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**Datasheet for the decision
of 13 July 2016**

Case Number: T 0631/12 - 3.5.02

Application Number: 06738382.8

Publication Number: 1875594

IPC: H02M7/48, H02M7/5387

Language of the proceedings: EN

Title of invention:

Power Converter System and Method

Relevant legal provisions:

EPC Art. 123(2), 54(2)

Keyword:

Amendments - allowable - main request (no)

Novelty - auxiliary request (no)



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Case Number: T 0631/12 - 3.5.02

D E C I S I O N
of Technical Board of Appeal 3.5.02
of 13 July 2016

Appellant: GENERAL ELECTRIC COMPANY
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted on 27 October 2011
refusing European patent application No.
06738382.8 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman R. Lord
Members: H. Bronold
W. Ungler

Summary of Facts and Submissions

- I. The appeal concerns the decision of the examining division refusing the European patent application on the grounds that the request then on file contravened Article 123(2) EPC and that the subject-matter of the independent claims of that request did not involve an inventive step according to Article 56 EPC.
- II. The appellant requested in writing in the statement of grounds of appeal dated 6 March 2012 that the contested decision be set aside and that a patent be granted on the basis of the claims of their main request, which formed the basis of the decision under appeal, or if that was not possible on the basis of the claims of their auxiliary request filed together with the statement setting out the grounds of appeal.
- III. In a communication under Article 15(1) RPBA sent together with the summons to oral proceedings, the board informed the appellant that it had doubts as to whether the amendments made to the main request were allowable under Article 123(2) EPC and that it further had doubts as to whether the subject-matter of the auxiliary request was new and involved an inventive step in the sense of Articles 54(2) and 56 EPC.
- IV. With letter dated 11 July 2016 the appellant withdrew their request for oral proceedings and requested a decision according to the state of the file.
- V. The oral proceedings were held on 13 July 2016 in absence of the appellant.

VI. The following documents cited by the examining division are relevant for this decision:

D1: US 5,986,909; and

D2: US 5,339,235.

VII. Claim 1 of the main request reads:

"A power converter system (12) for supplying an output voltage, the power converter system adapted to operate in a normal mode and a fault mode, the system comprising:

a plurality of three phase bridges (14-19,90);

a plurality transformers (20,25), wherein each bridge is coupled to a primary winding of a corresponding transformer and wherein secondary windings of the transformers are coupled together;

a plurality of dc link capacitors (32,37), each coupled across a corresponding bridge; and

a controller (11) adapted for, during the normal mode, switching each bridge with a respective normal phase shift, and, during the fault mode, bypassing at least one faulty one of the bridges and switching each of the remaining ones of the bridges with a respective adjusted phase shift to generate the output voltage."

Independent method claim 12 defines a corresponding method for supplying an output voltage.

VIII. Claim 1 of the auxiliary request differs from claim 1 of the main request in the following:

- the term "three-phase" before the expression "bridges (14-19,90)" is deleted, and

- the wording "in which the harmonic components are at a minimum" is added at the end of the claim.

Independent method claim 12 defines a corresponding method for supplying an output voltage.

IX. The arguments of the appellant can be summarised as follows:

Main request

The reference to three-phase bridges was supported, at least implicitly, by the last line of page 7 and the first two lines of page 8 of the description of the application, which refer to load currents which lead, are in phase with or lag the output voltage. Document D1 related to single-phase bridges in series. When one bridge of D1 failed, the output was unbalanced. According to the invention using three-phase bridges, even if one bridge was lost, the output was still balanced.

Auxiliary request

The independent claims of the auxiliary request were amended to clarify that the respective adjusted phase shift generates an output voltage in which the harmonic components are at a minimum. The amendment was supported by lines 7 and 8 of paragraph [0022] of the description. The additional feature solved the problem of minimising overall total harmonic distortion.

Reasons for the Decision

1. Main request - Amendments

In claims 1 and 12 of the main request, the originally disclosed feature "bridges (14-19, 90)" was amended to "three-phase bridges (14-19, 90)".

The appellant argues that support for this amendment can be found in the last line of page 7 and the first two lines of page 8 of the originally filed description.

Those lines bridging pages 7 and 8 read as follows:

"In one embodiment, load current 61 leads the output voltage. In another embodiment, load current 62 is in phase with the output voltage. In yet another embodiment, the load current 63 lags the output voltage."

This passage however relates to three different embodiments, not to three phases provided in a single embodiment. Thus, this passage does not support the amendment of the main request.

Further, in figures 1 and 2 of the drawings, the outputs of the secondary windings 77-82 of the transformers 20-24 are indicated as being three-phased. However, no such indication is given for the outputs of bridges 14-19 or for the primary windings 71-76 of transformers 20-24, thus implying that the bridges are not foreseen to be three-phased. In addition, the

description is completely silent about three-phase bridges.

Consequently, the board concludes that claims 1 and 12 of the main request contravene Article 123(2) EPC.

2. Auxiliary request - Patentability

In claims 1 and 12 of the auxiliary request, the wording "in which the harmonic components are at a minimum" was added.

This feature seems to be known already from document D2. In the abstract of D2 it is stated that the power supply of D2 "compensates for a short-circuited power switch ... without introducing undesirable harmonic components", which corresponds to the effect defined in the addition to claims 1 and 12 of the auxiliary request.

Document D2 is directed to the same problem, namely to avoid harmonic components during a fault mode of a power converter system in which at least one faulty converter bridge is bypassed, see D2, abstract. D2 does not explicitly disclose a physical bypass, but neither does the application. It follows from the topology shown in figure 1 of D2, that due to the series connection of the secondary windings of transformers T1 to T6, a faulty bridge is automatically bypassed. D2 further discloses that each bridge is connected to the primary windings of a transformer and that the secondary windings of the transformers are coupled together: see column 3, lines 55 to 57, "Inverters INV4, INV5 and INV6 connect to the primaries of T4, T5 and T6, respectfully..." and lines 59 to 61, "The secondaries of transformers T1 to T6 are common to all

the primaries and are wound in a series-add configuration".

If there is a difference between the disclosure of document D2 and the subject-matter of claims 1 and 12 of this request, it might be seen as being that document D2 does not explicitly disclose capacitors which are DC-link capacitors. Document D2 does however disclose in figure 3 capacitors, which are represented by dotted lines and which are connected to the DC-side of a converter bridge. Since the present claims 1 and 12 do not specify the function of the claimed DC-link capacitors, the board is satisfied that any capacitor provided on the DC side of a bridge can be regarded as a DC link capacitor in the sense of the claim. Thus, the capacitors of figure 3 of D2 can be interpreted as DC-link capacitors, even if this is not stated explicitly. Therefore, all technical features of claims 1 and 12 are already known from document D2.

Consequently, the board concludes that the subject-matter of claims 1 and 12 of the appellant's auxiliary request lacks novelty over the disclosure of document D2.

3. Since neither the main request nor the auxiliary request is allowable, the appeal has to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



U. Bultmann

R. Lord

Decision electronically authenticated