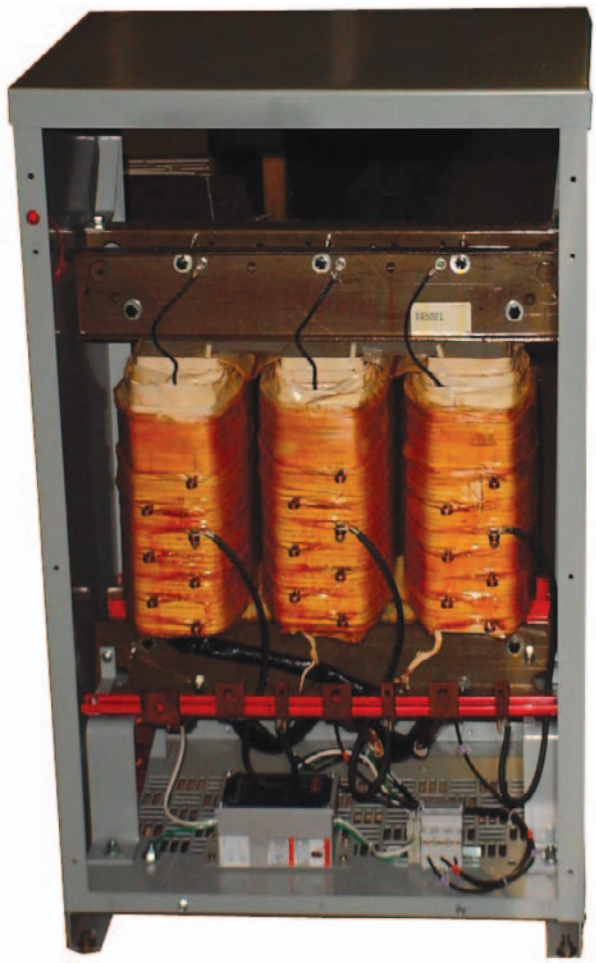
TVSS integral to harmonic mitigating transformer



Eaton's harmonic mitigating transformer (HMT) represents an evolution of the transformer into something that will provide clean, energy-efficient electricity to power the loads of today and tomorrow. The recent shift of electrical loads from predominantly AC consumers (resistive loads) to DC consumers (such as computer power supplies, printers and fax machines) requires that our electrical infrastructure change as well. Eaton's HMTs, when applied properly within an electrical distribution system, will help keep the loads operating the way their manufacturer's intended, while at the same time keeping the facility's electrical system free from voltage distortion and other harmful effects that modern loads impose on an electrical system. Customers who are concerned about power quality within their facilities frequently also desire to protect their valuable equipment from electrical surges. For those applications, Eaton offers the option of having their TVSS factory-installed integral to their HMTs.

Integral TVSS features

- Protection modes—full mode: L-N (normal mode); L-G, N-G (common mode)
- Response time less than 1 nanosecond
- Capacitance up to 30 nf
- Diagnostics—green LED indicators, dry relay (volt-free) contacts (contact rating 60 W or 125 VA, 125 Vac and 0.5A or 30 Vdc and 1A)
- Short-circuit current rating—200 kAIC using 30A Class RK5 fuse
- UL® 1449 2nd Edition listed
- Tested per NEMA® LS-1 and ANSI/IEEE® C62.45
- 80 kA per phase standard; 40 kA or 160 kA optional
- Factory-connected to secondary of transformer as standard; optional primary connection available

Optional Indicator Light
Mounted on the front of the transformer enclosure to provide visual indication that the TVSS is no longer functional when the transformer is energized.

Powering Business Worldwide

TVSS Let-Through Voltage Ratings

Ratings ❶	L-L	L-G	L-N	N-G	Delta System L-L	Delta System L-G
ANSI/IEEE Cat A1						
120/208V wye; 240V delta	110	300	60	320	110	580
277/480V wye; 480V delta	120	460	60	580	130	960
600V delta	—	—	—	—	—	—
ANSI/IEEE Cat C3						
120/208V wye; 240V delta	1300	970	840	900	1550	1620
277/480V wye; 480V delta	2150	1400	1340	1290	2250	2190
600V delta	—	—	—	—	2660	2720
ANSI/IEEE Cat B3/C1						
120/208V wye; 240V delta	940	540	490	510	960	980
277/480V wye; 480V delta	1700	960	930	910	1620	1580
600V delta	—	—	—	—	2020	2040
UL 1449, 2nd Edition Suppressed Voltage Rating						
120/208V wye; 240V delta	800	400	400	400	800	800
277/480V wye; 480V delta	1500	800	800	800	1500	1500
600V delta	—	—	—	—	2000	2000

❶ Test environment: All tests performed with 6.00-inch (152.4 mm) lead length, positive polarity. Voltages are peak ±10%. Measurements are taken from the zero reference per NEMA LS-1.

Note: Let-through voltages shown are for selected units and vary per Equalizer model. See individual submittal specification sheets for tested let-through voltage data.

Maximum EMI/RFI Attenuation—MIL-STD-220

1 kHZ	10 kHZ	100 kHZ	1 MHZ	10 MHZ	Maximum Attenuation Frequency
0 dB	8.5 dB	30 dB	23 dB	6.8 dB	5.8 dB at 238 kHz

Harmonic Mitigating Transformer Ordering Guide

X 48 M 28 F 30 TCUEES2 NON

Primary Voltage ❶
- **29** = 208 Vac
- **48** = 480 Vac
- **60** = 600 Vac

Secondary Voltage ❶
- **29** = 208/120 Vac
- **47** = 480/277 Vac

Tap Arrangement
- **M** = 2 at +2.5%, 4 at –2.5%
- **D** = 2 at +2.5%, 2 at –2.5%

Temperature Rise
- **T** = 150°C
- **F** = 115°C
- **B** = 80°C

kVA Rating
- **15** = 15
- **30** = 30
- **45** = 45
- **75** = 75
- **12** = 112.5
- **49** = 150
- **22** = 225
- **33** = 300

Modifications ❶
- **T** = Single thermal sensor (190°C)
- **TT** = Two thermal sensors (190°C and 175°C)
- **X** = 50/60 Hz
- **CU** = Copper windings (standard)
- **EE** = ENERGY STAR label (standard)
- **SS** = Stainless steel enclosure
- **P1** = 40 kA per phase, TVSS installed on transformer primary
- **P2** = 80 kA per phase, TVSS installed on transformer primary
- **P3** = 160 kA per phase, TVSS installed on transformer primary
- **S1** = 40 kA per phase, TVSS installed on transformer secondary
- **S2** = 80 kA per phase, TVSS installed on transformer secondary (standard)
- **S3** = 160 kA per phase, TVSS installed on transformer secondary
- **P1P** = 40 kA per phase, TVSS installed on transformer primary with indicating light
- **P2P** = 80 kA per phase, TVSS installed on transformer primary with indicating light
- **P3P** = 160 kA per phase, TVSS installed on transformer primary with indicating light
- **S1P** = 40 kA per phase, TVSS installed on transformer secondary with indicating light
- **S2P** = 80 kA per phase, TVSS installed on transformer secondary with indicating light
- **S3P** = 160 kA per phase, TVSS installed on transformer secondary with indicating light

Phase Shift
- **NON** = 0°
- **THR** = 30°
- **POS** = +15°C
- **NEG** = –15°C

❶ The most common ratings are shown. Contact Eaton for availability of additional ratings.

Type NON Harmonic Mitigating Transformer Selection Information (0-Degree Phase Shift)

kVA	Full Cap. Taps FCAN	Full Cap. Taps FCBN	Type	°C Temp. Rise	Dimensions (Inches) H	W	D	Wt Lbs	Dimensions (mm) H	W	D	Wt kg	Frame	Wiring Diagram Number	Weathershield Catalog Number	Style Number
480 Volts to 208/120 Volts, Shielded, Copper Windings, NEMA TP-1 Energy Efficient, 0-Degree Phase Shift (No Thermal Sensor)																
15	2 at +2.5%	4 at –2.5%	DT-3	150	30	20-1/8	14-1/8	320	762	511	359	145	FR910A	200X	**WS31**	**X48M28T15CUEES2NON**
30	2 at +2.5%	4 at –2.5%	DT-3	150	30	20-1/8	14-3/8	420	762	511	364	191	FR912A	200X	**WS31**	**X48M28T30CUEES2NON**
45	2 at +2.5%	4 at –2.5%	DT-3	150	39-1/4	26-1/8	19-1/8	625	995	663	486	284	FR914B	200X	**WS33**	**X48M28T45CUEES2NON**
75	2 at +2.5%	4 at –2.5%	DT-3	150	46-5/8	28	23	925	1183	710	584	420	FR916A	200X	**WS19**	**X48M28T75CUEES2NON**
112.5	2 at +2.5%	4 at –2.5%	DT-3	150	56-1/4	31-1/4	24-1/4	1600	1427	790	616	726	FR917	200X	**WS34**	**X48M28T12CUEES2NON**
150	2 at +2.5%	4 at –2.5%	DT-3	150	62-1/4	31-1/4	30-1/4	2170	1581	794	768	986	FR918A	200X	**WS34**	**X48M28T49CUEES2NON**
225	2 at +2.5%	4 at –2.5%	DT-3	150	75	44-1/2	36	3100	1905	1130	914	1409	FR919	200X	**WS35**	**X48M28T22CUEES2NON**
300	2 at +2.5%	4 at –2.5%	DT-3	150	75	44-1/2	36	3300	1905	1130	914	1500	FR919	200X	**WS35**	**X48M28T33CUEES2NON**
500	2 at +2.5%	4 at –2.5%	DT-3	150	75	44-1/2	36	4800	1905	1130	914	2179	FR920	200X	**WS35**	**X48M28T55CUEES2NON**
15	2 at +2.5%	4 at –2.5%	DT-3	115	30	20-1/8	14-1/8	320	762	511	359	145	FR910A	200X	**WS31**	**X48M28F15CUEES2NON**
30	2 at +2.5%	4 at –2.5%	DT-3	115	30	20-1/8	14-3/8	420	762	511	364	191	FR912A	200X	**WS31**	**X48M28F30CUEES2NON**
45	2 at +2.5%	4 at –2.5%	DT-3	115	39-1/4	26-1/8	19-1/8	625	995	663	468	284	FR914B	200X	**WS33**	**X48M28F45CUEES2NON**
75	2 at +2.5%	4 at –2.5%	DT-3	115	46-5/8	28	23	925	1183	710	584	420	FR916A	200X	**WS19**	**X48M28F75CUEES2NON**
112.5	2 at +2.5%	4 at –2.5%	DT-3	115	56-1/4	31-1/4	24-1/4	1600	1427	790	616	726	FR917	200X	**WS34**	**X48M28F12CUEES2NON**
150	2 at +2.5%	4 at –2.5%	DT-3	115	62-1/4	31-1/4	30-1/4	2170	1581	794	768	986	FR918A	200X	**WS34**	**X48M28F49CUEES2NON**
225	2 at +2.5%	4 at –2.5%	DT-3	115	75	44-1/2	36	3600	1905	1130	914	1634	FR919	200X	**WS35**	**X48M28F22CUEES2NON**
300	2 at +2.5%	4 at –2.5%	DT-3	115	75	44-1/2	36	3500	1905	1130	914	1589	FR919	200X	**WS35**	**X48M28F33CUEES2NON**
500	2 at +2.5%	4 at –2.5%	DT-3	115	75	44-1/2	36	4800	1905	1130	914	2179	FR920	200X	**WS35**	**X48M28F55CUEES2NON**

Type THR Harmonic Mitigating Transformer Selection Information (30-Degree Phase Shift)

kVA	Full Cap. Taps FCAN	Full Cap. Taps FCBN	Type	°C Temp. Rise	Dimensions (Inches) H	W	D	Wt Lbs	Dimensions (mm) H	W	D	Wt kg	Frame	Wiring Diagram Number	Weathershield Catalog Number	Style Number
480 Volts to 208/120 Volts, Shielded, Copper Windings, NEMA TP-1 Energy Efficient, 30-Degree Phase Shift (No Thermal Sensor)																
15	2 at +2.5%	4 at –2.5%	DT-3	150	30	20-1/8	14-1/8	320	762	511	359	145	FR910A	203X	**WS31**	**X48M28T15CUEES2THR**
30	2 at +2.5%	4 at –2.5%	DT-3	150	30	20-1/8	14-3/8	420	762	511	364	191	FR912A	203X	**WS31**	**X48M28T30CUEES2THR**
45	2 at +2.5%	4 at –2.5%	DT-3	150	39-1/4	26-1/8	19-1/8	625	995	663	486	284	FR914B	203X	**WS33**	**X48M28T45CUEES2THR**
75	2 at +2.5%	4 at –2.5%	DT-3	150	46-5/8	28	23	925	1183	710	584	420	FR916A	203X	**WS19**	**X48M28T75CUEES2THR**
112.5	2 at +2.5%	4 at –2.5%	DT-3	150	56-1/4	31-1/4	24-1/4	1600	1427	790	616	726	FR917	203X	**WS34**	**X48M28T12CUEES2THR**
150	2 at +2.5%	4 at –2.5%	DT-3	150	62-1/4	31-1/4	30-1/4	2170	1581	794	768	986	FR918A	203X	**WS34**	**X48M28T49CUEES2THR**
225	2 at +2.5%	4 at –2.5%	DT-3	150	75	44-1/2	36	3100	1905	1130	914	1409	FR919	203X	**WS35**	**X48M28T22CUEES2THR**
300	2 at +2.5%	4 at –2.5%	DT-3	150	75	44-1/2	36	3300	1905	1130	914	1500	FR919	203X	**WS35**	**X48M28T33CUEES2THR**
500	2 at +2.5%	4 at –2.5%	DT-3	150	75	44-1/2	36	4800	1905	1130	914	2179	FR920	203X	**WS35**	**X48M28T55CUEES2THR**
15	2 at +2.5%	4 at –2.5%	DT-3	115	30	20-1/8	14-1/8	320	762	511	359	145	FR910A	203X	**WS31**	**X48M28F15CUEES2THR**
30	2 at +2.5%	4 at –2.5%	DT-3	115	30	20-1/8	14-3/8	420	762	511	364	191	FR912A	203X	**WS31**	**X48M28F30CUEES2THR**
45	2 at +2.5%	4 at –2.5%	DT-3	115	39-1/4	26-1/8	19-1/8	625	995	663	468	284	FR914B	203X	**WS33**	**X48M28F45CUEES2THR**
75	2 at +2.5%	4 at –2.5%	DT-3	115	46-5/8	28	23	925	1183	710	584	420	FR916A	203X	**WS19**	**X48M28F75CUEES2THR**
112.5	2 at +2.5%	4 at –2.5%	DT-3	115	56-1/4	31-1/4	24-1/4	1600	1427	790	616	726	FR917	203X	**WS34**	**X48M28F12CUEES2THR**
150	2 at +2.5%	4 at –2.5%	DT-3	115	62-1/4	31-1/4	30-1/4	2170	1581	794	768	986	FR918A	203X	**WS34**	**X48M28F49CUEES2THR**
225	2 at +2.5%	4 at –2.5%	DT-3	115	75	44-1/2	36	3600	1905	1130	914	1634	FR919	203X	**WS35**	**X48M28F22CUEES2THR**
300	2 at +2.5%	4 at –2.5%	DT-3	115	75	44-1/2	36	3500	1905	1130	914	1589	FR919	203X	**WS35**	**X48M28F33CUEES2THR**
500	2 at +2.5%	4 at –2.5%	DT-3	115	75	44-1/2	36	4800	1905	1130	914	2179	FR920	203X	**WS35**	**X48M28F55CUEES2THR**

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