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Datasheet for the decision of 10 December 2019

Case Number: T 1672/16 - 3.2.03

Application Number: 08874783.7

Publication Number: 2307938

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Language of the proceedings: EN

Title of invention:
FLOW CONTROL SYSTEM

Patent Proprietor:
Belparts

Opponent:
BELIMO Holding AG

Headword:

Relevant legal provisions:
EPC Art. 56, 84, 100(b), 123(2)
EPC R. 80
RPBA Art. 13(1)

Keyword:
Grounds for opposition - fresh ground for opposition (no)
Inventive step
Late-filed auxiliary requests - admitted (yes)
Amendments - extension beyond the content of the application as filed (no) - allowable (yes)

Decisions cited:
G 0007/95

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

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Case Number: T 1672/16 - 3.2.03

D E C I S I O N
of Technical Board of Appeal 3.2.03
of 10 December 2019

Appellant: (Patent Proprietor)	Belparts Wingepark 4 3110 Rotselaar (BE)
Representative:	Nederlandsch Octrooibureau P.O. Box 29720 2502 LS The Hague (NL)
Respondent: (Opponent)	BELIMO Holding AG Brunnenbachstrasse 1 8340 Hinwil (CH)
Representative:	Rentsch Partner AG Bellerivestrasse 203 Postfach 8034 Zürich (CH)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 10 May 2016 revoking European patent No. 2307938 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman	G. Ashley
Members:	R. Baltanás y Jorge
	E. Kossonakou

Summary of Facts and Submissions

I. European patent No. 2 307 938 (hereinafter: the "patent") relates to a flow control system.

II. An opposition was filed against the patent, based on Article 100(a) EPC together with Articles 54 and 56 EPC, and on Article 100(c) EPC.

III. The appeal lies from the decision of the opposition division to revoke the patent. The opposition division considered that the subject-matter of claim 1 as granted and also as amended in the first to fourth auxiliary requests does not involve an inventive step, and that the amendments carried out in claim 1 of the fifth to ninth auxiliary requests do not comply with the requirements of Article 123(2) EPC.

Appellant is the patent proprietor.

IV. In a communication dated 7 June 2019, pursuant to Article 15(1) of the Rules of Procedure of the Boards of Appeal (RPBA), the Board indicated its preliminary opinion of the case.

V. The opponent (hereinafter: the "respondent") filed new submissions on 8 November 2019 (further to its previous reply to the statement of the grounds of appeal) which contained an objection against the main request on grounds of Article 100(b) EPC.

VI. The appellant filed new auxiliary requests 1 to 4 with its submissions of 4 December 2019.

VII. Oral proceedings were held on 10 December 2019. The requests of the parties at the end of the oral proceedings were established as follows:

The appellant requested that the decision under appeal be set aside, and the patent be maintained as granted or according to one of the auxiliary requests 1 to 4 filed on 4 December 2019.

The respondent requested that the appeal be rejected.

VIII. Granted claim 1 (including the numbering of the features -in bold- as adopted by the parties; main request) reads:

"**1.1** *A central heating/cooling system and/or sanitary system, comprising:*
1.2 *a common source (15) provided for delivering a liquid or gas medium,*
1.3 *a plurality of consumer devices (7)*
1.3.1 *connected to the common source through a pipe system via which the medium is distributed,*
1.4 *at least one flow control system*
1.4.1 *associated with at least one of the plurality of consumer devices and*
1.4.2 *provided for controlling a flow of the medium passing through a pipe part of the pipe system,*
1.5 *the flow control system comprising:*
1.5.1 *a flow sensor (1)*
1.5.1.1 *for sensing an actual medium flow through the pipe part and*
1.5.1.2 *outputting an electrical signal indicative of the sensed actual medium flow,*
1.5.2 *a controller (2)*
1.5.2.1 *in communicative connection with the flow sensor (1) and*

1.5.2.2 *outputting a control signal,*
1.5.3 *and an orifice adjusting system (3, 4)*
1.5.3.1 *in communicative connection with the controller,*
1.6 *the orifice adjusting system comprising a flow chamber with an adjustable orifice in the pipe part,*
1.7 *the orifice adjusting system being provided for adjusting the adjustable orifice in response to the control signal of the controller,*
1.8 *wherein the flow sensor is arranged outside the flow chamber and*
1.9 has a static measurement principle based on a wave propagating in the medium,

1.10 *characterized in that the controller (2) is having as input a value representing a set medium flow, and*
1.11 wherein the controller is provided
1.11.1 *for evaluating the electrical signal indicative of the sensed actual medium flow with the value representing the set medium flow and*
1.11.2 *outputting the control signal based on said* evaluation."

IX. Claim 1 of auxiliary request 1 is identical to claim 1 as granted with the following amendments:

- The feature "liquid or gas medium" in feature 1.2 is replaced by "liquid medium".

- The following features are added at the beginning of the characterising portion:

"the flow sensor is an ultrasonic sensor or an electromagnetic flow sensor;
the flow sensor is provided in said pipe part in a position behind the orifice adjusting system, spaced by

at least a quieting section for attenuating turbulence in the medium caused by the orifice adjusting system; and in that.."

- The feature "*evaluating*" in feature 1.11.1 is replaced by "*making an evaluation on the level of flow by directly comparing*".

- The feature "*and thereby controlling the flow in the pipe part by means of the orifice adjusting system until the actual medium flow equals the set medium flow.*" is added at the end of the claim.

X. State of the art

The following documents have been considered in the contested decision and in the grounds of appeal:

E1: WO 98/25086 A1
E2: WO 2008/039065 A1
E10: EP 2157376 A2
E11: WO 2010/074921 A2

The appellant also filed the following documents with the grounds of appeal:

E14: File wrapper content of the regional phase of E1
E15: WO 01/13017 A1
E16: WO 2006/136158 A1
E17: WO 2014/183868 A2
E18: US 2015/0176931 A1
E19: US 2015/0088321 A1

XI. The appellant's arguments can be summarised as follows.

Main request

The opposition ground of Article 100(b) EPC was not raised during the opposition procedure. The appellant does not agree to its introduction during the appeal procedure and thus requests that the objection is not admitted by the Board.

Granted clam 1 differs from E1 by four features (1.8, 1.9, 1.10, 1.11.1) and not only by the presence of a sensor with a static measurement principle (1.9)

Concerning feature 1.8 (flow sensor arranged outside the flow chamber), the flow sensor of E1 is arranged in the valve, since this is the aim of the invention of this document (see page 2, line 20, and page 4, lines 5 to 9). Contrary to this, the contested patent discloses in paragraphs [0017] and [0023] the meaning of "outside" with respect to the prior art described in paragraph [0007], where the flow sensor is arranged in or adjacent to the flow chamber (see column 3, line 2). The appellant argues that consulting the description in order to clarify the real meaning of a feature is appropriate in the context of discussing inventive step, since the technical contribution of the differentiating feature has to be defined.

Document E1 does not disclose feature 1.10 (input of a set medium flow), but merely a device which compares a measured flow with a programmed maximum value, limiting the opening of a valve accordingly, such valve being dynamically controlled by a thermostat (see page 3, lines 4 to 11, and page 6, lines 14 and 19).

The system of E1 does not evaluate the sensed medium flow with respect to a set medium flow (feature 1.11.1), since the valve is only closed when a maximum is reached (page 7, lines 16 and further). If the flow remains below the maximum, no evaluation takes place, in contrast to the invention; thus it is not possible to compensate pressure variations. Furthermore, the adjustment of the valve disclosed in E1 (see page 3, lines 11 and further) does not necessarily have to be carried out by a comparison as defined in feature 1.11.1, since it could be achieved by other means such as tables where opening values for the valve are linked to each particular output signal of the thermostat.

In view of the differentiating features, the problem to be solved when departing from E1 must be considered as that given in paragraph [0009] of the patent, namely to provide a widely applicable, pressure independent flow control system with accurate control of the flow rate over the whole of the applicable range.

If the skilled person were to combine one of the devices in E1 with the teaching of E2, the obvious way to do so would be on the basis of the same flow sensor of E1, i.e. by consulting the embodiment of E2 having a turbine flow sensor (see page 12, lines 8 to 12). The idea of using one of the alternatives mentioned on line 19 would be a further step for the skilled person and, even if they considered ultrasound sensors, the relatively large size of such sensors would discourage them from incorporating one into a valve of the type disclosed in E1.

The appellant submitted that the invention satisfied a long-felt need, as shown by the documents E15 to E19. E15 and E16 are patent applications from the respondent

filed before the priority date of the patent, in which the systems operate on the principle of measuring the pressure differential over a valve, whereas E17 to E19 are patent documents with a priority date after the publication date of the patent and which disclose the same or similar flow control systems as the claimed one. This shows that the appellant's invention satisfied a long-felt need, and that it was later followed by others.

Auxiliary request 1

Auxiliary request 1 addresses prima facie the objections of lack of inventive step against the main request. The added features address the problem of improving accuracy by avoiding turbulence caused by pressure waves created when closing the valve. It should therefore be admitted into the procedure in spite of being late filed.

The accuracy of the flow sensor is further increased by positioning it behind the orifice adjusting system "spaced by at least a quieting section", since this location avoids the negative influence of the initial higher speed of fluid flowing across the sensor when the orifice is closed.

The skilled person starting from E1 would at best replace the turbine sensor by the ultrasound sensor of E2, but would not realise that the sensor must be located at the claimed position. The embodiment of figure 2 of E1 does not disclose a sensor arranged outside the flow chamber as required by claim 1, and the horizontal lines between the turbine of the sensor 22 and the valve plug 12 correspond to a typical filter which is intended to avoid malfunction of the turbine.

Concerning Article 123(2) EPC, originally filed page 6 of the description discloses at lines 2 to 23 the list of possible sensors and their effects, including the problems associated with vortex sensors. The skilled person would thus not find it surprising that the choice of possible sensors is reduced to the two claimed ones.

XII. The respondent's arguments can be summarised as follows.

Main request

The patent contains no enabling disclosure which would allow the skilled person to implement the invention when more than one flow control system are associated with only one consumer device (features 1.4 and 1.4.1). The patent should thus be revoked on the grounds of Article 100(b) EPC.

Concerning inventive step, the only difference between the claimed invention and E1 is feature 1.9 (sensor with a static measurement principle).
Feature 1.8 (sensor arranged outside the flow chamber) is disclosed in both embodiments shown in figures 1 and 2 respectively of E1. The alleged feature "positioned outside the valve body" cannot be used to establish a difference with respect to E1, because no valve body is defined in claim 1 of the opposed patent. Finally, the broad formulation of a claim cannot be restricted merely by considering the disclosure in the description; in particular, feature 1.8 has to be interpreted as it is claimed, since the feature as defined in the claim has a clear technical meaning.

Document E1 discloses the modulation of flow as a function of the feedback provided by a flow meter (see page 2, line 20, and page 3, lines 6 to 16). The signal issued by the flow meter is an electrical signal as in claim 1, and any of the three operation modes of E1 involves evaluation of this signal (see page 7, lines 1 to 7).

E2 belongs to the same technical field of hydronics and would be consulted by the skilled person, who learns that ultrasound sensors are an alternative to turbine sensors. The statement by the appellant that ultrasound sensors are bigger than turbine sensors and could not be implemented in E1 lacks any substance, since the opposite is actually true; even if two transducers were needed, they could be arranged opposite to each other within a short pipe section.

Auxiliary request 1

The respondent had no objection against the admission of auxiliary request 1 in the procedure.

The embodiment in figure 2 of E1 discloses that the flow sensor is behind the flow chamber, and also located in a quieting section, since the horizontal lines shown between the turbine of the sensor 22 and the valve plug 12 indicate a typical flow straightener to reduce turbulence.
Furthermore, it is common general knowledge that a section of a minimum length has to be provided between the flow chamber and the flow sensor in order to ensure accuracy by reducing exposure of the flow sensor to turbulence. The skilled person, when adopting the ultrasound sensor as suggested by E2, would simply

provide the required distance between flow chamber and flow sensor, thus arriving at the invention.

The subject-matter or claim 1 extends beyond the originally filed application, since one out of three options has been deleted from granted claim 2, now integrated in claim 1 (vortex flow sensors have been excluded, while just the ultrasonic and electromagnetic flow sensors are now claimed). The remaining flow sensors have the technical effect of reducing turbulence, which was not originally disclosed, and no particular technical connection suggesting a link between ultrasonic flow sensors and electromagnetic flow sensors was originally disclosed in the patent application. Their association in claim 1 thus presents the skilled person with subject-matter which was not originally disclosed.

The embodiments of figures 10 and 11 do not belong to the invention and the description should be adapted accordingly.
Paragraph 26 of the patent specification has been deleted in the adapted description. This is not allowable, since its absence leaves the reader in doubt about whether such an embodiment forms part of the invention or not. In particular, the deletion leaves the door open for broader interpretations of the invention based on the doctrine of equivalents in later proceedings before the Courts.

Reasons for the Decision

1. New ground of opposition based on Article 100(b) EPC

The respondent raised an objection based on the ground of opposition according to Article 100(b) EPC.
The objection concerned sufficiency of disclosure of the features 1.4 and 1.4.1 of granted claim 1.

This ground of opposition had not been raised during the opposition procedure.

According to the criteria set out in G7/95, a fresh ground of opposition can only be admitted in appeal proceedings with the agreement of the patent proprietor.

Since the patent proprietor does not accept opening a discussion on the fresh ground of opposition, the Board has no power to examine such an objection.

The objection based on Article 100(b) EPC is thus not admitted in the procedure.

2. Main request, Article 56 EPC

2.1 It is undisputed by the parties that E1 discloses:

A central heating/cooling system and/or sanitary system (see e.g. page 1, lines 7 to 9), comprising:
a common source (see e.g. page 6, line 3 and 4: "heating or cooling unit") provided for delivering a liquid medium,

a plurality of consumer devices ("heat exchange device"; see e.g. page 1, line 16)

connected to the common source through a pipe system (see figure 1) through which the liquid medium is distributed,

at least one flow control system (see e.g. page 2, line 30)

associated with at least one of the plurality of consumer devices (see figure 1) and

provided for controlling a flow of the medium passing through a pipe part of the pipe system (see e.g. page 3, lines 6 to 8),

the flow control system comprising:

a flow sensor (22)

for sensing an actual medium flow through the pipe part (see e.g. page 6, lines 26 to 29) and

outputting an electrical signal (see page 6, line 28) indicative of the sensed actual medium flow,

a controller (20)

in communicative connection with the flow sensor (22; see page 6, lines 26 to 28) and

outputting a control signal (see e.g. page 7, lines 3 to 7),

and an orifice adjusting system (12, 21)

in communicative connection with the controller (see e.g. page 7, lines 3 and 4),

the orifice adjusting system comprising a flow chamber with an adjustable orifice in the pipe part (see figure 1),

the orifice adjusting system being provided for adjusting the adjustable orifice in response to the control signal of the controller (see e.g. page 7, lines 3 to 6),

wherein the controller outputs a control signal based on an evaluation (see e.g. page 7, lines 3 to 7).

In view of the above, E1 is the closest prior art to the invention and therefore an appropriate starting point for assessing inventive step.

2.2 Feature 1.8 (flow sensor arranged outside flow chamber)

2.2.1 According to the appellant, it is appropriate in the context of discussing inventive step to consult the description in order to clarify the meaning of a feature, since the technical contribution of the differentiating feature has to be defined.

The Board does not agree with this argument, since feature 1.8 is clear in itself and does not require any further interpretation.
Feature 1.8 reads: "wherein the flow sensor is arranged outside the flow chamber". The feature is not ambiguous, since the skilled person understands that the flow sensor is located outside of a defined space, namely the flow chamber.

No further limitation, in particular the position of the flow sensor with respect to the valve body, an entity which is not mentioned in the claim, can be read into feature 1.8.

2.2.2 In order to determine if a flow sensor is arranged outside a flow chamber, it must be first determined what the flow chamber is in the context of claim 1 and E1.

Concerning claim 1, the feature "flow chamber" is first mentioned in feature 1.6 in the following manner: "the orifice adjusting system comprising a flow chamber with an adjustable orifice in the pipe part".
No other portion of claim 1 makes reference to the "flow chamber", apart from feature 1.8.
The flow chamber according to claim 1 is thus the portion of the pipe part where the adjustable orifice is located.

It suffices thus for feature 1.8 to be disclosed in E1 that a flow sensor is arranged outside the portion of the pipe part where the adjustable orifice is located.

2.2.3 Figure 1 of E1 shows a valve portion 16 having an adjustable orifice. Valve plug 12 is located at the upper end of the orifice in the diagram. Valve portion 16 thus corresponds to the claimed "flow chamber" in feature 1.6.
Figure 1 of E1 also shows that the flow detector 22 (the typical induction sensor associated with a turbine) and its turbine are located at valve portion 10, which is separate from valve portion 16. The flow detector 22 and its turbine are thus arranged outside the flow chamber in the sense of claim 1.

Even if the figures of E1 are considered as schematic, they are clear enough to determine in which section the flow detector is arranged, namely in a section of the valve body separate from that of the valve portion 16.

2.3 Feature 1.10 (input of a value representing a set medium flow)

The appellant is of the opinion that document E1 does not disclose feature 1.10, since the maximum rate of flow disclosed in page 6, line 19, cannot be considered as a set value for the flow. According to the appellant, there is no input of a set flow in E1, since the control system of E1 is based on signals issued by a thermostat (see page 3, line 11).

The Board does not share this view, since feature 1.10 merely requires that a value representing a medium flow is provided as an input. The feature is not limited to an input being provided by a specific actor (e.g. a user or an element of the system), and it does not define when this input is provided (e.g. at the production step of the flow control system or after its implementation). Furthermore, the adjective "set" in the expression "a value representing a set medium flow" merely means that a specific medium flow is defined as a value.

Document E1 discloses a device which can be programmed in several ways. One of the programs is for controlling a valve plug (12) by comparing in a controller (20) a measured medium flow obtained by a flow detector (22) with a maximum programmed rate of flow (see page 6, lines 18 to 20) in order to open or close the valve plug (see page 7, lines 3 to 7), which necessarily implies that the maximum programmed rate of flow has

been provided as an input to the control system at some stage. The maximum programmed rate of flow thus corresponds with the claimed "value representing a set medium flow" of feature 1.10.

Moreover, the passage bridging pages 7 and 8 also discloses that the feedback signal from the flow detector 22 to the control device 20 can be used to maintain a rate of flow (see page 8, lines 2 and 3). In order to maintain said rate of flow as a function of the feedback received from the flow detector, it is necessary that a target rate of flow has been previously provided to the control device. This step also constitutes the input of a value representing a set medium flow as claimed in feature 1.10.

Consequently, E1 discloses feature 1.10.

2.4 Feature 1.11.1 (evaluating the electrical signal indicative of the sensed actual medium flow with the value representing the set medium flow)

The appellant's argument is that this feature is not derivable from E1, since E1 is restricted to a valve control based on a thermostat input, and the role of the medium flow evaluation therein is restricted to a flow limiting action.

However, claim 1 does not require that the controller outputs a control signal based solely on the evaluation of the medium flow, but leaves the door open to devices which use such evaluation merely as one factor amongst others.

In particular, feature 1.11.1 merely requires that the sensed actual medium flow is evaluated with respect to

the value representing the set medium flow. Such an evaluation is implicitly disclosed in the passages of E1 showing that the signal of the flow detector 22 is used as a feedback to the control device 20 (see page 7, lines 3 to 7, or paragraph bridging pages 7 and 8), meaning that an action is thereby taken by the control device 20 as a function of that feedback signal. This action implies a comparison - and thus, an evaluation - of the feedback signal with respect to the set medium flow (see previous point 2.3).

2.5 Feature 1.11.2 (outputting the control signal based on said evaluation)

To be complete, feature 1.11.2 cannot establish a difference with respect to E1 in regards of the evaluation process of feature 1.11.1. The output of control device 2 of E1 is a signal based on the evaluation carried out both for reaching a maximum programmed flow (see page 7, lines 4 to 7) and for maintaining a rate of flow (see paragraph bridging pages 7 and 8).
The fact that the output of a control signal might not occur when the sensed actual medium flow is below the maximum programmed flow is irrelevant, since the claim merely requires that an action takes place at any given moment.

2.6 In other words, features 1.11.1 and 1.11.2 do not limit the invention to a flow control system where output signals are constantly generated at every moment.

2.7 Feature 1.9 (static measurement principle based on a wave propagating in the medium)

2.7.1 In view of the above, the only differentiating feature of the claimed subject-matter with respect to E1 is feature 1.9, which defines that the flow sensor has a static measurement principle based on a wave propagating in the medium.

2.7.2 The technical effect of the differentiating feature is that the medium flow is measured in a contactless manner.

The problem solved by the differentiating feature can thus be defined as an alternative way of measuring the medium flow.

The problem suggested by the appellant (to provide a widely applicable, pressure independent flow control system with accurate control of the flow rate over the whole of the applicability range) cannot be considered as being realistic, since it is based on a higher number of differentiating features, which has turned out not to be accurate (see points 2.2, 2.3 and 2.4 above).

2.8 Combination of E1 with E2

2.8.1 The skilled person would be open to consider alternatives for an element such as the flow sensor 22 of E1, since it was well-known that there was a variety of such flow sensors on the market which could provide a feedback signal as a function of the medium flow in order to measure it.

2.8.2 While looking for alternative flow sensors, the skilled person would consult document E2, since it belongs to the same technical field of flow regulation in heating systems as E1 (see title) and it concerns a device

where medium flow is measured (see e.g. page 5, lines 16 to 21).

2.8.3 The skilled person learns from E2 that, in a comparable control system where medium flow is measured by a turbine flow sensor as in E1 (see page 12, lines 8 to 12), sensors based on ultrasound or magnetism are an alternative (see page 12, lines 19 to 22).

2.8.4 The appellant argues that the skilled person would rather take the main teaching of E2, namely that a turbine sensor has to be used in such systems, and in recognising that the size of sensors based on ultrasound or magnetism is excessive, would dismiss those, as being impossible to locate at the required positions of E1, namely within the valve body itself.

The Board is not persuaded by this argument.
First of all, no evidence has been filed concerning the alleged large size of a sensor based on ultrasound or magnetism at the priority date. The Board considers that the usual electronic components intended for generating and/or receiving ultrasound signals, and also those for creating and detecting a magnetic field are generally not characterised by being of a large size. In the absence of evidence in support of the appellant's argument, the Board tends to consider that such sensors do not exhibit a size which would be substantially larger than the turbine flow sensors, to the extent that it would be impossible to locate them at the positions disclosed in figure 1 of E1.

Secondly, the skilled person learns from E2 that, even if a turbine sensor were to be used as in E1, other sensors can be equally envisaged for the flow measurement function, namely those based on ultrasound

or magnetism. This is a teaching which the skilled person obtains from the cited passage at page 12, lines 19 to 22. This teaching does not require any further research about the cited sensors, which are explicitly cited and correspond to the kind of sensor claimed in feature 1.9.

2.8.5 Given that sensors having a static measurement principle based on a wave propagating in the medium (i.e. based on ultrasound or on magnetism) are disclosed in E2 as being known alternatives to turbine flow sensors, there can be no inventive activity in replacing one by another. The skilled person would thus arrive at the claimed invention without exercising an inventive skill.

2.9 Alleged long-felt need

The appellant argued that the invention satisfied a long-felt need in the technical field, thus indicating the presence of an inventive step. In order to prove the alleged long-felt need, the appellant filed documents E15 to E19. E15 and E16 are patent applications from the respondent filed before the priority date of the patent, disclosing systems which operate by measuring the pressure differential across a valve. E17 to E19 are patent applications from other manufacturers with a priority date after the publication date of the patent which disclose the same or similar flow control systems as the claimed one. According to the appellant, this shows that the claimed solution satisfies a long-felt need, and after it was made known publically, it was adopted by others.

The Board is not persuaded by this submission. The presence of a long-felt need is only considered to be a

secondary indication which could speak in favour of inventiveness in case of doubt.
In the present case, the analysis of the prior art within the framework of the problem-solution approach leaves no doubt about the conclusion (see points 2.1 to 2.6 above), and secondary indications are not required in order to assess the circumstances of the case.

2.10 In view of the above, the subject-matter of claim 1 as granted lacks an inventive step.

3. Auxiliary request 1

3.1 Article 13(1) RPBA

3.1.1 The appellant submitted auxiliary request 1 on 4 December 2019, i.e. six days before the oral proceedings.

According to Article 13(1) RPBA the Board has the discretion to admit and consider this amendment to the appellant's case.

3.1.2 In exercising such discretion in inter-partes proceedings it is important to take into consideration the view of the other party, who might not be in a position to provide a proper reply to such a late-filed amendment.

In the present case the respondent declared that it had no objection to the admittance of auxiliary request 1. The Board notes that the right to be heard of the respondent has not been affected by the admittance of the late-filed request.

3.1.3 Another important criterion when exercising the discretion of the Board is whether the request can address *prima facie* the raised objections.

Claim 1 of the amended auxiliary request has been supplemented with features having a basis in granted claims 2 and 5, and which further define the kind of flow sensor used (ultrasonic or electromagnetic) and its location (behind the orifice adjusting system).

Figure 1 of document E1 shows neither the claimed type of sensor, nor a flow sensor placed at the claimed location.
Document E2 also does not disclose a flow sensor placed at the claimed location.

According to the appellant, the added features solve the problem of increasing the accuracy of the measurement, which *prima facie* makes sense from a technical point of view due to the lower turbulence.

The fact that figure 2 of E1 may disclose a flow sensor behind the flow chamber is irrelevant at the stage of assessing the issue in a *prima facie* manner, since the starting point for the inventive step objection leading to rejection of the main request was the embodiment of figure 1 (see point 2 above). Furthermore, determining the exact location of the flow sensor in figure 2 can only be carried out once the matter is discussed in depth (see point 3.2 below).
The same applies for the argument about an alleged disclosure of a quieting section in figure 2 of E1 consisting of the horizontal lines between the flow detector 22 and the valve plug 12 which are not mentioned in the description.

3.1.4 Since the Board and the respondent are in a position to deal with the amended auxiliary request without delaying the proceedings, and since *prima facie* the amendments address the raised objections, amended auxiliary request 1 is admitted into the proceedings.

3.2 Article 56 EPC

3.2.1 Document E1 remains an appropriate starting point for assessing the inventive step of the invention, since the added features do not change the basic nature of the invention (i.e. a central heating/cooling system and/or sanitary system comprising a flow control system).

3.2.2 The respondent argues that the embodiment of figure 2 of E1 discloses a flow sensor arranged outside the flow chamber (feature 1.8) and behind the orifice adjusting system (added feature in the characterising portion of claim 1).

Figure 2 of E1 (reproduced below) shows a valve comprising a valve plug 12 which forms part of the claimed adjustable orifice in the pipe part (feature 1.7).

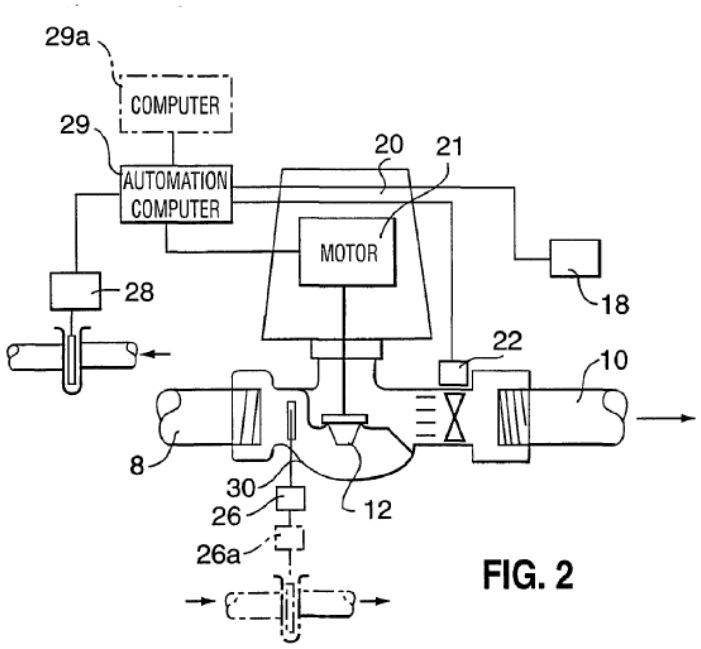

FIG. 2

In order to determine if flow detector 22 of figure 2 is arranged outside and behind the flow chamber, it has to be first determined what the skilled person would understand as "flow chamber" in figure 2.

The valve shown in figure 2 is of a compact design, i.e. it only comprises a relatively short straight pipe section formed by the valve body since it is a two-port two-way valve. A partition is arranged in the valve body which includes an orifice. The interaction of the valve plug 12 with the orifice provides the claimed adjustable orifice, the orifice adjusting system located inside the valve body being formed by the plug, its stem and the partition.
As it was set out in point 2.2.2 above, the flow chamber is the portion of the pipe part where the adjustable orifice is located. If a skilled person were to be asked to define which portion of the pipe part contains the adjustable orifice in figure 2 of E1, he would identify the valve body between the inlet port 8 and the outlet port 10, since it would be artificial in

technical terms to subdivide that short space where no branch line can be observed (in contrast to figure 1 of E1, where a second line 16 is shown). Hence the Board is not persuaded by the argument that the flow chamber should correspond to a section of the valve body arbitrarily ending at some point before the flow detector 22.

As a consequence, figure 2 of E1 shows a flow sensor arranged inside the flow chamber contrary to the requirements of claim 1, and it does not disclose the disputed feature.

3.2.3 Obviousness of locating the flow sensor outside the flow chamber starting from figure 2 of E1

The respondent argues that the skilled person, when incorporating the ultrasonic sensor as suggested by E2, would have simply provided a distance between flow chamber and flow sensor to ensure accuracy by reducing the exposure of the flow sensor to turbulence, since this was common general knowledge, thus arriving at the invention.

The Board does not agree with this argument, since, first of all, no evidence can be found concerning the alleged common general knowledge or, more in particular, that the location disclosed in figure 2 of E1 would be considered as inherently unsuitable by the skilled person when replacing the turbine flow sensor by an ultrasonic flow sensor as taught by E2.
The argument of the respondent that the horizontal lines shown between the turbine of the flow detector 22 and the plug 12 in figure 2 indicate a quieting section is contradictory, since the presence of such a flow straightener to reduce turbulence is an indication that

the disclosed location in figure 2 is a reliable one from the point of view of turbulence.

It would therefore not be readily apparent to modify the device of figure 2 by arranging the flow sensor outside the flow chamber, as defined in claim 1.

3.2.4 Obviousness of locating the flow sensor behind the orifice adjusting system when departing from figure 1 of E1

As established in section 2.2 above, figure 1 of E1 shows the flow sensor to be outside of the flow chamber.

Claim 1 defines that the flow sensor is provided in the pipe part in a position behind the orifice adjusting system, spaced by at least a quieting section for attenuating turbulence in the medium caused by the orifice adjusting system.

The feature implies that "behind the orifice adjusting system" must be interpreted as "behind the orifice adjusting system in the flow direction", since otherwise there would be no need to attenuate the turbulence caused by the orifice adjusting system.

The device shown in figure 1 of E1 comprises a flow detector 22 which is not behind the orifice adjusting system in the flow direction, as the flow passing through the orifice adjusting system returns via the exit port 14, where the flow detector 22 would have to be placed to in order to comply with the requirements of claim 1.

No reason has been put forward in support of such a modification, and the Board can also not see why the skilled person would envisage a change which would fundamentally affect the operation of the disclosed flow control system. The purpose of flow sensor 22 of figure 1 is to measure the flow of fluid passing through the heat exchanger, whereas a flow detector at the modified location would measure a different flow of fluid, namely the addition of the flow of fluid passing through the heat exchanger plus the flow of fluid by-passing the heat exchanger when plug 12 allows the passage of fluid. The measurement of a different parameter instead of the disclosed one would require further modifications in the control system of E1.

3.2.5 Given that locating the flow sensor outside the flow chamber and behind the orifice adjusting system is not obvious starting from either the embodiment shown in figure 1 or figure 2 of E1, the subject-matter of claim 1 involves an inventive step.

3.3 Article 123(2) EPC

3.3.1 Originally filed claim 2 (as well as granted claim 2) included three options for the flow sensor, namely that "the flow sensor is chosen from the group consisting of: ultrasonic flow sensor, vortex flow sensor, electromagnetic flow sensor"

This feature is now in amended claim 1 of the first auxiliary request, with the exception of the option "vortex flow sensor", which was deleted.

3.3.2 According to the respondent, since the remaining ultrasonic and electromagnetic flow sensors have the technical effect of reducing turbulence with respect to

the vortex flow sensors, and no connection between ultrasonic flow sensors and electromagnetic flow sensors was originally disclosed in the patent application, the association of these flow sensors in claim 1 faces the skilled person with subject-matter which was not originally disclosed.

3.3.3 This argument is not persuasive for the following reasons:

Originally filed page 6 of the description discloses examples of flow sensors based on the measurement principle of wave propagation in a medium (see lines 2 to 5).
Three examples are mentioned, namely the ultrasonic flow sensors (see line 6), the vortex flow sensors (see line 9) and the electromagnetic flow sensors (see line 12).
The advantages and disadvantages of each of these sensors are mentioned at page 6, lines 16 to 23. In particular, ultrasonic flow sensors are preferred due to their "high accuracy over a wide flow range", vortex sensors are disclosed as being less preferred because among other disadvantages, "the measurement principle requires a minimum flow rate", and electromagnetic sensors are also less preferred "in view of restricting applicability to media with electric conductivity", even if this last type is also disclosed as "very suitable for sanitary applications".

The skilled person is therefore aware that the three types of sensor are options for implementing the invention, and is informed about the advantages and disadvantages of each type of sensor.
The skilled person could therefore not be surprised that the example corresponding to the sensor involving

more disadvantages (i.e. the vortex sensor) was excluded from the invention, such that the invention is restricted to other disclosed options whose technical effects were known to him.

3.3.4 Concerning the turbulence reduction as a technical effect of restricting the choice of sensor to ultrasonic and electromagnetic sensors, the skilled person was aware when reading the originally filed application that vortex sensors, which are based on the presence of an obstruction in the flow path to induce vortices in the medium (see page 6, lines 9 to 11), create turbulence in the medium by its own nature, whereas ultrasonic and electromagnetic sensors are based on a contactless working principle which does not create such turbulence.

Thus, the choice of ultrasonic or electromagnetic sensors to reduce turbulence is no surprise in view of the original disclosure.

3.3.5 The amendment of claim 1 therefore complies with the requirements of Article 123(2) EPC.

3.4 Amended description, Article 84 EPC

3.4.1 In order to avoid any lack of clarity resulting from inconsistency between the claims and the rest of the patent specification, embodiments which fall outside the scope of the claims must be identified as such or removed from the description and/or the figures.

3.4.2 The respondent objects that the embodiments of figures 10 and 11 do not belong to the invention, since the arrangement of the flow sensor 1 behind the heat exchange system 7 is not encompassed by claim 1.

In the view of the Board, this is not the case.

(a) The relevant feature of claim 1 concerning the location of the flow sensor reads: "the flow sensor is provided in said pipe part in a position behind the orifice adjusting system, spaced by at least a quieting section for attenuating turbulence in the medium caused by the orifice adjusting system".

The first two sentences of paragraph [0027] of the patent specification disclose this feature. Paragraph [0028] elaborates on that by stating that the flow sensor can be positioned in front of or behind the at least one "consumer device", which is the generic name given in the patent to the devices receiving the medium flow from the flow control system (see paragraph [0014]).

The devices of figures 10 and 11, where the flow sensor 1 is arranged respectively before and after the heat exchange system 7, correspond thus to the embodiment which is disclosed in paragraphs [0027] and [0028].

(b) An important point in interpreting claim 1, in order to determine if the disclosed embodiments correspond to the invention, is to determine whether the flow sensor is arranged "behind the orifice adjusting system".
Taking into account the aim of the invention, i.e. adjusting the flow control system as a function of the real flow delivered to a consumer device (see paragraphs [0009] and [0022]), the function of the claimed flow sensor (i.e. to measure the medium flow delivered to a consumer device), and the

meaning of "behind" which has been set out in point 3.2.4 above, this feature is interpreted as implying that the flow sensor must receive the whole of the medium flow originating from the orifice adjusting system.

Since the flow sensor 1 of figures 10 and 11 complies with this requirement, there is no reason to conclude that the disclosed embodiments do not belong to the claimed invention.

(c) The embodiments of figure 10 and 11 do therefore correspond to the claimed invention.

3.4.3 The respondent considers that the deletion of paragraph [0026] of the patent specification in the adapted description is not allowable, since its presence would contribute to delimit the invention if a remark is added to point out that this embodiment does not belong to the invention. In particular, the deletion leaves the door open for broader interpretations of the invention based on the doctrine of equivalents in later proceedings before the Courts.

(a) First of all, the EPC does not require that a patent must comply with the doctrine of equivalents.
Construction of a claim for purposes of establishing infringement is outside the competence of the Board.

(b) Secondly, in order to comply with the requirements mentioned under point 3.4.1 above, the patent proprietor is allowed to carry out amendments of the description under Rule 80 EPC.

(c) Paragraph [0026] of the patent specification corresponds in its entirety to an embodiment wherein "the flow sensor is provided in front of the flow chamber" in order to achieve a more compact system.

This embodiment is in contradiction with the current wording of claim 1, which defines a flow sensor arranged behind the orifice adjusting system and thus behind the flow chamber (see feature 1.6).

In order to avoid inconsistencies between the claims and the description which may give rise to clarity problems when interpreting the claims, embodiments which fall outside the scope of the invention must be either deleted or acknowledged as such in the description.

In this case, the deletion removes an embodiment which does not belong to the invention; the deletion does not leave behind any wording which could lead to an ambiguous definition of the scope of claim 1.

(d) In view of the above, the deletion of paragraph [0026] of the patent specification is compliant with the provisions of the EPC, and in particular with Article 84 EPC and Rule 80 EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the opposition division with the order to maintain the patent in amended form on the basis of the following documents:

   - claims 1 to 17 of auxiliary request 1 filed on 4 December 2019;
   - description pages 2 to 7 filed at the oral proceedings before the Board and
   - figures 1 to 16 of the patent specification.

The Registrar: The Chairman:

C. Spira G. Ashley

Decision electronically authenticated