G01J

MEASUREMENT OF INTENSITY, VELOCITY, SPECTRAL CONTENT, POLARISATION, PHASE OR PULSE CHARACTERISTICS OF INFRARED, VISIBLE OR ULTRAVIOLET LIGHT; COLORIMETRY; RADIATION PYROMETRY (light sources F21, H01J, H01K, H05B; investigating properties of materials by optical means G01N)

Definition statement

This place covers:

Apparatus or methods for measuring properties of infrared, visible, or ultraviolet light, for the purpose of:

- Photometry not otherwise provided for (G01J 1/00)
- Spectrometers and spectroscopy per se : measurement of the spectral content of incident light and spectroscopic methods used in this process (G01J 3/00)
- Colorimetry per se (G01J 3/00)
- Measurement of temperature by optical means (remote detection of infrared radiation, non-contact) (G01J 5/00)
- Polarimeters and polarimetry per se : passive measurement of the state of polarisation of incident light (G01J 4/00)
- Measurement of the velocity of light (G01J 7/00)
- Measurement of optical phase differences : wavefront and coherence measurements (G01J 9/00)
- Measurement of the wavelength of incident light (G01J 9/00)
- Measurement of the characteristics of ultrashort pulses (G01J 11/00)

Relationships with other classification places

G01J relates in general to the passive optical detection per se of the quantities referred to in the Definition Statement. Measuring arrangements having a configuration dictated by the particular type of sample being investigated (for example spectrophotometer units adapted to scan articles spread over the whole width of a conveyor belt), as well as the corresponding methods, are a subject-matter to be found and classified in the corresponding (application-related) fields.

Optical arrangements occur in many areas of technology. To avoid unnecessary double classification, optical systems and instruments for which specific entries exist elsewhere (for example interferometers, gas analyzers or optical elements per se) are not generally given a secondary class in G01J. Exceptionally, where a feature of general interest for G01J is disclosed, such a secondary class may be given.

References

Limiting references

This place does not cover:

Non-optical measurement of temperature	G01K
Gas analyzers	G01N 21/00
Ellipsometry	G01N 21/00
Sample holders or sample preparations leading to an enhanced detection, e.g. SERS substrates	G01N 21/00
Stabilization of the wavelength of a laser by means of a feedback loop, without numerical determination of said wavelength	H01S 5/0687

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Measuring length, thickness or similar linear dimensions by optical means; Instruments therefor	G01B 11/00, G01B 9/00
Investigating or analysing materials by optical means	G01N 21/00
Prospecting or detecting by optical means	G01V 8/00
Controlling or varying light intensity, spectral composition or exposure time in photographic printing apparatus	G03B 27/72
Exposure in photomechanical, e.g. photolithographic, production of textured or patterned surfaces, e.g. printing surfaces	G03F 7/20

Informative references

Attention is drawn to the following places, which may be of interest for search:

Apparatus for testing or examining the human eyes	A61B 3/00
Colour determination, selection, or synthesis in painting or artistic drawing, e.g. use of colour tables	B44D 3/00
Light sources	F21
Indicating or recording measured values in general	G01D
Testing of optical apparatus	G01M 11/00
Sunshine-duration recorders	G01W 1/12
Optical elements, systems or apparatus	G02B
Interference filters, gratings, lenses, etc. per se	G02B
Control of light by devices or arrangements the optical operation thereof is modified by changing the optical properties of the medium of the devices or arrangements	G02F 1/00
Control of light in general	G05D 25/00
Mass spectrometry	H01J 49/00
Discharge lamps	H01J 61/00, H01J 63/00, H01J 65/00
Electric incandescent lamps	H01K
Lasers	H01S 3/00, H01S 5/00
Electric arc lamps	H05B 31/00
Electroluminescent light sources	H05B 33/00
Semiconductor devices sensitive to radiation	H10F, H10K 30/00, H10K 39/00
Semiconductor devices for light emission, e.g. LEDs	H10H, H10K 50/00
Thermoelectric elements per se	H10N 10/00, H10N 15/00

Special rules of classification

G01J comprises Indexing Codes corresponding to EC classes and Indexing Codes corresponding to finer subdivisions of EC classes. Generally speaking, the classification policy in G01J is to allocate all relevant EC classes and make a correspondingly limited use of Indexing Codes (by opposition to

policies in some other fields, where for example a single EC class is given and all other aspects are allocated in the form of Indexing Codes). The limited use of the Indexing Codes in G01J is defined as follows:

The Indexing Codes corresponding to EC classes (e.g. G01J 1/04, corresponding to EC class G01J 1/04) should be given to a document which should not have an EC class in G01J (because it relates primarily to another field) but which describes a side aspect of potential relevance for the subject-matter of the corresponding group (e.g. G01J 1/04).

Of the Indexing Codes corresponding to finer subdivisions of EC classes, only a limited number is used, because the classification practice has shown that not all of these Indexing Codes are necessary and that a danger of loosing in classification consistency exists, due to potential overlaps between these groups. A list of the Indexing Codes (corresponding to finer subdivisions of EC classes) to be used is appended under the headers of each section below (G01J 1/00, G01J 3/00, etc.).

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Optical	concerning light with wavelengths in the infrared, visible and ultraviolet domains
UV	Ultraviolet
Vis	Visible
NIR	Near Infrared

G01J 1/00

Photometry, e.g. photographic exposure meter (spectrophotometry G01J 3/00; specially adapted for radiation pyrometry G01J 5/00 {; exposure meters built in cameras G03B 17/06})

Definition statement

This place covers:

Photometry per se, photodetection principles, solar radiance measurements,

goniophotometry, aspects of integrating sphere measurement theory, standard sources for perfoming photometry; e.g. relating to exposure meters, scalar irradiance meters, directionally sensitive photodetectors, sunshine monitors, laser power meters, illuminometers, standard flashing lights, domestic lighting measurements, measurement of street lighting.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Spectrophotometry	G01J 3/00
Specially adapted for radiation pyrometry	G01J 5/00
Medical goniometers	A61B 5/1071
Solar simulators	F21V 13/08, F21S 8/006
Investigating biological material (sunscreen on skin)	G01N 33/5088
Meteorology/sun light	G01W 1/12
For the control of intensity, phase, colour of light	G05D 25/00

Special rules of classification

In G01J 1/00, the list of Indexing Codes corresponding to finer subdivisions of EC classes and being in use is the following:

G01J 2001/0276

G01J 2001/028

G01J 2001/0285

G01J 2001/0481

G01J 2001/0485

G01J 1/0488

G01J 1/0492

G01J 2001/4238

G01J 2001/4242

G01J 2001/4247

G01J 2001/4261

G01J 2001/4266

G01J 2001/4406

G01J 2001/442

G01J 2001/4426

G01J 2001/4433

G01J 2001/444

These Indexing Codes therefore belong to the list of codes which must be considered for use during classification.

The further remaining Indexing Codes, not appearing in this list above, optionally may be considered as well, but these additional codes, being only optional, cannot be considered as a reliable help for search, because they are not complete.

Indexing Code G01J 2001/4242 is used for classifying the aspect of synchronous detection for all apparatuses of G01J.

G01J 1/02

Details

Definition statement

This place covers:

Optical or mechanical details specific to photometry, e.g. relating to removing stray light, photometer field of view determination, pointing of a photometer, housings, user interfaces or display arrangements

G01J 1/04

Optical or mechanical part {supplementary adjustable parts}

Definition statement

This place covers:

Optical or mechanical details of photometers. Optical concentrators, deflectors, attenuators, conical light guides, corrugated diffusers.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Reflective baffles	G01J 1/0214
Integrating spheres	G01J 2001/0481
Filters, filter glasses	G01J 1/0488
Solar radiation detectors for controlling air-conditioning of a car	B60H 1/0075
Solar radiation detectors for controlling protective blades or dimming	E06B 9/32, H05B 39/04, G05D 25/02
Burglar alarms	G08B 13/00, G01J 5/20

G01J 1/06

Restricting the angle of incident light

Definition statement

This place covers:

Photometers having elements positioned in front of the detector for restricting the angle of incident light.

G01J 1/08

Arrangements of light sources specially adapted for photometry {standard sources, also using luminescent or radioactive material}

Definition statement

This place covers:

Standard light sources, e.g. relating to deuterium lamps, argon arc, tungsten filaments.

Calibration of photodetectors using these standard sources, e.g. relating to a model sky for calibration and testing, or comparison sources built in photometers for calibrating the latter.

References

Limiting references

This place does not cover:

Arrangements of light sources specially adapted for spectrometry - explicitly presented as used for performing spectroscopic or colorimetric analysis	G01J 3/10

Deuterium lamps as such (details about their constitutive elements)	H01J 61/00

Special rules of classification

The "arrangements of light sources" are not necessarily for calibration. This group covers documents referring to photometric devices making use of a light source, wherein details of the light source are an important part of the disclosure (for example the way the source itself is built). This is independent from any consideration as to calibration.

In addition, documents referring to the calibration of a light sensor by means of light sources which are able to impinge the detector with known and predetermined amounts of light. These light sources used for calibrating light sensors are particular light sources, and therefore are classified in this group too.

G01J 1/16

using electric radiation detectors (G01J 1/20 takes precedence)

Definition statement

This place covers:

Photometers based on a comparison of a value measured through electric radiation detectors with reference light or a reference electric value, e.g. relating to signal processing details, lock in amplifiers, ratio forming circuits, automatic gain control for compensation.

References

Limiting references

This place does not cover:

Intensity of the measured or reference value being varied to equalise their effects at the detectors	G01J 1/20
Synchronous detection	G01J 2001/4242
Processing details for spectrometers	G01J 3/28

G01J 1/1626

{Arrangements with two photodetectors, the signals of which are compared}

Definition statement

This place covers:

Photometers, light meters, or the like, in which a second detector is used for correction, compensation, or the like.

Series connected pairs of photodiodes, or the like. Differential photometers, ratiometric photometers. AGC (automatic gain control). Automatic exposure control.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Arrangements with two or more detectors, e.g. for sensitivity compensation	G01J 1/4228

G01J 1/18

using comparison with a reference electric value

Definition statement

This place covers:

Compensation for drift of photometers by comparison with standard light sources, voltages, etc. Compensation for dirty lenses, temperature compensation.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Compensation of spectrometers	G01J 3/28

G01J 1/22

using a variable element in the light-path, e.g. filter, polarising means (G01J 1/34 takes precedence)

Definition statement

This place covers:

Photometers having means for varying the intensity of a measured or a reference value in order to equalise their effects at the detectors, and wherein said means is a variable element positioned in the light path; e.g. relating to

Visual photometers in which the field of view is split to allow comparison with a standard source and which use grey wedges, adjustable slits or diaphragms, or polarisation filters which swing into the line of sight.

Printed scales for light meters.

Photographic exposure meters, graduated neutral density wedges.

Spinning sectored discs.

Polarisation photometers.

Relationships with other classification places

In G01J 4/00(polarization measurement), a modulating polarizer/analyzer is often inserted between the incoming light and the detector during the measurement process. The difference with the present group however is that in G01J 4/00 measurements are simply made in order to determine the polarization and are usually not compared to a reference light or electric value, as required in G01J 1/22 (subgroup of G01J 1/10).

References

Limiting references

This place does not cover:

Using separate light paths used alternately or sequentially, e.g. flicker	G01J 1/34

Informative references

Attention is drawn to the following places, which may be of interest for search:

Polarizing means inserted in the light path	G01J 1/0429

G01J 1/26

adapted for automatic variation of the measured or reference value (regulation of light intensity G05D 25/00)

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

For optical protection (optical limiters)Indexing Code	G01J 2001/0276
Regulation of light intensity	G05D 25/00

G01J 1/32

adapted for automatic variation of the measured or reference value (regulation of light intensity G05D 25/00)

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Regulation of light intensity	G05D 25/00
Feedback loops in optical heads for recording or reproducing	G11B 7/125
For controlling light sources like LEDs	H05B 33/00, H05B 47/00

G01J 1/34

using separate light paths used alternately or sequentially, e.g. flicker

Definition statement

This place covers:

Comparative photometers in which two different light paths or light types impinge alternately (sequentially) the eye of an observer. Comparison with standard sources are an example.

Chopper wheels, tuned fork choppers, light dividers, hinged mirrors, nutating mirrors, rotating polygonal mirrors, wheels carrying polarisation filters or colour filters.

Polarisation photometers with flicker effect, with or without a sample, should have a class in G01J 1/34.

Examples of flicker photometer : FR878647, US5936724.

Rotating polygonal mirrors : DE1239870).

Wheels carrying polarisation filters : US2450761.

Wheels carrying colour filters : US2394508.

Visual determination of colour differences by flickering, using colour filters : US2394508.

References

Limiting references

This place does not cover:

Flickering phenomena due to the behaviour of a sample, e.g. GB2261944	G01N 21/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Beam switching arrangements	G01J 3/08
Photometers having particular monochromator arrangements	G01J 3/12, G01J 3/14
Polarisation photometers with sample but without flicker effect	G01N 21/21

G01J 1/36

using electric radiation detectors

Definition statement

This place covers:

Comparative photometers in which two different light paths or light types impinge alternately (sequentially) on electric radiation detectors.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Beam switching arrangements	G01J 3/08

G01J 1/42

using electric radiation detectors (optical or mechanical part G01J 1/04; by comparison with a reference light or electric value G01J 1/10)

Definition statement

This place covers:

All aspects of photometers related to the electric radiation detector(s) itself, e.g. photon counters, particular photodiode types for IR astronomy, position sensitive detectors (PSD), solarimetry, power meters, measurement of light intensity of street lighting, integrating photometers for pulsed sources, sunlight dosimeters.

References

Limiting references

This place does not cover:

Optical or mechanical part of electric radiation detectors	G01J 1/04

Using electric radiation detectors by comparison with a reference light or electric value	G01J 1/10

Informative references

Attention is drawn to the following places, which may be of interest for search:

Regulation of detector's gain by automatic gain control	G01J 1/16, G01J 1/1626, G01J 1/18, G01J 1/44
Control systems for motor vehicles (for the headlamps or air-conditioning), with solar radiation as input	B60H 1/0075, B60Q 1/14

G01J 1/4228

{arrangements with two or more detectors, e.g. for sensitivity compensation}

Definition statement

This place covers:

Photometers, light meters, etc, in which a second detector is used for correction, compensation, etc. Series connected pairs of photodiodes, etc. Photometers using photodetector arrays. Temperature compensation. Background compensation. Linearisation.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Arrangements with two photodetectors, the signals of which are compared	G01J 1/1626
Temperature compensation	G01J 1/18
Pyrometry using multiple wavelengths detection	G01J 5/60

G01J 1/4257

{applied to monitoring the characteristics of a beam, e.g. laser beam, headlamp beam (monitoring arrangements for lasers in general H01S 3/0014)}

Definition statement

This place covers:

Intensity distribution of laser beams, monitoring the characteristics of laser beams. Laser power measurements. Spot size. Beam waist. Sampling of high energy laser beams.

Characteristics of a beam include power, power repartition or energy density within a cross section of the beam (near-field and far-field energy patterns), size of a cross section of the beam (spot size, beam waist, focus position, waist radius), divergence, quality of a laser beam and position of the beam (by means of electrical detectors (position sensitive detectors, quadrant detectors, etc.)).

References

Limiting references

This place does not cover:

Polarization detection of the beam	G01J 4/00
Wavelength, phase, wavefront and coherence detection	G01J 9/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Cards to be held manually for detecting spot position of an infrared laser beam	G01J 1/58
Shaping the laser beam	B23K 26/06, G02B 27/09
Detection of the power of a laser by calorimetry	G01K 7/00
Monitoring arrangements for lasers in general, e.g. laser power measurement	H01S 3/0014

G01J 1/429

{applied to measurement of ultraviolet light (using counting tubes G01T)}

Definition statement

This place covers:

All aspects related to the use of electric radiation detectors specific to photometry and applied to measurement of ultraviolet light, e.g. for measuring UV radiation from flames, sun lamps, sterilisation plant, or UV lasers.

Typical examples of subject matter covered by the scope of this subgroup are exposure meters for UV microlithography, UV CCDs for astronomy or weapons tracking, sunburn monitors (using electronic detectors), UV dosimetry, UV fire alarms.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Radiation therapy	A61N 5/0616, A61N 5/0617 and A61N 5/0624
Resistance of materials to light	G01N 17/004
Using counting tubes	G01T
Dose control for microlithography apparatuses	G03F 7/70558

G01J 1/44

Electric circuits {(for command of an exposure part G03B 7/02)}

Definition statement

This place covers:

All aspects of photometers using electric radiation detectors relating to electrical circuits, e.g. relating to circuits for photodiodes or photoresistors, avalanche photodiode quenching, temperature compensation, signal amplification, noise removal, signal storage, signal transfer, pulse circuits, background removal, autoranging.

References

Limiting references

This place does not cover:

Electric circuits for command of an exposure part	G03B 7/02

Informative references

Attention is drawn to the following places, which may be of interest for search:

Light pulse detection	G01J 11/00
Avalanche photodiode quenching with fast switching	H03K 17/0416, H03K 17/74, H10D 18/00
Readout of pixel arrays or photodiode arrays	H04N 5/00

G01J 1/46

using a capacitor

Definition statement

This place covers:

Photometer circuits with capacitor for integration or for generating pulse modulated signal/digital output.

Light meters for pulsed sources, e.g. lasers. Integrating photometers. Digital exposure meters.

Example: Measurement of very low light levels : WO9900649

G01J 1/50

using change in colour of an indicator, e.g. actinometer

Definition statement

This place covers:

Photometric devices using chemical effects, wherein a change in colour of an indicator indicates the amount of received light, e.g.relating to actinometers, sunburn dosimeters,

exposure meters for photography.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Organic tenebrescent materials	C09K 9/02

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Actinometer	A radiometric instrument used chiefly for meteorological measurements of terrestrial and solar radiation.

G01J 1/58

using luminescence generated by light

Definition statement

This place covers:

Devices using fluorescence (transfer of UV light to visible light) for measuring the intensity of incoming light (use of visible detectors).

Measuring intensity of UV radiation. Flame detectors. Laser warning devices. Indicator cards for UV radiation.

Suntan gauge.

UV integrating sphere, coated with fluorescent material.

Testing of phosphors.

Actinometry.

Fibre optic UV sensing.

Example: Optical crystal which receives a narrow band visible light from a source and infrared light from a sample (light containing infrared absorption spectrum information of the sample), and transforms these two lights into a sum frequency light having a visible sum frequency image : US6687051. (The visible sum frequency image is then detected.)

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Indicator cards for IR lasers	G01J 1/4257
Fluorescent glasses/filters (special database for compositions)	C03C 3/16 , C03C 3/17

G01J 3/00

Spectrometry; Spectrophotometry; Monochromators; Measuring colours

Definition statement

This place covers:

Optical spectrometry, spectrophotometry. Optical spectrometers per se, independently of specific applications, e.g. relating to waveguide spectrometers, acousto-optic spectrometers, imaging spectroscopy, UV spectroscopy, holographic spectroscopy, heterodyne spectroscopy.

Colour measurement per se.

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Photometry, spectroscopy, laser technology for microbiology or enzymology	C12M 1/3446
Spectroscopic arrangements for specific types of samples; sample inspection and analysis systems including spectrometers as black box units and/or where the spectrometric apparatus per se is not the core of the invention	G01N 21/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Photoacoustic spectroscopy	G01N 21/1702

Special rules of classification

Application specific arrangements are classified in G01N 21/00.

In G01J 3/00, the list of Indexing Codes corresponding to finer subdivisions of EC classes and being in use is the following:

G01J 2003/1213

G01J 2003/1217

G01J 2003/1221

G01J 2003/1226

G01J 2003/123

G01J 2003/1239

G01J 2003/1243

G01J 2003/1247

G01J 2003/1278

G01J 2003/1282

G01J 2003/1286

G01J 2003/2866

G01J 2003/466

G01J 2003/467

These Indexing Codes therefore belong to the list of codes which must be considered for use during classification. The further remaining Indexing Codes, not appearing in this list above, optionally may be considered as well, but these additional codes, being only optional, cannot be considered as a reliable help for search, because they are not complete.

G01J 3/02

Details

Definition statement

This place covers:

Details relating to particular optical elements of spectrometers, other than general prisms, filters, gratings and photodetectors.

Spectrometers using fibre optics.

Attachments for spectrometers, matching to cameras, correction for stray light.

Parabolic light concentrators. Collimators. Shutters.

Microscopes with beam splitters for spectrometry.

This group has a number of dedicated subgroups corresponding to each type of details. For the rare cases where a specific aspect is not foreseen, the present group is used.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Light concentrators	G02B 19/0004
Shutters per se	G02B 26/04

G01J 3/04

Slit arrangements {slit adjustment}

Definition statement

This place covers:

All aspects relating to slits in spectrometer arrangements, e.g. relating to adjustable slits, mounting arrangements for slits, calibration of slit width, motorised slit mechanisms, reflecting slits, alignment procedures for slits, curved slits.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Measurement of slit width	G01B

G01J 3/06

Scanning arrangements {arrangements for order-selection}

Definition statement

This place covers:

All aspects relating to scanning arrangements of elements of a spectrometer, e.g. relating to gratings driven by stepper motor, sinebar mechanisms, continuous rotation of a grating with shaft encoders, cam drive arrangements, fast-scan spectrometers, mechanisms for scanning a mirror or another optical element, screw-based mechanisms for coupling the movement of two optical elements.

G01J 3/08

Beam switching arrangements

Definition statement

This place covers:

Spectrometers having a switching mechanism for switching a light beam between sample path and reference path, for example using segmented mirror wheels or pivoted mirrors. Beam switching arrangements are arrangements for introducing sequentially light beams travelling along different beam paths into a single spectrometer.

G01J 3/10

Arrangements of light sources specially adapted for spectrometry or colorimetry

Definition statement

This place covers:

All aspects relating to light sources or lamps for spectrometers or spectrophotometers, e.g. relating to infrared sources, glow discharge lamps, UV sources, daylight simulators, Cerenkov light source, hollow cathode lamps, pulsed sources, lasers.

References

Limiting references

This place does not cover:

Calibration of a spectrometer	G01J 3/28

Informative references

Attention is drawn to the following places, which may be of interest for search:

Tunable lasers for frequency modulated spectroscopy	G01J 3/4338
Mixing light signals using waveguides	G02B 6/28

Beam splitting or combining systems (combining different wavelengths)	G02B 27/283
Deuterium lamps as such (details about their constitutive elements)	H01J 61/00
Lasers in general	H01S 3/00, H01S 5/00
Systems using LEDs as light sources	H05B 44/00

Special rules of classification

This group classifies the documents which contain sufficient details about the light source(s) being used in a spectroscopic device. Sufficient details include for example constructional details, type of light source or the use of a plurality of light sources in order to make a more complete measurement.

It usually does not refer to the position of the light source.

G01J 3/12

Generating the spectrum; Monochromators

Definition statement

This place covers:

Optical devices operating a selection of a relatively narrow spectral band out a broader spectral domain, e.g.relating to monochromators, optical filters associated to a broadband source, optical filters having a variable passband, scanning monochromators, liquid crystal optical filters, graded interference filters, rotating filter wheels or "paddle wheel" filters.

Filters being Fabry-Perot filters or linearly variable filters (wedge shape) (G01J 3/26)

The devices within this group can be placed either before the sample ("source side") or after the sample ("detection side").

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Fabry-Perot spectrometers	G01J 3/26
Spectrometers using a linearly variable filter	G01J 3/26
Calibration of monochromators	G01J 3/28
Integrated optics miniature spectral devices used in optical multiplexers	G02B 6/12

Special rules of classification

Specific details about the filters are additionally given appropriate Indexing Codes in the range G01J 2003/1213 - G01J 2003/1252.

G01J 3/14

using refracting elements, e.g. prisms (G01J 3/18, G01J 3/26 take precedence {prisms per se G02B 5/04})

Definition statement

This place covers:

Spectrometers using prisms as dispersive element.

References

Limiting references

This place does not cover:

Using gratings	G01J 3/18
Using Fabry-Perot cavities or linearly variable filters	G01J 3/26

Informative references

Attention is drawn to the following places, which may be of interest for search:

Prisms per se	G02B 5/04

G01J 3/16

with autocollimation

Definition statement

This place covers:

Autocollimating monochromators, i.e. combination of a prism with a concave mirror to produce a parallel beam of dispersed light - has the merit of allowing uniform slit width for all wavelengths.

G01J 3/18

using diffraction elements, e.g. grating (gratings per se G02B)

Definition statement

This place covers:

All aspects relating to diffraction or dispersion elements in spectrometers, e.g. relating to grating based monochromators or spectrometers, toroidal gratings, plane gratings, concave gratings, double pass grating monochromators, multi-echelle grating monochromators, order sorters.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Gratings per se	G02B 5/00
In-fibre Bragg gratings	G02B 6/02076

G01J 3/26

using multiple reflection, e.g. Fabry-Perot interferometer, variable interference filters

Definition statement

This place covers:

All aspects relating to Fabry-Perot cavities in Fabry-Perot spectrometers and interferometers, and linearly variable filters in spectrometry, e.g. relating to scanning Fabry-Perot interferometers, spectrometers using a wedge shaped linearly variable filter.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Different (simultaneous) incidence angles on an interference filter	G01J 2003/1243
For interferometric Fabry-Perot devices	G01B 9/0209
Fabry-Perot filters per se	G02B 26/001
Cavities containing an active medium (for example heat-sensitive)	G02F 1/21, G02F 1/03

G01J 3/28

Investigating the spectrum (using colour filters G01J 3/51)

Definition statement

This place covers:

All aspects relating to the various types of calibration or correction of optical spectrometers and spectrophotometers, for example using deconvolution of overlapping spectral lines, derivative spectroscopy, matrix solving methods, spectral library searching, automated calibration, neural networks.

References

Limiting references

This place does not cover:

Investigating the spectrum using colour filters	G01J 3/51

Informative references

Attention is drawn to the following places, which may be of interest for search:

Derivative spectroscopy	G01J 3/433
Pattern recognition and factor analysis	G06T
Demodulation techniques	H03D 3/00

G01J 3/2803

{using photoelectric array detector}

Definition statement

This place covers:

All aspects relating to detector arrays in spectrometers, e.g. relating to photodiode array spectrometers, details of CCDs for spectrometry, binning techniques, Vidicon detectors, focal position detection or spectrometer adjustment relatively to a focal point.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Focussing aid for photometers	G02B 7/28
Digital cameras per se and associated electronics or readout	H04N
Image sensors	H10F 39/12

G01J 3/2823

{Imaging spectrometer}

Definition statement

This place covers:

An imaging spectrometer collects incident light from a scene and analyzes it to determine the repartition of spectral intensities for each pixel thereof (spatial resolution of the scene).

Either a whole spectrum is measured for each pixel of a scene, or a hyperspectral image (comprising a large number of narrow spectral band spread densely over the spectrum) is produced.

An image is scanned to produce a map showing location of sources of different wavelengths. Applications to satellites.

This group can include imaging interferometers used as spectrometers.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Catoptric systems having multiple imaging planes, including multispectral systems	G02B 17/0694

G01J 3/2846

{using modulation grid; Grid spectrometers}

Definition statement

This place covers:

All aspects relating to measurement techniques based on Hadamard masks or grids, e.g. relating to spectrometers having patterned windows, wherein the patterns are complementary.

G01J 3/2889

{Rapid scan spectrometers; Time resolved spectrometry}

Definition statement

This place covers:

All aspects of time-resolved spectroscopy, e.g. relating to time-resolved Fourier transform spectrometry.

G01J 3/32

Investigating bands of a spectrum in sequence by a single detector

Definition statement

This place covers:

Spectrometers using a single detector which scans. Successive spectral band detection.

Examples of scanning are a wavelength scanning filter, a detector moving through a spectrum, the use of rotating slotted wheels.

Scanning spectrophotometers.

G01J 3/36

Investigating two or more bands of a spectrum by separate detectors

Definition statement

This place covers:

Spectrometers for analysing several spectral bands simultaneously, wherein each band is directed at or detected by a separate detector. Can use diode array detectors. Systems employing several subareas of a large area 2D detector as separate detectors (each subarea detecting a different spectral band) are classified here.

Polychromators (detection side).

Spectral detection in two or more broads spectral ranges, for example UV-Vis-NIR spectrometers. Several different spectrometers in one.

Example of UV-Vis-NIR spectrometers or several different spectrometers in one: DE10010213.

G01J 3/42

Absorption spectrometry; Double beam spectrometry; Flicker spectrometry; Reflection spectrometry (beam switching arrangements G01J 3/08)

Definition statement

This place covers:

All aspects of absorption spectrometry, where the absorption of a sample is being measured, e.g. relating to dual-beam, sample/reference cell spectrometers and spectrophotometers, reflection absorption spectrometers, grazing incidence spectrometers, absorption spectrometers using logarithmic amplifiers or ratio circuits,

cavity ring down spectroscopy (CRDS), nonlinear spectroscopy like two-photon absorption (TPA), THz (Terahertz) spectroscopy)

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Arrangements for switching the beam between a reference path and a sample path	G01J 3/08
Sample or cavity related aspects for cavity ring down spectroscopy	G01N 21/00

For cuvette arrangements	G01N 21/03 - G01N 21/15, B01J 2219/00274

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

CRDS	Cavity ring down spectroscopy
THz	Terahertz spectroscopy
TPA	two-photon absorption (e.g. in Nonlinear spectroscopy)

G01J 3/433

Modulation spectrometry; Derivative spectrometry

Definition statement

This place covers:

All aspects of derivative spectroscopy, wavelength, amplitude or phase modulation spectroscopy, phase switching spectroscopy, laser Stark modulation spectroscopy, e.g. relating to spectrometers using wobbling interference filters or a mirror vibrating on a tuning fork.

Derivative spectroscopy is mostly used for :

- Laser stabilization
- Analysis of gases:

- Measuring low concentrations (or liquids)

- Isolate a constituent among a multiplicity of constituents

- Isolate weak emission lines

- Determine the concentration of a substance in a mixture.

G01J 3/4338

{Frequency modulated spectrometry}

Definition statement

This place covers:

Frequency-modulation absorption spectroscopy, optical heterodyne spectroscopy, e.g. using lead-salt diode lasers, tunable lasers, two-tone techniques, multi-mode lasers, a vibrating slit for wavelength modulation, tilting interference filters, double frequency modulation.

G01J 3/44

Raman spectrometry; Scattering spectrometry {; Fluorescence spectrometry}

Definition statement

This place covers:

All aspects of Raman spectrometry, CARS (= coherent Raman anti-Stokes) spectroscopy,

Fourier Transform (FT) Raman spectroscopy, picosecond Raman spectroscopy.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

LIBS	Laser induced breakdown spectroscopy
CARS	Coherent Raman Anti-Stokes
SERS	Surface Enhanced Raman Spectroscopy

G01J 3/4406

{Fluorescence spectrometry}

Definition statement

This place covers:

Spectrometers for luminescence, phosphorescence, fluorescence.

Spectrofluorometers, spectrophosphorimeters, microspectrofluorimeters.

G01J 3/4412

{Scattering spectrometry (particle sizing by light scattering G01N 15/0205; optical velocimetry of particles G01P 5/20, G01P 5/26)}

Definition statement

This place covers:

All aspects relating to scattering light spectroscopy, Brillouin scattering spectrometry,

dynamic light scattering, quasi-elastic light scattering, photon correlation spectroscopy.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Particle sizing by light scattering	G01N 15/0205
Optical velocimetry of particles	G01P 5/20, G01P 5/26

G01J 3/443

Emission spectrometry

Definition statement

This place covers:

Atomic emission spectrometry.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Spectrometry by spark discharge	G01N 21/67

G01J 3/447

Polarisation spectrometry

Definition statement

This place covers:

Spectroscopy based on polarisation effects. Fourier Transform polarisation spectroscopy.

Polarisation spectrophotometer for both emission and excitation.

G01J 3/45

Interferometric spectrometry

Definition statement

This place covers:

Spectrum treatment, correction, calibration, standardization of data provided by Fourier Transform (FT) spectrometers or interferometers.

Interfaces to FT spectrometers/interferometers.

G01J 3/453

by correlation of the amplitudes

Definition statement

This place covers:

All aspects of Fourier Transform (FT) infrared, visible or UV spectrometry, e.g. involving Michelson interferometers, polarising interferometers, dual-beam FT spectrometry, static interferometers.

G01J 3/457

Correlation spectrometry, e.g. of the intensity (G01J 3/453 takes precedence)

Definition statement

This place covers:

All aspects of cross-correlation spectrometry, dispersive correlation spectroscopy, e.g. involving mask spectrometers (devices comprising a grating and an array of slits tailored to an predetermined spectrum), cross-correlation interferograms with a Michelson interferometer. Usually, correlation of measured data of interest with measured data serving as reference (e.g. measurement at non-absorbing lines) is performed.)

References

Limiting references

This place does not cover:

Interferometric spectrometry by correlation of the amplitudes	G01J 3/453

G01J 3/46

Measurement of colour; Colour measuring devices, e.g. colorimeters (measuring colour temperature G01J 5/60)

Definition statement

This place covers:

Optical measurement devices and methods having the purpose of measuring colour, e.g. relating to aspects of chromaticity diagrams, colour-difference formulae, colorimetry based on physiology, checking colour fidelity of TV cameras, CIE standards, tristimulus values, colour matching, control of colour for printing.

References

Limiting references

This place does not cover:

Measuring colour temperature	G01J 5/60

Informative references

Attention is drawn to the following places, which may be of interest for search:

Blending paints, colour matching	B05D 5/00, B05D 7/00, B01F 35/82
Colouring or compounding injection-moulded or blow-moulded plastics parts	B29C 45/18, B29C 48/00, B29B 7/00, B01F 35/213, B01F 35/82
Painting, artistic drawings	B44D 3/003
Distributed paint manufacturing system	C09D 7/40
Color recognition for blind people	G01D 7/12
Colour image analysis and flaw detection	G01N 21/00, G06T 7/00, G06T 7/40
Use of histograms in colour spaces, clustering techniques	G06T 7/10 , G06T 5/40, G09G 5/02, G09G 5/06
Document validation (e.g. of banknotes, see US3480785)	G07D 7/12
Teaching, or communicating with, the blind, deaf or mute	G09B 21/00
Control of colours for printing, aspects relating to printer specific colour spaces or to the control feedback loop on said printer	H04N 1/60

G01J 3/461

{with colour spinners}

Definition statement

This place covers:

Colour mixing, colour creation, colour reproduction using colour spinners (discs with partitions, sectors or portions of different colours).

"Visual" mixing, or mixing due to the human eye perception.

G01J 3/462

{Computing operations in or between colour spaces; Colour management systems}

Definition statement

This place covers:

Matrix representations of colour spaces, transformations from one colour space into another, numerical corrections or manipulations within a colour space.

Colour management systems.

G01J 3/463

{Colour matching}

Definition statement

This place covers:

Colour matching methods and devices.

G01J 3/465

{taking into account the colour perception of the eye; using tristimulus detection}

Definition statement

This place covers:

Colour measurements taking into account or modelling the particular perception of the human eye. Tristimulus detection, colour measurements based on the CIE colour matching functions.

Metamerism-related issues.

G01J 3/50

using electric radiation detectors

Definition statement

This place covers:

Colour measurement using photocells, cameras etc.

G01J 3/501

{Colorimeters using spectrally-selective light sources, e.g. LEDs}

Definition statement

This place covers:

Colorimeters using a selected number of discrete wavelengths as light source to illuminate the sample.

Examples of selective illuminants are LEDs or a broadband source followed by a filter or filters (the filter(s) being provided between the source and the sample). The resulting light may not be as narrowband as for a LED, but it should be sufficiently narrow for measuring a colour without using filters on the detection side (in front of the detector(s)).

G01J 3/51

using colour filters

Definition statement

This place covers:

Colorimeters having movable filters positioned in front of the detectors (filter wheels).

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Visual determination of colour differences by flickering, using filters	G01J 1/34

G01J 3/513

{having fixed filter-detector pairs}

Definition statement

This place covers:

Colorimeters having fixed filter-detector pairs.

Colorimeters using dichroic mirrors and ratio detectors (where only two wavelengths are detected and their ratio is monitored)

G01J 3/52

using colour charts

Definition statement

This place covers:

Colour systems in the form of color charts: OSA, DIN, Coloroid, Ostwald, CIE, BS5252, Munsell. Colour atlases, colour harmony. Farnsworth-Munsell 100-hue test. Grey scales.

Colour charts for printing. Colour charts in digital form (look-up tables).

G01J 3/52 regroups the colour charts as such (the way in which they are built, i. e. the particular presentation of colours that they allow and which answers the needs of a particular application). The way in which a colour database is structured should be classified here and includes "real" charts as well as virtual ones (computer-based)

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Methods or devices for colour determination; selection or synthesis e.g. use of colour tables	B44D 3/003

G01J 3/522

{circular colour charts}

Definition statement

This place covers:

Circular or partially circular colour charts. Charts made of one or more discs, superposed or not.

References

Limiting references

This place does not cover:

Polygonal (pentagonal...) charts , i.e. not considered circular	G01J 3/52

G01J 3/524

{Calibration of colorimeters}

Definition statement

This place covers:

All aspects relating to the calibration of colorimeters.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Colour charts per se	G01J 3/52 , G01J 3/522

G01J 3/526

{for choosing a combination of different colours, e.g. to produce a pleasing effect for an observer}

Definition statement

This place covers:

Devices which help a user to determine a choice of (different) colours which harmonize together, in the sense that the global effect of these colours put next to each other is pleasing to the eye. Mostly used for showing colour combinations in the fields of interior decoration (colours of sofas, walls, ceilings, curtains...), for the choice of different colours to be applied on different parts of a car, or in the field of clothing.

All aspects relating to the choice of pleasant colour combinations, e.g. relating to choice of colours for interior decoration, choice of colours in a nail varnish simulator, charts, advertising displays, etc, for aiding choice of colour, combination of colours.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Colour of hair and choice of the right dye	A45D 44/005

G01J 3/528

{using colour harmony theory}

Definition statement

This place covers:

Devices using colour harmony theory. These devices rely on the definition of colour harmony, according to which n colours harmonize together when their mixture gives a grey colour. These devices are usually circular colour charts covered by a mask with a number of holes. Choosing a first colour by means of one of the holes leads to the selection of other ("harmonic") colours through the remaining holes.

G01J 4/00

Measuring polarisation of light

Definition statement

This place covers:

Passive measurement of the polarisation state of a beam of incoming light. Measurement of degree of depolarisation.

Relationships with other classification places

Ellipsometric devices which send a selectable polarized light on a sample (active device) and detect afterwards the effect of the sample on the polarization state of the input light are classified in G01N 21/211. Documents about ellipsometry may only be classified in G01J if they present special or unusual ways of detecting polarization on the detection side.

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Investigating or analysing materials by measuring rotation of plane of polarised light	G01N 21/21

Informative references

Attention is drawn to the following places, which may be of interest for search:

Measurement of the polarisation dispersion of a transparent body (fiber) and/or testing of the optical properties of optical elements (lenses, fibers,...)	G01M 11/00
Optical elements for polarizing light	G02B 27/28
Optical elements for polarization control	G02B 27/286

G01J 4/02

Polarimeters of separated-field type; Polarimeters of half-shadow type

Definition statement

This place covers:

Polarimeters having a spatial filter for separating an incoming light beams into sub-beams.

G01J 4/04

Polarimeters using electric detection means (G01J 4/02 takes precedence)

Definition statement

This place covers:

Aspects of polarimeters relating in particular to electric radiation detectors and processing of the detected signals. Stokes, Jones, Mueller representations of polarization states and related calculus.

Example for Mueller representations of polarization states and related calculus : US2003117624.

References

Limiting references

This place does not cover:

Polarimeters of separated-field type; Polarimeters of half-shadow type	G01J 4/02

G01J 5/00

Radiation pyrometry, e.g. infrared or optical thermometry

Definition statement

This place covers:

The measurement of temperature through analysis of the optical (infrared, visible or ultraviolet) radiation emitted by the hot body.

The measurement of temperature through analysis of the optical (infrared, visible or ultraviolet) radiation emitted by a test body directly contacting the hot body whose temperature is to be determined.

Relationships with other classification places

Subclasses G01J and G01K cover the measurement of temperature in general, but Subclass G01J is restricted to a particular form of thermometry, namely radiation pyrometry. In contrast, subclass G01K covers all temperature measurements of general applicability, except radiation pyrometry.

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Systems for controlling combustion using light-sensitive elements	F23N 5/08
Optical systems, e.g. for plasma diagnostics, used in thermonuclear fusion reactors	G21B 1/23

Informative references

Attention is drawn to the following places, which may be of interest for search:

Image processing procedures for thermal measurement	G01J 5/025
Interfacing a pyrometer to an external device or network; User interface	G01J 5/025
Testing and calibration	G01J 5/52, G01J 5/80
Means for supervising combustion, e.g. windows	F23M 11/04
Observation devices used in furnaces, kilns, ovens or retorts	F27D 21/02
Measuring temperature; Measuring quantity of heat; Thermally-sensitive elements not otherwise provided for	G01K
Temperature measurement using microwaves	G01K 11/006
Calorimetry of radiation beams	G01K 17/00
Direction finders for radiant sources	G01S
Intrusion detection by radiation	G08B

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Radiation	Waves belonging to the sub-millimeter (Terahertz), infrared, visible or ultraviolet parts of the electromagnetic spectrum

G01J 5/0003

{for sensing the radiant heat transfer of samples, e.g. emittance meter}

Definition statement

This place covers:

Measurement of radiant heat transfer of samples.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Wafer temperature determination	G01J 5/0007
Emissivity via reflectivity	G01J 5/0007, G01J 5/80, G01J 2005/0074
Temperature control	G05D 23/27

G01J 5/0014

{for sensing the radiation from gases, flames}

Definition statement

This place covers:

Optical pyrometry for flames and/or gases and/or smoke, e.g. involving temperature measurement of hydrogen flames, arcs, plasmas, temperature measurement by light scattering, fluorescence,

laser beam deflection, plasma temperature profile in MHD boundary layer, remote sensing of gases temperature in the atmosphere, the use of line-reversal methods.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Monitoring flames	F23N 5/08

G01J 5/0022

{for sensing the radiation of moving bodies}

Definition statement

This place covers:

Non-contact temperature measurement of moving objects, e.g. steel strip, turbine blades, yarn, float glass, motor rotors, railway wagon wheel bearings. Detection of vehicle wheel spin by pyrometry.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Temperature detection of rotating bodies	G01K 13/08

G01J 2005/0092

{Temperature by averaging, e.g. by scan}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Thermography; Techniques using wholly visual means	G01J 5/48

G01J 5/02

Constructional details

Definition statement

This place covers:

Details about constructional aspects of non-contact temperature detection devices.

Details about optical aspects of non-contact temperature detection devices: G01J 5/08.

Elimination of stray light: G01J 5/06.

Getters: G01J 5/045.

Ear thermometer probe covers: G01J 5/021.

Ear thermometers casings: G01J 5/049.

Details about the functioning of non-contact temperature detection devices and processors for controlling such devices, e.g. G01J 5/026.

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Details pertaining to radiation pyrometry using polarisation effects	G01J 5/59

Informative references

Attention is drawn to the following places, which may be of interest for search:

Passive compensation of pyrometer measurements, e.g. using ambient temperature sensing or sensing of temperature within housing	G01J 5/70
Getters per se	B01D 53/0407, H01L 23/26

Special rules of classification

The general group: G01J 5/0011 for ear thermometers applies when neither G01J 5/049 nor G01J 5/021 is relevant.

G01J 5/021

{Probe covers for thermometers, e.g. tympanic thermometers; Containers for probe covers; Disposable probes}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Ear thermometers	G01J 5/0011
Casings for tympanic thermometers	G01J 5/049

G01J 5/022

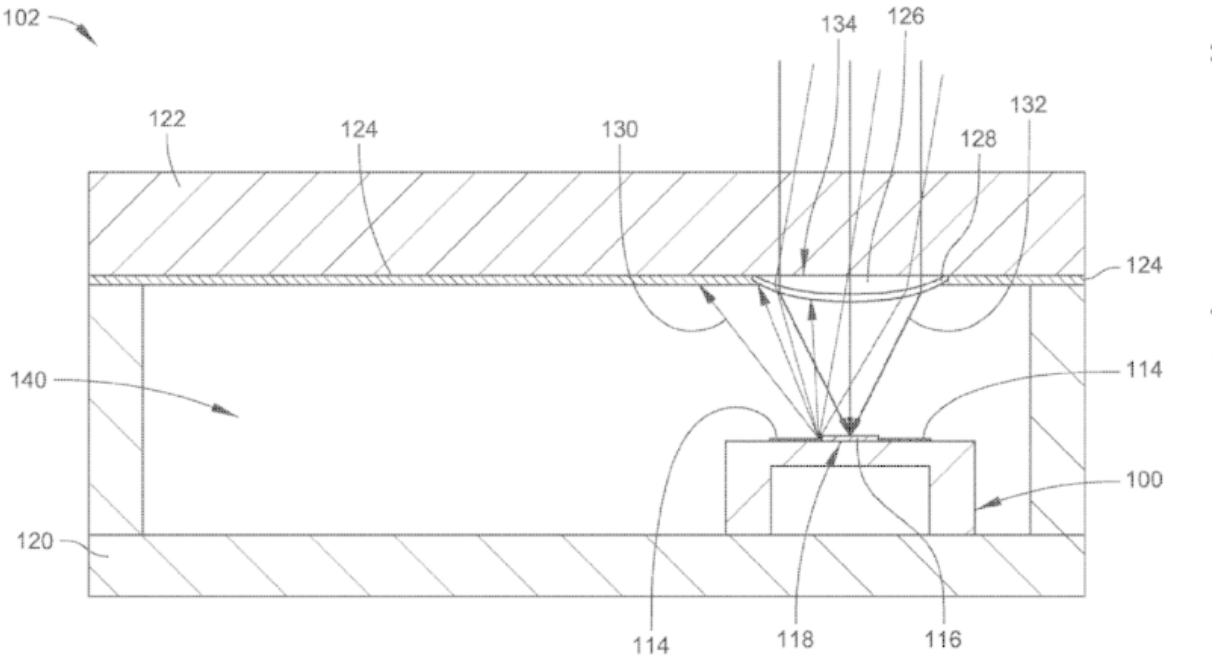
{Monolithic}

Definition statement

This place covers:

Compact devices in "one piece", e.g. integration or encapsulation of optical and sensing elements within a package.

Illustrative example of subject-matter classified in this group:



G01J 5/026

{Control of working procedures of a pyrometer, other than calibration; Bandwidth calculation; Gain control}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

References sources	G01J 5/53
Calibration	G01J 5/80

G01J 5/027

{making use of sensor-related data, e.g. for identification of sensor parts or optical elements}

Definition statement

This place covers:

Devices using sensor-related data during measurement or analysis. For instance, information obtained from bar codes, visual signatures, etc. on the optical elements is used to identify a specific component and its properties.

G01J 5/0295

{Nulling devices or absolute detection}

Definition statement

This place covers:

Pyroelectric null detectors using electrical balancing by a null detection method.

G01J 5/03

Arrangements for indicating or recording specially adapted for radiation pyrometers

Definition statement

This place covers:

Devices (circuitry, memory, display, etc.) pertaining to the recording and indicating of thermal data from thermoelectric elements, resistors, thermistors, photo-emissive and photo-voltaic cells, e.g. video recording, display of thermal color temperature.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Indicating measured values, in general	G01D 7/00
Recording measured values, in general	G01D 9/00
Power supply, reading and writing arrangements, and addressing arrangements of memories	G11C
Semiconductor devices for storage (e.g. memory arrays)	H10B

G01J 5/04

Casings

Definition statement

This place covers:

Details of housings of IR detectors. Purging arrangements, choice of thermal materials, encapsulated packages. Mounting arrangements for a pyrometer. Infrared thermometers, particularly mounts. Mounts for astronomical radiometers.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Details of a grip for a handheld sensor	G01J 5/0265
Window details, e.g. window seals	G01J 5/0875

G01J 5/041

{Mountings in enclosures or in a particular environment}

Definition statement

This place covers:

All aspects of mountings or housings of pyrometers in environments where the available space is very limited and/or where difficult measurement conditions prevail, for example due to dust or strong vibrations. Examples of such environments include car engines, exhaust pipes, furnaces, rotating machines, kilns, electron microscopes, moulds, gas turbines, microwave ovens, brakes.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Fibre optics, sapphire-tipped probes for hostile environments, immersion probes for melts	G01J 5/0818, G01J 5/0037, G01J 5/004
Contact thermometers	G01K 1/00
Rotating machines	G01K 13/08

G01J 5/047

{Mobile mounting; Scanning arrangements}

Definition statement

This place covers:

Constructional details of mountings allowing for translational and/or rotational sensor movement, e.g. rails.

G01J 5/049

{Casings for tympanic thermometers}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Ear thermometers	G01J 5/0011
Probe covers for thermometers, e.g. tympanic thermometers; Containers for probe covers; Disposable probes	G01J 5/021

G01J 5/05

Means for preventing contamination of the components of the optical system; Means for preventing obstruction of the radiation path

Definition statement

This place covers:

Means for prevention or determination of dirt, dust, smog, or clogging, e.g. from combustion taking place in furnaces, from disturbing radiation collection. This also includes cleaning optical elements before or during measurements.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Screening from ultraviolet, visible or infrared light, not restricted to measuring instruments	G12B 17/04
Screening from heat, not restricted to measuring instruments	G12B 17/06

G01J 5/06

Arrangements for eliminating effects of disturbing radiation; Arrangements for compensating changes in sensitivity (for adjusting of solid angle of collected radiation G01J 5/07; means for wavelength selection G01J 5/0801)

Definition statement

This place covers:

Cold shields, field stops at reference temperature. Radiation shields for thermocouples.

Constructional arrangements having the effect of limiting, reducing or eliminating spurious radiation.

References

Limiting references

This place does not cover:

Arrangements for adjusting the solid angle of collected radiation	G01J 5/07
Means for wavelength selection	G01J 5/0801

G01J 5/061

by controlling the temperature of the apparatus or parts thereof, e.g. using cooling means or thermostats

Definition statement

This place covers:

All aspects of non contact temperature measurement devices relating to the use of cooling or thermostating mechanisms for parts of the device, e.g. involving cryostats or vacuum vessels for IR detectors, cold shields, integrated detectors/coolers, self-cooling detectors, thermoelectric cooling, cold fingers, Dewar vessels.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Cooling techniques in general	F17C, F25J
Cooling devices per se	F25B 9/00, F25B 19/00, F25B 21/00

G01J 5/068

by controlling parameters other than temperature

Definition statement

This place covers:

Constructional arrangements for compensation of fluctuations caused by non-temperature environmental parameters (e.g. humidity, pressure or electromagnetic waves); controlling the atmosphere inside a pyrometer.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Passive compensation of pyrometer measurements, e.g. using ambient temperature sensing or sensing of temperature within housing	G01J 5/70

G01J 5/07

Arrangements for adjusting the solid angle of collected radiation, e.g. adjusting or orienting field of view, tracking position or encoding angular position (optical collimating elements G01J 5/0806)

Definition statement

This place covers:

The aiming, pointing or tracking of pyrometers.

The encoding of angular position of pyrometers.

The means for aligning pyrometers or determining the field of view.

References

Limiting references

This place does not cover:

Optical collimating elements	G01J 5/0806

G01J 5/08

Optical arrangements

Definition statement

This place covers:

Details about optical aspects of non-contact temperature detection devices.

Optical fibre thermometry. Infrared light guides. Sighting or pointing arrangements for pyrometers.

Infrared detectors having individual concentrators and conical horn antennas : US2003089842, GB2369724

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Simultaneous imaging of IR and millimetre waves	G01J 5/025
Probe for molten metal	B22D 2/00
Sighting or pointing arrangements	F41G
Detecting a number of persons in a room by scanning	G07C 9/00
Optical-mechanical scanning	H04N 5/33, G02B 26/10

G01J 5/0801

Means for wavelength selection or discrimination

Definition statement

This place covers:

The means for restricting (selection) the range of wavelengths that are used to determine temperature by radiation pyrometry.

The means for isolating ranges of wavelengths for different purposes (discriminating), one of which is temperature measurement by radiation pyrometry. The other purposes could be monitoring (e.g. using a radiation band to monitor sensitivity while another band is used to determine temperature), calibrating, ensuring centering on the hot source (by using a radiation band associated with a specific hot source – or with known noise – to track the hot source – or reduce the field of view to avoid sources of noise).

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Optical elements, other than lenses, in general	G02B 5/00

G01J 5/0802

Optical filters

Definition statement

This place covers:

The optical filters, i.e. elements to select a range or band of wavelengths, specially adapted for use in radiation pyrometers.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Optical filters, in general	G02B 5/20

G01J 5/0805

Means for chopping radiation

Definition statement

This place covers:

Details about the construction of the chopper itself, e.g. relating to the chopper wheels, IR detector packages with integral shuttered windows, liquid crystal shutters, electro-optical elements for modulating IR beam, circuit arrangements (peak detection, sample and hold circuits) linked to the chopper.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Shutters to protect photodetectors	G01J 2001/0276, G01J 1/26
Optical devices or arrangements using movable or deformable optical elements for controlling the intensity, colour, phase, polarisation or direction of light by periodically varying the intensity of light, e.g. using choppers	G02B 26/04
Transforming infrared radiation	H04N 5/33
Mounting of optical parts, e.g. lenses, shutters, filters; optical parts peculiar to the presence of use of an electronic image sensor	H04N 23/55

G01J 5/0875

Windows; Arrangements for fastening thereof

Definition statement

This place covers:

Windows insulating the sensor of a radiation pyrometer from the environment.

Arrangements for fastening windows to radiation pyrometers.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Means for preventing contamination of the components of the optical system or obstruction of the radiation path	G01J 5/05
Means for supervising combustion, e.g. windows	F23M 11/04
Observation devices used in furnaces, kilns, ovens or retorts	F27D 21/02
Windows for measuring arrangements not specially adapted for a specific variable	G01D 11/26

G01J 5/10

using electric radiation detectors

Definition statement

This place covers:

Detector aspects which do not depend on the specific features of thermopiles (classified in G01J 5/12), bolometers (G01J 5/20) or pyroelectric devices (G01J 5/34), that is, which can be used with any of these detector types.

Special rules of classification

In case generic disclosures are illustrated by means of one of these particular devices (i.e. bolometer) then both a class in G01J 5/10 and in G01J 5/20 (bolometers) should be given.

G01J 5/12

using thermoelectric elements, e.g. thermocouples

Definition statement

This place covers:

All aspects of thermopile detectors (arrays of thermocouples), e.g. relating to specific geometrical arrangements of the thermocouples, cold junction temperature compensation, thermocouples consisting of tensioned wire grid, heat flux meters.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Thermoelectric elements per se	H10N 10/00, H10N 15/00
Multilayer devices	H10N 10/17, H10N 10/854, H10N 10/857

G01J 5/14

Electrical features thereof

Definition statement

This place covers:

All aspects of thermopile detectors relating to electrical circuits and/or signal processing, e.g. involving linearisation of the detector's output, negative feedback to improve frequency response.

G01J 5/16

Arrangements with respect to the cold junction; Compensating influence of ambient temperature or other variables

Definition statement

This place covers:

Thermopiles in which the cold junction temperature is measured (for correction purposes), or in which the cold junction is thermostated.

Other detectors having temperature compensation circuits for which no other group is foreseen are classified here too (e.g. US2004079888)

G01J 5/20

using resistors, thermistors or semiconductors sensitive to radiation, e.g. photoconductive devices

Definition statement

This place covers:

All aspects of bolometric or junction based detectors, e.g. relating to fabrication details, superconducting bolometers, bolometer arrays, diode-based bolometers, cavity radiometers.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Particular leg structure/construction/shape	G01J 5/023
Particular layer structure/construction/shape	G01J 5/024
Fabrication of thin-film resistors	H01C 17/075
Millimeter-wave detection and imaging	H01Q 1/22, H01Q 1/38, H10F 39/00 G01K 11/006
Thermal imaging	H04N 5/33
Fabrication techniques	H10N 19/00

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Photoconductive devices	Devices which, under exposure to light, exhibit a change in conductivity, e.g. photo-resistors, photo-diodes or photo-transistors

G01J 5/22

Electrical features thereof

Definition statement

This place covers:

All aspects of bolometric or junction based detectors relating to electrical circuits and/or signal processing, e.g. involving correction of bolometer drift, superconducting bolometers, bolometer bridge circuits and their compensation, pulsed bolometers, a.c. bolometers.

G01J 5/28

using photoemissive or photovoltaic cells

Definition statement

This place covers:

All aspects of photoemissive cells, i.e. light-sensitive gas-filled or vacuum tubes that operate on the basis of the photoelectric effect, and photovoltaic cells generating voltage when light strikes the junction between a metal and a semiconductor or a junction between two different semiconductors, e.g. photodiodes operating in the photovoltaic mode.

Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "photoemissive cells" and "phototubes"
- "photovoltaic mode" and "zero-bias mode"

G01J 5/34

using capacitors, e.g. pyroelectric capacitors

Definition statement

This place covers:

Infrared sensors based on pyroelectric effect. Details for fabrication of pyroelectric arrays, etc. Infrared CCD imaging for intruder alarms, fire alarms. Pyroelectric polymer films, $LiTaO_3$, Sr(1-x)BaxNb2O6, other ferroelectric materials.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Thermal imaging	H04N 5/33
Pyroelectric devices other than temperature detectors	H10N 15/10

G01J 5/40

using bimaterial elements

Definition statement

This place covers:

Using bimetallic elements.

More generally, detectors having stacked layers of materials having different thermal expansion coefficients, the materials not being necessarily metallic.

G01J 5/44

using change of resonant frequency, e.g. of piezoelectric crystals

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Piezoelectric vibrating elements	B06B 1/06, H10N 30/20

G01J 5/46

using radiation pressure or radiometer effect

Definition statement

This place covers:

Radiometers measuring the radiant flux of radiation based on radiation pressure or the radiometer effect, e.g. light mills (Crookes radiometer), Nichols radiometer, MEMS radiometer.

Illustrative examples of subject-matter classified in this group:

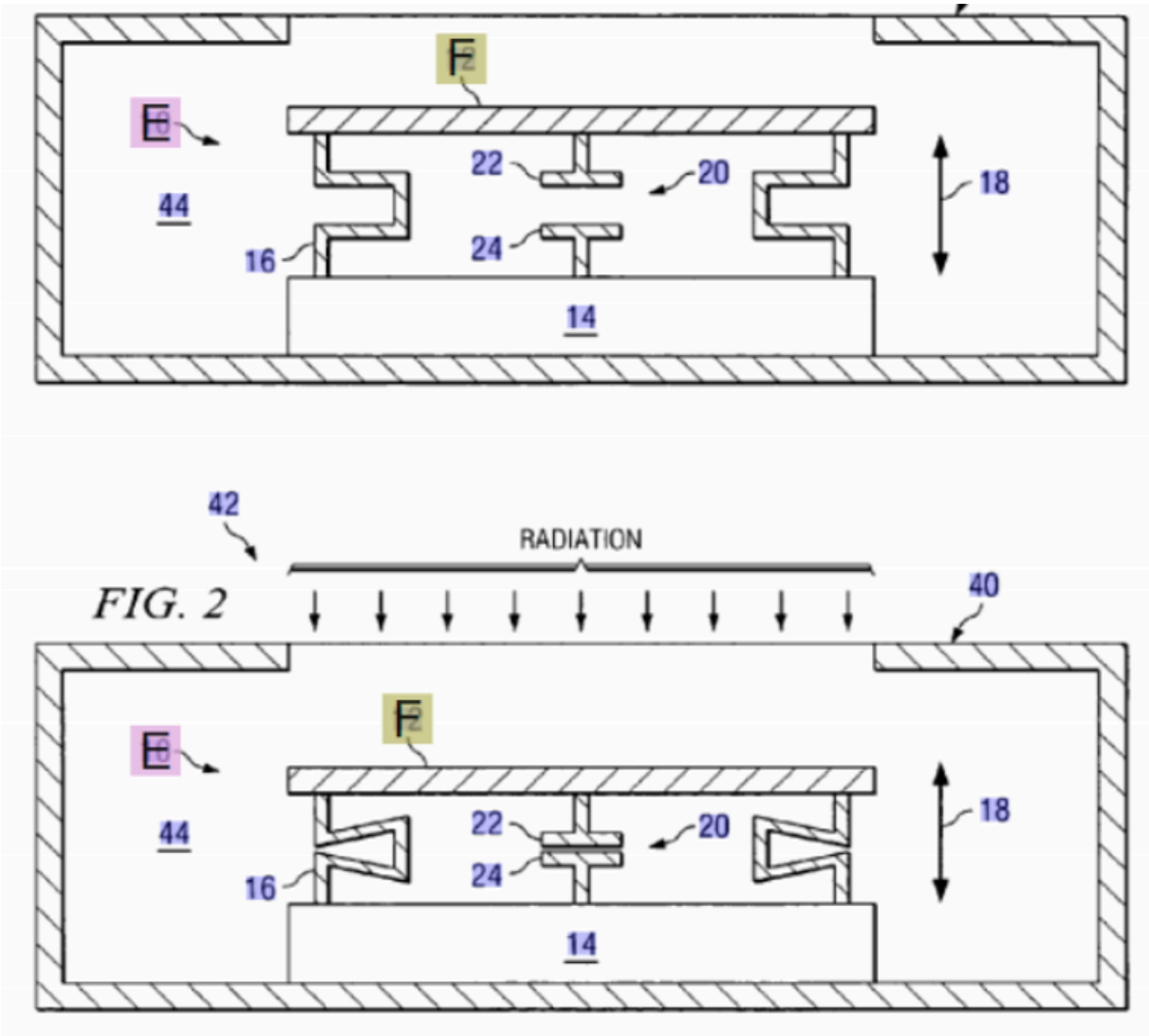


FIG. 2

G01J 5/48

Thermography; Techniques using wholly visual means

Definition statement

This place covers:

The measurement of the spatial distribution of optical radiation emitted by an object or body to infer a local temperature corresponding to different regions of that object or body.

The measurement of temperature using radiation pyrometry by wholly visual means.

Relationships with other classification places

The use of thermography to detect flaws is covered in general by group G01N 21/88, whereas the use of thermography specifically and solely to diagnose a medical condition is covered by group A61B 5/01. Group G01J 5/48 is appropriate whenever thermographic techniques or features of general applicability are described.

References

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Investigating the presence of flaws, defects or contamination by the use of optical means	G01N 21/88
Contactless testing of electronic circuits using non-ionising electromagnetic radiation, e.g. optical radiation	G01R 31/308

Informative references

Attention is drawn to the following places, which may be of interest for search:

Cameras or camera modules comprising electronic image sensors for generating image signals from thermal infrared radiation only	H04N 23/23

Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- thermography
- thermal imaging
- infrared imaging

G01J 5/52

using comparison with reference sources, e.g. disappearing-filament pyrometer

Definition statement

This place covers:

The measurement of temperature by radiation pyrometry where reference sources are used either simultaneously with the temperature measurement, e.g. disappearing-filament pyrometer, or in previous or subsequent steps, e.g. in calibration steps using standard sources. This encompasses a process of collecting radiation signals using sources the temperature of which is known, adjusting the radiation pyrometer based on these signals, and measuring the temperature of the desired object or body in the final step.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Calibration of radiation pyrometers, in general	G01J 5/80
Testing, inspecting or checking correct operation of radiation pyrometers	G01J 5/90

G01J 5/53

Reference sources, e.g. standard lamps; Black bodies

Definition statement

This place covers:

Calibration and testing of infrared imagers for temperature detection.

Reference black bodies. Reference sources per se and devices to expose detectors to be calibrated to said sources. Thermal scene projectors for testing IR imagers.

Synthesis of infrared spectral signatures.

Theory of blackbody cavities. Absolute radiometry.

Standard IR lamps. Imager with inbuilt reference source.

Array of emitters.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Testing of the correct functioning of a motion detector	G08B 29/00
Non-uniformity compensation for infrared detector arrays	H04N 25/60, H04N 5/33

G01J 5/58

using absorption; using extinction effect

Definition statement

This place covers:

The nondispersive determination of temperature based on the absorption or the attenuation of the emitted radiation. The determination involves the selection of a single wavelength or wavelength band.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Measuring temperature using changes in reflectance	G01K 11/125

G01J 5/59

using polarisation; Details thereof

Definition statement

This place covers:

The determination of temperature based on the polarisation of the emitted radiation.

The thermal imaging of a body based on the polarisation of the emitted radiation.

G01J 5/60

using determination of colour temperature

Definition statement

This place covers:

The determination of colour temperature, i.e. detecting at least one wavelength or spectral band emitted by a hot body, comparing the detected intensity or intensities to the values theoretically expected for a black body at well-defined temperatures and determining the temperature that produces the best fit between observed wavelengths or spectral bands and theoretically expected values.

The determination of temperature through measurement of at least two wavelengths or spectral bands, where the temperature is expressed as a mathematical function of pairs of intensity-wavelength values, or of intensity-spectral band values, typically in the form of ratios of intensities. In other words, the comparison need not be performed explicitly with the Planck formula. The comparison step could involve phenomenological equations derived from the Planck formula or providing a sufficiently precise approximation of it.

Relationships with other classification places

When temperature is inferred from measurements of spectra, the demarcation line between subclasses G01K and G01J is the following: subclass G01J encompasses solely temperature measuring techniques where the radiation spectrum originates from black-body radiation (as modelled by the Planck formula). In contrast, whenever the spectrum results from ambient radiation or radiation from a dedicated source being reflected or transmitted by the body the temperature of which is to be determined, this subject matter is covered in subclass G01K.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Measuring temperature using changes in colour, translucency or reflectance	G01K 11/12
Measuring temperature using thermoluminescent materials	G01K 11/20

G01J 5/601

{using spectral scanning}

Definition statement

This place covers:

Multiple-wavelength pyrometers for observing spectrum, using prisms, gratings, etc.

Spectralradiometers. Raman scattering. A finely resolved spectrum is detected either sequentially (spectral scanning) or simultaneously (snapshot detection).

G01J 5/602

{using selective, monochromatic or bandpass filtering}

Definition statement

This place covers:

All aspects of non contact temperature measurement or colour temperature measurement which is based on the detection of specific spectral bands, e.g. involving monochromatic pyrometry, or the use of band pass or narrow band filters.

G01J 5/70

Passive compensation of pyrometer measurements, e.g. using ambient temperature sensing or sensing of temperature within housing

Definition statement

This place covers:

Passive compensation using off-line or a posteriori calibration.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Ambient temperature sensor; Housing temperature sensor; Constructional details thereof	G01J 5/064
Constructional arrangements for compensation of fluctuations from humidity or other non-temperature environmental parameters	G01J 5/068

G01J 5/80

Calibration (using comparison with reference sources G01J 5/52)

Definition statement

This place covers:

The characterisation of a radiation pyrometer in good working order to determine instrumental parameters or settings, to be able to transform the collected radiation signal into an accurate value of temperature. One example is through modelling of the pyrometer's response.

The adjustment of a radiation pyrometer by correcting for known sources of background, like emissivity, atmospheric effects or scattered radiation.

Relationships with other classification places

This place is used to classify the calibrating or the modelling of a radiation pyrometer, in general. When calibration is accomplished by making use of reference sources, e.g. black bodies, the relevant place is group G01J 5/52.

When it is desired to ascertain that a radiation pyrometer is operating correctly, i.e. that its output is a faithful indication of the measured entity's temperature, the relevant classification place is group G01J 5/90.

One possible criterion to distinguish calibration from testing is that calibration presumes a properly operating instrument, but with that instrument being unable to produce a precise and accurate value of

temperature without being supplied with auxiliary measurements, e.g. by performing measurements in a situation where the output is known or predictable.

References

Limiting references

This place does not cover:

Calibrating using comparison with references sources	G01J 5/52

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Reference sources, e.g. standard lamps; Black bodies	G01J 5/53

G01J 5/90

Testing, inspecting or checking operation of radiation pyrometers

Definition statement

This place covers:

The testing, inspection or checking, operational or functional, of radiation pyrometers.

Relationships with other classification places

This place is used for subject matter linked to detecting faults or deficiencies in radiation pyrometers, preventing their correct and accurate use. In contrast, group G01J 5/80 is used to classify subject matter where the radiation pyrometer is in good working order, but requires the determination of instrument parameters, before any precise or accurate measurement may be obtained from the pyrometer.

G01J 7/00

Measuring velocity of light

Definition statement

This place covers:

Devices to perform extremely accurate measurements of the velocity of light.

The usual purpose of these devices is to check the validity of Einstein's theory of relativity.

G01J 9/00

Measuring optical phase difference (devices or arrangements for controlling the phase of light beams G02F 1/01); Determining degree of coherence; Measuring optical wavelength (spectrometry G01J 3/00)

Definition statement

This place covers:

Non-interferometric measurement devices and methods for measuring wavefront, phase, coherence length and/or wavelength of an incoming light beam, e.g. relating to wavefront sensors, Shack Hartmann detectors, laser diagnostics for wavelength, phase and coherence measurement, wavefront

detection per se for restoration of images degraded by turbulence, wavelength stabilization of laser beams by means of non interferometric determination of wavelength.

References

Limiting references

This place does not cover:

Spectrometry	G01J 3/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Laser diagnostics where parameters other than wavelength and polarisation are determined	G01J 1/4257
Wavelength stabilization of laser beams by means of interferometric determination of wavelength	G01J 9/0246, H01S 3/106, H01S 3/213, H01S 5/0687, H01S 5/1212
Wavefront sensing and adaptive optics for restoring images degraded by turbulence	G02B 26/06
Devices or arrangements for controlling the phase of light beams	G02F 1/01
Wavelength stabilization of laser beams where the wavelength is not numerically derived or actually calculated	H01S 3/00, H01S 5/00
Optical wavelength measurement for wavelength division multiplexing and telecom applications	H04J 14/00, H04J 14/05, H04J 14/07

Special rules of classification

In G01J 9/00, the list of Indexing Codes corresponding to finer subdivisions of EC classes being used is the following:

G01J 2009/0219

G01J 2009/0223

G01J 2009/0226

G01J 2009/023

G01J 2009/0234

G01J 2009/0238

G01J 2009/0242

G01J 2009/0261

G01J 2009/0265

G01J 2009/0273

These Indexing Codes therefore belong to the list of codes which must be considered for use during classification. The further remaining Indexing Codes, not appearing in this list above, optionally may be considered as well, but these additional codes, being only optional, cannot be considered as a reliable help for search, because they are not complete.

G01J 9/02

by interferometric methods (using interferometers for measuring optically the linear dimensions of objects G01B 9/02)

Definition statement

This place covers:

Interferometric devices for measuring wavefront, phase, coherence and/or wavelength of an incoming light beam. Mach-Zehnder, Talbot, Fizeau configurations etc, also with optical fibres.

Wavefront control with optical feedback. Phase-conjugate interferometers.

Wavemeters. Lau effect.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Interferometric tomography	G01B
Using interferometers for measuring optically the linear dimensions of objects	G01B 9/02
Optical fiber interferometer	G01B 9/02041
Measurement of the Optical Transfer Function (OTF) of a unit under test, measurement of the wavelength dispersion due to a transparent body (fiber)	G01M 11/00

G01J 9/0215

{by shearing interferometric methods}

Definition statement

This place covers:

Differential interferometry (= shearing interferometry) for measuring phase difference per se or degree of coherence of incoming light. Talbot interferometry.

Holographic interferometry. Moire interferometry. Speckle pattern interferometry

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Optical tomography	G01B

G01J 9/0246

{Measuring optical wavelength}

Definition statement

This place covers:

Interferometers for measuring wavelength, phase, etc, of laser beams. Single Wavelength Detection (SWD). Vernier fringe counting.

Spectral characteristics of laser beams.

G01J 9/04

by beating two waves of a same source but of different frequency and measuring the phase shift of the lower frequency obtained

Definition statement

This place covers:

Heterodyne laser interferometry. Self-homodyne technique. Optical heterodyne detection. Fibre-optic interferometry + spectrometry.

Use of a beat frequency between a known (local oscillator) signal and an unknown signal in order to measure the wavelength of the unknown signal.

G01J 11/00

Measuring the characteristics of individual optical pulses or of optical pulse trains

Definition statement

This place covers:

Measurements on laser pulses, e.g.

- Optical pulse train correlation.
- Interferometric autocorrelation.
- Solitons in optical fibres. Chirp measurement.
- Diffraction grating autocorrelators.
- Frequency-resolved optical gating [FROG].
- Autocorrelator for ultrashort optical pulses.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Time interval measurements by means of optical pulses	G04F 13/026
Pulse compression or frequency chirping of laser pulses	H01S 3/0057