

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43bis.1)**

To:

see form PCT/ISA/220

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/EP2016/062391

International filing date (day/month/year)
01.06.2016

Priority date (day/month/year)

International Patent Classification (IPC) or both national classification and IPC
INV. H05K7/20

Applicant
ABB SCHWEIZ AG

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:



European Patent Office
P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk - Pays Bas
Tel. +31 70 340 - 2040
Fax: +31 70 340 - 3016


Date of completion of this opinion

see form
PCT/ISA/210

Authorized Officer

Seifert, Frank

Telephone No. +31 70 340-0



Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - the international application in the language in which it was filed.
 - a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
 - a. forming part of the international application as filed:
 - in the form of an Annex C/ST.25 text file.
 - on paper or in the form of an image file.
 - b. furnished together with the international application under PCT Rule 13ter.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
 - c. furnished subsequent to the international filing date for the purposes of international search only:
 - in the form of an Annex C/ST.25 text file (Rule 13ter.1(a)).
 - on paper or in the form of an image file (Rule 13ter.1(b) and Administrative Instructions, Section 713).
4. In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>14</u>
	No: Claims	<u>1-13, 15</u>
Inventive step (IS)	Yes: Claims	
	No: Claims	<u>1-15</u>
Industrial applicability (IA)	Yes: Claims	<u>1-15</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

- 1 Reference is made to the following documents:
 - D1 EP 1 637 020 A1 (RITTAL GMBH & CO KG [DE]) 22 March 2006 (2006-03-22)
 - D2 US 4 047 561 A (JASTER HEINZ ET AL) 13 September 1977 (1977-09-13)

- 2 The present application does not meet the criteria of Article 6 PCT, because the subject-matter of the independent claims 1 and 15 is not clear.
 - 2.1 The relative terms "high point" and "junction point" used in claims 1-15 has no well-recognized meaning and leave the reader in doubt as to the meaning of the technical features to which it refer, thereby rendering the definition of the subject-matter of said claims unclear, Article 6 PCT.
 - 2.2 To render the meaning of the term "high point" clear the applicant may use the definition of the high point from the description, page 8, line 15-16 "a high point 32 constituting a geodetically highest point of each supply branch 20"
 - 2.3 To render the meaning of the term "junction point" clear the applicant may use the definition of the junction point from the description, page 8, line 19-20 "The deaeration line 28 is connected to the return flow line 22 at a junction point 34."
 - 2.4 It is clear from the descriptions page 1 that it is one object of the invention to provide effective deaeration of the coolant. Therefore a part of the coolant flow is deviated from a high point of the supply branch through a deaeration line thereby removing coolant containing a relatively high amount of air or gas (page 2, line 20 to page 3, line 3). The deviated part of the coolant containing the air or gas is guided through the deaeration line towards a junction point with the return line downstream of the cooling circuit (page 5, lines 15-19). Therefore the following features are considered to be essential:

- 2.5 - A first part of the liquid coolant can flow through the at least one supply branch to cool a respective electrical component
- 2.6 - A second part of the liquid coolant flow can be divided from one or several high points of the at least one supply branch and guided through the deaeration line in order to remove the liquid coolant containing (or containing a relatively high amount of) air or gas.
- 2.7 - The second part of the liquid coolant flow guided through the deaeration line may be 0.5-30%, such as 0.5-10%, such as 0.5-5% of the first part of the liquid coolant flow guided through the cooling circuit.
- 2.8 - In case the cooling circuit comprises an inlet flow line and a return flow line, at least one junction point may be provided on the return flow line. In case several supply branches provide connections between the inlet flow line and the return flow line, several junction points may be provided immediately downstream of each supply branch.
- 2.9 Since independent claims 1 and 15 do not contain these features they do not meet the requirement following from Article 6 PCT taken in combination with Rule 6.3(b) PCT that any independent claim must contain all the technical features essential to the definition of the invention.
- 3 Furthermore, the above-mentioned lack of clarity notwithstanding, the subject-matter of the independent claims 1 and 15 is not new in the sense of Article 33(2) PCT, and the criteria of Article 33(1) PCT are therefore not met.
- 4 The present application does not meet the criteria of Article 33(2) PCT, because the subject-matter of claim 1 is not new.
- D1 discloses:
- Liquid cooling system (Paragraph [0009]; Claim 1) for cooling at least one electrical component (Paragraph [0001] "Wärmeerzeugende Einbauten eines Schaltschranks", Fig. 1 (11)), the liquid cooling system (Paragraph [0009]; Claim 1) comprising:
- a cooling circuit (Paragraph [0014]; Fig. 1 (20)) having at least one supply branch (Fig. 1 (21), (22)) for supplying liquid coolant to an electrical component (Fig. 1 (11)); and
 - at least one deaeration line (Paragraph [0014]; Fig. 1 (24), (25)) to provide a connection between a high point (High point: Fig. 1 Upper end from (21)) and

a junction point (Fig. 1 (23) -> (22)) of the cooling circuit (Paragraph [0014]; Fig. 1 (20)) to bypass a part of the cooling circuit; wherein the pressure of the liquid coolant is lower in the junction point than in the high point during circulation of the liquid coolant in the liquid cooling system (Junction point downstream of high point, thus lower pressure).

Therefore the subject-matter of claim 1 is not new within the meaning of Article 33(2) PCT.

Furthermore, the document D2 also anticipates the subject-matter of claim 1: Liquid cooling circuit: Fig.1; Electric component: Fig. 1 (12); Deaeration line: Fig. 1 (17), (18); High point: End of line (17); Junction point: Fig. 1 T-Junction connected to line (18); Deaeration bypasses cooler (Fig.1 (13))

- 5 The present application does not meet the criteria of Article 33(2) PCT, because the subject-matter of claim 15 is not new.

D1 discloses:

Method of operating a liquid cooling system (Paragraph [0009]; Claim 1) for cooling at least one electrical component (Paragraph [0001]

"Wärmeerzeugende Einbauten eines Schaltschranks", Fig. 1 (11)), the method comprising the steps of:

- circulating liquid coolant in a cooling circuit (Paragraph [0014]; Fig. 1 (20)) having at least one supply branch (Fig. 1 (21), (22)) for supplying liquid coolant to an electrical component (Fig. 1 (11)); and
- connecting at least one high point (Fig. 1 Upper end from (21)) and a junction point (Fig. 1 (23) -> (22)) of the cooling circuit (12) to bypass a part of the cooling circuit (Paragraph [0014]; Fig. 1 (20)); wherein the pressure of the liquid coolant is lower in the junction point than in the high point (Junction point downstream of high point, thus lower pressure).

Therefore the subject-matter of claim 15 is not new within the meaning of Article 33(2) PCT.

Furthermore, the document D2 also anticipates the subject-matter of claim 15: Liquid cooling circuit: Fig.1; Supply branch: Fig.1 (12), (11), Electric component: Fig. 1 (12); Deaeration line: Fig. 1 (17), (18); High point: Fig. 1 Upper end of line (17); Junction point: Fig. 1 T-Junction connected to line (18); Deaeration bypasses cooler: Fig.1 (13).

- 6 Dependent claims 2-14 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step, see:
- 6.1 Claim 2 is not new as D1 discloses the high point (Fig. 1 Upper end from (21)) as high point of a supply branch (Fig.1 (21), (22)).
- 6.2 Claims 3 and 6 are not new as D1 and D2 disclose a junction point (D1: Fig.1 (21), (22); D2: Fig. 1 T-Junction connected to line (18)) that is geodetically below the high point (D1: Fig. 1 Upper end from (21); D2: Fig. 1 Upper end of line (17)).
- 6.3 Claim 4 is not new as D1 discloses several junction points and several local high points so a junction point geodetically above the high point can be defined, especially as the connection between these points is not defined as direct connection.
- 6.4 Claim 5 is not new as D1 discloses a plurality of supply branches: Fig. 1 (23), (11), (27); Deaeration line: Fig. 1 (24), (25); Junction point downstream of high point, thus lower pressure, Paragraph [0014].
- 6.5 Claim 7 is not new as D1 discloses the connection of the deaeration line between the high points (Fig. 1: High point #1: Upper end of (21), High point #2: Upper end of (22), Junction point: (23)->(22)).
- 6.6 Claim 8 is not new as D1 and D2 disclose an inlet flow line (D1: Fig. 1, (33); D2: Fig. 1, line between (13) and (10)), a return flow line (D1: Fig. 1 (34); D2: Fig. 1, line (11)) and a connection between these lines by a supply branch (D1: Fig. 1 (21), (27), (11), (23), (22); D2: Fig. 1, (10) -> (12)).
- 6.7 Claim 9 is not new as D1 and D2 disclose an inlet flow line (D1: Fig. 1, (33); D2: Fig. 1, line between (13) and (10)), a return flow line (D1: Fig. 1 (34); D2: Fig. 1, line (11)) and a junction point at the return flow line (D1: Fig. 1 (23) -> (22); D2: Fig. 1 (11) -> (17)).
- 6.8 Claim 10 not new as D1 and D2 disclose electrical components to be cooled (D1: Paragraph [0001] "Wärmeerzeugende Einbauten eines Schaltschranks", Fig. 1 (11); D2: Col. 2, lines 33; Fig. 1 (12)).
- 6.9 Claim 11 is not new as D1 discloses the inlet flow line (Fig. 1 (33)) to be geodetically below an electrical component (Fig. 1 (11)).
- 6.10 Claim 12 is not new as D1 discloses a local high point (Fig. 1, Upper end of (21)).

- 6.11 Claim 13 is not new as D1 discloses a high point (Fig. 1, Upper end of (21)) as highest point of the cooling circuit.
- 6.12 Claim 14 is not inventive as the utilization of a valve to close of the deaeration line is obvious for the skilled man.
- 6.13 Therefore the subject-matter of claims 2-13 is not new and the subject-matter of claim 14 is not inventive.