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USERS MANUAL FOR REGULATED POWER SUPPLIES

HR SERIES

All information contained herein provides instructions intended for the operations and applies to all HR series power supples.

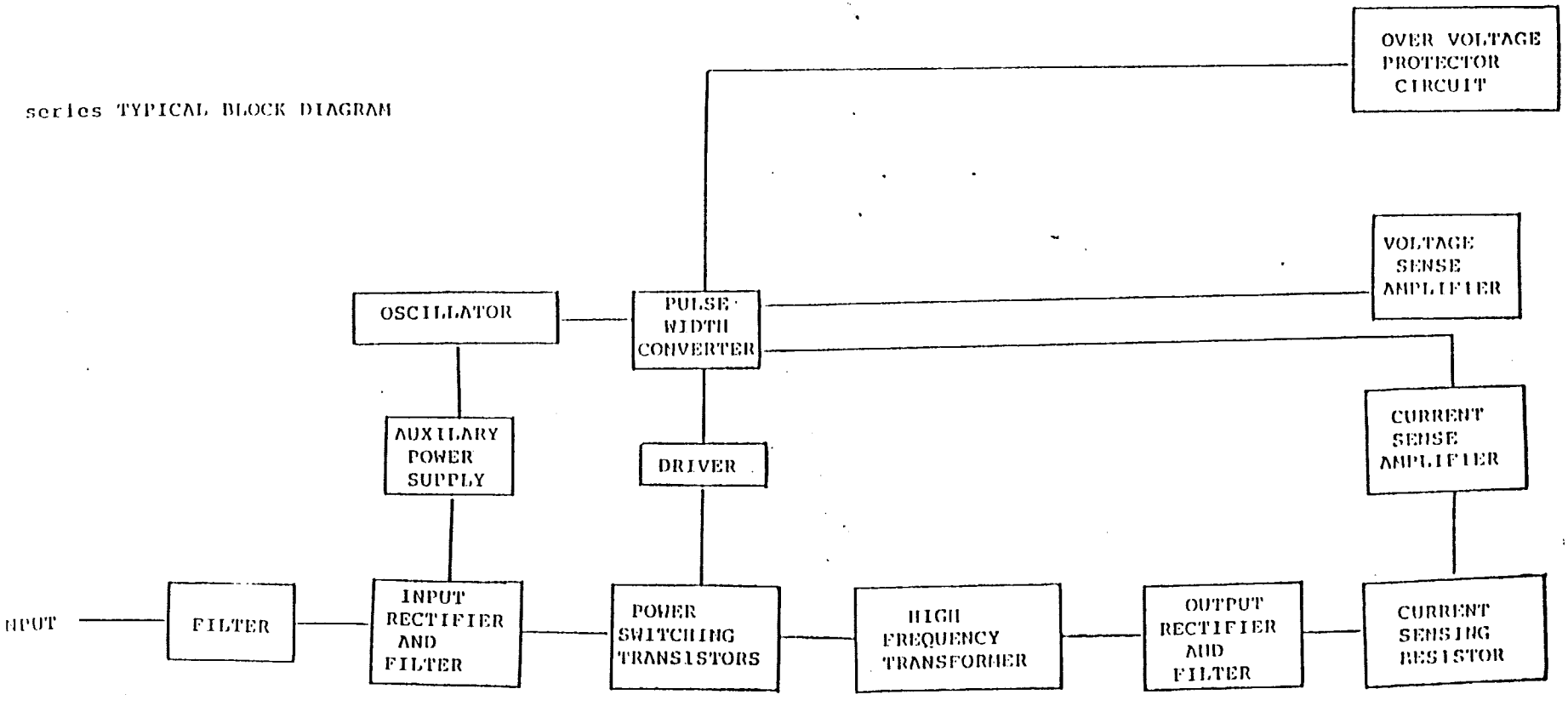
NEMIC-LAMBDA K.K.

The HR series were developed as a continuation of the prior HR series switching power supplies, with the specifications and ratings recommendation emphasized, and were designed for large volume production with ample results and VA in quantity production.

1. Features

- 0.4 % Reg. Line and Load
- High-efficiency, greater than 70 %
- Wide operating input range
  90 -132 VAC or 115-165 VDC
- 4 Package sizes up to 48V, up to 30 amps
- Overload and overvoltage protection
  standard on all units
- soft-start circuit (HR-10,11,12 only)
  limits in-rush current at turn-on
- Convection - cooled
  no fans or blowers
- Low-cost, 5 - year guaranteed power supplies
- Meet UL-114, 478 specifications

series TYPICAL BLOCK DIAGRAM



NOTE.. ALL HR-10,11,12 series include soft-start circuit which limits in-rush current at turn-on

3. Common specifications

3-1 Regulated voltage output

Regulation, line ..... 0.4 % for line variations from 90--132 VAC

Regulation, load ..... 0.4 % for load variations from 0 to full load.

Ripple and Noise ..... 50 mv pk-pk for 5,6v
60 mv pk-pk for 9,12,15v
80 mv pk-pk for 18,20,24,28v
100 mv pk-pk for 48v with either positive or negative terminal grounded.

Temperature
Coefficient ..... 1% max. from -10°c to +71°c

Remote Sensing ..... Provision is made for remote sensing to eliminate effect of power output lead resistance on DC regulation

3-2 Input

AC input ..... 90 -132 VAC at 47 -440 Hz

Dc input ..... 115 - 165 VDC

3-3 Remote ON - OFF control

The DC output of all HR - series power supplies can be turned on and off remotely by means of digital command.

..... Logic " 0 " for ON, logic " 1 " for OFF

..... 3.2 mA max. sinking required.

3-4 Remote programming

External Resistor .....Norinal 1000 ohm /volt output
Programming voltage ..... One-to-one voltage change

3-5 Overshoot .....No overshoot under conditions of power turn-on, turn-off, or power failure.

3-6 Protection

OCP ..... Over-current protection circuit limits output current to a preset safe value and protects the load and power supply when external overloads and direct shorts occur.

OVP ..... Over-voltage protection circuit prevents damage to the load caused by excessive power supply output voltage.

3-7 Operating Temperature

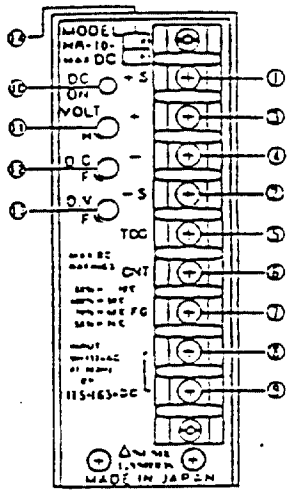
..... Continuous duty from -10°c to 71°c ambient with corresponding maximum output power ratings for all models of operation.

3-8 Storage Temperature

..... -30°c to +85 (Non operating)

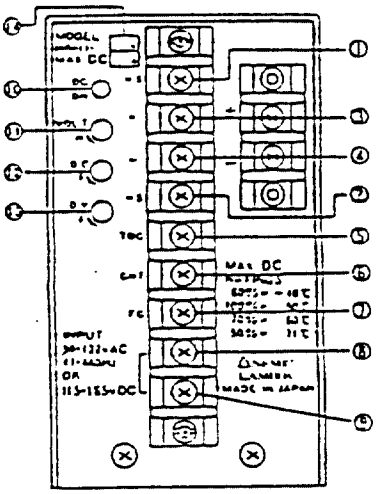
4. Front Panel information

HR-10 (HR-9)



Front view

HR-11(HR-12)



Front view

Figure 2 Front Panel Drawings

① ② Remote Sensing Terminals

..... Remote sensing provides complete compensation for the DC voltage drops in the connecting cables. Usually connect to the supply terminals + , - respectively.

③ ④ Supply Terminals

⑤ ⑥ Remote ON-Off control terminals

..... The DC output can be turned on and off remotely by means of digital command. The digital on-off command is applied to "CNT" (6). Logic " 0 " for ON and logic " 1 " for OFF.

⑦ Chassis Ground Terminal

⑧ ⑨ Input Terminals

..... Apply input power to input terminals with input voltage specifications

(10) Power ON LED

..... The LED emits whenever the DC output is turned on.

(11) Voltage Adjustment

(12) O.C.P. Adjustment

(13) O.V.P. Adjustment

(14) Voltage and Current Ratings

5. Connections for Operation

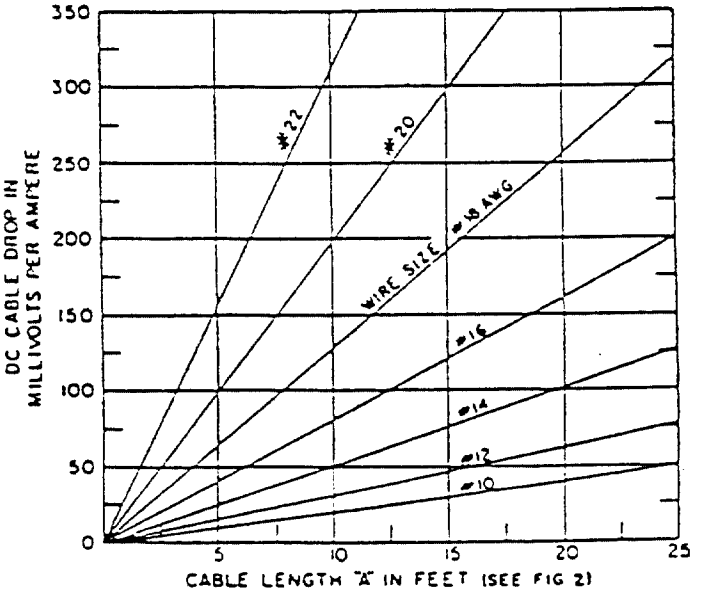
5-1 Ground Connections

All HR series power supplies can be operated either with negative or positive output terminal grounded.

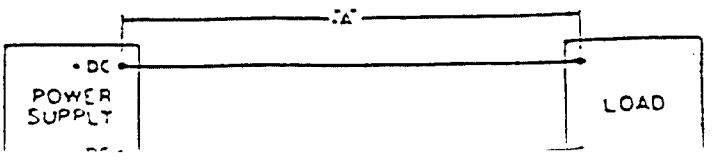
5-2 Supply Load Connections

The supply positive terminal is brought out terminal +, and negative terminal to -.

Recommended wiring of the power supply to the load and selection of wiring is shown in figures 3. Selection of proper wiring is made on the basis of load requirements.



Cable Connection Chart



5-3 Remote Sensing Connection

Refer to figure 4, remote sensing provides complete compensation for the DC voltage drops in the connecting cables. If remote sensing is not required, both terminals +s and -s must be connected to the supply terminals + and - respectively with the shortest leads.

Sensing leads should be a twisted pair to minimize AC pick-up. Compensation for the DC voltage drops must be used with less than 0.7 wolts.

5-4 Remote ON-OFF Control Connection

Remote on-off control is brought out to terminal CNT and terminal TOG. The DC output can be controled remotely without turning input power on and off by means of digital command which is applied to CNT.

Logic " 0 " for on and logic " 1 " for off.

Remote on-off control can be operated either with negative or positive output terminal grounded, as the control circuits are isolated from the primary and secondary with the photo-coupler and transformer.

Maximum supply voltage to CNT, which is with respect to TOG, must never exceed 10 volts, and maximum reverse is -0.7 volts.

5-5 Connections For Series or parallel Operation

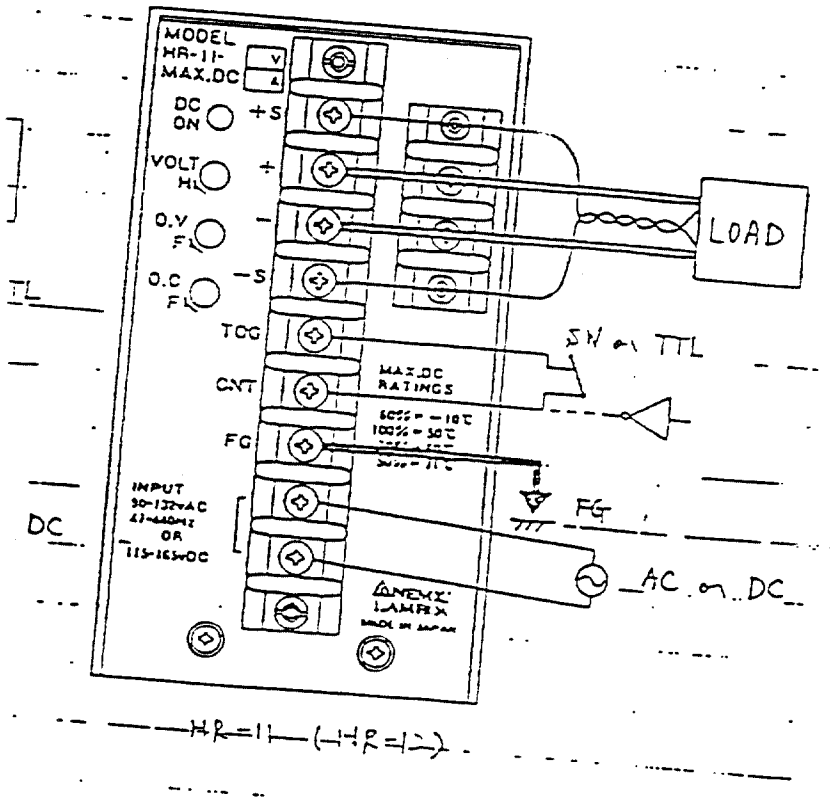
All HR series power supplies can be operated either with series or paralell operation. Before operatin, please consult the nearest office of the NEMIC-LAMBDA K.K. where trained personnel are ready to assist you.

Connection

ltage output can be programmed with an
d variable resistor valued at a nominal
change. Use a low temperature coefficient
nost stable operation.
adjust programming resistor for zero
oltage adjust control to the minimum

ogrammmed supply will nominally be
e plus 1 volt per 1000 ohms.

tion



6. Performance Checks

6-1 Voltage Adjustment

The power supply voltage output can be adjusted with the variable resistor, VOLT(⑪)of the front panel, within TYP. +-10% voltage When higher voltage variations are required, turn voltage adjust control to CW, H direction.

Note: Over-voltage Protection will operate when the output voltage exceeds the present voltage value for the over-voltage protection.

6-2 O.C.P. Adjustmnet

The over-current limit value can be adjusted with the variable resistor, O.C ⑫ of the front panel, turning current adjust control to CW, F direction, the over-current limit will beset to lower value. The power supply will automatically resume operation after eliminating the cause for over-current.

6-3 O.V.P. Adjustment

The over-voltage trip-point can be adjusted with the adjust control O.V. ⑬ of the front panel. The trip-point will be set to lower voltage by truning adjust control to CW, F direction. After firing, eliminate the cause for over-voltage, and then, resume operation of the supply by momentarily interrupting the AC input power.

6-4 Performance Checks

Make all performance checks on the front terminals.
Connect measuring devices directly to terminals and use the shortest leads possible to minimize the effect of the output impedance and AC pick-up.

Long load leads should be a twisted pair to reduce noise pick-up. Some elect., or film capacitor may be required between the positive and negative load leads to minimize the output impedance.

Use oscilloscope to measure peak-to-peak ripple voltage of the power supply DC output.

Use a Variac to vary the line voltage from 90-132 volts AC and check the power supply line regulation accuracy on the DVM differential meter.

6-5 Withstand Voltage Check

Withstand 1.5 KV AC for one minute between input terminals and and chassis are standard on all HR series power supplies. When checking withstand voltage, apply voltage from 0 to 1.5 KV carefully. Turning power off of test equipment, handle voltage control to avoid damaging power supplies.
Some of test equipments provided TIMER could indicate impulse overshoot voltage on turing power off after TIMER shutdown.

7. Mounting

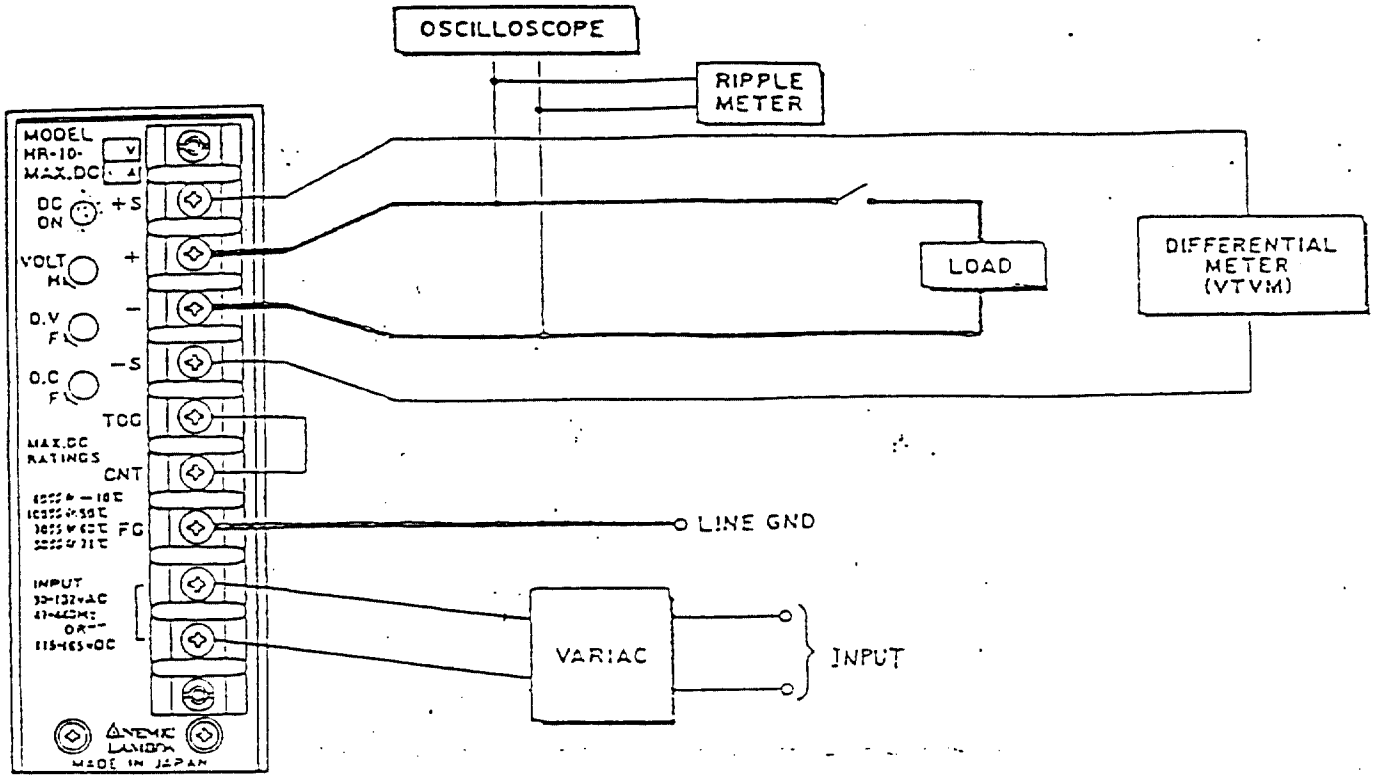
All HR series power supplies must be mounted with top facing up and on a horizontal metallic plane in areas with sufficient air circulation.

All units are rated at 50°c in free air and must be derated with corresponding load current ratings over 50°c ambient temperature.

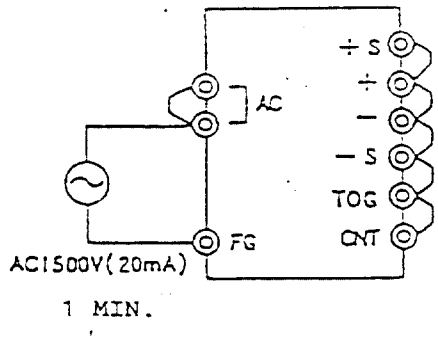
Maximum load current must not exceed the rated value for each ambient temperature.

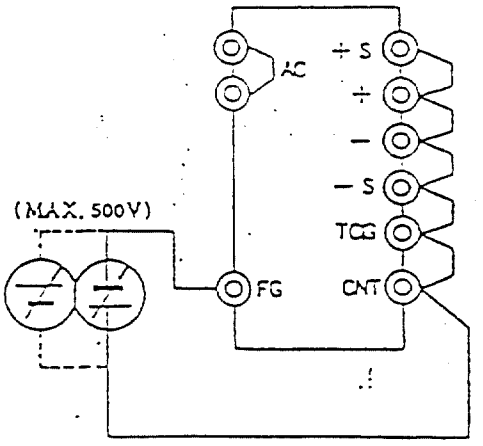
External fans or blowers must be used from 61°c to 71°c ambient temperature with air capability greater than 1000 liters per minute.

One surface with tapped mounting holes can be utilized for mounting all HR series power supplies.



Test Connections for Performance Checks.



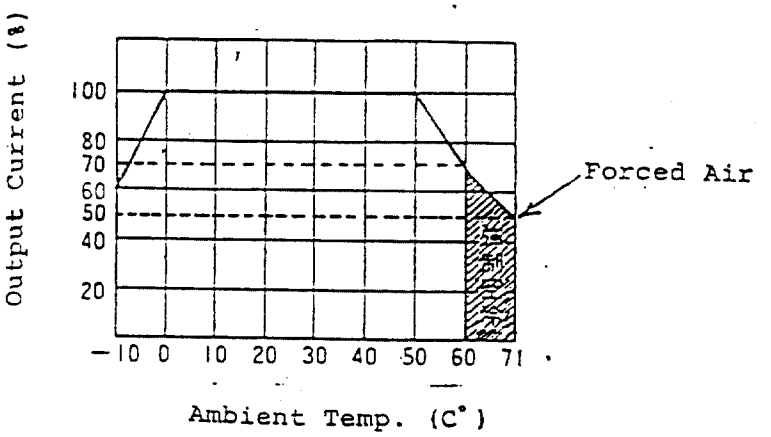


Withstand Voltage Check

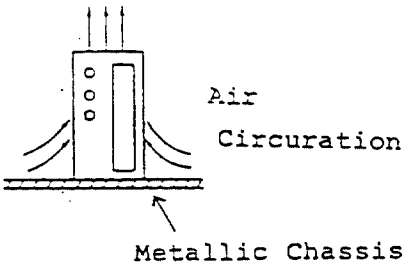
Isolation Resistance Check

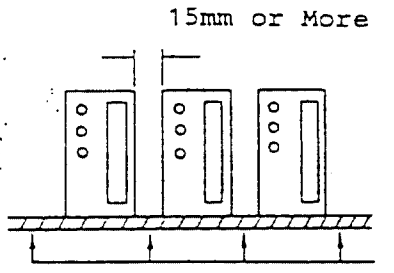
Customer's mounting screw must not protrude into power supply by more than 6 m/m.

Output Derating Curve



Standard Mounting Method





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