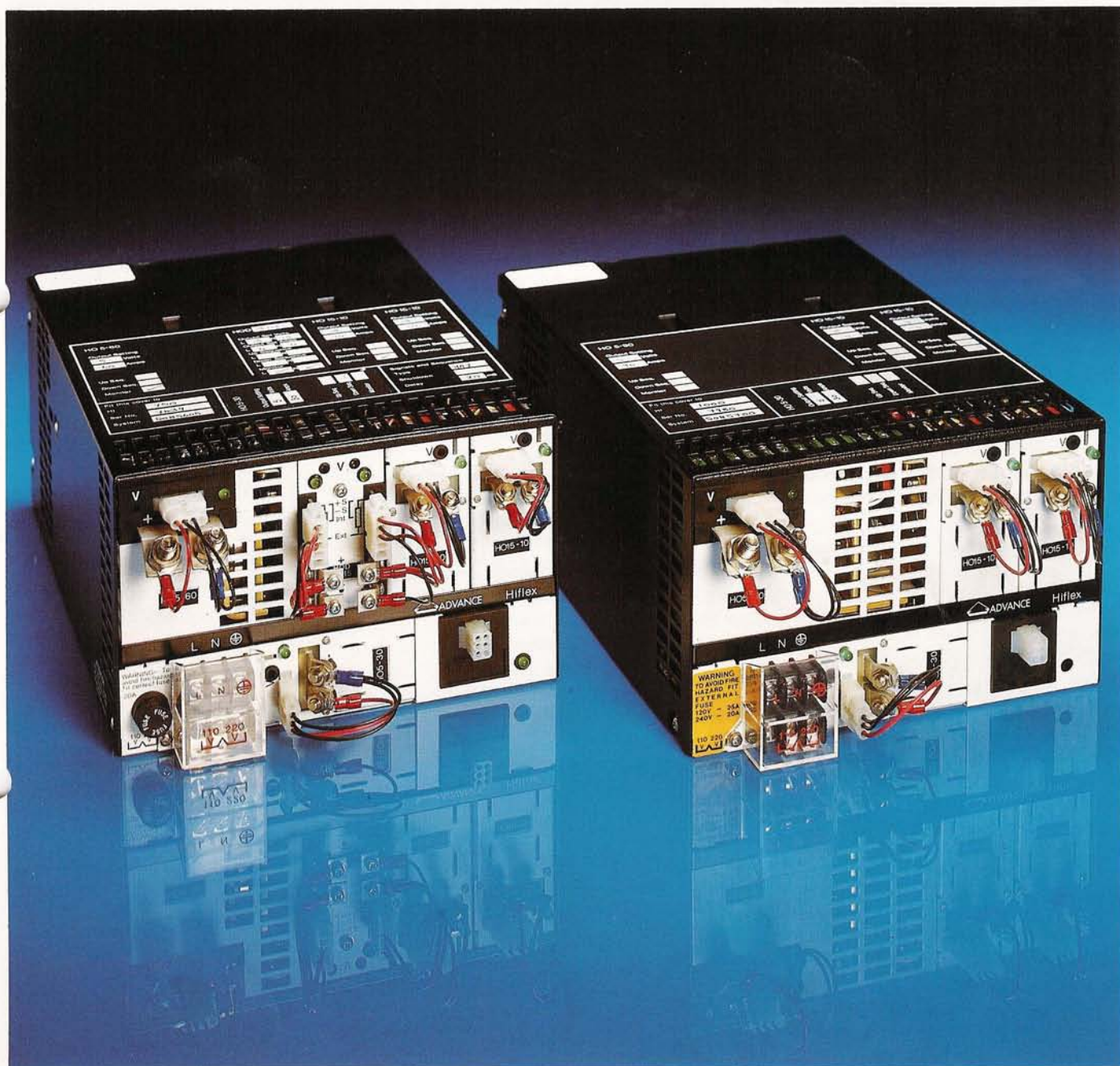


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 **ADVANCE
POWER SUPPLIES**
A Farnell Electronics Company



**Hiflex Modular
power supply
system**

Advance Hiflex Modular Power Supply System

Hiflex, the modular power supply system from Advance, is a totally unique concept in the field of energy conversion. Whether your system is computer mainframe or peripheral, telecommunications or instrumentation, Hiflex offers a flexibility and sophistication never before available to specifiers of power requirements. Using state of the art circuitry and technology, this revolutionary system, designed, manufactured and marketed by Advance, offers unparalleled advantages.

● Tried and Tested

Advance has over fifteen years of experience in the field of switchmode power supplies. The Advance Hiflex system was the successful conclusion to a four year in-depth research and development programme. The user may specify a Hiflex system therefore, secure in the knowledge that each component part is of a proven design and meets the most stringent of requirements. We at Advance are justly proud of the Hiflex system and its proven reliability in the field.

● One Box – One Size

A choice of 750 or 1000W regulated output power is housed in one industry standard box. Fan cooling ensures a power density of 104 or 138W/litre (1.7 or 2.3W/cubic inch), adequate cooling and a choice of mounting attitudes. The advantages over conventional racking systems are immediately apparent. Whatever configuration of modules, a Hiflex system will occupy a standard 8"×5"×11" space.

● Extreme Versatility

Output modules at power levels of 150W, 300W, 450W and 600W provide hundreds of power system variations. The multi-output capability of Hiflex extends to a maximum when six 150W modules are fitted. All outputs are non-interactive and no minimum load requirements are necessary. The high level of electrical specification, together with facilities provided as standard, such as voltage programming, choice of current overload characteristics (constant, re-entrant or trip), overvoltage protection and holdup against input failure, allow the equipment designer to exactly match his requirements. For

critical applications, standard Hiflex modules will operate in parallel redundant mode.

● Sophisticated Accessories

Further sophistication is afforded by the user being able to select additional modules offering "signals" (HA-1), "output sequencing" (HA-2) and "main inverter inhibit" (HA-3) packages. These packages are, of course, contained within the 8"×5"×11" enclosure.

● Short Design Time

The number of variations available, coupled with the modular construction of Hiflex, means that the most demanding or innovative of specifications become standard orders, quickly assembled at the Advance factory.

● Fast Delivery

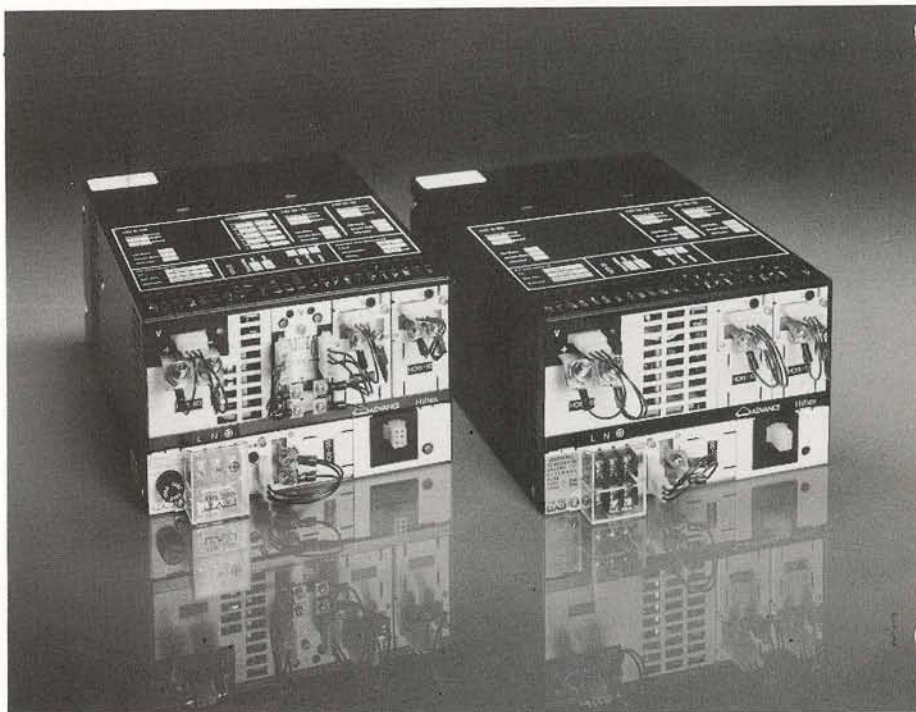
Speedy assembly of the chosen input unit and the relevant output module configuration means that production quantities or prototype requirements can be delivered as quickly as standard catalogue units.

● Approvals

The Hiflex system is:-
UL approved — file E63469
CSA certified — file LR41803
BT approved — NS/1640/1/d/022145

Hiflex meets RFI specifications
VDE0871/1/75 Curve A: BS800/77
and FCC20780 part 15J Curve A.

In addition, Hiflex meets the safety requirements of IEC435 and VDE0806



Hiflex Input Units HI750, HI1000

The input unit is the heart of the HIFLEX system. With a choice of 750 or 1000W rating, a Hiflex input unit operates independently from the output modules. It accepts the incoming mains (line) supply, filters out any transients and prevents any noise from within the system being fed back along the supply lines.

The incoming low frequency (50/60Hz) power is converted, using low loss, high efficiency circuitry into high frequency (30KHz) power suitable for driving the output modules.

For those users who wish to be independent of input frequency, HFI750 and HFI1000 input units, offer an alternative, using a dc fan. Allowance should be made for the fact that such a fan is mounted externally and increases the overall dimensions of a Hiflex system to 8"×5"×13". The standard airflow direction is from the rear to the front of a Hiflex system, but for certain applications a reverse airflow pattern is available. Please contact technical sales for details.

- The unit is factory set to either high mains or low mains input, according to requirements, but a link voltage selector allows the alternative input to be selected.
- The input unit is protected against overtemperature and undervoltage conditions.
- A soft start circuit is incorporated as standard, to limit the inrush current.
- A remote shutdown facility enables the user to externally control the shutdown of the complete system.
- The standard filter meets VDE0871/1/75 Curve A, BS800/77.
- A fan is built in which not only cools the input unit and output modules, but allows the Hiflex system to be mounted in any plane.
- One input unit, driving up to 6 output modules obviates the need to mount separate devices in a racking system – and means that only one set of mains connections is required.

Hiflex Output Modules

It is the choice and variety of output modules that makes Advance Hiflex a truly flexible power supply system. Single or dual outputs, with voltages from 2 to 48 volts mean that up to 12 outputs may be obtained from one Hiflex system.

Each output module accepts a power drive from the input unit and is then independent. Regulation and control circuitry within each module ensure a clean steady output from terminals on the front panel. A green LED on the front of each module indicates the presence of an output voltage.

- Voltage is adjustable by means of a front panel potentiometer.
- Remote sensing and programming is available on all output modules.
- The output modules contain their own protective systems. Overcurrent protection is available on all output modules and may be set in either constant current, re-entrant or trip modes.
- Overvoltage protection is standard on all outputs; in the event of overvoltage occurring on any output, all outputs will be disabled.

Hiflex Accessories

The sophisticated accessory packages available for the Hiflex power supply system are truly versatile. There are three accessory packs currently available, that fit into the basic 8"×5"×11" overall dimensions and they are unique to Hiflex. The packages permit the user to monitor and control the operation of the power supply system to meet specific equipment requirements, without the problems involved in designing ancillary circuitry.

HA1 Signals

- **'Input Failed'**

Indicating that the main inverter has failed owing to either failure of supply or an internal fault.

- **'Go' Signal**

T.T.L. compatible signal indicating that monitored outputs are available.

- **'Go' LED**

On front panel, operated by 'Go' signal.

- **'Commence Shutdown' Signal**

A signal output, with a delay adjustable from the occurrence of the 'Input Failed' signal.

HA2 Sequencing

Provided HA1 (Signals package) is specified, HA2, a Sequencing package is available, allowing outputs to be turned on and off in a predetermined order.

- **Up Sequence**

Adjustable sequencing allows up to 3 outputs to be sequenced on, to the users requirements.

- **Down Sequence**

Allows the same 3 outputs to be turned off in a predetermined sequence.

HA3 – Main Inverter Inhibit Facility

This package, used either in conjunction with HA1 signals or as a stand alone accessory, permits the user to shut down the inverter of the input unit and then to restart without the necessity for mains recycling.

RATINGS AND SIZES

The smallest Hiflex single output module is rated at 150W (e.g. 5V 30A). This "single" module measure 88×39×165mm and represents the basic module size (1M). Larger modules have the same height and depths, but the width increases in multiples of the 39mm module width. (For example a 5V 90A (equalling 3 module widths) = 3M = 88×117×165mm.

Specification

All figures quoted are typical at 25°C and at nominal mains input voltage, unless otherwise stated.

Input

Voltage

Dual standard, user selectable by link on front panel.

90–132V ac (low input)

180–264V ac (high input)

Frequency

47–63Hz (Fan limited HI750 +HI1000 units)

47–440Hz (HFI units with dc fan)

Current

HI750

at:

rms

mean

repetitive peak

switch on peak

HRC fuse fitted

HI1000

at:

rms

mean

repetitive peak

switch on peak

HRC fuse*

*to be supplied and fitted by customer

	90V	132V	180V	264V
rms	16.0A	11.6A	8.0A	5.8A
mean	8.6A	7.9A	4.9A	4.5A
repetitive peak	28.6A	26.3A	16.3A	15.0A
switch on peak	<15A	<15A	<30A	<30A
HRC fuse fitted	20A	20A	20A	20A

	90V	132V	180V	264V
rms	22.0A	15.0A	11.0A	8.0A
mean	12.0A	11.0A	7.0A	6.0A
repetitive peak	39.0A	35.0A	23.0A	21.0A
switch on peak	<15A	<15A	<30A	<30A
HRC fuse*	25A	25A	20A	20A

Output Voltage and Current

Module Type No.	Standard Output Voltage	Voltage Range	Current
HO2-30	2V	1.5–2.5	30A
HO2-60	2V	1.5–2.5	60A
HO5-30	5V	3.0–6.5	30A
HO5-60	5V	3.0–6.5	60A
HO5-65	5V	3.0–6.5	65A
HO5-90	5V	3.0–6.5	90A
HO5-100*	5V	3.0–6.5	100A
HO12-10	12V	7.0–15.0	10A
HO12-12	12V	7.0–15.0	12A
HO12-15	12V	7.0–15.0	15A
HO12-40	12V	7.0–15.0	40A
HO15-10	15V	12.0–18.0	10A
HO15-15	15V	12.0–18.0	15A
HO24-5	24V	15.0–28.0	5A
HO24-8	24V	15.0–28.0	8A
HO24-20	24V	15.0–28.0	20A
HO28-5	28V	17.0–34.0	5A
HO28-8	28V	17.0–34.0	8A
HO48-10	48V	30.0–58.0	10A
HOD 5/5	5V & 5V	3.0–6.5/3.0–6.5	4A & 4A
HOD12/5	12V & 5V	7.0–15/3.0–6.5	4A & 4A
HOD12/12	12V & 12V	7.0–15/7–15	4A & 4A
HOD15/5	15V & 5V	12–18/3.0–6.5	4A & 4A
HOD15/15	15V & 15V	12–18/12–18	4A & 4A
HOD24/5	24V & 5V	15–28/3.0–6.5	3A & 3A
HOD24/15	24V & 15V	15–28/12–18	3A & 3A
HOD24/24	24V & 24V	15–28/15–28	3A & 3A
HOL5-1-5	–5V	–3.0 to –6.5V	1.5A

*Maximum ratings only available to +40 °C

Voltage Adjustment

HO output module voltage continuously variable by –5% to +7.5%

HOD output module voltage continuously variable by –5% to +5%

Regulation

Static

0.1% for worst case combination of 100% load change and either 90V–132V or 180V–264V line change

Dynamic

For a 10–100% or 100–10% load change: 10% deviation, 2mS recovery time.

For a 50–100% or 100–50% load change: 5% deviation, 1mS recovery time.

Ripple and Noise

Less than 0.2% rms (2MHz bandwidth)

Less than 1.5% pk.–pk., 5V HO units and HOD 15/5 (30MHz bandwidth)

Less than 1.0% pk.–pk., other HO units (30MHz bandwidth)

Temperature Coefficient

Better than $\pm 0.015\%/^{\circ}\text{C}$ ($\pm 150\text{ppm}/^{\circ}\text{C}$)

Temperature Range

Operating

–10°C to +70°C, derating above 50°C by $2\frac{1}{2}\%/^{\circ}\text{C}$

Storage

–40°C to +85°C

Efficiency

70%

Output Hold Up

HI750

At 105% output power, nominal output current and voltage:–

For 220V–10% input:

28mS (i.e. full cycle at 50Hz)

For 110V–10% input:

23mS (i.e. full cycle at 60Hz)

HI1000

At 105% output power, nominal output current and voltage:–

For 220V input:

28mS (i.e. full cycle at 50Hz)

For 115V input:

23mS (i.e. full cycle at 60Hz)

The selection of output voltage or current other than nominal will modify hold up performance.

Remote Sensing

Available on all outputs.

Remote Programming

Available on all outputs: range –40% to +20% of nominal 5V, 15V or 28V following a linear law with offset:

$$V = 2.45 + \frac{R}{2} \text{ where R is the programming}$$

resistance in K Ω

Series and Parallel Operation

A maximum limitation of 250Vdc between outputs and output and case is applicable. The regulation, ripple and noise figures on parallel combinations of units will be slightly degraded. Sequenced shutdown may be available on some parallel combinations. If parallel combinations of output modules are required, please consult technical sales.

Remote Turnoff Input

This is a floating input, activated by a TTL compatible signal. The current drain by the input is approximately 7mA. The switching inverter is then inhibited and all

outputs decay exponentially. The remote turn-off input must then be de-energised and the mains (line) supply interrupted for a minimum of 3 seconds before normal operation will commence.

This facility is not available when the HA2 sequencing package is fitted. (See notes on HA1/HA2/HA3 for alternative shutdown procedures).

Protection – Input Modules

Overtemperature

In the event of an excessive internal temperature, all outputs are tripped. They may be reset by mains (line) cycling, provided that the temperature has returned to within safe limits.

Overcurrent

Trips when the inverter transistor peak current exceeds 12.5A. An inbuilt automatic "Trip and then try again" cycle is activated indefinitely at approximately one second intervals until the overcurrent has been reduced.

Undervoltage

An undervoltage inhibit circuit prevents start up at input voltages below 60% of nominal.

Inrush Current

Soft start circuitry limits the inrush current to a 30A peak.

Protection – Output Modules

Output Current

Set between 103% and 117% of nominal.

"Constant Current" folds back to approximately 80% of nominal.

"Re-entrant" folds back to approximately 20% of nominal.

"Trip" trips to all outputs when module current is 105%–125% of nominal. Reset by mains (line) cycling.

These options are selected by an internal link.

Overvoltage

Set between 119%–125% of nominal for 5V modules, 114%–126% for 12/15V modules and 109%–121% for 24/28V/48V modules. An overvoltage on any output trips all outputs. Reset by mains (line) cycling.

Overtemperature

300W and 450W 5V modules are fitted with temperature sensors which trip all outputs in the event of an excessive internal temperature. May be reset by mains (line) cycling provided that the temperature has returned to within safe limits.

Safety

Isolation

2000V rms input-case, 500V rms output-case, simultaneously giving 2500V rms input-output for one minute as per VDE0806.

Transformers without safety screens are double insulated and tested to 3750V rms for 1 minute.

Insulation

10M Ω at 500V dc between:

Input terminals and case

Output terminals and case

Input terminals and output terminals

Input and Output.

Earth leakage

Less than 3.5mA rms (meets IEC435 portable equipment).

Clearances

Meets IEC435, VDE0806.

RFI

The standard filter meets VDE0871/6/78 Curve A, BS800/83 and FCC20780 part 15J curve A.

Internally Fitted Accessories Available

HA1 Signals Package

"Input Failed" Signal

TTL compatible low for input failed. Goes low when the inverter is stopped, even if the input is correct.

"Commence Shutdown" Signal

TTL compatible Low.

This signal is given after an adjustable delay (max. 30ms) starting from the "Input Failed" signal. If the mains recovers during the delay, both signals return to normal.

"GO" Signal

TTL compatible High, indicates all supervised outputs greater than approx. 90% of set value. Maximum of 4 outputs supervised.

If HA2 is fitted the modules being sequenced must also be supervised.

"Go" LED

On front panel, indicates all supervised outputs greater than 90% of set value.

HA2 Sequencing Package

(NOT available without HA1)

Up Sequence

Adjustable sequencing on a maximum of 3 outputs. The output designated "first up" starts with the power inverter, the others being inhibited. Only when the previous output reaches 90% of its nominal setting will the next inhibit be released.

The outputs of additional unsequenced modules commence with inverter operation.

"Commence Shutdown" Input

TTL Low for "Start".

The same outputs may be turned off in any predetermined sequence. The first output on TTL Low, the others following at approximately 1ms intervals. On completion of down sequence inverter is inhibited.

May be connected to the "Commence Shutdown" Signal circuit to incorporate a predetermined delay.

HA3 Signals Package

Main inverter inhibit facility.

Run condition – Apply logic 0 or short circuit to control input.

Stop condition – Apply logic 1 or open circuit to control input.

Note

HA3 may be fitted in addition to HA1, but not HA2.

Notes on HA1/HA2

1. All signals outputs and command inputs are TTL compatible and are commoned to an internally generated rail which is isolated from all power inputs and outputs.
2. Module output voltages may be floating and polarity need not be specified.
3. Outputs are at $\pm 0.5V$ whilst held off on 5V or 2V units. $\pm 1V$ on higher volume modules.
4. Down sequence is NOT available if any of the following fault conditions exist.
 - (a) Primary current limit is activated on input unit.
 - (b) Overtemperature.
 - (c) Overvoltage on any output.
 - (d) Overcurrent on any output fitted with trip action.

To re-set the system after any of these events it is necessary to turn the input off then on again, except in the case of overcurrent on primary when the system will attempt to start at approximately one second intervals.

5. Down sequence IS available if the HA2 module is fitted and if the "Commence Shutdown" input is activated. This may be done externally at any time, by connecting the "Input Failed" or "Commence shutdown" signal to the "Commence Shutdown" input.
6. The maximum delay from input failure to the "Input Failure" Signal being given is 10ms.

Environment

Units tested to 25g shock (20ms), 2g vibration, 5–500Hz (0.1" max.) 1,000 bumps (30g 5ms). (DEF STAN 07.55) Hiflex has been tested in accordance with DEF STAN 61–5 part 4 and met the stated requirements.

Mechanical

UNF and metric points provided.

Size

Complete System

203mm wide×128.5±1mm high×279mm deep (8"×5"×11"). Excluding terminals.

Overall Weights

Mainframe 6kg
HO-150W modules 0.7kg
HO-300W modules 1.5kg
HO-450W modules 1.89kg
HO-600W modules 3.0kg

Power Density

HI750 138W/litre (1.7W/cu.in)
HI1000 104W/litre (2.3 W/cu.in)

Output Modules

88mm×39mm×165mm for a single 150W module or HOD module 1M.

Other power ratings are in multiples of the 39mm module.

Hiflex Output Modules

Type No.	Output Voltage	Output Current	Module Size
HO2-30	2V	30A	1M
HO2-60	2V	60A	2M
HO5-30	5V	30A	1M
HO5-60	5V	60A	2M
HO5-65	5V	65A	2M
HO5-90	5V	90A	3M
HO5-100	5V	100A	3M
HO12-10	12V	10A	1M
HO12-12	12V	12A	1M
HO12-15	12V	15A	1M
HO12-40	12V	40A	2M
HO15-10	15V	10A	1M
HO15-15	15V	15A	1M
HO24-5	24V	5A	1M
HO24-8	24V	8A	1M
HO24-20	24V	20A	2M
HO28-5	28V	5A	1M
HO28-8	28V	8A	1M
HO48-10	48V	10A	2M
HOD5/5	5V & 5V	4A & 4A	1M
HOD12/5	12V & 5V	4A & 4A	1M
HOD12/12	12V & 12V	4A & 4A	1M
HOD15/5	15V & 5V	4A & 4A	1M
HOD15/15	15V & 15V	4A & 4A	1M
HOD24/5	24V & 5V	3A & 3A	1M
HOD24/15	24V & 15V	3A & 3A	1M
HOD24/24	24V & 24V	3A & 3A	1M
HOL5-1-5*	-5V	1.5A	1M

*must be used in conjunction with an HO15-x module.



Specifying Hiflex

1. The input is settable to either European or American standard supplies. Please specify which required.
2. Up to 6 output modules may be specified. The key shows how they are positioned – when the Hiflex system is viewed from the front.
The smallest module available is rated at 150W (i.e. 5V 30A) and measures 88mm×39mm×160mm. This represents the basic module size (1M).
One 1M module can be accommodated on the lower level, up to 5 modules in the upper level.
3. In the upper level of the system, larger modules will always be positioned in the lower numbered positions (or lefthand side when viewed from the front).
Lower voltage units will be mounted to the left.
4. Specify which HO module is required in any combination of the module positions.
5. Please specify all output voltages.
6. The method of overcurrent protection may be specified for each output. The mode of operation is given in the general Hiflex specification. Indicate as follows:
Constant Current – C
Re-entrant – R
Trip – T
7. If the Hiflex signals package (HA1) is specified, a GO signal is provided indicating that all outputs are greater than 90% of set value. A maximum of 4 outputs may be supervised.
8. Up to 3 outputs may be controlled in the UP sequence, to switch on in a pre-determined order.
Two or more outputs of the same voltage and polarity may be sequenced together.
9. The same 3 outputs may be turned off in the DOWN sequence, in a pre-determined order.
Some combinations of paralleled modules may be sequenced down as one unit (consult Technical Sales).
10. Shutdown Initiation DOWN sequence may be initiated from an external signal, or from the 'Commence Shutdown' signal.
11. Shutdown Delay Indicates delay required from the presence of 'Input Failed' signal to 'Commence Shutdown' signal.
12. If voltage or current settings are required outside the nominal specification the appropriate values should be stated when Advance engineers have approved the variation. Parallel sequence is specified by Advance in order to ensure that the same unit will always deliver current first, when units are run in parallel.

HI750 / HI 1000



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