FAGOR

Fagor Automation S. Coop.

MANV-I/O

Installation and operation manual

Manual code: 14460006
Manual version: 0404

1 OPTION: INPUT / OUTPUT (X2)

This option offers an additional SUB-D type 15-pin female connector "X2" to connect up to four digital inputs and six digital outputs.
During the EDM process up to six penetration levels may be controlled, each activating a digital relay output depending on the position reached.

The electrode axis may be displayed continuously or just its lowest position reached by using the $\boxed{\text{C}}$ $\boxed{\text{+/-}}$ keys.

Each EDM level may be independently associated with each one of the display axis.

If the machine does not control all the EDM levels, the unused ones can be cancelled as to not being able to change its position or activate its corresponding output.

It also has four digital inputs, which can be activated at 5 V or 24 V. When used as Emergency Input (E4). If activate, the output signals will become inactive. They can also be used to reset the reading of the axes (E1 for the X axis, E2 for the Y axis, E3 for the Z axis).

- Hysteresis:
  In order to prevent the output signals as well as the position display to flicker in short oscillatory motions, a hysteresis zone (PAR 25) may be set in such a way that the displayed position and the output signal state will remained stationary within until the axis position exceeds this zone.

- **Cleaning cycle:**
  If so desired, two of the outputs may be used to control the cleaning cycle for the electrode. To do this, just set two distances: the first one called UP1 (PAR3) which will control output signal S4 and the other one UP2 (PAR4) which will control output signal S5.
  When the DRO detects a direction change on the electrode axis and once the set distance is reached (measured from the END coordinate) it will activate the corresponding signal.

Characteristics of the signals at connector "X2":

Four general purpose opto-isolated inputs. The operating voltage for these inputs may be chosen between 5V and 24V. The +24V power supply voltage must be between 0 and 24V (±25%). The on/off threshold is around +2.4V.

Characteristics of the inputs at 24V :
- Maximum load current: 100mA
- Minimum DC voltage: 18V
- Maximum DC voltage: 30V

Pin	Signal	Pin	Signal
1	Input 1	9	Input 2
2	Input 3	10	Input 4
3	GND for inputs at 24V	11	GND for inputs at 5V
4	Not connected	12	Not connected
5	Output 5	13	Output 6
6	Output 3	14	Output 4
7	Output 1	15	Output 2
8	Common output contact		

Characteristics of the inputs at 5V :
- Maximum load current: 100mA
- Minimum DC voltage: 3.75V
- Maximum DC voltage: 6.25V
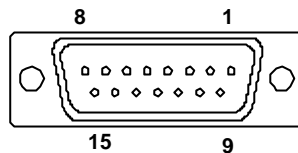
Six outputs, opto-isolated with solid state relay with a normally open contact.
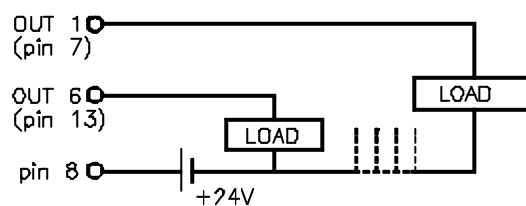
The main characteristics are:

- Maximum AC or DC voltage: 40V
- Maximum load current: 225mA
- Maximum internal resistance: 24 Ohm
- Maximum peak current: 2.5A for 100ms at 25°C
- Through current when open: $\leq 1\mu A$
- Galvanic isolation voltage: 1500V for 1 minute
- Activation time: $\leq 3ms$
- Deactivation time: $\leq 3ms$
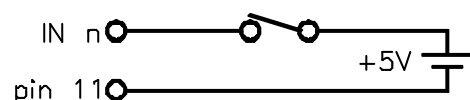
Open collector output connection:
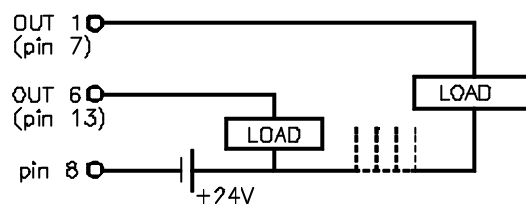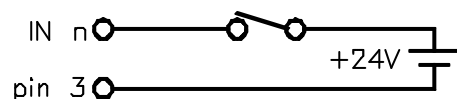
Open emitter output connection:

Note .- If any of the outputs is going to be connected to an inductive device, a 1N4000 type diode must be placed in parallel.

Input connection at 5 Volts :

Input connection at 24 Volts :

2. EDM RELATED INSTALLATION PARAMETERS

PAR20   Contains information on the operating modes. With its corresponding digits to "1" it means:

    Digit

   8, 7   Not being used at this time. They must be set to "0".

    6   Control electrode cleaning cycle.
When set to "1", level P3 is used as UP1 signal and P4 as UP2.
In this case P3 and P4 must be positive.

    5   Indicates when the signals are deactivated. A "0" means that they are deactivated whenever the position value is greater. A "1" forces signal S1 to be "0" in order to set the other ones to "0" (except for the S4 and S5 signals when using the cleaning cycle because they are controlled inside the cycle).

    4   Not being used at this time. It must be set to "0".

    3   Activate hysteresis and minimum coordinate on the 3rd axis (Z)

    2   Activate hysteresis and minimum coordinate on the 2nd axis (Y)

    1   Activate hysteresis and minimum coordinate on the 1st axis (X)

PAR21   Indicates the active level for the inputs. Only the first four digits are used. A "0" indicates that the input is active low (0V).

PAR23   Indicates the active level for the outputs. Only the first six digits are used. A "1" indicates that the output is active high (5V or 24V).

PAR25   Determines the hysteresis zone desired to avoid the flickering of the displayed coordinates and output signals. This value will be in mm or inches depending on whether the INCH LED is off or on.

PAR26   Determines the anticipation distance to activate the signal before reaching the set position. This value will be in mm or inches depending on whether the INCH LED is off or on.

PAR30 to PAR35   These parameters set the axis number controlling its corresponding signal. PAR30 corresponds to S1 (HOME),.... PAR35 to S6 (END). It admits values from "0" to "3" where "0" means that the signal is not being used.

PAR40 to PAR45   They set the signal activating positions (levels) of the axes indicated by PAR30 through PAR35. The PAR40 coordinate is used to activate signal "S1" (HOME), ... and the PAR45 coordinate to activate "S6" (END).
This value will be in mm or inches depending on whether the INCH LED is off or on.

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3. EDM MODE

It is possible to toggle between continuously displaying the electrode axis position and displaying only the lowest position reached by means of the $\boxed{\text{C}}$ $\boxed{\text{+/-}}$ key combination.

The value for each level may be changed even during the EDM operation directly from the keyboard:

Press $\boxed{\text{C}}$ $\boxed{\text{+4}}$ and the DRO will display the letter "C". Then:

- **To enter the home coordinate:**
   Press $\boxed{0}$ "coordinate" $\boxed{\text{ENTER}}$

- **To enter the end coordinate:**
   Press $\boxed{5}$ coordinate $\boxed{\text{ENTER}}$

- **To change the intermediate coordinates (P1 thru P4)**:
   - Press the key corresponding to the level to be changed:
      $\boxed{1}$ through $\boxed{\text{+4}}$.
   - Key in the desired intermediate coordinate value.
   - Press $\boxed{\text{ENTER}}$
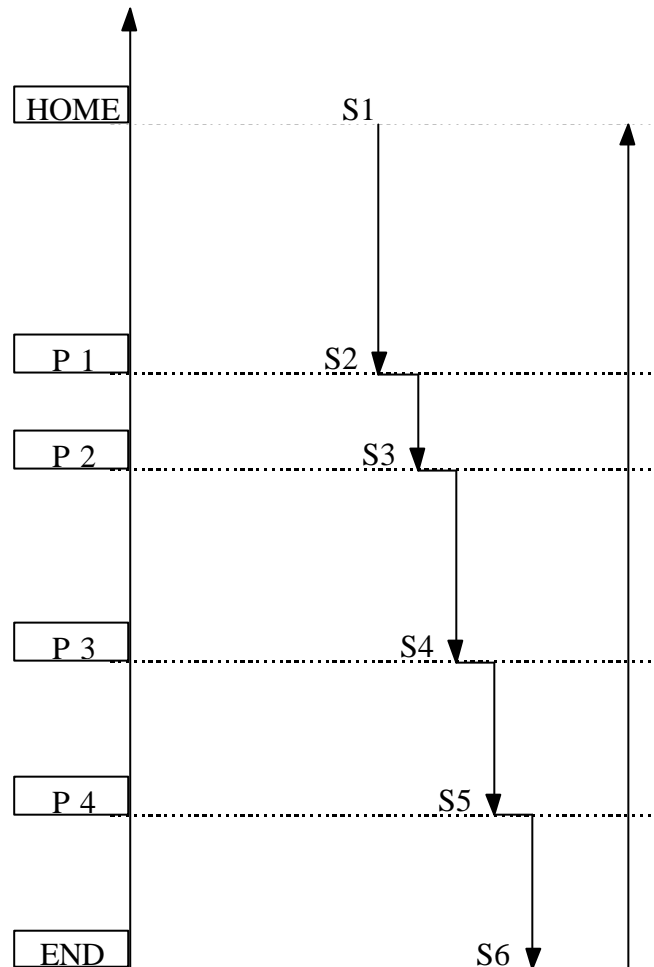
- **To select the diameter or length of the electrode:**
  Electrode length and radius compensation may be changed during the EDM process:

  - On the NV-10/11 model: Press [○ tool] "New length" [ENTER]

  - On the NV-20/21 model: Press [○ tool] "New diameter" [ENTER]

  The new length value will be **added to or subtracted from** the current position value.
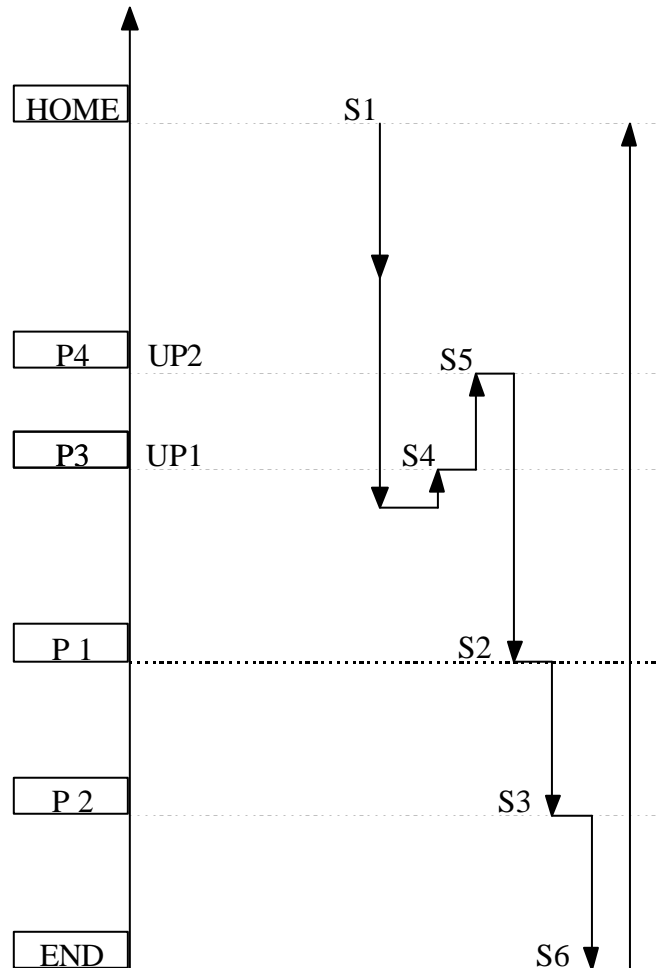
- **Cleaning cycle:**
  If PAR20(5) has been set to "1" indicating that there is a cleaning cycle, level P3 (C43) will be used to raise the electrode (UP1) activating output S4 and P4 (C44) to lower it (UP2) activating output S5.

  When the DRO detects a direction change on the electrode axis and once the programmed distance has been reached (measured from the minimum position reached), the corresponding signal will be activated.

  These levels may be set and modified during the EDM process.

  Many cleaning cycles may take place at different points during the edm operation.

HOME   S1

P4   UP2   S5

P3   UP1   S4

P 1   S2

P 2   S3

END   S6

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