Providing clean, energy-efficient electricity

The electrical transformer has been a staple of electrical power systems for the past 100+ years. While the types of electrical loads that are being added to our systems today have radically changed, the transformer has stayed relatively the same in design during this timeframe. Eaton's harmonic mitigating transformer (HMT) represents the evolution of the transformer into something that will best provide clean, energy-efficient electricity to power the loads of today and tomorrow.

The recent shift of our electrical loads from predominately AC consumers (resistive heating elements, incandescent lighting, three-phase motor load) to DC consumers (computers, fax machines, printers, down to the "wall-wart" that recharges the cell phone) requires that our electrical infrastructure changes as well. These new loads now introduce other currents and frequencies into our electrical power systems—commonly known as "harmonics."

Harmonic currents can cause additional heating, which may cause transformers, generators and conductors to become overloaded. Excessive heat is one of the major reasons that standard transformers and conductors fail prematurely. These harmonic currents have various other effects (such as "loss of ride-through capability", reduced lifespan and mysterious misoperation of equipment) on the components and loads of an electrical distribution system. Eaton's HMTs, when used properly within an electrical system, will help keep the loads operating the way the manufacturer designed them and keep the facility's electrical system free from voltage distortion.

Three-phase, Type DT-3 HMT, 60 Hz

- Harmonic mitigating (cancellation) transformers are a cost-effective means of treating harmful harmonics in an electrical distribution system
- Reducing harmonic content in electrical systems can result in a more reliable electrical system, lower maintenance costs, less downtime, fewer equipment malfunctions and lower cooling system capacity
- Available in a variety of phase-shift configurations that allow flexibility to target specific families of harmonics
- Harmonic treatment via electromagnetic flux cancellation
- May be installed as a standalone transformer, or included in IFS™
- Available in three-phase ratings from 15 to 500 kVA, up to 600V primary

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Features and benefits

- 480V to 208/120V standard. Additional voltage combinations available
- 150°C, 115°C or 80°C temperature rise available
- Copper windings and terminals standard; aluminum available
- NEMA® TP-1 energy-efficient and labeled
- 200 percent rated neutral
- Single electrostatic shield for attenuation of common mode and transverse mode noise
- Approximately 98 percent efficient when operated in systems with 100 percent nonlinear load profiles
- 220°C insulation system
- Third-party tested for harmonic performance and energy efficiency
- Meet NEMA ST-20 sound standards
- Eliminate circulating harmonic currents in primary windings of transformers
- Enclosures are NEMA 2 drip-proof. The addition of optional weather-shields makes the enclosure NEMA 3R rainproof
- Harmonic cancellation via electromagnetic flux cancellation. Filters, capacitors or other such devices are not used
- Help meet IEEE 519 harmonic limits

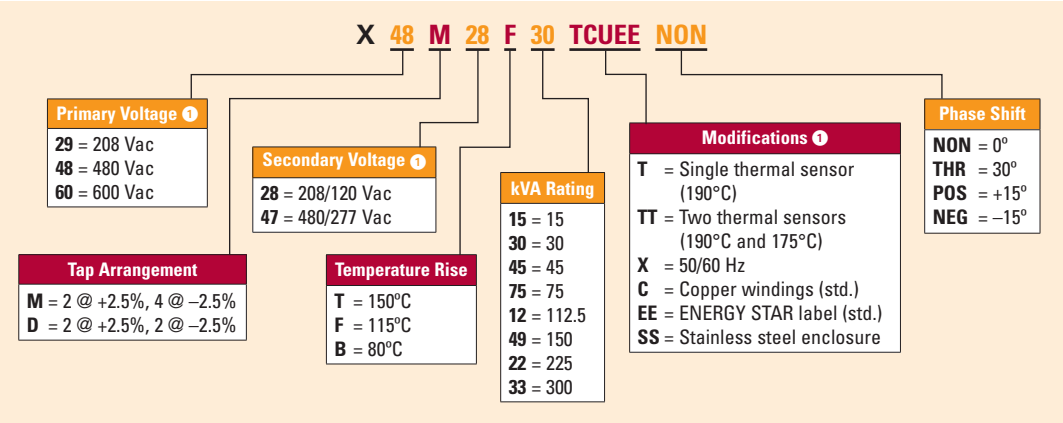
Transformer technology "rule of thumb" comparison chart

Transformer Type	Approximate Cost	Energy Usage	Power Quality Attributes
Standard delta-wye (TP-1, copper, 115C)	1X	100W	None
K-Factor K13 (copper, 115C)	1.5X–2X	130W 30% more	Designed to withstand heating effects
HMT (TP-1, copper, 115C)	1.5X–4X	40W 250% less	Corrects root cause

Transformer technology table explanation

In understanding the product placement of the HMT, it becomes useful to have some "rule of thumb" understanding to compare products. Looking at one of the aspects of an HMT—price, if a standard delta-wye transformer had a cost of one unit, a K-13 transformer would cost about double and an HMT would cost 1.5 to 4 times the unit cost. What's impressive to compare is the next column of information—"Energy Usage." If the amount of energy used by the transformer to power today's loads is compared against a standard delta-wye transformer (that was never designed to feed today's types of loads)—you can easily see that the HMT is designed to meet the issue head-on. Referring to the table's information, it would take 30 percent more energy for the transformer loss to power the same computer loads with a K-13 transformer, whereas an HMT would take 250 percent less energy to feed those same computer loads (because the HMT is designed differently than a standard delta-wye transformer and addresses the root issue of harmonic currents). A good comparison analogy is looking at the incandescent light bulb versus a compact fluorescent lamp—you might pay a bit more upfront, but because of the large energy savings (in the HMT due to the different design when feeding harmonic load), you soon realize the upfront cost pales in comparison to the potential of energy saved. Eaton can provide an estimation calculator to help determine the amount of payback and Return on Investment (ROI) based on the incremental cost of the HMT. It's very typical to return the price differential between the HMT and a standard transformer within a few years—thus using the additional 20 to 30 years of energy savings to add to the bottom line.

Catalog numbering system



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

Type NON harmonic mitigating transformer selection information

kVA	Full Cap. Taps FCAN	FCBN	Type	°C Temp. Rise	Dimensions (Inches) H	W	D	Wt Lbs	Dimensions (mm) H	W	D	Wt kg	Frame	Wiring Diagram Number	Weathershield	Style Number
15	2 @ +2.5%	4 @ –2.5%	DT-3	150	30.00	23.00	16.50	335	762	584	419	152	912B	200X	**WS38**	**X48M28T15CUEENON**
30	2 @ +2.5%	4 @ –2.5%	DT-3	150	30.00	23.00	16.50	433	762	584	419	197	912B	200X	**WS38**	**X48M28T30CUEENON**
45	2 @ +2.5%	4 @ –2.5%	DT-3	150	39.18	29.00	22.00	627	995	737	559	285	915D	200X	**WS39**	**X48M28T45CUEENON**
75	2 @ +2.5%	4 @ –2.5%	DT-3	150	46.58	27.97	23.00	926	1183	710	584	420	916A	200X	**WS19**	**X48M28T75CUEENON**
112.5	2 @ +2.5%	4 @ –2.5%	DT-3	150	56.18	31.11	24.24	1459	1427	790	616	662	917	200X	**WS34**	**X48M28T12CUEENON**
150	2 @ +2.5%	4 @ –2.5%	DT-3	150	62.18	31.25	30.25	1978	1579	794	768	898	918A	200X	**WS34**	**X48M28T49CUEENON**
225	2 @ +2.5%	4 @ –2.5%	DT-3	150	75.00	44.46	35.75	3398	1905	1129	908	1543	919X	201X	**WS35**	**X48M28T22CUEENON**
300	2 @ +2.5%	2 @ –2.5%	DT-3	150	75.00	44.46	35.75	3569	1905	1129	908	1620	919X	201X	**WS35**	**X48M28T33CUEENON**
15	2 @ +2.5%	4 @ –2.5%	DT-3	115	30.00	23.00	16.50	362	762	584	419	164	912B	200X	**WS38**	**X48M28F15CUEENON**
30	2 @ +2.5%	4 @ –2.5%	DT-3	115	30.00	23.00	16.50	434	762	584	419	197	912B	200X	**WS38**	**X48M28F30CUEENON**
45	2 @ +2.5%	4 @ –2.5%	DT-3	115	39.18	29.00	22.00	627	995	737	559	285	915D	200X	**WS39**	**X48M28F45CUEENON**
75	2 @ +2.5%	4 @ –2.5%	DT-3	115	46.58	27.97	23.00	926	1183	710	584	420	916A	200X	**WS19**	**X48M28F75CUEENON**
112.5	2 @ +2.5%	4 @ –2.5%	DT-3	115	56.18	31.11	24.24	1628	1427	790	616	739	917	200X	**WS34**	**X48M28F12CUEENON**
150	2 @ +2.5%	4 @ –2.5%	DT-3	115	62.18	31.25	30.25	2001	1579	794	768	908	918A	200X	**WS34**	**X48M28F49CUEENON**
225	2 @ +2.5%	4 @ –2.5%	DT-3	115	75.00	44.46	35.75	3596	1905	1129	908	1633	919X	201X	**WS35**	**X48M28F22CUEENON**
300	2 @ +2.5%	4 @ –2.5%	DT-3	115	75.00	44.46	35.75	3891	1905	1129	908	1767	919X	201X	**WS35**	**X48M28F33CUEENON**

Type THR harmonic mitigating transformer selection information

kVA	Full Cap. Taps FCAN	FCBN	Type	°C Temp. Rise	Dimensions (Inches) H	W	D	Wt Lbs	Dimensions (mm) H	W	D	Wt kg	Frame	Wiring Diagram Number	Weathershield	Style Number
15	2 @ +2.5%	4 @ –2.5%	DT-3	150	30.00	23.00	16.50	312	762	584	419	142	912B	203X	**WS38**	**X48M28T15CUEETHR**
30	2 @ +2.5%	4 @ –2.5%	DT-3	150	30.00	23.00	16.50	450	762	584	419	204	912B	203X	**WS38**	**X48M28T30CUEETHR**
45	2 @ +2.5%	4 @ –2.5%	DT-3	150	39.18	29.00	22.00	595	995	737	559	270	915D	203X	**WS39**	**X48M28T45CUEETHR**
75	2 @ +2.5%	4 @ –2.5%	DT-3	150	46.58	27.97	23.00	855	1183	710	584	388	916A	203X	**WS19**	**X48M28T75CUEETHR**
112.5	2 @ +2.5%	4 @ –2.5%	DT-3	150	56.18	31.11	24.24	1400	1427	790	616	636	917	203X	**WS34**	**X48M28T12CUEETHR**
150	2 @ +2.5%	4 @ –2.5%	DT-3	150	62.18	31.25	30.25	1910	1579	794	768	867	918A	203X	**WS34**	**X48M28T49CUEETHR**
225	2 @ +2.5%	4 @ –2.5%	DT-3	150	75.00	44.46	35.75	3450	1905	1129	908	1566	919X	203X	**WS35**	**X48M28T22CUEETHR**
300	2 @ +2.5%	2 @ –2.5%	DT-3	150	75.00	44.46	35.75	3894	1905	1129	908	1768	919X	203X	**WS35**	**X48M28T33CUEETHR**
15	2 @ +2.5%	4 @ –2.5%	DT-3	115	30.00	23.00	16.50	351	762	584	419	159	912B	203X	**WS38**	**X48M28F15CUEETHR**
30	2 @ +2.5%	4 @ –2.5%	DT-3	115	30.00	23.00	16.50	450	762	584	419	204	912B	203X	**WS38**	**X48M28F30CUEETHR**
45	2 @ +2.5%	4 @ –2.5%	DT-3	115	39.18	29.00	22.00	610	995	737	559	277	915D	203X	**WS39**	**X48M28F45CUEETHR**
75	2 @ +2.5%	4 @ –2.5%	DT-3	115	46.58	27.97	23.00	868	1183	710	584	394	916A	203X	**WS19**	**X48M28F75CUEETHR**
112.5	2 @ +2.5%	4 @ –2.5%	DT-3	115	56.18	31.11	24.24	1643	1427	790	616	746	917	203X	**WS34**	**X48M28F12CUEETHR**
150	2 @ +2.5%	4 @ –2.5%	DT-3	115	62.18	31.25	30.25	2121	1579	794	768	963	918A	203X	**WS34**	**X48M28F49CUEETHR**
225	2 @ +2.5%	4 @ –2.5%	DT-3	115	75.00	44.46	35.75	3370	1905	1129	908	1530	919X	203X	**WS35**	**X48M28F22CUEETHR**
300	2 @ +2.5%	4 @ –2.5%	DT-3	115	75.00	44.46	35.75	3894	1905	1129	908	1768	919X	203X	**WS35**	**X48M28F33CUEETHR**

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