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Datasheet for the decision of 2 July 2024

Case Number: T 0881/22 - 3.4.02

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Title of invention:
Switching power source circuit

Applicant:
Daikin Industries, Ltd.

Relevant legal provisions:
EPC Art. 84

Keyword:
Claims - clarity - main request and auxiliary requests 1 to 5 (no)

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Boards of Appeal

Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 0881/22 - 3.4.02

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 2 July 2024

Appellant: (Applicant)	Daikin Industries, Ltd. Osaka Umeda Twin Towers South, 1-13-1 Umeda, Kita-ku Osaka-shi, Osaka 530-0001 (JP)
Representative:	Hoffmann Eitle Patent- und Rechtsanwälte PartmbB Arabellastraße 30 81925 München (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 18 October 2021 refusing European patent application No. 11762412.2 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairwoman	C.D. Vassoille
Members:	H. Bronold
	R. Cramer

Summary of Facts and Submissions

I. The appeal of the patent applicant (appellant) is against the decision of the examining division refusing European patent application No. 11 762 412.2.

II. The examining division *inter alia* reached the conclusion that the subject-matter of claim 1 according to the main request and according to auxiliary requests 1 to 4 pending before it lacked an inventive step over a combination of documents D1 and D2. The contested decision contains in an *obiter dictum* the opinion of the examining division that claim 1 also lacked an inventive step over a combination of documents D1 and D5. Documents D5 and D6 were introduced by the examining division with their annex to the summons to oral proceedings.

III. The appellant requested that the contested decision be set aside and that a patent be granted on the basis of the claims of their main request or on the basis of the claims of one of their auxiliary requests 1 to 5, all filed together with the statement setting out the grounds of appeal. The appellant further requested that documents D5 and D6 not be admitted into the proceedings because they were presented late and not pertinent.

IV. In a communication pursuant to Article 15(1) RPBA the board raised an objection of lack of clarity against claim 1 of the main request under Article 84 EPC. The board furthermore expressed the preliminary opinion that the objection of lack of clarity applied

correspondingly to claim 1 according to all auxiliary requests.

V. With letter dated 31 May 2024 the appellant *inter alia* provided arguments supporting clarity of claim 1 according to the main request and according to auxiliary requests 1 to 5.

VI. Claim 1 according to the main request reads as follows:

"A switching power supply circuit (4) supplying a DC current to an inverter (5) that drives a refrigerant compressor (7) provided in a refrigerant cycle (900) and functioning in a critical current mode or a non-continuous current mode, the circuit comprising:
first and second input ends (P1, P2);
first and second output ends (P3, P4);
a first path (LH1) connecting said first input end (P1) and said first output end (P3);
a first reactor (L1) provided on said first path (LH1);
a first diode (D1) connected in series with said first reactor (L1) on said first output end side on said first path (LH1) and having an anode directed to said first reactor side;
a second path (LL) connecting said second input end (P2) and said second output end (P4); and
a first switching element (S1) provided between a point located between said first reactor (L1) and said first diode (D1) and said second path (LL), characterized in that
an inductance of said first reactor (L1) takes a first value (L11) at a maximum value of a current flowing through said first reactor (L1) when said refrigerant cycle (900) operates with intermediate operating capacity or capacity lower than said intermediate operating capacity, and

the inductance of said first reactor (L1) takes a second value (L12) smaller than said first value (L11) at a maximum value of a current flowing through said first reactor (L1) when said refrigerant cycle (900) transiently operates at the capacity exceeding full-load operating capacity and when said refrigerant cycle (900) operates at said full-load operating capacity."

VII. Claim 1 according to auxiliary request 1 includes the following additional features in comparison to claim 1 according to the main request:

"wherein an inductance curve (102) of said first reactor (L1) shows almost flat characteristics in an area of a large current, the inductance curve (102) the [sic] area of a small current flowing through said first reactor (L1) is larger than the inductance in the area of a large current such that the inductance curve (102) has at least two inflection points."

VIII. Claim 1 according to auxiliary request 2 comprises the following additional feature inserted after "characterised in that" in comparison to claim 1 according to auxiliary request 1:

"a swing choke is adopted as said first reactor (L1), and"

IX. In comparison to claim 1 of the main request, in claim 1 according to auxiliary request 3 the term "for" is inserted before "supplying a DC current", "that drives" before "a refrigerant compressor" is replaced with "suitable for driving" and "wherein a swing choke is adopted as said first reactor" is inserted after "a first reactor (L1) provided on said first path (LH1),".

X. Claim 1 according to auxiliary request 4 includes the amendments of claim 1 according to auxiliary requests 1 and 3.

XI. Claim 1 according to auxiliary request 5 includes the following additional features at the beginning of the characterising portion compared to claim 1 of the main request:

"a third path (LH2) connecting said first input end (P1) and said first output end (P3) and differing from said first path (LH1);
a second reactor (L2) provided on said third path (LH2);
a second diode (D2) connected in series with said second reactor (L2) on said first output end side on said third path (LH2) and having an anode directed to said second reactor side; and
a second switching element (S2) provided between a point located between said second reactor (L2) and said second diode (D2) and said second path (LL) and being rendered conducting exclusively from said first switching element (S1); wherein"

XII. The appellant's arguments which are of particular relevance for the decision are detailed below together with the reasons for the decision.

Reasons for the Decision

1. Introduction of a new objection by the board of appeal - Article 114(1) EPC

The appellant stated that they were surprised by the introduction of a new objection by the board, namely the objection under Article 84 EPC against claim 1 of all pending requests.

In an appeal from a decision of an examining division in which a European patent application was refused, the board of appeal has the power to examine whether the application or the invention to which it relates meets the requirements of the EPC. The same is true for requirements which the examining division did not take into consideration in the examination proceedings or which it regarded as having been met (cf. G 10/93, OJ EPO 1995, 172).

The new objection of lack of clarity of claim 1 according to all pending requests was thus legitimately raised by the board.

2. Main request - Article 84 EPC

2.1 Article 84 EPC specifies that the claims define the subject-matter for which protection is sought and requires the claims to be clear, concise and supported by the description. In this context it is settled case law of the boards of appeal that the claims must be clear in themselves when read by the person skilled in the art, without any reference to the content of the

description (Case Law of the Boards of Appeal of the European Patent Office, 10th edition, 2022, II.A.3.1), which is already evident from the wording of Article 84 EPC alone, reading "The claims shall...".

2.2 Claim 1 according to the main request contains the following two features 9 and 10 defining the claimed first reactor by reference to an external refrigerant cycle as follows:

9 : "an inductance of said first reactor (L1) takes a first value (L11) at a maximum value of a current flowing through said first reactor (L1) when said refrigerant cycle (900) operates with intermediate operating capacity or capacity lower than said intermediate operating capacity,"

and

10 : "the inductance of said first reactor (L1) takes a second value (L12) smaller than said first value (L11) at a maximum value of a current flowing through said first reactor (L1) when said refrigerant cycle (900) transiently operates at the capacity exceeding full-load operating capacity and when said refrigerant cycle (900) operates at said full-load operating capacity."

2.3 In its communication pursuant to Article 15(1) RPBA the board informed the appellant *inter alia* that it could not identify any instructions in the distinguishing features 9 and 10 regarding the creation of the claimed first reactor which were suitable to achieve the desired functions *inter alia* because the claimed inductance of the first reactor, according to features 9 and 10 of claim 1, would appear to necessarily depend

on the specific characteristics of the refrigerant compressor. These specific characteristics, in particular an "intermediate operating capacity" and a "full-load operating capacity" were not defined in claim 1 and also appeared to depend on the type of refrigerant compressor, which, however, did not form part of the claimed subject-matter.

With respect to the admittance of documents D5 and D6, introduced by the examining division, the board further stated in the communication under Article 15(1) RPBA that it "fails to see why these documents could be considered irrelevant for the appeal because the distinguishing features define the function of swing coils."

2.4 The appellant argued, in their reply to the board's communication, that from the board's statement regarding the admissibility of documents D5 and D6 it was evident that the skilled person faced no problem to reduce the features 9 and 10 into practice and that this was acknowledged by the board.

2.5 The board is not convinced by the appellant's argument. Firstly, the quotation is taken out of context because it belongs to the preliminary opinion of the board regarding admissibility of documents D5 and D6. Secondly, even if it was acknowledged that the distinguishing features defined the functioning of a swing choke, this does not have the consequence that the distinguishing features are to be considered clear within the meaning of Article 84 EPC.

The board notes in this respect that there exists a difference between the functioning of a swing choke and the technical features causing the functioning of a

swing choke. The former defines what is to be achieved and the latter defines how to achieve the former. Since patents are granted for solutions to technical problems, it is decisive how the desired functioning is achieved rather than what functioning is to be realised.

2.6 Moreover, even if it were assumed that the first reactor mentioned in claim 1 according to the main request is a swing choke and constituted a structural feature of the power supply circuit of claim 1, as argued by the appellant, the board still concludes that claim 1 is not clear within the meaning of Article 84 EPC as will be detailed below.

2.7 While it may be correct, as argued by the appellant, that the skilled person knows how to build a swing choke, the objected features are not exclusively directed to the functioning of a swing choke but define the functioning of the swing choke in terms of currents caused by operating conditions of "a refrigerant cycle" which does not form part of the claimed subject-matter.

2.8 In this context the appellant further argued during the oral proceedings before the board that it was permissible to define the subject-matter of a patent claim with reference to an entity not forming part of the claimed subject-matter and referred to the Guidelines for Examination. The appellant further argued that features 9 and 10 were clear for the skilled person because the skilled person knew how to build a swing choke and also knew all types of refrigerant cycles.

2.9 Although the appellant did not cite any specific section of the Guidelines for Examination, the board

acknowledges that the Guidelines for Examination contain a corresponding section in chapter F-IV.4.14.

However, the board does not agree with the appellant regarding the question whether the reference to external entities as it is formulated in claim 1 is clear within the meaning of Article 84 EPC.

The board notes regarding the reference to external entities that, in general, definitions referring to a second entity not forming part of the claimed subject-matter are considered admissible under Article 84 EPC and interpreted as "suitable for", like "a hook for a crane" for example or a "cylinder head for an engine" (as indicated in the cited section of the Guidelines for Examination).

2.10 In the present case however, the board came to the conclusion that the references used in claim 1 render the claimed subject-matter unclear within the meaning of Article 84 EPC.

Firstly, the second entity, "refrigerant cycle", is not limited to a specific entity but encompasses all possible refrigerant cycles. These can range from household appliances, like refrigerators or freezers, to cooling applications in industry, for example to liquify gases.

Secondly, the reference to the external entity is indirect. Features 9 and 10 refer to operating conditions of a refrigerant cycle whereas the claimed first reactor according to features 9 and 10 forms part of a power supply circuit which itself is "supplying DC current to an inverter", which in turn "drives a refrigerant compressor", which in turn is "provided in

a refrigerant cycle". Thus, although features 9 and 10 are referring to an external entity mentioned in claim 1, namely the refrigerant cycle, it does not become clear how the operating conditions mentioned in features 9 and 10 should be realised by modifications of both the inverter and the compressor. Therefore, it does not become clear for the person skilled in the art from features 9 and 10 which technical aspects have to be realised in the claimed first reactor, based on the given reference to operating conditions of the - unspecified - refrigerant cycle.

2.11 A further line of argument of the appellant was directed to the question under which conditions a functional definition of a technical result is permissible.

According to settled case law of the boards of appeal, (see Case Law of the Boards of Appeal of the European Patent Office, 10th edition, 2022, II.A.3.4), functional features defining a technical result are permissible in a claim

(i) if, from an objective viewpoint, such features could not otherwise be defined more precisely without restricting the scope of the invention,

and

(ii) if these features provided instructions which were sufficiently clear for the expert to reduce them to practice without undue burden.

Regarding the subject-matter of claim 1 according to the main request, the board considers neither criterion

(i) nor criterion (ii) to be fulfilled by the two distinguishing features.

2.12 Firstly, it seems to have been possible to define the subject-matter of claim 1 for example with respect to the material and shape of the magnetic core of the reactor, as well as with respect to the shape and size of the windings of the reactor. It would also have been possible to further define the operating capacities of the refrigerant cycle.

The board notes that claim 1 according to the main request is not restricted to a swing choke as first reactor. Even assuming that the first reactor according to claim 1 was a swing choke, the board is not convinced that the wording of features 9 and 10 of claim 1 define the scope of protection in a clear manner within the meaning of Article 84 EPC.

2.13 The appellant's arguments that this would have led to an overly restricted scope of protection and that it was the aim of the appellant to achieve the broadest protection possible do not convince the board. Given that the only example of a refrigerant cycle in the application is an air conditioner, the board fails to see why the scope of protection desired by the appellant and covering all possible applications of refrigerant cycles, including all types of inverters and all types of compressors, should be justified.

2.14 Secondly, as already pointed out by the board in its preliminary opinion in the communication pursuant to Article 15(1) RPBA, it is to be noted that the claimed inductance of the first reactor, according to features 9 and 10 of claim 1, would appear to necessarily depend on the specific operating conditions of the refrigerant

compressor. The specific operating conditions of the refrigerant cycle mentioned in claim 1, in particular an "intermediate operating capacity" and a "full-load operating capacity" are not clearly defined in claim 1 and depend at least on the type of refrigerant compressor for a specific refrigerant cycle, which, however, does not form part of the claimed subject-matter either.

2.15 The appellant also argued that the person skilled in the art knew how to build a swing choke and further had knowledge of all refrigerant cycles such that it was possible for the person skilled in the art to build a swing choke for any specific type of refrigerant cycle.

2.16 The board disagrees. The aspects presented by the appellant do not relate to the requirements of Article 84 EPC but to those of Article 83 EPC. The purpose of Article 83 EPC is to ensure that the claimed invention is disclosed in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art. This has not been objected to in the present case. Article 84 EPC however shall ensure that the matter for which protection is sought is defined by the claims in a clear and concise way. The board thus is not convinced by the appellant's argument.

2.17 Moreover, the appellant argued in their letter dated 31 May 2024 and during the oral proceedings before the board that the terms intermediate operating capacity and maximum load operating capacity were terms defined in standards JIS C9612 and ISO 5151-1, which were mentioned in the application.

2.18 As already mentioned above, according to settled case law of the boards of appeal, the claims must be clear

in themselves when read by the person skilled in the art, without any reference to the content of the description. This holds true even more so for documents which are only referenced in the description. The appellant's argument that the skilled person knew all standards and had to work within the limits of standards does not convince the board either. In the present case at least three different technical specialisations in three completely different technical fields would be mandatory to overview all standards concerned. One for inverters and power supply circuits, one for compressors and a further one for refrigerant cycles.

2.19 Even taking the references to the two standards in the description cited by the appellant into account, the board arrived at the conclusion that claim 1 lacks clarity within the meaning of Article 84 EPC.

The corresponding paragraph [0050] of the application (reference is made to EP 2 555 400 A1) does not contain full details regarding the disputed terms of features 9 and 10 covering the scope of claim 1.

Regrading Japanese norm JIS C9612, the application discloses in paragraph [0050] that "I1, I2, and I3 of the current IL1 correspond to the maximum currents when the power W supplied to the air conditioner 900 takes intermediate operating power consumption, rated operating power consumption, and full-load operating power consumption (see JIS C9612), respectively."

With respect to ISO 5151-1 the intermediate operating capacity is specified as "half of the rated operating power consumption" and "full-load operating capacity is the capacity at which an air conditioner is capable of

continuous output, which is specified by a producer of the air conditioner, in a cooling operation, and is 1.38 times the heating full-load operating power consumption at low temperature defined in the standard above in a heating operation."

2.20 The board notes that the references to both standards in the application are limited to the context of air conditioning. Claim 1 is however not restricted to air conditioning and covers any type of refrigerant cycle such that for all but the application in air conditioning the terms intermediate operating capacity and full-load operating capacity remain undefined even if the cited references to the two standards are taken into account. Therefore, the appellant's argument does not convince the board.

2.21 In summary, the board concludes that claim 1 lacks clarity within the meaning of Article 84 EPC. Therefore, the main request is not allowable.

3. Auxiliary requests 1 to 5

3.1 The board's above conclusion of lack of clarity of claim 1 according to the main request under Article 84 EPC applies *mutatis mutandis* to claim 1 according to auxiliary requests 1 to 5.

3.2 With respect to the features defining an inductance curve in claim 1 according to auxiliary requests 1, 2 and 4, the appellant argued that the definition of technical features by parameters was admissible and referred to the Guidelines for Examination GL-F.IV. 4.11.

3.3 The board disagrees and considers claim 1 according to auxiliary requests 1, 2 and 4 to have been amended by a further functional definition directed to desired characteristics of the inductance curve of the first reactor. This further functional definition does not render the wording of features 9 and 10 clear. Nor is it in itself allowable under Article 84 EPC.

In this context the board takes the view that the inductance curve as defined in claim 1 does not represent any technical feature of the first reactor represented by a parameter, but is merely a result of unknown measures. In the board's understanding it is thus nothing more than a graphical representation of the desired properties of the first reactor.

3.4 While the board considers the appellant's statement that the definition of technical features by parameters was admissible to be correct in general, the board does not agree that the definition of the inductance curve by the additional features of claim 1 according to auxiliary requests 1, 2 and 4 actually represents such a definition of the claimed reactor or swing choke by parameters.

In particular, the board can not identify any parameter of a reactor in the additional features describing the induction curve. A "flat characteristic in an area of a large current" and the fact that the inductance curve in "the area of a small current flowing through said first reactor (L1) is larger than the inductance in the area of a large current" does not represent parameters of the claimed reactor but merely describes the behaviour of the reactor. Therefore the additional features regarding the inductance curve in claim 1 according to auxiliary requests 1, 2 and 4 merely

represent redundant functional definitions in addition to the functional definition already given in features 9 and 10 with different wording.

3.5 The additional feature in auxiliary requests 2 to 4 replacing "that drives" by "suitable to drive" does not have any impact on features 9 and 10 objected to with respect to the main request because the inverter to which the additional feature in auxiliary requests 2 to 4 refers does not form part of the wording of features 9 and 10. The appellant did furthermore not present any corresponding arguments in this respect.

3.6 The same holds true for the additional features in claim 1 according to auxiliary request 5 relating to the third path, the second reactor, the second diode and the second switching element. The appellant did not present any corresponding arguments regarding these additional features either.

3.7 Consequently, the board concludes that none of auxiliary requests 1 to 5 is suitable to overcome the objection under Article 84 EPC against the main request. Thus, none of auxiliary requests 1 to 5 is allowable either.

4. Conclusion

Since there is no allowable request on file, the board is not in a position to accede to the appellant's requests.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairwoman:

L. Gabor C.D. Vassoille

Decision electronically authenticated