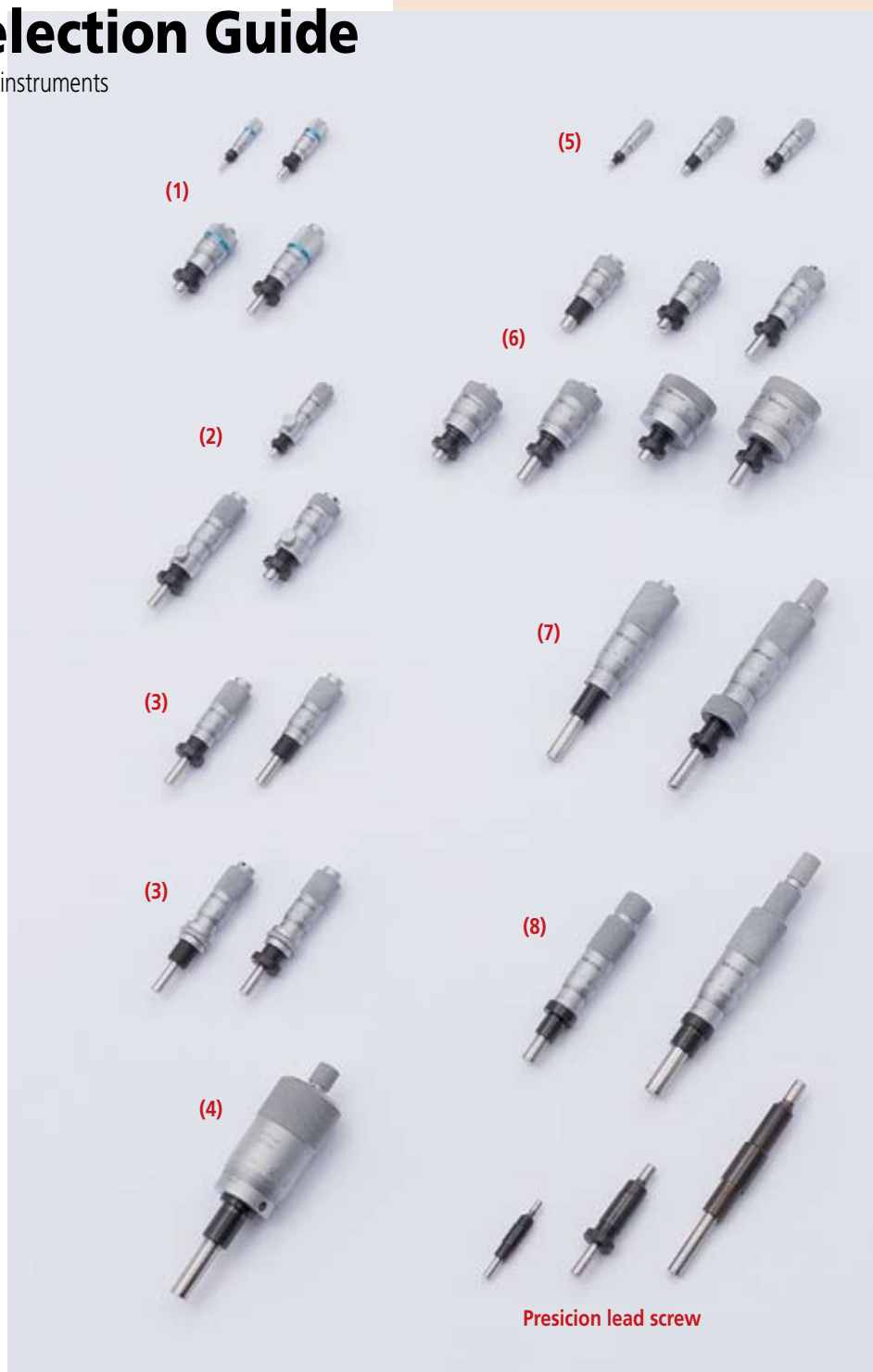


# Micrometer Head Selection Guide

The origin of Mitutoyo's trustworthy brand of small tool instruments

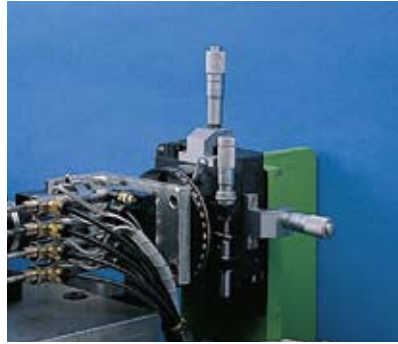
## SELECTION TABLE

Mounted on measuring instruments and precision instruments, micrometer heads are used for various purposes including measurement, feeding and positioning. Recent developments in technology have seen the micrometer head widely utilized in precise feeding devices and cross-travel stages on laser instruments and manipulators, in addition to the usual duties on measurement jigs. In parallel with the application expansion, the customer's needs have increased. To meet customer demands, Mitutoyo provides standard micrometer heads with different measuring ranges, stem type and body size. Furthermore, high-performance types of Digimatic Micrometer Head, 0.1mm spindle-pitch models (standard 0.5mm), etc., are now available for the new applications. Mitutoyo also provides customization services for special applications. Micrometer heads with customized spindle tips and precision leadscrews manufactured to customer specification can be offered even in one-off quantities.



Also refer to "Quick Guide to Precision Measuring Instruments" from page B-113.

Measuring range	Main feature of head		Series	Page
0 - 1mm/0- .02"	High-Function	Differential Screw Translator (Extra-Fine Feed) Type		B-104
0 - 2.5mm/0- .05"	High-Function	Differential Screw Translator (Extra-Fine Feed) Type	110	B-104
0 - 5mm/0- .2"	High-Function	Fine Spindle Feed of 0.1mm/rev	(1)	B-101, B-102
	Standard	Ultra-small / Small Type	(5)	B-80, B-81
0 - 6.5mm/0- .25"	Standard	Locking-screw Type	(2)	B-96 - B-98
	High-Function	Fine Spindle Feed of 0.1mm/rev	(1)	B-101, B-102
	High-Function	Fine Spindle Feed of 0.25mm/rev		B-103
	Standard	Ultra-small / Small Type	(5)	B-80, B-81
	Standard	Short Body with Choice of Thimble Diameter	(6)	B-82, B-83
0 - 10mm	High-Function	Large Thimble Type for Fine Feed	(13)	B-105, B-106
	Standard	Locking-screw Type	(2)	B-96 - B-98
0 - 13mm/0- .5"		Fine Spindle Feed of 0.25mm/rev		B-103
	High-Function	Differential Screw Translator (Extra-Fine Feed) Type	(11)	B-104
		Short Body with Choice of Thimble Diameter	(6)	B-82, B-83
	Standard	Small Standard Type	(3)	B-84, B-85
	Standard	Small Standard Type with Zero-adjustable Thimble	(10)	B-86, B-87



B

Measuring range	Main feature of head		Series	Page	
0 - 15mm/0 - .5"	High-Function	Non-rotating Spindle Type	(8)	153	B-99
	High-Function	Quick Spindle Feed of 1mm/rev	(4)	152	B-100
	Standard	Small Standard Type with Carbide-Tipped Spindle	(9)	149	B-88, B-89
0 - 25mm/0 - 1"	Digimatic			350	B-77 - B-79
	High-Function	Non-rotating Spindle Type	(8)	153	B-99
		Quick Spindle Feed of 1mm/rev		152	B-100
		Large Thimble Type for Fine Feed			B-105, B-106
		XY-Stage type	(14)		B-107
		Fine Graduation and High Accuracy		153	B-108
	Digit Counter type		250	B-109	
Standard	Medium-sized Standard Type	(7)	150	B-90 - B-92	
	Medium-sized Standard Type with 8mm diameter spindle		151	B-93 - B-95	
0 - 50mm/0 - 2"	Digimatic		(15)	164	B-77 - B-79
		Quick Spindle Feed of 1mm/rev		152	B-100
		Large Thimble Type for Fine Feed			B-105, B-106
		Non-rotating Spindle and Large Thimble		197	B-108
		Medium-sized Standard Type with 8mm diameter spindle	(12)	151	B-93 - B-95
60 - 75mm	Micro Jack		7	B-109	

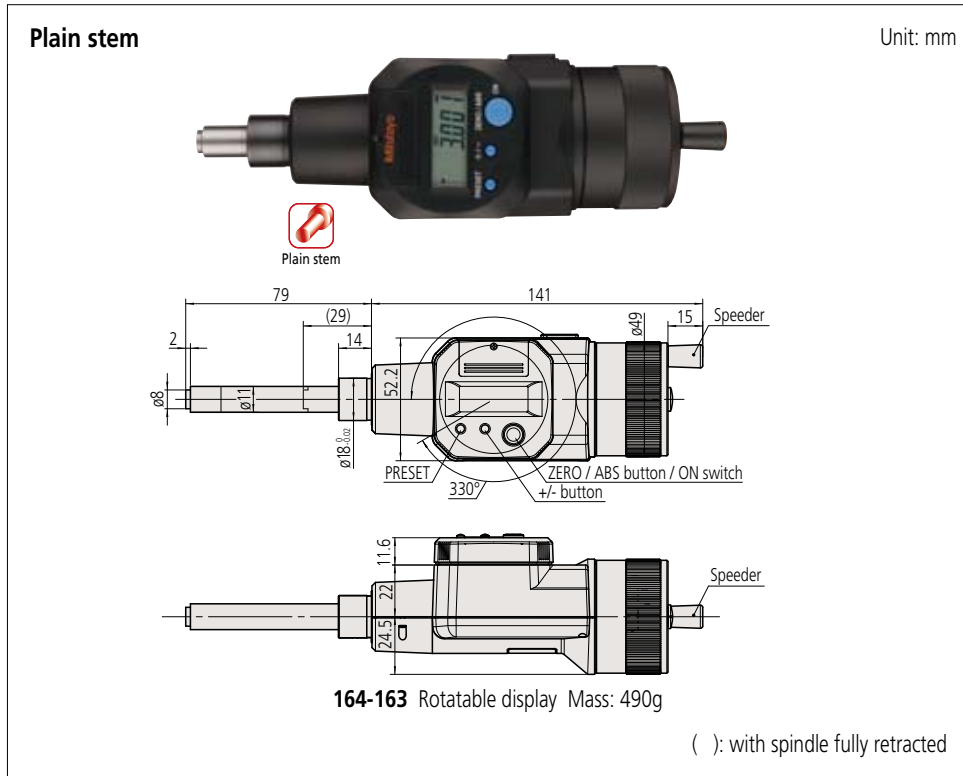
# Micrometer Head

The origin of Mitutoyo's trustworthy brand of small tool instruments

## Digimatic Micrometer Heads Series 164/350

- Equipped with digital display and output.
- series 350 IP65 models: the Digimatic output port enables inclusion in a statistical process control or networked measurement system. (Refer to page A-3 for details).

### DIMENSIONS



### SPECIFICATIONS

Metric									
Order No.	Range	Resolution	Accuracy**	Stem	Stem dia	Spindle end	Graduation features		
<b>164-163</b>	0 - 50mm	0.001mm	±3µm	Plain	18mm	Flat (carbide tip)	Standard		
<b>350-251-30</b>	0 - 25mm			±2µm	W/ clamp nut	10mm		Spherical (SR4) (carbide tip)	
<b>350-252-30</b>					Plain				12mm
<b>350-253-30</b>			W/ clamp nut		12mm				
<b>350-254-30</b>			Plain			12mm		Spherical (SR4) (carbide tip)	
<b>350-281-30*</b>			W/ clamp nut						12mm
<b>350-282-30*</b>			Plain		12mm	Flat (carbide tip)			
<b>350-283-30*</b>	W/ clamp nut		12mm	Flat (carbide tip)					
<b>350-284-30*</b>	Plain				12mm	Flat (carbide tip)			
<b>350-261-30*</b>	Plain		12mm	Flat (carbide tip)					

\* IP65 dust/water protection type  
\*\* Excluding quantizing error

Inch/Metric									
Order No.	Range	Resolution	Accuracy**	Stem	Stem dia	Spindle end	Graduation features		
<b>164-164</b>	0 - 2"	.00005" / 0.001mm	±.00015"	Plain	0.709"	Flat (carbide tip)	Standard		
<b>350-351-30</b>	0 - 1"			±.0001"	W/ clamp nut	0.375"		Spherical (SR4) (carbide tip)	
<b>350-352-30</b>					Plain				0.5"
<b>350-353-30</b>			W/ clamp nut		0.5"				
<b>350-354-30</b>			Plain			0.5"		Spherical (SR4) (carbide tip)	
<b>350-381-30*</b>			W/ clamp nut						0.5"
<b>350-382-30*</b>			Plain		0.5"	Flat (carbide tip)			
<b>350-383-30*</b>	W/ clamp nut		0.5"	Flat (carbide tip)					
<b>350-384-30*</b>	Plain				0.5"	Flat (carbide tip)			
<b>350-361-30*</b>	Plain		0.5"	Flat (carbide tip)					

\* IP65 dust/water protection type  
\* Note: Stem diameter of IP65 type is 12mm.  
\*\* Excluding quantizing error



These marks indicate that a product has successfully passed IP65-level testing, which is carried out by the independent German certification organization TÜV Rheinland.



### IP Codes (series 350)

Level 6: Dustproof  
No ingress of dust allowed.  
Level 5: Protected against water jets.  
Water projected in jets against the enclosure from any direction shall have no harmful effects.  
Battery for series 350  
SR44(1 pc), 938882 for initial operation checks (standard accessory)  
Battery for series 164  
SR44(2 pcs.), 938882 for initial operation checks (standard accessory)  
Battery life: Approx. 2.4 years under normal use (for series 350-XXX)  
Approx. 1.8 years under normal use (for series 164-163, 164)  
Length standard: Electromagnetic rotary sensor  
Standard accessories: Reference bar, 1 pc  
Spanner (301336), 1 pc (for series 350-XXX)  
Screwdriver (No.05CAA952), 1pc (for series 164-163, 164)

### Functions (series 164/350)

**Origin point setting** (ABS measurement system): Resets the ABS origin at the current spindle position to the minimum value of the measuring range and switches to ABS mode.  
**Zero-setting** (INC measurement system): A brief press on the ZERO/ABS button sets display to zero at the current spindle position and switches to the incremental (INC) measuring mode. A longer press resets to the ABS measuring mode.  
**Data output:** Equipped with output port for transferring measurement data to a Statistical Process Control (SPC) and measurement system.  
**Auto power ON/OFF:** The reading on the LCD disappears after this instrument is idle for about 20 minutes, but the reading and measurement mode are retained. Turning the spindle causes the reading on the LCD to reappear.

**Error alarm:** In case of an overflow on the LCD or a computing error, an error message appears on the LCD and the measuring function stops. This prevents an instrument from giving an erroneous reading. Also, when the battery voltage drops to a certain level, the low-battery-voltage alarm annunciator appears well before the micrometer becomes unusable.

### Optional accessories

Connecting cables for **series 164**  
1m: **959149**  
2m: **959150**

**USB Input Tool Direct**  
**USB-ITN-C** (2m): **06ADV380C**  
**02AZD790C** 160mm

For foot switch: **02AZE140C**  
Connecting cables for **series 350**  
1m: **05CZA662**  
2m: **05CZA663**

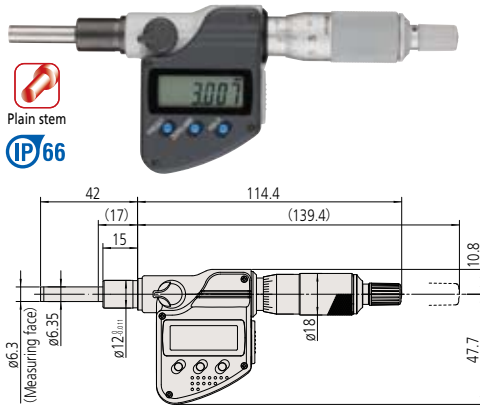
**USB Input Tool Direct**  
**USB-ITN-B** (2m): **06ADV380B**

Connecting cables for **U-WAVE-T**  
**02AZD790B** 160mm  
For foot switch: **02AZE140B**  
Refer to page B-68 for details.

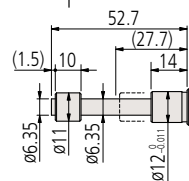
## DIMENSIONS

### Plain stem

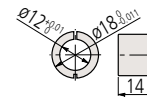
Unit: mm



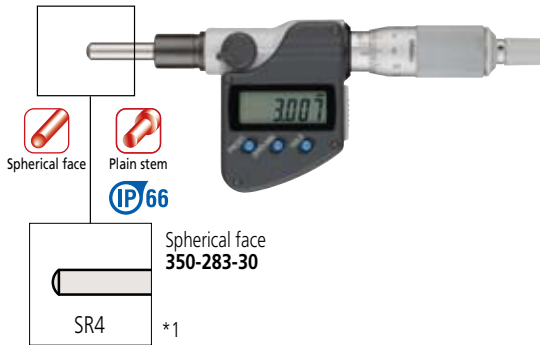
**350-281-30** (Stem dia. 12mm, waterproof type) Mass: 230g



Equipped with a non-rotating device  
**350-261-30**  
(Stem dia. 12mm, waterproof type)  
Mass: 235g



Bush (standard accessory)  
**350-261-30**

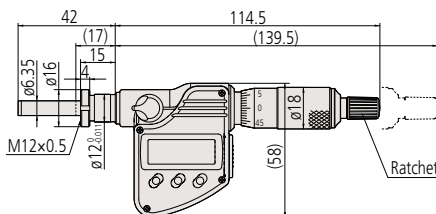
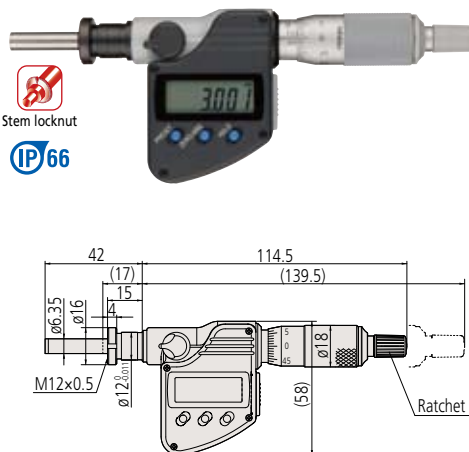


Spherical face  
**350-283-30**

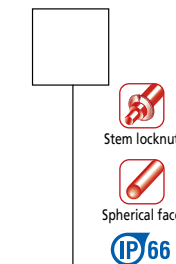
SR4 \*1

\*1 Other dimensions are the same as **350-281-30**.  
( ): with spindle fully retracted

### Stem locknut



Fixture thickness: 11.5mm  
**350-282-30** (Stem dia. 12mm, equipped with locknut, waterproof type) Mass: 230g



Spherical face  
**350-284-30**

SR4 \*1

\*1 Other dimensions are the same as **350-282-30**.  
( ): with spindle fully retracted



# Micrometer Head

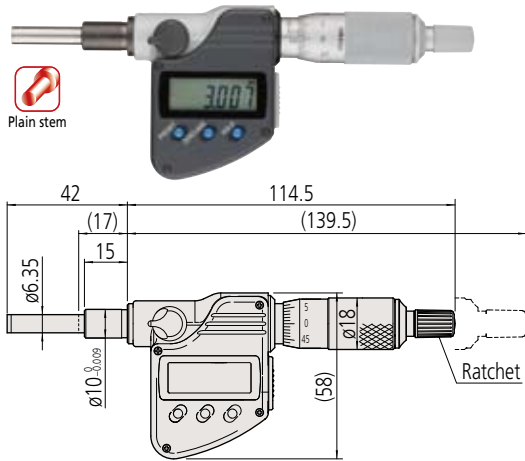
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## Digimatic Micrometer Heads SERIES 164, 350

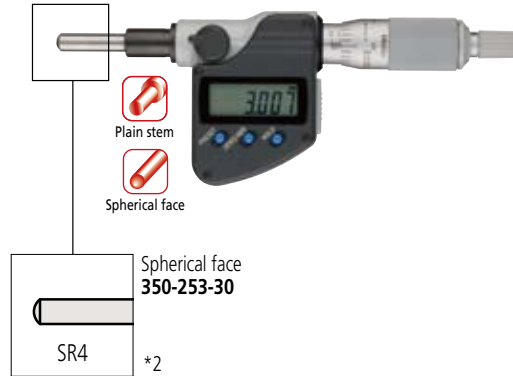
### DIMENSIONS

#### Plain stem

Unit: mm

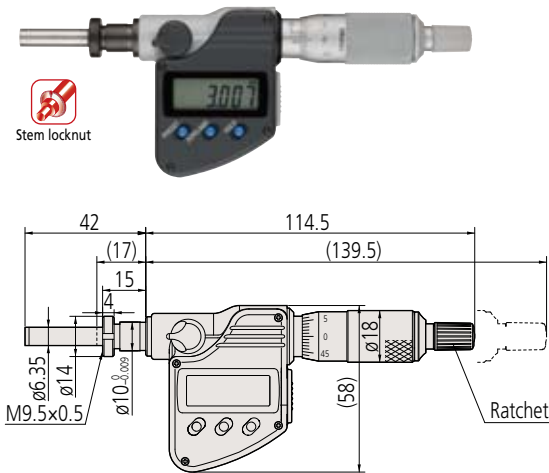


**350-251-30**  
(Stem dia. 10mm, for general use) Mass: 230g

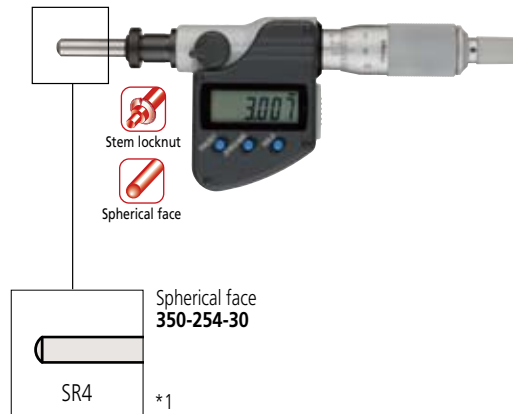


\*2 Other dimensions are the same as **350-251-30**.  
( ): with spindle fully retracted

#### Stem locknut



Fixture thickness: 11.5mm  
**350-252-30**  
(Stem dia. 10mm, for general use) Mass: 230g



\*1 Other dimensions are the same as **350-252-30**.  
( ): with spindle fully retracted

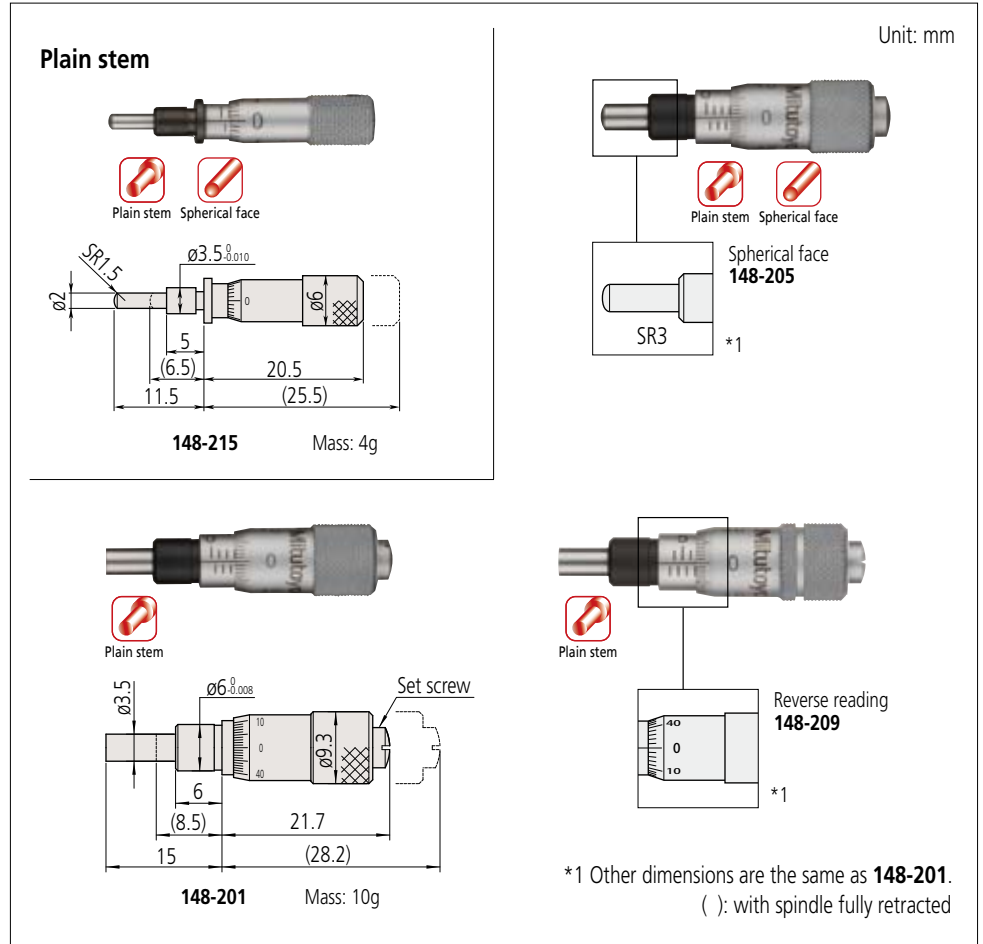
## Technical Data

Graduation: 0.02mm (148-215, 148-216),  
0.01mm or .001"

## Micrometer Heads SERIES 148 — Small/Ultra-small Type

- Miniature micrometer heads for ease of incorporating into machines.

### DIMENSIONS



### SPECIFICATIONS

Metric						
Order No.	Range	Accuracy	Stem dia.	Stem	Spindle end	Graduation
148-215	0 - 5mm	±5μm	3.5mm	Plain	Spherical (SR1.5)	Standard
148-216				W/ clamp nut		
148-201	0 - 6.5mm		6mm	Plain	Flat	
148-203				W/ clamp nut		
148-205			Spherical (SR3)	Plain		
148-207				W/ clamp nut		
148-209	Flat	Plain	Reverse reading			
148-211		W/ clamp nut				
Inch						
Order No.	Range	Accuracy	Stem dia.	Stem	Spindle end	Graduation
148-217	0 - .2"	±.00025"	.156"	Plain	Spherical (SR1.5)	Standard
148-218				W/ clamp nut		
148-202	0 - .25"		.25"	Plain	Flat	
148-204				W/ clamp nut		
148-206			Spherical (SR3)	Plain		
148-208				W/ clamp nut		
148-210*	Flat	Plain	Reverse reading			
148-212*		W/ clamp nut				

\* made-to-order models

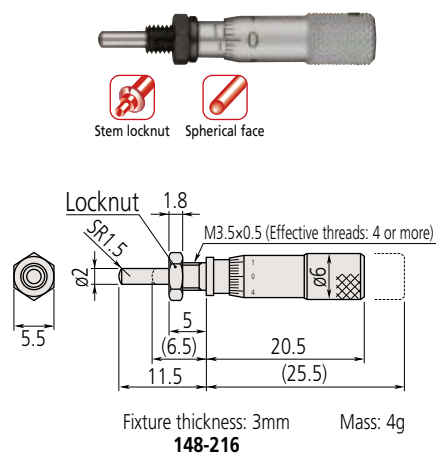
# Micrometer Head

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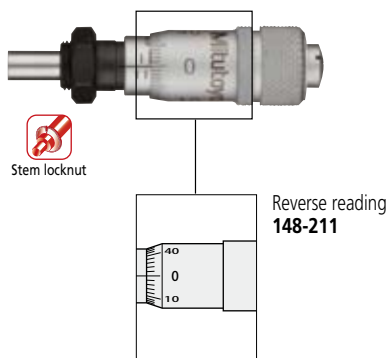
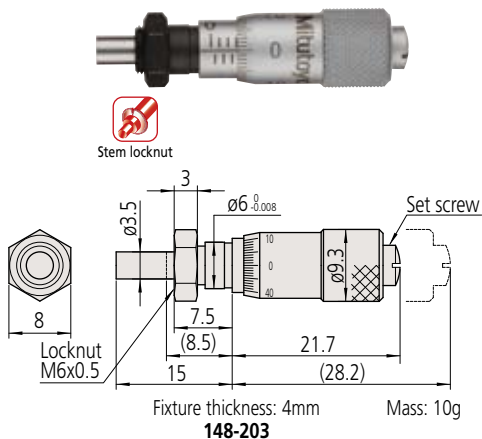
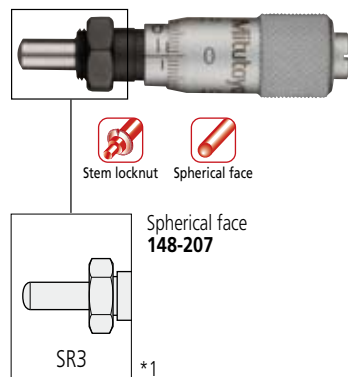
## Micrometer Heads SERIES 148 — Small Standard Type

### DIMENSIONS

#### Stem locknut



Unit: mm



\*1 Other dimensions are the same as **148-203**.  
( ) : with spindle fully retracted

## Technical Data

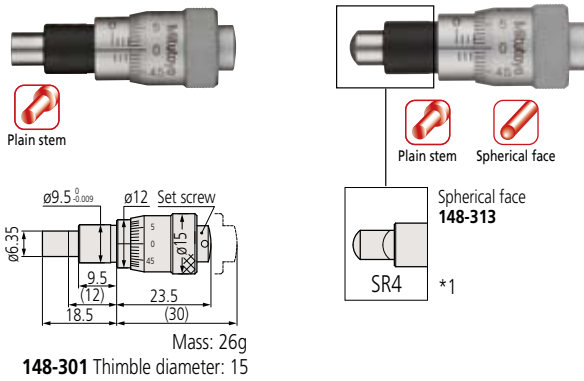
Graduation: 0.01mm or .001"  
Spindle pitch: 0.5mm or .025"

# Micrometer Heads SERIES 148 — Short Thimble with Choice of Diameter

- Short body design maintains measuring range for limited space applications.
- Available in three thimble diameters to provide ease-of-reading options.

## DIMENSIONS

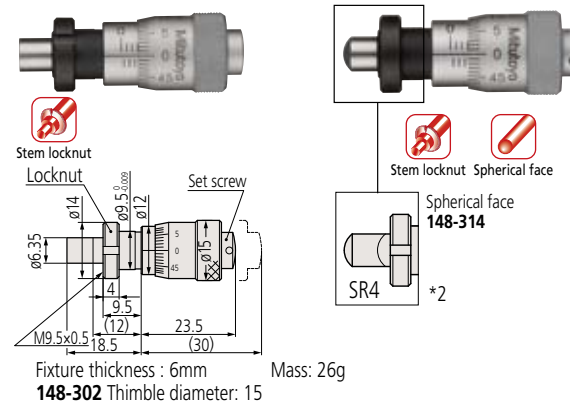
### Plain stem



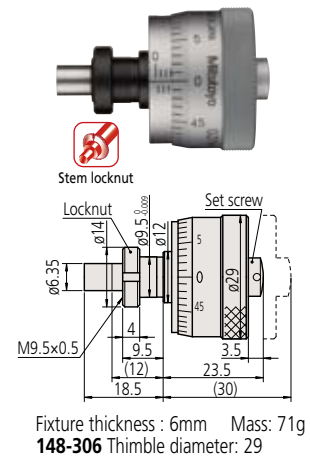
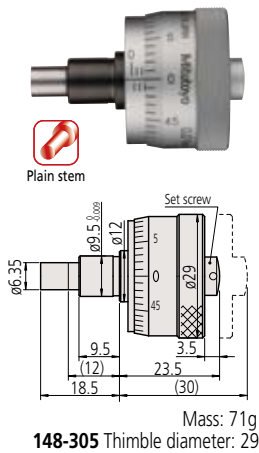
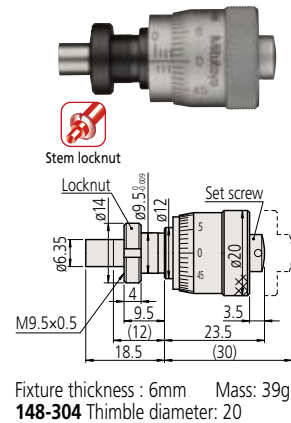
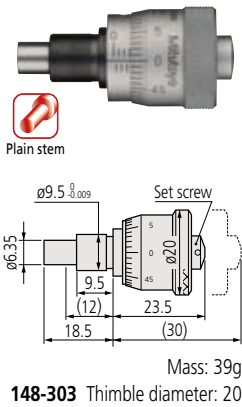
\*1 Other dimensions are the same as 148-301.

### Stem locknut

Unit: mm



\*2 Other dimensions are the same as 148-302.



( ) : with spindle fully retracted



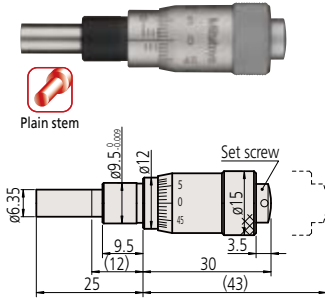
# Micrometer Head

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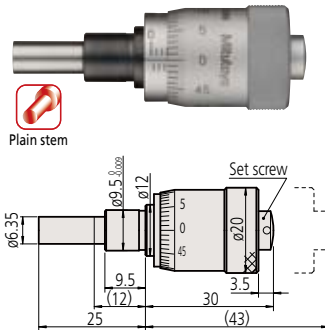
## Micrometer Heads SERIES 148 — Short Thimble with Choice of Diameter

### DIMENSIONS

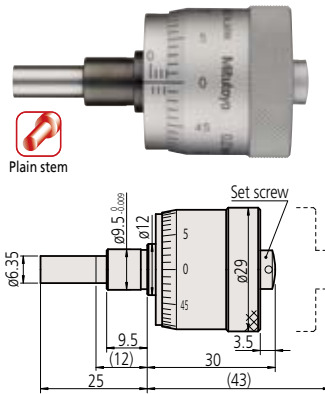
#### Plain stem



Mass: 35g  
**148-307** Thimble diameter: 15



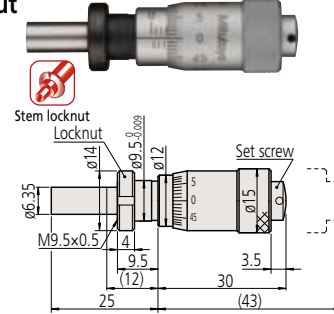
Mass: 55g  
**148-309** Thimble diameter: 20



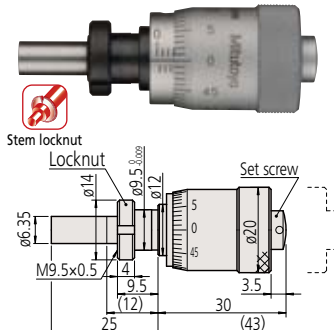
Mass: 103g  
**148-311** Thimble diameter: 29

#### Stem locknut

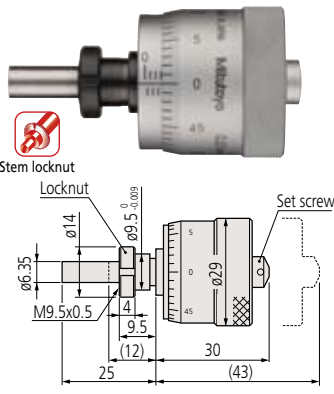
Unit: mm



Fixture thickness : 6mm Mass: 35g  
**148-308** Thimble diameter: 15



Fixture thickness : 6mm Mass: 55g  
**148-310** Thimble diameter: 20



Fixture thickness : 6mm Mass: 103g  
**148-312** Thimble diameter: 29

( ) : with spindle fully retracted

### SPECIFICATIONS

Metric						
Order No.	Range	Accuracy	Stem dia.	Stem	Spindle end	Special features
<b>148-301</b>	0 - 6.5mm	±2μm	9.5mm	Plain	Flat	15mm thimble dia.
<b>148-302</b>				W/ clamp nut		20mm thimble dia.
<b>148-303</b>				Plain		29mm thimble dia.
<b>148-304</b>				W/ clamp nut		15mm thimble dia.
<b>148-305</b>				Plain		15mm thimble dia.
<b>148-306</b>				W/ clamp nut		20mm thimble dia.
<b>148-313</b>				Plain		Spherical (SR4)
<b>148-314</b>	0 - 13mm	±2μm	9.5mm	Plain	Flat	15mm thimble dia.
<b>148-307</b>				W/ clamp nut		20mm thimble dia.
<b>148-308</b>				Plain		29mm thimble dia.
<b>148-309</b>				W/ clamp nut		15mm thimble dia.
<b>148-310</b>				Plain		15mm thimble dia.
<b>148-311</b>				W/ clamp nut		20mm thimble dia.
<b>148-312</b>				Plain		29mm thimble dia.

Inch						
Order No.	Range	Accuracy	Stem dia.	Stem	Spindle end	Special features
<b>148-351</b>	0 - .25"	±.0001"	.375"	Plain	Flat	.59" thimble dia.
<b>148-352</b>				W/ clamp nut		.79" thimble dia.
<b>148-353</b>				Plain		1.14" thimble dia.
<b>148-354</b>				W/ clamp nut		.59" thimble dia.
<b>148-355</b>				Plain		.79" thimble dia.
<b>148-356</b>				W/ clamp nut		1.14" thimble dia.
<b>148-357</b>				Plain		.59" thimble dia.
<b>148-358</b>	0 - .5"	±.0001"	.375"	W/ clamp nut	Flat	.79" thimble dia.
<b>148-359</b>				Plain		1.14" thimble dia.
<b>148-360</b>				W/ clamp nut		.59" thimble dia.
<b>148-361</b>				Plain		.79" thimble dia.
<b>148-362</b>				W/ clamp nut		1.14" thimble dia.

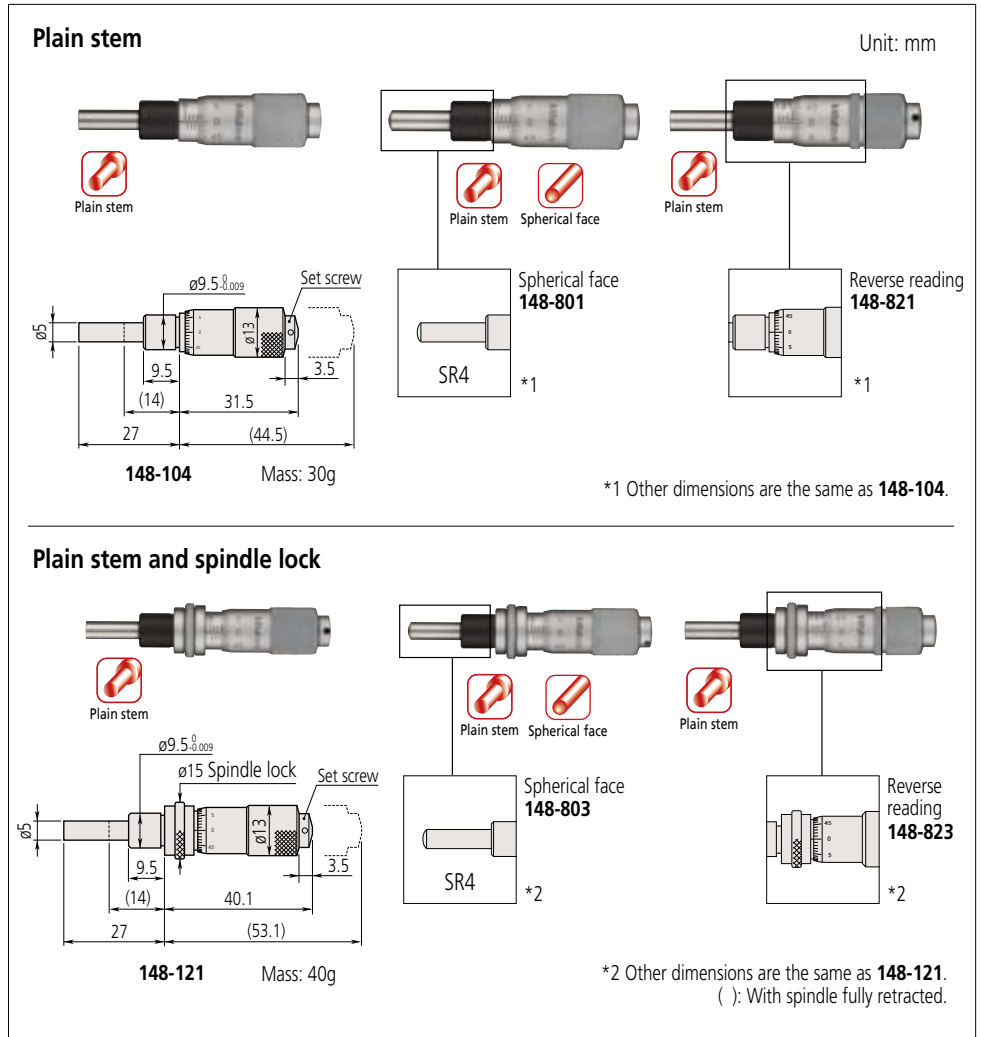
## Technical Data

Graduation: 0.01mm or .001"  
Spindle pitch: 0.5mm or .025"

## Micrometer Heads SERIES 148 — Small Standard Type

- Measuring range of 13mm.

### DIMENSIONS



### SPECIFICATIONS

Metric						
Order No.	Range	Accuracy	Stem dia.	Stem	Spindle end	Graduation features
148-104	0 - 13mm	±2μm	9.5mm	Plain	Flat	Standard
148-103				W/clamp nut		
148-121				Plain*		
148-120				W/clamp nut*		
148-801				Plain		
148-802				W/clamp nut		
148-803				Plain*	Spherical (SR4)	
148-804				W/clamp nut*		
148-821				Plain		
148-822				W/clamp nut		
148-823				Plain*		Flat
148-824				W/clamp nut*		

\* with spindle lock

Inch						
Order No.	Range	Accuracy	Stem dia.	Stem	Spindle end	Graduation features
148-112	0 - .5"	±.0001"	.375"	Plain	Flat	Standard
148-111**				W/clamp nut		
148-123				Plain*		
148-122				W/clamp nut*		
148-811				Plain		
148-812				W/clamp nut		
148-813				Plain*	Spherical (SR4)	
148-814				W/clamp nut*		
148-831				Plain		
148-832				W/clamp nut		
148-833				Plain*		Flat
148-834				W/clamp nut*		

\* with spindle lock

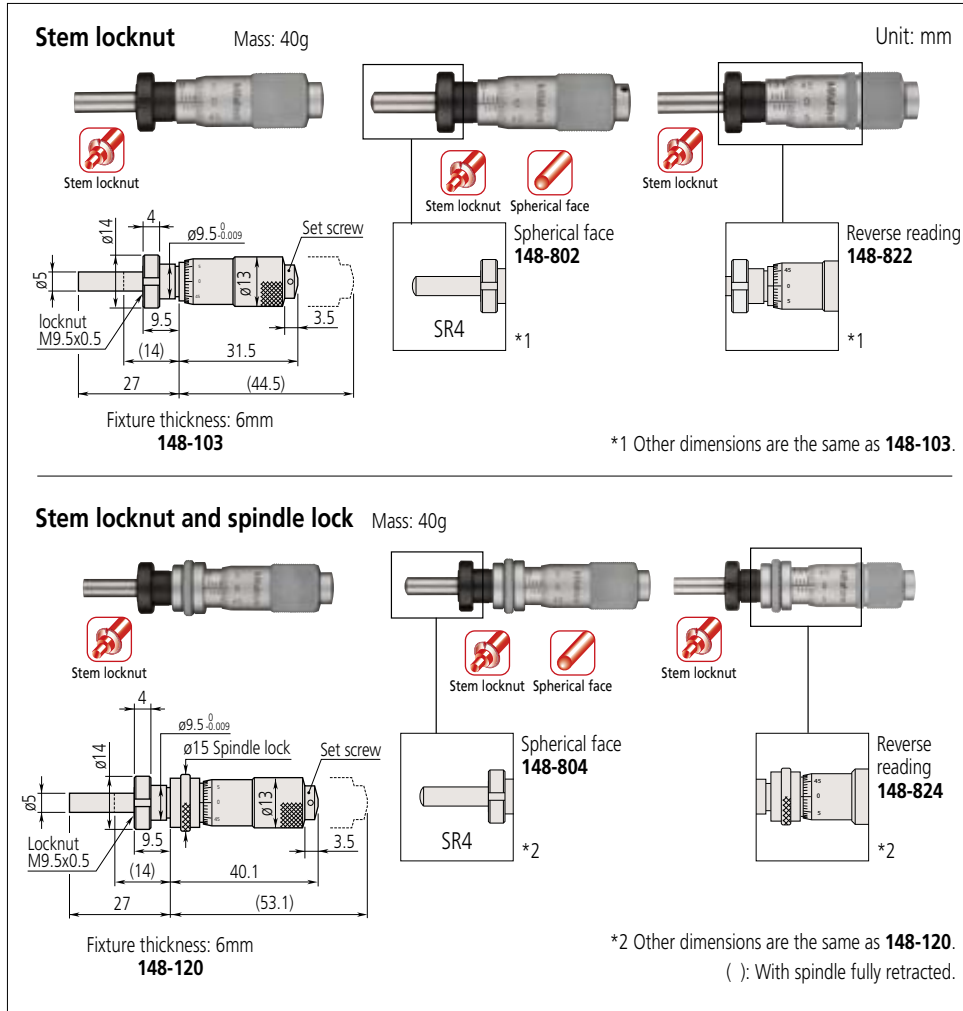
\*\* made-to-order model

# Micrometer Head

The origin of Mitutoyo's trustworthy brand of small tool instruments

## Micrometer Heads SERIES 148 — Small Standard Type

### DIMENSIONS



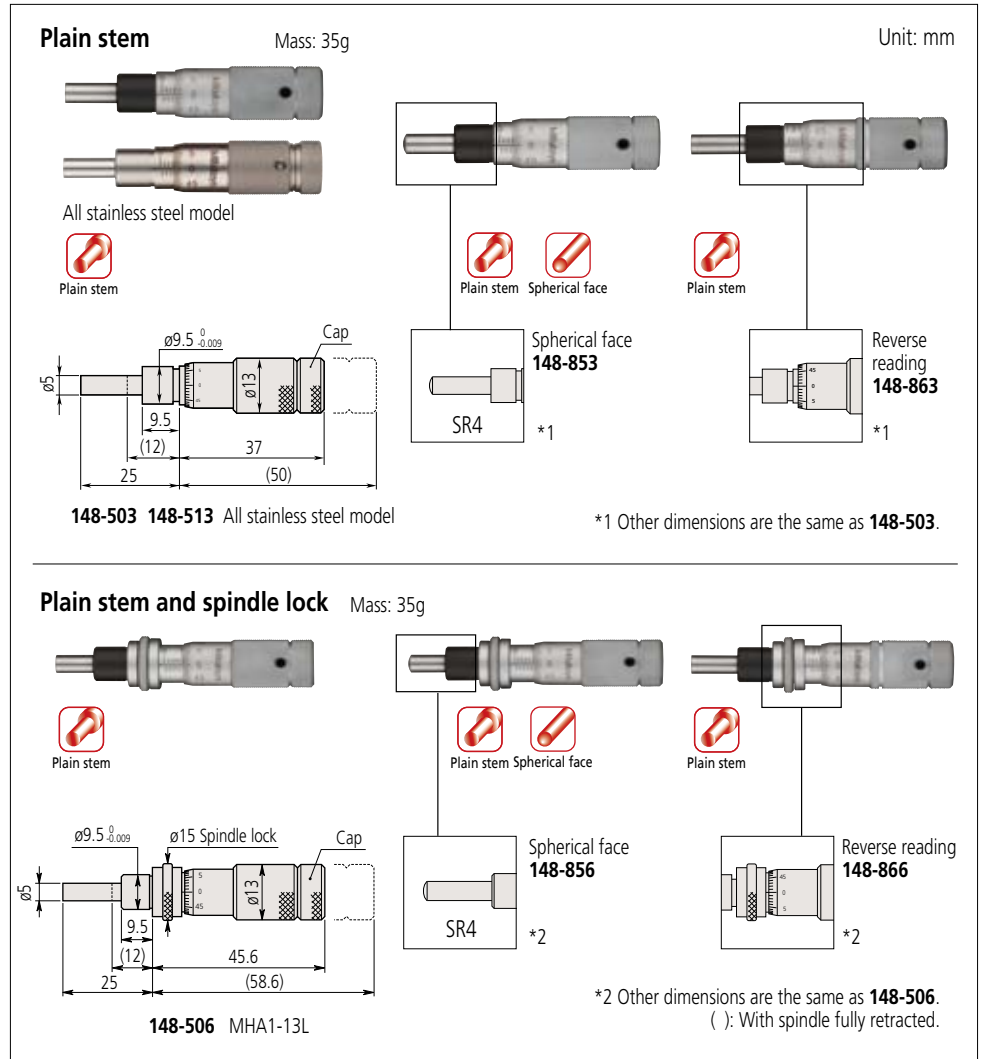
## Technical Data

Graduation: 0.01mm or .001"  
Spindle pitch: 0.5mm or .025"

## Micrometer Heads SERIES 148 — Small Thimble Diameter Standard Type

- Measuring range of 13mm.
- The thimble can be set to zero at any position by loosening the setscrew.
- Stainless steel throughout: 148-513, 518, 511

### DIMENSIONS



## SPECIFICATIONS

Metric						
Order No.	Range	Accuracy	Stem dia.	Stem	Spindle end	Special features
148-503	0 - 13mm	±2μm	9.5mm	Plain	Flat	Standard
148-513						Stainless steel throughout
148-508				W/ clamp nut	Spherical (SR4)	Standard
148-506				Plain*		
148-504				W/ clamp nut*	Flat	Reverse reading
148-853				Plain		
148-854				W/ clamp nut*	Spherical (SR4)	Standard
148-863				Plain		
148-864				W/ clamp nut*	Flat	Stainless steel throughout
148-518**				W/ clamp nut		
148-858**				W/ clamp nut	Spherical (SR4)	Standard
148-866**				Plain*		
148-856**				Plain*	Spherical (SR4)	Standard
148-868**				W/ clamp nut		
148-868**				W/ clamp nut	Flat	Reverse reading

\* with spindle lock \*\* made-to-order models

Inch						
Order No.	Range	Accuracy	Stem dia.	Stem	Spindle end	Special features
148-501	0 - .5"	±.0001"	.375"	Plain	Flat	Standard
148-511**						Stainless steel throughout
148-507**				W/ clamp nut	Spherical (SR4)	Standard
148-505				Plain*		
148-502				W/ clamp nut*	Flat	Reverse reading
148-851				Plain		
148-852				W/ clamp nut*	Spherical (SR4)	Standard
148-861				Plain		
148-862				W/ clamp nut*	Flat	Stainless steel throughout
148-518**				W/ clamp nut		
148-858**				W/ clamp nut	Spherical (SR4)	Standard
148-866**				Plain*		
148-856**				Plain*	Spherical (SR4)	Standard
148-868**				W/ clamp nut		
148-868**				W/ clamp nut	Flat	Reverse reading

\* with spindle lock \*\* made-to-order models

# Micrometer Head

The origin of Mitutoyo's trustworthy brand of small tool instruments

## Micrometer Heads SERIES 148 — Small Thimble Diameter Standard Type

### DIMENSIONS

#### Stem locknut

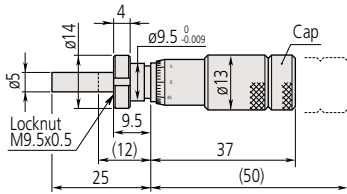
Unit: mm



All stainless steel model

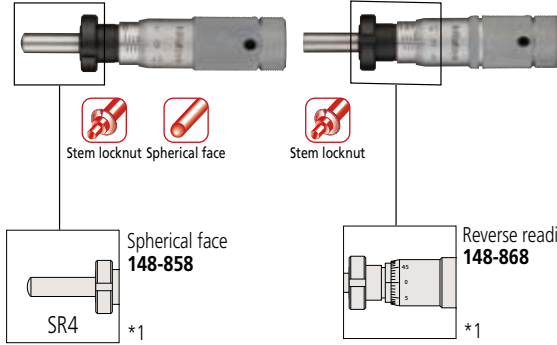


Stem locknut



Fixture thickness: 6mm

**148-508 148-518** All stainless steel model Mass: 40g



Stem locknut Spherical face

Stem locknut

Spherical face  
**148-858**

Reverse reading  
**148-868**

\*1

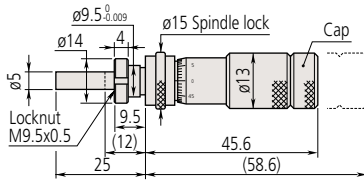
\*1

\*1 Other dimensions are the same as **148-508**.

#### Stem locknut and spindle lock



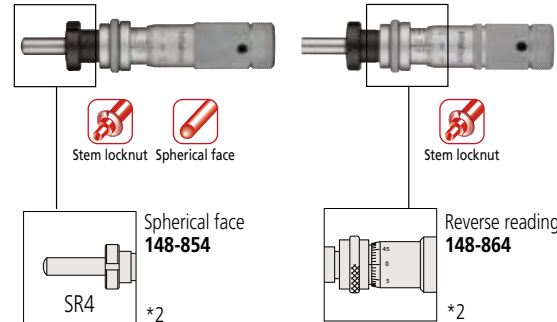
Stem locknut



Fixture thickness: 6mm

Mass: 40g

**148-504**



Stem locknut Spherical face

Stem locknut

Spherical face  
**148-854**

Reverse reading  
**148-864**

\*2

\*2

\*2 Other dimensions are the same as **148-504**.  
( ): With spindle fully retracted.

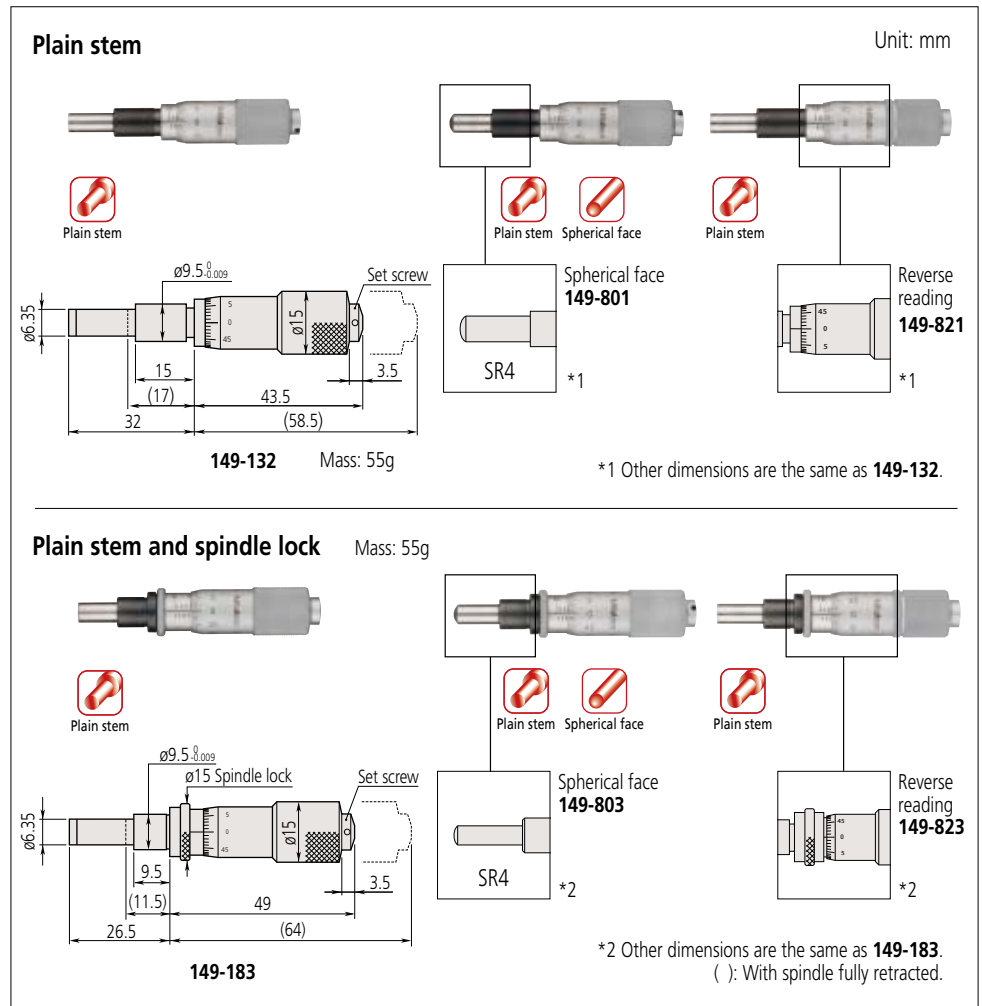
## Technical Data

Graduation: 0.01mm or .001"  
Spindle pitch: 0.5mm or .025"

## Micrometer Heads SERIES 149 — Small Standard Type with Carbide-Tipped Spindle

- Carbide-tipped spindle provides high abrasion resistance.

### DIMENSIONS



### SPECIFICATIONS

Metric							
Order No.	Range	Accuracy	Stem dia.	Stem	Spindle end	Graduation features	
<b>149-132</b>	0 - 15mm	±2μm	9.5mm	Plain	Flat (carbide tip)	Standard	
<b>149-131</b>				W/ clamp nut			
<b>149-183</b>				Plain*			
<b>149-184</b>				W/ clamp nut*			
<b>149-801</b>				Plain			Spherical (SR4)
<b>149-802</b>				W/ clamp nut			Flat (carbide tip)
<b>149-821</b>				Plain	Reverse reading		
<b>149-822</b>				W/ clamp nut			
<b>149-803**</b>				Plain*	Spherical (SR4)	Standard	
<b>149-804**</b>				W/ clamp nut*	Flat (carbide tip)		
<b>149-823**</b>				Plain*	Reverse reading		
<b>149-824**</b>				W/ clamp nut*		Flat (carbide tip)	

\* with spindle lock \*\* made-to-order models

Inch							
Order No.	Range	Accuracy	Stem dia.	Stem	Spindle end	Graduation features	
<b>149-148</b>	0 - .5"	±.0001"	.375"	Plain	Flat (carbide tip)	Standard	
<b>149-147</b>				W/ clamp nut			
<b>149-185***</b>				Plain*			
<b>149-182</b>				W/ clamp nut*			
<b>149-811</b>				Plain			Spherical (SR4)
<b>149-812</b>				W/ clamp nut			Flat (carbide tip)
<b>149-831**</b>				Plain	Reverse reading		
<b>149-832**</b>				W/ clamp nut			
<b>149-181**</b>				Plain*	Standard		
				Plain*			

\* with spindle lock \*\* made-to-order model \*\*\* w/ratchet (**149-181**) is available

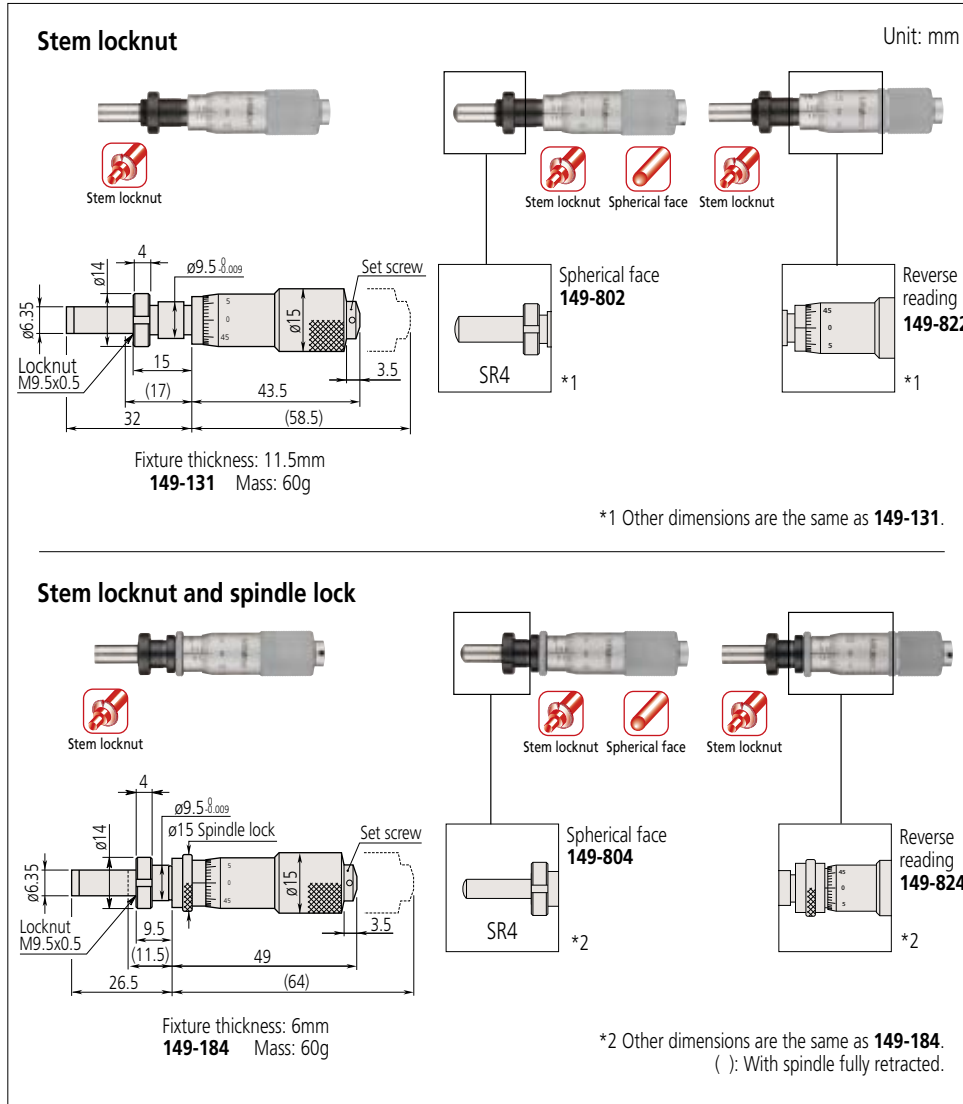
# Micrometer Head

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## Micrometer Heads

### SERIES 149 — Small Standard Type with Carbide-Tipped Spindle

#### DIMENSIONS



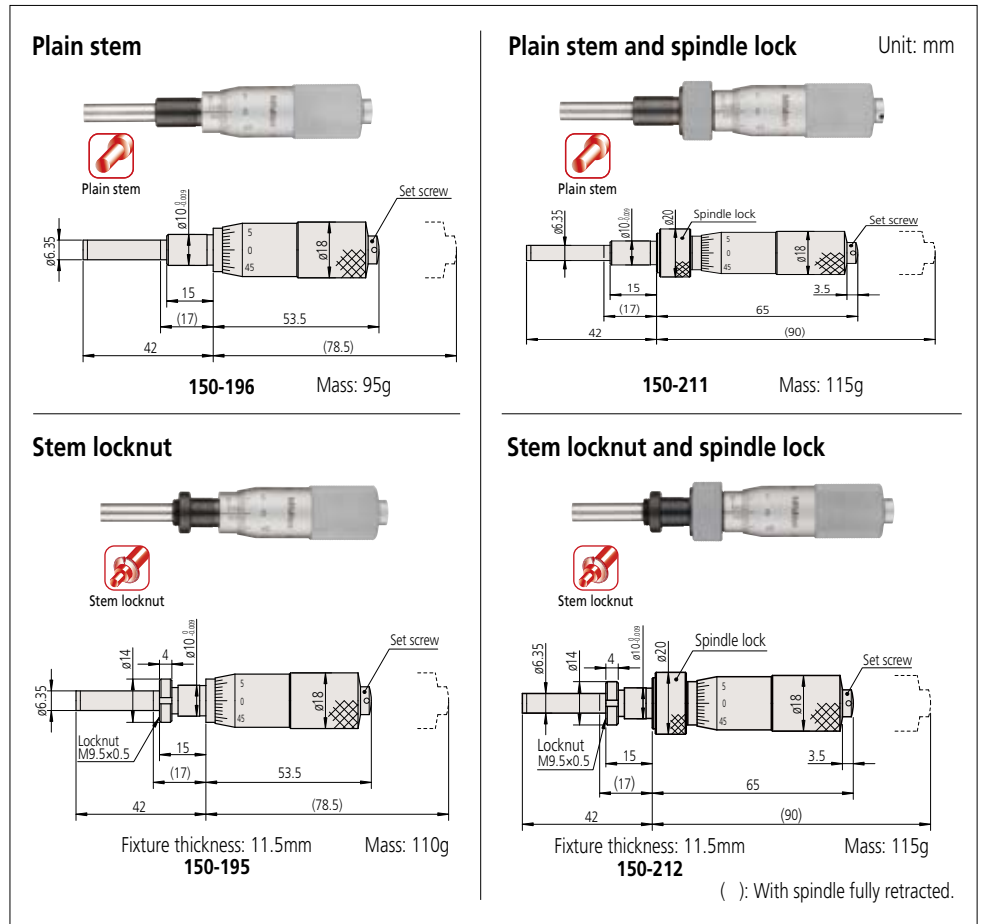
## Technical Data

Graduation: 0.01mm, 0.001mm, .001" or .0001"  
Spindle pitch: 0.5mm or .025"

## Micrometer Heads SERIES 150 — Medium-sized Standard Type

- Measuring range of 25mm.

### DIMENSIONS



### SPECIFICATIONS

Metric						
Order No.	Range	Accuracy	Stem dia.	Stem	Spindle end	Special features
150-192	0 - 25mm	±2µm	10mm	Plain	Flat (carbide tip)	Standard
150-191				W/ clamp nut		
150-209				Plain*		
150-210				W/ clamp nut*		
150-801				Plain	Spherical (SR4) (carbide tip)	Standard
150-802				W/ clamp nut		
150-821				Plain	Reverse reading	Standard
150-822				W/ clamp nut		
150-190				Plain	Flat (carbide tip)	W/vernier (0.001mm)
150-189				W/ clamp nut		
150-183**				Plain*		
150-184				W/ clamp nut*		
150-196				Plain	w/o ratchet stop	Standard
150-195				W/ clamp nut		
150-211				Plain*		
150-212				W/ clamp nut*		
150-219				Plain	Flat	Long spindle
150-220				W/ clamp nut		
150-803**				Plain*	Spherical (SR4) (carbide tip)	Standard
150-804**				W/ clamp nut*		
150-823**	Plain*	Flat (carbide tip)	Reverse reading			
150-824**	W/ clamp nut*					
150-223**	Plain*	Flat	Long spindle			
150-224**	W/ clamp nut*					

\* with spindle lock \*\* made-to-order models

Inch						
Order No.	Range	Accuracy	Stem dia.	Stem	Spindle end	Special features
150-208	0 - 1"	±.0001"	.375"	Plain	Flat (carbide tip)	Standard
150-207				W/ clamp nut		
150-213**				Plain*		
150-214**				W/ clamp nut*		
150-811				Plain	Spherical (SR4) (carbide tip)	Standard
150-812				W/ clamp nut		
150-831				Plain	Reverse graduation	Standard
150-832				W/ clamp nut		
150-206				Plain		
150-205**				W/ clamp nut		
150-215**				Plain*	Flat (carbide tip)	W/vernier (.0001")
150-216**				W/ clamp nut*		
150-198				Plain		
150-197				W/ clamp nut		
150-217**				Plain*	w/o ratchet stop	Standard
150-218**				W/ clamp nut*		
150-221**				Plain	Flat	Long spindle
150-222**				W/ clamp nut		

\* with spindle lock \*\* made-to-order models



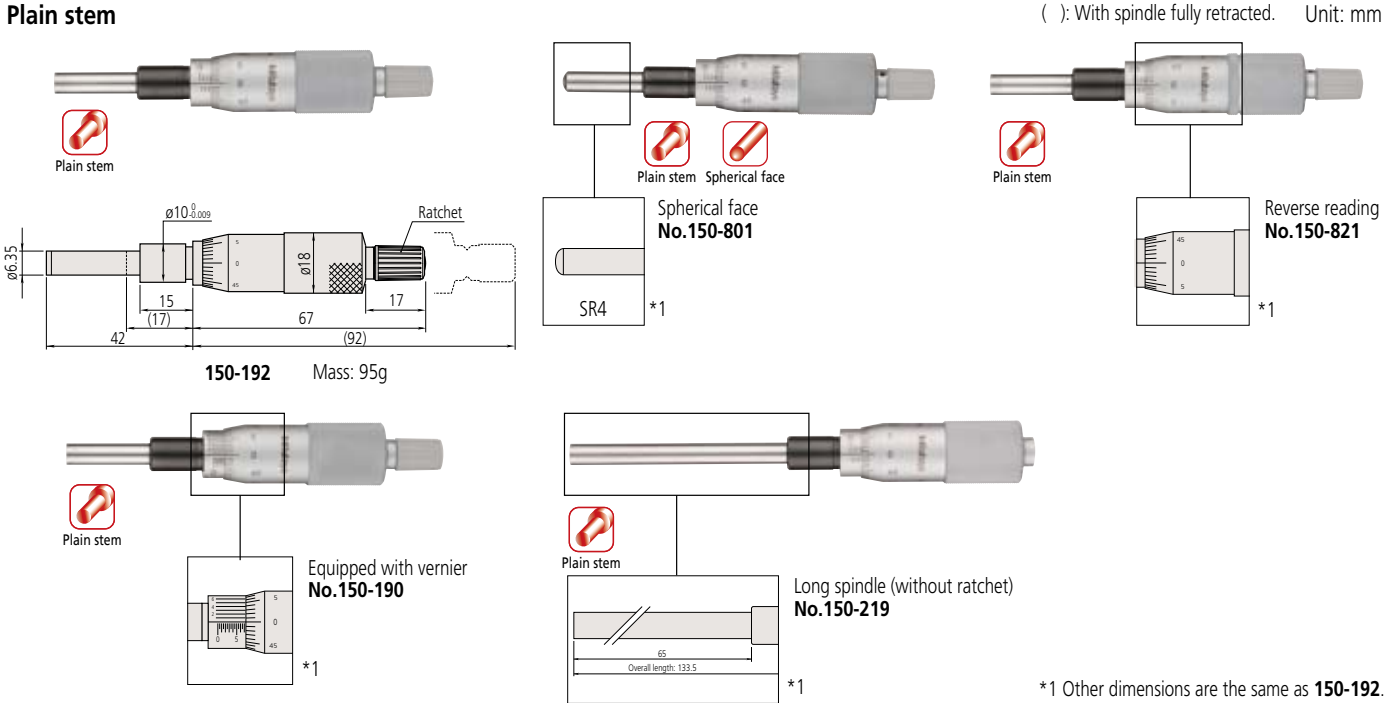
# Micrometer Head

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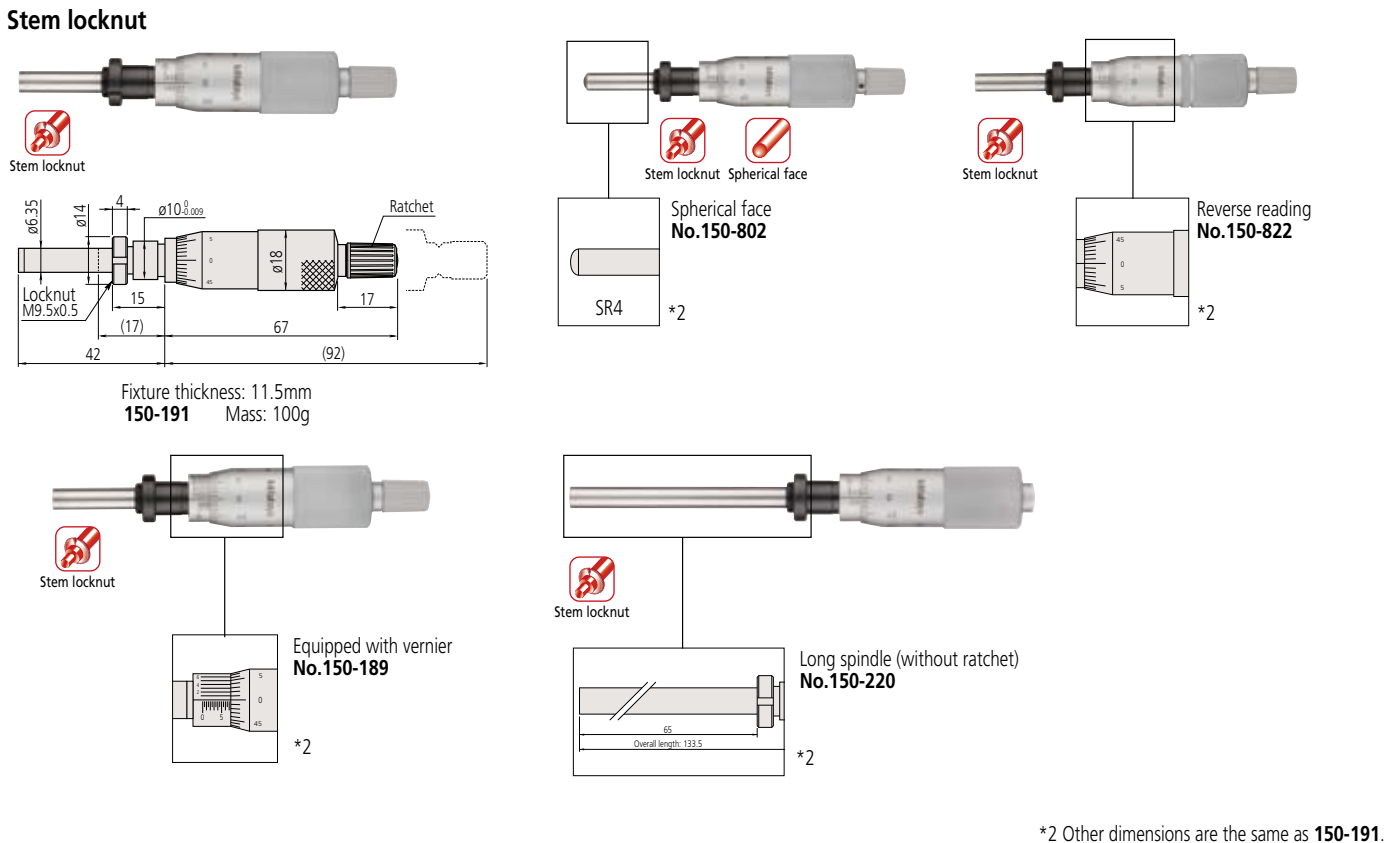
## Micrometer Heads SERIES 150 — Medium-sized Standard Type

### DIMENSIONS

#### Plain stem



#### Stem locknut



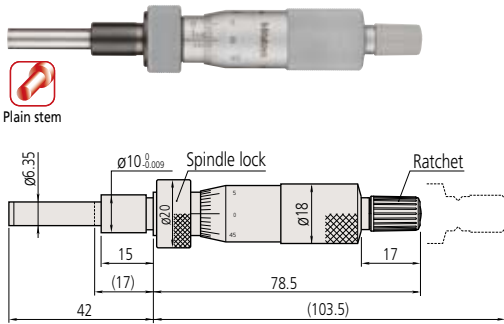
# Micrometer Heads SERIES 150 — Medium-sized Standard Type

## DIMENSIONS

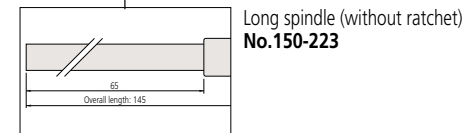
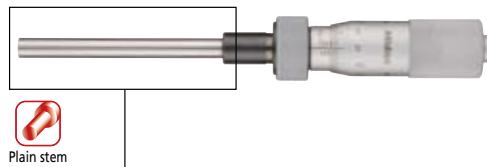
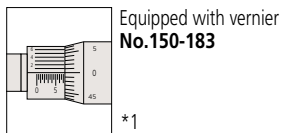
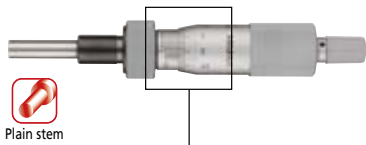
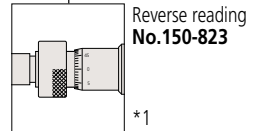
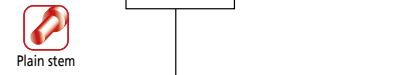
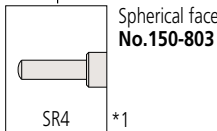
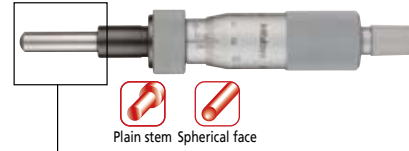
### Plain stem and spindle lock

Mass: 110g

( ): With spindle fully retracted. Unit: mm

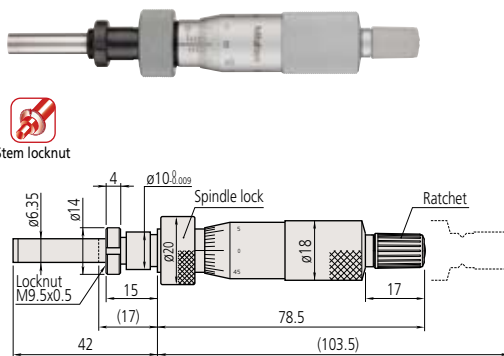


**150-209**

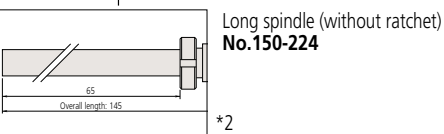
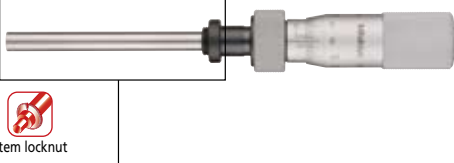
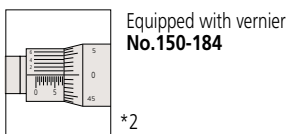
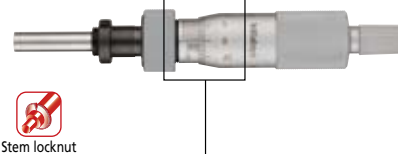
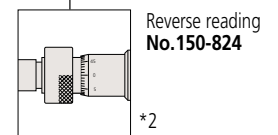
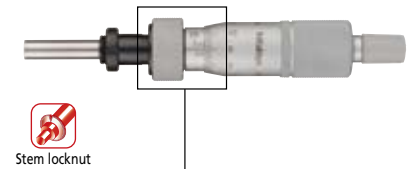
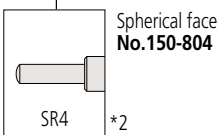
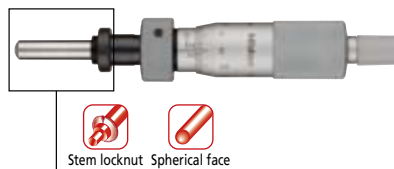


### Stem locknut and spindle lock

Mass: 115g



Fixture thickness: 11.5mm  
**150-210**



# Micrometer Head

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## Micrometer Heads

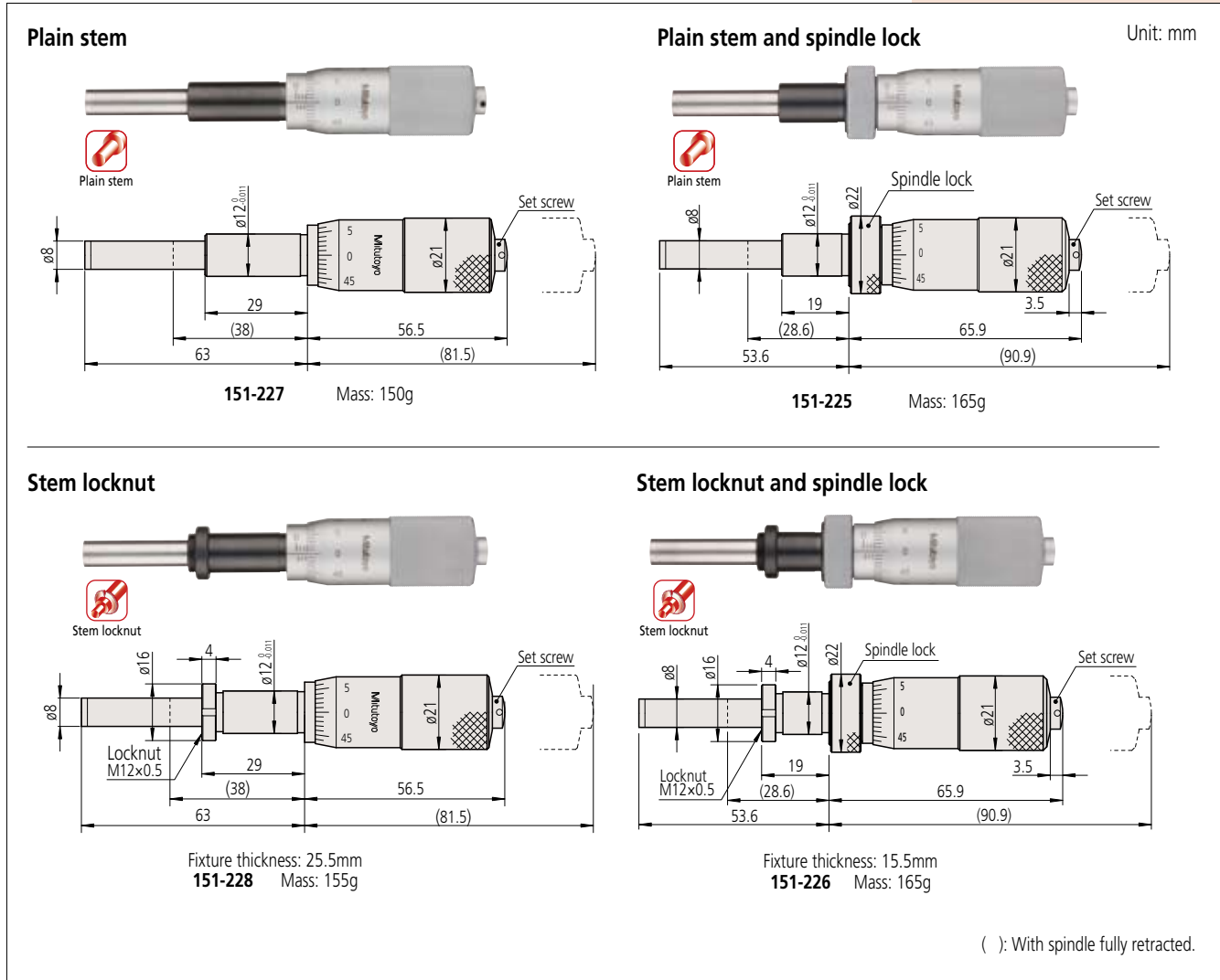
### SERIES 151 — Medium-sized Standard Type with 8mm diameter spindle

- Larger spindle for heavy-duty applications (normally  $\phi 6.35\text{mm}$ ).

#### Technical Data

Graduation: 0.01mm, 0.001mm, .001" or .0001"  
Spindle pitch: 0.5mm or .025"

## DIMENSIONS



## SPECIFICATIONS

Metric						
Order No.	Range	Accuracy	Stem dia.	Stem	Spindle end	Special features
151-224	0 - 25mm	$\pm 2\mu\text{m}$	12mm	Plain	Flat (carbide tip)	—
151-223				W/ clamp nut		
151-214**				Plain*		
151-213**				W/ clamp nut*		
151-222				Plain		
151-221				W/ clamp nut		
151-212**				Plain*		
151-211**				W/ clamp nut*		
151-227				Plain		
151-228				W/ clamp nut		
151-225				Plain*		
151-226				W/ clamp nut*		
151-256				Plain		
151-255				W/ clamp nut		
151-260				Plain		
151-259	W/ clamp nut					

\* with spindle lock \*\* made-to-order models

Inch											
Order No.	Range	Accuracy	Stem dia.	Stem	Spindle end	Special features					
151-240	0 - .1"	$\pm .0001"$	.5"	Plain	Flat (carbide tip)	—					
151-239				W/ clamp nut							
151-238				Plain							
151-237				W/ clamp nut							
151-241**				Plain*							
151-242**				W/ clamp nut*							
151-243**				Plain*							
151-244**				W/ clamp nut*							
151-272				Plain							
151-271				W/ clamp nut							
151-245				0 - .2"			$\pm .0002"$	.5"	Plain	Flat (carbide tip)	w/o ratchet stop
151-246									W/ clamp nut		
151-247									Plain		

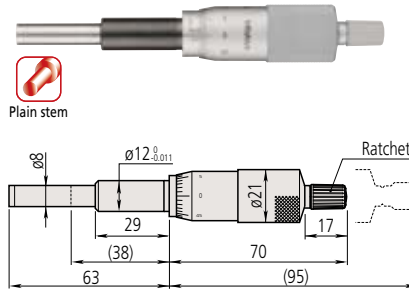
\* with spindle lock \*\* made-to-order models

# Micrometer Heads

## SERIES 151 — Medium-sized Standard Type with 8mm diameter spindle

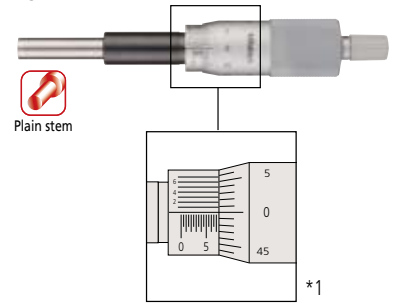
### DIMENSIONS

#### Plain stem



151-224 Mass: 150g

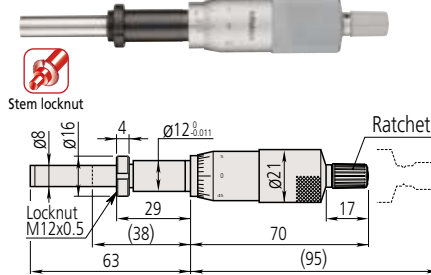
Equipped with vernier  
151-222



\*1 Other dimensions are the same as 151-224.

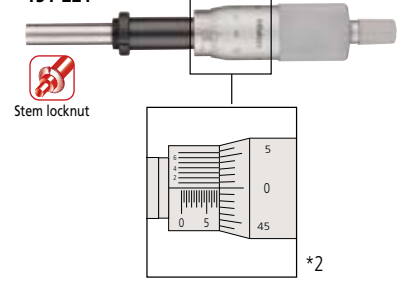
Unit: mm

#### Stem locknut



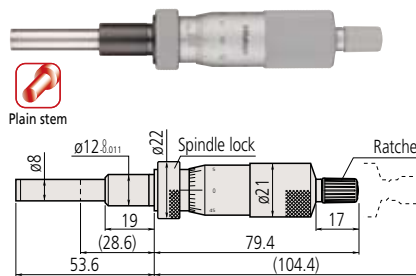
Fixture thickness: 25.5mm  
151-223 Mass: 155g

Equipped with vernier  
151-221



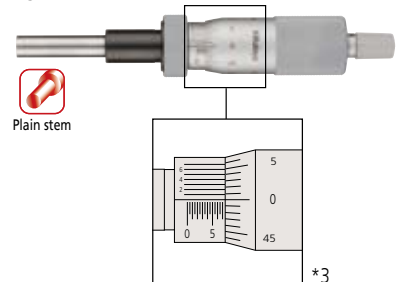
\*2 Other dimensions are the same as 150-223.

#### Plain stem and spindle lock



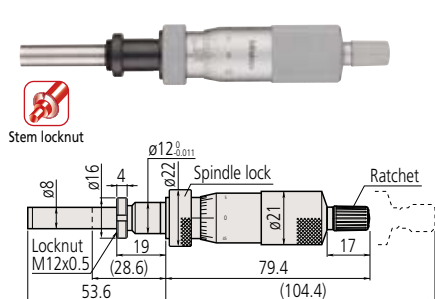
151-214 Mass: 160g

Equipped with vernier  
151-212



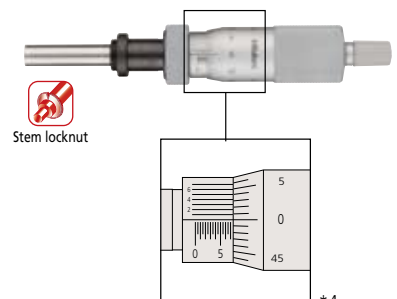
\*3 Other dimensions are the same as 150-214.

#### Stem locknut and spindle lock



Fixture thickness: 15.5mm  
151-213 Mass: 165g

Equipped with vernier  
151-211



\*4 Other dimensions are the same as 150-213.  
( ) : With spindle fully retracted.

# Micrometer Head

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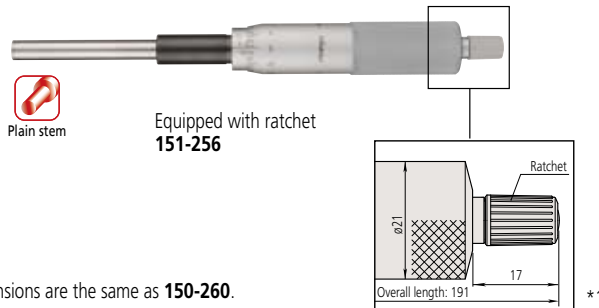
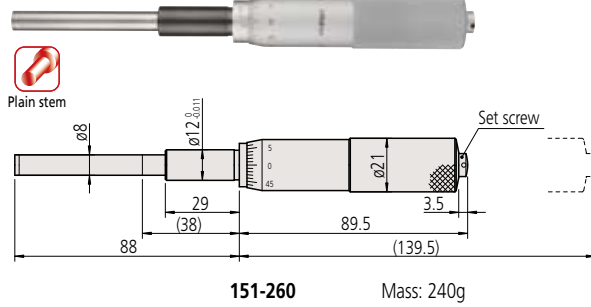
## Micrometer Heads

### SERIES 151 — Medium-sized Standard Type with 8mm diameter spindle

#### DIMENSIONS

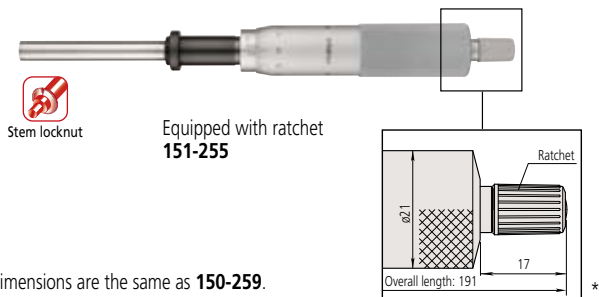
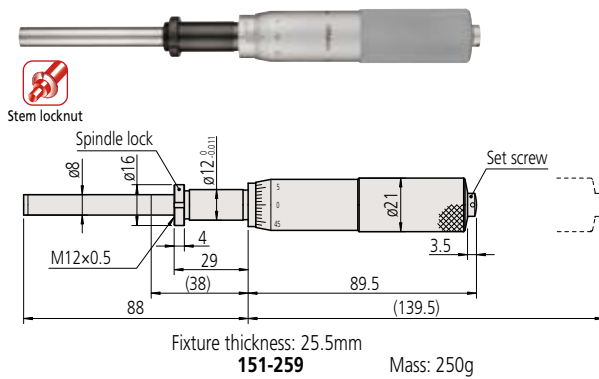
##### Plain stem

Unit: mm



\*1 Other dimensions are the same as **150-260**.

##### Stem locknut



\*2 Other dimensions are the same as **150-259**.  
( ): With spindle fully retracted.

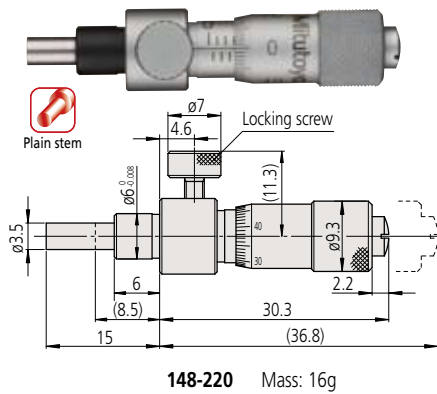


## Micrometer Heads SERIES 148 — Locking-screw Type

- Locking screw provides secure locking at any position of the spindle.
- Position of the locking screw is the same as the sleeve index line.

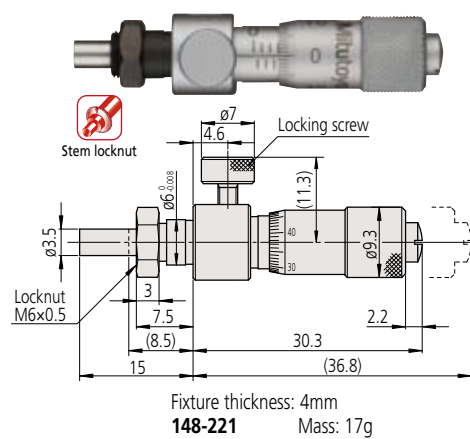
### DIMENSIONS

#### Plain stem

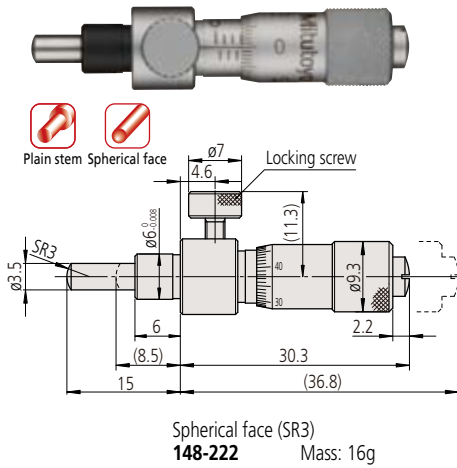


#### Stem locknut

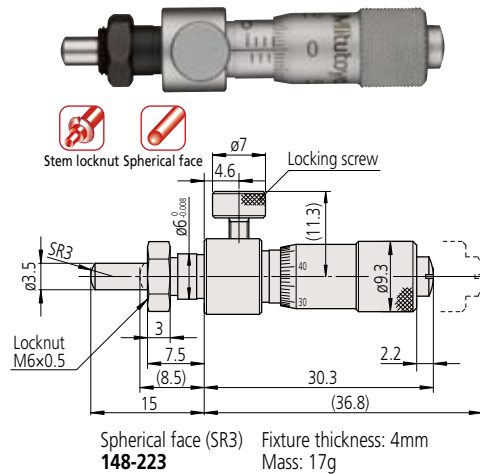
Unit: mm



#### Plain stem



#### Stem locknut



( ) : With spindle fully retracted.

### SPECIFICATIONS

Metric							
Order No.	Range	Graduation	Accuracy	Stem dia.	Stem	Spindle end	Graduation features
148-220	0 - 6.5mm	0.01mm	±5μm	6mm	Plain	Flat	Standard
148-221					W/ clamp nut		
148-222					Plain		
148-223	0 - 13mm	0.01mm	±2μm	9.5mm	W/ clamp nut	Flat	
148-150					Plain		
148-151					W/ clamp nut		
148-152	0 - 13mm	0.01mm	±2μm	9.5mm	Plain	Spherical (SR4)	
148-153					W/ clamp nut		
148-316					Plain		
148-317	0 - 6.5mm	0.01mm	±2μm	9.5mm	W/ clamp nut	Flat	
148-318					Plain		
148-319					W/ clamp nut		

Inch							
Order No.	Range	Graduation	Accuracy	Stem dia.	Stem	Spindle end	Graduation features
148-230	0 - .25"	.001"	±.00025"	.25"	Plain	Flat	Standard
148-231					W/ clamp nut		
148-232					Plain		
148-233	0 - .5"	.001"	±.0001"	.375"	W/ clamp nut	Flat	
148-160					Plain		
148-161					W/ clamp nut		
148-162	0 - .5"	.001"	±.0001"	.375"	W/ clamp nut	Spherical (SR4)	
148-163					Plain		
148-327					W/ clamp nut		
148-328	0 - .25"	.001"	±.0001"	.375"	W/ clamp nut	Flat	
148-329					Plain		
148-329					W/ clamp nut		

# Micrometer Head

The origin of Mitutoyo's trustworthy brand of small tool instruments

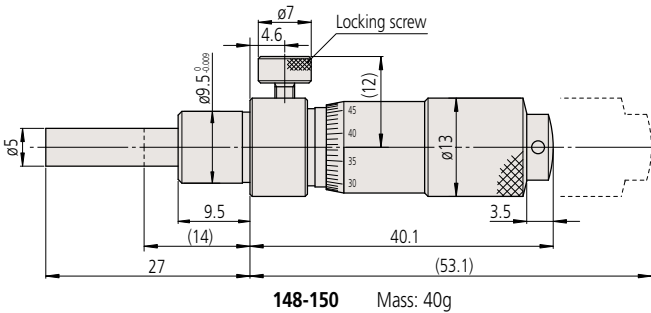
## Micrometer Heads SERIES 148 — Locking-screw Type

### DIMENSIONS

#### Plain stem



Plain stem



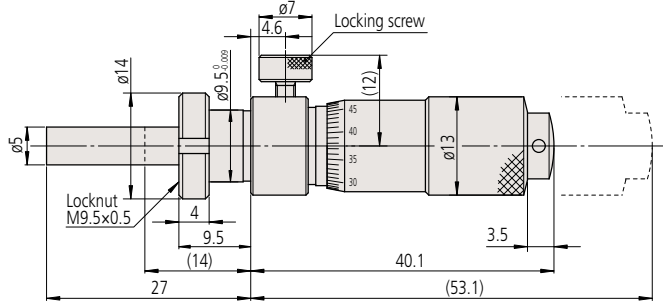
**148-150** Mass: 40g

#### Stem locknut

Unit: mm



Stem locknut

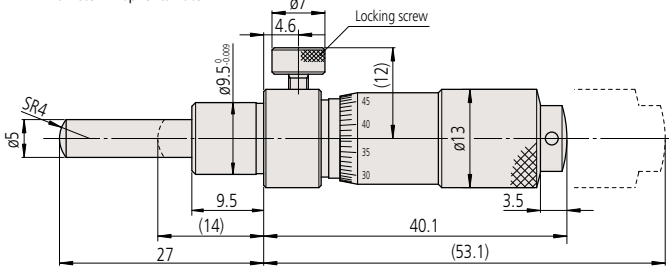


Fixture thickness: 6mm  
**148-151** Mass: 43g

#### Plain stem



Plain stem Spherical face

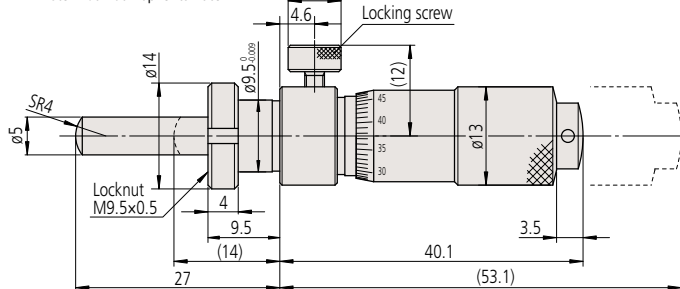


Spherical face (SR4)  
**148-152** Mass: 40g

#### Stem locknut



Stem locknut Spherical face



Spherical face (SR4) Fixture thickness: 6mm  
**148-153** Mass: 43g

( ) : With spindle fully retracted.

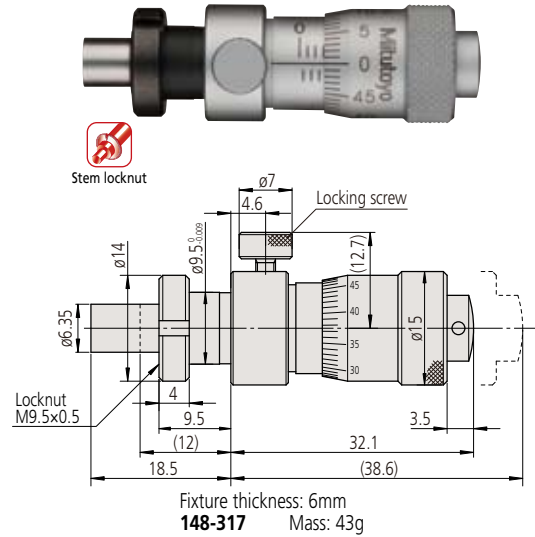
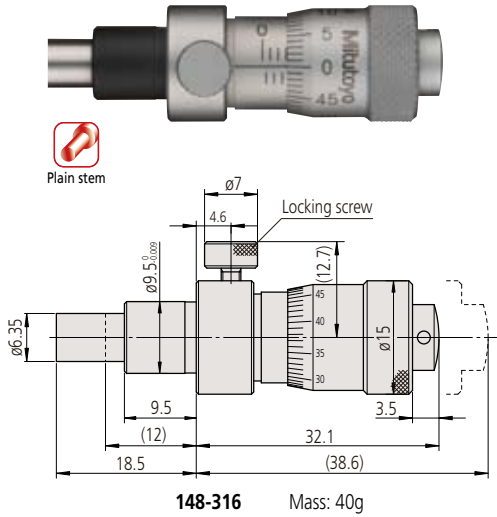
# Micrometer Heads SERIES 148 — Locking-screw Type

## DIMENSIONS

Plain stem

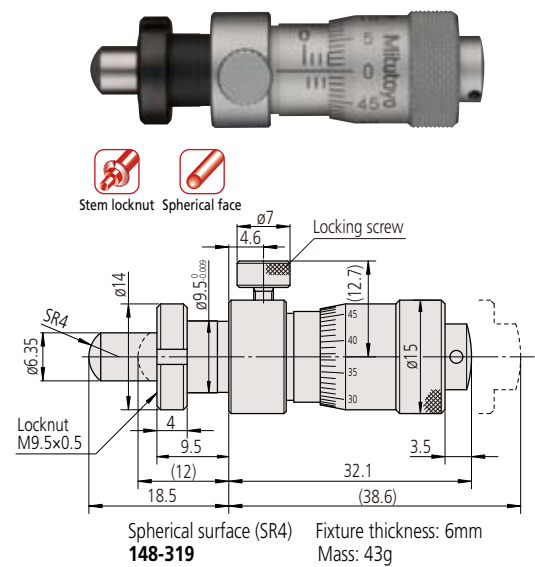
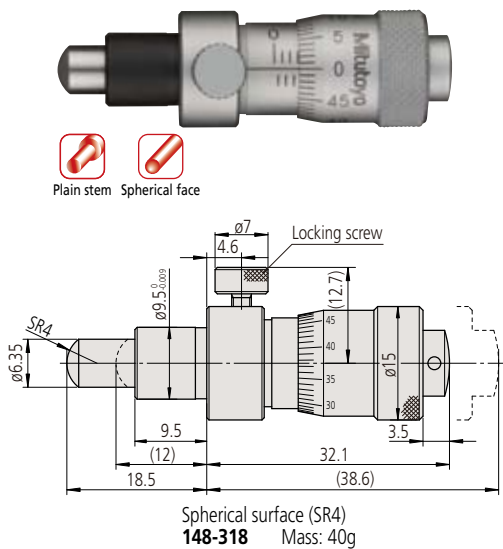
Stem locknut

Unit: mm



Plain stem

Stem locknut



( ) : With spindle fully retracted.



# Micrometer Head

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## Micrometer Heads SERIES 153 — Non-rotating Spindle Type

- The spindle translates without rotation.
- Torsion-free feed reduces workpiece deformation and wear.

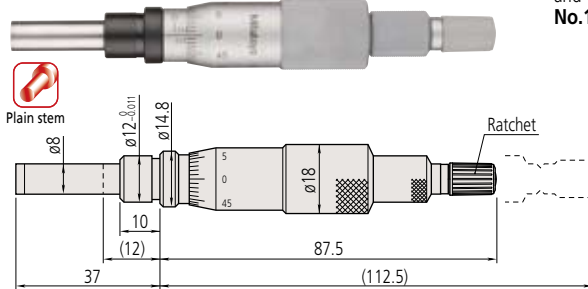
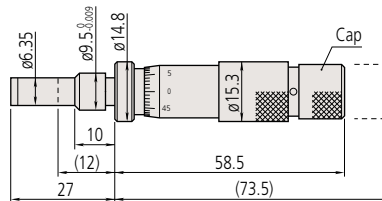
### DIMENSIONS

Unit: mm



Plain stem

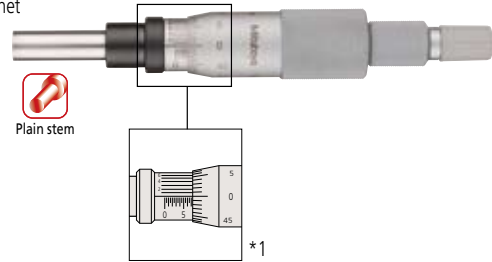
**153-101** Mass: 70g



Plain stem

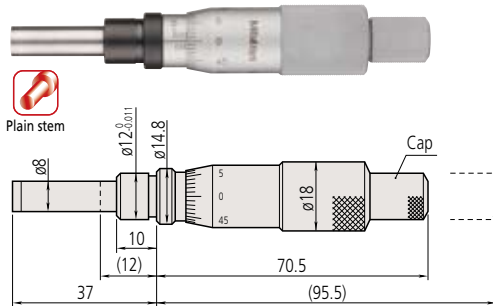
**153-201** Mass: 125g

Equipped with ratchet and vernier ratchet  
**No.153-202**



Plain stem

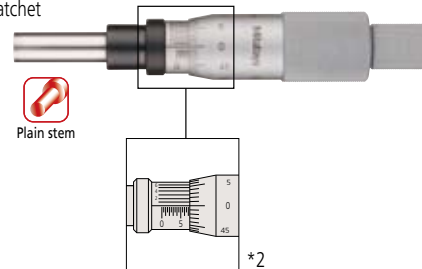
\*1 Other dimensions are the same as **153-201**



Plain stem

**153-203** Mass: 125g

Without ratchet/ Equipped with vernier ratchet  
**No.153-204**



Plain stem

\*2 Other dimensions are the same as **153-203**  
( ): With spindle fully retracted.

### SPECIFICATIONS

#### Metric

Order No.	Range	Graduation	Accuracy	Stem dia.	Stem	Spindle end	Spindle pitch	Graduation features
<b>153-101</b>	0 - 15mm	0.01mm	±3μm	9.5mm	Plain	Flat (carbide tip)	0.5mm	Standard
<b>153-201*</b>	0 - 25mm	0.001mm		12mm				w/ vernier (0.001mm)
<b>153-202*</b>		0.01mm						Standard
<b>153-204</b>		0.001mm						w/ vernier (0.001mm)

#### Inch

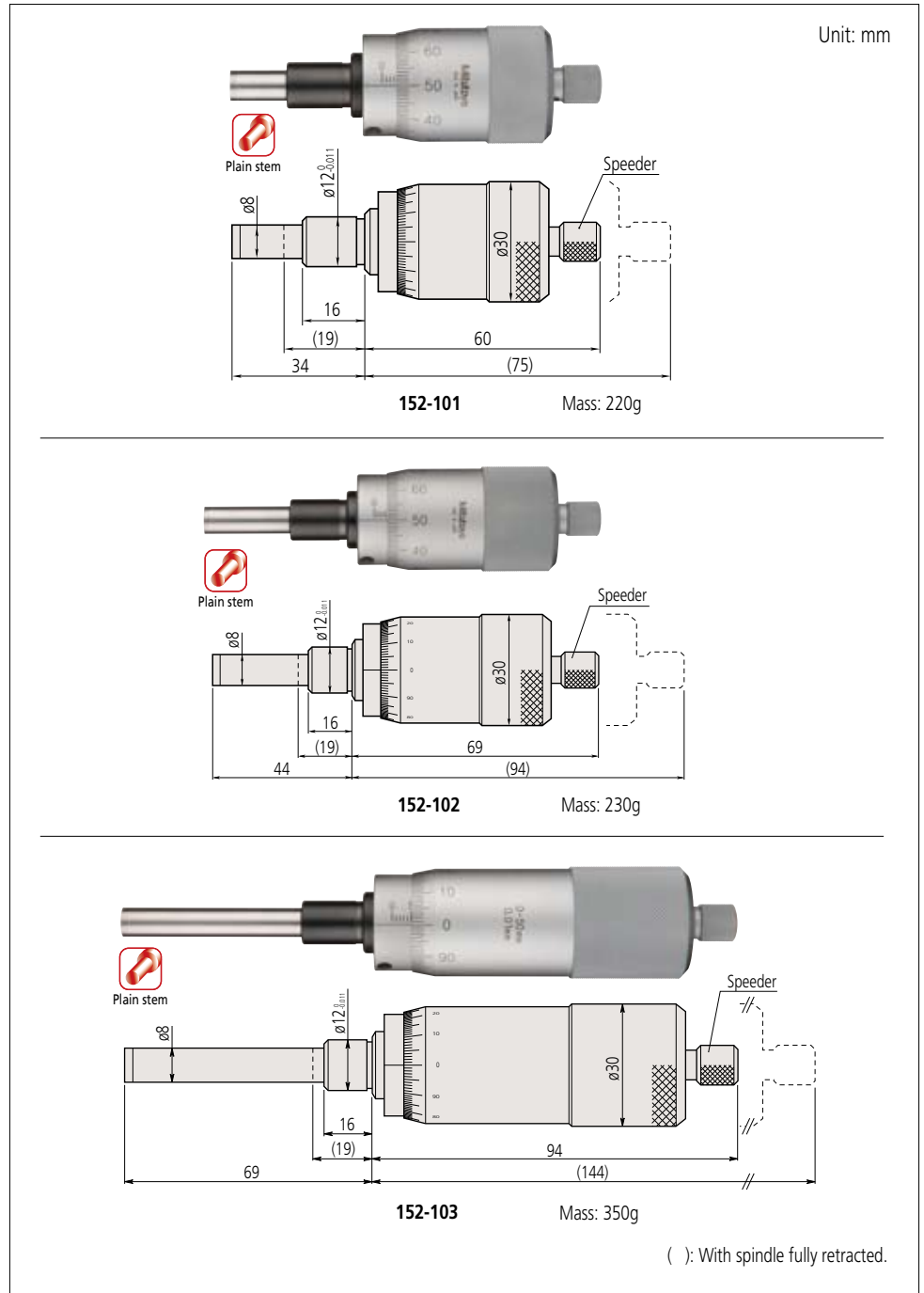
Order No.	Range	Graduation	Accuracy	Stem dia.	Stem	Spindle end	Spindle pitch	Special features
<b>153-108**</b>	0 - .5"	.001"	±.00015"	.375"	Plain	Flat (carbide tip)	.025"	w/ vernier (.0001")
<b>153-205*</b>	0 - 1"	.001"		.5"				Standard
<b>153-206*</b>		.0001"						w/ vernier (.0001")
<b>153-207</b>		.001"						Standard
<b>153-208</b>		.0001"						w/ vernier (.0001")

\* with ratchet stop \*\* made-to-order model

## Micrometer Heads SERIES 152 — Quick Spindle Feed of 1mm/rev

- Quick spindle feed of 1mm/rev.

### DIMENSIONS



### SPECIFICATIONS

Metric							
Order No.	Range	Graduation	Accuracy	Stem dia.	Stem	Spindle end	Spindle pitch
152-101	0 - 15mm	0.01mm	±2μm	12mm	Plain	Flat (carbide tip)	1mm
152-102	0 - 25mm		±4μm				
152-103	0 - 50mm						

# Micrometer Head

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## Micrometer Heads

### SERIES 148 — Fine Spindle Feed of 0.1mm/rev

- Highly accurate 0.1mm pitch thread is only one-fifth of that used for a standard-pitch head (0.5mm).
- External dimensions are compatible with standard 0.5mm pitch heads.

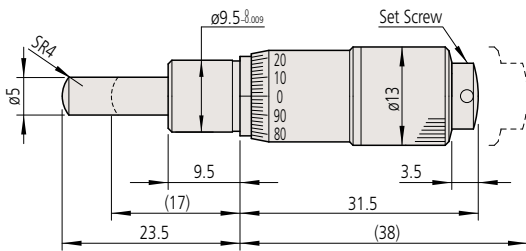
## DIMENSIONS

### Plain stem

Unit: mm



Plain stem Spherical face

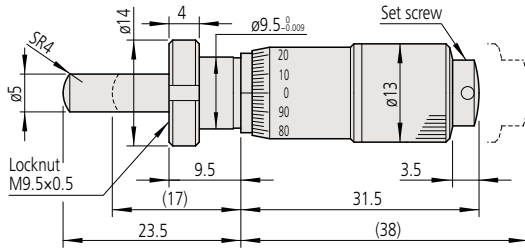


148-142 Mass: 31g

### Stem locknut



Stem locknut Spherical face



Fixture thickness: 6mm  
148-143 Spherical face Mass: 34g



Sleeve marker

( ): With spindle fully retracted.

## Spindle pitch



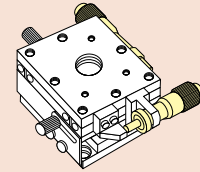
Pitch = 0.1mm



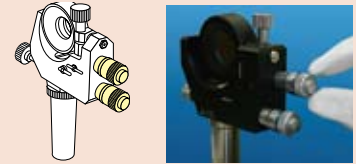
Pitch = 0.5mm

## Applications

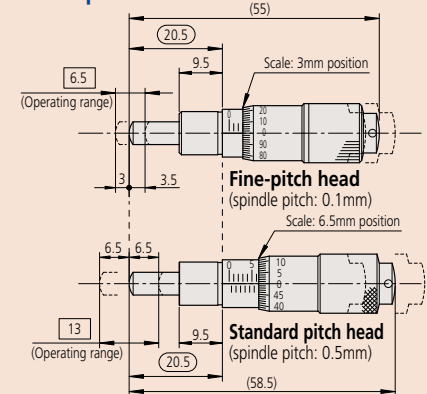
- Semiconductor-wafer positioning machinery and optical component alignment units, etc.
- Precision X-Y table positioning



- Precision adjustment of mirror in holder



## Comparison of mounting dimensions between a fine-pitch head and a standard-pitch head at the mid-range travel position.



While the fine-pitch micrometer head has a measuring range of 6.5mm, the standard head has a larger range of 13mm.

When replacing a standard head, the fine-pitch type can use the common range in the middle of the spindle travel. The standard and compact types of fine-pitch head are otherwise completely interchangeable.

## SPECIFICATIONS

### Metric

Order No.	Range	Graduation	Accuracy	Stem dia.	Stem	Spindle end	Spindle pitch	Special features
148-142	0 - 6.5mm	0.002mm	$\pm 2\mu\text{m}$	9.5mm	Plain	Spherical (SR4)	0.1mm	—
148-143					w/ clamp nut			
148-342					Plain			
148-343					w/ clamp nut			
148-242					Plain			
148-243	0 - 5mm	0.004mm	$\pm 5\mu\text{m}$	6mm	w/ clamp nut	Spherical (SR3)	Small thimble diameter	
148-244					Plain			
148-245					w/ clamp nut			
148-245	0 - 5mm	0.004mm	$\pm 5\mu\text{m}$	3.5mm	w/ clamp nut	Spherical (SR1.5)	0.1mm	—

# Micrometer Heads SERIES 148 — Fine Spindle Feed of 0.1mm/rev

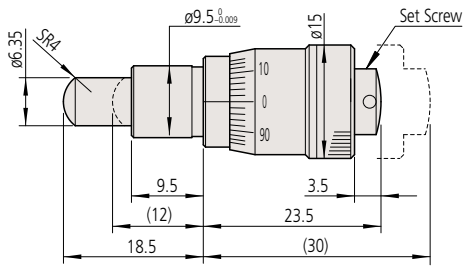
## DIMENSIONS

Unit: mm

### Plain stem



Plain stem Spherical face

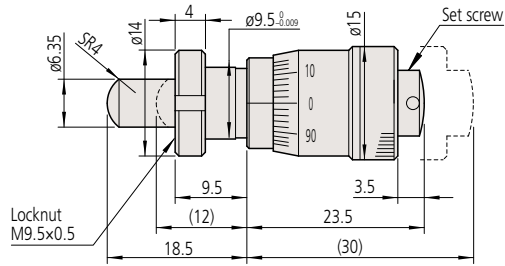


148-342 Mass: 29g

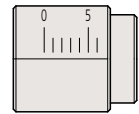
### Stem locknut



Stem locknut Spherical face



Fixture thickness: 6mm  
148-343 Spherical face Mass: 31g

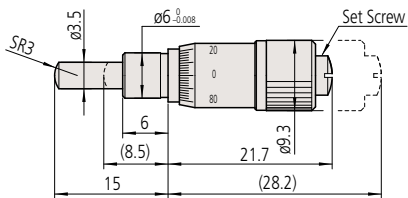


Sleeve marker

### Plain stem



Plain stem Spherical face

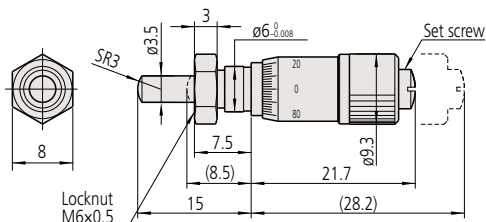


148-242 Mass: 10g

### Stem locknut



Stem locknut Spherical face



Fixture thickness: 4mm  
148-243 Spherical face Mass: 10g

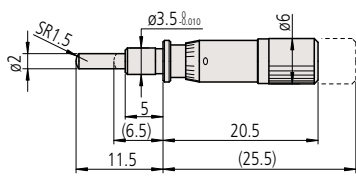


Sleeve marker

### Plain stem



Plain stem Spherical face

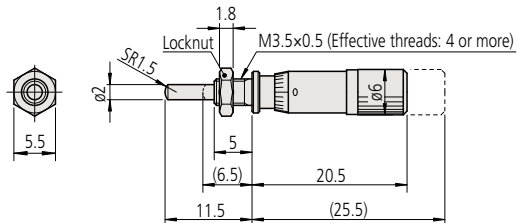


148-244 Mass: 4g

### Stem locknut



Stem locknut Spherical face



Fixture thickness: 3mm  
148-245 Spherical face Mass: 5g



Sleeve marker

( ): With spindle fully retracted.

# Micrometer Head

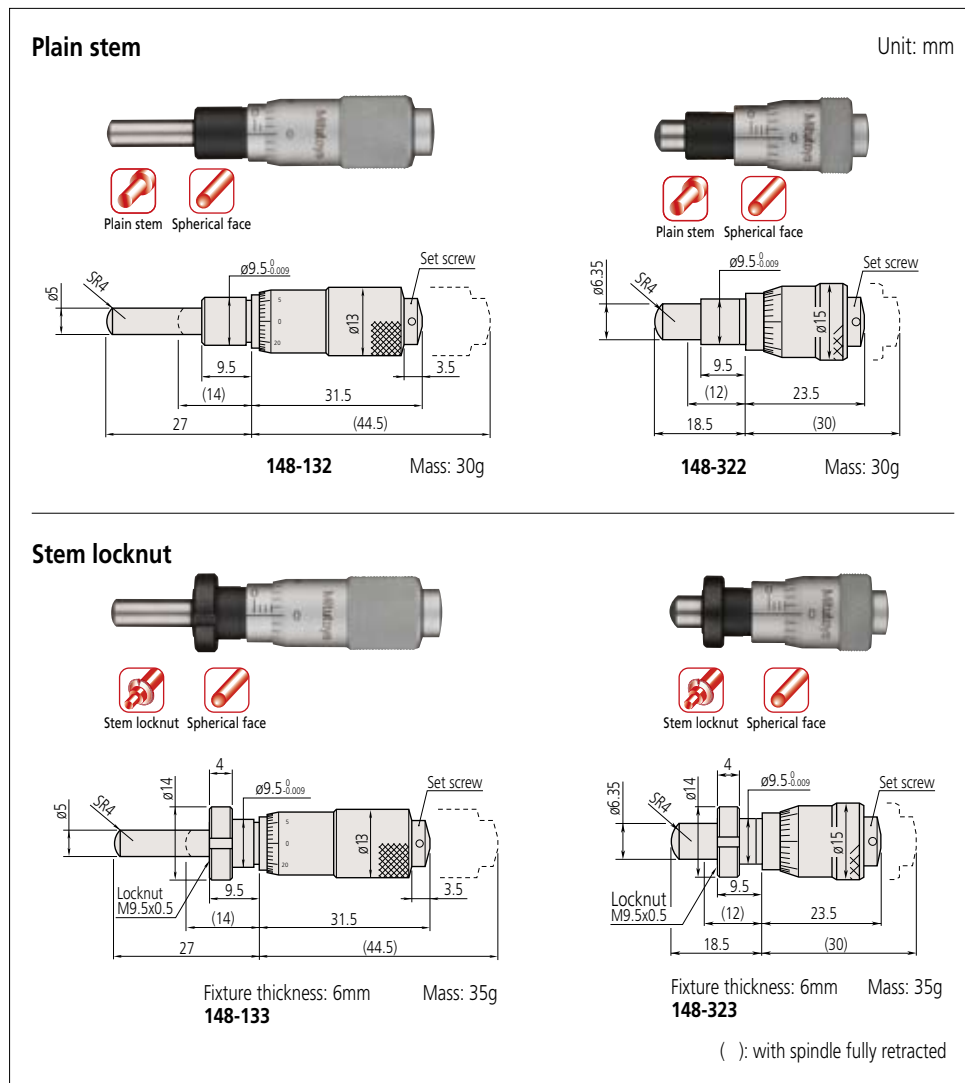
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## Micrometer Heads

### SERIES 148 — Fine Spindle Feed of 0.25mm/rev

- Miniature micrometer heads for ease of incorporating into machines.

## DIMENSIONS



## SPECIFICATIONS

Metric							
Order No.	Range	Graduation	Accuracy	Stem dia.	Stem	Spindle end	Spindle pitch
148-132	0 - 13mm	0.01mm	±2μm	9.5mm	Plain	Spherical (SR4)	0.25mm
148-133					w/ clamp nut		
148-322	0 - 6.5mm	0.01mm	±2μm	9.5mm	Plain	Spherical (SR4)	0.25mm
148-323					w/ clamp nut		

## Micrometer Heads


### SERIES 110 — Differential Screw Thread Translator (Extra-Fine Feed) Type

- The differential movement of spindle threads and nuts allows ultra-fine feeding.

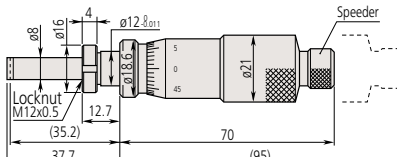
#### DIMENSIONS

Unit: mm

- Differential movement mechanism with double spindle.
- Non-rotating spindle.
- Fixture thickness: 9.5mm




Equipped with vernier



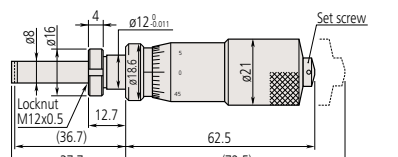
Locknut M12x0.5 (35.2) 12.7 70 (95) Speeder

Fixture thickness: 9.5mm  
**110-101, 110-102** Equipped with vernier Mass: 150g

- Differential movement mechanism with double spindle.
- Non-rotating spindle.
- Fixture thickness: 9.5mm





Equipped with vernier



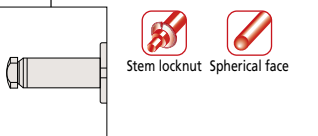
Locknut M12x0.5 (36.7) 12.7 62.5 (72.5) Set screw

Fixture thickness: 9.5mm  
**110-105, 110-106** Equipped with vernier Mass: 150g

Spherical face

Equipped with vernier



Locknut M9.5x0.5 (17) 15 67.5 (80.5) Thimble (fine) Thimble (coarse) Set screw

Fixture thickness: 11.5mm  
**110-502** Dual thimble Mass: 95g

**No.110-107**  
**No.110-108** Equipped with vernier  
 ( ) : with spindle fully retracted

#### SPECIFICATIONS

##### Metric

Order No.	Range		Graduation		Accuracy**	Stem dia.	Stem	Spindle end	Graduation features
<b>110-101</b>	0 - 2.5mm		0.001mm		±5µm/±1.5µm	12mm	w/ clamp nut	Flat (carbide tip)	Standard
<b>110-102</b>			0.0001mm						Fine
<b>110-105</b>			0.001mm						Standard
<b>110-106</b>	0 - 1mm		0.0001mm		±3µm/±1.5µm	9.5mm	w/ clamp nut	Spherical (SR10) (carbide tip)	Fine
<b>110-107</b>			0.001mm						Standard
<b>110-108</b>			0.0001mm						Fine
<b>110-502</b>	Thimble (fine)	0 - 0.2mm	Thimble (fine)	0.0005mm	±3µm/±1.5µm	9.5mm	w/ clamp nut	Spherical (SR3)	Dual scales; 0.2mm fine-feed range
	Thimble (coarse)	0 - 13mm	Thimble (coarse)	0.01mm					

##### Inch

Order No.	Range		Graduation		Accuracy**	Stem dia.	Stem	Spindle end	Graduation features
<b>110-111</b>	0 - .05"		.00002"		±.00025"/±.00006"	.5"	w/ clamp nut	Flat (carbide tip)	Standard
<b>110-112</b>			.000005"						Fine
<b>110-115*</b>			.00002"						Standard
<b>110-116*</b>	0 - .02"		.000005"		±.00015"/±.00006"	.375"	w/ clamp nut	Spherical (SR10) (carbide tip)	Fine
<b>110-117*</b>			.00002"						Standard
<b>110-118*</b>			.000005"						Fine
<b>110-504</b>	Thimble (fine)	0 - .006"	Thimble (fine)	.00002"	±.00015"/±.00006"	.375"	w/ clamp nut	Spherical (SR3)	Dual scales; 0.2mm/.006" fine-feed range
	Thimble (coarse)	0 - .5"	Thimble (coarse)	.001"					

\* made-to-order models

\*\* Wide range / narrow range

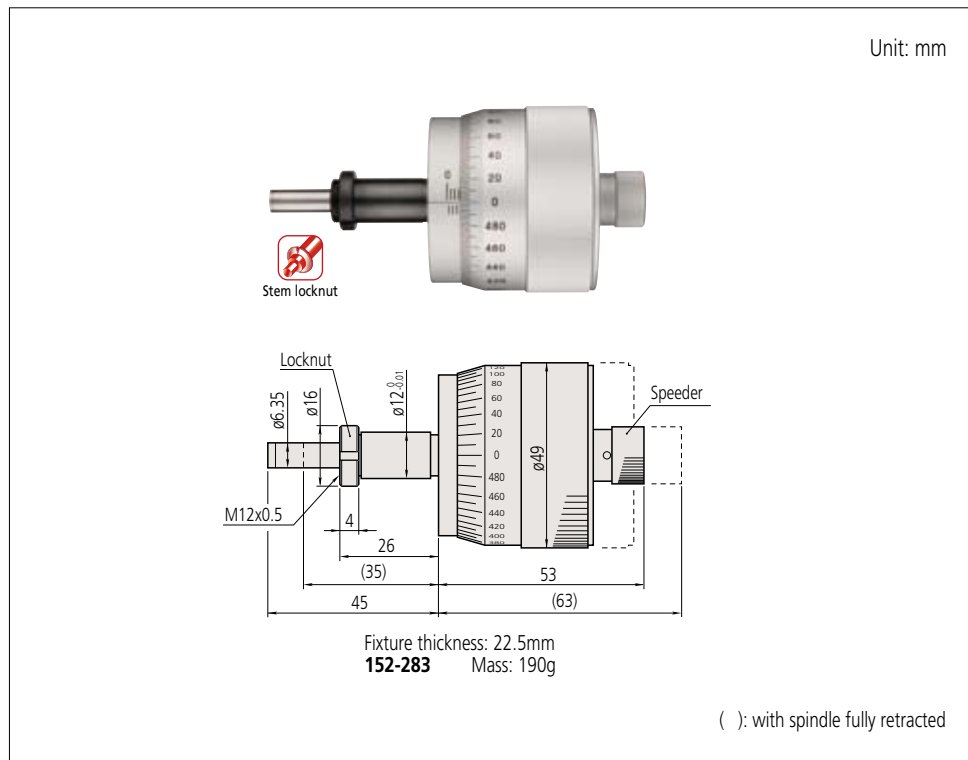
# Micrometer Head

The origin of Mitutoyo's trustworthy brand of small tool instruments

## Micrometer Heads SERIES 152 — Large thimble type

- Large-diameter thimble for fine adjustment and positioning.

### DIMENSIONS

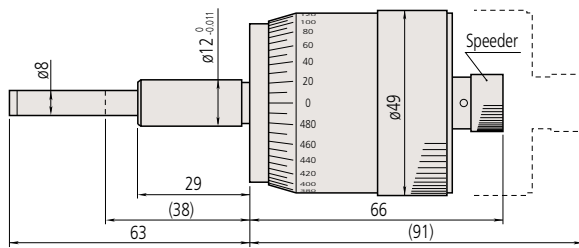


### SPECIFICATIONS

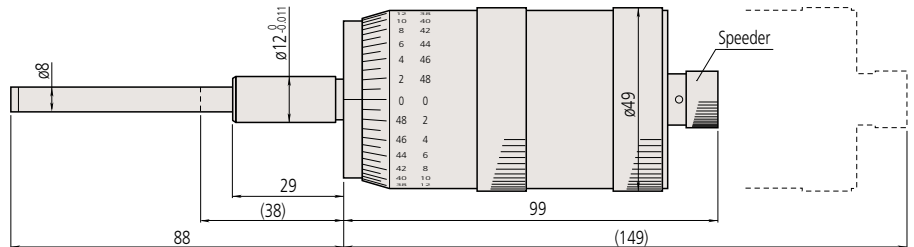
Metric								
Order No.	Range	Graduation	Accuracy	Stem dia.	Stem	Spindle end	Spindle pitch	Graduation features
<b>152-283</b>	0 - 10mm	0.002mm	±2μm	12mm	w/ clamp nut	Flat (carbide tip)	0.5mm	Standard
<b>152-332</b>	0 - 25mm				Plain			Bidirectional
<b>152-348</b>	0 - 50mm		±4μm					
Inch								
Order No.	Range	Graduation	Accuracy	Stem dia.	Stem	Spindle end	Spindle pitch	Graduation features
<b>152-372</b>	0 - 1"	.0001"	±.0001"	.5"	w/ clamp nut	Flat (carbide tip)	.025"	Bidirectional
<b>152-388</b>	0 - 2"							

## DIMENSIONS

Unit: mm



**152-332**  
**152-348** Bidirectional Mass: 310g



**152-380** Mass: 460g

( ) : with spindle fully retracted



# Micrometer Head

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## Micrometer Heads SERIES 152 — XY-Stage type

- Micrometer heads especially designed for accurate cross-travel stage translation in X and Y.
- Spindle end: Flat form and hardened, or spherical with carbide tip (more than HRA90), lapped surface.

### DIMENSIONS

**152-390** Mass: 270g

- The thimble can be rotated to a better reading position while maintaining the spindle position.

Unit: mm

**No.152-389**

\*1 Other dimensions are the same as **153-390**

---

Length of A: 0 to 6 A = 6 in the drawing above.  
**152-402** Mass: 460g

- The zero-setting ring allows spindle movement without thimble position change for easy zero setting.

**152-402**

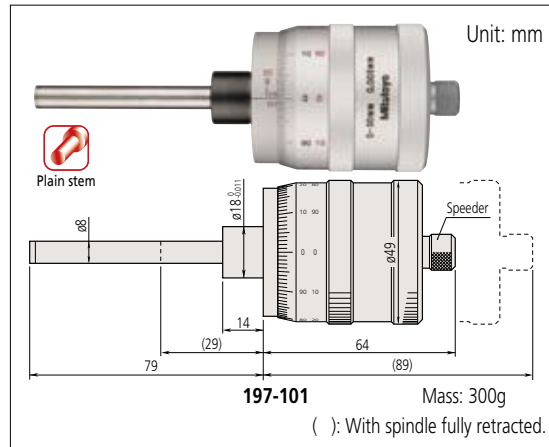
\*2 Other dimensions are the same as **152-402**  
( ): With spindle fully retracted.

### SPECIFICATIONS

Metric							
Order No.	Range	Graduation	Accuracy	Stem dia.	Stem	Spindle pitch	Graduation features
<b>152-390</b>	0 - 25mm	0.005mm	±2μm	18mm	Plain	1mm	for X-axis, bidirectional
<b>152-389</b>							for X-axis, with Vernier
<b>152-402</b>		0.001mm Vernier graduation					
<b>152-401</b>							
Inch							
Order No.	Range	Graduation	Accuracy	Stem dia.	Stem	Spindle pitch	Graduation features
<b>152-392</b>	0 - 1"	.0001"	±.0001"	.709"	Plain	.025"	for X-axis, bidirectional
<b>152-391</b>							

## Micrometer Heads SERIES 197 — Long Stroke Non-rotating Spindle

### DIMENSIONS



- Large thimble micrometer head with non-rotating spindle.
- Floating thimble allows easy zero setting at any spindle position.
- Dual-spindle mechanism for quick feed of 1mm/rev (standard models: 0.5mm/rev).

### SPECIFICATIONS

Metric									
Order No.	Range	Graduation	Accuracy	Stem dia.	Stem	Spindle end	Spindle pitch	Graduation features	
197-101	0 - 50mm	0.005mm	±5µm	18mm	Plain	Flat (carbide tip)	1mm	Bidirectional	

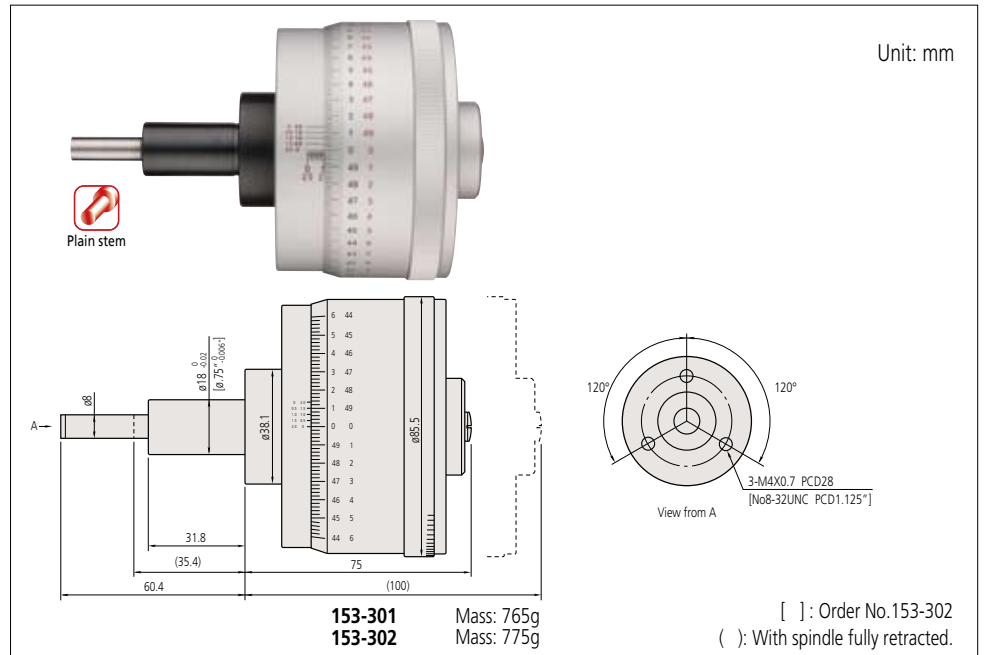
  

Inch									
Order No.	Range	Graduation	Accuracy	Stem dia.	Stem	Spindle end	Spindle pitch	Graduation features	
197-201	0 - 2"	.0002"	±.0001"	.709"	Plain	Flat (carbide tip)	.05"	Bidirectional	

## Micrometer Heads SERIES 153 — High Accuracy and Resolution

- Fine graduation and high resolution model.
- Non-rotating spindle type.

### DIMENSIONS



### SPECIFICATIONS

Metric									
Order No.	Range	Graduation	Accuracy*	Stem dia.	Stem	Spindle end	Spindle pitch	Graduation features	
153-301	0 - 25mm	0.0005mm	±1/±0.5µm	18mm	Plain	Flat (carbide tip)	0.5mm	Bidirectional	

Inch									
Order No.	Range	Graduation	Accuracy*	Stem dia.	Stem	Spindle end	Spindle pitch	Graduation features	
153-302	0 - 1"	.00001"	±.00005"/±.00003"	.75"	Plain	Flat (carbide tip)	.025"	Bidirectional	

\* Wide range / narrow range

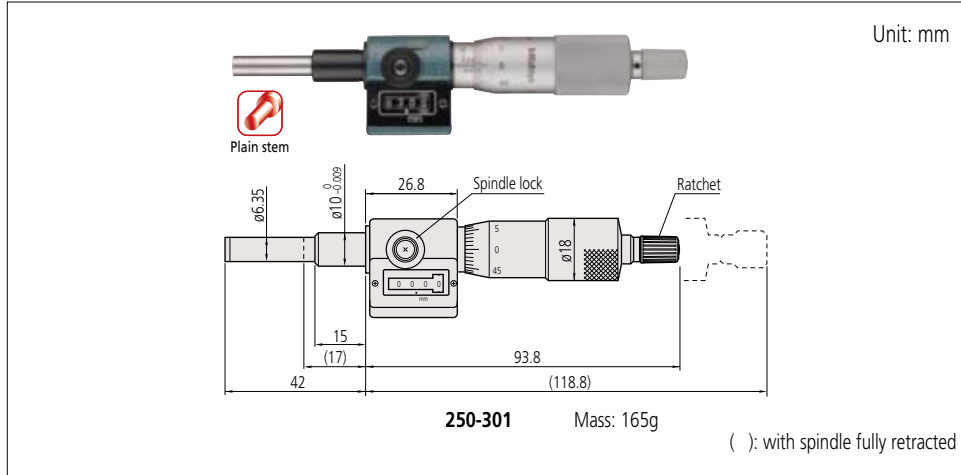
# Micrometer Head

The origin of Mitutoyo's trustworthy brand of small tool instruments

## Micrometer Heads SERIES 250 — Digit Counter type

- Digit counter for easy reading of spindle movement.
- Carbide measuring face.

### DIMENSIONS



### SPECIFICATIONS

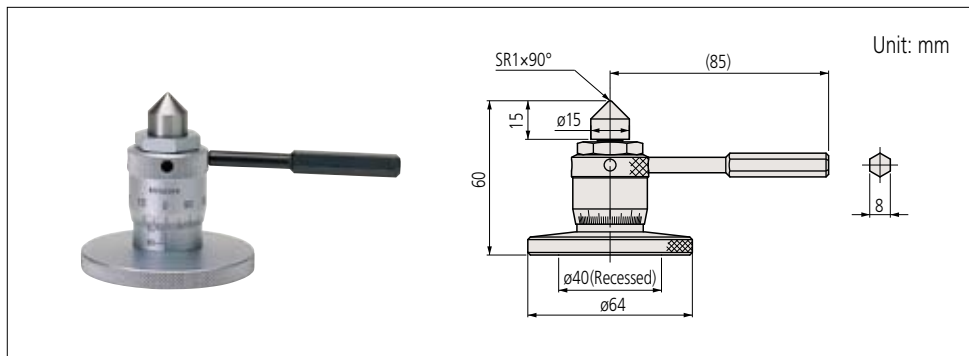
Metric									
Order No.	Range	Graduation	Accuracy	Stem dia.	Stem	Spindle end	Spindle pitch	Graduation features	
250-301	0 - 25mm	0.01mm	±2μm	10mm	Plain	Flat (carbide tip)	0.5mm	—	

Inch									
Order No.	Range	Graduation	Accuracy	Stem dia.	Stem	Spindle end	Spindle pitch	Graduation features	
250-312	0 - 1"	.0001"	±.0001"	.375"	Plain	Flat (carbide tip)	.025"	Vernier scale	

## Micro Jack SERIES 7

- Used for accurate leveling of machines, surface plates, and other precision instruments.
- Zero-setting is possible at any position.
- Easy adjustment under heavy load.

### DIMENSIONS



### SPECIFICATIONS

Metric				
Order No.	Range	Graduation	Handle power at the max. loading	Remarks
7850	60 - 75mm	0.01mm	90 N	Max. load: 400kg



## Micrometer Heads Mounting Fixtures

- Manufacturing brackets to mount micrometer heads for each particular application can be laborious and costly. Mitutoyo offers various types of fixtures for micrometer heads to meet a wide range of applications. These fixtures are made of nickel-plated cast iron.

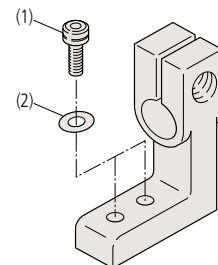
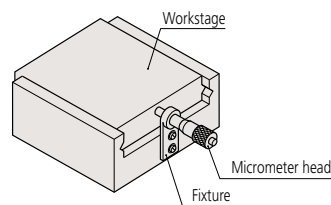


### SPECIFICATIONS

Mounting hole size

Micrometer Head	Fixtures (Order No.)	Mounting hole size
<b>148 Series</b>	<b>303560, 303562, 303564, 303566 303559, 303561, 303563, 303565</b>	ø9.5x9.5 long for plain stem or stem locknut type micrometer heads
<b>149 Series</b>	<b>303569, 303571, 303573, 303575 303568, 303570, 303572, 303574</b>	ø9.5x15 long for plain stem or stem locknut type micrometer heads
<b>150 Series</b>	<b>303579, 303581, 303583, 303585 303578, 303580, 303582, 303584</b>	ø10x15 long for plain stem or stem locknut type micrometer heads

\* Supplied with a socket head screw (M3 x 0.5 x 12) for fixtures to be used with a micrometer head without stem locknut (plain stem type micrometer head).



### SPECIFICATIONS

Recommended socket head screws for the fixtures

Fixtures (Order No.)	Socket head screw (1)	Washer (2)
<b>303559, 303560, 303561, 303562, 303563, 303564 303565, 303566</b>	M3x0.5x8 M3x0.5x12	Small, Nominal dia.: 3 Small, Nominal dia.: 3
<b>303568, 303569, 303570, 303571, 303572, 303573 303578, 303579, 303580, 303581, 303582, 303583</b>	M4x0.7x10	Small, Nominal dia.: 4
<b>303574, 303575 303584, 303585</b>	M4x0.7x12	Small, Nominal dia.: 4

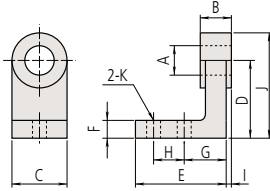
( ) : with spindle fully retracted

# Micrometer Head

The origin of Mitutoyo's trustworthy brand of small tool instruments

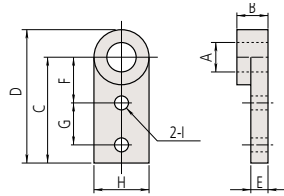
## Micrometer Heads Mounting Fixtures

Fixtures for micrometer heads with stem locknut



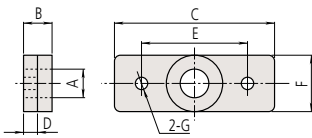
(Unit: mm)

Order No.	A	B	C	D	E	F	G	H	I	J	K
303559	ø9.5	6	15	20	24	5	11	8	0.5	27.5	ø3.4
303568		11.5	20	30	35	7	16	12	1.75	40	ø4.5
303578		ø10									



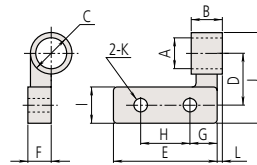
(Unit: mm)

Order No.	A	B	C	D	E	F	G	H	I
303563	ø9.5	6	30	37.5	4.5	15	10	15	ø3.4
303572		11.5	40	50	6.5	18	15	20	ø4.5
303582		ø10							



(Unit: mm)

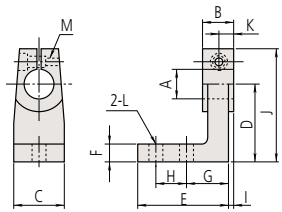
Order No.	A	B	C	D	E	F	G
303561	ø9.5	6	40	3.5	30	15	ø3.4
303570		11.5	60	5.5	40	20	ø4.5
303580		ø10					



(Unit: mm)

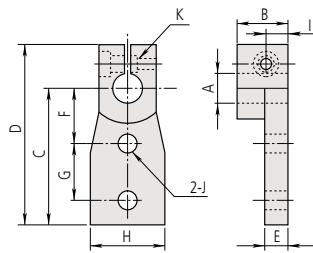
Order No.	A	B	C	D	E	F	G	H	I	J	K	L
303565	ø9.5	6	ø15	15	25	8.5	7.5	10	10	27.5	ø3.4	0.75
303574		11.5		20	40		10	20	15	35	ø4.5	1.25
303584		ø10										

Fixtures for plain stem type micrometer heads



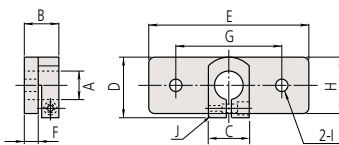
(Unit: mm)

Order No.	A	B	C	D	E	F	G	H	I	J	K	L	G
303560	ø9.5	9	15	20	23	5	11	8	1.5	3.25	4.5	ø3.4	M3×0.5
303569		14.5	20	30	35	7	16	12	3.25	4.25	7.25	ø4.5	
303579		ø10											



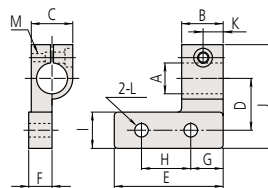
(Unit: mm)

Order No.	A	B	C	D	E	F	G	H	I	J	K
303564	ø9.5	9	30	4.25	4	15	10	15	4.5	ø3.4	M3×0.5
303573		14.5		5.25	6	18	15	20	7.25	ø4.5	
303583		ø10									



(Unit: mm)

Order No.	A	B	C	D	E	F	G	H	I	J
303562	ø9.5	9	15	20	40	3	30	15	ø3.4	M3×0.5
303571		14.5		22.5	60	5	40	20	ø4.5	
303581		ø10								

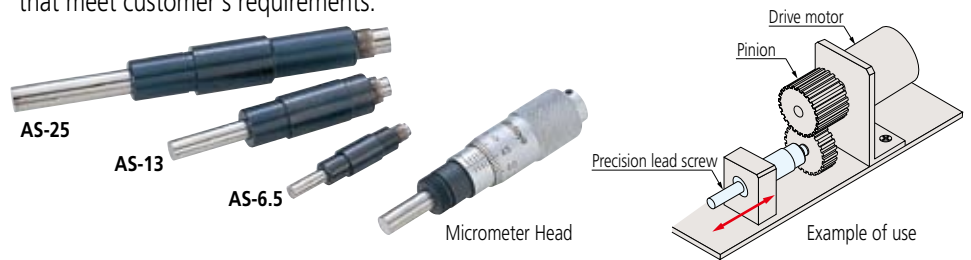


(Unit: mm)

Order No.	A	B	C	D	E	F	G	H	I	J	K	L	M
303566	ø9.5	9	15	25	8.5	7.5	10	10	32.5	4.5	ø3.4	M3×0.5	
303575		14.5		10		20	15	40	7.25	ø4.5			
303585		ø10											

## Precision Leadscrews

- Mitutoyo manufactures simple and less expensive precision leadscrews for precise positioning mechanisms and fine-feed mechanisms, in addition to standard micrometer heads.
- Mitutoyo also manufactures leadscrews with special specifications, such as 0.25mm pitch, as well as those with the standard 0.5mm feed pitch and with dimensions and forms that meet customer's requirements.
- Durability: 100-thousand operations are guaranteed (use condition: 4 kg load; 2 kg for **AS-6.5** and **BS-6.5**)
- Main applications:
  - Precision feed stages
  - Fine adjustment of optical elements (mirrors, prisms)
  - Fiber optic centering devices
  - Various assembly and adjustment jigs

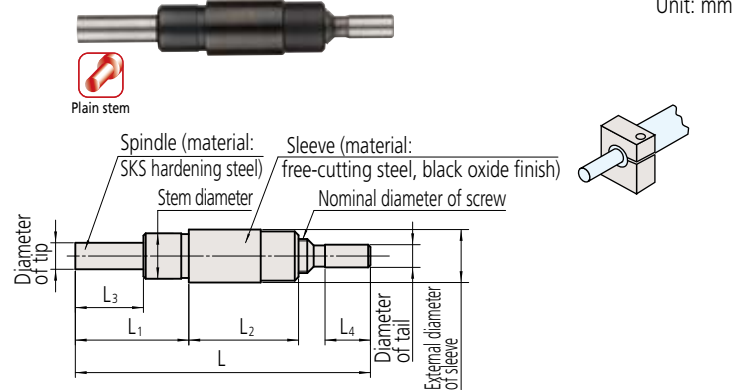


## SPECIFICATIONS

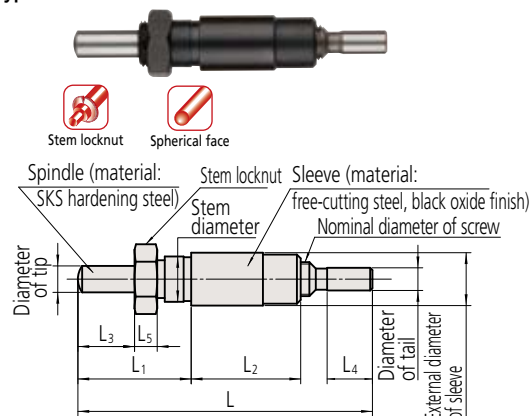
Order No.	Model	Stroke (mm)	Feed pitch (mm)	Feed accuracy (μm)	Stem diameter (mm)	Tip diameter (mm)	Tail diameter (mm)	Screw nominal diameter	Sleeve diameter (mm)	Measuring face	Mass	Others
<b>04AZA160</b>	AS-6.5	6.5	0.5	±5	ø6 <sup>0.008</sup>	ø3.5	ø3 <sup>0.01</sup>	M4.5 x 0.5	ø7	Hardened	10g	<ul style="list-style-type: none"> <li>• AS type: Flat spindle tip without nut</li> <li>• BS type: Spherical spindle tip with nut</li> </ul>
<b>04AZA161</b>	BS-6.5										11g	
<b>04AZA162</b>	AS-13	13		±2	ø9.5 <sup>0.009</sup>	ø5	ø5 <sup>0.012</sup>	M7.35 x 0.5	ø10.5	Carbide	27g	
<b>04AZA163</b>	BS-13										30g	
<b>04AZA164</b>	AS-25	25	±2	ø10 <sup>0.009</sup>	ø6.35	ø6 <sup>0.015</sup>	M7.35 x 0.5	ø12	Carbide	61g		
<b>04AZA165</b>	BS-25									64g		

## DIMENSIONS

### Type AS: Plain stem

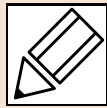


### Type BS: Stem with locknut



Order No.	L	L1	L2	L3	L4	L5
<b>04AZA160</b>	39	15	14.5	9	6	—
<b>04AZA161</b>	—	—	—	7.5	—	3
<b>04AZA162</b>	57.5	25	21.5	15.5	8	—
<b>04AZA163</b>	—	—	—	—	—	4
<b>04AZA164</b>	96.5	42	39.5	27	10	—
<b>04AZA165</b>	—	—	—	—	—	4

# Quick Guide to Precision Measuring Instruments



## Micrometer Heads

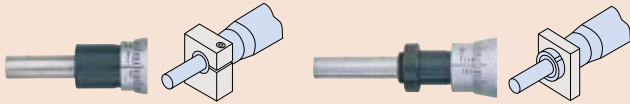
### Key Factors in Selection

Key factors in selecting a micrometer head are the measuring range, spindle face, stem, graduations, thimble diameter, etc.

#### Stem

Plain stem

Stem locknut type



- The stem used to mount a micrometer head is classified as a "plain type" or "clamp nut type" as illustrated above. The stem diameter is manufactured to a nominal Metric or Imperial size with an h6 tolerance.
- The clamp nut stem allows fast and secure clamping of the micrometer head. The plain stem has the advantage of wider application and slight positional adjustment in the axial direction on final installation, although it does require a split-fixture clamping arrangement or adhesive fixing.
- General-purpose mounting fixtures are available as optional accessories.

#### Measuring Face



Flat face



Spherical face



Anti-rotation device

- A flat measuring face is often specified where a micrometer head is used in measurement applications.
- When a micrometer head is used as a feed device, a spherical face can minimize errors due to misalignment (Figure A). Alternatively, a flat face on the spindle can bear against a sphere, such as a carbide ball (Figure B).
- A non-rotating spindle type micrometer head or one fitted with an anti-rotation device on the spindle (Figure C) can be used if a twisting action on the workpiece must be avoided.
- If a micrometer head is used as a stop then a flat face both on the spindle and the face it contacts provides durability.

Figure A

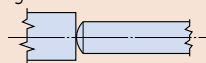


Figure C

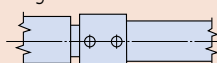
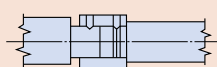
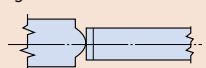


Figure B



#### Non-Rotating Spindle

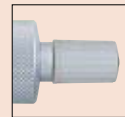
- A non-rotating spindle type head does not exert a twisting action on a workpiece, which may be an important factor in some applications.

#### Spindle Thread Pitch

- The standard type head has 0.5mm pitch.
- 1mm-pitch type: quicker to set than standard type and avoids the possibility of a 0.5mm reading error. Excellent load-bearing characteristics due to larger screw thread.
- 0.25mm or 0.1mm-pitch type  
This type is the best for fine-feed or fine-positioning applications.

#### Constant-force Device

- A micrometer head fitted with a constant-force device (ratchet or friction thimble) is recommended for measurement applications.
- If using a micrometer head as a stop, or where saving space is a priority, a head without a ratchet is probably the best choice.



Micrometer head with constant-force device



Micrometer head without constant-force device (no ratchet)

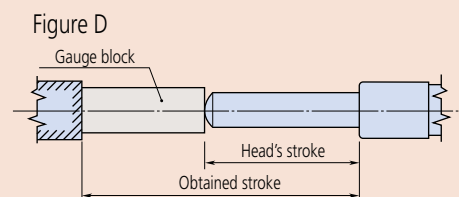
#### Spindle Lock

- If a micrometer head is used as a stop it is desirable to use a head fitted with a spindle lock so that the setting will not change even under repeated shock loading.



#### Measuring Range (Stroke)

- When choosing a measuring range for a micrometer head, allow an adequate margin in consideration of the expected measurement stroke. Six stroke ranges, 5 to 50mm, are available for standard micrometer heads.
- Even if an expected stroke is small, such as 2mm to 3mm, it will be cost effective to choose a 25mm-stroke model as long as there is enough space for installation.
- If a long stroke of over 50mm is required, the concurrent use of a gauge block can extend the effective measuring range. (Figure D)



- In this guide, the range (or stroke end) of the thimble is indicated by a dashed line. For stroke ends, consider the thimble as moving to the position indicated by the line when designing the jig.

#### Ultra-fine Feed Applications

- Dedicated micrometer heads are available for manipulator applications, etc., which require ultra-fine feed or adjustment of spindle.

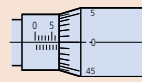
## Thimble Diameter

- The diameter of a thimble greatly affects its usability and the "fineness" of positioning. A small-diameter thimble allows quick positioning whereas a large-diameter thimble allows fine positioning and easy reading of the graduations. Some models combine the advantages of both features by mounting a coarse-feed thimble (speeder) on the large-diameter thimble.

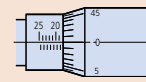


## Graduation Styles

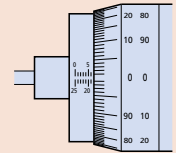
- Care is needed when taking a reading from a mechanical micrometer head, especially if the user is unfamiliar with the model.
- The "normal graduation" style, identical to that of an outside micrometer, is the standard. For this style the reading increases as the spindle retracts into the body.
- On the contrary, in the "reverse graduation" style the reading increases as the spindle advances out of the body.
- The "bidirectional graduation" style is intended to facilitate measurement in either direction by using black numerals for normal, and red numerals for reverse, operation.
- Micrometer heads with a mechanical or electronic digital display, which allow direct reading of a measurement value, are also available. These types are free from misreading errors. A further advantage is that the electronic digital display type can enable computer-based storage and statistical processing of measurement data.



Normal graduation style



Reverse graduation style



Bidirectional graduation style

## Guidelines for Self-made Fixtures

A micrometer head should be mounted by the stem in an accurately machined hole using a clamping method that does not exert excessive force on the stem. There are three common mounting methods as shown below. Method 3 is not recommended. Adopt methods (1) or (2) wherever possible.

(Unit: mm)

Mounting method	(1) Clamp nut				(2) Split-body clamp				(3) Setscrew clamp			
	Points to keep in mind											
Stem diameter	ø9.5	ø10	ø12	ø18	ø9.5	ø10	ø12	ø18	ø9.5	ø10	ø12	ø18
Mounting hole Fitting tolerance	G7 +0.005 to +0.020		G7 +0.006 to +0.024		G7 +0.005 to +0.020		G7 +0.006 to +0.024		H5 0 to +0.006		H5 0 to +0.008	
Precautions	Care should be taken to make Face A square to the mounting hole. The stem can be clamped without any problem at squareness within 0.16/6.5.				Remove burrs generated on the wall of the mounting hole by the slitting operation.				M3x0.5 or M4x0.7 is an appropriate size for the setscrew. Use a brass plug under setscrew (if thickness of fixture allows) to avoid damaging stem.			



## ■ Maximum Loading Capacity of Micrometer Heads

The maximum loading capacity of a micrometer head depends mainly on the method of mounting and whether the loading is static or dynamic (used as a stop, for example). Therefore the maximum loading capacity of each model cannot be definitely specified. The loading limits recommended by Mitutoyo (at less than 100,000 revolutions if used for measuring within the guaranteed accuracy range) and the results of static load tests using a small micrometer head are given below.

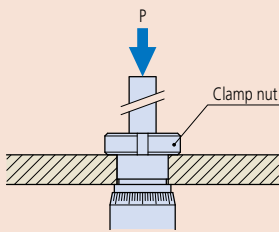
### 1. Recommended maximum loading limit

		Maximum loading limit
Standard type	spindle pitch: 0.5mm	Up to approx. 39.2N (4kgf)*
	Spindle pitch: 0.1mm/0.25mm	Up to approx. 19.6N (2kgf)
High function type	Spindle pitch: 0.5mm	Up to approx. 39.2N (4kgf)
	Spindle pitch: 1.0mm	Up to approx. 58.8N (6kgf)
	Non-rotating spindle	Up to approx. 19.6N (2kgf)
	Series 110 micro-fine feed type (with a differential mechanism)	Up to approx. 19.6N (2kgf)

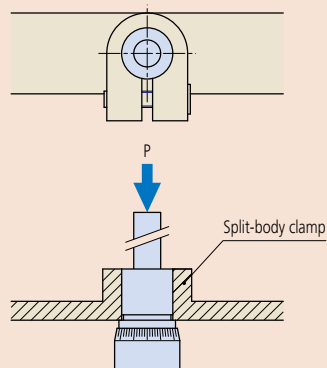
\* Up to approx. 19.6N (2kgf) only for Ultra small models

### 2. Static load test for micrometer heads (using 148-104/148-103 for this test)

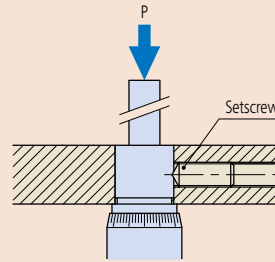
(1) Clamp nut



(2) Split-body clamp



(3) Setscrew clamp



#### Test method

Micrometer heads were set up as shown and the force at which the head was damaged or pushed out of the fixture when a static load was applied, in direction P, was measured. (In the tests no account was taken of the guaranteed accuracy range.)

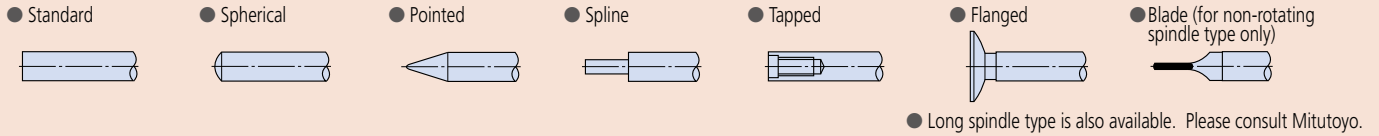
Mounting method	Damaging / dislodging load*
(1) Clamp nut	Damage to the main unit will occur at 8.63 to 9.8kN (880 to 1000kgf).
(2) Split-body clamp	The main unit will be pushed out of the fixture at 0.69 to 0.98kN (70 to 100kgf).
(3) Setscrew clamp	Damage to the setscrew will occur at 0.69 to 1.08kN (70 to 110kgf).

\* These load values should only be used as an approximate guide.

## ■ Custom-built Products (Product Example Introductions)

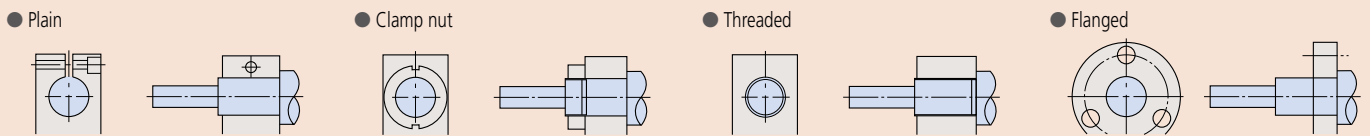
Micrometer heads have applications in many fields of science and industry and Mitutoyo offers a wide range of standard models to meet customers' needs. However, in those cases where the standard product is not suitable, Mitutoyo can custom build a head incorporating features better suited to your special application. Please feel free to contact Mitutoyo about the possibilities - even if only one custom-manufactured piece is required.

### 1. Spindle-end types



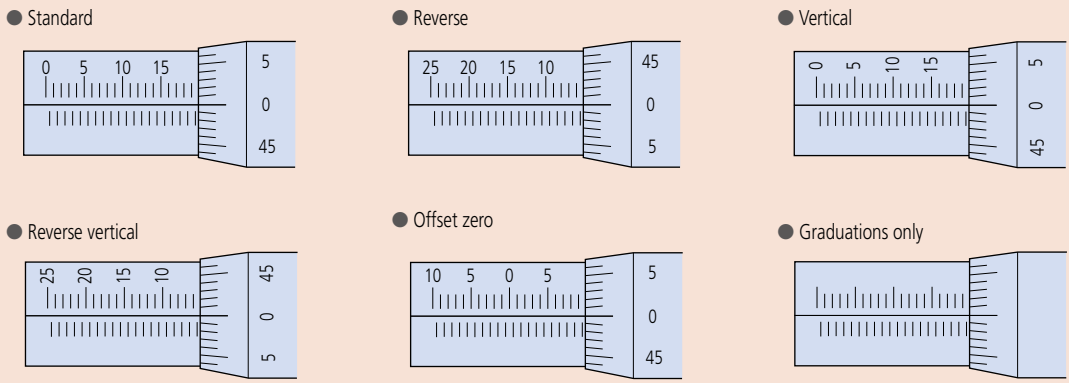
### 2. Stem types

A custom stem can be manufactured to suit the mounting fixture.



### 3. Scale graduation schemes

Various barrel and thimble scale graduation schemes, such as reverse and vertical, are available. Please consult Mitutoyo for ordering a custom scheme not shown here.

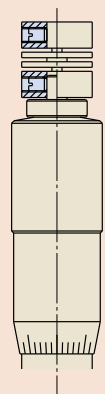


### 4. Logo engraving

A specific logo can be engraved as required.

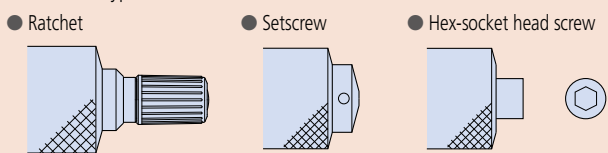
### 5. Motor Coupling

Couplings for providing motor drive to a head can be designed.



### 6. Thimble mounting

Thimble mounting methods including a ratchet, setscrew, and hex-socket head screw types are available.



### 7. Spindle-thread pitch

Pitches of 1mm for fast-feed applications or 0.25mm for fine-feed can be supplied as alternatives to the standard 0.5mm. Inch pitches are also supported. Please consult Mitutoyo for details.

### 8. Lubricant for spindle threads

Lubrication arrangements can be specified by the customer.

### 9. All-stainless construction

All components of a head can be manufactured in stainless steel.

### 10. Simple packaging

Large-quantity orders of micrometer heads can be delivered in simple packaging for OEM purposes.

### 11. Spindle and nut (Precision lead screw)

The spindle can be used as a precision lead screw. The nut is machined in accordance with the specified dimensions. For details, refer to "Precision Lead Screws" on page B-112.

### 12. Accuracy inspection certificate

An accuracy inspection certificate can be supplied at extra cost. For detailed information, contact the nearest Mitutoyo Sales Office.