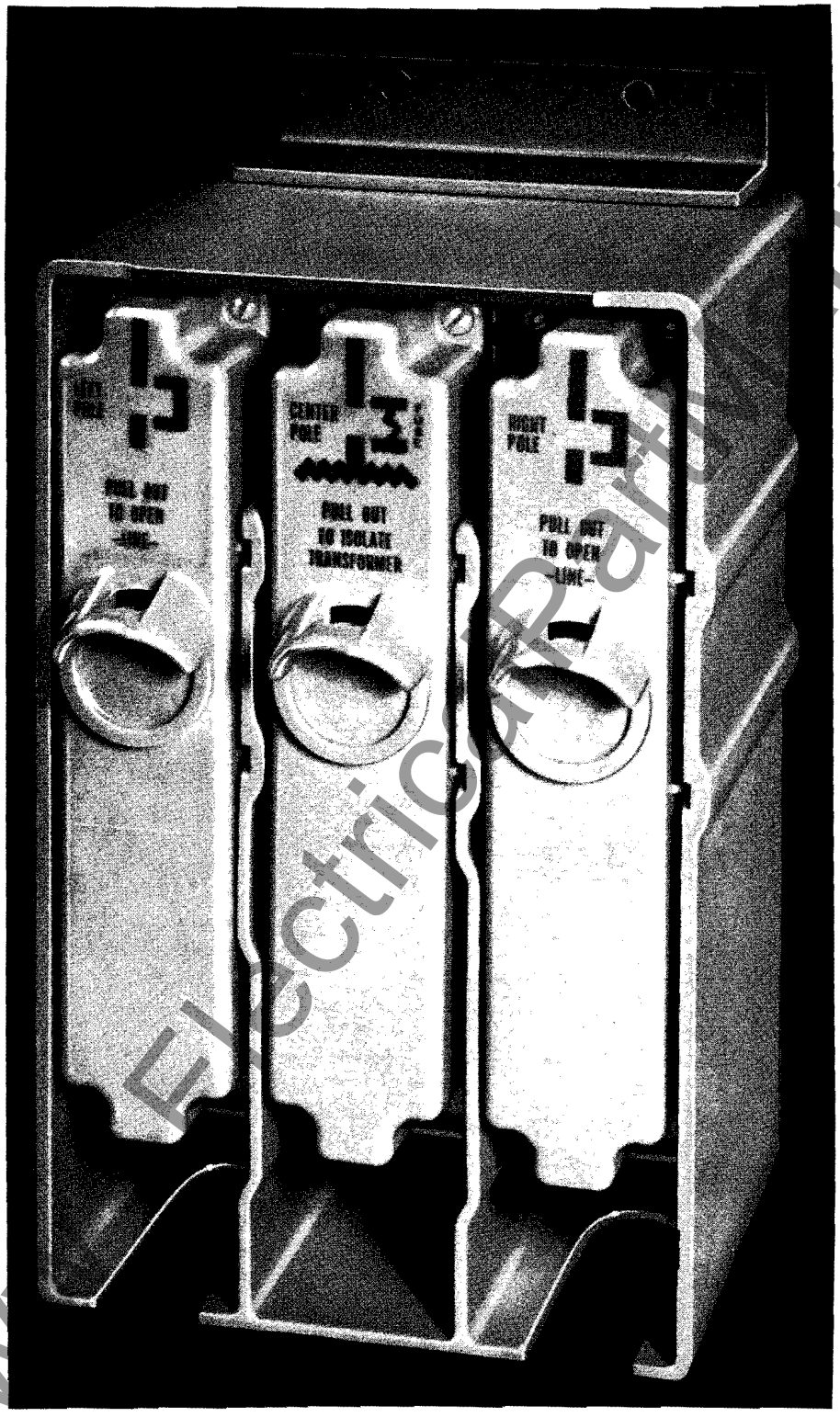
Westinghouse

Type EFD Switch

For Pad Mounted Distribution Transformers



The Westinghouse type EFD load-break switch is specifically designed to meet the full switching requirements of underground distribution systems utilizing pad-mounted transformers.

To fulfill these requirements, the EFD incorporates two major benefits in its design – switching flexibility and safety. These benefits are made possible by a compact, "dead-front" type construction that enables the EFD switch to be externally mounted on the transformer.

The EFD is available on single phase or three phase pad mounted transformers. It is applicable on 15 kv class grounded wye systems for either loop-feed or radial-feed distribution.

Features

Dead-Front Type Construction
Simplified Operation
Externally Fusible
Load Break
Compact Construction
Schematic Diagram Decals
Single Phase or Three Phase Application
Loop-Feed or Radial-Feed Application
Current Limiting Fusing

Construction

The EFD switch poles, housing, and all structural parts are high pressure molded of glass polyester, a thermosetting material, which affords the switch greater structural and dimensional stability. Glass polyester incorporates high dielectric strength, track-resistance, and durability. Nylon screws are used in assembly of the switch poles.

All current carrying parts are made of copper with both stationary and moving contacts silver plated to meet ASA temperature rise requirements.

May, 1967
Supersedes DB 46-356 dated May, 1966
E, D, C/2062/DB

Westinghouse

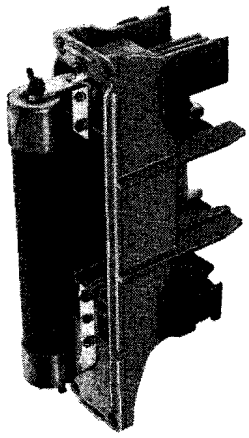
Fuse Protection

A sealed, current-limiting, silver-sand fuse, is normally provided for the transformer-connecting pole.

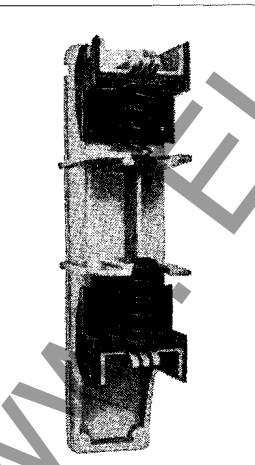
The fuse is mounted within the housing of the center switch pole so that the switch can be re-fused safely, away from the high voltage contacts.

The EFD fuse is a full-range clearing fuse, capable of safely interrupting up to 25,000 amps symmetrical, 40,000 amps asymmetrical for all voltage ratings. The sealed, EFD fuse does not expel gases or create noise, even during the interruption of high fault currents.

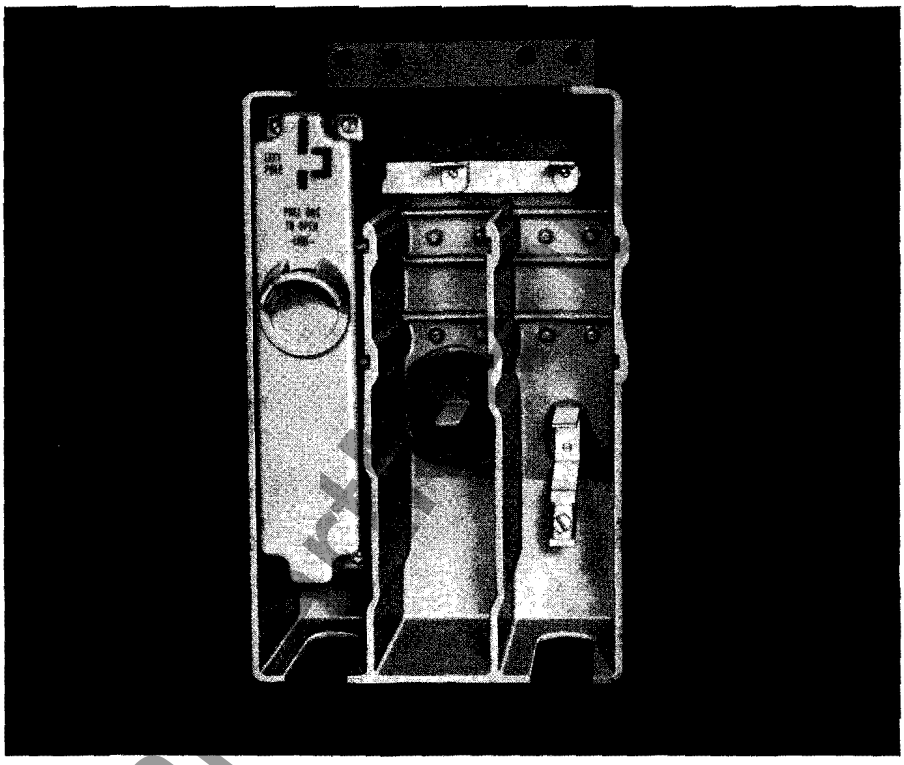
The fuse is available for single phase transformer ratings 25 kva through 167 kva and for three phase ratings through 300 kva, connected for grounded wye operation at 2400, 4800, 8000, and 15000 volts.

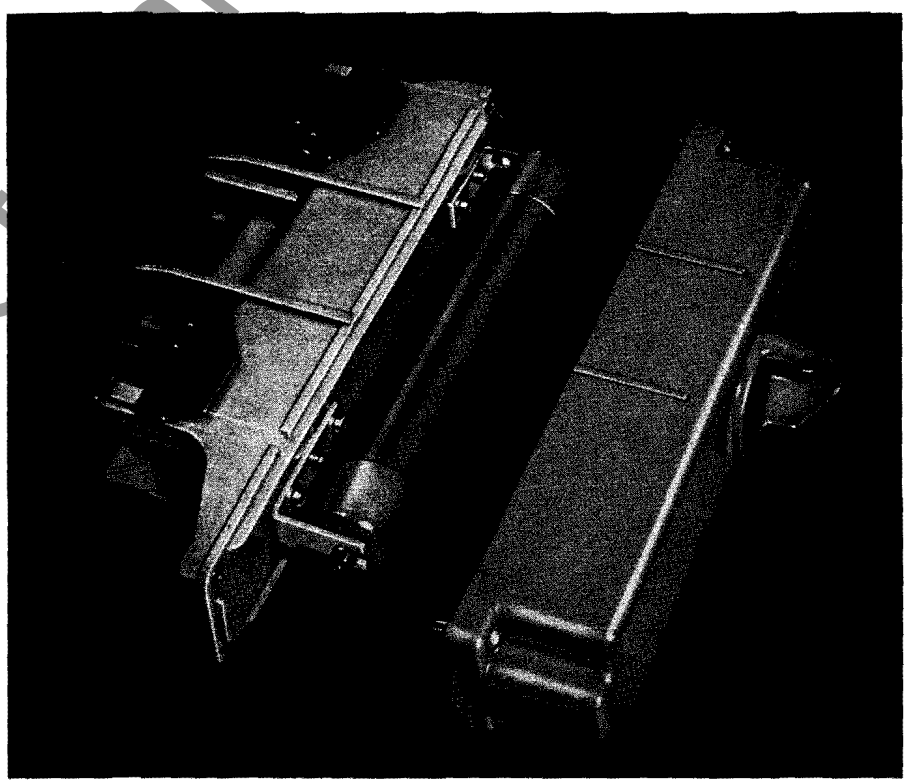


EFD Fuse



Spring-loaded Arc Quenching Plate





Type EFD Switch

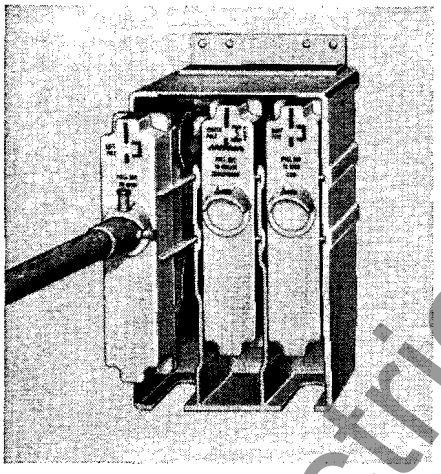
For Pad Mounted Distribution Transformers

Switching

The three poles of the EFD switch may be opened or closed in a varied order to provide the following operating positions:

1. Loop-feed through; transformer energized.
2. Loop-feed through; transformer isolated.
3. Transformer fed from the left; right side of the loop opened.
4. Transformer fed from the right; left side of the loop opened.
5. Loop broken at transformer.

The five switching positions of the EFD switch permit alternate feed for each transformer in the loop circuit in case of a line fault or outage. In the event of a line fault, the EFD switch may be operated to isolate the fault, while still providing complete customer service.



Operation of the EFD switch is made safe and convenient by its simplified construction. The switch contacts can be opened by simply drawing out the insulated switch poles so that they are completely free of the switch housing. This leaves a clearly visible disconnect.

The contacts are recessed within the main switch housing. Thus, during the interruption of current, the arc is completely contained within the switch housing until it is quenched. Furthermore, hazards due to open, exposed contacts, are greatly reduced.

The switch poles are drawn out or inserted with an ordinary hookstick. No resetting operation is necessary before insertion of the switch pole.

For added safety, a schematic diagram decal mounted on the front of the switch, insures operating personnel of proper switching operation.

Load-Breaking

The switching flexibility of the EFD is combined with a high performance load break capability.

When a switch pole is drawn out and the contacts separate, the circuit is broken in two places, creating two series arcs. Two sets of spring-loaded, arc quenching plates extinguish the arc within two or three half cycles. The quench plates are molded of a glass polyester material that generates a deionizing gas in the presence of an arc. The gas extinguishes the arc. This glass polyester has such durability that repeated operation under load has failed to cause any noticeable wear. All three switch poles have this load break capability.

In addition to reliability, an important safety feature is inherent in the EFD switch design. Should the switch pole be opened on a fault current higher than can be interrupted, the pole connector can be immediately reinserted, without resetting operations or special equipment. Safe switch reclosing is made possible by a 5,000 ampere close-in rating.

The Westinghouse EFD switch is designed to exceed the following performance characteristics:

Continuous Current Rating . . . 200 Amperes
Load-Break Rating① . . . . . 200 Amperes
Close-in Rating . . . . . 5,000 Amperes
Momentary Rating . . . . . 10,000 Amperes
Insulation Rating . . . . . 95 Kv BIL

① At 70% Power Factor or higher

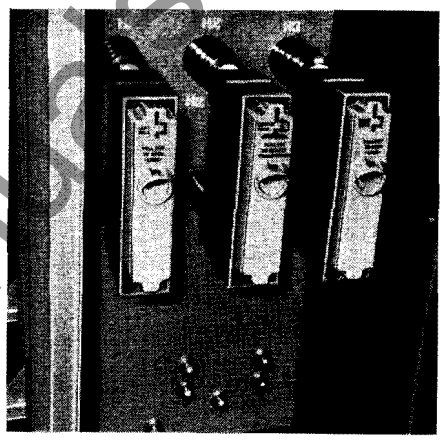
Cable Connections

High voltage feeder cables are connected to the left and right switch contacts by means of solderless, clamp-type connectors. These connectors are capable of accepting cable sizes ranging from #6 to #4/0.

A grounding pole is also available to protect lineman working around the transformer compartment. The construction of the grounding pole is similar to that of the switch poles. However, the grounding pole serves to insulate the switch contacts rather than connect them. In addition, the grounding pole actually serves as a physical barrier to prevent lineman from touching the energized upper switch contact. A copper stud, connected to the lower switch contact and feeder cable, extends through the face of the grounding pole. A grounding clamp can be attached to the extended copper stud.

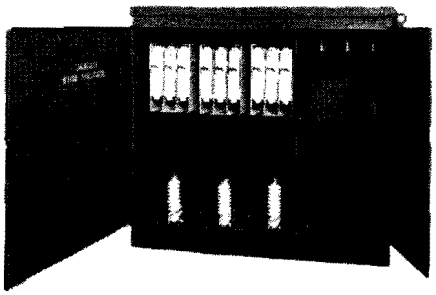
Thus, when a lineman wants complete assurance that a high voltage cable is de-energized, he merely draws out the switch pole; inserts the grounding pole in its place; and attaches a grounding clamp to the copper stud and to ground.

Alternate Design



For three phase, radial-feed, three single poles and mounting boxes are provided for each phase line. Each switch pole is mounted on a standoff insulator and a through-type bushing. In this manner, three phase transformers can be disconnected from a radial feed circuit.

Three Phase Application

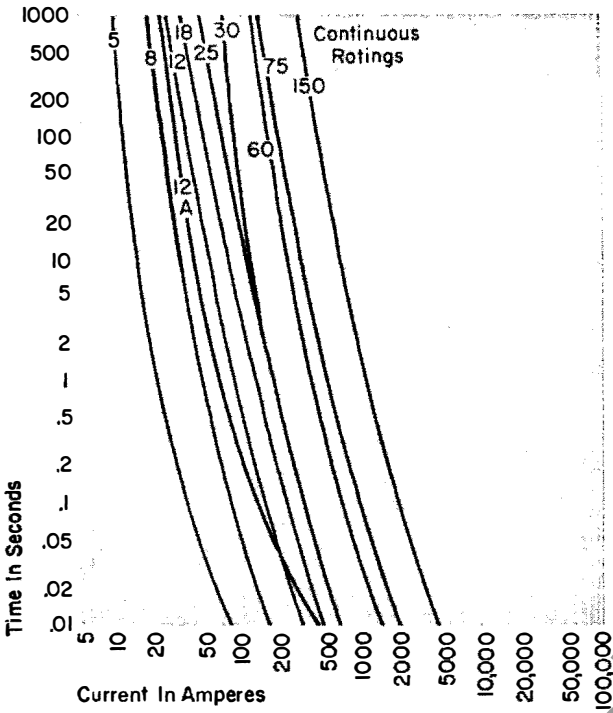


For three phase, loop-feed systems, three EFD switches can be mounted together to provide the five switching positions for each of the three phase lines. Either arrangement, loop-feed or radial-feed, provides the same flexibility and the high performance characteristics of the single phase EFD applications.

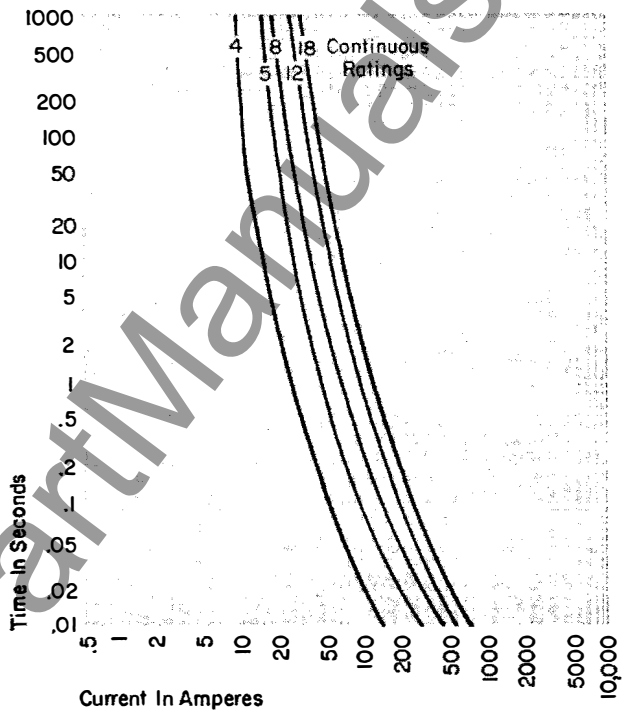
Type EFD Switch

For Pad Mounted Distribution
Transformers

Performance Curves



Melt-Time Current Characteristic Curves for EFD Switch Current Limiting Fuses, Curve No. 562761



Melt-Time Current Characteristic Curves for EFD Switch Current Limiting Fuses, 15 Kv Rating

Minimum melt time shown by curves; maximum clearing time is melt time plus 20%

Fuse Style and Continuous Current Rating – Single Phase

Kva	Voltage			
	2400	4160, 4800	7200, 7620, 8000	15000
15+25	678C276G01 (18)	678C248G05 (8)	678C248G03 (5)	678C295G05 (4)
37½	678C276G04 (25)	678C249G02 (12)	678C248G06 (8)	678C295G04 (5)
50	678C277G04 (30)	678C276G02 (18)	591C273G03 (12)	678C295G03 (8)
75	678C282G01 (75)	678C276G05 (25)	678C276G03 (18)	678C295G02 (12)
100	678C282G01 (75)	680C386G02 (30)	678C276G06 (25)	678C295G02 (12)
167	680C387G01 (150)	680C386G03 (60)	680C386G01 (30)	678C295G07 (18)

Fuse Style and Continuous Current Rating – Three Phase

Kva	Voltage						
	2400Δ	4160Y/2400	4160, 4800Δ	7200Δ	12470Y/7200	12000 to 15000Δ	24940 Gnd Y/14400
45	678C276G01 (18)	678C276G01 (18)	678C249G02 (12)	678C248G03 (5)	678C248G03 (5)	678C295G05 (4)	678C295G05 (4)
75	678C277G04 (30)	678C276G01 (18)	678C276G02 (18)	591C273G03 (12)	678C248G03 (5)	678C295G03 (8)	678C295G05 (4)
112½	678C282G01 (75)	678C276G04 (25)	678C276G05 (25)	678C276G03 (18)	678C248G06 (8)	678C295G02 (12)	678C295G04 (5)
150	678C282G01 (75)	678C277G04 (30)	680C386G02 (30)	678C276G06 (25)	591C273G03 (12)	678C295G02 (12)	678C295G03 (8)
225	678C282G01 (75)	678C282G01 (75)	680C386G03 (60)	680C386G01 (30)	678C276G03 (18)	678C295G07 (18)	678C295G02 (12)
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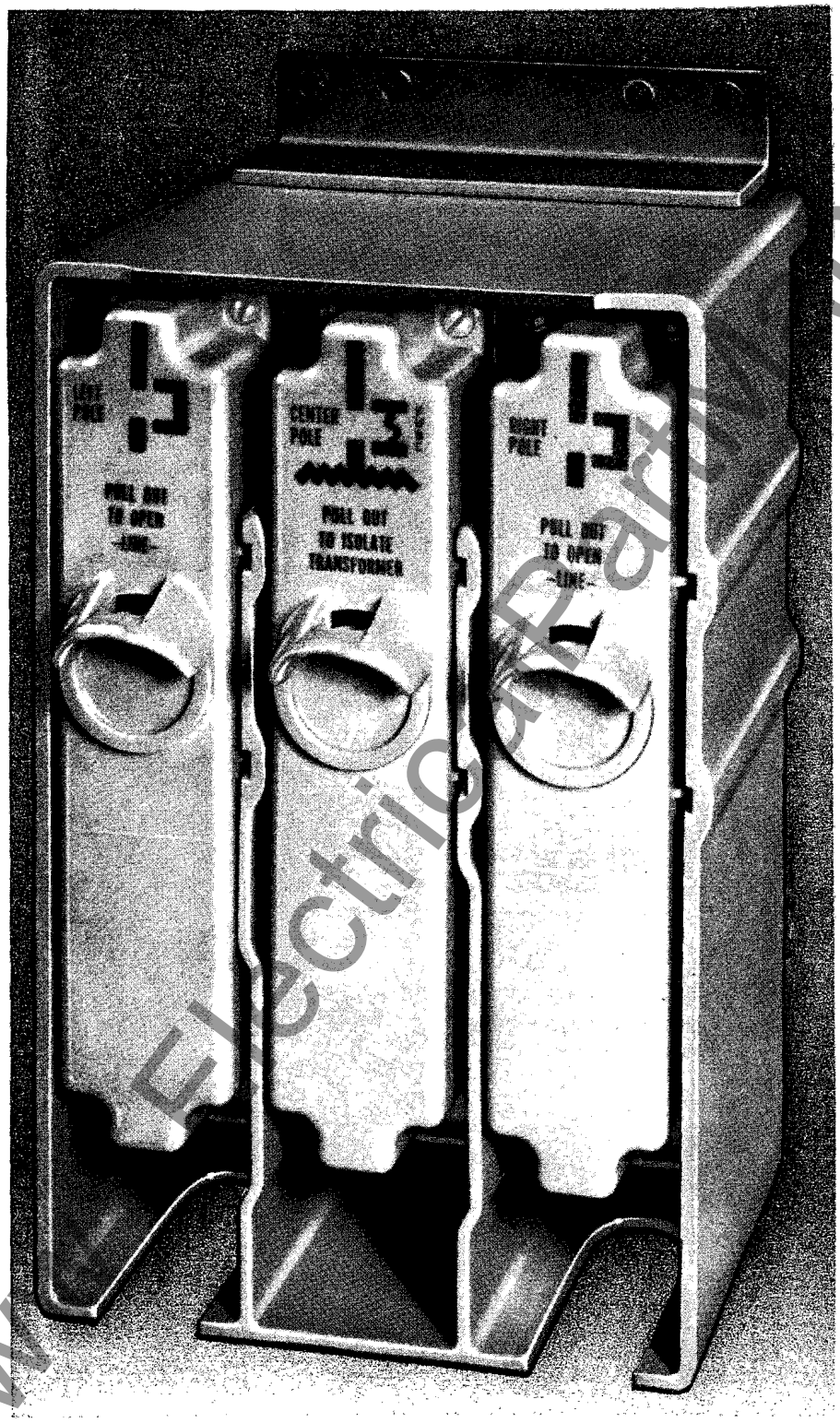
Westinghouse Electric Corporation
Distribution Transformer Division, Sharon, Pa. 16146
Printed in USA

Westinghouse

Type EFD Switch

For Pad Mounted Distribution Transformers



The Westinghouse type EFD load-break switch is specifically designed to meet the full switching requirements of underground distribution systems utilizing pad-mounted transformers.

To fulfill these requirements, the EFD incorporates two major benefits in its design – switching flexibility and safety. These benefits are made possible by a compact, "dead-front" type construction that enables the EFD switch to be externally mounted on the transformer.

The EFD is available on single phase or three phase pad mounted transformers. It is applicable on 15 kv class grounded wye systems for either loop-feed or radial-feed distribution.

Features

Dead-Front Type Construction
Simplified Operation
Externally Fusible
Load Break
Compact Construction
Schematic Diagram Decals
Single Phase or Three Phase Application
Loop-Feed or Radial-Feed Application
Current Limiting Fusing

Construction

The EFD switch poles, housing, and all structural parts are high pressure molded of glass polyester, a thermosetting material, which affords the switch greater structural and dimensional stability. Glass polyester incorporates high dielectric strength, track-resistance, and durability. Nylon screws are used in assembly of the switch poles.

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Westinghouse

Fuse Protection

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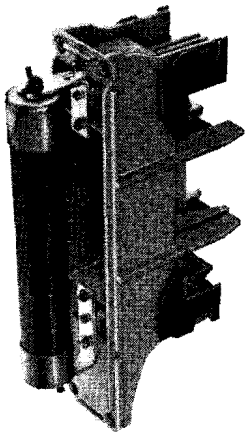
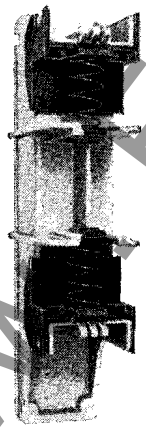
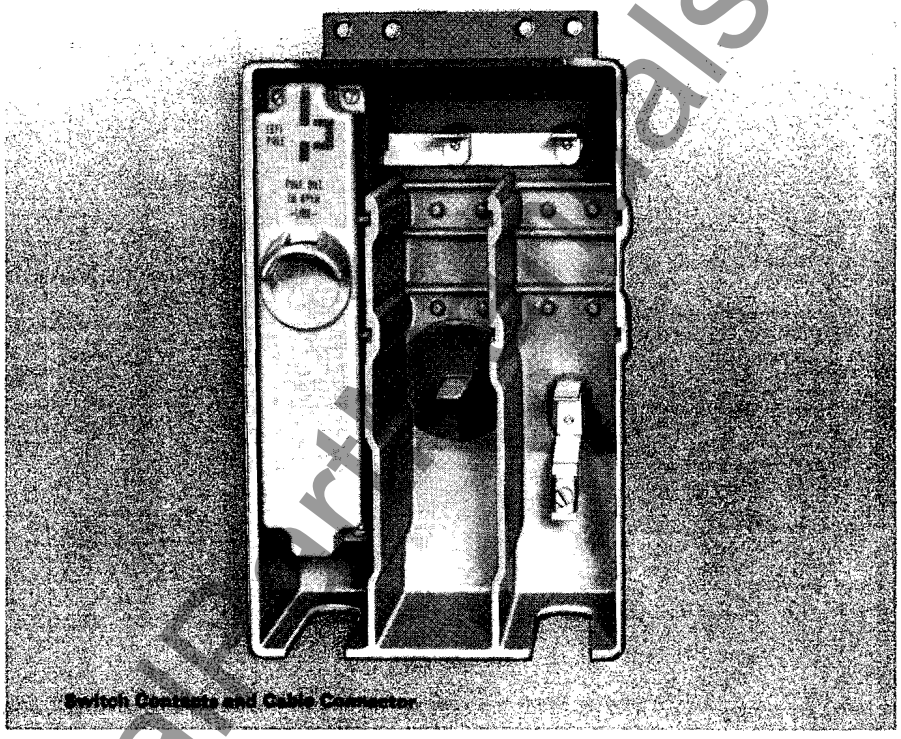


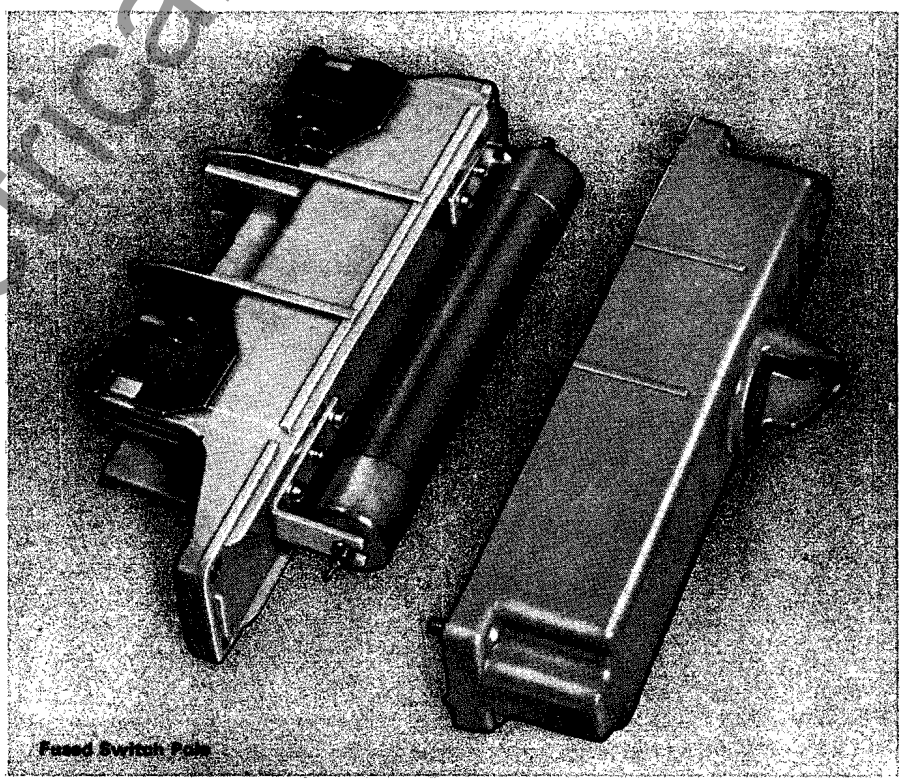
EFD Fuse



Spring-loaded Arc Quenching Plate



Switch Contacts and Cable Connector



Fused Switch Pole

Type EFD Switch

For Pad Mounted Distribution Transformers

Switching

The three poles of the EFD switch may be opened or closed in a varied order to provide the following operating positions:

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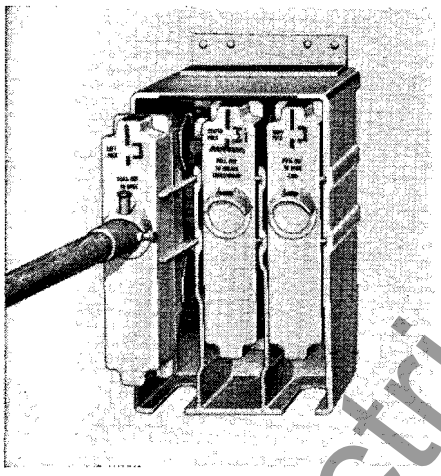

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Load-Break Rating① . . . . . 200 Amperes
Close-in Rating . . . . . 5,000 Amperes
Momentary Rating. . . . . 10,000 Amperes
Insulation Rating. . . . . 95 Kv BIL

① At 70% Power Factor or higher

Cable Connections

High voltage feeder cables are connected to the left and right switch contacts by means of solderless, clamp-type connectors. These connectors are capable of accepting cable sizes ranging from #6 to #4/0.

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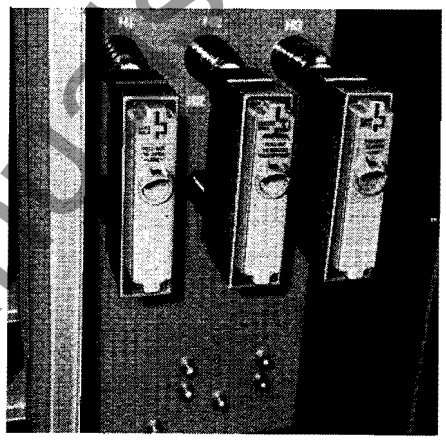
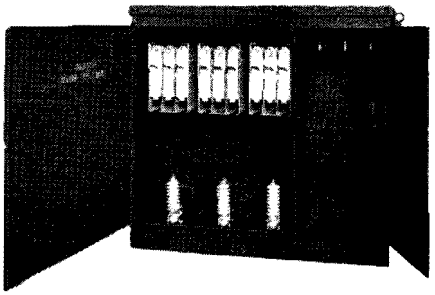
Alternate Design



For three phase, radial-feed, three single poles and mounting boxes are provided for each phase line. Each switch pole is mounted on a standoff insulator and a through-type bushing. In this manner, three phase transformers can be disconnected from a radial feed circuit.

Three Phase Application

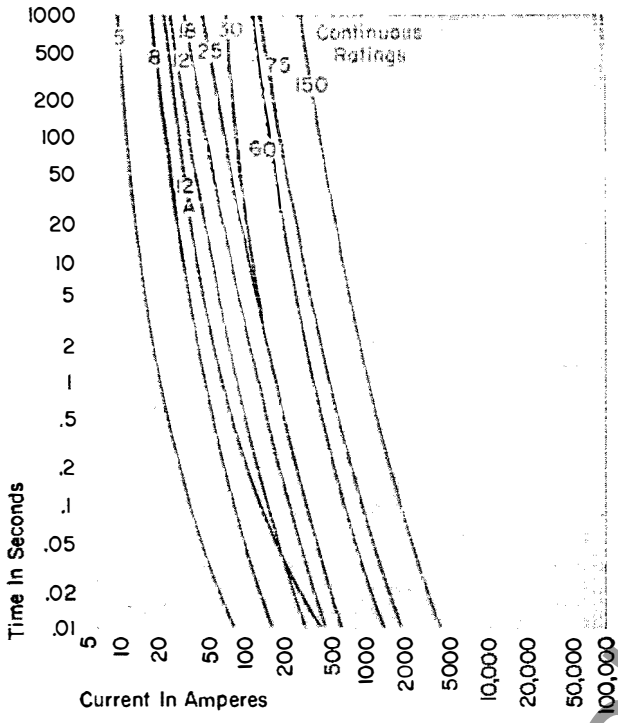


For three phase, loop-feed systems, three EFD switches can be mounted together to provide the five switching positions for each of the three phase lines. Either arrangement, loop-feed or radial-feed, provides the same flexibility and the high performance characteristics of the single phase EFD applications.

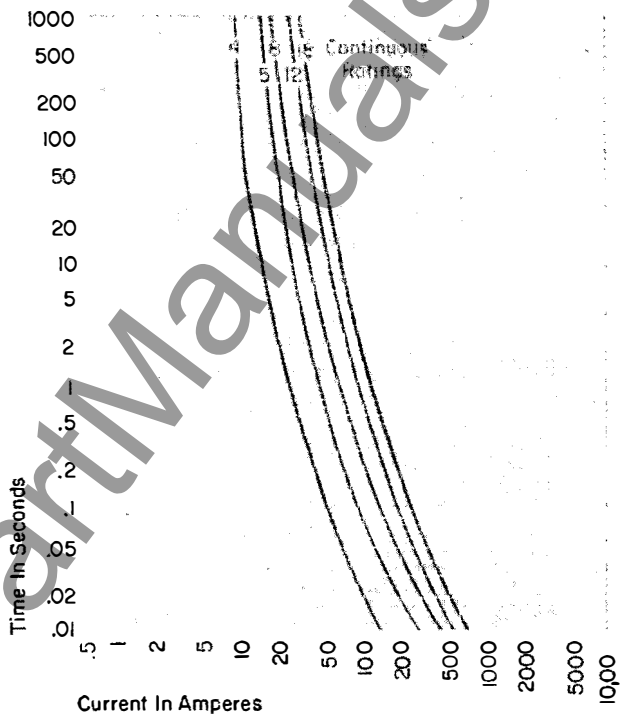
Type EFD Switch

For Pad Mounted Distribution
Transformers

Performance Curves



Melt-Time Current Characteristic Curves for EFD Switch Current Limiting Fuses, Curve No. 562761



Melt-Time Current Characteristic Curves for EFD Switch Current Limiting Fuses, 15 Kv Rating

Minimum melt time shown by curves; maximum clearing time is melt time plus 20%

Fuse Style and Continuous Current Rating – Single Phase

Kva	Voltage			
	2400	4160, 4800	7200, 7620, 8000	15000
15+25	678C276G01 (18)	678C248G05 (8)	678C248G03 (5)	678C295G05 (4)
37½	678C276G04 (25)	678C249G02 (12)	678C248G06 (8)	678C295G04 (5)
50	678C277G04 (30)	678C276G02 (18)	591C273G03 (12)	678C295G03 (8)
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167	680C387G01 (150)	680C386G03 (60)	680C386G01 (30)	678C295G07 (18)

Fuse Style and Continuous Current Rating – Three Phase

Kva	Voltage						
	2400Δ	4160Y/2400	4160, 4800Δ	7200Δ	12470Y/7200	12000 to 15000Δ	24940 Gnd Y/14400
45	678C276G01 (18)	678C276G01 (18)	678C249G02 (12)	678C248G03 (5)	678C248G03 (5)	678C295G05 (4)	678C295G05 (4)
75	678C277G04 (30)	678C276G01 (18)	678C276G02 (18)	591C273G03 (12)	678C248G03 (5)	678C295G03 (8)	678C295G05 (4)
112½	678C282G01 (75)	678C276G04 (25)	678C276G05 (25)	678C276G03 (18)	678C248G06 (8)	678C295G02 (12)	678C295G04 (5)
150	678C282G01 (75)	678C277G04 (30)	680C386G02 (30)	678C276G06 (25)	591C273G03 (12)	678C295G02 (12)	678C295G03 (8)
225	678C282G01 (75)	678C282G01 (75)	680C386G03 (60)	680C386G01 (30)	678C276G03 (18)	678C295G07 (18)	678C295G02 (12)
300	680C387G01 (150)	678C282G01 (75)	680C386G03 (60)	680C386G01 (30)	678C276G06 (25)	678C295G07 (18)	678C295G02 (12)

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