

K-Factor Transformers

K-Factor transformers are designed to reduce the heating effects of harmonic currents created by loads like those shown in Chart A. The K-Factor rating is an index of the transformer's ability to withstand harmonic content while operating within the temperature limits of its insulating system. Hevi-Duty K-Factor transformers have UL ratings of K-4, K-13, and K-20.

The Hevi-Duty K-Factor design is a specialized transformer that offers these benefits:

- Conductors capable of carrying the harmonic currents of non-linear loads without exceeding the temperature rating of the insulation system.
- A transformer design that takes into account the increase in naturally occurring "stray" losses caused by non-linear loads. These losses cause standard transformers to dramatically overheat and substantially shorten design life.
- A core and coil design that manages the DC flux caused by triplen harmonics. As these harmonics increase, they cause additional current to circulate in the delta winding. This produces a DC flux in the core which leads to core saturation, voltage instability and overheating.

Features

- Conductors to carry harmonics of a K-rated load without exceeding insulation temperature ratings
- UL 1561 listed up to K-20 rated protection
- Rated temperature rise of 150°C, 220°C insulation
- Shielded for quality power
- Basic design takes "stray losses" into account and functions within safe operating temperatures
- Core and coil design engineered to manage the zero sequence flux caused by triplen harmonics
- Provides 100% rated current without overheating the windings or saturating the core



Accessories and Optional Design Styles*

- Wall mounting brackets (500 lbs maximum)
- Weather Shields (UL-3R)
- Totally enclosed non-ventilated designs (TENV) (Non UL)
- Low temperature rise units available
- Open core and coil designs (UR) (Non CSA)
- Copper Wound designs
- Alternate voltages
- Compliant to NEMA TP-1 Standards

* Not all optional designs are UL listed. Contact Technical Services.

Chart A: Typical Load K-Factors

Load	K-Factor
Electric discharge lighting	K-4
UPS with optional input filtering	K-4
Welders	K-4
Induction heating equipment	K-4
PLCs and solid state controls (other than variable speed drives)	K-4
Telecommunications equipment (e.g., PBX)	K-13
UPS without input filtering.....	K-13
Multewire receptacle circuits in general care areas of health care facilities and classrooms of schools, etc.	K-13
Multewire receptacle circuits supplying inspection or testing equipment on an assembly or production line.....	K-13
Mainframe computer loads	K-20
Solid state motor drives (variable speed drives)	K-20
Multewire receptacle circuits in critical care areas and operating/recovery rooms of hospitals	K-20

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Selection Tables: Three Phase

Group A: K-4 Rated 480 Δ Primary, 208Y/120 Secondary, 60 Hz

kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	3H4T2H15S	WS-02	23	18	14	180	1	2	18.1	41.7
30	3H4T2H30S	WS-14	28	23	16	329	1	2	36.1	83.4
45	3H4T2H45S	WS-14	28	23	16	357	1	2	54.2	125.0
75	3H4T2H75S	WS-30	34	28	22	647	1	2	90.3	208.0
112.5	3H4T2H112S	WS-10	44	33	21	890	1	2	135.0	313.0
150	3H4T2H150S	WS-10	44	33	21	1045	1	2	181.0	417.0
225	3H4T2H225S	WS-11	46	36	24	1230	1	2	271.0	625.0
300	3H4T2H300S	WS-11	46	36	24	1420	1	2	361.0	834.0
500	3H4T2H500S	WS-12	65	45	35	2460	1	2	602.0	1390.0

Group B: K-13 Rated 480 Δ Primary, 208Y/120 Secondary, 60 Hz

kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	3H13T2H15S	WS-14	28	23	16	305	1	2	18.1	41.7
30	3H13T2H30S	WS-30	34	28	22	405	1	2	36.1	83.4
45	3H13T2H45S	WS-30	34	28	22	535	1	2	54.2	125.0
75	3H13T2H75S	WS-30	34	28	22	805	1	2	90.3	208.0
112.5	3H13T2H112S	WS-10	44	33	21	972	1	2	135.0	313.0
150	3H13T2H150S	WS-11	46	36	24	1325	1	2	181.0	417.0
225	3H13T2H225S	WS-11	46	36	24	1515	1	2	271.0	625.0
300	3H13T2H300S	WS-12	65	45	35	2460	1	2	361.0	834.0

Group C: K-20 Rated 480 Δ Primary, 208Y/120 Secondary, 60 Hz

kVA	Catalog Number	NEMA 3R Weather Shield*	Height (inch)	Width (inch)	Depth (inch)	Approx. Ship Weight (lbs)	Design Style**	Elec Conn**	Primary Amps	Secondary Amps
15	3H20T2H15S	WS-14	28	23	16	305	1	2	18.1	41.7
30	3H20T2H30S	WS-30	34	28	22	405	1	2	36.1	83.4
45	3H20T2H45S	WS-30	34	28	22	535	1	2	54.2	125.0
75	3H20T2H75S	WS-30	34	28	22	805	1	2	90.3	208.0
112.5	3H20T2H112S	WS-10	44	33	21	972	1	2	135.0	313.0
150	3H20T2H150S	WS-11	46	36	24	1325	1	2	181.0	417.0
225	3H20T2H225S	WS-11	46	36	24	1515	1	2	271.0	625.0
300	3H20T2H300S	WS-12	65	45	35	2460	1	2	361.0	834.0

Electrical Connections

240 x 480 Volt Primary,
120/240 Volt Secondary
Taps: 2, 2½% FCAN; 4, 2½% FCBN

Primary Voltage	Interconnect	Connect Lines To
504	1 to 2	H1 & H2
492	2 to 3	H1 & H2
480	3 to 4	H1 & H2
468	4 to 5	H1 & H2
456	5 to 6	H1 & H2
444	6 to 7	H1 & H2
432	7 to 8	H1 & H2
252	H1 to 2 H2 to 1	H1 & H2
240	H1 to 4 H2 to 3	H1 & H2
228	H1 to 6 H2 to 5	H1 & H2
216	H1 to 8 H2 to 7	H1 & H2

Secondary Voltage	Interconnect	Connect Lines To
240	X2 to X3	X1 & X4
120-0-120	X2 to X3 X2 to ⚬	X1-X2-X4
120	X1 to X3 X2 to X4	X1 & X4

S5 Series

480 Δ Volt Primary,
208Y/120 Volt Secondary
Taps: 2, 2½% FCAN; 4, 2½% FCBN

Primary H1-H2-H3	Secondary Voltage
@ Tap	Voltage
1	504
2	492
3	480
4	468
5	456
6	444
7	432

Primary H1-H2-H3	Secondary Voltage
X1, X2, X3	X0- X1, X2, X3
208	120

T2 Series

480 Δ Volt Primary,
240 Δ W/120 CT Volt Secondary
Taps: 2, 2½% FCAN; 4, 2½% FCBN

Primary H1-H2-H3	Secondary Voltage
@ Tap	Voltage
1	504
2	492
3	480
4	468
5	456
6	444
7	432

Primary H1-H2-H3	Secondary Voltage
X1, X2, X3	X6-X1, X6-X3
240	120

T5 Series

600 Volt Primary,
120/240 Volt Secondary
Taps: 2, 2½% FCAN; 4, 2½% FCBN

Primary H1-H2-H3	Interconnect	Connect Lines To
630	1 to 2	H1 & H2
615	2 to 3	H1 & H2
600	3 to 4	H1 & H2
585	4 to 5	H1 & H2
570	5 to 6	H1 & H2
555	6 to 7	H1 & H2
540	7 to 8	H1 & H2

Secondary Voltage	Interconnect	Connect Lines To
240	X2 to X3	X1 & X4
120-0-120	X2 to X3 X2 to ⚬	X1-X2-X4
120	X1 to X3 X2 to X4	X1 & X4

S10 Series

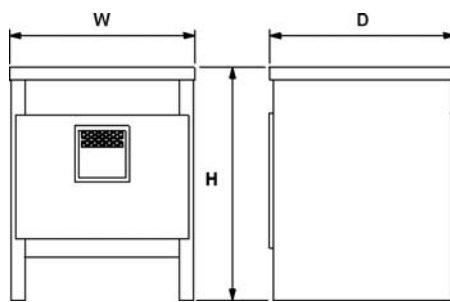
480 Δ Volt Primary
380/220 or 480Y/277 Volt Secondary
Taps: 2, 2½% FCAN; 4, 2½% FCBN

Primary H1-H2-H3	Secondary Voltage
@ Tap	Voltage
1	504
2	492
3	480
4	468
5	456
6	444
7	432

Primary H1-H2-H3	Secondary Voltage
X1, X2, X3	X0- X1, X2, X3
380 480	220 277

T79 & T81 Series

Design Style



Ventilated Design Style 1