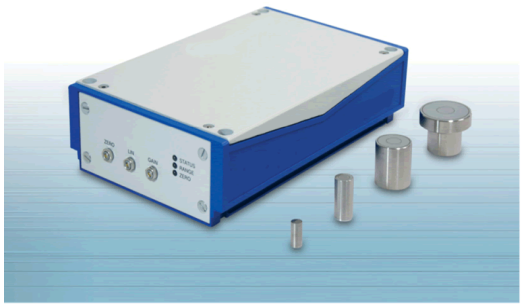
M63 Distance sensor



- **Extreme high resolution**
- **True non contact measurement**
- **Unmatched temperature stability**
- **Any target, even insulators**

The operating principle of non-contact capacitive displacement measurement used by the M system (capacitive Non-Contact Displacement Transducer) is based on the ideal parallel plate capacitor. The two plate electrodes are formed by the sensor and the opposing target. If an AC current with constant frequency flows through the sensor capacitor, the amplitude of the AC voltage on the sensor is proportional to the distance between the capacitor electrodes; an adjustable compensating voltage is simultaneously generated in the amplifier electronics. After demodulation of both AC voltages, the difference is amplified and output as an analogue signal.

The high linearity is in the measuring principle

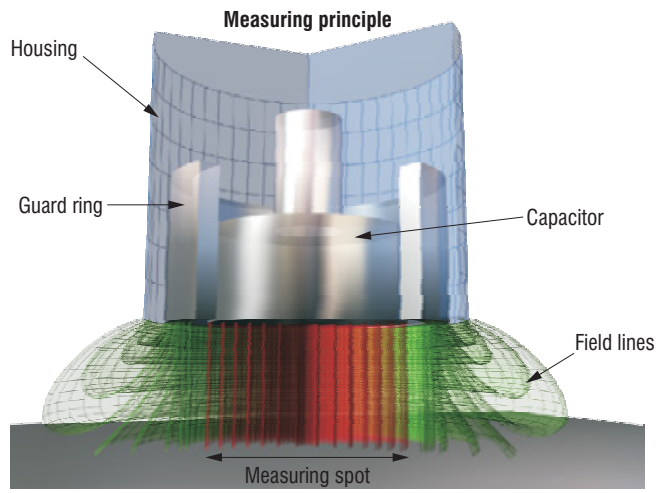
The M system evaluates the reactance Xc of the capacitor which changes strictly in proportion to the distance:

$$Xc = \frac{1}{j \cdot \omega \cdot C}$$

$$\text{capacitance } C = \varepsilon_r \cdot \varepsilon_0 \cdot \frac{\text{area}}{\text{distance}}$$

$$Xc = \text{constant} \cdot \text{distance}$$

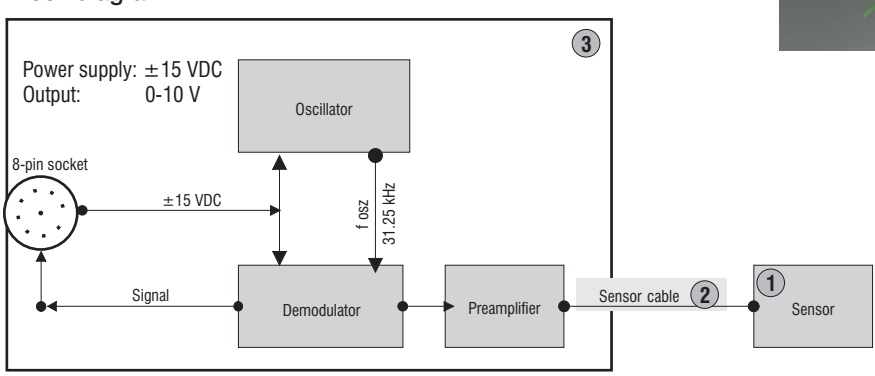
This theoretical relationship is put into practice by constructing the sensors as guard ring capacitors.



Measuring channel consists of:

1 - a capacitive displacement sensor
2 - a sensor cable
3 - signal conditioning electronics

Block diagram



Spezifikation / Sensor			02	05	1	1HP	2	3	5	10
Messbereich	el. Leiter (Metall)	mm	0,2	0,5	1	1	2	3	5	10
Linearität[1]	≤±0,3 % d.M.	±µm	0,6	1,5	3	3	6	9	15	30
Auflösung	20 Hz	µm	0,01	0,03	0,06	0,06	0,1	0,2	0,3	0,6
	5000 Hz	µm	0,05	0,1	0,2	0,2	0,5	0,7	1,2	2,4
	20000 Hz	µm	0,1	0,2	0,5	0,5	1	1,5	2,4	4,9
	50000 Hz	µm	0,2	0,5	1	1	2	2,9	4,9	9,8
Sensoraußendurchmesser		mm	6	8	10	10	20	30	40	60
Sensorgewicht		g	2	3,5	7,1	7,1	61	95	120	230
Aktive Sensormessfläche		ømm	2,3	3,9	5,5	5,5	7,9	9,8	12,6	17,8
Schirmelektrodenbreite		mm	1	1,4	1,5	1,5	4	8,1	11,8	18,1
Mindestdurch-messer des Messobjekts	el. Leiter (Metall)	mm	5	7	9	9	17	27	37	57
	Isolator	mm	7	10	12	12	24	36	48	72
Temperaturstab. Sensor	Nullpunkt	±µm/°C	0,06	0,06	0,17	0,06	0,17	0,17	0,17	0,17
	Empfindlichkeit	-ppm/°C	11	11	30	11	30	30	30	30
Temperaturstabilität	Elektronik	≤±0,01 % d.M. / °C								
Langzeitstabilität[2]		≤0,02 % d.M. / Monat								
Empfindlichkeit		V/mm	50	20	10	10	5	3,33	2	1
Ausgang	Spannung	0 - 10 VDC (max. 10 mA kurzschlusssicher)								
Versorgung		24 VDC (9…30 V) / 5,5 W								
Bandbreite		20 Hz / 5 kHz / 20 kHz / **50 kHz** (-3 dB) umschaltbar über Taste								
Temperatur-bereich	Sensor	-50 bis +200 °C								
	Sensorkabel	-50 bis +150 °C								
	Elektronik	+10 bis +50 °C								
Umgebungsbedingungen	Sensor	Luftfeuchte 5 bis 95 % (nicht kondensierend)								
Elektromagnetische Verträglichkeit EMV		Störaussendung gem. DIN EN 55011								
		Störfestigkeit gem. DIN EN 61000-6-2								
Schutzart	Elektronik und Sensoren	IP 54								

d. M. = des Messbereichs

1) Werte gültig bei Standardeinstellung 100 % Messbereich, 1 m Kabel

2) Langzeitstabilität bei 20 °C Bezugstemperatur und Dauerbetrieb

Accessories

Power- and output cable, 3 m long, 8-pin

Power supply for mounting in cabinets
Output ±15 VDC / 500 mA,
Input 90 - 262 VAC

Micrometer calibration fixture
Range 0 - 2.5 mm
Division 0.1 µm
for sensors

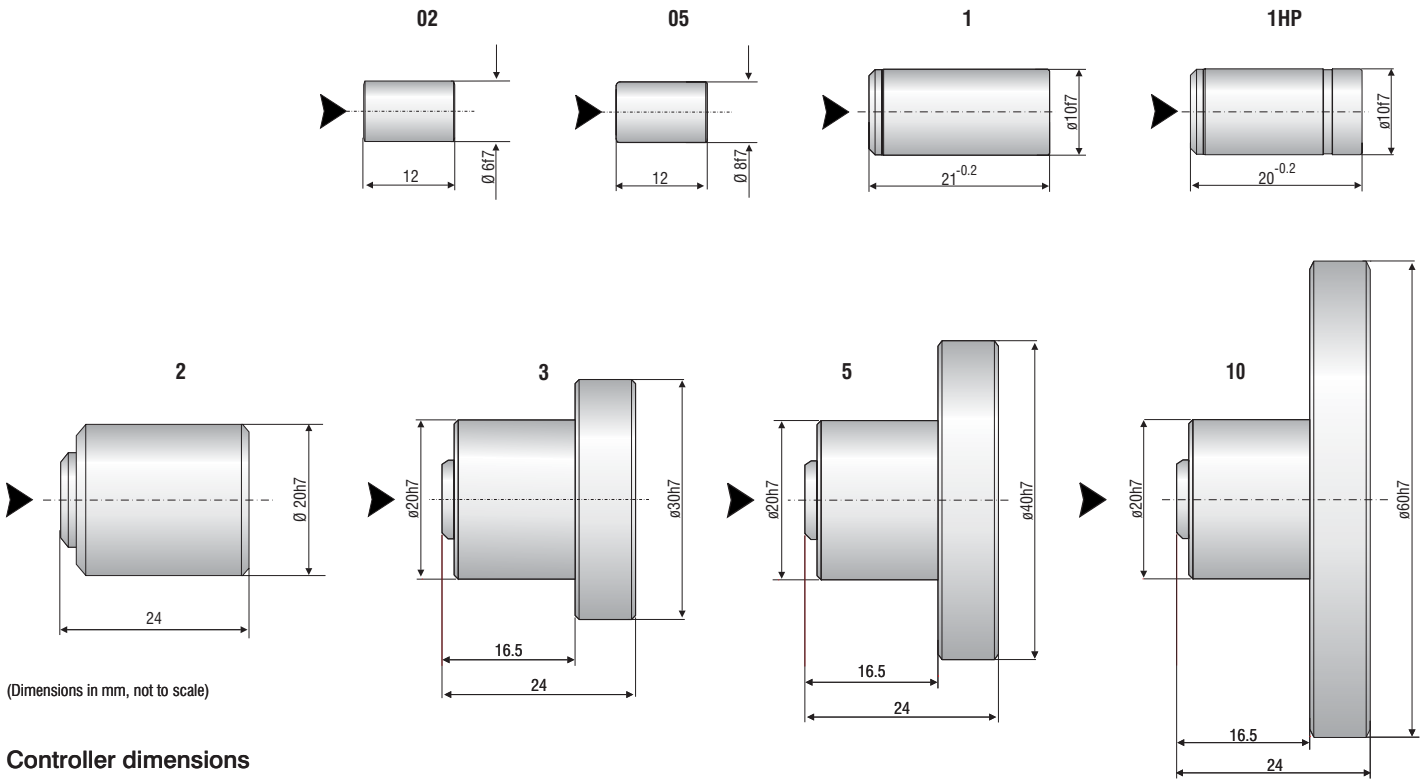
Digital micrometer calibration fixture
Range 0 - 25 mm
Adjustable offset (zero), for all sensors

Digital signal processing unit with display for synchronous processing of two channels

Signal output cable for multi-channel operation

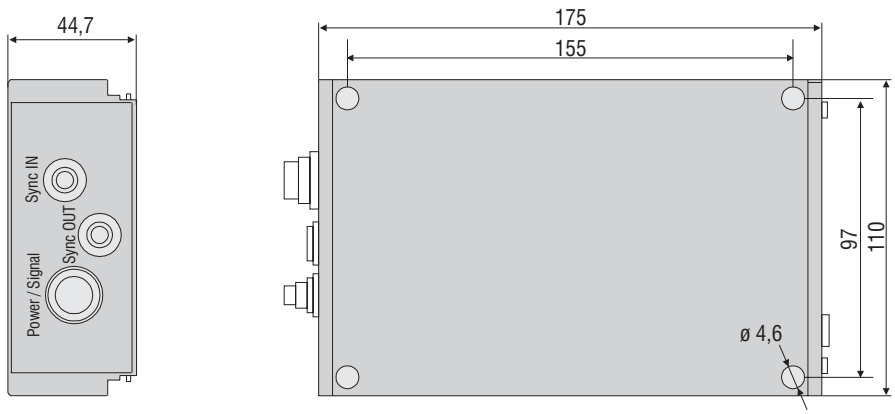
Supply-/synchronisation cable for multi-channel operation

Sensor dimensions



(Dimensions in mm, not to scale)

Controller dimensions



connector

Dimension	Fit tolerance (µm)
6h6	0 - 8
6e7	-20 - 32
6f7	-10 - 22
8f7	- 13 - 28
10f7	- 13 - 28
20h7	0 - 21
30h7	0 - 21
40h7	0 - 25
60h7	0 - 30