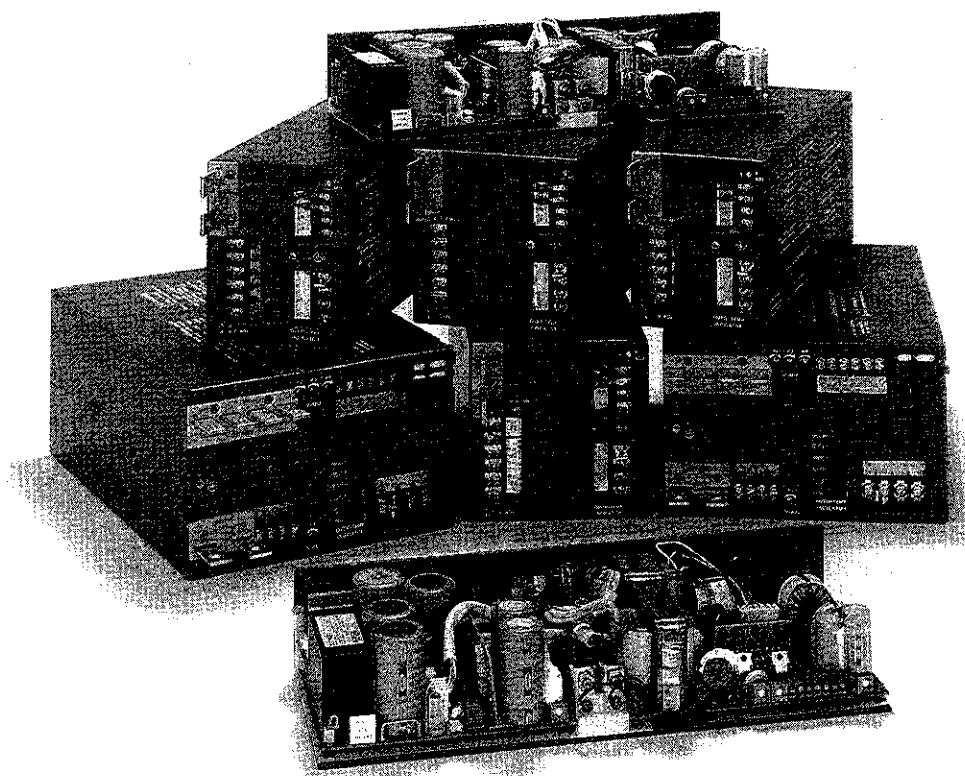


PART IA — AC-TO-DC SWITCHING POWER SUPPLIES

LAMBDA'S INDUSTRIAL WATTBox™ LFQ SERIES



QUAD OUTPUT INDUSTRIAL SOLUTIONS FROM 325W TO 1200W

Reliability starts with the design. The WattBox LFQ Series embodies a unique control concept, developed by Lambda, which provides inherently reliable operation in transient line and load conditions. In addition, the WattBox allows increased power density up to 2.8W/in^3 for a quad output. This design approach, coupled with the high quality standards you've come to expect from Lambda, makes the WattBox LFQ Series the natural choice in demanding industrial applications.

All of the outputs from each LFQ WattBox are floating and regulated. Dynamic performance is guaranteed for each output over the full AC input range and from zero to full load (up to the maximum total power for the individual package). Cross regulation between outputs is controlled within 0.1% with respect to the other.

- 0.995 power factor and harmonic correction per IEC 555-2 when used with the PFHC-2600.
- High power up to 1.2kW.
- Power density up to 2.8W/in^3 .
- Meets UL/CSA/TUV/IEC.
- Short circuit, overvoltage and fan failure protection.
- TTL compatible signal enables remote turn-on/turn-off.
- Performance guaranteed for the full range of line and load regulation.
- International input: 85–132VAC/170–250VAC/47–63Hz/250–370VDC.
- Industrial isolation ratings: 2500 RMS input to output; 1500V RMS input to ground; 500V RMS output to ground minimum.
- Continuous duty from 0 to 60°C. Guaranteed turn-on at -10°C .
- All components and ratings are rigidly specified by Lambda including Class H insulated magnetics, high grade electrolytic capacitors, high quality fans (where used), PWM controller and CC4 printed circuit boards. All mounted in heavy gauge sheet steel enclosures.
- LRA-18, 19-inch rack mounting accessories and standard assemblies available.
- Grade 2 design.

PART IA—AC-TO-DC SWITCHING POWER SUPPLIES

LAMBDA'S INDUSTRIAL WATTBox™ LFQ SERIES

DC OUTPUT

Voltage range shown in tables.

REGULATED VOLTAGE

regulation, line	0.1% for line variations from 187 to 265VAC and from 95 to 132VAC. On LFQ-29, 30, 0.1% for line variations from 85 to 132VAC and from 170 to 265VAC.
regulation, load	0.1% for load variations from 0 to full load for main output; 0.2% for fourth output (5V) of LFQ-26-1, LFQ-27-1, LFQ-28-1; 1% for 12V/15V outputs*; 2% for 24V/28V outputs*; (*5V outputs require a preload of 12.5A on LFQ-26, 19.0A on LFQ-27, 25.5A on LFQ-28 for full power on other outputs, and 4.0A on output #2 of LFQ-29, 30 for max power out on outputs 3 and 4. Output #2 must be greater than or equal to output #3). 0.2% for second 5V output of LFQ-29-1, 30-1.
ripple and noise (20MHz Bandwidth)	15mV RMS, 100mV pk-pk for 5V outputs. 25mV RMS, 150mV pk-pk for 12V/15V outputs. 25mV RMS, 250mV pk-pk for 24V/28V outputs.
cross regulation	5V outputs: 0.1% max for load variations on auxiliary outputs from no load to full load; Auxiliary outputs: 0.1% max for load variations on 5V output from preload to full load current.
remote programming resistance	1000 Ω /V nominal (main output and output 1, 2, 3 on LFQ-29, 29-1, 30, 30-1).
remote programming voltage	volt per volt (main output and outputs 1, 2, 3 of LFQ-29, 29-1, 30, 30-1).
temperature coefficient	0.03%/°C.

AC INPUT (User selectable)

line	95 to 132VAC/187-265VAC, 47-440Hz. 85 to 132VAC/170 to 265VAC on LFQ-29, 29-1, 30, 30-1.
power	LFQ-26, 26-1: 434 watts maximum. LFQ-27, 27-1: 633 watts maximum. LFQ-28, 28-1: 880 watts maximum. LFQ-29, 29-1: 1310 watts maximum. LFQ-30, 30-1: 1710 watts maximum.
RMS current	LFQ-26, 26-1: 7.0A RMS maximum. LFQ-27, 27-1: 11.0A RMS maximum. LFQ-28, 28-1: 15.0A RMS maximum. LFQ-29, 29-1: 20.0A RMS maximum. LFQ-30, 30-1: 26.0A RMS maximum.

EFFICIENCY

75% minimum on LFQ-26, 26-1, 27, 27-1. 72% minimum on LFQ-28, 28-1.
70% minimum on LFQ-29, 29-1, 30, 30-1.

DC INPUT

260 to 370VDC. (Units must be configured for 220V input.) 250-370VDC on LFQ-29, 29-1, 30, 30-1.

OVERSHOOT

No overshoot at turn-on, turn-off or power failure.

STORAGE TEMPERATURE RANGE

-55°C to +85°C.

AMBIENT OPERATING TEMPERATURE

Continuous duty 0° to 60°C with suitable derating above 40°C. Guaranteed turn-on at -10°C with reduced specifications.

OVERLOAD PROTECTION ELECTRICAL

External overload protection. Automatic electronic current limiting circuit limits the output current to a preset value, thereby providing protection for the load as well as the power supply.

HOLD UP TIME

All outputs will remain within regulation limits for at least 16.7 msec after loss of AC power when operating at maximum output power and 105VAC input at 60Hz. (When configured at 220V input: 20 msec holdup when operating at maximum output power and 210VAC input at 50Hz.)

IN-RUSH CURRENT LIMITING

The turn-on in-rush current will not exceed 40 amps peak on LFQ-26, 26-1. (75 amps peak on LFQ-27, 27-1, 28, 28-1, 29, 29-1, 30, 30-1.)

OVERVOLTAGE PROTECTION

Main 5V output only. If output voltage exceeds a preset value, inverter drive is removed.

COOLING

The LFQ-26, 26-1 are convection cooled. The LFQ-27, 27-1, 28, 28-1, 29, 29-1, 30, 30-1 are fan cooled. A fan failure circuit will shut down the inverter in the event of fan failure or interference of fan rotation. AC input power must be momentarily interrupted to restore output after fault condition is corrected.

LED INDICATOR

An LED fan failure indicator will illuminate in the event of fan failure or interference of fan rotation.

DC OUTPUT CONTROLS

Screwdriver adjustment over the entire voltage range.

INPUT AND OUTPUT CONNECTIONS

PC Board mounted barrier strip: AC input, 5V DC sensing and remote turn-on/turn-off of LFQ-27, 27-1, 28, 28-1; AC input, remote turn-on/turn-off, DC sensing outputs 1, 2, 3 of LFQ-29, 29-1, 30, 30-1. DC output 4 of LFQ-29, 29-1, 30, 30-1; Auxiliary outputs of LFQ-27, 27-1, 28, 28-1.

PC Board mounted terminal block: AC input, 5VDC, sensing and remote turn-on/turn-off and auxiliary outputs of LFQ-26, 26-1.

Chassis stud: all ground connections.

Bus Bars mounted on PC Board: 5VDC outputs of LFQ-26, 26-1, 27, 27-1, 28, 28-1; DC outputs 1, 2, 3 of LFQ-29, 29-1, 30, 30-1.

MOUNTING

Two mounting surfaces and two mounting positions on LFQ-26, 26-1. LFQ-27, 27-1, 28, 28-1, 29, 29-1, 30, 30-1 have one mounting surface. Forced air cooling will allow multiple mounting positions.

REMOTE TURN-ON/TURN-OFF

TTL compatible voltage level signal enables remote turn-on/turn-off of the power supply. A voltage of 2.8V to 5.0V applied to remote on/off terminals will initiate turn-off. Open circuit or short circuit condition, or a zero to 0.5V signal will cause turn-on.

REMOTE SENSING

Provision is made for remote sensing to eliminate the effects of power output lead resistance on DC regulation. (Main 5V output only of LFQ-26, 26-1, 27, 27-1, 28, 28-1 and outputs 1, 2, 3 of LFQ-29, 29-1, 30, 30-1.)

ISOLATION RATING

2500V RMS input to output.

EMI

Conducted EMI conforms to FCC Docket 20780 Class A and VDE 0871 Class A above 150 kHz.

POWER FACTOR AND HARMONIC CORRECTION

0.995 power factor and harmonic correction per IEC 555-2 when used in conjunction with Lambda's PFHC-2600. See pp. 30-31.

PHYSICAL DATA

Package Model	Weight		Size (Inches)
	Lb. Net	Lb. Ship	
LFQ-26, 26-1	6	7	2.5 × 4.75 × 13
LFQ-27, 27-1	12	14	4.0 × 4.875 × 11
LFQ-28, 28-1	13	15	5.0 × 4.875 × 11
LFQ-29, 29-1, 30, 30-1	17	20	7.75 × 4.875 × 11.5

FINISH

Gray, Fed. Std. 595, No. 26081

GUARANTEED FOR 3 YEARS

Three year guarantee includes labor as well as parts. Guarantee applies to operation at full published specifications at end of three years.

SAFETY AGENCY APPROVALS

All models are UL recognized, CSA certified and TUV licensed.

PART IA—AC-TO-DC SWITCHING POWER SUPPLIES

INDUSTRIAL SWITCHING SELECTOR GUIDE

Quad Output WattBox™ LFQ Series.

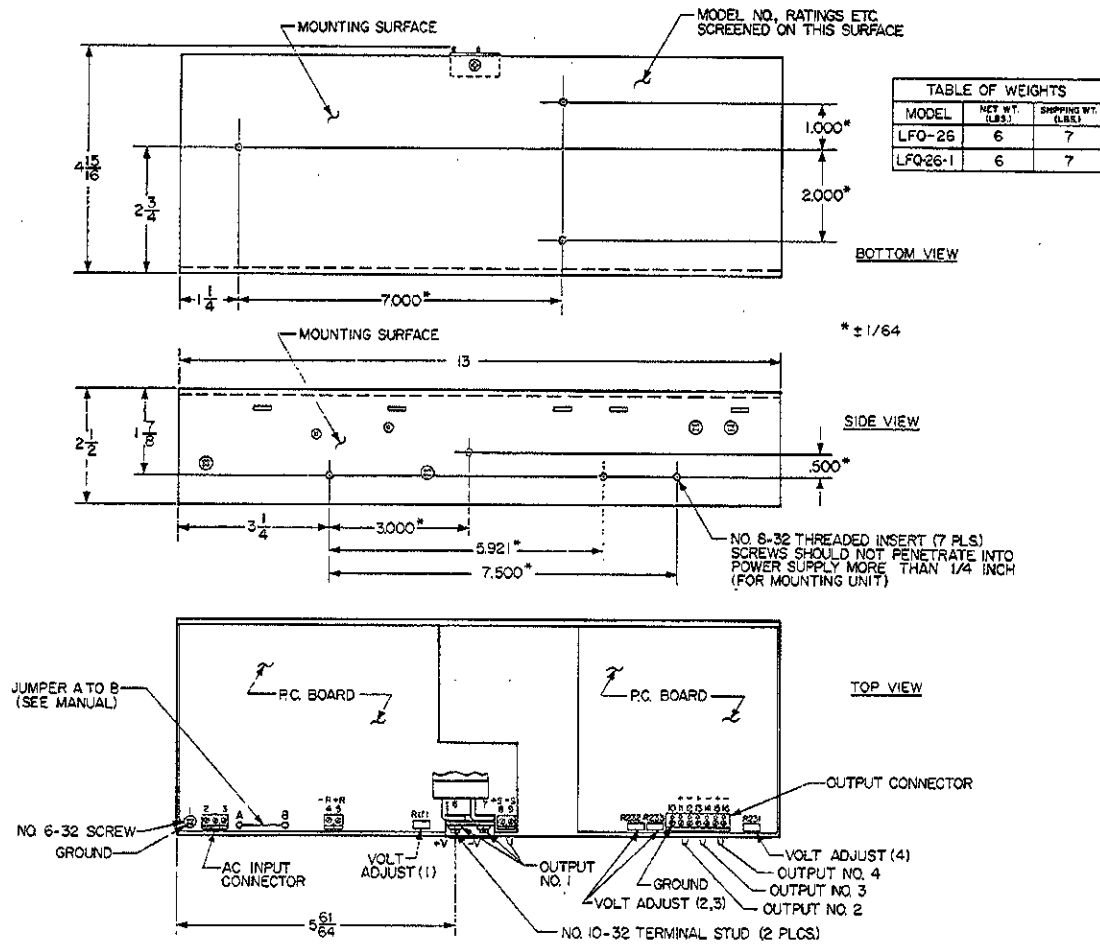
MODEL	OUTPUT NUMBER	ADJUSTABLE VOLTAGE RANGE (VDC)	VOLT NOMINAL (Vo)	MAX OUTPUT POWER (WATTS)			MAX CURRENT (AMPS AT)			COMPLETE ELEC. SPEC. PG.	COMPLETE MECH. SPEC. PG.	DIMENSIONS (INCHES)	PRICE				
				40°C	50°C	60°C	40°C	50°C	60°C				QTY. 1	QTY. 10	QTY. 25	QTY. 250	QTY. 1000
LFQ-26	1	5V ± 5%	5	325	276	227	50.00	42.00	34.00	35	157	2.5 × 4.75 × 13	\$ 543	\$ 518	\$ 497	\$408	\$340
	2	11.4-15.75	12				6.00	5.10	4.20								
	3	11.4-15.75	15				4.80	4.10	3.40								
	4	22.8-29.4 ⁽¹⁾	28				6.00	5.10	4.20								
LFQ-26-1	1	5V ± 5%	5	325	276	227	50.00	42.00	34.00	35	157	2.5 × 4.75 × 13	543	518	497	408	340
	2	11.4-15.75	12				6.00	5.10	4.20								
	3	11.4-15.75	15				4.80	4.10	3.40								
	4	5V ± 5%	5				6.00	5.10	4.20								
LFQ-27	1	5V ± 5%	5	475	420	362	75.00	66.00	57.00	35	158	4.0 × 4.875 × 11	687	654	627	527	455
	2	11.4-15.75	12				9.00	7.90	6.90								
	3	11.4-15.75	15				7.20	6.40	5.50								
	4	22.8-29.4 ⁽¹⁾	28				9.00	7.90	6.90								
LFQ-27-1	1	5V ± 5%	5	475	420	362	75.00	66.00	57.00	35	158	4.0 × 4.875 × 11	687	654	627	527	455
	2	11.4-15.75	12				9.00	7.90	6.90								
	3	11.4-15.75	15				7.20	6.40	5.50								
	4	5V ± 5%	5				9.00	7.90	6.90								
LFQ-28	1	5V ± 5%	5	635	578	502	100.00	91.00	79.00	35	158	5.0 × 4.875 × 11	813	775	743	620	533
	2	11.4-15.75	12				12.00	10.80	9.50								
	3	11.4-15.75	15				9.60	8.60	7.60								
	4	22.8-29.4 ⁽¹⁾	28				12.00	10.80	9.50								
LFQ-28-1	1	5V ± 5%	5	635	578	502	100.00	91.00	79.00	35	158	5.0 × 4.875 × 11	813	775	743	620	533
	2	11.4-15.75	12				12.00	10.80	9.50								
	3	11.4-15.75	15				9.60	8.60	7.60								
	5	5V ± 5%	5				12.00	10.80	9.50								
LFQ-29	1	5V ± 5%	5	920	830	700	150.00	130.00	105.00	35	158	7.75 × 4.875 × 11.5	1012	964	925	772	664
	2	11.4-15.75	12				18.00	15.70	12.60								
	3	11.4-15.75	15				14.40	12.50	10.00								
	4	22.8-29.4	28				18.00	15.70	12.60								
LFQ-29-1	1	5V ± 5%	5	920	830	700	150.00	130.00	105.00	35	158	7.75 × 4.875 × 11.5	1012	964	925	772	664
	2	11.4-15.75	12				18.00	15.70	12.60								
	3	11.4-15.75	15				14.40	12.50	10.00								
	4	5V ± 5%	5				18.00	15.70	12.60								
LFQ-30	1	5V ± 5%	5	1200	1050	850	170.00	148.00	120.00	35	158	7.75 × 4.875 × 11.5	1204	1148	1133	907	784
	2	11.4-15.75	12				20.00	17.40	14.00								
	3	11.4-15.75	15				16.00	13.90	11.20								
	4	22.8-29.4	28				20.00	17.40	14.00								
LFQ-30-1	1	5V ± 5%	5	1200	1050	850	170.00	148.00	120.00	35	158	7.75 × 4.875 × 11.5	1204	1148	1133	907	784
	2	11.4-15.75	12				20.00	17.40	14.00								
	3	11.4-15.75	15				16.00	13.90	11.20								
	4	5V ± 5%	5				20.00	17.40	14.00								

NOTES: ⁽¹⁾ Peak output current (40°C) for 5 sec.: LFQ-27 — 4.5A; LFQ-28 — 6.0A.
⁽²⁾ All outputs are floating and regulated. They can be configured in either a positive or negative mode.

PART V—MECHANICAL DRAWINGS

LES-24 LES-25 AND WATTBOX LES-26 LFO-26-1

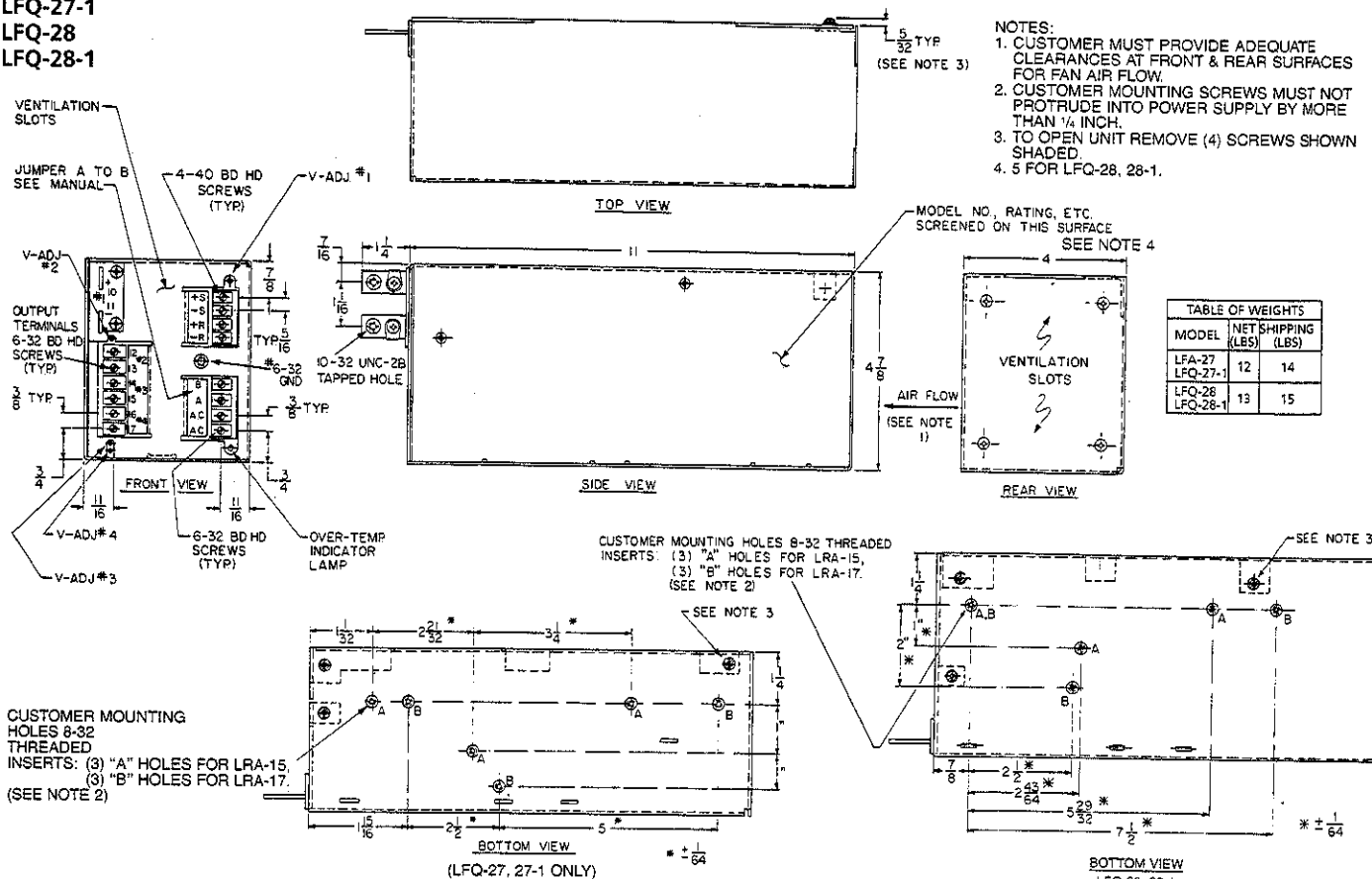
LFO-26
LFO-26-1



PART V—MECHANICAL DRAWINGS

LFQ-27, 27-1, 28, 28-1, 29, 29-1, 30, AND 30-1

LFQ-27
LFQ-27-1
LFQ-28
LFQ-28-1



LFQ-29
LFQ-29-1
LFQ-30
LFQ-30-1

