



## Manual Machine Tool DRO Products

### Digital Readout and Linear scales

Based in Leicestershire, central England, EMS (International) are a global supplier of measuring solutions for machine tool and automation. Since our original formation by Electronica (EMS) in 2008 we have continued to grow and serve our international markets globally becoming EMS (International) in 2012. Building on our export success as of February 2014 we now have a presence in China as **ems-i (Beijing)**, ([www.ems-i.cn](http://www.ems-i.cn)), to provide local sales and service support specifically targeting machine tool CNC and automation applications.

Whilst this catalogue covers products for manual machine tools we also provide measurement and metrology solutions to both the CNC and Automation sectors. This includes high performance CNC scales, rotary encoders, digital counters, digital height gauges and much more.





We remain committed to supplying only quality products backed by our UK based sales, service and support.

Best regards,

*ems-i*



## Contents

	Page	
<a href="#">EL700 LCD Colour Graphical DRO</a>	3	
<a href="#">EL600 LCD Mono Graphical DRO</a>	4	
<a href="#">EL400 LED Professional Machine Shop DRO</a>	5	
<a href="#">EL400 LED Ball-scale Retrofit Machine Shop DRO</a>	6	
<a href="#">EL300 LED DRO (Plastic Case)</a>	7	
<a href="#">EL10 LED Single Axis DRO</a>	8	
<a href="#">EM200 Complete DRO Kit packages</a>	9	
<a href="#">MG232 Performance Enclosed Magnetic Scales</a>	10	
<a href="#">MLC320 Enclosed Magnetic Scales (820 - 2040mm)</a>	11	
<a href="#">MLC310 Enclosed Magnetic Scales (2000 - 3000mm)</a>	12	
<a href="#">S1 Slim Spar Mounted Magnetic Scales</a>	13	
<a href="#">S2 Spar Mounted Magnetic Scales (1000 - 30,000mm)</a>	14	
<a href="#">PS Spar Mounted Magnetic Scale Profiles</a>	15	
<a href="#">MLS120 Magnetic Reader-head with Detachable Cable</a>	16	
<a href="#">MLS130 Ultra-miniature Magnetic Reader-head</a>	17	
<a href="#">GS110 Optical Micro-scale</a>	18	
<a href="#">ALS 11uA Retrofit Scales</a>	19	

**EMS (International) Ltd.**  
Unit 7  
Kingsley Business Park  
Kibworth Beauchamp  
Leicestershire, LE8 0LE

Tel: 0116 279 3035  
[info@ems-i.co.uk](mailto:info@ems-i.co.uk) / [www.ems-i.co.uk](http://www.ems-i.co.uk)


# EL700 LCD PERFORMANCE DIGITAL READOUT

TFT Colour LCD Graphical display



- 5.7" TFT Colour LCD with Backlight
- Robust wipe clean soft touch keypad
- Machine specific Milling & Turning
- Graphical representations of all functions
- Dynamic tool position display
- Huge array of functions to improve productivity
- One-touch context sensitive graphical help
- Clear wide-viewing angle display
- Give programs a real name and save for recall
- Ideal first-fit or retrofit replacement.

The EL700 is a high performance professional machine shop digital readout housed in a die-cast aluminium case. Fully loaded with all the features it also benefits from a clear LCD graphical display that shows visually all functions allowing for higher levels of productivity. Job programs can also be given a 'real' name and saved for later recall simplifying repeat work.

In graphic mode it even dynamically shows the tool position on screen relative to the job or function you are working on. And if you need any help press the  key for context sensitive help.

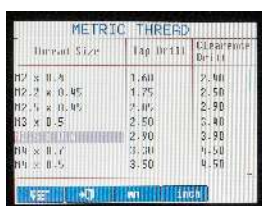
Feature	Generic (Mill + Lathe)
No of Axes	2, 3, 4 simultaneous display
Display	5.7" QVGA Monochrome LCD display
Case	Die-cast Aluminium
Power	90 ... 265 VAC (50/60Hz) 15W SMPS
Storage Temperature	- 20°C to 70°C
Operating Temperature	0°C to 50°C
Relative Humidity	20% to 85% Non-condensing
Dimensions (H x W x D)	192mm X 290mm X 76mm
Protection Class	Front Panel - IP54, Rear Panel - IP40



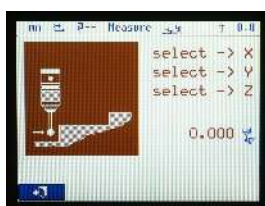
Generic Functions	Mill Specific Functions
Sub datum (99 steps) Home /	Bolt Hole circular (including full custom)
Machine reference	Bolt Hole arc
Half function	Arc contouring
Probe measurements	Grid array function
Job timer / Cost calculator	Linear Bolt Hole function
Distance-to-go function	Slot function
Password protected mode	Tool database
Trigonometric calculator	Lathe Specific Functions
Angular axis configuration	Tool offsets (16 numbers)
Encoder fail detection	Axis summing
Switch between Numeric and Graphical (Tool) Display	Axis vectoring
LCD Contrast Adjustment (via keypad)	Taper calculations
	Rad / Dia display



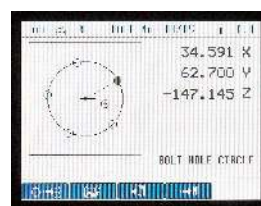
DRO Numeric Mode



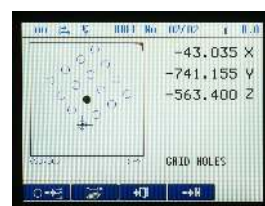
Tap and Drill Database



Probe Measurement



Fully Custom Bolt Holes



Grid Hole Array Function

## EMS (International) Limited

Unit 7 : Kingsley Business Park : Kibworth Beauchamp : Leicestershire LE8 0LE : England

Tel: +44 (0) 116 279 3035 : Fax: +44 (0) 116 271 1153  
e-mail: info@ems-i.co.uk : web: www.ems-i.co.uk

EL700 TFT Colour Readout




# EL600 LCD PERFORMANCE DIGITAL READOUT

Monochrome LCD Graphical display



- 5.7" QVGA Monochrome LCD with Backlight
- Robust wipe clean soft touch keypad
- Machine specific Milling & Turning
- Graphical representations of all functions
- Dynamic tool position display
- Huge array of functions to improve productivity
- One-touch context sensitive graphical help
- Clear wide-viewing angle display
- Give programs a real name and save for recall
- Ideal first-fit or retrofit replacement.

The EL600 is a high performance professional machine shop digital readout housed in a die-cast aluminium case. Fully loaded with all the features it also benefits from a clear LCD graphical display that shows visually all functions allowing for higher levels of productivity. Job programs can also be given a 'real' name and saved for later recall simplifying repeat work.

In graphic mode it even dynamically shows the tool position on screen relative to the job or function you are working on. And if you need any help press the  key for context sensitive help.

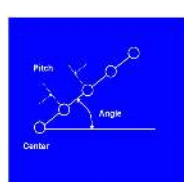
Feature	Generic (Mill + Lathe)
No of Axes	2 , 3
Display	5.7" QVGA Monochrome LCD display
Case	Die-cast Aluminium
Power	90 ... 265 VAC (50/60Hz) 15W SMPS
Storage Temperature	- 20°C to 70°C
Operating Temperature	0°C to 50°C
Relative Humidity	20% to 85% Non-condensing
Dimensions (H x W x D)	192mm X 290mm X 76mm
Protection Class	Front Panel - IP54, Rear Panel - IP40



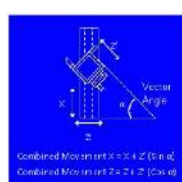
Generic Functions	Mill Specific Functions
Sub datum (99 steps)	Bolt Hole circular
Home / Machine reference	Bolt Hole arc
Half function	Arc contouring
Probe measurements	Grid array function
Job timer / Cost calculator	Linear Bolt Hole function
Distance-to-go function	Slot function
Password protected mode	Tool database
Trigonometric calculator	Lathe Specific Functions
Angular axis configuration	Tool offsets (16 numbers)
Encoder fail detection	Axis summing
Switch between Numeric and Graphical (Tool) Display	Axis vectoring
LCD Contrast Adjustment (via keypad)	Taper calculations
	Rad / Dia display



Bolt-hole



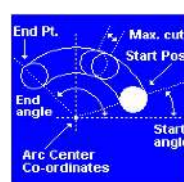
Line-hole



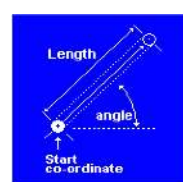
Vectoring



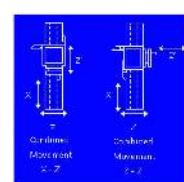
Grid Array



Arc-contouring



Slots & Pockets



Axes Summing

## EMS (International) Limited

Unit 7 : Kingsley Business Park : Kibworth Beauchamp : Leicestershire LE8 0LE : England

Tel: +44 (0) 116 279 3035 : Fax: +44 (0) 116 271 1153  
e-mail: info@ems-i.co.uk : web: www.ems-i.co.uk

EL600 LCD Readout

# EL400 MACHINE TOOL DIGITAL READOUT

Generic DRO for Milling and Turning applications



- Machine specific versions
- Milling, Turning & EDM (*internal relays*)
- Optical Glass or Magnetic encoders
- Cost effective design
- Auxiliary option with 6-outputs and Probe
- Tactile operator feedback
- Latest SDM manufactured design
- Segmented and Linear compensation
- Clear wide-viewing angle display
- Quality International manufacturer
- Ideal replacement for retrofit.

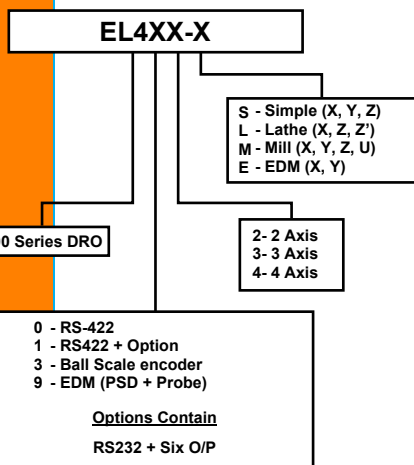
The EL400 is a professional machine shop digital readout housed in a die-cast aluminium case. Fully loaded with all the features you would expect including bolt-hole (PCD) patterns, sub-datums, tool-offsets, line-hole, arc-contouring and many more.

It also benefits from a rubber tactile keypad which provides positive operator feedback. With one-touch axis zero and access to all main functions it facilitates high levels of production efficiency.



Feature	Mill	Lathe	Simple	EDM
No. Axes	2, 3, 4	2, 3	2, 3	2
Display	LED			
Case	Die-cast Aluminium			
Power	90...265 VAC (50/60 Hz)			
Storage Temperature	-20°C to +70°C			
Operating Temperature	0°C to +50°C			
Relative Humidity	20% to 85% Non-condensing			
Dimensions (H x W x D)	155mm x 270mm x 80mm			
USB Service	Fitted as standard			
Auxiliary Port (6-outputs + RS232)	Option	Option		✓

Feature	Mill	Lathe	Simple	EDM
Half Function	✓	✓	✓	✓
Axis home reference	✓	✓	✓	✓
Machine Reference	✓	✓	✓	✓
One touch axis zero	✓	✓	✓	✓
Sub Datums	✓	✓	✗	✓
Tool Offsets	✗	✓	✗	✗
Bolt-hole circle (PCD)	✓	✗	✗	✓
Arc Bolt Hole	✓	✗	✗	✓
Arc Contouring	✓	✗	✗	✓
Grid Hole function	✓	✗	✗	✓
Taper calculator	✗	✓	✗	✗
Internal axis summing	✓	✓	✗	✗
Vectoring function	✗	✓	✗	✗
Line Hole function	✓	✗	✗	✓
Calculator (Trigonometric)	✓	✓	✗	✓
Pre-set Depth	✗	✗	✗	✓
Encoder fail detection	✓	✓	✓	✓
Memory backup	✓	✓	✓	✓



**EMS (International) Limited**

Unit 7 : Kingsley Business Park : Kibworth Beauchamp : Leicestershire LE8 0LE : England

Tel: +44 (0) 116 279 3035 : Fax: +44 (0) 116 271 1153  
e-mail: info@ems-i.co.uk : web: www.ems-i.co.uk

Standard  
Option

EL400 Digital Readout

# EL430 MACHINE TOOL DIGITAL READOUT

100% Compatible Ball-scale Replacement DRO

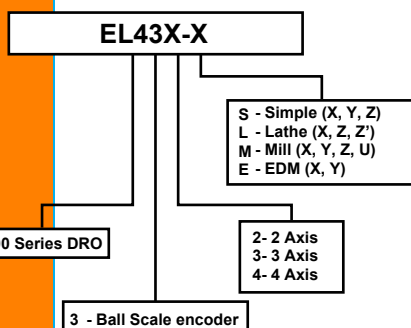


- Machine specific Milling & Turning
- 100% Ball-scale Compatible
- Cost effective design
- Auxiliary option with 6-outputs and Probe
- Tactile operator feedback
- Get 1µm resolution from 1/2" Ball-scales
- Segmented and Linear compensation
- Clear wide-viewing angle display
- Quality International manufacturer
- Ideal replacement for retrofit.

The EL430 is a professional machine shop digital readout housed in a die-cast aluminium case. Designed as a direct low-cost replacement for expensive Ball-scale DRO. Fully loaded with all the features you would expect including bolt-hole (PCD) patterns & tool-offsets.

It also benefits from a rubber tactile keypad which provides positive operator feedback.

With one-touch axis zero and access to all main functions it facilitates high levels of production efficiency.



Adaptor leads for Legacy style ball-encoders fitted with round Bleecon connectors

Feature	Mill	Lathe
No. Axes	2, 3, 4	2, 3
Display	7-Segment LED	
Case	Die-cast Aluminium	
Integrated SMPS	90...265 VAC (50/60 Hz)	
Storage Temperature	-20°C to +70°C	
Operating Temperature	0°C to +50°C	
Relative Humidity	20% to 85% Non-condensing	
Dimensions (H x W x D)	155mm x 270mm x 80mm	
USB Port (service & updates)	Standard	Option
Auxiliary Port (6-outputs)	Standard	Option

Function	Mill	Lathe
Half Function (Centre Find)	Standard	Option
Axis home reference	Standard	Option
Machine Reference	Standard	Option
One touch axis zero keys	Standard	Option
Sub-datums	Standard	Option
Tool Offsets	Standard	Option
Bolt-hole circle (PCD - Full circle)	Standard	Option
Arc Bolt Hole	Standard	Option
Arc Contouring	Standard	Option
Grid Hole function	Standard	Option
Taper calculator	Standard	Option
Internal axis summing	Standard	Option
Vectoring function	Standard	Option
Line Hole function	Standard	Option
Calculator (Trigonometric)	Standard	Option
Encoder fail detection	Standard	Option
Memory backup	Standard	Option

Standard  
Option

## EMS (International) Limited

Unit 7 : Kingsley Business Park : Kibworth Beauchamp : Leicestershire LE8 0LE : England

Tel: +44 (0) 116 279 3035 : Fax: +44 (0) 116 271 1153  
e-mail: info@ems-i.co.uk : web: www.ems-i.co.uk

EL430 Ball-scale Compatible Readout

# EL300 MACHINE TOOL DIGITAL READOUT

Generic DRO for Milling and Turning applications



- Generic design with user selectable
- Modes for Milling and Turning
- Optical Glass or Magnetic encoders
- Cost effective design
- Auxiliary option with 6-outputs and Probe
- Tactile operator feedback
- Latest SDM manufactured design
- Segmented and Linear compensation
- Clear wide-viewing angle display
- Quality International manufacturer
- Ideal replacement for retrofit.

The EL300 is a compact cost effective machine tool digital readout housed in an ABS plastic light weight case. With a clear LED axis display there is no compromise on performance as it has all the functionality you would expect from a leading DRO.

It also benefits from a rubber tactile keypad which provides positive operator feedback. With milling and turning functions available at the touch of a button it is also ideal for combination or dual purpose machines.

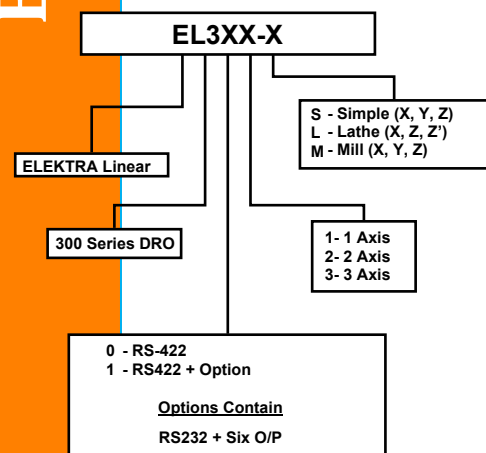


Feature	Mill	Lathe	Simple
No. Axes	2, 3	2, 3	1, 2, 3
Display	LED		
Case	Plastic Injection moulded		
Power	90...265 VAC (50/60 Hz)		
Storage Temperature	-20°C to +70°C		
Operating Temperature	0°C to +50°C		
Relative Humidity	20% to 85% Non-condensing		
Dimensions (HxWxD)	155mm x 270mm x 80mm		
USB Service Port	Fitted as standard		
Auxiliary Port			

Feature	Mill	Lathe	Simple
Half Function			
Inch/metric conversion			
Absolute/incremental modes			
Axis home reference			
Machine Reference			
Sub Datums			
Tool Offsets			
Bolt-hole circle (PCD)			
Arc Bolt Hole			
Arc Contouring			
Grid Hole function			
Taper calculator			
Internal axis summing			
Vectoring function			
Line Hole function			
Calculator (Trigonometric)			
Encoder fail detection			
Memory backup			

Standard  
 Option

## EL300 Digital Readout



## EMS (International) Limited

Unit 7 : Kingsley Business Park : Kibworth Beauchamp : Leicestershire LE8 0LE : England

Tel: +44 (0) 116 279 3035 : Fax: +44 (0) 116 271 1153  
e-mail: info@ems-i.co.uk : web: www.ems-i.co.uk



# INDUSTRIAL 1-AXIS DIGITAL READOUT

Quadrature Input



- ✓ 2MHz Input Frequency
- ✓ 8-digit clear LED display
- ✓ 15D Auxiliary Port
- ✓ Probe Input
- ✓ Quadrature high-speed Counter
- ✓ 9Vdc power supply
- ✓ Resolution display to 0.1µm
- ✓ Segmented & Linear Error Compensation

The easy to use EL10 Single axis digital readout can be used with linear or rotary encoders.

With RS232 output and 6 opto-isolated outputs as standard the EL10 is suitable for a wide range of automation and machine tool applications.



## Standard Functions

- Half Function
- Inch/Metric Conversion
- Axis Home Reference
- Machine Reference
- One-touch Axis Zero/Reset
- Pre-set Depth
- Encoder Fail Detection
- Memory Backup

## Technical Specifications

Display	7 x 0.56" 7-segment LED display
Power Supply	Adaptor external Input: 100-240VAC 50/60Hz Output: 9VDC/2.5A
Power Consumption	20W (max.)
Encoder Input	9-Pin D-Type Female. Differential Line driver as per EIA RS422 standards.
Inputs	A/B Encoder Pulse Input (600 KHz Max.) Z (External Reset) - Edge selected by Menu HOLD Input - Edge selected by Menu
Auxiliary (I/O)	15-Pin D-Type Female For Auxiliary Output. Probe Input. RS232 Output. 6 opto-isolated outputs
Display	8-digit 0.56" 7-Segment LED
Serial Communication	RS232 (Optional)
Dimensions	144 x 72 x 110.5mm
Weight	500g (approx)
Relative Humidity	80% Non-condensing
Storage Temperature	-10 to 60°C
Operating Temperature	0 to 50°C
Protection Class	IP50 Front Panel, IP20 Rear Panel



**EMS (International) Limited**

Unit 7 : Kingsley Business Park  
Kibworth Beauchamp  
Leicestershire LE8 0EX : England

Tel: +44 (0) 116 279 3035 : Fax: +44 (0) 116 271 1153  
e-mail: info@ems-i.co.uk : web: www.ems-i.co.uk

EL10 1-axis DRO



# EM200 BUDGET 'COMPLETE' DRO KITS

Full dro kits for cost sensitive installations



## EM200 Budget 2 or 3-axes DRO Kits



The **EM200** series digital readout kits are fully CE Certified and have been meticulously compiled to provide a quality measurement system that includes all scales, mounting arm (or stand) and fittings required at incredible value

The kits are supplied with a detailed graphical operators manual and scale installation guide. Along with all installation parts including all screws, washers, cable P-clips etc. all scales under 500mm travel also come with a mounting spar to simplify installation.



### DRO Specifications

No. Axes / Type	2 or 3-axes / Mill or Lathe
Display(s) LED	8 x 7-segment positional display 8 x 14 segment information display 2 x 7 segment job / tool display
Case Type	Lightweight ABS
Power Supply	110-240 Vac / 50-60Hz / 15W
Size	265 x 182 x 48mm
Weight	1.1Kg
Mounting	M10 stud via supplied tilt mount
Keyboard	Wipe clean membrane
Functions	Inch / Metric Absolute / Incremental Half function Calculator 99 Sub datums PCD (Bolt-hole) Line hole array Inclined Plane Machining R Function / Simple Arc Function Shrinkage Compensation Tool Offsets (Lathe)
Connection Type	9 pin D-type
Operating Temperature	0° C to 40° C
Storage Temperature	-20 °C to 70°C
Protection Class	IP54

### Scale Specifications

Resolution / Grating	5µm / 20µm
Accuracy	+/-10µm/m
Cable	3m Armoured
Output Signal Type	RS422 Line Driver (1Vpp by Special order)
Output Signals	A, /A, B, /B, Z, /Z (Full differential),
Travel Lengths	<u>GS110 Micro-scale</u> 150, 220, 270, 320, 370mm <u>GS130 Standard scale</u> 270, 320, 370, 420, 470, 520, 620, 670, 720, 770, 820, 1020mm
Mounting Spar	Included for scales under 500mm
Operating Current	Maximum 40 mA per Channel
Power Supply	5 VDC
Operating Temperature	0° C to 40° C
Storage Temperature	-20 °C to 70°C
Protection Class	IP54

### EMS (International) Limited

Unit 7 : Kingsley Business Park : Kibworth Beauchamp : Leicestershire LE8 0LE : England

Tel: +44 (0) 116 279 3035 : Fax: +44 (0) 116 271 1153  
e-mail: [info@ems-i.co.uk](mailto:info@ems-i.co.uk) : web: [www.ems-i.co.uk](http://www.ems-i.co.uk)

# MG232 SLIM IP67 ENCLOSED MAGNETIC SCALE

Performance Magnetic scale for Machine Tools



## MG232 Magnetic Encoder



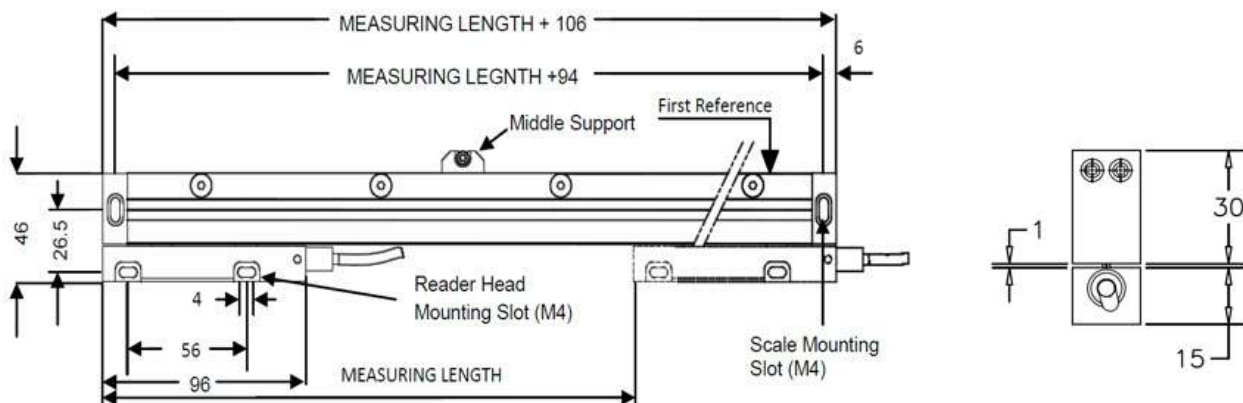
- Industry accepted IP67 Protection class
- Combines the ease of mounting and performance of Optical encoders with the robustness of Magnetic measuring systems
- Custom reference mark available on request
- High resolutions to 0.5µm available
- Available in lengths up-to 3040 mm
- Scale cover included as standard
- Double interlocked stainless steel armoured cable or high-flex PUR cables
- Suitable for High speed applications

The MG232 enclosed high-performance linear encoders provide unsurpassed robustness without the need to compromise on performance. Ideally suited for manual and CNC applications the MG232 offers far higher levels of contamination resistance to coolants, dust and debris compared to traditional Optical scales.



### Technical Specifications

Power Supply	5Vdc +/- 5%
Resolutions	0.5, 1.0 or 5.0µm
Accuracy	± 10µm
Measuring Lengths	120, 170, 220, 270, 320, 370, 420, 470, 520, 620, 720, 770, 820, 920, 1020, 1120, 1240, 1340, 1440, 1540, 1640, 1740, 1840, 1940, 2040mm (up to 3040mm by special order)
Signal Output	Differential Line driver as per EIA RS422 standards
Reference	Every 50mm Custom or Distance-Coded by special order
Cable	With double locking Stainless Steel protective armour Non-armoured (PUR) option available
Environmental	Rated to IP67
Storage Temperature	-20 to 70°C
Max. Operating Speed	2m/s



### EMS (International) Limited

Unit 7 : Kingsley Business Park : Kibworth Beauchamp : Leicestershire LE8 0LE : England

Tel: +44 (0) 116 279 3035 : Fax: +44 (0) 116 271 1153  
e-mail: [info@ems-i.co.uk](mailto:info@ems-i.co.uk) : web: [www.ems-i.co.uk](http://www.ems-i.co.uk)




# MLC320 Magnetic Encoder



- **Robust heavy aluminium section**
- **Industry accepted IP67 Protection class and high resistance to shock and vibration**
- **Combines the ease of mounting and performance of Optical encoders with the robustness of Magnetic measuring systems**
- **Custom reference mark available on request**
- **High resolution 5µm as standard**
- **L2-part Reader-head bracket and scale guards included**
- **5m Detachable reader-head cable**
- **Fully guided readr-head for ultimate alignment**

**Applications include:**

- Lathes, Milling, Drilling, Boring Machines
  - Sheet Metal Working Machines
  - Welding Machines
  - Bending Machines
  - Robotics/Materials Handling
  - Marble Machines
  - Wood Cutting Machines
  - PVC Profile Cutting Machines
  - Glass Working Machinery
  - Etc...
- 



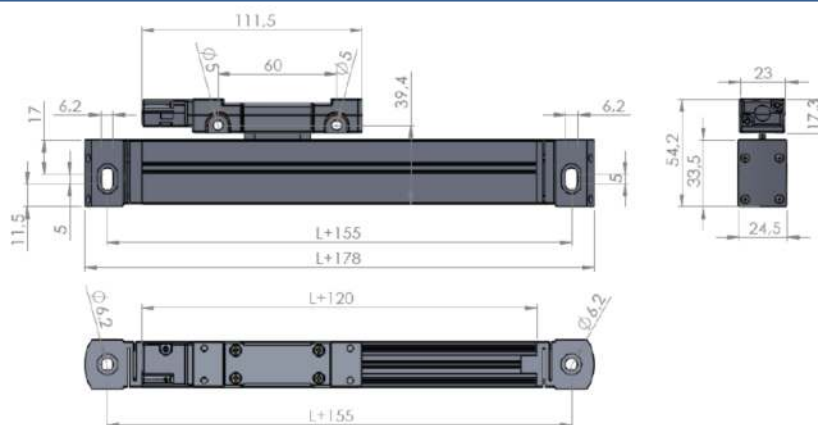
<b>Power Supply</b>	5Vdc +/- 5%
<b>Resolutions</b>	5μm or 10μm
<b>Accuracy</b>	± 20μm
<b>Measuring Lengths</b>	820, 870, 920, 1020, 1120, 1240, 1340, 1440, 1540, 1640, 1740, 1840, 1940, 2040 (Custom measuring lengths by special order)
<b>Signal Output</b>	Differential Line driver as per EIA RS422 standards
<b>Reference</b>	Periodic (5mm) Single-point by Special Order
<b>Cable</b>	5m length Coated stainless steel protective amour
<b>Environmental</b>	Rated to IP67
<b>Storage Temperature</b>	-20 to 70°C
<b>Max. Operating Speed</b>	3m/s

## Mechanical Dimensions

Dimensions in mm



**Detachable cable with gasket sealing to maintain IP67 protection**



Unit 7 : Kingsley Business Park : Kibworth Beauchamp : Leicestershire LE8 0LE : England

**Tel: +44 (0) 116 279 3035 : Fax: +44 (0) 116 271 1153**  
**e-mail: [info@ems-i.co.uk](mailto:info@ems-i.co.uk) : web: [www.ems-i.co.uk](http://www.ems-i.co.uk)**

# MG310 HEAVY IP67 ENCLOSED MAGNETIC SCALE

Performance Magnetic scale for longer travels



## MLC310 Magnetic Encoder



- Robust heavy aluminium section
- Industry accepted IP67 Protection class and high resistance to shock and vibration
- Combines the ease of mounting and performance of Optical encoders with the robustness of Magnetic measuring systems
- Custom reference mark available on request
- High resolution 5µm as standard
- Lengths up-to 3000 mm
- Scale cover included
- 5m armoured cable

The MG310 enclosed high-performance linear encoder has fully sealed electronics and sensors in a robust construction designed specifically for longer travels. Providing unsurpassed robustness without the need to compromise on performance they offer far higher levels of contamination resistance to coolants, dust and debris, shock and vibration compared to traditional Optical scales.

### Applications include:

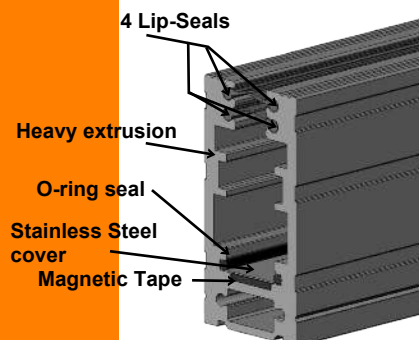
- Lathes, Milling, Drilling, Boring Machines
- Sheet Metal Working Machines
- Welding Machines
- Bending Machines
- Robotics/Materials Handling
- Marble Machines
- Wood Cutting Machines
- PVC Profile Cutting Machines
- Glass Working Machinery
- Etc...



### Technical Specifications

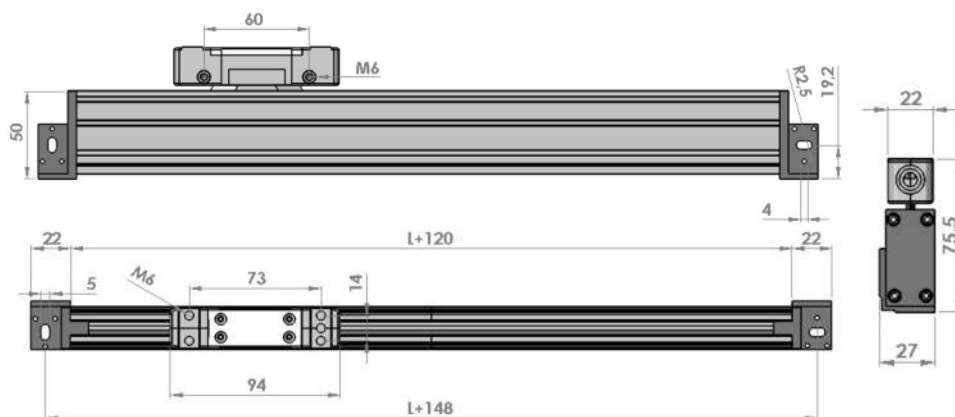
Power Supply	5Vdc +/- 5%
Resolutions	5µm or 10µm
Accuracy	± 20µm
Measuring Lengths	2000, 2100, 2200, 2300, 2400, 2500, 2600, 2700, 2800, 2900, 3000mm (Custom measuring lengths by special order)
Signal Output	Differential Line driver as per EIA RS422 standards
Reference	Periodic (5mm) Single-point by Special Order
Cable	5m length Coated stainless steel protective armour
Environmental	Rated to IP67
Storage Temperature	-20 to 70°C
Max. Operating Speed	3m/s

### Construction



### Mechanical Dimensions

Dimensions in mm



## EMS (International) Limited

Unit 7 : Kingsley Business Park : Kibworth Beauchamp : Leicestershire LE8 0LE : England

Tel: +44 (0) 116 279 3035 : Fax: +44 (0) 116 271 1153  
e-mail: [info@ems-i.co.uk](mailto:info@ems-i.co.uk) : web: [www.ems-i.co.uk](http://www.ems-i.co.uk)



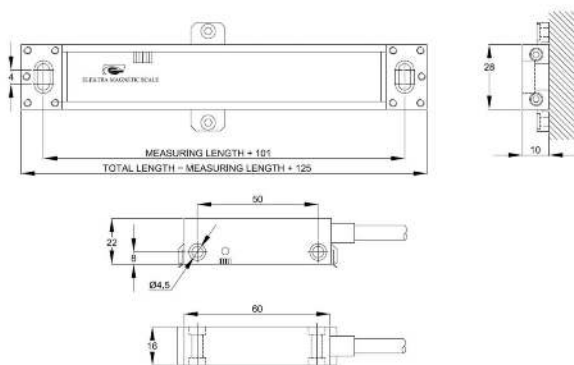
# S1 SLIM MAGNETIC SCALES

Can be cut to length for optimal installation



The S1 super slim magnetic scales are an easy to fit solution to a broad range of measurement applications. Available in a range of standard lengths they can also be 'cut-to-fit' during installation so as to maximise the available travel using basic machine-shop equipment in a matter of minutes. So no need to compromise on standard optical scale lengths.

With a cross section of just 28 x 10mm and over-travel of just 125mm they are ideal for smaller machines and low profile



- RS422 full differential signals for high noise immunity
- Rated to IP67 protection class
- Resolutions available up to 1µm
- Ideal for manual machine-tools and CNC applications
- Backlash free operations
- Non-contact, non-optical, measurement
- Broad range of mounting kits
- Can be 'cut-to-fit' during installation

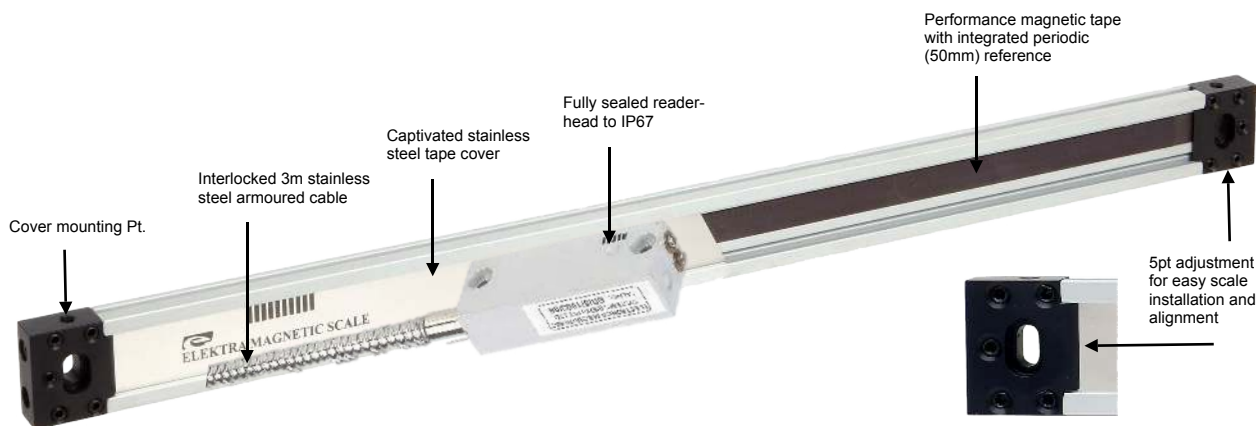
## Technical Specifications

Resolution	1µm, 5µm, 10µm
Technology	Magnetic with 2mm pole-pitch
Accuracy Options	± 10µm
Repeatability	±1 Resolution count
Standard Lengths	100, 150, 200, 250, 300, 350, 4000, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 1000mm
Max. Traverse Speed	4m/s at 5µm and above resolutions 2m/s at 1µm resolution
Power Supply	+ 5 VDC (+/-5%) Typ.150mA (250mA max)
Output Signal Options	RS422 Differential Quadrature
Reference Mark	Periodic, Every 50mm
Mechanical Dimensions	28 x 10 x ML+125 (mm)
Operating Temperature	0° C to 50° C
Storage Temperature	-20 °C to 70°C
Cable	5m Armoured
Max Cable Length	20m (3m supplied)
Protection Class	IP67

## The S1 Advantage

S1 Magnetic scales consist of performance magnetic tape mounted to an aluminium extrusion spar and protected by a captivated stainless steel cover strip. The scale also has integrated mounting which includes a slot for easy vertical alignment adjustment but significantly it also includes 5 jacking screws at each end allowing for adjustment for parallel and tapered surfaces.

- **S1 scales** provide full environmental sealing to dust, coolants, metal chips
- **S1 scales** are easy to install using the integrated adjustable mounting
- **S1 scales** come with scale covers and installation kit including all screws, washers, P-clips etc.
- **S1 scales** can be easily cut to length during installation, so no need to compromise on manufacturer 'standard' lengths.
- **S1 scales** are low profile and can fit where alternative optical or magnetic scales simply won't
- **S1 scales** come with a 2-Year UK backed manufacturers guarantee
- **S1 scales** offer higher performance operation with resolutions to 1µm and a certified accuracy class of 10µm/m
- **S1 scales** (unlike many low-cost systems) have full differential signals as used on CNC machines to provide higher noise immunity and improved operating stability



## EMS (International) Limited

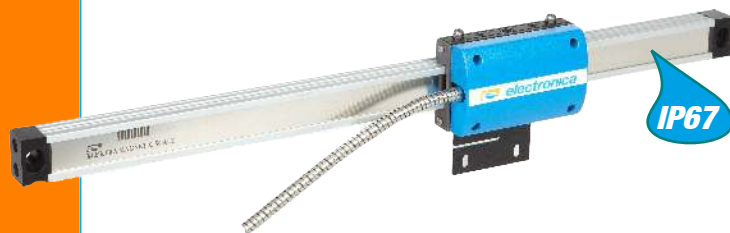
Unit 7 : Kingsley Business Park : Kibworth Beauchamp : Leicestershire LE8 0LE : England

Tel: +44 (0) 116 279 3035 : Fax: +44 (0) 116 271 1153  
e-mail: info@ems-i.co.uk : web: www.ems-i.co.uk

S1 Slim Magnetic Scale

## S2 Scales for Longer Travel Lengths

Available in lengths from 2,000 to 30,000mm



The Guided version of the S2 magnetic encoders provide an ideal solution for longer travels where the alignment between the reader-head and scale can not be guaranteed.

The Guiding carriage is easy to install and can be coupled to the machine by a number of 'flexible' no-backlash options to provide a very high mounting tolerance.



- RS422 full differential signals for high noise immunity
- Rated to IP67 protection class
- Resolution available up to 1  $\mu\text{m}$
- Ideal for manual machine-tools and CNC applications
- Backlash free operations
- Non-contact, non-optical, measurement
- CE and RoHS compliant

### Technical Specifications

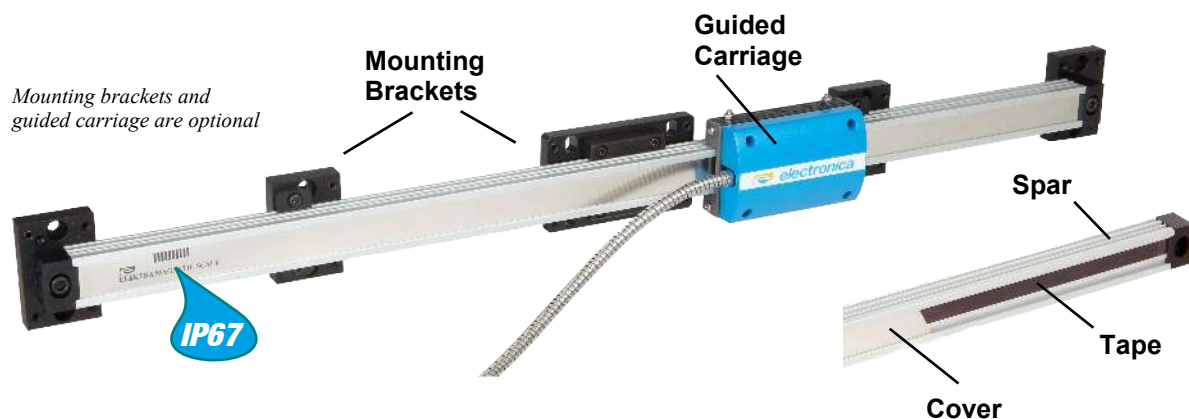
Resolution	1 $\mu\text{m}$ , 5 $\mu\text{m}$ , 10 $\mu\text{m}$
Technology	Magnetic with 2mm pole-pitch
Accuracy Options	$\pm 10\mu\text{m}$
Repeatability	$\pm 1$ Resolution count
Single Lengths	1000, 1100, 1200, 1300, 1400, 1500, 1600, 1700, 1800, 1900, 2000mm
Modular Systems	User Specified to 30m in 100mm increments
Max. Traverse Speed	4m/s at 5 $\mu\text{m}$ and above resolutions 2m/s at 1 $\mu\text{m}$ resolution
Power Supply	+ 5 VDC (+/-5%) Typ. 150mA (250mA max)
Output Signal Options	RS422 Differential Quadrature
Reference Mark	Periodic, Every 50mm
Mechanical Dimensions	65 x 45 x ML+135
Operating Temperature	10° C to 50° C
Storage Temperature	-20 °C to 70°C
Cable	5m Armoured
Max Cable Length	20m
Protection Class	IP67

### S2 Guided 'Modular' Spar Type Magnetic

The **Modular** version of the S2 magnetic encoders allow for the S2 Guided benefits to be used on VERY long travel lengths of between 2m and 30m (or even longer). The system is supplied for easy on-site assembly consisting of:

- Spar sections which are joined together by stainless steel dowel pins.
- Optional Mounting brackets, with a high level of adjustment, can be mounted to the machine if the surface is poor or uneven.
- The magnetic tape, supplied as a roll, is then applied to what is now a single rigid spar.
- The stainless steel cover strip inserted to create a single length encoder with NO joins in the measuring system.
- Finally the guided carriage is slid on to the end of the scale, using a special guide provided, and then the end block fitted.

This system provides a quick installation mechanism on what can often be difficult conditions. As the measuring element is continuous and securely mounted to the machine surface the high levels of accuracy and performance can be maintained as there are no mechanical limitations.



## EMS (International) Limited

Unit 7 : Kingsley Business Park : Kibworth Beauchamp : Leicestershire LE8 0LE : England

Tel: +44 (0) 116 279 3035 : Fax: +44 (0) 116 271 1153  
e-mail: [info@ems-i.co.uk](mailto:info@ems-i.co.uk) : web: [www.ems-i.co.uk](http://www.ems-i.co.uk)



**Ideally suited for manual machine tools these profiles provide a number of mounting options.**

<b>Tape Pitch</b>	5mm
<b>Reference</b>	Every 5mm (standard) User-definable reference option
<b>Maximum Resolution</b>	1μm
<b>Repeatability</b>	±1 Resolution count
<b>Accuracy</b>	20μm/m
<b>Standard Lengths</b>	100, 150, 200, 250, 300, 350, 4000, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 1000mm
<b>Max. Traverse Speed</b>	2m/s at 1μm resolution
<b>Operating Temperature</b>	0° C to 50° C
<b>Storage Temperature</b>	-20 °C to 70°C
<b>Protection Class</b>	IP67

- Rated to IP67 protection class
- Resolutions available up to 1µm
- Ideal for manual machine-tools
- Backlash free operations
- Non-contact, non-optical, measurement
- Can be 'cut-to-fit' during installation

**MLS120**

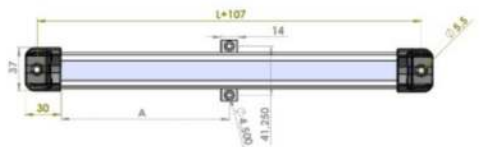
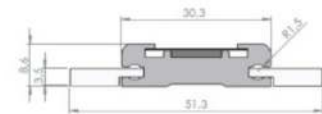
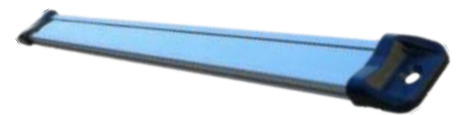
- Detachable cable
- Integrated wipers
- PUR or armoured cable

**MLS130**

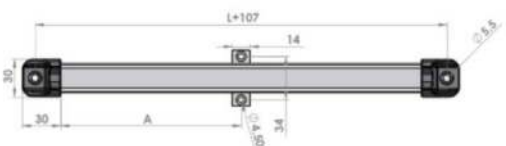
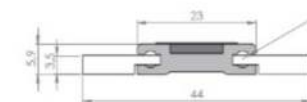
- Very Small size
- PUR cable

### Standard Features:

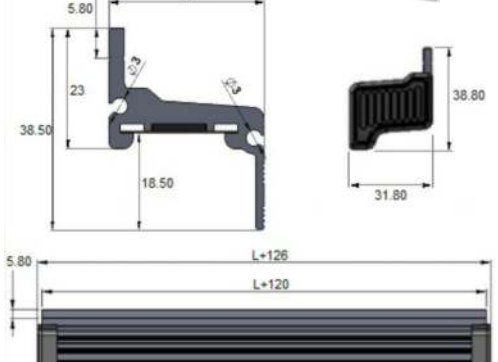
- Easy Mounting
- High Resolutions to 1μm Resolution
- High Accuracy (20μm Class)
- Sturdy Metal Case
- Protection Class IP67



**PS310 Low profileTape mounting profile.  
Captivated stainless steel cover strip.**



**PS210 Low profileTape mounting profile.**  
Stainless cover strip is not captivated.



**PS110 Tape mounting profile with integrated cover.**  
Ideal for manual machine tools

Unit 7 : Kingsley Business Park : Kibworth Beauchamp : Leicestershire LE8 0LE : England

**Tel: +44 (0) 116 279 3035 : Fax: +44 (0) 116 271 1153**  
**e-mail: [info@ems-i.co.uk](mailto:info@ems-i.co.uk) : web: [www.ems-i.co.uk](http://www.ems-i.co.uk)**

# MLS120 LINEAR ENCODER MAGNETIC READER-HEAD

Quadrature Output Encoder



- **Detachable cable!**
- Integrated wipers
- Easy Mounting
- High Resolution Up to 0.001 mm Resolution
- High Accuracy
- Spiral or PUR high-flex cable options
- Measuring Lengths Up to 100 m
- Resistant to Humidity
- Sturdy Metal Case
- Protection Class IP67

MLS120 series reader-heads are designed for use with our magnetic tape in a wide range of applications. The reader-head is fully encapsulated providing IP67 environmental protection to coolants, liquids, dust and debris. The MLS120 has the added benefit of a detachable cable making for easy installation and service.

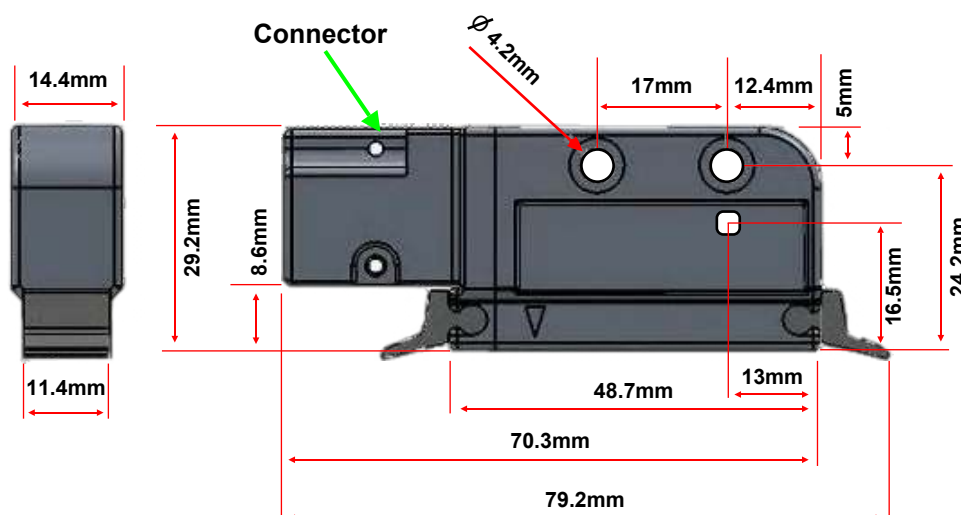
## Applications:

- Manual machine tools
- Machining Centres
- PVC Cutting Machines
- Wood Cutting Machines
- Lathes, Milling, Drilling, Grinding Machines
- Sheet Metal Working Machines
- Marble Machines
- Welding Machines
- Bending Machines
- Electrical Discharge Machines
- Robotics / Material Handling
- Glass Working Machinery etc...

## Reader-head Specifications

Resolution	1µm, 5µm, 10µm, 25µm, 50µm (or on request)
Output Signal Type	Push-Pull or TTL RS422 Line Driver
Output Signals	A, /A, B, /B, Z, /Z (Full differential)
Operating Current	Maximum 40 mA per Channel
Power Supply	5 VDC 10..30 VDC (Optional)
Housing Material	Aluminium
Sensor to Tape Gap range	0.1 mm to 2 mm
Cable	PUR or Spiral Armour (Detachable via connector)
Travel Velocity	3 m/s
Repeatability	±1 Pulse
Operating Temperature	-25 to +85°
Protection Class	IP67 (Exceeds NEMA 6)

## Mechanical Dimensions



## Connection Details

Colours	
YELLOW	A
WHITE	/B
RED	VDC
BLACK	0V
BLUE	/A
GREEN	B
GREY	/Z
PINK	Z
SHIELD	GND

## EMS (International) Limited

Unit 7 : Kingsley Business Park : Kibworth Beauchamp : Leicestershire LE8 0LE : England

Tel: +44 (0) 116 279 3035 : Fax: +44 (0) 116 271 1153  
e-mail: [info@ems-i.co.uk](mailto:info@ems-i.co.uk) : web: [www.ems-i.co.uk](http://www.ems-i.co.uk)



### MLS130 MINIATURE LINEAR ENCODER MAGNETIC READER-HEAD

Quadrature Output Encoder



- **VERY SMALL SIZE!**
- Easy Mounting
- High Resolution Up to 0.001 mm Resolution
- High Accuracy
- Armoured or PUR high-flex cable options
- Measuring Lengths Up to 100 m
- Resistant to Humidity
- Sturdy Metal Case
- Protection Class IP67

MLS130 series reader-heads are our smallest sized reader-heads that have been designed for mounting in those areas where space is too small for conventional linear encoders. With an ultra-small size they are ideal for many space restricted applications. Designed for use with our magnetic tape the reader-head is fully encapsulated providing IP67 environmental protection to coolants, liquids, dust and debris.

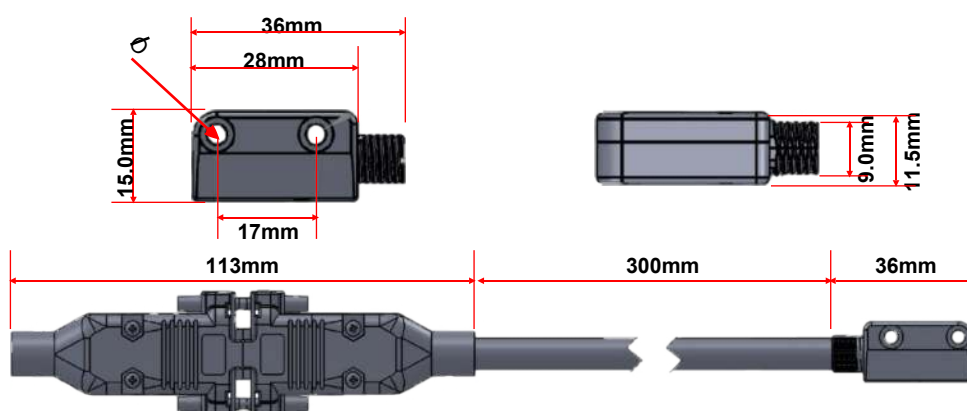
#### Applications:

- Manual machine tools
- Hobby machine tools
- Printing applications
- PVC Cutting Machines
- Wood Cutting Machines
- Lathes, Milling, Drilling, Grinding Machines
- Sheet Metal Working Machines
- Marble Machines
- Welding Machines
- Bending Machines
- Electrical Discharge Machines
- Robotics / Material Handling
- Glass Working Machinery etc...

#### Reader-head Specifications

Resolution	1µm, 5µm, 10µm, 25µm, 50µm (or on request)
Output Signal Type	Push-Pull or TTL RS422 Line Driver
Output Signals	A, /A, B, /B, Z, /Z (Full differential)
Operating Current	Maximum 40 mA per Channel
Power Supply	5 VDC 10..30 VDC (Optional)
Housing Material	Aluminium
Sensor to Tape Gap range	0.1 mm to 2 mm
Cable	300mm PUR or Armoured
Travel Velocity	3 m/s
Repeatability	±1 Count
Operating Temperature	-25 to +85°
Protection Class	IP67 (Exceeds NEMA 6)

#### Mechanical Dimensions



#### Connection Details

##### Colours

YELLOW	A
WHITE	/B
RED	VDC
BLACK	0V
BLUE	/A
GREEN	B
GREY	/Z
PINK	Z
SHIELD	GND

### EMS (International) Limited

Unit 7 : Kingsley Business Park : Kibworth Beauchamp : Leicestershire LE8 0LE : England

Tel: +44 (0) 116 279 3035 : Fax: +44 (0) 116 271 1153  
e-mail: [info@ems-i.co.uk](mailto:info@ems-i.co.uk) : web: [www.ems-i.co.uk](http://www.ems-i.co.uk)

# GS110 OPTICAL MICRO-SCALE FOR RESTRICTED SPACES

Perfect for smaller machines



- **VERY SMALL SIZE!**
- Easy Mounting
- 5µm Standard Resolution
- Supplied complete with mounting spar, reader-head brackets and scale cover
- Armoured cable
- Measuring Lengths Up to 400 mm
- Optical glass scale
- Sturdy Metal Case
- Protection Class IP54

The GS110 micro-scales have an ultra-low profile for mounting on small machines, lathe cross-slides or in other applications where the mounting space is restricted.  
With a 5-bearing reader-head carriage accuracy and a long working life is assured.

Also available in 1Vpp analogue and distance-coded options by special order.

## Applications:

- Manual machine tools
- Hobby machine tools
- CNC machine tools
- Printing applications
- Lathes, Milling, Drilling, Grinding
- Electrical Discharge Machines
- Robotics / Material Handling etc...

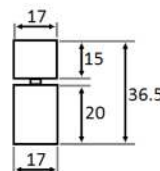
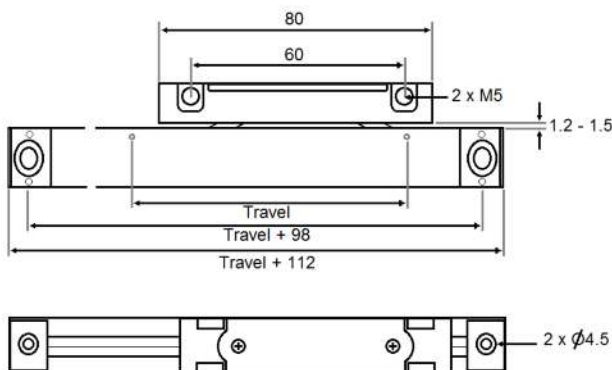


Full mounting kit supplied as standard with reader-head brackets and scale mounting spar.  
*Note: Scale cover included but not shown*

## Reader-head Specifications

Resolution	5mm (Standard) (1µm by special order)
Accuracy	+/-5µm
Grating Pitch	RS422 Line Driver
Reference	Periodic every 50mm (Distance-coded by special order)
Output Signal Type	RS422 Line Driver (1Vpp by Special order)
Output Signals	A, /A, B, /B, Z, /Z (Full differential),
Travel Lengths	80, 120, 170, 220, 280, 320, 370, 400mm
Operating Current	Maximum 40 mA per Channel
Power Supply	5 VDC
Housing Material	Aluminium
Sensor to Tape Gap range	0.1 mm to 2 mm
Cable	3m Armoured
Travel Velocity	2 m/s
Repeatability	±1 Count
Operating Temperature	-0 to 70°
Protection Class	IP54

## Mechanical Dimensions



## EMS (International) Limited

Unit 7 : Kingsley Business Park : Kibworth Beauchamp : Leicestershire LE8 0LE : England

Tel: +44 (0) 116 279 3035 : Fax: +44 (0) 116 271 1153  
e-mail: info@ems-i.co.uk : web: www.ems-i.co.uk

## 20µm OPTICAL LINEAR SCALE

11µA, 20µm grating with compatible round 9-pin connector



- 20µm Optical grating glass scale
- Guided scanning unit on a 5 ball-bearing carriage
- 11µA 20µm Optical Grating
- Metal 9pin Round Heidenhain™ compatible connector
- Easy Mounting
- Measuring Lengths 50 mm – 3000 mm
- 60 m/min Max. Traverse velocity
- **Reader-head bracket and Aluminium cover included**

ALS series 11µA optical scales offer a great are precision replacement alternative to expensive original fit encoders on older machines that require 11µA signals with a 20µm grating period. These scales are ideal for Milling, Turning and CNC applications and even come with a fully compatible metal 9-pin round connector.

### Compatible with

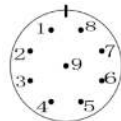
#### Compatibility

LS803D	LS903
LS503D	LS603
LS303	LS403
LS703	LS406
LS106	LS107

*Scales are fully electrically/signal compatible. Some mechanical adjustment to brackets may be required.*

Pin	Colour	11µA
1	Grey	A
2	Brown	/A
3	Red	+5VDC
4	Black	0V - Gnd
5	Blue	B
6	Green	/B
7	Yellow	Z
8	White	/Z
9		Shield

### Connection

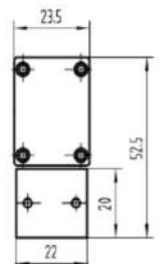
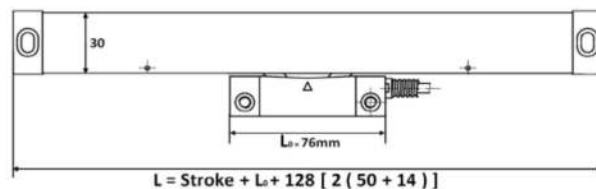


### Technical Specifications

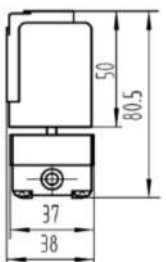
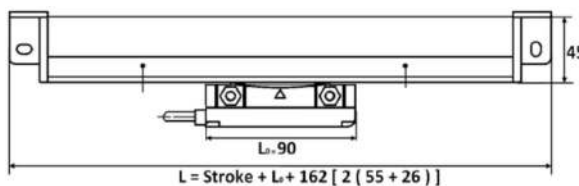
Output	11µA Sinusoidal
Output Signals	A, /A, B, /B, Z, /Z
Grating Pitch	20 µm
Power Supply	5 VDC
Accuracy	± 10 µm
Max. Speed	60 m/min
Repeatability	± 1 Pulse
Housing	Aluminium
Reference mark	Periodic (Every 50mm) Single Point (Optional)
Storage Temperature	40 to +55°C
Operating Temperature	0 to +50°C
Protection Class	IP54
Cable Length (Armoured)	50 – 1000 mm scale 3m Cable 1020 – 3000 mm scale 5m Cable

### Mechanical Dimensions

**Scales to 1000mm**  
(Slim section)



**Scales to 1000-3000mm**  
(Heavy section)



## EMS (International) Limited

Unit 7 : Kingsley Business Park : Kibworth : Leicestershire LE8 0LE : England

Tel: +44 (0) 116 279 3035 : Fax: +44 (0) 116 271 1153  
e-mail: [info@ems-i.co.uk](mailto:info@ems-i.co.uk) : web: [www.ems-i.co.uk](http://www.ems-i.co.uk)

ALS Optical Scales with 11µA, 20µm Grating





**EMS (International) Limited**

Unit 7 : Kingsley Business Park : Kibworth Beauchamp  
Leicestershire LE8 0LE : England

Tel: +44 (0) 116 279 3035 : Fax: +44 (0) 116 271 1153

e-mail: [info@ems-i.co.uk](mailto:info@ems-i.co.uk) : web: [ems-i.co.uk](http://ems-i.co.uk)