INSTRUCTION MANUAL

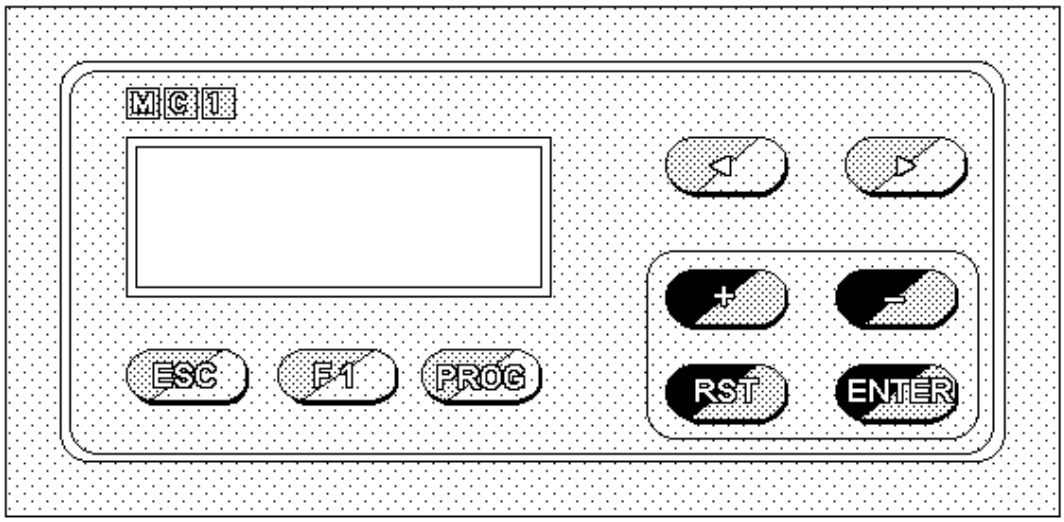
ELECTRONIC
CAMS
PROGRAMMER

MC1

16 CAMS

ELECTRONIC CAMS PROGRAMMER

MC1



TECHNICAL CHARACTERISTICS

- Panel installation or bar DIN connection.
- 4 lines display, 20 characters each lines.
- 5 different languages available for programming and displaying.
- Possibility of storing in EEPROM 8 Programs (Formats), 16 outputs each.
- Operation through absolute encoder on GRAY code.
- 99 ON / OFF sequences for each single output.
- Automatic linear advance independent on each cam.
- Encoder reset (zero machine reset) practicable from keyboard (**Calibration).**
- Programs selection from keyboard or PLC.
- Selection of clockwise or anticlockwise rotation through a parameter.
- **Help** function for control of encoder status and changing program input.

OPTIONS

- Serial line interface for programs loading/unloading through PC.
- Extension to 32 cams.
- Extension up to 8 different languages.

AVAILABLE FUNCTIONS

The following functions are available:

- Programs Execution.

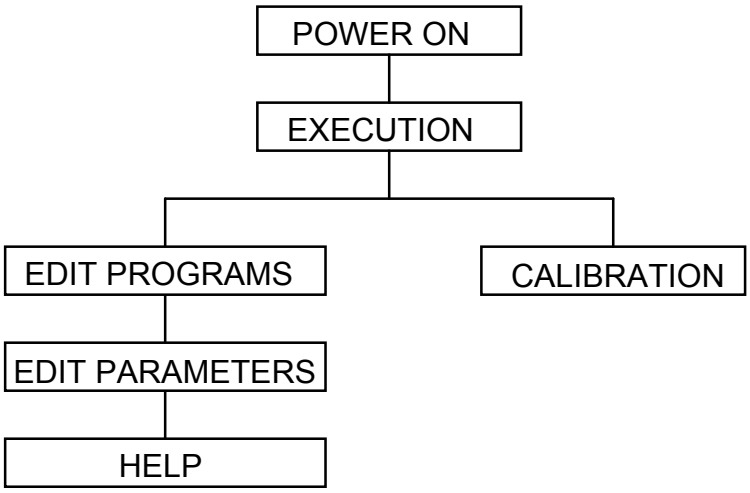
- Programs Edit.

- Parameters Edit.

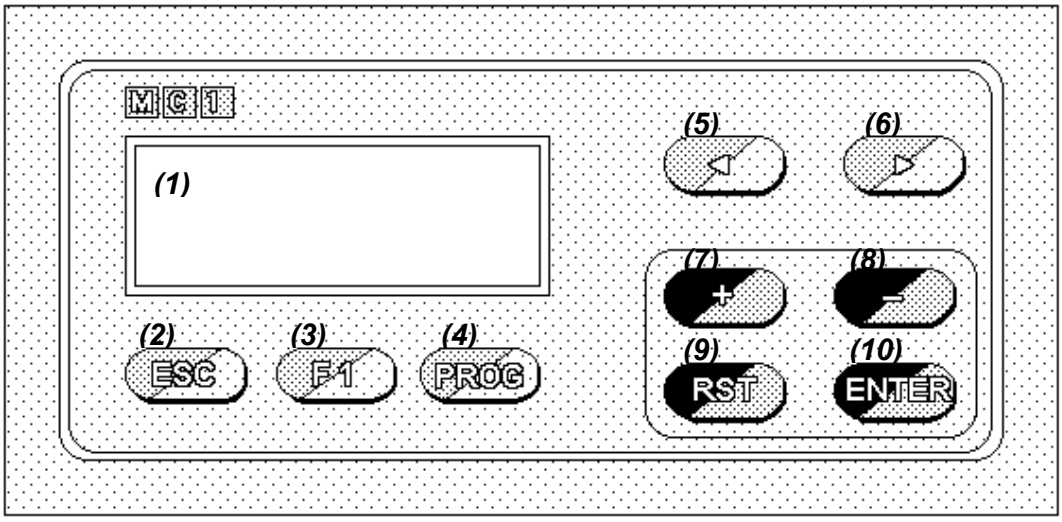
- Help.

- Calibration.

They can be represented by this flow chart:



FRONT PANEL DESCRIPTION



(1) **LCD data display** (4 lines, 20 characters each).
The display shows the chosen functions.
The blinking cursor indicates that the device is ready to receive a data.

(2) Key **ESC**: used to go out of chosen function.

(3) Key **F1**: used to have access to 'Calibration' and 'Parameters Edit' functions.

(4) Key **PROG**: used to have access to 'Programs Edit' function.

(5) Key **<**: for cursor displacement to the previous field during 'Programs Edit'.

(6) Key **>**: for cursor displacement to the next field during 'Programs Edit'.

(7) Key **+**: for value increment, step by step. Keeping it pressed over 3 seconds, the increment is continuos.

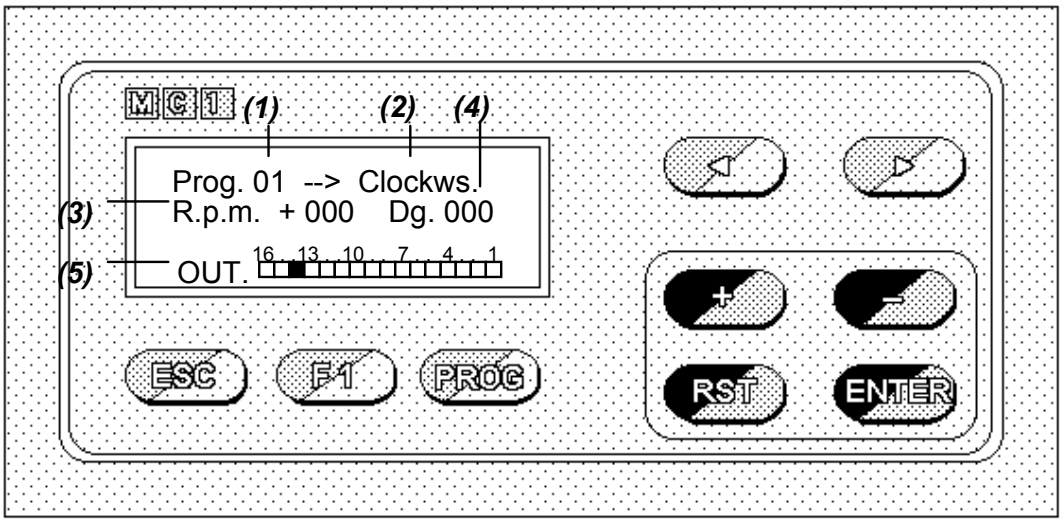
(8) Key **-**: for value decrement, step by step. Keeping it pressed over 3 seconds, the decrement is continuos.

(9) Key **RST**: used to delete data, to change the operative program and to have access to 'Help' function.

(10) Key **ENTER**: for data confirmation.

FUNCTIONS DESCRIPTION

When the device is ON, automatically one enter in the execution function and a page similar to the following one is displayed:



(1) Actual operative program.

(2) Rotation sense.

(3) Rotation speed on R.p.m.
The symbol **+** shows a movement according to programmed rotation sense; the symbol **-** shows a movement in the opposite rotation sense.

(4) Mechanical encoder position on degrees.

(5) Cams status (cam 01 on the right, cam 16 on the left):
■ = cam ON □ = cam OFF

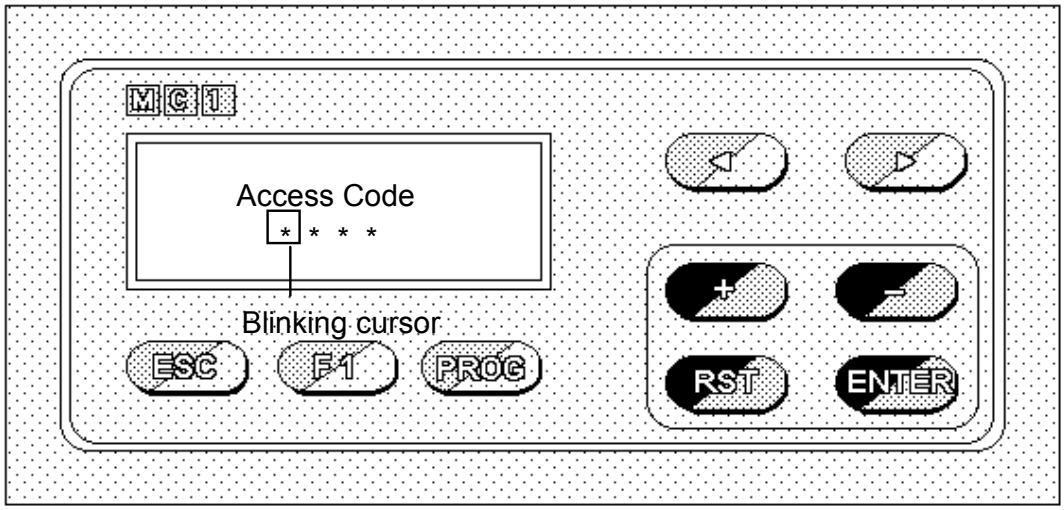
Through this page, it is possible to have access to the different available functions.

ATTENTION !!!

The access is inhibited when the encoder is operative.

PROGRAMS EDIT

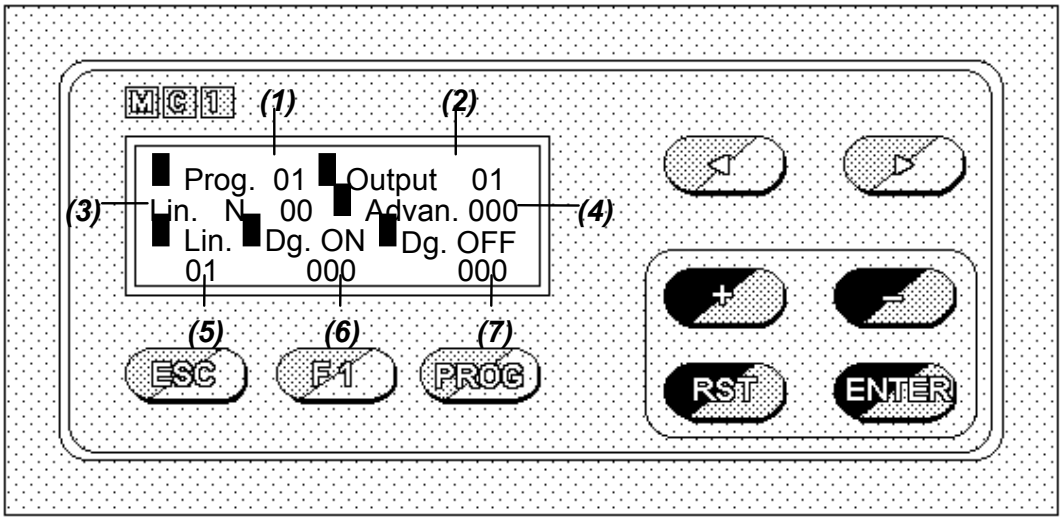
By pressing **PROG** over 3 seconds, it is possible to have access to the **Edit** function: this allows you a new program insertion or an existing program modification.
By pressing **ESC** in any position of the edit page, you go back to the execution procedure.



First of all, Access Code (Password composed of 4 key sequence) must be correctly introduced.

The correct sequence is: **PROG**, **+**, **-**, **ENTER**.

If the sequence hasn' t been correctly introduced an error message is shown, otherwise the edit page is displayed.
Initially the first line of the output 01 related to the last operative program is displayed.



In order to insert or modify a program, these steps have to be followed (during this procedure, the blinking cursor shows the data to be programmed):

(1) To program the ***Program number*** (01-08).
Press **>** to go to the next field.

(2) To program the ***Output number*** (01-16).
Press **>** to go to the next field.

(3) This field shows the number of ***ON/OFF sequences*** programmed for the chosen output. It is only a visualization field.

(4) To program the ***Advance*** for the programming output (000-180).
It allows you to compensate the operative delay of relays, electro-valves etc., advancing the controls in relation to the different machine speed, in real time.
Press **>** or **ENTER** to confirm and to store.

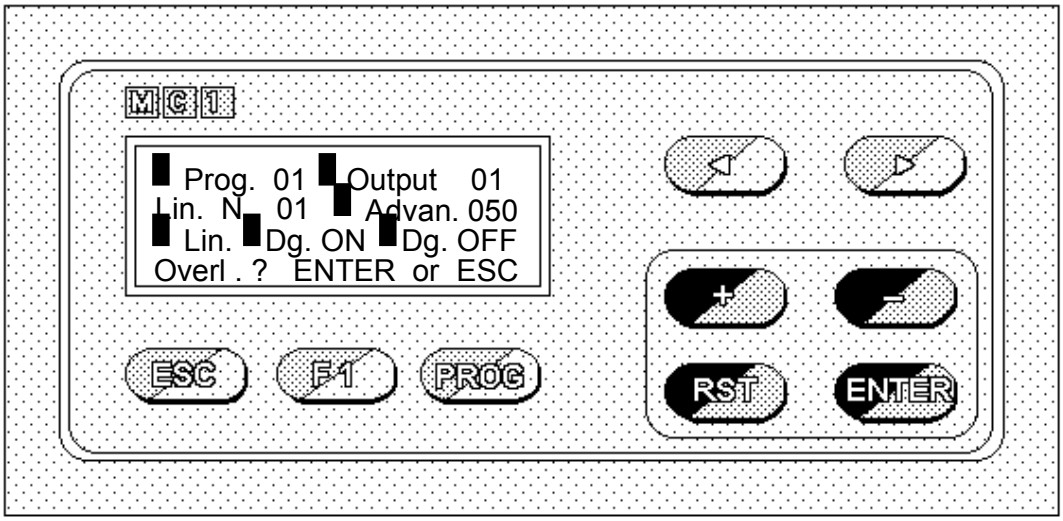
(5) To program the ***number*** related to the ***line*** to insert or modify.
N.B. Each cam may be programmed with maximum 99 ON/OFF sequences.
Press **>** to go to the next field.

(6) To program the ***Degree ON*** value (000-359).
Press **>** to go to the next field.

(7) To program the ***Degree OFF*** value (000-359).
The programmed ON/OFF sequence must be confirmed by pressing **ENTER.**
If it is a new sequence, automatically the total number of lines programmed on the output will be up-to-date (see point ***(3)***).

N.B.

- If a ON/OFF sequence overlaps another one already stored (for e.: new sequence 90-150; stored sequence 50-100), a request for confirm appears on the last line of the display:

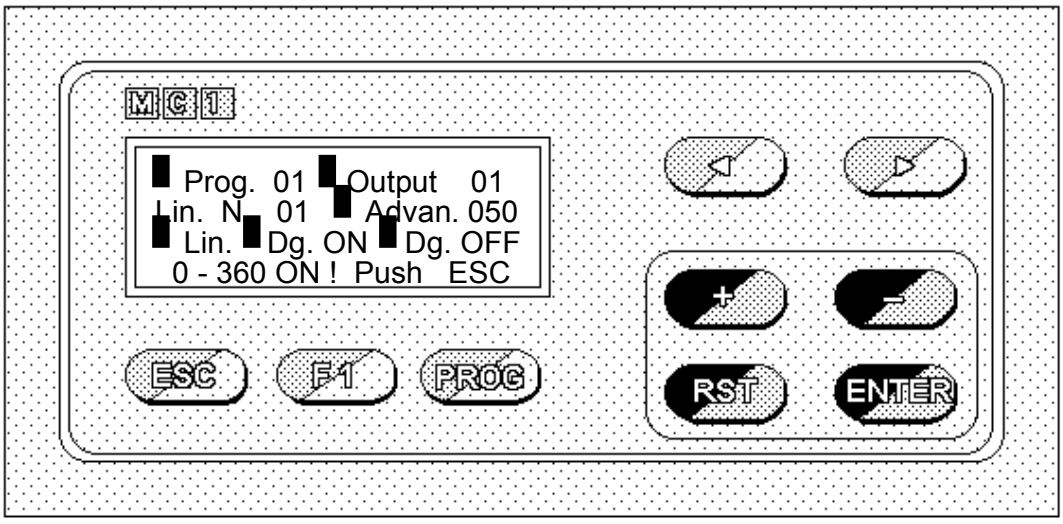


If you press **ENTER** the new sequence will be 50-150; if you do not want to confirm the new sequence, press **ESC.**

- If two ON/OFF sequences are programmed, where the OFF degrees of the first sequence are equal to the ON degrees of the second sequence, their result will be a new sequence limited by the ON degrees of the first sequence and the OFF degrees of the second one.

Example:
1st sequence - Degree ON 050 / Degree OFF 100
2nd sequence - Degree ON 100 / Degree OFF 140
New result will be a sequence Degree ON 050 / Degree OFF 140 .

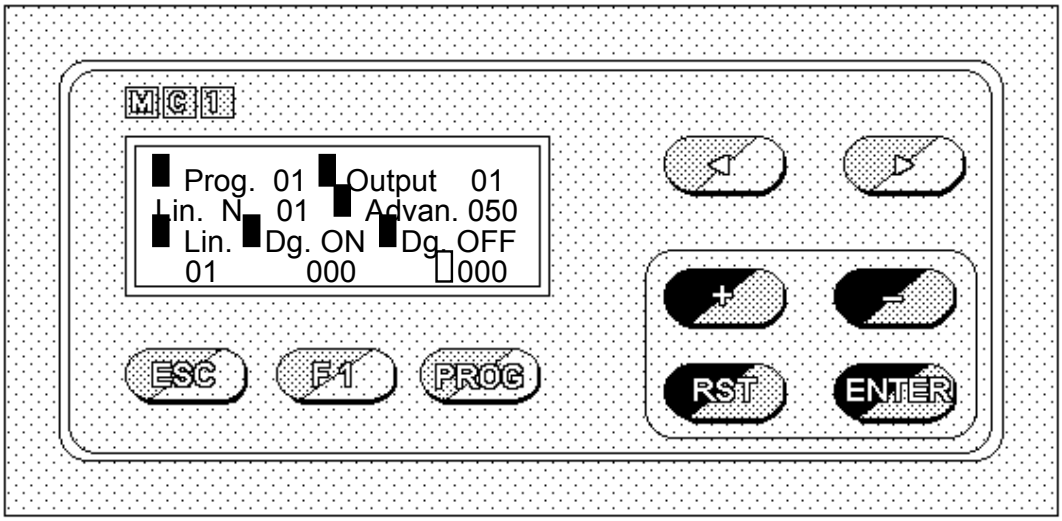
- If a new ON/OFF sequence is insert when the interval 0-360 degrees is completely programmed, the following message will appear on the last line of the display:



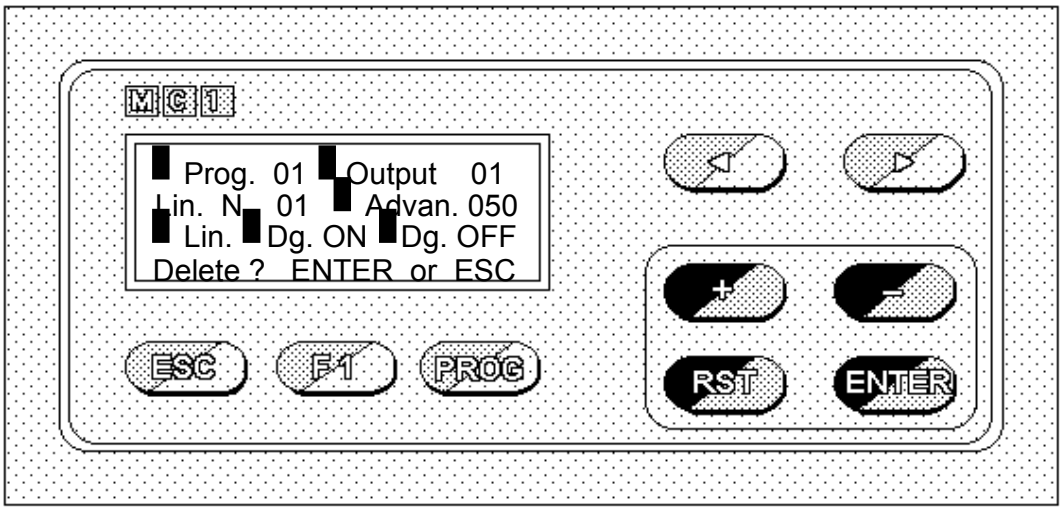
By pressing **ESC** the sequence will not be stored.

A - How to delete a ON/OFF sequence

To delete an already stored ON/OFF sequence, choose the number of the line to be modified and program the value 000 for Degree ON and also for Degree OFF.



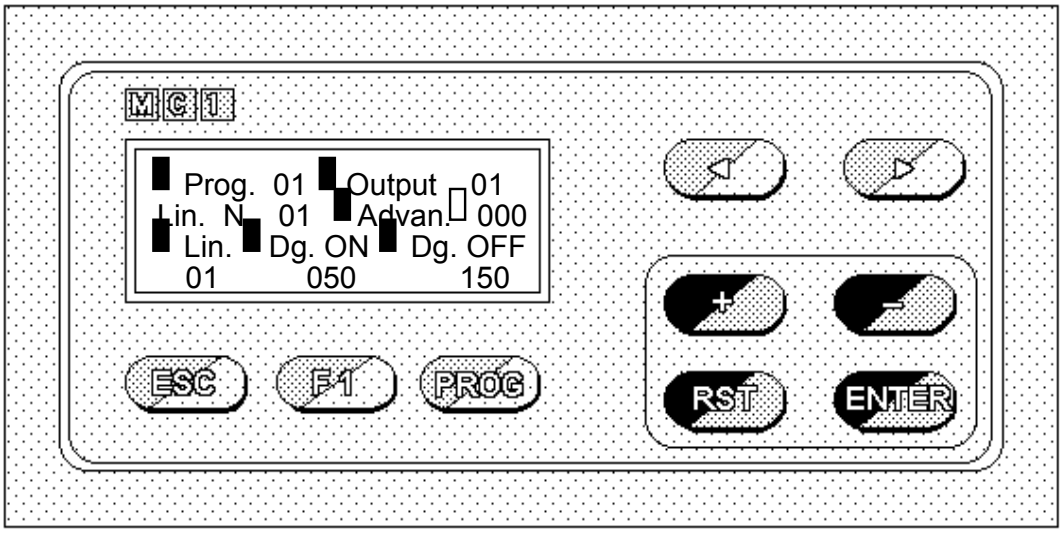
By pressing **ENTER**, on the last line of the display appears a request for confirm:



Press **ENTER** again to delete the sequence; otherwise press **ESC** to cancel the deleting procedure.

B - How to delete an Advance

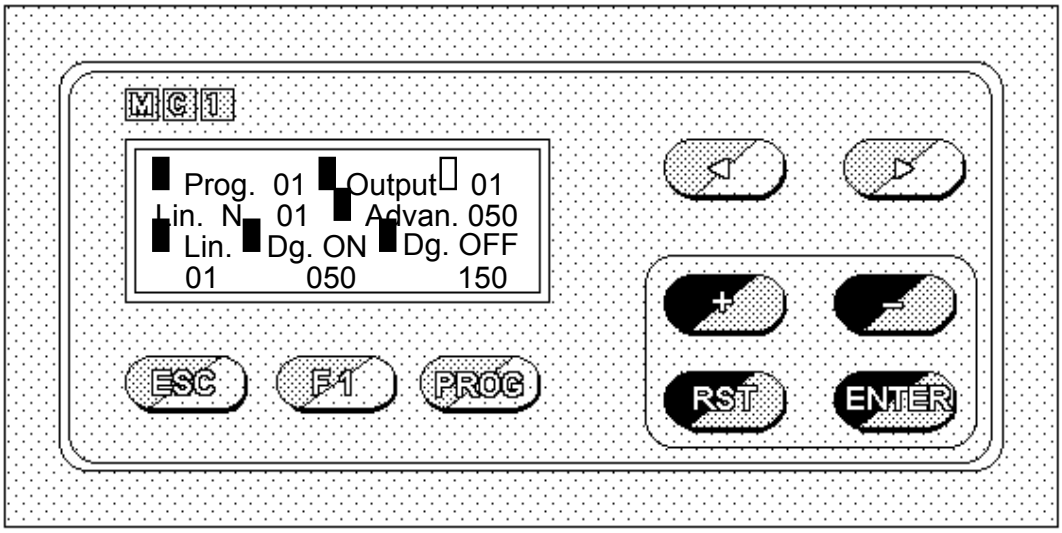
To delete an already stored Advance value, choose the program and the output desired, send the cursor to the 'Advan.' field and program the value 000.



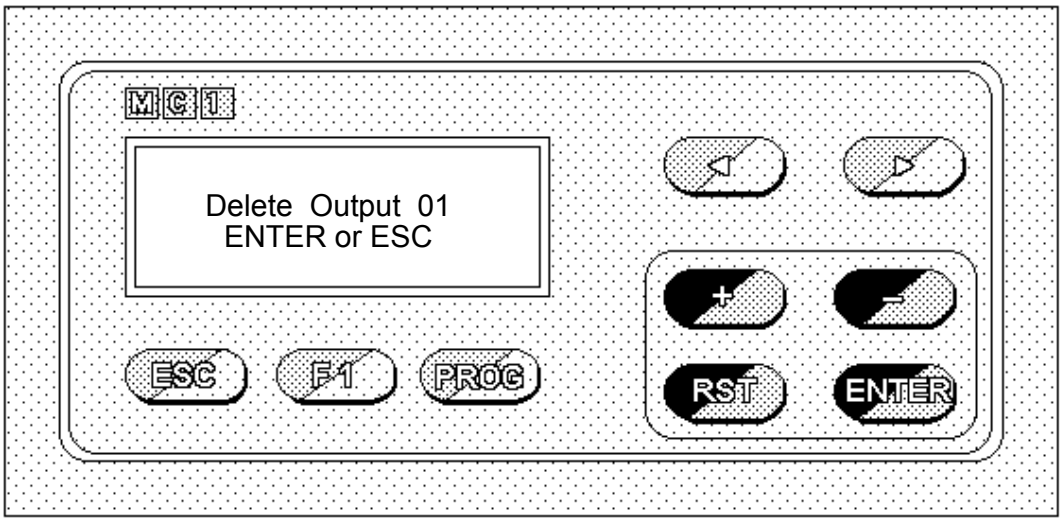
To store the new value press **ENTER**, or go to another field by pressing **<** and **>**.

C - How to delete an Output

To delete an Output (its advances and ON/OFF sequences), select the relevant Program and the number of the output you want to delete.



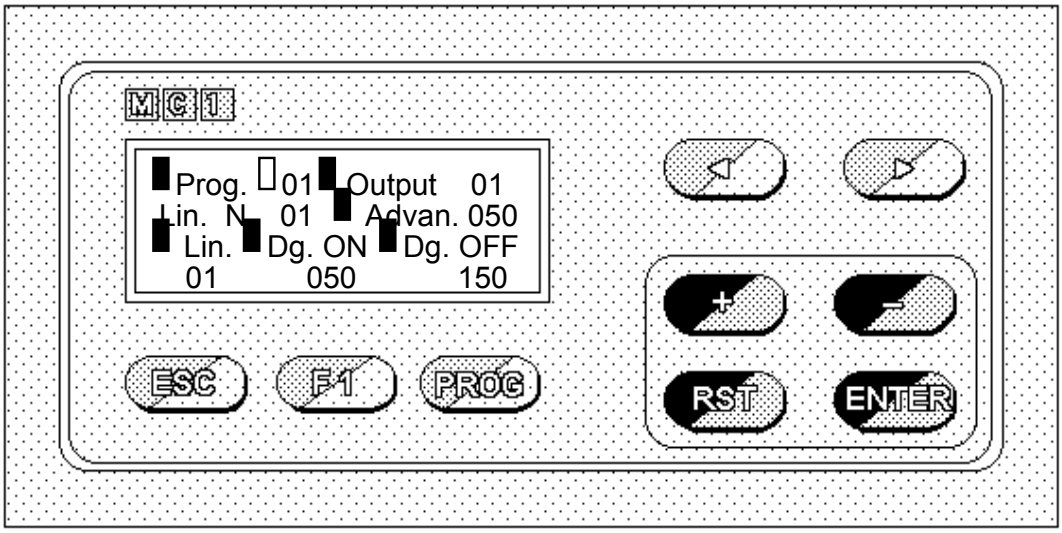
Send the cursor to the 'Output' field (blinking cursor will be near it).
By pressing **RST** for over 3 seconds, the display shows:



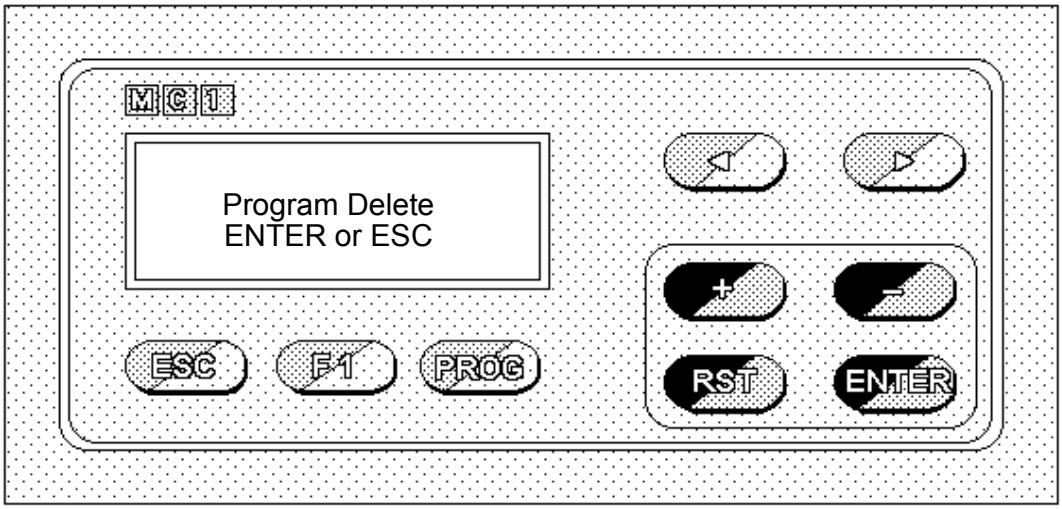
Press **ENTER** if you want to delete all data contained in the selected output or press **ESC** if you do not want to delete them.

D - How to delete a Program

To delete a Program (advance and ON/OFF sequences of all outputs), you must select the relevant number:



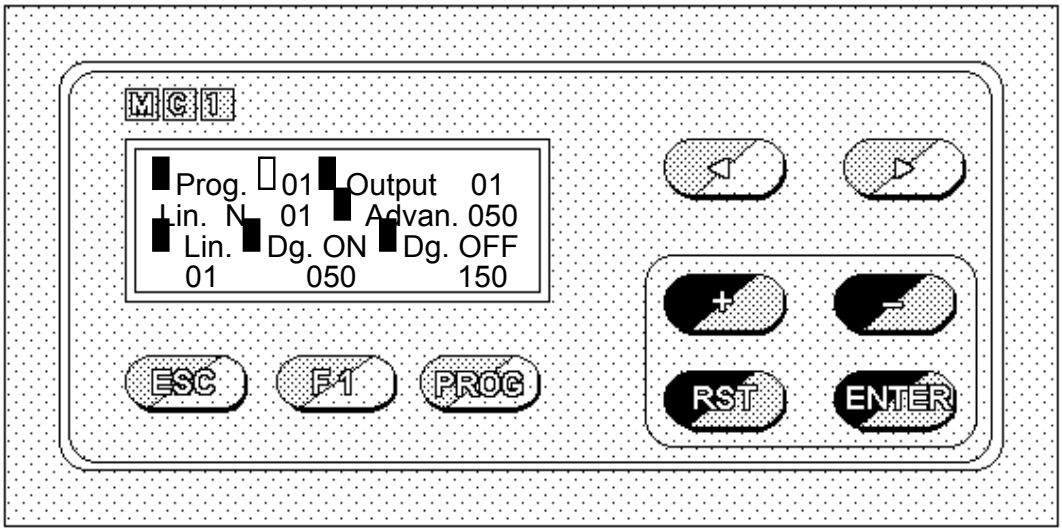
By pressing **RST** for over 3 seconds, the display shows:



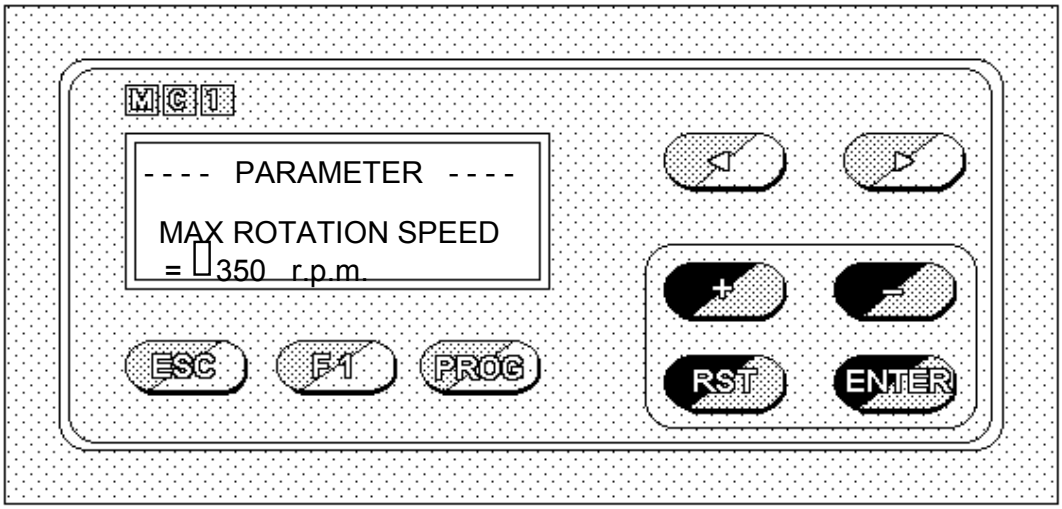
Press **ENTER** to proceed or **ESC** to cancel the deleting procedure.

PARAMETERS EDIT

As it' s already been shown on page 2, to have access to the **Parameters Edit** function it is necessary to enter in the edit page, as already said.



Send the blinking cursor to 'Prog.' field and press **F1** for over 3 seconds to enter in the **Parameters Edit** page.



By pressing **ESC** it is possible to go back to the Programs Edit page.

The following ones are the parameters that must be introduced:

max rotation speed **(r.p.m.)** :
maximum operating value = 700.
On the introduced speed, the advance value will be automatically calculated (in a brief, you introduce the machine maximum operative speed).

speed correction **(r.p.m.)** :
it is possible to modify this parameter from a value of -50 r.p.m. to +50 r.p.m.. The correction is operative in real time and it is proportional to the effective rotation speed.

rotation sense :
Clockwise or Anticlockwise.
To calibrate the encoder rotation sense with the machine rotation sense, both in accordance, you must choose the correct rotation sense.

version :
In the standard version, 5 languages are available: Italian, English, French, German and Spanish.

To edit each parameter set the desired value by pressing **+** and **-**, and confirm it by pressing **ENTER**.

PROGRAMS EXECUTION

The selection of the program to execute may be operative through:

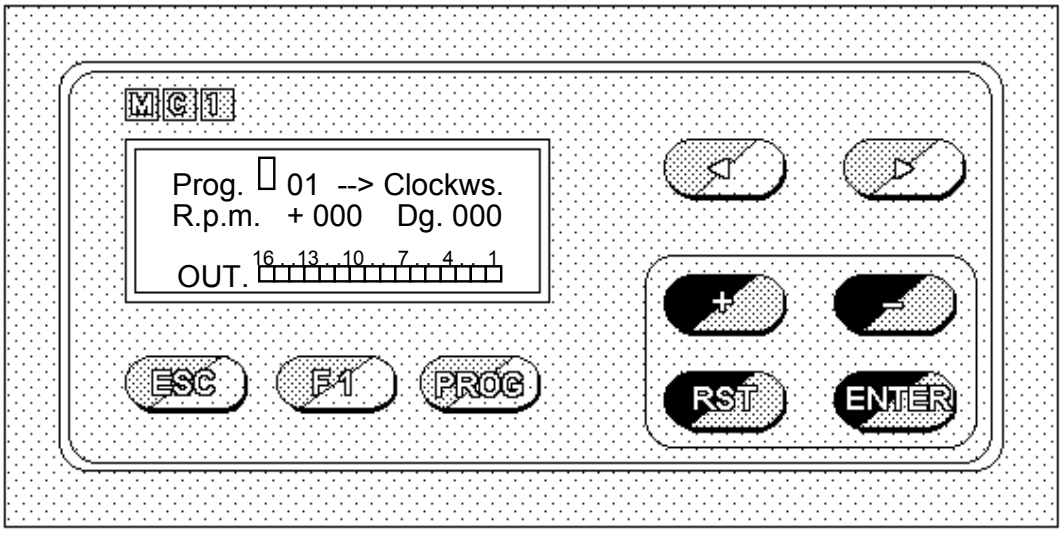
A - keyboard;

B - PLC.

A - Program selection through keyboard

The operation (the programming) through keyboard is operative if the inputs eventually coming from PLC are disconnected, or if they are connected but the selected program number is not included from 1 to 8.
To select the program to execute it is necessary to press **RST** for over 3 seconds.

After the introduction of the Access Code, the following page is displayed and the cursor blinks on 'Prog.' field (data to be introduced).



Through **+** and **-** select the operative program number, confirming it by pressing **ENTER**.
The program will be automatically executed.

B - Program selection through PLC

The PLC output configuration allows program selection:

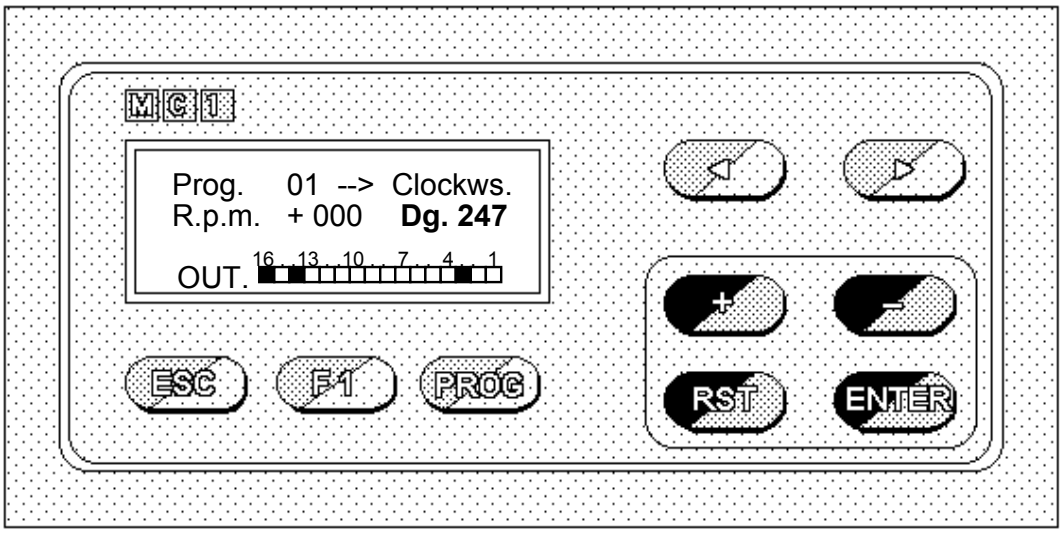
Example:

	Bit 8	Bit 4	Bit 2	Bit 1
Configuration for program 01 =	0	0	0	1
...				
...				
Configuration for program 08 =	1	0	0	0

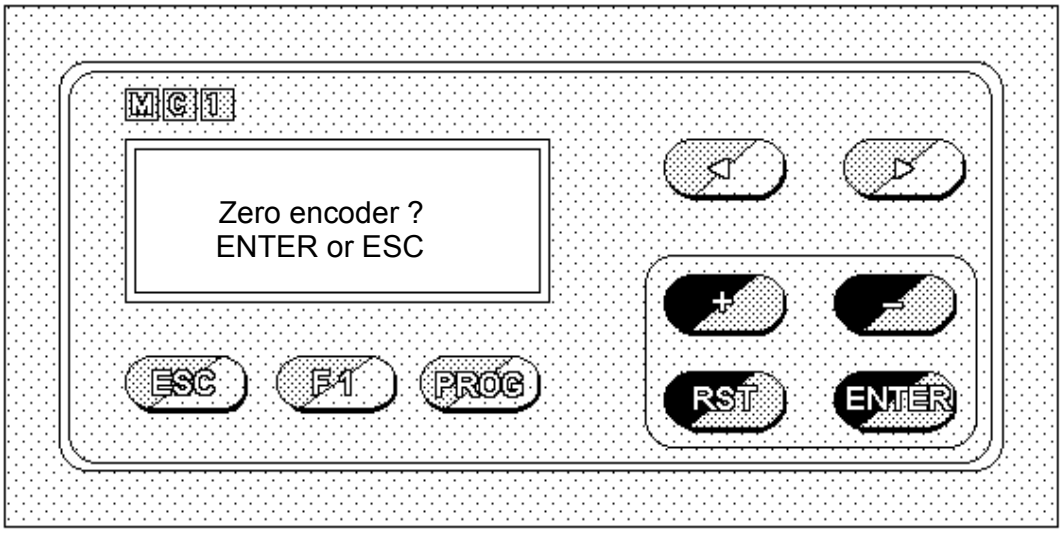
When this selection is active and the selected program number is included from 1 to 8, the selection from keyboard is not possible.

CALIBRATION

As it' s already been shown on page 2, it is possible to have access from the execution page to the **Calibration** (set the zero of the encoder).
This operation is possible if the encoder is motionless.



By pressing **F1** for over 3 seconds and by introducing the access code, the display shows:

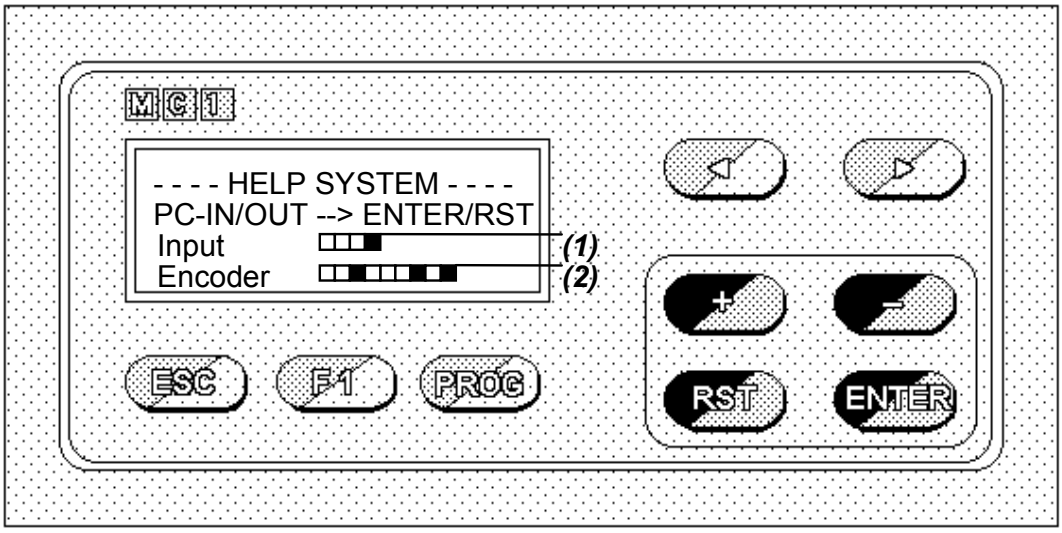


Press **ESC** to cancel the procedure or press **ENTER** to confirm the calibration: automatically the encoder position will be equal to 000.

HELP

From the parameters edit page, in particular from the page of the first parameter (Max rotation speed), it is possible to call **Help** function by pressing **RST**.

This function allows you to control the encoder status and the input coming from the PLC.

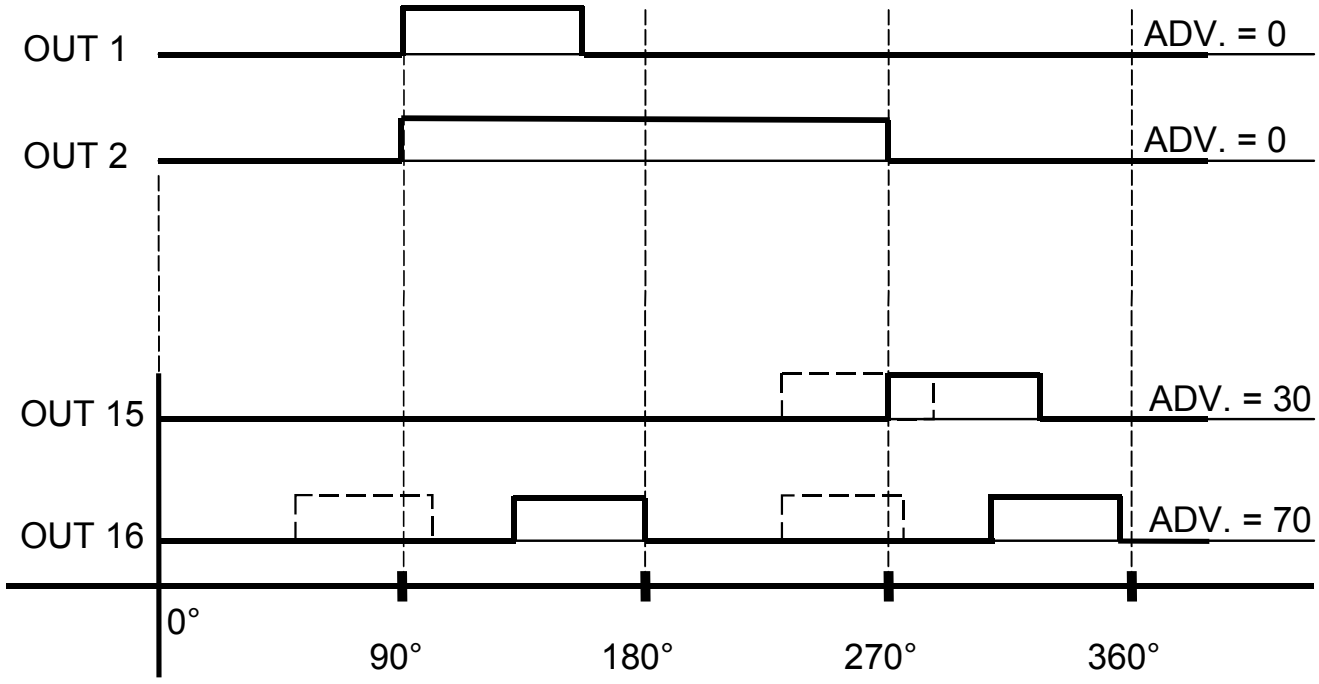


(1) It shows the status of the input for the change of the program in execution.
■ = input ON □ = input OFF

(2) It shows the encoder status, displays the logic level of the encoder bit and controls the exact performance of the **GRAY** code.
If an error occur, the displayed message will be 'ERROR' in substitution of 'Encoder'.
If this event happens, the problem can concern the encoder, the cable or the input circuit.

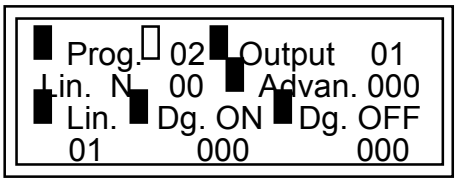
EXAMPLE OF PROGRAM EDIT

PROGRAM N. 02

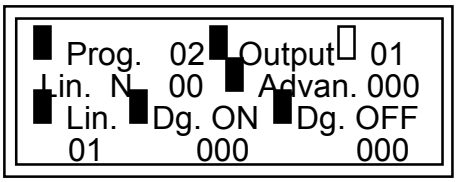


To edit the program, follow the procedure shown in pictures below (the blinking cursor shows the field to be introduced):

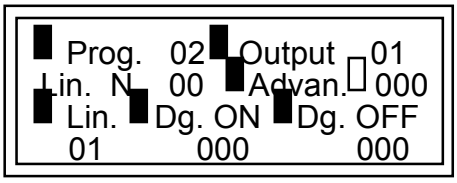
(1)



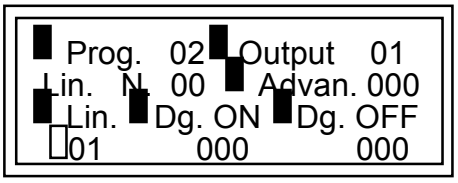
(2)



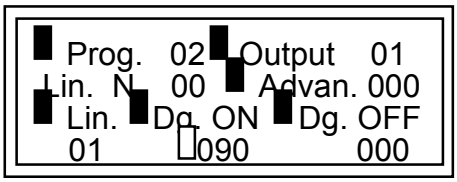
(3)



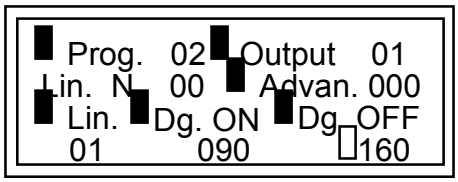
(4)



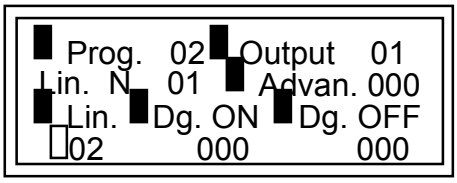
(5)



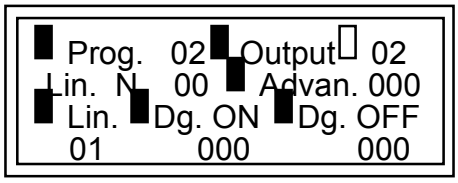
(6)



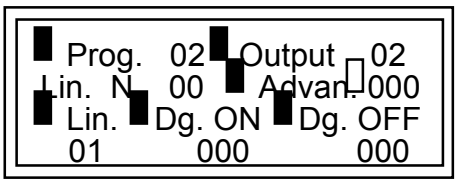
(7)



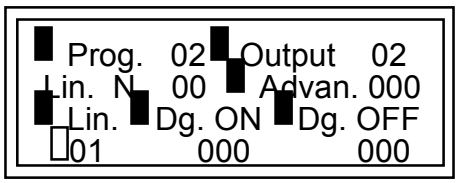
(8)



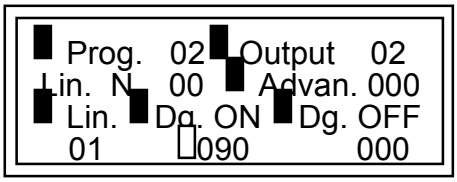
(9)



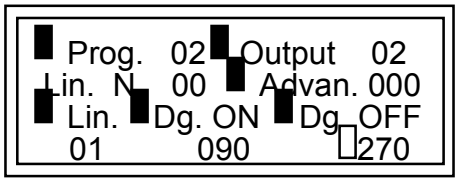
(10)



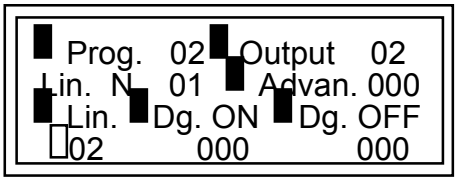
(11)



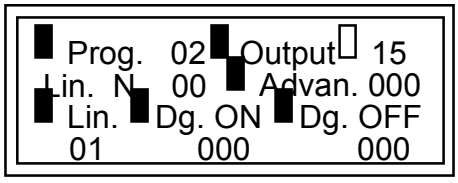
(12)



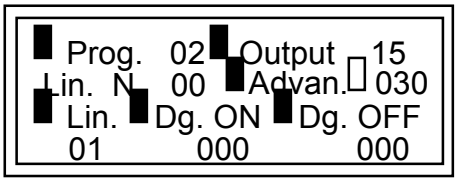
(13)



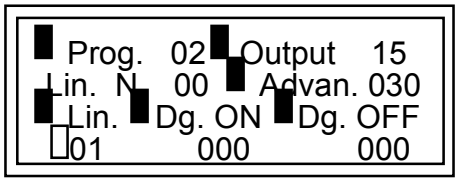
(14)



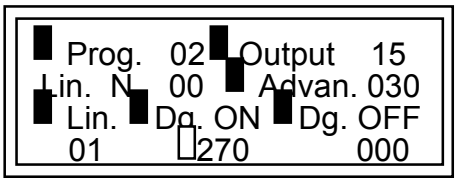
(15)



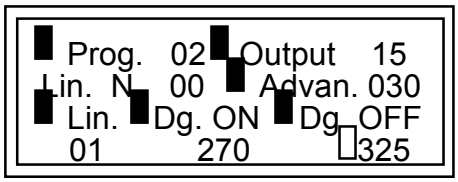
(16)



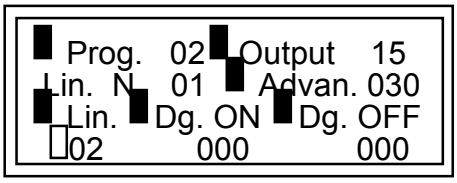
(17)



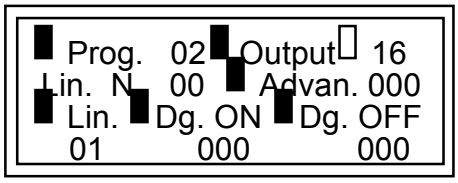
(18)



(19)



(20)



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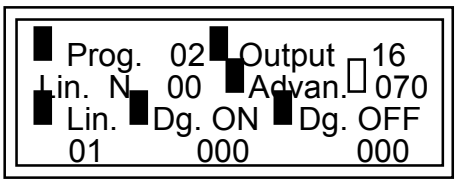

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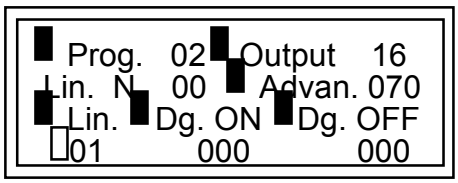

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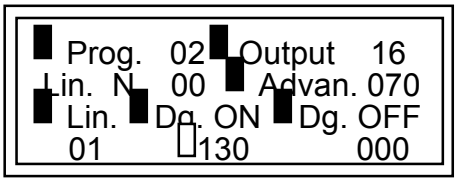

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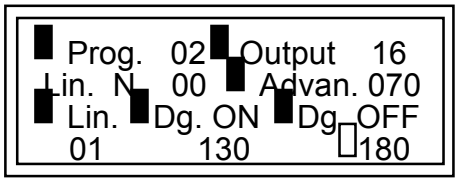

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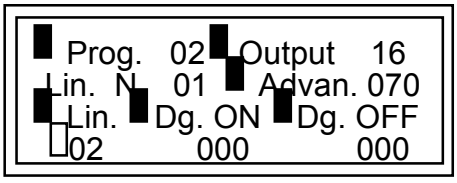

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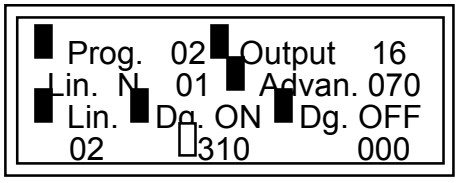

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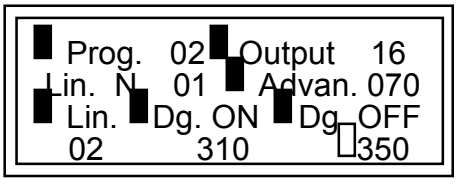

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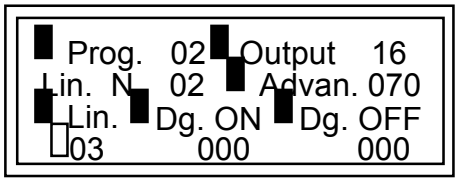
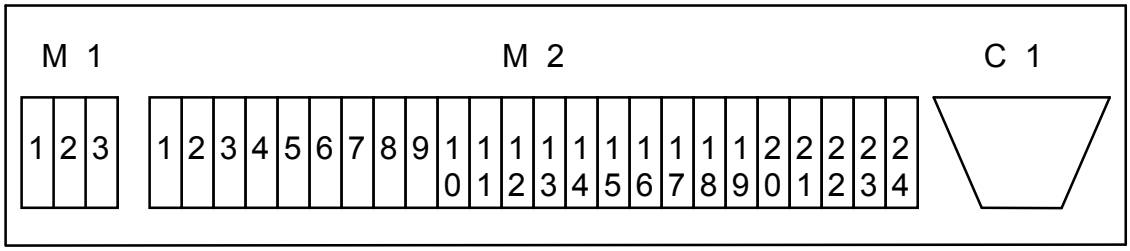


ELECTRICAL CHARACTERISTICS

POWER SUPPLY:	+24 VDC - 110 / 220 VAC +/- 15% 50/60 HZ
CURRENT CONSUMPTION:	10 VA
OPERATING TEMPERATURE:	from 0°C to 45°C
RELATIVE HUMIDITY:	from 5% to 90% without condensation
ENCODER POWER SUPPLY:	+12 VDC
OUTPUT POWER SUPPLY:	+24 VDC external
INPUT POWER SUPPLY:	+24 VDC or GND input current 10 mA max
OUTPUT (CAM):	PNP or NPN +24 VDC 120mA each

ELECTRICAL CONNECTIONS



Terminal block M1 (see notes on pag. 23)

Pin 1 = 220 Volt a.c.
Pin 2 = GND
Pin 3 = 220 Volt a.c.

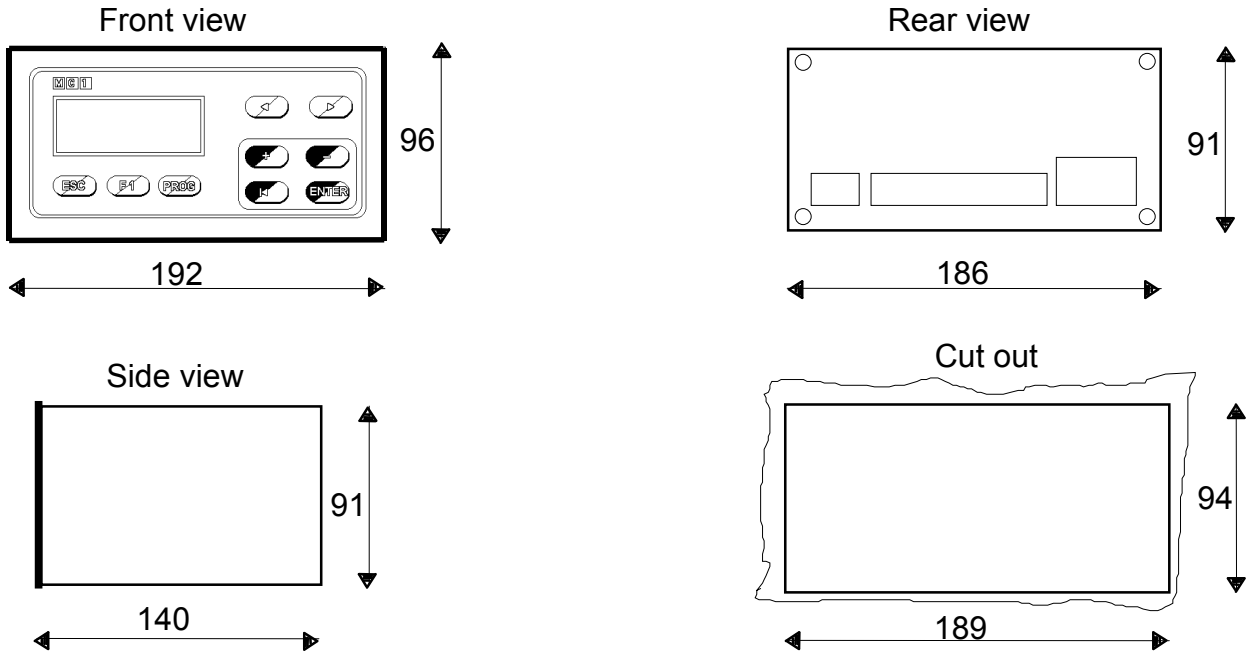
Connector C1 (see notes on pag. 23)
(Absolute 9 bit encoder Mod. TKTE)

Pin 1 = +12 Volt
Pin 2 = 0 Volt
Pin 3 = B8
Pin 4 = B4
Pin 5 = B6
Pin 6 = B2
Pin 7 = B0
Pin 8 = NC
Pin 9 = 0 Volt
Pin 10 = B7
Pin 11 = B5
Pin 12 = B3
Pin 13 = B1
Pin 14 = 0 Volt
Pin 15 = 0 Volt

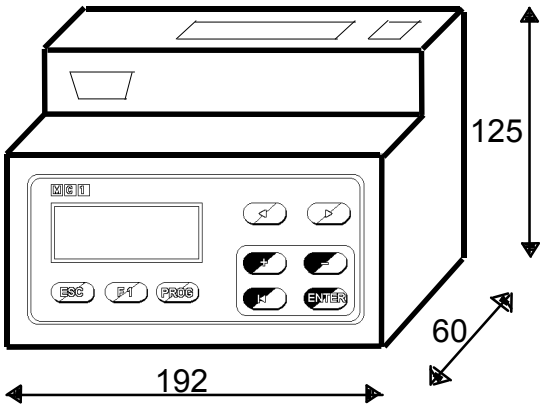
Terminal block M2

Pin 1 = NC
Pin 2 = 0 Volt
Pin 3 = +24 Volt
Pin 4 = Cam 16
Pin 5 = Cam 15
Pin 6 = Cam 14
Pin 7 = Cam 13
Pin 8 = Cam 12
Pin 9 = Cam 11
Pin 10 = Cam 10
Pin 11 = Cam 9
Pin 12 = Cam 8
Pin 13 = Cam 7
Pin 14 = Cam 6
Pin 15 = Cam 5
Pin 16 = Cam 4
Pin 17 = Cam 3
Pin 18 = Cam 2
Pin 19 = Cam 1
Pin 20 = Input Com.
Pin 21 = Bit 8
Pin 22 = Bit 4
Pin 23 = Bit 2
Pin 24 = Bit 1

PANEL MC1 MECHANICAL CHARACTERISTICS



BACK OF BOARD MC1 MECHANICAL CHARACTERISTICS



BAR DIN CONNECTION

NOTES (in reference to pag. 21)

MODEL WITH POWER SUPPLY 110 VAC

Terminal block M1

Pin 1 = 110 Volt a.c.
Pin 2 = GND
Pin 3 = 110 Volt a.c.

MODEL WITH POWER SUPPLY 24 VDC

Terminal block M1

Pin 1 = +24 VDC
Pin 2 = GND
Pin 3 = 0 Volt (+24 VDC)

WITH ABSOLUTE 9 BIT ENCODER MOD. TKE 45:

Connector C1

Pin 1 = +12 Volt
Pin 2 = 0 Volt
Pin 3 = B8
Pin 4 = B4
Pin 5 = B6
Pin 6 = B2
Pin 7 = B0
Pin 8 = (MSB)
Pin 9 = 0 Volt
Pin 10 = B7
Pin 11 = B5
Pin 12 = B3
Pin 13 = B1
Pin 14 = (\MSB)
Pin 15 = Up/down