Examiners' Report Paper A 2012 (Electricity/Mechanics)

1. General considerations

In the following, the abbreviation GL refers to the Guidelines For Examination in the European Patent Office in the version valid at the time of the examination.

1.1. Introduction

This year's paper relates to devices for indicating the temperature of liquid. In the client's letter (par. [002]) the reason for achieving a minimum temperature of cooking oil close to the surface of the oil when cooking doughnuts is explained. Indicating that this temperature has been achieved is considered to be the underlying goal of such devices.

1.2. Prior Art

In his letter (par. [003]), the client refers to a prior art document D1, which discloses a device that indicates the temperature of the cooking oil close to the surface. The device floats in the oil and has a pointer 34 and a scale 35 for indicating the temperature of the oil. The pointer 34 is attached to the inner surface of the body 1 of the device through a bimetallic strip 30 coiled in the form of a spiral. When the temperature of the bimetallic strip 30 increases it uncoils and displaces the pointer 34. A metal stabilising weight 6 is positioned at the bottom of the device. Furthermore the bimetallic strip and the pointer are very light in weight. Consequently the device floats stably in the oil with the pointer 34 parallel to the surface of the oil, and remains stationary when the pointer moves.

The client mentions that a problem with this prior art temperature indicating device is that it can be difficult to see the pointer when the device is splashed with oil.

In his letter (par. [003]), the client further refers to a prior art document D2, which discloses another device for indicating the temperature of cooking oil close to the surface of the oil. This device has a body 1 for floating on oil. A fin 12 for indicating temperature protrudes from the outer surface of the body. The fin is easy to see. A weight 5 is attached to the inner surface of the body by means of a spring 42, a hollow support 40 and a layer of wax 41. When the temperature of the wax reaches 180°C it melts so that the weight 5 is displaced by the spring 42 away from the support 40. As a result, the device rotates in the oil, indicating that the oil is at 180°C. The device floating in oil with the fin 12 pointing upwards is an indication that the temperature of the device has reached or exceeded 180°C, irrespective of the actual temperature of the oil.

The client mentions that a problem with this prior art temperature indicating device is that the device must be discarded or reconditioned after it has been used once.

1.3. Challenges of the Paper

The client describes three examples of the invention. The client wishes to protect all the examples of the device in a European Patent application.

In a first example (Figs. 1 to 4), a bimetallic strip is attached at one end to the inner surface of a hollow spherical body. A ball-shaped weight is attached to the other end of the bimetallic strip. If the temperature of the surrounding oil increases, the bimetallic strip bends and displaces the weight away from the centre of the body so that the device rotates in the oil.

In a second example (Figs. 5 and 6), a ball-shaped weight is attached to the inner surface of a spherical body by means of a first spring and a second spring. The stiffness of the first spring is independent of temperature. The second spring is a thermo-variable spring. If the temperature of the surrounding oil increases, the second spring becomes stiffer so that the weight is displaced away from the centre of the body and the device rotates in the oil.

In a third example (Figs. 7 and 8), a weight is attached to the inner surface of a body by means of a tension spring and a magnet. The weight is held in a guiding tube. If the temperature of the surrounding oil exceeds the Curie temperature of the magnet, the magnet loses its magnetic properties, so that the spring displaces the weight away from the magnet in the guiding tube and the device rotates in the oil.

In all three examples of the invention, the weight is held in a first position by an attachment means, such that the body adopts a first predetermined orientation in the oil indicating said first temperature. The attachment means are also configured to hold the weight in a second position, such that the body adopts a second predetermined orientation in the liquid indicating a second temperature. In response to a change in temperature of the attachment means from the first temperature to the second temperature, the weight is displaced from the first position to the second position relative to the body. In addition, when the temperature of the attachment means changes from the second temperature back to the first temperature, the weight is displaced from the second position back to the first position.

1.4. The Marking Scheme

Answer papers were awarded marks on a scale of 0 to 100 marks:
up to **50 marks** were available for an independent claim,
up to **35 marks** were available for a set of dependent claims, and
up to **15 marks** were available for the introductory part of a description.

2. Independent claim (up to 50 marks available)

Generally it is noted that the marks awarded for an independent claim reflect the degree to which the claim achieves protection for the client's invention in its broadest possible scope.

This year, the only independent claim expected was a device category claim to a temperature indicating device.

Where an answer paper has an additional independent claim in a different category, e.g. a method of indicating the temperature of a liquid, 50 marks were available for the independent device claim and no marks were available for the independent method/use claim.

Answer papers having multiple independent claims in the device category which attempt to cover different examples of the invention (e.g. the examples shown in Figs. 1-6 on the one hand and the example shown in Figs. 7-8 on the other hand) achieved up to 35 marks for the independent claims in total, because it is considered that the invention can be appropriately claimed with a single independent device category claim.

Other cases were considered on a case-by-case basis.

This year separate applications were not expected and no marks were foreseen for them.

2.1 Example Solution

Example feature set as a basis for an independent claim:

(a) Device for floating in a liquid and for indicating the temperature of the liquid, said device comprising

(b) a body,

(c) a weight,

(d) an attachment means attaching the weight to the body,

(e) wherein said attachment means is configured to displace the weight from a first position relative to the body to a second position relative to the body in response to a change in temperature of the attachment means from a first temperature to a second temperature and from the second position back to the first position in response to a change in temperature of the attachment means from the second temperature to the first temperature, whereby

(f) the attachment means is configured to hold the weight in the first position, such that the body adopts a first predetermined orientation in the liquid at said first temperature, and

(g) the attachment means is configured to hold the weight in the second position, such that the body adopts a second predetermined orientation in the liquid at said second temperature.

2.2 Equivalent/non-equivalent wording of example solution

In the following notes, remarks are made to features of the example solution. An “equivalent” indicates a different wording for a given feature that achieved the same number of marks as the wording given in the example solution. It is not intended to indicate that the wording itself necessarily has exactly the same meaning as the wording of the example solution. A “non-equivalent” indicates a different wording for a given feature that did not achieve the same number of marks as the wording given in the sample solution.

Remarks to feature (a)

Equivalents: Instead of feature (a), using the wording *"Temperature indicator for floating in a liquid"*, *"Temperature indicating device for floating in a liquid"*, *"Temperature indicating device arranged so that when it floats in a liquid it can indicate the temperature of the liquid",* or *"Floatable device for measuring a temperature of a liquid"*. If "*floating*" is not mentioned, there is no deduction of marks, e.g. *"Device for determining the temperature of a liquid"*.

Non-equivalents: Specifying the type of liquid leads to an unnecessary limitation (see 2.3.2). A device for indicating more than one specific temperature unnecessarily limits the claim (see 2.3.1).

Remarks to feature (b)

Non-equivalents: "*spherical body", "ball", "ball-shaped body", "hollow body", "metal body", "body comprising metal"* are all unnecessary limitations (see 2.3.2 or 2.3.3).

Remarks to feature (c)

If a claim misses any reference to a weight, the claim risks being unclear (see 2.6.2).

Equivalents: "*mass"; "element",* a physical element implicitly has a weight.

Non-equivalents: "*ball", "ball-shaped weight"; "central weight"; "metal weight"* are considered to be unnecessary limitations (see 2.3.1 or 2.3.2).

Remarks to feature (d)

If a claim misses feature (d), the claim may be unclear (see 2.6.2).

Equivalents: "*holding means for holding the weight with respect to the body"; "displacing means for displacing the weight with respect to the body"; "positioning means for positioning the weight with respect to the body";* "*means connecting the weight to the body"*; "*means connecting the weight to a surface of the body"*

Non-equivalents: "*an attachment means attaching the weight"* (without reference to the body); "*an attachment means attaching the weight to the inner surface of the body"* (see 2.3.2)*;* "*a bimetallic strip for attaching the weight to the body"* (see 2.3.1); "*a spring for attaching the weight to the body"* (see 2.3.1); "*attachment means comprising metal"* (see 2.3.3), "*first and second holding means"* (see 2.3.3)

Remarks to feature (e)

In order for the device to solve the underlying problem of the invention, a user must be able to associate at least one particular orientation of the device with the temperature of the liquid being at or above a particular temperature.

Equivalents: In the example solution the features (e), (f) and (g) define two temperatures, two corresponding positions of the weight and two corresponding orientations of the body. Alternatively, full marks could have been achieved using the expressions “*reversible*” or “*reversibly*” (see 2.6.3).

Non-equivalents: If the reversible nature of the displacement of the weight is neither explicitly nor implicitly present in a claim, the claim risks a lack of novelty with respect to D2 (see 2.4.2). A claim corresponding to the example solution replacing feature (e) by "*the displacement of the weight by means of the attachment means is thermo-variable",* or using the expressions "*increasing temperatures"* and "*decreasing temperatures"* may lead to a lack of clarity (see 2.6.3).

Remarks to feature (f)

Feature (f) defines a relationship between the position of the weight and the orientation of the body. The device of D1 comprises features (a) to (e). A claim not defining a relationship between the position of the weight and the orientation of the body risks a lack of novelty with respect to D1 (see 2.4.1).

Equivalents: "*...such that the device adopts a first orientation…"* (feature (f) without the orientation being defined as “predetermined”).

Non-equivalents: use of the term "*position*" instead of "*orientation*" (see 2.6.3).

Remarks to feature (g)

As with feature (f), a claim not defining a relationship between the position of the weight and the orientation of the body risks a lack of novelty with respect to D1 (see 2.4.1).

Equivalents: *"...such that the device adopts a second orientation…"* (feature (g) without the orientation being defined as “predetermined”).

Non-equivalents: use of the term "*position*" instead of "*orientation*" (see 2.6.3).

2.3 Unnecessary Limitations (up to -50 marks)

Unnecessary limitations in independent claims are considered to be features that: a) are unnecessary for defining the client’s invention in its broadest possible scope; and b) disadvantage the client by limiting the scope of the claim.
An unnecessary limitation may for example result in the exclusion of protection for one of the examples of the invention discussed in the client’s letter.

If a feature of a claim is unclear so that it is ambiguous as to whether or not the claim is unnecessarily limited by that feature, then this is considered under the section lack of clarity (see 2.6) and not in this section.

2.3.1 Generally, where a claim is unnecessarily limited to the extent that one of the examples specifically illustrated in Figs. 1-8 of the client's letter is not covered by the claim, then 20 marks were deducted for each example which is not covered.

Examples:

- A device for indicating at least two different second temperatures (-20 marks for excluding the example of Figs. 7-8).
- Ball-shaped weight (-20 marks for excluding the example of Figs. 7-8).
- A claim according to which the weight is held in its first position at the centre of the body (-20 marks for excluding the example of Figs. 7-8).
- Attachment means comprising a bimetallic strip (-40 marks for not covering the example of Figs. 5-6 and of Figs. 7-8).
- Attachment means comprising a spring (-20 marks for not covering the example of Figs. 1-4).
- A claim having features (a) to (g) of the example solution additionally defining at least one fin on the outer surface of the body for indicating temperature (-20 marks for not covering the example of Figs. 1-4).
- A claim having features (a) to (g) of the example solution additionally defining lines on the outer surface of the body for indicating temperature (-40 marks for not covering the example of Figs. 5-8).
- A claim which at least implicitly defines a continuous change in position of the weight with a continuous temperature change (-20 marks for excluding the example of Figs. 7-8).
- Below a specific temperature the weight is always held in a first position, whereas when reaching said specific temperature the weight moves to a second position (-40 marks for excluding the examples of Figs. 1-6).

2.3.2 Independent claims having all the features of the example solution claim and at least one additional feature in accordance with the following examples are considered to be unnecessarily limited. Marks were deducted for claims using the following examples as a reference:

A claim having all features (a) to (g) of the example solution additionally defining:

- (in feature (a)) that the device is used for (cooking) oil (-5 marks for excluding the use mentioned in par. [025]);
- that the body is a spherical body (-20 marks for excluding the arrangement mentioned in first sentence of par. [024]);
- that the body is hollow and/or any of the components, such as the weight or the attachment means, is specified as being located inside the body (-20 marks for excluding the arrangement mentioned in last sentence of par. [023]);
- that the body is made of metal (-20 marks for excluding the arrangement mentioned in first two sentences of par. [023]);
- that the weight is made of metal (-20 marks for excluding ceramic material see par. [007]);

- a stabilising weight (-20 marks for excluding the arrangement mentioned in second sentence of par. [024]);
- that the second temperature is 180°C (-20 marks for excluding the use mentioned in par. [025]).

2.3.3 Other features present in all examples of the client's invention but considered to be unnecessary for defining the invention lead to a deduction of fewer marks:

A claim having all features (a) to (g) of the example solution additionally defining:

- that the body comprises metal (-5 marks);
- that the attachment means comprises metal (-5 marks);
- that the device is floating in the liquid (-5 marks for claiming the device whilst in use).

A claim formulated using instead of feature (d) "first and second holding means for holding the weight with respect to the body", or "first and second attachment means attaching the weight to the body" arguably covers all examples of the client's invention. However, such a feature is unnecessary for defining the invention in its broadest possible scope (-5 marks).

2.3.4 A claim having all features (a) to (g) of the example solution further defining any additional feature(s) of the following example is not considered as being limited, no marks are deducted:

- the body and/or attachment means is made of a heat conductive material.

2.4 Lack of Novelty (-30 marks)

An independent claim that is considered to lack novelty against any of the available prior art lost 30 marks.

2.4.1 The following is noted regarding the document D1:

The device of D1 comprises a pointer (34) attached by a bimetallic strip (30) to the inner surface of a body (1). Although the pointer (34) is disclosed as being very light in weight, it does have some weight. Therefore D1 discloses a weight (34) attached to a body (1) by means of an attachment means (30).

The bimetallic strip (30) is configured to displace the pointer (34) from a first position relative to the body (1) to a second position relative to the body in response to a change in temperature of the strip from a first temperature to a second temperature (penultimate sentence of par. [003]) and from the second position back to the first position in response to a change in temperature of the strip from the second temperature to the first temperature (last sentence of par. [003]).

Due to a stabilising weight (6), the body (1) adopts an orientation in the liquid in which the pointer (34) is parallel to the surface of the oil.

Features (f) and (g) of the example independent claim provide novelty with respect to D1. In D1 the orientation of the body (1) does not indicate the temperature of the liquid. Instead, the position of the pointer (34) relative to the scale (35) on the outer surface of the body (1) indicates the temperature of the liquid. Furthermore, the change of the position of the pointer (34) from a first to a second position does not result in a change in orientation of the body (1) in the liquid. This is confirmed by par. [005] and par. [006] of D1, which state that the body (1) remains stationary in the liquid.

A claim having only features (a) to (e) of the example solution is considered to lack novelty with respect to D1 (-30 marks).

2.4.2 The following is noted regarding the document D2:

The device of D2 comprises a ball-shaped weight (5) attached to the inner surface of a body (1) by: a spring (42); a hollow support (40); and a layer of wax (41).

When the temperature of the spring (42), the support (40) and the wax (41) increases from a first temperature to a second temperature (second sentence of par. [003]), the wax melts and the spring displaces the weight (5) from a first position relative to the body (1), shown in Fig. 1, to a second position relative to the body, shown in Fig. 2 (third sentence of par. [003]).

Furthermore, the spring (42) in combination with the layer of wax (41) on the support (40) are configured to hold the weight (5) in the first position shown in Fig. 1, such that the body (1) adopts a first predetermined orientation in the liquid at said first temperature (last sentence of par. [002]). On the other hand, the spring (42) is also configured to hold the weight (5) in the second position shown in Fig. 2, such that the body (1) adopts a second predetermined orientation in the liquid at said second temperature (second and fourth sentences of par. [004]).

Feature (e) of the example independent claim provides novelty with regard to D2. In D2 the weight (5) is not displaced from the second position back to the first position in response to a change in temperature of the spring (42) from the second temperature to the first temperature because there is no mechanism to move the weight back without external intervention, furthermore, the wax melts and disperses. Therefore the change in position of the weight due to a temperature change cannot be reversed merely by a subsequent return to the original temperature. The change in position of the weight can only be “reversed” by reconditioning the device (par. [005]).

A claim having features (a) to (d), (f) and (g), but without the reversible characte of the attachment means with respect to temperature change defined in feature (e), lacks novelty with respect to D2 (-30 marks).

Example:

- A claim having features (a), (b), (c) and (d) of the example solution, wherein the device is arranged so that the attachment means causes the weight to be reversibly displaced so that the orientation of the body is reversibly displaced (-30 marks).

2.4.3 If, due to an unclear formulation, there were doubts as to whether or not the wording of a claim could be read onto a piece of the prior art, then such claims were considered under lack of clarity (see 2.6), not under lack of novelty.

Claims which are novel over the available prior art, but do not comprise all the features of the example solution were assessed on a case-by-case basis, and were typically considered under Inferior Solutions (see 2.8).

2.5 Lack of Inventive Step (up to -25 marks)

An answer paper having a single independent claim, whose subject-matter is considered to lack an inventive step in the light of the available prior art lost 25 marks.

2.6 Lack of Clarity (up to -30 marks)

Up to 30 marks in total could have been deducted in this section. The full deduction of 30 marks was applicable where the sum of all clarity issue deductions added up to 30 marks or more.

2.6.1 Claims defined in terms of a result to be achieved

Claims which attempt to define the invention in terms of a result to be achieved lost marks under lack of clarity irrespective of whether or not the claim additionally lost marks due to lack of novelty.

The mechanism by which temperature is indicated in the invention can be summarised by the following elements:

1. a change in temperature of the liquid causes
2. a change of temperature of the attachment means causing

3. the attachment means to displace the weight so that
4. the orientation of the body changes.

Answer papers missing elements 2 and 3 completely lost 25 marks. Answer papers having at least parts of elements 2 and 3 lost fewer marks. This is illustrated by the following examples:

Examples:

- A claim having features (a) and (b) of the example solution, wherein "the device is arranged so that a change in temperature of the liquid from a first temperature to a second temperature causes the orientation of the body to change from a first predetermined orientation to a second predetermined orientation and so that a change in temperature of the liquid from the second temperature to the first temperature causes the orientation of the body to change from the second orientation to the first orientation". (-25 marks for missing elements 2 and 3)

- A claim having features (a), (b), (c) and (d) of the example solution, wherein "the device is arranged so that a change in temperature of the attachment means from a first temperature to a second temperature causes the orientation of the body to change from a first predetermined orientation to a second predetermined orientation and so that a change in temperature of the attachment means from the second temperature to the first temperature causes the orientation of the body to change from the second orientation to the first orientation. (- 20 marks for missing elements 1 and 3)

- A claim having features (a), (b), (c), (d), (f) and (g) of the example solution, and having, instead of feature (e), the feature: "wherein the device is arranged so that a change in temperature of the liquid from a first temperature to a second temperature causes the weight to be displaced from a first position relative to the body to a second position relative to the body and so that a change in temperature of the liquid from the second temperature to the first temperature causes the weight to be displaced from the second position relative to the body to the first position relative to the body". (- 5 marks for missing element 2)

2.6.2 Claims defined in terms of a means for changing the centre of gravity

Full marks were awarded for a claim defining the features (c) and (d) of the example solution in combination, for example using an expression such as “means for changing the centre of gravity of the device”, provided the claim as a whole was clear and achieved an equivalent scope to that of the example solution.

However, claims using such expressions to replace features (c) and (d) risk defining a result to be achieved (2.6.1) and/or otherwise lacking clarity. It is important to note that a change in the centre of gravity of a floating device does not necessarily lead to a change in orientation of the device. Such claims were considered on a case-by-case basis.

Examples:

- A claim having features (a) and (b) of the example solution, wherein the device further comprises means for changing the centre of gravity of the device from a first position to a second position with respect to the body in response to a change of temperature from a first temperature to a second temperature and for changing the centre of gravity back to the first position in response to a change of temperature from the second temperature to the first temperature (-25 marks for missing a link between the change of the centre of gravity and a change in orientation of the body).

- A claim having features (a) and (b) of the example solution, and further having the features: "wherein the device further comprises means for changing the centre of gravity of the device, the means for changing the centre of gravity being configured to change the centre of gravity as a function of temperature so that the device adopts a first predetermined orientation in the liquid at a first temperature and a second predetermined orientation in the liquid at a second temperature, and again adopts the first predetermined orientation in response to a change in temperature of the liquid from the second temperature to the first temperature" (-10 marks for missing that the centre of gravity would be fully restored to its state prior to the temperature change).

2.6.3 Other Clarity Issues

A claim which is novel and in which the attachment means displaces the weight at increasing and decreasing temperatures without defining first and second temperatures risks lacking clarity, particularly if it is not at least implicitly defined that increases/decreases in temperature cause the weight to undergo corresponding changes in position and the device to correspondingly adopt different orientations when floating in the liquid in such a way that it would be possible to derive an indication of temperature.

Example:

- the displacement of the weight by means of the attachment means is thermo-variable (up to -5 marks where the context of the term “thermo-variable” leads to a lack of clarity).

Furthermore, the use of the expression 'reversible' in a novel claim may lead to a lack of clarity, in particular when a link to the temperature change is missing. In this context the word “reversible” is considered to mean that after a temperature

change, the position and orientation of the weight and the body respectively would be fully restored to their position and orientation prior to the temperature change if a temperature change in the opposite sense occurs.

Examples:

- holding means causing the weight to be reversibly displaced so that the orientation of the body is reversibly changed (up to -10 marks for missing a connection with a temperature change);

- reversible element, reversible weight, reversible attachment means (up to -10 marks; these expressions may lead to a lack of clarity because whilst the movement of an element may be reversed it may be unclear what is meant by a “reversible element”);

- holding means causing the weight to be reversibly displaced in response to a temperature change so that the orientation of the body is reversibly changed (no marks deducted);

- reversible temperature dependent movement (no marks deducted).

Other minor issues of lack of clarity lost up to 5 marks per feature.

Examples:

- use of "position of the body" instead of "orientation of the body" may result in an unclear claim (up to -5 marks, a translational movement of a device for example results in a different position of a body without its orientation having changed);

- a temperature indicating means (-5 marks, because it is not clear whether or not the arrangement mentioned in the first two sentences of par. [023] is excluded);

- stabilising means (-5 marks, because it is not clear whether or not the arrangement mentioned in the last sentence of par. [024] is excluded).

2.7 Formal Matters (up to -5 marks)

2.7.1 For the example solution it is considered appropriate to use a two-part form of claim. A two-part form of claim that was not correct with respect to at least one of the items of prior art mentioned in the client’s letter lead to a deduction of 3 marks.

2.7.2 The total absence of reference signs in the claims resulted in a deduction of 2 marks.

Partially incorrect or very incomplete reference signs in the claims resulted in a deduction of 1 mark.

2.8 Inferior Solutions (up to 30 marks available)

An independent claim which is considered to be an inferior solution is a claim which:

- offers a less favourable scope of protection for the client than the example solution claim, for example because it is contrary to the client's wishes;
- misses at least one feature of the example independent claim;
- has at least one feature that is not in the example independent claim; and
- is new and arguably not obvious with respect to the available prior art.

3. Dependent Claims (up to 35 marks available)

Generally it is noted that the marks awarded for a dependent claim reflect the degree to which the claim offers a fall-back position for the client, taking into consideration the independent claim or claims and the prior art available. No marks were awarded for any claims subsequent to a 15th claim, since the client states that claim fees will not be paid.

3.1 Structure

3.1.1 Important requirements for awarding full marks are:

- clarity, e.g. consistency of terminology with the independent claim;
- claim structure, a set of dependent claims having a structure which gives the client an appropriate set of fall-back options whilst at the same time being concise and having claims with correct back-references is considered to have a good structure.

3.1.2 As a general rule, where a feature A is unnecessarily limited in a set of dependent claims, by grouping it together with a feature B, the full potential of a fall-back position for features A and B is not achieved. The number of marks available for a claim combining features A and B corresponded to the number of marks achieved either by a claim to feature A or a claim to feature B, whichever was lower.

Example:

Dependent claims 2 and 3 depending on the example solution independent claim, and having the wording:

“2. A device according to claim 1, further characterised by feature X” (2 marks).
“3. A device according to claim 1 (and/or claim 2), further characterised by feature Y” (1 mark).

In this case the total obtained for the two features in claims 2 and 3 is 3 marks. However, the above features claimed together in a single claim and not claimed as options, give the client a more limited fall-back position:

"2. A device according to claim 1, having features X and Y" (1 mark).

3.1.3 Where an answer paper has an independent claim which differs from that of the example solution, the dependent claims may differ from the example dependent claims. This was considered on a case-by-case basis, considering the value of the dependent claims in the light of the independent claim.

3.2 Example feature set

In this section, an example feature set is defined which could have been used to formulate good dependent claims for an independent claim corresponding to the example solution discussed above. In the example feature set, groups of features for dependent claims are defined, each relating to a specific aspect of the invention. The marks available for each of these groups is indicated. It is however noted that there are different ways of grouping features in dependent claims whilst still achieving the full number of available marks. An example set of claims is attached in annex (see 5).

Intermediate temperatures (up to 3 marks)

- between the first and the second temperatures, the position of the weight and therefore the orientation of the device is a continuous function of the temperature of the attachment means (up to 3 marks)

Attachment means and weight (up to 21 marks)

- the attachment means comprises a bimetallic strip (up to 4 marks)
- the attachment means comprises a thermo-variable spring (up to 4 marks)
- the thermo-variable spring is made of a nickel-titanium alloy (up to 2 marks)
- the attachment means comprises a magnet (up to 3 marks)
- the magnet is made of a nickel-iron alloy having 30-35% nickel by weight (up to 2 marks)
- the weight is held by a guide (up to 2 marks)
- the magnet functions as a stabilising weight (up to 2 marks)
- the weight is made of ceramic (up to 2 marks)

Body (up to 7 marks)

- the body is elongated (3 marks)
- the body is made of a non-magnetic material such as aluminium (up to 2 marks)
- the attachment means attaches the weight to the outer surface of the body (up to 2 marks)

Indicator (up to 4 marks)

- a temperature indicator in the form of a plurality of circumferential lines provided on the outer surface of the body, each line being labelled with a temperature value (up to 2 marks)
- a temperature indicator in the form of a plurality of fins protruding from the outer surface of the body, each fin being labelled with a temperature value (up to 2 marks)

3.3 Other dependent claims offering a useful fall-back (up to 5 marks)

3.3.1 Claims considered to offer a useful fall-back position (up to 5 marks)

Up to 5 marks in total were available for one or more additional dependent claims which offer a useful fall-back position or positions, provided the total of 35 marks for the dependent claims was not exceeded. The dependent claims appropriate for achieving fall-back positions may depend on the independent claim. For example, if an answer paper has an independent claim to a device that is not new with respect to D2 because feature (e) is missing, a dependent claim to this feature is an important fall back position for the applicant (5 marks).

3.3.2 Claims considered not to offer a useful fall-back position

Dependent claims which were considered not to offer a useful fall-back position for the client were not awarded marks.

Examples:

- the body has a spherical shape;
- the body is made of metal;
- the body is hollow;
- the attachment means and/or the weight are arranged in the body;
- the body is cylindrical;
- the body comprises a transparent top;
- the device comprises a stabilizing weight;
- numerical indication of temperature;
- indication of specific temperatures;
- the temperature indicator is one fin protruding from the outer surface of the body.

4. Description (15 marks available)

4.1 For an acknowledgement of prior art, 5 marks were available. Full marks in this section were available for citing a single piece of prior art and explaining it. When the independent claim is constructed in the two-part form, full marks were available for a brief explanation of the cited prior art. When the independent claim is constructed in the one-part form, full marks were only awarded in this section for a citation of a piece of prior art and explanations from which it is derivable which of the features claimed in the independent claim are known from the cited prior art (see GL C-III, 2.3.2).

4.1.1 For the example solution independent claim, D2 is considered to be more relevant than D1. Both D1 and D2 are considered to disclose devices having an element constituting a weight attached to a body in which the attachment means is configured to displace the weight from a first position relative to the body to a second position relative to the body in response to a change in temperature of the attachment means from a first temperature to a second temperature. In D1, like the device of the example solution independent claim, the attachment means is configured to displace the weight from the second position back to the first position in response to a change in temperature of the attachment means from the second temperature to the first temperature. In D2, the attachment means cannot return the weight to its first position. However, D2 discloses a first and a second predetermined orientation of the body in the liquid, when the weight is in its first or its second position respectively. As a result, the change in orientation of the body in the liquid gives a clear indication of the change in temperature of the liquid.

4.1.2 For a claim according to the example solution independent claim it is appropriate to cite D2 (2 marks) and explain its content (up to 3 marks).

4.1.3 For the example solution independent claim, merely citing D2 without describing its technical content received 2 marks.

4.1.4 For the example solution independent claim, a citation of D1 and explanation of its content received up to 3 marks.

4.1.5 For the example solution independent claim, a mere citation of D1 without describing its technical contents received 1 mark.

4.2 A total of 6 marks were available for a discussion of a problem. Full marks were only awarded for a problem consistent with the prior art acknowledged and with the independent claim of the answer paper. General problems received few or no marks e.g. 'making a device more practical to use' (0 Marks).

4.2.1 For the example solution independent claim, the discussion can be as follows: D2 discloses a device for indicating the temperature of

cooking oil close to the surface of the oil. This device comprises a body with an external fin, a weight held inside the body by means of a spring, a conical support and a layer of wax. A problem with this device is that it cannot be used more than once to indicate a temperature unless it is first reconditioned.

4.3 A total of 4 marks were available for a discussion of a solution to the problem provided by the invention. Full marks were only awarded for a solution consistent with the independent claim of the answer paper.

Other arguments pertaining to problems that are not solved by the independent claim of an answer paper were not awarded marks.

4.3.1 For the example solution independent claim, a solution to the above problem could be discussed as follows: in the invention as claimed, the attachment means attaching the weight to the body is not only configured to displace the weight from a first position relative to the body to a second position relative to the body in response to a change in temperature of the attachment means from a first temperature to a second temperature but also configured to displace the weight from the second position back to the first position in response to a change in temperature of the attachment means from the second temperature to the first temperature.

5. Annex - Example set of claims

1. Device for floating in a liquid and for indicating the temperature of the liquid, said device comprising

   - a body (1),
   - a weight (5; 22),
   - an attachment means (3; 10, 11; 20, 21) attaching the weight (5; 22) to the body (1), characterised in that

   said attachment means (3; 10, 11; 20, 21) is configured to displace the weight (5; 22) from a first position relative to the body (1) to a second position relative to the body (1) in response to a change in temperature of the attachment means (3; 10, 11; 20, 21) from a first temperature to a second temperature and from the second position back to the first position in response to a change in temperature of the attachment means (3; 10, 11; 20, 21) from the second temperature to the first temperature, whereby the attachment means (3; 10, 11; 20, 21) is further configured to hold the weight (5; 22) in the first position, such that the body (1) adopts a first predetermined orientation in the liquid at said first temperature, and whereby the attachment means (3; 10, 11; 20, 21) is configured to hold the weight (5; 22) in the second position, such that the body (1) adopts a second predetermined orientation in the liquid at said second temperature.

2. Device according to claim 1, wherein, between the first and the second temperatures, the position of the weight (5) and therefore the orientation of the device is a continuous function of the temperature of the attachment means (3; 10, 11).

3. Device according to claim 2, wherein the attachment means comprises a bimetallic strip (3).

4. Device according to claims 1 or 2, wherein the attachment means comprises a thermo-variable spring (11).

5. Device according to claim 4, wherein the thermo-variable spring (11) is made of a nickel-titanium alloy.

6. Device according to claim 1, wherein the attachment means comprises a magnet (20).

7. Device according to claim 6, wherein the magnet (20) is made of a nickel-iron alloy having 30-35% nickel by weight.

8. Device according to any of claims 6 or 7, wherein the weight (22) is held by a guide (23).

9. Device according to any of claims 6-8, wherein the magnet (20) functions as a stabilising weight.

10. Device according to any of claims 6-9, wherein the body (1) is made of a non-magnetic material such as aluminium.

11. Device according to any of the claims 1-5, wherein the weight (5) is made of ceramic.

12. Device according to any of the preceding claims, wherein the body (1) is elongated.

13. Device according to any of the preceding claims, wherein the attachment means attaches the weight to the outer surface of the body (1).

14. Device according to any of the preceding claims, comprising a temperature indicator in the form of a plurality of fins (12) protruding from the outer surface of the body (1), each fin being labelled with a temperature value.

15. Device according to any of claims 1 to 13, comprising a temperature indicator in the form of a plurality of circumferential lines (7) provided on the outer surface of the body (1), each line being labelled with a temperature value.

EXAMINATION COMMITTEE I

Candidate No. _____

Paper A (Electricity/Mechanics) 2012 - Marking Sheet

Category	Maximum possible	Marks awarded	
Independent claim	50		
Dependent claims	35		
Description	15		
Total	100		

Examination Committee I agrees on ..... marks and recommends the following grade to the Examination Board:

☐ PASS (50-100)

☐ COMPENSABLE FAIL (45-49)

☐ FAIL (0-44)

28 June 2012

_____

Chairman of Examination Committee I