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**D E C I S I O N**  
**of 9 March 1999**

**Case Number:** T 1041/96 - 3.4.2  
**Application Number:** 88310890.4  
**Publication Number:** 0319176  
**IPC:** G01G 3/14, G01G 3/18

**Language of the proceedings:** EN

**Title of invention:**

Weighing apparatus with digital load cell and sealed enclosure

**Patentee:**

Mettler-Toledo, Inc.

**Opponent:**

- 01: Hottinger Baldwin Messtechnik GmbH  
02: Carl Schenck AG  
03: GEC Avery Limited  
04: K-Tron Technologies, Inc./ Wirth Gallo Messtechnik AG  
05: Bizerba-Werke Wilhelm Kraut GmbH & Co. KG

**Headword:**

-

**Relevant legal provisions:**

EPC Art. 56, 114(2)

**Keyword:**

"Inventive step - general technical knowledge"  
"Late submitted allegation of public prior use - not admitted"

**Decisions cited:**

-

**Catchword:**

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Boards of Appeal

Chambres de recours

Case Number: T 1041/96 - 3.4.2

**D E C I S I O N**  
**of the Technical Board of Appeal 3.4.2**  
**of 9 March 1999**

**Appellant:** Mettler-Toledo, Inc.  
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**Opponent 02:** Carl Schenk AG  
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- 2 -

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**Decision under appeal:** **Decision of the Opposition Division of the  
European Patent Office posted 2 October 1996  
revoking European patent No. 0 319 176 pursuant  
to Article 102(1) EPC.**

**Composition of the Board:**

**Chairman:** E. Turrini  
**Members:** S. V. Steinbrener  
M. Lewenton  
B. J. Schachenmann  
A. G. Klein

## Summary of Facts and Submissions

I. The appellant (proprietor of the patent) lodged an appeal against the decision of the Opposition Division revoking European patent No. 0 319 176 (application No. 88 310 890.4).

Five oppositions had been filed against the patent as a whole and based on Articles 100(a) and (b) EPC since the subject matter of the patent in suit allegedly lacked novelty and inventive step, respectively, and was insufficiently disclosed.

The Opposition Division held that the grounds for opposition mentioned in Article 100(a) EPC prejudiced the maintenance of the patent in that the subject matter of claim 1 as amended in accordance with the main and auxiliary requests did not involve an inventive step when taking account of the following documents (using the numbering of the Opposition Division):

OI3: EP-A-0 171 237

OII2: D. Meyer-Ebrecht et al.: "Intelligente Sensoren - Aufgaben und Möglichkeiten" in W. Henning (ed.): "Sensoren - Technologie und Anwendung: Vorträge der NTG/GMR-Fachtagung vom 9.-11. März 1982 in Bad Nauheim", VDE-Verlag, Berlin 1982, pages 81 to 87, and

a prior use apparatus ("prior use III") derived from the testimony of a witness heard at the request of respondent 05.

During the appeal proceedings, the respondents and the Board *inter alia* referred to the following further documents:

OII3: WO-A-86/03831

OIII2: AU-A-72907/87

OIII3: EP-A-0 106 900

WO-A-89/01611, and

German Industry Standard DIN 66 019, May 1976.

Of these documents, the first four had already been cited before the first instance, and the last one was submitted by respondent 05 with its letter of 4 August 1997. In this context, the witness heard by the Opposition Division was again offered by respondent 05 to give evidence before the Board of Appeal.

Furthermore, with its letters dated 5 June 1997 and 1 February 1999 respondent 03 submitted various additional documents to establish lack of novelty or inventive step of the claimed subject matter, in particular with respect to a further public prior use.

- II. In the communication of 20 November 1998 pursuant to Article 11(2) of the Rules of Procedure of the Boards of Appeal, the Board pointed out that in its provisional view amended claim 1 submitted by the appellant with the grounds of appeal offended against Articles 84 and 123 EPC whereas the requirements of Article 83 EPC seemed to be met by the patent in suit. Furthermore, the subject matter of claim 1 - insofar as it was understandable and admissible - was not

considered to be anticipated by the available prior art. The existence of an inventive step, however, appeared to be questionable and should be discussed at the scheduled oral proceedings. In this context, the Board considered it necessary to hear the witness offered by respondent 05 having regard to the type of external control existing in an alleged prior use weighing apparatus comprising a plurality of load cells. The witness was accordingly summoned by a separate decision on the taking of evidence pursuant to Rule 72(1) EPC.

- III. Oral proceedings took place on 9 March 1999 in the absence of respondents 01 and 02 who had informed the Board of their non-appearance in advance. In the course of the oral proceedings, the Board refrained from hearing the witness after having reached a decision in the light of the available written prior art, which decision was pronounced at the end of the oral proceedings.
- IV. The appellant requested that the decision under appeal be set aside and that the patent be maintained in amended form on the basis of claim 1 submitted as "Main version" during the oral proceedings or, auxiliarily, on the basis of claim 1 submitted as "First subsidiary version", "Second subsidiary version" and "Third subsidiary version", respectively, during the oral proceedings.
- V. Respondent 01 did not actively take part in the present appeal proceedings. Respondents 02 to 05 requested that the appeal be dismissed.

VI. The wording of claim 1 according to the main request on file at the time of the present decision reads as follows:

"1. Weighing apparatus formed as a modular digital load cell (20), comprising a counterforce (12, 600, 675), transducer means (75, 76, 79, 80, 610, 611, 617, 618, 687, 688, 689, 690) mounted on said counterforce and circuit means (14, 625, 626, 628, 700) including means (100) for producing digital representations of loads applied to said counterforce, means (105) for applying at least one correction factor to said digital representations and means (105, 105b, 107, 108) for transmitting said corrected digital representations to a controller (130) on a signal path in a normal mode of operation, said circuit means (14, 625, 626, 628, 700) being operative to communicate with a host computer to transmit said uncorrected digital representations for use in determining said correction factor and to receive the so determined correction factor for storage in said circuit means (14, 625, 626, 628, 700) in a calibration operation of said load cell,

**characterized in that**

said circuit means (14, 625, 626, 628, 700) is responsive to message commands communicated from said controller (130) or host computer enabling and disabling said transmission of said corrected and uncorrected digital representations by said circuit means, means (15, 642, 704) providing a sealed enclosure for said transducer means and said circuit means being provided, said signal path extending through said enclosure means (15, 642, 704) and being

operative to enable said communication of said message commands, correction factor, and uncorrected and corrected digital representations to be performed with said host computer or controller (130) located externally to said enclosure means (15, 642, 704)."

Claims 1 in accordance with the auxiliary requests are worded as follows:

First subsidiary version

"1. Weighing apparatus formed as a modular digital load cell (20), comprising a counterforce (12, 600, 675), transducer means (75, 76, 79, 80, 610, 611, 617, 618, 687, 688, 689, 690) mounted on said counterforce for providing an analog weight signal of loads applied to said counterforce and circuit means (14, 625, 626, 628, 700) including means including an analog-to-digital converter (100) for producing digital representations of said analog weight signal, means (105) for applying at least one correction factor to said digital representations and means (105, 105b, 107, 108) for transmitting said corrected digital representations to a controller on a signal path in a normal mode of operation, said circuit means (14, 625, 626, 628, 700) being operative to communicate with a host computer to transmit said uncorrected digital representations for use in determining said correction factor and to receive the so determined correction factor for storage in said circuit means (14, 625, 626, 628, 700) in a calibration operation of said load cell,

**characterized in that**

said circuit means (14, 625, 626, 628, 700) is responsive to message commands communicated from said controller (130) or host computer enabling and disabling said transmission of said corrected and uncorrected digital representations by said circuit means, means (15, 642, 704) providing a sealed enclosure for said transducer means and said circuit means being provided, said signal path extending through said enclosure means (15, 642, 704) and being operative to enable said communication of said message commands, correction factor, and uncorrected and corrected digital representations to be performed with said host computer or controller (130) located externally to said enclosure means (15, 642, 704)."

Second subsidiary version

"1. Weighing apparatus comprising at least one modular digital load cell (20), said cell including a counterforce (12, 600, 675), transducer means (75, 76, 79, 80, 610, 611, 617, 618, 687, 688, 689, 690) mounted on said counterforce and circuit means (14, 625, 626, 628, 700) including means (100) for producing digital representations of loads applied to said counterforce, means (105) for applying at least one correction factor to said digital representations and means (105, 105b, 107, 108) for transmitting said corrected digital representations to a controller on a signal path in a normal mode of operation, said circuit means (14, 625, 626, 628, 700) being operative to communicate with a host computer to transmit said uncorrected digital representations for use in determining said correction factor and to receive the so determined correction factor for storage in said circuit means (14, 625, 626,

628, 700) in a calibration operation of said load cell,

**characterized in that**

said circuit means (14, 625, 626, 628, 700) is responsive to message commands communicated from said controller (130) or host computer enabling and disabling said transmission of said corrected and uncorrected digital representations by said circuit means, means (15, 642, 704) providing a sealed enclosure for said transducer means and said circuit means being provided, said signal path extending through said enclosure means (15, 642, 704) and being operative to enable said communication of said message commands, correction factor, and uncorrected and corrected digital representations to be performed with said host computer or controller (130) located externally to said enclosure means (15, 642, 704)."

Third subsidiary version

"1. Weighing apparatus comprising at least one modular digital load cell (20), said cell including a counterforce (12, 600, 675), transducer means (75, 76, 79, 80, 610, 611, 617, 618, 687, 688, 689, 690) mounted on said counterforce for providing an analog weight signal of loads applied to said counterforce and circuit means (14, 625, 626, 628, 700) including means including an analog-to-digital converter (100) for producing digital representations of said analog weight signal, means (105) for applying at least one correction factor to said digital representations and means (105, 105b, 107, 108) for transmitting said corrected digital representations to a controller on a

signal path in a normal mode of operation, said circuit means (14, 625, 626, 628, 700) being operative to communicate with a host computer to transmit said uncorrected digital representations for use in determining said correction factor and to receive the so determined correction factor for storage in said circuit means (14, 625, 626, 628, 700) in a calibration operation of said load cell,

**characterized in that**

said circuit means (14, 625, 626, 628, 700) is responsive to message commands communicated from said controller (130) or host computer enabling and disabling said transmission of said corrected and uncorrected digital representations by said circuit means, means (15, 642, 704) providing a sealed enclosure for said transducer means and said circuit means being provided, said signal path extending through said enclosure means (15, 642, 704) and being operative to enable said communication of said message commands, correction factor, and uncorrected and corrected digital representations to be performed with said host computer or controller (130) located externally to said enclosure means (15, 642, 704)."

VII. The appellant's arguments in support of its requests may be summarised as follows:

Since all of the objections raised by the Board and/or the respondents under Articles 123 and 84 EPC have duly been taken into account for the present main and subsidiary versions of claim 1, these versions should meet the requirements of the EPC in this respect. In

particular, the claims do not refer to a LAN configuration but clearly define the functionality of the load cell. Responsiveness of the load cell to message commands communicated from a controller or host computer as set out in the characterising portion of claim 1 is disclosed at column 9, line 31 to column 10, line 45 of the application documents as published.

For all claim versions, the precharacterising portion departs from the appellant's own document OI3 which is considered to be the closest prior art. Although the circuit elements enclosed by a broken line in Figure 4 of OI3 are referred to as "digital load cell 60" (see OI3, page 14, second paragraph), the actual meaning of the broken line and the real structure of both the circuit means as such and the load cell as a whole are not entirely clear. In any case, the strain gauge bridge cannot be on a common circuit board with the remaining circuit elements as it might appear from Figure 4, but must be separately attached to a counterforce which is not shown in said Figure.

Although the functions of data correction and communication and the different modes of operation can already be derived from pages 15 and 16 of said document, the polling feature of the characterising portion is not disclosed. As can be seen from Figure 5 of OI3, data transmission does not occur on demand of the host computer or controller, but rather automatically after system start up. Moreover, although the prior art calibration mode is illustrated in Figures 7 and 8 of OI3, it is left open where the raw data really come from. Thus, document OI3 does not disclose any message exchange between the load cell and

the external host computer or controller.

Furthermore, said document is completely silent on any sealing aspects of the load cell and consequently also on any signal paths extending through such sealings.

Provision of the above different features for a load cell according to OI3 would not be obvious to a skilled person from the remaining pertinent documents. Although it is admitted that sealing of load cells as such is known from documents OIII3 and OII2, these documents do not disclose electronics of the claimed type within the sealed enclosure. The cell of document OII2 makes use of analog signal processing, and digitisation is only mentioned in a more speculative way as a desirable possibility. There is no indication of any responsiveness to message commands controlling information exchange.

Finally, document OIII2 relates to the interconnection of four load cells in a multi-load cell weighing system, the analog outputs of the cells being cyclically switched to an analog-to-digital converter with the aid of a microprocessor and then stored in a memory where they are corrected. There is no information about the origin of the individual cell correction factors. Since no message commands for transmission of corrected and uncorrected data are communicated from a host computer or a controller to the load cells, and no sealing is provided, the prior art weighing system is far from what is claimed in the present requests.

VIII. In its letter dated 17 June 1997, respondent 02 raised

an objection of lack of inventive step against the subject matter of claim 1 then on file but did not comment on the latest version of claims. The arguments of respondents 03 to 05 may be summarised as follows:

Respondent 03 protested against the Board's intention to disregard its late filed documents submitted for the purpose of establishing a further prior use. In its view, the late filing which in any case occurred within the period set in the Board's communication was justified because of the amendments to the claims effected by the appellant. Moreover, the evidence was considered highly relevant since the Avery A 100 scale was released before the priority date of the patent in suit and in substance anticipated the claimed features.

Respondent 04 referred to its comments in writing (see the letter dated 28 May 1997) according to which the subject matter of the patent in suit was not sufficiently disclosed since it was not restricted to strain gauge transducers, lacked novelty over the apparatus established as public prior use before the first instance by hearing a witness, and was not inventive with respect to document OII3.

Respondent 05 advanced two different lines of argument. Firstly, document OI3 discloses a load cell according to the precharacterising portion of claim 1. Even if the exchange of raw data is not explicitly described in the prior art, it would be implicitly understood by a skilled person from the overall configuration of OI3 that data transmission must be handled by message commands communicated from the host microprocessor via the known input/output bus to the load cell. For

instance, in order to calculate the correction factors, raw data must be transmitted by the cell microprocessor on demand, the factors then being retransmitted to the cell after determination. The cell must therefore be responsive to message commands from the host in order to distinguish which kind of data, i.e. corrected or uncorrected ones, are requested and whether data are to be transmitted or received. A sealed enclosure with the necessary connection leads extending through it is known from document OII2 which also suggests digitisation of weight signals. In consequence, a skilled person would arrive at the claimed solution by combining the teaching of documents OI3 and OII2 without exercising inventive skill.

Secondly, as can be established by hearing the witness again, an embodiment of the prior use weighing apparatus was intended to comprise four hermetically sealed load cells. Furthermore, a common interface board was provided for handling of data from several cells. Data transmission from individual cells could be switched on or off. Thus, starting from document OI3 an obvious combination with features of the prior use apparatus would also lead to the claimed subject matter.

These arguments apply to the auxiliary requests as well since the respective precharacterising portions only differ by minor modifications which have been made for reasons of clarity and are also known from the closest prior art.

## Reasons for the Decision

### 1. *Admissibility of Appeal*

The appeal complies with Articles 106 to 108 and with Rule 1(1) and Rule 64(b) EPC. It is therefore admissible.

### 2. *Articles 123 and 84 EPC*

In the light of the appellant's arguments, the Board considers the amended versions of claim 1 according to the main and subsidiary requests to be admissible and clear. Apparently, respondents 03 and 05 did not pursue their respective objections in this context during the oral proceedings.

### 3. *Article 54 EPC*

The Board also holds the view that the claimed subject-matter is novel with respect to the prior art identified. In particular, the Board agrees with the Opposition Division that the weighing apparatus established as public prior use by hearing a witness before the first instance (see the minutes of Dr Selig's testimony before the Opposition Division) did not anticipate the claimed subject matter in that, e.g., data correction was not carried out within the load cell but externally by an additional circuit board, i.e. no means for applying at least one correction factor to the raw data and transmitting **corrected** data from the load cell to the external controller was provided in the prior use device.

Having regard to the allegation of a further public prior use late filed by respondent 03, the Board does not consider this allegation to be sufficiently substantiated to form a basis for attacking novelty or inventive step. In particular, the meaning of a plurality of the late filed documents is not apparent from respondent's 03 letters, and although further arguments based on entirely new additional documents have been submitted shortly before the scheduled oral proceedings, the impact of the alleged prior use on patentability still remains unclear. In particular, it does not follow from these submissions what exactly has been used at which date and under which circumstances, and whether novelty or inventive step would be concerned. In consequence, the Board does not find the late filed prior use *prima facie* relevant and therefore has to disregard it in accordance with the established practice of the boards of appeal (see the decisions cited in "Case Law of the Boards of Appeal of the European Patent Office", 3rd edition 1998, European Patent Office 1999, Section VI, Chapter F-8.2: "Late-filed evidence of public prior use").

4. *Article 56 EPC*

4.1 Main version of claim 1

The Board shares the appellant's view that document OI3 comes closest to the claimed subject matter. As the appellant has correctly pointed out at the oral proceedings, this document already discloses a weighing apparatus having all the features defined in the precharacterising portion of claim 1 (see in particular Figures 4, 7 and 8; page 1, last paragraph to page 2,

second paragraph; page 14, second paragraph to page 16, first paragraph; and page 20, last paragraph to page 24 of the description).

However, contrary to the appellant's opinion, the Board considers features of the characterising portion of claim 1 to be known from document OI3 as well. Firstly, the digital load cell 60 of Figure 4 of OI3 can form a unit in itself and be incorporated into a variety of microcomputer controlled scale systems (see OI3, page 14, last paragraph to page 15, first paragraph). In this case, the cell is interfaced with the scale or host computer which must therefore be assumed to be located externally of said cell (see Figure 4: host microprocessor 62). Since microprocessor 90 of the digital load cell is able to communicate with external host microcomputer 62 (see OI3, page 15, last paragraph to page 16, first paragraph), there must necessarily be a signal path extending between the cell and the host computer operative to enable said communication (see connection indicated by arrows in both directions in Figure 4 of OI3).

Secondly, in the Board's view the full nature of the prior art communication would be implicit to a skilled person. In accordance with the acknowledgement of document OI3 in the precharacterising portion of claim 1, it goes without saying that transmission of correction factors and of uncorrected and corrected digital representations is included in said communication. Moreover, from the simple fact that in the prior art two microprocessors, one operating on a modular unit level, the other on a system level as host computer, are interfaced with each other via a signal

path allowing data transfer in both directions, it would readily occur to a skilled person that a polling hierarchy of master-slave or client-server type between both processors should exist so that the processor on the modular unit level is responsive to message commands communicated from the host computer or controller on the system level, said commands enabling and disabling data transmission. This hierarchy is clearly reflected by the term "host microprocessor" consistently used in OI3, and by the fact that the host microprocessor 62 itself receives operator information through keyboard 67 (see Figure 4 of OI3), which information must be transmitted as a message command to load cell microprocessor 90 in order to become effective.

The appellant's line of defence in this respect is mainly based on the fact that such a polling hierarchy is not explicitly described in document OI3. Although it is correct that document OI3 does not explicitly refer to the claimed architecture, the Board is convinced that sufficient indications are given in OI3 to make its existence in the prior art scale system readily envisable by a skilled person in the microprocessor field as respondent 05 has rightly pointed out, and there is no indication to the contrary in OI3. In addition to the arguments already set out in the preceding paragraph, the very concept of communication between two microprocessors involving data transfer in both directions on a common communication channel entails the exchange of message commands of the send/receive type in accordance with a protocol and the execution of actions corresponding to such message commands as is illustrated by e.g. German

Industry Standard DIN 66 019, May 1976. Since different data, i.e. corrected or uncorrected ones, may be transmitted from the load cell to the host computer in OI3, it is clear that the cell must receive the information when to send uncorrected data, i.e. to switch to the calibration mode, and when to send corrected data, i.e. to switch back to the normal mode. Similarly, the cell must receive a message command when to receive the correction factors from the host computer and what to do with them. In all of these cases, the cell microprocessor must be responsive to messages from the host microcomputer enabling and disabling said data transfers.

In the Board's view, despite some "gaps" in the explicit teaching of OI3, these facts are also apparent from the data transfer procedures described in said document. Even if it were assumed that the cell microprocessor 90, after the initialising step 102 (see Figure 5 of OI3), "automatically" starts with collecting weight data as the appellant asserts, invalid correction factors (creep constants) are flagged to the host by subroutine 127 to 131. Similarly, invalid weight data are flagged to the host by subroutine 142. Moreover, in the creep compensation subroutine a check is made at block 141 (see Figure 6 of OI3) whether the host is a calibration system or an application system. Finally, prior to calculating the correction factors, actual creep measurements are transferred from the load cell to the host computer in the calibration mode (see page 21, second paragraph of OI3), which factors after calculation are sent back to the load cell for use in creep predictions (see page 24 of OI3). Thus, it appears that under the above-

mentioned conditions, the prior art load cell has to wait for and to proceed in accordance with message commands communicated from the host computer, said commands inter alia enabling and disabling transmission of corrected and uncorrected digital representations by the cell microprocessor.

Therefore, in the Board's view, even if not explicitly anticipated by document OI3, the first feature of the characterising portion of claim 1 would, in any case, be a skilled person's first idea of how to organise the communication between the cell and host microprocessors in the prior art weighing apparatus.

Consequently, the subject-matter of claim 1 in substance differs from the closest prior art by the provision of a sealed enclosure for the transducer means and circuit means, the signal path extending through said enclosure. Document OI3 is silent in this respect, although the known digital load cell constitutes a self-contained modular unit as indicated by the broken line enclosure in Figure 4 of OI3.

The technical effect associated with this difference appears to relate to protection against environmental influence on the self-contained load cell which only requires digital analysis and correction from an external source (see also the patent specification, column 2, lines 17 to 21 in this context).

The problem of achieving such protection and its solution by hermetically sealing the load cell are, however, well-known in the prior art (see e.g. document OIII3, page 1, last paragraph). Moreover, document OII2

discloses a sealed load cell (see Figure 2 and associated text) containing the transducers and the electrical circuits required for analog signal transformation within the enclosure (see OII2, page 82, last paragraph). Furthermore, document OII2 clearly hints at data digitisation and signal processing on the sensor level with the aid of a microprocessor (see OII2, page 84, second paragraph) so that the sealed enclosure may in substance include the complete digital data generating and processing electronics.

Starting from a weighing apparatus as disclosed in document OI3, a skilled person would therefore, in an attempt to protect the known self-contained digital load cell against harmful environmental impact, obviously seal the known cell by an enclosure comprising the necessary cell electronics as suggested in document OII2, the enclosure thereby following the schematically drawn broken line in Figure 4 of OI3.

The subject-matter of the main version of claim 1 thus does not involve an inventive step as required by Article 56 EPC, and claim 1 is not allowable for this reason.

#### 4.2 Subsidiary versions of claim 1

The subsidiary versions of claim 1 differ from the main version by modifications of the precharacterising portion effected mainly for reasons of clarity, i.e. (i) the transducer means is for providing an analog weight signal of loads applied to said counterforce and the circuit means includes an analog-to-digital converter for producing digital representations of said

analog weight signal (1st subsidiary version);  
(ii) the weighing apparatus comprises at least one modular digital load cell, said cell including a counterforce (2nd subsidiary version); and  
(iii) modifications (i) and (ii) are combined in the 3rd subsidiary version.

However, since the modified features are anticipated by the weighing apparatus according to document OI3 which comes closest to the claimed subject matter of the subsidiary versions as well, the assessment of inventive step for the subsidiary versions of claim 1 must lead to the same negative result as already obtained above for the main version of claim 1. In consequence, claim 1 of the respective subsidiary versions is also not allowable (Article 56 EPC).

## **Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairman:

P. Martorana

E. Turrini