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**Datasheet for the decision
of 16 October 2018**

Case Number: T 0975/17 - 3.4.02

Application Number: 03749230.3

Publication Number: 1658478

IPC: G01F25/00, G01F1/84

Language of the proceedings: EN

Title of invention:

A METHOD AND APPARATUS FOR CORRECTING OUTPUT INFORMATION OF
FLOW MEASUREMENT APPARATUS

Applicant:

Micro Motion, Inc.

Relevant legal provisions:

EPC 1973 Art. 54(1), 56, 84

EPC Art. 123(2)

RPBA Art. 13(1)

Keyword:

Admission of amended claims (yes)
Added subject-matter (no, amended claims)
Clarity (yes, amended claims)
Novelty and inventive step (yes)



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Case Number: T 0975/17 - 3.4.02

D E C I S I O N
of Technical Board of Appeal 3.4.02
of 16 October 2018

Appellant: Micro Motion, Inc.
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Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 11 November
2016 refusing European patent application No.
03749230.3 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman R. Bekkering
Members: F. J. Narganes-Quijano
T. Karamanli

Summary of Facts and Submissions

I. The appellant (applicant) lodged an appeal against the decision of the examining division refusing European patent application No. 03749230.3.

II. In its decision the examining division held that independent claims 1 and 13 of the main request and claim 1 of the auxiliary request then on file contravened the requirements of Article 123(2) EPC.

In an *obiter dictum* the examining division expressed its opinion that independent claims 1 and 13 of the main and auxiliary requests then on file were not clear (Article 84 EPC).

During the examination proceedings reference was made to the following document:

D6: US 4 911 006 A.

III. Oral proceedings were held before the board on 16 October 2018.

During the oral proceedings the appellant submitted claims 1 to 4 and pages 1, 2, 2a, 3-21, 21a, and 22-34 of the description of a new single request.

The appellant requested that the decision under appeal be set aside and that a patent be granted in the following version:

- Claims: Nos. 1 to 4 of the single request filed at the oral proceedings of 16 October 2018.

- Description: Pages 1, 2, 2a, 3-21, 21a, and 22-34 of the single request filed at the oral proceedings of 16 October 2018.

- Drawings: sheets 1/14-14/14 as originally filed.

At the end of the oral proceedings the chairman announced the decision of the board.

IV. Independent claims 1 and 4 of the single request of the appellant read as follows:

"1. Meter electronics (120) for a flow measurement apparatus, said meter electronics (120) comprising:

a processing system configured to:

specify a low flow cutoff value (204, 304, 404) representing a material flow below which said flow measurement apparatus will not generate an output signal representing a true material flow;

sample data points of a fluid signal (201, 208, 308, 301, 315, 401, 430, 422) representing flow information generated by said flow measurement apparatus

compare the sampled data points with the low flow cutoff value;

determine (503) a zero flow sampling state if the sampled data points fall below the low flow cutoff value;

establish (504) an adaptively changing set of deviation limits (202, 203, 302, 303, 402, 403) that track a spurious flow signal, if the zero flow sampling state is determined;

the deviation limits comprising upper and lower deviation limits calculated as follows:

$$\mu_l = \mu + \sigma A$$

$$l_l = \mu - \sigma A$$

where

μ_1, l_1 = the upper and lower deviation limits respectively,

μ = the average of previous N samples of the fluid signal,

σ = the standard deviation of the previous N samples,

A = the number of standard deviations away from the average;

determine (505) whether a subsequent sampled data point of the fluid signal is within said deviation limits;

define (509) spurious flow information, if the sampled data point is within said deviation limits, and prevent said spurious flow information from being applied to an output of said flow measurement apparatus;

define (511) true material flow information, if the sampled data point is outside of said deviation limits, and

generate an output signal representing the true material flow information;

continue to sample data points of the fluid signal, and

turn off the step of establishing the deviation limits and determining whether a sampled data point of the fluid signal is within said deviation limits until the sampled data points fall again below the low flow cutoff value."

"4. A method of operating a flow measurement apparatus for outputting flow information generated by said flow measurement apparatus, comprising the steps of:

specifying a low flow cutoff value (204, 304, 404) representing a material flow below which said flow measurement apparatus will not generate an output signal representing a true material flow;

sampling data points of a fluid signal (201, 208, 308, 301, 315, 401, 430, 422) representing flow information generated by said flow measurement apparatus

comparing the sampled data points with the low flow cutoff value;

determining (503) a zero flow sampling state if the sampled data points fall below the low flow cutoff value;

establishing (504) an adaptively changing set of deviation limits (202, 203, 302, 303, 402, 403) that track a spurious flow signal if the zero flow sampling state is determined;

the deviation limits comprising upper and lower deviation limits calculated as follows:

$$\mu_l = \mu + \sigma A$$

$$l_l = \mu - \sigma A$$

where

μ_l , l_l = the upper and lower deviation limits respectively,

μ = the average of previous N samples of the fluid signal,

σ = the standard deviation of the previous N samples,

A = the number of standard deviations away from the average;

determining (505) whether a subsequent sampled data point of the fluid signal is within said deviation limits;

defining (509) spurious flow information, if the sampled data point is within said deviation limits, and

preventing said spurious flow information from being applied to an output of said flow measurement apparatus;

defining (511) true material flow information, if the sampled data point is outside of said deviation limits, and

generating an output signal representing the true material flow information;

continuing to sample data points of the fluid signal, and

turning off the step of establishing the deviation limits and determining whether a sampled data point of the fluid signal is within said deviation limits until the sampled data points fall again below the low flow cutoff value."

The claims of the appellant's single request also includes dependent claims 2 and 3 referring back to claim 1.

Reasons for the Decision

1. The appeal is admissible.
2. *Admission of the amended request*

In an attempt to overcome the objections raised under Article 123(2) EPC and Article 84 EPC 1973 by the examining division in its decision (cf. point II above) and also additional objections raised by the board, the appellant submitted during the oral proceedings before the board a set of claims of a single request based on a proposal made by the examining division during the first-instance proceedings. These claims were further amended by the appellant in order to address the additional objections raised by the board, and these

amendments resulted in the claims of the present request of the appellant.

In view of the fact that the claims were based on a version of the claims proposed by the examining division and therefore obviously considered by the examining division as allowable, and in view of the further amendments made to the claims in order to overcome the additional objections raised by the board, the board, exercising its discretion under Article 13(1) RPBA, decided to admit the claims of the single request into the appeal proceedings.

3. *Amendments - Article 123(2) EPC*

3.1 Claim 1 is based on claim 1 as originally filed together with dependent claims 3 to 6 as originally filed, the passage of the description as originally filed on page 3, line 28, to page 4, line 5, and the embodiment disclosed on page 16, line 13, to page 20, line 20, of the description as originally filed, see in particular the flow chart of Fig. 5 and the corresponding description.

In its decision the examining division found that the requests then on file contravened the requirements of Article 123(2) EPC in that the respective claim 1 was directed to the determination of whether a sampled data point of a fluid signal represented a zero flow or a true material flow depending on whether the sampled data point was within or outside specific deviation limits, but the deviation limits were only defined as being established "based on" a plurality of previously sampled data points, and this feature broadened the content of the application as originally filed. In particular, the examining division held that the then

claims on file would cover embodiments in which, contrary to the disclosure of the invention in the application as originally filed (see in particular page 3, lines 28 to 31), the deviation limits would not allow tracking the spurious zero flow signal.

Claim 1 as amended according to the present single request of the appellant specifies that the deviation limits are constituted by an adaptively changing sets of deviations limits comprising upper and lower deviation limits calculated in terms of a plurality of previously sampled data points as disclosed in the application as originally filed in connection with the embodiment disclosed on page 16, line 13 to page 20, line 20, see in particular page 20, lines 1 to 10. In addition, the deviation limits calculated in this way allow, as also required by the claimed subject-matter, tracking the spurious zero flow signal (see page 18, lines 27 to 32, and page 20, lines 14 to 18 of the description as originally filed). Therefore, present claim 1 overcomes the objection raised under Article 123(2) EPC by the examining division in its decision in respect of claim 1 of the requests then on file.

- 3.2 Independent claim 4 of the present single request is based on independent claim 14 as originally filed together with the same amendments made to claim 1 as originally filed and resulting in present claim 1 (cf. point 3.1 above). Therefore, present independent claim 4 overcomes the objection raised under Article 123(2) EPC by the examining division in its decision in respect of independent claim 13 of the main request then on file which was based on independent claim 14 as originally filed.

3.3 Dependent claim 2 is based on dependent claim 2 as originally filed, and dependent claim 3 is based on dependent claim 7 as originally filed together with the passage on page 7, line 20, to page 8, line 6, of the description as originally filed.

3.4 The amendments made to the description relate to the adaptation of some of its passages to the invention as defined in the present claims (Article 84 and Rule 27(1)(c) EPC 1973), to the acknowledgement of the pertinent state of the art in the introductory part of the description (Rule 27(1)(b) EPC 1973), and to the correction under Rule 139 EPC of an obvious error in the mathematical expression on page 21 (compare with Fig. 8 and with the sentence on page 21, line 15, of the description as originally filed).

3.5 In view of the above considerations, the board concludes that the application as amended according to the present single request of the appellant comply with the requirements of Article 123(2) EPC.

4. *Article 84 EPC 1973*

The claims have been amended in several respects to meet the requirements of clarity and of support by the description (Article 84 EPC 1973). In particular, independent claims 1 and 4 have been restricted to the first of the embodiments disclosed in the description and specify, among other features, features relating to the following:

- the zero flow sampling state is determined upon detection that the sample data points fall below a low flow cutoff value,

- the deviation limits are constituted by an adaptively changing set of deviation limits calculated as claimed, and

- the operation of establishing the deviation limits and determining whether a subsequent sampled data point is within the deviation limits is carried out only during a zero flow sampling state.

The corresponding claimed features overcome, in particular, the objections raised under Article 84 EPC 1973 by the examining division in an *obiter dictum* of the decision.

The board is therefore satisfied that the claims comply with the requirements of clarity and of support by the description in accordance with Article 84 EPC 1973.

5. *Novelty and inventive step*

As already mentioned in the first paragraph of point 2 above, independent claims 1 and 4 are based on a proposal made by the examining division during the first-instance proceedings, i.e. on a proposal considered by the examining division to define patentable subject-matter, and the board adheres to the examining division's view in this respect for the following reasons:

5.1 Novelty - Claim 1

Document D6 discloses a flow measurement apparatus (abstract and Fig. 1) comprising meter electronics with a processing system (unit 20 in Fig. 1) configured to sample data points of the fluid signal measured by the flow measurement apparatus, and to generate an output signal representing the mass flow rate corresponding to the measured flow signal. In addition, the processing

system is configured to set a low flow cutoff value selected by the user and representing a material flow below which the flow sampling state is determined to be in a zero flow sampling state, and in this zero flow sampling state the flow measurement apparatus does not generate an output signal representing the true material flow corresponding to the measured flow signal, but an output signal representing a value of the mass flow rate equal to zero (see column 23, lines 7 to 23, column 25, lines 14 to 18, column 27, lines 5 to 19, and column 30, lines 27 to 53, together with the steps 645 and 1022 in the flow charts shown in Fig. 6B and 10A, respectively).

The meter electronics defined in claim 1 differs from the meter electronics disclosed in document D1 essentially in that, upon detection of the zero flow sampling state, an adaptively changing set of deviation limits that track the zero flow signal are calculated as claimed, and then

- when a subsequent sample data point is determined to be within the deviation limits, the flow material information corresponding to this sampled data point is defined as spurious flow material information and is prevented from being applied to the output of the flow measurement apparatus, and

- when a subsequent sample data point is determined to be outside the deviation limits, the flow material information corresponding to this sampled data point is defined as true flow material information and is applied to an output of the flow measurement apparatus.

In addition, this operation is carried out with the subsequent sampled data points as long as they are within the deviation limits, and when one of the sampled data points is found to be outside the

deviation limits, the operation is stopped until the sampled data points fall again below the low flow cutoff value.

The remaining prior-art documents on file are less relevant.

The subject-matter of claim 1 is therefore new over the available prior art (Article 54(1) EPC 1973).

5.2 Inventive step - Claim 1

Document D6 represents the closest state of the art. The distinguishing features identified in point 5.1 above have the technical effect of identifying during a zero flow state sampled data points that, due to the zero-drift problem caused by the presence of bubbles and/or different phase materials in the monitored flow material (see description of the application, page 2, lines 12 to 20, and page 2, line 27 to page 3, line 26, together with Fig. 2 to 4 and the corresponding description, in particular page 17, lines 3 to 21), are above the low flow cutoff value, thus constituting spurious material flow information not representing a true material flow. The objective problem solved by the claimed meter electronics is therefore the improvement of the reliability of the material flow determination during a zero flow state.

None of the prior-art documents on file suggest tracking the zero flow sampling state as claimed to identify data points that, although being above the low flow cutoff value, represent a zero flow state, thus preventing reporting the corresponding spurious material flow information as pertaining to a true material flow.

Therefore, the subject-matter of claim 1 involves an inventive step over the available prior art (Article 56 EPC 1973).

5.3 Novelty and inventive step - Independent claim 4

Independent claim 4 is directed to a method of operating a flow measurement apparatus for outputting flow information generated by the apparatus, and the steps of the claimed method are essentially in one-to-one correspondence with the functional features of the processing system of the meter electronics defined in claim 1. The method of independent claim 4 is therefore new and inventive for the same reasons given in points 5.1 and 5.2 in respect of the meter electronics defined in claim 1.

5.4 The board concludes that the subject-matter of independent claims 1 and 4, and therefore also that of dependent claims 2 and 3, is new (Article 54(1) EPC 1973) and involves an inventive step (Article 56 EPC 1973) over the available prior art.

6. In view of the above conclusions and considerations, the board finds that the application and the invention to which it relates according to the present request of the appellant satisfy the requirements of the EPC and that therefore the case is to be remitted to the department of first instance with the order to grant a patent on the basis of the appellant's request.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance with the order to grant a patent in the following version:
 - Claims: Nos. 1 to 4 of the single request filed at the oral proceedings of 16 October 2018.
 - Description: Pages 1, 2, 2a, 3-21, 21a, and 22-34 of the single request filed at the oral proceedings of 16 October 2018.
 - Drawings: Sheets 1/14-14/14 as originally filed.

The Registrar:

The Chairman:



M. Kiehl

R. Bekkering

Decision electronically authenticated