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# User manual

## GNM 100 control module - 220V for manual guns

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# GNM 100 control module - 220V

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## 1. Introduction



**WARNING :** Safety warning: the GNM 100 must never be installed in an explosive atmosphere. This means it must be installed outside the coating booth at a minimum distance of 1.5 meters (5 feet) from the nearest opening.

This control module is for the power units hereafter called the "high voltage units" which are fitted inside the guns. This module is only for use with guns made by SAMES.

- The GNM module has a conductive extruded aluminium (black anodize) box, the tightness of which conforms to protection index IP 64. Two part numbers are available:
  - 858075 for all countries except the United Kingdom.
  - 1516137 for the United Kingdom.



**WARNING :** For a use in cabinet, the room temperature must be below 45°C.

We strongly advise you not to place the GNM close to any source of heat, which would increase its inner temperature and engender a working defect.

However, if the GNM has to be located in such conditions, provide for an air conditioning device.

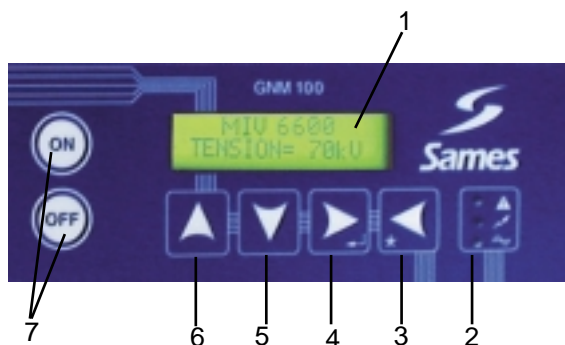
The maximum temperature is 45°C for a use with a 90 KV/ 100µA high voltage unit (HVU). This maximum temperature depends on the supplied power, therefore on the type of HVU/sprayer which controls the GNM.

Storage temperature: 0°C to 70°C.

## 2. Description

### 2.1. Presentation

The GNM 100 has a microcontroller which displays the functions on a two-line screen.



1	Display
2	Signal lights (3 leds).
3	Last screen / special function (*).
4	Next screen or validation of a value.
5	To decrease parameter values and select preselected settings.
6	To increase parameter values and select preselected settings.
7	ON / OFF switch.

(\*) : the other functions are described further on in this manual.

Signal lights:

- green = GNM 100 powered.
- orange= trigger (high voltage activated).
- red = fault.

## 2.2. Specifications

Working temperature: 0 to 40° C (32 to 104°F)

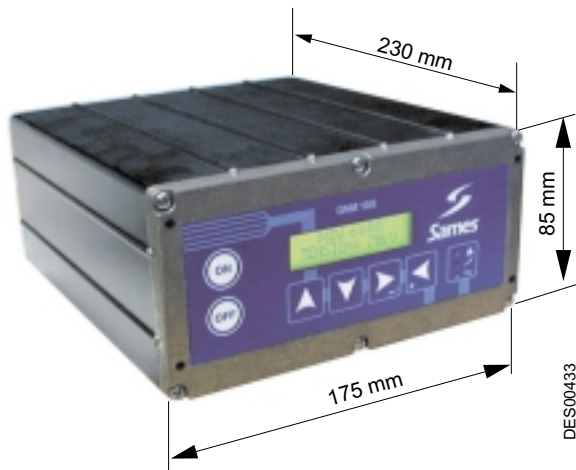
### 2.2.1. Electrical input data

Input voltage	220 VAC + / - 20 V
Frequency	50 / 60 Hz
Maximum input power	50 VA

### 2.2.2. Electrical output data

Maximum voltage output	60 V RMS
Frequency output	16-60 kHz
Maximum output current	1,1 A RMS

### 2.2.3. Size



	<b>GNM 100</b>
Protection index:	IP 64
Mass with cable	3 kg - 6.6 lbm

### 3. Low voltage connections

#### 3.1. Supply

The **GNM** can be supplied with 220 V or 110 V voltage, 50-60 Hz. Selection takes place by means of a switch located on the main printed circuit.

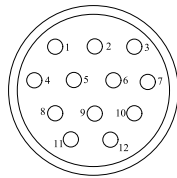
#### 3.2. Low voltage connectors



**WARNING** : [see RT Nr 6169](#) for use with a high voltage unit UHT 153.

#### 3.3. Connecting plug (12 pins A)

Connection to the high voltage unit.

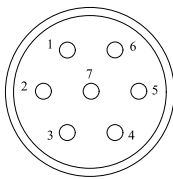


DES00595

N° of pins	Signal
1	earth
2	input + photo coupler
3	+ 15 V
4	earth
5	input + photo coupler
6	high voltage unit recognition
7	high voltage unit recognition (earth)
8	shielding
9	high voltage unit transformer
10	high voltage unit transformer
11	return I HV
12	return U HV

#### 3.4. Connecting plug (7 pins C)

Connection to the controls of the atomizer (e.g. electro valve). It is possible to use the 4, 5 and 6-pins (trigger copy for the PLC).

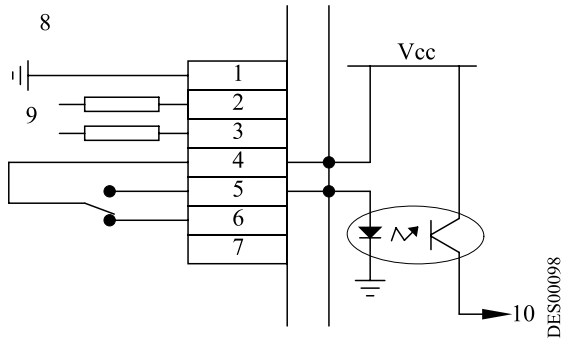


N° of pins	Signal
1	earth
2	phase 1, output protected
3	phase 2, output protected
4	common to trigger image relay
5	trigger image relay contact normally closed
6	trigger image relay contact normally open
7	not connected



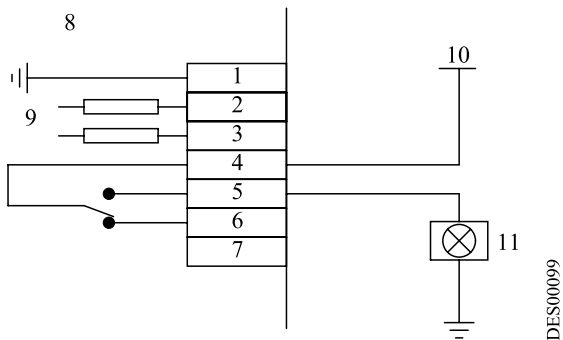
**WARNING** : This relay is for passing low currents. If a high current is used this contact can no longer be used for low currents.

Example of a PLC cabling:



1 to 7	<b>GNM case</b>
8	Inside <b>GNM</b>
9	Main supply output protected by fuses
10	PLC input

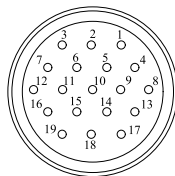
Cabling for "HV ON" signalling light,



1 to 7	<b>GNM case</b>
8	Inside <b>GNM</b>
9	Main supply output protected by fuses
10	220 VAC oR 110 VAC
11	Light on

### 3.5. Connecting plug (19 pins B)

Connection to an PLC:



N° of pins	Signal
1	Earth
2	Not connected
3	Not connected
4	Input 4 / 20 mA
5	Earth 4 / 20 mA or 0 / 10 V
6	Input 0 / 10 V
7	Image output <b>Vm</b> (100 kV = ~ 5 V)
8	Earth
9	Image output <b>Im</b> (500 µA = ~ 5 V)
10	Input + photo coupler
11	+ 15 V / 50 mA max. protected
12	Earth
13	Input + photo coupler
14	Relay OK board contact normally closed
15	Relay OK board contact normally open
16	OK board common relay
17	Not connected
18	Not connected
19	Not connected

The mass is joined to the earth through the board.

### 3.5.1. Analog input

Cabling on external adjustment points can be 4/20 mA or 0-10 V.

#### 3.5.1.1. 4/20 mA adjustment point

This scale setting has to be done in a PLC. To do this, apply an adjustment point of 8 mA and another adjustment point of 16 mA and read the HV value on the **GNM** screen. A simple calculation permits one to fine the corresponding point.

#### 3.5.1.2. 0/10 V adjustment point

Scale setting is done inside the **GNM**.

10 V corresponds to 100 **kV**. For a high voltage unit on which the maximum voltage is below 100 **kV**, the adjustment point is automatically revealed at its maximum value.

### 3.5.2. Control of **Vm** and Im outputs

Copies of **Vm** and Im are only given as indications. They are not calibrated inside the **GNM** and differences can exist.

#### 3.5.2.1. Control of the **Vm** output

The **Vm** scale is 0-5 V for 0-100 **kV**. The minimum impedance of the measure equipment has to be 50 **kΩ**.

#### 3.5.2.2. Control of the Im output

The Im scale is 0-5 V for 0-500  $\mu$ A.

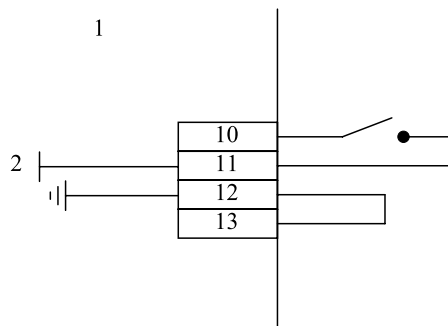
The minimum impedance of the measure equipment has to be 50 **kΩ**.

### 3.5.3. Wiring of external trigger

Control of the external trigger can be done in two ways:

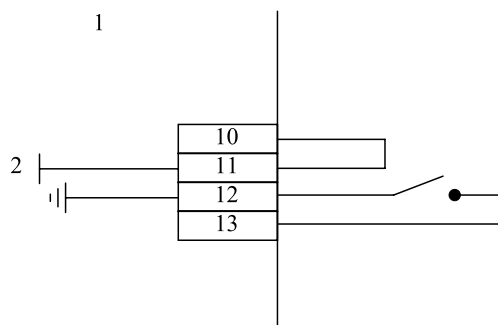
- Dry contact,
- Using external voltage between 12 and 24 Vdc ([see § 3.5.3.2 page 9](#)).

#### 3.5.3.1. Dry contact. There are two possibilities:



DES00101

or :



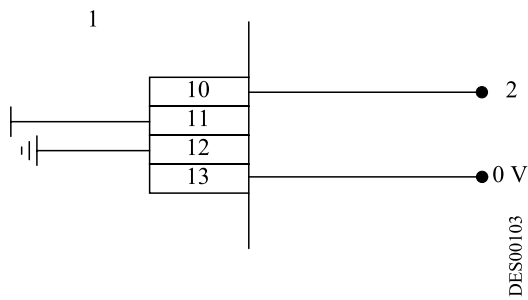
DES00102

1	Inside <b>GNM</b>
2	+ 15 Vdc; 50 mA max
10 to 13	<b>GNM</b> case



### 3.5.3.2. Using external voltage

The external voltage is between 12 and 24 Vdc.  
Input impedance roughly 1 k $\Omega$ .



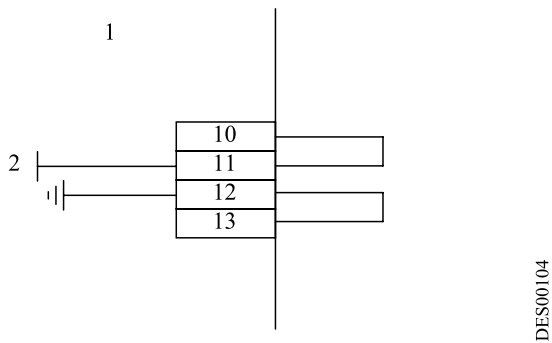
0 V	Supply return 12 to 24 V
1	Inside <b>GNM</b>
2	+ 12 to 24 V dc
10 to 13	<b>GNM</b> case



**WARNING :** Inputs 10 and 13 are opto-coupled inputs. They are therefore isolated from the earth. Make sure that the 0 V of the 12 to 24 V supply is at a potential close to the earth.

### 3.5.3.3. In the case where P8 = 1,

The trigger has to be connected as follows:



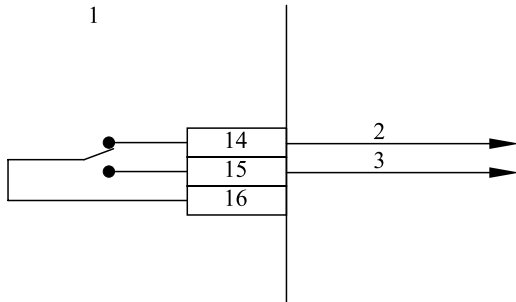
1	Inside <b>GNM</b>
2	+ 15 Vdc; 50 mA max
10 to 13	<b>GNM</b> case

### 3.5.4. Using information relative to the faults

The closed contact of the OK board relay signals that the board is under voltage and that there is no fault.

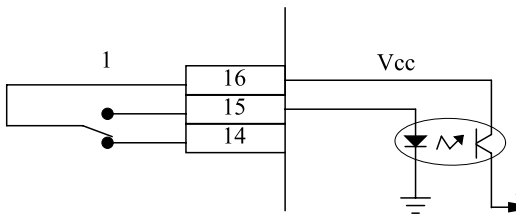


**WARNING :** This relay is for passing low currents. If a high current is used this contact can no longer be used for low currents.



DES00105

1	Inside <b>GNM</b>
2	OK board
3	No OK board
14 to 16	<b>GNM</b> case

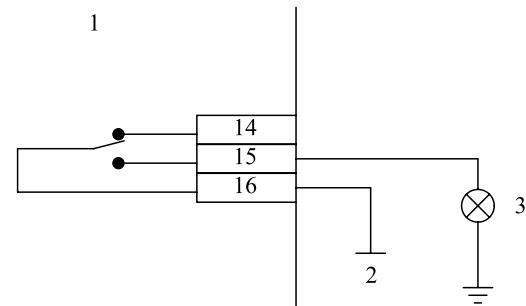


DES00106

Liaison wiring with an PLC:

1	Inside <b>GNM</b>
2	PLC input
14 to 16	<b>GNM</b> case

Wiring of a HV fault signalling lamp:



DES00107

1	Inside <b>GNM</b>
2	220 VAC oR 110 VAC
3	Fault
14 to 16	<b>GNM</b> case

## 4. Operating principle of the GNM 100

### 4.1. Supply voltage and connections

The voltage of the GNM 100 is preset at 220 V. Make sure that the earth terminal of the module (located at the back) is properly connected to the earth with cable with a gauge between 6 and 10 mm<sup>2</sup>. Connect the mains cord. Connect the gun plug to the GNM 100 (marked A on the back of the box).




**WARNING :** The messages indicated are given as guidelines and vary according to the type of gun used.

### 4.2. Automatic selection of the high voltage unit



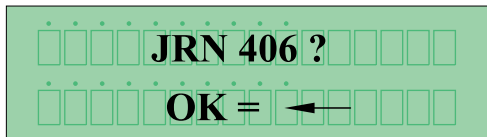
**WARNING :** Each time a new type of high voltage unit is validated, all the parameters take the works preset value and the old parameters are replaced by the new ones.

When connected to a different type of high voltage unit, the GNM message will request validation of this new high voltage unit which is done by pressing key 4 .

When connected to a high voltage unit, the GNM 100 automatically recognises it and displays its name on the screen. If it is the same as the one used the last time, the following screen will not appear.

If the display indicates a type of gun other than the one connected, do not validate. Switch off the GNM 100 and disconnect the gun. Connect the gun again and try to power the GNM 100 again.

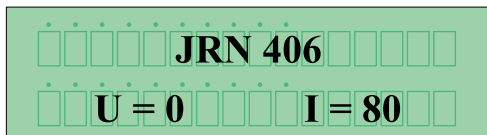
If the gun is still not recognised by the GNM 100, contact a SAMES distributor.



DES00434

After validation, the display indicates:

- U = 0 (high voltage set point)
- I = 80 (current limitation set point).

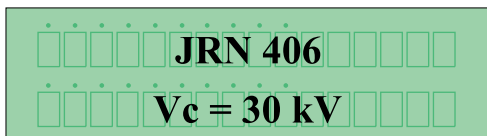


DES00435

Press key 4  (see § 2.1 page 4).

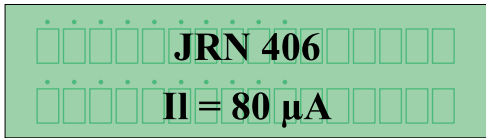
### 4.3. Modifying a set point

To change the high voltage set point, press key 2  or 3 . The display will, for example, indicate:



DES00436

Press V to scroll the menu.



DES00437

To change the current set point, press key 2 or 3 . The display will, for example, indicate:

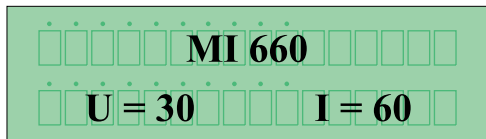
#### 4.4. Storing the set points

The GNM 100 can memorise 9 U and I value tables preset by the user as needed. These tables are referenced from J1 to J9.

To create a table:

- The gun trigger must be released.
- Adjust the high voltage (Vc) and the current limitation (II) set point values according to the procedure described in paragraph 3.3, then press key .

the display will, for example, indicate:



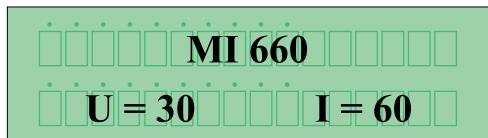
DES00438

•Choose a table (from J1 to J9) by pressing keys 2 or 3 (for example J2).

•Press key for three seconds. The U and I values are stored in the table J2.

#### 4.5. Using the values stored

When, for example, the display indicates:



DES00438

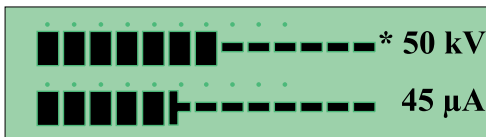
Choose a table (from J1 to J9) by pressing keys 2 or 3 .

The set point values of the high voltage and the current limitation used are memorised in the table chosen.

#### 4.6. Triggering the high voltage

The trigger has to be pulled for the gun to be powered.

The display takes the form of a bar graph, indicating the high voltage and current values, for example:



DES00086

Displayed at the end of each bar graph is the voltage value at the gun electrode (in kilovolts) and the current debited by the gun's high voltage electrode (in micro amps).

The position of the symbol (\*) at the end of the bar graph indicates whether the module works by a high voltage regulation or by a current limitation.

If no table is used when the trigger is pulled, the high voltage and current set point values can be modified by pressing keys 2 or 3 .

If a table from J1 to J9 is used when the trigger is pulled, the values cannot be changed.

When the trigger is released for more than 3 seconds, the last value read is displayed.

#### 4.7. Faults

Six "major" faults can be displayed on the GNM 100

Fault temperture	Excessive casing temperature
Fault UP	High voltage unit not recognised
Fault CC	Low voltage output short circuit
Fault Reg. Freq	Bad frequency regulation
Fault $\mu$ P	Micro calculator fault
Fault Supply	Bad internal supply regulation

The faults are displayed in code on the two display lines and the red signal light lights up.

The only way to reset the faults is to turn off the module for a minimum of 30 seconds and to put it on again by means of the push button (7).

The GNM 100 has a safety sector which removes the display messages when activated.

To reset, turn power off (7). Wait one minute and turn on again (7).

#### 4.8. Cleaning the GNM 100



**WARNING : turn off the GNM 100 control module before cleaning**

To clean paint from the front of the GNM 100, use a rag dipped (and not soaked) in ethyl alcohol or burning alcohol.

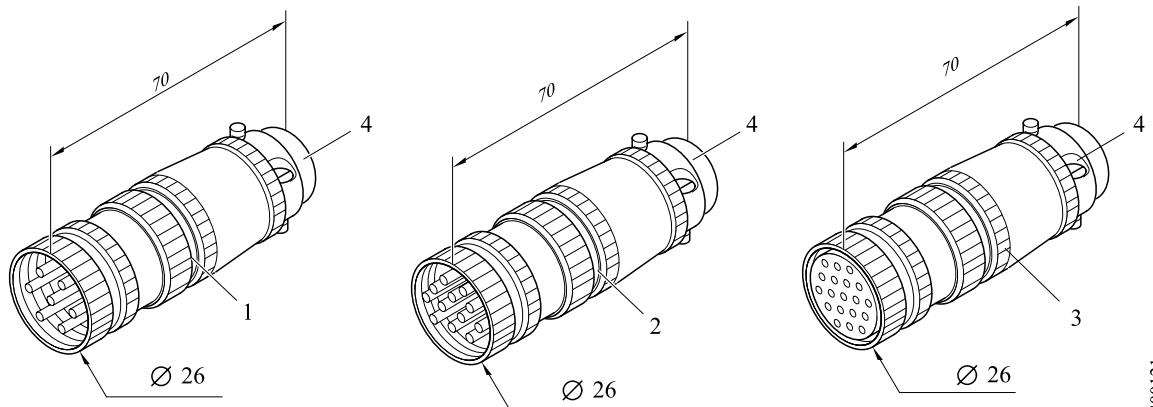
**Note: Do not use a solvent or a thinner.**

Dry immediately with a clean cloth.

#### 5. Spare parts

As this module is sealed, only «SAMES Technologies» is authorised to carry out repairs.

## 6. Plugs



DES00121

Ref.	Part number	Description	Qty	Sale unit
1	E4PTFS316	Male plug 7 contacts	1	1
2	E4PTFS343	Male plug 12 contacts	1	1
3	E4PTFS406	Female plug 19 contacts	1	1
4	E4PTFA323	Cable clamp	1	1