



*Gas Analysers & Integrated Systems  
for Process Gas Analysis*

## Thermal Conductivity Analyser for Binary Mixtures

# 8866



### Main Applications

- Heat treatments
- Copper melting furnaces and Galvanizing
- Iron and steel industry
- Chemical and petrochemical industry
- Synthesis gas
- Fertilizers
- Soda and Chlorine plants
- Nuclear plants and electric power industry
- Hydrogen cooled generators
- Gas production industry (purity monitoring)
- Hydrogen generators
- .... And many others

### Features

- Accuracy better than 1% of full scale
- Max accuracy also in case of suppressed ranges thanks to 4 ports version with reference flow
- Special compensation function to eliminate the effect of interfering gases
- Temperature controlled sensing unit
- Fast response time
- Excellent long term stability
- Very easy maintenance thanks to modular construction
- Practically indestructible
- IP65 protection
- Versions for safe area or in Explosion-Proof housing for hazardous area Zone 1 / Zone 21
- Powerful microprocessor based control unit

## Sensing Unit

### The Measure

The 8866 thermal conductivity analyzer allows accurate and continuous analysis of a binary (two-component) mixture. All zero-based ranges and suppressed ranges from 20 to 90% have air-filled sealed reference cell. It's necessary, for suppressed ranges from 95%, using reference cell (4 ports) with a constant flow of 100% of the measuring. For intermediate ranges (50-94%) it's alternative the use of the first or second solution.

### High Accuracy

The 8866 is an high accuracy analyzer (class of accuracy better than 1%). For this reason the inner sensing unit is temperature controlled in order to be completely insensitive to ambient temperature variations.

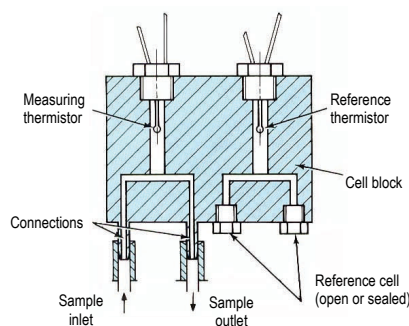
### Extremely Rugged

The model 8866 is specifically designed for continuous measurements in the most heavy duty applications. There are no inner moving parts; installation position and eventual vibrations don't alter the accuracy and stability of the measure. The sensing unit of is housed in a rugged IP65 housings, configurable for safe or hazardous area with the highest protection mode:

**I12 GD EEx-d IIC T6, IP65 T 85°C, T<sub>amb</sub> -10...+50°C**

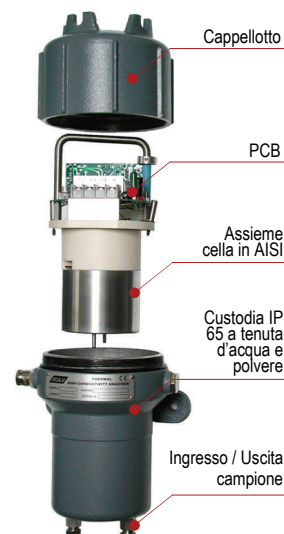
### Very Easy Maintenance

Modular construction makes maintenance extremely easy. It's enough to unscrew the cap of the housing to have access to inner sensing unit that can be removed only by disconnecting 3 wires and unscrewing 2 screws.



### Cell Assembly

The Cell Block assembly is made of stainless steel construction with two identical internal cells: the measuring cell and the reference cell. A highly stable thermistor is mounted in each cell. These matched thermistors form the active arms of a bridge circuit: the unbalanced current of the bridge provides the means of measuring the relative ability of the sample and reference gases to conduct heat away from their respective thermistors to the cell wall, which is held at a constant temperature. The reference gas chamber, with inlet and outlet openings drilled into the chamber from the base, may be open or sealed. The cells in which the thermistors are mounted are deadened so the sample gas enters only by diffusion, minimising the effect of sample flow variations. In addition, the entire cell-block assembly is maintained at a constant optimum temperature through two heaters and a control thermistor which are located in the cell-block assembly.



## Specifications...

### ...Performance

#### Accuracy:

± 1% of span (output signal).

#### Repeatability:

± 0.3% of span (short term).

#### Reproducibility:

24 hours: ± 1% of span.

#### Response Time (max. 2000 cc/min flow rate)

H<sub>2</sub>: Initial: < 1 sec.; 60%: 13 sec.; 90%: 23 sec.; 99%: 40 sec.

CO<sub>2</sub>: Initial: < 2 sec.; 63%: 24 sec.; 90%: 45 sec.; 99%: 80 sec.

#### Drift:

Zero: max. ± 1% of span per week

Span: max ± 1% of span per week (without autocalibration).

#### Ambient Temperature Influence:

depends on range. Typically less than 1% of full scale over entire temperature range.

#### Atmospheric Pressure Influence:

± 0.1 % of reading per hPa

#### Sample Flow Rate Influence:

less than 0.5% of span over flow range of 100 to 2000 cc/min.

#### Line Voltage Influence:

max. 0.02% of span, for each 1% change of power voltage.

### ...Operative

#### Sample Requirements

Sample Flow Rate: 100 ± 2000 cc/min.

Sample Pressure: 3000 Pa minimum (with filter and flow meter).

#### Linearization:

within 1% of span

#### Range:

see suffix C on the ordering information

#### Ambient Requirements

Relative Humidity: 90% maximum.

Operation Temperature: -10 to +50 °C

Temperature controlled: at 50°C

Storage Temperature: 70° C max.

#### Power Requirements:

24 ± 30 Vdc, 30 VA directly or from power supply energized with 115 Vac ± 10 Vac or 230 Vac ± 20 Vac

#### Pneumatic Connections:

¼" or 6 mm OD tubing (compression fittings supplied)

#### Wiring Connections:

General purpose housing: 2 openings for G 3/8" (PG 13 cable grip).

Explosion proof housing: 2 openings for GK 1/2" (cable grip or conduit).

### ...Physical

#### Material Contacting Sample Gas:

AISI 316, Viton, Glass.

#### Weight:

7 Kg. in Standard housing

8,5 Kg. EEx-d housing

#### Dimensions:

150 x 150 x 290 mm (standard housing);

180 x 155 x 325 mm (explosion proof housing)

Finish: Epoxy grey textured enamel

Protection: IP65 (watertight and dust tight)

### Version for hazardous area

**I12 GD EEx-d IIC T6 IP65 T85°C T<sub>amb</sub> -10...+50°C**



Designed in accordance to directive ATEX 94 / 9 / CE

Certificate number:  
**CESI 03 ATEX 130**

## M702 Control Unit

### Description

Powerful microprocessor-based system (keyboard configurable) allowing selection of range, type of alarms, set point and it can receive 3 analogical input signals (2 of them can be used for cross sensitivity compensation or special functions).

On request, a system to perform zero and/or full scale auto calibration can be provided.

Optional RS232C output can directly drive a printer with selectable timing and baud rate. Isolated current output is standard. The unit can be housed in a compact Noryl DIN case for panel mounting (standard), in a IP 65 case with clear front door for wall mounting or in explosion proof housing for mounting in classified area.

### Display

It provides a continuous readout indication of the requested variable in engineering units (e.g. %), of alarms set point and alarms condition.

### Single or dual alarm

A single alarm (high or low) or dual alarms (1 high and 1 low, 2 high or 2 low) can be provided as option. Each alarm consists of: 1) a keyboard configurable alarm threshold; 2) a LED, which is lit when an alarm is detected; 3) a relay contact that can be used to actuate an external signal or to start a shutdown process device.

### Auxiliary functions

Other options with diagnostic and calibration fault contacts are available.



### Background Compensation

If interfering gases are present in the background, it's possible to compensate their effects on the measured gas (automatically through the 2 auxiliary inputs from the relative analysers, or manually setting up their average value into control unit). The error can be ignored when interfering gases are present in low percentage.

### Advantages of a modular construction

Control and sensing unit split, gives the customer the possibility to select the preferred mounting configuration, optimizing costs. It will be possible to have the control unit in fields (both in safe or hazardous area) but also remote it in control room. This solution could be preferred in hazardous areas application when local visualization is not needed. Moreover, in case of failure, sensing and control can be separately repaired or replaced, reducing to

the minimum the plant stop.

### Other versions

The model 8866 can be provided for rack 19" mounting or configured for laboratory use in half-rack 19" dimension; with both the solutions, sensing and control unit are integrated into a smart aluminum case.

Refer to models [4400 TCA](#) (2 ports) and [404 TCA](#) (4 ports)



Transportable / Laboratory version



Rack 19" version

## Technical Specification

### Inputs

Input signals: 3 adjustable and linearizable from 10 mV with accuracy better than 1:10000  
Scanning time: 0,5 seconds  
Conversion type: double ramp  
Resolution: 1/20000  
Input impedance: 100 Mohm typical  
Isolation between channels: none

### Alarms

Contact rating: N.O./N.C. 1 A @ 250 Vac (define the alarm contact condition -soldering type- at order. Refer to suffix E).  
Set: programmable on 100% of range  
Relay status: normally triggered / not triggered  
Number of alarms: 2 on concentration. Wrong calibration and fault alarms available.  
Threshold: high or low to be selected at order; field adjustable by soldering jumpers. Refer to suffix D1 and D2.

### Serial interface

Standard: RS 232 C  
Check lines: CTS  
Speed: 9600, 4800, 2400, 1200. 600, 300 baud/sec.  
Parity: even, odd, none  
Isolation: 1500 V

### Analogical output

Output: 4-20 mA isolated proportional to 100% of range on maximum load of 500  $\Omega$   
Total Range (over range): 3.6 - 24 mA  
Resolution: 1/3800  
Isolation: 1500 V  
Uploading time: 1 second

### Printing messages

Periodical printing: programmable in h., min.  
Alarm printing: automatic printing  
Printing message: year, month, day, hour, minutes, % (Ch1), temperature (Ch2, Ch3), alarm 1 status, alarm 2 status

### Ranges of variables

Read out in engineering units, in accordance to customer specification.

### Ambient requirements

Working temperature: 0  $\div$  50  $^{\circ}$ C  
Storage temperature: -10  $\div$  +75 $^{\circ}$ C  
Humidity: 10  $\div$  90% without condense

### Power Supply:

220/110 Vac; 50/60 Hz; 5 VA

### Physical specification

Dimensions: 96 x 96 x 185 mm.  
Weight: about 0,5 Kg.  
Mounting: panel cut out

### Clock

Clock type: Gregorian  
Back-up: by means of lithium battery  
Battery life: 1 year in case of power supply absence. Accuracy: 1 second/month

### Explosion-proof housing

Protection mode:

II 2 GD EEx d IIC T6 IP65 T<sub>amb</sub> -20  $\div$  +60 $^{\circ}$ C  
for hazardous area ZONE 1 / ZONE 21

### Installation:

Wall or panel  
Dimensions:  
240 x 240 x 300 mm

Adjustable without opening the housing

3 Gk 3/4" holes

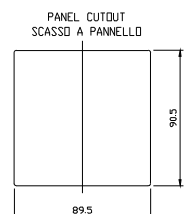
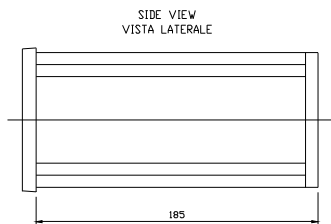
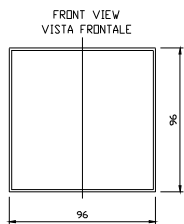


### IP65 housing

Installation:  
Wall or panel

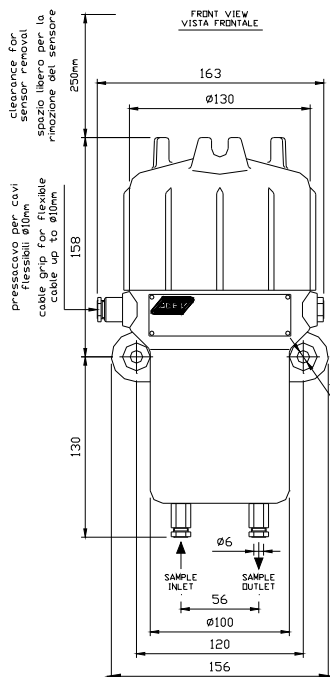
Dimensions:  
265 x 241 x 312 mm  
Clear front door

# Dimensional Specification

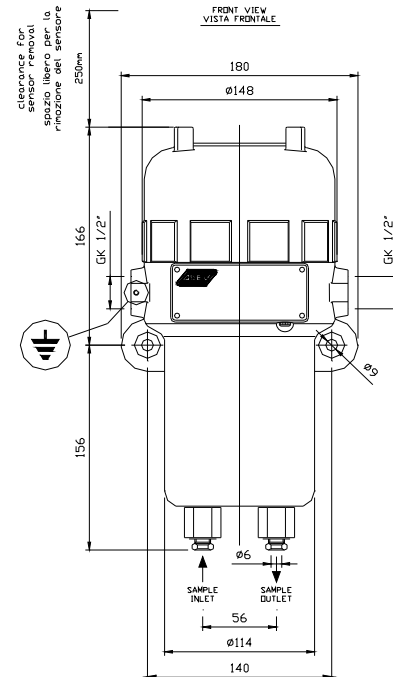


Control unit dimensions

A5103600



Sensing unit dimensions in General Purpose housing



Sensing unit dimensions in Explosion Proof housing

## Conformity to European Normative

In accordance to Low Voltage directive 2006/95/EC

In accordance to EMC directive 2004/108/EC:

- EN 61000-6-2
- EN 61000-6-3
- EN 50270

In accordance to directive ATEX 94/9/EC

## Ordering 8866



### Suffix A - Line voltage

- 0 24 Vdc (only sensing as spare)
- 2 230 V 50/60 Hz
- 4 115 V 50/60 Hz

### Suffix B - Stream composition

B1—Gas to measure	B2—Background
1 H <sub>2</sub>	1 H <sub>2</sub>
2 CO <sub>2</sub>	2 CO <sub>2</sub>
3 Air	3 Air
4 Helium	4 Helium
5 Argon	5 Argon
6 SO <sub>2</sub>	6 SO <sub>2</sub>
7 CH <sub>4</sub>	7 CH <sub>4</sub>
8 N <sub>2</sub>	8 N <sub>2</sub>
9 N <sub>2</sub> O	9 N <sub>2</sub> O
S Specify	S Specify

### Suffix C - Range

- 001 0-1% <sup>a)</sup>
- 002 0-2% <sup>b)</sup>
- 005 0-5% <sup>b)</sup>
- 010 0-10%
- 015 0-15%
- 020 0-20%
- 030 0-30%
- 040 0-40%
- 075 0-75%
- 100 0-100%
- 080 80-100%
- 195 95-100% <sup>c)</sup>
- 198 98-100% <sup>c)</sup>
- 992 Double range
- 990 Dissociated Ammonia
- 999 On specification

- <sup>a)</sup> Range available only for H<sub>2</sub> measurements
- <sup>b)</sup> Autocalibration suggested for components different from H<sub>2</sub>
- <sup>c)</sup> Suggested 4 ports version with reference flow

### Suffix D1 - Alarm threshold

- 0 None
- 1 1 low alarm
- 2 1 high alarm
- 3 1 high alarm + 1 low alarm
- 4 2 low alarms
- 5 2 high alarms
- 9 On specification

### Suffix D2 - Wrong calibration and fault alarms

- 0 None
- 1 Wrong calibration alarm shared with an alarm threshold
- 2 Fault alarm shared with an alarm threshold
- 3 Wrong calibration alarm on dedicated relay
- 4 Fault alarm on dedicated relay
- 5 Wrong calibration alarm shared with fault alarm
- 9 On specification

### Suffix E - Alarm contacts

- 0 None
- 1 Closed in alarm condition
- 2 Open in alarm condition

### Suffix F - Serial output

- 0 NO
- 1 RS 232 C + internal clock

### Suffix G - Sensing unit

- 1 IP65 housing for sensing unit \_ 2 ports
- 2 Explosion-proof housing for sensing unit \_ 2 ports
- 3 IP65 housing for sensing unit \_ 4 ports
- 4 Explosion-proof housing for sensing unit \_ 4 ports
- 9 On specification

### Suffix H - Autocalibration

- 0 NO
- 1 Autocalibration
- 2 Autocalibration + autocalibration start inlet free contact
- 3 Autocalibration + autocalibration start inlet free contact with calibration in progress free contact
- 4 calibration in progress free contact (for manual calibration)

### Suffix I1- Control unit

- 0 Without control unit and power supplier
- 1 M702 (standard)
- 2 EC2001
- 9 On specification

### Suffix I2- Control unit configuration

- 0 Not used (select only combined with suffix I1 = 0)
- 1 Provided loose for mounting in a cut out 89,5 x 90,5 mm
- 2 Mounted & wired in IP65 housing (power supplier included)
- 3 Mounted & wired in Ex housing (power supplier included)
- 9 On specification

### Suffix O - Options

- 0 None
- 1 Automatic / manual compensation for 2 variable gases into the background
- 9 On specification



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