EWS1500

EVALUATION DATA

型式データ

DWG. No. A115-53-01			
承認	承認	査閲	担当
'90.1.26	'90.1.26	'90.1.25	'90.1.20

NEMIC·LAMBDA

INDEX

1. Specifications — 2/43
2. Evaluation data — 3/43 ~ 6/43
3. Characteristics

3-1 Steady state data

(1) Regulation-line and load, temp. drift — 7/43 ~ 10/43

(2) Output voltage and ripple voltage v.s. input voltage — 11/43 · 12/43

(3) Efficiency and input current v.s. output current — 13/43 · 14/43

3-2 Warm up voltage drift — 15/43

3-3 O.C.P characteristics — 16/43 ~ 19/43

3-4 O.V.P characteristics — 20/43

3-5 Output rise time — 21/43 ~ 24/43

3-6 Output fall time — 25/43 ~ 28/43

3-7 Output rise time with ON/OFF CONTROL — 29/43

3-8 Output fall time with ON/OFF CONTROL — 30/43

3-9 Hold up time — 31/43 32/43

3-10 Dynamic line — Response — 33/43

3-11 Dynamic load — Response — 34/43 ~ 36/43

3-12 Response to brown out — 37/43 38/43

3-13 Inrush current characteristics — 39/43 40/43

3-14 Inrush current waveform — 41/43

3-15 Leakage current — 42/43

3-16 PV voltage v.s. output voltage — 43/43

EWS1500 SPECIFICATIONS

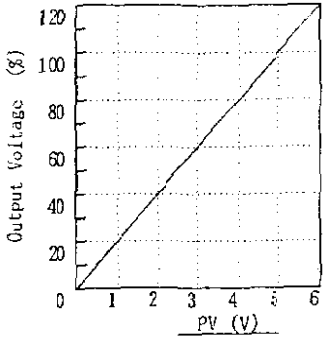
1115 - 01 - 01F

	Items \ Model		EWS1500 -2	EWS1500 -3.3	EWS1500 -5	EWS1500 -10	EWS1500 -12	EWS1500 -15	EWS1500 -24	EWS1500 -36	EWS1500 -48
1	Nominal Output Voltage	V	2	3.3	5	10	12	15	24	36	48
2	Maximum Output Current	A	300	300	300	150	125	100	63	42	32
3	Maximum Output Power	W	600	990	1500	1500	1500	1500	1512	1512	1536
4	Efficiency (Typ) (*1)	%	65	70	80	81	81	82	83	83	84
5	Input Voltage Range (*2)	—	1φ 85 ~ 132VAC / 170 ~ 265VAC (Selectable), 47 ~63Hz AC Input Voltage and Frequency Range Shown on Panel Label 100-120V~, 200-240V~ (50/60Hz)								
6	Input Current (Typ) (*1)	A	100VAC…16A 200VAC…8A	100VAC…24A 200VAC…12A	100VAC·····32A 200VAC·····16A						
7	In-rush Current (Typ) (*3)	A	30A at 100VAC / 60A at 200VAC								
8	Output Voltage Range (Typ) *4	—	±20%								
9	Maximum Ripple & Noise	mV	100		200				400		
10	Maximum Line Regulation (*5)	mV	20	20	20	40	48	60	96	144	192
11	Maximum Load Regulation (*6)	mV	30	30	30	60	72	90	144	216	288
12	Over Current Protection (*7)	%	105 ~ 130								
13	Over Voltage Protection (*8)	V	Vo+0.4~0.8	Vo+0.66~1.32	Vo+1.0~2.0	Vo+2.0~4.0	Vo+2.4~4.8	Vo+3.0~6.0	Vo+4.8~9.6	Vo+7.2~14.4	Vo+9.6~19.2
14	Hold-Up Time (Typ) (*9)	—	20ms								
15	Remote Sensing	—	Possible								
16	Remote ON/OFF Control	—	Possible								
17	Parallel Operation	—	Possible (with current balance)								
18	Series Operation	—	Possible								
19	Operating Temperature (*10)	—	-10 ~ +60℃								
20	Operating Humidity	—	30% ~ 90% RH (No dewdrop)								
21	Storage Temperature	—	-30 ~ +85℃								
22	Storage Humidity	—	10% ~ 95% RH (No dewdrop)								
23	Cooling	—	Forced air by blower fan (Blower fan is mounted within supply)								
24	Temperature Coefficient	—	Less than 2% at -10℃ ~ +60℃								
25	Withstand Voltage (*11)	—	Input - Chassis····2.5kVAC Input - Output····3.75kVAC 1min. Output - Chassis····500VAC 1min.								
26	Isolation Resistance	—	More than 100MΩ at 25℃ and 70% RH Output-Chassis···500VDC								
27	Vibration	—	Less than 19.6m/s²								
28	Shock	—	Less than 196.1m/s²								
29	Weight	—	7.0kg								
30	Size (W·H·D)	mm	(200×97×300) Refer to Outline Drawing								
31	Monitoring Signal (*12)	—	PF (Open Collector Output)								

NOTES

* 1 : At 100V/200VAC & Maximum output power.
* 2 : For cases where conformance to various safety specs (UL,CSA,etc) are required, input voltage range will be 100-120V~, 200-240V~ (50/60Hz)
* 3 : When resuming operation in less than 5 sec after power failure at no load, softstart circuit will not limit the in-rush current at turn-on.
* 4 : By means of V.adj. on front panel. Also by PV controlling output voltage is adjustable from 0V to the Maximum output voltage (Rating ×120%). Refer to Fig. 1. Ratings : Refer to Fig. 2.
* 5 : From 85 ~ 132VAC or 170 ~ 265VAC, constant load.
* 6 : From No load ~ Full load, constant input voltage.
* 7 : Constant current limiting with automatic recovery. (The unit automatically shuts down the output when it is left for 5 seconds (TYP) under the state that OCP is operating and the output voltage is less than PF detected level.)
* 8 : At rated voltage. Inverter shut-down method, manual reset. (OVP circuit will shut-down output) OVP trip point varies with tracking the output voltage.
* 9 : At 200VAC, Nominal output voltage & Maximum output current.
*10 : Ratings - Refer to Derating Curve on the Fig. 3.
*11 : Leakage current range used : Input - Chassis greater than 20mA
Input - Output greater than 20mA
Output - Chassis greater than 330mA
*12 : PF voltage varies with tracking output voltage.

Fig. 1 Output Voltage Control



*PV setting allowance : At rated input and no load, ±2% of required output voltage or ±1% of nominal output voltage, whichever is greater.

Fig. 2 Derating Curve

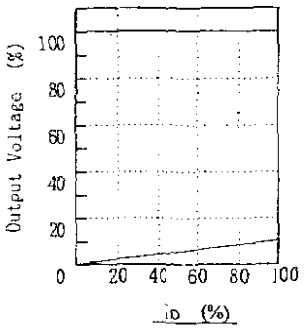
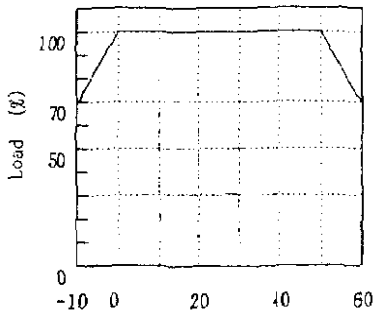
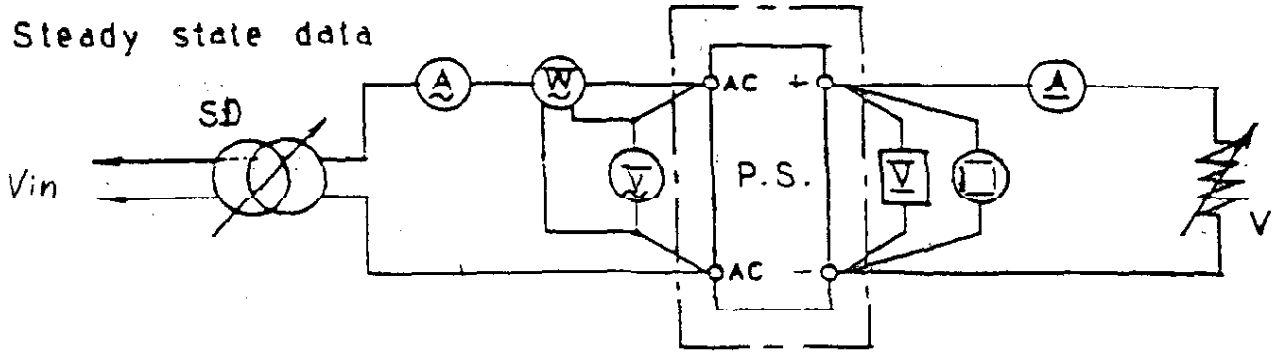


Fig. 3 Derating Curve



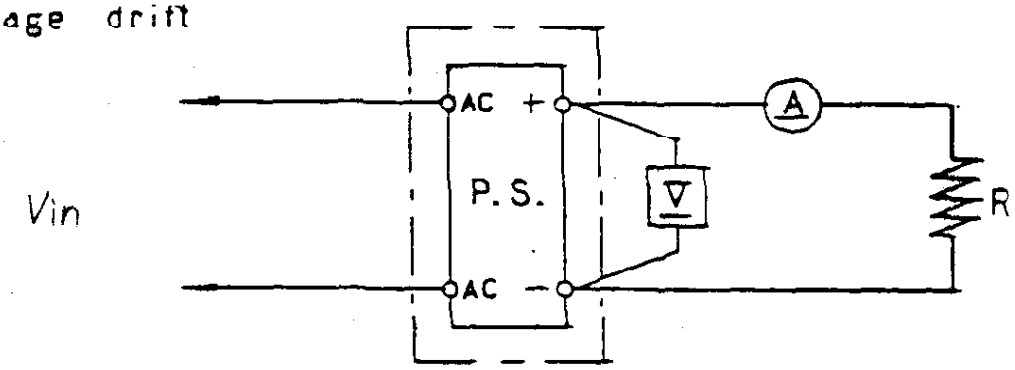
Circuits used for determination

(1) Steady state data



controlled temp., chamber

(2) Warm up voltage drift

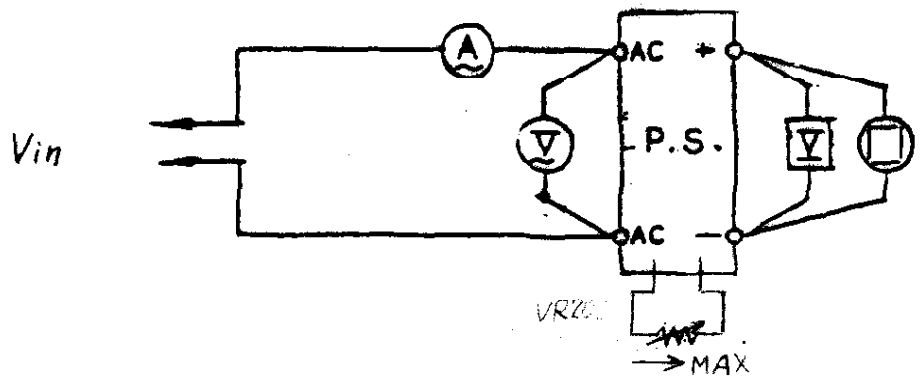


contorolled temp., chamber

(3) Over current protection (o.c.p) characteristics

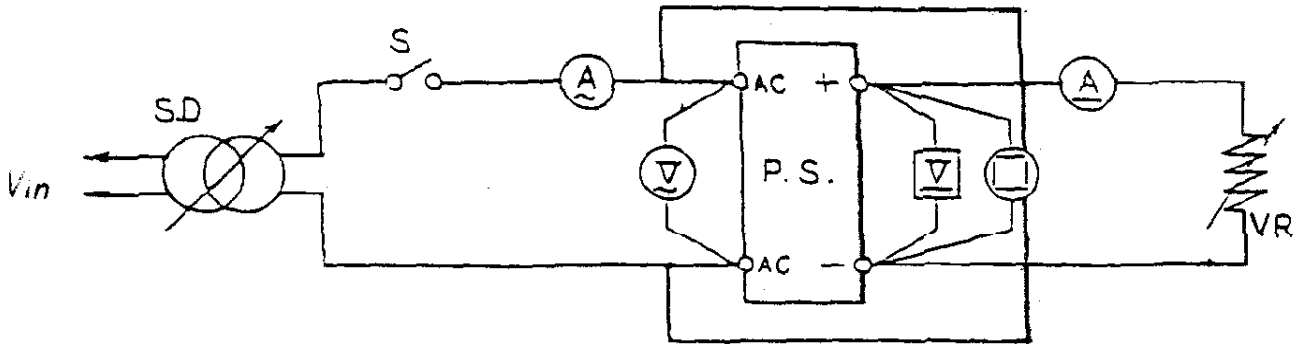
Same as steady state data.

(4) Over voltage protection (o.v.p) characteristics



VR202 within P.S.

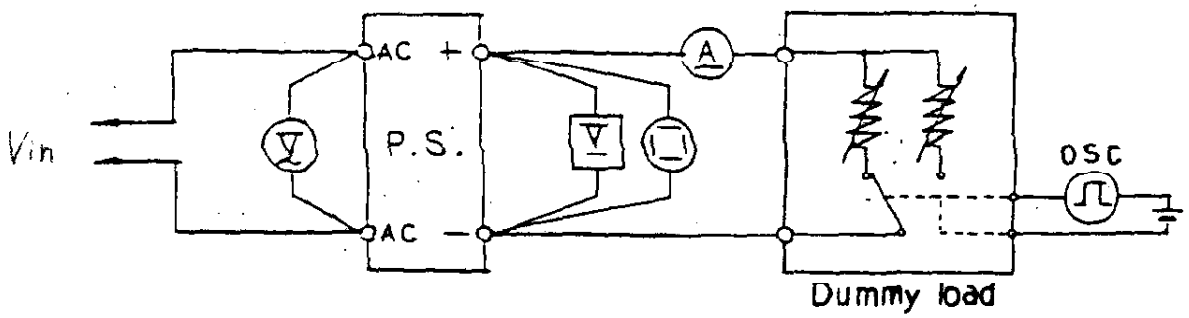
(5) Output rise characteristics



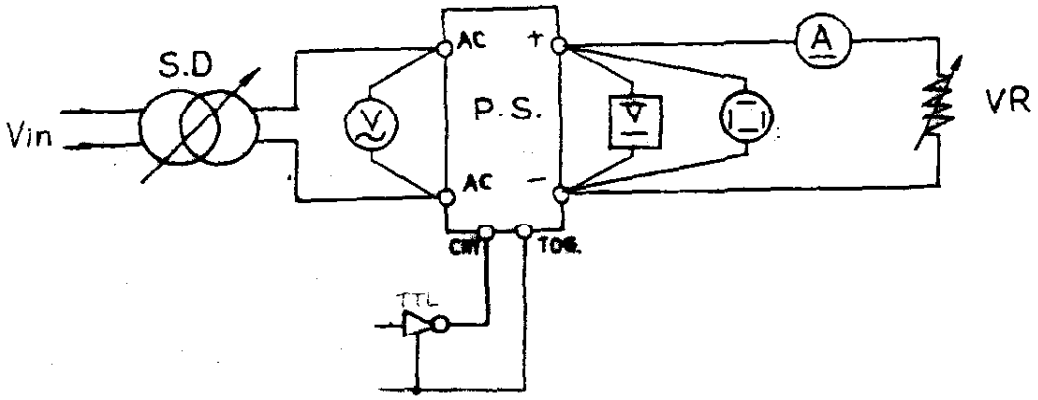
(6) Output fall characteristics

Same as output rise characteristics.

(7) Dynamic load response



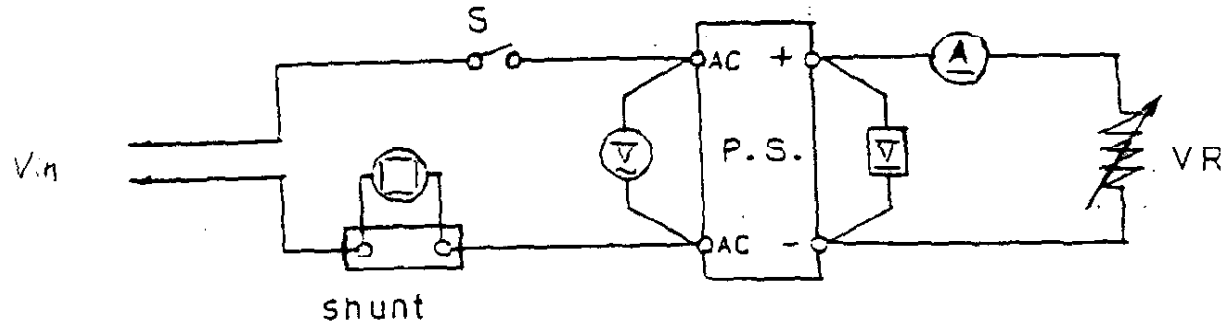
(8) Rise time characteristics using remote ON/OFF control



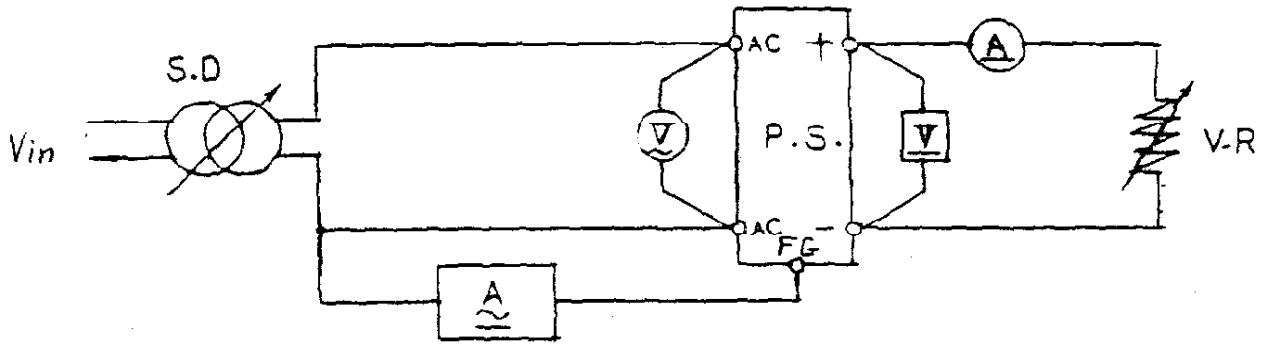
(9) Fall time characteristics using remote ON/OFF control

Same as rise time characteristics using remote ON/OFF control

(10)Inrush current characteristics



(11)Leakage current



leakage current meter

Note : ·Leakage current measured through a 1kΩ resistor.

·Range wed — AC + DC

List of equipment used

	EQUIPMENT USED	MANUFACTURER	MODEL.NO
1	Oscilloscope	HITACHI·DENSHI	V-650F
2	Storage oscilloscope	SONY·TEKTRONIX	7633
3	Digital volt meter	A & D	5512A
4	A.C. Ampere meter	YOKOGAWA·ELEC.,	2053
5	A.C. Volt meter	〃	2052
6	A.C. Watt meter	〃	2533
7	D.C. Ampere meter	〃	2012
8	Variac	MATSUNAGA	SD-2650
9	Dynamic dummy load	KIKUSUI·ELEC.,	PLZ1002W
10	Controlled temp., chamber	ETAC	ELH-868-40
11	Leakage current meter	YOKOGAWA;ELEC.,	3226
12			
13			
14			
15			
16			
17			
18			
19			

EWS1500

Regulation - line and load, temp. drift

5 V

1. Regulation - line and load Condition Ta: 25°C

Iout \ Vin	85 VAC	100 VAC	132 VAC	line regulation	
0 %	5.006 V	5.006 V	5.005 V	1 mv	0.02 %
50 %	5.033 V	5.032 V	5.028 V	5 mv	0.10 %
100 %	5.030 V	5.032 V	5.028 V	4 mv	0.08 %
load regulation	27 mv	26 mv	23 mv		
	0.54 %	0.52 %	0.46 %		

2. Temperature drift Conditions Vin: 100 VAC, Iout: 100 %

Ta	0 °C	25 °C	50 °C	Temp. stability	
Vout	5.050 V	5.032 V	5.027 V	23 mv	0.46 %

10 V

1. Regulation - line and load Condition Ta: 25°C

Iout \ Vin	85 VAC	100 VAC	132 VAC	line regulation	
0 %	10.019 V	10.018 V	10.017 V	2 mv	0.02 %
50 %	10.068 V	10.064 V	10.062 V	6 mv	0.06 %
100 %	10.030 V	10.025 V	10.013 V	17 mv	0.17 %
load regulation	49 mv	46 mv	49 mv		
	0.49 %	0.46 %	0.49 %		

2. Temperature drift Conditions Vin: 100 VAC, Iout: 100 %

Ta	0 °C	25 °C	50 °C	Temp. stability	
Vout	10.029 V	10.025 V	10.009 V	20 mv	0.20 %

EWS1500

Regulation - line and load . temp. drift

24 V

1. Regulation - line and load

Condition Ta: 25°C

Iout \ Vin	85 VAC	100 VAC	132 VAC	line regulation	
0 %	24.04 V	24.04 V	24.03 V	10 mv	0.04 %
50 %	24.17 V	24.16 V	24.14 V	30 mv	0.13 %
100 %	24.14 V	24.12 V	24.09 V	50 mv	0.21 %
load regulation	130 mv	120 mv	110 mv		
	0.54 %	0.50 %	0.46 %		

2. Temperature drift

Conditions Vin : 100 VAC
Iout: 100 %

Ta	0 °C	25 °C	50 °C	Temp.stability	
Vout	24.13 V	24.12 V	24.11 V	20 mv	0.08 %

EWS1500

Regulation - line and load , temp. drift

5 V

1. Regulation - line and load

Condition Ta : 25°C

Iout \ Vin	170 VAC	200 VAC	265 VAC	line regulation	
0 %	5.007 V	5.006 V	5.006 V	1 mv	0.02 %
50 %	5.033 V	5.031 V	5.029 V	4 mv	0.08 %
100 %	5.028 V	5.030 V	5.027 V	3 mv	0.06 %
load regulation	26 mv	25 mv	23 mv		
	0.52 %	0.50 %	0.46 %		

2. Temperature drift

Conditions Vin : 200 VAC
Iout : 100 %

Ta	0 °C	25 °C	50 °C	Temp.stability	
Vout	5.051 V	5.030 V	5.023 V	28 mv	0.56 %

10 V

1. Regulation - line and load

Condition Ta : 25°C

Iout \ Vin	170 VAC	200 VAC	265 VAC	line regulation	
0 %	10.020 V	10.019 V	10.017 V	3 mv	0.03 %
50 %	10.067 V	10.063 V	10.059 V	8 mv	0.08 %
100 %	10.030 V	10.025 V	10.015 V	15 mv	0.15 %
load regulation	47 mv	44 mv	44 mv		
	0.47 %	0.44 %	0.44 %		

2. Temperature drift

Conditions Vin : 200 VAC
Iout : 100 %

Ta	0 °C	25 °C	50 °C	Temp.stability	
Vout	10.029 V	10.025 V	10.009 V	20 mv	0.20 %

EWS1500

Regulation - line and load . temp. drift

24 V

1. Regulation - line and load

Condition Ta : 25°C

Iout \ Vin	170 VAC	200 VAC	265 VAC	line regulation	
0 %	24.04 V	24.04 V	24.03 V	10 mv	0.04 %
50 %	24.17 V	24.15 V	24.13 V	40 mv	0.17 %
100 %	24.14 V	24.13 V	24.08 V	60 mv	0.25 %
load regulation	130 mv	110 mv	100 mv		
	0.54 %	0.46 %	0.42 %		

2. Temperature drift

Conditions Vin : 200 VAC
Iout : 100 %

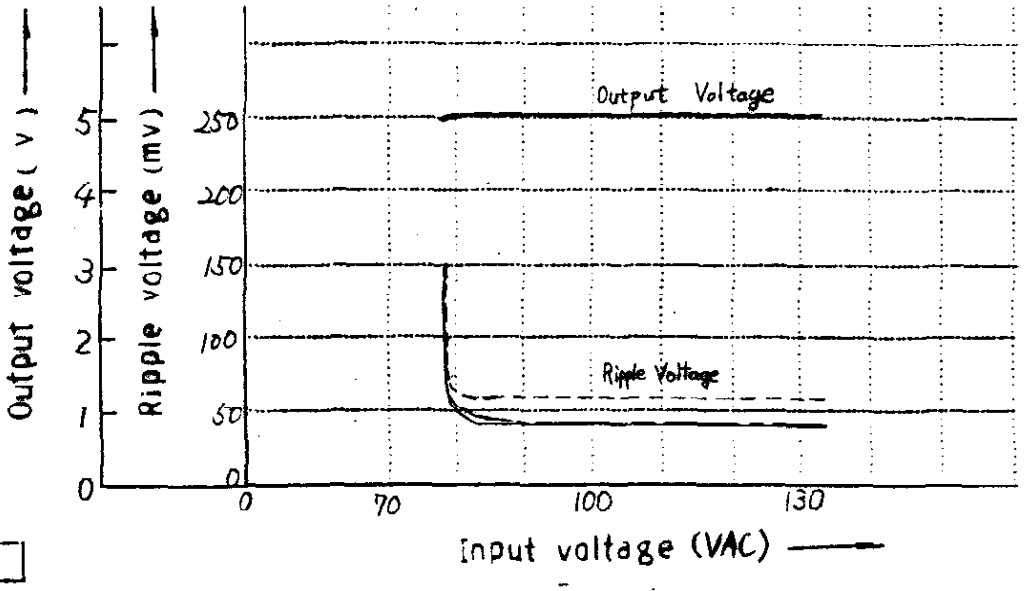
Ta	0 °C	25 °C	50 °C	Temp.stability	
Vout	24.15 V	24.13 V	24.11 V	40 mv	0.17 %

Output voltage and ripple voltage v.s. input voltage

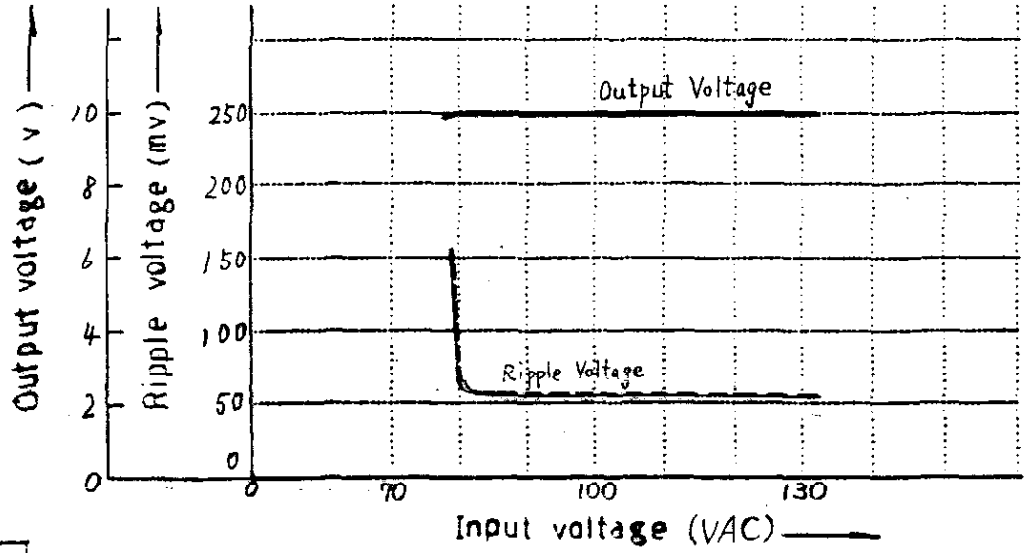
EWS1500

Conditions Iout : 100%
Ta : 0°C ----- 25°C — — 50°C ———

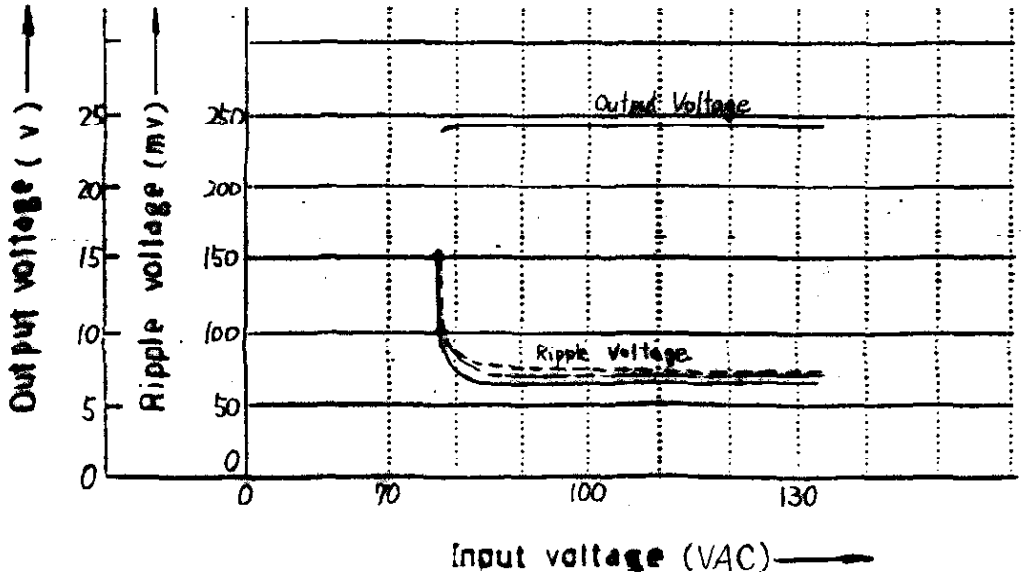
5 V



10 V



24 V

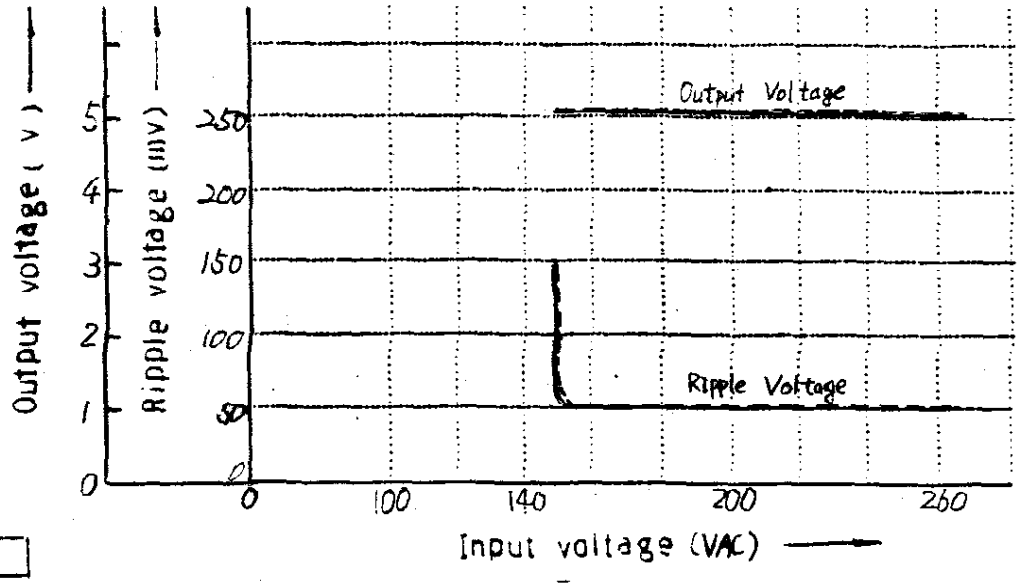


Output voltage and ripple voltage vs. input voltage

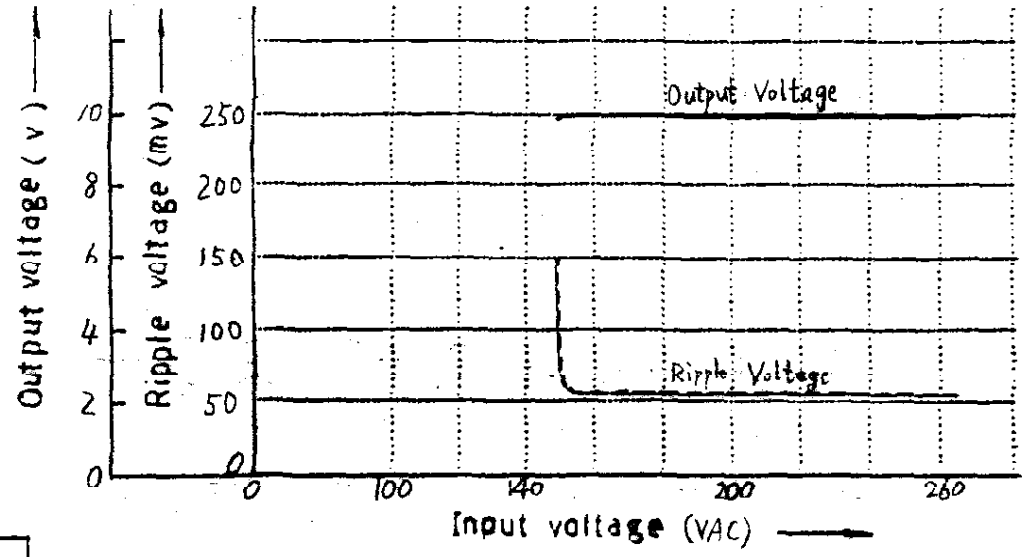
EWS1500

Conditions Iout : 100%
Ta : 0°C - - - -
25°C — · —
50°C ——

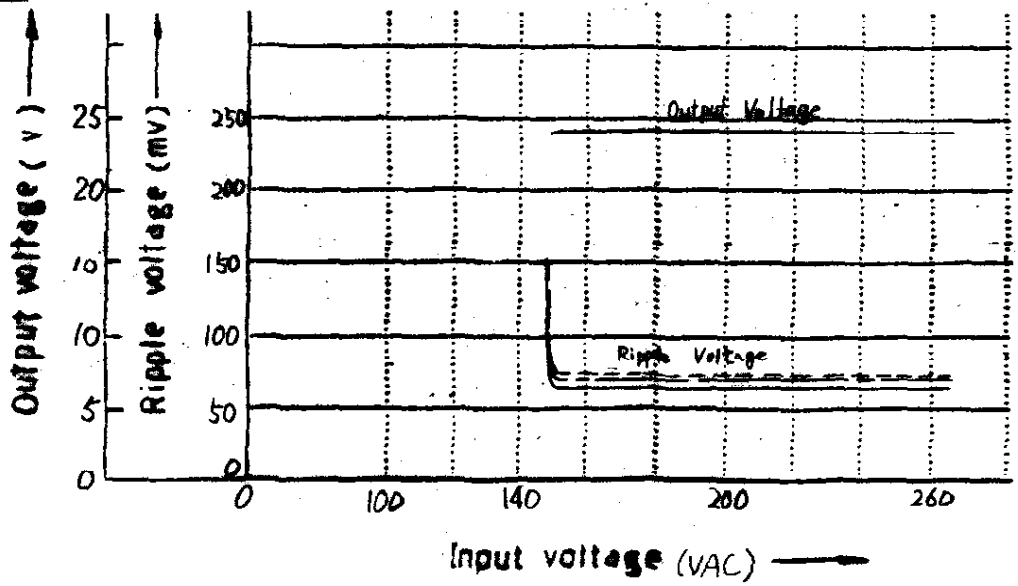
5 V



10 V



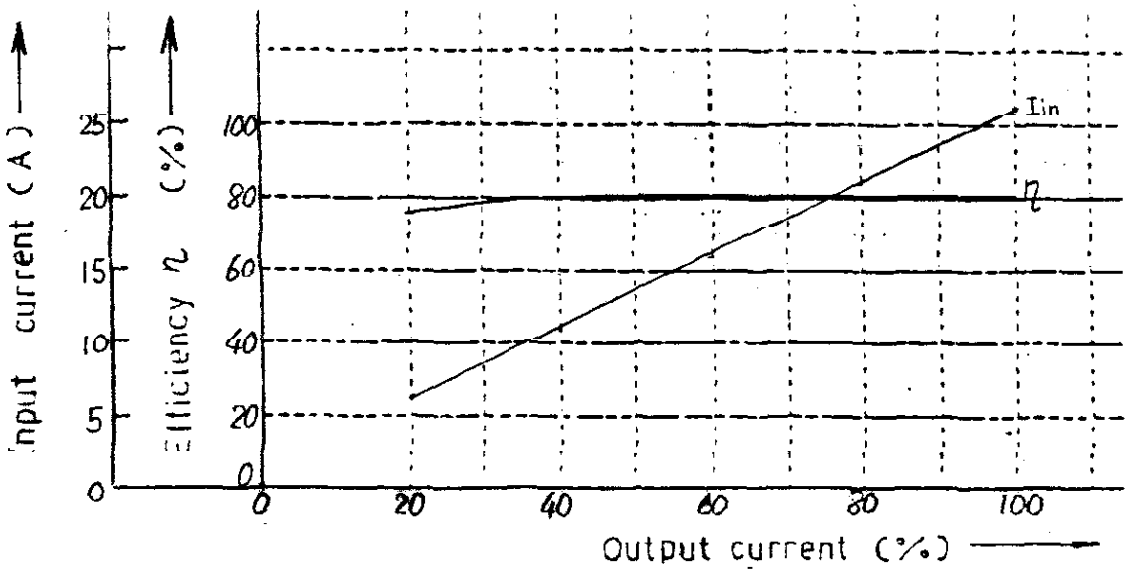
24 V



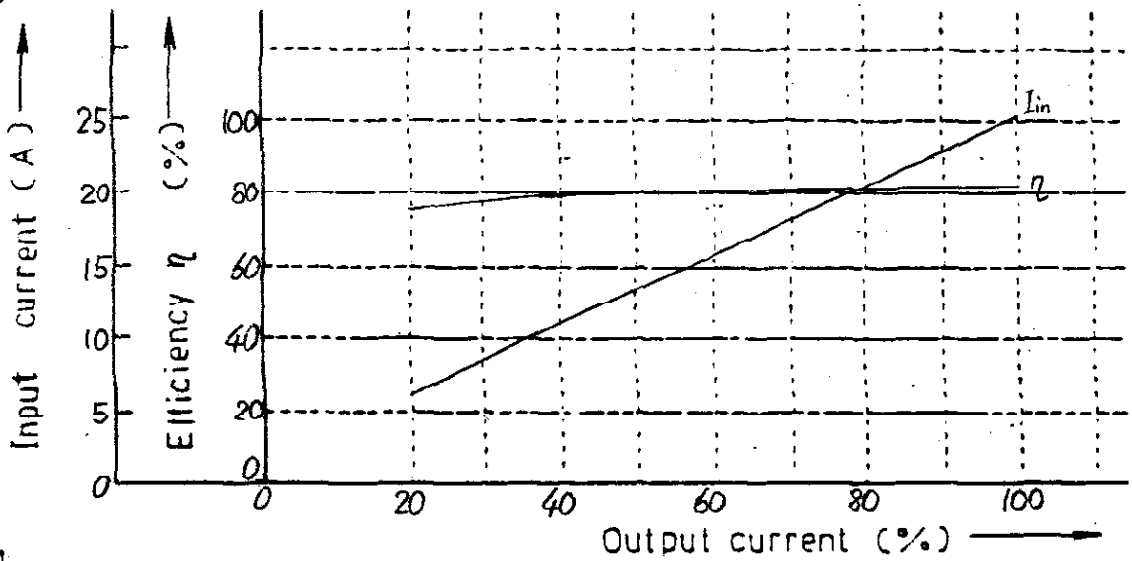
Efficiency and input current v.s. output current

Conditions Vin : 100 VAC
Ta : 25°C

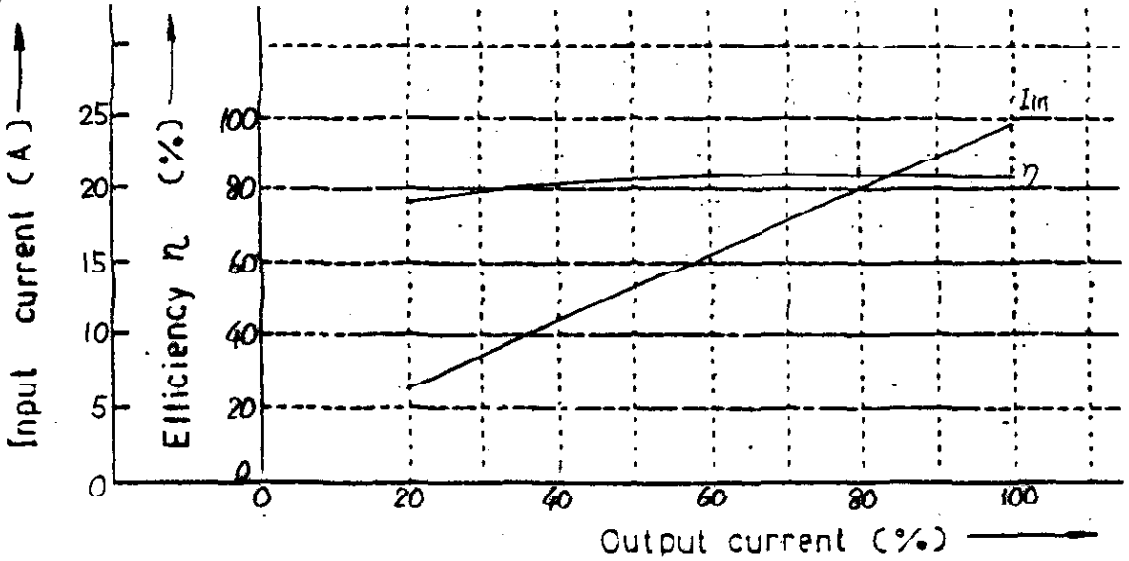
5 V



10 V



24 V

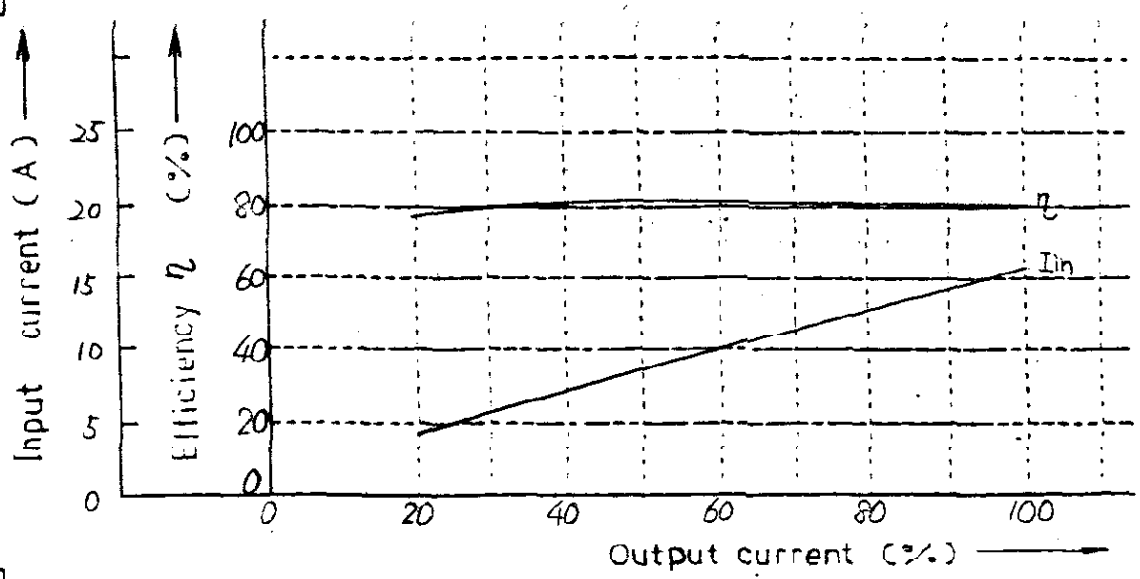


Efficiency and input current v.s. output current

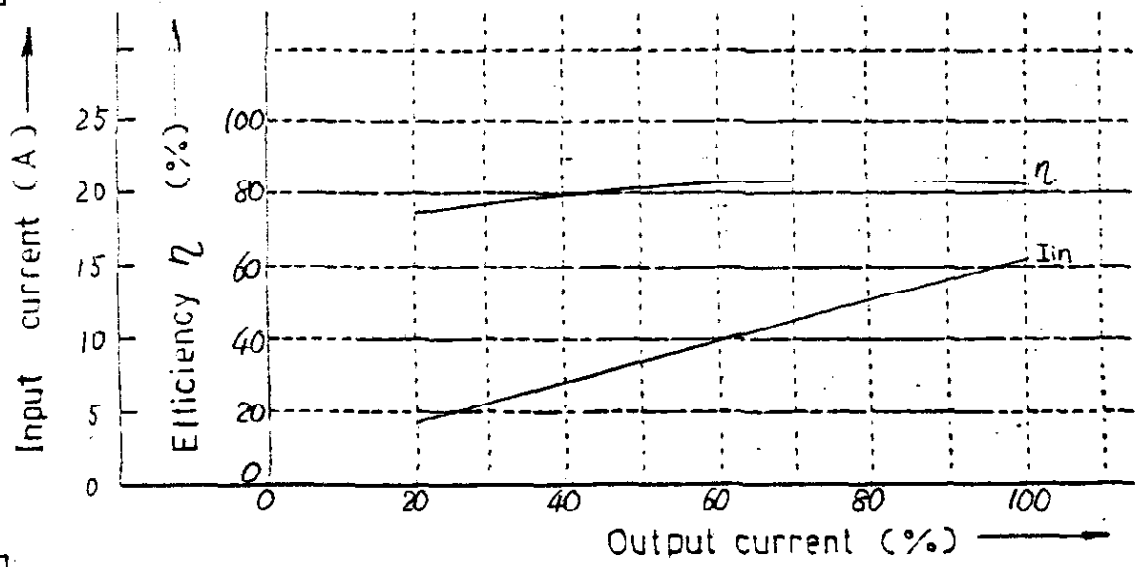
EWS1500

Conditions Vin : 200 VAC
Ta : 25°C

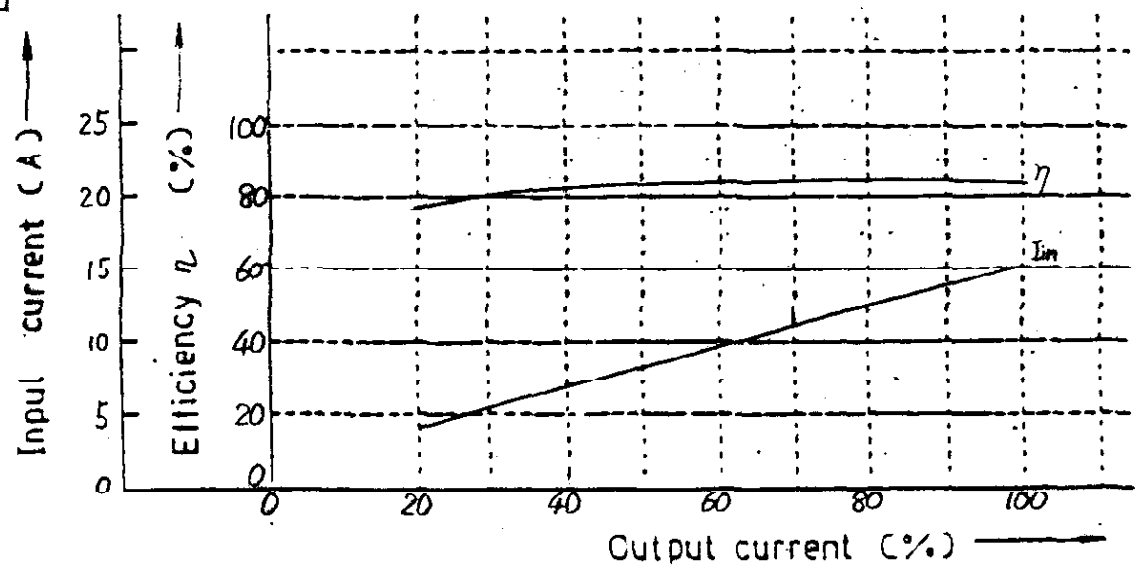
5 V



10 V



24 V

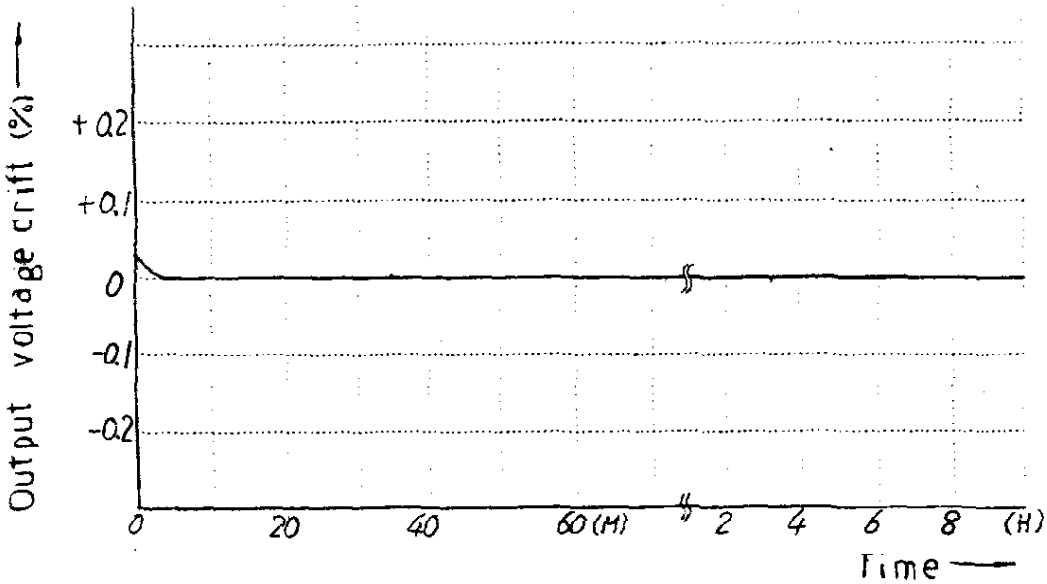


EWS1500

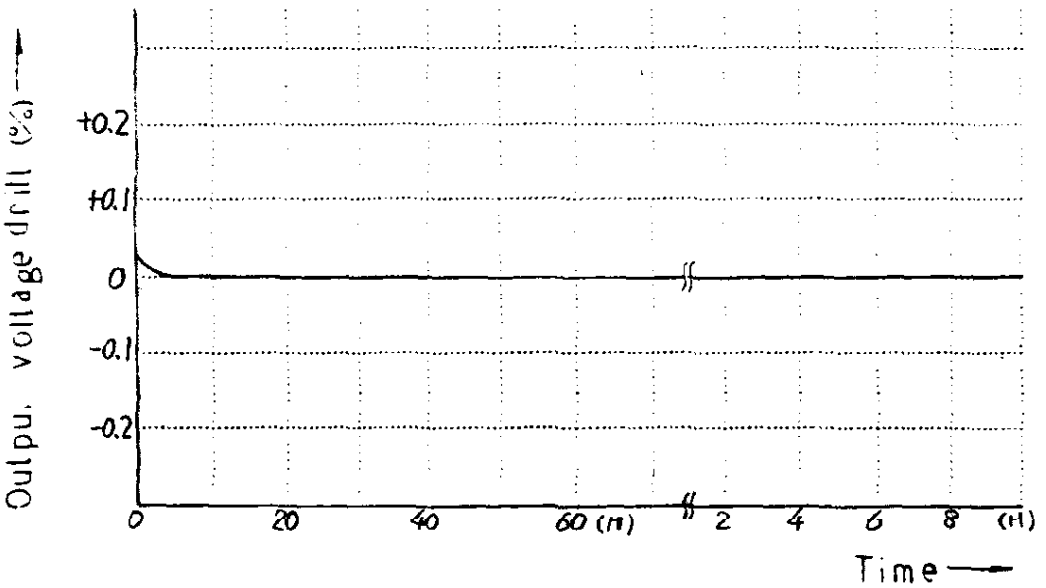
Warm up voltage drift

Conditions Vin : 200 VAC
Vout.Iout : 100 %
Ta : 25 °C

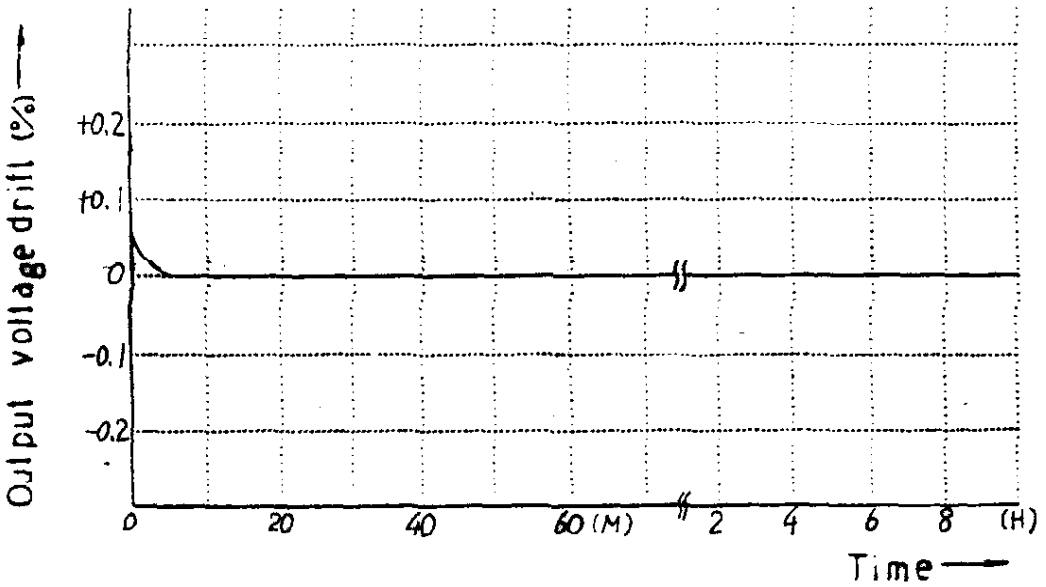
5 V



10 V



24 V

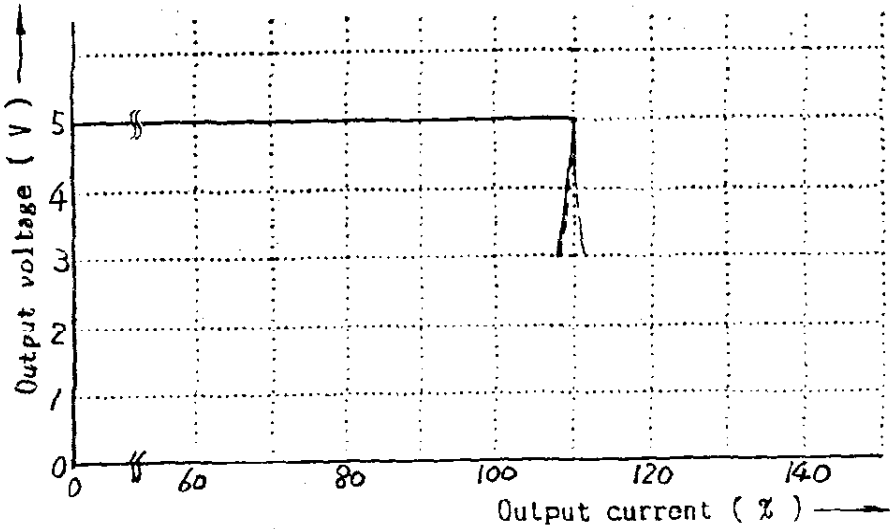


EWS1500

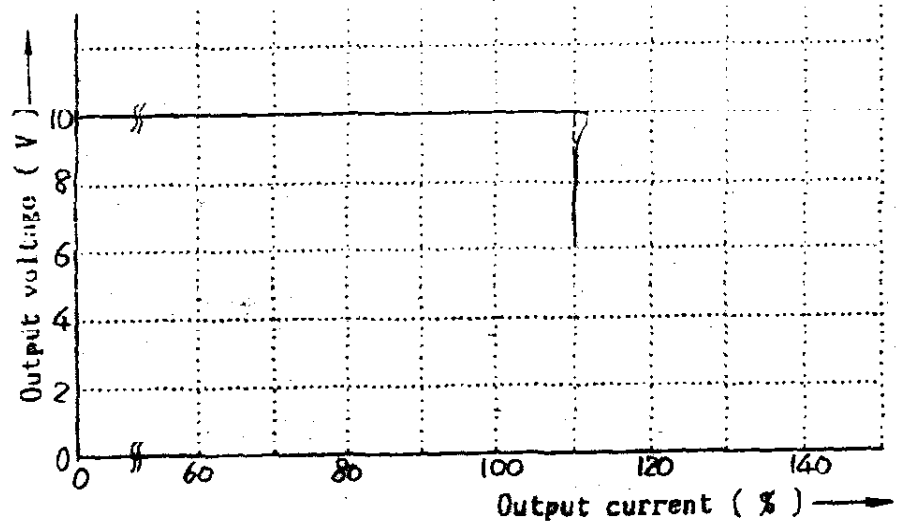
O. C. P. Characteristics

Conditions Vin : 85VAC ———
100VAC - - - - - -
132VAC — · —
Ta : 25 ℃

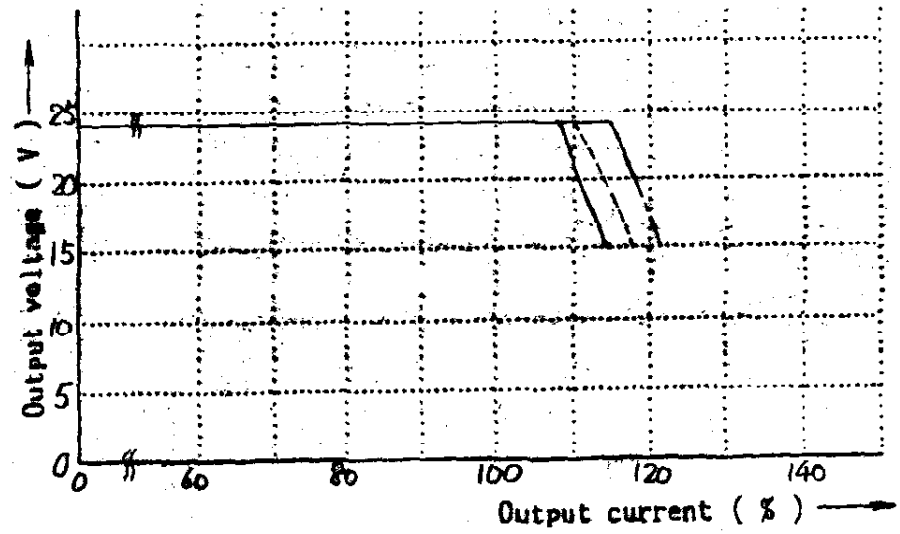
5 V



10 V



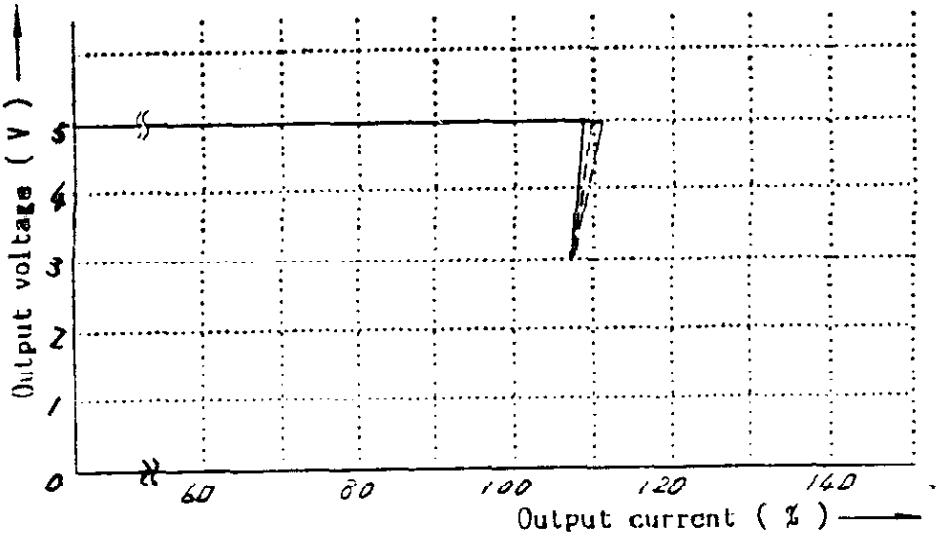
24 V



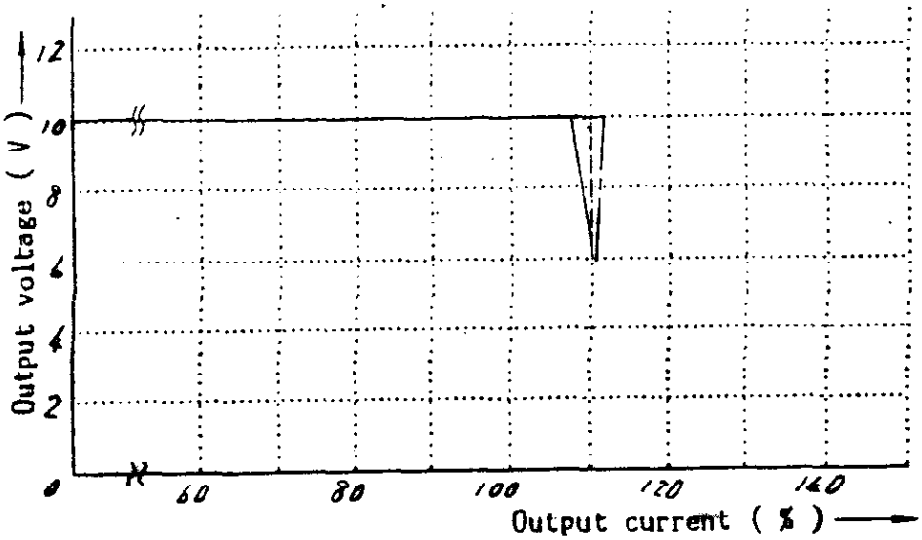
D. C. P. Characteristics

Conditions Vin : AC 100VAC
Ta : 0 ℃ ———
25 ℃ - - - - -
50 ℃ —·—

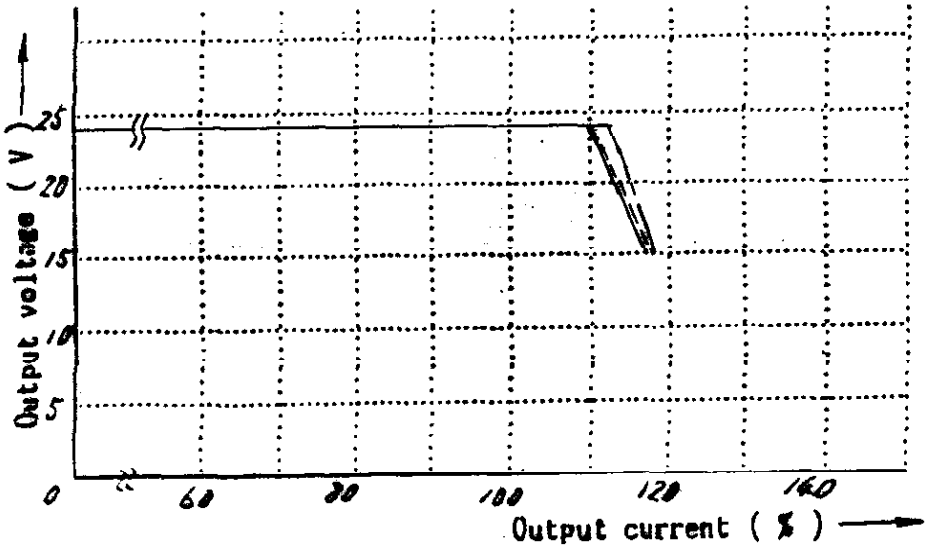
5V



10V



24V



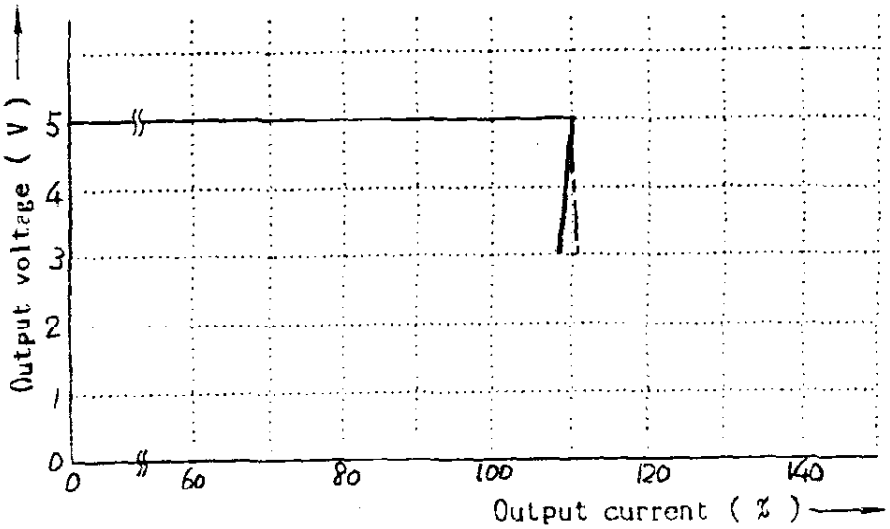
EWS1500

O. C. P. Characteristics

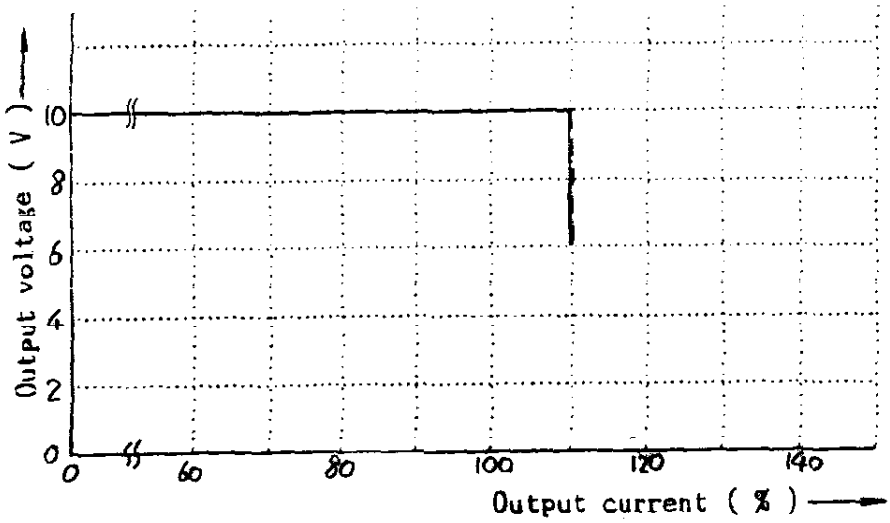
Conditions Vin : 170VAC ——
200VAC ------
265VAC —·—

Ta : 25 ℃

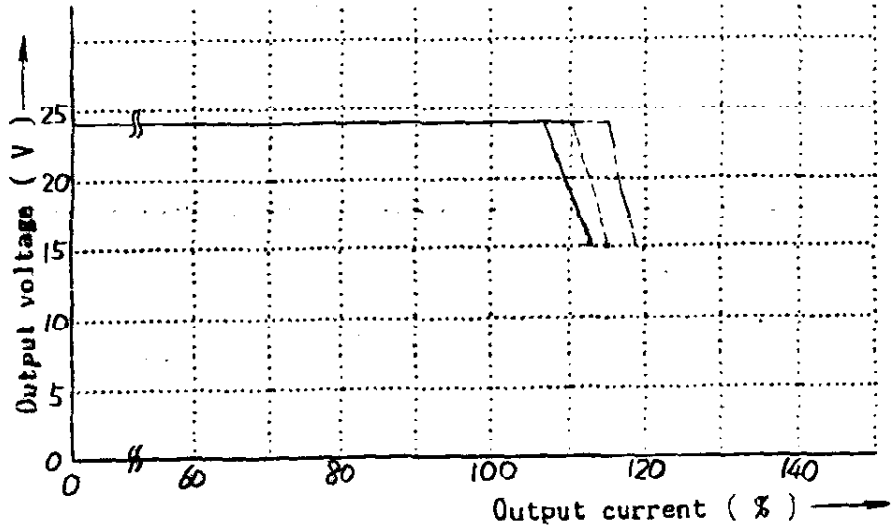
5 V



10 V



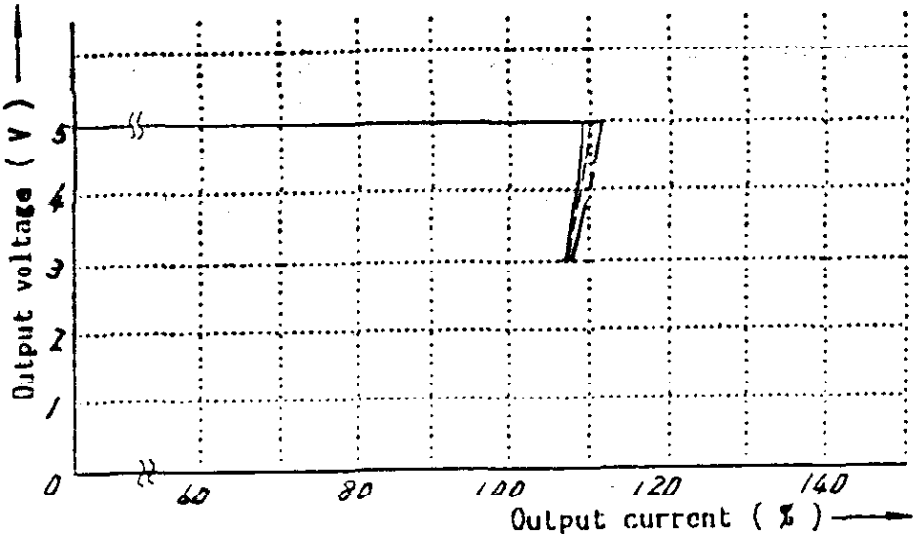
24 V



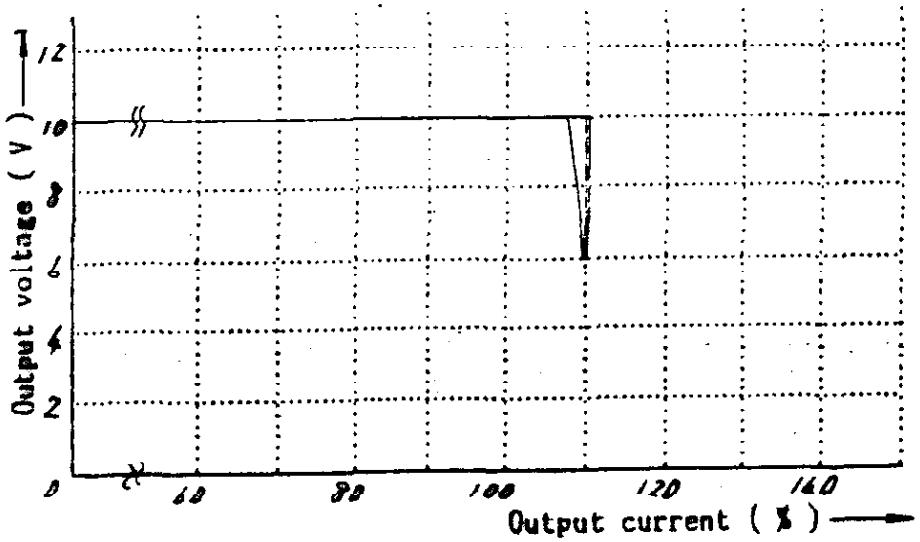
O. C. P. Characteristics

Conditions Vin : 200 VAC
Ta : 0 ℃ ——
25 ℃ - - - - -
50 ℃ —·—

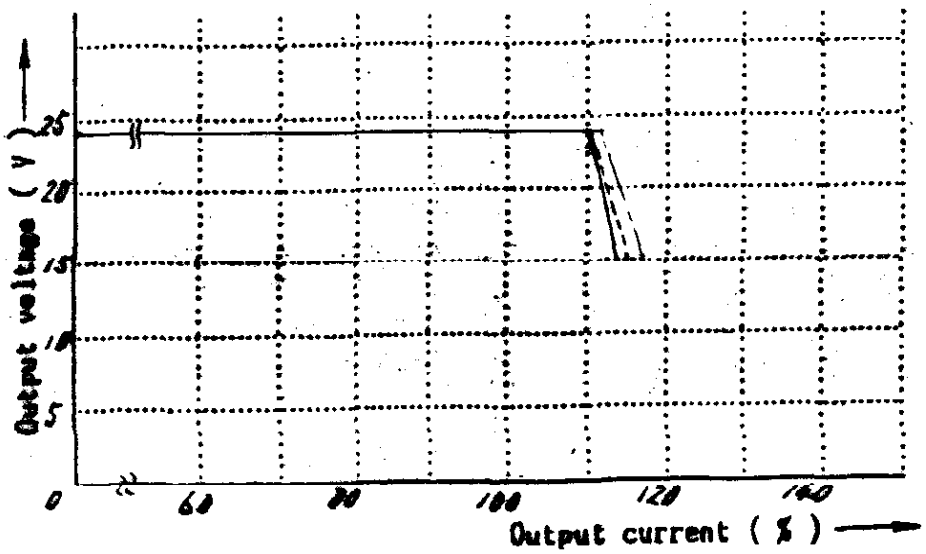
5V



10V



24V

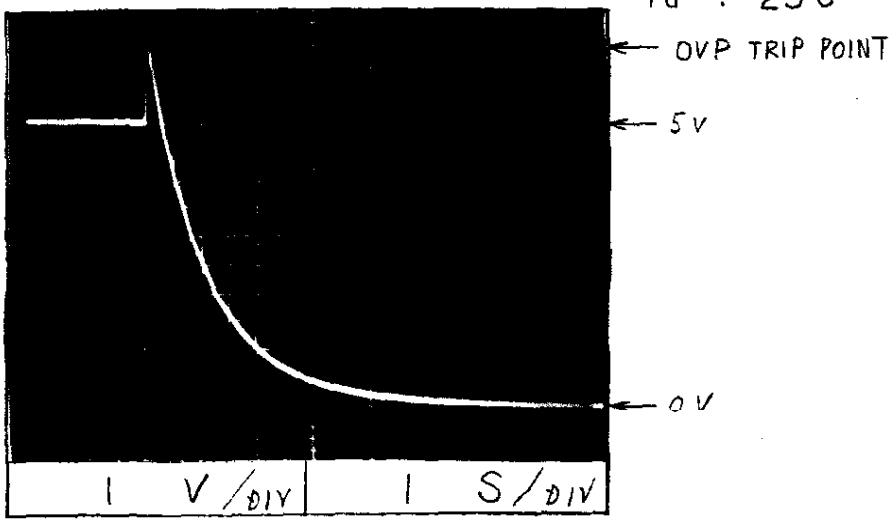


O.V.P. Characteristics

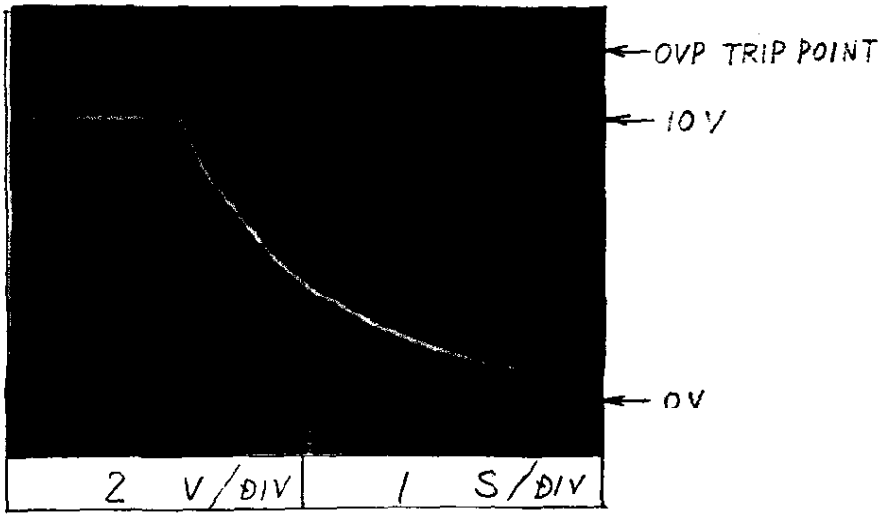
EWS 1500

Conditions Vin : 200VAC
Iout : 0%
Ta : 25°C

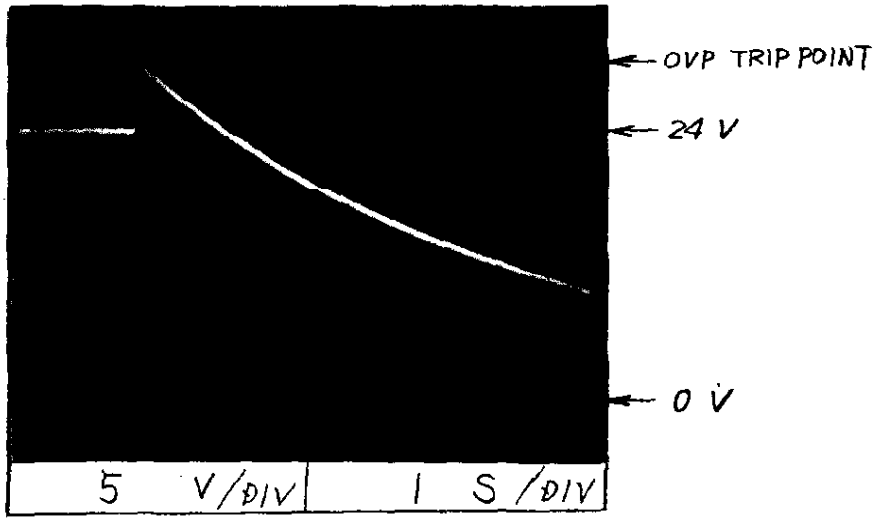
5 V



10 V



24 V

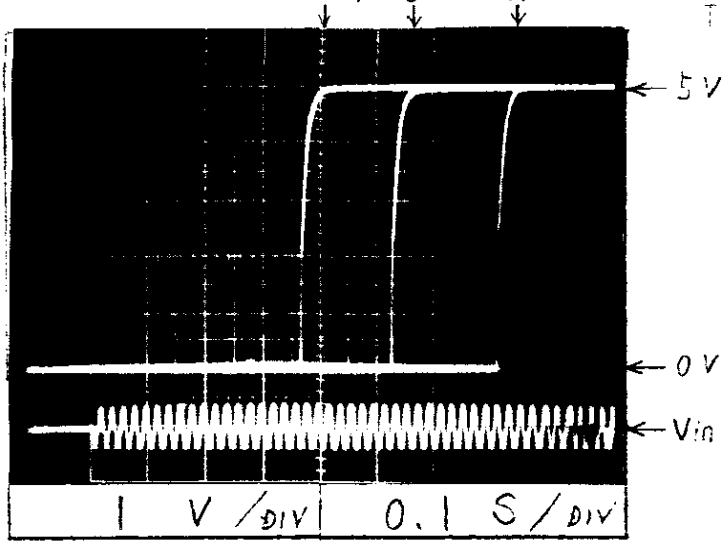


Output rise time

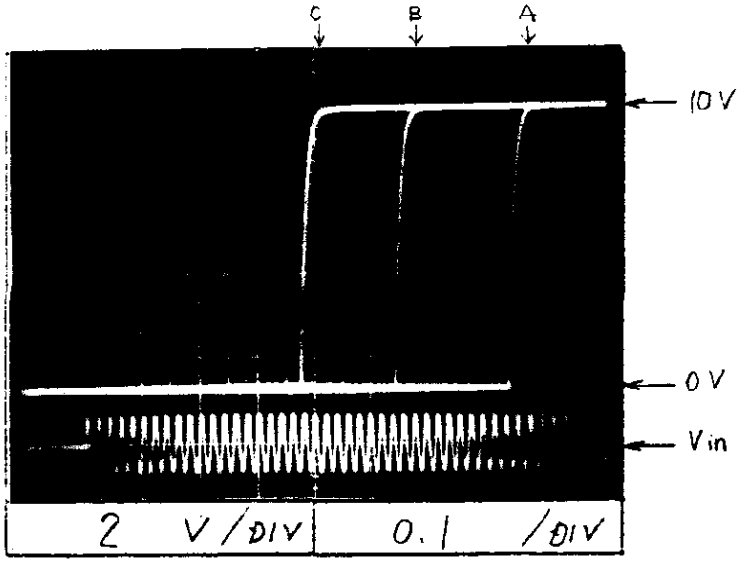
EWS1500

Conditions Vin : A 85 , B 100 , C 132VAC
Iout : 0 %
Ta : 25°C

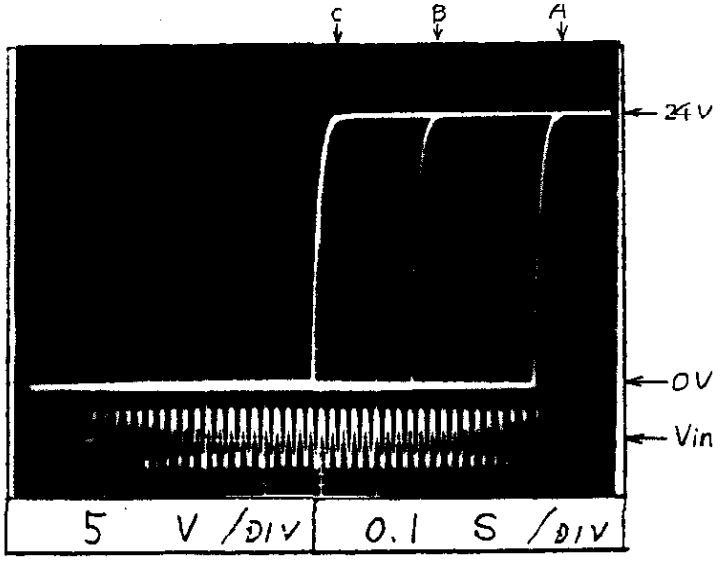
5 V



10 V



24 V

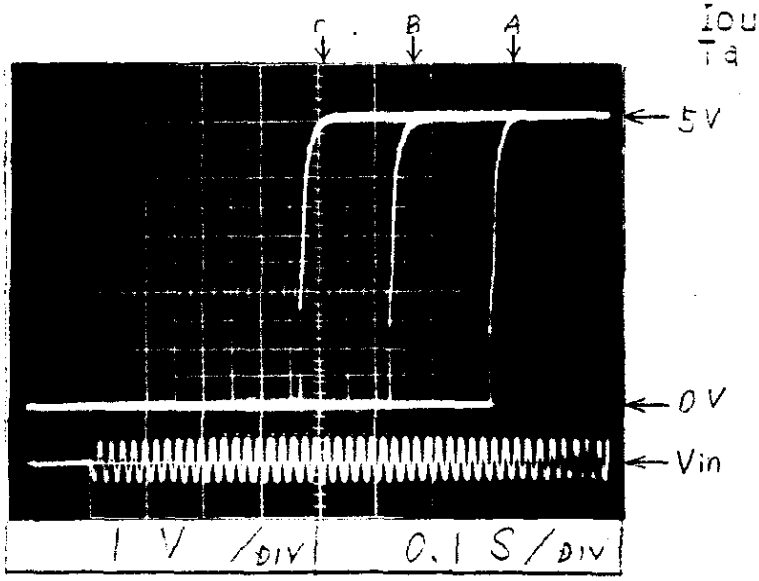


Output rise time

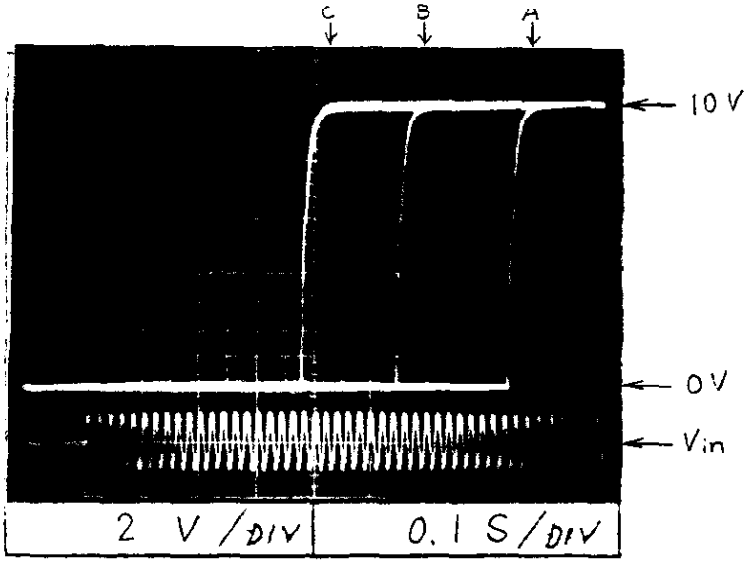
EWS 1500

Conditions Vin : A 85 B 100 C 132VAC
Iout: 100 %
Ta : 25°C

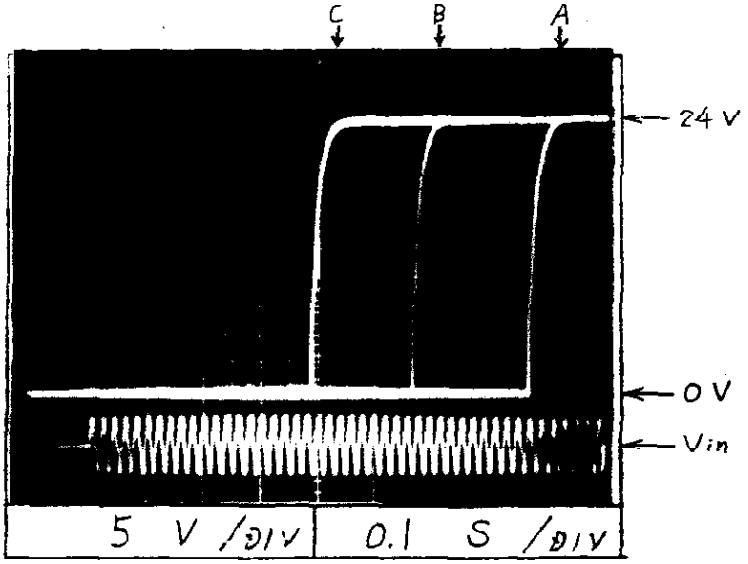
5 V



10 V



24 V

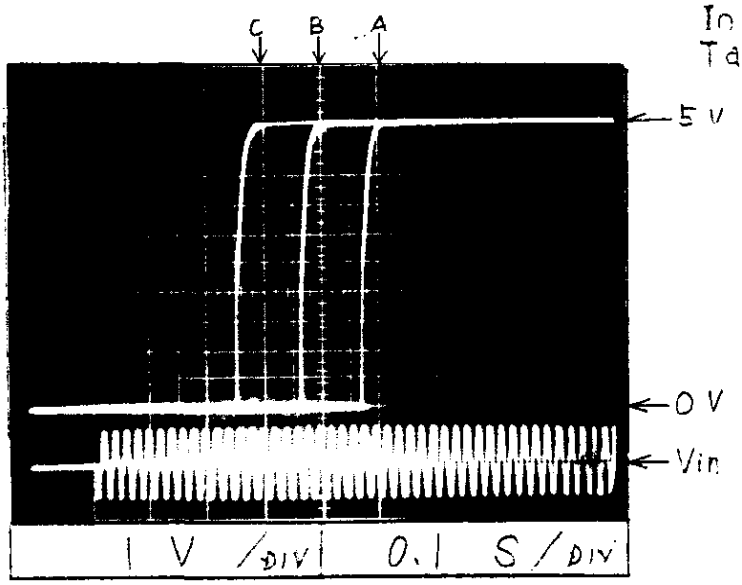


Output Rise time

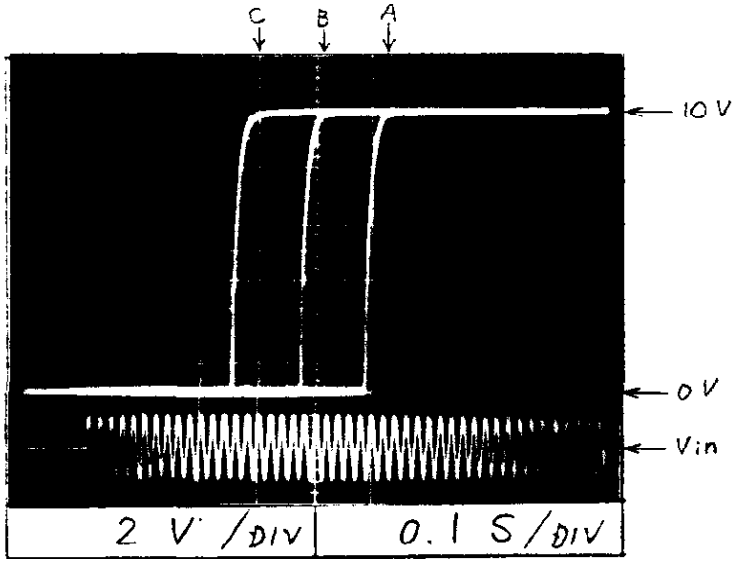
EWS 1500

Conditions Vin : A 170 , B 200 , C 265VAC
Iout : 0 %
Ta : 25°C

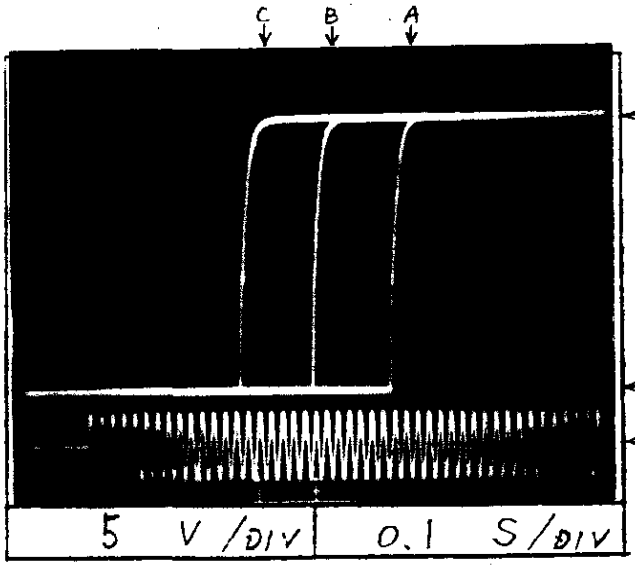
5 V



10 V



24 V

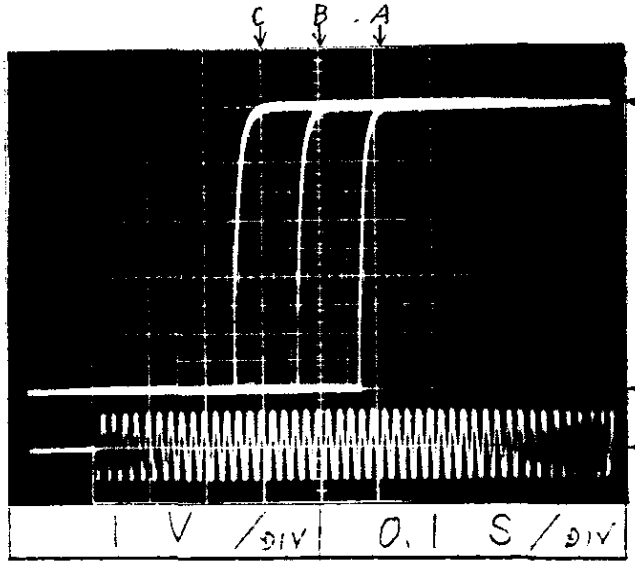


Output rise time

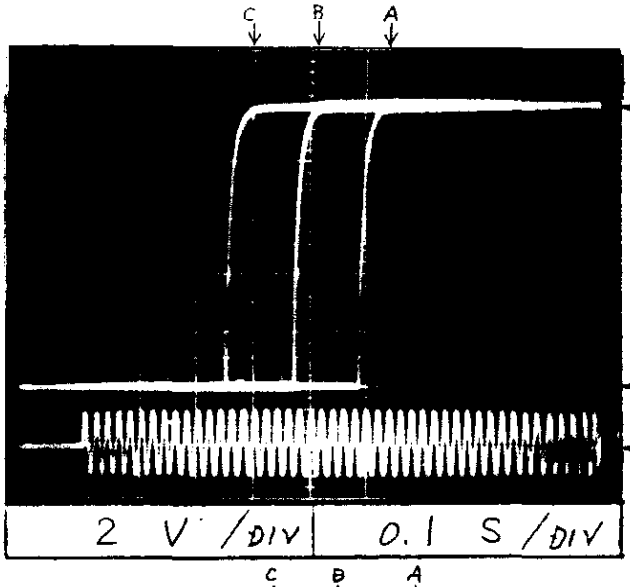
EWS1500

Conditions Vin : A 170 , B 200 , C 265VAC
Iout : 100 %
Ta : 25°C

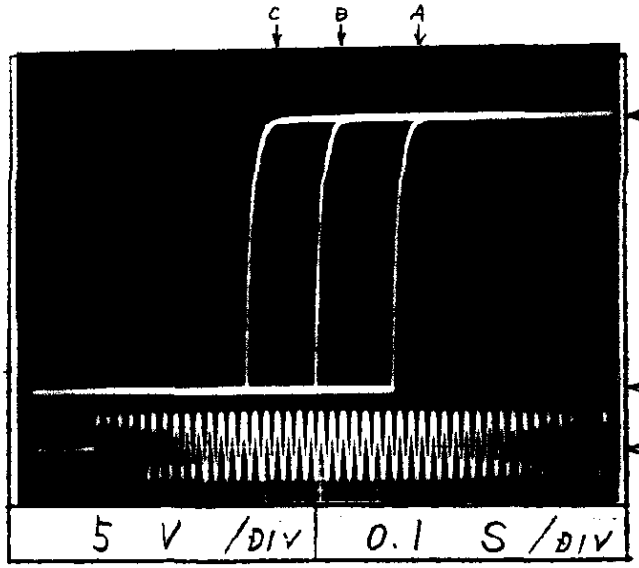
5 V



10 V



24 V

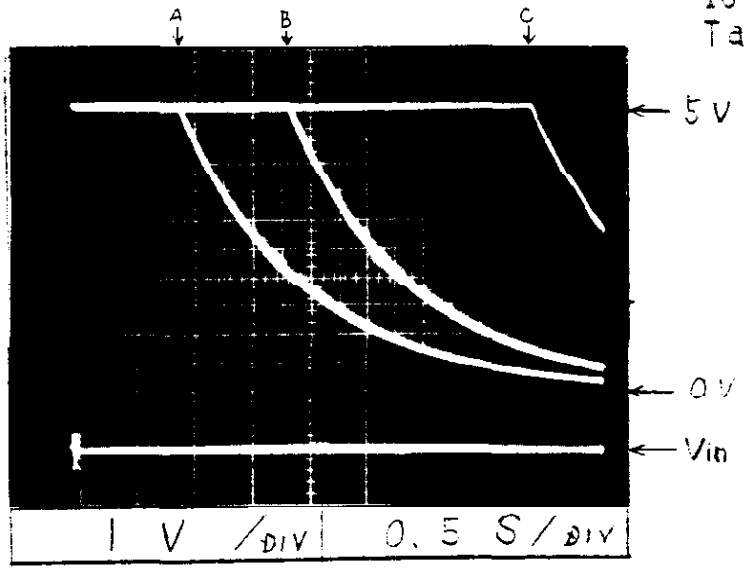


Output fall time

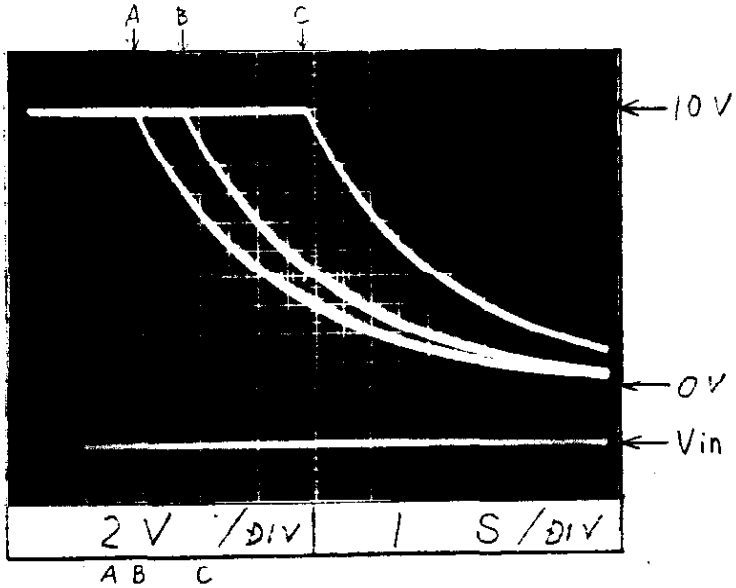
EWS1500

Conditions Vin : A 85 , B 100 , C 132VAC
Iout: 0 %
Ta : 25°C

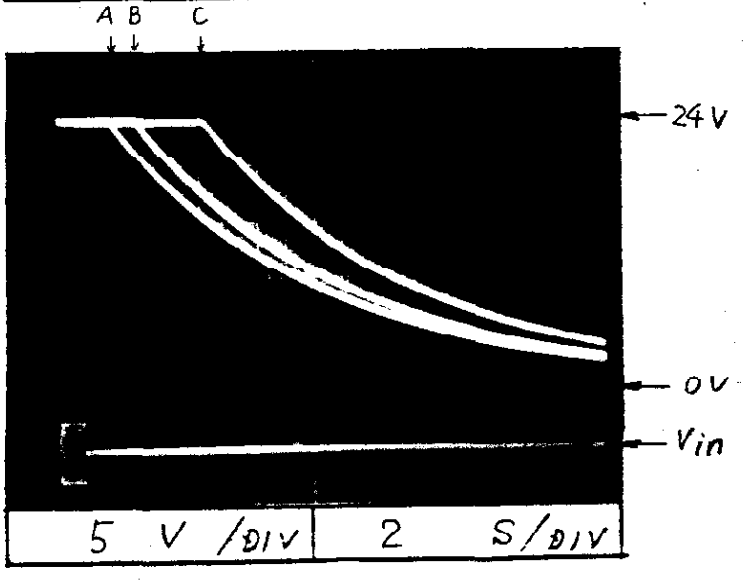
5 V



10 V



24 V

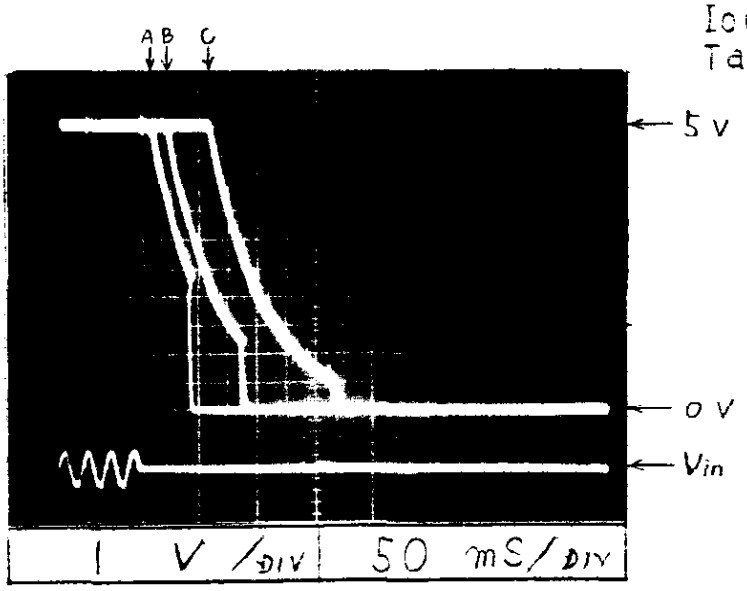


Output fall time

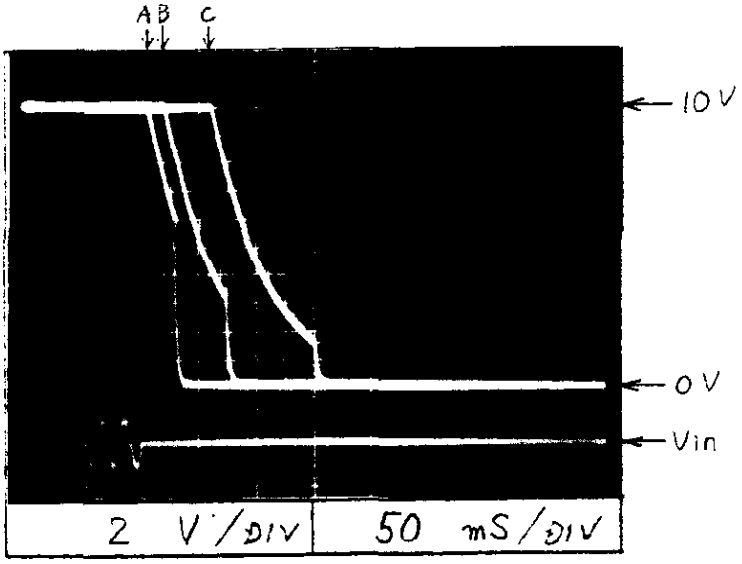
EWS1500

Conditions Vin : A 85 B 100 C 132VAC
Iout: 100 %
Ta : 25°C

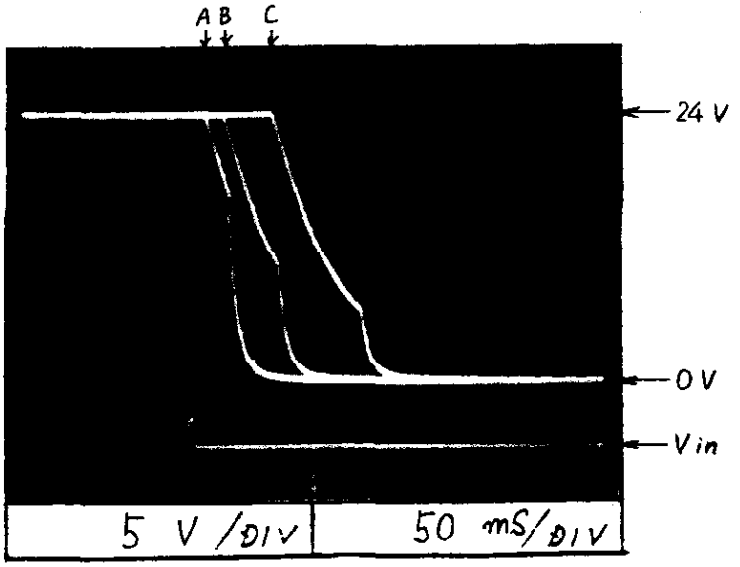
5 V



10 V



24 V

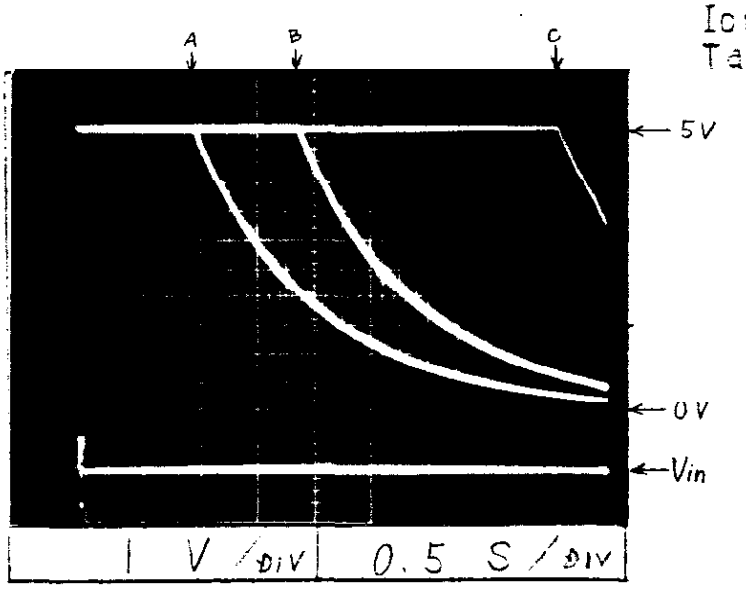


Output fall time

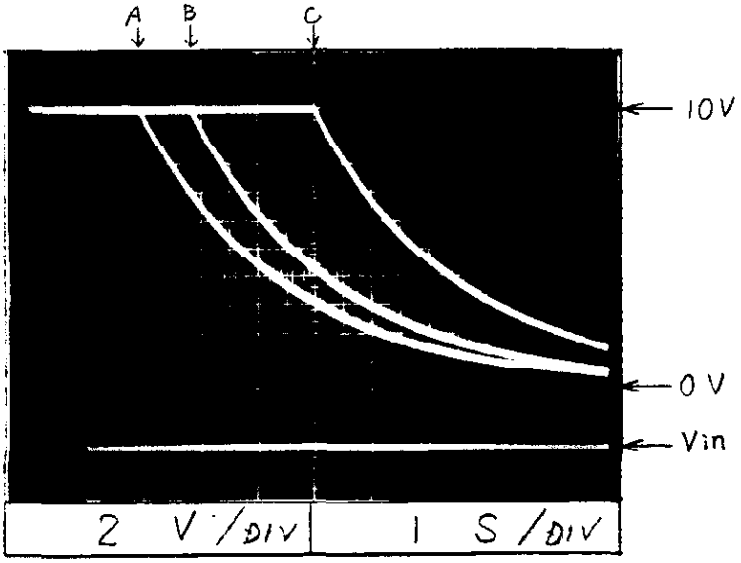
EWS 1500

Conditions Vin : A 170 B 200 C 265VAC
Iout: 0 %
Ta : 25°C

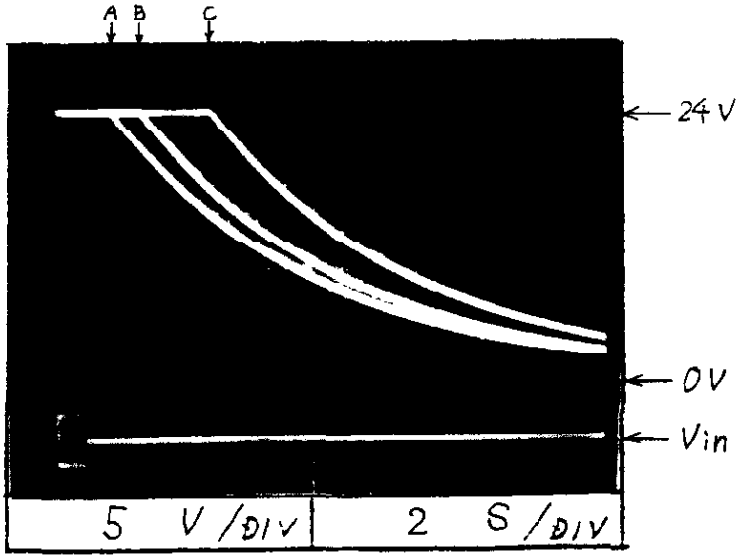
5 V



10 V



24 V

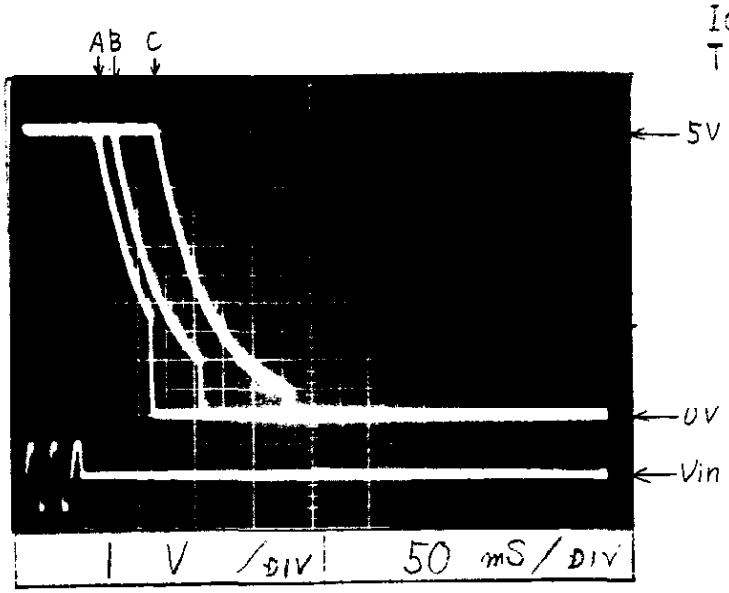


EWS1500

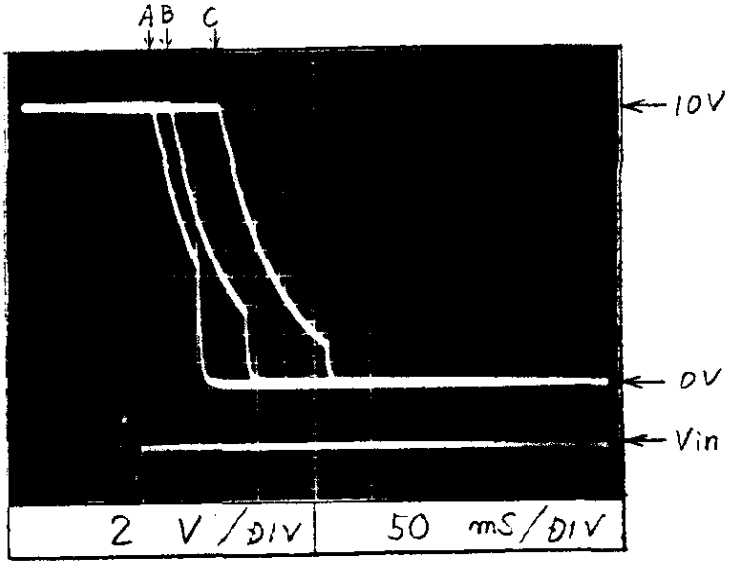
Output fall time

Conditions Vin : A 170 B 200 C 265VAC
Iout: 100 %
Ta : 25°C

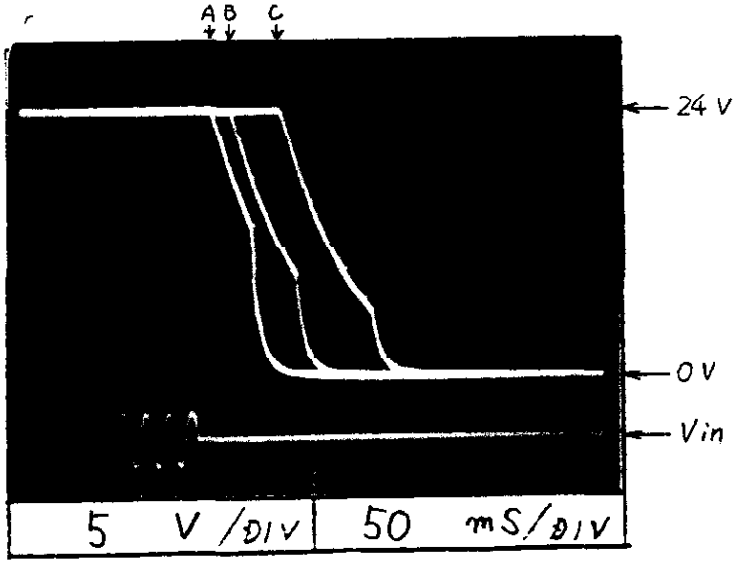
5 V



10 V



24 V

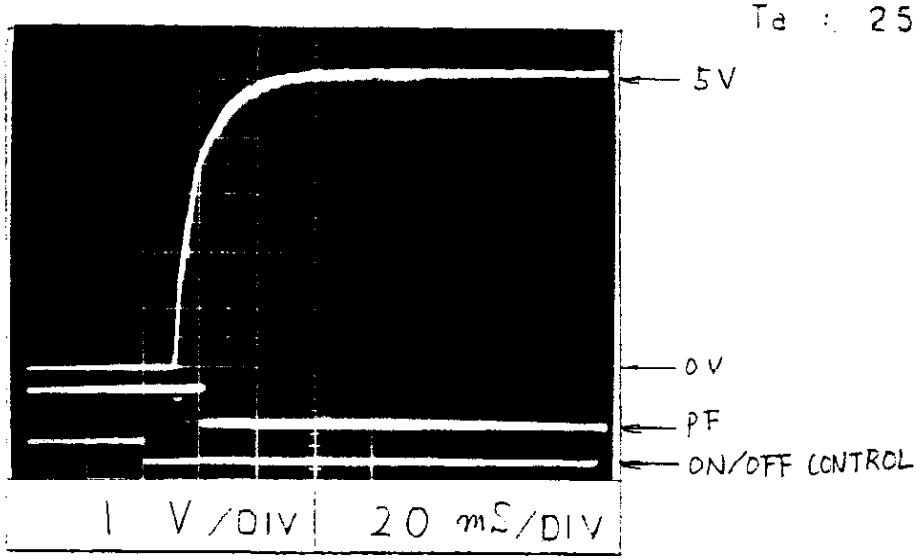


Output rise time with ON/OFF CONTROL

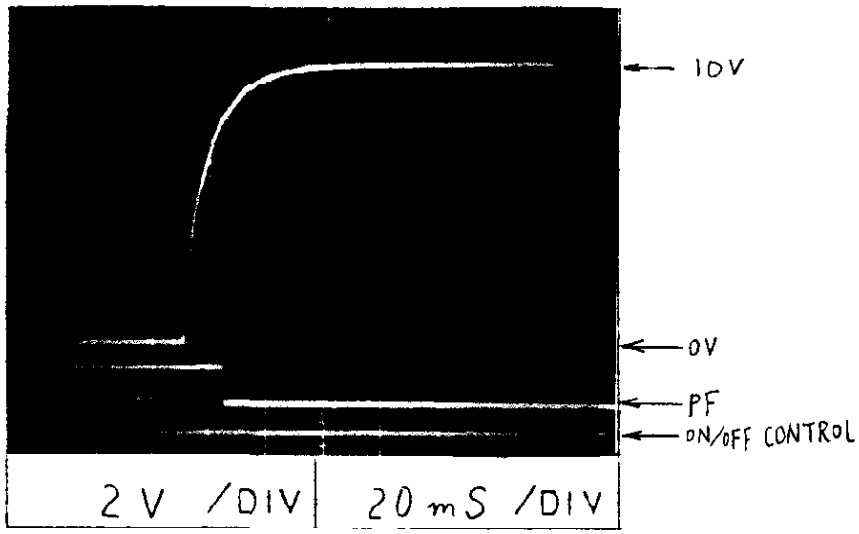
EWS 1500

Conditions Vin : 200 VAC
Iout : 100 %
Ta : 25 °C

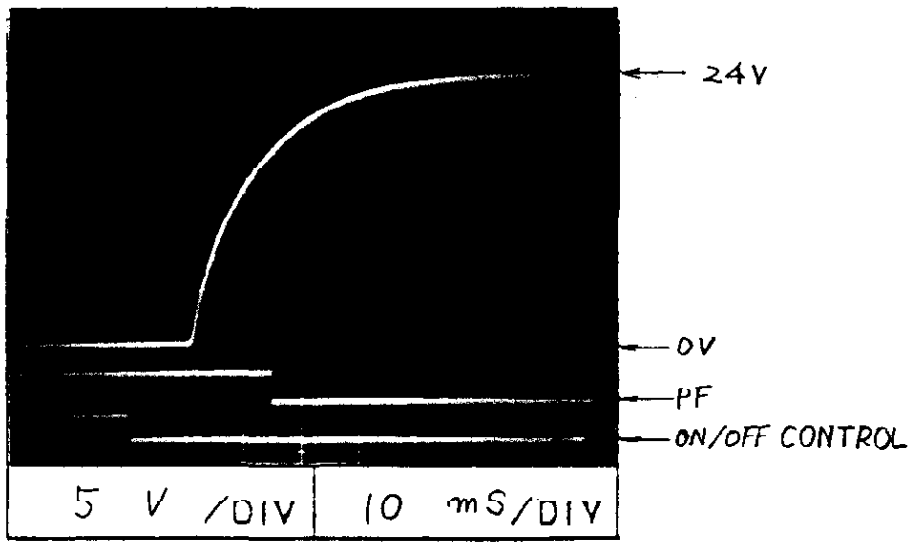
5 V



10 V



24 V

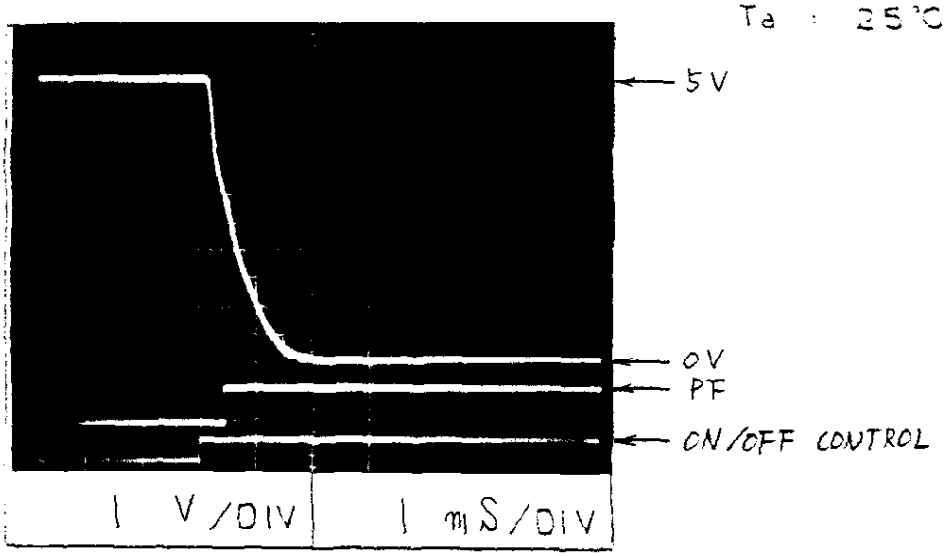


Output fall time with ON/OFF CONTROL

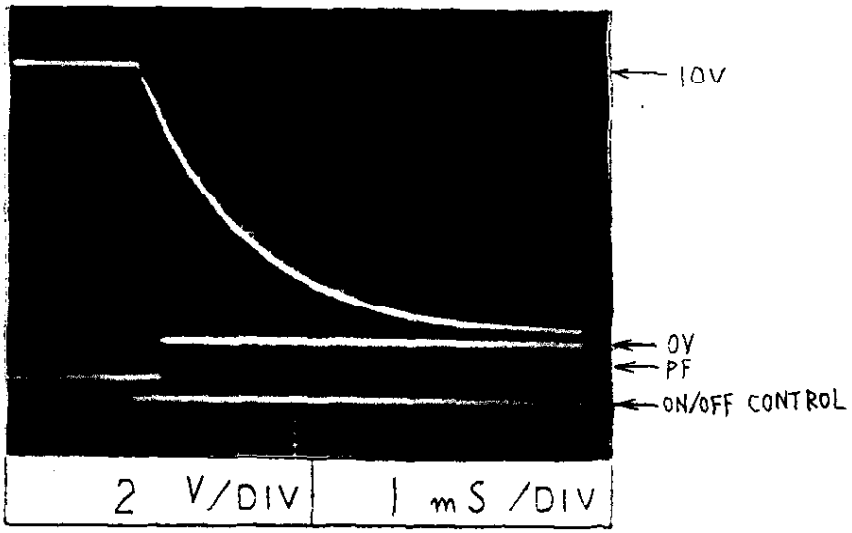
EWS 1500

Conditions Vin. : 200 VAC
Iout : 100 %
Ta : 25°C

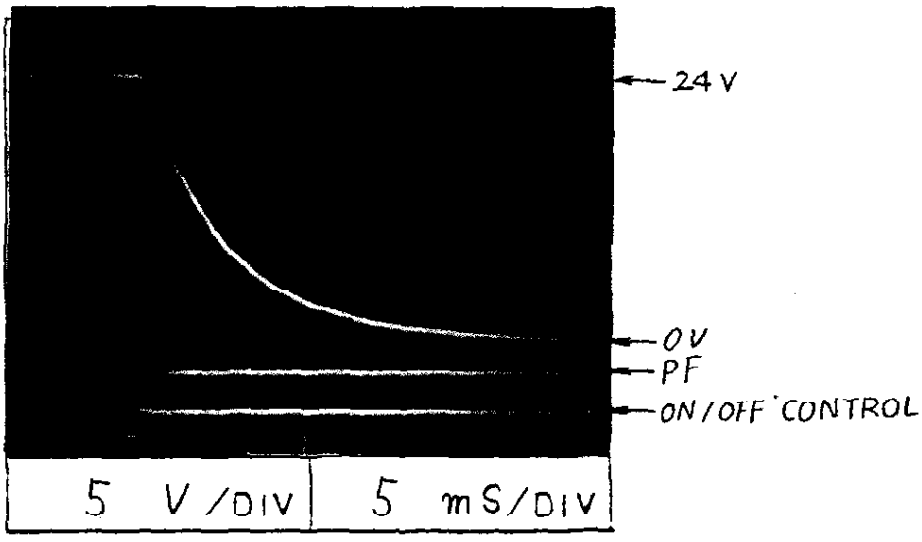
5 V



10 V



24 V

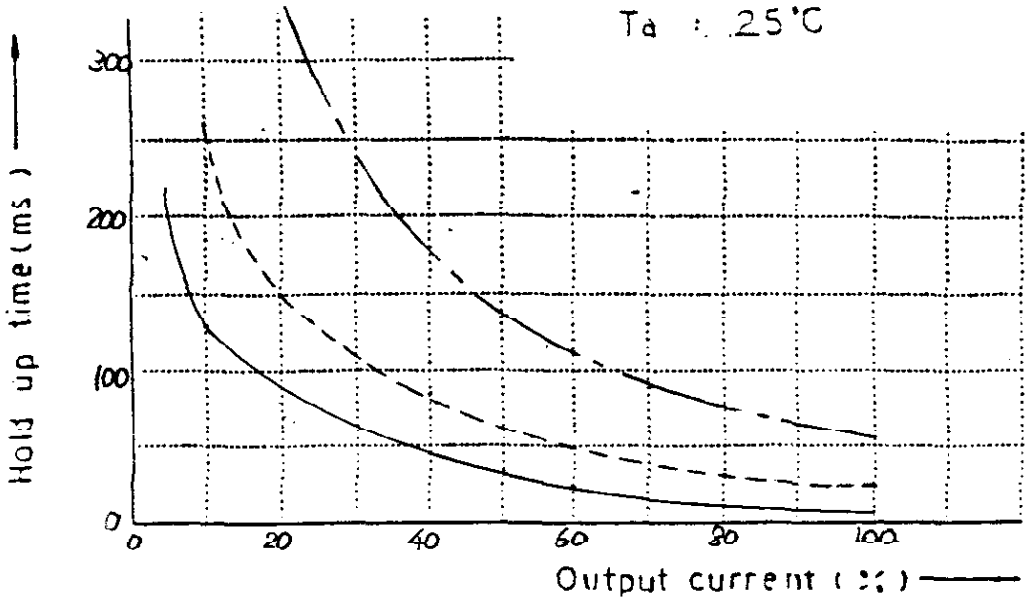


EWS1500

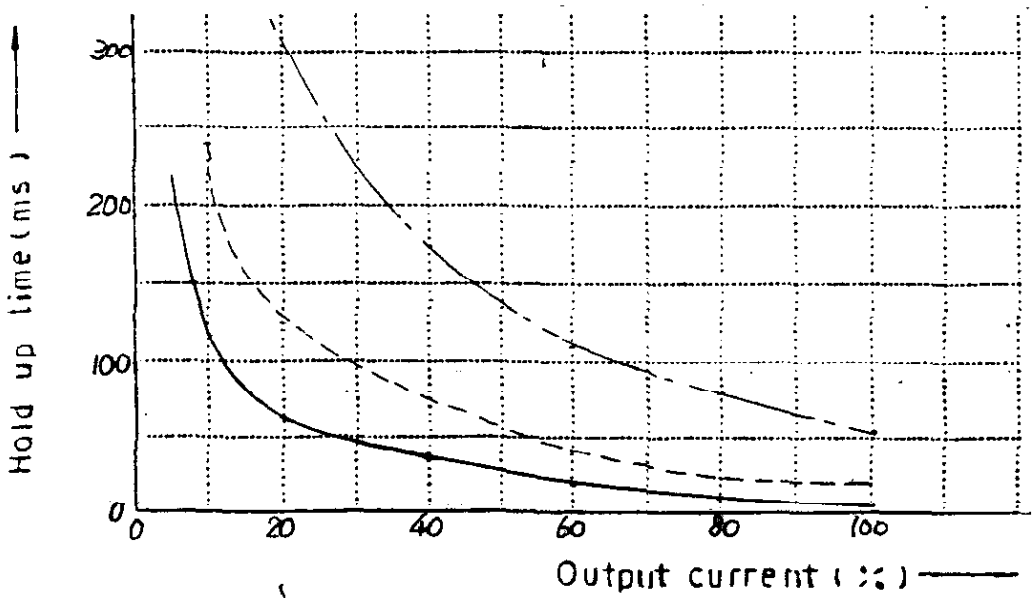
Hold up time

Condilions Vin : 85VAC ——
100VAC - - - -
132VAC — — —
Ta : 25°C

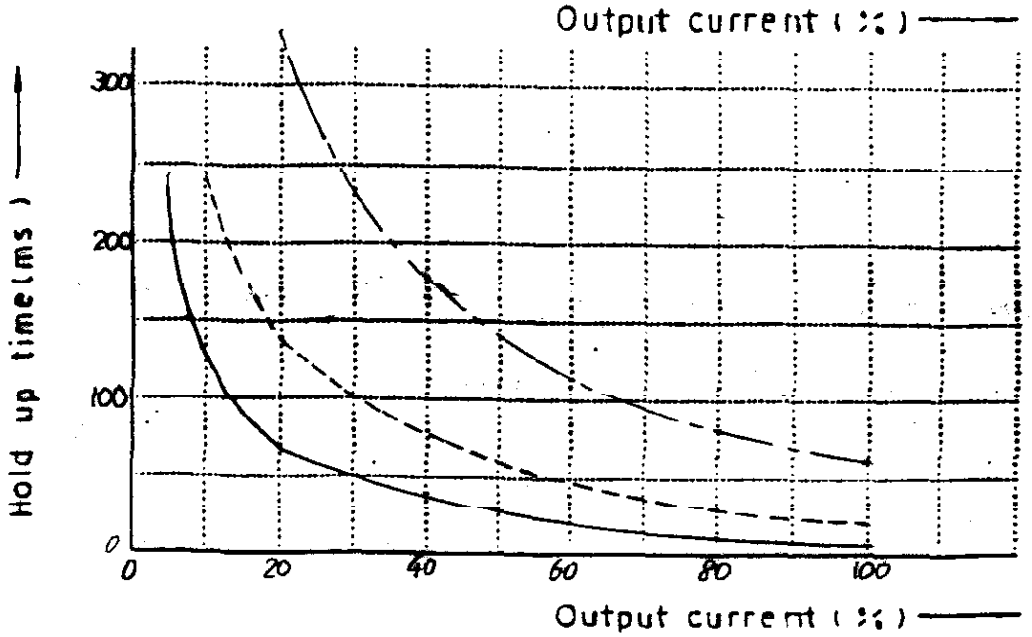
5 V



10 V



24 V

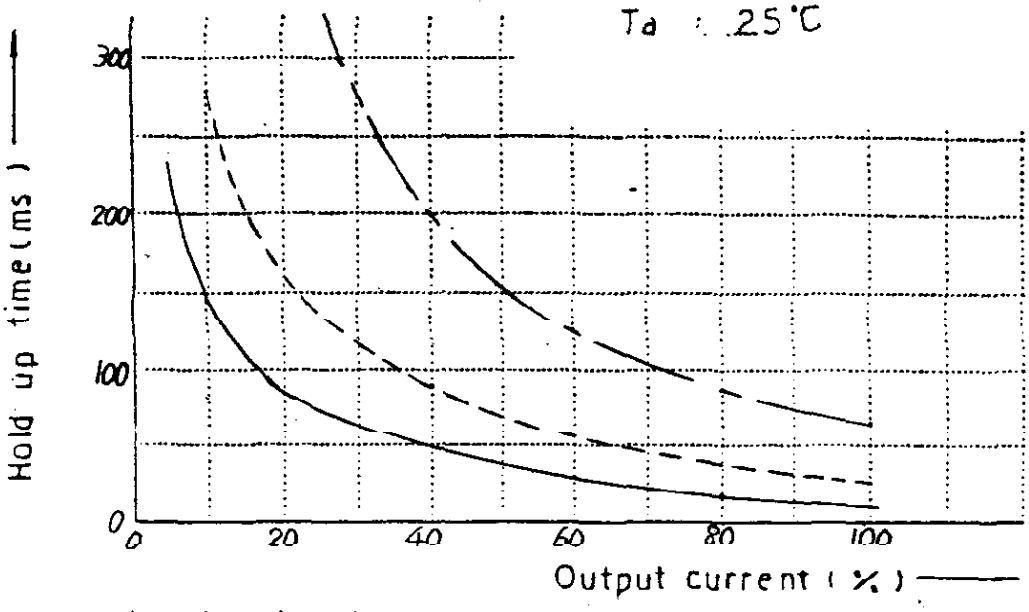


EWS1500

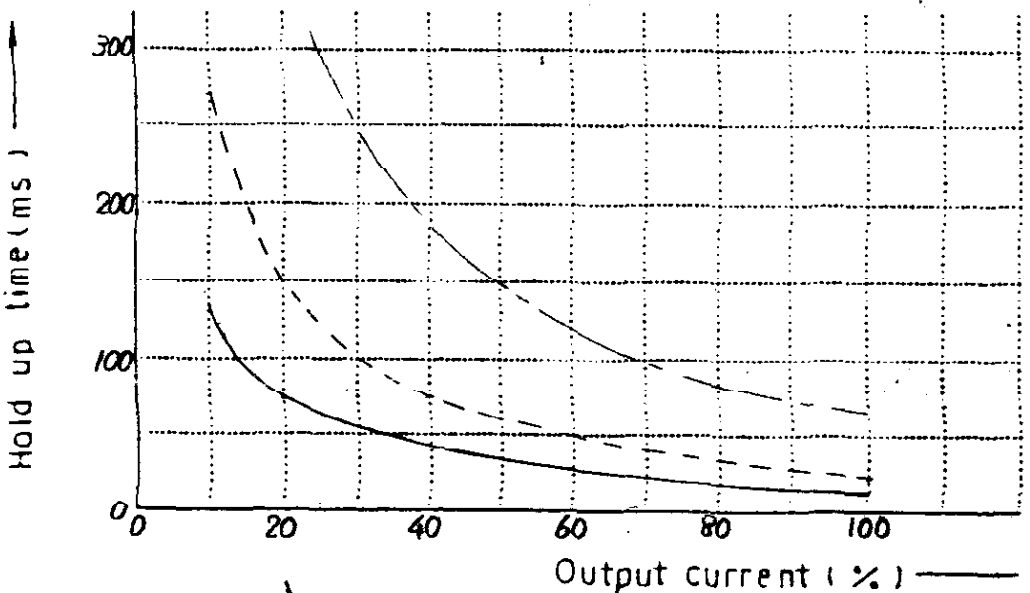
Hold up time

Conditions Vin : 170VAC ——
200VAC - - - -
265VAC — — —
Ta : 25°C

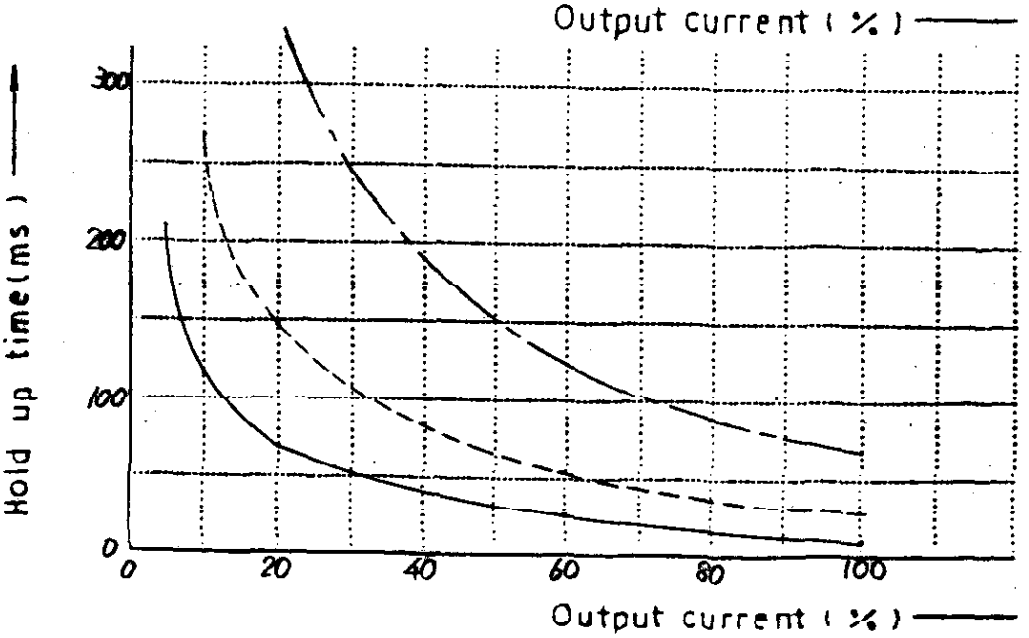
5 V



10 V



24 V



Dynamic line — Resperse

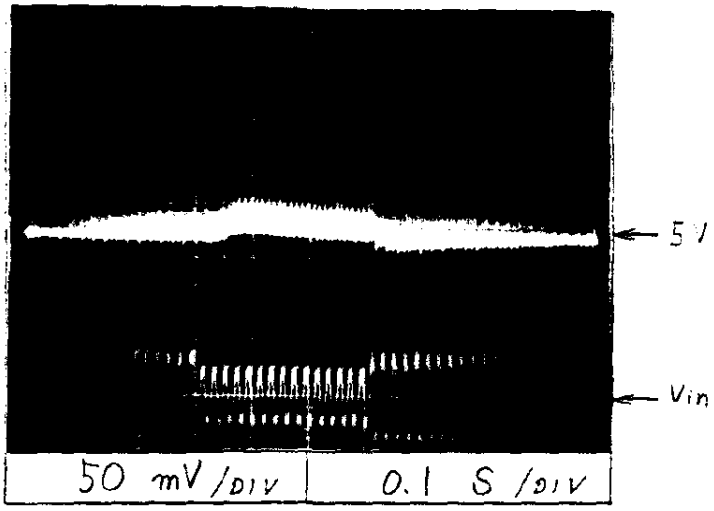
EWS 1500

Conditions

Iout : 100%
Ta : 25°C

Vin : AC170V ═ AC265V

5 V



Dynamic load – response

EWS 1500

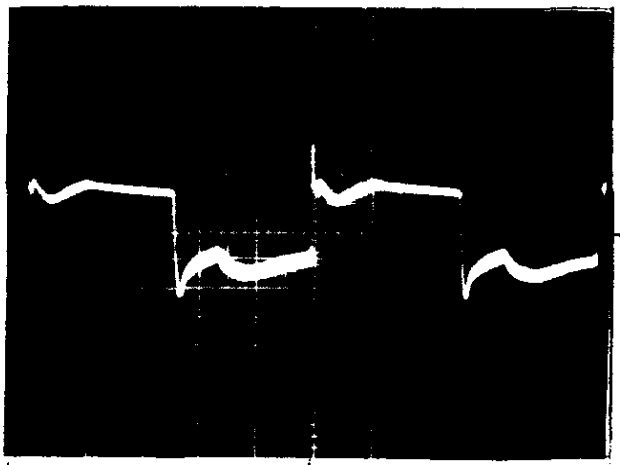
Conditions

Vin : 100/200VAC
Ta : 25°C

Iout 0 ⇄ 100 %

f = 100 Hz

5 V



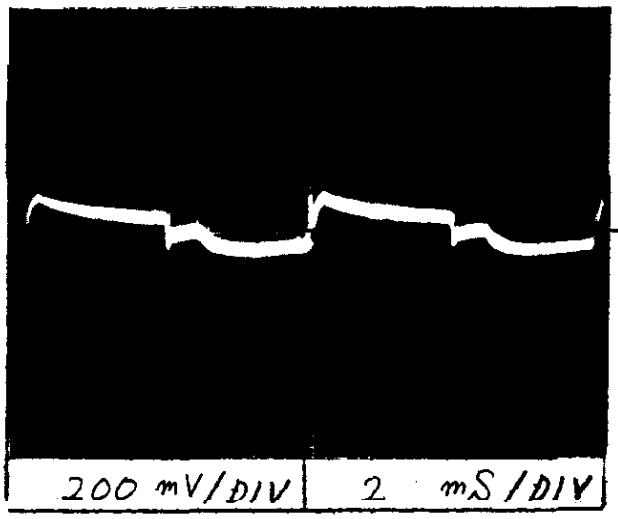
+ 6.0 %

– 4.6 %

Iout 50 ⇄ 100 %

f = 100 Hz

5 V



+ 3.4 %

– 1.4 %

Dynamic load - response

EWS 1500

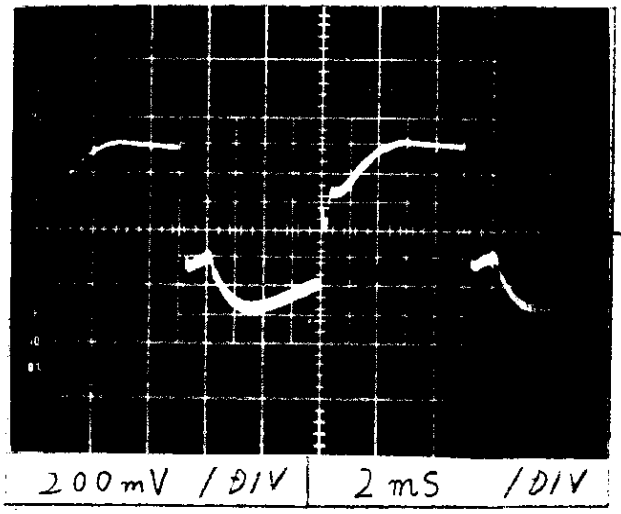
Conditions.

Vin : 100/200VAC
Ta : 25°C

Iout 0 ⟷ 100 %

f = 100 Hz

10 V



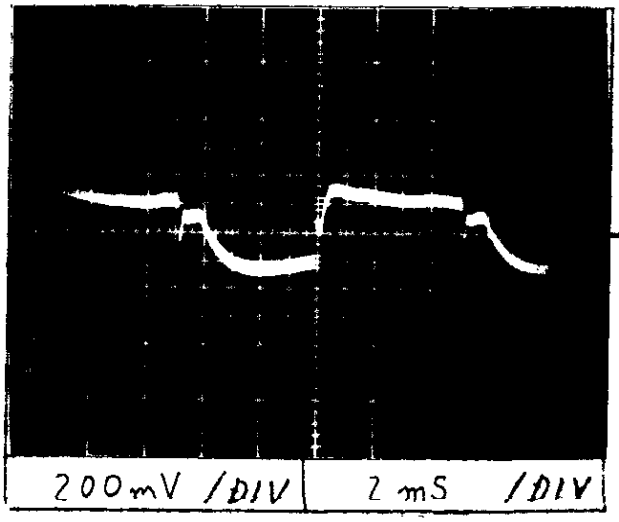
+ 3.0 %

- 2.8 %

Iout 50 ⟷ 100 %

f = 100 Hz

10 V



+ 1.4 %

- 1.2 %

Dynamic load-response

EWS1500

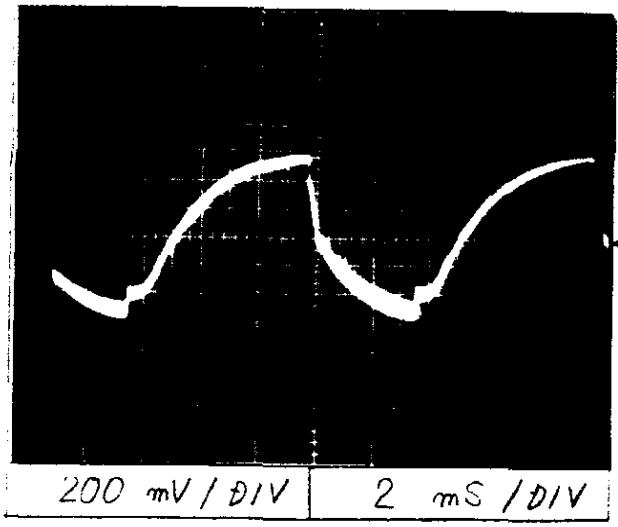
Conditions

Iout 0 ⟷ 100 %

f = 100 Hz

Vin : 100/200 VAC
Ta : 25°C

24 V



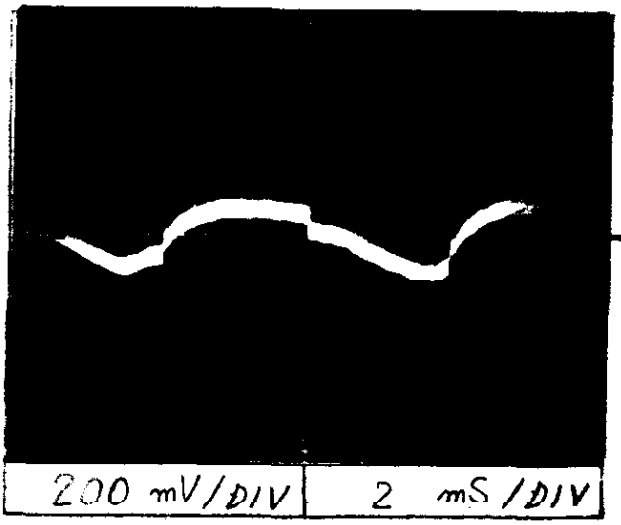
+ 1.1 %

- 1.1 %

Iout 50 ⟷ 100 %

f = 100 Hz

24 V



+ 0.4 %

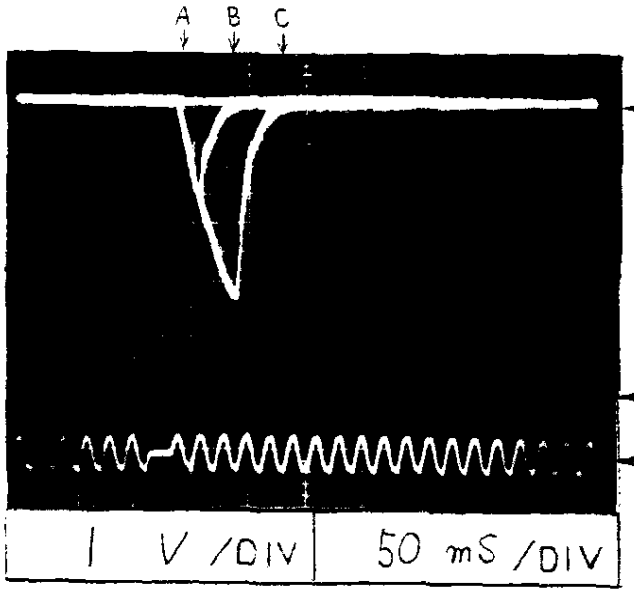
- 0.4 %

Response to brown out

EWS1500

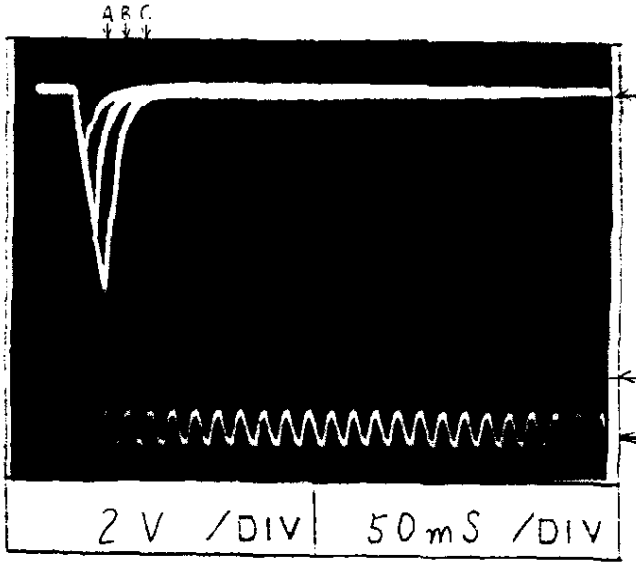
Conditions Vin : 100VAC
Iout: 100%
Ta : 25°C

5 V



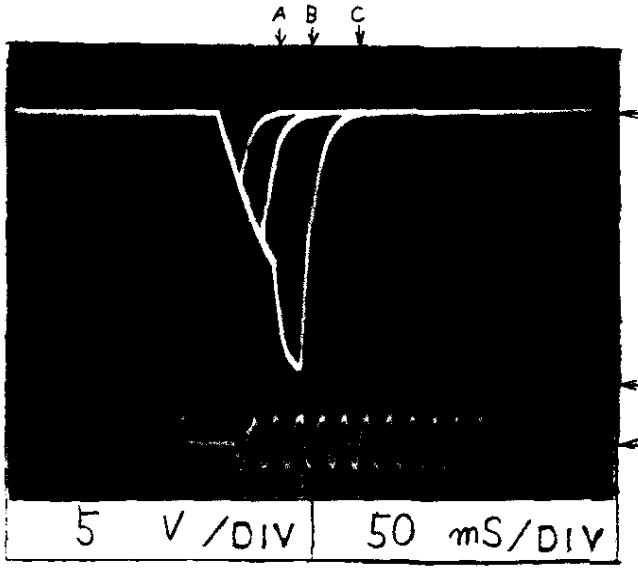
Brown out time
A : 20 ms
B : 40 ms
C : 75 ms

10 V



Brown out time
A : 30 ms
B : 40 ms
C : 50 ms

24 V



Brown out time
A : 40 ms
B : 60 ms
C : 75 ms

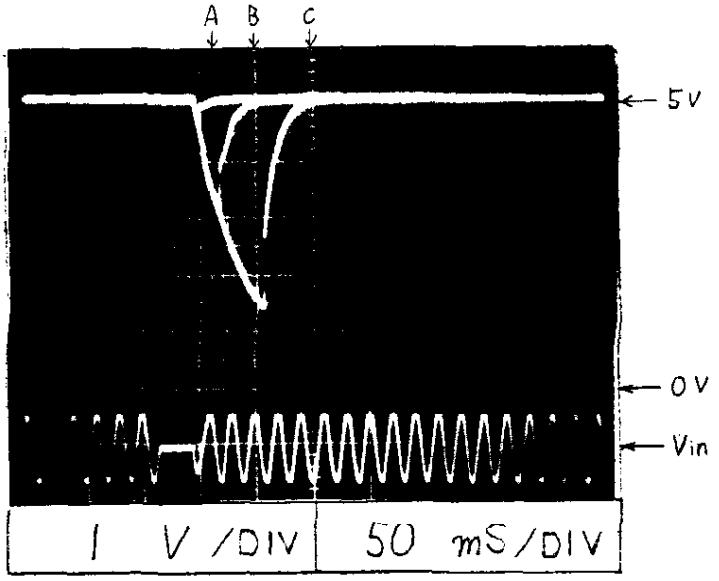
Response to brown out

EWS 1500

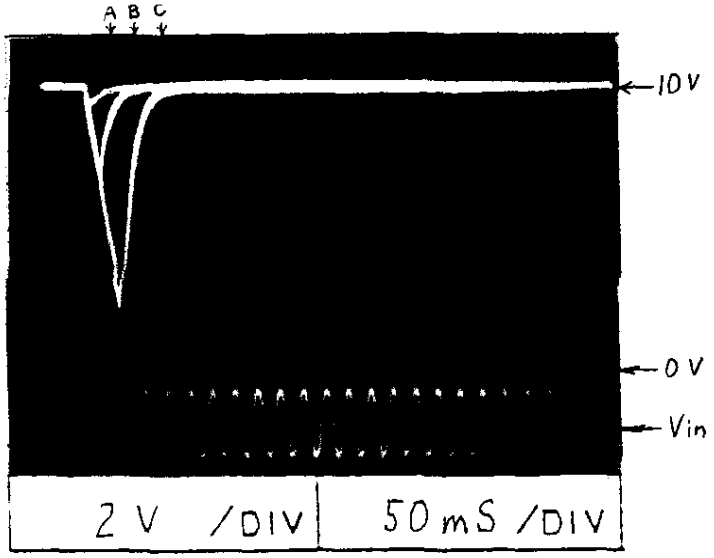
Conditions Vin.: 200VAC
Iout: 100%
Ta : 25°C
Brown out time

A : 30 ms
B : 50 ms
C : 90 ms

5 V



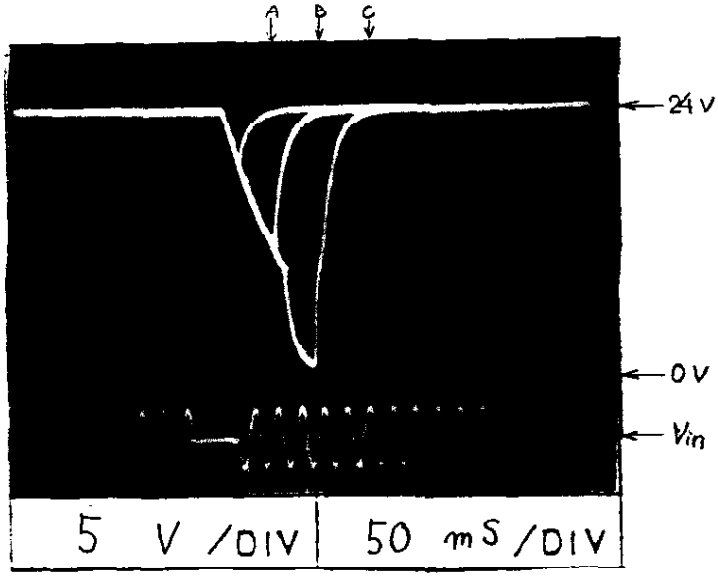
10 V



Brown out time

A : 30 ms
B : 40 ms
C : 60 ms

24 V



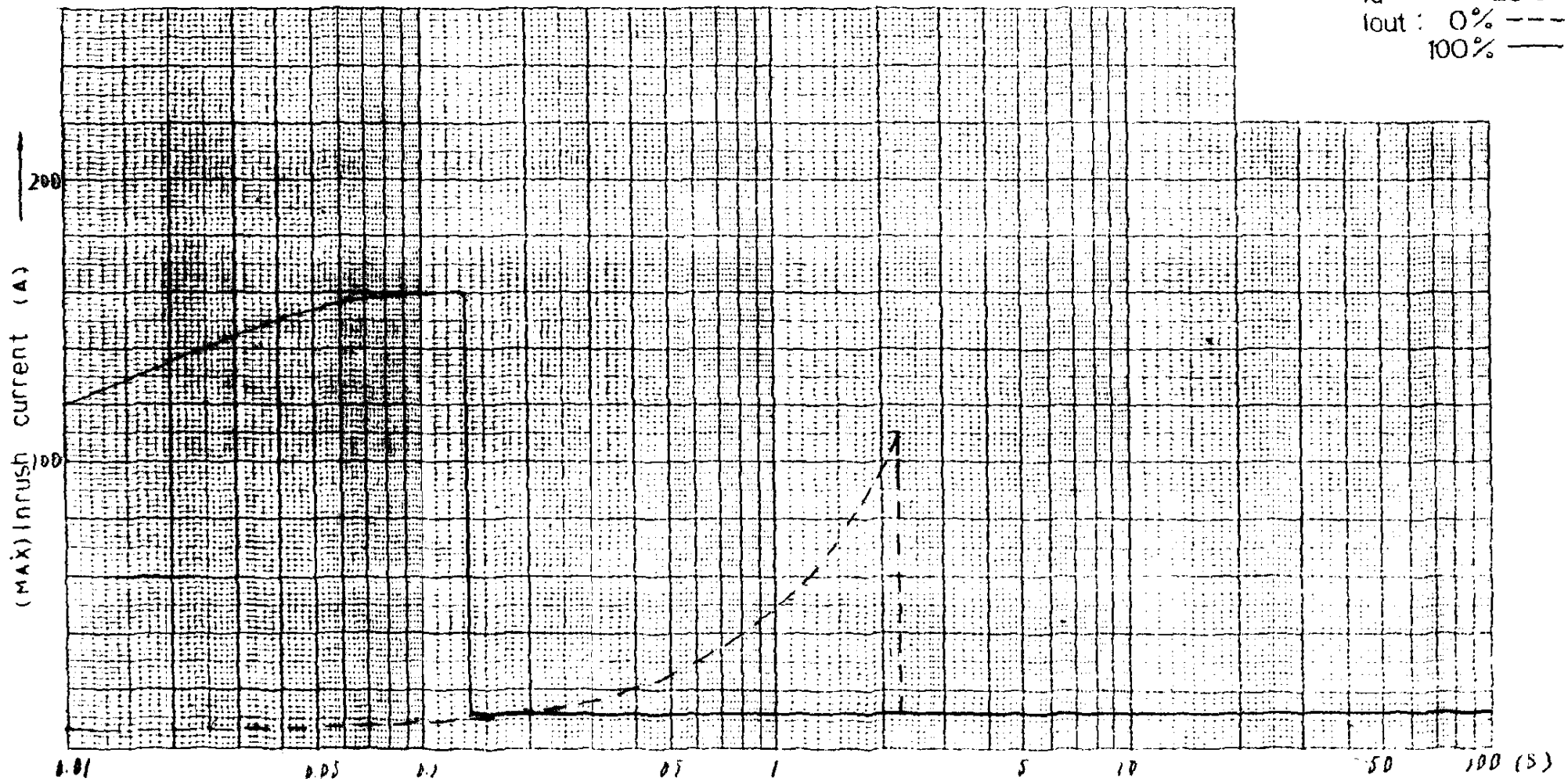
Brown out time

A : 40 ms
B : 70 ms
C : 95 ms

EWS 1500

Inrush current characteristics

Conditions
Vin. : 100 VAC
Ta : 25°C
Iout : 0% ---
100% ——

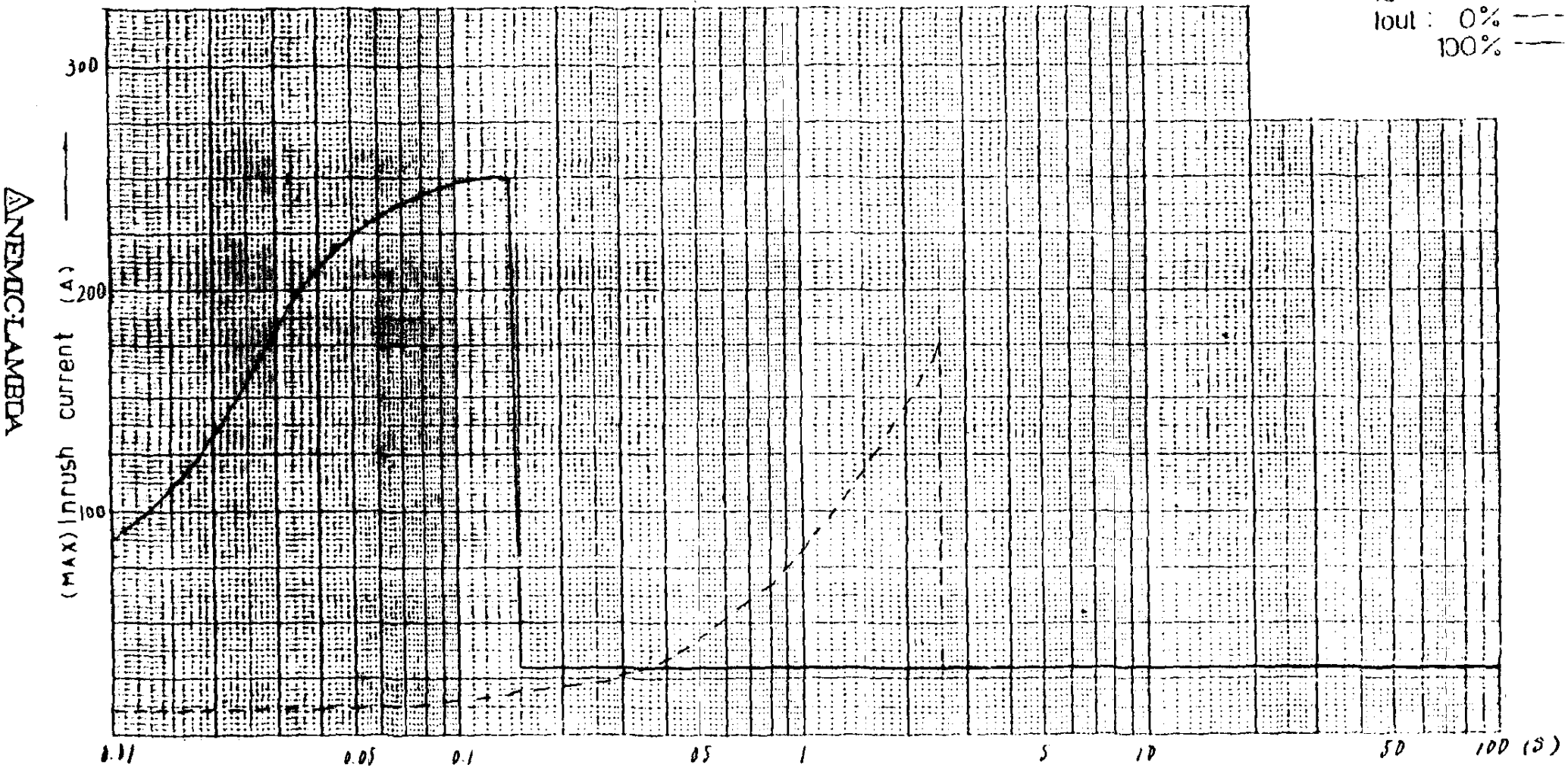


NEMIC-LAMBDA

EWS 1500

Inrush current characteristics

Conditions
Vin : 200 VAC
Ta : 25°C
Iout : 0% ---
100% ——



△NEMIC-LAMBDA

40/43

Inrush current waveform

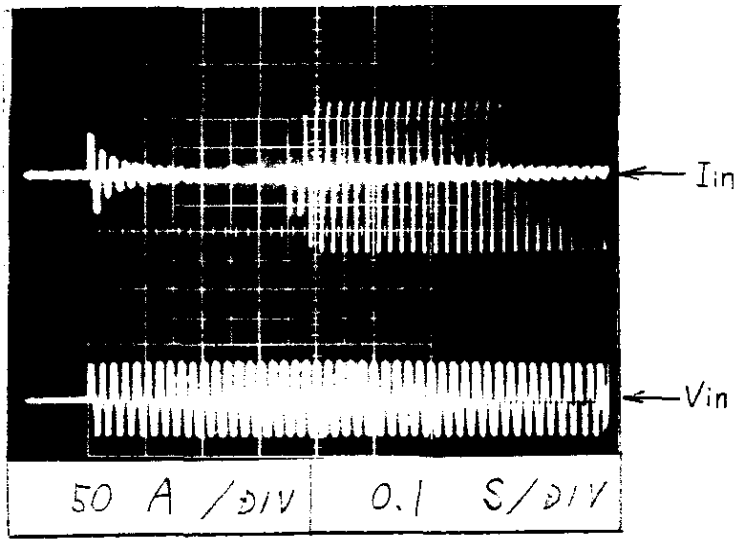
EWS 1500

Conditions Vin : 200VAC
Iout : 100 %
Ta : 25 °C

E V

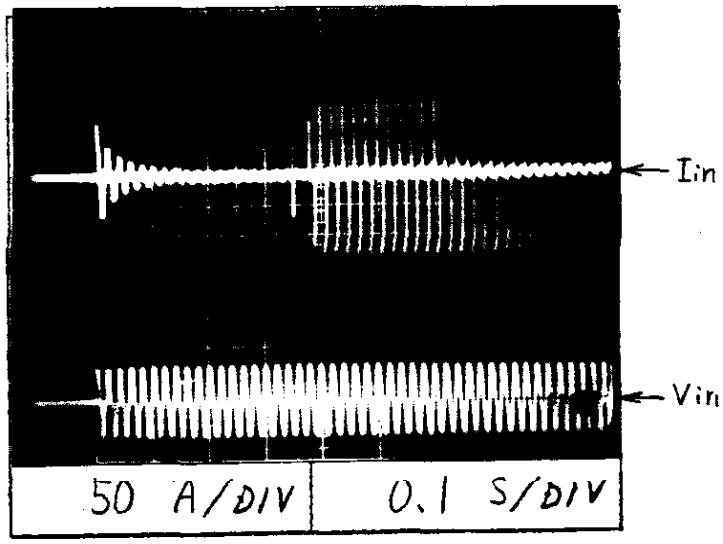
Switch in phase angle
of input AC voltage

ϕ = 0°



Switch in phase angle
of input AC voltage

ϕ = 90°

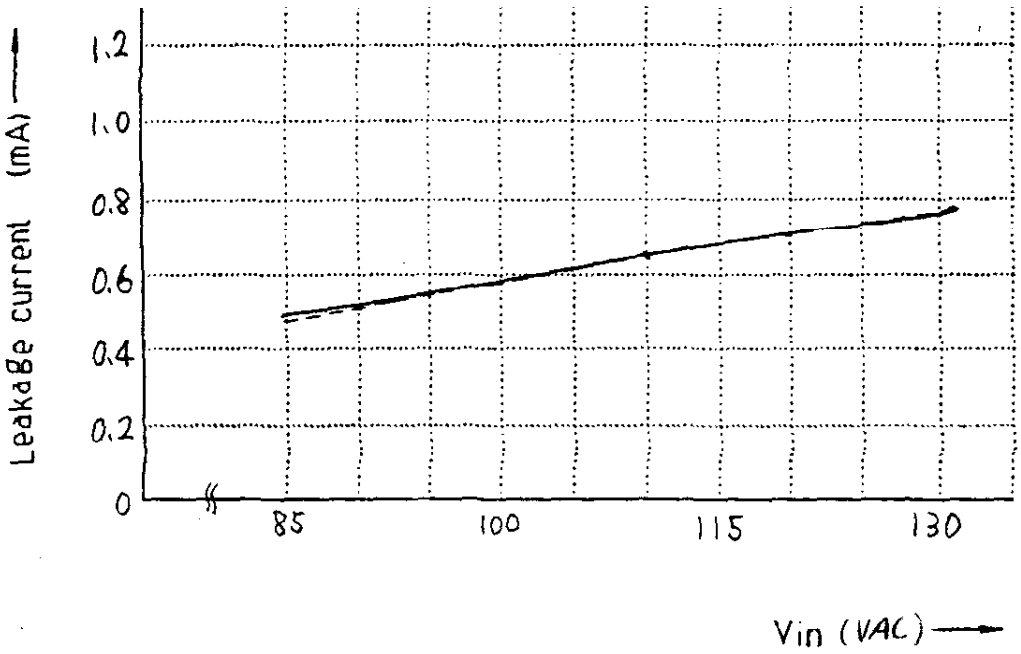


EWS 1500

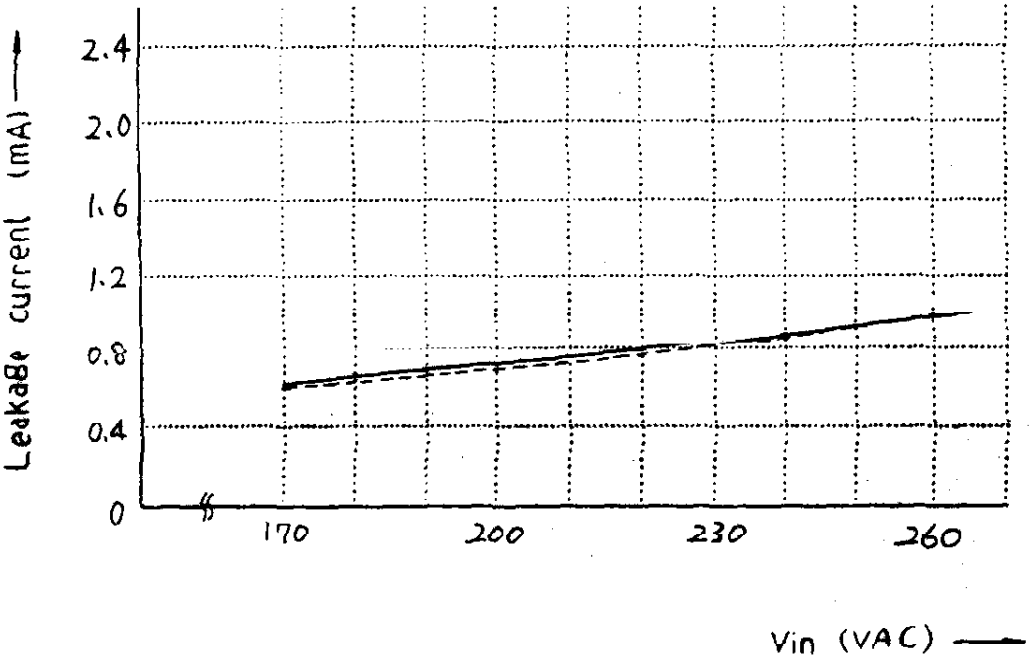
Leakage current

Conditions ACG-FG SHORT
Iout: 100 % ——
0 % - - - - - -
Ta : 25°C

5 V



5 V

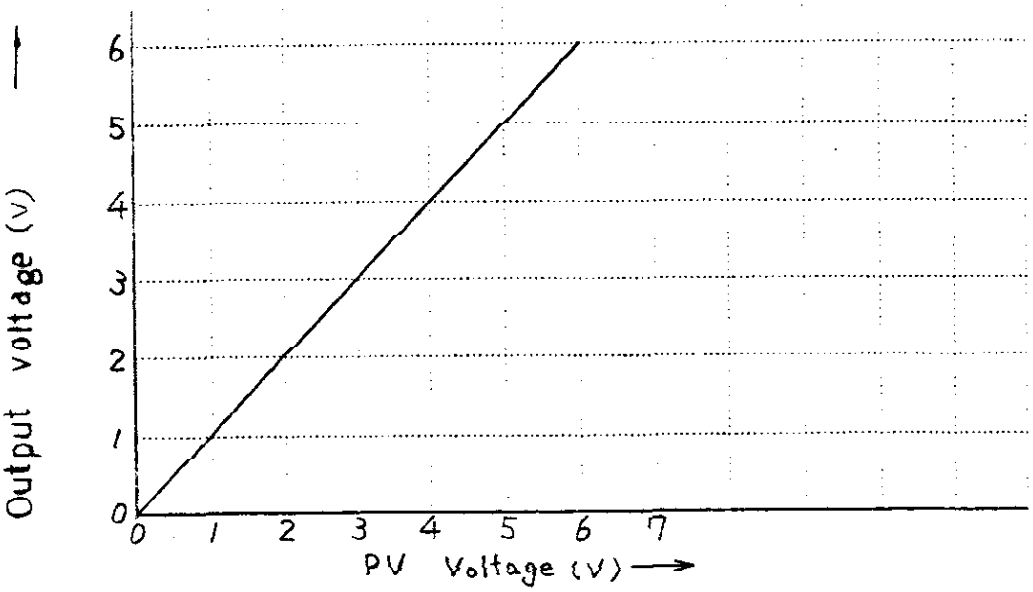


P.V. Voltage V.S. Output Voltage

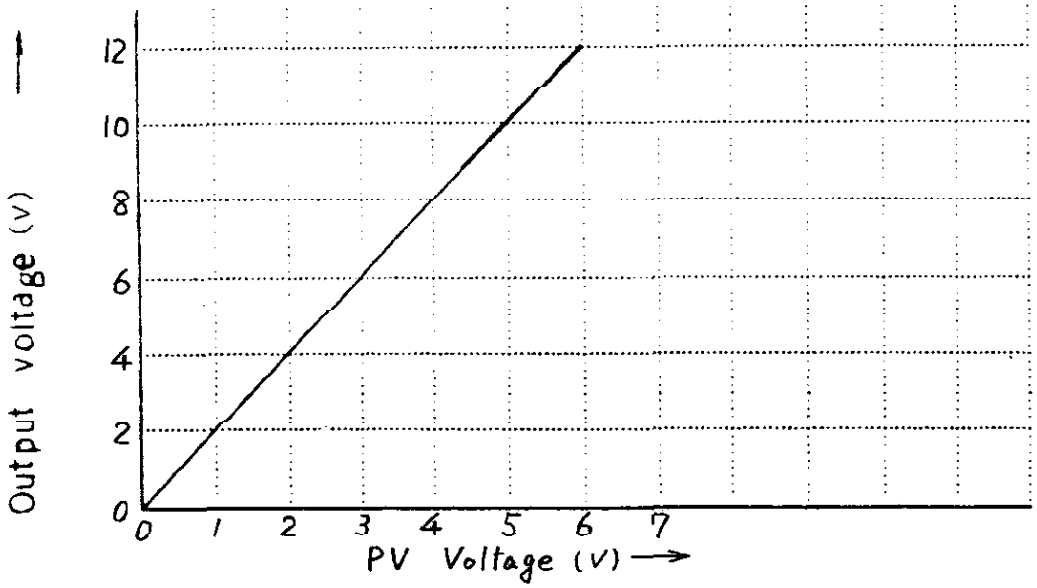
EWS 1500

Conditions Vin : 200VAC
Iout : 100%
Ta : 25°C

5 V



10 V



24 V