PAC/PAP1300UL Datasheet & Manual

Features:
Switched mode power supply/charger
Wide output range 0…72V_{DC} 0…50A
Analog control by an external 0…5Vdc
Power failure alarm output

The Micropower PAC/PAP1300UL is a high power, lightweight, advanced power supply using modern switching technology. The unit can be used as a power supply or constant voltage battery charger. The output voltage and output current can be adjusted from 0 to maximum using the trimmer on the front panel.

Technical data

Variable		Unit	
INPUT DATA			
Input phase		-	1 Phase
Input voltage supply		V_{AC}	30…132 (55…120 reduced power)
Input frequency		Hz	47…63
Input current at MIN rated input V (max output I and 4,07 VPC)		A	13.2
Recommended input fuse		A	16
ELECTRIC DATA			
Power factor		-	> 0,98
Efficiency (120Vac, 10%...100% load)		%	86 typical
Inrush current (Limited by an NTC resistor)		A	< 30
Line regulation		%	±0,1
Load regulation		%	±0,5
Output setting accuracy		%	±0,1
Output ripple (f > 50Hz)		%rms	< 1 from maximum output voltage (< 1 MHz bandwidth). Resolution is defined by an 8-bit or 10-bit A/D converter of a microcontroller. Measured using nominal output voltage.
PROPERTIES			
Short circuit protection		-	Electrical fuse
Wrong polarity protection		-	Electrical fuse
Isolation	input-chassis	V_{AC}	1500
	input-output	V_{AC}	3000
	output-chassis	V_{AC}	500
Standards	safety	-	UL1564 – UL recognized/listed
	EMC	-	EN55032
Protection class	mechanical	IP	IP20 metal enclosure
	electrical	-	Class 1
Mounting		-	DIN-rail, wall, bench
Cooling		-	Temperature controlled fan
Operating temp range		°C	-25…+40
Certifications		-	UL
HMI		-	LED
CHARGER DIMENSIONS			
Charger weight excl. cables		kg	3
Outer dimensions	W x H x D	mm	212 x 157 x 85

Power supply models

Trimmer adjustable power supplies							
Model	**Input voltage range **)**	**Nominal output voltage**	**Voltage Setting range**	**Nominal output current**	**Current setting range**	**Max power**	**Installation/dimensions (width x height x depth)**
PAP1300/UL24	30…132V_{ac}	24V_{dc}	0-36V_{dc}	50A	0-50A	1300W	Wall /bench 212x157x85
PAP1300UL/36	30…132V_{ac}	36V_{dc}	0-54V_{dc}	33A	0-33A	1300W	Wall /bench 212x157x85
PAP1300UL/48	30…132V_{ac}	48V_{dc}	0-72V_{dc}	25A	0-25A	1300W	Wall /bench 212x157x85

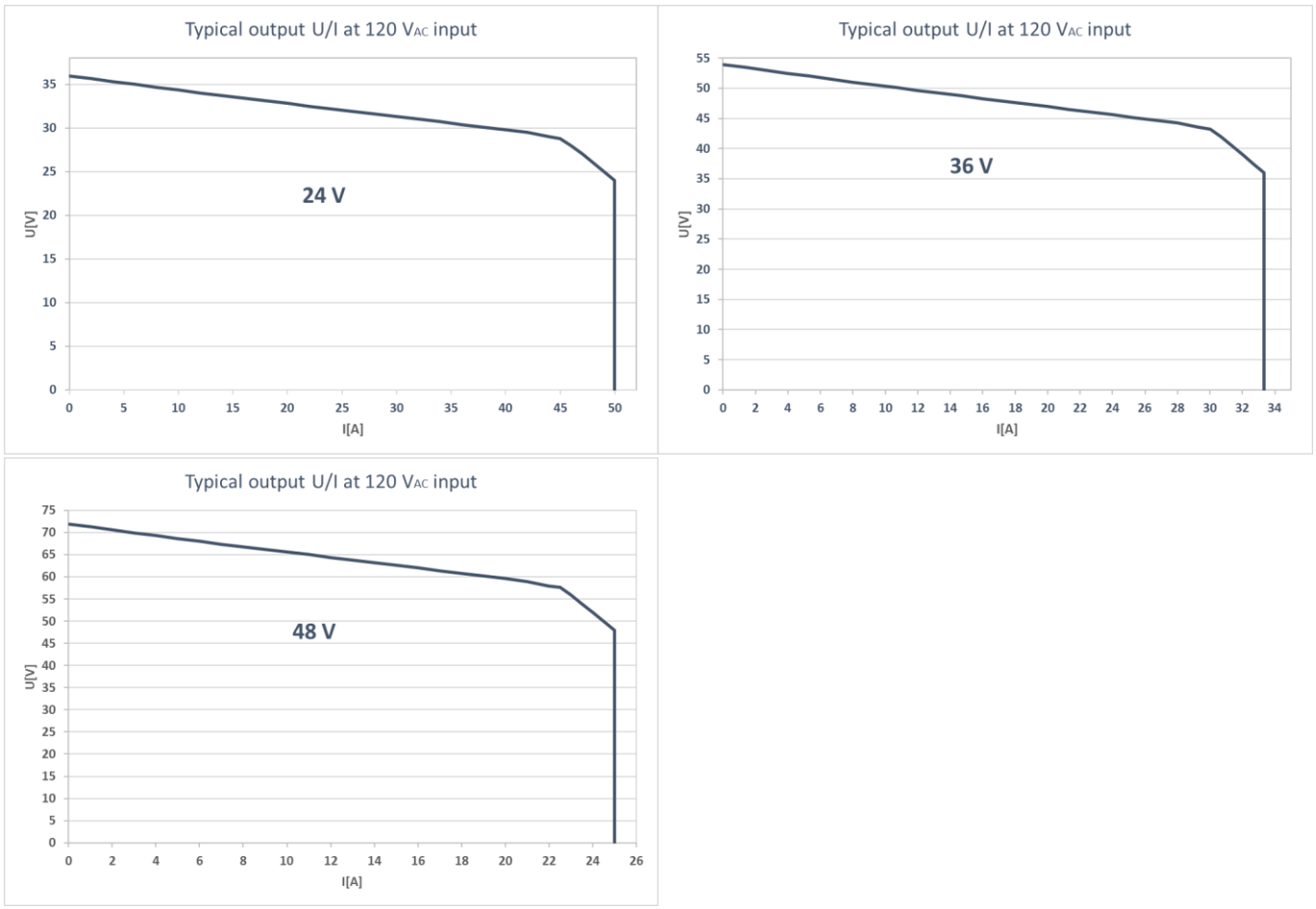


Figure 1. Typical output current-voltage characteristics.

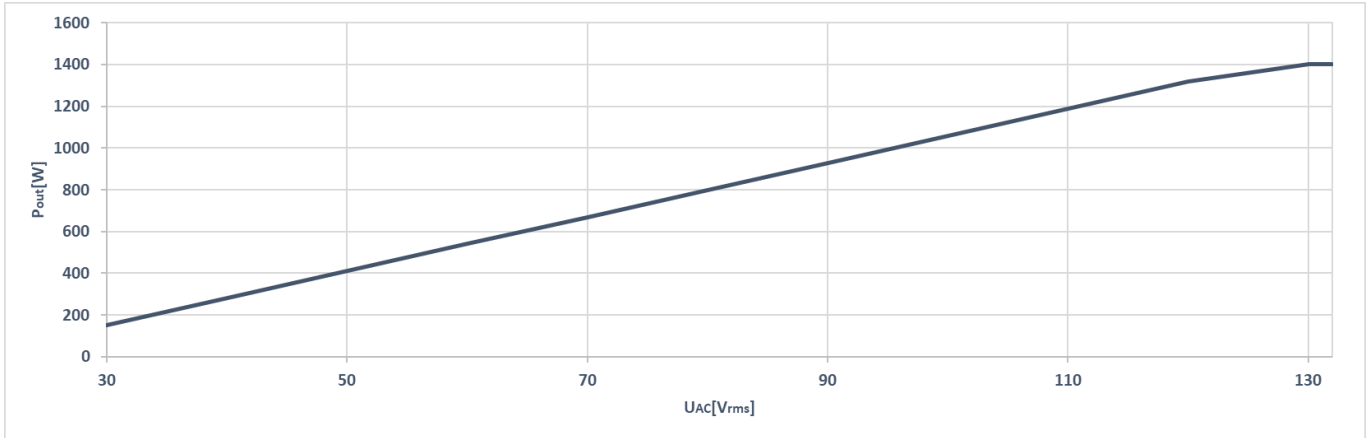
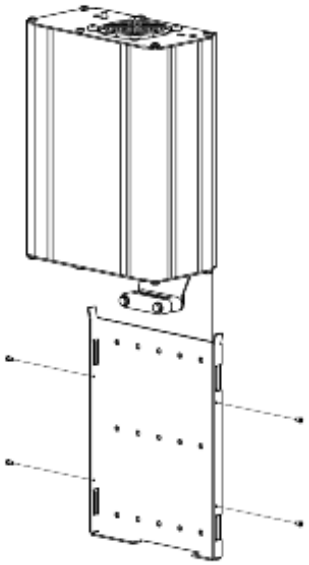


Figure 2. Maximun output power-input voltage de-rating characteristics.

Installation

1. The location must be dry, dust-free and indoor. The acceptable full power temperature range is 0°C…+50°C. Higher ambient temperature will limit the power (see curve). The power supply is not waterproof. Keep it dry and away from areas with high humidity in order to avoid the risk for electrical shock and damages to the charger.
2. The power supply can be installed horizontally or vertically. In case the power supply is mounted vertically with the cable plate downwards, the floor and everything right below the power supply must be fire-resistant. Vertical mounting is prohibited in case this condition cannot be met.
3. Leave at least 10 cm free space at both ends of the power supply to ensure sufficient ventilation.

When used as a charger, the charging process generates explosive hydrogen gas. Keep the area well ventilated Never use an open flame or equipment that produce sparks close to the power supply and battery.



Wall mounting

Screw the assembly board to the wall using the mounting holes in the back of the board. Next, place the power supply to the assembly board and fasten it by using the small screws on the sides of the board.

Charging operation

1. Ensure that the power supply is switched off and that the environment meets the conditions as described in the previous section.
2. Connect the output cables to the load / battery terminals: + cable to the + terminal and – cable to the – terminal

   Note: *Do not cut the output cables. In case the cables are shortened, the output voltage is overcompensated as much as the loss of voltage drops in the cable. The overcompensation may cause voltage variations depending on the current consumption.*

3. Turn the power on by turning the switch to position 1.
4. During normal power supply operation / charging process, the STATUS LED will light continuous orange.
5. To avoid sparking, turn off the power supply before disconnecting the cables.

DC Input connection

The power supply input cable is connected as follows:

L	negative or positive DC supply input
N	positive or negative DC supply input
PE	protective earth

Output adjustment

The output voltage and output current limit of the power supply can be adjusted as using the multi-turn potentiometers accessible from the front panel.

Both voltage and current can be adjusted from zero to the maximum value. Maximum 1300W output power is available within the adjustment range.

The Charger includes up to 16 pre-programmed charging algorithms that are set by the code switch. See the setting table for this unit. Any of these 16 different voltage settings can be taken in use and additionally be adjusted within ±5% using the trimmer on the front panel. See the instructions for choosing the programmed voltage and the fine-tune adjustment.

LED

An orange LED indicates a healthy power supply output voltage.

Overcurrent protection

The output of the power supply is protected against overcurrent and short circuit by an autonomic, self-resetting electronic current limiter.

Series/parallel connection

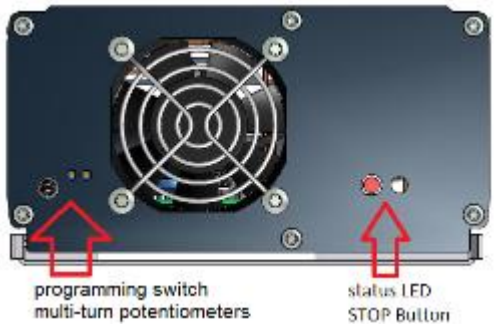
Parallel operation: No restrictions, passive load sharing
Series operation: Up to 500V total voltage. For more information about use with an AI or S option, ask the manufacturer.

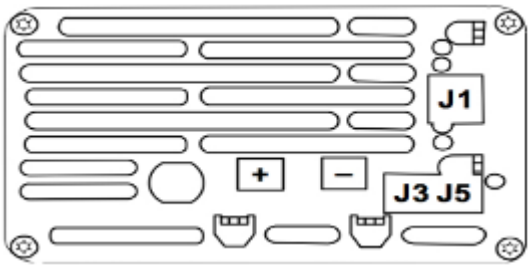
Warning

Dangerous voltages, capable of causing death are present in the power supply. Do not remove the cover. There are no operator serviceable parts inside the unit. Refer servicing to qualified service personnel only.

Charge lithium batteries only with appropriate BMS (Battery Management System).

Modular connectors & *Front panel*





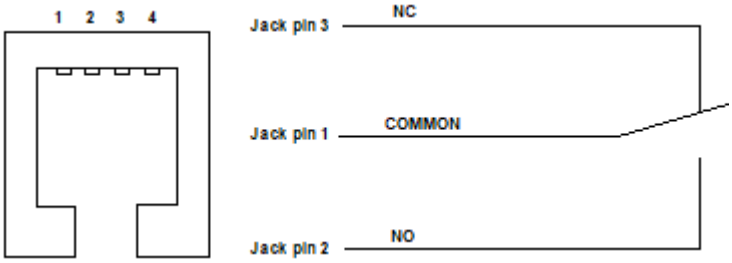
Rear panel

J1:	Option Analog input 0–5V
J3:	Special version Temperature compensation Voltage sense
J5:	Standard RS–232 bus in and out, master–slave Option Alarm relay Option External LED

Alarm relay (Option R)

On models with an alarm relay, the alarm relay output indicates whether the output voltage is healthy or not. The alarm signal is activated in case of an AC failure or charger failure. Both normally closed signals and normally open contacts are available.

Pin configuration, modular connector J5 with alarm relay option.



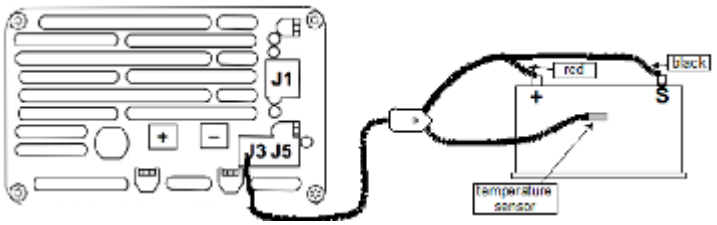
Cable
Black = common
Red = NO
Green = NC

Relay

Isolation:	Technical data:
Output to case: 500 V	1 A@24 V_{DC}
Output to GND: 120 V	0,5 A@120 V_{AC}

Temperature sense (Option T & S)

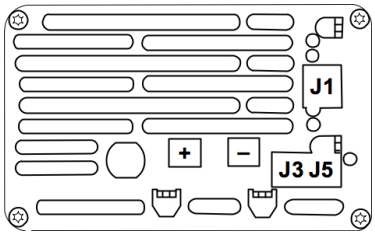
The sense cable enables the charger to adjust the output voltage in accordance with the battery voltage and temperature fluctuations. The temperature sense cable is connected to connector J3. The sense cable is connected to the battery as shown below. The temperature sensor is either glued 10 cm under the battery's top edge (see figure below), or to the cable tag connected to the battery minus.

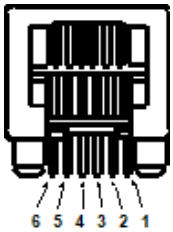


Analog control and master-slave connection

The optional analog control input J1 allows full control of the output current and voltages and it provides the measured values for both of these. A +5V supply power is available for the supply of the control logic. The analog input has an isolation value of 500 V towards the input and output of the power supply.

The master–slave bus cables are connected from the master unit to the slave units as shown in the picture.





Pin configuration J1

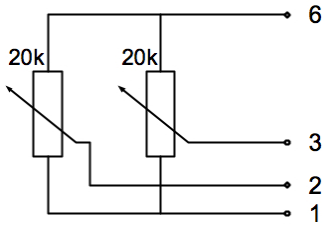
1. Ground
2. Current control input
3. Voltage control input
4. Measured current value
5. Measured voltage value
6. +5V (max 20mA) power output

Controlling the analog card

All control voltages must be between 0 and +5V, Higher voltages are not allowed. The control logic is positive, so that a +5V control voltage gives a maximum value from the power supply, while 0V means minimum output. As soon the control connector is unplugged from the modular connector, the power supply is reset to the minimum output values.

The measured values can be read from the measurement signals. The measured values are scaled equal to the target values. If the power supply is set to the voltage reference, the measured value must be equal to the target. The same counts for the current control and its measured value. Measured signals (both together) can be loaded with max 20mA; otherwise proper operation cannot be guaranteed.

The modular connector is isolated from the input, output and enclosure of the power supply. This enables the possibility to parallel or series connect several power supplies maintaining equal voltages. The number of connected devices is not limited. The 500V insulation voltage may, however, not be exceeded. This manual cannot be applied in case the connector of the analog card differs from a modular connector (9-pin D-connector). In that case it is an incompatible analog controlled power supply.



Connection example using the internal +5 V_{DC} supply and external potentiometers

The +5V can be used as a supply for external circuits. The circuit shown to the left lets the power supply operate as a potentiometer-controlled device. It is important to keep in mind that the +5V output may not be loaded more than 20 mA, otherwise proper operation cannot be guaranteed.

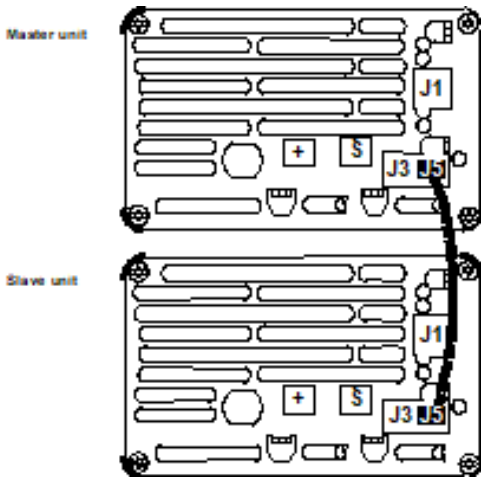
Optional master-slave connection

Using a master power supply together with a slave unit.

The master unit can be either a trimmer adjustable model (e.g. PAP1300/24) or an analog controllable model (e.g. PAP1300/24AI). The slave unit is a separate unit without any adjustment possibilities, e.g. type PAP1300/24S or PAP1300/24SH, which has an alarm relay output.

If more current or a higher voltage is needed, the adjustable master power supply can be connected in parallel or in series, via the digital bus, with the slave unit, which follows the master unit but has no adjustment possibilities by itself. Dependent on the connection, the maximum output current, or the voltage is doubled, while both power supplies are simultaneous adjusted using the multi turn potentiometers, or external analog control. A maximum of one slave unit can be used in this way. Contact your local distributor in case more slave units are to be connected. Special terminals and wires are needed. The power supply's output terminals and the communication bus terminals are isolated, so that the outputs can be connected in series for obtaining a higher voltage.

Serial bus connection



The bus cable is connected from the master unit (J5) to the slave unit (J5). The first unit, or master unit has potentiometers for voltage and current adjustment. An erroneous connection of the bus cable does not cause any damage but causes the slave unit to not follow the commands sent from the master unit. Due to the digital bus connection, only one slave unit can be connected to the master unit.

J5 has the following pin configuration:

Pin 1 and 3	serial output
Pin 2 and 4	serial input

Pin 1 of the master unit is connected to pin 4 of the slave unit. Pin 3 of the master unit is connected to pin 2 of the slave unit.

List of possible option combinations:

Device have output connectors J1, J3 and J5 for option purposes. Same of the options are alternative and cannot be assembled together. Columns in following table show which options can be assembled same time.

Code-switch	•	•	•				
Field Presettable				•	•		
Analog control						•	•
Temperature measurement	•	•	•				
Sense	•	•	•	•	•	•	•
External LED	•						
Bus OUT		•		•		•	
Bus IN		•					
Relay			•		•		•