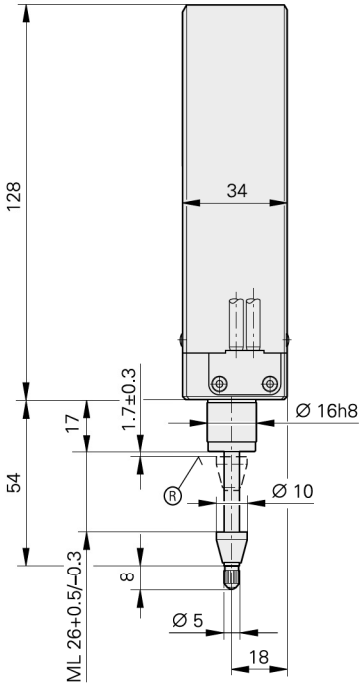
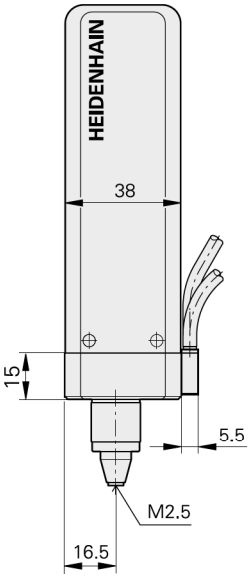
HEIDENHAIN-CERTO

Incremental length gauges with ± 0.1 µm/± 0.05[1)] µm*/± 0.03 µm[1)] accuracy

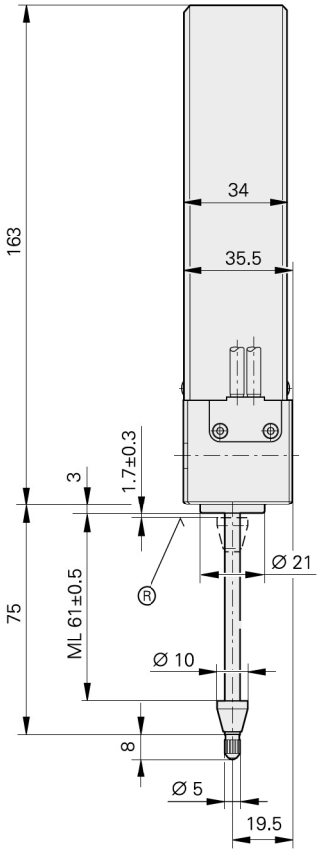
- **For very high accuracy**
- **For inspection of measuring equipment and gauge blocks**
- **Ball-bush guided plunger**

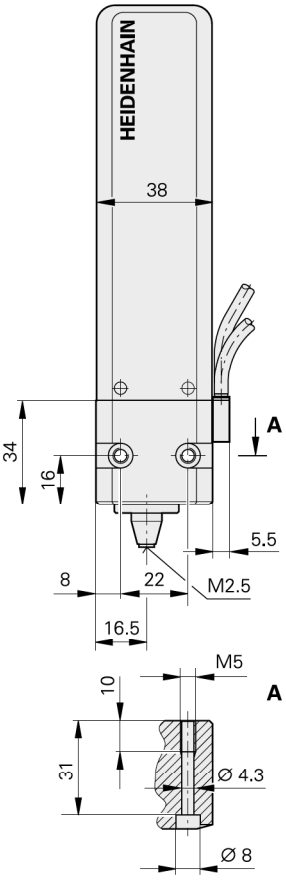
CT 2500





CT 6000





mm

Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm

Ⓡ = Reference mark position

Specifications	CT 2501	CT 6001	CT 2502	CT 6002
Plunger actuation	By motor		Via coupling with moving machine part	
Measuring standard	DIADUR phase grating on Zerodur glass ceramic; grating period 4 µm			
System accuracy At 19 °C to 21 °C	± 0.1 µm, ± 0.03 µm[1)]	± 0.1 µm, ± 0.05 µm[1)]	± 0.1 µm, ± 0.03 µm[1)]	± 0.1 µm, ± 0.05 µm[1)]
Position error per signal period	≤ ± 0.02 µm			
Reference mark	One, approx. 1.7 mm below upper stop			
Measuring range	25 mm	60 mm	25 mm	60 mm
Gauging force Vertically downward Vertically upward Horizontal	By motor 1 N/1.25 N/1.75 N – /– /0.75 N – /0.75 N/1.25 N		Moving force[2)] 0.6 N 0.1 N 0.6 N	
Radial force	≤ 0.5 N (mechanically permissible)			
Fastening	Clamping shank ∅ 16h8	Plane surface	Clamping shank ∅ 16h8	Plane surface
Operating attitude	Any required (for preferred operating attitude see *Mounting*)			
Vibration 55 to 2000 Hz **Shock** 11 ms	≤ 100 m/s^2 (EN 60068-2-6) ≤ 1000 m/s^2 (EN 60068-2-27)			
Operating temperature	10 °C to 40 °C; reference temperature 20 °C			
Protection EN 60529	IP 50			
Weight without cable	520 g	700 g	480 g	640 g

Electrical Data	CT 2501	CT 6001	CT 2502	CT 6002
Interface	~ 11 µA$_{PP}$			
Signal period	2 µm			
Measuring velocity	≤ 24 m/min (depending on the subsequent electronics) ≤ 12 m/min with the ND 28x display unit			
Electrical connection*	• Cable 1.5 m with D-sub connector (male) 15-pin • Cable 1.5 m with M23 connector (male), 9 pin Interface electronics are integrated in connector.			
Cable length	≤ 30 m			
Power supply	5 V DC ± 0.25 V/< 180 mA		5 V DC ± 0.25 V/< 120 mA	

Required accessories*	For CT 2501	For CT 6001
Switch box	SG 25M	SG 60M

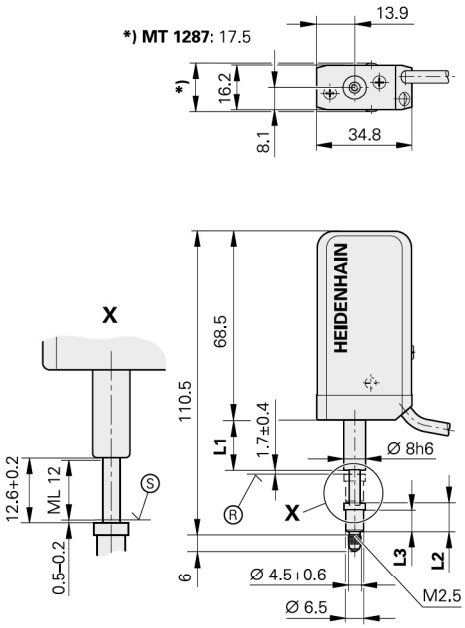
***** Please select when ordering
[1)] After linear length-error compensation in the evaluation electronics
[2)] Force required to move the plunger or force of its weight

HEIDENHAIN-METRO

Incremental length gauges with ± 0.2 µm accuracy

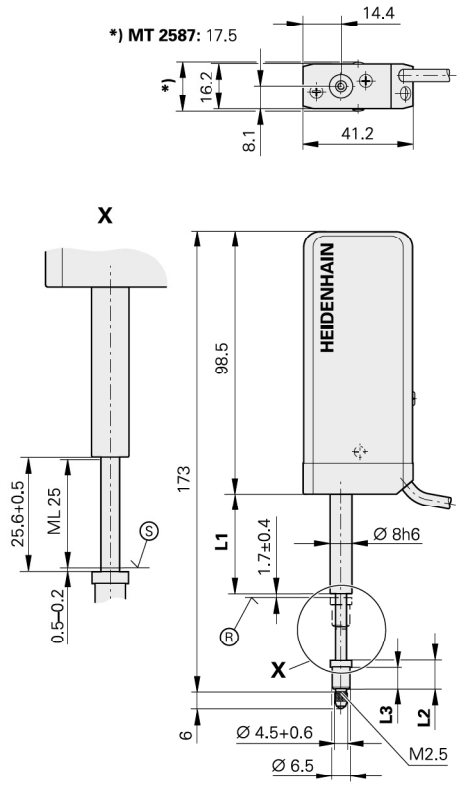
- **High repeatability**
- **Plunger actuation by cable release, by the workpiece or pneumatically**
- **Ball-bush guided plunger**

MT 1200



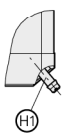
	MT 12x1	MT 1287
L1	18.5	22.0
L2	10.1	6.2
L3	8.1	4.2

MT 2500



	MT 25x1	MT 2587
L1	37.0	41.0
L2	10.1	6.2
L3	8.1	4.2

MT 1287
MT 2587



mm

Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm

Ⓡ = Reference mark position
Ⓢ = Beginning of measuring length
Ⓗ1 = Air connection for 2 mm tube

Mechanical Data	MT 1271 ⊓⊔TTL MT 1281 ∿ 1 V_{PP}	MT 2571 ⊓⊔TTL MT 2581 ∿ 1 V_{PP}	MT 1287 ∿ 1 V_{PP}	MT 2587 ∿ 1 V_{PP}
Plunger actuation Position of plunger at rest	By cable lifter or measured object Extended		Pneumatic Retracted	
Measuring standard	DIADUR phase grating on Zerodur glass ceramic; grating period 4 µm			
System accuracy	± 0.2 µm			
Position error per signal period	≤ ± 0.02 µm			
Reference mark	Approx. 1.7 mm below upper stop			
Measuring range	12 mm	25 mm	12 mm	25 mm
Gauging force	See *Gauging force—plunger actuation*			
Version "without spring" Vertically downward	0.13 N	0.17 N	–	
Compressed air	–		≤ 1.4 bar	
Radial force	≤ 0.8 N (mechanically permissible)			
Fastening	Clamping shank ∅ 8h6			
Operating attitude	Any; *for version without spring:* vertically downward			
Vibration 55 to 2000 Hz **Shock** 11 ms	≤ 100 m/s^2 (EN 60068-2-6) ≤ 1000 m/s^2 (EN 60068-2-27)			
Operating temperature	10 °C to 40 °C; reference temperature 20 °C			
Protection EN 60529	IP 50		IP 64 (with sealing air)	
Weight without cable	100 g	180 g	110 g	190 g

Electrical Data	MT 1271 MT 2571		MT 128x MT 258x
Interface	⊓⊔TTL x 5	⊓⊔TTL x 10	∿ 1 V_{PP}
Signal period	0.4 µm	0.2 µm	2 µm
Recommended measuring step	0.1 µm[1)]	0.05 µm[1)]	0.1 µm/0.05 µm
Mech. permissible traversing speed	≤ 30 m/min		
Edge separation a at scanning frequency*/traverse speed 200 kHz ≤ 24 m/min 100 kHz ≤ 12 m/min 50 kHz ≤ 6 m/min 25 kHz < 3 m/min	 ≥ 0.23 µs ≥ 0.48 µs ≥ 0.98 µs –	 – ≥ 0.23 µs ≥ 0.48 µs > 0.98 µs	–
Electrical connection* (Interface electronics integrated in connector)	Cable 1.5 m with D-sub connector (male) 15-pin		Cable 1.5 m with • D-sub connector (male), 15-pin • M23 connector (male), 12-pin
Cable length	≤ 30 m with HEIDENHAIN cable		
Power supply	5 V DC ± 0.25 V/< 160 mA (without load)		5 V DC ± 0.25 V/< 130 mA

***** Please select when ordering

[1)] After 4-fold evaluation

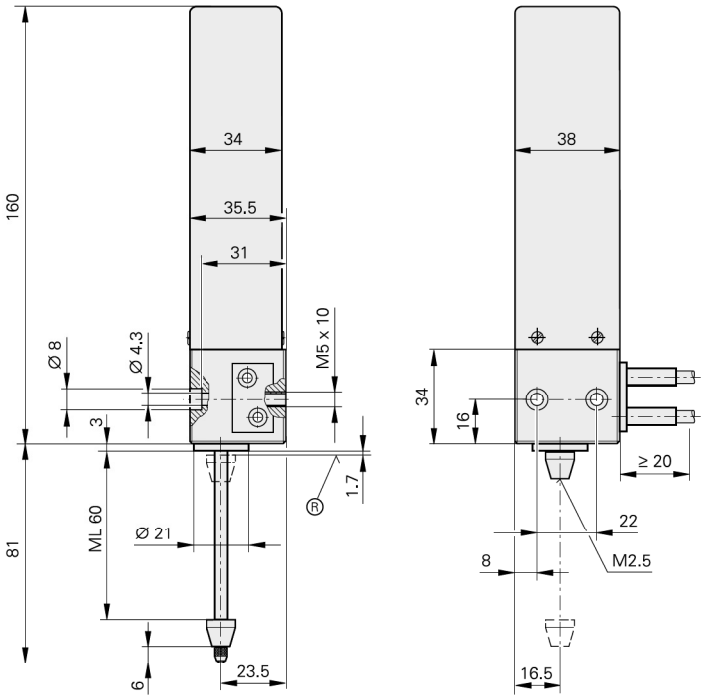
HEIDENHAIN-METRO

Incremental length gauges with ± 0.5 µm/± 1 µm accuracy

- **Large measuring ranges**
- **For dimensional and positional measurement**
- **Ball-bush guided plunger**

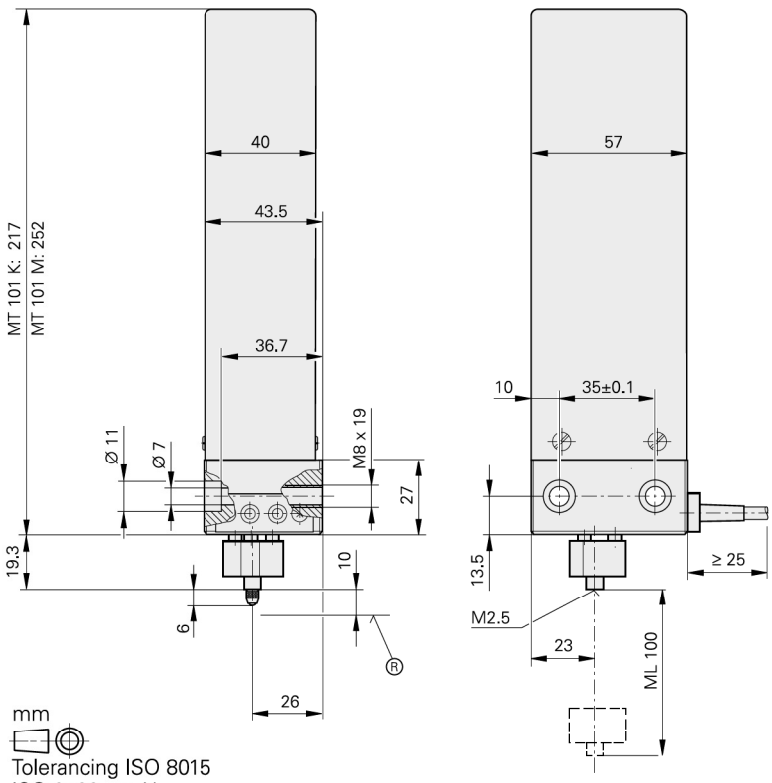
MT 60M

MT 60



MT 101M

MT 101



mm

Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm

Ⓡ = Reference mark position

Specifications	MT 60M	MT 101M	MT 60K	MT 101K
Plunger actuation	By motor		Via coupling with moving machine part	
Measuring standard	DIADUR grating on silica glass; grating period 10 µm			
System accuracy	± 0.5 µm	± 1 µm	± 0.5 µm	± 1 µm
Position error per signal period	≤ ± 0.1 µm			
Reference mark (approx.)	1.7 mm from top	10 mm from top	1.7 mm from top	10 mm from top
Measuring range	60 mm	100 mm	60 mm	100 mm
Gauging force Vertically downward Vertically upward Horizontal	By motor 1 N/1.25 N/1.75 N – /– /0.75 N – /0.75 N/1.25 N	By motor 0.7 N with SG 101V – 0.7 N with SG 101H	Moving force[1)] 0.35 N 0.1 N 0.5 N	Moving force[1)] 1.7 N 2 N 0.4 N
Radial force mech. permissible	≤ 0.5 N	≤ 2 N	≤ 0.5 N	≤ 2 N
Fastening	Plane surface			
Operating attitude	Any	Vertically downward with SG 101V Horizontal with SG 101H	Any	
Vibration 55 to 2000 Hz **Shock** 11 ms	≤ 100 m/s^2 (EN 60068-2-6) ≤ 1000 m/s^2 (EN 60068-2-27)			
Operating temperature	10 °C to 40 °C; reference temperature 20 °C			
Protection EN 60529	IP 50			
Weight without cable	700 g	1400 g	600 g	1200 g

Electrical Data	MT 60M	MT 101M	MT 60K	MT 101K
Interface	∿ 11 μA_{PP}			
Signal period	10 µm			
Measuring velocity	≤ 18 m/min	≤ 60 m/min	≤ 18 m/min	≤ 60 m/min
Electrical connection*	Cable 1.5 m with D-sub connector (male) 15-pin or with M23 connector (male) 9-pin			
Cable length	≤ 30 m with HEIDENHAIN cable			
Power supply	5 V DC ± 0.25 V			
Current consumption	< 120 mA	< 70 mA		

Required accessories*	For MT 60M	For MT 101M
Switch box	SG 60M	*Vertical orientation:* SG 101V *Horizontal orientation:* SG 101H
Power supply unit	–	Required (see *Accessories*)

***** Please select when ordering
[1)] Force required to move the plunger or of its weight

Switch boxes, coupling

Switch boxes for CT 2501, CT 6001, MT 60M, MT 101M
Switch boxes are required for length gauges with motorized plunger actuation. The plunger is controlled through two push buttons or by external signal. The gauging force is adjustable at the SG 25M and SG 60M switch boxes in three stages.

SG 25M
ID 317436-01

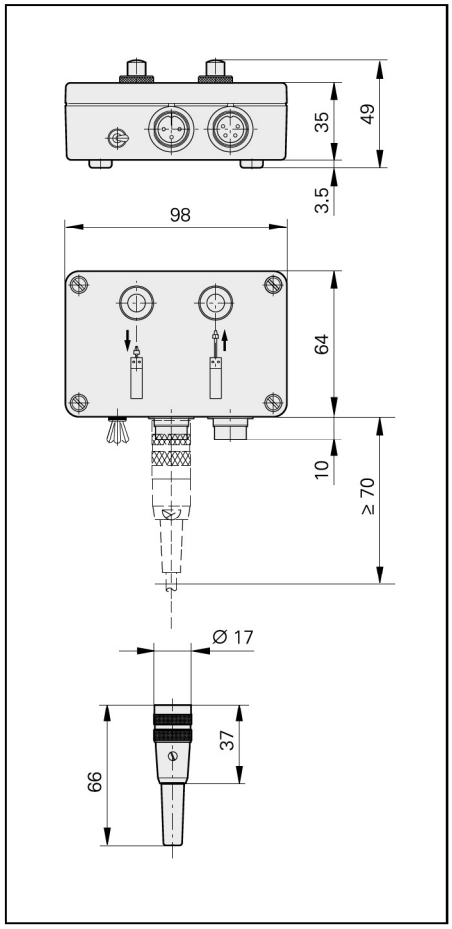
SG 60M
ID 317436-02

SG 101V[1)]
For the MT 101M in vertical operation
ID 361140-01

SG 101H[1)]
For the MT 101M in horizontal operation
ID 361140-02

Connector (female) 3-pin
For external operation of the switch box
ID 340646-05

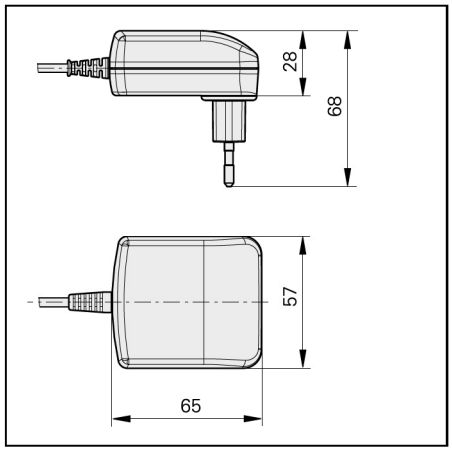
[1)] Separate power supply required



Power adapter for SG 101V/H
An adapter connected to the switch box powers the MT 101M.

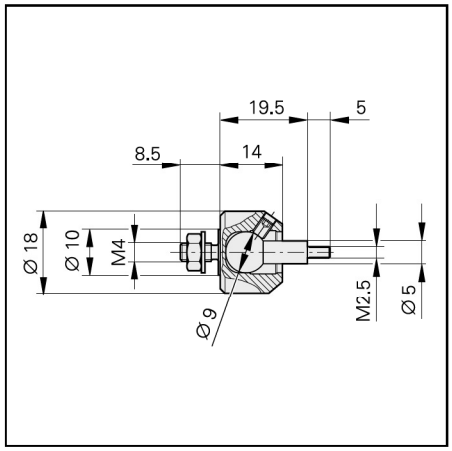
Voltage range 100 V to 240 V AC
Exchangeable plug adapter
(U.S. and Euro connectors included in delivery)

ID 648029-01



Coupling
For connecting the plunger of the length gauge (specifically for the MT 60K, MT 101K, CT 2502 and CT 6002) to a moving machine element

ID 206310-01



mm
Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm

Accessories for HEIDENHAIN-CERTO
Gauge stand

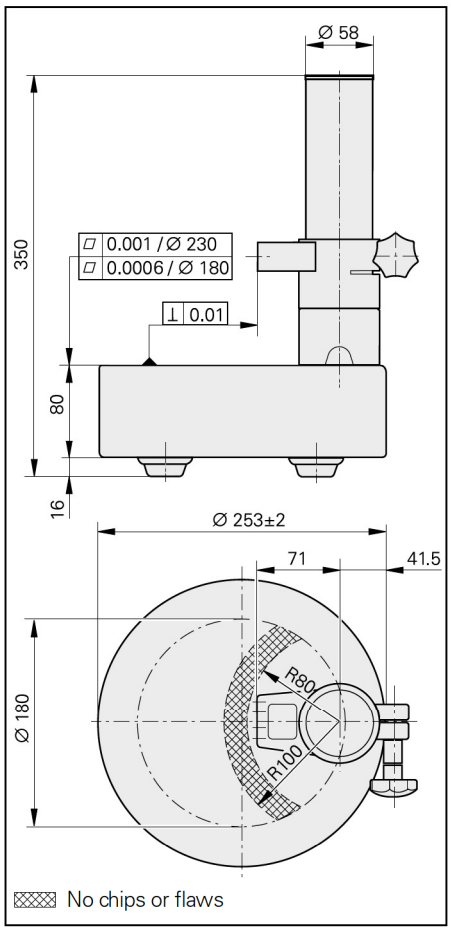
CS 200 gauge stand
For length gauges CT 2501*
CT 6001

ID 221310-01

Overall height	350 mm
Base	Ø 250 mm
Column	Ø 58 mm
Weight	15 kg

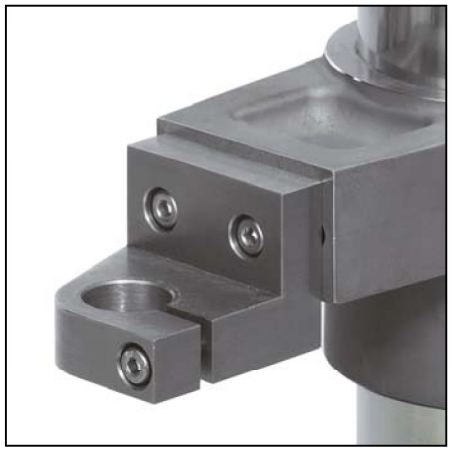
*) With special holder

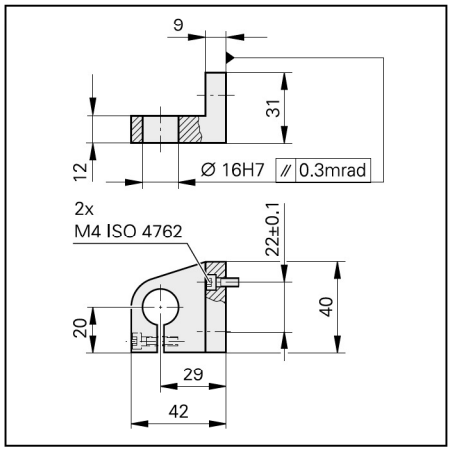
The flatness of the CS 200 is determined with the aid of a Fizeau interferometer.



Holder for CS 200
For the CT 2501 with Ø 16 mm clamping shank

ID 324391-01





mm
Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm

Ceramic suction plate, diaphragm pump

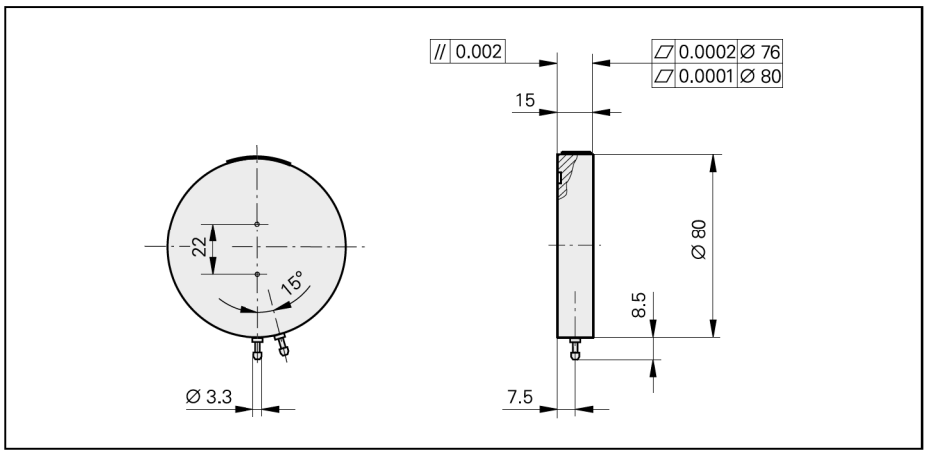
Ceramic suction plate
Wear-resistant working surface with high surface quality specifically for inspecting gauge blocks

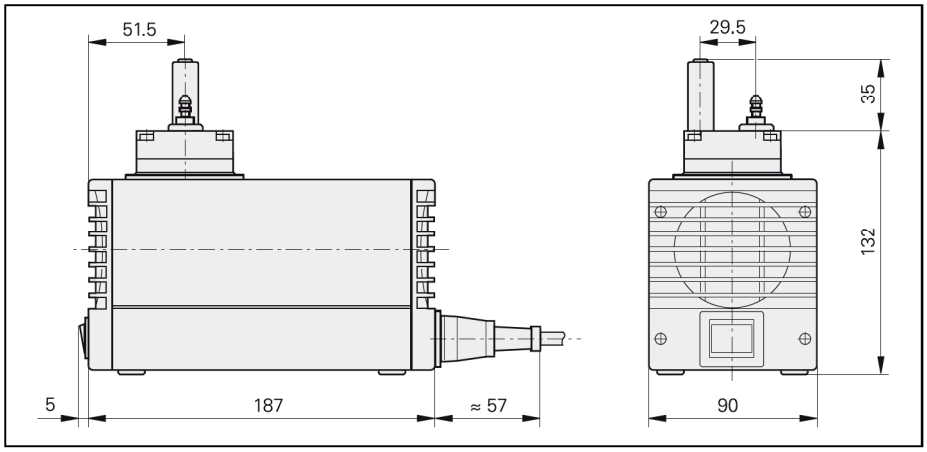
ID 223100-01

The gauge block (class 1 or 2)—or any other object with a plane surface—is drawn by suction onto the top of the ceramic plate. The ceramic plate is likewise drawn to the granite base and held in place through negative gauge pressure.

Parts for connecting the ceramic suction plate with the diaphragm pump are among the items supplied:

Pressure tubing 3 m
T-joint
Connecting piece





Diaphragm pump
Source of suction for drawing the measured object and ceramic suction plate

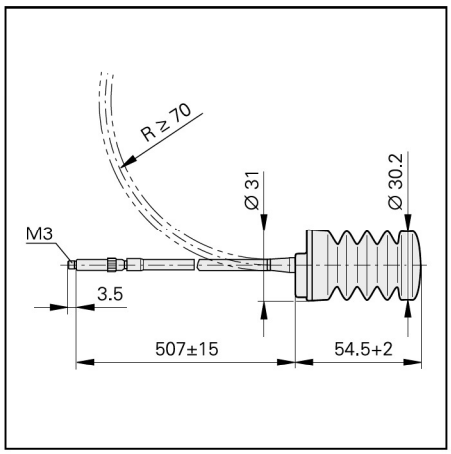
Power consumption	20 W
Weight	2.3 kg
Line voltage	230 V AC/50 Hz
ID 754220-01	
Line voltage	115 V AC/60 Hz
ID 754220-02	

mm
Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm

Accessories for HEIDENHAIN-ACANTO, HEIDENHAIN-METRO and HEIDENHAIN-SPECTO cable-type lifter, gauge stands

Cable lifter
For manual plunger actuation of MT 1200 and MT 2500. The integral pneumatic damping reduces the plunger extension speed to prevent rebounding, for example on very hard materials.

ID 257790-01



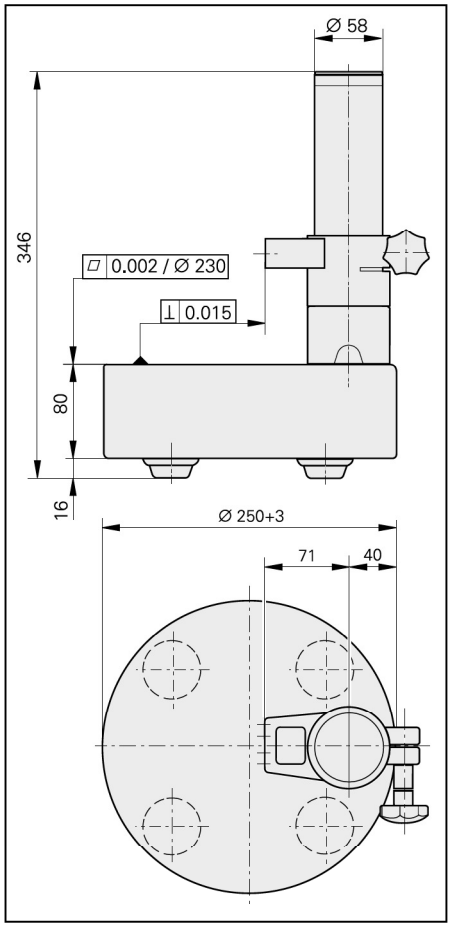
MS 200 gauge stand

For length gauges	AT[1)]
	ST[1)]
	MT 1200[1)]
	MT 2500[1)]
	MT 60 M
	MT 101 M

ID 244154-01

Overall height	346 mm
Base	Ø 250 mm
Column	Ø 58 mm
Weight	18 kg

[1)] With special holder



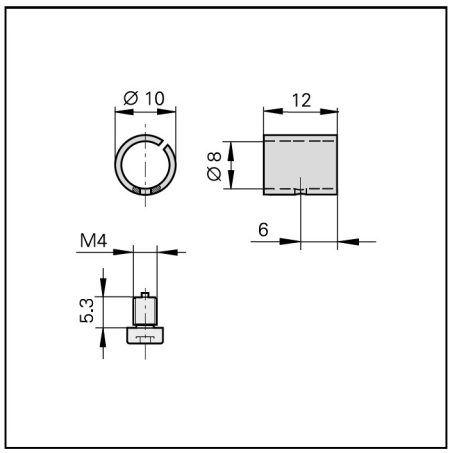
Holder for MS 200
For mounting the length gauges with Ø 8 mm clamping shank, e.g. AT, ST, MT 1200, MT 2500

ID 324391-02

Clamping sleeve

For length gauges	AT, ST
	MT 1200
	MT 2500

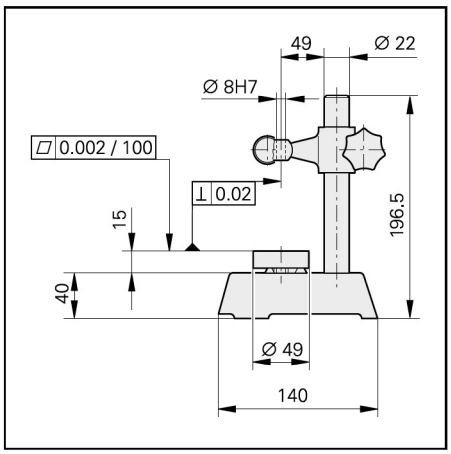
For fixing the length gauge reliably without overloading the 8h6 clamping shank.
Consisting of:
Sleeve, clamping screw
ID 386811-01 (1 piece)
ID 386811-02 (10 pieces)



mm
Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm

MS 45 gauge stand

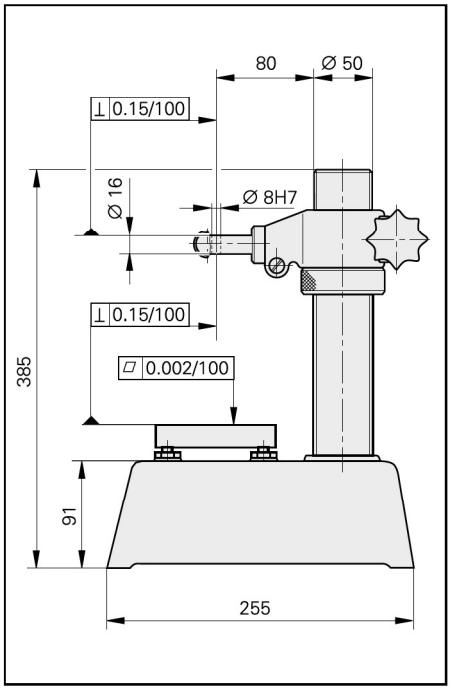
For length gauges	AT, ST MT 1200 MT 2500
ID 202162-02	
Overall height	196.5 mm
Measuring plate	Ø 49 mm
Column	Ø 22 mm
Weight	2.2 kg



MS 100 gauge stand

For length gauges	AT ST MT 1200 MT 2500 MT 60 M[1)] MT 101 M[1)]
ID 202164-02	
Overall height	385 mm
Measuring plate	100 mm x 115 mm
Column	Ø 50 mm
Weight	18 kg

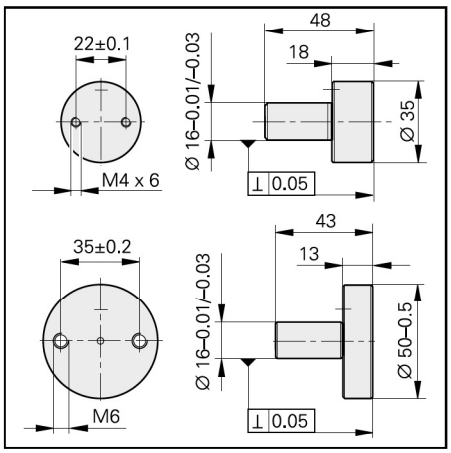
[1)] With special holder



Holder for MS 100

For mounting the MT 60 M
ID 207479-01

For mounting the MT 101 M
ID 206260-01



mm

Tolerancing ISO 8015
ISO 2768 - m H
< 6 mm: ±0.2 mm

Digital readouts

ND 200
Digital readouts for one axis
HEIDENHAIN encoders with 11 µA$_{PP}$ or 1 V$_{PP}$ signals and EnDat 2.2 interface can be connected to the digital readouts of the ND 200 series. The **ND 280** readout provides the basic functions for simple measuring tasks. The **ND 287** also features other functions such as sorting and tolerance check mode, min./max. value storage, measurement series storage. It calculates the mean value and standard deviations and creates histograms and control charts. The ND 287 permits optional connection of a second encoder for sum/difference measurement or of an analog sensor. The ND 28x units have serial interfaces for measured value transfer.

For more information, see the *Digital Readouts/Linear Encoders* brochure.

	ND 280	ND 287
Encoder input[1]	1 x ∿ 11 µA$_{PP}$, ∿ 1 V$_{PP}$ or EnDat 2.2	
Connection	D-sub (15-pin) female	
Input frequency	∿ *1 V$_{PP}$:* ≤ 500 kHz; *11 µA$_{PP}$:* ≤ 100 kHz	
Signal subdivision	Up to 4096-fold (adjustable)	
Display step (adjustable)	*Linear axis:* 0.5 µm to 0.002 µm *Angular axis:* 0.5° to 0.00001° or 00°00'00.1"	
Functions	• REF reference mark evaluation • 2 datums	
	–	• Sorting and tolerance checking • Measurement series (max. 10000 measured values) • Minimum/maximum value storage • Statistics functions • Sum/difference display (option)
Switching I/O	–	Yes
Interface	RS-232-C/V.24; USB (UART); Ethernet (option for ND 287)	

[1] Automatic detection of interface

ND 2100 G GAGE-CHEK
Digital readouts
The ND 2100G GAGE-CHEK readouts are versatile metrology displays for measuring and inspection tasks in manufacturing and quality assurance. With inputs for up to eight encoders, they are predestined for multipoint measurements from simple pass/fail detection up to complex SPC evaluation.

For more information see *Digital Readouts for Metrology Applications* brochure

	ND 2100G GAGE-CHEK		
Input signals*	∿ 1 V$_{PP}$	⊓⊔ TTL	EnDat 2.2
Encoder inputs	D-sub (15-pin) female	D-sub (9-pin) female	M12 flange socket (8-pin) female
Number of inputs*	*ND 2104G:* 4 *ND 2108G:* 8		
Signal evaluation/subdivision	10-fold	4-fold	–
Display	5.7" color flat-panel display		
Functions	• Part programming of up to 100 parts • Sorting and tolerance checking using tolerance and warning limits • Measurement series with MIN/MAX display • Mathematical and trigonometric formulas, logical operations • Functions for statistical process control (SPC) • Graphic display (measurement results, distribution) • Data storage of values and formulas		
Switching I/O	Yes		
Interface	• RS-232-C/V.24 • USB		