ME501/ME505 datasheet

FLUSH DIAPHRAGM, PIEZORESISTIVE CERAMIC PRESSURE SENSOR

Metallux ME501/ME505 pressure sensors are made with a ceramic base plate and a flush diaphragm and work following the piezoresistive principle.

The Wheatstone bridge is screen printed on one side of the flush ceramic diaphragm which is, in turn, glued to the sensor's body. The bridge faces the inside where a cavity is made and the diaphragm's opposite side can therefore be exposed directly to the medium to be measured.

Because of the Al_2O_3 ceramic excellent chemical resistance (aggressive gases, most of solvents and acids, etc.), no additional protection is normally required.

Metallux ME501/ME505 sensors are thermally compensated by laser-adjustable PTC resistors and the use of ceramic ensures a high linearity across the entire range of measurement, reducing effects of hysteresis to a minimum.

FEATURES

Excellent resistance to corrosion and abrasion

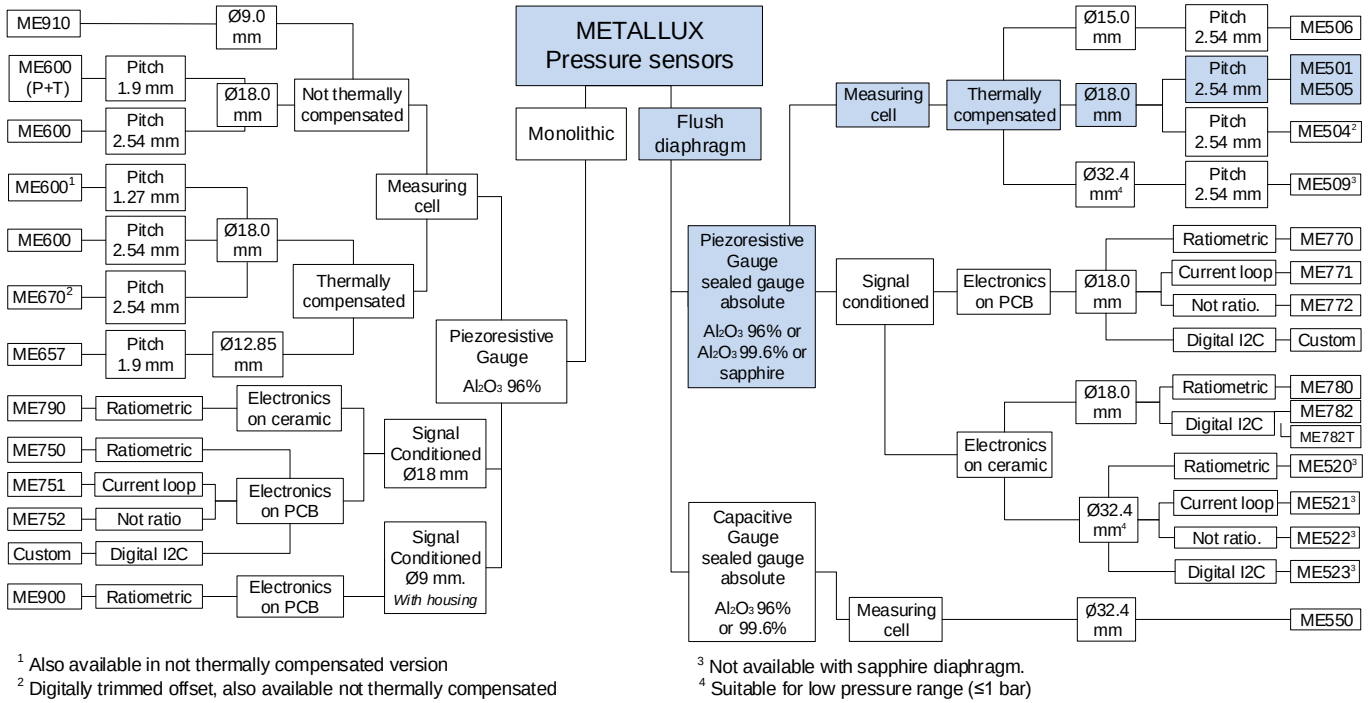
Absolute measurement available

Thermally compensated

Extended customization

Extended choice of measuring ranges

Pressure sensors family tree



[1] Also available in not thermally compensated version
[2] Digitally trimmed offset, also available not thermally compensated
[3] Not available with sapphire diaphragm.
[4] Suitable for low pressure range (≤1 bar)

ME501/ME505 datasheet

Technical characteristics

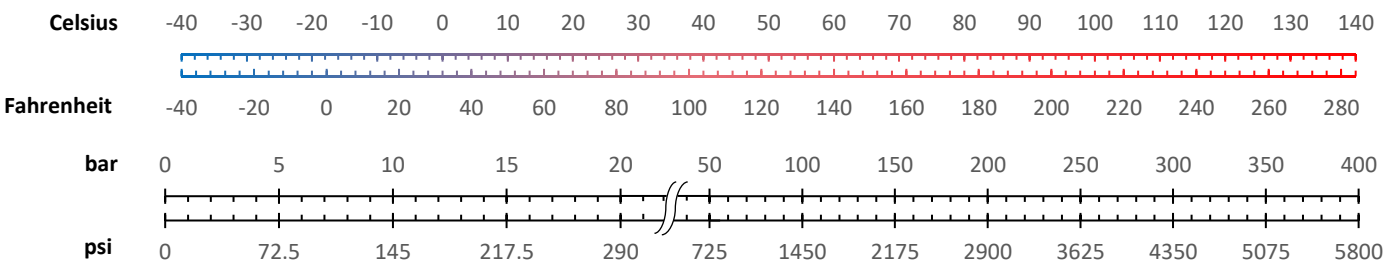
Parameters	Units	Description
Sensor type	-	Flush diaphragm, absolute (A), gauge (R) or sealed gauge (S)
Technology	-	Piezoresistive
Diaphragm material	-	Ceramic Al_2O_3 96% (standard), 99.6% or sapphire (on request)
Weight	g	≤ 8 (ceramic cell only)
Response time	ms	≤ 1
Supply voltage	VDC	2...30
Offset	mV/V	- 0.1 ± 0.1 (Other nominal values available on request)
Current cons.	mA	≤ 1.3 @ 10V
Operating temperature	°C	-40...+135 (-40 °F...+275 °F)
Storage temperature	°C	-40...+150 (-40 °F...+302 °F)
Impedance	kΩ	11 ± 30%
Compliant with	-	REACH, RoHS, Conflict Minerals Free

		ME501							ME505				
Nominal pressure FSO	bar	0.5	1	2	5	10	20	50	100	200	400	600	800
	psi[1]	*7*	*14*	*29*	*73*	*145*	*290*	*725*	*1450*	*2900*	*5800*	*8700*	*11600*
Overload pressure	bar	1	2	4	10	15	35	100	150	350	500	750	1000
	psi[1]	*14*	*29*	*58*	*145*	*217*	*507*	*1450*	*2175*	*5075*	*7250*	*10875*	*14500*
Burst pressure	bar	2	3	6	15	25	65	120	200	500	650	950	1250
	psi[1]	*29*	*43*	*87*	*217*	*362*	*942*	*1740*	*2900*	*7250*	*9425*	*13775*	*18125*
Vacuum capability	bar	-0.1	-0.5	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1
	psi[1]	*-1.4*	*-7*	*-14*	*-14*	*-14*	*-14*	*-14*	*-14*	*-14*	*-14*	*-14*	*-14*
Type	-	R	A / R / S	A / R / S	A / R / S	A / R / S	A / R / S	A / R / S	S	S	S	S	S
Total thickness	mm	6.15	6.17	6.23	6.30	6.35	6.55	6.70	6.70	7.05	7.32	7.55	8.05
	in	*0.242*	*0.243*	*0.245*	*0.248*	*0.250*	*0.258*	*0.263*	*0.263*	*0.278*	*0.288*	*0.297*	*0.317*
Sensitivity [2]	mV/V	1.4...2.4	2.0...3.6	2.0...3.5	2.3...4.0	3.1...5.5	2.4...4.0	4.0...6.0	3.0...4.8	2.5...3.9	3.1...4.8	3.1...4.8	2.0...3.5
Accuracy [3] (typ./max.)	%FS	0.4/0.9	0.3/0.9	0.3/0.6	0.2/0.4	0.2/0.5	0.2/0.5	0.2/0.5	0.2/0.5	0.4/0.8	0.5/1.0	0.5/1.0	0.5/1.0
Thermal offset shift (typ./max.)	%FS/K	± 0.02 / ± 0.06	+25 °C...+85 °C (+77 °F...+185 °F)										Not compensated
		± 0.05 / ± 0.15	-40°C...+25°C (-40 °F...+77°F)/ +85°C....+135°C (+185°F...+275°F)										
		± 0.005 / ± 0.02[5]	+25 °C...+85 °C (+77 °F...+185 °F)										Compensated
		± 0.03 / ± 0.06	-40°C...+25°C (-40 °F...+77°F)/ +85°C....+135°C (+185°F...+275°F)										
Thermal span shift	%FS/K	Min.	Typ.	Max.	-40 °C...+135 °C (-40 °F... / ... +275 °F)								
		- 0.030	-0.016	0									
		-0.040	-0.020	0 (for FSO ≤2bar)									
Reliability tests [4]	-	1000 hours @85 °C (185 °F) & 85 %RH			500 thermal shocks -40°C...+150 °C (-40 °F... +302 °F)								
		1000 hours burn-in @150 °C (302 °F)			10 million 0 bar to P_{nom} pressure cycles								

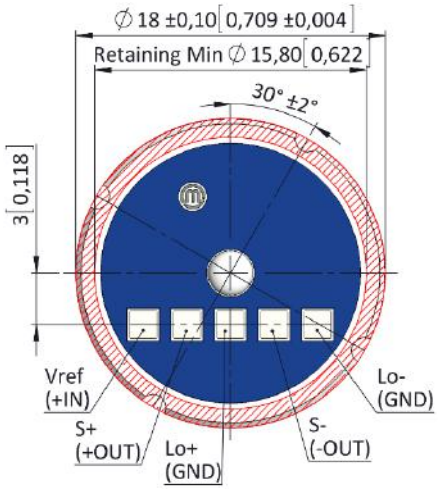
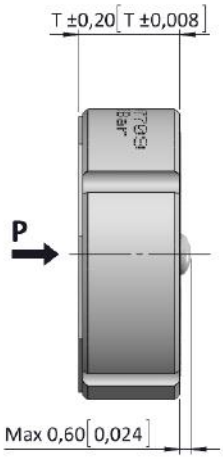
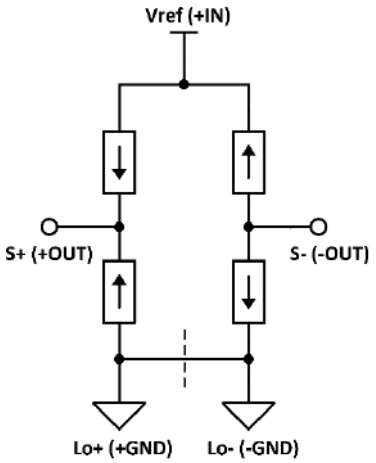
Tests performed at 25°C in Metallux housings, unless otherwise specified. Different housings may affect performances.

1. Psi values for reference only.
2. The sensitivity of each production batch is constant, within the indicated range and with minimal dispersion.
3. Accuracy = $\sqrt{\text{NonLinearity}^2+\text{Hysteresis}^2+\text{NonRepeatability}^2}$, terminal based.
4. All technical characteristics will remain within indicated ranges performing the above-mentioned reliability tests.
5. See Ordering Code for compensation level

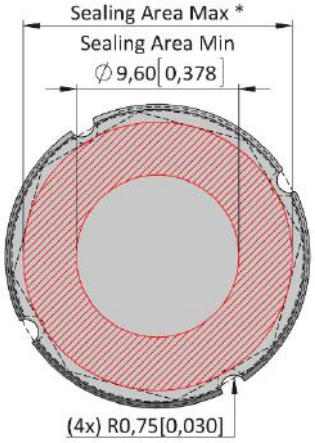
Conversion tools



Mechanical drawings and electrical schematics

Top View	Side View	Schematics
		
(5x) Pads 1,6x1,6[0,063x0,063] Pitch=2,54[0,1]	T = sensor total thickness (see pag.2)	

ME501 Bottom View



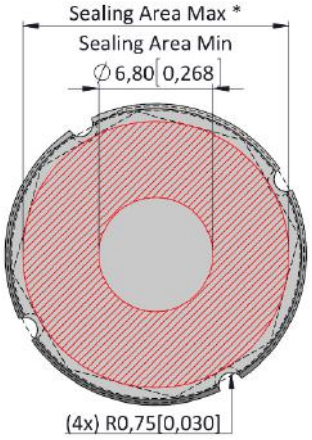
*Sealing area max.	
Round	∅ 15,7[0,618]
Octagonal	∅ 14,7[0,579]

Diaphragm shape:

ROUND
0.5 bar - 7 psi
1 bar - 14 psi
2 bar - 29 psi

OCTAGONAL
5 bar - 72psi
10 bar - 145 psi
20 bar - 290 psi
50 bar - 720 psi

ME505 Bottom View



*Sealing area max.	
Round	∅ 15,7[0,618]
Octagonal	∅ 14,7[0,579]

Diaphragm shape:

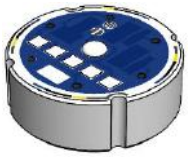
OCTAGONAL
100 bar - 1450 psi
200 bar - 2900 psi
400 bar - 5800 psi

ROUND
600 bar - 8700 psi
800 bar - 11600 psi

All quotes are in mm [inch] – General tolerance ISO 2768-1 M

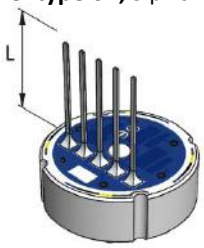
Electrical terminations

Example: type 03, pre-tinned soldering pads



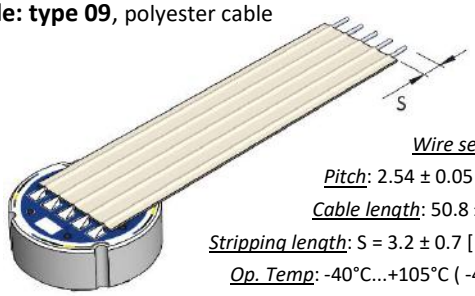
Pitch: 2.54 ± 0.05 [0.1 ± 0.002]
Max. tin thickness: 0.3 [0.01]
Op. Temp: -40°C...+135°C (-40 °F...275 °F)

Example: type 01, 5 pins L = 13.0 ± 0.5 [0.51 ± 0.02]



Pitch: 2.54 ± 0.05 [0.1 ± 0.002]
Pin section: 0.51 x 0.25 [0.02 x 0.01]
Pin length: L = 13.0 ± 0.5 [0.51 ± 0.02]
Op. Temp: -40°C...+135°C (-40 °F...275 °F)

Example: type 09, polyester cable



Wire section: AWG24
Pitch: 2.54 ± 0.05 [0.1 ± 0.002]
Cable length: 50.8 ± 2 [2 ± 0.08]
Stripping length: S = 3.2 ± 0.7 [0.13 ± 0.028]
Op. Temp: -40°C...+105°C (-40 °F...221 °F)

Other types available

Type 31 : 5 pins L = 9 ± 0.5 [0.51 ± 0.02]
Type 02 or 06 : 4 pins L = 13 ± 0.5 (without LO (-) or Lo (+))
Type 32 or 36 : 4 pins L = 9 ± 0.5 (without LO (-) or Lo(+))
Type 04 : NOMEX™ cable, 50.8 mm, Op. Temp: -40°C...+125°C
Type 05 : PVC flat cable, 50.8 mm, Op. Temp: -20°C...+105°C
Type 07 : 5 pins L = 13 ± 0.5 [0.51 ± 0.02] – open bridge
Type 37 : 5 pins L = 9 ± 0.5 [0.51 ± 0.02] – open bridge
Type 99 : customization on request

All quotes are in mm [inch] – General tolerance ISO 2768-1 M

Ordering code

	ME501/5 _	_ _ _	_	_	_ _	_
Sensor type						
	Absolute A					
	Gauge R					
	Sealed Gauge S					
Pressure range						
	0...0.5 bar [0...7 psi] (ME501 -/R/-)	0p5				
	0...1 bar [0...14 psi] (ME501 A/R/S)	001				
	0...2 bar [0...29 psi] (ME501 A/R/S)	002				
	0...5 bar [0...72 psi] (ME501 A/R/S)	005				
	0...10 bar [0...145 psi] (ME501 A/R/S)	010				
	0...20 bar [0...290 psi] (ME501 A/R/S)	020				
	0...50 bar [0...720 psi] (ME501 A/R/S)	050				
	0...100 bar [0...1450 psi] (ME505 -/-/S)	100				
	0...200 bar [0...2900 psi] (ME505 -/-/S)	200				
	0...400 bar [0...5800 psi] (ME505 -/-/S)	400				
	0...600 bar [0...8700 psi] (ME505 -/-/S)	600				
	0...800 bar [0...11600 psi] (ME505 -/-/S)	800				
	Others on request (please specify)	999				
Sensitivity adjustment						
	Without		0			
	On request		9			
Thermal offset shift adjustment						
	≤ ± 0.06 % FS/K (not thermally compensated)			0		
	≤ ± 0.04 % FS/K			1		
	≤ ± 0.02 % FS/K			2		
	Others on request (please specify)			9		
Termination type						
	5 pins 13 mm ± 0.5 mm, pitch 2.54 mm				01	
	5 pins 9 mm ± 0.5 mm, pitch 2.54 mm				31	
	4 pins 13 mm (without LO (-)) ± 0.5 mm, pitch 2.54 mm				02	
	4 pins 9 mm (without LO (-)) ± 0.5 mm, pitch 2.54 mm				32	
	5 pre-tinned soldering pads, pitch 2.54 mm				03	
	NOMEX™ cable 50.8 mm – 5 wires, pitch 2.54 ± 0.5 mm				04	
	PVC flat cable 50.8 mm – 5 wires, pitch 1.27 mm				05	
	Polyester cable 50.8 mm – 5 wires, pitch 2.54 mm				09	
	4 pins 13 mm ± 0.5 mm (without LO (+)) pitch 2.54 mm				06	
	4 pins 9 mm ± 0.5 mm (without LO (+)) pitch 2.54 mm				36	
	5 pins 13 mm ± 0.5 mm – open bridge, pitch 2.54 mm				07	
	5 pins 9 mm ± 0.5 mm – open bridge, pitch 2.54 mm				37	
	Others on request (please specify)				99	
Additional coating						
	Without					1
	Parylene coating					2
	Others on request (please specify)					9

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