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Datasheet for the decision of 13 October 2021

Case Number: T 0921/18 - 3.5.02

Application Number: 11700442.4

Publication Number: 2594004

IPC: H02J3/24, H02P9/48, F03D7/04, H02J3/38

Language of the proceedings: EN

Title of invention:
Power oscillation damping by a converter-based power generation device

Patent Proprietor:
Siemens Gamesa Renewable Energy A/S

Opponent:
Enercon GmbH

Relevant legal provisions:
EPC Art. 54, 56

Keyword:
Novelty - (yes)
Inventive step - (yes)

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Case Number: T 0921/18 - 3.5.02

D E C I S I O N
of Technical Board of Appeal 3.5.02
of 13 October 2021

Appellant: (Opponent)	ENERCON GmbH Dreekamp 5 26605 Aurich (DE)
Representative:	Eisenführ Speiser Patentanwälte Rechtsanwälte PartGmbB Postfach 10 60 78 28060 Bremen (DE)
Respondent: (Patent Proprietor)	Siemens Gamesa Renewable Energy A/S Borupvej 16 7330 Brande (DK)
Representative:	Aspacher, Karl-Georg Siemens Gamesa Renewable Energy GmbH & Co. KG Otto-Hahn-Ring 6 81739 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 31 January 2018 rejecting the opposition filed against European patent No. 2594004 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	R. Lord
Members:	G. Flyng
	W. Ungler

Summary of Facts and Submissions

I. The appeal lies from the decision of the opposition division rejecting the opposition to European patent number EP 2 594 004.

II. The independent claims 1 and 11 of the patent as granted read as follows (feature references added):

Claim 1

M1.1 Power generation device comprising:
M1.2 - a power generator (104);
M1.3 - a converter device (106) having
M1.4 a power output (112) for providing electrical output power (150) to an electricity network (128);
M1.5 - the converter device being configured for receiving input power (142) from the power generator (104) and providing, in response hereto, the electrical output power (150) at the power output (128);
M1.6 - the converter device (106) being configured for modulating the electrical output power (150) in response to a damping control signal (132) so as to damp a power oscillation in the electricity network (128);
characterised in that
M1.7 - the converter device (106) comprises a device controller (152) for receiving the damping control signal and controlling in response hereto elements of the converter device;
M1.8 - the device controller (152) changing the rotational speed reference of the mechanical

system of the power generator (104) in order to extract or deposit energy from the modulation of the electrical output power of the converter device (106).

Claim 11

M11.1 "Method of operating a controller of a converter device (106) configured for providing an electrical output power to an electricity network, the method comprising:

M11.2 - receiving an oscillation indicating signal (126), indicative of a power oscillation in the electricity network (128);

M11.3 - providing a damping control signal (132) to the converter device (106) in response to the oscillation indicating signal (126);

M11.4 - the damping control signal (132) being configured so as to drive the converter device (106) to modulate the electrical output power of the converter device (106) and thereby damp the power oscillation in the electricity network (128);

M11.5 - the damping control signal (132) being configured so as to drive the converter device (106) to exchange power between the electricity network (128) and a rotary machine (104) of a power generation device (102a, ... 102n) by changing the rotational energy of a rotation element (140) of the rotary machine (104);

M11.6 - changing the rotational speed reference of the mechanical system of the power generator (104) in order to extract or deposit energy from the modulation of the electrical output power of the converter device (106)."

III. The following document references are being used:

E1: WO 2005/025026 A1

E2: EP 2 182 207 A2

E3: "Power oscillation damping controller for fully rated converter wind turbines", N. D. Caliao et al., 45th International Universities Power Engineering Conference (UPEC), 2010, IEEE, Piscataway, NJ, USA, 31 August 2010, pages 1 to 6.

IV. In the contested decision the opposition division held that the subject-matter of each of the claims 1 and 11 of the patent as granted was novel and inventive.

The opposition division held in particular that document E1 did not disclose features M1.6 and M1.7 of claim 1 or features M11.3 and M11.4 of claim 11, and that document E3 did not disclose feature M1.8 of claim 1 or features M11.5 and M11.6 of claim 11.

Furthermore, they held that documents E1 and E3 presented alternative ways of solving the problem of damping power oscillations, so there was no incentive for a skilled person to combine the two teachings.

In view of this finding on the patent proprietor's main request, the four auxiliary requests that had been filed with the submission of 8 August 2017 were not addressed in the decision.

V. In the grounds for appeal the appellant (opponent) submitted in essence that the subject-matter of claims 1 and 11 of the patent as granted lacked novelty over document E1 and also lacked an inventive step starting from document E2 or E3 as closest prior art and combined with document E1.

VI. In the reply to the appeal the respondent (patent proprietor) submitted *inter alia* that document E1 did not disclose features M1.6, M1.7 and M1.8 of claim 1 or the corresponding features M11.4, M11.5 and M11.6 of claim 11, that document E3 did not disclose features M1.6 and M1.8 of claim 1, and that document E2 did not disclose features M1.6, M1.7 and M1.8 of claim 1.

VII. The Board summonsed the parties to oral proceedings, setting out their preliminary observations in a communication pursuant to Article 15(1) RPBA.

The Board noted that it was common ground that the independent claims 1 and 11 of the patent defined generally corresponding method and apparatus features and focused on claim 1 on the understanding that the observations applied also to claim 11.

Considering novelty of the patent as granted the Board noted *inter alia* that while E1 disclosed that nominal power could be additionally fed in when the rotational speed drops (see page 4, fourth paragraph), it was not clear to the Board that this necessarily implied that a "rotational speed reference" of the mechanical system had been changed, as was specified by feature M1.8 of claim 1.

Considering inventive step of the patent as granted the Board noted that the key question seemed to be whether document E1 would render it obvious for the device controller to be arranged to change the rotational speed reference of the mechanical system of the power generator for the purpose stated in feature M1.8.

VIII. The appellant and the respondent filed written submissions in preparation for the oral proceedings.

IX. Oral proceedings were held on 13 October 2021.

The appellant (opponent) requested finally that the decision under appeal be set aside and the patent be revoked.

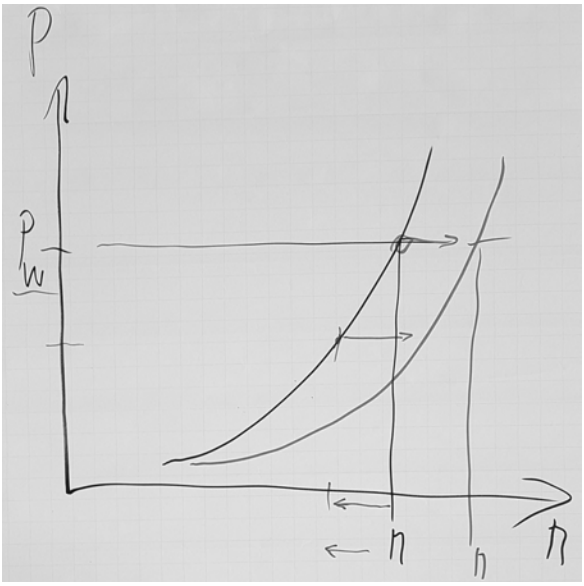
The respondent (patent proprietor) requested finally that the appeal be dismissed (main request), auxiliarily that the decision under appeal be set aside and the patent be maintained in amended form on the basis of one of the first to fourth auxiliary requests filed with letter of 8 August 2017.

X. In so far as they are relevant for the findings in this decision, the appellant's submissions in respect of the respondent's main request may be summarised as follows.

The appellant argued that the subject-matter of claim 1 of the patent as granted lacked novelty over document E1. The last paragraph on page 5 of E1 disclosed that in dependence on the converter and control system used in the wind turbine, it may be required to design the converter and the controller with different speed/power characteristics than were hitherto used, or to provide additional margin for power feed-in for utilizing the full mechanically present potential of control energy.

According to the appellant, changing the speed/power characteristic in this manner amounted to changing the rotational speed reference in the sense of feature M1.8 of claim 1.

The appellant illustrated this argument with a sketch in the oral proceedings, which is represented below:



According to the appellant, feature M1.8 of claim 1 of the patent as granted was not to be understood in the sense that there was an oscillating speed reference, as this was not disclosed in the patent. Feature M1.8 merely required that there be a change in the speed reference that would allow the output power to be modulated by other means. This was achieved in document E1 by moving to a different characteristic, as illustrated in the above sketch, which then allowed the speed to be modulated up and down.

The appellant submitted furthermore that the patent did not disclose how changing the speed reference as set out in feature M1.8 would lead to energy being extracted or deposited from the modulation of the electrical output power of the converter device.

Regarding inventive step, the appellant argued in the grounds of appeal that the subject-matter of granted claim 1 was obvious when starting from either document

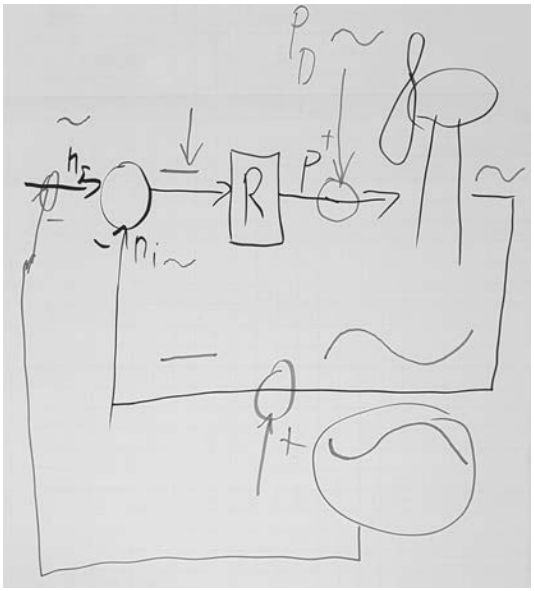
E2 or document E3 as closest prior art. The appellant conceded that neither of these documents disclosed feature M1.8, but argued that this feature was obvious in view of document E1.

In the oral proceedings the appellant did not develop this line of attack, but argued that when starting from document E1 as closest prior art the feature M1.8 was obvious in view the common general knowledge of the person skilled in the art.

The appellant submitted that document E1 mentioned the need to damp out network frequency oscillations in the second paragraph of page 14 and described in the third paragraph how this was achieved, in the example of figure 3, by the wind turbine feeding additional power into the system for 2.25 seconds and then reducing the power feed-in into the system for 2.25 seconds in order to dampen the oscillation. The appellant argued that as E1 did not disclose how this power control was achieved, this was the problem to be solved.

The appellant submitted that in the system of E1, when extra power was fed into the network, the speed of the wind turbine would naturally decrease. As a result of the speed decrease the control system would tend to react by feeding in less power, which was the opposite of what was required. To avoid that happening it would be necessary to shift the speed reference of the system such that the power control did not attempt to reduce the feed-in. This would result in an oscillating speed reference.

The appellant supported these submissions in the oral proceedings with the following illustration:



The illustration initially showed only a positive compensation input (+) being added into the actual speed negative feedback loop (n_i). Following an intervention from the respondent, the appellant submitted that the compensation could alternatively be achieved by providing a negative compensation input (-) to the speed reference (n_s) and added this negative compensation input (-) to the illustration, as shown above.

The appellant stated that all submissions in respect of claim 1 applied *mutatis mutandis* to claim 11.

XI. In so far as they are relevant for the findings in this decision, the respondent's submissions in respect of their main request may be summarised as follows.

The respondent submitted that the subject-matter of claim 1 of the patent as granted was novel over document E1, arguing *inter alia* that E1 did not

disclose changing a rotational speed reference of the mechanical system of the power generator at all, let alone in order to extract or deposit energy from the modulation of the electrical output power of the converter device as set out in feature M1.8.

According to the respondent, it was clear from the words "in order to" in feature M1.8 that according to claim 1 energy was extracted or deposited from the modulation of the electrical output power as a result of the rotational speed reference being changed. The modulation referred to in feature M1.8 was that set out in feature M1.6, i.e. the modulation of the electrical output power in response to a damping control signal so as to damp a power oscillation in the electricity network.

In paragraph [0090] of the patent, column 18, lines 26 to 33, it was disclosed that "Upon initiating a modulation of the electrical output power, the rotational speed of the rotating element 140 and hence of the rotor 136 (see Fig. 2) of the wind turbine device is decreased in order to allow the additional power between the two rotational states to be fed to the converter device 106 and thus to be output at the power output 108 in order to provide the active power modulation shown in Fig. 6". According to the respondent, this meant that the speed was actively decreased as a result of the speed reference being reduced. This was confirmed on lines 41 and 42, which stated that "... the actual rotational speed is controlled by the wind turbine control". This made it clear that speed was controlled using an oscillating speed reference.

The respondent pointed out that according to the last paragraph on page 6 of document E1, the generator/ converter system was able, for a short time, to feed slightly more power into the system than was permitted by the wind conditions. The energy was then taken from the rotating masses. From this it was clear that the drop in speed referred to the first paragraph on page 7 of document E1 was not caused by any change of speed reference, but rather was merely a consequence of reserve energy being delivered to the network. This was confirmed by the last paragraph on page 16 of document E1, which stated that *due to the drop in speed as a consequence of the activation of the reserve energy, the operating point changes from AP1 in the direction of AP2a* (translation by the Board).

The respondent submitted that the new objection of lack of inventive step starting from document E1 should not be admitted into the proceedings. Were it to be admitted, the respondent concurred with the appellant that when extra power was fed into the network the speed of the wind turbine would decrease, but argued that it was not evident from document E1 how the control scheme would then react. There was no suggestion in E1 that the speed reference should be altered in the manner argued by the appellant. E1 taught merely to increase the base speed and to allow the speed to oscillate as a consequence of the variation in the energy drawn. By contrast, the patent taught to actively vary the speed in order to extract or deposit energy from the output power.

The respondent stated that the submissions in respect of claim 1 applied *mutatis mutandis* to claim 11.

Reasons for the Decision

1. Main Request, Novelty, Article 54 EPC

1.1 Feature M1.8 of claim 1 of the patent as granted specifies that the device controller (152) *[changes]* the rotational speed reference of the mechanical system of the power generator (104) in order to extract or deposit energy from the modulation of the electrical output power of the converter device (106). The "modulation" that is referred to in feature M1.8 is that which is set out in feature M1.6, i.e. the modulation of the electrical output power in response to a damping control signal so as to damp a power oscillation in the electricity network. That is not in dispute.

1.2 The Board finds the respondent's argument persuasive, that it is clear from the words "in order to" in feature M1.8 of claim 1 that changing the rotational speed reference causes energy to be extracted or deposited from the modulation of the electrical output power. In other words, changing the rotational speed reference causes energy to be subtracted from or added to the electrical output power. As feature M1.8 gives this clear and credible technical teaching, there is no need to refer to the description to determine whether it should be given any different meaning, as proposed by the appellant.

1.3 As regards the disclosure of document E1, the Board is not convinced by the appellant's submission that changing the speed/power characteristic as described in E1 amounts to the same thing as changing the rotational speed reference in the sense of feature M1.8 of claim

1. Firstly, there is no indication in E1 that the speed/power characteristics determine or otherwise act as rotational speed references. Furthermore, E1 does not disclose that changing the speed/power characteristic causes energy to be extracted or deposited from the modulation of the electrical output power. On the contrary, as the respondent submitted, it is clear from the last paragraph on page 16 of document E1 that the speed drops as a consequence of the activation of the reserve energy, not as a consequence of any change of speed reference.

1.4 Thus, document E1 does not disclose feature M1.8 of claim 1 as granted. The same applies *mutatis mutandis* for the corresponding feature M11.6 of claim 11 as granted.

1.5 For these reasons the Board came to the conclusion that the ground for opposition under Article 100(a) EPC in conjunction with Article 54 EPC does not prejudice the maintenance of the patent.

2. Main Request, Inventive Step, Article 56 EPC

2.1 Considering the appellant's inventive step objections starting from either document E2 or document E3 as closest prior art, the Board finds that as neither of these documents discloses feature M1.8 of claim 1, a fact conceded by the appellant, and as document E1, for the reasons set out above, also does not disclose this feature, no combination of these documents can lead in an obvious manner to the subject-matter of claim 1.

2.2 Considering the appellant's inventive step objection starting from document E1 as closest prior art, the

Board is not convinced, for the reasons set out below, that feature M1.8 of claim 1 would be obvious to the person skilled in the art in view of their common general knowledge.

2.3 Firstly, the Board is not convinced by the appellant's contention that the control system of document E1 would tend to react to a speed decrease caused by extra power being fed into the network by feeding less power into the network. The disclosure of document E1 does not support this contention. There is no suggestion in E1 that the control system would react in this way, and were it to do so, that would undermine the basic purpose of the control described there, which is to feed in extra power whilst allowing the wind turbine speed to drop.

2.4 Furthermore, the Board is not convinced by the appellant's contention that it would be obvious for the skilled person to counteract this alleged tendency of the E1 control system to react by feeding less power into the network by shifting the speed reference of the system, in particular by providing a negative compensation input (-) to the speed reference (n_s) as indicated in the illustration on page 8 above. As the appellant themselves put forward, there would be at least one other potential solution to this alleged problem, namely to add a positive compensation input (+) into the actual speed negative feedback loop (n_i). Thus, even if the alleged problem were *arguendo* to exist, it would not be obvious for the skilled person to choose the proposed solution, corresponding to feature M1.8 of claim 1, from among the options available.

2.5 The same applies *mutatis mutandis* for the corresponding feature M11.6 of claim 11 as granted.

2.6 For these reasons the Board came to the conclusion that the ground for opposition under Article 100(a) EPC in conjunction with Article 56 EPC did not prejudice the maintenance of the patent.

2.7 In view of the above conclusion the question of the admissibility of the new objection can be left aside.

3. As none of the grounds for opposition cited by the appellant prejudice the maintenance of the patent, the appeal was 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