PAP3200 Datasheet & Manual

Features:

Switched mode power supply/charger
Wide output range 0…320 V_{DC} & 0…200 A
Analog control by an external 0…5V_{DC}
Power failure alarm output
Master-slave connection

Micropower PAP/PAC series is a high power, lightweight, advanced power supply series using modern switching technology. All units 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 value with internal adjustment trimmers, with an optional 0-5 V analog control or serial bus.

Technical data

Variable		Unit	
INPUT DATA			
Input phase		-	1 Phase
Input voltage supply		V_{AC}	70…264 (70…230 reduced power)
		V_{DC}	70…369
Frequency		Hz	47…63
Input current		A	16
Recommended input fuse		A	16
Input cable area		mm²	3x1,5
Input cable length		m	1,5
Input connector		-	CEE 7/7, moulded
BATTERY CONNECTIONS			
Battery cable		mm²	10
Battery cable length		m	3,0
Battery cable connection (in charger)		-	Busbar terminals (available only in 12 V, 24 V, 36 V and 48 V models, otherwise 2 m cables)
ELECTRIC DATA			
Power factor		-	> 0,98
Efficiency (230Vac, 100% load)		%	89
Inrush current (Limited by an NTC resistor)		-	soft start
Output ripple (f < 1 MHz)		%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.
Output Grounding		-	Floating
PROPERTIES			
Short circuit protection		-	Electrical current limit
Wrong polarity protection		-	Fuse (Not included in 12 V model)
Overcurrent protection		-	Electrical current limit
Isolation	input-chassis	V_{AC}	1500
	input-output	V_{AC}	3750
	output-chassis	V_{AC}	700
Standards	safety	-	EN 60950-1:2001 LIMITATIONS Conformity can be limited depending on the end application output control method or unit mechanical structure. Note: If the charger's rated output voltage is higher than 60 V_{DC} the charger does not fulfil 1.2.8.7 (Safety Extra Low Voltage). Standard parts (2.1 Protection against electric shock) must be considered in installation. EN60335-2-29:2004 EN60335-1:2002 + A11:2004 + A1:2004 + A12:2006 + A2:2006

			EN50366:2003 + A1:2006 LIMITATIONS Conformity can be limited depending on the end application output control method or unit mechanical structure. Note: If the charger's rated output voltage is higher than 36 V it doesn't fulfil article 10.101 ("The no-load DC output voltage shall not exceed 42.4 V").
	EMC	-	EN55032 Class B, Application must be discussed in detail
Protection class	**mechanical**	**IP**	IP20 metal enclosure
	electrical	-	Class 1
Mounting		-	Wall, bench
Cooling		-	Temperature controlled fan
Operating temp range		**°C**	0…+40 (fixed assembly)
Maximum ambient temperature		**°C**	+55
Temperature protection		-	Processor controlled on/off
HMI		-	LED
CHARGER DIMENSIONS			
Charger weight excl. cables		**kg**	7,10
Outer dimensions	**W x H x D**	**mm**	400 x 250 x 80

Power supply models

Model	Input voltage range *)	Nominal output voltage	Voltage setting range	Current setting range	Maximum output power	Installation/dimensions (width x height x depth)
PAP3200/12	70-264 V_{ac}/70-369 V_{DC}	12 V_{dc}	0-18 V_{dc}	0-200 A	3200 W	Wall /bench 400x250x80 mm
PAP3200/24	70-264 V_{ac}/70-369 V_{DC}	24 V_{dc}	0-36 V_{dc}	0-127 A	3200 W	Wall /bench 400x250x80 mm
PAP3200/36	70-264 V_{ac}/70-369 V_{DC}	36 V_{dc}	0-54 V_{dc}	0-95,5 A	3200 W	Wall /bench 400x250x80 mm
PAP3200/48	70-264 V_{ac}/70-369 V_{DC}	48 V_{dc}	0-72 V_{dc}	0-64 A	3200 W	Wall /bench 400x250x80 mm
PAP3200/72	70-264 V_{ac}/70-369 V_{DC}	72 V_{dc}	0-108 V_{dc}	0-42 A	3200 W	Wall /bench 400x250x80 mm
PAP3200/110	70-264 V_{ac}/70-369 V_{DC}	110 V_{dc}	0-165 V_{dc}	0-25 A	3200 W	Wall /bench 400x250x80 mm
PAP3200/160	70-264 V_{ac}/70-369 V_{DC}	160 V_{dc}	0-240 V_{dc}	0-20 A	3200 W	Wall /bench 400x250x80 mm
PAP3200/220	70-264 V_{ac}/70-369 V_{DC}	220 V_{dc}	0-320 V_{dc}	0-14 A	3200 W	Wall /bench 400x250x80 mm
***) Reduced power 70-230 V_{AC} / 70-260 V_{DC}, see Figure 2**						

Intelligent optional models (24V models as type designation example)		
Model	**Option description**	**Cable set**
PAP3200/24AI	Analog control by external 0–5 V_{DC} voltage. Control signal isolated from power supply input and output.	1,5 m, modular connector (other ends open)
PAP3200/24H	Power failure alarm relay. Indicates input and module failures.	2 m cable (other ends open)
PAP3200/24AIH	Analog control and power failure relay	Analog + relay cables

Master-slave connection (24V models as type designation example)	
Master units	**Slave units**
PAP3200/24 trimmer adjustment (RS-232 bus out)	PAP3200/24S (TTL control bus in/out)
PAP3200/24AI analog control (RS-232 bus out)	PAP3200/24SH (Slave unit with relay, RS-232 bus in/out
1,5 m cable set for master slave connection included in slave unit. Cable connected to J101 of the slave unit, other ends open.	

Customized versions on request

- Cyclic battery chargers including charging algorithms
- Temperature compensation, external LED, external ON-OFF

Characteristics

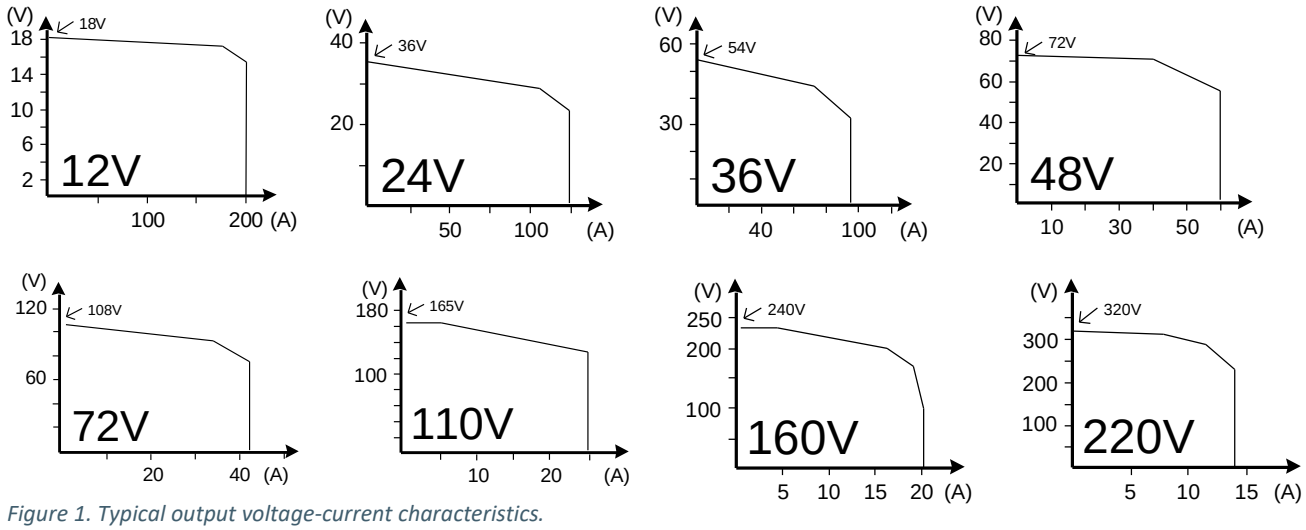


Figure 1. Typical output voltage-current characteristics.

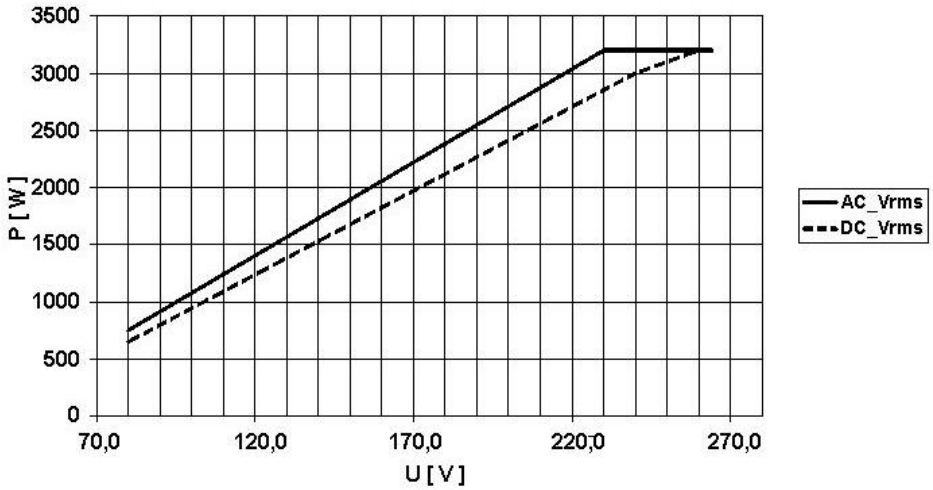
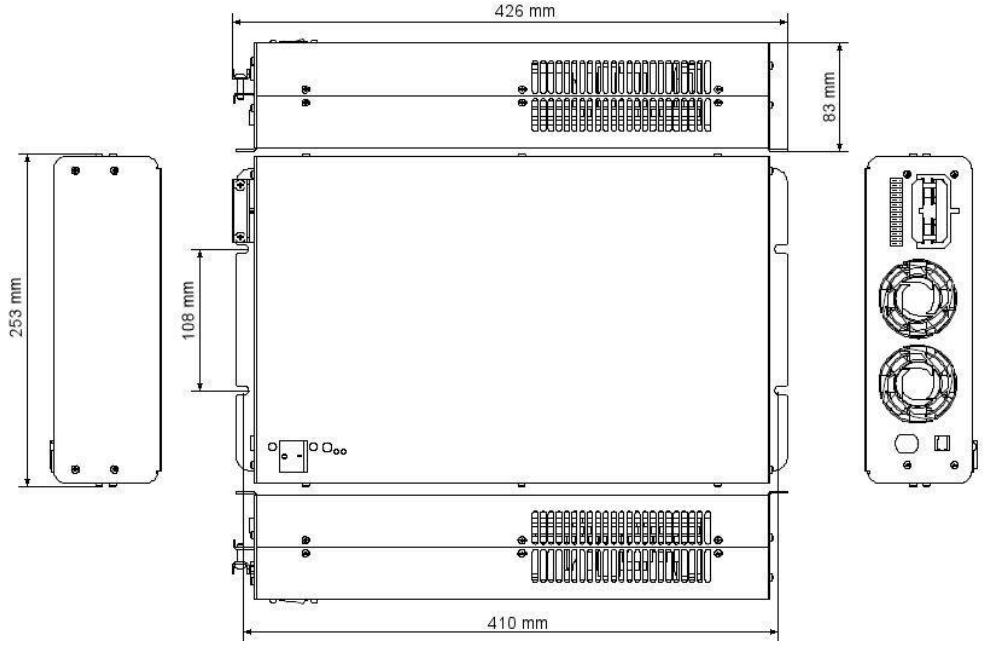


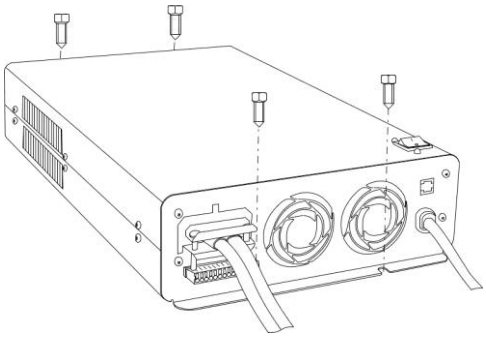
Figure 2. Typical output power - Input voltage characteristic.

Dimensions



Installation

The location must be dry, dust-free and indoors. Equipment must be connected to an earthed input socket outlet. For unplugging the unit, make sure the wall socket is near and in an easy access area. The acceptable full power temperature range is 0°C…+40°C. The thermal protection will cause the unit to power down at too high an operating temperature. The power supply is not waterproof. Keep it dry and away from areas with high humidity to avoid the risk of electrical shock and damage to the charger.



Wall mounting

The power supply can be mounted to the wall with the two mounting holes on both ends of the power supply unit as shown in the figure.
It is recommended that the power supply is mounted vertically on to the wall. It is suitable for mounting on a concrete or other non-combustible surface only.
Leave at least 10 cm free space at the cooling fan end and at both sides of the power supply to ensure sufficient ventilation.
When used as a charger, the charging process generates explosive hydrogen gas. Install the power supply as far away from the battery as possible to prevent hydrogen gases from entering the charger. Keep the area well ventilated. Never use an open flame or equipment that produces sparks close to the power supply and battery.

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
3. Turn the power on by turning the switch to position 1.
4. During normal power supply operation / charging process, the STATUS LED is continuously 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 voltage and current limit adjustment

Trimmer or analog control adjustable modules, type example PAP3200/24 or PAP3200/24AI:

The output voltage and output current limit of the power supply can be adjusted as follows:

- Trimmer adjustable models: with the multi-turn potentiometers accessible from the top cover.
- Analog controllable models by an external 0-5 V_{DC} voltage. See detailed description.

Both voltage and current can be adjusted from zero to the maximum value. Maximum 3200 W / 3000 W output power is available within the adjustment range.

Temperature compensated models, type example PAP3200/24T:

The power supply includes 16 pre-programmed output voltages 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 top cover. See the instructions for choosing the programmed voltage and the fine-tune adjustment.

LED

STATUS LED indicates different phases during the charging process. In normal power supply operation**,** an orange led indicates a healthy output voltage.

Stand-by LED is ON when input network (AC) is connected, but the power supply's output is switched OFF by the switch on top cover. Stand-by LED goes OFF when the power supply's output is switched ON.

Overcurrent protection

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

Series/parallel connection

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

Warnings

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.

This device is not meant to be used by children or people whose physical, sensory or mental attributes or lack of experience and knowledge prevent them from using the device safely unless a person responsible for their safety supervises them or has instructed them how to use the device.

It must be ensured that children do not play with the device.

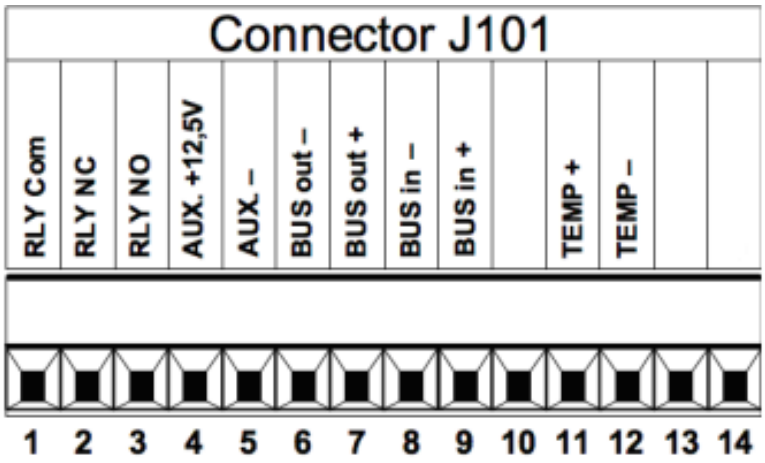
Charge lithium batteries only with appropriate BMS (Battery Management System).

Feature selection table

	Trimmer	Analog	Relay	Bus out	Bus in	Temp	Code switch	External ON/OFF	External LED
Trimmer adjustment	•		•	•				•	•
Analog control (isolated)		•	•	•				•	•
Alarm relay	•	•	•		•	•	•	•	•
Bus Out (TTL control to slave)	•	•		•	•	•	•	•	•
Bus In			•	•	•	•	•	•	
Temp. compensation			•	•	•	•	•	•	•
External ON/OFF	•	•	•	•	•	•	•	•	
External LED	•	•	•	•	•	•	•		•
Customized charging algorithm chargers with code switch			•	•	•	•	•	•	•

Connectors J101 and J69 for optional features

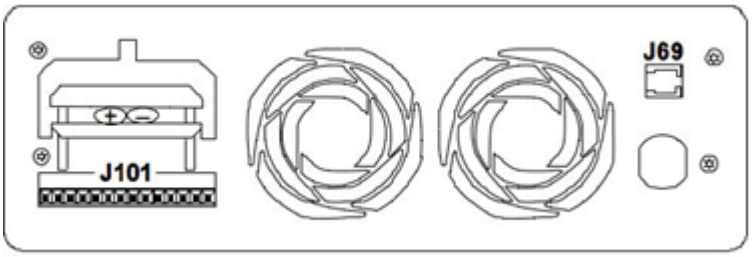
Optional relay alarm, temp. comp., Ext ON-OFF, Ext LED and serial bus connections



Screw terminals connector J101

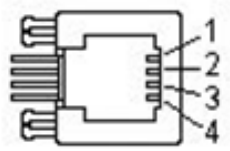
1. Alarm relay (common) *)
2. Alarm relay (nc) *)
3. Alarm relay (no) *)
4. Aux. +12.5 V **)
5. Aux. – *) **)
6. Serial bus out *)
7. Serial bus out *)
8. Serial bus in *)
9. Serial bus in *)
10. Not connected
11. Temperature sensor +*)
12. Temperature sensor – *)
13. NOT IN USE
14. NOT IN USE

*) *These connectors are floating/isolated from output*
**) *Disabled after 06/20. Contact manufacturer for more information*



Connector J69 option
External LED
External ON / OFF
WARNING: *External LED and External ON / OFF contact is NOT GALVANIC ISOLATED!*
Note: *Only one of these features possible at a time.*

Connector J69

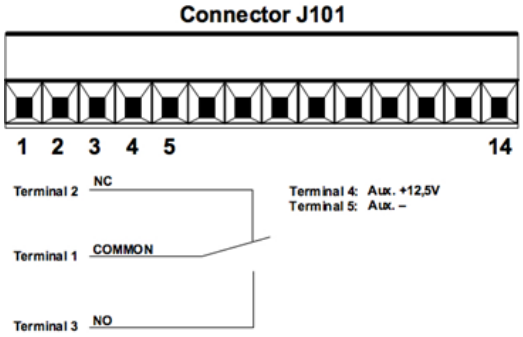


Pin	External LED	External ON/OFF
1	LED Green	NC
2	Ground	Ground
3	LED Red	NC
4	NC	ON/OFF

Alarm relay models

On models with an alarm relay, the internal alarm relay output indicates whether the output voltage is healthy or not and is connected to terminals 1…3 of connector J101 as shown below. The alarm signal is activated in case of an AC failure or charger failure. Both normally closed signals and normally open contacts are available.

Terminal 4 is an auxiliary control voltage for an external relay. (Feature disabled after 06/20)
Terminal 5 is the ground connection. (Feature disabled after 06/20)
Note: *Auxiliary control voltage feature disabled after 06/20. Contact manufacturer for more information.*



Internal alarm relay

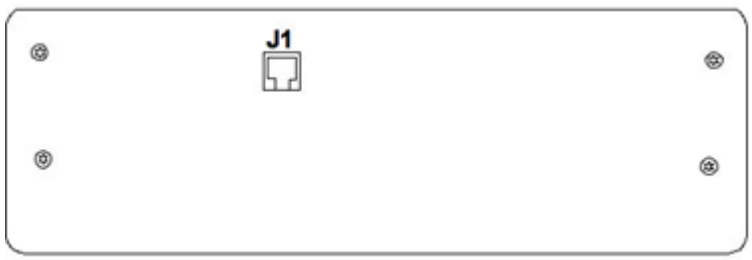
Isolation:
Output to case: 500 V
Output to GND: 120 V

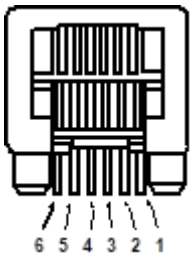
Technical data:
0,5 A@24 V_{DC}
0,5 A@120 V_{AC}

Common is connected to NC when the power is switched off.
Common is connected to NO when the power is switched on.

Optional isolated analog control

The optional isolated analog control input J1 allows full control of the output current and voltages and it provides the measured values for both. +5 V_{DC} supply power is available for the supply of the control logic. The isolated analog control card is connected to the AMP Modular 6 connector J1.





Pin configuration J1

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

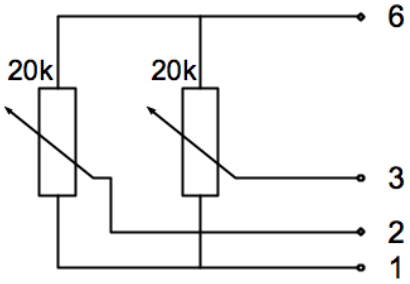
Figure 3. Pin configuration of the modular connector J1.

Controlling the analog card

All control voltages must be between 0 and +5 V. Higher voltages are not allowed. The control logic is positive, so that a +5 V_{DC} control voltage gives a maximum value from the power supply, while 0 V 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.

The modular connector is isolated from the output of the power supply. This enables the possibility to parallel connect several power supplies maintaining equal voltages. For more information on connecting power outputs in serial and using an analog card, ask the manufacturer. See also limitations to standards on page 1.



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

The +5 V 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 +5 V output may not be loaded more than 20 mA, otherwise proper operation cannot be guaranteed.

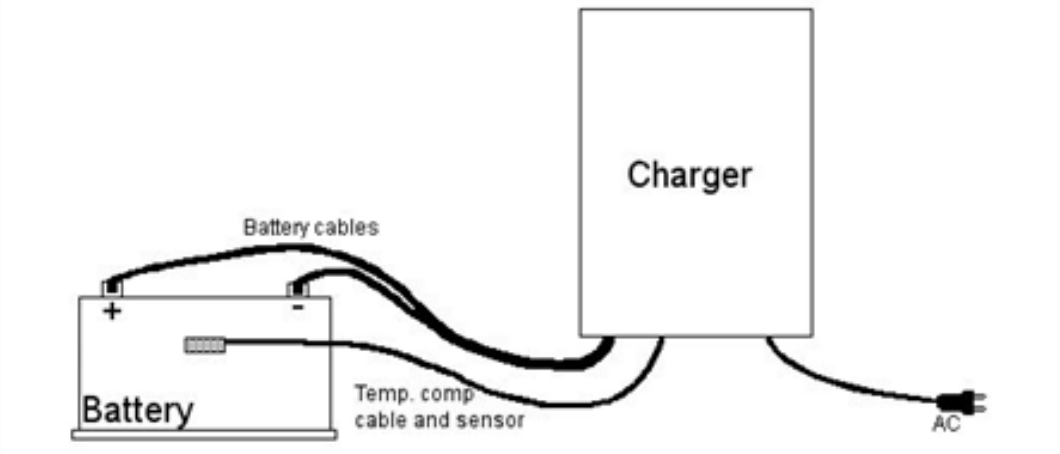
Calibration instructions

The manufacturer calibrates the analog control interface. Recalibration is not necessary if the analog control card is used between 0 and +5 V. A qualified person is required for recalibration of the device. Calibration is done using a pair of multi-meters and the schematic example given above. The calibration procedure is as follows.

1. Adjust the potentiometers to 5 V for the voltage and 2 V for the current targets. Connect a voltage meter to the power supply output. Adjust the ‘Voltage Set’ potentiometer to the maximum output voltage.
2. Connect a voltage meter to pin 5 of the modular connector J1. Adjust the trimmer ‘Voltage Meas.’ so that the digital voltage meter always shows the same value as pin 3 (target voltage).
3. Connect a current meter to the output so that the output is shorted. Adjust the current target potentiometer to +5 V. Adjust the ‘Current Set’ trimmer to the device maximum output current (see specifications for the device). Make sure that the current meter has the correct measurement range. Never exceed the maximum current value for the device. Contact the distributor in case the maximum current is not known.
4. Measure the voltage at pin 4 of the modular connector J1. Adjust using the ‘Current Meas.’ to the same voltage level as on pin 2 (target current).

Temperature compensation models (ex. PAP3200/24T)

The temperature compensation wire enables the charger to adjust the output voltage in accordance with the battery voltage and changes in temperature. The resolution is defined by an 8-bit A/D converter of a microcontroller. The temperature compensation wire and battery voltage sense cables are connected to connector J101 terminals 11…14 (see above). Connect the cable to the battery as shown in the illustration. The temperature sensor is either glued 10 cm below the top edge of the battery or fixed to the cable tag connected to the minus terminal of the battery.



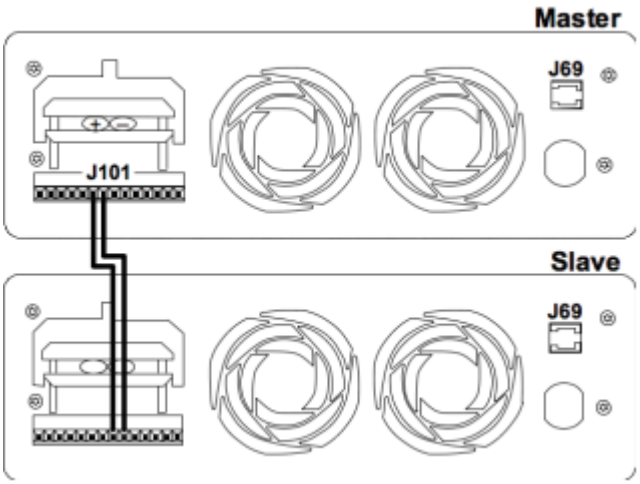
Optional master-slave connection

Using a master power supply together with a slave unit.

The master unit can be either a trimmer adjustable model (e.g. PAP3200/24) or an analog controllable model (e.g. PAP3200/24AI). The slave unit is a separate unit without any adjustment possibilities, e.g. type PAP3200/24S or PAP3200/24SH, which has an alarm relay output.

If more current is needed power outputs can be connected in parallel. Slave units are controlled via the digital bus. The communication bus OUT terminal is isolated, so that the bus outputs and input can be connected in chain. Slave unit voltage and current setting accuracy is defined by an 8-bit A/D converter of a microcontroller. For more information about connecting power outputs in serial and using digital communication, ask the manufacturer. See also limitations to standards on page 1.

Serial bus connection



The bus cable is connected from the master unit (J101) to the slave unit (J101).

J101 has the following terminal configuration:

Pin 7 of the master unit is connected to pin 9 of the slave unit.
Pin 6 of the master unit is connected to pin 8 of the slave unit.