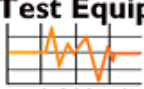


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# Mainframe HM8001-2 Manual/English




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Instruments

## DECLARATION OF CONFORMITY

**Manufacturer** HAMEG Instruments GmbH  
Industriestraße 6  
D-63533 Mainhausen

The HAMEG Instruments GmbH herewith declares conformity of the product

**Product name:** Main frame  
**Type:** HM8001-2  
**with:** –  
**Options:** –

with applicable regulations  
EMC Directive 89/336/EEC amended by  
91/263/EWG, 92/31/EEC

Low-Voltage Equipment Directive 73/23/EEC  
amended by 93/68/EEC

Harmonized standards applied

### Safety

EN 61010-1: 1993 / IEC (CEI) 1010-1: 1990 A  
1: 1992 / VDE 0411: 1994  
EN 61010-1/A2: 1995 / IEC 1010-1/A2: 1995 /  
VDE 0411 Teil 1/A1: 1996-05  
Overvoltage category II  
Degree of pollution: 2

### Electromagnetic compatibility

EN 61326-1/A1  
Radiation: table 4; Class B  
Immunity: table A1

EN 61000-3-2/A14  
Harmonic current emissions: Class D

EN 61000-3-3  
Voltage fluctuations and flicker

Date: 22.07.2004

Signature

**Manuel Roth**  
Manager

## General information regarding the CE marking

HAMEG instruments fulfill the regulations of the EMC directive. The conformity test made by HAMEG is based on the actual generic and product standards. In cases where different limit values are applicable, HAMEG applies the strictest standard. For emission the limits for residential, commercial and light industry are applied. Regarding the immunity (susceptibility) the limits for industrial environment have been used.

The measuring and data lines of the instrument have much influence on emission and immunity and therefore on meeting the acceptance limits. For different applications the lines and/or cables used may be different. For measurement operation the following hints and conditions regarding emission and immunity should be observed:

### 1. Data cables

For the connection between instruments resp. their interfaces and external devices, (computer, printer etc.) sufficiently screened cables must be used.

Maximum cable length of data lines must not exceed 3 m. The manual may specify shorter lengths. If several interface connectors are provided only one of them may be used at any time.

Basically interconnections must have a double screening. For IEEE-bus purposes the double screened cable HZ72 from HAMEG is suitable.

### 2. Signal cables

Basically test leads for signal interconnection between test point and instrument should be as short as possible. Without instruction in the manual for a shorter length, signal lines must be less than 3 meters long.

Signal lines must be screened (coaxial cable - RG58/U). A proper ground connection is required. In combination with signal generators double screened cables (RG223/U, RG214/U) must be used.

### 3. Influence on measuring instruments.

In the presence of strong high frequency electric or magnetic fields, even with careful setup of the measuring equipment an influence can not be excluded.

This will not cause damage or put the instrument out of operation. Small deviations of the measuring value (reading) exceeding the instrument's specifications may result from such conditions in some cases.

HAMEG Instruments GmbH

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### English

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## Mainframe HM8001-2



### Modular system



HM8001-2 mainframes can be stacked up to 5 units high



Option H0801 – BNC connectors on rear panel



**Basic unit for modules from the Modular System Series 8000**

**Power supply for two modules**

**DC voltages electronically regulated, floating and short-circuit proof**

**Power transformer with thermal fuse**

**Up to 5 mainframes can be stacked**

**Module HM800 for customized instrument construction available**

**4 BNC connectors on the rear panel of the HM8001-2 (Option H0801) provide for signal transmission to or from HM8018, HM8021-4 and HM8030-6 modules**

## SPECIFICATIONS

Valid at 23 degrees C after a 30 minute warm-up

### General

Mainframe with power supply accomodates any 2 modules. 4 BNC connectors on rear panel for external interconnection to each module compartment (Option HO801)

### Module Supply Voltages

2 x 8 V <sub>Ac</sub>	max. 0.5A each
2 x 5 V <sub>Dc</sub>	max. 1A each
4 x 20 V <sub>Dc</sub>	max. 0.5A each
<b>Voltages:</b>	between 5 V and 20 V are programmable from each module
<b>Polarity:</b>	optional
<b>Power consumption per module:</b>	max. 25Watt

All DC voltages are electronically stabilized, floating and short circuit proof.

<b>AC test voltage to chassis:</b>	500V
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### Miscellaneous

Power switch on front panel between the two modules.

<b>Line voltage:</b>	115/230 V at 50 - 60 Hz
<b>Power consumption:</b>	max. 110 Watt
<b>Protective system:</b>	Safety class I (EN61010-1)
<b>Size (W x H x D):</b>	285 x 75 x 365 mm
<b>Weight:</b>	approx. 4 kg
<b>Color:</b>	techno-brown

### Included in delivery:

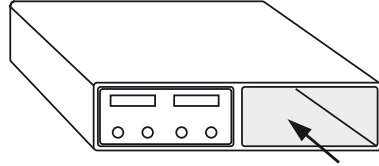
Mainframe HM8001-2, Operator's manual

### Optional Accessories:

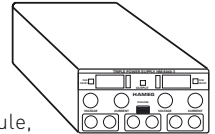
HO801 BNC connectors

## Important hints

The operator is requested to carefully read the following instructions and those of the mainframe HM8001-2, to avoid any operating errors and mi-



stakes and in order to become acquainted with the module.



After unpacking the module, check for any mechanical damage or loose parts inside. Should there be any transportation damage, inform the supplier immediately and do not put the module into operation. This plug-in module is primarily intended for use in conjunction with the Mainframe HM8001-2. When incorporating it into other systems, the module should only be operated with the specified supply voltages.

### Used Symbols



ATTENTION refer to manual.



DANGER High voltage.



Protective ground (earth) terminal.

### Installation

If the HM8001-2 is to be stacked with other mainframes or HAMEG Oscilloscopes, the exact positioning is only ensured by the footrests delivered with the instrument. These should be attached to the top of each instrument (except the uppermost one) using the double-sided adhesive tape provided. Insert the footrests into the appropriate ventilation holes on top of the lower instrument in such a way that they correspond exactly with the positioning of the feet on the instrument to be stacked above. Instruments stacked in a tilted position will now be prevented from slipping. Put

the undermost HM8001-2 Mainframe into tilt position by swinging forward the tilt stands (fixed on front feet). When stacking several instruments, ensure that ventilation is not impaired in any way. Instruments with the highest power consumption should preferably be stacked uppermost.

### Safety

This instrument has been designed and tested in accordance with IEC Publication 1010-1, Safety requirements for electrical equipment for measurement, control, and laboratory use. It corresponds as well to the the CENELEC regulations EN 61010-1. All case and chassis parts are connected to the safety earth conductor. Corresponding to Safety Class 1 regulations (three-conductor AC power cable). Without an isolating transformer, the instrument's power cable must be plugged into an approved three-contact electrical outlet, which meets International Electrotechnical Commission (IEC) safety standards.



#### Warning!

**Any interruption of the protective conductor inside or outside the instrument or disconnection of the protective earth terminal is likely to render the instrument dangerous. Intentional interruption is prohibited.**

The instrument must be disconnected and secured against unintentional operation if there is any suggestion that safe operation is not possible.

#### This may occur:

- if the instrument shows visible damage,
- if the instrument has loose parts,
- if the instrument does not function,
- after long storage under unfavourable circumstances (e.g. outdoors or in moist environments),
- after excessive transportation stress (e.g. in poor packaging).



**When removing or replacing the metal case, the instrument must be completely disconnected from the mains supply.**

If any measurement or calibration procedures are necessary on the opened-up instrument, these must only be carried out by qualified personnel acquainted with the danger involved.

### Operating conditions

The ambient temperature range during operation should be between +10°C and +40°C and should not exceed -40°C or +70°C during transport or storage. The operational position is optional, however, the ventilation holes on the HM8001-2 and on the plug-in modules must not be obstructed.

### Warranty and Repair

HAMEG instruments are subjected to a strict quality control. Prior to leaving the factory, each instrument is burnt-in for 10 hours. By intermittent operation during this period almost all defects are detected. Following the burn-in, each instrument is tested for function and quality, the specifications are checked in all operating modes; the test gear is calibrated to national standards.

The warranty standards applicable are those of the country in which the instrument was sold. Reclamations should be directed to the dealer.

#### Only valid in EU countries

In order to speed reclamations customers in EU countries may also contact HAMEG directly. Also, after the warranty expired, the HAMEG service will be at your disposal for any repairs.

#### Return material authorization (RMA):

Prior to returning an instrument to HAMEG ask for a RMA number either by internet (<http://www.hameg.com>) or fax. If you do not have an original shipping carton, you may obtain one by calling the HAMEG sales dept (+49-6182-800-300) or by sending an email to [vertrieb@hameg.com](mailto:vertrieb@hameg.com).

### Maintenance

The most important characteristics of the instruments should be periodically checked according to the instructions provided in the sections "Operational check and "Alignment procedure. To obtain the normal operating temperature, the mainframe with inserted module should be turned on at least 60 minutes before starting the test. The specified alignment procedure should be strictly observed. When removing the case detach mains/line cord and any other connected cables from case of the mainframe HM8001-2. Remove both screws on rear panel and, holding case firmly in place, pull

chassis forward out of case. When later replacing the case, care should be taken to ensure that it properly fits under the edges of the front and rear frames. After removal of the two screws at the rear of the module, both chassis covers can be lifted. When reclosing the module, care should be taken that the guides engage correctly with the front chassis.

### Cleaning the HM8001-2

The exterior of the mainframe should be regularly cleaned with a small brush. Stubborn stains on case, handle, plastic and aluminium parts should be wiped with a damp cloth (water +1% mild detergent). Remove grease with methylated spirit or a suitable spirit-based cleaning agent. Utmost care should be taken to ensure that no cleaning fluid drops inside the instrument.

### Operation of the module

Provided that all hints given in the operating instructions of the HM8001-2 Mainframe were followed especially for the selection of the correct mains voltage start of operation consists practically of inserting the module into the right or left opening of the mainframe. The following precautions should be observed: Before exchanging the module, the mainframe must be switched off. A small circle (o) is now revealed on the red power button in the front centre of the mainframe. If the BNC sockets at the rear panel of the HM8001-2 unit were in use before, the BNC cables should be disconnected from the basic unit for safety reasons. Slide in the new module until the end position is reached.

Before being locked in place, the cabinet of the instrument is not connected to the protective earth terminal (banana plug above the mainframe multipoint connector). In this case, no test signal must be applied to the input terminals of the module.

Generally, the HM8001-2 set must be turned on and in full operating condition, before applying any test signal. If a failure of the measuring equipment is detected, no further measurements should be performed. Before switching off the unit or exchanging a module, the instrument must be disconnected from the test circuit.

### Module Power Supply

All supply voltages required for module operation are generated by the built-in power supply unit of the HM8001-2. As already mentioned, both module compartments are electrically separate from each other. The multipoint connectors in the module compartments are numbered from 1 to 22. Further markings indicate the type of voltage and potential across the terminals. In some cases, several different types of voltages or even different values can be drawn from one voltage source, as can be seen from the diagram (see next page) and from the circuit diagram. The AC voltages of the secondary windings are applied to the terminals marked  $V_{AC}$ . Rectification and/or voltage regulation therefore can be carried out in the modules if desired.

In case the HM8001-2 is equipped with the option HO801, no. 1 and 2 contacts are directly connected to the rear panel BNC terminals, through which signals are fed or supplied in some modules. They can also be connected to control points in the modules.



**Caution! A potential higher than 42V must not be applied under any circumstances.**

## Operating the HM8001-2

### General Information

Apart from the plug-in modules of the HM8000 Modular System, self-designed modules can also be operated using the blank HM800. However, the maximum power and voltage levels must not be exceeded.



**Attention!**  
When operating self-designed modules, the power consumption per module must not exceed 25 Watts.

Each module compartment of the mainframe HM8001-2 contains a 22 pole multipoint connector, by means of which the inserted module is connected to the corresponding operating voltages. Apart from the fixed 5V<sub>DC</sub> all other DC voltages can be programmed from the module using resistors and wire connectors.

The operating voltages of the modules are independent from each other and adjacent modules do not influence each others functions. Therefore, no modifications are necessary to the mainframe for the supply voltage of each individual module. Refer to the programming instructions for further details.

### Maximum Power supplied

The maximum total power output of each mainframe is 36 Watts. Loads which draw excessive power will activate the transformer's safety shut-down protection until removed. The 8000 series modules use less than 11 Watts of power each under

normal circumstances, with the exception of the Power Supply HM8040-3, which requires 25Watts and should not be used in conjunction with another HM8040-3 module under full load.

### Programming

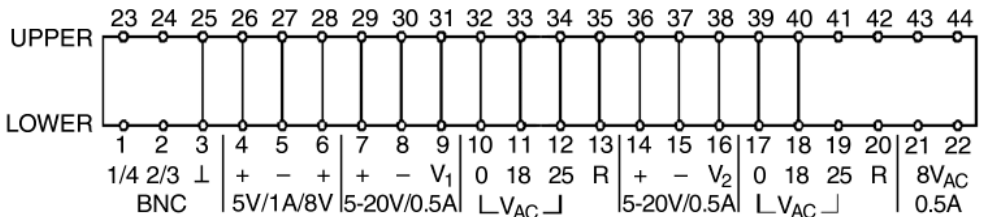
Except for the fixed +5V, all other regulated DC voltages available in the mainframe HM8001-2 can be programmed on the modules PCB connector by means of a resistor and wire connector. These are already incorporated into all complete modules. The reference voltages, precisely calibrated during manufacture, ensure a high recurrence accuracy of the output DC voltages if a low tolerance re-sistor is used for programming. Without the resistor each output (contacts 8 - 7 or 15 - 14) supplies +5.2V<sub>DC</sub>, provided that a wire connector has been mounted on the modules PCB connector (contacts 13 - 11 or 20 - 18).

Higher voltages can be programmed according to the following table:

V <sub>0</sub> across 8 + 7 (or 15 + 14)	Wire connector across	Resistor R <sub>s</sub> across 8 + 9 (or 15 + 16)
5.2 V		no resistor
10 V	13 + 11	3.92 kΩ
12 V	20 + 18	2.80 kΩ
15 V		1.91 kΩ
18 V	13 + 12	1.5 kΩ
20 V	20 + 19	1.3 kΩ

The R<sub>s</sub> resistor can be calculated using the following equation:

$$R_s = \frac{18.8}{V_0 - 5.2} \quad (R_s \text{ in } k\Omega / V_0 \text{ in } V)$$



## Mains/Line Voltage Change

On delivery, the instrument is set to AC 230V mains/line voltage. The instrument has an appliance inlet at the rear. This device contains the power fuse, which is interchangeable for the different mains/line voltages. The fuse holder can be pulled out by means of a small screwdriver [after disconnection of the power cord from the appliance inlet]. Change the power voltage by switching over the voltage selector switch. The fuse holder should then be plugged in again in the desired position.

The power fuse has to match to the set of the mains/line voltage and must be changed if necessary. Make sure that only fuses with the required rated current and of the specified type are used for replacement.



**It is forbidden to repair defective fuses or to bridge them by no means. Any damage caused this way will void the warranty.**

### Required power fuse-link:

5x20mm, slow-blow, 250V~, C, to IEC 127/III;  
DIN 41662.

Mains/line voltage	Rated current
115 V~ ±10%:	T 2 A
230 V~ ±10%:	T 1 A

## Calibration and Test Instructions

Remove case to calibrate and test the instrument. All voltages for operating the modules are supplied from the multipoint connector contacts in

the individual module compartments. The easiest way of testing is by measuring them on inserted high power consumption modules (e.g. HM8030 or HM8035). However, high power consumption can also be simulated using resistors with the following values:

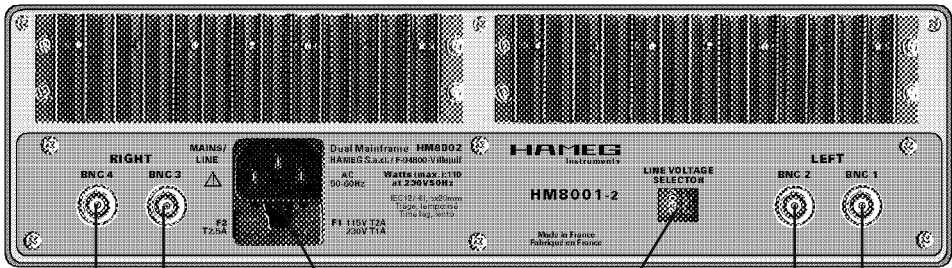
- for 2 x 5 V<sub>DC</sub> = 2 x 5 Ω, 5 Watts
- for 4 x 20 V<sub>DC</sub> = 4 x 40 Ω, 10 Watts

To avoid damaging of the multipoint connector contacts, the resistors should be linked to a corresponding 22 pole connector, onto which the required 1.3kΩ resistors and the four appropriate wire connectors can be soldered for programming the 4 x 20V potential. The diagram (page 18) shows the values assigned to the multipoint connector contacts.

The accuracy of the DC voltages is partly dependent on the reference voltage setting and the tolerance of the resistors used for programming. With the 1% accuracy set during manufacture and when using 1% resistors, the max. error is not more than 2%. Variations of the mains/line voltage of ±10% should not affect the supply voltages by more than 0.5%. The highest tolerable hum and noise level is max. 3mV<sub>pp</sub>. Only voltmeters with at least 0.1% accuracy should be used for all measurements. These should be connected directly to the multipoint connector contacts, as otherwise voltage drops could influence the test results.

If the specified tolerances are not met, the cause must be located and recalibration of the reference voltages may possibly be necessary.

## Rear panel



Signal In-/Outputs for the right module compartment (Option HO801)

Mains/Line Voltage Input and fuse

Mains/Line Voltage selector

Signal In-/Outputs for the left module compartment (Option HO801)