

Drawout Expulsion Fuse Links

Type DO-III Fuse Links, Oil Immersed

PTAP-AFS928

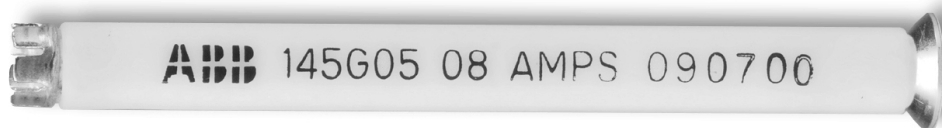
Technical Guide



100 Amp Current Sensing Fuse Style 1B11143G16



50 Amp Dual Sensing Fuse Style 1B11144G12



8 Amp Dual Element Fuse Style 1B11145G05

General Description

The DO-III Expulsion Fuse Link is an oil immersed, expulsion type, fuse assembly for use in the ABB DO-III draw out load break expulsion fuse holder or equivalent. It is designed for use with single and three phase pad-mounted transformers filled with transformer oil or other approved fluid and is designed to protect the distribution system in the event of an internal transformer fault, secondary fault, or severe overload. It must be used in series with a current limiting fuse or isolation Link.

Application Information

Multiple Ratings

DO-III Expulsion Fuses are manufactured in Current Sensing, Dual Sensing, and Dual Element types of fuses per Table 1. Current Sensing Fuse Links sense secondary faults, extreme overload currents and transformer faults, while the Dual Sensing and Dual Element Fuse Links additionally detect excessive transformer fluid temperature to keep damage caused by extreme temperature environments and long-term overloads from occurring.

Table 1 DO-III Expulsion Fuse Links

Current Sensing		Dual Sensing		Dual Element	
Fuse Style	I	Fuse Style	I	Fuse Style	I
1B11143G04	6	1B11144G03	3	1B11145G03	5
1B11143G06	10	1B11144G05	8	1B11145G04	6
1B11143G08	15	1B11144G08	15	1B11145G05	8
1B11143G10	25	1B11144G10	25	1B11145G06	12
1B11143G12	40	1B11144G12	50	1B11145G07	15
1B11143G14	65	1B11144G14	65	1B11145G09	25
1B11143G16	100			1B11145G11	40
1B11143G17	140			1B11145G12	50

See TCC Curves 1C11102 for min. melt current sensing
 See TCC Curves 1C11103 for max clear current sensing
 See TCC Curves 1C11104 for min. melt dual sensing
 See TCC Curves 1C11105 for max clear dual sensing
 See TCC Curves 1C11106 for min. melt dual element
 See TCC Curves 1C11107 for max clear dual element

Fuse Curve Selection

There are two methods that can be used to determine the correct DO-III Expulsion Fuse Link that will properly coordinate with other protective devices in the system:

The first method is to use the time versus current characteristics curves (TCC Curves) of the DO-III Expulsion Fuse Link and the TCC Curves of related system devices and confirm that the DO-III Expulsion Fuse Link curve lies between its nearest upstream and downstream device curves.

The other method is to use Tables 2 through 7. Select the proper fuse link based on the kVA and primary voltage of the transformer to be protected. Use Tables 2 through 4 for single phase and Tables 5 through 7 for three phase transformer applications.

Single Phase Transformer Applications

Table 2 Current Sensing Fuse Link ^a

kVA	Primary Voltage in kV										
	2.4	4.16	4.8	7.2	7.62	8.32	12.0	12.47	13.2	13.8	14.4
10	06 ^b	04 ^b	04 ^b	04 ^b	04 ^b	04 ^b	04 ^b	04 ^b	04 ^b	04 ^b	04 ^b
15	08 ^b	06 ^b	06 ^b	04 ^b	04 ^b	04 ^b	04 ^b	04 ^b	04 ^b	04 ^b	04 ^b
25	10 ^b	08 ^b	06	06 ^b	04 ^b	04 ^b	04 ^b	04 ^b	04 ^b	04 ^b	04 ^b
37.5	10	08	08	06	06	06	06 ^b	06 ^b	04 ^b	04 ^b	04 ^b
50	12	10	10 ^b	08 ^b	08 ^b	08 ^b	06 ^b	06 ^b	06 ^b	06 ^b	06 ^b
75	14 ^b	12 ^b	10	10 ^b	08 ^b	08 ^b	08 ^b	08 ^b	08 ^b	06	06
100	14	12	12	10	10	10	08	08	08	08	08 ^b
167	17 ^b	14 ^b	14 ^b	12	12	12	10	10	10	10	10
250	-	16	16 ^b	14 ^b	14 ^b	14 ^b	12	12	12	12 ^b	12 ^b
333	-	17 ^b	17 ^b	16 ^b	14	14 ^b	14 ^b	12	12	12	12
500	-	-	-	17 ^b	17 ^b	16	14	14 ^b	14 ^b	14 ^b	14 ^b

Table 3 Dual Sensing Fuse Link ^c

kVA	Primary Voltage in kV										
	2.4	4.16	4.8	7.2	7.62	8.32	12.0	12.47	13.2	13.8	14.4
5	03	03	03	03	03	03	03	03	03	03	03
10	05	05	03	03	03	03	03	03	03	03	03
15	08	05	05	03	03	03	03	03	03	03	03
25	10	08	08	05	05	05	03	03	03	03	03
37.5	12	10	08	08	08	08	05	05	05	05	05
50	12	10	10	08	08	08	05	05	05	05	05
75	14	12	12	10	10	10	08	08	08	08	08
100	14	12	12	10	10	10	08	08	08	08	08
167	-	14	14	12	12	12	10	10	10	10	10
250	-	-	-	14	14	14	12	12	12	12	12
333	-	-	-	14 ^d	14	14	12	12	12	12	12
500	-	-	-	-	-	-	14	14	14	14	14

Table 4 Dual Element Fuse Link ^{c, e}

kVA	Primary Voltage in kV										
	2.4	4.16	4.8	7.2	7.62	8.32	12.0	12.47	13.2	13.8	14.4
5	03	03	03	03	03	03	03	03	03	03	03
10	05	04	04	03	03	03	03	03	03	03	03
15	07	05	05	03	03	03	03	03	03	03	03
25	09	06	06	04	04	04	03	03	03	03	03
37.5	11	09	08	06	06	06	05	05	04	04	04
50	12	09	09	07	07	07	06	06	05	05	05
75	-	12	11	09	09	09	07	06	06	06	06
100	-	12	12	09	09	09	09	09	07	07	07
167	-	-	-	12	12	12	11	11	09	09	09
250	-	-	-	-	-	-	12	12	11	11	11
333	-	-	-	-	-	-	12	12	12	12	12

Single Phase Application Notes

- Fuse recommendations are based on fuse melting at 3 to 4 times transformer rated current at 5 minutes. Recommended fuses meet inrush requirement of 12 times transformer full load current for 0.1 second.
- Recommended Fuses provide more than 4 times Transformer rated current for 5 minutes.
- Recommendations are based on 200% transformer loading for 2 hours, 160% loading for 7 hours and thermal characteristics of typical ABB Transformers. Recommended fuses meet inrush requirement of 12 times transformer full load current for 0.1 second.
- Recommended fuse will result in some loss of overload capacity.
- ABB DO-III Expulsion Fuse Links 1B11145G09-G12 should not be used at voltages greater than 15500 V for delta configuration.

Three Phase Transformer Applications

Table 5 Current Sensing Fuse Link ^a

kVA	Primary Voltage in kV									
	2.4	4.16	4.8	8.32	12.0, 12.47	13.2	13.8, 14.4	20.8 ^{c,d}	22.9 ^{c,d}	24.94 ^c
45	10 ^b	08 ^b	06	06 ^b	04 ^b	04 ^b	04 ^b	04 ^b	04 ^b	04 ^b
75	12 ^b	10 ^b	08	06	06 ^b	06 ^b	06 ^b	04 ^b	04 ^b	04
112.5	12	10	10	08	06	06	06	06 ^b	04 ^b	04
150	14 ^b	12	12 ^b	10 ^b	08 ^b	08 ^b	08 ^b	06 ^b	06 ^b	06
225	16 ^b	14 ^b	12	10	10 ^b	10 ^b	08	08 ^b	08 ^b	06
300	17 ^b	14	14 ^b	12	10	10	10	08	08	08
500	-	17 ^b	16	14 ^b	12	12	12	10	10	10
750	-	-	17	16 ^b	14 ^b	14 ^b	14 ^b	12	12	12
1000	-	-	-	17 ^b	16 ^b	14	14	14 ^b	12	12
1500	-	-	-	-	17 ^b	17 ^b	16	14	14 ^b	14 ^b
2000	-	-	-	-	-	17	17	16 ^b	16 ^b	16 ^b
2500	-	-	-	-	-	-	-	17 ^b	17 ^b	16

Table 6 Dual Sensing Fuse Link ^f

kVA	Primary Voltage in kV									
	2.4	4.16	4.8	8.32	12.0, 12.47	13.2	13.8, 14.4	20.8 ^{c,d}	22.9 ^{c,d}	24.94 ^d
45	10	08	08	05	03	03	03	03	03	03
75	12	10	10	08	05	05	05	03	03	03
112.5	14	12	10	08	08	08	08	05	05	05
150	14	12	12	10	08	08	08	05	05	05
225	-	14	14	12	10	10	10	08	08	08
300	-	14	14	12	10	10	10	08	08	08
500	-	-	-	14	12	12	12	10	10	10
750	-	-	-	-	14	14	14	12 ^e	12	12
1000	-	-	-	-	14 ^e	14 ^e	14 ^e	12 ^e	12	12
1500	-	-	-	-	-	-	-	14	14	14

Table 7 Dual Element Fuse Link ^f

kVA	Primary Voltage in kV									
	2.4	4.16	4.8	8.32	12.0, 12.47	13.2	13.8, 14.4	20.8 ^{c,d}	22.9 ^{c,d}	24.94 ^d
45	09	07	07	04	03	03	03	03	03	03
75	12	09	09	06	04	04	04	03	03	03
112.5	-	11	09	07	06	06	06	05	04	04
150	-	12	12	09	07	07	07	06	05	05
225	-	-	-	11	09	09	09	07	06	06
300	-	-	-	12	09	09	09	09	07	07
500	-	-	-	-	12	12	12	11	09	09
750	-	-	-	-	-	-	-	12	11	11
1000	-	-	-	-	-	-	-	-	12	12

Three Phase Application Notes

- Fuse recommendations are based on fuse melting at 3 to 4 times transformer rated current at 5 minutes. Recommended fuses meet inrush requirement of 12 times transformer full load current for 0.1 second.
- Recommended Fuses provide more than 4 times Transformer rated current for 5 minutes.
- ABB DO-III Expulsion Fuse Links alone should not be used at voltages greater than 17100 V for delta configuration or 24940 gnd Y/14400. For application through 23 kV delta or 34500 gnd Y/19920 a 23 kV rated current limiting fuse is recommended in series with the DO-III Expulsion Fuse Link.
- Recommended fuse is limited to gnd Y /gnd Y transformer with less than 50% delta loading.
- Recommended fuse will result in some loss of overload capacity.
- Recommendations are based on 200% transformer loading for 2 hours, 160% loading for 7 hours and thermal characteristics of typical ABB Transformers. Recommended fuses meet inrush requirement of 12 times transformer full load current for 0.1 second. ABB DO-III Expulsion Fuses 1B11145G09 through G12 should not be used at voltages greater than 15500V for delta configuration. ABB DO_III Expulsion Fuses 1B11145G03 through G07 alone should not be used at voltages greater than 17100 V for delta configuration or 24940 gndY/14400.



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Type DO-III Fuse Links, Oil Immersed Drawout Expulsion Fuse Links

PTAP-AFS928

Installation Information

Removing the Existing Fuse

1. **WARNING: VENT THE TRANSFORMER BEFORE OPERATING THE BAYONET FUSE HOLDER. FAILURE TO DO SO CAN CAUSE SEVERE INJURY, DEATH OR PROPERTY DAMAGE.**

Vent the transformer to atmosphere by manually operating the pressure relief device normally provided, or by removing the vent plug. The transformer should be vented before it is energized if it has been pressurized for leak test or if the unit has been opened and resealed.

2. Attach Hot-Line tool to handle eye, Stand to one side and unlock the handle. (See Figure 1)

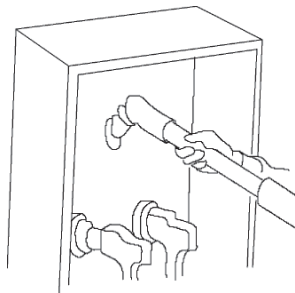


Figure 1

3. Push down and rotate the handle 90° clockwise in the housing to break any adhesion between the gasket and the housing. (See Figure 2)

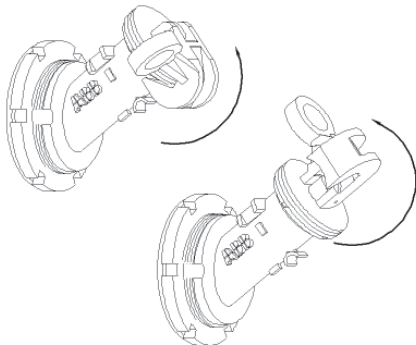


Figure 2

4. Quickly pull the fuseholder out approximately 6 inches to open the circuit. Wait a few seconds for oil to drain back into the tank, then completely withdraw fuse holder. (See Figure 3)

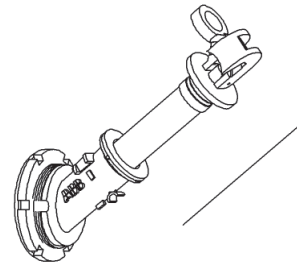


Figure 3

5. Use a 3/4 inch and 1/2 inch wrench to remove the end plug from the fuse cartridge. (See Figure 4)

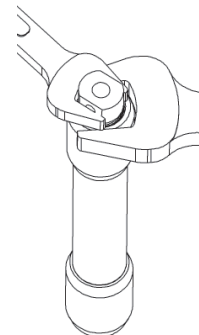


Figure 4

6. Use a flat head screwdriver or other tool to straighten out the castle end of the fuse so that the fuse may be removed.
7. Use a 3/4 inch wrench to remove the fuse cartridge from the puller assembly and remove and discard the damaged fuse. (See Figure 5)

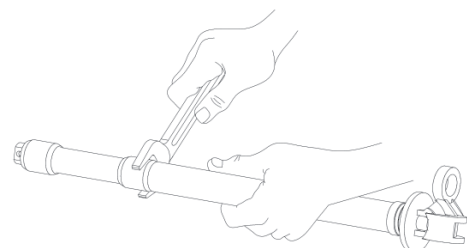


Figure 5

NOTE: FOLLOW ALL FEDERAL, STATE AND LOCAL LAWS AND REGULATIONS WITH REGARD TO DISPOSING OF ALL MATERIAL INCLUDING FUSES.

8. WARNING: INSURE THAT THE CORRECT FUSE IS BEING INSTALLED IN THE FUSE HOLDER. FAILURE TO DO SO CAN RESULT IN SEVERE INJURY, DEATH OR PROPERTY DAMAGE

Place the Fuse in the fuse holder and thread the fuseholder onto the puller assembly with the flared end toward the puller assembly. Tighten to 50-70 inch pounds.

9. Thread the end plug against the fuse's castle end of the fuseholder and tighten to 50-70 inch pounds. (See Figure 6)

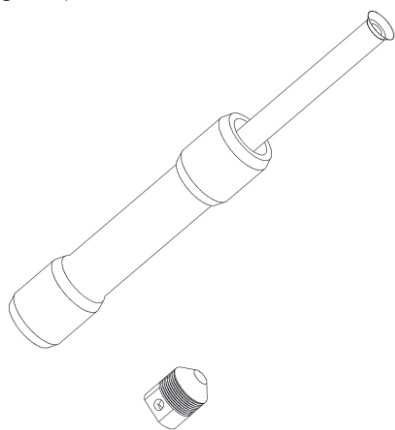


Figure 6

Remove the end plug and ensure that the castle ends have flared evenly.

Replace the end plug and retighten to 50-70 inch pounds.

10. To Reinstall Fuseholder:

Attach hot-line tool to handle eye, stand to one side and place the fuse holder end just inside the housing.

Rapidly push the fuseholder in until dust cap seats against the housing (See Figure 7.)

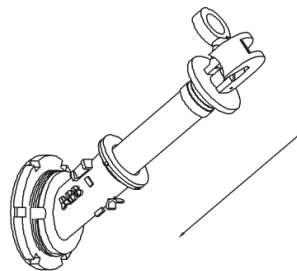


Figure 7

Push down and rotate the locking handle, hooking it over the shoulder of the housing.



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DESCRIPTION
DO-III CURRENT SENSING FUSE
DO-III DUAL SENSING FUSE
DO-III DUAL ELEMENT FUSE

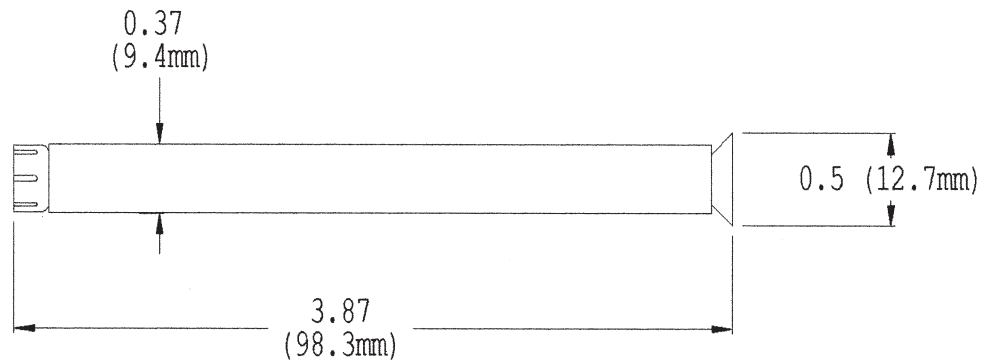


ABB Inc.		
Components & Insulation Material		
TITLE DO-III FUSE HOLDER EXPULSION FUSE OUTLINE		
DIMENSION SHEET:	PAGE:	REVISION:
44-885	13	02
DIMENSIONS ARE IN INCHES.		