

## Tender Specifications for Universal Length Measuring Machine

**Application:** Calibration/ Measurement of Plain and Thread plug and ring gauges, Dial Indicators and Electronic comparators, External and Internal Micrometers, Bore Gauges, Snap Gauges, Length Bar/ Long Slip Gauges etc.

Sl. No.	Description	CMTI Requirements	Vendor's Specifications
1	Mechanical Design	Specify	
2	Measuring Range	Essential (Specify your standard Range)	
	a. External Plain – Absolute	100 mm or higher	
	b. External Plain - Differential	600 mm or higher	
	c. Internal Plain	3 – 400 mm and above	
	d. External Cylindrical Thread	1 - 550 mm (pitch 0.2 to 6mm)	
	e. Internal Cylindrical Thread	3 – 400 mm (pitch 0.5 to 6mm)	
	f. Micrometers (External & Internal)	300 mm and above	
	g. Dial Indicators (Plunger & Lever)	Plunger : Up to 100 mm Lever: Up to 5 mm	
	h. Two Point Bore Gauges	Transmission range :Up to 5 mm	
	i. Snap Gauge	Up to 100 mm and above	
	j. Length Bar / Long Slip Gauges	Up to 500 mm	
3	Drive System	Manual	
4	Feedback element/ Precision Glass Scale details including method of mounting	Specify	
5	Probing System details	Mechanical probing with carbide tips and ruby balls	
6	Operation Movement of measuring slide Positioning of Head stock and Tail Stock quill Work table height Adjustment	Specify	
7	Accuracy	$0.5 + \frac{L}{1000} \mu m$ or finer	
8	Resolution	0.1 $\mu m$ or finer	
9	Repeatability	Specify	
10	Measuring Force	0.2 to 2 N and above - Selectable	

11	Precision Work Table (with 5 Axis adjustment)	Work Table Dimension: 150 X 150 mm and above Height Adjustment: 70 mm and above Float: 20 mm and above Tilt: $\pm 1.5^\circ$ Rotation: $\pm 1.5^\circ$ Load Capacity: 20 kg and above	
12	Features a. Compliance with Abbe's principle b. Automatic detection of maximum and minimum value c. Zero setting/ Presetting d. Computer aided correction of Systematic errors e. Temperature Sensors for Machine and DUC -02 Nos. f. Computer aided correction for Temperature and measuring forces g. Metric/ Inch conversion h. Software for measurement as per standards	Essential Essential Essential Essential Essential Essential Essential Essential	
13	Error Compensation through software	Essential Procedure, Programmes, Authorization to be provided to CMTI for carrying out compensation of the axes.	
14	Software	Software for measurement of SI. No 2 (Gauge Measurement Software) and threads covering Metric, Unified, Whitworth, Acme, British Threads, etc. Software copy to be provided on CD ROM	
15	Report formats	Customized Report Format	
16	Charts & Plots	As per CMTI requirement	
17	Computer Hardware	Computer Hardware , software along with MS Window OS & Laser jet Printer should be latest one available and should meet all functional requirement.	

18	Standard Accessories including work holding fixtures for carrying out a) Plain Plug / Ring Gauges b) Thread Plug / Ring Gauges c) Dial Gauges (Plunger & Lever) d) Micrometers (External & Internal) e) Bore Gauges f) Snap Gauges g) Length Bar / Long Slip Gauges	Provide a list	
19	Optional Accessories including work holding fixtures for carrying out a) Taper Plug / Ring Gauges b) Taper Thread Plug / Ring Gauges	Specify	
20	Artefacts with Calibration Certificate from accredited laboratory. a) Setting Plug Gauge ~ dia. 50 mm b) Setting Ring Gauge ~ dia. 14 & 50 mm	Essential	
21	Equipment calibration and Certification	Equipment should be calibrated from an accredited laboratory with uncertainty on par with accuracy requirement	
22	Furniture	a) Sturdy table for mounting the equipment is to be provided. b) Computer table and Chair	
23	Acceptance Criteria	Should meet all requirements of specifications satisfactorily as given in the enclosed Acceptance Criteria and the Scope of Supply as per purchase order enclosure. Final acceptance is based on acceptance tests conducted at CMTI Rajkot as per the enclosed Acceptance Criteria.	
24	Service Support	Service support with spare parts availability for a period of ten years is essential.	
25	Environment	Specify environmental requirements like, Temperature, Humidity etc	
26	Power Supply	230 V / 50 Hz	
27	Manuals	Operation & Maintenance Manuals (with all Circuit diagrams) in English (2 hard copies + 1 soft copy on CD ROM)	
28	Installation & Commissioning	Installation & Commissioning should be done free of cost at CMTI, Rajkot by the trained engineers.	

29	Training	Training on operation, programming, application and maintenance of the machine to be provided for 2 engineers for minimum of 4 man-days at CMTI Rajkot.	
30	Performance Warranty	The equipment should have warranty for 36 months including material and labor from the date of installation, commissioning and acceptance at CMTI Rajkot.	
31	Supplier should supply at least 5 same specification machine in the last 5 years	Essential	
32	Customers using same model in India and other countries	The manufacturer has to provide the list of customers for the same quoted model along with their contact details like Contact Person, Phone, fax and e mail address etc.	
	<b>Optional</b>		
33	a. Taper – External (Taper Plug Gauge)	Up to 500 mm and above	
	b. Taper – Internal (Taper Ring Gauge)	3 to 100 mm and above	
	c. External Taper Thread Plug Gauge	Up to 500 mm and above	
	d. Internal Taper Thread Ring Gauge	10 – 100 mm and above	
34	Resolution of Y & Z axis Stage for Taper measurements	Y Axis Stage: 10 $\mu\text{m}$ Z Axis Stage: 0.1 $\mu\text{m}$	

**ACCEPTANCE CRITERIA FOR UNIVERSAL LENGTH MEASURING MACHINE**

Sl. No.	Parameter	Specification	Testing Method/ Remarks
1.	Measuring Range	Essential (Specify your standard Range)	Physical and functional check
	a. External Plain – Absolute	100 mm or higher	
	b. External Plain - Differential	600 mm or higher	
	c. Internal Plain	3 – 400 mm and above	
	d. External Cylindrical Thread	1 - 550 mm (pitch 0.2 to 6mm)	
	e. Internal Cylindrical Thread	3 – 400 mm (pitch 0.5 to 6mm)	
	f. Micrometers (External & Internal)	300 mm and above	
	g. Dial Indicators (Plunger & Lever)	Plunger : Up to 100 mm Lever: Up to 5 mm	
	h. Two Point Bore Gauges	Transmission range :Up to 5 mm	
	i. Snap Gauge	Up to 100 mm and above	
j. Length Bar / Long Slip Gauges	Up to 500 mm		
2	Accuracy	$0.5 + \frac{L}{1000} \mu m$ or finer	Using Laser Interferometer/ Slip Gauge
3	Resolution	0.1 $\mu m$ or finer	DRO Display
4	Repeatability	Specify	Using Laser Interferometer/ Slip Gauge
5	Precision Work Table (with 5 Axis adjustment)	Work Table Dimension: 150 X 150 mm and above Height Adjustment: 70 mm and above Float: 20 mm and above Tilt: $\pm 1.5^\circ$ Rotation: $\pm 1.5^\circ$ Load Capacity: 20 kg and above	Physical and functional check
6	Artefacts with Calibration Certificate from accredited laboratory. a) Setting Plug Gauge ~ dia. 50 mm b) Setting Ring Gauge ~ dia. 14 & 50 mm		Physical Verification
7	Equipment calibration and Certification	Equipment should be calibrated from an accredited laboratory with uncertainty on par with accuracy requirement	Physical Verification
8	Features a. Compliance with Abbe's principle		Physical and Functional Check

	<ul style="list-style-type: none"> <li>b. Automatic detection of maximum and minimum value</li> <li>c. Zero setting/ Presetting</li> <li>d. Computer aided correction of Systematic errors</li> <li>e. Temperature Sensors for Machine and DUC -02 Nos.</li> <li>f. Computer aided correction for Temperature and measuring forces</li> <li>g. Metric/ Inch conversion</li> <li>h. Software for measurement as per standards</li> </ul>		
9	Error Compensation through software	Procedure, programmes, Authorization to be provided to CMTI for carrying out compensation of the axes.	Functionality Check
10	Software	Software for measurement of SI. No 2 (Gauge Measurement Software) and threads covering Metric, Unified, Withworth , Acme, British Threads, etc. Software copy to be provided on CD ROM	Functionality Checks with Measurement and Analysis
11	Training	Training on operation, programming, application and maintenance of the machine to be provided for 2 engineers for minimum of 4 man-days at CMTI Rajkot.	
12	Optional		
	a. Taper – External (Taper Plug Gauge)	Up to 500 mm and above	Physical and functional check
	b. Taper – Internal (Taper Ring Gauge)	3 to 100 mm and above	
	c. External Taper Thread Plug Gauge	Up to 500 mm and above	
	d. Internal Taper Thread Ring Gauge	10 – 100 mm and above	
13	Resolution of Y & Z axis Stage for Taper measurements	Y Axis Stage: 10 $\mu\text{m}$ Z Axis Stage: 0.1 $\mu\text{m}$	System Display

Note: The above criteria is in addition to scope of supply and may be modified based on the scope of supply while placing the Purchase Order

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