

SECTION G — PHYSICS

G01 MEASURING; TESTING

G01R MEASURING ELECTRIC VARIABLES; MEASURING MAGNETIC VARIABLES (measuring physical variables of any kind by conversion into electric variables, see Note (4) following the title of class G01; measuring diffusion of ions in an electric field, e.g. electrophoresis, electro-osmosis, G01N; investigating non-electric or non-magnetic properties of materials by using electric or magnetic methods G01N; indicating correct tuning of resonant circuits H03J 3/12; monitoring electronic pulse counters H03K 21/40; monitoring operation of communication systems H04)

Note(s)

- 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.
- 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;
- Attention is drawn to the Notes following the title of class G01.
- In this subclass, instruments or arrangements for measuring electric variables are classified in the following way:
 - Electromechanical instruments where the measured electric variables directly 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.
- In this subclass, group G01R 17/00 takes precedence over groups G01R 19/00-G01R 31/00.

Subclass index

ELECTRIC MEASURING INSTRUMENTS

In general.....5/00, 7/00, 9/00
 Details.....1/00
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MEASURING ELECTRIC VARIABLES

Details of measuring arrangements.....11/02, 15/00
 Arrangements for displaying.....13/00
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 Current or voltage; power, power factor; time integral of power or current; frequency; resistance, reactance, impedance.....19/00, 21/00, 22/00, 23/00, 27/00
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TESTING ELECTRIC PROPERTIES OR LOCATING FAULTS.....31/00

MEASURING MAGNETIC VARIABLES.....33/00

- 1/00 Details of instruments or arrangements of the types included in groups G01R 5/00-G01R 13/00 and G01R 31/00** (constructional details particular to arrangements for measuring the electric consumption G01R 11/02) [3, 2006.01]
- 1/02 • General constructional details (details of a kind applicable to measuring arrangements not specially adapted for a specific variable G01D 7/00)
- 1/04 • • Housings; Supporting members; Arrangements of terminals

- 1/06 • • Measuring leads; Measuring probes (G01R 19/145, G01R 19/165 take precedence; end pieces for leads H01R 11/00) [3]
- 1/067 • • • Measuring probes [3]
- 1/07 • • • • Non contact-making probes [6]
- 1/073 • • • • Multiple probes [3]
- 1/08 • • Pointers; Scales, Scale illumination
- 1/10 • • Arrangements of bearings
- 1/12 • • • of strip or wire bearings

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- 1/14 • • Braking arrangements; Damping arrangements
- 1/16 • • Magnets
- 1/18 • • Screening arrangements against electric or magnetic fields, e.g. against earth's field
- 1/20 • Modifications of basic electric elements for use in electric measuring instruments; Structural combinations of such elements with such instruments
- 1/22 • • Tong testers acting as secondary windings of current transformers (voltage or current isolation using transformers G01R 15/18)
- 1/24 • • Transmission-line, e.g. waveguide, measuring sections, e.g. slotted section
- 1/26 • • • with linear movement of probe
- 1/28 • Provision in measuring instruments for reference values, e.g. standard voltage, standard waveform
- 1/30 • Structural combination of electric measuring instruments with basic electronic circuits, e.g. with amplifier
- 1/36 • Overload-protection arrangements or circuits for electric measuring instruments
- 1/38 • Arrangements for altering the indicating characteristic, e.g. by modifying the air gap (circuits G01D 3/02)
- 1/40 • Modifications of instruments to indicate the maximum or the minimum value reached in a time interval, e.g. by maximum indicator pointer [3]
- 1/42 • • thermally operated
- 1/44 • Modifications of instruments for temperature compensation [2]

3/00 Apparatus or processes specially adapted for the manufacture of measuring instruments

5/00 Instruments for converting a single current or a single voltage into a mechanical displacement (vibration galvanometers G01R 9/02)

- 5/02 • Moving-coil instruments
- 5/04 • • with magnet external to the coil
- 5/06 • • with core magnet
- 5/08 • • specially adapted for wide angle deflection; with eccentrically-pivoted moving coil
- 5/10 • String galvanometers
- 5/12 • Loop galvanometers
- 5/14 • Moving-iron instruments
- 5/16 • • with pivoting magnet
- 5/18 • • with pivoting soft iron, e.g. needle galvanometer
- 5/20 • Induction instruments e.g. Ferraris instruments
- 5/22 • Thermoelectric instruments (measuring effective values of currents or voltages using thermoconverters G01R 19/03)
- 5/24 • • operated by elongation of a strip or wire or by expansion of a gas or fluid
- 5/26 • • operated by deformation of a bimetallic element
- 5/28 • Electrostatic instruments (combined with radiation detector G01T)
- 5/30 • • Leaf electrometers
- 5/32 • • Wire electrometers; Needle electrometers
- 5/34 • • Quadrant electrometers

7/00 Instruments capable of converting two or more currents or voltages into a single mechanical displacement (G01R 9/00 takes precedence)

- 7/02 • for forming a sum or a difference
- 7/04 • for forming a quotient (for measuring resistance G01R 27/08)
- 7/06 • • moving-iron type
- 7/08 • • moving-coil type, e.g. crossed-coil type

- 7/10 • • • having more than two moving coils
- 7/12 • for forming product
- 7/14 • • moving-iron type
- 7/16 • • having both fixed and moving coils, i.e. dynamometers
- 7/18 • • • with iron core magnetically coupling fixed and moving coils

9/00 Instruments employing mechanical resonance

- 9/02 • Vibration galvanometers, e.g. for measuring current
- 9/04 • using vibrating reeds, e.g. for measuring frequency
- 9/06 • • magnetically driven
- 9/08 • • piezo-electrically driven

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)

- 11/02 • Constructional details (applicable to electric measuring instruments in general G01R 1/00)
- 11/04 • • Housings; Supporting racks; Arrangements of terminals
- 11/06 • • Magnetic circuits of induction meters [2]
- 11/067 • • • Coils therefor [2]
- 11/073 • • • Armatures therefor [2]
- 11/09 • • • • Disc armatures [2]
- 11/10 • • Braking magnets; Damping arrangements
- 11/12 • • Arrangements of bearings
- 11/14 • • • with magnetic relief
- 11/16 • • Adaptations of counters to electricity meters
- 11/17 • • Compensating for errors; Adjusting or regulating means therefor [2]
- 11/18 • • • Compensating for variations in ambient conditions [2]
- 11/185 • • • • Temperature compensation [2]
- 11/19 • • • Compensating for errors caused by disturbing torque, e.g. rotating-field errors of polyphase meters [2]
- 11/20 • • • Compensating for phase errors in induction meters [2]
- 11/21 • • • Compensating for errors caused by damping effects of the current, e.g. adjustment in the overload range [2]
- 11/22 • • • Adjusting torque, e.g. adjusting starting torque, adjusting of polyphase meters for obtaining equal torques [2]
- 11/23 • • • Compensating for errors caused by friction, e.g. adjustment in the light-load range [2]
- 11/24 • • Arrangements for avoiding or indicating fraudulent use [4]
- 11/25 • • Arrangements for indicating or signalling faults [2, 4]

Note(s)

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

- 11/30 • Dynamo-electric motor meters
- 11/32 • • Watt-hour meters
- 11/34 • • Ampère-hour meters
- 11/36 • Induction meters, e.g. Ferraris meters (Ferraris instruments G01R 5/20)
- 11/38 • • for single-phase operation
- 11/40 • • for polyphase operation
- 11/42 • • • Circuitry therefor
- 11/46 • Electrically-operated clockwork meters; Oscillatory meters; Pendulum meters

- 11/48 • Meters specially adapted for measuring real or reactive components; Meters specially adapted for measuring apparent energy
- 11/50 • • for measuring real component
- 11/52 • • for measuring reactive component
- 11/54 • • for measuring simultaneously at least two of the following three variables: real component, reactive component, apparent energy
- 11/56 • Special tariff meters
- 11/57 • • Multi-rate meters (G01R 11/63 takes precedence) [2]
- 11/58 • • • Tariff-switching devices therefor [2]
- 11/60 • • Subtraction meters; Meters measuring maximum or minimum-load hours
- 11/63 • • Over-consumption meters, e.g. measuring consumption while a predetermined level of power is exceeded [2]
- 11/64 • • Maximum meters, e.g. tariff for a period is based on maximum demand within that period
- 11/66 • • • Circuitry
- 13/00 Arrangements for displaying electric variables or waveforms** (display by mechanical displacement only G01R 5/00, G01R 7/00, G01R 9/00; recording frequency spectrum G01R 23/18) [4]
- 13/02 • for displaying measured electric variables in digital form (counters G06M; analogue/digital conversion in general H03M 1/00) [4]
- 13/04 • for producing permanent records [4]
- 13/06 • • Modifications for recording transient disturbances, e.g. by starting or accelerating a recording medium
- 13/08 • • Electromechanical recording system using a mechanical direct-writing method
- 13/10 • • • with intermittent recording by representing the variable by the length of a stroke or by the position of a dot
- 13/12 • • Chemical recording, e.g. clydonographs (G01R 13/14 takes precedence)
- 13/14 • • Recording on a light-sensitive material
- 13/16 • • Recording on a magnetic medium
- 13/18 • • • using boundary displacement
- 13/20 • Cathode-ray oscilloscopes (cathode-ray tubes H01J 31/00)
- 13/22 • • Circuits therefor (circuits for generating pulses, e.g. sawtooth waveforms H03K 3/00)
- 13/24 • • • Time-base deflection circuits
- 13/26 • • • Circuits for controlling the intensity of the electron beam (brilliance control H01J 29/98)
- 13/28 • • • Circuits for simultaneous or sequential presentation of more than one variable (electronic switches H03K 17/00)
- 13/30 • • • Circuits for inserting reference markers, e.g. for timing, for calibrating, for frequency marking
- 13/32 • • • Circuits for displaying non-recurrent functions such as transients; Circuits for triggering; Circuits for synchronisation; Circuits for time-base expansion
- 13/34 • • • Circuits for representing a single waveform by sampling, e.g. for very high frequencies (sample-and-hold arrangements G11C 27/02) [2]
- 13/36 • using length of glow discharge, e.g. glowlight oscilloscopes (discharge tubes H01J) [4]
- 13/38 • using the steady or oscillatory displacement of a light beam by an electromechanical measuring system (such measuring systems per se G01R 5/00, G01R 7/00, G01R 9/00) [4]
- 13/40 • using modulation of a light beam otherwise than by mechanical displacement, e.g. by Kerr effect [4]
- 13/42 • Instruments using length of spark discharge, e.g. by measuring maximum separation of electrodes to produce spark
- 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 and G01R 35/00** (details of instruments G01R 1/00; measuring leads, measuring probes G01R 1/06; overload protection arrangements G01R 1/36; circuits for correcting the transfer function G01D 3/02) [1, 2006.01]
- 15/04 • Voltage dividers [6]
- 15/06 • • having reactive components, e.g. capacitive transformer [6]
- 15/08 • Circuits for altering the measuring range
- 15/09 • • Autoranging circuits [6]
- 15/12 • Circuits for multi-testers, e.g. for measuring voltage, current, or impedance at will
- 15/14 • Adaptations providing voltage or current isolation, e.g. for high-voltage or high-current networks (voltage dividers G01R 15/04) [6]
- 15/16 • • using capacitive devices [6]
- 15/18 • • using inductive devices, e.g. transformers [6]
- 15/20 • • using galvano-magnetic devices, e.g. Hall-effect devices [6]
- 15/22 • • using light-emitting devices, e.g. LED, optocouplers [6]
- 15/24 • • using light-modulating devices [6]
- 15/26 • • using modulation of waves other than light, e.g. radio or acoustic waves [6]
- 17/00 Measuring arrangements involving comparison with a reference value, e.g. bridge**
- 17/02 • Arrangements in which the value to be measured is automatically compared with a reference value
- 17/04 • • in which the reference value is continuously or periodically swept over the range of values to be measured
- 17/06 • • Automatic balancing arrangements
- 17/08 • • • in which a force or torque representing the measured value is balanced by a force or torque representing the reference value
- 17/10 • ac or dc measuring bridges (automatic comparison or re-balancing arrangements G01R 17/02)
- 17/12 • • using comparison of currents, e.g. bridges with differential current output
- 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)
- 17/16 • • with discharge tubes or semiconductor devices in one or more arms of the bridge, e.g. voltmeter using a difference amplifier
- 17/18 • • with more than four branches
- 17/20 • ac or dc potentiometric measuring arrangements (automatic comparison or re-balancing arrangements G01R 17/02)
- 17/22 • • with indication of measured value by calibrated null indicator
- 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 5/04) [4]

Note(s)

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
- 19/03 • • using thermoconverters [4]
- 19/04 • Measuring peak values of ac or of pulses [2]
- 19/06 • Measuring real component; Measuring reactive component
- 19/08 • Measuring current density
- 19/10 • Measuring sum, difference, or ratio
- 19/12 • Measuring rate of change
- 19/14 • Indicating direction of current; Indicating polarity of voltage
- 19/145 • Indicating the presence of current or voltage [3]
- 19/15 • • Indicating the presence of current [3]
- 19/155 • • Indicating the presence of voltage [3]
- 19/165 • Indicating that current or voltage is either above or below a predetermined value or within or outside a predetermined range of values (circuits with regenerative action, e.g. Schmitt trigger H03K 3/00; threshold switches H03K 17/00) [3]
- 19/17 • • giving an indication of the number of times this occurs [3]
- 19/175 • Indicating the instants of passage of current or voltage through a given value, e.g. passage through zero [3]
- 19/18 • using conversion of dc into ac, e.g. with choppers
- 19/20 • • using transducers
- 19/22 • using conversion of ac into dc
- 19/25 • using digital measurement techniques (arrangements for displaying measured electric variables in digital form G01R 13/02) [3]
- 19/252 • • using analogue/digital converters of the type with conversion of voltage or current into frequency and measuring of this frequency [4]
- 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]
- 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]
- 19/28 • adapted for measuring in circuits having distributed constants
- 19/30 • Measuring the maximum or the minimum value of current or voltage reached in a time interval (G01R 19/04 takes precedence; modifications of instruments to indicate the maximum or the minimum value reached in a time interval G01R 1/40) [2, 3]
- 19/32 • Compensating for temperature change (modifications of instruments for temperature compensation G01R 1/44) [2]
- 21/00 Arrangements for measuring electric power or power factor (G01R 7/12 takes precedence) [4]**
- 21/01 • in circuits having distributed constants (G01R 21/04, G01R 21/07, G01R 21/09, G01R 21/12 take precedence) [2]
- 21/02 • by thermal methods [2]
- 21/04 • • in circuits having distributed constants
- 21/06 • by measuring current and voltage (G01R 21/08-G01R 21/133 take precedence) [4]

- 21/07 • • in circuits having distributed constants (G01R 21/09 takes precedence) [2]
- 21/08 • by using galvanomagnetic-effect devices, e.g. Hall-effect devices (such devices *per se* H01L) [2]
- 21/09 • • in circuits having distributed constants [2]
- 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) [2]
- 21/12 • • in circuits having distributed constants
- 21/127 • by using pulse modulation (G01R 21/133 takes precedence) [4]
- 21/133 • by using digital technique [4]
- 21/14 • Compensating for temperature change [2]
- 22/00 Arrangements for measuring time integral of electric power or current, e.g. electricity meters** (electromechanical arrangements therefor G01R 11/00; monitoring electric consumption of electrically-propelled vehicles B60L 3/00) [4, 2006.01]
- Note(s)**
- 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]
- 22/04 • by calorimetric methods [4]
- 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** (frequency discriminators H03D)
- 23/02 • Arrangements for measuring frequency, e.g. pulse repetition rate; Arrangements for measuring period of current or voltage (measuring short time intervals G04F)
- 23/04 • • adapted for measuring in circuits having distributed constants
- 23/06 • • by converting frequency into an amplitude of current or voltage
- 23/07 • • • using response of circuits tuned on resonance, e.g. grid-drip meter [2]
- 23/08 • • • using response of circuits tuned off resonance
- 23/09 • • • using analogue integrators, e.g. capacitors establishing a mean value by balance of input signals and defined discharge signals or leakage (radiation-measuring instruments in which pulses generated by a radiation detector are integrated G01T 1/15) [2]
- 23/10 • • by converting frequency into a train of pulses, which are then counted
- 23/12 • • by converting frequency into phase shift
- 23/14 • • by heterodyning; by beat-frequency comparison (generation of oscillations by beating unmodulated signals of different frequencies H03B 21/00) [2]
- 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]
- 23/16 • Spectrum analysis; Fourier analysis
- 23/163 • • adapted for measuring in circuits having distributed constants [3]
- 23/165 • • using filters [3]
- 23/167 • • • with digital filters [3]
- 23/17 • • with optical auxiliary devices [3]

- 23/173 • • Wobblulating devices similar to swept panoramic receivers (panoramic receivers per se H03J 7/32) [3]
- 23/175 • • by delay means, e.g. tapped delay lines [3]
- 23/177 • • Analysis of very low frequencies [3]
- 23/18 • • with provision for recording frequency spectrum
- 23/20 • • Measurement of non-linear distortion
- 25/00 Arrangements for measuring phase angle between a voltage and a current or between voltages or currents** (measuring power factor G01R 21/00; measuring position of individual pulses in a pulse train G01R 29/02; phase discriminators H03D) [2]
- 25/02 • in circuits having distributed constants
- 25/04 • involving adjustment of a phase shifter to produce a predetermined phase difference, e.g. zero difference
- 25/06 • employing quotient instrument
- 25/08 • by counting of standard pulses (measuring time intervals G04F) [2]
- 27/00 Arrangements for measuring resistance, reactance, impedance, or electric characteristics derived therefrom**
- 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)
- 27/04 • • in circuits having distributed constants
- 27/06 • • • Measuring reflection coefficients; Measuring standing-wave ratio
- 27/08 • • Measuring resistance by measuring both voltage and current
- 27/10 • • • using two-coil or crossed-coil instruments forming quotient
- 27/12 • • • • using hand generators, e.g. meggers
- 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)
- 27/16 • • Measuring impedance of element or network through which a current is passing from another source, e.g. cable, power line
- 27/18 • • • Measuring resistance to earth
- 27/20 • • Measuring earth resistance; Measuring contact resistance of earth connections, e.g. plates
- 27/22 • • Measuring resistance of fluids (measuring vessels, electrodes therefor G01N 27/07)
- 27/26 • • Measuring inductance or capacitance; Measuring quality factor, e.g. by using the resonance method; Measuring loss factor; Measuring dielectric constants
- 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)
- 27/30 • • with provision for recording characteristics, e.g. by plotting Nyquist diagram
- 27/32 • • in circuits having distributed constants [2]
- 29/00 Arrangements for measuring or indicating electric quantities not covered by groups G01R 19/00-G01R 27/00**
- 29/02 • Measuring characteristics of individual pulses, e.g. deviation from pulse flatness, rise time, duration (of amplitude G01R 19/00; of repetition rate G01R 23/00; of phase difference of two cyclic pulse trains G01R 25/00; monitoring pattern of pulse trains H03K 5/19) [3]
- 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]
- 29/033 • • • giving an indication of the number of times this occurs [3]
- 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
- 29/06 • Measuring depth of modulation
- 29/08 • Measuring electromagnetic field characteristics
- 29/10 • • Radiation diagrams of aerials
- 29/12 • Measuring electrostatic fields
- 29/14 • • Measuring field distribution
- 29/16 • Measuring asymmetry of polyphase networks
- 29/18 • Indicating phase sequence; Indicating synchronism
- 29/20 • Measuring number of turns; Measuring transformation ratio or coupling factor of windings (calibrating instrument transformers G01R 35/02)
- 29/22 • Measuring piezo-electric properties
- 29/24 • Arrangements for measuring quantities of charge (electrostatic instruments G01R 5/28; indicating presence of current G01R 19/15; arrangements for measuring time integral of electric power or current G01R 22/00) [2]
- 29/26 • Measuring noise figure; Measuring signal-to-noise ratio [2]
- 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** (measuring leads, measuring probes G01R 1/06; indicating electrical condition of switchgear or protective devices H01H 71/04, H01H 73/12, H02B 11/10, H02H 3/04; testing or measuring semiconductors or solid state devices during manufacture H01L 21/66; testing line transmission systems H04B 3/46)
- 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 (G01R 31/18 takes precedence) [6]
- 31/02 • Testing of electric apparatus, lines, or components for short-circuits, discontinuities, leakage, or incorrect line connection
- 31/04 • • Testing connections, e.g. of plugs, of non-disconnectable joints
- 31/06 • • Testing of electric windings, e.g. for polarity (measuring number of turns, transformation ratio, or coupling factor G01R 29/20)
- 31/07 • • Testing of fuses (means for indicating condition of fuse structurally associated with the fuse H01H 85/30) [6]
- 31/08 • Locating faults in cables, transmission lines, or networks (emergency protective circuit arrangements H02H)
- 31/10 • • by increasing destruction at fault, e.g. burning-in by using a pulse generator operating a special programme
- 31/11 • • using pulse-reflection methods
- 31/12 • Testing dielectric strength or breakdown voltage
- 31/14 • • Circuits therefor
- 31/16 • • Construction of testing vessels; Electrodes therefor
- 31/18 • • Subjecting similar articles in turn to test, e.g. "go/no-go" tests in mass production
- 31/20 • • Preparation of articles or specimens to facilitate testing

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- 31/24 • Testing of discharge tubes (during manufacture H01J 9/42) [2]
- 31/25 • • Testing of vacuum tubes [2]
- 31/26 • Testing of individual semiconductor devices (measurement of impurity content of materials G01N) [2]
- 31/265 • • Contactless testing [6]
- 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]
- 31/28 • Testing of electronic circuits, e.g. by signal tracer (testing for short-circuits, discontinuities, leakage or incorrect line connection G01R 31/02; checking computers G06F 11/00; checking static stores for correct operation or testing static stores during standby or offline operation G11C 29/00)
- 31/30 • • Marginal testing, e.g. by varying supply voltage (marginal testing of computers G06) [2]
- 31/302 • • Contactless testing (non contact-making probes G01R 1/07) [5]
- 31/303 • • • of integrated circuits (G01R 31/305-G01R 31/315 take precedence) [6]
- 31/304 • • • of printed or hybrid circuits (G01R 31/305-G01R 31/315 take precedence) [6]
- 31/305 • • • using electron beams [5]
- 31/306 • • • • of printed or hybrid circuits [6]
- 31/307 • • • • of integrated circuits [6]
- 31/308 • • • using non-ionising electromagnetic radiation, e.g. optical radiation [5]
- 31/309 • • • • of printed or hybrid circuits [6]
- 31/311 • • • • of integrated circuits [6]
- 31/312 • • • by capacitive methods [5]
- 31/315 • • • by inductive methods [5]
- 31/316 • • Testing of analog circuits [6]
- 31/3161 • • • Marginal testing [6]
- 31/3163 • • • Functional testing [6]
- 31/3167 • • Testing of combined analog and digital circuits [6]
- 31/317 • • Testing of digital circuits [6]
- 31/3173 • • • Marginal testing [6]
- 31/3177 • • • Testing of logic operation, e.g. by logic analysers [6]
- 31/3181 • • • Functional testing (G01R 31/3177 takes precedence) [6]
- 31/3183 • • • • Generation of test inputs, e.g. test vectors, patterns or sequences [6]
- 31/3185 • • • • Reconfiguring for testing, e.g. LSSD, partitioning [6]
- 31/3187 • • • • Built-in tests [6]
- 31/319 • • • • Tester hardware, i.e. output processing circuits [6]
- 31/3193 • • • • • with comparison between actual response and known fault-free response [6]
- 31/327 • Testing of circuit interrupters, switches or circuit-breakers (structural association with switches H01H) [6]
- 31/333 • • Testing of the switching capacity of high-voltage circuit-breakers (means for detecting the presence of an arc or discharge in switching devices H01H 9/50, H01H 33/26) [6]
- 31/34 • Testing dynamo-electric machines (testing electric windings G01R 31/06; methods or apparatus specially adapted for manufacturing, assembling, maintaining or repairing dynamo-electric machines H02K 15/00) [3]

- 31/36 • Apparatus for testing electrical condition of accumulators or electric batteries, e.g. capacity or charge condition (accumulators combined with arrangements for measuring, testing or indicating condition H01M 10/48; circuit arrangements for charging, or depolarising batteries or for supplying loads from batteries H02J 7/00) [3]
- 31/40 • Testing power supplies [6]
- 31/42 • • AC power supplies [6]
- 31/44 • Testing lamps (discharge lamps G01R 31/24; structurally associated with light source circuit arrangements for detecting lamp failure H05B 37/03) [6]

33/00 Arrangements or instruments for measuring magnetic variables

- 33/02 • Measuring direction or magnitude of magnetic fields or magnetic flux (G01R 33/20 takes precedence; measuring direction or magnitude of the earth's field for navigation or surveying G01C; for prospecting, for measuring the magnetic field of the earth G01V 3/00) [4]
- 33/022 • • Measuring gradient [3]

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]
- 33/028 • • Electrodynamic magnetometers [3]
- 33/032 • • using magneto-optic devices, e.g. Faraday [3]
- 33/035 • • using superconductive devices [3]
- 33/038 • • using permanent magnets, e.g. balances, torsion devices [3]
- 33/04 • • using the flux-gate principle
- 33/05 • • • in thin-film element [3]
- 33/06 • • using galvano-magnetic devices
- 33/07 • • • Hall-effect devices [6]
- 33/09 • • • Magneto-resistive devices [6]
- 33/10 • • Plotting field distribution
- 33/12 • Measuring magnetic properties of articles or specimens of solids or fluids (involving magnetic resonance G01R 33/20) [4]
- 33/14 • • Measuring or plotting hysteresis curves
- 33/16 • • Measuring susceptibility
- 33/18 • • Measuring magnetostrictive properties
- 33/20 • involving magnetic resonance (medical aspects A61B 5/055; magnetic resonance gyrometers G01C 19/60) [4, 5]
- 33/24 • • for measuring direction or magnitude of magnetic fields or magnetic flux [4]
- 33/26 • • • using optical pumping [4]
- 33/28 • • Details of apparatus provided for in groups G01R 33/44-G01R 33/64 [5]
- 33/30 • • • Sample handling arrangements, e.g. sample cells, spinning mechanisms [5]
- 33/31 • • • • Temperature control thereof [6]
- 33/32 • • • Excitation or detection systems, e.g. using radiofrequency signals [5]
- 33/34 • • • • Constructional details, e.g. resonators [5]
- 33/341 • • • • comprising surface coils [6]
- 33/3415 • • • • • comprising arrays of sub-coils [6]
- 33/343 • • • • of slotted-tube or loop-gap type [6]
- 33/345 • • • • of waveguide type (G01R 33/343 takes precedence) [6]
- 33/36 • • • • Electrical details, e.g. matching or coupling of the coil to the receiver [5]

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

Note(s)

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

- 33/381 • • • • using electromagnets (electromagnets per se H01F 7/06) [6]
- 33/3815 • • • • • with superconducting coils, e.g. power supply therefor (superconductive magnets H01F 6/00) [6]
- 33/383 • • • • using permanent magnets (permanent magnets per se H01F 7/02) [6]
- 33/385 • • • • using gradient magnetic field coils [6]
- 33/387 • • • • Compensation of inhomogeneities (screening G01R 33/42) [6]
- 33/3873 • • • • • using ferromagnetic bodies [6]
- 33/3875 • • • • • using correction coil assemblies, e.g. active shimming [6]
- 33/389 • • • • Field stabilisation [6]
- 33/42 • • • Screening (screening in general H05K 9/00) [5, 6]
- 33/421 • • • • of main or gradient magnetic field [6]
- 33/422 • • • • of the radiofrequency field [6]
- 33/44 • • using nuclear magnetic resonance (NMR) (G01R 33/24, G01R 33/62 take precedence) [5]
- 33/46 • • • NMR spectroscopy [5]
- 33/465 • • • • applied to biological material, e.g. in vitro testing [6]
- 33/48 • • • NMR imaging systems [5]
- 33/483 • • • • with selection of signal or spectra from particular regions of the volume, e.g. in vivo spectroscopy [6]

- 33/485 • • • • • based on chemical shift information [6]
- 33/50 • • • • based on the determination of relaxation times [5]
- 33/54 • • • • Signal processing systems, e.g. using pulse sequences [5]
- 33/56 • • • • • Image enhancement or correction, e.g. subtraction or averaging techniques [5]
- 33/561 • • • • • • by reduction of the scanning time, i.e. fast acquiring systems, e.g. using echo-planar pulse sequences [6]
- 33/563 • • • • • • of moving material, e.g. flow-contrast angiography [6]
- 33/565 • • • • • • Correction of image distortions, e.g. due to magnetic field inhomogeneities [6]
- 33/567 • • • • • • gated by physiological signals [6]
- 33/58 • • • • Calibration of imaging systems, e.g. using test probes [5]
- 33/60 • • using electron paramagnetic resonance (G01R 33/24, G01R 33/62 take precedence) [5]
- 33/62 • • using double resonance (G01R 33/24 takes precedence) [5]
- 33/64 • • using cyclotron resonance (G01R 33/24 takes precedence) [5]
- 35/00 Testing or calibrating of apparatus covered by the other groups of this subclass [2]**
- 35/02 • of auxiliary devices, e.g. of instrument transformers according to prescribed transformation ratio, phase angle, or wattage rating
- 35/04 • of instruments for measuring time integral of power or current
- 35/06 • • by stroboscopic methods