DATATEC, INC.

SUBMITTAL DATA

Murray Hill, New Jersey
May 11, 1998

Bill of Material:

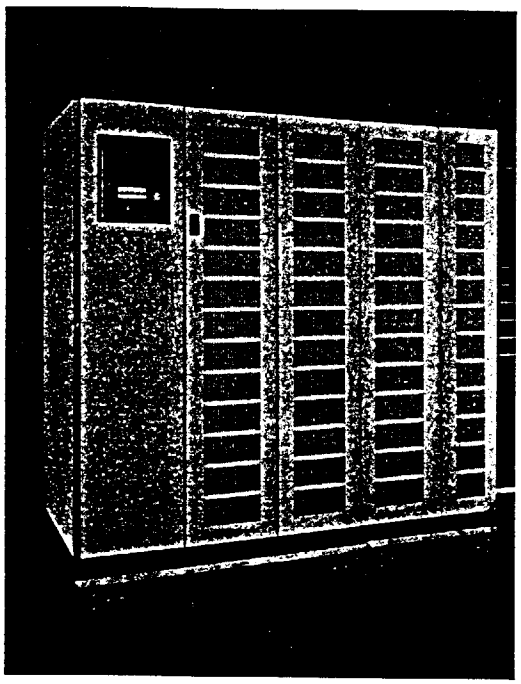
One (1) Exide Electronics Powerware Plus 500 UPS, Model 500
Rated 500 kva/400 kw
Input Voltage: 480 VAC, 3 phase, 60 Hz
Output Voltage: 480 VAC, 3 phase, 60 Hz
Battery Runtime: 5 minutes at 400 kw load
Includes:

- LCD display screen with metering, battery discharge data, alarm and event history
- RS-232 communications
- Battery Management System
- Remote notify
- Internal modem
- Remote Monitor Panel
- Building alarm contacts
- 10% Input THD filter
- Lug Kit
- Automatic bypass
- Manual bypass
- Emergency power off button
- Battery packs (#J-37)
- Ten year pro-rated battery warranty
- 24 month full service warranty, 7 day, 24 hour coverage
- Freight, FOB jobsite loading dock
- Start up service by Exide Electronics

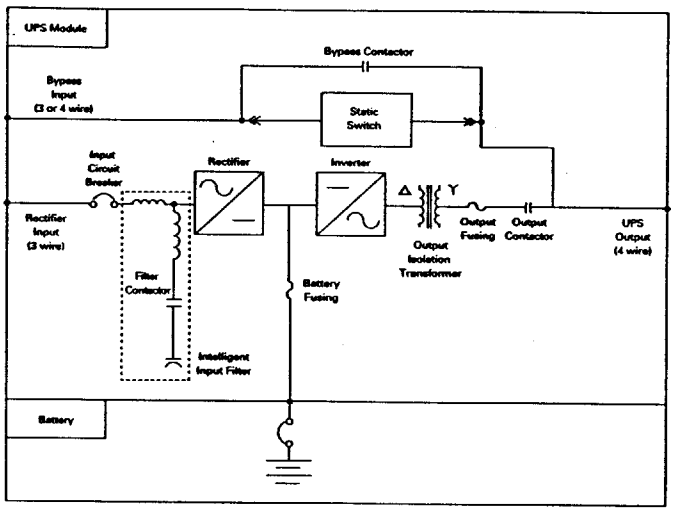
1100 Goffle Road, Hawthorne, New Jersey 07506 • Tel: (973) 423-0005 • Fax: (973) 423-5702

Powerware® Plus 500 Online Uninterruptible Power System

Model 400	400kVA / 320kW
Model 500	500kVA / 400kW



One Line Diagram



- *Continuous online protection*
- *Superior system reliability*
- *World class quality*
- *Flexible network communications*
- *DC Expert™ Battery Management System*
- *Powerware HotSync™ Redundant and Capacity Capability*

Environmental Specifications

Ambient temperature: 0°C to +40°C
Storage: –20°C to +70°C
Relative humidity: 5-95% non-condensing
Altitude: 1500 meters (5000ft.) at 40°C ambient temperature without load derating
Audible noise: Less than 72 typicaly dBA at 1 meter; in accordance with ISO 7779
Electrostatic discharge: Withstands 25kV without damage or disturbance to the load; exceeds requirements of IEC 801-2
EMC: Meets FCC Class A, Subpart J of Part 15 and EN 50091-2 (CISPR 22, Class A)

Input Specifications

Voltage range: (See chart on other side)
Frequency range: (60 Hz) 57-63 Hz;
Surge protection: Meets ANSI C62.41, Category A & B, EN 50091-2, and EN 50082-2
Power factor: 0.95 typical at full load with input filter
Input current distortion less than 10% with input filter

Output Specifications

Voltage THD: Less than 5% (100% non-linear load with 3:1 crest factor); less than 3% (100% linear load)
Voltage regulation: Better than ±1%
Transient response: Less than 5% for 100% load step; full recovery within 1 cycle
Frequency: (free run) ±0.005 Hz
Frequency sync range: ±0.5 Hz
Frequency slew rate: 1 Hz/second maximum
Voltage adjustment range (operator): ±5%

Battery Specifications

Matching cabinets – or remote option available
Battery type: Sealed, valve-regulated lead acid
Recharge time: 10 to 12 times the discharge time to 95%
Other battery options: Wet cell and nickel-cadmium batteries; open racks available

For battery run times and configurations, refer to Bulletin BAT01FXA.

Safety

UL1778 Listed
CUL CAN/CSA C22.2 NO.107.1-M91 Listed
EN 50091-1
All cabinets provide seismic mounting features
Selectable DC ground fault detection capability

Specifications subject to change without notice.

EXIDE ELECTRONICS
Strategic Power Management™

Powerware Plus 500 Performance Characteristics

		Model 500	Model 400
		500kVA/400kW	400kVA/320kW
Input voltage	Volts	480	480
Output voltage	Volts	480	480
Input voltage range			
Minimum	Volts	408	408
Maximum	Volts	528	528
Input / output frequency	Hz	60	60
AC input (with input filter)			
Nominal amps	Amps	556	445
Maximum amps ❶	Amps	640	560
AC input (without input filter)			
Nominal amps	Amps	694	578
Maximum amps ❶	Amps	800	640
Bypass input			
Nominal amps	Amps	600	480
AC output			
Nominal amps	Amps	600	480
10 minutes max.	Amps	750	600
DC link			
Nominal DC voltage	Volts	480	480
Float voltage	Volts	540	540
End of discharge ❷	Volts	401	401
Maximum amps ❷	Amps	1000	800
Physical attributes (w/o batt.)			
Installed weight	Lbs	6100	6100
Installed width	Inches	74	74
System efficiencies			
@ 100% load	%	92	92
@ 75% load	%	92	92
@ 50% load	%	91	91
Full load heat dissipation			
BTU/Hr. (x1000)		119.5	95.6
KCal/Hr. (x1000)		30.2	24.1
Inverter efficiency (full load)	%	92.5	92.5

I.S. EN ISO 9001

UL LISTED

UL LISTED

CE

❶ *Maximum amps equals full load current plus battery recharge current.*

❷ *End on Discharge based on 1.67 v/cell. Maximum Amps based on 1.8 v/cell.*

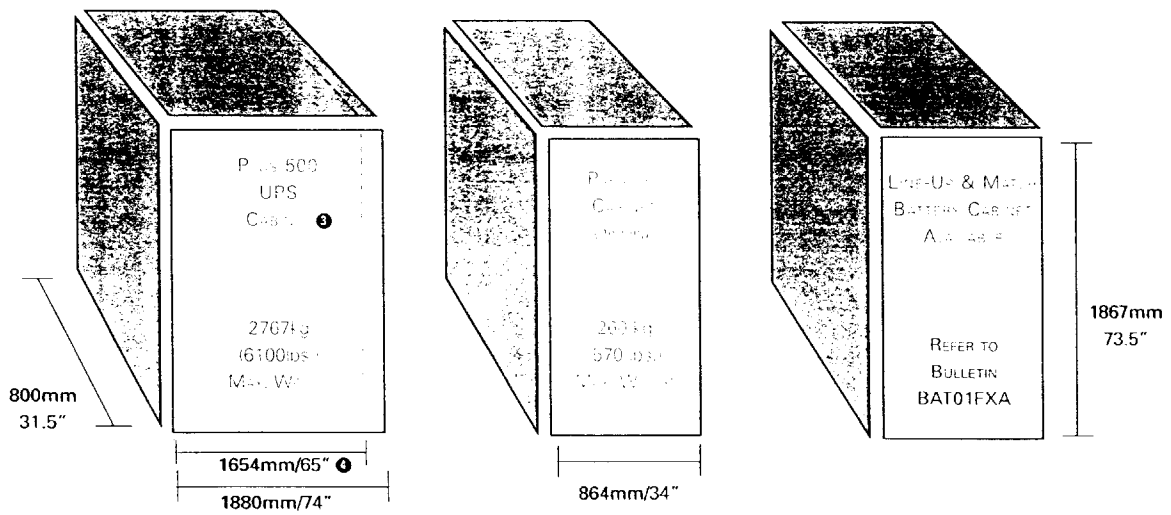
❸ *All accessories feature plug and play capability.*

❹ *Removable wireway section reduces width by 9" to aid installation.*

Shipping pallet and packaging adds 50 to 300 lbs per shipping unit.

Specifications subject to change without notice.

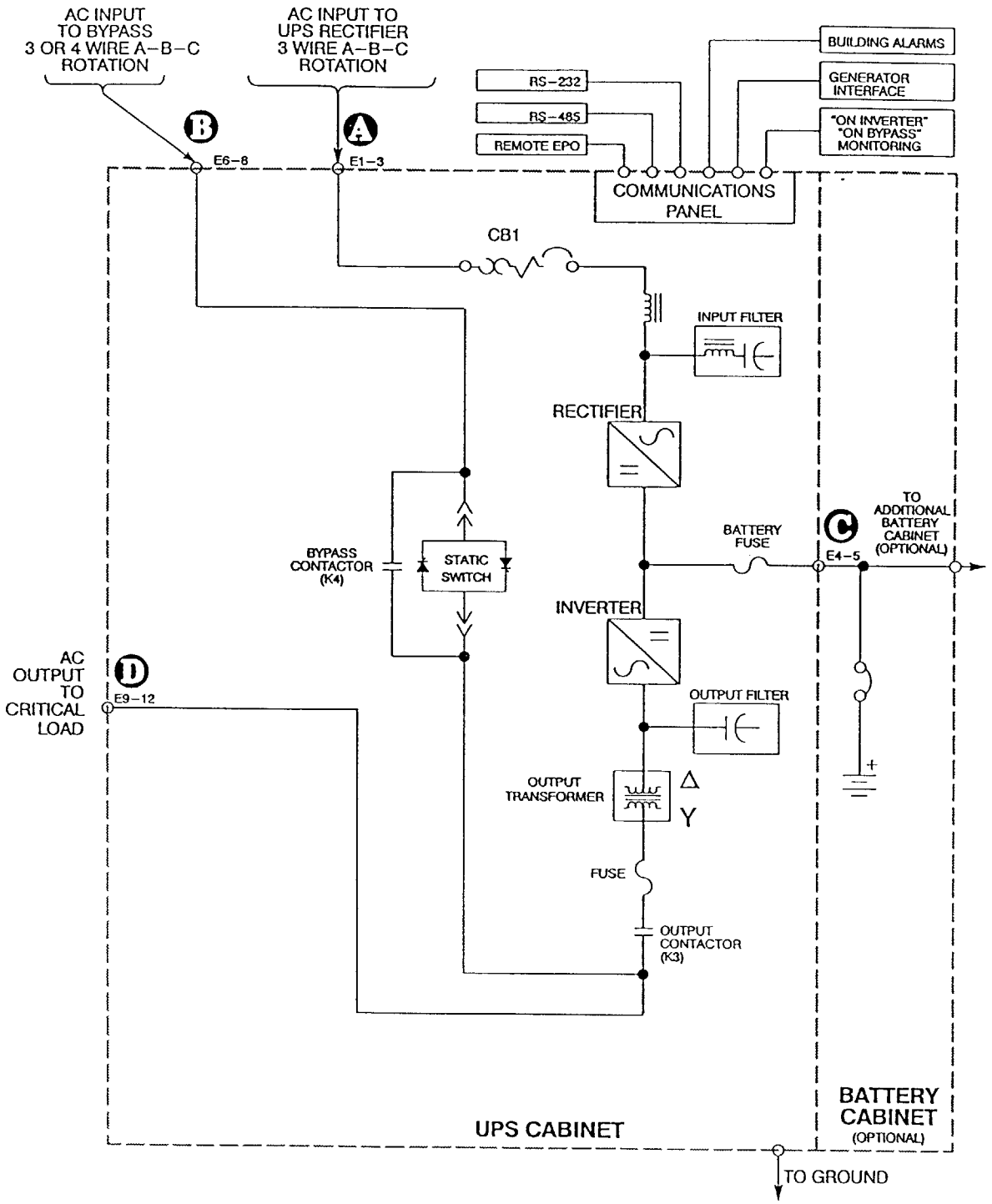
Physical Dimensions and Weights



1-800-554-3448 (Toll-free in US & Canada) World Headquarters, 8609 Six Forks Road, Raleigh, NC 27615 USA

Telephone (US): 1-919-872-3020; Fax (US): 1-800-75-EXIDE; International Telephone: 1-919-870-3238; International Fax: 1-919-870-3300

PLS26FXA 12/97



NOTE 1: A bypass neutral feeder must be supplied when the output neutral is used. If no bypass neutral is supplied, the output neutral is not to be used. In neither case shall the output neutral be bonded to ground.

DESCRIPTION:	ONELINE DRAWINGS OF UPS SYSTEM	
DRAWING NO:	164201118–4	*SHEET:* 1 of 1
REVISION: A	*DATE:* 010198	

Table B. INPUT/OUTPUT Ratings & External Wiring Requirements for **Powerware Plus 500**					
Ratings			*Units*	*Rating 60 Hz*	
Basic unit rating at 0.8 lagging PF load			KVA KW	400 320	500 400
			INPUT/OUTPUT VOLTAGE	480	480
AC INPUT	**AC Input to UPS Rectifier (0.95 min. PF)** *3Ø, 1 gnd* *Minimum conductor size (number per Ø)* Ⓐ *Minimum conductor size (number per Ø)* *(Maximum amps includes full load current plus battery recharge current)		Amps with Filter: Amps* AWG or kcmil(ea)	 560 500(2)	 640 300(3)
			Amps without Filter: Amps* AWG or kcmil(ea)	 640 300(3)	 800 400(3)
AC INPUT	**AC Input to Bypass** *Full Load Current 3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* Ⓑ		Amps	480	600
			AWG or kcmil(ea)	250(3)	350
DC INPUT	**DC Input from Battery to UPS** *(1) positive, (1) negative* Ⓒ *Minimum conductor size (number per Ø)*		VDC	480	480
			Amps @ (1.8V/cell)	800	1000
			AWG or kcmil(ea)	See Table C	See Table C
AC OUTPUT	**AC Output to Critical Load** *Full Load Current 3Ø, (1) Neutral, (1) gnd* *Minimum conductor size (number per Ø)* Ⓓ		Amps	480	600
			AWG or kcmil(ea)	250(3)	350(3)

Read and understand the following notes while planning your installation:

1. Refer to national and local electrical codes for acceptable external wiring practices.
2. Material and labor for external wiring requirements are to be provided by designated personnel.
3. For external wiring, use 90°C copper wire. See the appropriate column in Table B.
4. Wire ampacities are chosen from Table 310–16 of the NEC. Wire is 90°C specification.
5. The neutral conductor is considered to be a current-carrying conductor per note 10 of the Notes to Ampacity Table 310 of the NEC. If a neutral is used, the wire is derated by 80% per Note 8(a) of the Notes to Ampacity Table 310 assuming 4–6 conductors in a raceway. If there is no neutral, it is assumed that there is only 3 current carrying conductors in a raceway (one per phase).

NOTE: Callout letter Ⓐ, Ⓑ, Ⓒ, and Ⓓ map to drawing #164201118–3

DESCRIPTION:	INSTALLATION NOTES	
DRAWING NO:	164201118–1	*SHEET:* 2 of 13
REVISION: A	*DATE:* 010198	

Table C. Battery Cabinet Ratings and External Wiring Requirements

UPS	Model	Battery Type	Cabinet Series	Number of Cabinets	DC Voltage	DC Amps per Cabinet	Minimum Conductor Size per Cabinet (AWG or kcmil)	Number of Wires per Cabinet
PWP500	500	J27	1085	4	480	300	4/0	1 pos 1 neg
	500	J31	1085	4	480	300	4/0	
→	500	J37	1085	3	480	300	350	
	500	J37	1085	4	480	300	4/0	
	500	J47	1085	3	480	300	350	
	500	J47	1085	4	480	300	4/0	
	500	002	1085	3	480	300	350	
	500	002	1085	4	480	300	4/0	
PWP500	400	J27	1085	4	480	300	3/0	1 pos 1 neg
	400	J31	1085	3	480	300	250	
	400	J31	1085	4	480	300	3/0	
	400	J37	1085	3	480	300	250	
	400	J37	1085	4	480	300	3/0	
	400	J47	1085	2	480	300	350	
	400	J47	1085	3	480	300	250	
	400	J47	1085	4	480	300	3/0	
	400	002	1085	2	480	300	350	
	400	002	1085	3	480	300	250	
	400	002	1085	4	480	300	3/0	
PWP400	400	J31	1085	3	420	300	300	1 pos 1 neg
	400	J31	1085	4	420	300	4/0	
	400	J37	1085	3	420	300	300	
	400	J37	1085	4	420	300	4/0	
	400	J47	1085	3	420	300	300	
	400	J47	1085	4	420	300	4/0	
	400	002	1085	3	420	300	300	
	400	002	1085	4	420	300	4/0	
PWP400	300	J31	1085	3	420	300	4/0	1 pos 1 neg
	300	J31	1085	4	420	300	2/0	
	300	J37	1085	2	420	300	350	
	300	J37	1085	3	420	300	4/0	
	300	J37	1085	4	420	300	2/0	
	300	J47	1085	2	420	300	350	
	300	J47	1085	3	420	300	4/0	
	300	J47	1085	4	420	300	2/0	
	300	002	1085	3	420	300	4/0	
	300	002	1085	4	420	300	2/0	

DESCRIPTION: INSTALLATION NOTES		
DRAWING NO: 164201118–1		SHEET: 3 of 13
REVISION: A	DATE: 010198	

1. A bypass neutral feeder must be supplied when the output neutral is used. If no bypass neutral feeder is supplied, the output neutral is not to be used. In neither case shall the output neutral be bonded to the ground.
2. External overcurrent protection is not provided by this product, but is required by codes. Refer to Tables A through D for wiring requirements. If an output lockable disconnect is required, it is to be supplied by designated personnel.
3. When an input transformer is present, the rectifier and bypass inputs may both be supplied by the same source.
4. Terminals E1 through E12 are UL and CSA rated at 90°C. A hex key tool is required to attach wires to terminals. Refer to Table D for power cable terminations and Table E for conduit requirements. Drawing 164201118–4 shows the location of the power cable terminals inside the UPS cabinet.

Table D. Power Cable Terminations

Terminal Function	*Terminal*	*Function*	*Size of Pressure Termination*	*Tightening Torque N-M (lb-in)*	*Int Hex Size (In.)*
Internal Wiring to UPS Rectifier (CB1 Input)	E1	Phase A	4 – #4/0–500 kcmil	42.4 (375)	3/8
	E2	Phase B	4 – #4/0–500 kcmil	42.4 (375)	3/8
	E3	Phase C	4 – #4/0–500 kcmil	42.2 (375)	3/8
AC Input to Bypass	E6	Phase A	4 – #2–600 kcmil	56.5 (500)	1/2
	E7	Phase B	4 – #2–600 kcmil	56.5 (500)	1/2
	E8	Phase C	4 – #2–600 kcmil	56.5 (500)	1/2
AC Output to Critical Load	E9	Phase A	4 – #2–600 kcmil	56.5 (500)	1/2
	E10	Phase B	4 – #2–600 kcmil	56.5 (500)	1/2
	E11	Phase C	4 – #2–600 kcmil	56.5 (500)	1/2
DC Input from Battery to UPS	E4	Battery (+)	4 – #2–600 kcmil	56.5 (500)	1/2
	E5	Battery (–)	4 – #2–600 kcmil	56.5 (500)	1/2
Neutral, Output	E12	Neutral	12 – #2–600 kcmil	56.5 (500)	1/2
Customer Ground	Ground	Ground	8 – #2–600 kcmil	56.5 (500)	1/2

NOTE: Customer ground, size 2/0, can be run in any conduit listed in Table D.

DESCRIPTION: INSTALLATION NOTES		
DRAWING NO: 164201118–1		*SHEET:* 4 of 13
REVISION: A	*DATE:* 010198	

5. Per NEC article 300-20(a), all three phase conductors must be run in the same conduit. If a neutral and/or ground is used, it must be run in the same conduit as the phase conductors.
6. Conduit is sized to accommodate one neutral conductor (if applicable) and one ground conductor the same size as the phase conductors.
7. Conduit sizes were chosen from NEC Table C1, type letters RHH, RHW, RHW-2, TW, THW, THHW, THW-2.

Table E. Power Cable Conduit Requirements

Terminal	Plus 500			Plus 400		
	Number of Wires in Conduit	*Minimum Conduit Trade Size*	*Number of Conduits*	*Number of Wires in Conduit*	*Minimum Conduit Trade Size*	*Number of Conduits*
UPS Input (A, B, C, Gnd)	4	3 in.	3	4	2.5 in.	3
Input Transformer (A, B, C, Gnd)	4	3 in.	3	4	2.5 in.	3
Bypass (A, B, C, Gnd)	5	3 in.	3	5	2.5 in.	3
Output (A, B, C, Gnd)	5	3 in.	3	5	2.5 in.	3
Battery (+), (−), Gnd	3	2.5 in.	3	3	2.5 in.	3

DESCRIPTION: INSTALLATION NOTES		
DRAWING NO: 164201118−1		*SHEET:* 5 of 13
REVISION: A	*DATE:* 010198	

1. In the UPS system, each battery cabinet, PDM cabinet, and the input transformer cabinet are crated separately for shipping.
2. Do not tilt cabinets more than ±10° during handling.
3. Dimensions are in millimeters (inches).
4. If perforated floor tiles are required for ventilation, you should place them in front of the UPS. Table F lists the ventilation requirements for full load operation:

Table F. Air Conditioning or Ventilation Requirements During Full Load Operation

Ratings	*Input/Output Voltage*	Heat Rejection* BTU/hr × 1000/hr (Kg–cal/hr)
Powerware Plus 400		
300 KVA	400/400	71.7 (18.1)
400 KVA	400/400	95.6 (24.1)
Powerware Plus 500		
400 KVA	480/480	95.6 (24.1)
500 KVA	480/480	119.5 (30.2)

5. Recommended minimum clearance over the UPS module is 304.8 mm (12 in.). Required for cooling air exhaust: approximately 1420 liter/sec (3000 cfm).
6. Battery voltage is computed at 2 volts per cell as defined by Article 480 of the NEC. Rated battery current is computed at 1.8 volts per cell.
7. The battery wiring used between the battery and the UPS should not allow a voltage drop of more than 1% of nominal DC voltage at rated battery current.
8. A battery disconnect switch is recommended, and may be required by NEC or local codes when batteries are remotely located. The battery disconnect switch may be supplied as an accessory, and should be installed between battery and UPS.
9. If the conductors used for DC input from the battery cabinet(s) to the UPS are those provided by the UPS manufacturer, and the UPS and battery cabinet are manufactured by the same supplier, then it is acceptable if they do not meet the noted minimum conductor sizes.

DESCRIPTION: INSTALLATION NOTES		
DRAWING NO: 164201118–1		SHEET: 6 of 13
REVISION: A	DATE: 010198	

1. Table G lists the maximum rating for input circuit breakers.

Table G. Maximum Input Circuit Breaker Ratings

Powerware Plus System	Input Voltage Rating			
	400V		480V	
	With Filter	Without Filter	With Filter	Without Filter
Powerware Plus 400, Model 300	600	800	N/A	N/A
Powerware Plus 400, Model 400	700	1000	N/A	N/A
Powerware Plus 500, Model 400	N/A	N/A	700	800
Powerware Plus 500, Model 500	N/A	N/A	800	1000

CAUTION: To reduce the risk of fire, connect only to a circuit provided with maximum input circuit breaker current ratings from Table G in accordance with the National Electrical code, ANSI/NFPA 70.

2. Source protection for the AC input should be treated as if you were supplying a three phase transformer, to allow for filter inrush current.
3. Source protection for the input to the bypass section should be treated as if you were supplying a 500 kVA three phase transformer, to allow for transformer magnetization inrush current.
4. The input breaker (CB1) has a trip rating of 1000 amps AT and an Amp Interrupting Capability (AIC) of 65,000 in symmetrical RMS amps for the Powerware Plus 400 and 500.
5. The input and bypass three phase feeds should be symmetrical about ground, due to the existence of voltage surge protection devices.
6. The line-to-line unbalanced output capability of the UPS is limited only by the full load per phase current values for AC output to critical load shown in Tables A and B. The recommended line-to-line load unbalance is 50% or less.
7. Output overcurrent protection and output disconnect switch are to be provided by the user. Table H lists the maximum rating for output circuit breakers satisfying the criteria for both.

Table H. Maximum Output Circuit Breaker Ratings

Powerware Plus System	Output Voltage Rating	
	400V	480V
Powerware Plus 400, Model 300	600	N/A
Powerware Plus 400, Model 400	800	N/A
Powerware Plus 500, Model 400	N/A	600
Powerware Plus 500, Model 500	N/A	800

DESCRIPTION:	INSTALLATION NOTES		
DRAWING NO:	164201118–1	SHEET:	7 of 13
REVISION:	A	DATE:	010198

1. The UPS equipment operating environment must meet the size and weight requirements shown in Table I, according to your UPS system configuration:

Table I. Equipment Weight

Component	*Weight (Kg (lb)*	
	Shipping	*Installed*
UPS Cabinet (Powerware Plus 400) (400/400 System)	2812 (6200)	2767 (6100)
UPS Cabinet (Powerware Plus 500) (480/480 System)	2812 (6200)	2767 (6100)

2. The basic environmental requirements for operation of the UPS system are:

Ambient Temperature Range: 0–40°C (32–104°F)

Recommended Operating Range: 20–25°C (68–77°F)

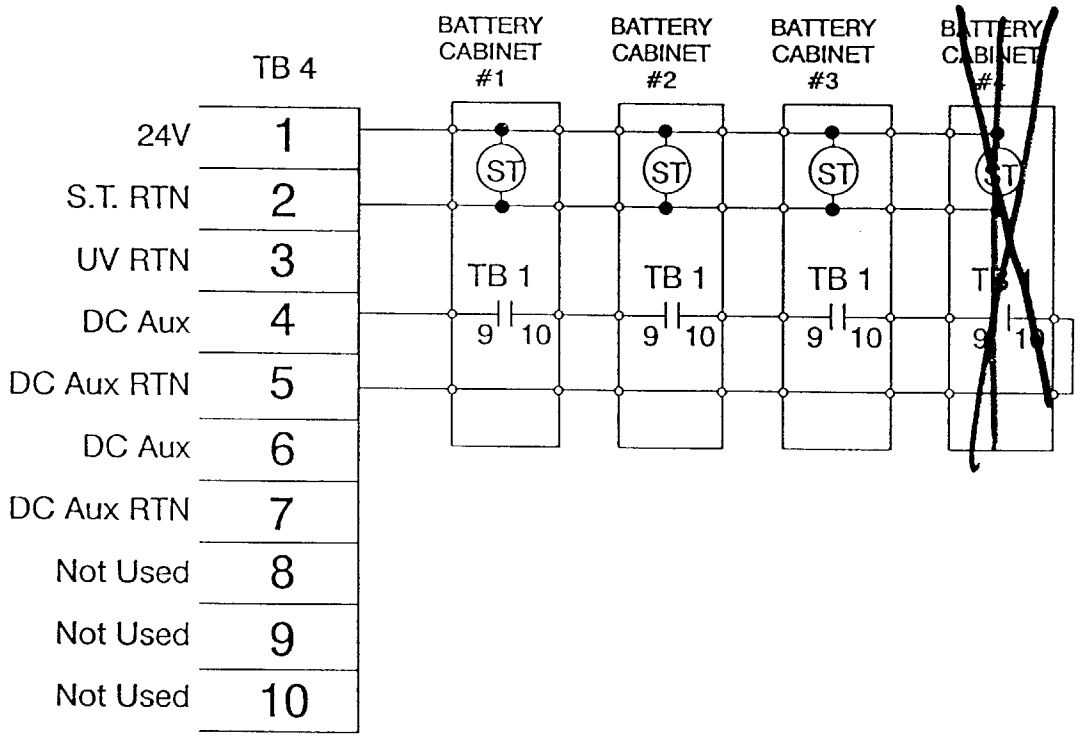
Maximum Relative Humidity: 95%

DESCRIPTION: INSTALLATION NOTES		
DRAWING NO: 164201118–1		*SHEET:* 8 of 13
REVISION: A	*DATE:* 010198	

1. Table O lists the battery shunt trip and UV trip wiring requirements.

Table O. Battery Shunt Trip or UV Trip Wiring Requirements		
	ST	UV
TB4 Points	1, 2	1, 3
Output Max Pulse	220 VA instantaneous	40 VA
Wiring	#12–22AWG	#12–22AWG

2. There is no DC disconnect device within the UPS.
3. The DC input to the UPS is protected by internal fuses F21 and F22.
4. The UPS DC disconnect trip signal from TB4, points 1 and 2 (shunt trip) or TB4, points 1 and 3 (UV trip) must be connected to the DC source disconnect device(s).
5. Recommended wire size is 14 AWG.



NOTE: *For other than Exide battery cabinets that use UV trip coils, connect to TB4 Pin 3 instead of TB4 Pin 2.*

DESCRIPTION:	**INSTALLATION NOTES**	
DRAWING NO:	164201118–1	*SHEET:* 13 of 13
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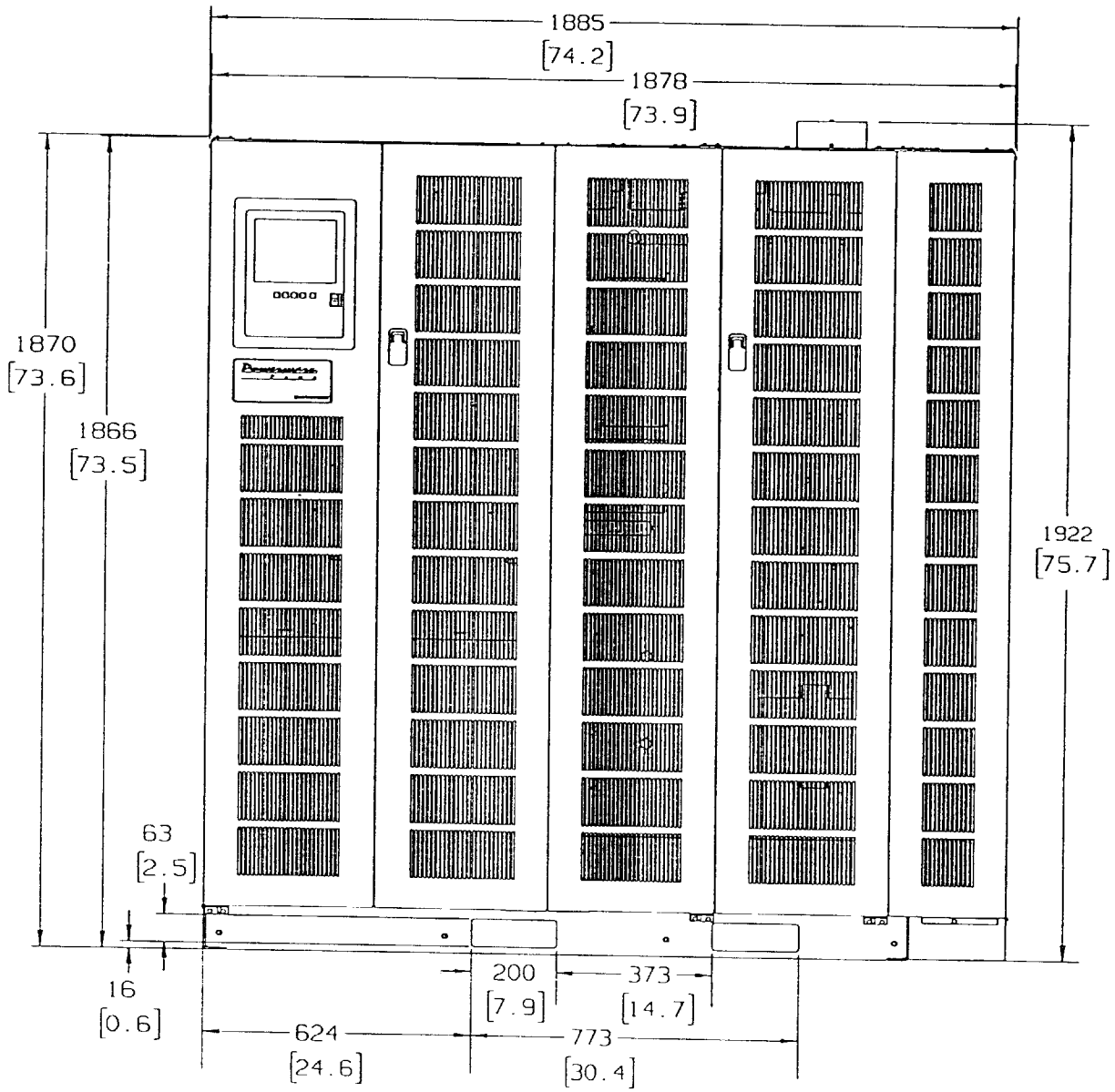
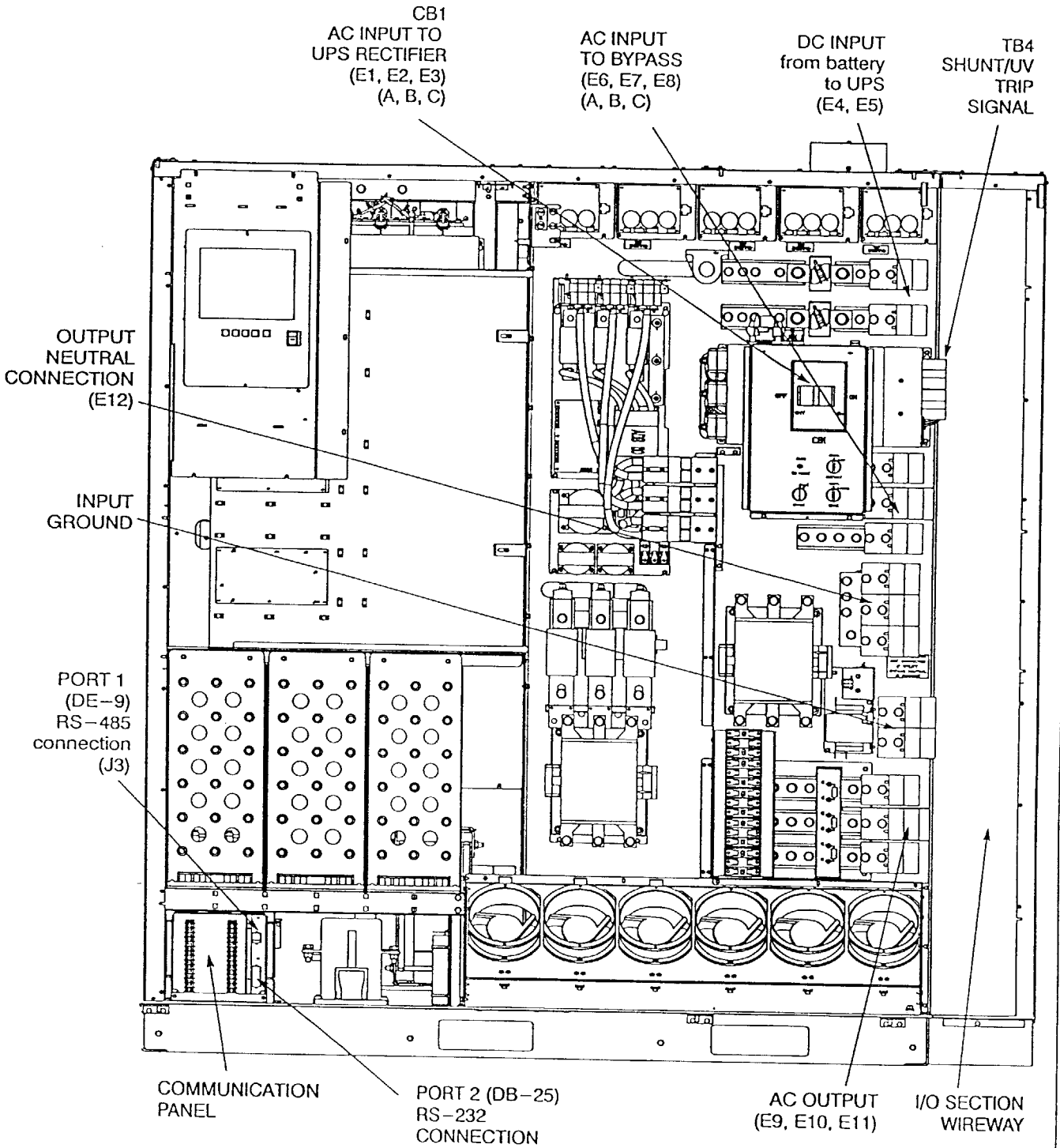
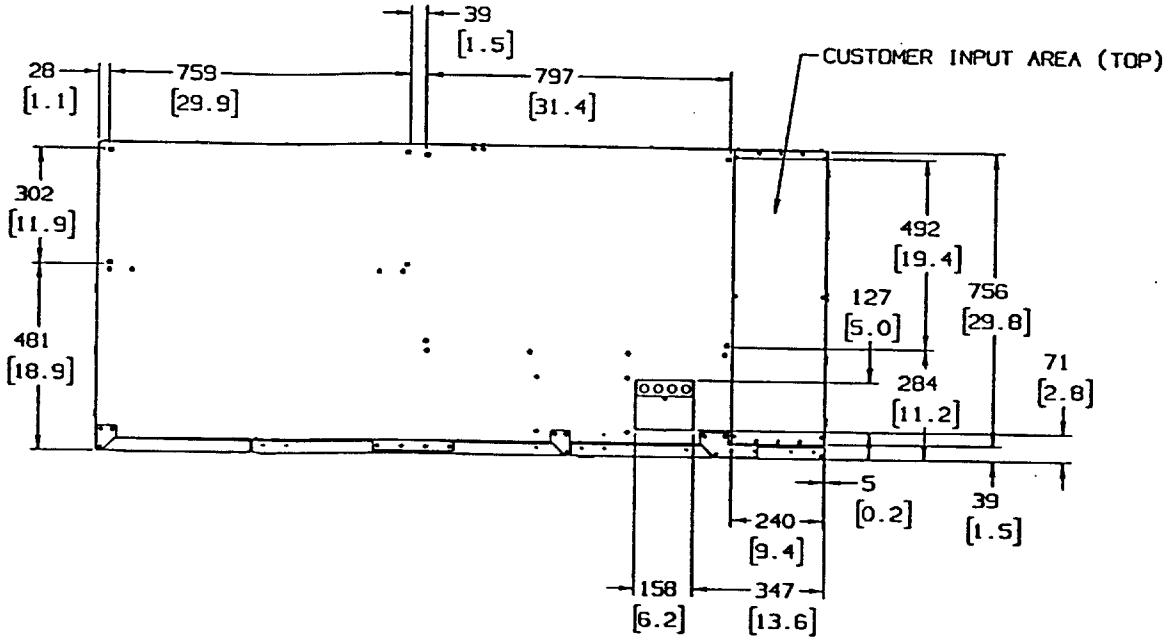


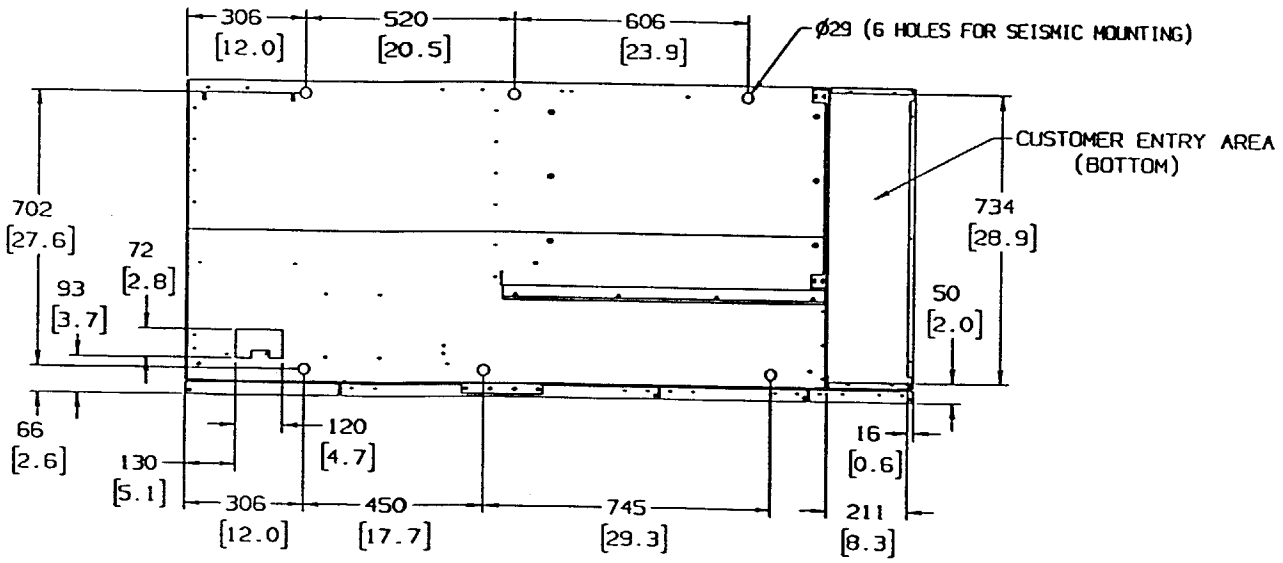
Dimensions are in millimeters (inches)

DESCRIPTION: UPS CABINET		
DRAWING NO: 164201118–6		SHEET: 1 of 2
REVISION: A	DATE: 010198	



DESCRIPTION:	LOCATION OF UPS POWER TERMINALS		
DRAWING NO:	164201118–5	SHEET:	1 of 1
REVISION:	A	DATE:	010198

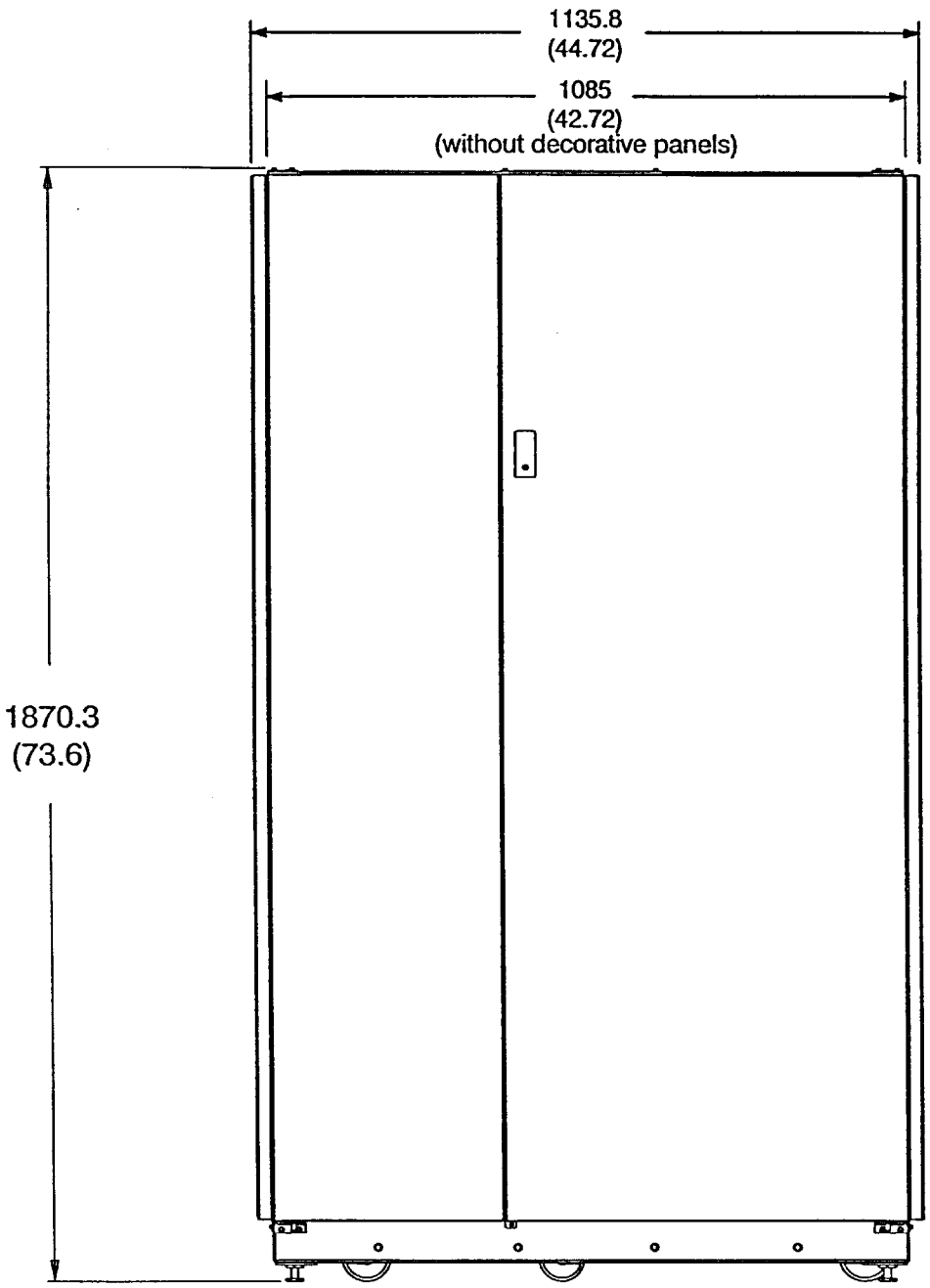




PLAN VIEW SHOWING BOTTOM ENTRY LOCATIONS

Dimensions are in millimeters (inches)

DESCRIPTION:	UPS CABINET		
DRAWING NO:	164201118–6	SHEET:	2 of 2
REVISION: A		DATE:	010198



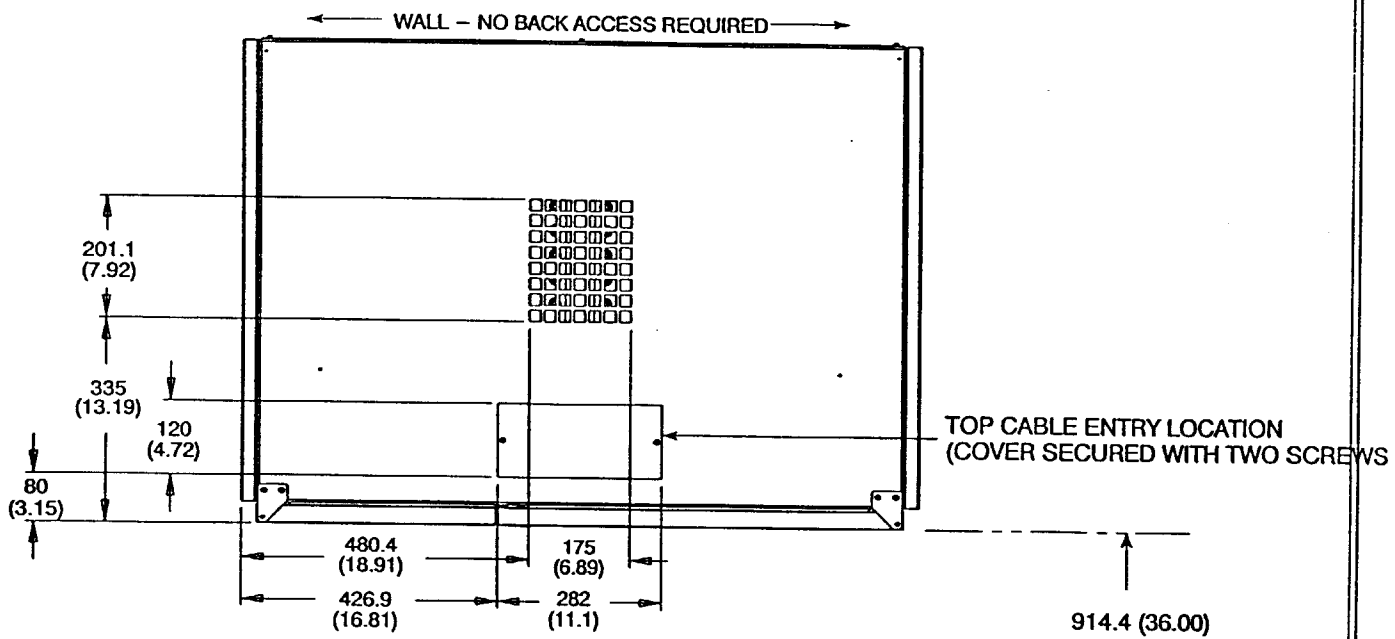
Series 1085 Battery Cabinet

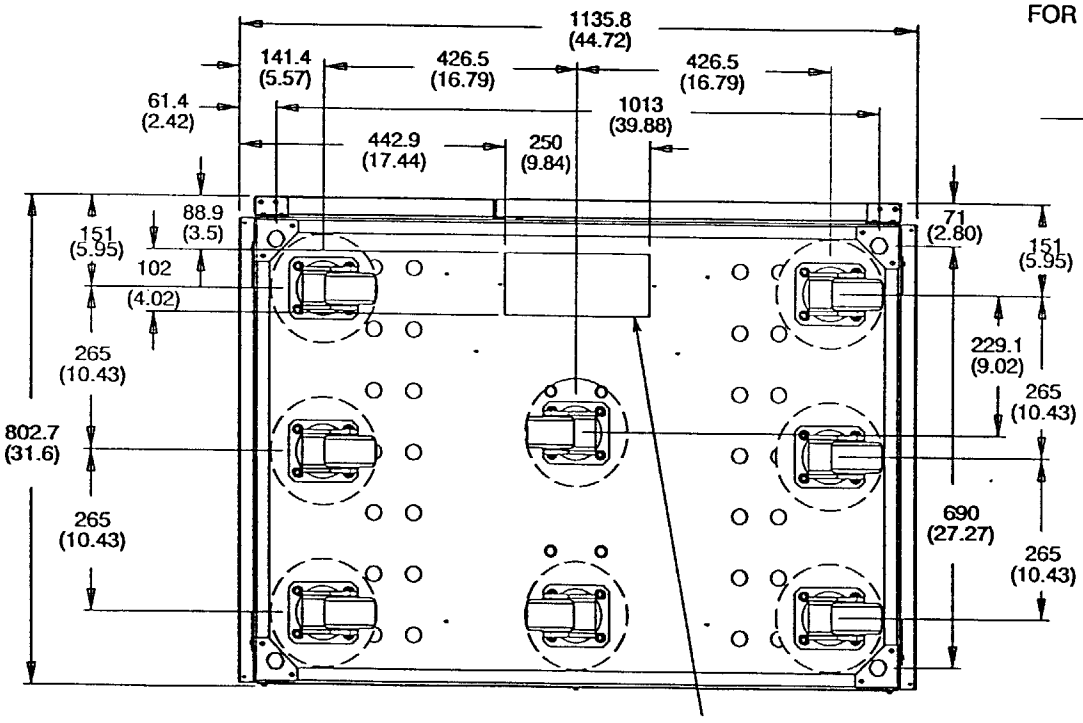
QTY 3
MODEL J-37
3,800 lbs EACH

Dimensions are in millimeters (inches)

DESCRIPTION: Series 1085 Battery Cabinet (elevation)			
DRAWING NO: 164200300–3			SHEET: 3 of 5
CREATED BY: Phillip M. Kukelhan	REVISION: A		DATE: 12–1–95

Series 1085 Battery Cabinet (TOP VIEW)



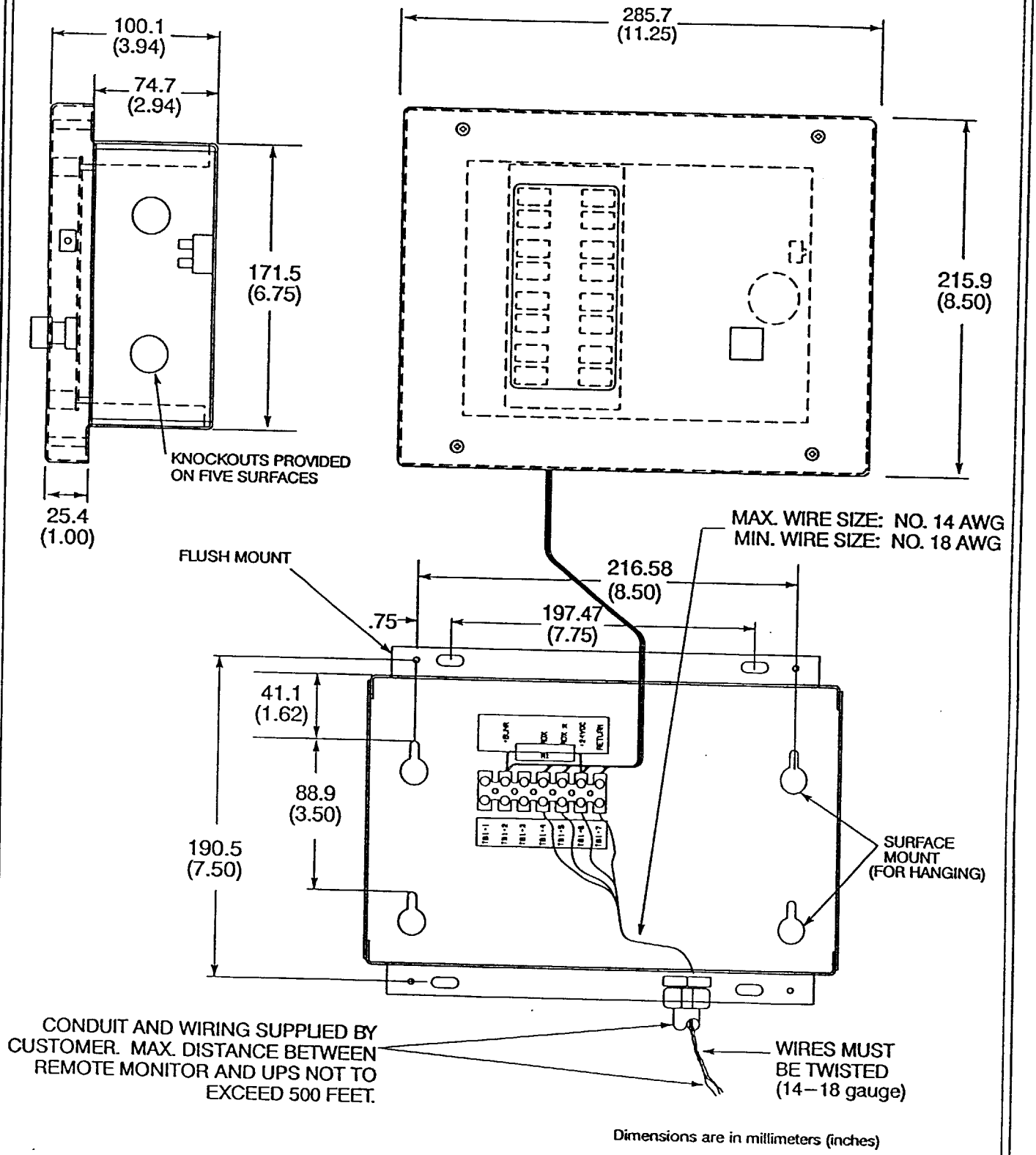


Series 1085 Battery Cabinet (BOTTOM VIEW)

BOTTOM CABLE ENTRY LOCATION (COVER SECURED WITH TWO SCREWS

Dimensions are in millimeters (inches)

DESCRIPTION: Series 1085 Battery Cabinet (plan)			
DRAWING NO: 164200300–4			SHEET: 4 of 5
CREATED BY: Phillip M. Kukelhan	REVISION: A		DATE: 12–1–95



Dimensions are in millimeters (inches)

DESCRIPTION:	REMOTE MONITOR PANEL		
DRAWING NO:	164201118–9	SHEET:	1 of 1
REVISION: A		DATE:	010198