CHAPTER 1
GENERAL INFORMATION

1.1 INTRODUCTION

The P-Series power supplies consists of four PQ Quarter-rack supplies and four PH Half-rack supplies. These supplies may be operated locally via the front panel controls or switch selected for remote operation using a remote program source. The Systron Donner P-1 and P-2 Programmer modules provide all the logic necessary to control the P-Series supplies via an IEEE STD-488 GPIB.

Table 1-1 provides a listings of the eight modules that make up the P-Series power supply system.

TABLE 1-1 P-SERIES MODULES

MODULE	FUNCTION AND CHARACTERISTICS
PQ 10-3	Programmable 0-10V, 0-3A Quarter-rack Power Supply
PQ 20-2	Programmable 0-20V, 0-2A Quarter-rack Power Supply
PQ 50-1	Programmable 0-50V, 0-1A Quarter-rack Power Supply
PQ 100-0.5	Programmable 0-100V, 0-0.5A Quarter-rack Power Supply
PH 10-10	Programmable 0-10V, 0-10A Half-rack Power Supply
PH 20-6	Programmable 0-20V, 0-6A Half-rack Power Supply
PH 50-3	Programmable 0-50V, 0-3A Half-rack Power Supply
PH 100-1.5	Programmable 0-100V, 0-1.5A Half-rack Power Supply

This instruction manual contains the general characteristics and specifications, operating procedures, theory of operation, maintenance and calibration procedures, parts lists and the related schematic diagrams and assembly drawings for all the modules that comprise the P-Series power supplies.

The P1, P1E, and P2 Programmer modules that provide the remote programming for the power supplies are not included in this instruction manual. If the Power Supplies are to be system configured utilizing programmer modules, refer to the P1 and P2 Programmer Instruction Manual for detailed information on system configuration, programmer data and operation and maintenance of the Programmer modules.

1.2 DESCRIPTION

The P-Series power supplies are modular in design to allow a compact multiple output programmable system configuration for use in test and process-control systems when used in conjunction with the P-Series programmer(s). The programmer will allow up to eight power supplies to be controlled via a General Propose Interface Bus (GPIB) which conforms to IEEE STD-488-1975 or locally via the programmer front panel data switches. The power supplies will respond to program changes in less than 2 milliseconds. Each Power Supply module may be controlled locally by its front panel control settings when the local

modes are rear panel switch selected. The Power Supply modules are lightweight, compact precision dissipative regulators housed in quarter and half rack chassis having equal height and depth, thus allowing a compact multiple output rack assembly. Both constant voltage and constant current operation are provided, which may be either locally controlled or remotely programmed. In the voltage mode, adjustable current limiting is provided, while the current mode provides adjustable voltage limiting. Both output voltage and current are front panel metered, and front panel indicators provide indication of the operational mode of the supply.

1.3 SPECIFICATIONS

Table 1-2 lists the power supply power ratings. The performance specifications describe the power supply's warranted performance and are listed in Table 1-3. Table 1-4 provides the supplemental characteristics of the power supply which are typical values, but non-warranted performance parameters.

TABLE 1-2 POWER RATINGS

P-Series Model	Output				Sink Current Limit ***	Input	
	Voltage Mode **		Current Mode				
	Range *	Resistance	Range	Impedance		Voltage	Line Frequency
PQ 10-3	0 to 10 Vdc	20 µΩ	0 to 3 A	3.3 kΩ+ 11 µF	3.5 A	All models:	All models:
PQ 20-2	0 to 20 Vdc	67 µΩ	0 to 2 A	6.6 kΩ+ 5.7 µF	2.3 A		
PQ 50-1	0 to 50 Vdc	333 µΩ	0 to 1 A	16.6 kΩ+ 2.2 µF	1.0 A	90-110 Vac	47-440 Hz
PQ 100-0.5	0 to 100 Vdc	1.3 µΩ	0 to 0.5 A	33.3 kΩ+ 1.0 µF	.35A	104-127 Vac	
						194-237 Vac	
PH 10-10	0 to 10 Vdc	67 µΩ	0 to 10 A	3.3 kΩ+ 16 µF	3.5 A	207-253 Vac	
PH 20-6	0 to 20 Vdc	200 µΩ	0 to 6 A	6.6 kΩ+ 6.6 µF	2.3 A		
PH 50-3	0 to 50 Vdc	1.0 MΩ	0 to 3 A	16.6 kΩ 2.2 µF	1.0 A		
PH 100-1.5	0 to 100 Vdc	4.0 MΩ	0 to 1.5 A	33.3 kΩ 1.0 µF	.35A		

Notes

*** An extra 0.5 V per output lead compensates for lead voltage drop.**
**** Isolation voltage: 300V terminal to chassis.**
***** Nominal value**

TABLE 1-3 PERFORMANCE SPECIFICATIONS

PERFORMANCE SPECIFICATIONS	STABILIZATION MODE	
	VOLTAGE	CURRENT
LOAD EFFECT: The change in stabilized output caused by a load change equal to the output rating.	0.002% E-rated	0.05% I-rated or 1mA^2 + 3 mA whichever is greater
SOURCE EFFECT: The change in stabilized output caused by any change in the ac line within the input rating.	0.001% E-rated	0.005% I-rated or 200 µA whichever is greater

TABLE 1-3 PERFORMANCE SPECIFICATIONS (Cont'd)

PERFORMANCE SPECIFICATIONS	STABILIZATION MODE	
	VOLTAGE	CURRENT
PARD: Periodic and random deviations from the stabilized output, measured from 20 Hz to 10 MHz.	300 μV rms or 3 mV p-p	0.05% I-rated, or 1 mA, RMS whichever is greater 0.15% I-rated, or 3 mA, p-p whichever is greater
STEP RESPONSE TIME: The time required to achieve 99.9% of the programmed change with a resistive load.	2 ms	1 ms

With a capacitive load, voltage stabilization may be delayed because current, charge or discharge, is limited. When the load capacitance is known, the step response time can be calculated using the equation below C_i is the supply's internal capacitor (see output ratings) and I_1 is the sink or source current limit. The units of measure are seconds, volts, farads and amperes.

$$\text{Time} = \frac{\Delta E\ (C_i + C_e)}{I_1}$$

TABLE 1-4 SUPPLEMENTAL CHARACTERISTICS

SUPPLEMENTAL CHARACTERISTICS	STABILIZATION MODE	
	VOLTAGE	CURRENT
DRIFT: The output drift over 8 hours under constant line, load and temperature after a 30-minute warmup.	0.01% E-rated in Local 0.005% E-rated in Remote	0.1% I-rated or 3 mA* in Local 0.02% I-rated in Remote
TEMPERATURE EFFECT: The change in stabilized output per °C change in ambient temperature.	0.01% E-rated in Local 0.005% E-rated in Remote	0.01% I-rated in Local or Remote
RESOLUTION: The resolution obtainable with front panel controls.	0.03% E-rated	0.06% I-rated
PROGRAMMING SCALE: The external input that will change the output from minimum to maximum.	0 to +10V @ 1 mA Voltage and V_{LIM} ®	0 to -1 mA @ -1V

TABLE 1-4 SUPPLEMENTAL CHARACTERISTICS (Cont'd)

SUPPLEMENTAL CHARACTERISTICS	STABILIZATION MODE	
	VOLTAGE	CURRENT
TRANSIENT RECOVERY: Time required to recover within 0.1% E-rated following a step load change between 10% and 100% of I-rated.	50 µs	
METER ACCURACY: The maximum non-linear error at 25°C.	2%	2%
V_{LIM} ® ADJUSTMENT RANGE:	5% to 109% E-rated	
V_{LIM} ® MARGIN: The recommended minimum margin of setting above output voltage.	5% E-rated	
CROWBAR TRACKING RANGE:	5V to 110% E-rated **	
CROWBAR THRESHOLD: The voltage above V_{LIM} ® at which the crowbar will trip.	1% E-rated 50 µs response	

Notes:
* Whichever is greater
** 50V and 100V models 7V to 110%

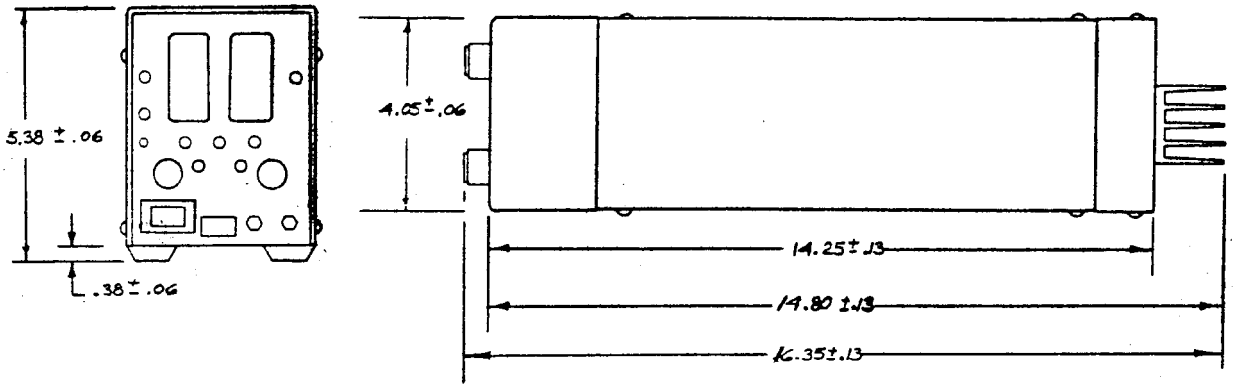
1.4 PHYSICAL CHARACTERISTICS

Table 1-5 lists the P-Series power supplies' physical characteristics. Figure 1-1 provides outline drawings with dimensional data.

TABLE 1-5 PHYSICAL CHARACTERISTICS

Storage Temperature: -40°C to +85°C		
Dimensions:		
PQ Models	Height	5.38" (13.7 cm)
	Width	4.05" (10.3 cm)
	Depth	16.35" (41.5 cm)
PH Models	Height	5.38" (13.7 cm)
	Width	8.10" (20.6 cm)
	Depth	16.35" (41.5 cm)
Weight:		
PQ Models	Net	11 lbs (5 kg)
	Shipping	15 lbs (6.8 kg)
PH Models	Net	23 lbs (10.5 kg)
	Shipping	28 lbs (12.7 kg)

PQ MODELS



PH MODELS

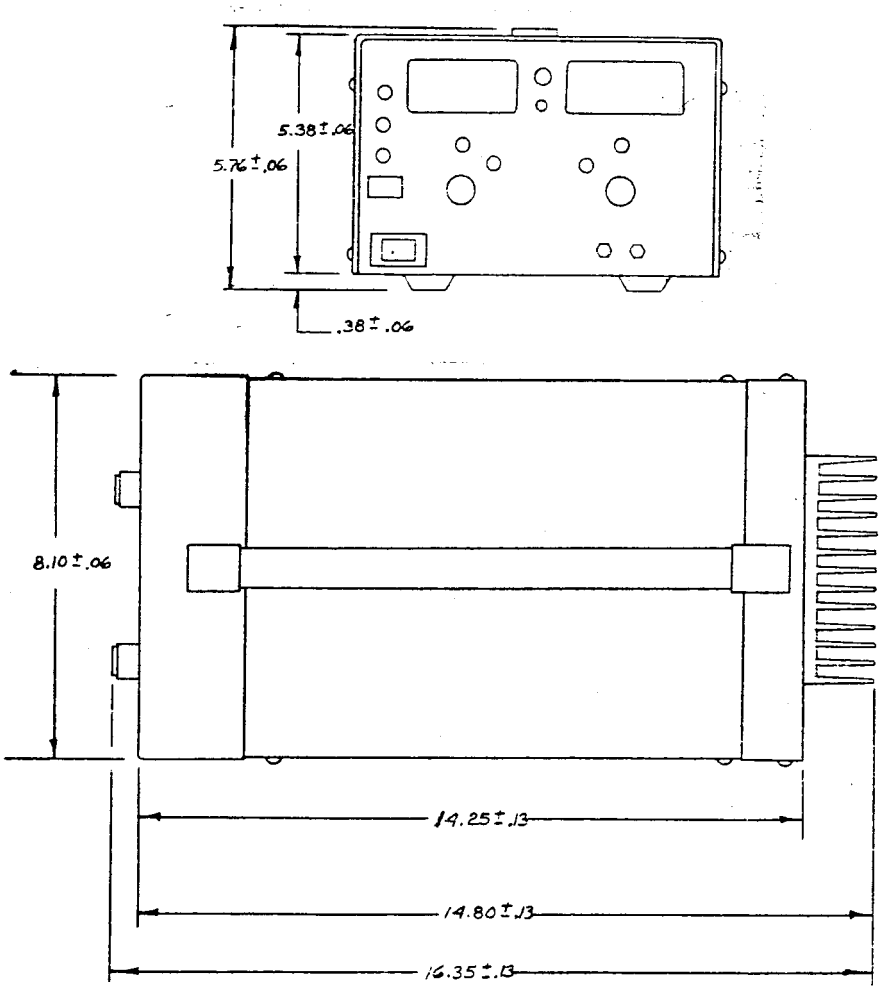


FIGURE 1-1 P-SERIES OUTLINE DRAWINGS