to provide a high degree of rigidity with minimum weight.

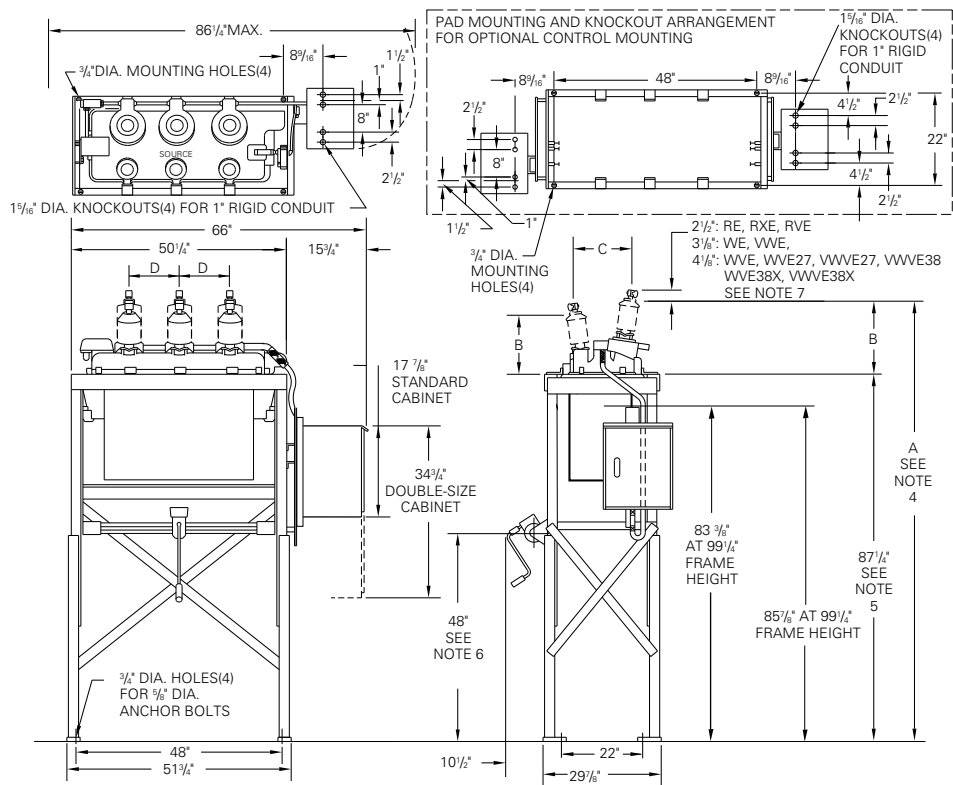
Holes are provided for attaching brackets to mount optional accessories and auxiliary equipment. The height of substation frames is adjustable to satisfy a variety of application conditions. Only one tank-lifting mechanism is needed for use in the same substation or at the same location. This lifting mechanism can be easily transferred between frames as required.

Reclosure dimensions

Table 1. Dimensions of Hydraulic and Electronic Reclosers

Recloser Type	Bushing	Dimensions (inches)							
		Recloser without BCT				Recloser with BCT			
A*	B	C	D	A*	B	C	D		
R, RX, RE, RXE W, VW, WE, VWE	Standard or 17 inch Extra Creepage	99	11-5/8	11-1/8	11-3/8	103-5/8	16-3/8	11-7/8	11-3/8
RV, RVE, WV, VVV, VWE, VWE, WVE27, WV27, VVV27, VVVE27, VVVE38	Standard 26 1/2 inch Creepage	104	16-3/4	11-7/8	11-3/8	108-3/4	21-1/4	12-5/8	11-3/8
WV38X, VVV38X WVE38X, VVVE38X		104	16-3/4	11-7/8	15-1/8	108-3/4	21-1/4	12-5/8	15-5/8

* At minimum height.



Notes:

1. Refer to Table 1 for dimensions A, B, C, and D.
2. All bushing terminals are at the same elevation.
3. Bushing current transformers may be located on either the load side or source side of the recloser.
4. These dimensions are shown at minimum height.
5. Adjustable from 87-1/4 to 114-1/4 inches in 3 inch increments.
6. For 102-1/4 inch frame height, this dimension is 51 inches.
7. For hydraulically controlled recloser, this dimension is
2-1/2": RV, RX
3-1/8": W, VW
4-1/8": WV, WV27, VVV27, WV38X, VVV38X, VVV38

Figure 1. KA99WV1 substation frame shown with electronically controlled recloser.

Foundation for frame

A mounting pad should be constructed for proper support of the recloser and substation frame. Concrete slabs can

be fabricated by a local concrete products firm. See the dimensions in the plan and profile views of Figures 2 and 3. The overall weight of a recloser with frame and accessories is approximately 2,000 pounds.

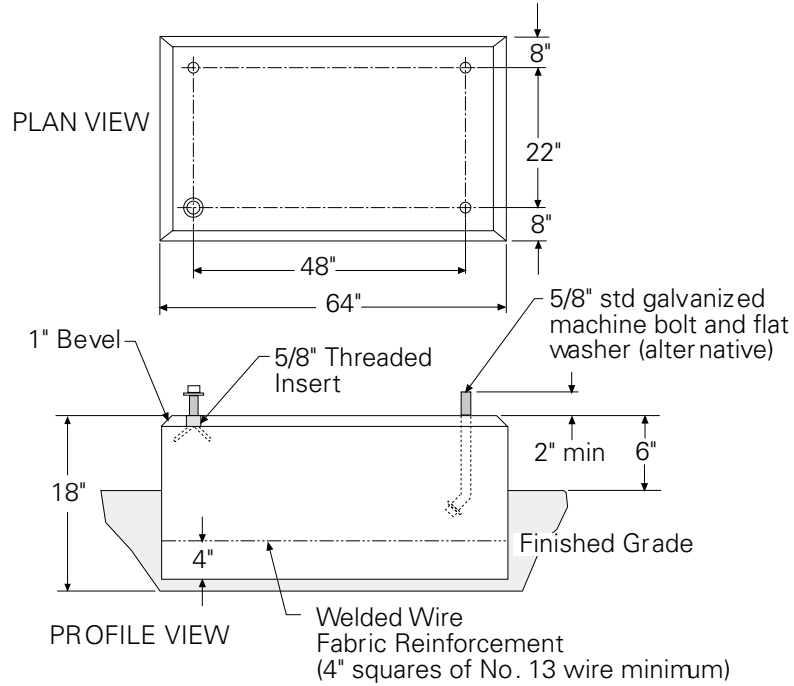


Figure 2. Location of anchoring holes and hardware in foundation of substation frame.

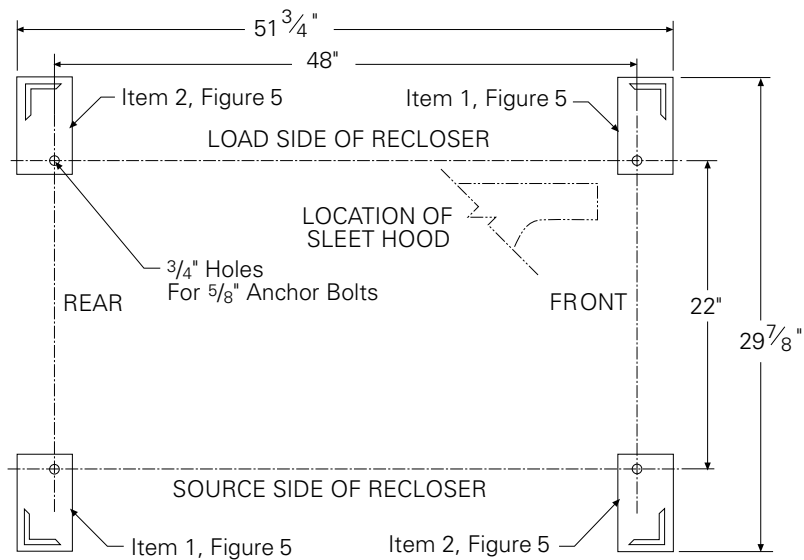


Figure 3. Orientation of frame and position of lower frame posts.

Basic frame assembly

General

The assembly of the basic substation frame is shown in Figures 2–6. The parts are identified in Table 3.

To simplify the assembly procedure, erect the frame in the following four stages:

Stage 1: Assemble the frame base (Figure 4).

Stage 2: Assemble top half (Figure 6) to frame base.

Stage 3: Install the recloser.

Stage 4: Assemble the frame accessories.

Assembly of frame base

Refer to Figures 2–4 and Table 3.

1. Position four lower frame posts (Items 1 and 2) as shown in Figure 3.
2. Fasten the posts to the mounting pad with 5/8-inch hardware (Figure 2).
3. Attach the lower ends of the long cross braces (Item 3) to the lower frame posts using cap screw (Item 18) on one end and cap screw (Item 19) and ground clamp (Item 16) on the opposite end. Secure both ends with lockwasher (Item 20) and nut (Item 21).
4. Attach the upper ends of the long cross braces (Item 3) to the frame posts using cap screw (Item 18), lockwasher (Item 20) and nut (Item 21).
 - A. For frame heights of 105-1/4, 108-1/4, and 111-1/4 inches, attach the upper ends of the long cross braces to the lower frame posts.
 - B. For frame heights below 105-1/4 inches, attach the upper ends of the long cross braces to the upper frame posts.

Determining frame height

The upper frame posts as assembled to the lower frame posts determine the frame height. The range of frame heights is shown in Figure 1. The amount of required overlap (upper post inside lower post) to obtain the desired frame height is shown in Table 2 and Figure 5.

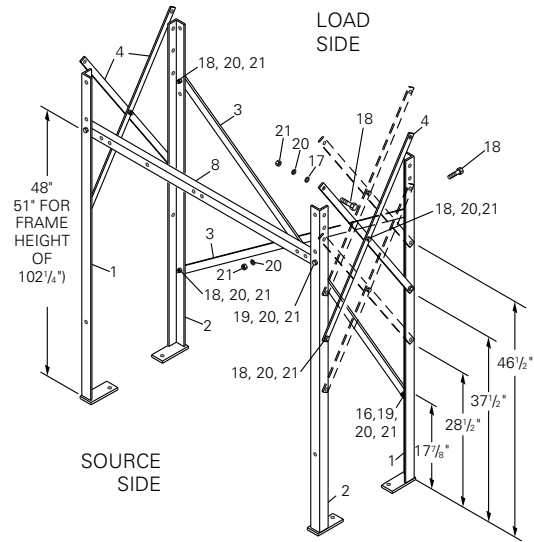


Figure 4. Assembly of bottom of Substation Frame KA89WV1.

Table 2. Frame Heights and Overlap

Frame Height (inches)	Overlap (inches)
87-1/4	28-1/2
90-1/4	25-1/2
93-1/4	22-1/2
96-1/4	19-1/2
99-1/4 *	16-1/2
102-1/4	13-1/2
105-1/4	10-1/2
108-1/4	7-1/2
111-1/4	4-1/2

* Minimum height when KA89WV4 or KA89WV5 is used.

Top half frame assembly

Refer to Figures 4–6 and Table 3.

- At the desired height (from Table 2), attach the upper frame posts (Items 5, 6, 7) to the lower frame posts (Items 1 and 2), as shown in Figure 5 and 6, using a minimum of three bolts at each junction. Locate a spacer (Item 17) between the upper and lower frame posts surfaces as shown in Figure 5.

Note: Upper post with knee (Item 6) is positioned adjacent to the sleet hood of the recloser (Figure 3) for access to the yellow operating handle of the recloser.

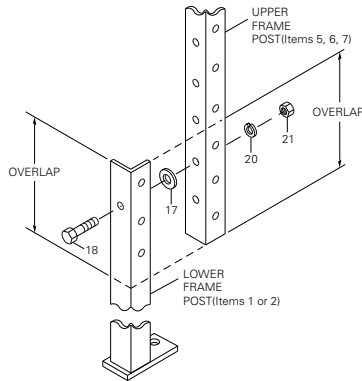


Figure 5. Frame height is determined by the amount of overlap between upper and lower frame posts.

- Attach the short cross braces (Item 4) to the upper and lower posts as shown in Figure 4.

Note: Use a spacer (Item 17) between each brace and post when attaching upper ends of the short cross braces to the upper posts (Figure 4).

- Assemble the tank-lifting windlass support angles (Item 8) to the inside surfaces of the frame posts (Figure 4 and 6).
 - Mount one of the support angles on the far side (load side of the recloser) at 33-1/4 inches from the top of the frame (Figure 6).
 - Mount the other support angle on the near side (source/windlass side of the recloser) 48 inches from the pad (Figure 4).

Note: Due to assembly interferences, for a frame height of 102 1/4 inches, mount the source-side support angle 51 inches from the pad.

- Attach the top support angle (Item 9) to the source side of the frame.
- Using gusset (Item 23) and spacer (Item 22), attach the top support angle (Item 10) to the load side of the frame as shown in the inset of Figure 6.
- Attach the hoist support angles (Item 11) to the front of the frame; connect hoist support assembly (Item 12) to the hoist support angles.
- Attach the hoist support assembly (Item 13) to the rear of the frame.

Table 3. Components of Basic Substation Frame Assembly KA89WV1

Item	Description	Part No.	Qty
1	Lower Post	KA88WV1	2
2	Lower Post	KA88WV2	2
3	Long Cross Brace	KP1533R1	2
4	Short Cross Brace	KP148WV	4
5	Upper Post	KP2377R2	1
6	Upper Post w/knee	KP2390R	1
7	Upper Post	KP2377R1	2
8	Support Angle	KP1522R	2
9	Top Support Angle	KP2374R	1
10	Top Support Angle	KP2391R	1
11	Hoist Support Angle	KP150WV	2
12	Hoist Support Assembly	KA596R	1
13	Hoist Support Assembly	KA60WV	1
14	Recloser Mounting Brackets	KP153WV	6
15	Lifting Lug	KP2383R	2
16	Ground Clamp	KP1596R	1
17	Spacer	KP2028A61	14
18	Cap Screw, hex, 1/2-13 x 1 1/2	K730101150150Q	63
19	Cap Screw, hex, 1/2-13 x 2	K730101150200Q	9
20	Lockwasher, med, 1/2	K900801050000Z	72
21	Hex nut, 1/2-13	K880201113050Q	60
22	Spacer	KP2388R	1
23	Gusset	KP2389R	1

Installing the recloser

Refer to Figure 6 and Table 3.

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

- Loosely attach the recloser mounting brackets (Item 14) to top support angles (Items 9 and 10) with cap screw (Item 18), lockwasher (Item 20), and nut (Item 21).
- Hoist the recloser into place.
- Attach the recloser head to the brackets with cap screws (Item 18) and lockwashers (Item 20); tighten all hardware.

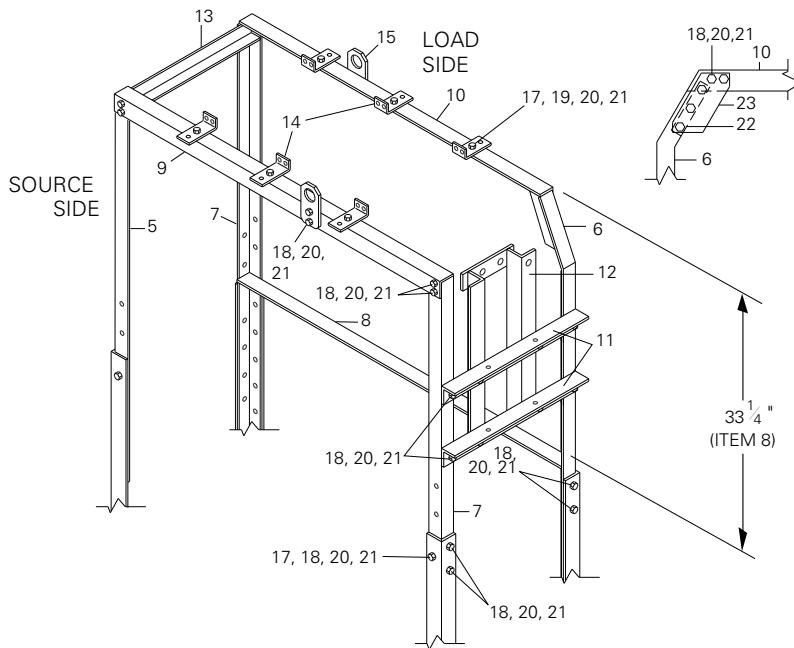


Figure 6. Assembly of top half of Substation Frame (KA89WV1).

Assembly of frame accessories

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.

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IMPORTANT

When using the tank-lifting windlass:

- The recloser must remain level.
- The cable must wind evenly on the spools.
- Do not raise the recloser beyond height dimension B, specified in Table 1. Be sure the crimped end of the cable is not bent around the sheave assembly (Item 2, Figure 7).
- Install the recloser mounting brackets (Item 14, Figure 6) after the recloser's current-transformer housings have cleared the top support angles (Items 9 and 10, Figure 6).

WV38X, WV38X, WVE38X, and WVVE38X reclosers:

- Lower these reclosers into the frame from the top. They will not clear the substation frame when raised with the windlass.

Tank-lifting windlass (KA89WV2)

Refer to Figures 7 through 10 and Table 4. The tank-lifting windlass is used to lower and raise a 15 kV or 27 kV recloser mounted in the substation frame. It can also be used to lower and raise the tank of a 15 kV, 27 kV, or 38 kV recloser. The tank-lifting windlass is ordered and shipped separately.

Only one windlass is required for use with several frame structures in the same substation or at the same location. The windlass is easily transferred between frames as required.

The tank-lifting windlass is mounted on the recloser source side of the substation frame assembly.

1. Remove the nuts and lockwashers from the captive machine bolts in each spool of Item 1.
2. Insert the captive spool bolts through the holes of the windlass support angle as shown in Figure 8.
3. Secure the spool assemblies with the nuts and lockwashers previously removed as shown in Figure 8.
4. Secure the back of the gear box to the support angle with two cap screws (Item 6) and two lockwashers (Item 7) as shown in Figure 9.
5. Position the frame sheave assemblies (Item 2) on the frame hoist-support angles. (See Figures 7 and 10).
6. Hook one tank sheave assembly (Item 3) to each end of the recloser tank.

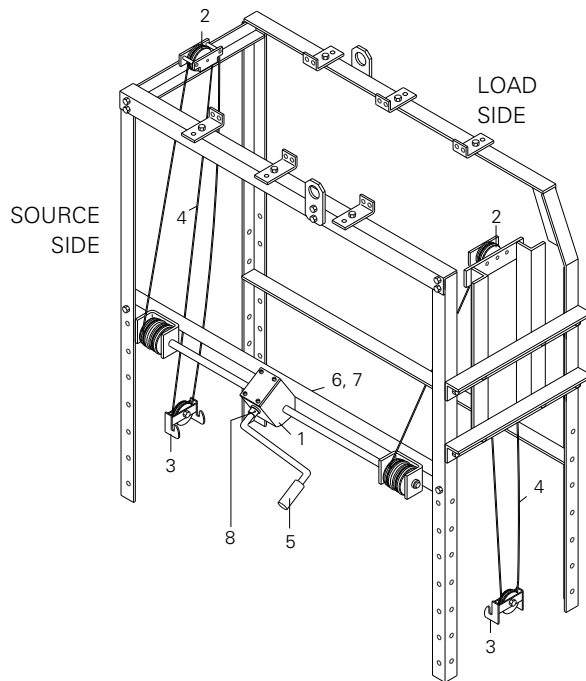


Figure 7. Installing Tank-Lifting Windlass KA89WV2 to tophalf substation frame.

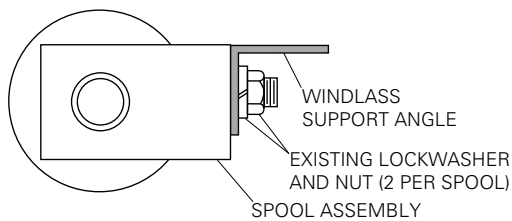


Figure 8. Secure the spool assemblies with the nuts and lockwashers previously removed.

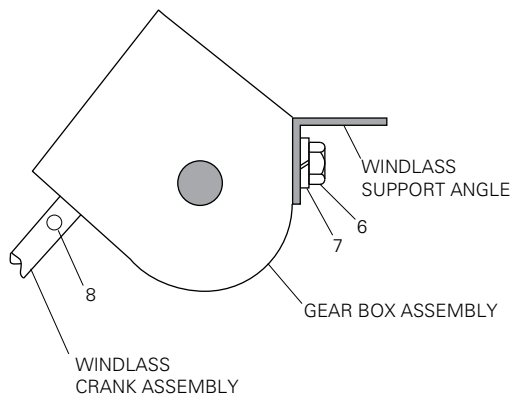


Figure 9. Secure the gear box to the windlass support angle.

Table 4. Components of Tank-Lifting Windlass KA89WV2

Item	Description	Part No.	Qty
1	Gear Box/Spool Assembly	KA19CE3	1
2	Sheave, Frame	KA123R	2
3	Sheave, Recloser Tank	KA121R	2
4	Cable Assembly	KA592R1	2
5	Crank Assembly, Gear Box	KA112CE1	1
6	Cap Screw, hex, 1/2-13 x 1 1/2	K7301011501500Q	2
7	Lockwasher, med, 1/2, stl	K900801050000Q	2
8	Cotter pin, 1/8 x 1, brass	K970525125100A	1

- Remove the hex nut from the stud end of each cable assembly (Item 4) and thread the cable through the tank sheave (Item 3), then up through the frame sheave (Item 2), and into the hole in the cable spool as shown in Figure 10.
- Fasten the stud terminal end of the cable to the spool with the previously removed hex nut and attach the loop end of the cable to the remaining pin on the hoist supports. Refer to Figure 6, Items 12 and 13.

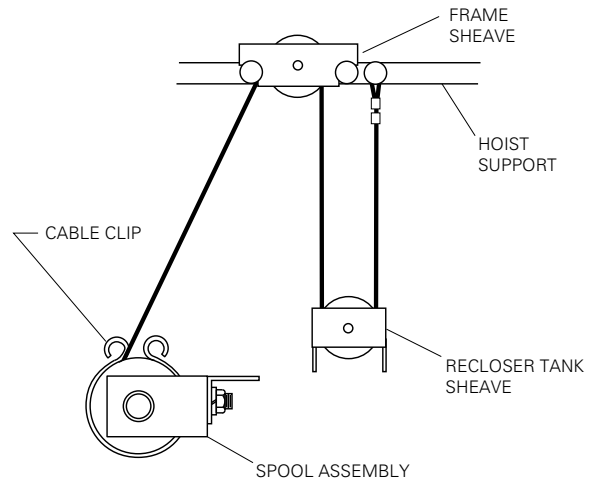


Figure 10. Threading the cable from the frame sheaves to the spool assemblies.

- Attach windlass crank assembly (Item 5) to the gear box and secure with the brass cotter pin (Item 8).

CAUTION

Equipment Misoperation. A shearable brass cotter pin serves to protect the windlass from over-loading during lifting operations. This pin must be replaced with an identical brass cotter pin if damaged or lost. Failure to comply can result in equipment misoperation and damage.

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- Evenly wind the cables on the spools to take up the slack.

CAUTION

Equipment damage. Refer to the specific switchgear unit maintenance manual for tanking/untanking procedures and related instructions. Failure to follow these instructions could result in equipment damage or personal injury.

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Lowering the recloser tank

1. Apply a slight tension to the lifting cables.
2. Loosen and remove the head bolts that attach the tank to the head mechanism.
3. Using the crank, lower the tank to gain access to the recloser mechanism and contacts.

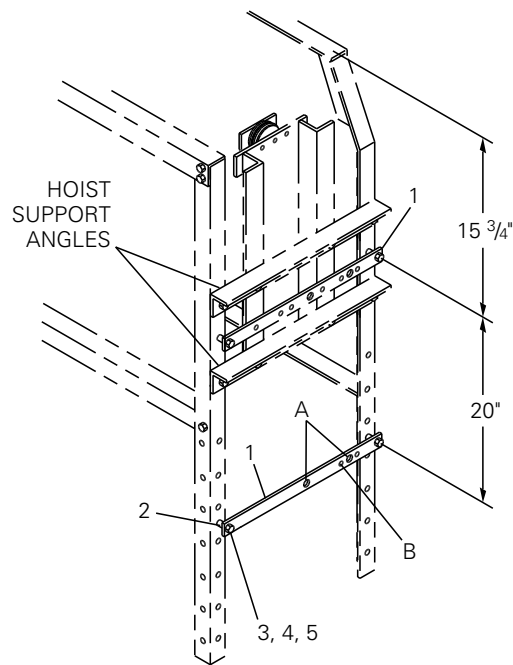
Raising the recloser tank

1. For proper alignment and to eliminate undue stress on the lifting windlass, raise the tank to within 1/8 inch of the recloser head and reassemble the tank using the head bolts.
2. If the lifting windlass is to remain installed after the tank has been bolted to the head, install the provided cable clips over the two cable spools (Figure 10).

Mounting straps, standard-size control cabinet (KA89WV4)

Refer to Figure 11 and Table 5. The straps for mounting a standard-size control cabinet can be attached to either the front of the frame (sleet-hood end of the recloser) or the rear (auxiliary-switch end of the recloser).

1. Using the two holes located between the hoist support angles (approximately 15-3/4 inches below the top of the frame), attach one horizontal mounting strap (Item 1) with two spacers (Item 2), two cap screws (Item 3), two lockwashers (Item 4), and two hex nuts (Item 5).
2. Attach the second strap to the holes located approximately 20 inches below the first strap, using the same mounting procedure as in Step 1.
3. Mount the control cabinet to the horizontal mounting straps with two cap screws (Item 6), two flat washers (Item 7), two lockwashers (Item 8), and two hex nuts (Item 9). Refer to letter A in Figure 11.
4. Cable clamps (Item 13) are provided for securing the control cable to the frame. Attach the clamps with a cap screw (Item 10), a lockwasher (Item 11), and hex nut (Item 12). Refer to letter B in Figure 11.



A: Mounting hardware for control cabinet, (Items 6, 7, 8, 9).

B: Mounting hardware for cable clamps, (Items 10, 11, 12, 15).

Figure 11. Brackets for installing a standard-size control cabinet (KA89WV4).

Table 5. Mounting Hardware for Standard-Size Electronic Control Cabinet (KA89WV4)

Item	Description	Part No.	Qty
1	Mounting Channel	KP149WV	2
2	Spacer	KP1556R	4
3	Cap Screw, hex, 3/8-16 x 3-1/2	K730101137350Q	4
4	Lockwasher, med, 3/8 stl	K900801037000Z	4
5	Hex nut, 3/8-16, stl	K880201116037Q	4
6	Cap Screw, hex, 1/2-13 x 2-1/2	K730101150250Q	2
7	Flat Washer, SAE, 1/2, stl	K900215050000A	2
8	Lockwasher, med, 1/2, stl	K900801050000Z	2
9	Hex nut, 1/2-13, stl	K880201113050Q	2
10	Cap Screw, rd hd, 1/4-20 x 1	K730101125100Q	6
11	Lockwasher, med, 1/4, stl	K900801025000Z	6
12	Hex nut, 1/4-20, stl	KP2020A23	6
13	Cable Clamp	KP2055A4	6
14	Washer 3/8 in I.D.	KP2028A34	4
15	Flat Washer, SAE 1/4, stl	K900201025000Q	6

Mounting straps, double-size control cabinet (KA89WV5)

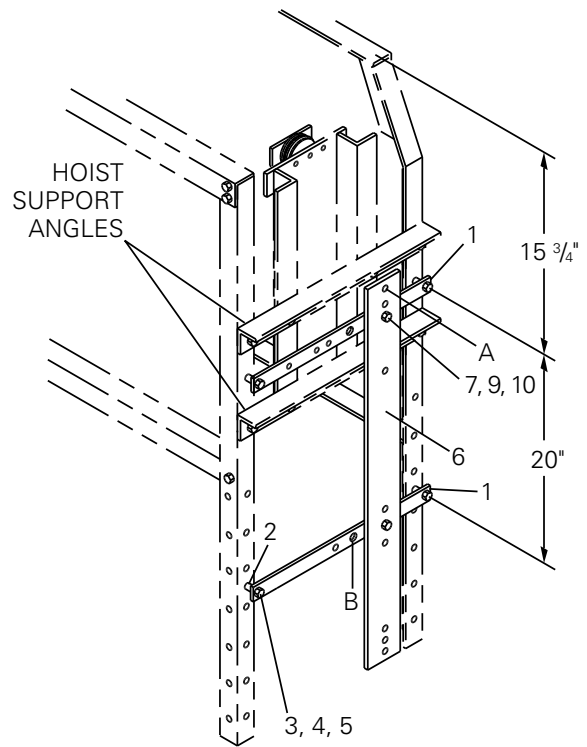
Refer to Figure 12 and Table 6. The straps for mounting a double-size control cabinet can be attached to either the front of the frame (sleet-hood end of the recloser) or the rear (auxiliary-switch end of the recloser).

- Using the two holes located between the hoist support angles (approximately 15-3/4 inches below the top of the frame), attach one horizontal mounting strap (Item 1), with two spacers (Item 2), two cap screws (Item 3), two lockwashers (Item 4), and two hex nuts (Item 5).
- Attach the second strap to the holes located approximately 20 inches below the first strap, using the same mounting procedure as in Step 1.
- Attach control cabinet mounting strap (Item 6), using two cap screws (Item 7), two lockwashers (Item 9), and two hex nuts (Item 10).

- Mount the control cabinet to the control mounting strap using two cap screws (Item 8), two flat washers (Item 11), two lockwashers (Item 9), and two nuts (Item 10). Refer to letter A in Figure 12.
- Cable clamps (Item 12) are provided for securing the control cable to the frame. Attach the clamps with cap screws (Item 13), lockwashers (Item 14), and hex nuts (Item 15). Refer to letter B in Figure 12.

Table 6. Mounting Hardware for Double-Size Electronic Control Cabinet (KA89WV5)

Item	Description	Part No.	Qty
1	Mounting Channel	KP149WV	2
2	Spacer	KP1556R	4
3	Cap Screw, hex, 3/8-16 x 3 1/2, stl	K730101137350Q	4
4	Lockwasher, med, 3/8, stl	K900801037000Z	4
5	Hex nut, 3/8-16, stl	K880201116037Q	4
6	Control Mounting Strap	KP1366M	1
7	Cap Screw, hex, 1/2-13 x 1 1/2, stl	K730101150150Q	2
8	Cap Screw, hex, 1/2-13 x 2 1/2, stl	K730101150250Q	2
9	Lockwasher, med, 1/2, stl	K900801050000Z	4
10	Hex nut, 1/2-13, stl	K880201113050Q	4
11	Flat Washer, SAE, 1/2, stl	K900215050000A	2
12	Cable Clamp	KP2055A4	6
13	Cap Screw, hex hd, 1/4-20 x 1	K730101125100Q	6
14	Lockwasher, med, 1/4, stl	K900801025000Z	6
15	Stop nut, 1/4-20, stl	KP2020A23	6
16	Washer, 3/8, stl	KP2028A34	4
17	Flat Washer, SAE 1/4, stl	K900201025000Q	6



A: Mounting hardware for control cabinet (Items 8, 9, 10, 11).

B: Mounting hardware for cable clamps (Items 12, 13, 14, 15, 17).

Figure 12. Brackets for installing a double-size control cabinet (KA89WV5).

Mounting for ground-trip shorting switch (KA89WV6)

Use the hardware listed in Table 7 to mount the Ground-Trip Shorting switch. Refer to Figure 13.

Table 7. Mounting Hardware for Ground-Trip Shorting Switch to Basic Substation Frame (KA89WV6)

Item	Description	Part No.	Qty
1	Bracket	KP1623R	1
2	Cap Screw, hex, 1/2-13 x 1-1/2	K730101150150Q	2
3	Lockwasher, med, 1/2, stl	K900801050000Z	2
4	Hex nut, 1/2-13, stl	K880201113050Q	2
5	Cap Screw, hex, 1/4-20 x 1-3/4	K730101125175Q	2
6	Spacer	KP3009A65	2
7	Lockwasher, med, 1/4, stl	K900801025000Z	2
8	Stop nut, 1/4-20, stl	K2020A23	2

1. Attach the bracket to the upper hoist support angle with two 1/2-13 cap screws (Item 2), two lockwashers (Item 3), and two hex nuts (Item 4).
2. Attach the switch to the bracket using two 1/4-20 cap screws (Item 5), two spacers (Item 6), two lockwashers (Item 7), and two stop nuts (Item 8).

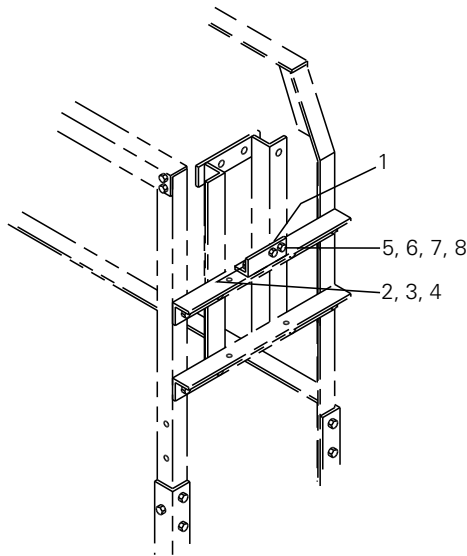


Figure 13. Installing a ground-trip shorting switch (KA89WV6).

Mounting for control cabinet on load side of frame (KA89WV9)

Refer to Figure 14 and Table 8. A standard-or double-size cabinet may be mounted on the load side of the frame.

Table 8. Mounting Hardware for Recloser Control (Standard or Double-Size Cabinet) to Load Side of Frame (KA89WV9)

Item	Description	Part No.	Qty
1	Mounting Strap	KP1807R	1
2	Cap Scrw, hex, 1/2-13 x 1 1/2, stl	K730101150150Q	2
3	Cap Scrw, hex, 1/2-13 x 2 1/2, stl	K730101150250Q	2
4	Lockwasher, med, 1/2, stl	K900801050000Z	4
5	Hex nut, 1/2-13, stl	K880201113050Q	4
6	Spacer	KP2028A61	1
7	Flat Washer, SAE, 1/2, stl	K900201050000Q	2
8	Cable Clamp	KP2055A4	6
9	Screw, rd hd, 1/4-20 x 1, stl	K730101125100Q	6
10	Lockwasher, med, 1/4, stl	K900801025000Z	6
11	Stop nut, 1/4-20, stl	K2020A23	6

1. Attach mounting strap (Item 1) to the frame using two 1/2-13 x 1 1/2 inch long cap screws (Item 2), two lockwashers (Item 4), and two hex nuts (Item 5).
2. Mount the control cabinet to the strap using two 1/2-13 x 2-1/2 inches long cap screws (Item 3), two lockwashers (Item 4), two hex nuts (Item 5), one spacer (Item 6, lower mounting point only), and two washers (Item 7).
3. Attach cable clamps (Item 8) to the frame with machine screw (Item 9), lockwasher (Item 10), and stop nut (Item 11) to secure the control cable to the frame.

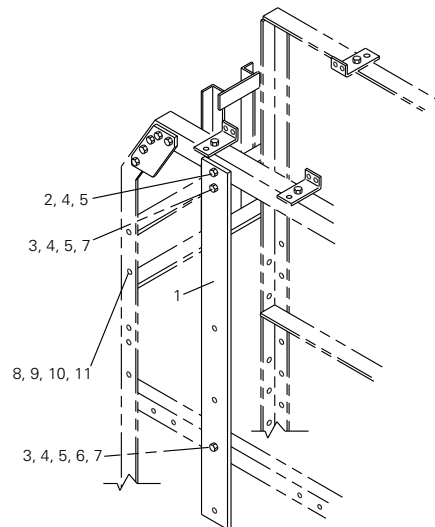


Figure 14. Installing control cabinet on the load side of the frame (KA89WV9).

Mounting for recloser control to end of frame (KA89WV10)

Control mounted at 42-inch height

Refer to Figure 15 and Table 9. Mounting accessory KA89WV10 locates a standard single-sized or a double-sized control cabinet at a 42-inch height (from the bottom of the cabinet to the mounting pad) with a basic frame height of 99 1/4 inches or higher.

1. Attach the first horizontal support strap (Item 1) to the frame legs 46-1/2 inches from the concrete mounting pad using two spacers (Item 3), two washers (Item 4), two cap screws (Item 5), two lockwashers (Item 7), and two hex nuts (Item 6). Assemble the hardware as shown in Figure 16.
2. Attach the second horizontal support strap to the frame legs 27 inches above the first horizontal strap using two spacers (Item 2), two washers (Item 4), two cap screws (Item 5), two lockwashers (Item 7), and two hex nuts (Item 6). Assemble the hardware as shown in Figure 16.

Note: Use the 2-1/16 inch spacers (Item 2) on the upper support strap and the 11-3/16 inch spacers (Item 3) on the lower support strap. This places the support straps in the same vertical plane, mounting the control in an upright position.

3. Locate the vertical control support strap (Item 8) so that the hole measuring 1-3/8 inches from the end is at the top.

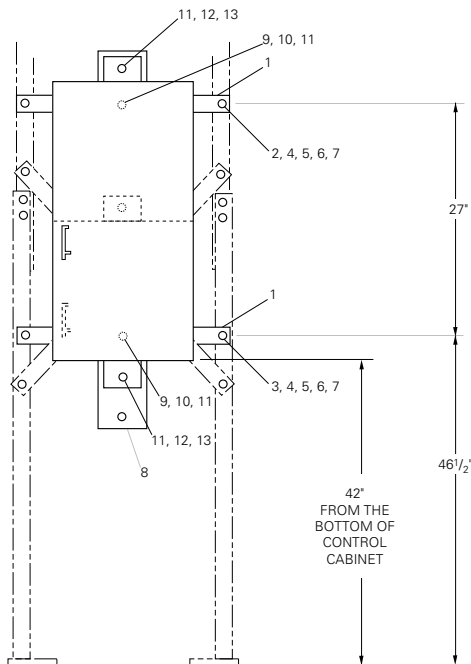


Figure 15. Control mounted on end of frame at 42-inch height (KA89WV10).

Table 9. Hardware for Mounting Control (Standard- or Double- Size Cabinet) to Load Side of Frame (KA89WV10)

Item	Description	Part No.	Qty
1	Horizontal Support Strap	KP149WV	2
2	Spacer, 2 1/16 long	KP1556R	2
3	Spacer, 1 13/16 long	KP2557R	4
4	Washer, 1 1/8 O.D.	KP2028A34	4
5	Cap Screw, hex, 3/8-16 x 3-1/2	K730101137350Q	4
6	Nut, hex, 3/8-16	K880201116037Q	4
7	Lockwasher, 3/8	K900801037000Z	4
8	Control Support Strap	KP2556R	1
9	Cap Screw, hex, 1/2-13 x 1-1/2	K730101150150Q	2
10	Nut, hex, 1/2-13	K880201113050Q	4
11	Lockwasher, 1/2	K900801050000Z	4
12	Cap Screw, hex, 1/2-13 x 2-1/2	K730101150250Q	2
13	Flat washer, 1/2 SAE	K900201050000Q	2
14	Cable Clamp	KP2055A4	6
15	Cap Screw, hex, 1/4-13 x 1	K730101125100Q	6
16	Stop nut, 1/4-20	K2020A23	6
17	Lockwasher, 1/4	K900801025000Z	6

4. Connect the control strap (Item 8) to the upper horizontal support strap through the second hole from the top, as shown in Figure 15, with cap screw (Item 9), lockwasher (Item 11), and hex nut (Item 10) as shown in Figure 17.
5. Connect the bottom half of the control strap to the lower horizontal strap using the same hardware combination shown in Figure 17.

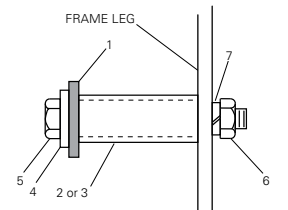


Figure 16. Hardware assembly for mounting the horizontal support straps (KA89WV10).

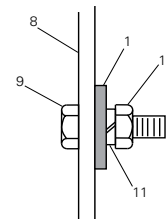


Figure 17. Hardware assembly for mounting the vertical control support strap (Substation Frame Accessory KA89WV10).

To mount the recloser control to the control support strap, locate the top mounting hole for the control cabinet being used. The lower mounting point is the same for both single and double-sized cabinets. Refer to Figure 15.

Single-size cabinet

1. From the top of Item 8, locate the seventh hole and loosely install one cap screw (Item 12), one flat washer (Item 13), one lockwasher (Item 11), and one locknut (Item 10) as shown in Figure 18.
2. Hang the control cabinet on the cap screw and tighten the hardware to secure the control.
3. Secure the bottom of the control cabinet using the same hardware combination (Figure 18).

Double-size cabinet

1. From the top of Item 8, locate the first hole and loosely install one cap screw (Item 12), one flat washer (Item 13), one lockwasher (Item 11), and one locknut (Item 10) as shown in Figure 18.
2. Hang the control cabinet on the cap screw and tighten the hardware to secure the control.
3. Secure the bottom of the control cabinet using the same hardware combination (Figure 18).

Cable clamps are provided to secure the control cable. Fasten the cable clamps (Item 14) to the horizontal support straps using cap screw (Item 15), stop nut (Item 16), and lockwasher (Item 17).

Control cabinet mounted at 60-inch height

Refer to Figure 19 and Table 9. For all basic frame heights, accessory KA89VV10 will mount the control at a 60-inch height (from top of the control cabinet to the mounting pad).

1. Attach the first horizontal support strap to the frame legs 28-1/2 inches from the concrete mounting pad, as shown in Figure 20, using two spacers (Item 2), two washers (Item 4), two cap screws (Item 5), two lockwashers (Item 7), and two hex nuts (Item 6). Assemble the hardware as shown in Figure 16.
2. Attach the second horizontal support strap to the frame legs 27 inches above the first horizontal strap, as shown in Figure 16, using two spacers (Item 3), two washers (Item 4), two cap screws (Item 5), two lockwashers (Item 7), and two hex nuts (Item 6). Assemble the hardware as shown in Figure 16.
3. Locate the vertical control support strap (Item 8) so that the hole measuring 1-3/8 inches from the end is at the top. Connect the control strap to the upper horizontal support strap through the third hole from the top, as shown in Figure 19, with cap screw (Item 9), lockwasher (Item 10), and hex nut (Item 11). Connect bottom half of the control strap to the lower horizontal strap using the same hardware combination (Figure 17).

To mount the recloser control to the control support strap, locate the top mounting hole for the control cabinet being used. The upper mounting point is the same for both single and double-sized cabinets.

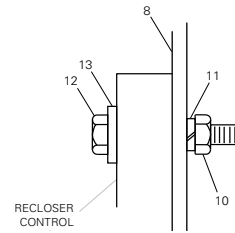


Figure 18. Hardware assembly for mounting the control (Substation Frame Accessory KA89VV10).

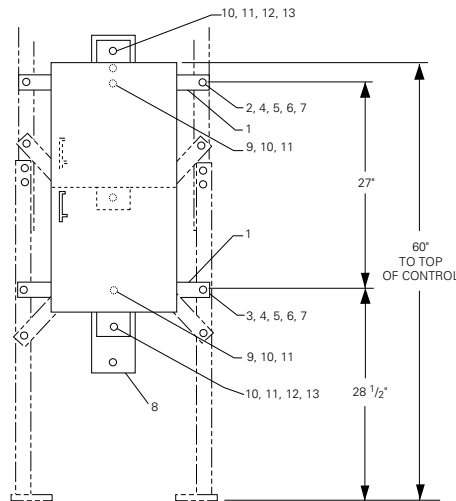


Figure 19. Control mounted at 60-inch height (KA89VV10).

Single-size cabinet

1. From the top of Item 8, locate the first hole and loosely install one cap screw (Item 12), one flat washer (Item 13), one lockwasher (Item 11), and one locknut (Item 10) as shown in Figure 18.
2. Hang the control cabinet on the cap screw and tighten the hardware to secure the control.
3. Secure the bottom of the control cabinet using the same hardware combination (Figure 18).

Double-size cabinet

1. From the top of Item 8, locate the first hole and loosely install one cap screw (Item 12), one flat washer (Item 13), one lockwasher (Item 11), and one locknut (Item 10) as shown in Figure 18.
2. Hang the control cabinet on the cap screw and tighten the hardware to secure the control.
3. Secure the bottom of the control cabinet using the same hardware combination (Figure 18).

Cable clamps are provided to secure the control cable. Fasten the cable clamps (Item 14) to the horizontal support straps using cap screw (Item 15), stop nut (Item 16), and lockwasher (Item 17).

Mounting for recloser control on side of frame (KA89WV11)

Control mounted at 42-inch height

Refer to Figure 20 and Table 10. Mounting accessory KA89WV11 locates the recloser control at a 42-inch height (from the bottom of the cabinet to the mounting pad) with a basic frame height of 96-1/4 inches or higher.

1. On the side of the frame with the long, crossed braces, locate the 49-inch long support angle (Item 1) to the holes in the frame legs, 48 inches up from the concrete mounting pad. Fasten with two cap screws (Item 2), two lockwashers (Item 4), and two hex nuts (Item 3).

Note: If the frame is erected to a height of 102 1/4 inches to the top of the recloser support angles (Items 9 and 10, Figure 6), locate the horizontal support angle to the holes in the frame legs, 51 inches up from the concrete mounting pad.

2. The tank-lifting windlass support angle, located 33 1/4 inches from the top of the frame (See Top Half Frame Assembly, Part 3A section under Basic Frame Assembly), should be reinstalled to a height of 69 inches up from the concrete mounting pad. Use the existing hardware.

Note: If the frame is erected to a height of 102-1/4 inches to the top of the recloser support angle, locate the horizontal support angle to the holes in the frame legs, 72 inches up from the concrete mounting pad.

3. Locate the vertical control support strap (Item 5) so that the hole measuring 1-3/8 inches from the end is at the top.
4. Insert one cap screw (Item 2) through the fourth hole of the support strap (Item 8 from Figure 4).
5. Place 1-1/2 inch diameter spacers (Item 6) behind the support strap and onto the cap screw.

Note: Use enough spacers so the support strap does not interfere with other frame components.

6. Insert cap screw (Item 2) through the lower mounting hole (approximately 21 inches below the upper mounting hole).

7. Place 1-1/2 inch diameter spacers (Item 6) behind the support strap and onto the cap screw.

Note: Use enough spacers so the support strap does not interfere with other frame components.

8. Mount the vertical control strap to the upper and horizontal support angle as shown in Figure 20.
9. Fasten the vertical strap with two lockwashers (Item 4), and two hex nuts (Item 3) as shown in Figure 21.

To mount the recloser control to the control support strap, locate the top mounting hole for the control cabinet being used. The lower mounting point is the same for both single and double-sized cabinets.

Table 10. Hardware for Mounting Recloser Control (Standard or Double-Size Cabinet) to Load Side of Frame (KA89WV11)

Item	Description	Part No.	Qty
1	Support Angle	KP1522R	1
2	Cap Screw, hex, 1/2-13 x 1-1/2	K730101150150Q	4
3	Nut, hex, 1/2-13	K880201113050Q	6
4	Lockwasher, 1/2	K90080105000Z	6
5	Control Support Strap	KP2556R	1
6	Spacer	KP2028A61	8
7	Cap Screw, hex, 1/2-13 x 2-1/2	K730101150250Q	2
8	Flat Washer, 1/2 SAE	K90020105000Q	2
9	Cable Clamp	KP2055A4	6
10	Screw, hex, 1/4 x 1	K730101125100Q	6
11	Stop nut, 1/4-20	KP2020A23	6
12	Lockwasher, 1/4	K90080102500Z	6

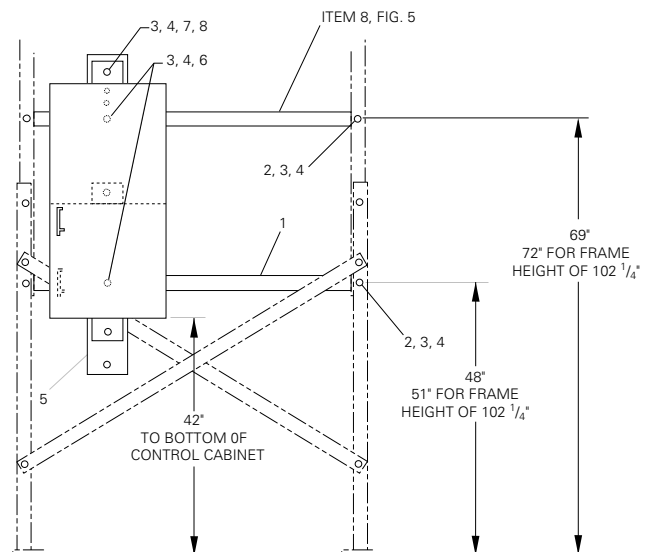


Figure 20. Control mounted on side of frame at 42-inch height (KA89WV11).

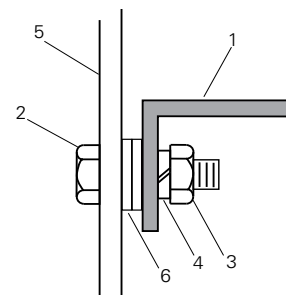


Figure 21. Hardware and spacer location for vertical control strap (Substation Frame Accessory KA89WV11).

Single-size cabinet

1. From the top of Item 5, locate the seventh hole and loosely install one cap screw (Item 2), one flat washer (Item 8), one lockwasher (Item 4), and one hex nut (Item 3) as shown in Figure 20.
2. Hang the control cabinet on the cap screw and tighten the hardware to secure the control.
3. Secure the bottom of the control cabinet using the same hardware combination as shown in Figure 22.

Double-size cabinet

1. From the top of Item 5, locate the first hole and loosely install one cap screw (Item 2), one flat washer (Item 8), one lockwasher (Item 4), and one hex nut (Item 3) as shown in Figure 20.
2. Hang the control cabinet on the cap screw and tighten the hardware to secure the control.
3. Secure the bottom of the control cabinet using the same hardware combination as shown in Figure 22.

Cable clamps are provided to secure the control cable. Fasten the cable clamps (Item 9) to the horizontal support straps using cap screw (Item 10), and stop nut (Item 11) and lockwasher (Item 12).

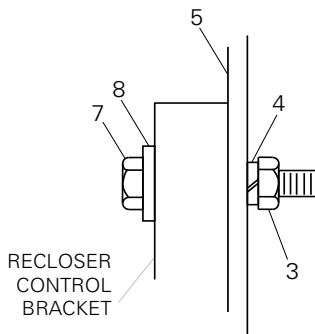


Figure 22. Hardware assembly for mounting the control (Substation Frame Accessory KA89WV11).

Control cabinet mounted at 60-inch height

Refer to Figure 23 and Table 10. For all basic frame heights, accessory KA89WV11 mounts the control at a 60-inch height from the top of the control cabinet to the mounting pad.

1. On the side of the frame with the long crossed braces, locate the 49-inch long support angle (Item 1), to the holes in the frame legs, 17-7/8 inches up from the concrete mounting pad. Fasten with cap screw (Item 2), lockwasher (Item 4), and hex nut (Item 3) or use the current hardware securing the lower end of the crossed braces.

2. The horizontal support angle located 33-1/4 inches from the top of the frame (See Top Half Frame Assembly, Part 3A section under Basic Frame Assembly) should be reinstalled to a height of 48 inches up from the concrete mounting pad. Use the existing hardware.

Note: If the frame is erected to a height of 102-1/4 inches to the top of the recloser support angle, locate the horizontal support angle to the holes in the frame legs, 51 inches up from the concrete mounting pad.

3. Locate the vertical control support strap (Item 5) so that the hole measuring 1-3/8 inches from the end is at the top.
4. Insert one cap screw (Item 2) through the last hole from the bottom of the vertical control strap (Item 5).
5. Place 1-1/2 inch diameter spacers (Item 6) behind the support strap and onto the cap screw.

Note: Use enough spacers so the support strap does not interfere with other frame components.

6. Insert one cap screw (Item 2) through the eighth hole from the bottom of the vertical control strap.
7. Place 1-1/2 inch diameter spacers (Item 6) behind the support strap and onto the cap screw.

Note: Use enough spacers so the support strap does not interfere with other frame components.

8. Mount the vertical control strap to the upper and horizontal support angle as shown in Figure 23.
9. Fasten the vertical strap with two lockwashers (Item 4), and two hex nuts (Item 3) as shown in Figure 23.

To mount the recloser control to the control support strap, locate the top mounting hole for the control cabinet being used. The upper mounting point is the same for both single and double-sized cabinets.

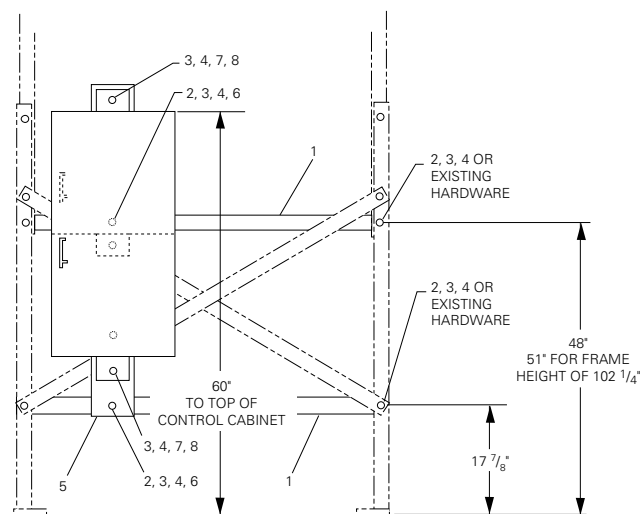


Figure 23. Control mounted on side of frame at 60-inch height (KA89WV11).

Single-size cabinet

1. From the top of Item 5, locate the first hole and loosely install one cap screw (Item 2), one flat washer (Item 8), one lockwasher (Item 4), and one hex nut (Item 3) as shown in Figure 23.
2. Hang the control cabinet on the cap screw and tighten the hardware to secure the control.
3. Secure the bottom of the control cabinet using the same hardware combination as shown in Figure 22.

Double-size cabinet

1. From the top of Item 8, locate the first hole and loosely install one cap screw (Item 2), one flat washer (Item 8), one lockwasher (Item 4), and one hex nut (Item 3) as shown in Figure 23.
2. Hang the control cabinet on the cap screw and tighten the hardware to secure the control.
3. Secure the bottom of the control cabinet using the same hardware combination as shown in Figure 22.

Cable clamps are provided to secure the control cable. Fasten the cable clamps (Item 9) to the horizontal support straps using cap screw (Item 10), and stop nut (Item 11) and lockwasher (Item 12).

Factory-assembled units

When specified on the order, the frame can be partially assembled and shipped from the factory with the recloser, control, and recloser accessories mounted and wired on the frame. To place a factory-assembled unit into service:

1. Uncrate the unit and remove the shipping skids.
2. Disassemble the frame parts from their shipping positions.
3. Detach the lower frame posts, which are bolted across the upper frame posts.
4. Relocate the long and short braces to their proper locations.
5. Remove the cross braces and assemble all frame components in accordance with these instructions.



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