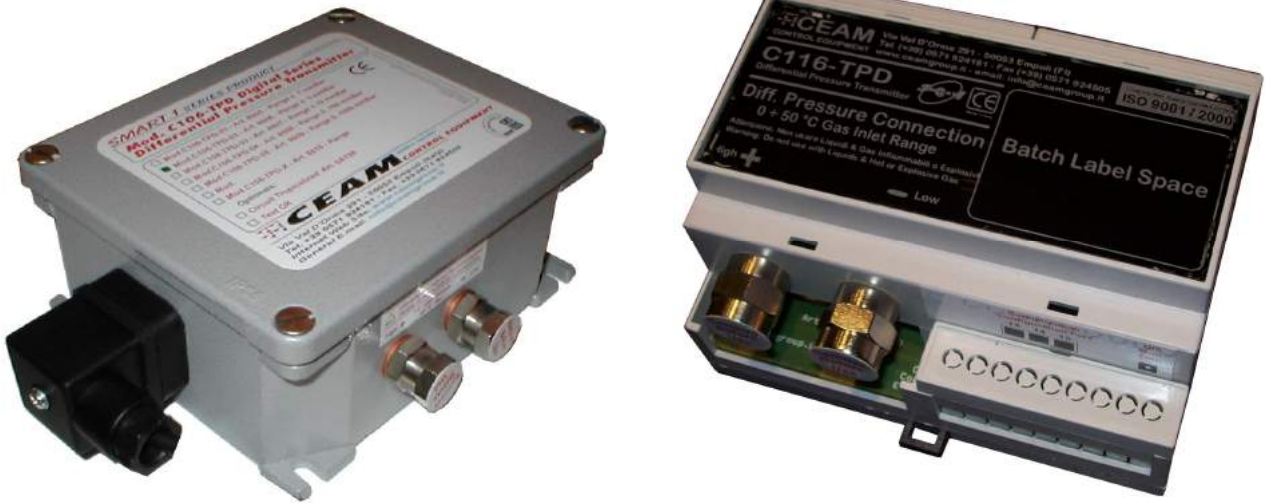


# C116-TPD Series

Configurable Differential Pressure Transmitter



Wall & Din Rail Version



Technological Platform CEAM © Smart 1

Operator Manual

Cod. Manual C116-TPD\_UK\_M1

English Language

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# 1 – General Features

## 1.1 - General Description:

C116-TPD is a family of innovative digital differential pressure configurable transmitters, low-cost products, but with top performance range and can be ordered in various options, starting from the type of Housing which can be plastic IP20 Din-Rail or Wall mounting in light Alloy IP54.

The tools are composed of three functional blocks, below we give a brief general definition:

### The Sensor (Hardware):

The first part is represented by the sensor, namely that sensitive electronic component that physically enters in contact with the gas or fluid to be measured and which transforms the measured pressure into an electrical signal, that to make it usable must be appropriately treated and conditioned.


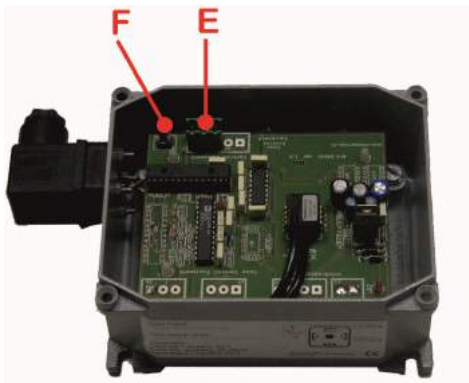
### The electronic control part (Hardware):

The second part equally important, is represented by the electronic microprocessor part (Motherboard) that deals with the processing of the sensor signal and provides to manage all functions of the instrument, this very dependable card is designed with CEAM Smart1 technology so it is totally free of trimmers and jumpers typically sources of problems.

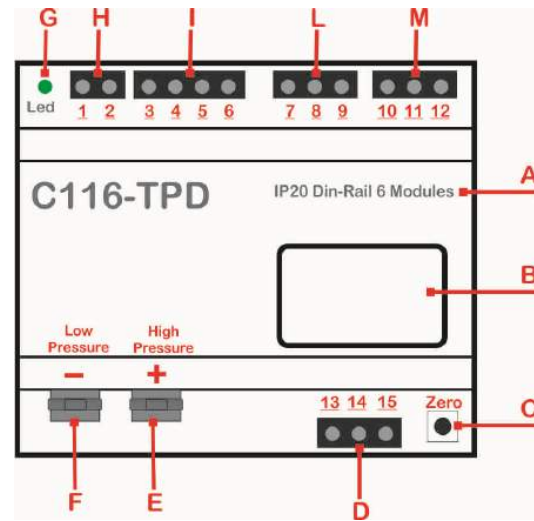
### The Firmware & the Software (Software):

Like all tools with CEAM technology Smart-1, the transmitter C116-TPD, is equipped with an extremely powerful electronics that does not just convert the sensor signal, producing a usable linear output, but it has an active role and thanks to the firmware, allows the complete management of the transmitter, its configuration, allows all standard and optional special functions, its interface to a system and also allows the calibration.

## 1.2 – Instruments Legenda

Wall version with Housing in Light alloy IP54	
	
<p><b>Legenda:</b></p> <p><b>A:</b> Connector DIN 43650 for Analog Signals and Power supply  <b>B:</b> Kight Alloy housing  <b>C:</b> input pressure + (Positive)  <b>D:</b> input pressure – (Negative)</p> <p>Inside the instrument:  <b>E:</b> Serial Connector of Standard configuration – Inside the instrument  <b>F:</b> differential pressure reset button</p> <p>other optional connections that are not visible in the images:  <b>H:</b> Connector 8 Pin for configuration – Outside the instrument (Optional)  <b>L:</b> Connector M12 for the serial connection RS485 e C-BUS – Outside the instrument (Optional)</p>	

## Plastic Version Din-Rail Backplane – IP20

**Legenda:**

- A: Plastic Housing - Din Rail – IP20
- B: Space for label production lot with complete product identification code
- C: Differential Pressure reset button
- D: Serial RS232 Terminal 13 = GND - 14 TX - 15 RX
- E: Hydraulic Pressure intake (Negative)
- F: Hydraulic Pressure intake (Positive)
- G: Led indication On tool (on)
- H: 24 Vdc = 1+ (V. Positive) & 2 - (V Negative)
- I: Optional Alarm outputs = AL1 + AL2
- L: Optional Auxiliary analog inputs = AI1 + AI2
- M: Analog output = 11 common Negative - 12 Positive OP1 - Optional 10 Positive OP2 +

The Electronic pressure transmitters of C116-TPD are part of the Smart-1 CEAM Family, and are designed using the latest generation of electronic technologies, are equipped with microprocessor electronic, with totally configurable structure, both from the software standpoint and the hardware profile. Thanks to their design features, they can guarantee an extremely high reliability under even heavy applications, well above the average for this product segment.

The C116-TPD, are high-tech industrial electronic transmitters, designed for the measurement of low and very low differential pressures, suitable for measurements in air and dry gases and non-explosive and / or corrosive and to better adapt to different operational needs, the family C116-TPD is available in various measuring ranges selectable during the order.

Fully digital instruments and except for the reset button of the differential pressure, they are completely devoid of Trimmer, jumper, typically sources of uncertainty, all configuration, and calibration are accessible only with a PC, via software (optional), connected via the RS232 port, RS485 optional

**Note:**

As already mentioned above, the only mechanical member present inside the product, is the preferred Zero button which allows the operator to manually bring to zero the pressure measurement when it is necessary, or for special applications, to possibly choke a measure, forcibly bringing it to zero.

**Warning!**

Manual calibration of the differential zero should be performed just with both pressure inputs of the differential pressure transmitter in Atmospheric pressure.

**If mistakenly you press the Zero button with the meter in pressure, the current measurement is reset, and then to return the instrument to the correct size you need to make a new successful clear at ambient pressure.**

**1.3 – Input & Output:**

The C116-TPD are equipped by the following I/O:

OP 1: Primary Analog output total range is 0 to 21 mA totally configurable through the Optional Configuration Software (Factory setting 4 to 20 mA)

**Note: With the adoption of an Optional resistive shunt placed on the analog output, you can also obtain voltage signals, for more information contact your assistance service CEAM.**

OP 2 Optional: Secondary Analog Output total range is 0 to 21 mA totally configurable through the Optional Configuration Software (Factory setting 4 to 20 mA)

AL1 + AL2 Optional: No.2 Digital output of configurable alarm

AI1 + AI2 Optional: No. 2 Auxiliary analog input

COM1: RS232 serial communication standard, can be used for configuration.

COM2 Optional: RS485 port for digital connection of the product

### **1.4 - Electrical connections:**

The electrical connection of the C116-TPD transmitter is different according to the version of the product as follows:

Version with Plastic Housing DIN-RAIL

All connections are via screw terminals, fixed or removable

Version with Wall Metal Housing:

All connections are made via connectors as follows:

OP1 + OP2 + Power supply: connector Base DIN 43650 outside

COM1 RS232: Serial connector for product software configuration, located inside the instrument.

RS485 COM2: M12 optional external connector for the optional serial communication port RS485.

### **1.5 – Configuration software:**

The OPTIONAL Configuration software is available with Windows operating system.

The Software (optional) for the configuration of the product is divided into different password protected areas, each reserved to a specific functionality.

Below are summaries of the main functions of the various levels of configuration:

**Level 1 (User):**

This level allows the only reading of all the data and is the only one that does not require password access

**Level 2 (Installer):**

This level allows the reading of all the data and the configuration of all parameters that can be configured by the user level

**Level 3 (Utility):**

This level allows the access to the eventual optional special features of the product.

**Level 4 (Factory):**

This level of access that allows the complete management of the product even in restricted areas and its calibration, and it is not accessible to the user.

**Warning:** For further details on the functions of the Optional Software refer to the separate manual, or contact our Sales Department, and for more detailed information please contact our technical support service.

## 2 – Technical Features

The control circuit, similar to the entire Smart-1 Series, is based on RISC microprocessors of high performance, in some cases in order to maintain performance of high level, some versions of the product are realized even with multi-processor structure, where every single processor provides to independently fulfill a specific function, creating a real parallel management of product functions.

All these technical characteristics, and also thanks to the enormous possibility of adaptation provided by the configuration software, the product in addition to ensuring a very high level of precision and reliability, also ensures a very high level of versatility and adaptation of the process.

Moreover, thanks to the particular structure of the circuit, compared to analog similar products, the product provides a degree of immunity to disturbances much higher than the average.

Thanks to this type of technology, the product is a real microcomputers, able not only to perform some precision measurement, but also to talk with the outside world.

The series product is equipped with a classic analog output of 4..20 mA for the retransmission of the measured pressure, with the possibility to customize the product purchasing separately the various options:

- 1: Optional RS232 Communication Card.
- 2: Optional RS485 communication card5.

**Note: Option Serial Acquisition:**

In case the instrument is connected to a system by means of the optional serial port RS232 or RS485, in addition to the pressure variable, it makes visible all available information, without the need for additional options.

The high technical characteristics of the product guarantee a great versatility as to allow its use in virtually all operating areas where it is necessary to make precise and reliable measurements of air and non-corrosive gases, such as industrial furnaces, dryers, filters, Flow Measurement in the channel, and in many other cases where a differential pressure measurement is needed, including heavy-duty applications.

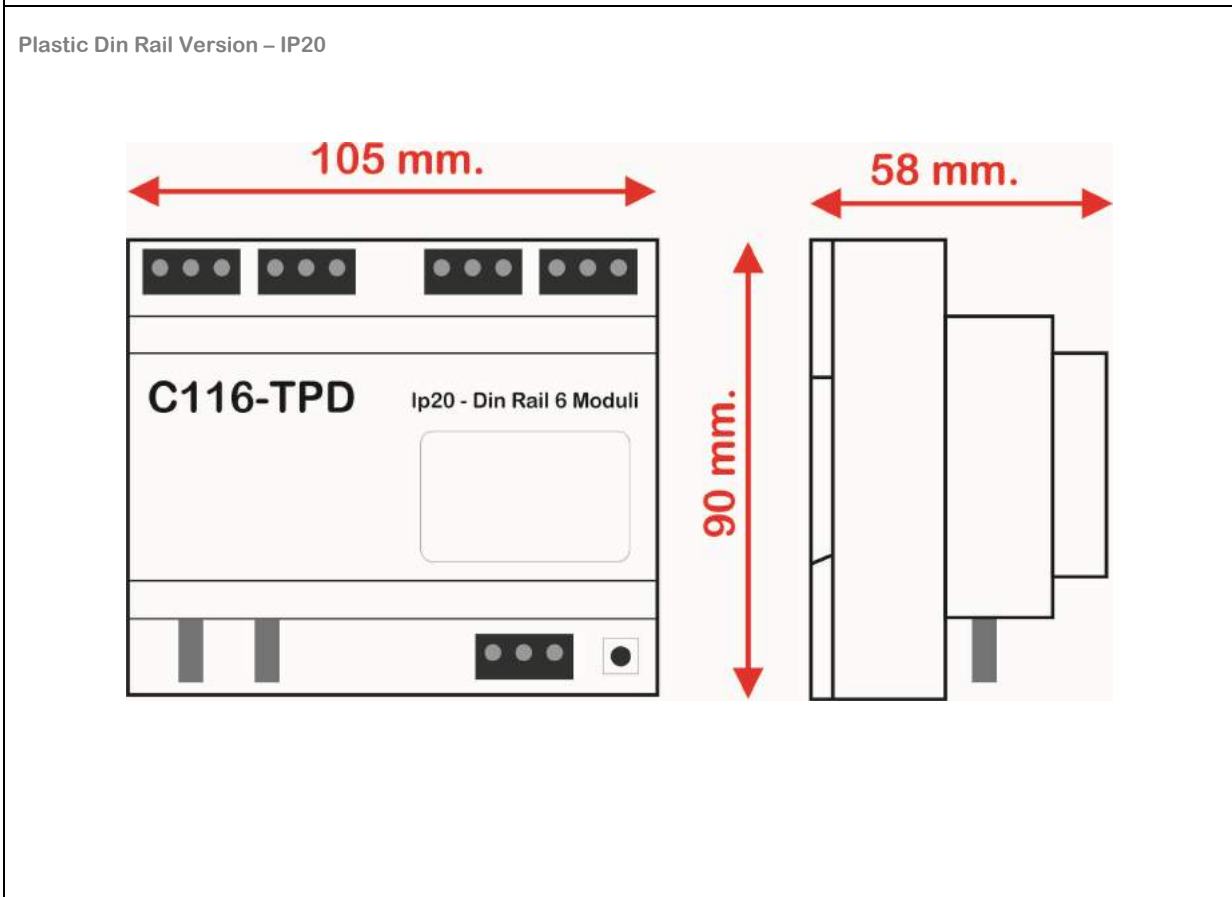
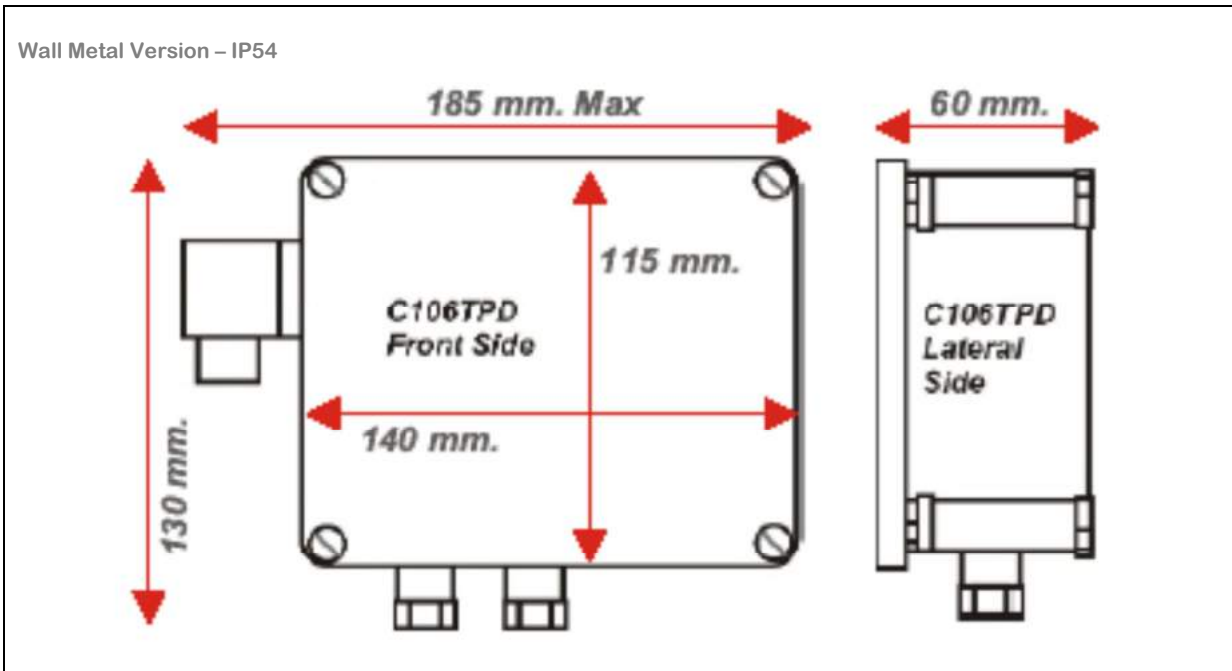
### 2.1- Technical Specifications:

Articles	8605	8606	8607	8608	8609
Measure Ranges	± 1 mbar	±5 mbar	±10 mbar	0÷100 mbar	0÷1000 mbar
Max Pressure	200 mbar	700 mbar	700 mbar	1.4 bar	2.0 bar
Common Pressure	3 bar				
Chemical Compatibility	ARIA - GAS Not Corrosive - Not Infiammable - Not Esplosive				
Inlet Gas Max Coditions	-10 ÷ 60 °C - 5÷85 UR% Not Condensing				
Temp. Compensation	@ Range 0÷50 °C				
Analogic Output	1 or 2 x 0÷21,5 mA - 4 ÷ 20 mA Factory Configuration				
Precision	±0,4% or better				
Communications	RS232 or RS232 + RS485 - Ceam Smart1 Protocoll for CWS				
Power Supply	24 Vdc				
Operating Condition	0 ÷ 65 °C - 10 ÷95 Not Condensing				
Store House Condition	-20 ÷ 65 °C - 0 ÷95 Not Condensing				
Instrument Tecnology	Circuito Microprocessore - Piattaforma Ceam Smart1				
Device Housing	Plastic Din-Rail IP20 Modular (6 Modules) or Light Alloy for Wall IP54				
Electric Connection	Screw or Connectors				
Pneumatic Connection	Threaded: 2 x 1/8" Female				

**Note**The above figures are expressed after the instrument calibration  
(The table is purely indicative and subject to variations and updates without notice)



2.2 – Dimensions:



## 3 – Instructions for use

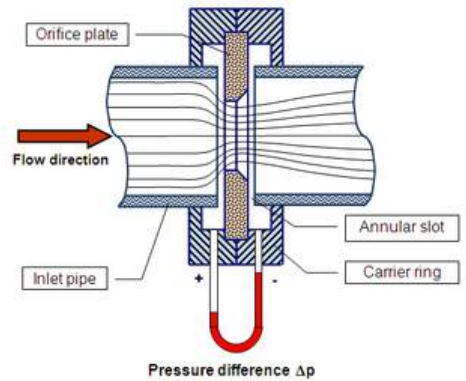
### 3.1- General Notions

#### Differential Pressure & Common Pressure :

Using instruments for measuring differential pressure it must always be made especially careful not to confuse the range of differential pressure with the common pressure on which we are going to measure this differential.

To fully understand the issue we use a typical example that we hope is clear enough:

One of the typical uses of a differential pressure transmitter is the flow measurement with throttling devices such as orifice plate, for who does not know them, they are special perforated discs that are inserted into the pipe where the fluid to be measured flows, and precisely produce a throttling, generating a variable differential pressure proportional to the velocity of the fluid, between before and after the flange. This measuring mode follows the specifications of physical laws (Bernoulli's equation) which in this example we will not explain, but we will simply say that this device generates a differential pressure equal to that of the tube conditions where it is applied, it will be greater if the hole bottleneck is smaller and less if the throttling hole is bigger (in the picture, an application example - source Wikipedia).



So the differential pressure generated and which can be also very low, typically of a few millibars, is totally independent from the pressure of the fluid in the tube (Common Pressure) that may be even tens of bars or even much more.

It 'easy to understand that if we use a measuring instrument that has a differential range of 100 mbar, and a common maximum pressure of 10 bar, it means that if the common pressure is applied simultaneously to both the measuring branches of the instrument, it will have no damage , but if it is applied to only one of the branches, even for only a fraction of a second, in reality the instrument undergoes it as if it were an excessive differential pressure, so as to damage the measurement cell irreparably.

For this reason, it is always advisable to mount on the pneumatic measure line a "Manifold" as the one in the picture to the side or similar, which is a device composed of taps, typically 1 or 3 taps (up to 5 to have also the calibration function ) that allows with the opening of the center tap, to put in balance the measuring branches of the transmitter eliminating the risk of pressure shock. With Manifold opened, the instrument must score a differential pressure of zero, if it is not zero, you can reset it manually using the appropriate button. Then once in operation properly reset, closing the central tap the two arms begin to measure the actual differential pressure, without damage.



For further information contact the technical service CEAM

### 3.2- Warnings

The tools of the C116-series TPD for their use only require compliance with existing rules and the rules of good installation typical for differential pressure transmitters, that professionals operators who are preparing to use this kind of tools they need to know, we cite only some main which however should already be known to operators who are preparing to install this type of instruments:

Substantially in the specific case, there are two types of problems to be met both for mounting the body of the instrument and of the pressure outlet point, and which are of electrical nature and those of pneumatic character relating to the pressure measurement.

Improper installation can cause unreliable measurements and also damage the device, besides voiding the warranty, so before installing:

- 1) Carefully check that the selected point of mounting of the electronic part, is performed in accordance with current regulations, with the original Ceam accessories (power supply and any eventual protection) and that the place is sheltered from the sun and weather, is a clean place and with no vibration
- 2) Make sure the power is corrected with that required by the instrument
- 3) Make sure that the instrument is used to measure only AIR and pure gases, dried and free of oil, and especially not flammable, non-aggressive chemically and non-explosive
- 4) Make sure that the differential pressure is compatible with the selected range, but especially that also the Common Pressure is compatible.
- 5) Make sure that the temperature of the measured fluid is compatible with the range of the instrument, if there is a fluid overheating even temporary is necessary to mount an optional cooling cur.

- 6) Check that the measured medium does not produce condensation, and if there is this risk even occasionally, on the measurement line an absorption condensation barrier system must be inserted in order to avoid it gets to the sensor.

To prevent any abnormal condensate, can reach the sensor damaging the instrument, make sure that the electronic measuring module is always ranked higher than the point of pressure plug, preparing the pneumatic line a tap and / or a system for the eventual condensate drain

- 7) To avoid measurement errors, make sure that the pneumatic circuit from the outlet pressure to the instrument is free of leaks that could distort the measured pressure.
- 8) In order not to damage the measuring cell, especially if of very low differential range, strictly avoid putting pressure in only one branch of measure at a time, but be sure to use a manifold with a central tap which first put in communication both sockets pressure (Positive and Negative) of the transmitter and only after opening the line taps it will be closed. Otherwise not using a common faucet leveling of the differential pressure, in the case of an individual branch connection, the "Common Pressure" of the measuring point is to be added to the pressure differentiate with the risk of damaging the cell.

### 3.3 Pneumatic Connection:

For the pneumatic connection, all of the C116-TPD versions are equipped with two female threads 1/8 "gas, on which then connect the two tubes of the measuring line.

**WARNING:** The two screw connections of the transmitter are fixed in housing with an inner nut, but not enough to bear the tightening of fitting of the outer measure line. So as not to damage the instrument, in the tightening of the measuring line connections you must use a key and a second key that blocks the connection of the C116-TPD avoiding its rotation..

The accidental rotation of the C116-TPD fitting involves the breaking of the internal connection pipe to the sensor, making the tool inoperable, and this damage will void the warranty on the product.

### 3.4 Electrical Connection:

#### Wall metal version

##### Power supply & Analog Output Primary OP1:

The power supply connection and of the 'primary analog output OP1 must be made through the side DIN 43650 connector to the container as shown on the sticker



##### RS232 serial port configuration:

Inside the transmitter, as reported on the legend, there is the connector of the RS232 serial port that can be used to configure the product, through the optional Software and Cable

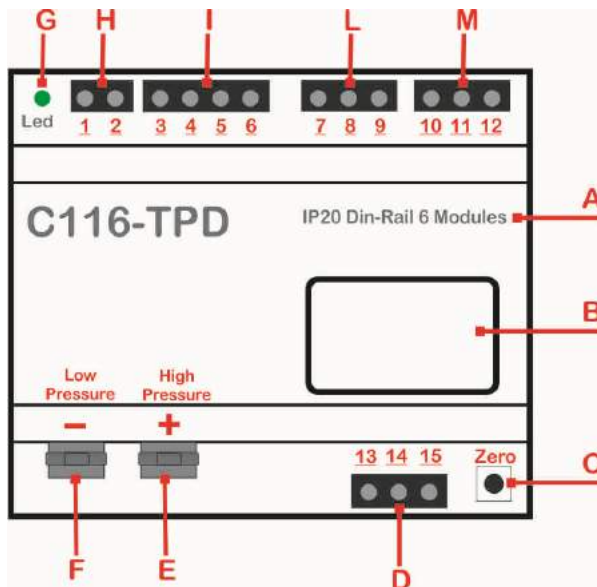
#### Optional connections:

##### Secondary Analog Output OP2:

Also the second Optional analog output OP2 can be connected with PIN 3 (mA Positive) of the DIN 43650 connector with the common negative to the OP1 on Pin GND

##### RS485 Port

For the optional RS485 connection it is usable the MINIDIN connector that is mounted only if the option was purchased

**Plasti Version Din-Rail**

**Power supply** = (H Terminal) : 24 Vdc = 1+ (V. Positive) & 2- (V Negative)

**RS232 Configuration** = (D Terminal): 13 GND – 14 TX – 15 RX

**Analog Output OP1** = (M Terminal) : 11 mA Common Negative – 12 mA Positive

#### Optional connections:

**Analog Secondary Output OP2** = (M Terminal): 10 mA Positive – 11 mA Common Negative with OP1

**Optional Alarm Outputs AL1 + AL2** = (I Terminal): 3-4 AL1 – 5-6 L2

**Optional Auxiliary Analog Inputs AI1+AI2** = (L Terminal): AI1 - 9 mA Positive AI1 – 7 AI2 Positive - 8 mA Common Negative

### **3.5 Measurement Procedure**

If the C116-TPD is used in classic analog mode, once observed the installation precautions both electric and hydraulic, and the instrument is powered correctly, there are no additional procedures to be followed.

In practice, once the product is configured properly, once powered, it produces a linear analog output signal, directly proportional to the differential pressure measurement performed.

All products in the SMART-1 Family as has been amply explained in previous chapters, they are fully configurable using one of the available Optional software, and it is thanks to this option you can get the maximum versatility of the product.

While if the C116-TPD, independent of the use in analog mode, it is also used in digital mode connected to the CEAM ©CWS platform, using the optional RS485 port, in this case the system to which it is connected the C116-TPD talks to the product in a Bidirectional mode, in practice it does not only get the information on the measured pressure, but if required you also get information about the status of the instrument, and also a wide range of other ancillary information.

**Note:** For more details on this topic please contact our Sales Department, or for more details, please contact our technical support service.

## 4 – How to Order

The C116-TPD can be ordered in various measurement range and with numerous optional accessories, all viewable and selectable, including related accessories, directly online at [www.sensorstore.it](http://www.sensorstore.it)

## 5 – Warranty

### **Warning!!**

The present handbook is merely indicative, and it is subject to changes in any moment, without giving any notice.

The not respecting strictly the indication found on this handbook, the opening and tampering the product, the incorrect use, the wrong wiring, the using of spare parts or optional not original CEAM Control Equipment, the removing of the labels, of the identification marks put by CEAM Control Equipment, and the hidden export to Extra CE counties, they make immediately lose the responsibility over the product and the warranty right!

**WARRANTY TERMS:** the product is under warranty for a period of 12 Months (Art. 1490 C.C. and following) starting by the delivery note date, also in case it is in vision, and then transformed in selling, the complete text of the warranty conditions offered by CEAM Control Equipment in conformity to the actual laws, are published, and are at disposal of any people which demand for them, the document is registered both in paper form and in electronic form, to the CEAM Control Equipment, headquarter, and to see it, it is sufficient to make a written request, specifying the title of the applicant.

#### **The warranty cover:**

The products and the components which bad functioning is referable for sure to production defects, the eventual defect met gives only the right to repair it, and not to substitute the product, besides the eventual production defect, does not give any right to resolute the contract, or to suspend the payment if not expressly agreed in written by CEAM.

#### **The warranty does not cover:**

Defects generated by incorrect or improper use of the product  
 Defects generated by using spare parts or consumables products not original CEAM  
 Defects generated by environmental and/or atmospheric problems and/or natural calamity  
 Products and/or services tampered or modified even partially  
 Products and/or services to which have been taken off, or tampered, even partially, labels and lot codes original CEAM

#### **In any case, the warranty does not cover:**

Batteries, magnetic devices, perishable products and/or consumable products  
 The components of Third parts, to which it must answer directly, the assistance service of the same, with the modalities provided from them.  
 The technical time used to verify and/or to repair the products  
 The travelling allowance, and the technical intervention on the place, if effected.  
 The packaging and shipping cost of the products there and back.  
 All the additional costs supported by CEAM to fulfil the warranty.

#### **Clause of responsibility exclusion**

CEAM does not assume any responsibility, regarding eventual damages, direct or in direct, caused to people or things, or damages for non production and/or incorrect production and/or eventual damage, in some way referable to the product and/or to this handbook service.

CEAM does not assume any responsibility regarding eventual damages caused to people or things because of the eventual not conformity to the product and/or service of the present handbook, which is merely indicative, and that can be changed by CEAM in any moment without giving any notice.



Conformity



Company With Quality System Certified  
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