Operation

The DBA type fuse unit is of the replaceable type rather than the renewable type. When the fuse has blown and drop-out completed, the entire unit is removed with a switch stick. After replacement of the blown unit, it is closed back into place with the switch stick.

In replacing the blown fuse, the end fittings are removed and clamped on a new fuse. End fittings consist of an operating eye at the top and hinge lifting eye at the bottom. The two fittings have different shapes and are keyed with different projections. Fittings are simple to remove or replace, and cannot be reversed since the keys insure quick, correct alignment.

DE-ION circuit interruption by action of the boric acid fuse unit is followed simultaneously by a mechanical drop-out action. When closing the fuse unit with the switch stick, the ejector casting located under the sleet hood, compresses the ejector spring. Under fault conditions the fuse element melts, the helical spring pulls the arcing rod and arc through the cylinder. The upper end of the arcing rod drives through a small hole in the top of the ferrule of the fuse unit and strikes the trigger-releasing ejector. The trigger operates and causes the ejector spring to force the ejector casting against the fuse assembly forcing it outward to swing through a 180˚ arc into a drop-out position. Drop-out action provides immediate visual indication that the particular circuit in which the fuse is connected has been interrupted. The additional drop-out break insulates the fault from the feeders with an air gap of at least one foot on lower voltage system and up to six feet on higher voltage systems.

This air break eliminates any possibility of carbonized fuse parts breaking down to allow leakage or another fault. Since drop-out action takes place after current interruption within the boric acid cylinder, burning or arcing at the contact surfaces is eliminated.

Application

The DBA fuse is applicable in utility and industrial high voltage power systems for protecting:

- Power transformers
- Feeder circuit sectionalizing
- Distribution transformers
- Potential transformers

Ratings

- 8.3 to 145 kV
- 0.5E to 200E Amperes

The power fuse is an inherently fast circuit-interrupting device. This must be taken into account when determining the required short-circuit interrupting rating of a fuse.

The boric acid power fuse will interrupt currents of short-circuit magnitude in approximately 1/2 cycle measured from the instant of short-circuit. During this 1/2 cycle, the short-circuit current may be much higher than the sustained rms short-circuit current of the system at that point. The fuse must be capable of safely interrupting this transient current that might exist at the instant the fuse operates.

In an alternating current circuit containing inductance, a sudden change in the AC current is accompanied by a transient DC component that is a function of the AC current before and after the change and the point on the cycle at that the change occurs. The decrement of the transient is a function of the inductance and resistance or losses of the circuit.

If a short is suddenly established on a circuit, the DC component can have a maximum peak value equal to the crest of the 60 cycle short-circuit current of the system. This maximum transient is obtained if the fault occurs at voltage zero. Due to the system losses, this DC component will die out to a low value in a few cycles. However, a fuse normally interrupts a short-circuit in 1/2 cycle, and this DC component of current must be taken into consideration in rating the fuse. If the decrement of DC component in this half cycle is neglected, the rms value of current for the totally asymmetrical condition would be 1.73 times the rms symmetrical value of the 60 cycle component.

Experience has shown that there is some decrement in this first half cycle and also that the current is limited somewhat by the arc drop in the fuse. For this reason, a ratio of 1.6 has been selected between the rms asymmetrical current the fuse must be designed to interrupt, and the rms short-circuit of the system on which the fuse is to be used. This instantaneous rms asymmetrical value of short-circuit current, which the fuse must be designed to interrupt, is often referred to as the rms symmetrical value including the DC component. The asymmetrical value is obtained by multiplying the symmetrical value by 1.6. The symmetrical value of short-circuit current on a three-phase system is determined by dividing the available three-phase, short-circuit kVA by the product of the system voltage and $1/\sqrt{3}$.

Instructions for DBA Type Fuse Units 8.3 kV to 145 kV

Installation of Replacement Fuses

DBA fuse units are available in two classifications, DBA-1 and DBA-2 and are used for utility-type applications from 8.3 kV through 145 kV.

Remove fuses from all three phases and replace with new or tested units. Fuses having been involved in a fault but not blown should be tested by resistance measurements to ascertain that they are suitable for continued service. Resistance limits are available on request.

Prior to installation, it is advisable to check the functioning of the mounting as follows:

1. Remove fuse fittings from hinge casting (see the figures on **Pages V14-T2-30** and **V14-T2-31**) and mount on a suitable fuse unit as shown in the figure on this page.
2. Check gauging distance "S" between center of guide pin in latch housing and bottom of socket in hinge casting as illustrated in the figures on **Pages V14-T2-30** and **V14-T2-31**. Dimension "S" must measure the same on both sides of the mounting. If dimension "S" is found to be incorrect, adjust it by using the clearances provided in the bolt holes (see the figures on **Pages V14-T2-30** and **V14-T2-31**).
3. Put the suitable fuse unit equipped with fittings in the mounting. Check operation of latch assembly by closing and opening the fuse as shown in the figures on **Pages V14-T2-30** and **V14-T2-31**).

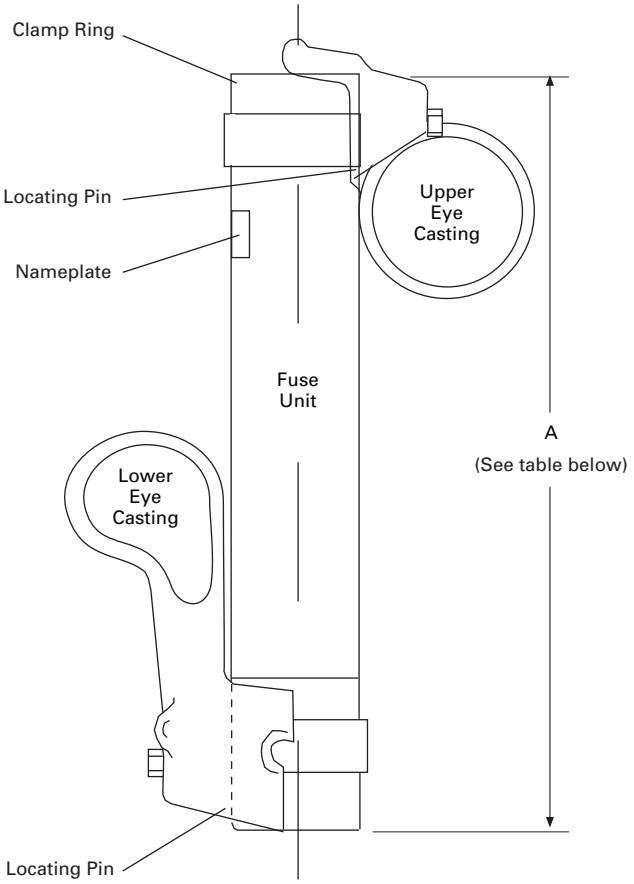
DBA-1 fuses up to 69 kV as well as DBA-2 fuses up to 46 kV can be lifted into the hinge casting by means of conventional all-purpose switch sticks. For lifting heavier fuses into the hinge, a switch stick about one foot shorter than the distance from ground level to the fuse hinge is recommended. This switch stick should be held approximately vertical as shown in the figures on **Pages V14-T2-30** and **V14-T2-31**. For the closing-in or disconnecting operation, a switch stick of at least four foot greater length should be employed. Insert the switch stick pin into the eye of the fuse fitting from the right-hand side and have it form an angle of at least 35˚ with the fuse.

Fuse should be closed in with a sharp thrust. A similar impact-like pull is required to open the fuse. After the latch contacts have parted, the fuse may be allowed to disengage itself from the switch stick and drop out in a normal manner.

Maintenance

General maintenance instructions are published in the IEEE Std. C-37.48™-1973. Inspection of the fuse mounting should include checking the gauge distance "S" (see the figures on **Pages V14-T2-30** and **V14-T2-31**) and the operation of the latch mechanism.

Fuse Unit With Fittings

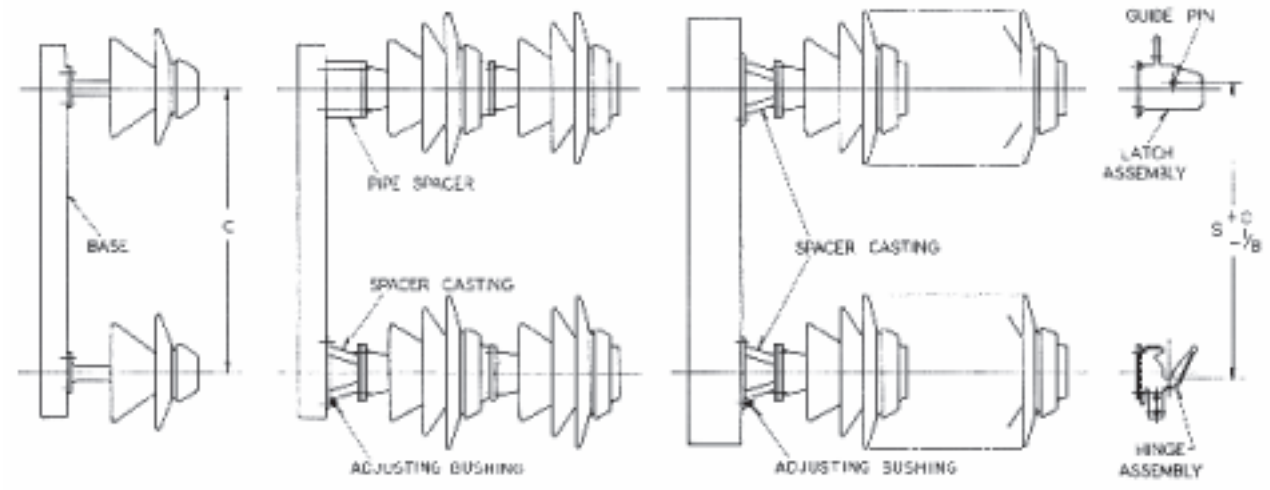


Dimensions in Inches (mm)

kV	DBA-1	DBA-2
8.3	13.5 (342.9)	—
15.5	17.0 (431.8)	—
25.5	21.5 (546.1)	—
38	28.5 (723.9)	28.13 (714.5)
48.3	34.0 (863.6)	33.63 (854.2)
69	43.88 (1,114.6)	43.63 (1,108.2)
92	—	52.0 (1,320.8)
121	—	62.0 (1,574.8)
145	—	72.0 (1,828.8)

Insulator Spacing

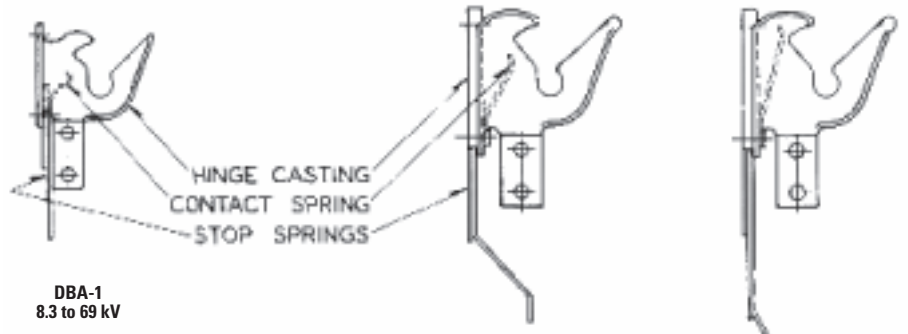
Approximate Dimensions in Inches (mm)



7.2 to 46 kV **69 kV** **92 to 138 kV**

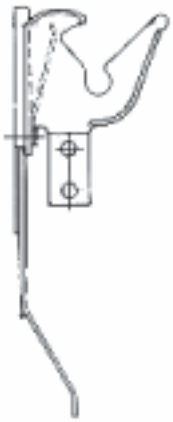
kV	Dimension C	Dimension S	Dimension C	Dimension S
	DBA-1		**DBA-2**	
7.2	13.63 (346.2)	15.25 (387.4)	—	—
15	17.13 (435.1)	18.75 (476.3)	—	—
23	21.63 (549.4)	23.25 (590.6)	—	—
34.5	28.63 (727.2)	30.25 (768.4)	27.88 (708.2)	—
46	34.13 (866.9)	35.75 (908.1)	33.38 (847.9)	—
69	44.00 (1117.6)	45.63 (1159.0)	43.38 (1101.9)	—
92	—	—	51.75 (1314.5)	—
115	—	—	61.75 (1568.5)	—
138	—	—	71.75 (1822.5)	—

Hinge Assembly



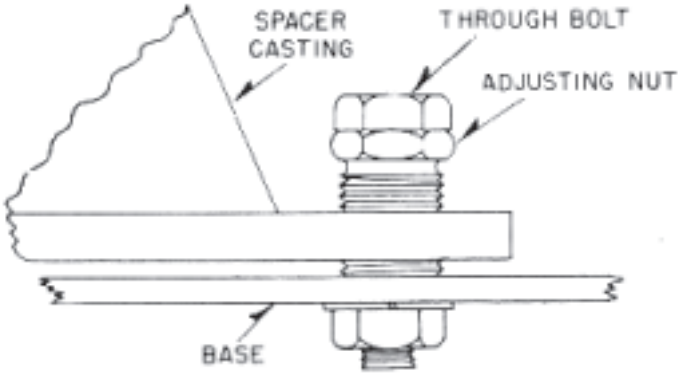
DBA-1
8.3 to 69 kV

DBA-2
38 to 72.5 kV



DBA-2
92 to 145 kV

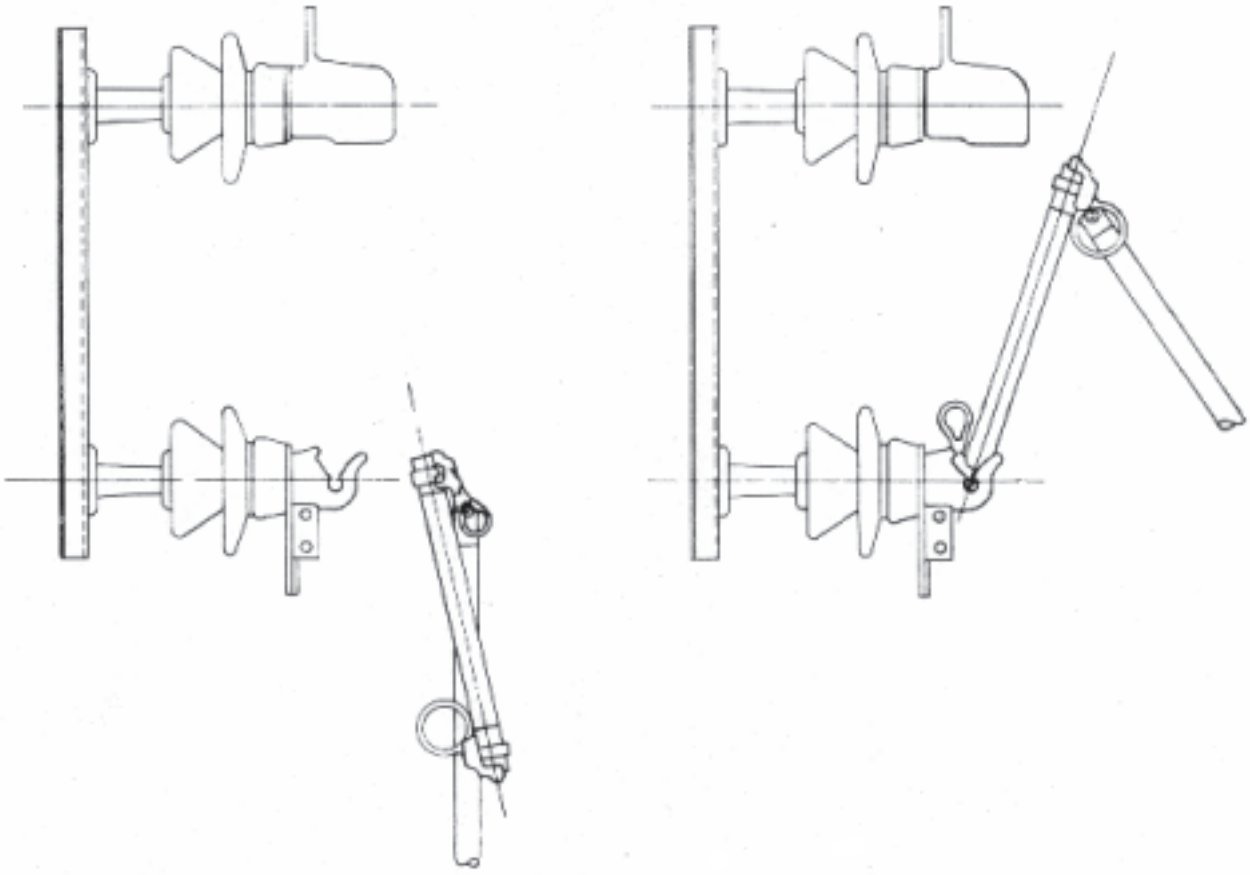
Spacer Adjustment



Procedure

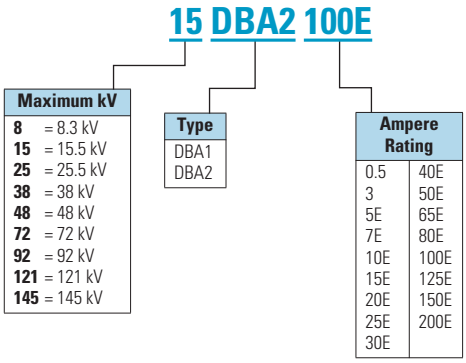
1. Loosen all four through bolts.
2. Turn adjusting nut the desired amount.
3. Retighten all four through bolts.

Switch Stick Operation



Catalog Number Selection

DBA Fuse Units



Interrupting Ratings

DBA Fuse Interrupting Ratings

Fuse Unit Maximum Voltage Rating kV	Maximum System Voltage kV	DBA-1 rms Symmetrical kA	DBA-2 rms Symmetrical kA
8.3	2.75	6.3	—
—	5.5	6.3	—
—	8.3	6.3	—
15.5	15.5	6.3	—
25.8	25.8	6.3	12.5
38	38	5.0	12.5
48	48	4.0	12.5
72	72	—	10.0
92	92	—	6.3
121	121	—	5.0
145	145	—	4.0

Product Selection

DBA-1 Type Expulsion Fuse Units

Voltage (kV)					Performance Curves	
Nominal	Maximum	Ampere Rating	Catalog Number	Approximate Shipping Weight Lbs (kg)	Minimum Melting	Total Clearing
7.2	8.3	0.5	**8DBA1-0.5**	1.5 (0.7)	**TC45935101**	**TC45935201**
7.2	8.3	3	**8DBA1-3**	1.5 (0.7)	**TC45935101**	**TC45935201**
7.2	8.3	5E	**8DBA1-5E**	1.5 (0.7)	**TC45935101**	**TC45935201**
7.2	8.3	7E	**8DBA1-7E**	1.5 (0.7)	**TC45935101**	**TC45935201**
7.2	8.3	10E	**8DBA1-10E**	1.5 (0.7)	**TC45935101**	**TC45935201**
7.2	8.3	15E	**8DBA1-15E**	1.5 (0.7)	**TC45935101**	**TC45935201**
7.2	8.3	20E	**8DBA1-20E**	1.5 (0.7)	**TC45935101**	**TC45935201**
7.2	8.3	25E	**8DBA1-25E**	1.5 (0.7)	**TC45935101**	**TC45935201**
7.2	8.3	30E	**8DBA1-30E**	1.5 (0.7)	**TC45935101**	**TC45935201**
7.2	8.3	40E	**8DBA1-40E**	1.5 (0.7)	**TC45935101**	**TC45935201**
7.2	8.3	50E	**8DBA1-50E**	1.5 (0.7)	**TC45935101**	**TC45935201**
7.2	8.3	65E	**8DBA1-65E**	1.5 (0.7)	**TC45935101**	**TC45935201**
7.2	8.3	80E	**8DBA1-80E**	1.5 (0.7)	**TC45935101**	**TC45935201**
7.2	8.3	100E	**8DBA1-100E**	1.5 (0.7)	**TC45935101**	**TC45935201**
7.2	8.3	125E	**8DBA1-125E**	1.5 (0.7)	**TC45935101**	**TC45935201**
7.2	8.3	150E	**8DBA1-150E**	1.5 (0.7)	**TC45935101**	**TC45935201**
7.2	8.3	200E	**8DBA1-200E**	1.5 (0.7)	**TC45935101**	**TC45935201**
14.4	15.5	0.5	**15DBA1-0.5**	2.1 (1.0)	**TC45935101**	**TC45935201**
14.4	15.5	3	**15DBA1-3**	2.1 (1.0)	**TC45935101**	**TC45935201**
14.4	15.5	5E	**15DBA1-5E**	2.1 (1.0)	**TC45935101**	**TC45935201**
14.4	15.5	7E	**15DBA1-7E**	2.1 (1.0)	**TC45935101**	**TC45935201**
14.4	15.5	10E	**15DBA1-10E**	2.1 (1.0)	**TC45935101**	**TC45935201**
14.4	15.5	15E	**15DBA1-15E**	2.1 (1.0)	**TC45935101**	**TC45935201**
14.4	15.5	20E	**15DBA1-20E**	2.1 (1.0)	**TC45935101**	**TC45935201**
14.4	15.5	25E	**15DBA1-25E**	2.1 (1.0)	**TC45935101**	**TC45935201**
14.4	15.5	30E	**15DBA1-30E**	2.1 (1.0)	**TC45935101**	**TC45935201**
14.4	15.5	40E	**15DBA1-40E**	2.1 (1.0)	**TC45935101**	**TC45935201**
14.4	15.5	50E	**15DBA1-50E**	2.1 (1.0)	**TC45935101**	**TC45935201**
14.4	15.5	65E	**15DBA1-65E**	2.1 (1.0)	**TC45935101**	**TC45935201**
14.4	15.5	80E	**15DBA1-80E**	2.1 (1.0)	**TC45935101**	**TC45935201**
14.4	15.5	100E	**15DBA1-100E**	2.1 (1.0)	**TC45935101**	**TC45935201**
14.4	15.5	125E	**15DBA1-125E**	2.1 (1.0)	**TC45935101**	**TC45935201**
14.4	15.5	150E	**15DBA1-150E**	2.1 (1.0)	**TC45935101**	**TC45935201**
14.4	15.5	200E	**15DBA1-200E**	2.1 (1.0)	**TC45935101**	**TC45935201**

DBA-1 Type Expulsion Fuse Units, continued

Voltage (kV)					Performance Curves	
Nominal	Maximum	Ampere Rating	Catalog Number	Approximate Shipping Weight Lbs (kg)	Minimum Melting	Total Clearing
23	25.5	0.5	**25DBA1-0.5**	3.1 (1.4)	**TC45935101**	**TC45935201**
23	25.5	3	**25DBA1-3**	3.1 (1.4)	**TC45935101**	**TC45935201**
23	25.5	5E	**25DBA1-5E**	3.1 (1.4)	**TC45935101**	**TC45935201**
23	25.5	7E	**25DBA1-7E**	3.1 (1.4)	**TC45935101**	**TC45935201**
23	25.5	10E	**25DBA1-10E**	3.1 (1.4)	**TC45935101**	**TC45935201**
23	25.5	15E	**25DBA1-15E**	3.1 (1.4)	**TC45935101**	**TC45935201**
23	25.5	20E	**25DBA1-20E**	3.1 (1.4)	**TC45935101**	**TC45935201**
23	25.5	25E	**25DBA1-25E**	3.1 (1.4)	**TC45935101**	**TC45935201**
23	25.5	30E	**25DBA1-30E**	3.1 (1.4)	**TC45935101**	**TC45935201**
23	25.5	40E	**25DBA1-40E**	3.1 (1.4)	**TC45935101**	**TC45935201**
23	25.5	50E	**25DBA1-50E**	3.1 (1.4)	**TC45935101**	**TC45935201**
23	25.5	65E	**25DBA1-65E**	3.1 (1.4)	**TC45935101**	**TC45935201**
23	25.5	80E	**25DBA1-80E**	3.1 (1.4)	**TC45935101**	**TC45935201**
23	25.5	100E	**25DBA1-100E**	3.1 (1.4)	**TC45935101**	**TC45935201**
23	25.5	125E	**25DBA1-125E**	3.1 (1.4)	**TC45935101**	**TC45935201**
23	25.5	150E	**25DBA1-150E**	3.1 (1.4)	**TC45935101**	**TC45935201**
23	25.5	200E	**25DBA1-200E**	3.1 (1.4)	**TC45935101**	**TC45935201**
34.5	38	0.5	**38DBA1-0.5**	4.2 (1.9)	**TC45935101**	**TC45935201**
34.5	38	3	**38DBA1-3**	4.2 (1.9)	**TC45935101**	**TC45935201**
34.5	38	5E	**38DBA1-5E**	4.2 (1.9)	**TC45935101**	**TC45935201**
34.5	38	7E	**38DBA1-7E**	4.2 (1.9)	**TC45935101**	**TC45935201**
34.5	38	10E	**38DBA1-10E**	4.2 (1.9)	**TC45935101**	**TC45935201**
34.5	38	15E	**38DBA1-15E**	4.2 (1.9)	**TC45935101**	**TC45935201**
34.5	38	20E	**38DBA1-20E**	4.2 (1.9)	**TC45935101**	**TC45935201**
34.5	38	25E	**38DBA1-25E**	4.2 (1.9)	**TC45935101**	**TC45935201**
34.5	38	30E	**38DBA1-30E**	4.2 (1.9)	**TC45935101**	**TC45935201**
34.5	38	40E	**38DBA1-40E**	4.2 (1.9)	**TC45935101**	**TC45935201**
34.5	38	50E	**38DBA1-50E**	4.2 (1.9)	**TC45935101**	**TC45935201**
34.5	38	65E	**38DBA1-65E**	4.2 (1.9)	**TC45935101**	**TC45935201**
34.5	38	80E	**38DBA1-80E**	4.2 (1.9)	**TC45935101**	**TC45935201**
34.5	38	100E	**38DBA1-100E**	4.2 (1.9)	**TC45935101**	**TC45935201**
34.5	38	125E	**38DBA1-125E**	4.2 (1.9)	**TC45935101**	**TC45935201**
34.5	38	150E	**38DBA1-150E**	4.2 (1.9)	**TC45935101**	**TC45935201**
34.5	38	200E	**38DBA1-200E**	4.2 (1.9)	**TC45935101**	**TC45935201**

DBA-1 Type Expulsion Fuse Units, continued

Voltage (kV)					Performance Curves	
Nominal	Maximum	Ampere Rating	Catalog Number	Approximate Shipping Weight Lbs (kg)	Minimum Melting	Total Clearing
46	48	0.5	**48DBA1-0.5**	6.5 (3.0)	**TC45935101**	**TC45935301**
46	48	3	**48DBA1-3**	6.5 (3.0)	**TC45935101**	**TC45935301**
46	48	5E	**48DBA1-5E**	6.5 (3.0)	**TC45935101**	**TC45935301**
46	48	7E	**48DBA1-7E**	6.5 (3.0)	**TC45935101**	**TC45935301**
46	48	10E	**48DBA1-10E**	6.5 (3.0)	**TC45935101**	**TC45935301**
46	48	15E	**48DBA1-15E**	6.5 (3.0)	**TC45935101**	**TC45935301**
46	48	20E	**48DBA1-20E**	6.5 (3.0)	**TC45935101**	**TC45935301**
46	48	25E	**48DBA1-25E**	6.5 (3.0)	**TC45935101**	**TC45935301**
46	48	30E	**48DBA1-30E**	6.5 (3.0)	**TC45935101**	**TC45935301**
46	48	40E	**48DBA1-40E**	6.5 (3.0)	**TC45935101**	**TC45935301**
46	48	50E	**48DBA1-50E**	6.5 (3.0)	**TC45935101**	**TC45935301**
46	48	65E	**48DBA1-65E**	6.5 (3.0)	**TC45935101**	**TC45935301**
46	48	80E	**48DBA1-80E**	6.5 (3.0)	**TC45935101**	**TC45935301**
46	48	100E	**48DBA1-100E**	6.5 (3.0)	**TC45935101**	**TC45935301**
46	48	125E	**48DBA1-125E**	6.5 (3.0)	**TC45935101**	**TC45935301**
46	48	150E	**48DBA1-150E**	6.5 (3.0)	**TC45935101**	**TC45935301**
46	48	200E	**48DBA1-200E**	6.5 (3.0)	**TC45935101**	**TC45935301**
69	72	0.5	**72DBA1-0.5**	7.1 (3.25)	**TC45935101**	**TC45935301**
69	72	3	**72DBA1-3**	7.1 (3.25)	**TC45935101**	**TC45935301**
69	72	5E	**72DBA1-5E**	7.1 (3.25)	**TC45935101**	**TC45935301**
69	72	7E	**72DBA1-7E**	7.1 (3.25)	**TC45935101**	**TC45935301**
69	72	10E	**72DBA1-10E**	7.1 (3.25)	**TC45935101**	**TC45935301**
69	72	15E	**72DBA1-15E**	7.1 (3.25)	**TC45935101**	**TC45935301**
69	72	20E	**72DBA1-20E**	7.1 (3.25)	**TC45935101**	**TC45935301**
69	72	25E	**72DBA1-25E**	7.1 (3.25)	**TC45935101**	**TC45935301**
69	72	30E	**72DBA1-30E**	7.1 (3.25)	**TC45935101**	**TC45935301**
69	72	40E	**72DBA1-40E**	7.1 (3.25)	**TC45935101**	**TC45935301**
69	72	50E	**72DBA1-50E**	7.1 (3.25)	**TC45935101**	**TC45935301**
69	72	65E	**72DBA1-65E**	7.1 (3.25)	**TC45935101**	**TC45935301**
69	72	80E	**72DBA1-80E**	7.1 (3.25)	**TC45935101**	**TC45935301**
69	72	100E	**72DBA1-100E**	7.1 (3.25)	**TC45935101**	**TC45935301**
69	72	125E	**72DBA1-125E**	7.1 (3.25)	**TC45935101**	**TC45935301**
69	72	150E	**72DBA1-150E**	7.1 (3.25)	**TC45935101**	**TC45935301**
69	72	200E	**72DBA1-200E**	7.1 (3.25)	**TC45935101**	**TC45935301**

DBA-2 Type Expulsion Fuse Units

Voltage (kV)					Performance Curves	
Nominal	Maximum	Ampere Rating	Catalog Number	Approximate Shipping Weight Lbs (kg)	Minimum Melting	Total Clearing
34.5	38	0.5	**38DBA2-.5**	10 (4.6)	**TC45935101**	**TC45935301**
34.5	38	3	**38DBA2-3**	10 (4.6)	**TC45935101**	**TC45935301**
34.5	38	5E	**38DBA2-5E**	10 (4.6)	**TC45935101**	**TC45935301**
34.5	38	7E	**38DBA2-7E**	10 (4.6)	**TC45935101**	**TC45935301**
34.5	38	10E	**38DBA2-10E**	10 (4.6)	**TC45935101**	**TC45935301**
34.5	38	15E	**38DBA2-15E**	10 (4.6)	**TC45935101**	**TC45935301**
34.5	38	20E	**38DBA2-20E**	10 (4.6)	**TC45935101**	**TC45935301**
34.5	38	25E	**38DBA2-25E**	10 (4.6)	**TC45935101**	**TC45935301**
34.5	38	30E	**38DBA2-30E**	10 (4.6)	**TC45935101**	**TC45935301**
34.5	38	40E	**38DBA2-40E**	10 (4.6)	**TC45935101**	**TC45935301**
34.5	38	50E	**38DBA2-50E**	10 (4.6)	**TC45935101**	**TC45935301**
34.5	38	65E	**38DBA2-65E**	10 (4.6)	**TC45935101**	**TC45935301**
34.5	38	80E	**38DBA2-780E**	10 (4.6)	**TC45935101**	**TC45935301**
34.5	38	100E	**38DBA2-100E**	10 (4.6)	**TC45935101**	**TC45935301**
34.5	38	125E	**38DBA2-125E**	10 (4.6)	**TC45935101**	**TC45935301**
34.5	38	150E	**38DBA2-150E**	10 (4.6)	**TC45935101**	**TC45935301**
34.5	38	200E	**38DBA2-200E**	10 (4.6)	**TC45935101**	**TC45935301**
46	48	0.5	**48DBA2-.5**	12 (5.5)	**TC45935101**	**TC45935301**
46	48	3	**48DBA2-3**	12 (5.5)	**TC45935101**	**TC45935301**
46	48	5E	**48DBA2-5E**	12 (5.5)	**TC45935101**	**TC45935301**
46	48	7E	**48DBA2-7E**	12 (5.5)	**TC45935101**	**TC45935301**
46	48	10E	**48DBA2-10E**	12 (5.5)	**TC45935101**	**TC45935301**
46	48	15E	**48DBA2-15E**	12 (5.5)	**TC45935101**	**TC45935301**
46	48	20E	**48DBA2-20E**	12 (5.5)	**TC45935101**	**TC45935301**
46	48	25E	**48DBA2-25E**	12 (5.5)	**TC45935101**	**TC45935301**
46	48	30E	**48DBA2-30E**	12 (5.5)	**TC45935101**	**TC45935301**
46	48	40E	**48DBA2-40E**	12 (5.5)	**TC45935101**	**TC45935301**
46	48	50E	**48DBA2-50E**	12 (5.5)	**TC45935101**	**TC45935301**
46	48	65E	**48DBA2-65E**	12 (5.5)	**TC45935101**	**TC45935301**
46	48	80E	**48DBA2-780E**	12 (5.5)	**TC45935101**	**TC45935301**
46	48	100E	**48DBA2-100E**	12 (5.5)	**TC45935101**	**TC45935301**
46	48	125E	**48DBA2-125E**	12 (5.5)	**TC45935101**	**TC45935301**
46	48	150E	**48DBA2-150E**	12 (5.5)	**TC45935101**	**TC45935301**
46	48	200E	**48DBA2-200E**	12 (5.5)	**TC45935101**	**TC45935301**