SECTION G — PHYSICS

G01 MEASURING; TESTING

G01R MEASURING ELECTRIC VARIABLES; MEASURING MAGNETIC VARIABLES (indicating correct tuning of resonant circuits H03J 3/12)

Note(s) [5, 2006.01]

1. This subclass covers:
   - measuring all kinds of electric or magnetic variables directly or by derivation from other electric or magnetic variables;
   - measuring all kinds of electric or magnetic properties of materials;
   - testing electric or magnetic devices, apparatus or networks (e.g. discharge tubes, amplifiers) or measuring their characteristics;
   - indicating presence or sign of current or voltage;
   - NMR, EPR or other spin-effect apparatus, not specially adapted for a particular application;
   - equipment for generating signals to be used for carrying out such tests and measurements.
2. In this subclass, the following terms or expressions are used with the meanings indicated:
   - "measuring" includes investigating;
   - "instruments" or "measuring instruments" means electro-mechanical measuring mechanisms;
   - "arrangements for measuring" means apparatus, circuits, or methods for measuring;
3. Attention is drawn to the Notes following the title of class G01.
4. In this subclass, instruments or arrangements for measuring electric variables are classified in the following way:
   - Electromechanical instruments where the measured electric variables direcly effect the indication of the measured value, including combined effects of two or more values, are classified in groups G01R 5/00-G01R 11/00.
   - Details common to different types of the instruments covered by groups G01R 5/00-G01R 11/00 are classified in group G01R 1/00.
   - Arrangements involving circuitry to obtain an indication of a measured value by deriving, calculating or otherwise processing electric variables, e.g. by comparison with another value, are classified in groups G01R 17/00-G01R 29/00.
   - Details common to different types of arrangements covered by groups G01R 17/00-G01R 29/00 are classified in group G01R 15/00.
5. In this subclass, group G01R 17/00 takes precedence over groups G01R 19/00-G01R 31/00.

Subclass index

1/00 Details of instruments or arrangements of the types covered by groups G01R 5/00-G01R 13/00 or G01R 31/00 (constructional details particular to electromechanical arrangements for measuring the electric consumption G01R 11/02) **[1, 3, 2006.01]**

1/02 • General constructional details **[1, 2006.01]**

1/04 • • Housings; Supporting members; Arrangements of terminals **[1, 2006.01]**

1/06 • • Measuring leads; Measuring probes (G01R 19/145, G01R 19/165 take precedence) **[1, 3, 2006.01]**

1/067 • • • Measuring probes **[3, 2006.01]**

1/07 • • • • Non contact-making probes **[6, 2006.01]**

1/073 • • • • Multiple probes **[3, 2006.01]**

1/08 • • Pointers; Scales; Scale illumination **[1, 2006.01]**

1/10 • • Arrangements of bearings **[1, 2006.01]**

1/12 • • • of strip or wire bearings **[1, 2006.01]**

1/14 • • Braking arrangements; Damping arrangements **[1, 2006.01]**

1/16 • • Magnets **[1, 2006.01]**

1/18 • • Screening arrangements against electric or magnetic fields, e.g. against earth's field **[1, 2006.01]**

1/20 • Modifications of basic electric elements for use in electric measuring instruments; Structural combinations of such elements with such instruments **[1, 2006.01]**

1/22 • • Tong testers acting as secondary windings of current transformers **[1, 2006.01]**

1/24 • • Transmission-line, e.g. waveguide, measuring sections, e.g. slotted section **[1, 2006.01]**

1/26 • • • with linear movement of probe **[1, 2006.01]**

1/28 • Provision in measuring instruments for reference values, e.g. standard voltage, standard waveform **[1, 2006.01]**

1/30 • Structural combination of electric measuring instruments with basic electronic circuits, e.g. with amplifier **[1, 2006.01]**

1/36 • Overload-protection arrangements or circuits for electric measuring instruments **[1, 2006.01]**

1/38 • Arrangements for altering the indicating characteristic, e.g. by modifying the air gap **[1, 2006.01]**

1/40 • Modifications of instruments to indicate the maximum or the minimum value reached in a time interval, e.g. by maximum indicator pointer **[1, 3, 2006.01]**

1/42 • • thermally operated **[1, 2006.01]**

1/44 • Modifications of instruments for temperature compensation **[2, 2006.01]**

3/00 Apparatus or processes specially adapted for the manufacture of measuring instruments [1, 2006.01]

5/00 Instruments for converting a single current or a single voltage into a mechanical displacement [1, 2006.01]

5/02 • Moving-coil instruments **[1, 2006.01]**

5/04 • • with magnet external to the coil **[1, 2006.01]**

5/06 • • with core magnet **[1, 2006.01]**

5/08 • • specially adapted for wide angle deflection; with eccentrically-pivoted moving coil **[1, 2006.01]**

5/10 • String galvanometers **[1, 2006.01]**

5/12 • Loop galvanometers **[1, 2006.01]**

5/14 • Moving-iron instruments **[1, 2006.01]**

5/16 • • with pivoting magnet **[1, 2006.01]**

5/18 • • with pivoting soft iron, e.g. needle galvanometer **[1, 2006.01]**

5/20 • Induction instruments e.g. Ferraris instruments **[1, 2006.01]**

5/22 • Thermoelectric instruments **[1, 2006.01]**

5/24 • • operated by elongation of a strip or wire or by expansion of a gas or fluid **[1, 2006.01]**

5/26 • • operated by deformation of a bimetallic element **[1, 2006.01]**

5/28 • Electrostatic instruments **[1, 2006.01]**

5/30 • • Leaf electrometers **[1, 2006.01]**

5/32 • • Wire electrometers; Needle electrometers **[1, 2006.01]**

5/34 • • Quadrant electrometers **[1, 2006.01]**

7/00 Instruments capable of converting two or more currents or voltages into a single mechanical displacement (G01R 9/00 takes precedence) **[1, 2006.01]**

7/02 • for forming a sum or a difference **[1, 2006.01]**

7/04 • for forming a quotient (for measuring resistance G01R 27/08) **[1, 2006.01]**

7/06 • • moving-iron type **[1, 2006.01]**

7/08 • • moving-coil type, e.g. crossed-coil type **[1, 2006.01]**

7/10 • • • having more than two moving coils **[1, 2006.01]**

7/12 • for forming product **[1, 2006.01]**

7/14 • • moving-iron type **[1, 2006.01]**

7/16 • • having both fixed and moving coils, i.e. dynamometers **[1, 2006.01]**

7/18 • • • with iron core magnetically coupling fixed and moving coils **[1, 2006.01]**

9/00 Instruments employing mechanical resonance [1, 2006.01]

9/02 • Vibration galvanometers, e.g. for measuring current **[1, 2006.01]**

9/04 • using vibrating reeds, e.g. for measuring frequency **[1, 2006.01]**

9/06 • • magnetically driven **[1, 2006.01]**

9/08 • • piezoelectrically driven **[1, 2006.01]**

11/00 Electromechanical arrangements for measuring time integral of electric power or current, e.g. of consumption (monitoring electric consumption of electrically-propelled vehicles B60L 3/00) **[1, 2006.01]**

11/02 • Constructional details **[1, 2006.01]**

11/04 • • Housings; Supporting racks; Arrangements of terminals **[1, 2006.01]**

11/06 • • Magnetic circuits of induction meters **[1, 2, 2006.01]**

11/067 • • • Coils therefor **[2, 2006.01]**

11/073 • • • Armatures therefor **[2, 2006.01]**

11/09 • • • • Disc armatures **[2, 2006.01]**

11/10 • • Braking magnets; Damping arrangements **[1, 2006.01]**

11/12 • • Arrangements of bearings **[1, 2006.01]**

11/14 • • • with magnetic relief **[1, 2006.01]**

11/16 • • Adaptations of counters to electricity meters **[1, 2006.01]**

11/17 • • Compensating for errors; Adjusting or regulating means therefor **[2, 2006.01]**

11/18 • • • Compensating for variations in ambient conditions **[1, 2, 2006.01]**

11/185 • • • • Temperature compensation **[2, 2006.01]**

11/19 • • • Compensating for errors caused by disturbing torque, e.g. rotating-field errors of polyphase meters **[2, 2006.01]**

11/20 • • • Compensating for phase errors in induction meters **[1, 2, 2006.01]**

11/21 • • • Compensating for errors caused by damping effects of the current, e.g. adjustment in the overload range **[2, 2006.01]**

11/22 • • • Adjusting torque, e.g. adjusting starting torque, adjusting of polyphase meters for obtaining equal torques **[1, 2, 2006.01]**

11/23 • • • Compensating for errors caused by friction, e.g. adjustment in the light-load range **[2, 2006.01]**

11/24 • • Arrangements for avoiding or indicating fraudulent use **[1, 4, 2006.01]**

11/25 • • Arrangements for indicating or signalling faults **[2, 4, 2006.01]**

Note(s) [4]

Groups G01R 11/48-G01R 11/56 take precedence over groups G01R 11/30-G01R 11/46.

11/30 • Dynamo-electric motor meters **[1, 2006.01]**

11/32 • • Watt-hour meters **[1, 2006.01]**

11/34 • • Ampère-hour meters **[1, 2006.01]**

11/36 • Induction meters, e.g. Ferraris meters **[1, 2006.01]**
11/38 • • for single-phase operation **[1, 2006.01]**
11/40 • • for polyphase operation **[1, 2006.01]**
11/42 • • • Circuitry therefor **[1, 2006.01]**
11/46 • Electrically-operated clockwork meters; Oscillatory meters; Pendulum meters **[1, 2006.01]**
11/48 • Meters specially adapted for measuring real or reactive components; Meters specially adapted for measuring apparent energy **[1, 2006.01]**
11/50 • • for measuring real component **[1, 2006.01]**
11/52 • • for measuring reactive component **[1, 2006.01]**
11/54 • • for measuring simultaneously at least two of the following three variables: real component, reactive component, apparent energy **[1, 2006.01]**
11/56 • Special tariff meters **[1, 2006.01]**
11/57 • • Multi-rate meters (G01R 11/63 takes precedence) **[2, 2006.01]**
11/58 • • • Tariff-switching devices therefor **[1, 2, 2006.01]**
11/60 • • Subtraction meters; Meters measuring maximum or minimum-load hours **[1, 2006.01]**
11/63 • • Over-consumption meters, e.g. measuring consumption while a predetermined level of power is exceeded **[2, 2006.01]**
11/64 • • Maximum meters, e.g. tariff for a period is based on maximum demand within that period **[1, 2006.01]**
11/66 • • • Circuitry **[1, 2006.01]**

13/00 Arrangements for displaying electric variables or waveforms [1, 4, 2006.01]

13/02 • for displaying measured electric variables in digital form **[1, 4, 2006.01]**
13/04 • for producing permanent records **[1, 4, 2006.01]**
13/06 • • Modifications for recording transient disturbances, e.g. by starting or accelerating a recording medium **[1, 2006.01]**
13/08 • • Electromechanical recording system using a mechanical direct-writing method **[1, 2006.01]**
13/10 • • • with intermittent recording by representing the variable by the length of a stroke or by the position of a dot **[1, 2006.01]**
13/12 • • Chemical recording, e.g. clydonographs (G01R 13/14 takes precedence) **[1, 2006.01]**
13/14 • • Recording on a light-sensitive material **[1, 2006.01]**
13/16 • • Recording on a magnetic medium **[1, 2006.01]**
13/18 • • • using boundary displacement **[1, 2006.01]**
13/20 • Cathode-ray oscilloscopes **[1, 2006.01]**
13/22 • • Circuits therefor **[1, 2006.01]**
13/24 • • • Time-base deflection circuits **[1, 2006.01]**
13/26 • • • Circuits for controlling the intensity of the electron beam **[1, 2006.01]**
13/28 • • • Circuits for simultaneous or sequential presentation of more than one variable **[1, 2006.01]**
13/30 • • • Circuits for inserting reference markers, e.g. for timing, for calibrating, for frequency marking **[1, 2006.01]**
13/32 • • • Circuits for displaying non-recurrent functions such as transients; Circuits for triggering; Circuits for synchronisation; Circuits for time-base expansion **[1, 2006.01]**
13/34 • • • Circuits for representing a single waveform by sampling, e.g. for very high frequencies **[1, 2, 2006.01]**
13/36 • using length of glow discharge, e.g. glowlight oscilloscopes **[1, 4, 2006.01]**
13/38 • using the steady or oscillatory displacement of a light beam by an electromechanical measuring system **[1, 4, 2006.01]**
13/40 • using modulation of a light beam otherwise than by mechanical displacement, e.g. by Kerr effect **[1, 4, 2006.01]**
13/42 • Instruments using length of spark discharge, e.g. by measuring maximum separation of electrodes to produce spark **[1, 2006.01]**

15/00 Details of measuring arrangements of the types provided for in groups G01R 17/00-G01R 29/00, G01R 33/00-G01R 33/26 or G01R 35/00 [1, 2006.01]

15/04 • Voltage dividers **[1, 6, 2006.01]**
15/06 • • having reactive components, e.g. capacitive transformer **[1, 6, 2006.01]**
15/08 • Circuits for altering the measuring range **[1, 2006.01]**
15/09 • • Autoranging circuits **[6, 2006.01]**
15/12 • Circuits for multi-testers, e.g. for measuring voltage, current, or impedance at will **[1, 2006.01]**
15/14 • Adaptations providing voltage or current isolation, e.g. for high-voltage or high-current networks **[6, 2006.01]**
15/16 • • using capacitive devices **[6, 2006.01]**
15/18 • • using inductive devices, e.g. transformers **[6, 2006.01]**
15/20 • • using galvano-magnetic devices, e.g. Hall-effect devices **[6, 2006.01]**
15/22 • • using light-emitting devices, e.g. LED, optocouplers **[6, 2006.01]**
15/24 • • using light-modulating devices **[6, 2006.01]**
15/26 • • using modulation of waves other than light, e.g. radio or acoustic waves **[6, 2006.01]**

17/00 Measuring arrangements involving comparison with a reference value, e.g. bridge [1, 2006.01]

17/02 • Arrangements in which the value to be measured is automatically compared with a reference value **[1, 2006.01]**
17/04 • • in which the reference value is continuously or periodically swept over the range of values to be measured **[1, 2006.01]**
17/06 • • Automatic balancing arrangements **[1, 2006.01]**
17/08 • • • in which a force or torque representing the measured value is balanced by a force or torque representing the reference value **[1, 2006.01]**
17/10 • AC or DC measuring bridges **[1, 2006.01]**
17/12 • • using comparison of currents, e.g. bridges with differential current output **[1, 2006.01]**
17/14 • • with indication of measured value by calibrated null indicator, e.g. percent bridge, tolerance bridge (G01R 17/12, G01R 17/16 take precedence) **[1, 2006.01]**
17/16 • • with discharge tubes or semiconductor devices in one or more arms of the bridge, e.g. voltmeter using a difference amplifier **[1, 2006.01]**
17/18 • • with more than four branches **[1, 2006.01]**
17/20 • AC or DC potentiometric measuring arrangements **[1, 2006.01]**
17/22 • • with indication of measured value by calibrated null indicator **[1, 2006.01]**

19/00 Arrangements for measuring currents or voltages or for indicating presence or sign thereof (G01R 5/00 takes precedence; for measuring bioelectric currents or voltages A61B 5/24) **[1, 4, 2006.01]**

Note(s) [3]

Within groups G01R 19/02-G01R 19/32, group G01R 19/28 takes precedence. Groups G01R 19/18-G01R 19/25 take precedence over groups G01R 19/02-G01R 19/165 and G01R 19/30.

19/02 • Measuring effective values, i.e. root-mean-square values **[1, 2006.01]**

19/03 • • using thermoconverters **[4, 2006.01]**

19/04 • Measuring peak values of AC or of pulses **[1, 2, 2006.01]**

19/06 • Measuring real component; Measuring reactive component **[1, 2006.01]**

19/08 • Measuring current density **[1, 2006.01]**

19/10 • Measuring sum, difference, or ratio **[1, 2006.01]**

19/12 • Measuring rate of change **[1, 2006.01]**

19/14 • Indicating direction of current; Indicating polarity of voltage **[1, 2006.01]**

19/145 • Indicating the presence of current or voltage **[3, 2006.01]**

19/15 • • Indicating the presence of current **[3, 2006.01]**

19/155 • • Indicating the presence of voltage **[3, 2006.01]**

19/165 • Indicating that current or voltage is either above or below a predetermined value or within or outside a predetermined range of values **[3, 2006.01]**

19/17 • • giving an indication of the number of times this occurs **[3, 2006.01]**

19/175 • Indicating the instants of passage of current or voltage through a given value, e.g. passage through zero **[3, 2006.01]**

19/18 • using conversion of DC into AC, e.g. with choppers **[1, 2006.01]**

19/20 • • using transductors **[1, 2006.01]**

19/22 • using conversion of AC into DC **[1, 2006.01]**

19/25 • using digital measurement techniques **[3, 2006.01]**

19/252 • • using analogue/digital converters of the type with conversion of voltage or current into frequency and measuring of this frequency **[4, 2006.01]**

19/255 • • using analogue/digital converters of the type with counting of pulses during a period of time proportional to voltage or current, delivered by a pulse generator with fixed frequency **[4, 2006.01]**

19/257 • • using analogue/digital converters of the type with comparison of different reference values with the value of voltage or current, e.g. using step-by-step method **[4, 2006.01]**

19/28 • adapted for measuring in circuits having distributed constants **[1, 2006.01]**

19/30 • Measuring the maximum or the minimum value of current or voltage reached in a time interval (G01R 19/04 takes precedence) **[2, 3, 2006.01]**

19/32 • Compensating for temperature change **[2, 2006.01]**

21/00 Arrangements for measuring electric power or power factor (G01R 7/12 takes precedence) **[1, 4, 2006.01]**

21/01 • in circuits having distributed constants (G01R 21/04, G01R 21/07, G01R 21/09, G01R 21/12 take precedence) **[2, 2006.01]**

21/02 • by thermal methods **[1, 2, 2006.01]**

21/04 • • in circuits having distributed constants **[1, 2006.01]**

21/06 • by measuring current and voltage (G01R 21/08-G01R 21/133 take precedence) **[1, 4, 2006.01]**

21/07 • • in circuits having distributed constants (G01R 21/09 takes precedence) **[2, 2006.01]**

21/08 • by using galvanomagnetic-effect devices, e.g. Hall-effect devices **[1, 2, 2006.01]**

21/09 • • in circuits having distributed constants **[2, 2006.01]**

21/10 • by using square-law characteristics of circuit elements, e.g. diodes, to measure power absorbed by loads of known impedance (G01R 21/02 takes precedence) **[1, 2, 2006.01]**

21/12 • • in circuits having distributed constants **[1, 2006.01]**

21/127 • by using pulse modulation (G01R 21/133 takes precedence) **[4, 2006.01]**

21/133 • by using digital technique **[4, 2006.01]**

21/14 • Compensating for temperature change **[2, 2006.01]**

22/00 Arrangements for measuring time integral of electric power or current, e.g. electricity meters [4, 2006.01]

Note(s) [4]

An arrangement for measuring time integral of electric power is classified in group G01R 21/00 if the essential characteristic is the measuring of electric power.

22/02 • by electrolytic methods **[4, 2006.01]**

22/04 • by calorimetric methods **[4, 2006.01]**

22/06 • by electronic methods **[2006.01]**

22/08 • • using analogue techniques **[2006.01]**

22/10 • • using digital techniques **[2006.01]**

23/00 Arrangements for measuring frequencies; Arrangements for analysing frequency spectra [1, 2006.01]

23/02 • Arrangements for measuring frequency, e.g. pulse repetition rate; Arrangements for measuring period of current or voltage **[1, 2006.01]**

23/04 • • adapted for measuring in circuits having distributed constants **[1, 2006.01]**

23/06 • • by converting frequency into an amplitude of current or voltage **[1, 2006.01]**

23/07 • • • using response of circuits tuned on resonance, e.g. grid-drip meter **[2, 2006.01]**

23/08 • • • using response of circuits tuned off resonance **[1, 2006.01]**

23/09 • • • using analogue integrators, e.g. capacitors establishing a mean value by balance of input signals and defined discharge signals or leakage **[2, 2006.01]**

23/10 • • by converting frequency into a train of pulses, which are then counted **[1, 2006.01]**

23/12 • • by converting frequency into phase shift **[1, 2006.01]**

23/14 • • by heterodyning; by beat-frequency comparison **[1, 2, 2006.01]**

23/15 • • Indicating that frequency of pulses is either above or below a predetermined value or within or outside a predetermined range of values, by making use of non-linear or digital elements **[3, 2006.01]**

23/16 • Spectrum analysis; Fourier analysis **[1, 2006.01]**

23/163 • • adapted for measuring in circuits having distributed constants **[3, 2006.01]**

23/165 • • using filters **[3, 2006.01]**

23/167 • • • with digital filters **[3, 2006.01]**

23/17 • • with optical auxiliary devices **[3, 2006.01]**

23/173 • • Wobbulating devices similar to swept panoramic receivers **[3, 2006.01]**

23/175 • • by delay means, e.g. tapped delay lines **[3, 2006.01]**

23/177 • • Analysis of very low frequencies **[3, 2006.01]**

23/18 • • with provision for recording frequency spectrum **[1, 2006.01]**

23/20 • • Measurement of non-linear distortion **[1, 2006.01]**

25/00 Arrangements for measuring phase angle between a voltage and a current or between voltages or currents [1, 2, 2006.01]

25/02 • in circuits having distributed constants **[1, 2006.01]**

25/04 • involving adjustment of a phase shifter to produce a predetermined phase difference, e.g. zero difference **[1, 2006.01]**

25/06 • employing quotient instrument **[1, 2006.01]**

25/08 • by counting of standard pulses **[2, 2006.01]**

27/00 Arrangements for measuring resistance, reactance, impedance, or electric characteristics derived therefrom [1, 2006.01]

27/02 • Measuring real or complex resistance, reactance, impedance, or other two-pole characteristics derived therefrom, e.g. time constant (by measuring phase angle only G01R 25/00) **[1, 2006.01]**

27/04 • • in circuits having distributed constants **[1, 2006.01]**

27/06 • • • Measuring reflection coefficients; Measuring standing-wave ratio **[1, 2006.01]**

27/08 • • Measuring resistance by measuring both voltage and current **[1, 2006.01]**

27/10 • • • using two-coil or crossed-coil instruments forming quotient **[1, 2006.01]**

27/12 • • • • using hand generators, e.g. meggers **[1, 2006.01]**

27/14 • • Measuring resistance by measuring current or voltage obtained from a reference source (G01R 27/16, G01R 27/20, G01R 27/22 take precedence) **[1, 2006.01]**

27/16 • • Measuring impedance of element or network through which a current is passing from another source, e.g. cable, power line **[1, 2006.01]**

27/18 • • • Measuring resistance to earth **[1, 2006.01]**

27/20 • • Measuring earth resistance; Measuring contact resistance of earth connections, e.g. plates **[1, 2006.01]**

27/22 • • Measuring resistance of fluids **[1, 2006.01]**

27/26 • • Measuring inductance or capacitance; Measuring quality factor, e.g. by using the resonance method; Measuring loss factor; Measuring dielectric constants **[1, 2006.01]**

27/28 • Measuring attenuation, gain, phase shift, or derived characteristics of electric four-pole networks, i.e. two-port networks; Measuring transient response (in line transmission systems H04B 3/46) **[1, 2006.01]**

27/30 • • with provision for recording characteristics, e.g. by plotting Nyquist diagram **[1, 2006.01]**

27/32 • • in circuits having distributed constants **[2, 2006.01]**

29/00 Arrangements for measuring or indicating electric quantities not covered by groups G01R 19/00-G01R 27/00 [1, 2006.01]

29/02 • Measuring characteristics of individual pulses, e.g. deviation from pulse flatness, rise time or duration **[1, 3, 2006.01]**

29/027 • • Indicating that a pulse characteristic is either above or below a predetermined value or within or beyond a predetermined range of values **[3, 2006.01]**

29/033 • • • giving an indication of the number of times this occurs **[3, 2006.01]**

29/04 • Measuring form factor, i.e. quotient of root-mean-square value and arithmetic mean of instantaneous value; Measuring peak factor, i.e. quotient of maximum value and root-mean-square value **[1, 2006.01]**

29/06 • Measuring depth of modulation **[1, 2006.01]**

29/08 • Measuring electromagnetic field characteristics **[1, 2006.01]**

29/10 • • Radiation diagrams of antennas **[1, 2006.01]**

29/12 • Measuring electrostatic fields **[1, 2006.01]**

29/14 • • Measuring field distribution **[1, 2006.01]**

29/16 • Measuring asymmetry of polyphase networks **[1, 2006.01]**

29/18 • Indicating phase sequence; Indicating synchronism **[1, 2006.01]**

29/20 • Measuring number of turns; Measuring transformation ratio or coupling factor of windings **[1, 2006.01]**

29/22 • Measuring piezoelectric properties **[1, 2006.01]**

29/24 • Arrangements for measuring quantities of charge **[2, 2006.01]**

29/26 • Measuring noise figure; Measuring signal-to-noise ratio **[2, 2006.01]**

31/00 Arrangements for testing electric properties; Arrangements for locating electric faults; Arrangements for electrical testing characterised by what is being tested not provided for elsewhere (testing or measuring semiconductors or solid state devices during manufacture H01L 21/66; testing line transmission systems H04B 3/46) **[1, 2006.01]**

Note(s) [2020.01]

Groups G01R 31/08, G01R 31/12, G01R 31/24, G01R 31/26, G01R 31/327, G01R 31/34, G01R 31/36, G01R 31/40, G01R 31/44 take precedence over group G01R 31/50.

31/01 • Subjecting similar articles in turn to test, e.g. "go/no-go" tests in mass production; Testing objects at points as they pass through a testing station (testing of cables continuously passing the testing apparatus G01R 31/59; testing dielectric strength or breakdown voltage G01R 31/12) **[6, 2006.01, 2020.01]**

31/08 • Locating faults in cables, transmission lines, or networks **[1, 2006.01, 2020.01]**

31/10 • • by increasing destruction at fault, e.g. burning-in by using a pulse generator operating a special programme **[1, 2006.01]**

31/11 • • using pulse-reflection methods **[1, 2006.01]**

31/12 • Testing dielectric strength or breakdown voltage **[1, 2006.01, 2020.01]**

31/14 • • Circuits therefor **[1, 2006.01]**

31/16 • • Construction of testing vessels; Electrodes therefor **[1, 2006.01]**

31/18 • • Subjecting similar articles in turn to test, e.g. "go/no-go" tests in mass production **[1, 2006.01]**

31/20 • • Preparation of articles or specimens to facilitate testing **[1, 2006.01]**

31/24 • Testing of discharge tubes (during manufacture H01J 9/42) **[1, 2, 2006.01, 2020.01]**

31/25 • • Testing of vacuum tubes **[2, 2006.01]**

31/26 • Testing of individual semiconductor devices (testing or measuring during manufacture or treatment H01L 21/66; testing of photovoltaic devices H02S 50/10) **[1, 2, 2006.01, 2014.01, 2020.01]**

31/265 • • Contactless testing **[6, 2006.01]**

31/27 • • Testing of devices without physical removal from the circuit of which they form part, e.g. compensating for effects due to surrounding elements **[6, 2006.01]**

31/28 • Testing of electronic circuits, e.g. by signal tracer (testing computers during standby operation or idle time G06F 11/22) **[1, 2006.01]**

31/30 • • Marginal testing, e.g. by varying supply voltage (testing computers during standby operation or idle time G06F 11/22) **[1, 2, 2006.01]**

31/302 • • Contactless testing **[5, 2006.01]**

31/303 • • • of integrated circuits (G01R 31/305-G01R 31/315 take precedence) **[6, 2006.01]**

31/304 • • • of printed or hybrid circuits (G01R 31/305-G01R 31/315 take precedence) **[6, 2006.01]**

31/305 • • • using electron beams **[5, 2006.01]**

31/306 • • • • of printed or hybrid circuits **[6, 2006.01]**

31/307 • • • • of integrated circuits **[6, 2006.01]**

31/308 • • • using non-ionising electromagnetic radiation, e.g. optical radiation **[5, 2006.01]**

31/309 • • • • of printed or hybrid circuits **[6, 2006.01]**

31/311 • • • • of integrated circuits **[6, 2006.01]**

31/312 • • • by capacitive methods **[5, 2006.01]**

31/315 • • • by inductive methods **[5, 2006.01]**

31/316 • • Testing of analog circuits **[6, 2006.01]**

31/3161 • • • Marginal testing **[6, 2006.01]**

31/3163 • • • Functional testing **[6, 2006.01]**

31/3167 • • Testing of combined analog and digital circuits **[6, 2006.01]**

31/317 • • Testing of digital circuits **[6, 2006.01]**

31/3173 • • • Marginal testing **[6, 2006.01]**

31/3177 • • • Testing of logic operation, e.g. by logic analysers **[6, 2006.01]**

31/3181 • • • Functional testing (G01R 31/3177 takes precedence) **[6, 2006.01]**

31/3183 • • • • Generation of test inputs, e.g. test vectors, patterns or sequences **[6, 2006.01]**

31/3185 • • • • Reconfiguring for testing, e.g. LSSD, partitioning **[6, 2006.01]**

31/3187 • • • • Built-in tests **[6, 2006.01]**

31/319 • • • • Tester hardware, i.e. output processing circuits **[6, 2006.01]**

31/3193 • • • • • with comparison between actual response and known fault-free response **[6, 2006.01]**

31/327 • Testing of circuit interrupters, switches or circuit-breakers **[6, 2006.01]**

31/333 • • Testing of the switching capacity of high-voltage circuit-breakers **[6, 2006.01]**

31/34 • Testing dynamo-electric machines **[3, 2006.01, 2020.01]**

31/36 • Arrangements for testing, measuring or monitoring the electrical condition of accumulators or electric batteries, e.g. capacity or state of charge [SoC] **[3, 2006.01, 2019.01, 2020.01]**

31/364 • • Battery terminal connectors with integrated measuring arrangements **[2019.01]**

31/367 • • Software therefor, e.g. for battery testing using modelling or look-up tables **[2019.01]**

31/371 • • with remote indication, e.g. on external chargers **[2019.01]**

31/374 • • with means for correcting the measurement for temperature or ageing **[2019.01]**

31/378 • • specially adapted for the type of battery or accumulator **[2019.01]**

31/379 • • • for lead-acid batteries **[2019.01]**

31/382 • • Arrangements for monitoring battery or accumulator variables, e.g. SoC **[2019.01]**

31/3828 • • • using current integration **[2019.01]**

31/3832 • • • • without measurement of battery voltage **[2019.01]**

31/3835 • • • involving only voltage measurements **[2019.01]**

31/3842 • • • combining voltage and current measurements **[2019.01]**

31/385 • • Arrangements for measuring battery or accumulator variables (for monitoring G01R 31/382) **[2019.01]**

31/387 • • • Determining ampere-hour charge capacity or SoC **[2019.01]**

31/388 • • • • involving voltage measurements **[2019.01]**

31/389 • • Measuring internal impedance, internal conductance or related variables **[2019.01]**

31/392 • • Determining battery ageing or deterioration, e.g. state of health **[2019.01]**

31/396 • • Acquisition or processing of data for testing or for monitoring individual cells or groups of cells within a battery **[2019.01]**

31/40 • Testing power supplies (testing photovoltaic devices H02S 50/10) **[6, 2006.01, 2014.01, 2020.01]**

31/42 • • AC power supplies **[6, 2006.01]**

31/44 • Testing lamps **[6, 2006.01, 2020.01]**

31/50 • Testing of electric apparatus, lines, cables or components for short-circuits, continuity, leakage current or incorrect line connections (testing of sparking plugs H01T 13/58) **[2020.01]**

31/52 • • Testing for short-circuits, leakage current or ground faults **[2020.01]**

31/54 • • Testing for continuity **[2020.01]**

31/55 • • Testing for incorrect line connections **[2020.01]**

31/56 • • Testing of electric apparatus (testing of transformers G01R 31/62; testing of connections G01R 31/66) **[2020.01]**

31/58 • • Testing of lines, cables or conductors (testing of electric windings G01R 31/72) **[2020.01]**

31/59 • • • while the cable continuously passes the testing apparatus, e.g. during manufacture **[2020.01]**

31/60 • • • Identification of wires in a multicore cable **[2020.01]**

31/62 • • Testing of transformers **[2020.01]**

31/64 • • Testing of capacitors **[2020.01]**

31/66 • • Testing of connections, e.g. of plugs or non-disconnectable joints (testing for incorrect line connections G01R 31/55) **[2020.01]**

31/67 • • • Testing the correctness of wire connections in electric apparatus or circuits **[2020.01]**

31/68 • • • Testing of releasable connections, e.g. of terminals mounted on a printed circuit board **[2020.01]**

31/69 • • • • of terminals at the end of a cable or a wire harness; of plugs; of sockets, e.g. wall sockets or power sockets in appliances **[2020.01]**

31/70 • • • Testing of connections between components and printed circuit boards (G01R 31/68 takes precedence) **[2020.01]**

31/71 • • • • Testing of solder joints **[2020.01]**

31/72 • • Testing of electric windings (testing of transformers G01R 31/62) **[2020.01]**

31/74 • • Testing of fuses **[2020.01]**

33/00 Arrangements or instruments for measuring magnetic variables [1, 2006.01]

33/02 • Measuring direction or magnitude of magnetic fields or magnetic flux (G01R 33/20 takes precedence) **[1, 4, 2006.01]**

33/022 • • Measuring gradient **[3, 2006.01]**

Note(s)

Group G01R 33/022 or group G01R 33/10 takes precedence over groups G01R 33/025-G01R 33/06.

33/025 • • Compensating stray fields **[3, 2006.01]**

33/028 • • Electrodynamic magnetometers **[3, 2006.01]**

33/032 • • using magneto-optic devices, e.g. Faraday **[3, 2006.01]**

33/035 • • using superconductive devices **[3, 2006.01]**

33/038 • • using permanent magnets, e.g. balances, torsion devices **[3, 2006.01]**

33/04 • • using the flux-gate principle **[1, 2006.01]**

33/05 • • • in thin-film element **[3, 2006.01]**

33/06 • • using galvano-magnetic devices **[1, 2006.01]**

33/07 • • • Hall-effect devices **[6, 2006.01]**

33/09 • • • Magneto-resistive devices **[6, 2006.01]**

33/10 • • Plotting field distribution **[1, 2006.01]**

33/12 • Measuring magnetic properties of articles or specimens of solids or fluids (involving magnetic resonance G01R 33/20) **[1, 4, 2006.01]**

33/14 • • Measuring or plotting hysteresis curves **[1, 2006.01]**

33/16 • • Measuring susceptibility **[1, 2006.01]**

33/18 • • Measuring magnetostrictive properties **[1, 2006.01]**

33/20 • involving magnetic resonance (medical aspects A61B 5/055; magnetic resonance gyrometers G01C 19/60) **[4, 5, 2006.01]**

33/24 • • for measuring direction or magnitude of magnetic fields or magnetic flux **[4, 2006.01]**

33/26 • • • using optical pumping **[4, 2006.01]**

33/28 • • Details of apparatus provided for in groups G01R 33/44-G01R 33/64 **[5, 2006.01]**

33/30 • • • Sample handling arrangements, e.g. sample cells, spinning mechanisms **[5, 2006.01]**

33/31 • • • • Temperature control thereof **[6, 2006.01]**

33/32 • • • Excitation or detection systems, e.g. using radiofrequency signals **[5, 2006.01]**

33/34 • • • • Constructional details, e.g. resonators **[5, 2006.01]**

33/341 • • • • • comprising surface coils **[6, 2006.01]**

33/3415 • • • • • • comprising arrays of sub-coils **[6, 2006.01]**

33/343 • • • • • of slotted-tube or loop-gap type **[6, 2006.01]**

33/345 • • • • • of waveguide type (G01R 33/343 takes precedence) **[6, 2006.01]**

33/36 • • • • Electrical details, e.g. matching or coupling of the coil to the receiver **[5, 2006.01]**

33/38 • • • Systems for generation, homogenisation or stabilisation of the main or gradient magnetic field **[5, 2006.01]**

Note(s) [6]

Groups G01R 33/385-G01R 33/389 take precedence over groups G01R 33/381-G01R 33/383.

33/381 • • • • using electromagnets **[6, 2006.01]**

33/3815 • • • • • with superconducting coils, e.g. power supply therefor **[6, 2006.01]**

33/383 • • • • using permanent magnets **[6, 2006.01]**

33/385 • • • • using gradient magnetic field coils **[6, 2006.01]**

33/387 • • • • Compensation of inhomogeneities **[6, 2006.01]**

33/3873 • • • • • using ferromagnetic bodies **[6, 2006.01]**

33/3875 • • • • • using correction coil assemblies, e.g. active shimming **[6, 2006.01]**

33/389 • • • • Field stabilisation **[6, 2006.01]**

33/42 • • • Screening **[5, 6, 2006.01]**

33/421 • • • • of main or gradient magnetic field **[6, 2006.01]**

33/422 • • • • of the radiofrequency field **[6, 2006.01]**

33/44 • • using nuclear magnetic resonance [NMR] (G01R 33/24, G01R 33/62 take precedence) **[5, 2006.01]**

33/46 • • • NMR spectroscopy **[5, 2006.01]**

33/465 • • • • applied to biological material, e.g. in vitro testing **[6, 2006.01]**

33/48 • • • NMR imaging systems **[5, 2006.01]**

33/483 • • • • with selection of signal or spectra from particular regions of the volume, e.g. in vivo spectroscopy **[6, 2006.01]**

33/485 • • • • • based on chemical shift information **[6, 2006.01]**

33/50 • • • • based on the determination of relaxation times **[5, 2006.01]**

33/54 • • • • Signal processing systems, e.g. using pulse sequences **[5, 2006.01]**

33/56 • • • • • Image enhancement or correction, e.g. subtraction or averaging techniques **[5, 2006.01]**

33/561 • • • • • • by reduction of the scanning time, i.e. fast acquiring systems, e.g. using echo-planar pulse sequences **[6, 2006.01]**

33/563 • • • • • • of moving material, e.g. flow-contrast angiography **[6, 2006.01]**

33/565 • • • • • • Correction of image distortions, e.g. due to magnetic field inhomogeneities **[6, 2006.01]**

33/567 • • • • • • gated by physiological signals **[6, 2006.01]**

33/58 • • • • Calibration of imaging systems, e.g. using test probes **[5, 2006.01]**

33/60 • • using electron paramagnetic resonance (G01R 33/24, G01R 33/62 take precedence) **[5, 2006.01]**

33/62 • • using double resonance (G01R 33/24 takes precedence) **[5, 2006.01]**

33/64 • • using cyclotron resonance (G01R 33/24 takes precedence) **[5, 2006.01]**

35/00 Testing or calibrating of apparatus covered by the other groups of this subclass [1, 2, 2006.01]

35/02 • of auxiliary devices, e.g. of instrument transformers according to prescribed transformation ratio, phase angle, or wattage rating **[1, 2006.01]**

35/04 • of instruments for measuring time integral of power or current **[1, 2006.01]**

35/06 • • by stroboscopic methods **[1, 2006.01]**