

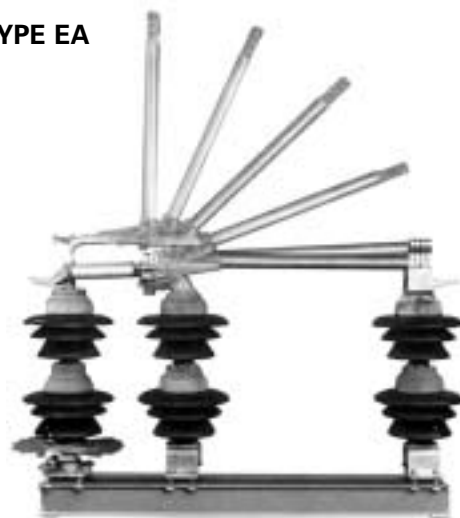
**Type EA, EA1, EA2
EAB, EA1S and VBV
VERTICAL BREAK
SWITCHES**

***8.25 KV through 800 kV
600 to 4000 Ampere***

TYPE VBV



TYPE EA



Type EA and EAB

GENERAL DESIGN FEATURES

Type EA – Aluminum Vertical Break Switch

**8.25 kV through 362 kV
600-4000 Amps**

Type EAB - Copper Vertical Break Switch

**8.25 kV through 242 kV
600-4000 Amps**

The EA rotating rear insulator, vertical break switch embodies all of the rugged physical characteristics of the Memco product line. The design utilizes the best features of both copper and aluminum in the live parts, maintaining the time proven concept of silver to copper at all moving contacts. The result is a truly high performance switch.

APPLICATION: With arcing horns or quick break attachment it can be used for line sectionalizing, bypassing circuit breakers, or opening magnetizing current of transformer primary connections. Without arcing horns it can be used for isolating breakers or as a disconnecting switch.

FEATURES

• Jaw & Hinge Contacts

Both the jaw and hinge employ similar types of special high temperature resistant, copper alloy contact fingers. This material, possessing excellent spring characteristics and high conductivity, makes an ideal self contained contact. There is no need for back-up springs or other pressure compensating devices commonly found on other switches. The end result is cleaner and better contact arrangement. The reverse loop contact as used on the jaw takes advantage of the magnetic forces found under fault conditions to increase the contact pressure of the fingers and to force the blade against the closed position blade stop.

The hinge contact fingers are in continuous contact with the switch blade throughout the complete opening and closing operation of the switch.

TYPICAL JAW CONTACT ARRANGEMENTS



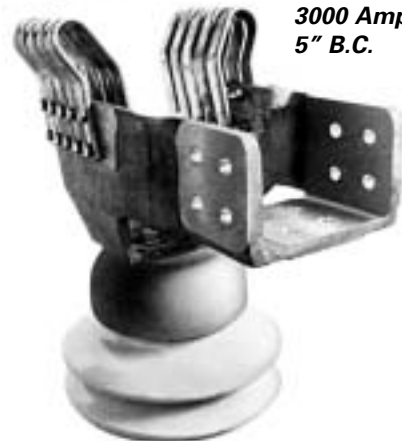
**600 Ampere,
3" B.C.**



**2000 Ampere
5" B.C.**



**1200 Ampere,
5" B.C.**



**3000 Ampere,
5" B.C.**

Type EA and EAB

• Current Carrying Parts

High strength, high conductivity aluminum is used where practical throughout the live parts. Blade end transitions are made by either bolted aluminum to copper or threaded copper to aluminum depending upon the blade diameter. In either case, all copper or bronze transition pieces are tinned and the current interchange points between the tinned copper and aluminum are effectively sealed to prevent the entrance of moisture.

All bearings and counterbalancing springs are isolated from the main current path by insulating bushings. The switch is designed in accordance with the latest ANSI standards. It is also available, when specified, based upon past industry standards which limit temperature rise to 30° C over an ambient of 40° C.

• Wiping Action & Operation

The rolling action of the blade when opening and closing the switch provides a positive wiping and cleaning action of the jaw and hinge contacts. The jaw contact pressure is relieved by the blade rotation prior to lift out.

In the closed position the blade mechanism is mechanically locked over center thereby locking the blade closed. In the open position the blade center of gravity is located well behind the pivot point thereby preventing the blade from falling closed.



3000 Ampere, 5" B.C. hinge assembly

• Blade Height Adjustment

Blade height adjustment is provided by a very convenient arrangement located in the linkage between the top of the rotating insulator and the blade.

• Mounting Position

The type EA switch may be mounted in horizontal, upright, vertical, or underhung position. Counterbalancing is provided, where required, by compression type spring assemblies. Conversion in the field from one mounting position to another can be made with a minimum of difficulty.

• Bearings

Maintenance free bearings are used at the base of the rotating insulator of all switches. Switches through 72.5 kV are furnished with sleeve or ball bearings. At 121kV and above, ball bearings are used. All bearings are enclosed in weatherproof housings and are free of maintenance.

Live part bearings consist of teflon, nylon, or roller type, depending upon the application. No field servicing is required.

• Bases

Rigid galvanized structural steel channel bases are furnished on all switches. Switches rated 72.5kV, 1200 ampere and below are normally furnished on flat channel bases. Double channel bases are furnished at 121 kV and above. Aluminum bases are available when specified.

• Leveling Bolts

All switches 121 kV and above are furnished with four leveling bolts per insulator stack to provide fast, effective means of aligning insulator stacks in the field.

Rigid welded base showing bearing and leveling bolts.



Type EA and EAB

- **Factory Assembled & Adjusted**

Switches 48.3 kV and below are pre-assembled and adjusted on insulators at the factory. Switches 72.5 kV and above are assembled and adjusted, less insulators. Only minor adjustments, if any, are required at installation.

- **Insulators**

NEMA standard station post or cap and pin insulators are available as specified.

- **Field Installation**

The simplicity of design assures ease of installation and years of trouble-free service.

Type EAB - Copper Vertical Break Switch

FEATURES

The type EAB vertical break switch utilizes copper and bronze for all current carrying parts. In all other respects it is identical with the type EA, described previously. Aluminum is used for corona rings and counterbalancing spring housing. Blade end transitions, as described under "EA Carrying Parts" are unnecessary. Silver contact material is silver brazed directly to the copper blade tip. The resulting contact is time proven silver to copper.
Not all ratings are available in copper, refer to factory.

EA & EAB SWITCH ACCESSORIES

- **Ground Switches**

Ground switches of the same or lower momentary ratings as the main switches can be installed on either the jaw or hinge end of the switch. Standard practice is to operate the ground blade 90° to the main blade. However, ground blades parallel to the main blade are available. Both braid and braidless ground switches are available.

- **Quick Break Attachments**

Quick break attachments having the following interrupting ratings can be furnished on all EA switches.

| Switch Rating kV | Magnetizing Current Bank kVA | Line Charging Current Amps. | Dropping Equivalent Lines - Miles |
|------------------|------------------------------|-----------------------------|-----------------------------------|
| 8.25 | 20,000 | 22 | * |
| 15.5 | 30,000 | 20 | * |
| 25.8 | 40,000 | 18 | * |
| 38.0 | 50,000 | 16 | * |
| 48.3 | 60,000 | 14 | 75 |
| 72.5 | 80,000 | 12 | 50 |
| 121 | 100,000 | 9 | 25 |
| 145 | 100,000 | 7.5 | 18 |
| 169 | 100,000 | 6 | 12 |

- **Outriggers**

Outriggers of various designs are available for copper or aluminum conductors.

- **Terminal Connectors**

When specified terminal connectors can be furnished.

Refer to factory for outline drawings.

TYPICAL EA SWITCHES



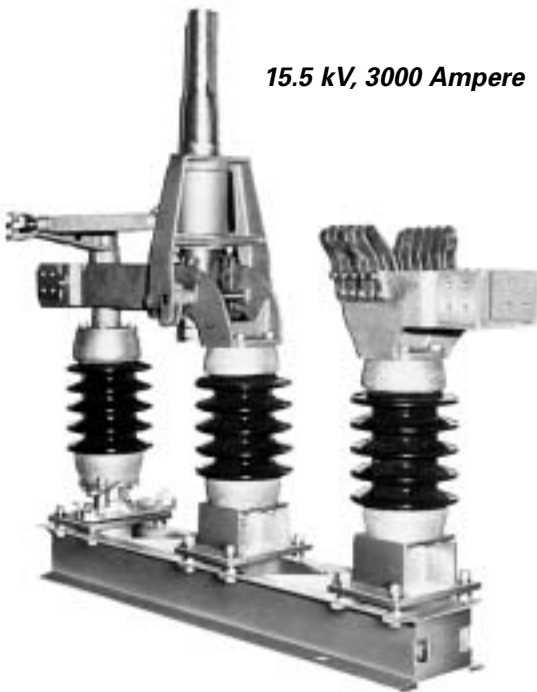
15.5 kV, 600 Ampere



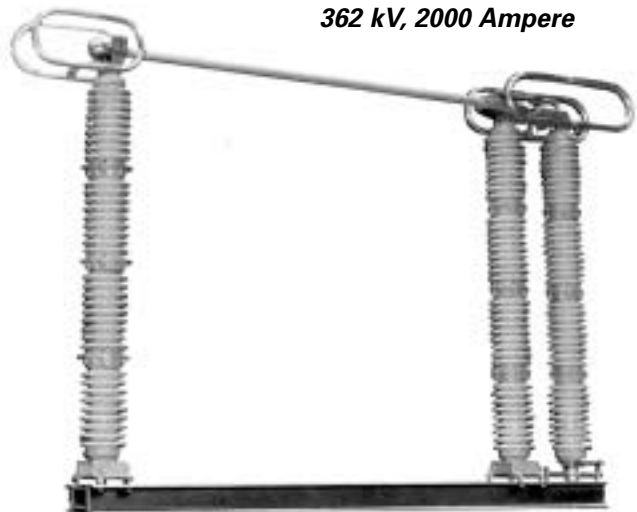
38 kV, 1200 Ampere



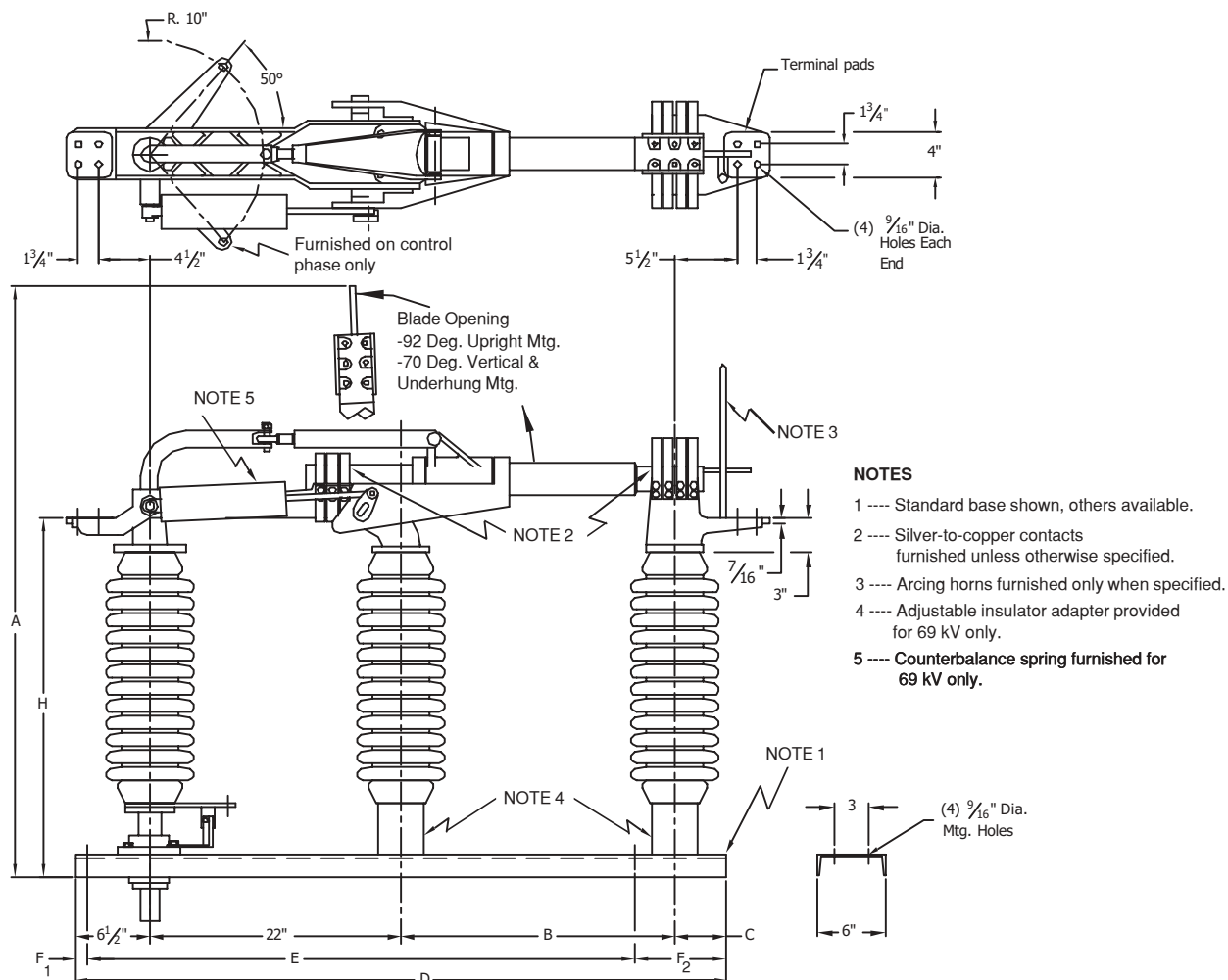
145 kV, 3000 Ampere



15.5 kV, 3000 Ampere



362 kV, 2000 Ampere

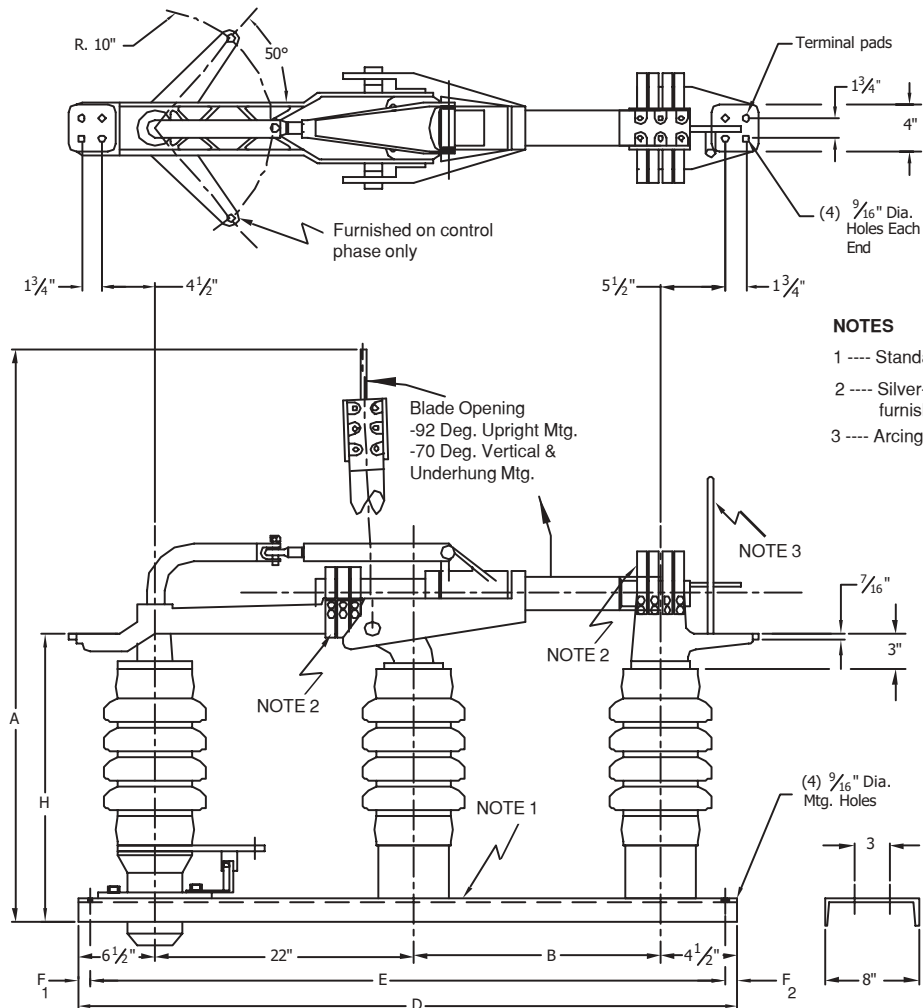


| Voltage Rating kV | | CATALOG NUMBER | Insul. Tech. Ref. No. | Approximate Dimensions (Refer to Factory for Certified Prints) | | | | | | | |
|----------------------|-----|-------------------|--------------------------------|---|-----|--------|-----|-----|----------------|----------------|---------|
| Max. | BIL | | | A | B | C | D | E | F ₁ | F ₂ | H |
| 8.2 | 95 | 7EA-20HP3 | 202 | 47" | 15" | 4 1/2" | 48" | 36" | 2 1/2" | 9 1/2" | 17" |
| 15.5 | 110 | 15EA-20HP3 | 205 | 49 1/2" | 15" | 4 1/2" | 48" | 36" | 2 1/2" | 9 1/2" | 19 1/2" |
| 25.8 | 150 | 23EA-20HP3 | 208 | 53 1/2" | 18" | 4 1/2" | 51" | 39" | 2 1/2" | 9 1/2" | 23 1/2" |
| 38 | 200 | 34EA-20HP3 | 210 | 63 1/2" | 24" | 4 1/2" | 57" | 48" | 1" | 8" | 27 1/2" |
| 48.3 | 250 | 46EA-20HP3 | 214 | 73 1/2" | 30" | 4 1/2" | 63" | 54" | 1" | 8" | 31 1/2" |
| 72.5 | 350 | 69EA-20HP3 | 216 | 81 1/2" | 42" | 7 1/2" | 71" | 69" | 1" | 8" | 39 1/2" |

- (1) Catalog numbers shown are with station post insulators. If cap and pin insulators are required, change the P to C in the catalog number (eg.: 7EA-20HC3).
- (2) When 30° temperature rise unit is required, omit the H in the catalog number (eg.: 7EA-20P3).

| Ampere Rating | Momentary Rating |
|------------------|---------------------|
| 2000A | 100 KA |

Type EA 8.2 kV - 72.5 kV 2000 Ampere



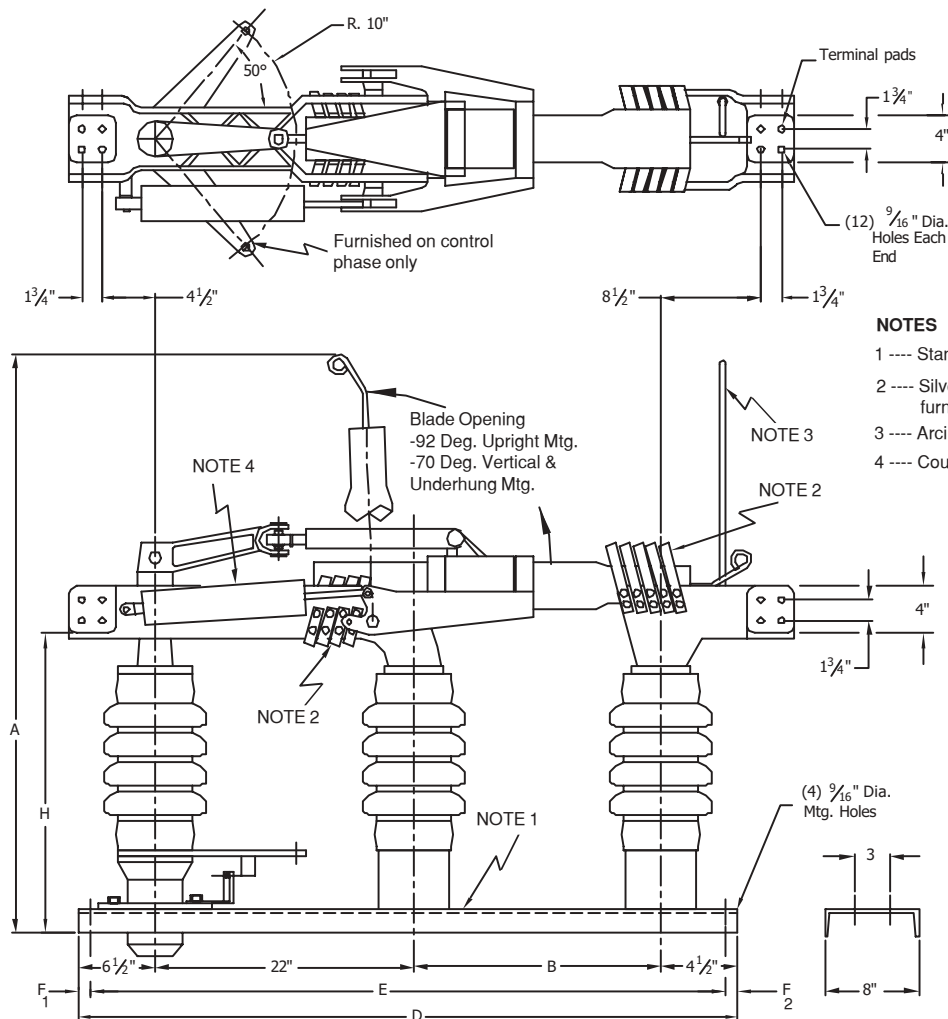
| Voltage Rating kV | | CATALOG NUMBER (1) (2) | Insul. Tech. Ref. No. | Approximate Dimensions (Refer to Factory for Certified Prints) | | | | | | |
|----------------------|-----|------------------------------|--------------------------------|---|-----|-----|-----|----------------|----------------|---------|
| Max. | BIL | | | A | B | D | E | F ₁ | F ₂ | H |
| 8.2 | 95 | 7EA-20HP5 | 222 | 49 3/4" | 21" | 54" | 36" | 1" | 17" | 19 3/4" |
| 15.5 | 110 | 15EA-20HP5 | 225 | 51 3/4" | 21" | 54" | 36" | 1" | 17" | 21 3/4" |
| 25.8 | 150 | 23EA-20HP5 | 227 | 54 3/4" | 21" | 54" | 36" | 1" | 17" | 24 3/4" |
| 38 | 200 | 34EA-20HP5 | 231 | 65 3/4" | 27" | 60" | 48" | 1" | 11" | 29 3/4" |
| 48.3 | 250 | 46EA-20HP5 | 267 | 75 3/4" | 33" | 66" | 54" | 1" | 11" | 33 3/4" |

(1) Catalog numbers shown are with station post insulators. If cap and pin insulators are required, change the P to C in the catalog number (eg.: 7EA-20HC5).

(2) When 30° temperature rise unit is required, omit the H in the catalog number (eg.: 7EA-20P5).

| Ampere Rating | Momentary Rating |
|------------------|---------------------|
| 2000A | 100 KA |

Type EA 8.2 kV - 48.3 kV 2000 Ampere



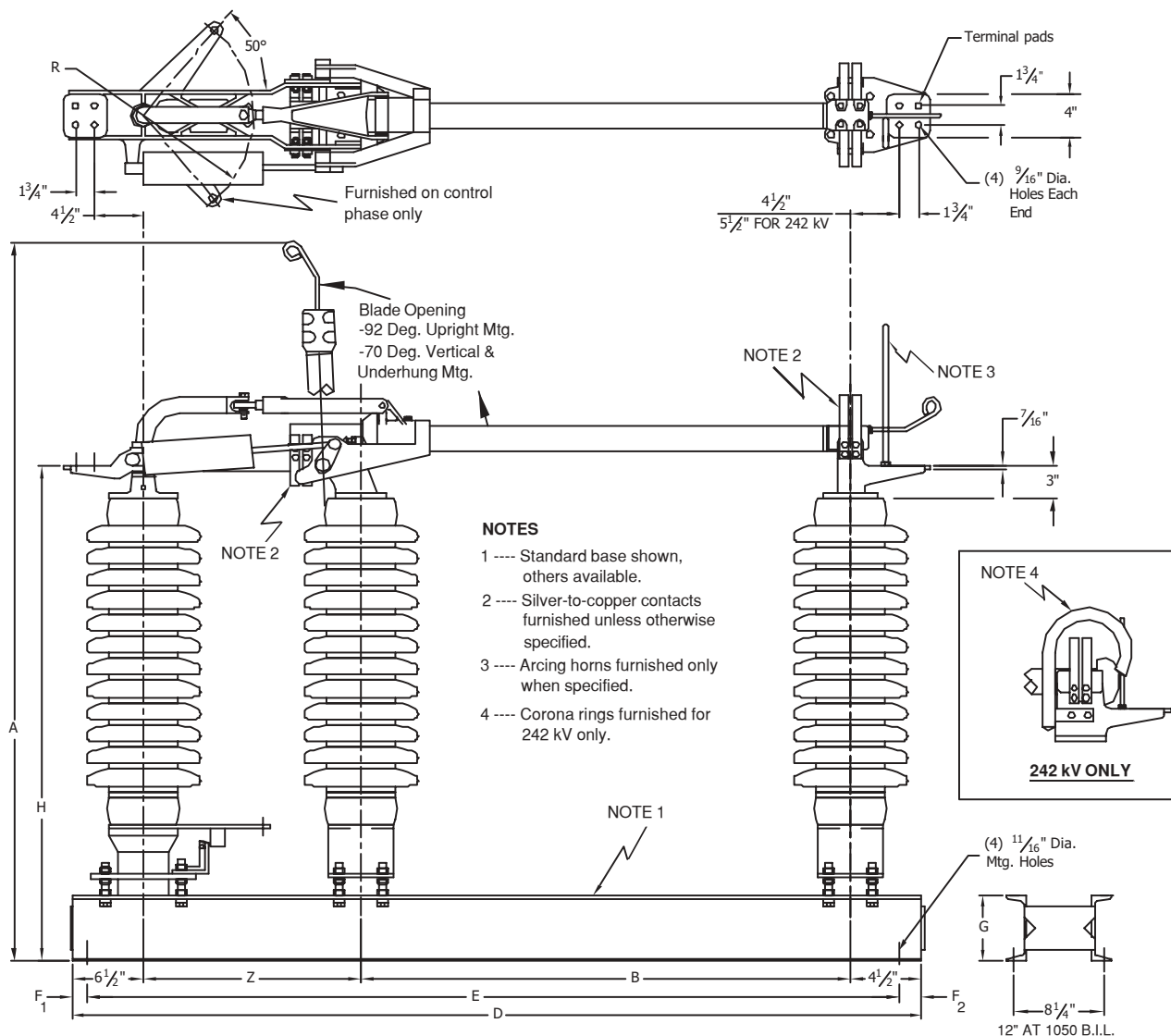
| Voltage Rating kV | | CATALOG NUMBER | Insul. Tech. Ref. No. | Approximate Dimensions (Refer to Factory for Certified Prints) | | | | | | |
|----------------------|-----|-------------------|--------------------------------|---|-----|-----|-----|----------------|----------------|---------|
| Max. | BIL | | | A | B | D | E | F ₁ | F ₂ | H |
| 8.2 | 95 | 7EA-30HP5 | 222 | 53 3/4" | 21" | 54" | 36" | 1" | 17" | 20 1/4" |
| 15.5 | 110 | 15EA-30HP5 | 225 | 55 3/4" | 21" | 54" | 36" | 1" | 17" | 22 1/4" |
| 25.8 | 150 | 23EA-30HP5 | 227 | 58 3/4" | 21" | 54" | 36" | 1" | 17" | 25 1/4" |
| 38 | 200 | 34EA-30HP5 | 231 | 63 3/4" | 27" | 60" | 48" | 1" | 11" | 30 1/4" |
| 48.3 | 250 | 46EA-30HP5 | 267 | 67 3/4" | 33" | 66" | 54" | 1" | 11" | 34 1/4" |

(1) Catalog numbers shown are with station post insulators. If cap and pin insulators are required, change the P to C in the catalog number (eg.: 7EA-30HC5).

(2) When 30° temperature rise unit is required, omit the H in the catalog number (eg.: 7EA-30P5).

| Ampere Rating | Momentary Rating |
|------------------|---------------------|
| 3000A | 120 KA |

Type EA 8.2 kV - 48.3 kV 3000 Ampere

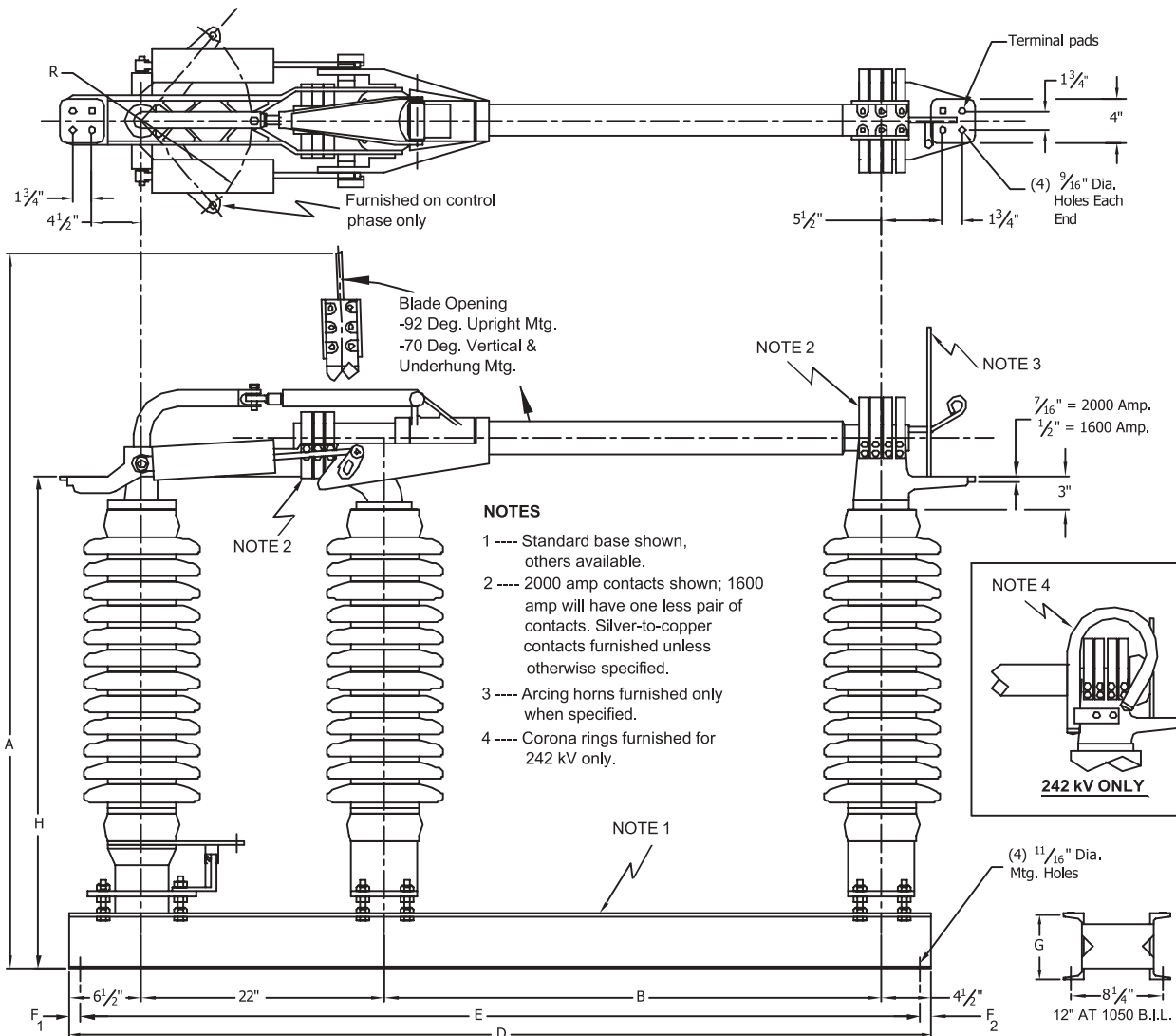


| Voltage Rating kV | | CATALOG NUMBER (1) (2) | Insul. Tech. Ref. No. | Approximate Dimensions (Refer to Factory for Certified Prints) | | | | | | | | | |
|----------------------|------|------------------------------|--------------------------------|---|------|------|------|----------------|----------------|----|----------|-----|-----|
| Max. | BIL | | | A | B | D | E | F ₁ | F ₂ | G | H | R | Z |
| 72.5 | 350 | 69EA-12HP5 | 278 | 99 5/8" | 45" | 76" | 69" | 3 1/2" | 3 1/2" | 5" | 44 5/8" | 10" | 20" |
| 121 | 550 | 115EA-12HP5 | 286 | 128 5/8" | 60" | 91" | 87" | 2" | 2" | 5" | 59 5/8" | 10" | 20" |
| 145 | 650 | 138EA-12HP5 | 288 | 149 5/8" | 72" | 103" | 99" | 2" | 2" | 5" | 68 5/8" | 10" | 20" |
| 169 | 750 | 161EA-12HP5 | 291 | 170 5/8" | 84" | 115" | 111" | 2" | 2" | 6" | 77 5/8" | 10" | 20" |
| 242 | 900 | 230EA-12HP5 | REFER TO FACTORY | 195 1/8" | 96" | 129" | 123" | 3" | 3" | 6" | 95 5/8" | 12" | 22" |
| 242 | 1050 | 230EA-12HP5 | 312 | 225 1/8" | 114" | 147" | 123" | 3" | 21" | 6" | 107 5/8" | 12" | 22" |

- (1) Catalog numbers shown are with station post insulators.
If cap and pin insulators are required, change the P to C in the catalog number (eg.: 69EA-12HC5).
- (2) When 30° temperature rise unit is required, omit the H in the catalog number (eg.: 69EA-12P5).

| Ampere Rating | Momentary Rating |
|------------------|---------------------|
| 1200A | 61 KA |

Type EA 72.5 kV - 242 kV 1200 Ampere

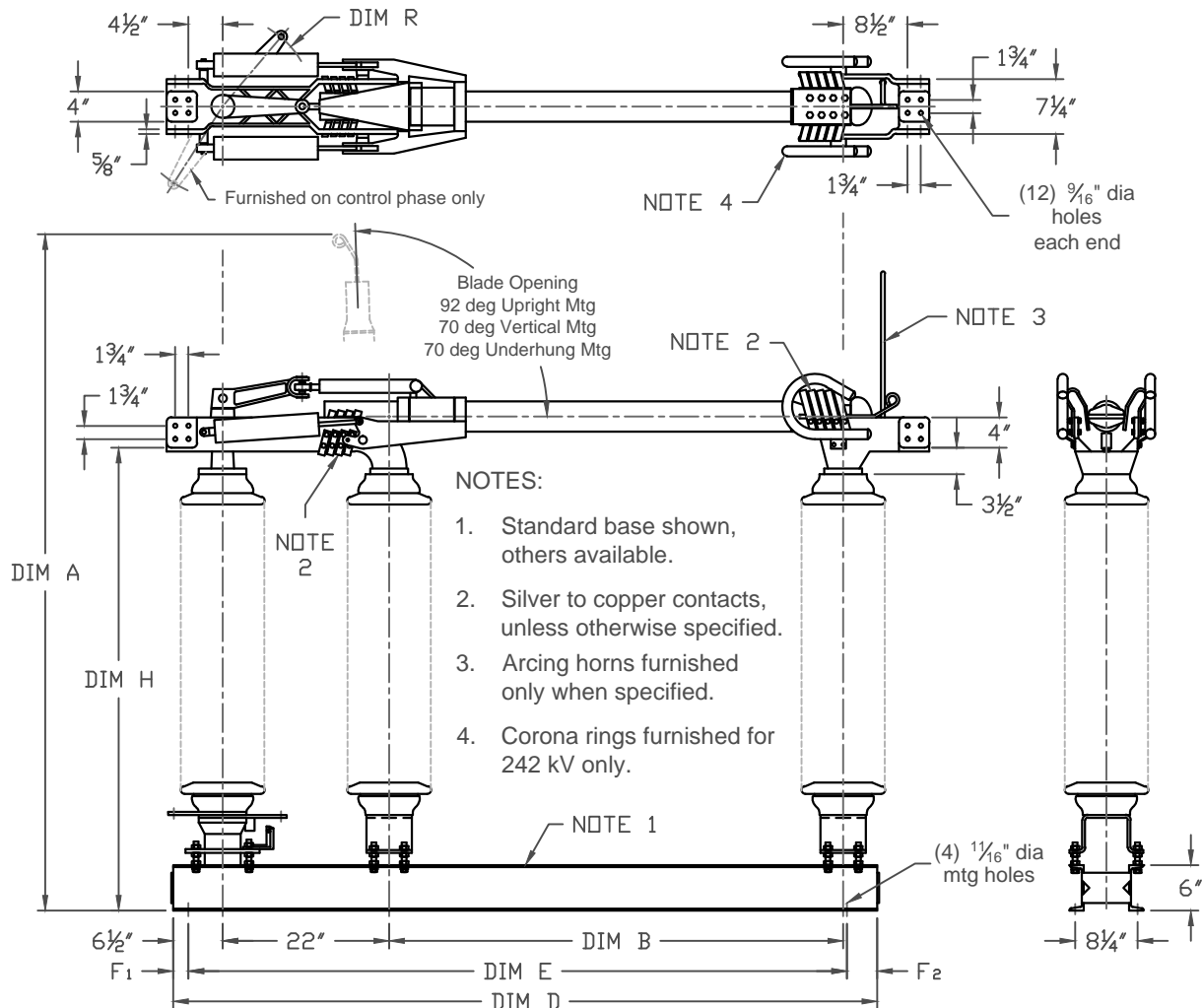


| Voltage Rating kV | | CATALOG NUMBER | Insul. Tech. Ref. No. | Approximate Dimensions (Refer to Factory for Certified Prints) | | | | | | | | |
|----------------------|------|-------------------|--------------------------------|---|------|------|------|------------------|------------------|----|--------------------|-----|
| Max. | BIL | | | A | B | D | E | F ₁ | F ₂ | G | H | R |
| 72.5 | 350 | 69EA-20HP5 | 278 | 109 $\frac{1}{8}"$ | 45" | 78" | 69" | 4 $\frac{1}{2}"$ | 4 $\frac{1}{2}"$ | 5" | 44 $\frac{5}{8}"$ | 10" |
| 121 | 550 | 115EA-20HP5 | 286 | 129 $\frac{5}{8}"$ | 60" | 93" | 87" | 3" | 3" | 5" | 59 $\frac{5}{8}"$ | 10" |
| 145 | 650 | 138EA-20HP5 | 288 | 150 $\frac{1}{8}"$ | 72" | 105" | 99" | 3" | 3" | 5" | 68 $\frac{5}{8}"$ | 10" |
| 169 | 750 | 161EA-20HP5 | 291 | 171 $\frac{1}{8}"$ | 84" | 117" | 111" | 3" | 3" | 6" | 77 $\frac{5}{8}"$ | 12" |
| 242 | 900 | 230EA-20HP5 | REFER TO FACTORY | 195 $\frac{5}{8}"$ | 96" | 129" | 123" | 3" | 3" | 6" | 95 $\frac{5}{8}"$ | 12" |
| 242 | 1050 | 230EA-20HP5 | 312 | 255 $\frac{5}{8}"$ | 114" | 147" | 123" | 3" | 21" | 6" | 107 $\frac{5}{8}"$ | 12" |

- (1) Catalog numbers shown are with station post insulators. If cap and pin insulators are required, change the P to C in the catalog number (eg.: 69EA-20HC5).
- (2) When 30 ∞ temperature rise unit is required, omit the H in the catalog number (eg.: 69EA-20P5).
- (3) Catalog numbers shown are for 2000 amps. For 1600 amps, change 20 to 16 in the catalog number as required (eg.: 72.5 kV-1600 A: Cat No. 69EA-16HP5).

| Ampere Rating | Momentary Rating |
|------------------|---------------------|
| 1600A | 70 KA |
| 2000A | 100 KA |

Type EA 72.5 kV - 242 kV 1600 and 2000 Ampere



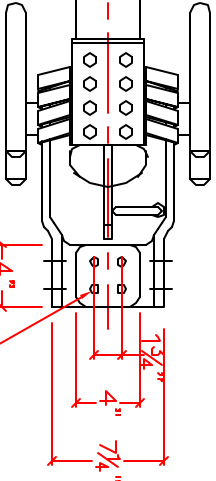
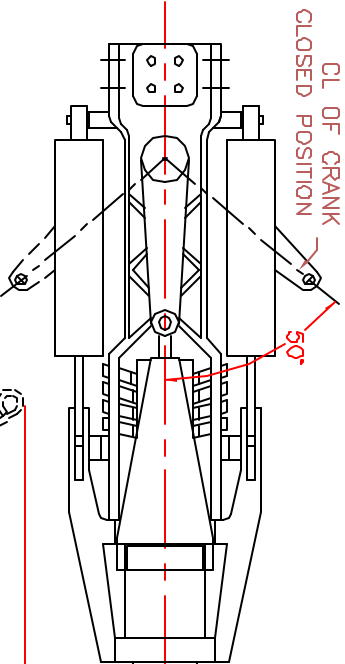
| Voltage Rating (kV) | | Catalog Number notes 1 & 2 | Insulator (TR No.) | Approximate Dimensions (Refer to factory for certified prints) | | | | | | | |
|---------------------|-----|-------------------------------|-----------------------|---|-----|------|------|--------|--------|---------|-----|
| MAX | BIL | | | A | B | D | E | F1 | F2 | H | R |
| 72.5 | 350 | 69EA-30HP5 | 278 | 103 3/4" | 45" | 78" | 69" | 3 1/2" | 5 1/2" | 46 1/8" | 10" |
| 121 | 550 | 115EA-30HP5 | 286 | 133 3/4" | 60" | 93" | 87" | 2" | 4" | 61 1/8" | 12" |
| 145 | 650 | 138EA-30HP5 | 288 | 154 3/4" | 72" | 105" | 99" | 2" | 4" | 70 1/8" | 12" |
| 169 | 750 | 161EA-30HP5 | note 3 | 174 3/4" | 84" | 117" | 111" | 2" | 4" | 78 1/8" | 12" |
| 242 | 900 | 230EA-30HP5 | note 3 | 204 3/4" | 96" | 129" | 123" | 3" | 3" | 96 1/8" | 12" |

- Switches have station post insulators. When copper switch is required, add a B in the catalog number (eg.: 69EAB-30HP5).
- When 30 degree temperature rise is required, omit the H in the catalog number (eg.: 69EA-30P5).
- Refer to factory.
- When 120 KA momentary amperage is required for 115 kV through 230 kV, add an S to the end of the catalog number (eg.: 69EA-30HP5S).

| Ampere Rating | Momentary Rating | |
|----------------|------------------|------------------|
| 3000A to 4000A | 69 kV | 120 KA |
| | 115-230 kV | 100 KA |
| | 115-230 kV | 120 KA note 4 |

Type EA & EAB

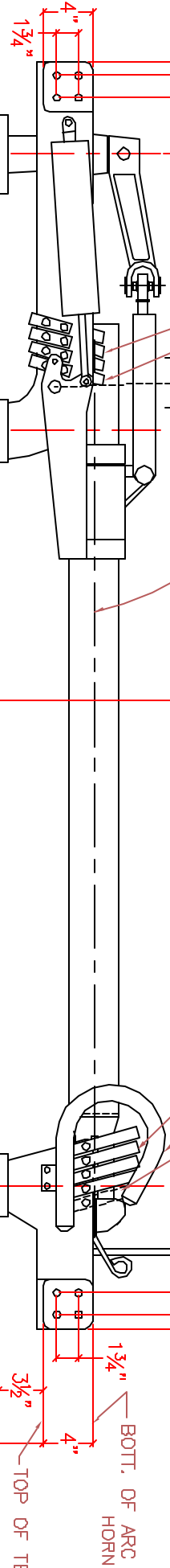
72.5 kV - 242 kV 3000A 242 kV 3500A 72.5 - 169 kV 4000A



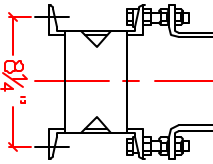
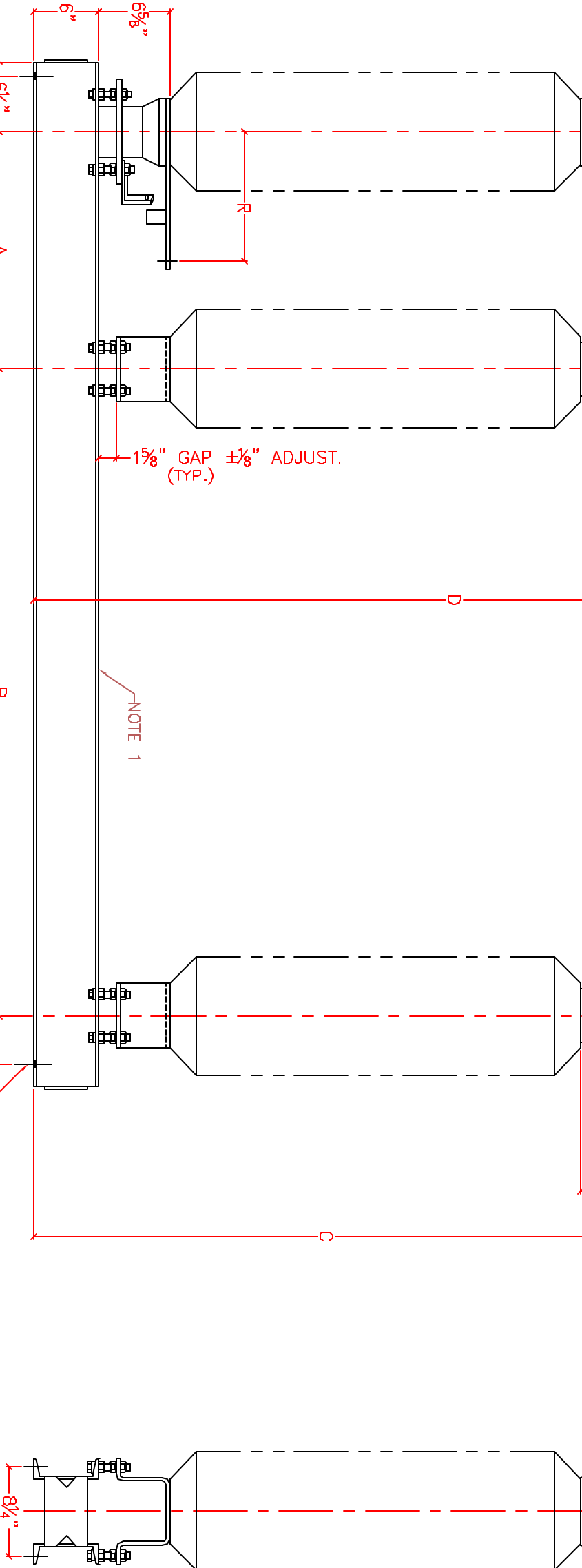
NOTES:--
1-STANDARD BASE SHOWN, FOR BASE FURNISHED
SEE DRAWING OF SWITCH OPERATING MECH.
2-ALL FERROUS PARTS H.D. GALVANIZED.
3-ARC HORNS FURNISHED ONLY WHEN SPECIFIED.
4-SILVER TO COPPER CONTACTS STANDARD. ALL
OTHER CURRENT CARRYING PARTS ALUMINIUM.
5-CURRENT RATING BASED ON ANSI-C37.37
ACCC DESIGNATION DQ4.
6-CORONA RINGS FURNISHED FOR 230KV ONLY.
7-ONE EXTRA PAIR OF CONTACTS FURNISHED HINGE
AND JAW END FOR 69KV 120KA MOMENTARY.

NOTE 7
NOTE 4
BLADE OPENING
92° FOR UPRIGHT MTG.
70° FOR VERTICAL &
UNDERHUNG MTG.

NOTE 3
NOTE 6
NOTE 7
NOTE 4
(12) Ø1/6" HOLES
EACH END



LIVE PARTS
MAX. 1 1/2"
MAX. 7"

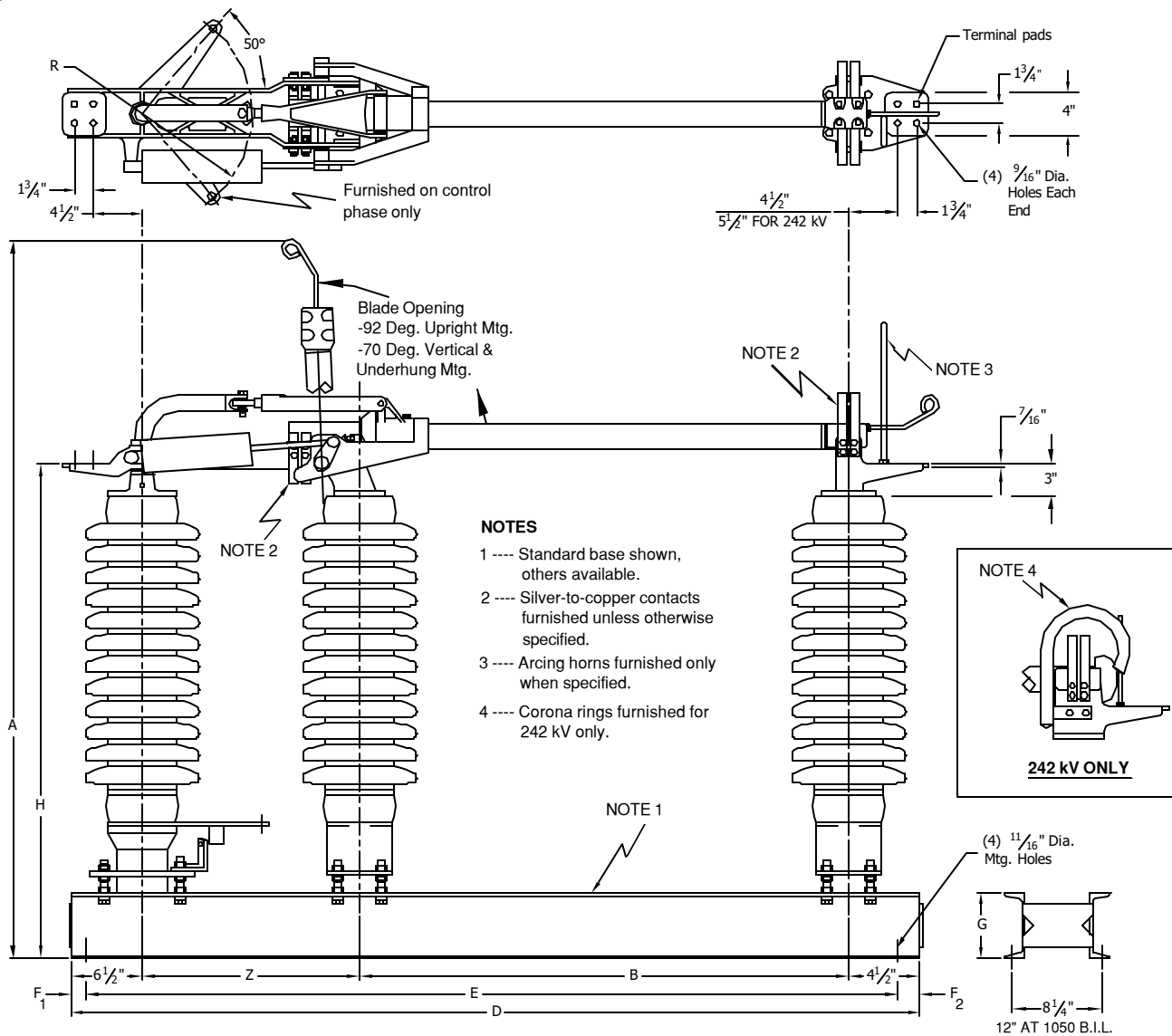


| ITEM NO. | KV. RATING | | POST INSULATORS | | | | DIMENSIONS IN INCHES | | | | | |
|----------|------------|------|-----------------|-------|--------|---------|----------------------|----|-----|-------|----|--|
| | MAX. | IMP. | SWITCH CAT. | TR NO | C | D | A | B | E | F | R | |
| 1 | 72.5 | 350 | 69EA-30HP5 | 278 | 46 1/8 | 103 3/4 | 22 | 45 | 69 | 3 1/2 | 10 | |
| 2 | 121 | 550 | 115EA-30HP5 | 286 | 61 1/8 | 133 3/4 | 22 | 60 | 87 | 2 | 12 | |
| 3 | 145 | 650 | 138EA-30HP5 | 288 | 70 1/8 | 154 3/4 | 22 | 72 | 99 | 2 | 12 | |
| 4 | 169 | 750 | 161EA-30HP5 | 291 | 78 1/8 | 174 3/4 | 22 | 84 | 111 | 2 | 12 | |
| 5 | 169 | 750 | 161EA-30HP5 | 295 | 78 1/8 | 174 3/4 | 22 | 84 | 111 | 2 | 12 | |
| 6 | 242 | 900 | 230EA-30HP5 | 304 | 96 1/8 | 204 3/4 | 22 | 96 | 123 | 3 | 12 | |
| 7 | 242 | 900 | 230EA-30HP5 | 308 | 96 1/8 | 204 3/4 | 22 | 96 | 123 | 3 | 12 | |

| | | |
|--|-------------------|---------|
| 5 | REDRAWN-NO CHANGE | 3-11-83 |
| NO | REVISION | DATE |
| REVISE ON CAD SYSTEM ONLY | | |
| OUTLINE-TYPE "EA" VERTICAL BREAK SWITCH 69KV 120KA MOMENTARY, 115-230KV 100KA MOMENTARY 3000AMP- 5"BC INSULATORS | | |
| DMN TK | QXD | DLG |
| DATE: 03-11-83 | FILE NO. C1837905 | |
| SCALE: NTS | DWG NO. C-18379 | REV 5 |
| PLOT SCALE: 1-8 | | |

CATALOG FURNISHED:

memco manufacturing inc.



| Voltage Rating kV | | CATALOG NUMBER (1) (2) | Insul. Tech. Ref. No. | Approximate Dimensions (Refer to Factory for Certified Prints) | | | | | | | | | |
|----------------------|------|----------------------------------|--------------------------------|---|------|------|------|---------------------------------|---------------------------------|----|-----------------------------------|-----|-----|
| Max. | BIL | | | A | B | D | E | F ₁ | F ₂ | G | H | R | Z |
| 72.5 | 350 | 69EAB-12HP5 | 278 | 99 ⁵ / ₈ " | 45" | 76" | 69" | 3 ¹ / ₂ " | 3 ¹ / ₂ " | 5" | 44 ⁵ / ₈ " | 10" | 20" |
| 121 | 550 | 115EAB-12HP5 | 286 | 128 ⁵ / ₈ " | 60" | 91" | 87" | 2" | 2" | 5" | 59 ⁵ / ₈ " | 10" | 20" |
| 145 | 650 | 138EAB-12HP5 | 288 | 149 ⁵ / ₈ " | 72" | 103" | 99" | 2" | 2" | 5" | 68 ⁵ / ₈ " | 10" | 20" |
| 169 | 750 | 161EAB-12HP5 | 291 | 170 ⁵ / ₈ " | 84" | 115" | 111" | 2" | 2" | 6" | 77 ⁵ / ₈ " | 10" | 20" |
| 242 | 900 | 230EAB-12HP5 | REFER TO FACTORY | 195 ¹ / ₈ " | 96" | 129" | 123" | 3" | 3" | 6" | 95 ⁵ / ₈ " | 12" | 22" |
| 242 | 1050 | 230EAB-12HP5 | 312 | 225 ¹ / ₈ " | 114" | 147" | 123" | 3" | 21" | 6" | 107 ⁵ / ₈ " | 12" | 22" |

- (1) Catalog numbers shown are with station post insulators.
If cap and pin insulators are required, change the P to C in the catalog number (eg.: 69EAB-12HC5).
- (2) When 30° temperature rise unit is required, omit the H in the catalog number (eg.: 69EAB-12P5).

| Ampere Rating | Momentary Rating |
|------------------|---------------------|
| 1200A | 61 KA |

Type EAB 72.5 kV - 242 kV 1200 Ampere