

**Operating instructions  
for  
Capacitive level transmitter**

**Model NMC**

**2 Wire (4 a 20mA)**

## 1. Content

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**Manufactured by:**

Kobold Mesura S.L.U  
Avda Conflent Nº68 Nave 15  
08915 Badalona  
Tel.: +34 93 460 38 83  
Fax: +34 93 460 38 72  
E-Mail: [info.es@kobold.com](mailto:info.es@kobold.com)  
Internet: [www.kobold.com](http://www.kobold.com)

Edition: Feb 2014

## **2. Note**

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Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.

The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to health & safety and prevention of accidents.

## **3. Instruments inspection**

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Instruments are inspected before shipping and sent out in perfect condition.

### **Scope of delivery**

The standard delivery includes:

- Capacitive Level Transmitter NMC
- Cable gland M20
- Operating Instructions

## **4. Description**

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The NMC transmitter is a two wire capacitance level transmitter for measuring continuous level in tanks containing liquids.

## **5. Application**

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The probe of the NMC and the wall of the tank, forms an electric capacitor. The dielectric of this capacitor when the tanks is empty, is the air.

When the liquid reaches the probe, the dielectric constant formed by the unit and tank, changes.

An electronic circuit sited in the connecting module of NMC, converts this capacity change in a variable current and proportional to the height of the liquid.

Due to each application is different, given that the kind and the measures of the tank and the products that it contains change, every unit has to be adjusted to be adapted to each tank and product.

Using the menus of the NMC , this operation is very easy.

The circuit, controled by microprocessor, stores all data and does the calculation. A display LCD guides us in the calibration process.

The output current signal is 4 to 20 mA. These values can be sited where we want in the probe.

## 6. Current simulation

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Using this option the NMC generates in the supply loop, a 4 to 20 mA current, in steps of 1 mA. This function is very useful to make tests with independence of the level of the tank.

## 7. Installation

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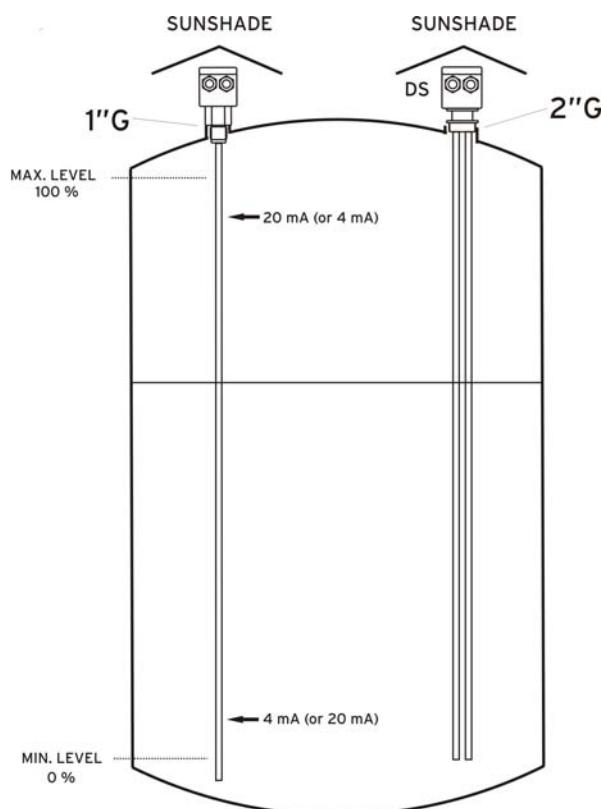
The NMC is installed using a G1" (G2" in DS version).

The probe must be installed avoiding a good contact between the probe and the tank's wall.

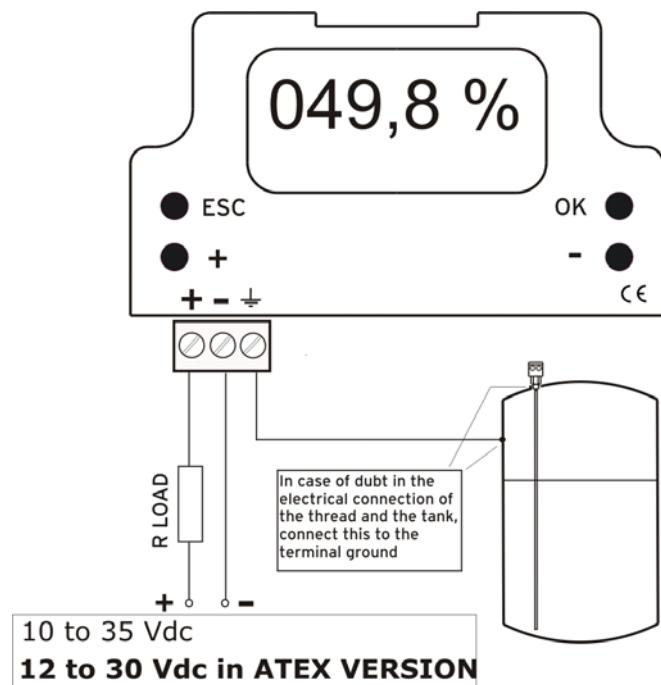
Electronic of the NMC unit should be protected with shelter against development of too high temperature by direct sunshine.

Be ensured that the connection 1"BSP to the tank has been done properly. The NMC 's thread should not been forced.

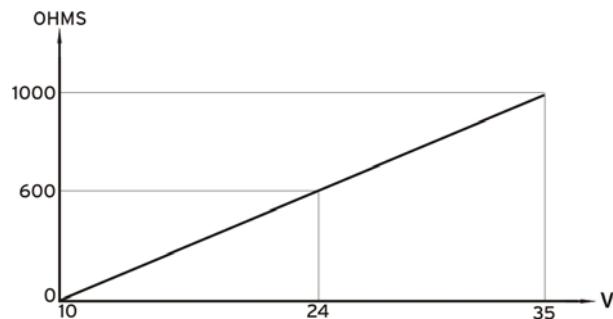
The electrical connection between the thread and the tank has to be good..



## 8. Electrical connection



The maximum resistance of the line in serial, depends on the power supply. These values have to be bear in mind for the good run of the NMC .



## 9. Programming

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### 9.1 Calibrating probe

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<b>Calib.Probe</b>	→ OK
<b>Output</b>	→ +
<b>Language</b>	→ -
<b>Back</b>	→ ESC

1. Pressing any key, you enter in the main menú.  
Press (OK) to enter in calibration probe.

**CALIBRATION**  
¿SURE?

Yes → OK No → ESC

2. To avoid mistakes, asks again if you are sure that  
you want to calibrate the unit. Press (OK) another  
time to enter.

<b>CALIBRATION</b>	
<b>Low Level</b>	→ OK
<b>High Level</b>	→ +

3. If the level in the tank is low, we will choose the  
(OK) option to adjust the unit with the lowest level

**LOW LEVEL ADJUST**  
Enter the actual level  
in probe.  
+ And -: 010.0% → OK

4. If, for example, when you adjust the low level, the  
level of the tank is the 10% of the capacitance, we will  
indicate it in the display using the ( + ) and ( - ) keys.  
Confirm with ( OK ).

**Calibrating**  
**PROBE**  
**For low level**  
....WAIT....

5. In this moment the microprocessor makes the  
operations to choose the best measurement range.  
This operations takes some seconds.

\*\*\*PROBE  
CALIBRATED\*\*\*

6. When this operation is finished, the display shows  
the message "PROBE CALIBRATED".

<b>Calib.Probe</b>	→ OK
<b>Output</b>	→ +
<b>Language</b>	→ -
<b>Back</b>	→ ESC

7. Automatically the display show the main menú.  
Now need calibrate the High Level, then pressing  
(OK) another time to enter in the calibration probe  
menu.

**CALIBRATION**  
¿SURE?  
**Yes → OK No →ESC**

8. To avoid mistakes, asks again if you are sure that you want to calibrate the unit. Press ( OK ) another time to enter.

**CALIBRATION**  
Low Level →OK  
High Level → +

9. Pressing (+) we enter in High level calibration.

**HIGH LEVEL ADJUST**  
Enter the actual level  
In probe  
  
+ and - :080.0% → OK

10. If when you adjust the high level, the liquid in the tank is 80% of the capacitance, we will indicate it in the display using the (+) and (-) keys. Confirm with (OK).

**Calibrating**  
**PROBE**  
**For low level**  
**.... WAIT ....**

11. The microprocessor makes the operations to calibrate the maximum level of the unit. This operation takes some seconds.

**\*\*\* PROBE**  
**CALIBRATED \*\*\***

12. The display shows this message to indicate NMC has finished the calibration internal process. When the liquid level will be in the minimum point, it will indicates 000.0% and when the liquid level will be in the maximum, 100.0%.

**Calib.Probe** → OK  
**Output** → +  
**Language** → -  
**Back** → ESC

13. Automatically, the display shows the main menu. Pressing ESC the unit return to read state. Pressing (+) we can enter in output adjustment menu and simulation mode.

## 9.2 Output Adjustment

**Calib.Probe** → OK  
**Output** → +  
**Language** → -  
**Back** → ESC

1. Pressing any key, you enter in the main menu. Press (+) to enter in Output.

OUTPUT	
Output SIM	→ -
Output Adj	→ +
Back	→ ESC

2. Pressing (+), we enter in Output adjustment menu.

OUTPUT ADJUST	
¿Where do you want the 4mA output?	
+ and - : 005.0%	→ OK

3. This asks, where do you want the NMC gives us 4mA. If you want it in 5% of the probe. Using (+) and (-) we indicate this value in the display. Confirm with (OK)

OUTPUT ADJUST	
¿Where do you want the 20mA output?	
+ and - : 095.0%	→ OK

4. We do the same for the 20mA. In this case, if we want this current in the 95% of the probe, we will indicate this value using (+) and (-). Confirm with (OK)

MEASURE FILTER	
Enter filter's level	
0 to 5	

+ and - : 1 → OK

5. Finished the adjustment, we can incorporate a filter to avoid oscillations caused by quick movements of the liquid's surface. This value between 0 and 5 (maximum filter). Confirm with (OK)

OUTPUT	
Output SIM	→ -
Output Adj	→ +
Back	→ ESC

6. Automatically return to output menu.  
Pressing ESC return to measuring mode.

**049.8%**  
**12.04mA**

7. In this point, the NMC is adjusted. The number in % indicates the height that reaches the level in the probe (0 to 100). The value of the current will depends f the adjustment of the points 3 and 4 of this section, and it can be in any point of the probe.  
It can be in maximum point and in the 20mA at the minimum.

## 9.3 Output simulate

---

Calib.Probe	→ OK
Output	→ +
Language	→ -
Back	→ ESC

1. Pressing any key, you enter in the main menu.  
Press (+) to enter in Output.

OUTPUT	
Output SIM	→ -
Output Adj	→ +
Back	→ ESC

2. Pressing (-), we enter in simulate output menu.

SIMULATE OUTPUT	
Back	→ ESC
+ and - : 04mA	→ OK

3. In this screen, using the (+) and (-) keys, the loop current (2 wire) will change in steps of 1mA. With this option, you can do current testes without generator. Pressing (OK) return to menu show in point 2. Pressing (ESC) return to read mode.

## 9.4 Language

Calib.Probe	→ OK
Output	→ +
Language	→ -
Back	→ ESC

1. Pressing any key, you enter in the main menu. Press (-) to enter in Language.

LANGUAGE	
+ & - : English	→ OK

2. Pressing (+) or (-) we can choose the language for the display.  
Language available: Spanish, English, German, Italian, French, Portuguese and Catalan.  
Pressing (OK) return to main menu in language selected.

## 10. Technical Data

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**Note:** Kobold Mesura makes every attempt to ensure the accuracy of these specifications but reserves the right to change them at any time.

Measuring principle:	Capacitive (for liquids up to 1000pF)
Probe length:	265...4000mm (shorter versions on request)
Accuracy:	±2 mm
Medium temp.:	max.90°C, NMC-H max.125°C
Max pressure.:	PN10
Media DC-value:	$\epsilon_r = \text{min. } 1.5$
Materials:	Housing: Polycarbonate Connection: St.steel 1.4305 (NMC-N,NMC-T,NMC-H) PVDF (NMC-S) Probe: - St.steel with PTFE coating (NMC-N, NMC-T) - PVDF coating (NMC-S) - St.steel probe 1.4305 with internal sensor (st.steel with PTFE coating) (NMC-T)
Mech.Connection:	G1 male (NMC-N,NMC-H,NMC-T) G2 male (NMC-S)
Supply voltage:	10...35 Vdc 12...30 Vdc for ATEX
Electr.connection:	via 1 (2) cable gland M20
Output:	4-20mA, two wire
Protection:	IP65
ATEX	 Ex II 2/1 GD Ex ia IIC T4 Gb/Ga Ex ia IIIC T85°C Db/Da -20°C ≤ Ta ≤ +60°C

## **11. Safety Instructions (ATEX)**

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### **1. Validity**

These safety instructions must be applied to the capacitive level transmitters series NMC...E when used in explosive atmospheres.

### **2. General considerations**

Working principle of NMC..E is capacitive and these instruments are used to measure and control the level on a liquid of any zone. Including zones with explosion risk.

Level instruments NMC..E have an analogue output 4-20mA two wires, and are used to measure the level in a tank. They can be used in explosive atmospheres group IIA, category 1/2GD

NMC..E have a housing with the electronic module and a probe that can be rigid (one or two roads) or flexible.

The probe can be installed in explosion risk areas 1/2GD.

The process connection element and the housing must be installed in area 2GD. When installing these instruments in explosive zones, all general instructions and recommendations regarding installations in explosive zones, as well as the instructions of this safety manual must be followed.

Verify that all data in the label of the instrument fits the installation requirements. EN60079-0, EN60079-11, EN60079-26, EN61241-0, EN61241-11 must be followed.

Switch off power supply before open housing or be sure there is no explosion risk.  
Verify that housing is closed before switch on the instrument.

It is very important to verify that ground terminal of the instrument is connected to ground of the installation.

Installation in hazardous zones must be done by trained people.

### **3. Protection against ESD (electro static discharges)**

Instruments with plastic parts that can produce electro static discharges, have a label for it.

It is important to follow some rules to avoid ESD:

- Avoid frictions.
- Do not clean the instrument with a dry cloth.
- Do not install in locations close to pneumatic flow of materials or close to steam exhaust systems.

### **4. Chemical resistance**

Materials in touch with the instrument must be chemically resists specially when used in hazardous zones category 1/2GD.

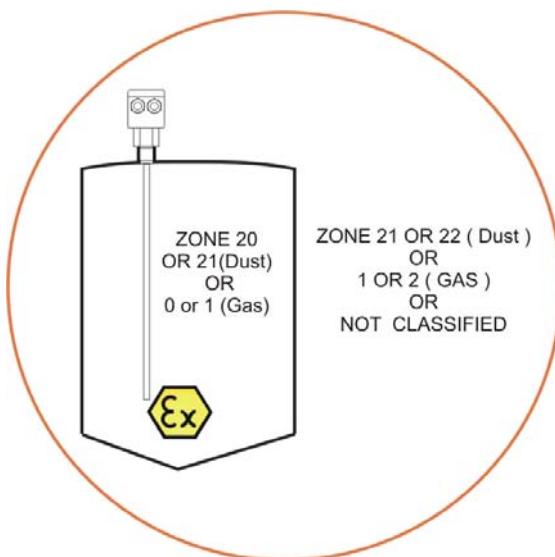
## 12. Installation in classified zone (ATEX)

In classified zones, NMC EX version, must be installed with the housing in zone 21, 22 dust and 1, 2 for Gas (category 2) or NOT CLASSIFIED.

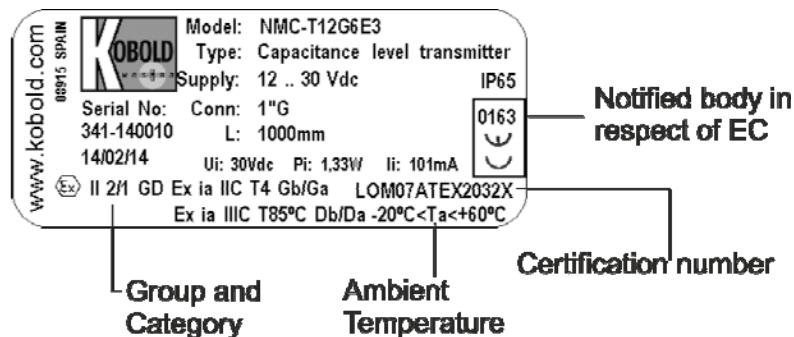
Process connection is mounted in the border wall between areas of category 2 and 1.

Probe can be mounted in ZONE 20,21 or 0,1 (category 1).

Installation must be done by people trained in ATEX environments.



## 13. Label Description (ATEX)



## 14. Declaration of conformance

DT0164

### DECLARACIÓN DE CONFORMIDAD CE

*EC DECLARATION OF CONFORMITY*

*EG-KONFORMITÄTSERKLÄRUNG*

*DÉCLARATION DE CONFORMITÉ*

*DICHIARAZIONE DI CONFORMITÀ CE*

**KOBOLD MESURA SLU**

**Avda. Conflent 68, nave 15 08915 Badalona (España)**

#### Declara, bajo la propia responsabilidad, que el producto

*Declares under our sole responsibility, that the product*

*Erklärt in alleiniger Verantwortung, daß das produkt*

*Déclare sous sa seule responsabilité, que le produit*

*Dichiara sotto la propria responsabilità, che il prodotto*

**MICROCAP...**

**NMC...**

#### A los cuales se refiere esta declaración, son conformes a las siguiente Directivas Europeas:

*To which this declaration relates is in conformity with the following European Directives:*

*An auf das diese Erklärung verweist, sie mit den Europäischen Richtlinien im Einklang stehen folgend:*

*À auxquels se réfère cette déclaration, ils sont conformes aux Directives Européennes suivant :*

*A ai quali si riferisce questa dichiarazione, sono conformi alle direttive europee seguente:*

### EMC2004/108/EC    Directiva Ex 94/9/EC

#### Normas armonizadas y documentos de la normativa aplicados:

*Applied harmonised standards and normative documents:*

*Angewandte harmonisierte Normen oder normativer Dokumente:*

*Normes harmonisées et documents normatifs appliqués*

*Norme armonizzate e documenti normativi applicati:*

EN61010-1 :2001	EN60079-0:2006 (acc. EN60079-0:2011)	EN61241-11:2006
EN61000-6-2 :2006	EN61241-0:2006	EN60079-26:2007
	EN60079-11:2007 (acc. EN60079-11:2012)	

#### Certificado de examen CE de tipo

*EC-type examination certificate*

*EG-baumusterprüfungsberechtigung*

*Attestation d'examen CE de type*

*Certificazione per esame di tipo CE*

#### Marcado

*Marking*

*Markierung*

*Inscription*

*Marcatura*



**II 2/1 GD Ex ia IIC T4 Gb/Ga**

**Ex ia IIIC T85°C Db/Da**

**-20°C ≤ Ta ≤ +60°C**

**Fabricado en: KOBOLD MESURA SLU Avda. Conflent 68, nave 15 08915 BADALONA (Spain)**

*Made in:*

*Hergestellt in:*

*Fabriqué dans:*

*Fabbricato in:*

#### Organismo notificado : LOM 0163

*Notified organism*

*Mitgeteilter Organismus*

*Organization annoncée*

*Organismo informato*

#### Número notificación : LOM 05ATEX9070

*Number notification*

*Zahlmitteilung*

*Nombre notification*

*Notifica di numero*

Badalona Feb. 2014

Gerente: Antonio Sánchez Tomás

**15. ATEX Certified****LABORATORIO OFICIAL J. M. MADARIAGA**

<p><b>(1)</b> <b>EC-TYPE EXAMINATION CERTIFICATE</b></p> <p><b>(2)</b> Equipment or protective system intended for use in potentially explosive atmospheres Directive 94/9/EC</p> <p><b>(3)</b> EC-Type Examination Certificate number: <b>LOM 07ATEX2032 X</b></p> <p><b>(4)</b> Equipment or Protection System      Capacitive level measuring device Types      Microcap...EX.. / NMC..., E..</p> <p><b>(5)</b> Applicant: <b>Kobold Mesura S.L.U</b></p> <p><b>(6)</b> Address <b>Grifé, 655</b> <b>08918 Badalona (BARCELONA)</b> <b>SPAIN</b></p> <p><b>(7)</b> This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.</p> <p><b>(8)</b> Laboratorio Oficial J.M. Madariaga (LOM), notified body number 0163 in accordance with Article 9 of the Directive 94/9/EC of the European Parliament of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.</p> <p>The examination and test results are recorded in confidential report nr. <b>LOM 07.105 HP</b></p> <p><b>(9)</b> Compliance with the Essential Health and Safety Requirements has been assured by compliance with:            — Standards      EN 60079-0:2006      EN 60079-11:2007      EN 60079-26:2007            — EN 61241-0:2006      EN 61241-11:2006</p> <p><b>(10)</b> If the sign X is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.</p> <p><b>(11)</b> This EC-Type Examination Certificate relates only to the design and construction of this specified equipment or protective system in accordance with the Directive 94/9/EC. Further requirements of the Directive applies to the manufacture and supply of this equipment or protective system. These are not covered by this certificate.</p> <p><b>(12)</b> The marking of the equipment or protective system shall include the following:</p>	 <b>Ta: -20 °C / +60 °C</b> <b>Ex iaD 20 T85 °C IP65</b>  <b>Carlos Fernández Ramón</b> <b>DIRECTOR OF THE LABORATORY</b>   <b>Angel Vega Remesal</b> <b>Head of ATEX area</b>
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UNIVERSIDAD POLITÉCNICA DE MADRID  
ENSAYOS E INVESTIGACIONES DE MATERIALES Y EQUIPOS PARA ATMÓSFERAS EXPLOSIVAS Y MINERÍA  
(Real Decreto 334/1992 de 3 de Abril - BOE 1992-04-29 -)





## LABORATORIO OFICIAL J. M. MADARIAGA

**(A1) SCHEDULE**

**(A2) EC-Type Examination Certificate: LOM 07ATEX2032 X**

**(A3) Description of equipment or protective system**

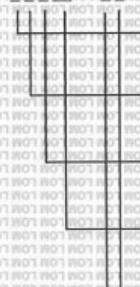
Capacitive level control device foreseen to be commercialised as two different type references:

Microcap...EX

NMC...E

Type nomenclature:

Microcap - EX --  
NMC - E --



**Probe version**

N, S, T H

**Probe length (m)**

1 to 4

**Connection material**

2 or 9

**Connection**

G1 or G2

**Power supply**

**Option**

This device is a current loop transmitter at 4-20 mA. The head of the device is made as category 2 and probe as category 1

**Specific parameters of the type of protection:** Ui: 30 V Pi: 1,33 W Ii: 50 mA

**(A4) Test report nr: LOM 07.105 HP**

**(A5) Special conditions for safe use**

It must be take in account the electrostatic risk of the head enclosure.

**(A6) Individual tests**

**None**



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## LABORATORIO OFICIAL J. M. MADARIAGA

### (A1) SCHEDULE

### (A2) EC-Type Examination Certificate: : LOM 07ATEX2032 X

### (A7) Essential Health and Safety Requirements

Explosion safe requirements are covered by application of the standards indicated in page 1/3 of this certificate.

### (A8) Descriptive documents:

	Rev.	Date
- Description nr.: DT0164	-	2007-04-29
DT0167	-	2007-03-19
- Component part list:	DT0161	2007-03-19
DT0162 (2 sheets)	-	2007-03-20
DT0163	-	2007-03-19
- Drawings nr.:	Microcap1	4
Microcap2 (2 sheets)	4	2007-01-23
Microcap3	4	2007-01-25
PE0201R0	-	2007-03-20
PE0202R0	-	2007-03-20
PE0203R0	-	2007-03-20
PE0204R0	-	2007-03-20
PE0205R0	-	2007-03-20
PE0206R0	-	2007-03-20
PE0207R0	-	2007-03-20
PE0208R0	-	2007-03-20
PE0209R0	-	2007-03-20
PM0481R0	-	2007-03-20
PM0482R0	-	2007-03-20



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## (1) EC-TYPE EXAMINATION CERTIFICATE SUPPLEMENT

- (2) Equipment or protective system intended for use in potentially explosive atmospheres  
Directive 94/9/EC

- (3) Supplement nr. 1 to EC-Type Examination Certificate number **LOM 07ATEX2032 X**

- (4) Equipment or Protection System **Capacitive level measuring device**  
Types Microcap...EX.. / NMC...E..

- (5) Applicant **Kobold Mesura S.I.U.**

- (6) Address **Grife, 655  
08918 Badalona (BARCELONA)  
SPAIN**

- (7) Test report nr.: **LOM 08.426 CP**

- (8) Variations included in this certificate

To include a variant with changes in the electronic circuit

Variations in the specific parameters of the type of protection:

Ui	Pi	Li
30V	1,33 W	101 mA
20 V	1,33 W	-
14,5 V	-	-

- (9) Variations in marking

Those that correspond to the specific parameters of the type of protection

- (10) Variations in the special conditions for a safe use

None

- (11) Descriptive documents

	Rev.	Date
- Part list nr.:	DT0161	1 2008-11-03
DT0162	1	2008-09-24
DT0163	-	2007-03-19
- Drawings nr.:	PE0201R1	1 2008-09-24
PE0204R1	1	2008-09-24
PE0207R1	1	2008-09-24
PE0210	5	2008-09-18
PE0211 (2 sheets)	5	2008-09-18
PE0212	5	2008-09-18

OFICIAL



Carlos Fernández Ramón  
DIRECTOR OF THE LABORATORY

Madrid, 12th December, 2008

Angel Vega Remesal  
Head of ATEX area

This supplement must be an inseparable part together with the basic certificate **LOM 07ATEX2032 X**  
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RCPCEP 07/4/2  
Rev. 0

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(Real Decreto 334/1992 de 3 de Abril - BOE 1992-4-29)



■ Alenza, 1 - 28003 MADRID • ☎ (34) 91 4421366 / 91 3367009 • ☎ (34) 91 4419933 • ☎ lom@lom.upm.es



## LABORATORIO OFICIAL J. M. MADARIAGA



### (1) EC-TYPE EXAMINATION CERTIFICATE SUPPLEMENT

(2) Equipment or protective system intended for use in potentially explosive atmospheres  
Directive 94/9/EC

(3) Supplement nr. 2 to EC-Type Examination Certificate number **LOM 07ATEX2032 X**

(4) Equipment or Protection System      Capacitive level measuring device  
Type Microcap...EX... / NMC-... E..

(5) Manufacturer      KOBOLD MESURA, S.L.U.

(6) Address      Guifré, 665  
08918 BADALONA(BARCELONA)  
ESPAÑA

(7) Test report nr.: **LOM 12.166 YP**

(8) Variations included in this certificate

- Update to the standards EN 60079-0:2009, EN 60079-31:2009 and EN 60079-26:2007
- Update of electronic design

Type codification remains unchanged.

Specific parameters of the type of protection are the same as specified in supplement 1 of this certificate

(9) Changes in marking

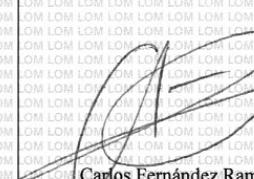
 Ex ia IIC T4 Gb/Ga  
Ex ia IIIC T85 °C Db/Da  
-20 °C ≤ Ta ≤ +60°C

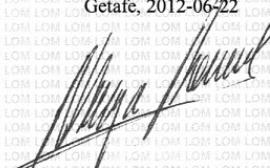
(10) Changes in the special conditions for a safe use

Without changes

(11) Descriptive documents

Rev.	Date
- Description nr.: DT0492	2012-04-01
- Schematics nr.: PE0231 (sheet 1)	2011-11-15
PE0231 (sheet 2)	2011-11-15
PE0231 (sheet 3)	2012-03-27
- Drawings nr: PE0233R0 (10 sheets)	2012-04-12
DT0488	2012-04-12

  
Carlos Fernández Ramón  
DIRECTOR OF THE LABORATORY

  
Angel Vega Remesal  
Head of ATEX area

This supplement must be an inseparable part together with the base certificate **LOM 07ATEX2032 X**

This Certificate is a translation from the original in Spanish. The LOM liability applies only on the Spanish text

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Rev. 0

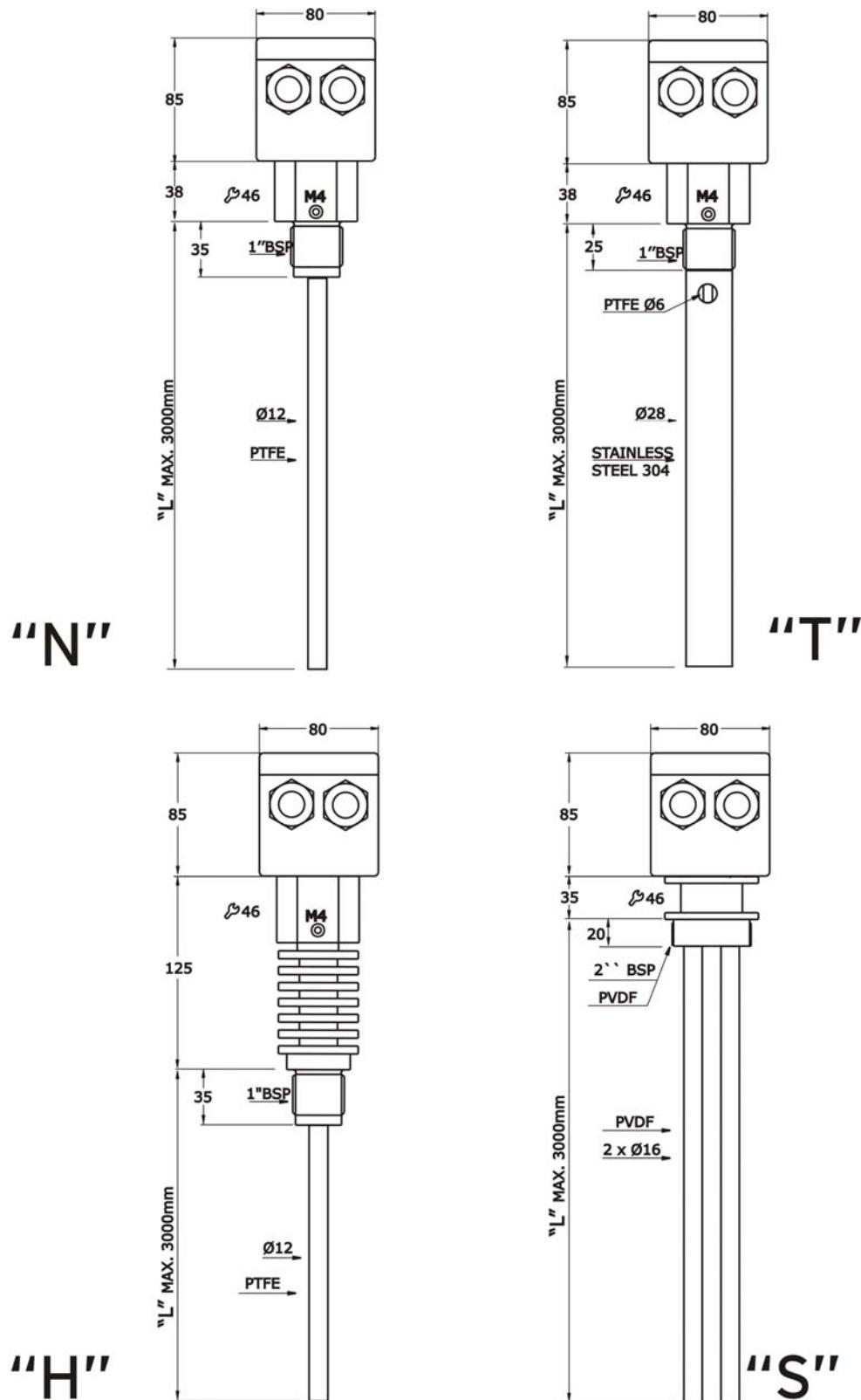
UNIVERSIDAD POLITÉCNICA DE MADRID  
ENSAYOS E INVESTIGACIONES DE MATERIALES Y EQUIPOS PARA ATMÓSFERAS EXPLOSIVAS Y MINERÍA

( Real Decreto 334/1992 de 3 de Abril - BOE 1992-04-29 )



 Eri Kandel, 1 - 28906 GETAFE (MADRID) • ☎ (34) 91 4421366 • ☎ (34) 91 4419933 • ☎ lom@lom.upm.es

## 16. Models



**17. Order details.**

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Version	Probe length*	Mechanical connection	ATEX	Supply
NMC-N	...1 = up to 1 meter	2G6 = G1, st,steel	0 = without E= ATEX	3 = 10...35 Vdc
NMC-H	...2 = up to 2 meter			
NMC-T	...3 = up to 3 meter			
	....4 = up to 4 meter			
NMC-S		9G9 = G2, PVDF		

## **18. Notes**

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**KOBOLD MESURA S.L.U**  
Avda Conflent N°68 Nave 15  
08915 Badalona  
Tel.: +34 93 460 38 83  
Fax: +34 93 460 38 76  
E-Mail: [info.es@kobold.com](mailto:info.es@kobold.com)  
[www.kobold.com](http://www.kobold.com)

**Technical data**  
**Subject to change without prior notice**

