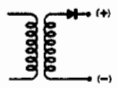
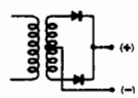
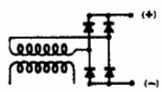
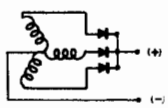
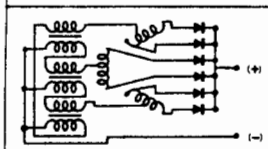
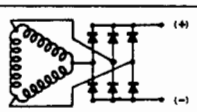
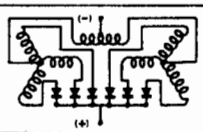
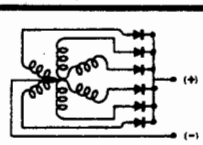
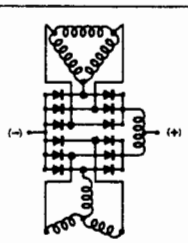
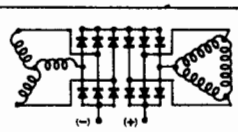
SILICON RECTIFIER CIRCUIT DIAGRAMS

	APPLICATION DATA	CIRCUIT INFORMATION						TRANSFORMER INFORMATION			POWER FACTOR	IMPEDANCE FACTOR	CONDUCTION PERIOD
	COLUMN REFERENCE NUMBER	1	2	3	4	5	6	7	8	9	10	11	12
	ABBREVIATIONS	$\frac{E_{rms}}{E_{do}}$	$\frac{f_r}{f_s}$	$\frac{I_{av}}{I_d}$	$\frac{I_{rms}}{I_d}$	$\frac{E_{pr}}{E_{do}}$	$\frac{E_{pr}}{E_{rms}}$	$\frac{I_{rms}}{I_d}$	$\frac{P_p}{P}$	$\frac{P_s}{P}$	PF	Z	β
SINGLE PHASE	 HALF WAVE RESISTIVE OR INDUCTIVE LOAD	2.22	1	1.0	1.57	3.14	1.41	1.57	2.47	3.5	0.405	200	180
	 FULL WAVE CENTER TAP	2.22	2	0.5	0.707	3.14	2.83	0.707	1.11	1.57	0.90	200	180
	 BRIDGE	1.11	2	0.5	0.707	1.57	1.41	1.00	1.11	1.11	0.90	200	180
THREE PHASE	 WYE	1.48	3	0.333	0.577	2.09	2.45	0.577	1.21	1.48	0.826	191	120
	 TRIPLE DIAMETRIC	2.22	6	0.167	0.236	3.14	2.83	0.236	1.11	1.57	0.955	200	180
	 BRIDGE	0.74	6	0.333	0.577	1.05	2.45	0.816	1.05	1.05	0.955	200	120
	 DOUBLE WYE	1.48	6	0.167	0.289	2.09	2.45	0.289	1.05	1.48	0.955	141	120
SIX PHASE	 STAR	1.48	6	0.167	0.408	2.09	2.83	0.408	1.28	1.81	0.955	58	60
	 PARALLEL BRIDGE (WITHOUT IPT)	0.715	12	0.167	0.408	1.05	2.83	0.577	1.01	1.43	0.985	200	60
	PARALLEL BRIDGE (WITH IPT)	0.74	12	0.167	0.289	1.05	2.83	0.408	1.01	1.05	0.985	200	120
	 SERIES BRIDGE	0.37	12	0.333	0.577	1.05	2.45	0.816	1.01	1.05	0.985	200	120

SILICON RECTIFIER CIRCUIT DIAGRAMS REFERENCES

COLUMN 1 — Ratio of no-load rms ac voltage (E_{rms}) (line-to-line) to no-load dc voltage (E_{do}). The no-load dc voltage is given approximately by:

$$E_{do} = (E_d + nE_f)\left\{\frac{1 + \frac{X_t}{Z} + \frac{R}{100}}{}\right\}$$

where E_d = full load dc voltage.
E_f = forward voltage drop.
n = number of devices in series per arm (half-wave).
or
2X number of devices in series per arm (bridge).
R = percent resistive drop in transformer.
X_t = percent reactive drop in transformer.
Z = impedance factor given in column 11.

Note — Busbars, saturable reactors, tap changers and system impedance may increase both the resistive and reactive voltage drop.

Note — In six-phase star circuit E_{RMS} is measured between lines 180° apart.

COLUMN 2 — Ratio of dc ripple frequency (f_r) over the line frequency (f_s).

Note — The overlap (high commutating reactance) increases the ripple voltage. Phase control also increases the ripple voltage substantially.

COLUMN 3 — Ratio of average rectified dc (I_{av}) per arm to the total dc output current (I_d).

COLUMN 4—Ratio of rms current (I_{rms}) per arm to the total dc output current (I_d).

Note — Fuses are dimensioned for rms current.

COLUMN 5 — Ratio of the reverse voltage across the rectifier (E_{Pr}) to the no-load dc voltage E_{do}.

COLUMN 6 — Ratio of the reverse voltage across the rectifier (E_{Pr}) to the secondary rms voltage (E_{rms}) across the transformer leg.

COLUMN 7 — Ratio of the secondary rms current (I_{rms}) in the line from the transformer to the total dc output current (I_d).

Note — Fuses in the ac leads of bridge rectifiers must be dimensioned for this secondary current.

COLUMN 8 — Ratio of the primary rated power (P_p) of the rectifier transformer to the ideal output power (P) of the rectifier. This power is given by $P = I_{dc} \times E_{do}$.

COLUMN 9 — Ratio of the secondary rated power (P_s) of the rectifier transformer to the ideal output power (P) of the rectifier. (See column 8.)

COLUMN 10 — Maximum obtainable power factor. Ratio of the apparent power (in KVA) to the real power (in KW) in the primary of the transformer. Overlap and phase control reduce the power factor to a value below this maximum.

COLUMN 11 — The impedance factor needed to calculate voltage drop.

COLUMN 12 — The conduction period.