

## Trans-Guard® FX Fuse

### Trans-Guard® FX Full-Range Current-Limiting Fuse

- Patented damage sensor significantly reduces the risk of fuse failure should the fuse be subjected to an element-damaging current surge
- Hermetically sealed construction ensures that no gases escape from the fuse during current interruption
- All Trans-Guard® FX fuses are helium mass spectrometer leak tested to ensure sealing system integrity
- Rugged machined brass end caps used for greater ferrule strength, resulting in less distortion and more secure fuse attachment in dry-well canisters
- Tested in accordance with the most recent ANSI/IEEE standards including short circuit testing at the manufacturer's specified rated maximum application temperature (RMAT)
- Optional blown fuse indicator features a unique design that does not affect the fuse's arcing performance

This fuse provides both overload and fault current protection for distribution equipment in a single fuse body. As a full-range fuse, it is capable of interrupting any continuous current between the minimum current that can cause melting of its elements and its rated maximum interrupting current (50,000 amps). The fuses are capable of interrupting in elevated ambient temperatures up to their rated maximum application temperature (RMAT).

The Trans-Guard® FX fuse is hermetically sealed and thus discharges no gases during fuse operation. An additional design distinction is its patented damage sensor that significantly reduces the potential for fuse failure in the event of element-damaging current surges.

#### Applications:

Trans-Guard® FX fuses are available in a broad range of ratings. For ease of application, all designs are compatible with the industry-recognized standard mounting codes. Common applications include the Trans-Guard® FX:

- Installed in drywell canisters for distribution transformer protection (see Figure 1)
- Clip mounted in live-front switchgear (see Figure 2)
- Externally mounted on overhead distribution systems, Type 4 (several outdoor versions available — contact factory for more information)
- Installed in Elastimold MCAN rubber molded canister for deadfront/submersible applications (see **page H-107**)
- Installed directly in oil, Type 8 (contact factory for more information)



Figure 1



Figure 2



## Trans-Guard® FX Fuse

**Power & High Voltage — Current-Limiting Fuses**
**Electrical Characteristics Of Trans-Guard® FX Fuses (Single Fuses)**

NOMINAL FUSE VOLTAGE RATING (kV)	FUSE DIAMETER (IN.)	CURRENT RATING (AMPS)	FUSE CAT. NO.	RATED MAXIMUM VOLTAGE (kV)	MAXIMUM CONTINUOUS CURRENT (IN AIR) (6) (7)			PEAK ARC VOLTAGE (5) (kV)	MINIMUM MELT I <sup>2</sup> T (AMP <sup>2</sup> -SEC)	MAXIMUM MELT I <sup>2</sup> T (3) (4) (AMP <sup>2</sup> -SEC)	RMAT (8) (°C)
					25° C	40° C	55° C				
5.5	2.2	3	HTFX220003	5.5	5.0	4.9	4.7	30	100	238	140
		6	HTFX220006		11.0	10.5	10.0	25	620	1,764	
		8	HTFX220008		13.5	13.0	12.5	23	800.0	2,560	
		10	HTFX220010		16.0	15.5	15.0	23	800.0	2,560	
		12	HTFX220012		20.5	19.5	19.0	21	920.0	4,814	
		18	HTFX220018		23.5	22.5	22.0	18	1,310	5,815	
		20	HTFX220020		27.5	26.5	25.5	18	1,620	6,779	
		25	HTFX220025		37.0	35.5	34.5	18	3,660	13,747	
		30	HTFX220030		41.0	39.5	38.5	18	5,250	18,863	
		40	HTFX220040		50.0	48.5	47.0	18	8,700	31,415	
		50	HTFX220050		57.0	55.0	53.5	18	12,800	44,260	
		65	HTFX220065		69.5	67.5	64.0	17	20,500	95,000	
75	HTFX220075	78.5	76.0	72.0	17	30,200	129,000				
5.5	3.3	80	HTFX320080	5.5	99	96	94	15	22,100	110,000	71
		100	HTFX320100		126	122	118	15	56,700	280,000	
		125	HTFX320125		142	138	134	15	78,300	380,000	
		150	HTFX320150		184	178	173	15	176,000	860,000	
		200	HTFX320200		208	202	196	15	259,000	1,270,000	
8.3	2.2	3	HTFX230003	10.0	5.0	4.9	4.7	30	100	350	140
		6	HTFX230006		11.0	10.5	10.0	32	620	2,700	
		8	HTFX230008		13.5	13.0	12.5	28	800	4,000	
		10	HTFX230010		16.0	15.5	15.0	28	800	4,000	
		12	HTFX230012		20.5	19.5	19.0	26	920	8,000	
		18	HTFX230018		23.5	22.5	22.0	26	1,310	9,500	
		20	HTFX230020		27.5	26.5	25.5	26	1,620	11,000	
		25	HTFX230025		37.0	35.5	34.5	26	3,660	22,000	
		30	HTFX230030		41.0	39.5	38.5	26	5,250	30,000	
	40	HTFX230040	50.0	48.5	47.0	26	8,700	50,000			
	50	HTFX230050	57.0	55.0	53.5	26	12,800	70,000			
	65	HTFX230065	87.0	84.0	81.5	23	34,000	200,000			
	80	HTFX230080	100.0	98.0	95.0	22	51,200	280,000			
	65	HTFX330065	81.0	79.0	77.0	25	25,200	100,000	71		
	80	HTFX330080	95.0	92.0	89.0	25	47,200	185,000			
100	HTFX330100	120.0	117.0	113.0	25	78,300	330,000				
125	HTFX330125	135.0	131.0	127.0	25	115,150	480,000				
15.5	2.2	3	HTFX240003 (1)	17.2	5.0	4.9	4.7	51	100	510	140
		6	HTFX240006		11.0	10.5	10.0	54	620	2,600	
		8	HTFX240008		13.5	13.0	12.5	46	800	3,700	
		10	HTFX240010		16.0	15.5	15.0	46	800	3,700	
		12	HTFX240012		20.5	19.5	19.0	43	920	6,500	
		18	HTFX240018		23.5	22.5	22.0	45	1,310	8,000	
		20	HTFX240020		27.5	26.5	25.5	45	1,620	10,000	
		25	HTFX240025		37.0	35.5	34.5	45	3,660	22,000	
		30	HTFX240030		41.0	39.5	38.5	45	5,250	30,000	
		40	HTFX240040		50.0	48.5	47.0	45	8,700	50,000	
		50	HTFX240050		53.0	51.5	50.0	45	12,800	70,000	
		65	HTFX240065		72.0	70.0	68.0	39	28,300	164,000	
	65	HTFX340065	78.0	75.0	73.0	40	25,200	110,000	71		
	80	HTFX340080	88.0	85.0	82.0	40	39,400	185,000			
	100	HTFX340100	114.0	110.0	107.0	40	80,000	380,000			

## Trans-Guard® FX Fuse

### Electrical Characteristics Of Trans-Guard® FX Fuses (Single Fuses) (continued)

NOMINAL FUSE VOLTAGE RATING (kV)	FUSE DIAMETER (IN.)	CURRENT RATING (AMPS)	FUSE CAT. NO.	RATED MAXIMUM VOLTAGE (kV)	MAXIMUM CONTINUOUS CURRENT (IN AIR) (6)			PEAK ARC VOLTAGE (5) (kV)	MINIMUM MELT I <sup>2</sup> T (AMP <sup>2</sup> -SEC)	MAXIMUM MELT I <sup>2</sup> T (3) (4) (AMP <sup>2</sup> -SEC)	RMAT (8) (°C)
					25° C	40° C	55° C				
23.0	2.2	6	HTFX250006	23.0	11.0	10.5	10.0	67	620	3,100	140
		8	HTFX250008		13.5	13.0	12.5	61	800	4,800	
		10	HTFX250010		16.0	15.5	15.0	61	800	4,800	
		12	HTFX250012		20.5	19.5	19.0	60	920	8,300	
		18	HTFX250018		23.5	22.5	22.0	60	1,310	11,200	
		20	HTFX250020		27.5	26.5	25.5	60	1,620	13,000	
		25	HTFX250025		37.0	35.5	34.5	60	3,660	28,000	
		30	HTFX250030		41.0	39.5	38.5	60	5,250	38,000	
		40	HTFX250040		48.0	46.5	45.0	60	8,700	61,000	
		50	HTFX250050		55.0	53.0	51.5	60	12,800	82,000	

### Electrical Characteristics of Trans-Guard® FX Fuses (Parallel Fuses)

NOMINAL FUSE VOLTAGE RATING (kV)	FUSE DIAMETER (IN.)	CURRENT RATING (AMPS)	FUSE CAT. NO.	RATED MAXIMUM VOLTAGE (kV)	MAXIMUM CONTINUOUS CURRENT (IN AIR) (6)			PEAK ARC VOLTAGE (5) (kV)	MINIMUM MELT I <sup>2</sup> T (AMP <sup>2</sup> -SEC)	MAXIMUM MELT I <sup>2</sup> T (3) (4) (AMP <sup>2</sup> -SEC)	RMAT (8) (°C)
					25° C	40° C	55° C				
8.3	2.2	60	HTFX230030	10.0	80.0	77.0	75.0	26	21,000	120,000	140
		80	HTFX230040		98.0	95.0	92.0	26	34,000	180,000	
		100	HTFX230050	8.8	111.0	108.0	105.0	24	51,200	250,000	
		130	HTFX230065		170.0	165.0	160.0	22	136,000	670,000	
		160	HTFX230080		198.0	191.0	186.0	21	204,800	890,000	
	3.3	130	HTFX330065	8.3	158.0	154.0	151.0	24	100,800	400,000	71
		160	HTFX330080		186.0	180.0	175.0	24	189,000	740,000	
		200	HTFX330100		235.0	229.0	221.0	24	313,000	1,300,000	
		250	HTFX330125		265.0	256.0	249.0	24	460,500	1,800,000	
15.5	2.2	60	HTFX240030	17.2	80.0	77.0	75.0	45	21,000	110,000	140
		80	HTFX240040		98.0	95.0	92.0	45	34,800	170,000	
		100	HTFX240050		104.0	101.0	98.0	45	51,200	310,000	
	3.3	130	HTFX340065	15.5	152.0	147.0	143.0	39	100,800	440,000	71
		160	HTFX340080		172.0	167.0	160.0	39	157,500	740,000	
		200	HTFX340100		222.0	214.0	208.0	39	320,000	1,520,000	

#### Notes for charts on pages H-72-H-73:

- Designs have a 50,000 Amps RMS. Symmetrical Rating (except 3A 17.2kV, which was tested at 44kA maximum).
- Current ratings shown in chart above are achieved by using a parallel combination of two fuses (order two fuses). To facilitate equal sharing of the interrupting duty, the two fuses should be resistance matched ( $\pm 2\%$ ) and be mounted such that the current paths to and from each fuse are symmetrical.
- Tabulated Maximum Total I<sup>2</sup>t values are for currents of 50,000 amperes at the nominal voltage of the fuse (except for fuses having a rated maximum voltage of 8.8kV, in which case the maximum total I<sup>2</sup>t values are at 8.8kV). Fuses that have a rated maximum voltage higher than their nominal voltage rating will have a higher I<sup>2</sup>t let-through when applied at voltages up to these higher values. For example, maximum total I<sup>2</sup>t values are increased by approximately 30% when 8.3kV fuses are applied at 10kV and approximately 25% when 15.5kV fuses are used at 17.2kV.
- Maximum total I<sup>2</sup>t values are reduced for currents below 50,000A. For example, at 10,000A, maximum total I<sup>2</sup>t values are approximately 15% less than the published values.
- Peak arc voltages quoted are for 50,000A currents at the rated maximum voltage listed. Reduced currents and voltages will reduce the peak arc voltage. Consult the factory for further information.
- Maximum continuous currents at higher ambient temperatures, and in confining enclosures:
  - These may be determined by derating the fuses by .2% per degree C over 25° C (for example, at 85° C the derating would be  $60 \times .2 = 12\%$ , making the maximum continuous current of a 30A fuse  $41 \times .88 = 36.1A$ ).
  - When fuses are applied in a confining enclosure, such as a drywell canister, additional derating of a fuse's maximum continuous current is necessary. Specifically, the maximum continuous current for fuses used in a dry-well canister, with the canister completely submerged in oil, will be reduced by an additional 2% (3% for fuses having a rated maximum voltage of 8.8kV). When calculating the derating for temperature, as described above, the temperature of the oil surrounding the canister should be used. For other types of enclosures, please consult the factory.
- Reduction in the long time melting current of the fuses (approximately one hour and longer) due to higher ambient temperatures and use in enclosures is the same as described above for "Maximum Continuous Current". See time-current characteristics for melting characteristics in this time region.
- The 2.2"-dia. 80A and 160A (paralleled 80A) fuses have an RMAT of 140° C at a reduced rated maximum voltage of 5.5kV.

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