

PSU830 POWER SUPPLY AND BATTERY CHARGER

PRODUCT APPLICATION AND DESIGN INFORMATION



Fig. 1: PSU830 power supply and battery charger

INTRODUCTION

The PSU830 power supply is intended for use in MX/ZX/ZXF/T2000/MX2 fire panels. It is a functional replacement for the PSB800, PSM800, PSB820 and PSB821. The PSU830 provides the following features:

- Power factor correction (PFC) to minimise loading effects on the AC supply and allows operation from 120 - 240V ac.
- Temperature compensated, battery charger for sealed lead acid batteries:
- Battery disconnection (load shed) when operating from battery supply to provide deep discharge protection to battery set
- Fault monitoring includes:-
 - battery disconnected, battery wiring short, battery high resistance, battery voltage low, battery reverse, temperature compensation fault, ac supply low, internal charger fault
- Common fault output - volt free relay contacts
- Diagnostic LEDs for
 - AC ok
 - Battery fault
 - Charger fault
 - Ground (earth) fault
- Two 27VDC fused field supply outputs with short circuit protection, one output may be reset (turned off) under command from fire panel
- 40VDC 2.2.A output for supplying up to 4 fully loaded MX Digital loops, typically a single PSU830 may replace two PSB800 40V 1.2A supplies
- 5VDC output for use within fire panel/repeater

- Selectable Ground (earth) fault monitoring
- Battery charging function of two PSU830 may be connected in parallel

TECHNICAL SPECIFICATION

The PSU830 complies with the requirements of:

- EN 54-4/1997:A2-2006 Fire Detection and fire alarm systems; part 4, Power supply equipment

SYSTEM COMPATIBILITY:

- Use only with MX/MX2/ZX/ ZXF/T2000 Fire Alarm Controllers

ENVIRONMENT

- Indoor Application only, Land and Marine
- *Operating Temperature:* -10° to +55°C
- *Storage Temperature:* -20° to +70°C
- *Operating Humidity:* Up to 95% non-condensing



NOTICE

Sealed lead acid batteries cannot be reliably charged when ambient air temperature around them (the battery ambient) exceeds 50° C.

DIMENSIONS (HWD):

- 62 x 132 x 242mm

EMC

- The PSU830 complies with the following:
- Product family standard EN50130-4 in respect of Conducted Disturbances, Radiated Immunity, Electrostatic Discharge, Fast Transients and Slow High Energy
- EN 61000-6-3 for Emissions

ELECTRICAL CHARACTERISTICS

- Input Voltage: 120-240Vac 50/60Hz (autoranging)
- Input Current Rated Load: 0.8-2.2A_{RMS}
- Rated input power: 200W maximum

- Outputs
 - Non-reset:
 - 27V dc @ 2A
 - 5V dc @ 2.2A Rated, 3.0A max
 - 40V dc @ 2.2 Rated, 2.3A max
 - Reset: 27V dc @ 2A
- +27V: 21-28.8Vdc (typically 27.3V with battery fully charged)
- +40V: 39.5-40.3Vdc
- +5V: 4.8-5.25Vdc
- Rated Output
- Rated output of 5A to supply the panel, fire system loads and charge 24V battery. De-rate to 4.5A when used at 120VAC and ambient above 40°C, e.g. some T2000 Marine applications.
- Maximum Alarm current 5A for 30 minutes
- Maximum continuous load current (excluding charging) 2.5A
- Rated output power: 136W

The PSU830 cannot support all outputs fully loaded, the following output load combinations are possible in MX panel application:

Output	Continuous Load (I _{max.a})	Alarm Load ^a (I _{max.b1})	Alarm Load (I _{max.b2})
5 V	1.8 A	2.2 A	1.8 A
27 V ^b	0.6 A	3.0 A	0.6 A
40 V	0.9 A	0.9 A	2.2 A

Table 1:

a – EN54 part 4 permits in alarm mode that the battery charging current may drop to zero, the alarm load I_{maxb1} and I_{maxb2} are equivalent to 5A output rating of the PSU830.

b – 27V output will typically be 27.3Vdc when operating from AC mains supply and 24Vdc when running from batteries.

The use of MXDesigner is recommended to obtain the optimum load calculation.

BATTERY CHARGER

A PSU830 may be used to charge 17Ah or 38Ah battery sets. To meet the requirements of charge to 80% rated capacity within 24 hours with a 38Ah battery set it is recommended that 2A or greater be allocated for battery charging. Points to note:

- Trickle charge determined by battery capacity, typically 100mA at 27.3Vdc.
- Maximum charging voltage 28.8V, battery at -5°C.

- Minimum charging voltage 21V, condition battery discharged.
- Deep discharge protection, battery disconnection voltage < 20V.

The PSU830 is not recommended for use with batteries that have been deep discharged.

Recommended temperature for charging battery -5 to +40°C measured in the battery housing with thermistor lead assembly within 2cms from battery. Sealed lead acid batteries cannot be reliably charged when ambient air temperature around them (the battery ambient) exceeds 50°C.

Two PSU830 may be connected in parallel (dual PSU configuration) to provide charger output of up to 10A. All other outputs remain separate, i.e. 2 x 5V, 4 x 27V, 2 x 40V and must not be connected together. To meet the requirements of charge to 80% rated capacity within 24 hours with a 65Ah battery set it is recommended that 3.4A or greater be allocated for battery charging.

BATTERY REQUIREMENTS

17Ah or 38Ah single PSU830.

38Ah dual PSU830. Do not charge 17Ah batteries with dual PSU830s.

- Standby Current Consumption: 90mA @ 24V dc

FAULT MONITORING AND RESPONSE

FAULT CONDITIONS THRESHOLDS

- Low AC, < 100VAC.
- Battery low < 22VDC
- Battery disconnect < 20VDC
- Battery High Resistance:
 - Single PSU: 0.6Ω
 - Dual PSU: 0.3Ω

This is the maximum resistance of the battery circuit including battery, wiring and connections to the charger.

- Earth (ground fault), operates on the 0V, 5V, 27V and 40V rails. Sensitivity varies with rail with respect to earth
 - 40V and Loop SIG < 300kohm
 - 27V < 100 kohm
 - 0V and Loop RTN < 22kohm

PROTECTION FOR

<p><u>Fault</u></p> <p>Battery charging terminals shorted:</p> <p>Battery charger connected to 12V battery:</p> <p>Battery reverse connection:</p> <p>Below final voltage (Deep Discharge):</p>	<p><u>Response</u></p> <p>Isolates output or ruptures fuse</p> <p>Isolates output</p> <p>Ruptures fuse</p> <p>Battery disconnected</p>
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Indicator	Colour	Function
Ground Fault (earth fault)	YELLOW	Normally OFF ON when dc leakage current detected between Chassis Ground and conductors of cables from panel including: MX Digital Loop SIG+ and SIG-; Remote Bus; +27V dc; 0V (dc common)
CGR/NTC fault	YELLOW	Normally OFF On when: Charger not charging battery, Thermistor faulty, Thermistor lead broken.
Battery fault	YELLOW	Normally OFF ON when: Battery disconnected, Battery wiring short, Battery high resistance, Battery below final voltage.
AC OK	GREEN	ON when AC supply healthy. OFF when AC removed or very low.

Table 2: Indicator functions
Note: On power-up the Battery and CGR/NTC fault indicators will flash up to 8 times.

FAULT RESPONSE TIMES

EN54.4 requires all faults other than battery resistance to be detected and indicated within 15 minutes, for the PSU830 this time is less than 14 minutes. Battery resistance fault must be indicated within 4 hours, for the PSU830 this time is less than 70 minutes and less than 14 minutes once a battery resistance fault has been detected.

Terminal	Marking	Function	Nominal Voltage
CON3.1	0V	DC common	
CON3.2	+27	27V DC resettable	27V DC via 2A fuse
CON3.3	0V	DC common	
CON3.4	+27	27V DC non-resettable	27V DC via 2A fuse
CON3.5	-BT	Battery negative	
CON3.6	-BT	Battery negative Slave PSU	
CON3.7	+BT	Battery positive	27V DC via 7.5A fuse
CON3.8	+BT	Battery positive Slave PSU	27V DC via shared fuse with CON3.7
CON3.9	RLC	Fault relay contact	Dry contact, rating 28V DC @ 500mA
CON3.10	RLNC	Fault relay contact	Dry contact, rating 28V DC @ 500mA

Table 3: Terminal CON3 functions

FAULT RELAY

The normal state of the fault relay contacts is closed, indicating no fault. Any faults detected will cause the fault relay contacts to open. When the PSU830 is not powered the state of the fault relay contacts is open.

BATTERY LOW

Battery low is not indicated as a fault at the PSU830. This signal is monitored by the fire panel to indicate that the battery is partially charged.

27V OUTPUTS

Each 27V output is protected by a 2A fuse. To obtain current up to 5.0A use PTM800 and 12-way cable assembly from CON1. The PTM800 provides 27V at terminal TB2-3, to this may be connected to an FB800 fuseboard.

DUAL PSU OPERATION

Fault monitoring outputs are connected in parallel and cannot distinguish which PSU830 is faulty, the fault status LEDs on each PSU should be used.

DESIGN PLANNING

Cables are to be selected in accordance with Publication 17A-02-D and the requirements of local regulations/ code of practise.

All the terminals at CON3 will accept cable up to 2.5mm².

To comply with EN54.2 and EN54.4 it is recommend that the batteries are installed in housing adjacent to the PSU830 and not further than 2 metres from it. All cabling between the PSU830 and the batteries housings must be protected, preferably with metal conduit, in order to provide adequate mechanical and EMI immunity.

Battery resistance fault monitoring includes the connecting leads, < 0.1 ohm, cabling must be used. The battery temperature thermistor lead assembly may be extended if required, thermistors must not be swapped between units.

The PSU housing must be positioned so that convection cooling is unrestricted. For installations where this is not possible, e.g. installing T2000 fire panel into a console would require fan cooling of the console and/or large apertures in the T2000 housing to assist cooling of the fire panel within the console.

USING PSU830 WITH MX DESIGNER

Fire panels using modules FIM802 and XLM800 the MX Digital addressable loop load is defined in MX Designer, summary below:

Load per loop	Maximum load per loop (including driver)	Loop driver quiescent load (no loop devices)	Maximum load at loop driver terminals
DC units	2200	220	1980
40V output, mA	550	55	495

In early versions of MX Designer only PSB800 is available. When PSB800 is selected it is possible to determine PSU830 power supply loading as each loop may be loaded above the DC units Red warning value, provided that the value does not exceed 2200 DC units per loop and 8800 DC units per PSU830. The voltage drop and AC units Red warning values stay the same and cannot be ignored. This means that in many situations a single PSU830 can be used where previously a combination of PSB800 and PSB800K were required.

Summary below:

MX Designer values	Default with PSB800	Capability with PSU830
DC units – per loop	2200	2200
AC units – per loop	250	250
Volt drop – per loop	14.4V	14.4V
DC units per power supply	4800	8800
40V output per power supply	1.2A	2.2A

If DC units 8800 is exceeded then a second PSU830 is required this provides power to the second and third XLM800 and is connected the same way as a PSB800 supplied with PSB800K.

DUAL PSU

In dual PSU configuration only the charger outputs of the PSU830 are in parallel, all other outputs remain separate, i.e. 2 x 5V, 4 x 27V, 2X 40V and must not be connected together. For optimum operational life the panel loading should be divided equally between the PSU830s wherever possible (although not essential). MX Designer may be used to assist in loading of the PSU830.

For dual PSU configuration OV connection between units must be made in addition to BT+ and BT-. Cable assembly must be fitted between CON6 on each unit to provide fault monitoring. It is necessary to use PTM800 to provide wiring interconnect terminal block from the auxiliary PSU830 to loads such as XLM800.

17Ah battery set *must not* be connected in dual PSU configuration due to possibility of overcharging.

PRODUCTS REQUIRED FOR INSTALLATION OF SECOND PSU830

All items required for installation of second PSU830 are available using FG number 557.202.044 PSU830K. PSU830K consists of the following items:

- 557.202.210 PSU830 Power Supply
- 557.201.232 PTM800 Power Terminal Module
- 557.201.231 PSU830 Dual Power Supply Kit

INSTALLATION, GENERAL POINTS

- For MX2, ZX4, ZX4BB panels the second (auxiliary) PSU830 is installed on top of the first (primary) PSU830.
- For MX4000 and MX4000BB, panels the auxiliary PSU830 is installed in the battery housing. The distance between the housings is constrained by the length of the interconnecting cables. The recommended installation is battery housing beneath fire panel.
- Connection of primary and auxiliary AC power leads is via a distribution block supplied with kit 557.201.231. The external AC supply is connected to a socket which is mated with distribution block.
- If FB800 fuseboard is required it may be mounted on small chassis plate above the batteries or on top of auxiliary PSU830, if the latter then PTM800 must be mounted on the side of the PSU830.
- The PTM800 should be mounted on the top of the PSU830 for MX4000 and MX4000BB panels. For ZX4 and ZX4BB it can either be mounted on top or on the left hand side with restricted access. For MX2 it would be sited on the left hand side.
- For the ZX4 and ZX4BB panels, nylon cable ties are required to attach the distribution block to the metal bracket inside the panel housing.
- Monitoring of the auxiliary PSU830 is provided by ribbon cable connected between both power supplies.
- Battery capacity must not be less than 38Ah when dual PSU830 is used as there is possibility of overcharging with smaller capacity batteries.

CONFIGURATION

HEADERS AND LINKS

The PSU830 has three headers to which are fitted jumper links, these headers enable selection of the following:

- Earth (ground) fault monitoring, there can only be one Earth fault monitoring circuit active at the fire panel.
- Output CON3.2 +2.7V may be reset (turned off) under CIE control.
- Unit may be configured for single unit or dual unit operation, link selects between primary (master) and auxiliary (slave). There can only be one primary and one auxiliary connected together, no other combinations are permitted. PSU830 cannot be mixed with any other PSU.

Header	Position	Function
E-FLT (LK3)	EN	Earth fault monitoring enabled
	DIS	Earth fault monitoring disabled
RESET (LK2)	EN	Reset enabled
	DIS	Reset disabled
LK4	MTR	PSU is master
	SLV	PSU is slave

Table 4: Header link configuration

Refer to Table 3, 4 and Figs. 2, 3, 4 for details of terminal block CON3, header and wiring configurations.

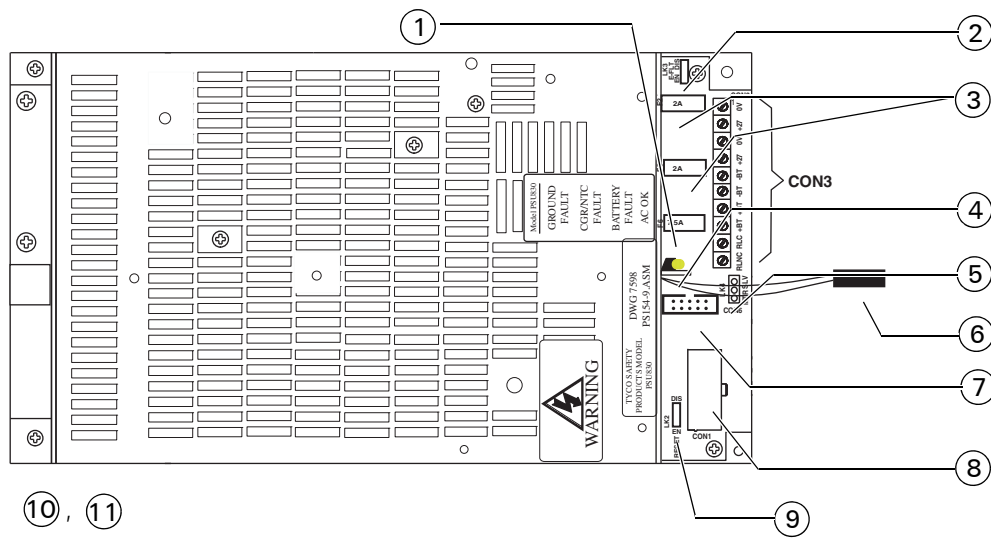


Fig. 2: PSU830 connectors, terminals and links

- 1- Battery fuse
- 2- Link 3
- 3- 27V output fuses
- 4- Diagnostic LEDs
- 5- Link 4
- 6- Battery temperature compensation cable and thermistor
- 7- CON6 to CON6 of other PSU830 (dual PSU830 application)
- 8- CON1 to FIM 802 PL2 or PTM800 if second PSU830
- 9- Link 2
- 10-LINK SETTINGS PRIMARY PSU830
 - LINK 2 (LK2, RESET_- DIS (disable)
 - LINK 3 (LK3, E-FLT) - EN (enable)
 - LINK 4 (LK4) - MTR (master)
- 11-LINK SETTINGS AUXILIARY PSU830
 - LINK 2 (LK2, RESET) - DIS (disable)
 - LINK 3 (LK3, E-FLT) - DIS (disable)
 - LINK 4 (LK4) - SLV (slave)

TYPICAL WIRING ARRANGEMENTS OF PSU830

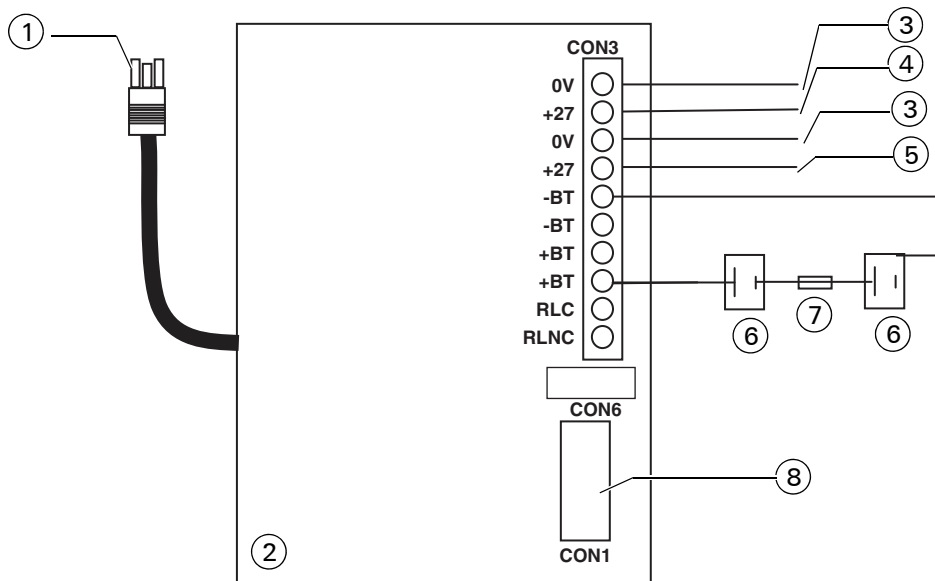


Fig. 3: PSU830 typical wiring of primary power supply

- 1- AC power input
- 2- Primary PSU830
- 3- DC common
- 4- +27.3VDC (reset)
- 5- +27.3VDC (standard)
- 6- 38Ah 12 volt DC batteries
- 7- Fuse-lead
- 8- To FIM802

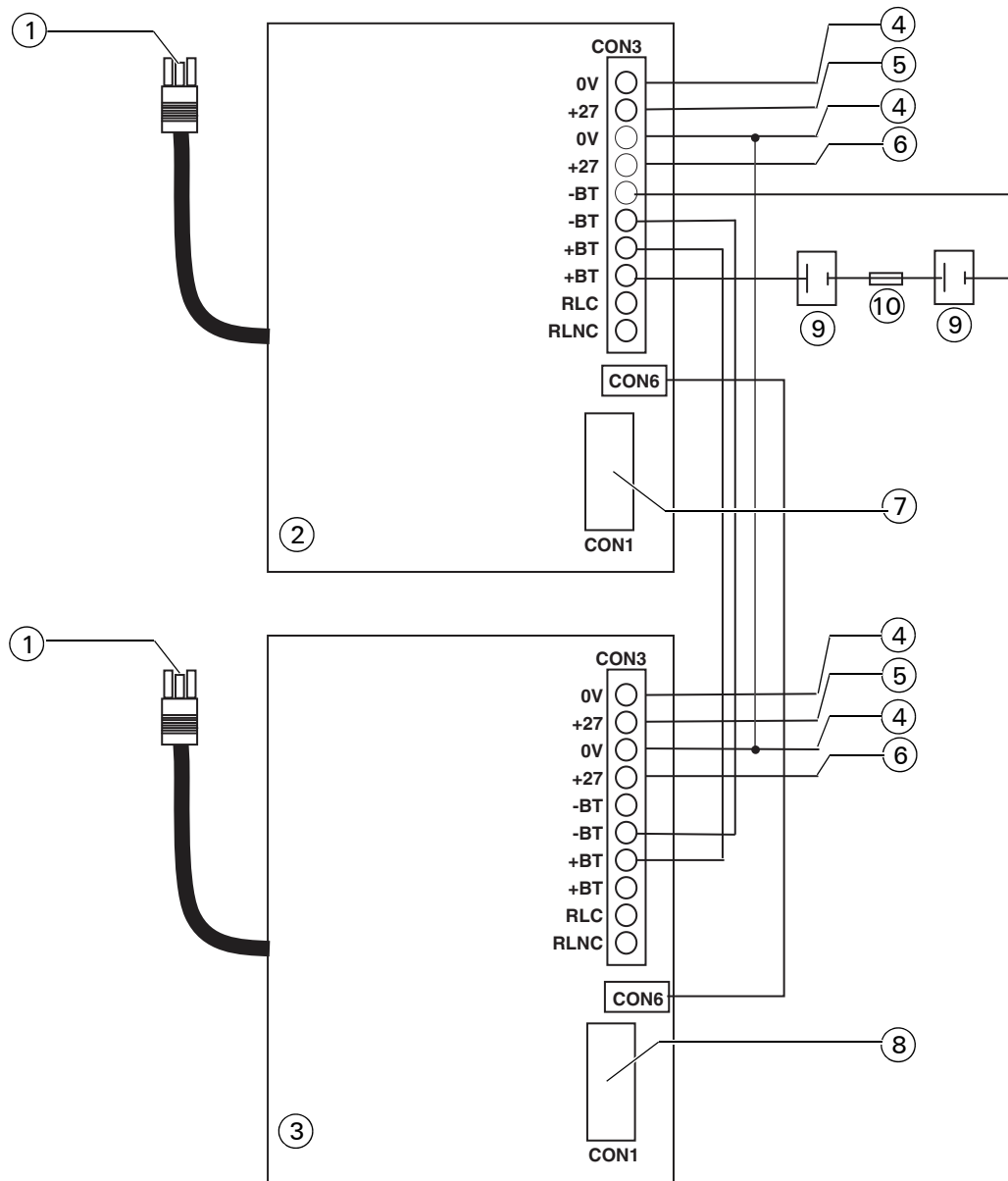


Fig. 4: Wiring for primary and auxiliary PSU830

- 1- AC power input
- 2- Auxiliary PSU830
- 3- Primary PSU830
- 4- DC common
- 5- +27.3VDC (reset)
- 6- +27.3VDC (standard)
- 7- To PTM800
- 8- To FIM802
- 9- 38Ah 12 volt DC batteries
- 10- Fuse-lead

OPTIONS

FB800

The fuseboard FB800 provides 8 fused outputs, it is connected to one of the 27V outputs of the PSU830. On the cover of the PSU830 there are four M3 tapped holes to accept the male/female threaded pillars supplied with the FB800.

PTM800

The PTM800 provides screw terminals for 40V, 27V and 5V supplies, necessary when second PSU830 is used to supply loop power to XLM800s. The 5V, 27V and 40V outputs are not fuse protected. The PTM800 is connected to the PSU830 via 12 way cable assembly. It is mounted by four plastic pillars and two 5/8 inch 4/40 UNC screws supplied with the PTM800. The PTM800 may be mounted on top or on the left hand side of the PSU830.

SERVICE REPLACEMENT

PSU830 is a NOT a form fit replacement for PSB800, PSM800 or PSB820, refer to publication 120.415.990 for service replacement instructions.

PSU830 should not be used with 10Ah battery sets due to possibility of overcharging.

ORDERING INFORMATION

- PSU830 Power Supply and Battery Charger: 557.202.210
- PTM800 Power Terminal Module: 557.201.232
- PSU830K Power Expansion Kit: 557.202.044

- Mini blade fuses Farnell RS
- 2A: 994-3811 219-3536
- 7.5A: 994-3854 220-0892

RELATED DOCUMENTATION

120.415.990 PSU830 Power supply and battery charger installation and service replacement instructions.

120.415.984 Installation guide - PSU830 Dual Power Supply kit.

CON1 CONNECTION

Pin	Function
1	Not used
2	Reset Input
3	DC Common (0V)
4	AC Fault Output
5	+27V DC @ 4A non-resettable
6	Battery Fault Output
7	Earth Fault Output
8	DC Common (0V)
9	Battery Voltage Monitor Output
10	+5V DC @ 2.2A
11	+40V DC @ 2.2A
12	Charger Fault Output

Table 5: CON1 12-Way Connector to FIM801/2, APM800 and PTM800

