

HAMEG Power Supplies

Whether in labs or in production sites, the reliable HAMEG power supplies are ubiquitous. These power supplies are easy to operate by their simple and intuitive front panel layouts. HM7044 and HM8143 feature RS-232, USB or IEEE-488 interfaces and can be incorporated in automated test systems. Together with other programmable HAMEG instruments professional test systems can be set up at moderate cost.



Standard properties

HAMEG power supplies feature floating outputs which are overload and short-circuit proof. They contain linear regulators which deliver well regulated low ripple output voltages. Separate displays for voltages and currents indicate the levels set. Using the ability to series connect or parallel outputs it is your choice to obtain higher voltages or higher currents. All instruments sport a finely adjustable current limit which protects the loads connected.

Pushing a button is all that is needed to turn an output or all outputs on or off without turning the instrument itself off. Further all supplies are thermally protected. The HM7044 and HM7042-5 have fans which are temperature-controlled.

Turning outputs on/off

The outputs of all HAMEG supplies can be activated/deactivated by pressing a button. The supply remains turned on. This allows to preset all output voltages prior to connecting them to the loads by pressing the associated OUTPUT button.

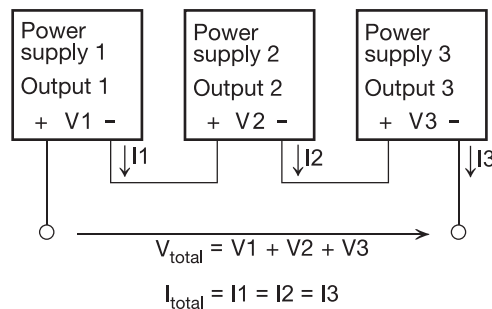
Parallel and series operation

The outputs to be connected in series or parallel must be independent. The outputs of one supply may also be connected with the outputs of another supply. For series operation the connections are as follows:

Series operation

Attention! High Voltage!

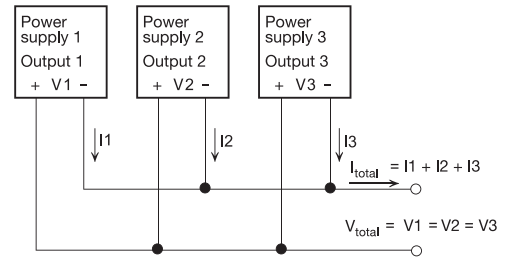
In series mode the voltages add (or subtract), thus the total voltage may exceed the



Series operation

safe voltage of 42V. In this case touching live parts may be fatal! The maximum current in series mode is given by the smallest current set in any of the supplies involved as the current is the same in all.

Parallel operation



Parallel operation

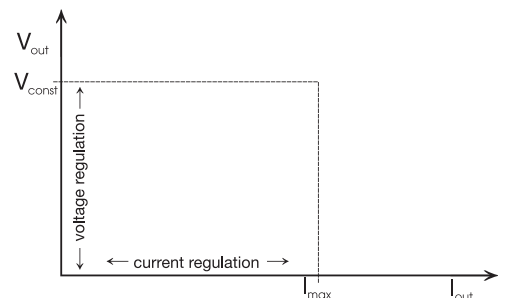
In order to increase the total current the outputs of the supplies are connected in parallel. The output voltages are identical and are limited by the output with the lowest maximum voltage specification. The total current is the sum of the individual currents of the paralleled sources.

Stop! Danger for some supplies

In case of parallel connection please check whether the total current is evenly distributed among the supplies, assuming supplies of equal specification. Parallel connection may lead to equalizing currents flowing between supplies. If supplies of other make should be used which may not be overload proof, such supplies can be destroyed by equalizing currents!

Current limiting and electronic fuse

Current limiting means that only a maximum current set is allowed to flow. This is adjusted prior to operating a test circuit and prevents too large damages to this circuit in case of malfunction like a short-circuit.

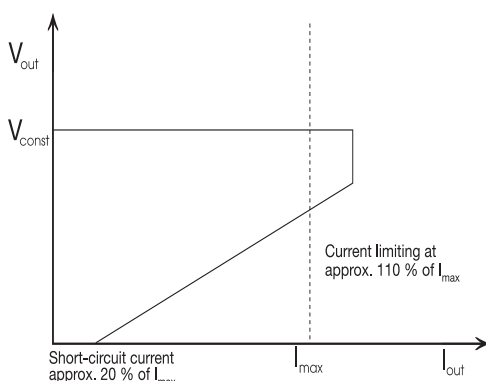


V-I-characteristic

The picture shows that in the range of voltage regulation the voltage V_{out} remains constant while the current may increase to its maximum value I_{max} . If this value is reached voltage regulation will yield to current regulation, i.e. the maximum current remains constant even if the load increases. Instead the output voltage V_{out} will decrease to almost zero with a short circuit. The current flowing remains constant and limited to I_{max} . HAMEG supplies are hence also current supplies and hold the current adjusted constant. We recommend to set the maximum current prior to connecting the supply to a test circuit, thus protecting this from major damage.

In order to still better protect sensitive loads all HAMEG power supplies feature a so called electronic fuse in addition to current limiting. This circuit disconnects the outputs extremely fast as soon as I_{max} is reached, that is no current will flow.

Some supplies on the market have a voltage dependent current limiting characteristic called fold-back. In case of overload or short circuit current limiting will set in at approx. 110 % of maximum current, the current will then be reduced depending on the load approx. 20 % with a short to applied. After removal of the overload the supply will return to normal operation. However, this is only true if the characteristic of the load is such that there is no stable operating point at the intersection of the supply characteristic and the load characteristic. A case in point are lamp loads: it may happen that the supply will not reach the voltage level set but remain in a low voltage low current "hang-up" situation!



Fold-back V-I-characteristic

Tracking operation

Tracking means that several outputs will be controlled such that all outputs involved will follow the "leader" by keeping the relationship of the voltages constant which were set in the beginning. Example: If voltage 1 is changed from 10 to 12V, voltages 2 and 3 will follow from 5 to 6 V. Voltage 4 will follow from 20 to 24 V.

However, if the maximum current of one output is limited and if this limit should be reached all currents of the outputs slaved to the leader will also enter current limiting. In case the electronic fuse was selected the output reaching its limit will be disconnected, and the slaved outputs will hence also be disconnected.

SENSE operation Compensation of conductor resistances

In the SENSE mode the voltage regulation circuit will take its input from the sense terminals which are connected directly to the load thus keeping the voltage there constant. The load current will cause a voltage drop in the connecting wires which would normally subtract from the supply's output voltage.

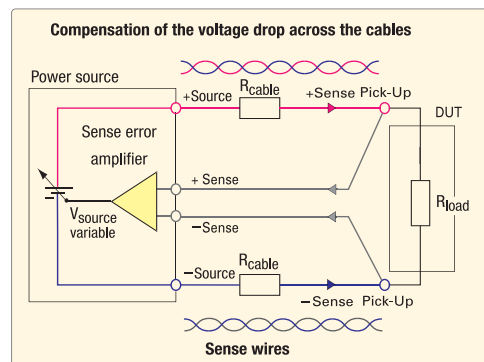
$$V_{load} = V_{out} - V_{cable}$$

$$V_{cable} = I_{load} \times R_{cable}$$

This voltage loss by the cables has to be compensated. In order to achieve this, the voltage is measured directly at the load by using the SENSE terminals. Because the current in the SENSE wires is minute there is no appreciable voltage drop, i.e. the voltage sensed by the supply is in fact the true load voltage. The supply now increases its output to the sum of the cable voltage drop and the load voltage desired. The voltage drop across the cable is thus compensated, and the load will see the voltage set.

HM8040-3 Triple Power Supply

This especially compact and robust supply in the modular 8000 series was designed mainly for applications in training, service and lab. The HM8040-3 features linear regulators, 3 independent outputs with a total power of 25W. In addition to low ripple and good regulation the HM8040-3 offers very good quality and an optimum price/



performance ratio. This module requires the use of the mainframe HM8001-2.

HM7042-5 Triple Power Supply

This supply offers a cost-effective alternative to many standard supplies on the market. In addition to low ripple and high efficiency the HM7042-5 sports all features to be expected of a lab supply. There are 3 independent output voltages. These may be series or parallel connected to obtain higher voltages or higher currents. The instrument has current limiting as well as over-current disconnect.



HM7044 High Performance Power Supply

The HM7044 is a universal precision instrument with 4 outputs of exceptional voltage and current stability, programmable current limiting and electronic fuse especially suited for lab and test facility use. The tracking mode allows simultaneous changes of output voltages as well as the disconnection of individual or all outputs in case a limit set was exceeded. SENSE terminals measure the voltage at the load compensating for cable losses.



HM8143 Arbitrary Power Supply

The HM8143 is a multifunctional workhorse, you get 3 instruments in one.

A Power Supply with 3 independent floating outputs which may be series or parallel connected. All outputs may be turned on or off by pushing a button. The 30V/2A outputs may be externally modulated or may be operated in the tracking mode allowing to change their voltages resp. currents simultaneously. Sense terminals measure the voltages directly at the respective loads thus keeping the load voltages constant. For digital circuits a 5V/2A output is provided.

An Arbitrary Waveform Generator with 1024 points allowing to generate user-defined waveforms in the low frequency range. The arbitrary signals are generated digitally and can be defined fairly simply. In general, an arbitrary signal consists of a multitude of amplitude levels which are addressed one after the other thus creating a waveform



which may be periodically repeated. The signal may be freely defined within the instrument specifications and will be stored by the instrument. Such signals may be defined by using the RS-232, IEEE-488 or USB interfaces.

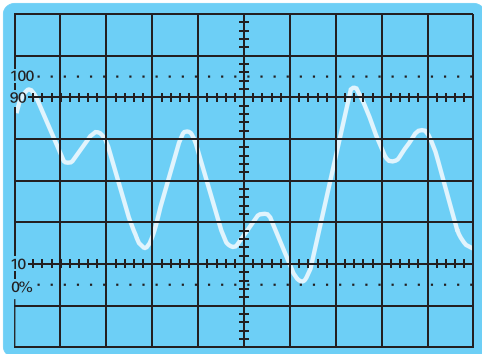
Modulation

The two 30 V outputs may be modulated using the rear terminals. The high slew rate



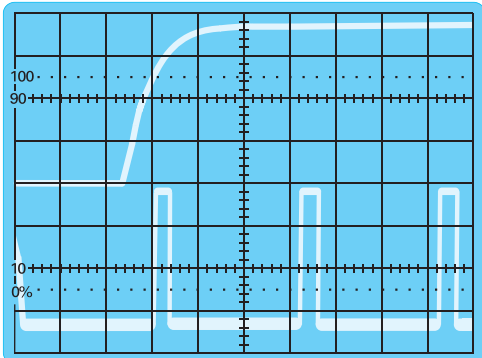
of 1 V/ μ s for modulation and the minimum pulse width of 100 μ s in the arbitrary mode allow to generate complex load profiles. For external modulation the low distortion of the linear output stage is available over the full power range.

An Electronic Load with a 60 W specification. Currents of up to 2 A per channel are permissible. The change of operating modes is automatic and will be indicated by a minus sign preceding the current display.



Arbitrary signal AF

LabVIEW drivers are available for HM7044 and HM8143 and may be downloaded from www.hameg.com.



Slew Rate 1 V/ μ s

HAMEG Distributor:



MCS Test Equipment Ltd
Unit 5-6 Station Yard,
Llanrwst, Conwy,
North Wales,
LL26 0EH

Tel: 08453 62 63 65
Fax: 08453 62 36 16

Email: sales@mcs-testequipment.co.uk
Web: www.mcs-testequipment.co.uk