

Technical Specifications

Power Supply	Adaptor external Input: 100-240VAC 50/60Hz Output: 5VDC/3A
Power Consumption	15 Watts
Storage Temperature	-20°C to 70°C
Operating Temperature	0°C to 50°C
Relative Humidity	80% Non-Condensing
Dimensions (mm) (*excluding earth stud)	72mm X 144mm X 110.5mm Height X Width X Depth
Net Weight	Approx 0.500kg
Encoder Input type	9-Pin D-Type Female. Differential Line driver as per EIA RS422 standards.
Auxiliary I/O (Optional)	15-Pin D-Type Female For Auxiliary Output. Probe Input. RS232 Output.USB B type connector (for service only)
Encoder Resolution Supported	0.1/0.2/0.5/1/2/3/5/10/20/50/100 Micron
Display	7 Segment Green LED
Standard Compliance	EMC and Low Voltage Compliance BS EN 61326 RoHS





Read before proceeding



- ❖ The EL10 DRO is sophisticated electronic equipment and should be carefully handled to avoid any damage.
 - ❖ Only the AC-DC adaptor provided with DRO should be used for Power supply. Using any other power supply may cause irreversible damage to DRO.
 - ❖ It is mandatory to switch off the DRO by switching off the Mains supply. Do not remove the adaptor directly from DRO rear plate without switching off the mains supply. This may affect last value storage.
 - ❖ DRO should be opened by authorized person only. Otherwise it will invalidate the warranty of the unit.
 - ❖ Cable routing of DRO and encoders should not be routed through or near high capacity switching/inductive load or where it can cause danger.
 - ❖ Proper equipotential ground should be connected to EL10 DRO on rear plate where symbol is shown. Grounding kit is provided with the DRO.
- ✓ **Note: - Front and Rear views of DRO, encoder connections, equipotential ground connections, warranty conditions and safe disposal information are mentioned on the last page of manual.**


Numeric Entry


Wherever numeric entry is required the user should refer following sequence to enter a number.

The display will show "0000.000" with right most digit blinking when the DRO is expecting a numeric entry. Decimals are displayed as per modes selected. Left most seven segment is reserved for negative sign.

Use  and  key to toggle the digit position.


Use  and  key to set the value for the selected digit.

Use  to save the numeric entry and set the desired value.

- ✓ **Note: - To cancel numeric entry, press  for 5 seconds. It will exit the current mode.**

Functions:-

> Reset Axis Value

This function is used to Zero the axis. Pressing  key will reset the axis.

When axis reset function is activated in ABS mode, it will redefine the datum of the travel, and then it is not possible to restore the old datum.


> Abs / Inc

The  key toggles between the Absolute / Incremental position display. Absolute mode displays the position of the axis from a fixed datum.

The Incremental mode displays each position relative to the last position. This is also known as point to point use.

The LED indicates the current selection of mode.

> Inch / MM

The  key toggles between the Inch units (in) or the millimeter units (mm). The LED indicates the current mode of display.



- ✓ **Note: - In angular mode, both the LEDs will be OFF on the front panel.**

> Preset

Preset  function allows user to set 'Distance-to-Go' to reach the next position.

Preset function also includes Near Zero Warning function. Press  key. Using

numeric entry input distance to go. Press  key. Now DRO is in preset mode which is indicated by glowing decimal point of the second digit from left. To exit




Preset mode press  key or press  for 5 seconds.

- ✓ **Note: During preset mode display works only into incremental mode and thus the datum is not disturbed.**

> Setting of Reference


This function allows user to set a machine zero point. With this machine zero point user can restore the work coordinates even if the machine is moved when the DRO is in OFF condition. Generally each encoder has reference marks present at every specified interval. One of these reference marks is used to recall the same datum point every time.

This function works only in ABS mode. If tried to use in INC mode, the DRO is automatically forced to ABS mode and then the function executes.

Press  for 5 seconds for setting of reference. Use  and  key to toggle between "Homing", "Set Machine reference" and "Machine Reference".

• Homing

In this function, the Datum is set at the reference mark on the encoder.

Access Homing function. Select  for referencing. Blinking message of "HOMING_" indicates that DRO is now waiting for the encoder reference mark. Move the slide to cross the reference mark. The datum will be set at the reference mark position.


- ✓ **Note: It is highly recommended to mark an indicator on the encoder so as to use the same reference mark each time while finding the datum point.**

• Set Machine reference

Machine referencing is used when datum is not at the reference mark on encoder but at a fixed distance from reference mark.


Access "SET REF" mode by pressing  key, and press  key. "Homing" will be displayed. Move the slide to cross reference mark of encoder.

Now "set ref" will be displayed Now the DRO is in counting mode, move the slide to

cross desired machine zero point. Press  to finish.




- ✓ **Note: For encoders which do not have reference mark - homing, machine referencing can be done by following method:**

User needs to move machine slide to desired position and enter into homing / set MC reference function. When the message "HOMING_" is

displayed, press . This position is set in DRO as absolute datum. Now for machine reference, user needs to perform the homing operation and move the slide to desired machine reference position and then set it.

• Machine reference

Recalls the machine reference set in "REF" function.

Select Machine reference mode using  and  keys. Press  key. Blinking message of "REF_" indicates that DRO is now ready to set reference. Move slide towards reference mark indicator.

After crossing reference mark on encoder DRO will start counting. This indicates that machine reference is now recalled.

> Half Function

This function is used to find the center of a work piece by halving the displayed

distance on the selected axis. Press  for 5 seconds to enter into Half function. It will halve the distance travel.

- ✓ **Note:-It is recommended to use half function in INC mode. If you use this function in ABS mode, it will change the datum point of the axis.**

➤ **Set axis value**

This function is used to set the axis with a known value using numeric entry.

Press **X0** for 5 seconds to enter into Set axis Function. Blinking zero indicates that DRO is now waiting for the value to be entered.

✓ **Note:-It is recommended to use Set function in INC mode. If you use this function in ABS mode, it will change the datum point of the axis.**

Setup:-

Press **Ent** key for 5 seconds to enter into Setup menu on DRO

With the help of navigation keys Up / Down you can choose the parameter as shown in parameter list.

With the help of navigation keys left / right you can choose the settings of each parameter

Parameter list for Linear mode

Display	Parameter	Setting options
L inERr	Counting mode	Linear
SC 5_0	Scale resolution	0.1 /0.2 /0.5 /1 /2/3 /5 /10 /20 /50 /100μ
dP 5_0	Display resolution	0.1 /0.2 /0.5 /1 /2/3 /5 /10 /20 /50 /100μ
rAd d iR	Measurement mode.*1	Radial / Diametric
LEFT r iGht	Direction	Left / Right
CAL ib	Error Comp.*2	Press Ent for error compensation
LoC OFF LoC ON	Keypad Lock	On / Off
SEr on	Serial transmission mode on or off	On/ Off
Prb dLY	Probe delay	Probe delay value. Default 00
SAU [hG	Store setting	Press Ent to store changed settings.
rSt dEF	Reset	Press Ent to Restore default settings
End	End	Press Ent to exit from setup

✓ **Note: - *1 Diametric mode is indicated by glowing right most decimal point.**
*2 – Explained in further sections

- **Error compensation should be done only in case job accuracies are not as per expectations.**
- **If job accuracies are acceptable, the error compensation should not be performed.**

LEC (Linear Error Compensation)

Linear error compensation can be applied, if the results of the comparison with a reference standard show a linear deviation over the whole measuring length. In this case the error can be compensated by the calculation of a single correction factor.

Select Calibration and navigate to LEC. Press **Ent** key. "d iSP uRL" message will be displayed on screen.

Press **Ent** key. The DRO shows current count of scale.

Set the machine at datum point (starting point) and press the **X0** key to reset the axis.

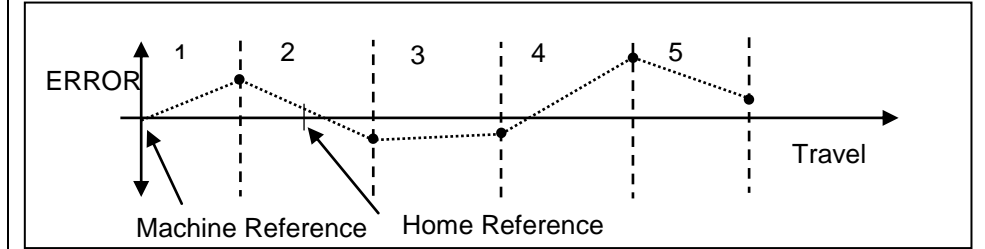
Move the axis away from datum point to put the slip gauge at datum point.

Move the axis to touch the slip gauge. The display value is the measured length of the slip gauge.

Press **Ent** key. Now DRO will display 0000.000 with blinking last digit. This allows the user to enter the actual distance between two edges of reference. Input the value and press **Ent** key. Now the DRO shows the "d iSP uRL" message. Use **▶** key to navigate to "CAL FAC." Press **Ent** key to read the calibration factor. The calculated calibration factor is displayed. Press **▼** key to navigate further. Save changes before exit.

SLEC (Segmented Error Compensation)

Segmented Linear Error Compensation (SLEC) is used when the results of the comparison with a reference standard shows non-linear error. In SLEC the entire axis travel can be divided into as many as 99 user defined segments. The error in each segment is compensated with a single correction factor. Each correction point is measured with respect to the starting point. This starting point is usually set close to the end of the scale. This starting point can coincide with the absolute datum point.



Auto Mode

Set the machine slide near encoder reference and then select SLEC menu. Blinking message of "homing" will be displayed which indicates that this axis is ready for sensing the reference mark. Move the machine to cross reference mark. Now display will show set mc ref message. Reach the start point of the first segment. And press **Ent** key. The display will show 0.000. This indicated that machine reference is now set at the beginning of first segment. Now reach the end of the first segment. Press the **Ent** key. Input the length of the segment as measured by standard. Repeat this step for all segments. After completing all segments navigate using **▼** to save changes and press **Ent** key. Saved message is flashed. This indicates that error compensation is complete.

Edit Mode

Edit mode allows user to check and edit the error compensation values for each segment after setting up in Auto mode. Select Segmented Linear Error Compensation (SLEC) press **Ent** key to select edit mode. Press **▶** and **◀** key to select the segment which needs to be edited. We can edit Display value & Slip value using numeric keypad. After pressing **Ent**, press **▶** and **◀** key to select the value which needs to be edited. The current value will be displayed on the screen. Press **Ent** to input the desired value. Press **Ent** again. Repeat the process for other segments if required. After completing editing, navigate to mode with **▼** key and press **Ent** to save changes.

✓ **Note: DispVal is value measured by encoder and slipval is actual value of reference slip gauge.**

Parameter list for Angular mode

Display	Parameter	Setting options
Angular	Counting mode	Angular
dd.ññ dd.ññ.55 dd.dEC	Display resolution	Degrees-Minutes/ Degrees-Minutes-Seconds/ Degrees-Decimal
rol over Cont	Measurement mode	Roll Over / Continuous
LEft righT	Direction	Left / Right
ERL ib	Error Comp. ³	Press for error compensation
LoC oFF LoC on	Keypad Lock	On / Off
SAve CHG	Store setting	Press to store changed settings.
rSt oEF	Reset	Press to Restore default settings
End	End	Press to exit from setup

✓ **Note:- *3 – Explained in further sections**

Error compensation for Angular mode

For error compensation of angular axis measurement, select the angular counting mode parameter in setup. There are two methods

- 1) Auto mode
- 2) Manual mode

Auto Mode

This parameter defines the Encoder counts per rotation. There is an automatic calibration process for finding the CPR value. In the automatic process, the user is prompted to pass two reference marks in the same direction. The DRO counts within them, and sets the CPR value.

✓ **Note: - There should be single reference mark on encoder for using this mode.**

In angular setup press enter when "CAL ib" message is displayed. Use and keys and press when "Aut" message is displayed. Blinking message of "rEF 01_" indicates that DRO is waiting for First Abs. After sensing a reference, a beep will be heard. Blinking message of "rEF 02_" indicates that DRO is waiting for reference mark. Travel in the same direction to cross the reference mark again.

DRO will display Pulses counted between two reference marks. Press to set this value. Use key to save change and exit.

- ✓ **Note: - After saving the count in auto mode PPR value can be checked in PPR menu in manual calibration mode. This value should be ¼th of count in auto mode.**
- ✓ **Note: If the encoder is not moved in the same direction in Auto mode, 0 value is displayed on the screen. Press to go to Auto menu again and execute the function.**

Manual Mode

In angular setup press when "CAL ib" message is displayed. Use and keys, and press when "Angular" message is displayed

There are three methods in manual mode

- **360° rotation method**

Press when "d ISPR" message is displayed in manual mode. DRO will show some random count. Press to reset the count. Move the machine to complete 1 rotation of the encoder. DRO will show pulses counted in 1 rotation. Press key. Now using numeric entry input value of 360° in terms of seconds i.e. 1296000. Press to save. Use key to save and exit.

- **Pulses per Revolution (PPR) Method**

Press when "PPR" message is displayed in manual mode. Existing PPR value is displayed. Press key to edit the PPR value of encoder. Again press key. Press key to save this value and exit from calibration menu.

Auxiliary Functions:

Touch Probe Functions:

Touch probe also called as Contact probe is a device which gives a trigger signal when it comes in contact with the work-piece. The EL10 DRO uses this trigger signal to execute certain functions, which help the operator to set an axis or measure a work-piece.

Basic setting:
In linear setup mode, you will see probe delay {Prb dLY} setting. This delay is provided to avoid multiple probe trigger during measurement. The user can set value between 1 second to 60 seconds. On entering the Prb dLY, you will see dLY 00_ press to enter the value of delay.

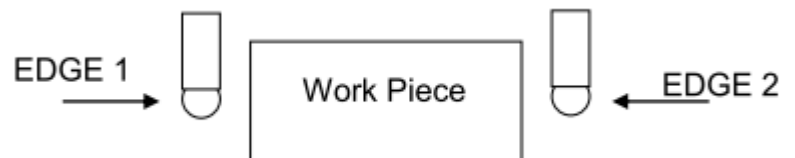
To enter probe function, press key. You will enter function menu.

Now the DRO will be in normal counting mode with rightmost decimal point blinking. This indicates that DRO is now in six output function mode. During 6 output operational mode, you cannot use any other functions. As you move the axis, when the each set distance is crossed, the corresponding output is switched on. And it remains on as long as the axis value is equal to or greater than its set value.

You will see probe message on screen. Press to go inside the function. You will see probe dia message. Before using probe functions make sure probe diameter is entered.

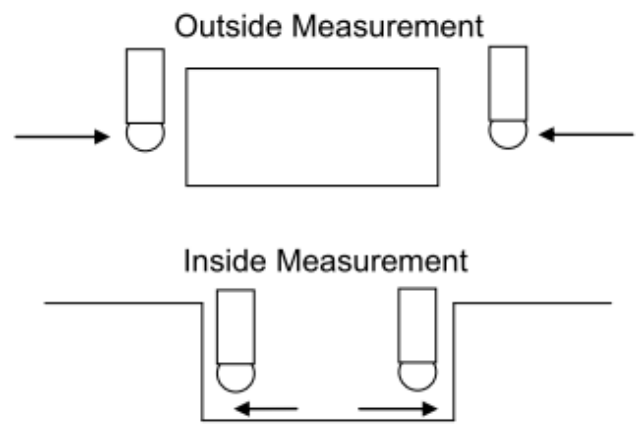
On seeing probe dia message, press . You will see existing value of probe dia. Press to enter value of probe dia using numeric entry. Once value is set, you will again come back to probe dia message. Now use to go to probe function menu. There are various probe functions such as probe edge, inside measurement and outside measurement.

Datum Function: The co-ordinates of the datum can be set by probing edges or surfaces and capturing them as datum.
Datum by edge: Here the DRO sets the datum at the trigger edge of the work piece.



Press when you see Probe Fn message. Probe edge {Pb EdGE} message is displayed. Press to go inside the function. There are two methods of probing the job by edges. Edge 1 and Edge 2 as shown in above diagram. Choose either method by using key and press . The message EdGE 1 or EdGE 2 will be displayed with last segment blinking. This indicates that DRO is waiting for probe signal. Move the probe to touch the job. Once the probe signal is received, the DRO shows 0.000 indicating that datum is set at the probing edge. Now DRO is in normal mode.

Inside/ outside measurement: the function is used to measure work piece width.



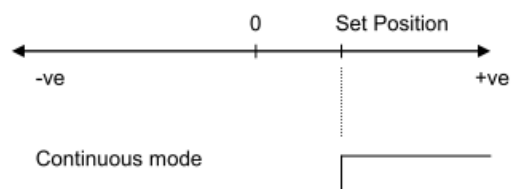
In probe function menu, use key to go to probe inside { P b in5 }

and probe outside { P b out } measurement. Press to select the desired function. When you have entered the desired function eg. Outside measurement, you will see out 1 message with blinking last segment. Probe the first edge. Upon receiving the first probe, you will hear a beep and Dro will flash message out 2 with last blinking segment. Now probe the second edge. DRO will now display the measured distance with second left decimal point blinking indicating that it's a result

of probe operation. Press to exit the probe menu and return to normal counting mode. Now the display shows the actual encoder count.

Six output function:

There are six optically isolated open collector 24V outputs with maximum rating of 500mA. User entered position for six outputs are stored in DRO; however at any point of operation user has flexibility to edit values using Program function. In this continuous mode if current tool position is greater than the entered value then respective output remains high, and when it is less the corresponding output remains low.



Program six output P Gn 6oP :

Press to enter function menu and using key choose 6 oP function.

Press and you will find program { P Gn 6oP } and execute

{ rUn 6oP } options. Press to program six output values.

General sequence of programming the six output is as follows:

oP= 1 > > existing value is displayed > > using numeric entry enter desired value. > > oP= 1 > > oP= 2 > > existing value is displayed >oP= 6

This way all 6 outputs can be programmed as per requirement. These values are stored till next time user modifies them.

Execute six output rUn 6oP :

In this function you can execute 6 outputs with reference to axis movement.

In 6 output function menu, select { rUn 6oP } by pressing key. o

To exit the six output function anytime, press key for continuous 5 seconds. The DRO will return to normal counting mode with rightmost decimal point switched off.

Serial mode: EL10 DRO offers continuous mode for transmitting current axis value to 32 bit operating system based personal computer. This works both in linear and angular mode and the data transmission is as below:

Current axis value I/A N/M/D L/U

I = incremental mode / A = absolute mode
N = linear inch mode / M = linear Mm mode / D = angular mode
L = probe latched count / U = encoder count.

Setting for hyper terminal :

Setting options	Values
Communication port	Com1 / Com2
Baud rate /Bits Per second	9600
Date Bits	8
Parity	None
Stop bits	1
Flow Control	None

Connections for probe & 6 output & serial mode on auxiliary connector:

Pin No.	Description	15pin D (F)	Pin No.	Description
1	Ext. GND		9	RXD out
2	Ext. +24V		10	TXD out
3	O/P 1		11	O/P 2
4	O/P 3		12	O/P 4
5	O/P 5		13	O/P 6
6	+5V		14	+5V
7	GND		15	GND
8	Probe		-	-

Encoder Connections:

Pin	1	2	3	4	5	6	7	8	9
Signal	+ABS*1	- ABS	VCC +5V	Shield*2	GND	+ A	- A	- B	+ B

✓ **Note:**

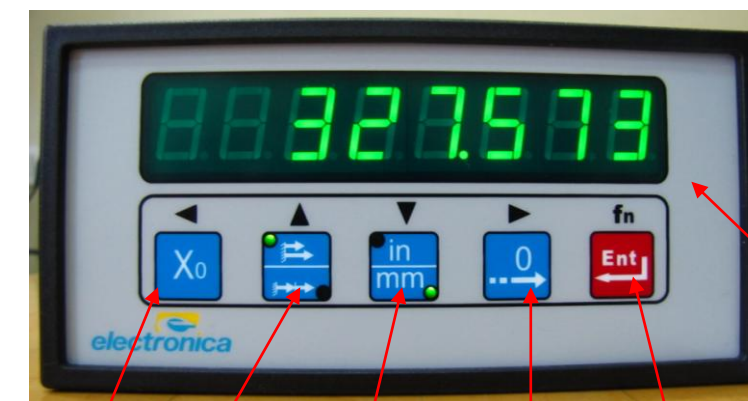
*1 – ABS is Reference Mark.

*2 – Ensure proper shielding of the encoder cables for proper functioning of the encoder and the DRO.

Encoder Cable should be properly routed as per manufacturers' guidelines.

Cable should not be routed near any inductive loads to avoid electrical noise interference. It should be routed away from the machine moving parts to avoid any damage.

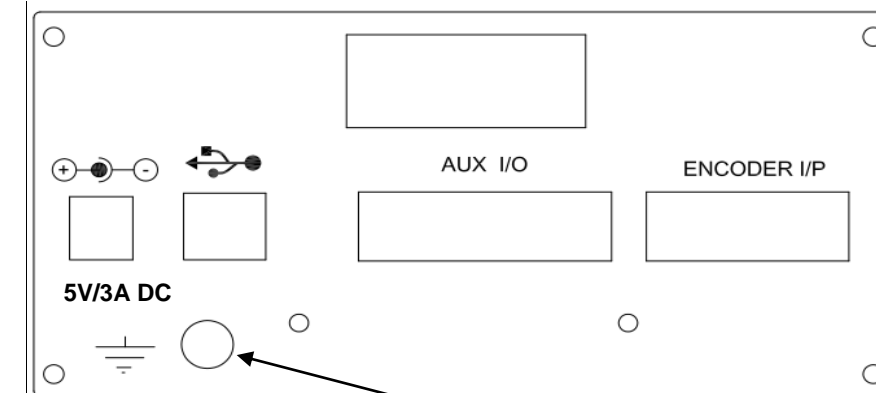
Front View



Set Key Abs/Inc Key Inch/mm Key Preset Key Enter Key

7 segment Display

Rear View



EQUIPOTENTIAL GROUND CONNECTION

Warranty will be considered void if and not limited to

- Failing to meet manufacturers specified supply conditions.
- Abusive handling.
- Environmental conditions outside of Manufacturers specifications.
- Manipulation, tampering of electronics.
- Replacement of original parts with other parts than specified by manufacturer.
- Used with encoders other than those supplied by the manufacturer.

Disposal

At the end of its life, EL10 DRO systems should be disposed of in a safe an environmentally sympathetic manner as applicable to local legislation. The casework and other components may be suitable for recycling. DO NOT BURN.

- ✓ **Mounting options are available. Kindly contact manufacturer for more details**

Electronica Mechatronic Systems (India) Pvt. Ltd.

Web: www.electronicaems.com; email: enquiry@electronicaems.com

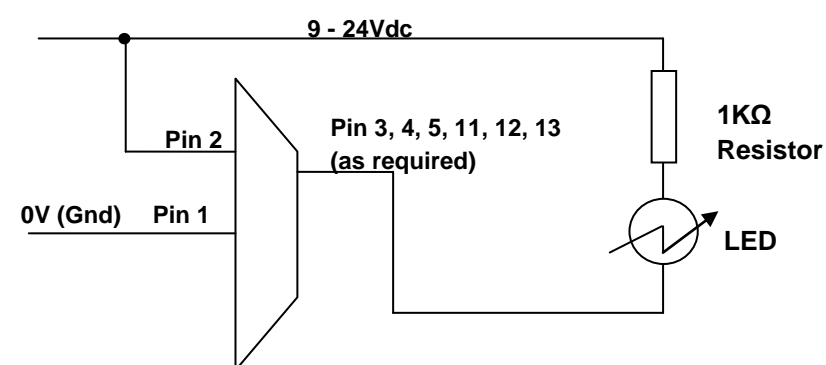
Code: 0073-14-1931

Update Date: 09/12/2012

Additional information about EL10 DRO

Six output testing:

For testing output of the function, make the use of external components with connector as shown in figure below

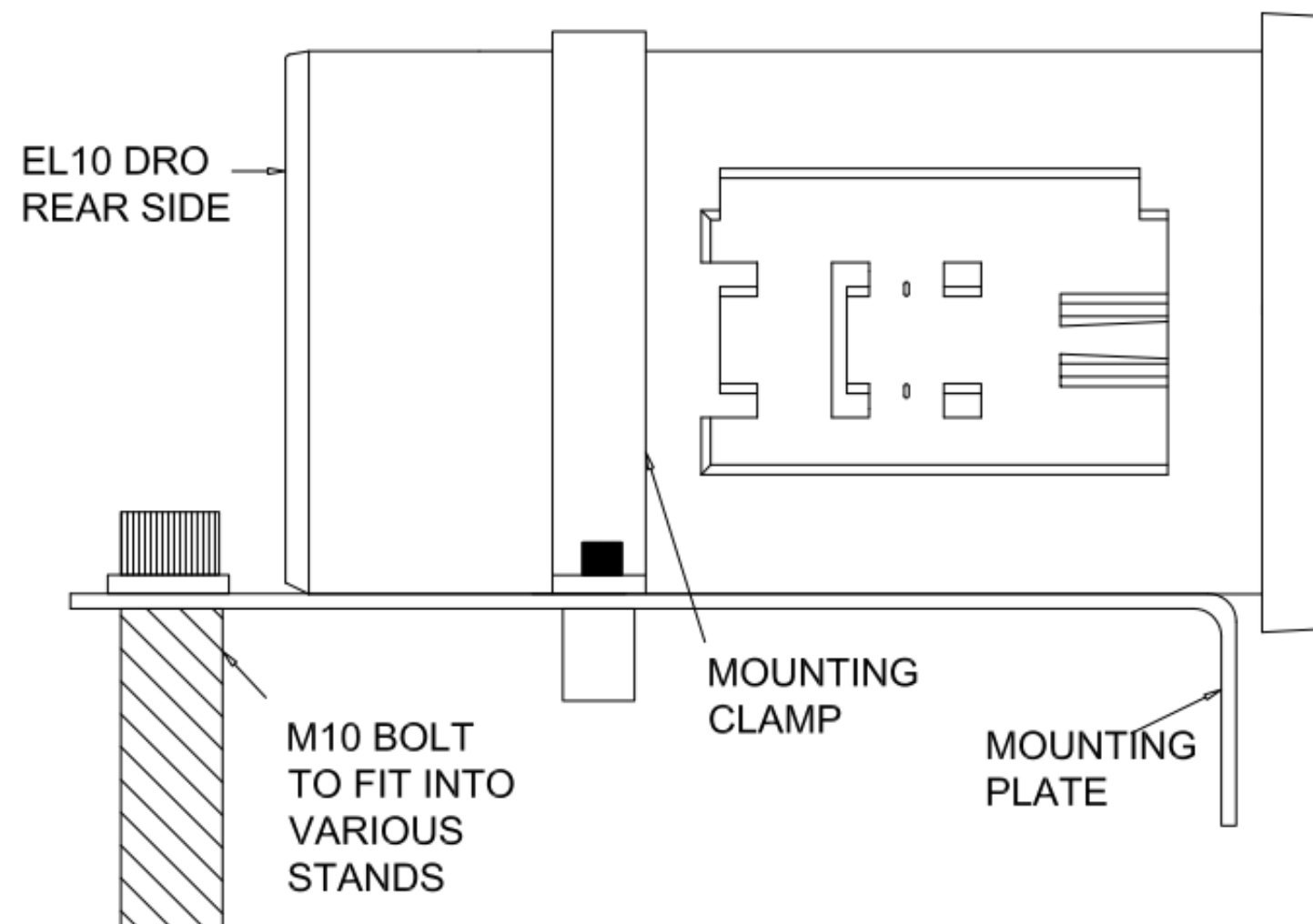


Electrical Output specifications:

- Outputs are open collector.
- Maximum current rating 500mA max.
- Output voltage rating 24V max.



EL10 DRO mounting guidelines



As shown in above image, DRO fits between Mounting plate and clamp using 2 nos. of M4 X 10 Allen screws and M4 washers.

This assembly can be mounted on various single arm and double arm stands.

Please contact manufacturer / distributor for more information regarding single and double arm stands as per your requirement.