

CPC COOPERATIVE PATENT CLASSIFICATION

G PHYSICS (NOTES omitted)

INSTRUMENTS

G01 MEASURING; TESTING (NOTES omitted)

G01L MEASURING FORCE, STRESS, TORQUE, WORK, MECHANICAL POWER, MECHANICAL EFFICIENCY, OR FLUID PRESSURE (weighing G01G)

NOTE

Attention is drawn to the Notes following the title of class [G01](#).

WARNING

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

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|-------|--|--------|---|
| 1/00 | Measuring force or stress, in general (measuring force due to impact G01L 5/00) | 1/144 | . . . {with associated circuitry (G01L 1/146 and G01L 1/148 take precedence)} |
| 1/005 | . {by electrical means and not provided for in G01L 1/06 - G01L 1/22 } | 1/146 | . . . {for measuring force distributions, e.g. using force arrays (G01L 1/148 takes precedence)} |
| 1/02 | . by hydraulic or pneumatic means | 1/148 | . . . {using semiconductive material, e.g. silicon} |
| 1/04 | . by measuring elastic deformation of gauges, e.g. of springs | 1/16 | . using properties of piezo-electric devices |
| 1/042 | . . {of helical springs} | 1/162 | . . {using piezo-electric resonators} |
| 1/044 | . . {of leaf springs} | 1/165 | . . . {with acoustic surface waves} |
| 1/046 | . . {of spiral springs} | 1/167 | . . . {optical excitation or measuring of vibrations} |
| 1/048 | . . {of torsionally deformable elements} | 1/18 | . using properties of piezo-resistive materials, i.e. materials of which the ohmic resistance varies according to changes in magnitude or direction of force applied to the material |
| 1/06 | . by measuring the permanent deformation of gauges, e.g. of compressed bodies | 1/183 | . . {by measuring variations of frequency of vibrating piezo-resistive material} |
| 1/08 | . by the use of counterbalancing forces {(automatic balancing arrangements for measuring electric variables in which a force or torque representing the measured value is balanced by a force or torque representing the reference value G01R 17/08)} | 1/186 | . . . {optical excitation or measuring of vibrations} |
| 1/083 | . . {using hydraulic or pneumatic counterbalancing forces} | 1/20 | . by measuring variations in ohmic resistance of solid materials or of electrically-conductive fluids (of piezo-resistive materials G01L 1/18); by making use of electrokinetic cells, i.e. liquid-containing cells wherein an electrical potential is produced or varied upon the application of stress |
| 1/086 | . . {using electrostatic or electromagnetic counterbalancing forces} | 1/205 | . . {using distributed sensing elements} |
| 1/10 | . by measuring variations of frequency of stressed vibrating elements, e.g. of stressed strings (using resistance strain gauges G01L 1/22 ; using piezo-resistive vibrators G01L 1/183) | 1/22 | . . using resistance strain gauges |
| 1/103 | . . {optical excitation or measuring of vibrations} | 1/2206 | . . . {Special supports with preselected places to mount the resistance strain gauges; Mounting of supports} |
| 1/106 | . . {Constructional details} | 1/2212 | {particularly adapted to unbounded-wire-type strain gauges} |
| 1/12 | . by measuring variations in the magnetic properties of materials resulting from the application of stress | 1/2218 | {the supports being of the column type, e.g. cylindric, adapted for measuring a force along a single direction} |
| 1/122 | . . {by using permanent magnets} | 1/2225 | {the direction being perpendicular to the central axis} |
| 1/125 | . . {by using magnetostrictive means (magnetostrictive devices in general H01L 41/12 ; magnetostrictive sensors H01L 41/25)} | 1/2231 | {the supports being disc- or ring-shaped, adapted for measuring a force along a single direction} |
| 1/127 | . . {by using inductive means (G01L 1/122 , G01L 1/125 take precedence)} | 1/2237 | {the direction being perpendicular to the central axis} |
| 1/14 | . by measuring variations in capacitance or inductance of electrical elements, e.g. by measuring variations of frequency of electrical oscillators | 1/2243 | {the supports being parallelogram-shaped} |
| 1/142 | . . {using capacitors} | | |

- 1/225 . . . {Measuring circuits therefor}
- 1/2256 {involving digital counting}
- 1/2262 {involving simple electrical bridges}
- 1/2268 . . . {Arrangements for correcting or for compensating unwanted effects}
- 1/2275 {for non linearity}
- 1/2281 {for temperature variations}
- 1/2287 . . . {constructional details of the strain gauges (adjustable resistors [H01C 10/00](#))}
- 1/2293 {of the semi-conductor type (semi-conductor devices controllable by variations of applied mechanical force [H01L 29/84](#))}
- 1/24 . by measuring variations of optical properties of material when it is stressed, e.g. by photoelastic stress analysis {using infra-red, visible light, ultra-violet}
- 1/241 . . {by photoelastic stress analysis}
- 1/242 . . {the material being an optical fibre}
- 1/243 . . . {using means for applying force perpendicular to the fibre axis}
- 1/245 {using microbending}
- 1/246 . . . {using integrated gratings, e.g. Bragg gratings}
- 1/247 . . {using distributed sensing elements, e.g. microcapsules (along a single optical fibre [G01L 1/242](#))}
- 1/248 . . {using infra-red ([G01L 1/241](#), [G01L 1/242](#) take precedence)}
- 1/25 . using wave or particle radiation, e.g. X-rays {, microwaves}, neutrons ([G01L 1/24](#) takes precedence)
- 1/255 . . {using acoustic waves, or acoustic emission ([G01L 1/10](#) and [G01L 1/16](#) take precedence)}
- 1/26 . Auxiliary measures taken, or devices used, in connection with the measurement of force, e.g. for preventing influence of transverse components of force, for preventing overload
- 3/00 Measuring torque, work, mechanical power, or mechanical efficiency in general**
- 3/02 . Rotary-transmission dynamometers
- 3/04 . . wherein the torque-transmitting element comprises a torsionally-flexible shaft
- 3/045 . . . {by measuring variations of frequency of stressed vibrating elements}
- 3/06 . . . involving mechanical means for indicating
- 3/08 . . . involving optical means for indicating
- 3/10 . . . involving electrical or magnetic means for indicating
- 3/101 {involving magnetic or electromagnetic means}
- 3/102 {involving magnetostictive means (magnetostrictive devices in general [H01L 41/12](#); magnetostrictive sensors [H01L 41/125](#))}
- 3/103 {Details about the magnetic material used}
- 3/104 {involving permanent magnets}
- 3/105 {involving inductive means ([G01L 3/102](#), [G01L 3/104](#) take precedence)}
- 3/106 {involving electrostatic means}
- 3/107 {involving potentiometric means}
- 3/108 {involving resistance strain gauges}
- 3/109 {involving measuring phase difference of two signals or pulse trains}
- 3/12 involving photoelectric means
- 3/14 . . wherein the torque-transmitting element is other than a torsionally-flexible shaft
- 3/1407 . . . {involving springs}
- 3/1414 {using mechanical or hydraulic transducers}
- 3/1421 {using optical transducers}
- 3/1428 {using electrical transducers}
- 3/1435 {involving magnetic or electromagnetic means}
- 3/1442 {involving electrostatic means}
- 3/145 {involving potentiometric means}
- 3/1457 {involving resistance strain gauges}
- 3/1464 . . . {involving screws and nuts, screw-gears or cams}
- 3/1471 {using planet wheels or conical gears}
- 3/1478 . . . {involving hinged levers}
- 3/1485 . . . {involving fluidic means}
- 3/1492 . . . {involving electric couplings}
- 3/16 . Rotary-absorption dynamometers, e.g. of brake type
- 3/18 . . mechanically actuated
- 3/20 . . fluid actuated
- 3/205 . . . {of the air brake type}
- 3/22 . . electrically or magnetically actuated {(electrical or magnetic brakes in general [H02K 49/00](#))}
- 3/24 . Devices for determining the value of power, e.g. by measuring and simultaneously multiplying the values of torque and revolutions per unit of time, by multiplying the values of tractive or propulsive force and velocity
- 3/242 . . {by measuring and simultaneously multiplying torque and velocity}
- 3/245 . . {by measuring and simultaneously multiplying pressure and velocity}
- 3/247 . . {by measuring and simultaneously multiplying tractive or propulsive force and velocity}
- 3/26 . Devices for measuring efficiency, i.e. the ratio of power output to power input
- 5/00 Apparatus for, or methods of, measuring force, work, mechanical power, or torque, specially adapted for specific purposes**
- 5/0004 . {Force transducers adapted for mounting in a bore of the force receiving structure ([G01L 5/0009](#) takes precedence)}
- 5/0009 . {Force sensors associated with a bearing (testing of bearings [G01M 13/04](#))}
- 5/0014 . . {by using capacitive sensors}
- 5/0019 . . {by using strain gages, piezo-electric, piezo-resistive or other ohmic-resistance based sensors}
- 5/0023 . . {by using magnetic sensors}
- 5/0028 . {Force sensors associated with force applying means ([G01L 5/0052](#), [G01L 5/0057](#), [G01L 5/0061](#) take precedence)}
- 5/0033 . . {applying a pulling force}
- 5/0038 . . {applying a pushing force}
- 5/0042 . . {applying a torque}
- 5/0047 . {measuring forces due to residual stresses}
- 5/0052 . {measuring forces due to impact ([G01L 5/0061](#), [G01L 5/14](#) take precedence; impact testing of structures [G01M 7/08](#); impact testing of material [G01N 3/00](#))}
- 5/0057 . {measuring forces due to spring-shaped elements}

- 5/0061 . {Force sensors associated with industrial machines or actuators (for the specific machine or actuator involved [see relevant class](#), e.g. [F01](#), [F04](#), [F16](#), [B66](#), [E21](#))}
- 5/0066 . . {Calibration arrangements (calibration of force sensors in general [G01L 25/00](#))}
- 5/0071 . . {Specific indicating arrangements, e.g. of overload}
- 5/0076 . . {Force sensors associated with manufacturing machines ([G01L 5/0066](#), [G01L 5/0071](#) and [B23Q 17/09](#) take precedence; for the specific machine or operation involved [see relevant class](#), e.g. [B21 - B42](#))}
- 5/008 . . . {Force sensors integrated in an article or a dummy workpiece}
- 5/0085 . . . {Force sensors adapted for insertion between cooperating machine elements, e.g. for measuring the nip force between rollers}
- 5/009 . . . {Force sensors associated with material gripping devices (manipulators in general [G01L 5/22](#))}
- 5/0095 . {measuring work or mechanical power}
- 5/03 . for measuring release force of ski safety bindings
- 5/04 . for measuring tension in flexible members, e.g. ropes, cables, wires, threads, belts or bands ([G01L 5/0004](#) takes precedence)}
- 5/042 . . {by measuring vibrational characteristics of the flexible member}
- 5/045 . . {for measuring the tension across the width of a band-shaped flexible member ([measuring flatness G01B](#); metal rolling in general [B21B](#))}
- 5/047 . . {Specific indicating or recording arrangements, e.g. for remote indication, for indicating overload or underload}
- 5/06 . . using mechanical means ([G01L 5/042](#), [G01L 5/045](#) take precedence)}
- 5/08 . . using fluid means ([G01L 5/042](#), [G01L 5/045](#) take precedence)}
- 5/10 . . using electrical means
- 5/101 . . . using sensors inserted into the flexible member
- 5/102 . . . using sensors located at a non-interrupted part of the flexible member
- 5/103 . . . using sensors fixed at one end of the flexible member
- 5/105 . . . using electro-optical means
- 5/106 . . . for measuring a reaction force applied on a cantilever beam
- 5/107 . . . for measuring a reaction force applied on an element disposed between two supports, e.g. on a plurality of rollers or gliders
- 5/108 . . . for measuring a reaction force applied on a single support, e.g. a glider
- 5/12 . for measuring axial thrust in a rotary shaft, e.g. of propulsion plants
- 5/13 . for measuring the tractive or propulsive power of vehicles
- 5/133 . . {for measuring thrust of propulsive devices, e.g. of propellers (aeroplanes [B64C](#); marine propulsion [B63H](#); jet-engines [F02K](#))}
- 5/136 . . {Force sensors associated with a vehicle traction coupling (vehicle connections [B60D](#); control of vehicle brakes [B60T](#))}
- 5/14 . for measuring the force of explosions; for measuring the energy of projectiles

- 5/16 . for measuring several components of force

WARNING

Group [G01L 5/16](#) is impacted by reclassification into groups [G01L 5/169](#), [G01L 5/171](#) and [G01L 5/173](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 5/161 . . using variations in ohmic resistance

WARNING

Group [G01L 5/161](#) is impacted by reclassification into groups [G01L 5/1623](#) and [G01L 5/1627](#).

Groups [G01L 5/161](#), [G01L 5/1623](#) and [G01L 5/1627](#) should be considered in order to perform a complete search.

- 5/162 . . . of piezoresistors

- 5/1623 . . . of pressure sensitive conductors (using piezoresistors [G01L 5/162](#))

WARNING

Group [G01L 5/1623](#) is incomplete pending reclassification of documents from group [G01L 5/161](#).

Groups [G01L 5/161](#) and [G01L 5/1623](#) should be considered in order to perform a complete search.

- 5/1627 . . . of strain gauges (using piezoresistors [G01L 5/162](#))

WARNING

Group [G01L 5/1627](#) is incomplete pending reclassification of documents from group [G01L 5/161](#).

Groups [G01L 5/161](#) and [G01L 5/1627](#) should be considered in order to perform a complete search.

- 5/163 . . . of potentiometers

- 5/164 . . using variations in inductance
- 5/165 . . using variations in capacitance
- 5/166 . . using photoelectric means
- 5/167 . . using piezo-electric means
- 5/168 . . using counterbalancing forces
- 5/169 . . using magnetic means

WARNING

Group [G01L 5/169](#) is incomplete pending reclassification of documents from group [G01L 5/16](#).

Groups [G01L 5/16](#) and [G01L 5/169](#) should be considered in order to perform a complete search.

- 5/171 . . using fluid means

WARNING

Group [G01L 5/171](#) is incomplete pending reclassification of documents from group [G01L 5/16](#).

Groups [G01L 5/16](#) and [G01L 5/171](#) should be considered in order to perform a complete search.

- 5/173 . . using acoustic means

WARNING

Group [G01L 5/173](#) is incomplete pending reclassification of documents from group [G01L 5/16](#).

Groups [G01L 5/16](#) and [G01L 5/173](#) should be considered in order to perform a complete search.

- 5/18 . for measuring ratios of force
 5/20 . for measuring wheel side-thrust
 5/22 . for measuring the force applied to control members, e.g. control members of vehicles, triggers
 5/221 . . {to steering wheels, e.g. for power assisted steering}
 5/223 . . {to joystick controls}
 5/225 . . {to foot actuated controls, e.g. brake pedals}
 5/226 . . {to manipulators, e.g. the force due to gripping}
 5/228 . . . {using tactile array force sensors}
 5/24 . for determining value of torque or twisting moment for tightening a nut or other member which is similarly stressed
 5/243 . . {using washers}
 5/246 . . {using acoustic waves (for force in general [G01L 1/255](#))}
 5/26 . for determining the characteristic of torque in relation to revolutions per unit of time
 5/28 . for testing brakes
 5/282 . . {the vehicle wheels cooperating with rotatable rolls}
 5/284 . . {Measuring braking-time or braking distance}
 5/286 . . {Measuring deceleration}
 5/288 . . {Measuring the force necessary to rotate a braked wheel}

Measuring fluid pressure

- 7/00 Measuring the steady or quasi-steady pressure of a fluid or a fluent solid material by mechanical or fluid pressure-sensitive elements** ([G01L 11/04](#) takes precedence;) transmitting or indicating the displacement of mechanical pressure-sensitive elements by electric {, e.g. photoelectric} or magnetic means [G01L 9/00](#); measuring differences of two or more pressure values [G01L 13/00](#); measuring two or more pressure values simultaneously [G01L 15/00](#) {; pressure sensitive fluidum level or volume measuring devices [G01F 17/00](#), [G01F 23/14](#); pressure sensitive depth meters [G01C 13/008](#); aircraft altitude meters [G01C 5/005](#))
 7/02 . in the form of elastically-deformable gauges
 7/022 . . {constructional details, e.g. mounting of elastically-deformable gauges ([G01L 7/041](#), [G01L 7/061](#), [G01L 7/082](#), [G01L 7/102](#), [G01L 7/163](#), [G01L 7/182](#) take precedence)}

- 7/024 . . {with mechanical transmitting or indicating means ([G01L 7/043](#), [G01L 7/063](#), [G01L 7/084](#), [G01L 7/104](#), [G01L 7/166](#), [G01L 7/185](#) take precedence)}
- 7/026 . . {with optical transmitting or indicating means ([G01L 7/045](#), [G01L 7/065](#), [G01L 7/086](#), [G01L 7/106](#), [G01L 7/187](#) take precedence)}
- 7/028 . . {correcting or regulating means ([G01L 7/048](#), [G01L 7/068](#), [G01L 7/088](#), [G01L 7/108](#) take precedence)}
- 7/04 . . in the form of flexible, deformable tubes, e.g. Bourdon gauges
- 7/041 . . . {Construction or mounting of deformable tubes}
- 7/043 . . . {with mechanical transmitting or indicating means}
- 7/045 . . . {with optical transmitting or indicating means}
- 7/046 . . . {with exhausted tubes}
- 7/048 . . . {correcting or regulating means for flexible, deformable tubes}
- 7/06 . . of the bellows type
- 7/061 . . . {construction or mounting of bellows}
- 7/063 . . . {with mechanical transmitting or indicating means}
- 7/065 . . . {with optical transmitting or indicating means}
- 7/066 . . . {with exhausted bellows}
- 7/068 . . . {correcting or regulating means for bellows}
- 7/08 . . of the flexible-diaphragm type
- 7/082 . . . {construction or mounting of diaphragms (of [semiconductive diaphragms G01L 9/0042](#))}
- 7/084 . . . {with mechanical transmitting or indicating means}
- 7/086 . . . {with optical transmitting or indicating means}
- 7/088 . . . {correcting or regulating means for flexible diaphragms}
- 7/10 . . of the capsule type
- 7/102 . . . {construction or mounting of capsules}
- 7/104 . . . {with mechanical transmitting or indicating means}
- 7/106 . . . {with optical transmitting or indicating means}
- 7/108 . . . {correcting or regulating means for capsules}
- 7/12 . . . with exhausted chamber; Aneroid barometers
- 7/14 with zero-setting means
- 7/16 . in the form of pistons
- 7/163 . . {construction or mounting of pistons}
- 7/166 . . {with mechanical transmitting or indicating means}
- 7/18 . using liquid as the pressure-sensitive medium, e.g. liquid-column gauges
- 7/182 . . {constructional details, e.g. mounting}
- 7/185 . . {with mechanical transmitting or indicating means}
- 7/187 . . {with optical transmitting or indicating means}
- 7/20 . . involving a closed chamber above the liquid level, the chamber being exhausted or housing low-pressure gas; Liquid barometers
- 7/22 . . involving floats, e.g. floating bells
- 7/24 . . involving balances in the form of rings partly filled with liquid

- 9/00** **Measuring steady of quasi-steady pressure of fluid or fluent solid material by electric or magnetic pressure-sensitive elements** [{\(G01L 11/004 takes precedence\)}](#); **Transmitting or indicating the displacement of mechanical pressure-sensitive elements, used to measure the steady or quasi-steady pressure of a fluid or fluent solid material, by electric or magnetic means** [\(measuring differences of two or more pressure values G01L 13/00; measuring two or more pressure values simultaneously G01L 15/00\)](#)
- 9/0001 . {Transmitting or indicating the displacement of elastically deformable gauges by electric, electro-mechanical, magnetic or electro-magnetic means [\(G01L 9/0026, G01L 9/0033, G01L 9/0082, G01L 9/0089, G01L 9/0091 take precedence\)](#)}
 - 9/0002 . . {using variations in ohmic resistance [\(G01L 9/0051 takes precedence\)](#)}
 - 9/0004 . . {using variations in inductance [\(G01L 9/007 takes precedence\)](#)}
 - 9/0005 . . {using variations in capacitance [\(G01L 9/0072 takes precedence\)](#)}
 - 9/0007 . . {using photoelectric means [\(G01L 9/0076 takes precedence\)](#)}
 - 9/0008 . . {using vibrations}
 - 9/001 . . . {of an element not provided for in the following subgroups of [G01L 9/0008](#)}
 - 9/0011 {Optical excitation or measuring}
 - 9/0013 {of a string}
 - 9/0014 {Optical excitation or measuring of vibrations}
 - 9/0016 {of a diaphragm}
 - 9/0017 {Optical excitation or measuring}
 - 9/0019 {of a semiconductive element}
 - 9/002 {Optical excitation or measuring}
 - 9/0022 {of a piezoelectric element}
 - 9/0023 {Optical excitation or measuring}
 - 9/0025 {with acoustic surface waves}
 - 9/0026 . {Transmitting or indicating the displacement of flexible, deformable tubes by electric, electro-mechanical, magnetic or electro-magnetic means [\(G01L 9/0008 takes precedence; pressure sensitive flexible, deformable tubes in general G01L 7/04\)](#)}
 - 9/0027 . . {using variations in ohmic resistance}
 - 9/0029 . . {using variations in inductance}
 - 9/003 . . {using variations in capacitance}
 - 9/0032 . . {using photoelectric means}
 - 9/0033 . {Transmitting or indicating the displacement of bellows by electric, electro-mechanical, magnetic, or electro-magnetic means [\(G01L 9/0008 takes precedence; pressure sensitive bellows in general G01L 7/06\)](#)}
 - 9/0035 . . {using variations in ohmic resistance}
 - 9/0036 . . {using variations in inductance}
 - 9/0038 . . {using variations in capacitance}
 - 9/0039 . . {using photoelectric means}
 - 9/0041 . {Transmitting or indicating the displacement of flexible diaphragms [\(pressure sensitive flexible diaphragms in general G01L 7/08\)](#)}
 - 9/0042 . . {Constructional details associated with semiconductive diaphragm sensors, e.g. etching, or constructional details of non-semiconductive diaphragms [\(details about the integration or bonding of piezoresistor in or on the diaphragm G01L 9/0052 and G01L 9/0057 respectively\)](#)}
 - 9/0044 . . . {Constructional details of non-semiconductive diaphragms}
 - 9/0045 . . . {Diaphragm associated with a buried cavity}
 - 9/0047 . . . {Diaphragm with non uniform thickness, e.g. with grooves, bosses or continuously varying thickness}
 - 9/0048 . . . {Details about the mounting of the diaphragm to its support or about the diaphragm edges, e.g. notches, round shapes for stress relief}
 - 9/005 . . . {Non square semiconductive diaphragm}
 - 9/0051 . . {using variations in ohmic resistance}
 - 9/0052 . . . {of piezoresistive elements [\(circuits therefor G01L 9/06\)](#)}
 - 9/0054 {integral with a semiconducting diaphragm}
 - 9/0055 {bonded on a diaphragm}
 - 9/0057 . . . {of potentiometers}
 - 9/0058 . . . {of pressure sensitive conductive solid or liquid material, e.g. carbon granules}
 - 9/006 . . . {of metallic strain gauges fixed to an element other than the pressure transmitting diaphragm}
 - 9/0061 {using unbounded-wire-type strain gauges}
 - 2009/0063 {using a fluid coupling between strain gauge carrier and diaphragm}
 - 9/0064 {the element and the diaphragm being in intimate contact}
 - 2009/0066 . . . {Mounting arrangements of diaphragm transducers; Details thereof, e.g. electromagnetic shielding means}
 - 2009/0067 {with additional isolating diaphragms}
 - 2009/0069 {the transducer being mounted on a flexible element}
 - 9/007 . . {using variations in inductance}
 - 9/0072 . . {using variations in capacitance}
 - 9/0073 . . . {using a semiconductive diaphragm}
 - 9/0075 . . . {using a ceramic diaphragm, e.g. alumina, fused quartz, glass}
 - 9/0076 . . {using photoelectric means}
 - 9/0077 . . . {for measuring reflected light}
 - 9/0079 {with Fabry-Perot arrangements}
 - 9/008 . . {using piezoelectric devices [\(piezoelectric resonators G01L 9/0022; surface acoustic waves G01L 9/0025\)](#)}
 - 9/0082 . {Transmitting or indicating the displacement of capsules by electric, electro-mechanical, magnetic, or electro-mechanical means [\(G01L 9/0008 takes precedence; pressure sensitive capsules in general G01L 7/10\)](#)}
 - 9/0083 . . {using variations in ohmic resistance}
 - 9/0085 . . {using variations in inductance}
 - 9/0086 . . {using variations in capacitance}
 - 9/0088 . . {using photoelectric means}
 - 9/0089 . {Transmitting or indicating the displacement of pistons by electrical, electro-mechanical, magnetic or electro-magnetic means [\(G01L 9/0008 takes precedence; pressure sensitive pistons in general G01L 7/16\)](#)}

9/0091	<ul style="list-style-type: none"> • {Transmitting or indicating the displacement of liquid mediums by electrical, electro-mechanical, magnetic or electro-magnetic means (G01L 9/0008 takes precedence; pressure sensitive liquid mediums in general G01L 7/18)} 	13/00	Devices or apparatus for measuring differences of two or more fluid pressure values
9/0092	<ul style="list-style-type: none"> • . {using variations in ohmic resistance} 	13/02	<ul style="list-style-type: none"> • using elastically-deformable members or pistons as sensing elements
9/0094	<ul style="list-style-type: none"> • . {using variations in inductance} 	13/021	<ul style="list-style-type: none"> • . {using deformable tubes}
9/0095	<ul style="list-style-type: none"> • . {using variations in capacitance} 	13/023	<ul style="list-style-type: none"> • . {using bellows}
9/0097	<ul style="list-style-type: none"> • . {using photoelectric means} 	13/025	<ul style="list-style-type: none"> • . {using diaphragms}
9/0098	<ul style="list-style-type: none"> • {using semiconductor body comprising at least one PN junction as detecting element} 	13/026	<ul style="list-style-type: none"> • . . {involving double diaphragm}
9/02	<ul style="list-style-type: none"> • by making use of variations in ohmic resistance, e.g. of potentiometers, {, i.e. electric circuits therefor, e.g. bridges, amplifiers or signal conditioning} 	13/028	<ul style="list-style-type: none"> • . {using capsules}
9/025	<ul style="list-style-type: none"> • . {with temperature compensating means (non electric temperature compensating means G01L 19/04)} 	13/04	<ul style="list-style-type: none"> • using floats or liquids as sensing elements
9/04	<ul style="list-style-type: none"> • . of resistance-strain gauges 	13/06	<ul style="list-style-type: none"> • using electric or magnetic pressure-sensitive elements
9/045	<ul style="list-style-type: none"> • . . {with electric temperature compensating means (non electric temperature compensating means G01L 19/04)} 	15/00	Devices or apparatus for measuring two or more fluid pressure values simultaneously
9/06	<ul style="list-style-type: none"> • . of piezo-resistive devices 	17/00	Devices or apparatus for measuring tyre pressure or the pressure in other inflated bodies
9/065	<ul style="list-style-type: none"> • . . {with temperature compensating means (non electric temperature compensating means G01L 19/04)} 	17/005	<ul style="list-style-type: none"> • {using a sensor contacting the exterior surface, e.g. for measuring deformation}
9/08	<ul style="list-style-type: none"> • by making use of piezo-electric devices {, i.e. electric circuits therefor} 	19/00	Details of, or accessories for, apparatus for measuring steady or quasi-steady pressure of a fluent medium insofar as such details or accessories are not special to particular types of pressure gauges
9/085	<ul style="list-style-type: none"> • . {with temperature compensating means (non electric temperature compensating means G01L 19/04)} 	19/0007	<ul style="list-style-type: none"> • {Fluidic connecting means}
9/10	<ul style="list-style-type: none"> • by making use of variations in inductance {, i.e. electric circuits therefor} 	19/0015	<ul style="list-style-type: none"> • . {using switching means}
9/105	<ul style="list-style-type: none"> • . {with temperature compensating means (non electric temperature compensating means G01L 19/04)} 	19/0023	<ul style="list-style-type: none"> • . {for flowthrough systems having a flexible pressure transmitting element}
9/12	<ul style="list-style-type: none"> • by making use of variations in capacitance {, i.e. electric circuits therefor} 	19/003	<ul style="list-style-type: none"> • . {using a detachable interface or adapter between the process medium and the pressure gauge}
9/125	<ul style="list-style-type: none"> • . {with temperature compensating means (non electric temperature compensating means G01L 19/04)} 	19/0038	<ul style="list-style-type: none"> • . {being part of the housing (other details about the housing G01L 19/14)}
9/14	<ul style="list-style-type: none"> • involving the displacement of magnets, e.g. electromagnets 	19/0046	<ul style="list-style-type: none"> • . {using isolation membranes (G01L 13/026 and G01L 19/0645 take precedence)}
9/16	<ul style="list-style-type: none"> • by making use of variations in the magnetic properties of material resulting from the application of stress 	2019/0053	<ul style="list-style-type: none"> • {Pressure sensors associated with other sensors, e.g. for measuring acceleration, temperature}
9/18	<ul style="list-style-type: none"> • by making use of electrokinetic cells, i.e. liquid-containing cells wherein an electric potential is produced or varied upon the application of stress 	19/0061	<ul style="list-style-type: none"> • {Electrical connection means}
11/00	Measuring steady or quasi-steady pressure of a fluid or a fluent solid material by means not provided for in group G01L 7/00 or G01L 9/00	19/0069	<ul style="list-style-type: none"> • . {from the sensor to its support}
11/002	<ul style="list-style-type: none"> • {by thermal means, e.g. hypsometer} 	19/0076	<ul style="list-style-type: none"> • . . {using buried connections}
11/004	<ul style="list-style-type: none"> • {by the use of counterbalancing forces (measuring force by the use of counterbalancing forces G01L 1/08)} 	19/0084	<ul style="list-style-type: none"> • . {to the outside of the housing (other details about the housing see G01L 19/14)}
11/006	<ul style="list-style-type: none"> • . {hydraulic or pneumatic counterbalancing forces} 	19/0092	<ul style="list-style-type: none"> • {Pressure sensor associated with other sensors, e.g. for measuring acceleration or temperature (G01L 9/025, G01L 9/045, G01L 9/065, G01L 9/085, G01L 9/105, G01L 9/125, G01L 19/02, G01L 19/04 take precedence; measuring two or more variable G01D 21/02; temperature sensors with pressure compensation G01K 1/26)}
11/008	<ul style="list-style-type: none"> • . {electrostatic or electromagnetic counterbalancing forces} 	19/02	<ul style="list-style-type: none"> • Arrangements for preventing, or for compensating for, effects of inclination or acceleration of the measuring device; Zero-setting means (for aneroid barometers G01L 7/14)
11/02	<ul style="list-style-type: none"> • by optical means 	19/04	<ul style="list-style-type: none"> • Means for compensating for effects of changes of temperature {, i.e. other than electric compensation (electric compensation G01L 9/025, G01L 9/045, G01L 9/065, G01L 9/085, G01L 9/105 or G01L 9/125)}
11/025	<ul style="list-style-type: none"> • . {using a pressure-sensitive optical fibre} 	19/06	<ul style="list-style-type: none"> • Means for preventing overload or deleterious influence of the measured medium on the measuring device or <i>vice versa</i>
11/04	<ul style="list-style-type: none"> • by acoustic means 	19/0609	<ul style="list-style-type: none"> • . {Pressure pulsation damping arrangements}
11/06	<ul style="list-style-type: none"> • . Ultrasonic means 	19/0618	<ul style="list-style-type: none"> • . {Overload protection}

19/0627	. . {Protection against aggressive medium in general}	21/18	. . using a pendulum
19/0636	. . . {using particle filters}	21/20	. . using members oscillating about a vertical axis
19/0645	. . . {using isolation membranes, specially adapted for protection (use of coupling membranes with a coupling fluid in general G01L 19/0046)}	21/22	. . using resonance effects of a vibrating body; Vacuum gauges of the Klumb type
19/0654	. . . {against moisture or humidity}	21/24	. . using rotating members; Vacuum gauges of the Langmuir type {(Langmuir probes for plasma diagnostics H05H 1/0006)}
19/0663	. . {Flame protection; Flame barriers}	21/26	. by making use of radiometer action, i.e. of the pressure caused by the momentum of molecules passing from a hotter to a cooler member; Vacuum gauges of the Knudsen type
19/0672	. . {Leakage or rupture protection or detection (detection of leakage per se G01M 3/00)}	21/28	. . using torsional rotary measuring members
19/0681	. . {Protection against excessive heat}	21/30	. by making use of ionisation effects
19/069	. . {Protection against electromagnetic or electrostatic interferences}	21/32	. . using electric discharge tubes with thermionic cathodes
19/08	. Means for indicating or recording, e.g. for remote indication	21/34	. . using electric discharge tubes with cold cathodes
19/083	. . {electrical}	21/36	. . using radioactive substances
19/086	. . {for remote indication}	23/00	Devices or apparatus for measuring or indicating or recording rapid changes, such as oscillations, in the pressure of steam, gas, or liquid; Indicators for determining work or energy of steam, internal-combustion, or other fluid-pressure engines from the condition of the working fluid
19/10	. . mechanical	23/02	. mechanically indicating or recording and involving loaded or return springs
19/12	. . Alarms or signals	23/04	. involving means subjected to known counteracting pressure
19/14	. Housings {(G01L 19/0007 , G01L 19/0084 , G01L 19/0092 , G01L 19/04 , G01L 19/06 take precedence)}	23/06	. Indicating or recording by optical means
19/141	. . {Monolithic housings, e.g. molded or one-piece housings}	23/08	. operated electrically {(G01L 23/22 takes precedence)}
19/142	. . {Multiple part housings}	23/085	. . {by measuring fluctuations of starter motor current or of battery voltage (battery testing arrangements G01R 31/36 ; testing of electrical installation on transport means G01R 31/005 ; battery testing arrangements G01R 31/36)}
19/143	. . . {Two part housings}	23/10	. . by pressure-sensitive members of the piezo-electric type
19/144	. . . {with dismountable parts, e.g. for maintenance purposes or for ensuring sterile conditions (for detachable interface or adapter between the process medium and the pressure gauge G01L 19/003)}	23/12	. . by changing capacitance or inductance
19/145	. . {with stress relieving means}	23/125	. . . {by changing capacitance}
19/146	. . . {using flexible element between the transducer and the support}	23/14	. . by electromagnetic elements
19/147	. . {Details about the mounting of the sensor to support or covering means}	23/145	. . . {by magnetostrictive elements}
19/148	. . {Details about the circuit board integration, e.g. integrated with the diaphragm surface or encapsulation}	23/16	. . by photoelectric means
19/149	. . {of immersion sensor, e.g. where the sensor is immersed in the measuring medium or for <u>in vivo</u> measurements, e.g. by using catheter tips (catheter tips per se A61M 25/0067 ; pressure measurements in the body A61B 5/00)}	23/18	. . by resistance strain gauges
19/16	. Dials; Mounting of dials	23/20	. combined with planimeters or integrators
21/00	Vacuum gauges	23/22	. for detecting or indicating knocks in internal-combustion engines; Units comprising pressure-sensitive members combined with ignitors for firing internal-combustion engines
21/02	. having a compression chamber in which gas, whose pressure is to be measured, is compressed	23/221	. . {for detecting or indicating knocks in internal combustion engines}
21/04	. . wherein the chamber is closed by liquid; Vacuum gauges of the McLeod type	23/222	. . . {using piezoelectric devices}
21/06	. . . actuated by rotating or inverting the measuring device	23/223	. . . {using magnetic or magnetostrictive means}
21/08	. by measuring variations in the transmission of acoustic waves through the medium, the pressure of which is to be measured	23/225	. . . {circuit arrangements thereof}
21/10	. by measuring variations in the heat conductivity of the medium, the pressure of which is to be measured	23/226 {using specific filtering}
21/12	. . measuring changes in electric resistance of measuring members, e.g. of filaments; Vacuum gauges of the Pirani type	23/227 {using numerical analyses}
21/14	. . using thermocouples	2023/228	. . {circuit arrangements thereof}
21/16	. by measuring variation of frictional resistance of gases	23/24	. {specially adapted} for measuring pressure in inlet or exhaust ducts of internal-combustion engines
		23/26	. Details or accessories
		23/28	. . Cooling means
		23/30	. . Means for indicating consecutively positions of pistons or cranks of internal-combustion engines in combination with pressure indicators

- 23/32
 - . . Apparatus specially adapted for recording pressure changes measured by indicators
- 25/00 Testing or calibrating of apparatus for measuring force, torque, work, mechanical power, or mechanical efficiency**
- 25/003
 - . {for measuring torque}
- 25/006
 - . {for measuring work or mechanical power or mechanical efficiency}
- 27/00 Testing or calibrating of apparatus for measuring fluid pressure**
- 27/002
 - . {Calibrating, i.e. establishing true relation between transducer output value and value to be measured, zeroing, linearising or span error determination (calibration of sensors [per se G01D 18/00](#))}
- 27/005
 - . . {Apparatus for calibrating pressure sensors}
- 27/007
 - . {Malfunction diagnosis, i.e. diagnosing a sensor defect (malfunction detection of sensor not measuring a specific variable [per se G01D 3/08](#))}
- 27/02
 - . of indicators