

NUMERICAL INDICATOR TUBE

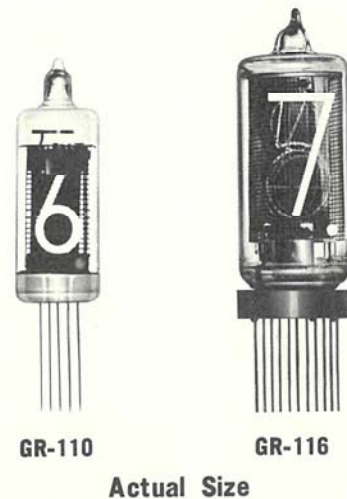
TYPES GR-110, GR-116

The GR-110 and GR-116 tubes are gas-filled, long-life, cold cathode high brightness side viewing numerical indicator tubes, suited for independently operable decimal point (S) inside.

Substantial driver circuitry cost savings can be obtained because the tubes have been designed for high peak current low duty cycle pulsed operation with time shared driver circuitry.

The GR-110 tube can be also operated in D.C. operation. Bright clear characters together with in optimum aspect ratio (height to width) provides excellent readability and viewing distance.

The small diameter of the tubes (GR-110 = 10.5 mm ϕ , GR-116 = 13.5 mm ϕ) allow for minimal instrument panel dimensions.



Outline Drawing

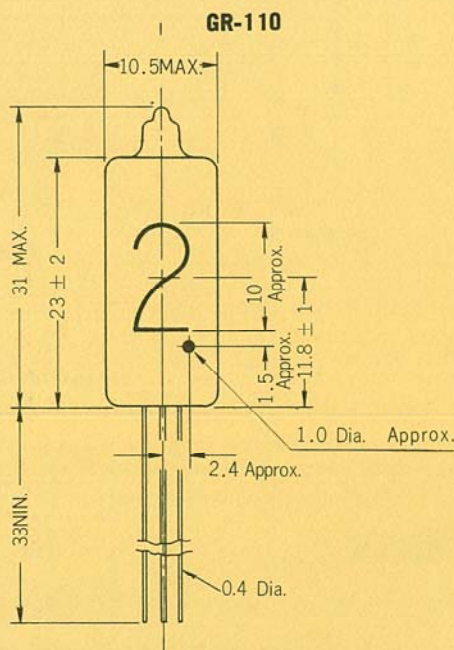


Figure 1.

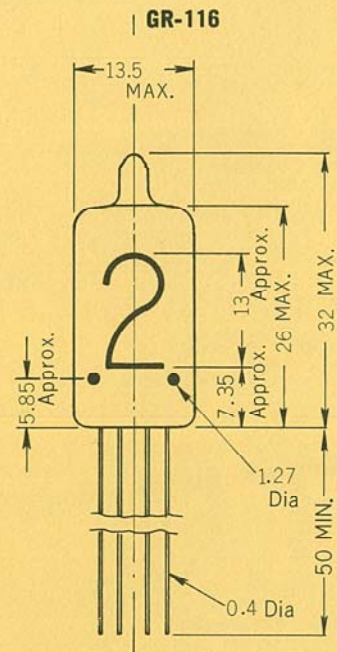


Figure 2.

— TYPE GR-110 — (DC or Time Sharing Application)

ELECTRICAL DATA

DC APPLICATIONS

Anode Supply Voltage [Ebb]170 Vdc min.
 Ionization Voltage [Ez]170 Vdc max.
 Cathode Current
 Numeral Cathode [Ik] ($E_{bb}=190V$, $R_k=27K\Omega$)1.5 mA dc nom.
 Decimal Point [Ik(·)] ($E_{bb}=190V$, $R_k(\cdot)=150K\Omega$)0.3 mA dc nom.

TIME SHARING APPLICATIONS

Peak Anode Supply Voltage [Ebb] } ($t_p=0.1msec$) { 190 V min.
 Peak Ionization Voltage [Ez] } ($duty = \frac{1}{10}$) { 190 V min.
 Peak Cathode Current [Ik]
 Numeral Cathode [ik] } ($E_{bb}=190V$) { 4 mA Approx.
 Decimal Point [ik(·)] } ($R_p=6.8K\Omega$) { 0.9 mA Approx.

ABSOLUTE MAXIMUM RATINGS

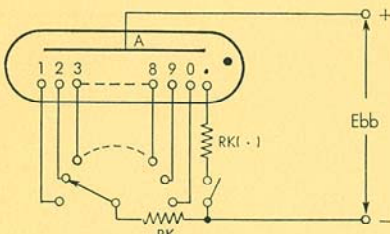
Peak Cathode Current
 Numeral Cathode [ik]2.5 mA max.
 Decimal Point [ik(·)]0.8 mA max.
 Average Cathode Current
 Numeral Cathode [Ik]1.0 ~ 2.0 mA
 Decimal Point [Ik(·)]0.15~0.5 mA
 Ambient Temperature [Ta] { $-20 \sim +55^\circ C$
 $-40 \sim +70^\circ C$ (reduced life)

Peak Cathode Current [Ik]
 Numeral Cathode [ik] 2 ~ 10 mA
 Decimal Point [ik(·)]0.5 ~ 3 mA
 Average Cathode Current
 Numeral Cathode [ik] 0.3~1.0 mA dc
 Decimal Point [ik(·)]0.05~0.3 mA dc
 Pulse Width [tp]50~500 μsec
 Ambient Temperature [Ta] { $-20 \sim +55^\circ C$
 $-40 \sim +70^\circ C$ (reduced life)

MECHANICAL SPECIFICATIONS

Outline DrawingFigure 1
 Pin LayoutFigure 6
 Pin ConnectionFigure 7
 Weight2.5 g Approx.
 Viewing Angle100 deg Approx.

DC. Application

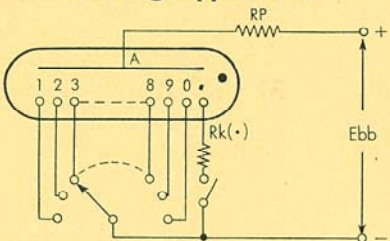


Test Circuit Figure 3.

Typical Operating Condition

Ebb	190	200	230	Vdc
Rk	27	33	47	K Ω
Rk(·)	150	180	270	K Ω

Time Sharing Application



Test Circuit Figure 4.

Typical Operating Condition

Ebb	190	200	230	V
Rp	8.2	10	18	K Ω
Rk(·)	47	62	108	K Ω

Pin Layout

Pin Layout (TOP View)

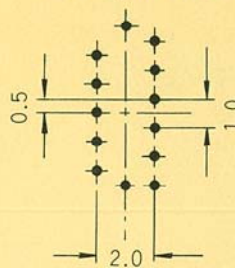


Figure 6.

Pin Connection

Pin Connection (Bottom View)

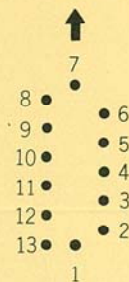


Figure 7.

duty cycle $\frac{1}{10}$

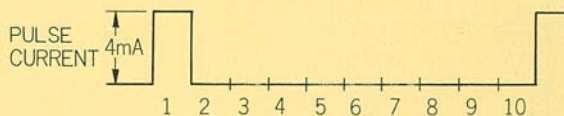


Figure 5.

Pin	Connections
1	ANODE
2	NUMERAL 0
3	NUMERAL 9
4	NUMERAL 8
5	DEC PT
6	NUMERAL 7
7	IC
8	NUMERAL 6
9	NUMERAL 5
10	NUMERAL 4
11	NUMERAL 3
12	NUMERAL 2
13	NUMERAL 1

— TYPE GR-116 — (Time Sharing Application)

ELECTRICAL DATA

Peak Anode Supply Voltage [Ebb]	($t_p=0.1$ msec Duty cycle = $\frac{1}{20}$)	.....175 V min.
Peak Ionization Voltage [Ez]	($t_p=0.1$ msec Duty cycle = $\frac{1}{20}$)	.....170 V max.
Peak Cathode Current [Ik]		
Numeral Cathode [ik]	($e_{bb}=200V, R_p=2.5K\Omega$)	.....14 mA nom.
Decimal Point [ik(.)]	($t_p=0.1$ msec, Duty cycle = $\frac{1}{20}$)	..... 4 mA nom.

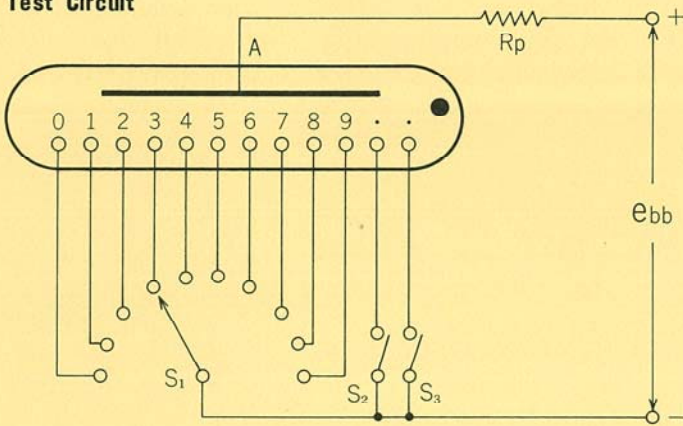
ABSOLUTE MAXIMUM RATINGS

Peak Cathode Current		
Numeral Cathode [ik]	.....	11 ~ 17 mA
Decimal Point [ik(.)]	.....	1 ~ 7 mA
Average Cathode Current		
Numeral Cathode [Ik]	.....	0.7 mA
Decimal Point [Ik(.)]	.....	0.2 mA
Pulse Width [tp]	.....	0.08 ~ 0.2 msec
Ambient Temperature [Ta]	.....	{ -20 ~ +55°C -40 ~ +70°C (reduced life)

MECHANICAL SPECIFICATIONS

Outline Drawing	.....	Figure 2
Pin Layout	.....	Figure 10
Pin Connection	.....	Figure 11
Weight	.....	3.6 g Approx.
Viewing Angle	.....	100 deg Approx.

Test Circuit



Typical Operating Conditions

Ebb	200	250	V
Rp	2.5	5	KΩ

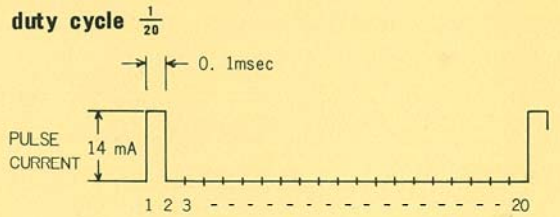


Figure 9.

Pin Layout

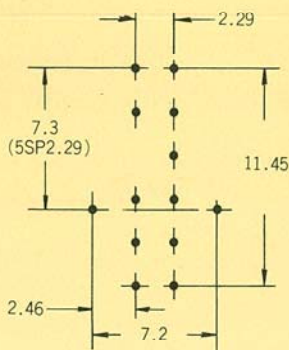


Figure 10.

Pin Connection

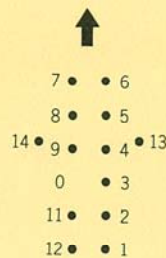


Figure 11.

Pin	Connections
1	NUMERAL 1
2	NUMERAL 2
3	NUMERAL 3
4	NUMERAL 4
5	NUMERAL 5
6	NUMERAL 6
7	ANODE
8	NUMERAL 7
9	NUMERAL 8
10	NO STEM LEAD
11	NUMERAL 9
12	NUMERAL 0
13	RT DEC PT
14	LET DEC PT

Design details change without notice

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