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D E C I S I O N
of 28 July 2005

Case Number: T 1295/01 - 3.5.3

Application Number: 95920667.3

Publication Number: 0764292

IPC: G05B 9/02

Language of the proceedings: EN

Title of invention:

Transmitter with electrical circuitry for inhibiting discharge
of stored energy

Patentee:

ROSEMOUNT INC.

Opponent:

Endress + Hauser Flowtec AG

Headword:

Transmitter/ROSEMOUNT

Relevant legal provisions:

EPC Art. 56

Keyword:

"Inventive step (no) "

Decisions cited:

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Catchword:

-



Case Number: T 1295/01 - 3.5.3

D E C I S I O N
of the Technical Board of Appeal 3.5.3
of 28 July 2005

Appellant:
(Opponent)

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Representative:

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Respondent:
(Proprietor of the patent)

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Representative:

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Decision under appeal:

Decision of the opposition division of the
European Patent Office posted 4 December 2001
rejecting the opposition filed against European
patent No. 0764292 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: A. S. Clelland
Members: F. van der Voort
R. T. Menapace

Summary of Facts and Submissions

I. This appeal is against the decision of the opposition division rejecting an opposition filed against European patent No. 0 764 292.

II. The opposition was filed against the patent as a whole and on the ground that the claimed subject-matter did not involve an inventive step (Articles 56 and 100(a) EPC). During the opposition proceedings, the opponent referred, *inter alia*, to the following documents:

D1: Ulrich Johannsmeyer, "Untersuchungen zur Eigensicherheit bei Feldbus-Systemen", PTB-Bericht W-53, Physikalisch-Technische Bundesanstalt, Braunschweig, March 1993;

D2h: Ted Schnaare, "Intrinsic Safety and Fieldbus", Seminar on intrinsic safety and fieldbus systems, Boston, MA, USA, 16 July 1993; and

D3: WO 93/08652 A.

During the opposition proceedings D2h was, together with seven other contributions to the seminar, commonly referred to as D2.

III. The opponent lodged an appeal against the decision and requested that it be set aside and the patent revoked in its entirety. The appellant argued, *inter alia*, that the subject-matter of claim 1 lacked an inventive step having regard to D1 and D3. Oral proceedings were conditionally requested.

IV. In his response to the notice of appeal, the respondent (proprietor) argued that the appeal should be rejected. Oral proceedings were conditionally requested.

V. The parties were summoned by the board to oral proceedings. In a communication accompanying the summons, the board gave a preliminary opinion.

VI. In response to the board's communication, the respondent filed a set of claims by way of an auxiliary request and submitted further arguments in support.

VII. Oral proceedings were held on 28 July 2005 at which the appellant requested that the decision under appeal be set aside and the patent revoked. The respondent requested that the appeal be dismissed (main request) or that the patent be maintained on the basis of the auxiliary request. At the end of the oral proceedings the board's decision was announced.

VIII. Claim 1 as granted reads as follows:

"1. A transmitter (10) for coupling to a two-wire control loop (16) carrying a loop current, comprising: a sensor (12) for sensing a variable of a process; measurement circuitry (18) coupled to the sensor (12) providing a transmitter output related to the process variable, the measurement circuitry (18) powered with the loop current and presenting an effective capacitance C_{eff} ; and a capacitance isolation network (20) operably coupled between the measurement circuitry (18) and the control loop (16), the isolation network being characterised by four rectifying elements (72, 74, 76, 78) connected in

a full wave bridge rectifier (70) having input terminals connected to the control loop (16) and an output terminal coupled to a fifth rectifying element (80) which is connected to the measurement circuitry (18) such that the loop current flows through three of the five rectifying elements simultaneously and inhibits discharge through the control loop of energy stored in C_{eff} ."

Claim 1 of the auxiliary request adds the following feature to claim 1 of the main request:

"wherein the isolation network (20) includes an RF filter component (52, 54) coupled to the control loop (16) and placed in a center wall (56) of the transmitter (10) which separates the measurement circuitry (18) from the control loop (16)."

Reasons for the Decision

1. *Inventive step (claim 1 of the main request)*
 - 1.1 The board considers D3 as representing the closest prior art for the purpose of assessing inventive step of the subject-matter of claim 1.

D3 discloses a transmitter (page 9, lines 20 to 31, and Fig. 4) coupled to a two-wire control loop (Fig. 1, field bus cable A, B) for carrying a loop current (page 5, line 33 to page 6, line 4). The transmitter includes a sensor 4 suitable for sensing a variable of a process (page 1, line 14, and page 6, line 10), measurement circuitry (components G, C, E and A of the

electronic unit 2 of Fig. 1) coupled to the sensor 4 and providing a transmitter output related to the process variable, in which the measurement circuitry is powered with the loop current and presents an effective capacitance including capacitor C (page 6, lines 11 and 12), and a capacitance isolation network including a rectifying element (Fig. 1, diodes 12) operably coupled between the measurement circuitry and the control loop A, B such that the loop current flows through the rectifying element and inhibits discharge through the control loop of energy stored in the effective capacitance (page 6, lines 12 to 17, and page 9, lines 1 to 4).

1.2 The subject-matter of claim 1 as granted differs from the transmitter shown in Fig. 1 of D3 in that, according to the claim, the capacitance isolation network has four rectifying elements included in a full wave bridge rectifier having input terminals connected to the control loop and an output terminal coupled to the (fifth) rectifying element which is connected to the measurement circuitry such that the loop current flows through three of the five rectifying elements simultaneously and inhibits discharge through the control loop of energy stored in the effective capacitance. The board notes that the wording "*such that the loop current flows through three of the five rectifying elements*" does not exclude that the current flows through more than three rectifying elements.

1.3 The provision of the bridge rectifier has, *inter alia*, the effect that the connection between the transmitter and the control loop may be inverted without affecting

the operation of the transmitter (see also the patent in suit, col. 3, lines 45 to 47).

- 1.4 The technical problem underlying the claimed subject-matter may therefore be seen in improving the transmitter disclosed in D3 such that it can be connected to the control loop independent of the polarity of the connection.

- 1.5 A person skilled in the art starting from D3 and faced with this technical problem would consider D1, since D1 also relates to a transmitter including a sensor coupled to a field bus cable for carrying a loop current (D1, page 2, section 2.1, first two paragraphs) and explicitly provides a solution to this problem (see page 12, section 3.2, first two paragraphs, and Fig. 8), namely a full wave bridge rectifier with four rectifying elements and having input terminals connected to a field bus cable ("Bus-Hauptleitung") and output terminals coupled to a field bus interface ("Feldbus-Schnittstelle") of the field device. In order to solve the above-mentioned problem, a person skilled in the art would therefore apply the teaching of D1 to the transmitter of D3.

- 1.6 The most straightforward manner of applying the teaching of D1 to the transmitter of D3 in order to render it polarity-independent would be to insert a bridge rectifier between the field bus cable A, B (see D3, Fig. 1) and the electronic unit 2, which corresponds to the field bus interface of the transmitter of D1. The loop current would thereby flow through at least three of the five rectifying elements simultaneously and, at the same time, the bridge

rectifier together with the diodes 12 would thereby constitute a capacitance isolation network providing a multi-level protection against a discharge through the control loop of energy stored in the effective capacitance. Hence, without the exercise of any inventive skill, the skilled person would arrive at the subject-matter of claim 1.

- 1.7 The respondent argued that a person skilled in the art would not start from D3, since other documents on file, e.g. D2h, were more pertinent in that these documents addressed both the problem of capacitance isolation and the problem of polarity inversion, whereas D3 only disclosed a solution to the first problem.

The board does not find this argument convincing, since D3 relates to the same technical field as the patent in suit, namely transmitters for use in a process control loop, in which the transmitters are powered and communicate via a control loop of the field bus type and include circuitry for inhibiting discharge of stored energy (cf. the patent in suit, col. 1, lines 5 to 41, and D3, the abstract). In addition, D3 discloses most of the features of claim 1 (see point 1.1 above). Hence, D3 would realistically be considered by a person skilled in the art as a starting point for further development and thus constitutes a suitable starting point for the purpose of assessing inventive step of the claimed subject-matter.

- 1.8 The respondent further argued that if the skilled person were to consider modifying the transmitter of Fig. 1 of D3 in order to make it immune to the polarity of the bus line, he would as a matter of course replace

the diodes 12 by the bridge rectifier, since there would be no further need for them.

The board notes however that neither D1 nor D3 contains a teaching which would lead the skilled person to remove the diodes 12 for inhibiting a capacitance discharge, even if, in accordance with the teaching of D3, a bridge rectifier were provided between the bus line and the transmitter in order to render the transmitter immune to the polarity of the line. The board notes that in D3 the diodes 12 form part of the electronic unit 2; the skilled person would have no reason to modify unit 2. Even if for the sake of argument it were assumed that the skilled person would recognize that the rectifying elements of the bridge rectifier also act as a means for inhibiting capacitance discharge, he would recognize that the bridge rectifier together with the blocking diodes 12 provides a higher-level protection against a discharge through the control loop at no additional cost. Whether less or more blocking diodes 12 would be more appropriate is then a matter of which level of protection is desired, which is not relevant to the technical problem as defined at point 1.4 above.

1.9 The board therefore concludes that the subject-matter of claim 1 lacks an inventive step (Articles 52(1) and 56 EPC).

2. *Inventive step (claim 1 of the auxiliary request)*

2.1 The additional feature of providing an RF filter component as defined in claim 1 of the auxiliary request relates to the problem of protecting the

transmitter against high frequency RF signals (see the patent in suit, col. 3, last line to col. 4, line 6), which is independent of the technical problem discussed at point 1.4 above. The claim thus defines an aggregation or collocation of features, in which the technical problem underlying the claimed subject-matter consists of two separate partial problems.

2.2 If starting out from D3 the skilled person were faced with the problem of providing RF protection, he would note that document D2h (see slide 17) discloses a fieldbus device including an isolation network with RFI filters including lead-through capacitors coupled to a control loop ("field wiring"). These capacitors thus serve the same purpose as the RF filter component in the patent in suit, i.e. to short-circuit to ground RF signals which otherwise would interfere with the operation of the device.

2.3 If the same effect were to be achieved in the transmitter of D3 it would therefore be obvious to the skilled person to provide it with the RFI filters as taught by D2h. Since according to D2h the RFI filters are connected between the circuitry of the fieldbus device and the field wiring, it would be obvious to the skilled person to correspondingly connect the RFI lead-through capacitors between the measurement circuitry and the control loop. Further, in the absence of any further indications in the patent or arguments put forward by the respondent in this respect, the board considers that it would be a matter of normal design choice for the skilled person to accommodate the lead-through capacitors in a center wall separating the measurement circuitry from the control loop.

- 2.4 Having solved both partial problems as discussed above at points 1.5, 1.6 and 2.3, the skilled person would thus arrive at a transmitter including all the features of claim 1 without the exercise of any inventive skill.
- 2.5 The subject-matter of claim 1 of the auxiliary request therefore lacks an inventive step (Articles 52(1) and 56 EPC).

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:

D. Magliano

A. S. Clelland