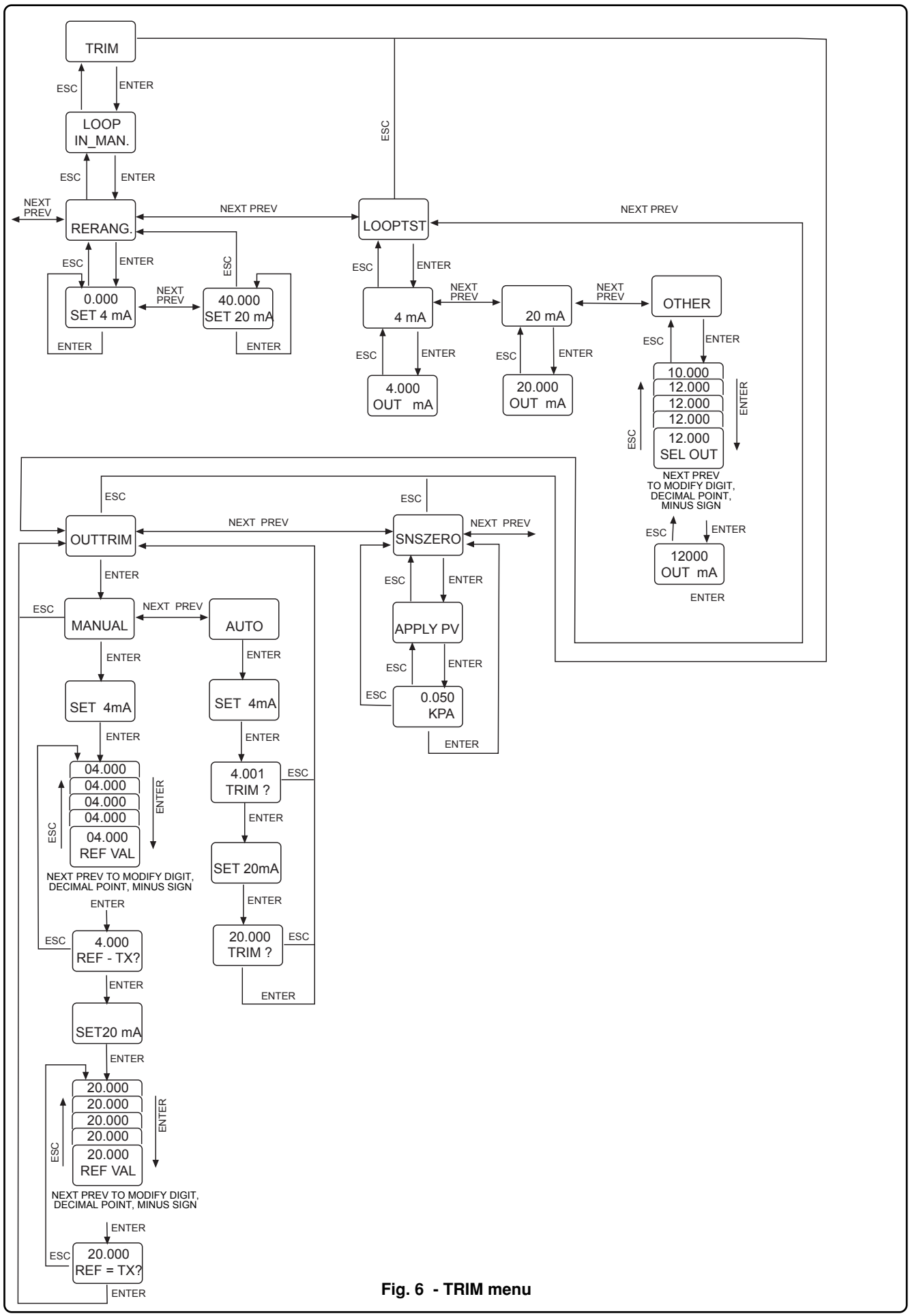


Fig. 6 - TRIM menu

ADDENDUM FOR COMETER OR INDICATOR WITH HART PROGRAMMING CAPABILITY AND PROMETER - PROGRAMMABLE INDICATOR

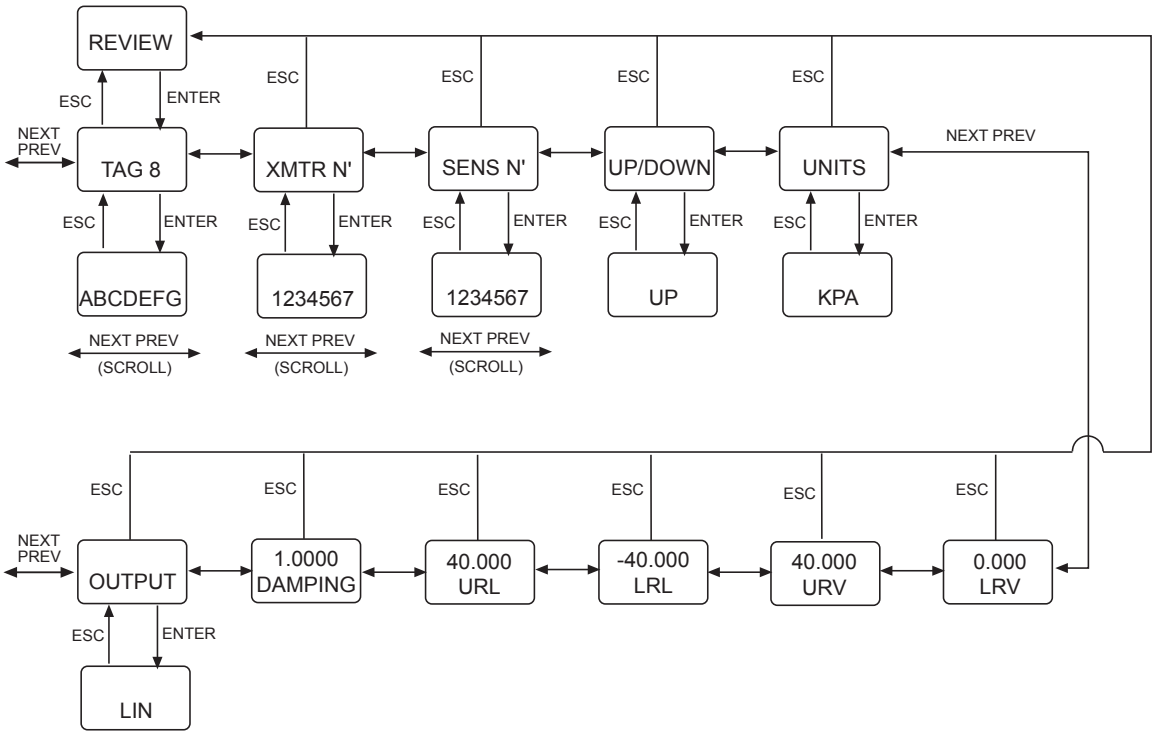


Fig. 7 - REVIEW menu

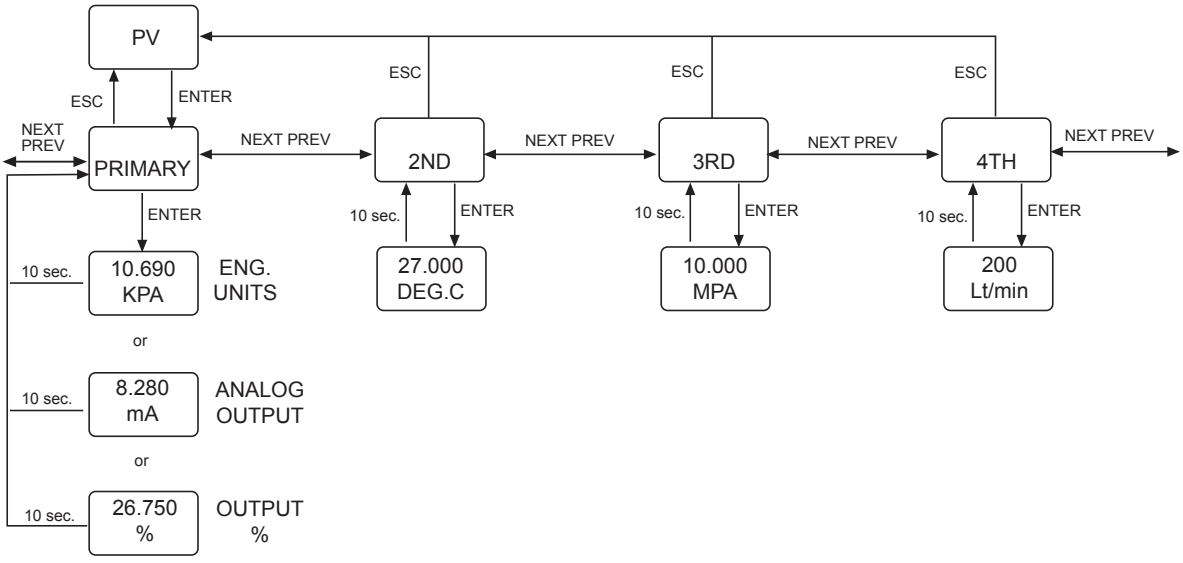


Fig. 8 - PV menu

ADDENDUM FOR PV-SCALING OPERATION

PV-scaling operation can be used to align the "zero" of the process with the "zero" reading of the transmitter. A configuration tool must be use to perform this operation through digital communication.

1) PV scaling for analog + HART Safety version

There are two different ways to perform a PV-scaling.

Method 1: apply to the transmitter a pressure that corresponds to the scaling value (offset) you have to apply to the reading and perform the operation using the configuration tools. The operation is called SET PV ZERO (see example 1).

Method 2: calculate the scaling value (offset) and apply it to the transmitter following the operation available on the configuration tool. With this method it is possible to perform a scaling operation even for a value different then zero. The operation is called SET PV VALUE (see example 2).

Effect of the PV-scaling operation:
An example can better explain the effect of the scaling action.

Example n° 1
the transmitter is calibrated at:
LRV = 0 mbar
URV = 200 mbar
the transmitter model has the following limits of operation:
LRL = -400 mbar
URL = +400 mbar
For the effect of a transmitter's capillary, connected to a tank, there is a pressure of 80 mbar when the tank is empty, i.e. the transmitter's reading is 80 mbar.
In order to eliminate the pressure caused by the fluid inside the capillary, you can perform a PV scaling for compensating/ scaling the reading for these 80 mbar. The result of this operation is:
the transmitter's reading is now 0 mbar.
offset is -80 mbar and must be considered that while the limits of the transmitter remains:
LRL = -400 mbar
URL = +400 mbar
and the calibration does not change
LRV = 0 mbar
URV = 200 mbar
The configuration tools allows you to evaluate the new operative limits:
operative LRL = -480 mbar
operative URL = +320 mbar

Example n° 2
the transmitter is calibrated at:
LRV = 0 mbar
URV = 200 mbar
the transmitter model has the following limits of operation:
LRL = -400 mbar
URL = +400 mbar
the transmitter is reading:
PV = 100 mbar
and you know the process value is 50 mbar.
You can apply this 50 mbar for your PV scaling operation, with similar effect as per the previous example:
PV reading = 50 mbar
offset = 50 mbar so that while the limits of the transmitter remains:
LRL = -400 mbar
URL = +400 mbar
with no change for the calibration, the configuration tools allows you to display the new operative limits:
operative LRL = -450 mbar
operative URL = +350 mbar

When requested it is possible to reset the value actually applied as offset.
When an offset is defined, the trimming operations are disabled and can be rehabilitated only by eliminating the scaling, i.e. setting the offset to 0.

WARNING. In order to ensure the correct operation of the transmitter, after the calibration procedure the device must be put in operating condition as described in Section Commissioning and Configuration Issues.

ADDENDUM FOR "SURGE PROTECTION" OPTION OF THE TRANSMITTERS

WARNING - Note for Hazardous Area Installation

For the Pressure Transmitter with surge protector must be additional considered:

1 The transmitter has to be supplied from a voltage source which is safely separated from mains (galvanic separation).
2 The potential equalization for the entire cable link must be guaranteed since the intrinsic safety circuit of the transmitter is grounded.

GENERAL DESCRIPTION

This option provides a built-in surge protection circuit.
The surge protector is designed to dissipate large quantities of electrical energy which have been induced in a transmission li
The option is suitable to protect up to 2500 V (5 kA discharge current) of 8μs rise time/20μs decay to half value.
These large quantities of energy can be induced in the signal transmission line by lightning discharge in the area or by nearby electrical equipment.
The dissipation of this energy prevents damage to transmitter circuitry connected to the transmission line.

The surge protector will not protect the instrument in case of a direct lightning strike.

The surge protector board is located inside the terminal block of the transmitter (see drawing).
The circuit is designed to operate and recover automatically. It does not require periodic testing or adjustment.

FITTING PROCEDURE (refer fig. 1)

CAUTION : This procedure should not be carried out on the field site.

a) Remove the transmitter cover of the field connections side.
b) Unplug the built-in indicator, if present.
c) Unscrew the two Phillips screws (M 4 x 18 mm) which secure the terminal block and pull it off the housing.
d) Unweld the + and - wires which connect the two RF (radio frequency) filters, on the back of the terminal block.
e) Fit properly the surge protector p.c. board and secure it by a self-tapping screw (M 2.9 x 6mm)
f) Secure the two +/- eyelet terminals to +/- holes on the back of the terminal block, by a welding operation.
g) Secure the two +/- wire eyelet terminals of the RF filters to the +/- bushes of the p.c. board by a welding operation.
h) Connect the wire eyelet terminal of the Surge Protector to the dedicated ground connection below terminal block, using a provided self tapping screw M4x8 mm and relevant washers.
i) Reinstall the terminal block and stick on the notice label in the proper position.
l) Plug the built-in indicator, if used.
m) Refit the cover.

Refer to Fig. 1 and also follows the indication in the figures 2a and 2b.
In the first one (2a) you can see the terminal block connection when there is no surge protector applied.
In the latter (2b) you can see the terminal block connection when surge protector is in!

NOTE - The Surge Protector is suitably provided with the necessary installation screws and the notice label.
Adding the unit to an existing transmitter will affect the power supply requirement for a minimum added operating voltage of 1.8 V d.c.

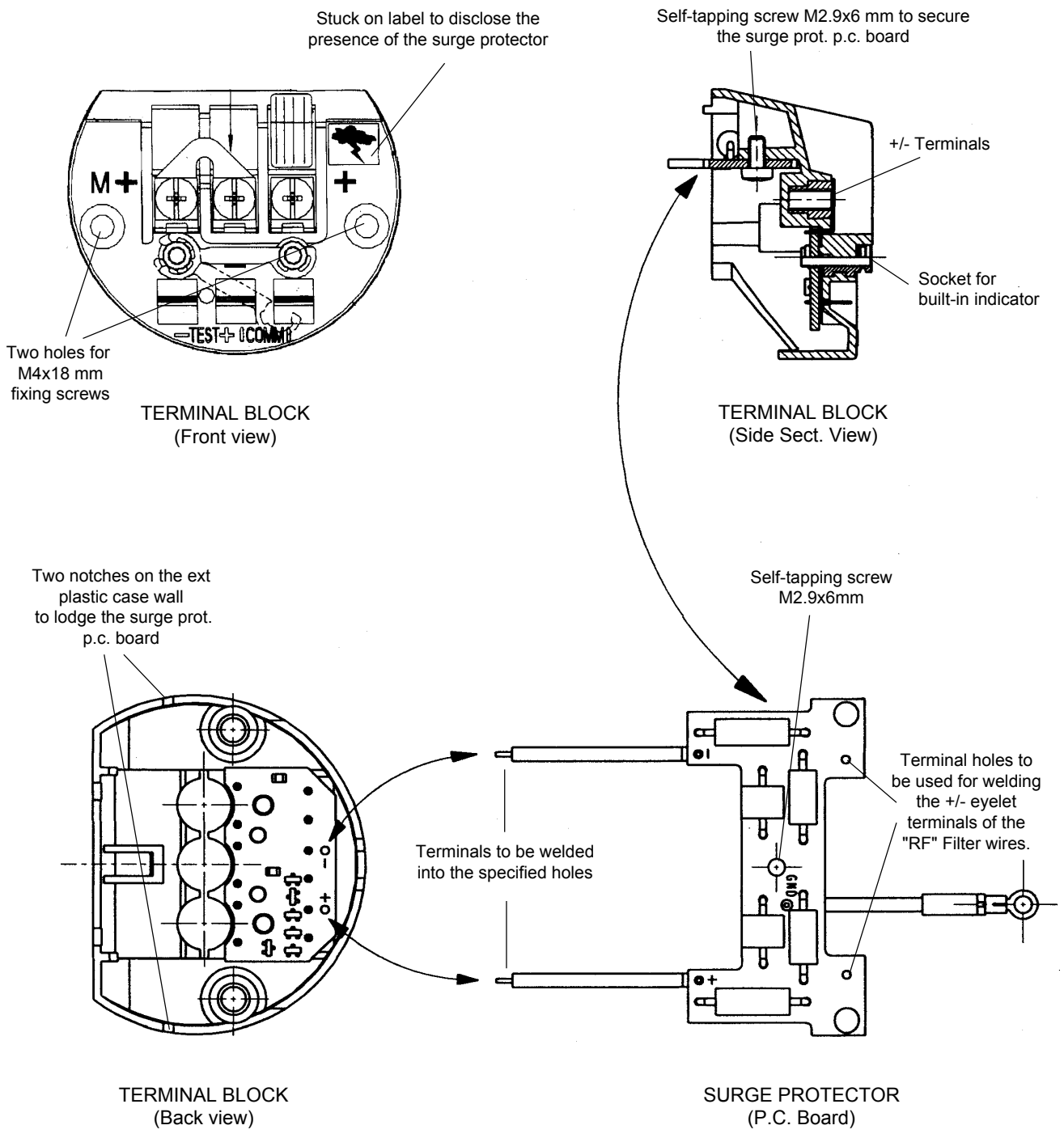


Fig. 1 - SURGE PROTECTOR

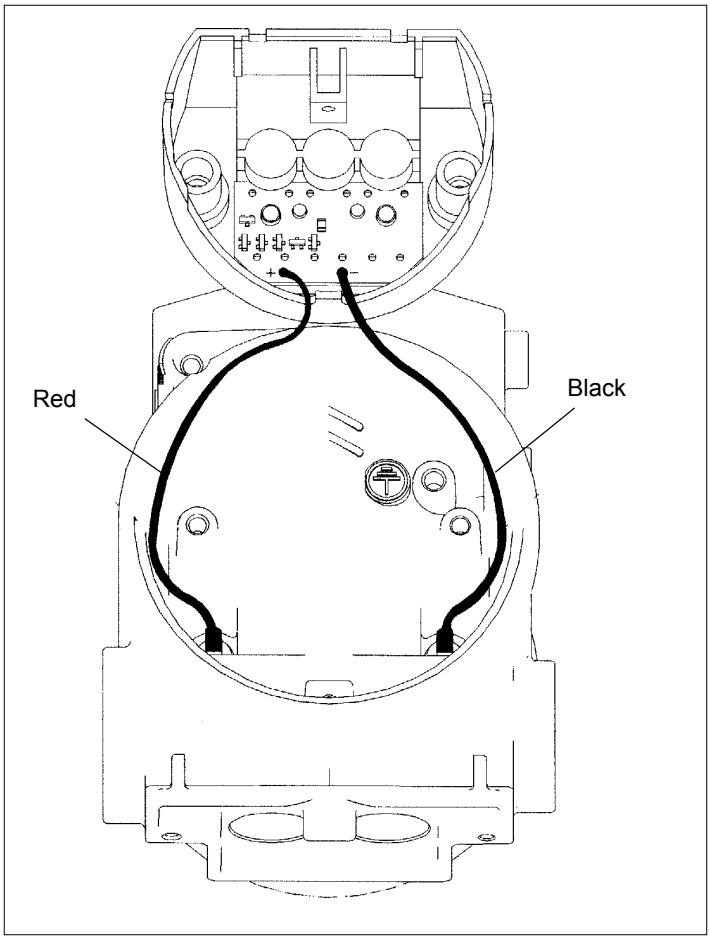


Fig. 2a
Connection for terminal block and housing.

Note: Before to fix the terminal block to the housing put the two wires in the position as shown above, in order to avoid any damages.

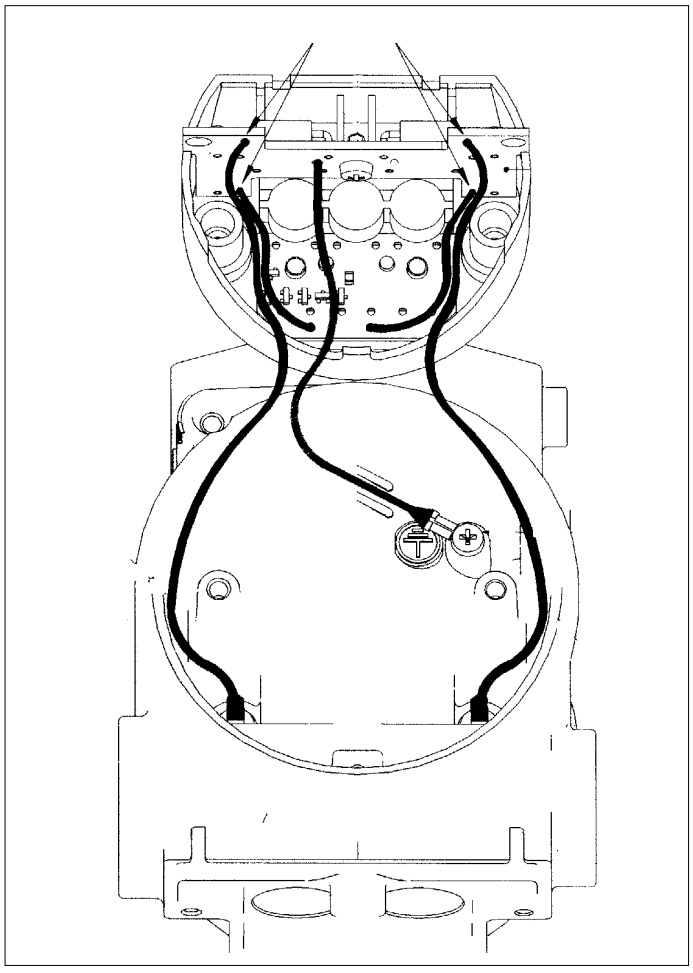
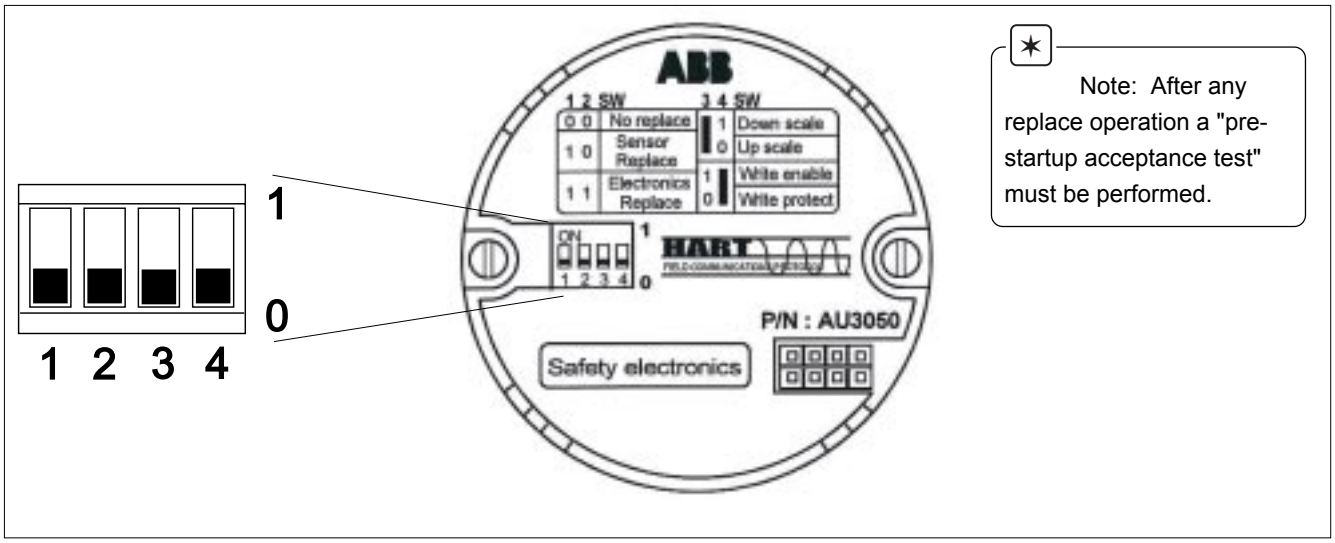


Fig. 2b
Connection for terminal block and housing, with surge protection.

Note: Before to fix the terminal block to the housing put the two wires in the position as shown above, in order to avoid any damages.

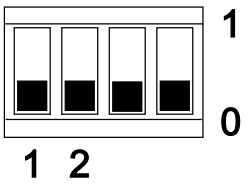
ADDENDUM USE OF HARDWARE LINKS ON THE SECONDARY ELECTRONIC

The secondary electronic is shown in the figure. There are 4 dip switches located on the secondary electronics as indicated below, they are used for settings when integral digital display is not available.



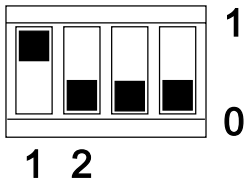
Note: After any replace operation a "pre-startup acceptance test" must be performed.

Switches **1** and **2** are used for Electronics or Transducer replace; Switch **3** is for Write Protect mode selection; Switch **4** is for Up/Down Scale selection. Here below a description of the operations.

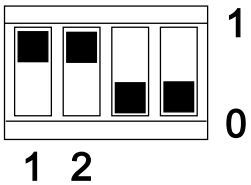


REPLACE

Usually switches 1 and 2 are down in "0" position.
They are moved when a replace operation is required.

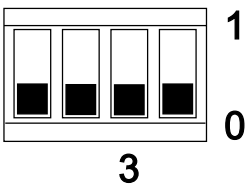


Switch 1 up in "1" position is required before power up the transmitter, when a replace is being performed. Switch 2 down in "0" position allows the replace of the transducer.



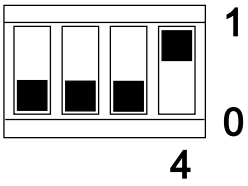
Switch 2 up in "1" position allows the replace of the secondary electronics.
It must be moved in this position, when electronics replace is being performed, before power up the transmitter.

AFTER ANY REPLACE OPERATION IT IS RECOMMENDED TO MOVE DOWN IN "0" POSITION THE RELEVANT SWITCHES.



WRITE PROTECT mode

With the switch 3 up in "0" position the write protect mode is active.
It is a way to protect the device from any change:
configuration data and parameters cannot be modified.



UP/DOWN SCALE mode

The switch 4 defines the fail safe output condition in case of transmitter failure:
- In the ON position the output is Down (below 4 mA)
- In the OFF position the output is UP (above 20 mA)

NOTE: Typically the Up/Down scale mode is activated when there is a failure in the physical elements of the sensor and on the electronics of the device, and more precisely:
1) Values in the sensor database are corrupted;
2) EEprom of Primary Electronic (sensor) is failed;
3) Values of Primary variables are out of limits;
4) Digital to analog converter (DAC) circuit is out of range.
5) ASIC - (Integrated circuit) of sensor is failed.
6) ASIC - (Integrated circuit) of electronics is failed.

ADDENDUM FOR SELECTABLE OUTPUT FUNCTIONS

GENERAL DESCRIPTION

The 2600T Series Pressure Transmitter can be selected with a linear, a "polynomial" output function, for input linearization using a 5th order polynomial function, or for input linearization using 2 polynomial functions of 2nd order.
Also a Constant Current function can be choosen for loop or associated equipment test.

1.0 LINEAR

Using this function, the relationship between the input (measured value), expressed in % of the calibrated span and the output is linear, e.g. at 0% input, corresponds 0% output (4mA), at 50% input corresponds 50% output (12mA) and at 100% input corresponds 100% output (20mA). Available for analog and analog + HART version.

2.0 POLYNOMIAL 1 (5th order)

Available for analog + HART version

The polynomial function, applied to the transmitter input (x) expressed in % of the calibrated span, has the following form:

$$Out = \pm A_0 \pm A_1 (x) \pm A_2 (x^2) \pm A_3 (x^3) \pm A_4 (x^4) \pm A_5 (x^5)$$

where (x) and Out should be normalized in the range 0 to 1 for calculation purpose, with following Out meaning:
Out = 0 means Analog out 4 mA
Out = 1 means Analog out 20 mA
This function can be used for linearization purpose: the user can plot the characteristic curve of the input and find, using a mathematical method, the parameters of the polynomium that better approximate the plotted curve. Check, after the calculation, if the maximum error is compatible with the application.
The following are some application examples.

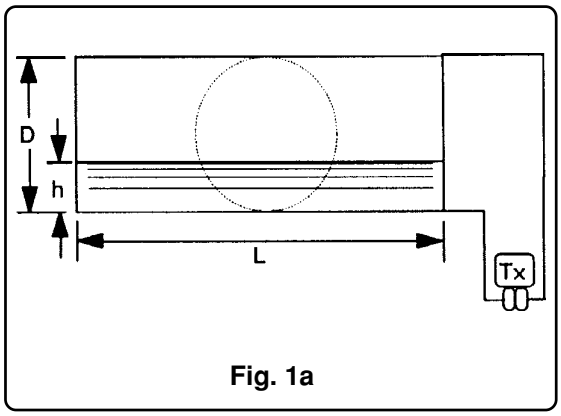


Fig. 1a

2.1 CYLINDRICAL VESSEL

Using the polynomial function applied to a level transmitter installed in a horizontal cylindrical vessel it is possible to transmit the measure of level in term of partial volume. Some different cases should be considered:

a) Cilindrical vessel with flat ends (not often used. Fig. 1a). Transmitter measuring the whole vessel heigth.
The following polynomium gives the area of the circular section in relation to the heigth h (heigth of the liquid in the vessel).

$$Out = - 0.02 + 0.297\ h + 2.83\ h^2 - 4.255\ h^3 + 3.5525\ h^4 - 1.421\ h^5$$

Being both the input h and the output Out normalized, i.e. in the range 0 to 1 (or 0% to 100%), the vessel diameter corresponding to a circular area equal to 1 (100%) will be "normalized" by a "K" factor of the following value :

$$K = 2 \cdot \sqrt{1/\pi} = 1.12838$$

The volume of the liquid contained in the vessel, at heigth = h will be

$$V = Out \cdot (d/1.12838)^2 \cdot L$$

where d = vessel diameter and L = vessel length.

The non conformity error is within 0.1% between 0.5% and 99.5% of h, 0.2% at 0% and 100%.

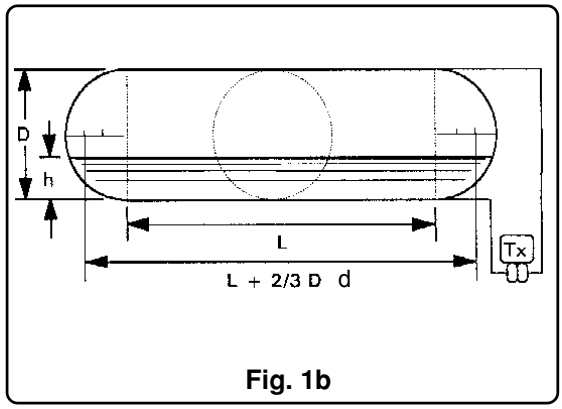


Fig. 1b

b) Cilindrical vessel with hemispherical ends (see Fig. 1b). Transmitter measuring the whole vessel heigth.
The same polynomium can be used also for the cylindrical vessel with hemispherical ends. To obtain the volume contained in the vessel can be used the following empyrical formula:

$$V = Out \cdot (d/1.12838)^2 \cdot (L + 2/3\ d)$$

The non conformity error depends on the ratio between diameter and length of the vessel: for ratio ≥5 to 1 the error is ≤0.25%. The polynomium found with mathematical method gives an error of ±0.15%.

c) Cilindrical vessel with elliptical or pseudoelliptical ends (see Fig. 1c).
Transmitter measuring the whole vessel heigth.
The same polynomium can be used also for the cylindrical vessel with elliptical or pseudoellipticall ends. To obtain the volume contained in the vessel can be used the following empyrical formula:

$V = Out \cdot (d/1.12838)^2 \cdot (L + 2/3\ m)$

where m is the length of the minor ellipse axis (see Fig.1c)

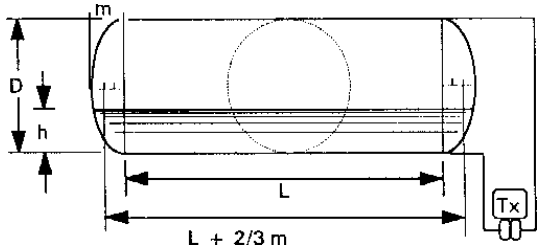


Fig. 1c

The non conformity error depends on the ratio between the diameter and the length of the vessel: for ratio ≥5 to 1 the error is ≤0.25%. The polynomium found with mathematical method gives an error of ±0.15%.

2.2 SPHERICAL TANK

Spherical tank (see Fig.1d). Transmitter measuring the whole vessel height.
The following polynomium gives the volume of the spherical section in relation to the heigth h of the liquid in the tank.

$Out = 3\ h^2 - 2\ h^3$

This formula is geometrical and then his conformity is perfect.

Being both the input h and the output Out normalized, i.e. in the range 0 to 1 (or 0% to 100%), the sphere diameter D corresponding to a volume equal to 1 (100%) will be "normalized" by a "K" factor of the following value:

$$K = 2 \cdot \sqrt[3]{3/(4\pi)} = 1.2407$$

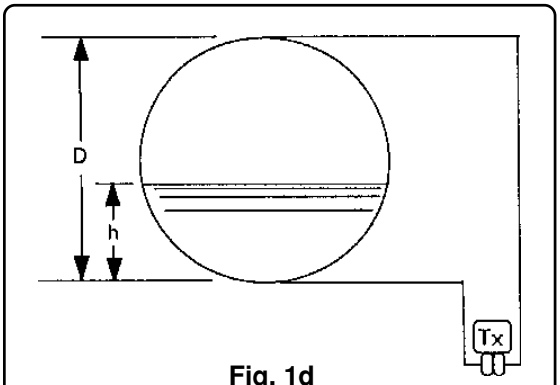


Fig. 1d

The volume of the liquid contained in the tank, at heigth = h will be

$$V = Out \cdot (D/1.2407)^3$$

where D = sphere diameter .

2.3 CYLINDRICAL VESSEL AND SPHERICAL TANK WITH PARTIAL LEVEL MEASUREMENT

Cases a) to d) but with partial level measurement (Fig. 2a)
In these cases two methods can be used:

1) Plot the changes in volume in relation to the level changes and, using a mathematical method, find the relevant polynomium.

2) Use the polynomium coefficients for cases a) to d) and calibrate the transmitter range to cover the full diameter of the vessel or tank: the changes in volume for the h changes between h_0 and h_{max} will be correct. Of course the transmitter will transmit, when the level is $\leq h_0$, the volume corresponding to h_0 the same apply for level $\geq h_{max}$.
All transmitted volumes are % of the total volume of the vessel.

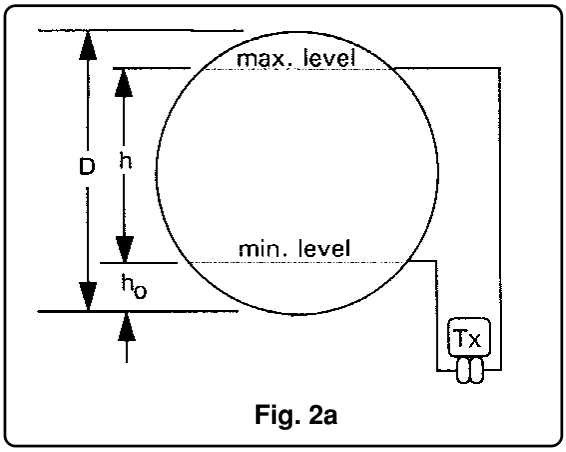


Fig. 2a

If it is required the partial volume starting from 0 (i.e. the volume at $h_0 = 0$) then the A_0 coefficient should be equal to the polynomium solved for h_0 with negative sign: for example for $h_0 = 20\%$

$$A_0 = -0.02 + 0.297 \cdot 0.2 + 2.83 \cdot 0.2^2 - 4.255 \cdot 0.2^3 + 3.5525 \cdot 0.2^4 - 1.421 \cdot 0.2^5 = -0.14179$$

The polynomium coefficients for the example will be:

A_0 A_1 A_2 A_3 A_4 A_5

$$Out = -0.14179 + 0.297\ h + 2.83\ h^2 - 4.255\ h^3 + 3.5525\ h^4 - 1.421\ h^5$$

Note : The accuracy of all above numerical values can not be guaranteed.

General notes for level measurement

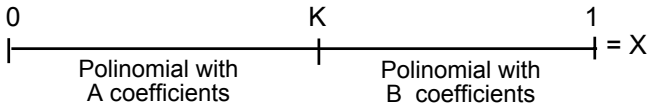
The level transmitter calibration is effected by the transmitter installation conditions, i.e. if the reference connection is empty (dry leg) or liquid filled (wet leg). In the first case (dry leg) the calibration in affected by the specific gravity of the measured liquid and the atmosphere above the liquid at process condition, whereas in the second case (wet leg), it is affected by the specific gravity of the liquid in the connecting pipe(s).

3.0 POLYNOMIAL 2 (Two polinomial functions of 2nd order) - Available for Analog + HART version - Fig. 2b

Analog Output transfer function can also be defined as a two polinomial function. Both polinomials are of 2nd order. So two different polinomial functions are used:

Out = $[\pm A_0 + A_1 (x^1) \pm A_2 (x^2)] + [\pm B_0 + B_1 (x^1) \pm B_2 (x^2)]$

Here the polinomial with A coefficients is used for X from 0 to a K value, and the second one with B coefficients for X greater than the K value.



Ax and Bx terms of the polinomials have to be calculated according to the shape of the vessel.
A PC based software tool is available for polinomial coefficients definition.

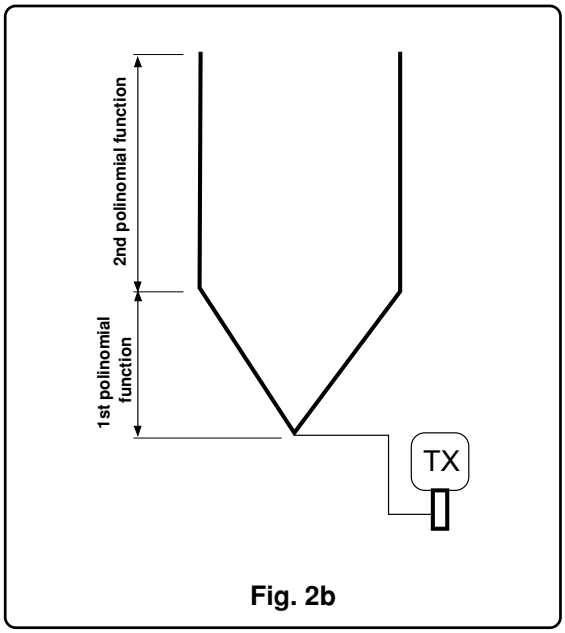


Fig. 2b

4.0 CONSTANT CURRENT Available for analog + HART version

This output function, activated by a Configuration Tool, can be used to test the transmitter output, the integrity of the transmission loop and the calibration of associated equipment like receivers, recorders, etc.
When this function is activated the transmitter acts like a costant current generator: using the configuration tool the user can specify a fixed output current of 4 mA, 20 mA or any value between 4 and 20 mA.

ADDENDUM FOR OUTPUT % RERANGING

Sometimes, in case of tank level measurement, it becomes difficult to calculate the LRV or the URV of the transmitter, or to empty the tank for zero adjustment. So, not only with flange-mounted, but also with differential pressure transmitters using remote seals, the Output % Reranging operation helps the user during transmitter calibration.
When it is know the level of the tank, expressed in percentage, the liquid level, it is possible to input this percentage that automatically the transmitter recalculates its LRV and URV according to the new percentage value.
This can be done using a HART configuration tool on a 2600T Transmitter.
Two options are available as Output % Reranging operation:

1) OP Range Low where both LRV and URV are adjusted
2) OP Range High where only URV is change in accordance with the new input percentage

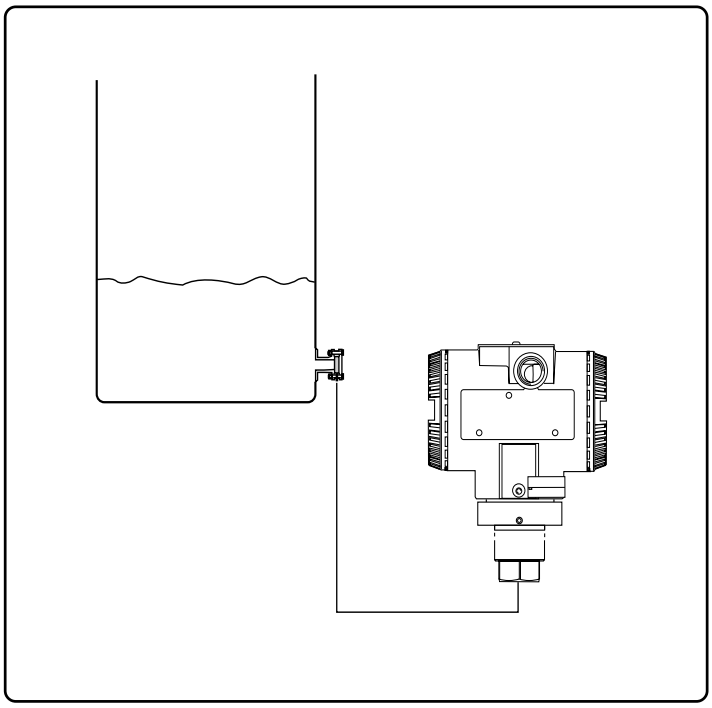
As example:

Actual level measured by the transmitter:
Transmitter output = 27%
Calibration : LRV = -125 mbar
URV = +340 mbar

a) New input level measurement (Option 1) = 30%
New calibration : LRV = -139.5 mbar
URV = +325.5 mbar
The transmitter output is now = 30%

Starting again from the initial settings:
Transmitter output = 27%
Calibration : LRV = -125 mbar
URV = +340 mbar

b) New input level measurement (Option 2) = 30%
New calibration : LRV = -125 mbar
URV = +291.5 mbar
The transmitter output is now = 30%



ADDENDUM FOR "EX SAFETY" ASPECTS AND "IP" PROTECTION (EUROPE)

According to ATEX Directive (European Directive 94/9/EC of 23 March 1994) and relative European Standards which can assure compliance with Essential Safety Requirements, i.e., EN 60079-0 (General requirements), EN 60079-1 (Flameproof enclosures “d”), EN 60079-11 (Intrinsic safety “i”), EN 60079-26 (Equipments, group II, category 1G) for GAS and EN 61241-0 (General requirements), EN 61241-1 (Flameproof enclosures “d”), EN 61241-11 (Intrinsic safety “i”) for DUST. The pressure transmitters of the 2600T SERIES have been certified for the following group, categories, media of dangerous atmosphere, temperature classes, types of protection. Examples of application are also shown below by simple sketches.

Certificate ATEX II 1G Ex ia IIC T6

ZELM Certificate number ZELM 08 ATEX 0361 X

The meaning of ATEX code is as follows:

- II : Group for surface areas (not mines)
- 1 : Category
- G : Gas (dangerous media)

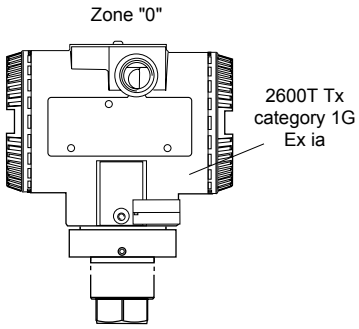
(Note: the number close to the CE marking of the transmitter safety label identifies the Notified Body which carries out the surveillance for the production of the transmitter)

The other marking refers to the protection type used according to relevant EN standards:

- Ex ia : Intrinsic safety, protection level “a”
- IIC : Gas group
- T6 : Temperature class of the transmitter (which corresponds to 85°C max) with a Ta (ambient temperature) +40°C

About the applications, this transmitter can be used in “Zone 0” (Gas) as it is shown on the picture.

Application with Gas



Note: the transmitter must be connected to a supply (associated apparatus) certified [Ex ia]

Certificate ATEX II 1/2G Ex ia IIC T6

ZELM Certificate number ZELM 08 ATEX 0361 X

The meaning of ATEX code is as follows:

- II : Group for surface areas (not mines)
- 1/2 : Category
- G : Gas (dangerous media)

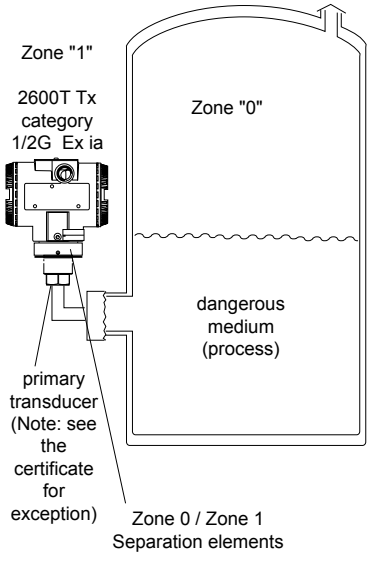
(Note: the number close to the CE marking of the transmitter safety label identifies the Notified Body which carries out the surveillance for the production of the transmitter)

The other marking refers to the protection type used according to relevant EN standards:

- Ex ia : Intrinsic safety, protection level “a”
- IIC : Gas group
- T6 : Temperature class of the transmitter (which corresponds to 85°C max) with a Ta (ambient temperature) +40°C

About the applications, this transmitter can be used in “Zone 0” (Gas) and "Zone 1" as it is shown on the picture.

Application with Gas



. . . ADDENDUM FOR "EX SAFETY" ASPECTS AND "IP" PROTECTION (EUROPE)

Certificate ATEX II 1D Ex iaD 20 T95°C

ZELM Certificate number ZELM 08 ATEX 0361 X

The meaning of ATEX code is as follows:

II	:	Group for surface areas (not mines)
1	:	Category
D	:	Dust (dangerous media)
T95°C	:	Maximum surface temperature of the transmitter enclosure with a Ta (ambient temperature) +75°C for Dust (not Gas). For application with dust layer between 5 and 50 mm, maximum surface temperature must be consider according to IEC 61241-14 chapter 6.3.3.3.

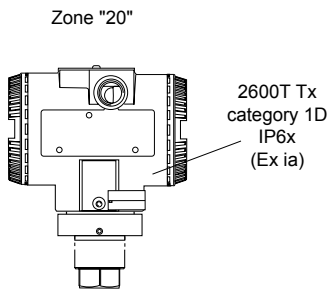
(Note: the number close to the CE marking of the transmitter safety label identifies the Notified Body which carries out the surveillance for the production of the transmitter)

The other marking refers to the protection type used according to relevant EN standards:

Ex iaD 20	:	Construction with inside intrinsic safety electronics suitable for Dust - Zone 20

About the applications, this transmitter can be used in "Zone 20" (Dust) classified area (continuous hazard) as it is shown on the picture.

Application with Dust



Note: the protection is mainly assured by the "IP degree" associated to the low power from the supply certfied [Ex ia]

Certificate ATEX II 1/2D Ex iaD 21 T95°C

ZELM Certificate number ZELM 08 ATEX 0361 X

The meaning of ATEX code is as follows:

II	:	Group for surface areas (not mines)
1/2	:	Category
D	:	Dust (dangerous media)
T95°C	:	Maximum surface temperature of the transmitter enclosure with a Ta (ambient temperature) +75°C for Dust (not Gas). For application with dust layer between 5 and 50 mm, maximum surface temperature must be consider according to IEC 61241-14 chapter 6.3.3.3.

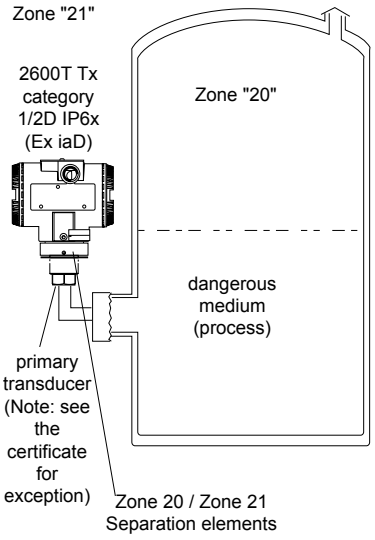
(Note: the number close to the CE marking of the transmitter safety label identifies the Notified Body which carries out the surveillance for the production of the transmitter)

The other marking refers to the protection type used according to relevant EN standards:

Ex iaD 21	:	Construction with inside intrinsic safety electronics suitable for Dust - Zone 21.

About the applications, this transmitter can be used in "Zone 20" (Dust) and "Zone 21" classified area (continuous hazard) as it is shown on the picture.

Application with Dust



Note: the protection is mainly assured by the "IP degree" associated to the low power from the supply. This can either be [b] or [ia] .

. . . ADDENDUM FOR "EX SAFETY" ASPECTS AND "IP" PROTECTION (EUROPE)

Certificate ATEX II 1/2G Ex d IIC T6

ZELM Certificate number ZELM 08 ATEX 0361 X

The meaning of ATEX code is as follows:

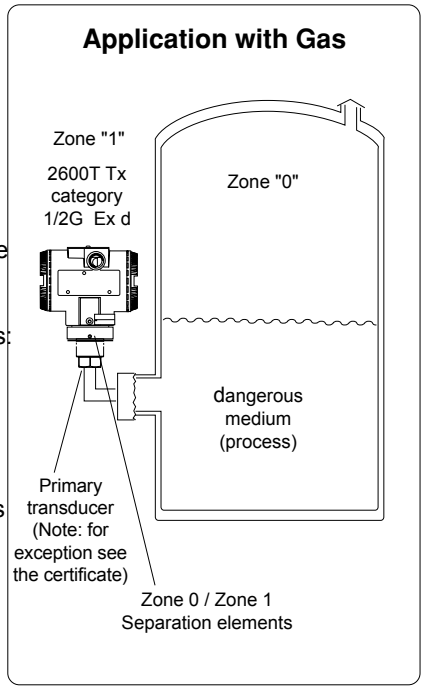
II : Group for surface areas (not mines)
1/2 : Category
G : Gas (dangerous media)

(Note: the number close to the CE marking of the transmitter safety label identifies the Notified Body which carries out the surveillance for the production of the transmitter)

The other marking refers to the protection type used according to relevant EN standards:

Ex d : Flameproof
IIC : Gas group
T6 : Temperature class of the transmitter (which corresponds to 85°C max) with a Ta (ambient temperature) +40°C

About the applications, this transmitter can be used in “Zone 0” (Gas) and "Zone 1" as it is shown on the picture.



Certificate ATEX II 1/2D Ex tD A21 IP67 T85°C

ZELM Certificate number ZELM 08 ATEX 0361 X

The meaning of ATEX code is as follows:

II : Group for surface areas (not mines)
1/2 : Category
D : Dust (dangerous media)
T85°C : Maximum surface temperature of the transmitter enclosure with a Ta (ambient temperature) +75°C for Dust (not Gas). For application with dust layer between 5 and 50 mm, maximum surface temperature must be consider according to IEC 61241-14 chapter 6.3.3.3.

(Note: the number close to the CE marking of the transmitter safety label identifies the Notified Body which carries out the surveillance for the production of the transmitter)

The other marking refers to the protection type used according to relevant EN standards:

Ex tD A21: Construction with flameproof of protection method suitable for Dust - Zone 21

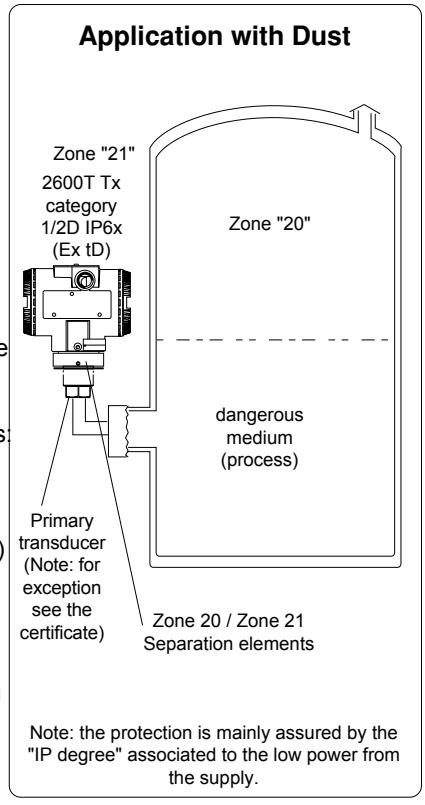
About the applications, this transmitter can be used in “Zone 20” and "Zone 21" (Dust) classified area (continuous hazard) as it is shown on the picture.

IP code

About the degree of protection provided by the enclosure of the pressure transmitter the 2600T SERIES has been certified IP67 according to EN 60529 standard (corresponding to IEC 529).

The first characteristic numeral indicates the protection of the inside electronics against ingress of solid forein objects including dusts. The assigned “6” means an enclosure dust-tight (no ingress of dust).

The second characteristic numeral indicates the protection of the inside electronics against ingress of water. The assigned “7” means an enclosure water-protected against a temporary immersion in water under standardized conditions of pressure and time.



. . . ADDENDUM FOR "EX SAFETY" ASPECTS AND "IP" PROTECTION (IECEx)

Certificate IECEx Ex d IIC T6 Ga/Gb

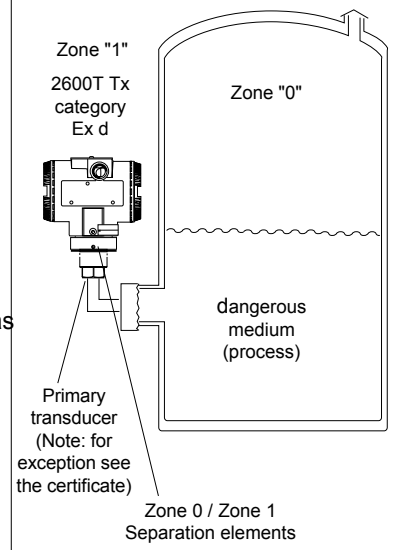
ZELM Certificate number IECEx ZLM 11.0006X

The marking refers to the protection type used according to relevant EN standards:

Ex d	: Flameproof
IIC	: Gas group
T6	: Temperature class of the transmitter (which corresponds to 85°C max) with a Ta (ambient temperature) from -40°C to +75°C
Ga/Gb	: protection level (EPL for Gas)
ambient temperature	: (-40°C < Ta < +75°C)

About the applications, this transmitter can be used in “Zone 0” (Gas) and "Zone 1" as it is shown on the picture.

Application with Gas



Certificate IECEx Ex d tb IIIC T85°C Da/Db

ZELM Certificate number IECEx ZLM 11.0006X

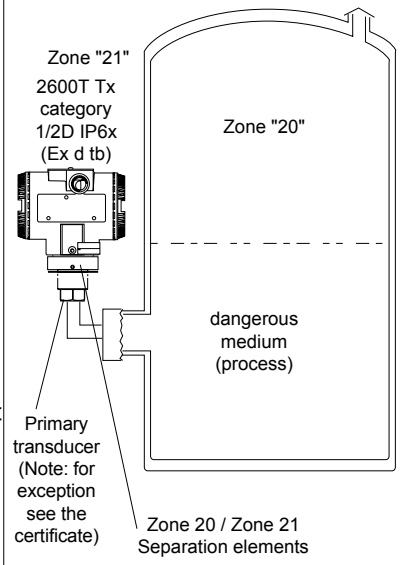
The marking refers to the protection type used according to relevant EN standards:

Ex d	: Flameproof
tb	: Protection by enclosure
IIIC	: conductive Dust Group
T85°C	: class temperature for Dust
Da/Db	: protection level (EPL for Dust)
ambient temperature	: (-40°C < Ta < +75°C)

About the applications, this transmitter can be used in “Zone 20” and "Zone 21" (Dust) classified area (continuous hazard) as it is shown on the picture.

IP code
About the degree of protection provided by the enclosure of the pressure transmitter, the 2600T SERIES has been certified IP67 according to IEC 60529 standard.
The first characteristic numeral indicates the protection of the inside electronics against ingress of solid forein objects including dusts. The assigned “6” means an enclosure dust-tight (no ingress of dust).
The second characteristic numeral indicates the protection of the inside electronics against ingress of water. The assigned “7” means an enclosure water-protected against a temporary immersion in water under standardized conditions of pressure and time.

Application with Dust



Note: the protection is mainly assured by the "IP degree".

. . . ADDENDUM FOR "EX SAFETY" ASPECTS AND "IP" PROTECTION (EUROPE)

C**ertificate** **ATEX II 1/2 G Ex d IIC T4/T5/T6** oppure
II 1/2 D Ex tD A21 IP67 T85°C (-40°C ≤ Ta <+85°C)

CESI Certificate number CESI 02 ATEX 027

The meaning of ATEX code is as follows:

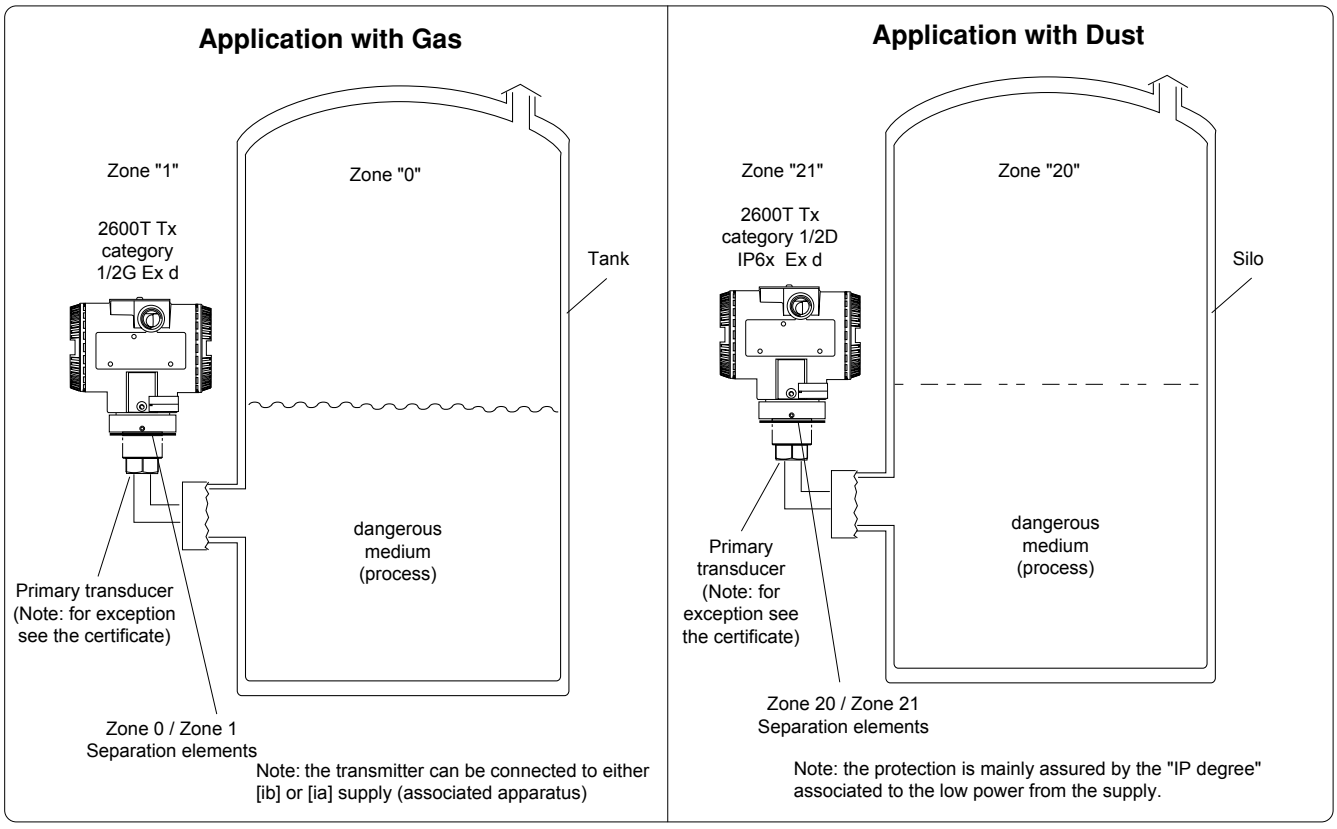
II	:	Group for surface areas (not mines)
1/2	:	Category - It means that only a part of the transmitter complies with category 1 and a second part complies with category 2 (see next application sketch)
G	:	Gas (dangerous media)
D	:	Dust (dangerous media)
T85°C	:	Maximum surface temperature of the transmitter enclosure with a Ta (ambient temperature) +75°C for Dust (not Gas). For application with dust layer between 5 and 50 mm, maximum surface temperature must be consider according to IEC 61241-14 chapter 6.3.3.3.

Note: the number close to the CE marking of the transmitter safety label identifies the Notified Body which carries out the Surveillance for the production of the transmitter.

The other marking refers to the protection type used according to relevant EN Standards:

Ex d	:	Flameproof
Ex tD A21	:	Construction with flameproof of protection method suitable for Dust - Zone 21
IIC	:	Gas group
T6	:	Temperature class of the transmitter (which corresponds to 85°C max) with a Ta (ambient temperature) +40°C
T4	:	Temperature class of the transmitter (which corresponds to 135°C max) with a Ta (ambient temperature) +85°C

About the applications, this transmitter can be used in Zone “0” (Gas) classified areas (continuous hazard) with its “process part” only, whereas the remaining part of the transmitter , i.e. its enclosure, can be used in Zone 1 (Gas), only (see sketch below). Reason of this is the process part of the transmitter (normally called primary transducer) that provides inside separation elements to seal off the electrical sensor from the continuously hazardous process, according to the EN50284 and EN50018. About Dust application, the transmitter is suitable for "Zone 21" according to the EN 50281 as it is shown on the relevant part of the sketch:



IP code

About the degree of protection provided by the enclosure of the pressure transmitter, the 2600T SERIES has been certified IP67 according to EN 60529 standard (corresponding to IEC 529).

The first characteristic numeral indicates the protection of the inside electronics against ingress of solid forein objects inc luding dusts. The assigned “6” means an enclosure dust-tight (no ingress of dust).

The second characteristic numeral indicates the protection of the inside electronics against ingress of water . The assigned “7” means an enclosure water-protected against a temporary immersion in water under standardized conditions of pressure and time.

ADDENDUM FOR "EX SAFETY" ASPECTS (NORTH AMERICA)

According to Factory Mutual Standards which can assure compliance with Essential Safety Requirements

FM 3600 : Electrical Equipment for use in Hazardous (Classified) Locations, General Requirements.

FM 3610 : Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II, III, Division 1, and Class I, Zone 0 & 1 Hazardous (Classified) Locations.

FM 3611 : Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III Division 1 and 2 Hazardous (Classified) Locations.

FM 3615 : Explosionproof Electrical Equipment.

FM 3810 : Electrical and Electronic Test, Measuring and Process Control Equipment.

NEMA 250 : Enclosure for Electrical Equipment (1000 Volts Maximum)

The 2600T Series pressure transmitters have been certified by Factory Mutual for the following Class, Divisions and Gas groups, hazardous classified locations, temperature class and types of protection.

- Explosionproof for Class I, Division 1, Groups A, B, C and D, hazardous (classified) locations.
- Dust Ignition proof for Class II, III Division 1, Groups E, F and G, hazardous (classified) locations.
- Suitable for Class II, III, Division 2, Groups F and G, hazardous (classified) locations.
- NonIncendive for Class I, Division 2, Groups A, B, C and D, in accordance with Nonincendive field wiring requirements for hazardous (classified) locations.
- Intrinsically Safe for use in Class I, II and III, Division 1, Groups A, B, C, D, E, F, and G in accordance with Entity requirements for hazardous (classified) locations.
- Temperature class T4 to T6 (dependent on the maximum input current and the maximum ambient temperature).
- Ambient Temperature range -40 °C to +85 °C (dependent on the maximum input current and the maximum temperature class).
- Electrical Supply range Minimum 10.5 Volts, Maximum 42 Volts (dependent on the type of protection, maximum ambient temperature, maximum temperature class and communication protocol).
- Type 4X applications Indoors/Outdoors.

For a correct installation in field of 2600T Series pressure transmitters please see the related control drawing.

Note that the associated apparatus must be FM approved.

ADDENDUM FOR "EX SAFETY" ASPECTS (NORTH AMERICA)

According to CSA International Standards which can assure compliance with Essential Safety Requirements

C22.2
0-M1991 : General Requirements – Canadian Electrical Code Part II.
0.4-M1982 : Bounding and Grounding of Electrical Equipment (Protective Grounding)
0.5-M1982 : Threaded Conduit Entries
25-M1966 : Enclosures for use in Class II Groups E, F and G Hazardous Locations.
30-M1986 : Explosion-proof Enclosures for use in Class I Hazardous Locations.
94-M1991 : Special Purpose Enclosures.
213-M1987 : Non-Incendive Electrical Equipment for use in Class I Division 2 Hazardous Locations.
157-M1992 : Intrinsically Safe and Non-Incendive Equipment for use in Hazardous Locations.

CAN/CSA C22.2 No.1010.1-92
Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1 : General Requirements (includes Amendment 1)

CAN/CSA C22.2 No.1010.1B-97
Amendment 2 to CAN/CSA C22.2 No 1010.1-92

CAN/CSA E60079-0-00
Electrical apparatus for explosive gas atmosphere. Part 0 : General Requirements.

CAN/CSA E60079-1-01
Electrical apparatus for explosive gas atmosphere. Part 1 : Construction and verification test of flameproof enclosure of electrical apparatus.

CAN/CSA E60079-11-02
Electrical apparatus for explosive gas atmosphere. Part 11 : Intrinsic Safety “i”

The 2600T Series pressure transmitters have been certified by CSA International for the following Class, Divisions and Gas groups, hazardous classified locations, temperature class and types of protection.

- Explosionproof for Class I, Division 1 and 2, Groups A, B, C and D; Class II Groups E, F and G; Class III; Enclosure Type 4X Ex d IIC.
- Non incendive for Class I, Division 2, Groups A, B, C and D; Class II Groups E, F and G; Class III; Enclosure Type 4X Ex nL IIC.
- Intrinsically Safe for Class I, Division 1 and 2, Groups A, B, C and D; Class II Groups E, F and G; Class III; Enclosure Type 4X Ex ia IIC.
- Temperature class T4 to T6 (dependent on the maximum input current and the maximum ambient temperature).
- Ambient Temperature range -40 °C to +85 °C (dependent on the maximum input current and the maximum temperature class).
- Electrical Supply range Minimum 10.5 Volts, Maximum 42 Volts (dependent on the type of protection, maximum ambient temperature, maximum temperature class and communication protocol).
- Type 4X applications Indoors & Outdoors.
- Pollution Degree I
- Installation Category II
- Altitude 2000 m
- Humidity 0 to 80%

For a correct installation in field of 2600T Series pressure transmitters please see the related control drawing.

Note that the associated apparatus must be CSA approved.

EC DECLARATION OF CONFORMITY

We: ABB S.p.A. – *ABB SACE Division*
Business Unit Instrumentation
Via Statale, 113
22016 Lenno (Como)
Italy

declares under our sole responsibility that the products:

2600T EN Series (Transmitters models 262/264/266/268, Hand Held Terminal, Field Indicator) in all the communication configurations (4÷20 mA + HART®, Profibus, Foundation Fieldbus, Safety)

are in conformity with the following standards:

EN 61000-6-3 (2001)	Electromagnetic compatibility (EMC) - Generic standards - Emission standard for residential, commercial and light-industrial environments	
according to:	*EN55022*	*(2001)*
EN 61000-6-2 (2001)	Electromagnetic compatibility (EMC) - Generic standards - Immunity for industrial environments	
according to:	*EN 61000-4-2*	*(2001)*
	EN 61000-4-3	*(2002)*
	EN 61000-4-4	*(2001)*
	EN 61000-4-5	*(2001)*
	EN 61000-4-6	*(2001)*

following the provisions of the EMC Directives 89/336/EEC and 93/68/EEC.

ABB S.p.A. – *ABB SACE Division*
Business Unit Instrumentation

Eugenio Volonterio
Technical Manager

Lenno, 14th May 2008

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Capitale Sociale
Share capital:
€ 107.000.000 i.v./*fully paid up*
P. IVA/VAT: IT 11988960156
Codice Fiscale e n° di iscrizione del Registro delle Imprese di Milano/*Fiscal Code and Official Company Book:* 00736410150
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Tel: +1 (0) 755 883 4366
Fax: +1 (0) 755 883 4373

Client Warranty

Prior to installation, the equipment referred to in this manual must be stored in a clean, dry environment, in accordance with the Company's published specification.

Periodic checks must be made on the equipment's condition. In the event of a failure under warranty, the following documentation must be provided as substantiation:

1. A listing evidencing process operation and alarm logs at time of failure.
2. Copies of all storage, installation, operating and maintenance records relating to the alleged faulty unit.

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www.abb.com/instrumentation

The Company's policy is one of continuous product improvement and the right is reserved to modify the information contained herein without notice.

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