ELCO ELETTRONICA
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MD10 DISPLAY UNIT – DIGITAL QUOTE DISPLAY

1.0 GENERAL CHARACTERISTICS

The instrument can be used as position reading and display device for connection to an incremental encoder transducer with bi-directional or mono-directional count.

Display
6-digit “POSITION” display, plus one-digit “MODE” display.
To display maximum scale from –99999 to 999999.
Decimal point position programmable.

Digital outputs (terminals 1, 2 and 3)
The system has available 2 relay outputs programmable.

Digital inputs (4, 5, 6, 7 and 8):
4 digital inputs are available and can be set up as required to receive signals from encoders, magnetic tapes, count sensors and locator sensors.

Power supply for remote devices (terminals 9 and 10):
A power supply of +12 V is available for remote sensors and transducers, with a maximum current of 0.15 A.

System power supply (terminals 11 and 12):

Four different types of power supply are available for the device:

24 VAC (+/-10%)	50/60 Hz	10 VA
110 VAC (+/-10%)	50/60 Hz	10 VA
220 VAC (+/-10%)	50/60 Hz	10 VA
24 VDC (+/-10%)		10 VA

2.0 FRONT VIEW

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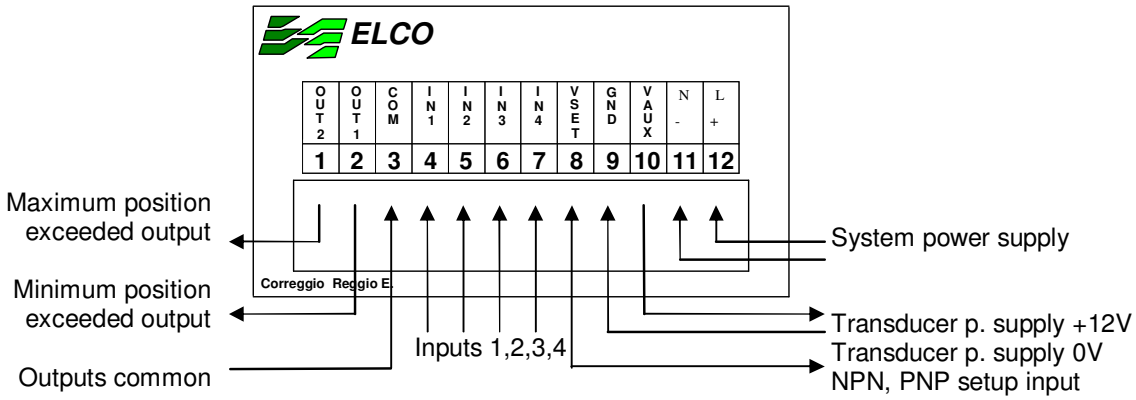
3.0 REAR VIEW AND CONNECTIONS



Input type selection:

- **for sensors or transducers with NPN or open collector outputs:** connect terminal N° 8 (VSET) to terminal N° 10 (VAUX).

- **for sensors or transducers with PNP or push-pull outputs:** connect terminal N° 8 (VSET) to terminal N° 9 (GND).

In both cases, the common reference terminal is N° 9 (GND).

Connection of inputs as bi-directional incremental encoder reader (maximum frequency 40 kHz with internal multiplication of encoder pulses by 4):
N° 10 = encoder power supply +12 V
N° 9 = encoder power supply 0V and encoder cable shield sleeve
N° 8 = bridge with VDC (terminal n. 10)
N° 7 = encoder channel A (from shielded cable)
N° 6 = encoder 0 notch (from shielded cable)
N° 5 = encoder channel B (from shielded cable)
N° 4 = reference sensor for calibration (if envisaged by program)

Connection of inputs as mono-directional counter (maximum frequency 40 kHz):
N° 10 = encoder or inductive sensor power supply +12 V
N° 9 = encoder power supply 0V and encoder or inductive sensor cable shield sleeve
N° 8 = bridge with VDC (terminal N° 10)
N° 7 = encoder channel A (from shielded cable) or inductive sensor
N° 6 = encoder 0 notch (if envisaged by program)
N° 5 = selection of count increase (if not active) or decrease (if active)
N° 4 = reference sensor for calibration (if envisaged by program)

Output connection:
N° 3 = contacts common
N° 2 = OUT 1 normally open contact (comparison on minimum position)
N° 1 = OUT 2 normally open contact (comparison on maximum position)

4.0 OPERATION AND PARAMETERS

FUNCTION	DESCRIPTION	"MODE" DISPLAY
1	Encoder quote visualization	off
2	Calibration Value	o
3	Resolution (space corresponding to 1 encoder / counter pulse)	r
4	Working parameters	P
5	Maximum position Value	C
6	Minimum position Value	d
7	Software Version	U

To modify the flashing digit, press the <UP> key.
To move the flashing cursor to another digit, press <SHIFT>.
To return to the "function", press <PROG>.

Function 1 (Working visualization)

The "MODE" display is off and the absolute position value calculated on the count is displayed.

Function 2 (Calibration value)

When the "MODE" display is off, press the <PROG> and <SHIFT> keys. When both keys are released the "o" character will appear on the "MODE" display, while the first digit on the left of the "POSITION VALUE" display will start to flash.
If the value to be entered is negative, press the <UP> button to obtain display of the "-" sign in the first digit on the left of the "POSITION VALUE" display.
This value is loaded as absolute real value of the count when a display calibration procedure is performed.

Function 3 (Resolution)

When the "MODE" display is off, press the <PROG> and <UP> keys.
When both keys are released the "r" character will appear on the "MODE" display. At this point the operator can enter the value of the resolution of one pulse, i.e. the distance expressed in the desired unit of measurement for each count pulse.
For example, if the system includes an encoder with 500 pulses per revolution and the axis moves 100.0 mm for each encoder revolution, the resolution becomes: *100.0 / 500 = 0.2.*

Function 4 (Parameters)

When the "MODE" display is off, press the <PROG> and <RESET> keys.
When both keys are released the "P" character will appear on the "MODE" display.
Setting characters in the "POSITION VALUE" display will allow selection of the instrument's operating mode.

The **third** character from the left indicates the type of count. Setting a number from 1 to 0 provides the corresponding operating mode, as follows.
3 – 0 = the device displays a value starting from a count carried out on two staggered signals, generated by a *bi-directional incremental encoder.*
3 – 1 = the device displays a value starting from a count carried out on one signal generated by a *sensor or a mono-directional incremental encoder.* In this case input N° 5 (IN2) decides whether the count is to be increased (if not active) or decreased (if active).

For other values, the device behaves as for **3 – 0**.

The **fifth** character from the left indicates the position of the decimal point during operation in video page one, in the calibration value, and in the maximum and minimum values. Setting a number from 0 to 3 provides the corresponding operating mode, as follows:
5 - 0 = no digit after the decimal point (e.g. 999999)
5 - 1= one digit after the decimal point (e.g. 99999.9)
5 - 2 = two digits after the decimal point (e.g. 9999.99)
5 - 3 = three digits after the decimal point (e.g. 999.999)
For values other than those above, we obtain **5 – 1**.

The **sixth** character from the left selects the system for calibration of the absolute position value. Setting a number from 0 to 3 provides the corresponding operating mode, as follows:
6 – 0 = calibration takes place with the <RESET> key only.
6 – 1 = calibration in response to deactivation of input N° 4 (signal IN1).
6 – 2 = calibration on the first activation edge of input N° 6 (signal IN3) after deactivation of input N° 4 (IN1), in bi-directional mode only.
6 – 3 = calibration does not take place in any circumstances.

Function 5 (Maximum position value):

With the "MODE" display off, press the <PROG> key and at the same time press the <RESET> key repeatedly until the character "C" appears on the "MODE" display.
At this point, the user can enter the value of the maximum position after which the device will activate output N° 1 (OUT2)**.** In all cases, the value to be exceeded must be greater than and different from the minimum value set in "**function 6**".

Function 6 (Minimum position value)

With the "MODE" display off, press the <PROG> key and at the same time press the <RESET> key repeatedly until the character "d" appears on the "MODE" display.
At this point, the minimum position value can be set.
Output N° 2 (OUT1) is activated when the absolute value falls below the minimum position setting.
In all cases, the value must be less than and different from the maximum value set in "Function 5".

Function 7 (Software Version)

With the "MODE" display off, press the <PROG> key and at the same time press the <RESET> key repeatedly until the character **"U"** appears on the "MODE" display.
At this point, the Software Level of the program (e.g. SL.1.0) will be displayed.

5.0 ELECTRICAL SPECIFICATIONS

INPUTS:
- opto-insulated
- current absorption (with +12 VDC) of 12 ma
- internal filter which can be selected upon order and modified on request
- on request, up to 6 inputs can be provided; in this case, the outputs must be eliminated.

OUTPUTS:
- relay contacts with a common available on terminal N°3
- capability for piloting 115 VAC 0.5A
- in case of inductive loads (relays, solenoid valves, etc.) a suitable filter must be installed in parallel with the load.

POWER SUPPLY:
- there must be no fluctuations in excess of +/-10% from the selected value.

WORKING TEMPERATURE AND CONDITIONS:

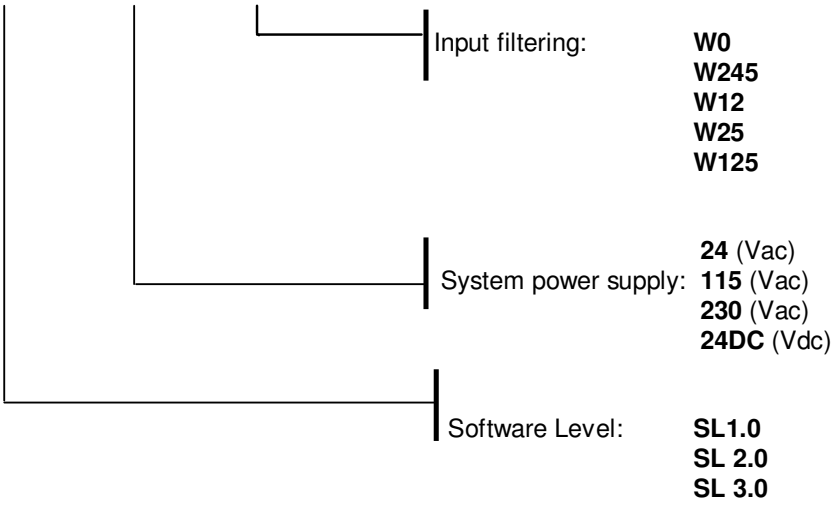
- working ambient temperature from –5° to +50°
- relative humidity 15…90%
- protection class IP 20 (DIN 40050/IEC 144)

EMC STANDARDS SATISFIED:
- EN50082-1 and 2
- EN61000-4-2
- EN610004-4 (IEC 801-4).

6.0 ORDERING CODES

The code is structured as follows:

MD10 XXXXX XXX XXXX



Software Level
The software level identifies the program loaded in the instrument.

SL1.0 = mono-directional and bi-directional counter with setting and management of the minimum and maximum values which can be programmed.
SL2.0 = bi-directional counter with automatic setting of inches and millimetres.
SL3.0 = reader of 5 inputs for the display of the same number of programmable numerical values (motor speed from the belt position).

System power supply

24 = 24 VAC +/-10% 50/60 Hz	10 VA
110 = 110 VAC +/-10% 50/60 Hz	10 VA
230 = 230 VAC +/-10% 50/60 Hz	10 VA
24DC = 24 VDC +/-10%	10 VA

Input filtering:

Code	Frequency N°5	Frequency N°6	Frequency N°7
W0	25 Khz	25 Khz	25 Khz
W245	150 hz	150 hz	150 hz
W12	150 hz	25 Khz	650 hz
W25	150 hz	25 Khz	150 hz
W125	150 hz	25 Khz	120 hz

If the frequency of 25 kHz is selected, the cable which carries the signal to the instrument must be screened and the sheathing must be connected to the GND terminal N° 9.

For example to order a display unit 24 VDC for magnetic tape measuring units you have to order the following code:

MD10 W0 24DC SL1.0