

Configuration of C310 multifunction transmitters by keypad



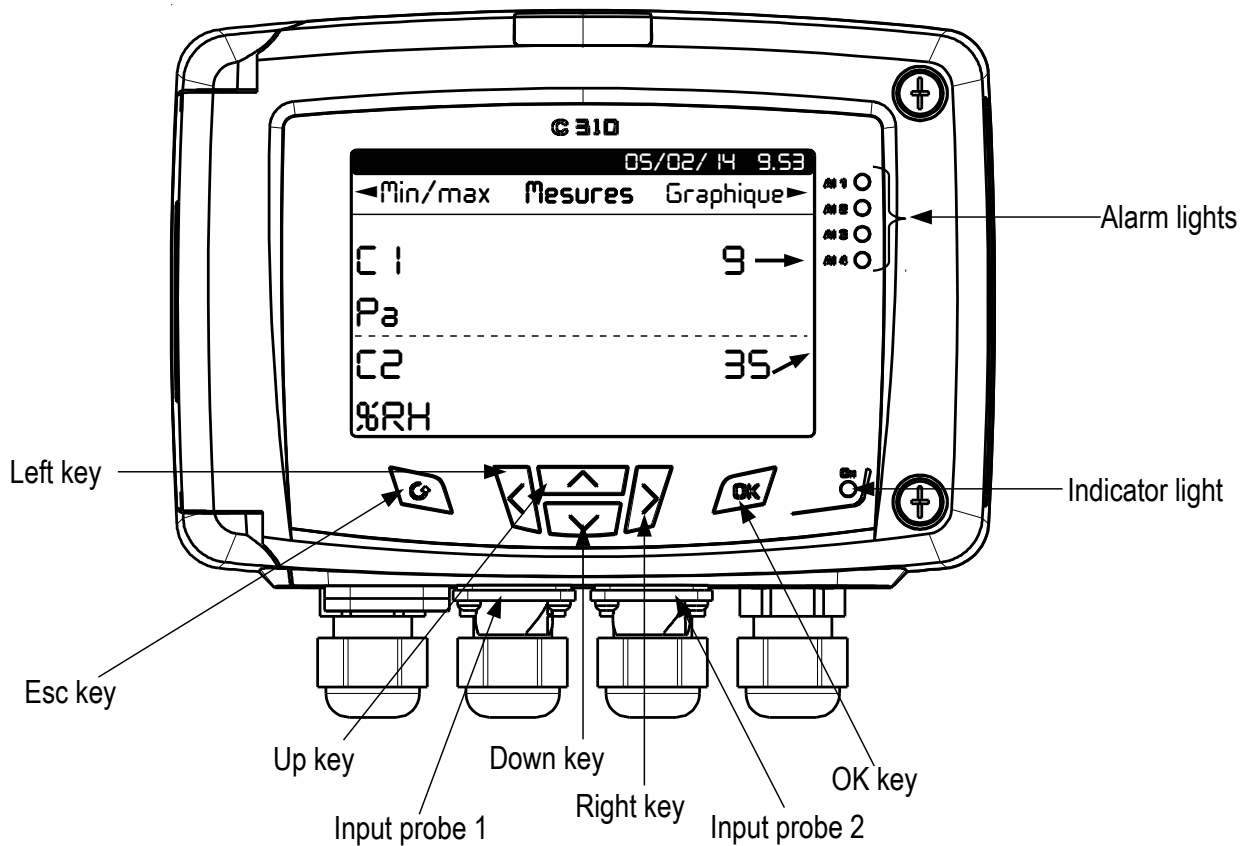
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1. Introduction

1.1. Description of the transmitter

C310 transmitters with display can be configured via keypad. It is possible to set the measurement units, to activate or not a channel,...



Trend indicator : on the screen, a trend indicator represented by a rising arrow, a going down arrow or a stable arrow is displayed above the measurement unit. It means the calculation of a moving average on the last hour (M1) to compare with a moving average on the last 5 minutes (M2) :

- If $M1 = M2$, the trend is stable.
- If $M1 < M2$, the trend is upwards.
- If $M1 > M2$, the trend is downward.

This trend indicator is displayed after 5 minutes.

Indicator light : the indicator light indicates that the transmitter is powered on.

1.2. Description of the keys

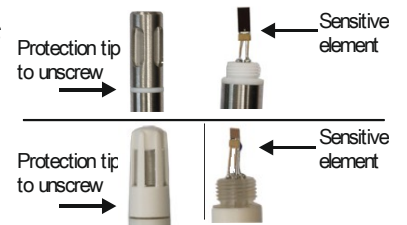
- **Up key** : increments a value, allows to browse through the menus
- **Down key** : decrements a value, allows to browse through the menus
- **Left key** : allows to browse through the menus
- **Right key** : allows to browse through the menus
- **OK key** : validates an input, allows to enter in the main menu
- **Esc key** : cancels an input or backs to the previous step

1.3. Protection tips of the sensor



It's extremely unwise to remove the protection tip of our hygrometry probes as the sensitive element is very fragile even to light contacts. However, if you have to remove the protection tip, take all possible precautions and avoid any contact with the sensitive element.

To remove the protection tip, unscrew it or unclip it.



2. Modbus

2.1. Configuration of parameters

- **Communication speed** : between 2400 and 115200 bauds, 19200 bauds by default
- **Data bits** : 8 bits
- **Stop bit** : 1 bit
- **Parity** : None
- **Flow control** : None
- **Transmitter addressing** : between 1 and 255 (automatically answers the requests from address 0)

2.2. Functions

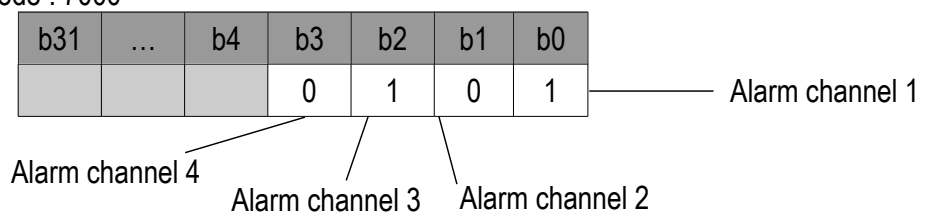
- **Register function** : Function 03
- **Register writing** : Function 16
- **Communication loop test** : Function 08

2.3. Access code to register

- **Registers type:**

Type	Size	Detail
Serial number	8 octets	Data organization
U8	1 octet	8 bits unsigned integer
U16	2 octets	16 bits unsigned integer
U32	4 octets	32 bits unsigned integer
Real	4 octets	32 bits real
Enumeration	1 octet	See table "Enumerations" pError: Reference source not found
Boolean	1 octet	True = 1 ; False = 0
Date	4 octets	Year (2 octets), Month (1 octet), Day (1 octet)
Time	5 octets	Hour (1 octet), Minute (1 octet), Second (1 octet), Millisecond (2 octets)

- **Alarms status** – Modbus code : 7000



- **Values** – Modbus code : 7010 (channel 1)
7040 (channel 2)
7070 (channel 3)
7100 (channel 4)
- **Number of digits after the decimal point** – Modbus code : 7020 (channel 1)
7050 (channel 2)
7080 (channel 3)
7110 (channel 4)

- **Unit** – Modbus code : 7030 (channel 1)
7060 (channel 2)
7090 (channel 3)
7120 (channel 4)

List of units :

Field	Unit	Value	Field	Unit	Value
	None	0		None	0
Temperature	°C	16	Air velocity	m/s	64
	°F	17		fpm	65
Hygrometry	%HR	32		km/h	66
	G/Kg	33	Airflow	m3/h	80
	Kj/KG	34		L/s	81
	°C td	35		cfm	82
	°F td	36		m3/s	83
	°C Tw	37	m3/h	80	
	°F Tw	38	Combustion	ppm	112
Pressure	kPa	50	Electricity	mV	160
	inWg	51		V	161
	hPa	52		µA	162
	mbar	53		mA	163
	mmHg	54		A	164
	mmH2O	55			
	daPa	56			
	Pa	57			

Example of a measurement at 24.2 °C :

- Value : code 7010, real type (Most Significant Byte / Least Significant Byte)

Byte 3		Byte 4		Byte 1		Byte 2	
b15	b16	b31	b24	b7	b0	b15	b8
0100	0001	1100	0001	1001	1001	1001	1010

Value : 24.2

- Number of digits after the decimal point : code 7020, U8 type

Byte 1	
b7	b0
0000	0001

Number of digits after the decimal point : 1

- Unit : code 7030, U8 type

Byte 1	
b7	b0
0001	0000

Unit value : 16 : °C (See table “List of units” p8)

“Enumerations” table :

Corresponding values		0	1	2	3	4	5	6	7
Backlight duration		Off	10s	30s	60s	Permanent			
Graphical period		3 mn	15 mn	30 mn	1 hour	3 hours	6 hours	12 hours	24 hours
Language		French	English	Third language					
Date Format		dd-mm-yyyy	mm-dd-yyyy	yyyy-mm-dd					
Time Format		24H	12H						
Modbus	Com speed	2400	4800	9600	19200	38400	115200		
Channel x	Unit	See list of unit							
Channel x	Transmitter	none	probe 1	probe 2	module				
Output x	Type	4 - 20 mA	0 - 20 mA	0 - 10 V	0 - 5 V	0 - 1 V			
Output x	Diagnostic	Deactivate	0%	50%	100%				
Input x	Type	4 - 20 mA	0 - 20 mA	0 - 10 V	0 - 5 V	0 - 1 V			
Alarm x	Mode	Deactivate	Rising edge	Falling edge	Monitoring	Transmitter state			
Alarm x	Security	Negative	Positive						
Relay x	Selection	OFF	ON	Alarm 1	Alarm 2	Alarm 3	Alarm 4		
Compensation	Temperature : Unit	°C	°F						
Compensation	Temperature : Mode	Value	Thermocouple	Probe N°1					
Compensation	Pressure : Unite	hPa	mbar	mmHg	m (alt)				
Compensation	Normative value	None	DIN1343	ISO2533					
Débit	Pressure unit for airflow	Pa	mmH2O	inWg	mbar				
Moy. Mesure	Differential pressure device	Pitot L	Pitot S	Debimo blades	Factor				
Section	Type	Rectangular	Circular	Coefficient					
Section	Unit	mm	inch						

3. Configure the transmitter

3.1. Enter the security code

To configure the transmitter, and for security purposes, a security code must be entered. The default code is **0101**.

- Connect the transmitter.
- Wait until the initializing period is over.
- Press OK.
“Code” is displayed with “0000” below.
- Press OK to go to the second zero.
- Press Up key to display 1 then press OK.
- Press OK to go to the 4th zero.
- Press Up key to display 1 then press OK.
The configuration screen is displayed.



This screen allows to set :

- the transmitter
- the channels
- the analogue outputs
- the alarms
- the relays
- the configurations
- the options



If a wrong code is entered, the following message is displayed : **“Bad code”**. Press OK to go back to the measurement screen then press OK to enter the code again.

3.2. Set the parameters of the transmitter

This part allows to set :

- the screen : contrast and backlight
 - the graphical period : during “X” last minutes, the transmitter displays the measured values as a graph
 - the language : French or English
 - the date and time
 - the beep key
 - the keypad locking
 - the safety code : modify the access code
 - back to factory configuration
 - the Modbus
 - the Ethernet
 - Information : get an access to information about the transmitter and the connected probes
-
- Enter the security code then press OK.
 - Press OK on **“Device”** line.
The screen allowing to configure the transmitter is displayed.

3.2.1 Set the screen

- Press OK on “**Screen**” line.
- Press OK on “**Contrast**” line to set the contrast between 0 and 3.
- Use Up and Down keys to set the contrast then press OK.
- Go to the “**Backlight settings**” line with the Down key then press OK.
- Press OK on “**Duration**” line then select the backlight duration with Up and Down keys :
 - ON : continuous backlight
 - 10 sec, 30 sec or 1 min : backlight turns off as soon as the selected time is up.
 - OFF : deactivated backlight
- Press OK to validate.
- Press Down key then OK on “**Backlight**” line.
- Set the backlight between 0 and 10 with Up and Down keys.
- Press OK to validate.
- Press Esc to back to the configuration screen of the device.

3.2.2 Set the graphical period

- Press OK “**Graphical period**” line.
- Use Up and Down keys to select the requested duration then press OK to validate.
Example : if 15 min is selected, the transmitter will graphically display the measured values during the last 15 minutes.

3.2.3 Set the language

- Press OK on “**Language**” line.
- Select the language with Up and Down keys : French or English.
- Press OK to validate.

3.2.4 Set date and time

- Press OK on “**Date-Time**” line.
“Date-time” screen is displayed.
- Press OK on “**Date**” line then select with Up and Down keys the date format :
 - JJ/MM/AAAA : day/month/year
 - MM/JJ/AAAA : month/day/year
 - AAAA/MM/JJ : year/month/ day
- Press OK.
- Go the number to modify with Up/Down/left/right keys then press OK.
- Enter the required number with Up/Down/left/right keys then press OK.
- Once the settings are performed, press Esc key to validate the date and time and to back to the configuration screen of the device.

3.2.5 Activate /deactivate the beep key

- Press OK on “**Beep key**” line.
- **Select “YES”** to activate the beep key or “**NO**” to deactivate it.
- Press OK to validate.

3.2.6 Lock and unlock the keyboard

- Press OK on “**Keyboard Lock**” line.
- **Select “YES”** to lock the keyboard then press OK.

A message is displayed indicating that the keyboard is locked and the device backs to measurement screen.



Press OK during 6 s to unlock the keyboard.

3.2.7 Modify the security code

- Press OK on “**Security code**” line.
The following message is displayed : “Modification Security code?”.
- Go to “**Continue**” then press OK.
- Enter the current code.
- Enter the new code.
- Go to “**YES**” then press OK to confirm the new code.
The transmitter displays a message indicating that the code has been modified.
- Press OK.



Keep the new created code because it will be not possible to access to the configuration of the transmitter with the code 0101.

3.2.8 Back to factory parameters

- Press OK on “**Back to factory settings**” line.
- Go to YES then press OK to confirm.

3.2.9 Set the Modbus (optional)

- Press OK on “**Modbus**” line.
- Press OK on “**Slave num**” line.
- Enter the slave number with Up and Down keys.
- Press OK to validate.
- Go to “**Communication speed**” line then press OK.
- Select the speed with Up and Down keys then press OK.



If the Modbus option is selected when ordered the transmitter, the default slave number will be indicated on serial number label and the default speed is 19 200 bds.

3.2.10 Set the Ethernet communication (optional)

- Press OK on “**Ethernet**” line.
- Press OK on “**Address**” line.
The address consists of 4 groups of numbers.
- Set the 1st group with the arrows then press OK.
- Repeat the procedure for the 3 following groups.
- Go to “**OK**” then press OK to validate the address.
- Press OK on “**Mask**” line.
The mask consists of 4 groups of numbers.
- Set the 1st group with the arrows then press OK.
- Repeat the procedure for the 3 following groups
- Go to “**OK**” then press OK to validate the mask.
- Press OK on “**Gateway**” line.
The gateway consists of 4 groups of numbers.
- Set the 1st group with the arrows then press OK.
- Repeat the procedure for the 3 following groups.
- Go to “**OK**” then press OK to validate the gateway.
- Press OK on “**Port**” line.
- Use the arrows to set the port then press OK.



The Address Mac can not be modified because it is linked to the Ethernet board.

3.2.11 Access to the transmitter information

This part allows to access to the information about the transmitter, the boards and the probes.

- Press OK on “**Information**” line.
A 1st screen is displayed with information about the transmitter (name, serial number, calibration date).
- Press Right arrow.
The screen displays information about the outputs.
- Press Right arrow.
The screen displays information about the connected boards.
- Press Right arrow.
The screen displays information about the connected probes.
- Press Esc key to quit the information screen.

3.3. Configure the measurement channels

This part allows to activate and assign a measurement channel to a probe or a board.

By default, channels are activated according to the supplied configuration of the transmitter. This configuration is indicated on the label located on the side of the transmitter.



To activate a channel, at least one probe or one board must be connected to the transmitter.

- Press OK.
- Enter the security code then press OK.
- Go to the “**Channel**” line then press OK.
The transmitter displays the 4 available channels.
- Go to the line of the channel to activate then press OK.
*The transmitter displays “**Probe – Unit** **OFF**”.*
- Press OK.
- Select with Right and Left arrows “**Probe 1**”, “**Probe 2**” or “**Board**” according to the required attribution for the channel.
The available units of the selected probe or board appear.
- Select the unit with Up and Down arrows then press OK.
The transmitter displays the feature of the channel.
 - *the type of probe (probe 1, probe 2 or board) and its unit*
 - *the coefficient*
 - *the offset*
- Modify if necessary the coefficient and offset.

3.4. Configure the analogue outputs



One channel must be configured at least (see chapter 3.3).

If no channel has been configured, the transmitter will indicate that the outputs configuration is impossible.


- Press OK.
- Enter the security code.

3.4.1 Select the type of output

- Go to “**Analogue outputs**” line then press OK.
The transmitter displays the available analogue outputs : by default, outputs 1 and 2 are available. Outputs 3 and 4 are available as option.
- Go to the output to configure with Up and Down arrows then press OK.
- Go to the “**Type**” line then press OK.

The transmitter displays the different types of outputs : 4-20 mA, 0-20 mA, 0-10 V or 0-5 V.

- Go to the type of required output then press OK.

 The output number is equivalent to the number of the displayed channel (ex : output 1 = channel1)

3.4.2 Set the minimum and maximum ranges

- Go to “**Range min**” then press OK.
- Set the value of the minimum range : use Up and Down arrows to modify the digit and use Left and Right arrows to go to one digit to an other.
- Press OK.
- Go to “**Range max**” line then press OK.
- Set the value of the maximum range : use Up and Down arrows to modify the digit and use Left and Right arrows to go to one digit to an other.

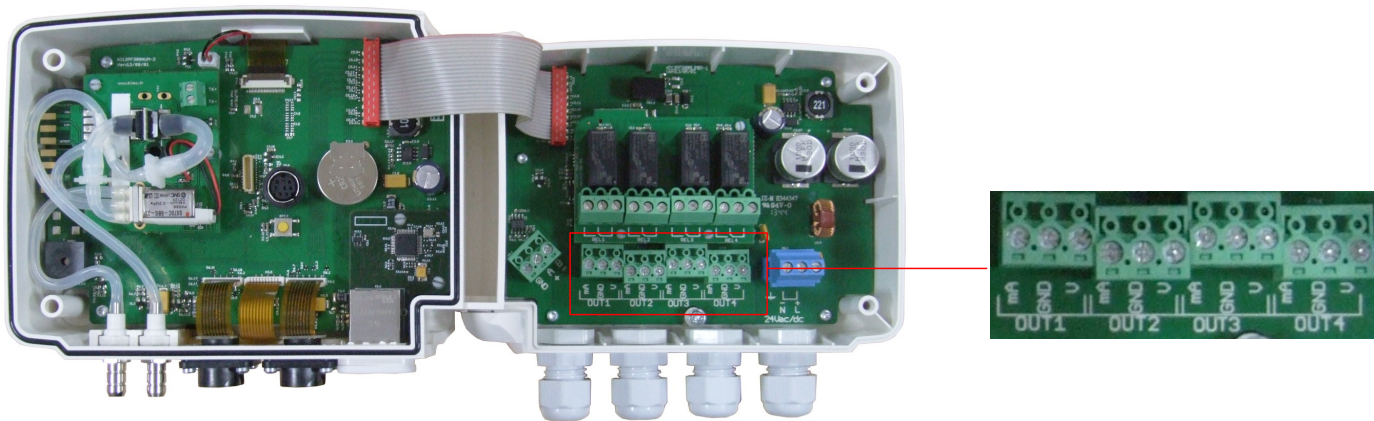
3.4.3 Perform an output diagnostic

This function allows to check on a measurement device (multimeter, regulator or automate) the proper functioning of the outputs. The transmitter will generate a voltage (between 0 and 10 V) or a current (between 0 and 20 mA) according to the setting of the type of output.

- For a 0-10 V output signal, the transmitter will generate 0 – 5 or 10 V.
- For a 0-5 V output signal, the transmitter will generate 0 – 2.5 or 5 V.
- For a 4-20 mA output signal, the transmitter will generate 4 – 12 or 20 mA.
- For a 0-20 mA output signal, the transmitter will generate 0 – 10 or 20 mA.

 **Before carrying out the output diagnostics, all connections and configurations of the transmitter must be enabled, to avoid any damage on the transmitter and the measurement device !**

- Select a channel for the outputs diagnostic.
OUT1, OUT2, OUT3 or OUT4* indicated on the electronic board above the terminal blocks.*
-




- Connect a measurement device on the output 1, 2, 3* or 4*.

* : optional outputs

Once the connection to the measurement device is complete, the output diagnostic on several check points can be performed :

- Go to “**Diagnostic**” line then press OK.
According to the type of output, the transmitter displays the outputs it will generate.
- Use Up and Down arrows to go from one point to generate to an other.

 **If the deviations are too large (> 0,05V or > 0,05mA) between the signal issued and the value displayed on the multimeter, we recommend that you return the transmitter to our factory.**

3.5. Configure the alarms

This part allows to activate and define the alarms conditions on one or several channels.



One channel must be configured at least (see chapter 3.3).

If no channel has been configured, the transmitter will indicate that the alarms configuration is impossible.

- Press OK.
- Enter the security code then press OK.
- Go to “**Alarms**” line then press OK.
The transmitter displays the 4 alarms : “Alarm 1”, “Alarm 2”, “Alarm 3” or “Alarm 4”.

3.5.1 Select the alarm mode

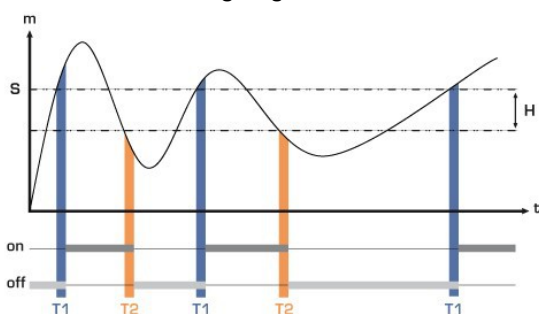
- Go to the line of the alarm to configure then press OK.
- Press OK on “**Mode**” line.
The transmitter displays the different available modes :
 - None
 - Rising edge
 - Falling edge
 - Monitoring
 - Transmitter state
- Go to the required mode with Up and Down arrows then press OK.

Details of the available alarms modes :

- **Rising edge (1 threshold)** : the alarm goes off when the measurement **exceeds** the threshold and stops when it is **below** the threshold
- **Falling edge (1 threshold)** : the alarm goes off when the measurement is **below** the threshold and stops when it **exceeds** the threshold.
- **Monitoring (2 thresholds)** : the alarm goes off when the measurement is outside the defined low and high thresholds.
- **Transmitter state** : the alarm goes off according to defined conditions (high ambient temperature*, memory error...)

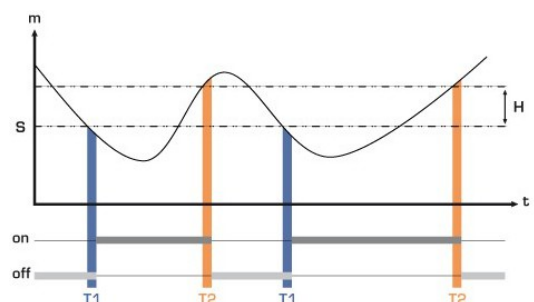
*only with the pressure board

Rising edge



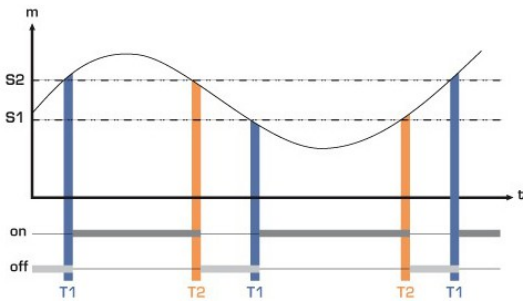
Measurement (m) > Threshold (S) during the time-delay T1 → Alarm activation
Measurement (m) < Threshold (S) - Hysteresis (H) during the time-delay T2 → Alarm deactivation

Falling edge




Measurement (m) < Threshold (S) during time-delay T1 → Alarm activation.
Measurement (m) > Threshold (S) + Hysteresis (H) during time-delay T2 → Alarm deactivation

Monitoring



The alarm goes off when the measurement is outside the low and high thresholds.

 When an audible alarm goes off, it is possible to acknowledge it pressing OK key on the transmitter.

3.5.2 Set the alarm in rising or falling edge

The alarm mode **“Rising edge”** or **“Falling edge”** is selected.

- Go to the **“Configuration”** line then press OK.
- Press OK on the **“Channel”** line and select the channel where the alarm will be active.
- Press OK to validate.
- Go to the **“Threshold”** line then press OK.
- Use Up/Down/Left/Right arrows to enter a threshold then press OK.
- Go to the **“Hysteresis”** line then press OK.
- Use Up/Down/Left/Right arrows to enter the hysteresis value then press OK.
- Go to the line **“Threshold delay”** then press OK.
- Use Up/Down/Left/Right arrows to enter the value of threshold delay in second then press OK (this value is between 0 and 600 s).
- Go to the **“Hysteresis threshold”** then press OK.
- Use Up/Down/Left/Right arrows to enter the value of the hysteresis delay in second then press OK (this value is between 0 and 600 s).
- Go to the **“Sound alarm”** line then press OK.
- Select **“YES”** to activate the audible alarm or **“NO”** not to activate it then press OK.

3.5.3 Configure the alarm in monitoring mode


The alarm mode **“Monitoring”** is selected.

- Go to the **“Configuration”** line then press OK.
- Press OK on the **“Channel”** line and select the channel where the alarm will be active.
- Go to the **“Threshold 1”** line then press OK.
- Use Up/Down/Left/Right arrows to enter the threshold 1 then press OK.
- Go to the **“Threshold 2”** line then press OK.
- Use Up/Down/Left/Right arrows to enter the threshold 2 then press OK.
- Go to the **“Delay 1”** line then press OK.
- Use Up/Down/Left/Right arrows to enter the value of the delay 1 in second then press OK (this value is between 0 and 600 s).
- Go to the **“Delay 2”** line then press OK.
- Use Up/Down/Left/Right arrows to enter the value of the delay 2 in second then press OK (this value is between 0 and 600 s).
- Go to the **“Sound alarm”** line then press OK.
- Select **“YES”** to activate the audible alarm or **“NO”** not to activate it then press OK.

3.5.4 Configure the alarm on Transmitter state mode


The alarm mode "**Transmitter state**" is selected.

- Go to the "**Configuration**" line then press OK.
- Press OK on the "**Condition selection**" line.
The transmitter displays the list of alarms conditions :
 - Ambient temperature too high*
 - Ambient temperature too low*
 - Memory error
 - Board error*
 - Probe 1 error
 - Probe 2 error
 - Pressure value too high*
- Go to the alarm condition with Up and Down arrows then press OK to select the condition.
The alarm condition is ticked.

 Use the right arrow to go to the 2nd page of the conditions and use the Left arrow to back to the 1st page.

- Press Esc key when the required conditions are selected.
The transmitter displays a message asking to save.
- Go to YES then press OK.
- Then go to the "Audible alarm" line then press OK.
- Select "**YES**" to activate the audible alarm or "**NO**" not to activate it then press OK.

*Only available with the pressure board

 The alarm must be completely set to be active (for example, do not keep "---" in front of a threshold, a delay,...).

3.5.5 Configure the relays (optional)

- Press OK.
- Enter the security code.
- Go to the "Relays" line then press OK.
The transmitter displays the 4 relays : "**Relay 1**", "**Relay 2**", "**Relay 3**" or "**Relay 4**".
- Select the relay to configure then press OK.
- Press OK on "**Selection**" line.
- Select "ON", "OFF" or "**Alarm 1, 2, 3 or 4**" with Up and Down arrows then press OK :
 - "**ON**" is selected : the relay is connected. It also allows to perform a test of the relay.
 - "**OFF**" is selected : the relay is deactivated.
 - "**Alarm 1, 2, 3 or 4**" is selected : the activation of the relay is assigned to an alarm previously configured.
- Go to "**Security**" line then press OK.
The outputs relays are by default in **negative security** : the relay is energized during an alarm condition. Via the keyboard, it is possible to switch the relays in **positive security** : the relay is de-energized during an alarm condition or a power cut.
- Select "**Positive**" or "**Negative**" with Up and Down arrows then press OK.

 To activate the relays according to the alarms, the alarms must be completely configured.

3.6. Configure the probes, boards and normative values

This part allows to set the following parameters :

- **for an air velocity and airflow probe : (hotwire or vane)** : the type of section, the correction factor, the in air velocity and the compensation in atmospheric pressure (only available for hotwire probes)
- **For a pressure board** : air velocity and airflow (if the option is activated), the integration in pressure, the purge mode and autozero duration.
- **For a CO₂ probe** : the compensation in atmospheric pressure,
- **For an hygro/temperature probe** : the compensation in atmospheric pressure for the psychrometry calculations.

3.6.1 Configure an air velocity and airflow probe



An air velocity/airflow probe must be connected.

Select the type of section :

- Press OK.
- Enter the security code then press OK.
- Go to the **“Parameters”** line then press OK.
- Go to **“Probe 1”** or **“Probe 2”** line (according to the channel of the air velocity/airflow probe) then press OK.
- Go to **“Type of section”** line then press OK.

For a rectangular section :

- Select **“Rectangular”** with Up and Down keys then press OK.
The transmitter displays the necessary settings to perform for a rectangular section.
- Press OK on **“Unit”** line then select **“mm”** or **“inch”** with Up and Down keys.
- Press OK.
- Go to **“Length”** line then press OK.
- Use Up/Down/Left/Right arrows to enter the length of the section then press OK.
- Go to **“Width”** line then press OK.
- Use Up/Down/Left/Right arrows to enter the width of the section then press OK.



Length and width of the section must be between 1 and 3000 mm.

For a circular section :

- Select **“Circular”** with Up and Down arrows then press OK.
The transmitter displays the necessary settings to perform for a circular section.
- Press OK on **“Unit”** line then select **“mm”** or **“inch”** with Up and Down keys.
- Press OK.
- Go to **“Diameter”** line then press OK.
- Use Up/Down/Left/Right arrows to enter the diameter of the section then press OK.



The diameter of the section must be between 1 and 3000 mm.

Enter a correction factor : this correction coefficient allows to adjust the transmitter according to data in air velocity of the installation.

How to calculate it ? For example, the air velocity in your section is **17 m/s** and the transmitter displays **16.6 m/s**. The coefficient to apply is $17 / 16,6$ it means **1.024**.

- Press OK.
- Enter the security code then press OK.
- Go to **“Parameters”** line then press OK.

- Go to “**Probe 1**” or “**Probe 2**” line (according to the channel of the air velocity/airflow probe) then press OK.
- Use Up/Down/Left/Right arrows to enter a correction factor then press OK.



The correction factor must be between 0.2 and 2.

Enter an integration in air velocity : The air velocity measurement element of the transmitter is very sensitive and reacts to air velocity changes. When making measurements in unstable air systems, the air velocity measurement may fluctuate. The integration coefficient (from 0 to 9) makes an average of the measurement ; this helps to avoid any excessive variations and guarantees a stable measurement.

New displayed value = $(((10 - \text{Coef.}) \times \text{New Value}) + (\text{Coef.} \times \text{Old value})) / 10$

Example : C310 with hotwire (0-30 m/s) – Current measurement : 2 m/s – New measurement : 8 m/s

The air velocity source being unstable, the user selects a strong integration. Integration : 7. The variation is lower than 10 m/s, it is possible to apply the integration calculation formula.

Next displayed value : $((2 * 8) + (7 * 2)) / 10 = 3 \text{ m/s}$.

- Press OK.
- Enter the security code then press OK.
- Go to the “**Parameters**” line then press OK.
- Go to “**Probe 1**” or “**Probe 2**” line (according to the channel of the air velocity/airflow probe) then press OK.
- Go to “**Air velocity integration**” line then press OK.
- Use Up and Down arrows to select an air velocity integration then press OK.



The air velocity integration must be between 0 and 9.

3.6.2 Configure a CO₂ probe or a temperature/hygrometry probe



A CO₂ probe or a temperature/hygrometry probe must be connected to the transmitter.

Set the compensation in atmospheric pressure

- Press OK.
- Enter the security code then press OK.
- Go to the “**Parameters**” line then press OK.
- Go to “**Probe 1**” or “**Probe 2**” (according to the channel of the CO₂ probe) then press OK.
- Go to “**Compensation**” line then press OK.
- Go to “Atmo pressure” line then select the unit with the Up and Down arrows.
- Press OK.
- Enter a value. This value must be between :
 - 0 and 4000 hPa
 - 0 and 4000 mbar
 - 0 and 3000.24 mmHg
 - 0 and 10 000 m (altitude)

3.6.3 Configure a board



A pressure board must be connected to the transmitter.
For the air velocity/airflow settings, the “Air velocity/airflow” option must be activated.

Select the measuring device :

- Press OK.
- Enter the security code then press OK.
- Go to the “**Parameters**” line then press OK.

- Go to “**Board**” line then press OK.
- Go to “**Air velocity/airflow**” line then press OK.
- Press OK on “Measure mean” line then use Up and Down arrows to select :
 - Pitot tube L (coefficient : 1.0015)
 - Pitot tube S (coefficient : 0.84)
 - Debimo blades (coefficient : 0.8165)
 - le coefficient of the element (free coefficient)
- Press OK.

Select the type of section : 3 selections are possible : rectangular or circular section or airflow coefficient.

- For the rectangular and circular sections : see chapter 3.6.1
- For the airflow coefficient :
 - Press OK on “**Section type**” line then select “**Flow coeff**”.
 - Press OK on “**Coefficient**” line then enter the coefficient with Up/Down/Left/Right arrows.
 - Press OK.
 - Press OK on “Reference unit” line then select the unit with Up and Down arrows.
 - Press OK.

This airflow coefficient allows to calculate an airflow from the pressure. It is indicated by the manufacturer of the devices supplied with pressure connections (+ and -). From the square root of the measured pressure (Delta P) and from this coefficient, you get the airflow. $Airflow = C_D \times \sqrt{\Delta pressure}$



The coefficient must be between 0.1 and 9999.9.

The available units for the reference unit are : Pa, mmH2O, inWg and mbar.

Enter a correction factor : this correction coefficient allows to adjust the transmitter according to data in air velocity of the installation.

How to calculate it ? For example, the air velocity in your section is **17 m/s** and the transmitter displays **16.6 m/s**. The coefficient to apply is **17 / 16,6** it means **1.024**.

- Press OK.
- Enter the security code then press OK.
- Go to the “**Parameters**” line then press OK.
- Go to “**Board**” line then press OK.
- Go to “**Correction factor**” line then press OK.
- Use Up/Down/Left/Right arrows to enter a correction factor then press OK.




The correction factor must be between 0.2 and 2.

Set the compensation in temperature and in atmospheric pressure : it is possible to modify the **compensation temperature value**. Indeed, measured air velocity and airflow with a Pitot tube or Debimo blades (or other differential pressure element) depends on operating temperature. It is required to enter the **operating temperature** in order to get more accurate results. It is possible to enter the value manually or to use a thermocouple K probe for an automatic temperature compensation.


- Press OK.
- Enter the security code then press OK.
- Go to the “**Parameters**” line then press OK.
- Go to “**Board**” line then press OK.
- Go to “**Compensation**” line then press OK.
- Press OK on “**Temperature**” line then select :
 - Manual entry to enter manually a temperature : press OK then select the unit (°C or °F) then enter a value between -50 and +50 °C.
 - Auto (thermocouple) : the transmitter will take into account the measured temperature by a thermocouple probe connected to the pressure board.

- Auto (probe 1) : the transmitter will take into account the measured temperature by a temperature probe connected to the transmitter at the location "Probe 1".
- Go to "**Atmo pressure**" line then select the unit with Up and Down keys.
- Press OK.
- Enter a value. This value must be between :
 - 0 and 4000 hPa
 - 0 and 4000 mbar
 - 0 and 3000.24 mmHg
 - 0 and 10 000 m (altitude)

 The default atmospheric pressure is 1013.25 hPa.

Enter an integration in pressure :

- Press OK.
- Enter the security code then press OK.
- Go to the "**Parameters**" line then press OK.
- Go to "**Board**" line then press OK.
- Go to "**Pressure integration**" line then press OK.
- Use Up and Down arrows to select an integration then press OK.



 The pressure integration must be between 0 and 9.

Enter the time-delay between two autozeros : Thanks to the temperature compensation of the gain (from 0 to 50°C) and to the autozero system, Class 310 transmitters guarantee an excellent long-term stability, along with a great measurement accuracy.

Autozero principle : the microprocessor drives a solenoid valve that compensates for any long-term drift of the sensitive element.

Compensation is made by regular automatic adjustment of the zero. True differential pressure measurement is then made regardless of the environmental conditions of the transmitter.

- Press OK.
- Enter the security code then press OK.
- Go to the "**Parameters**" line then press OK.
- Go to "**Board**" line then press OK.
- Go to "**Autozero**" line then press OK.
- Enter a duration with Up/Down/Left/Right arrows then press OK.

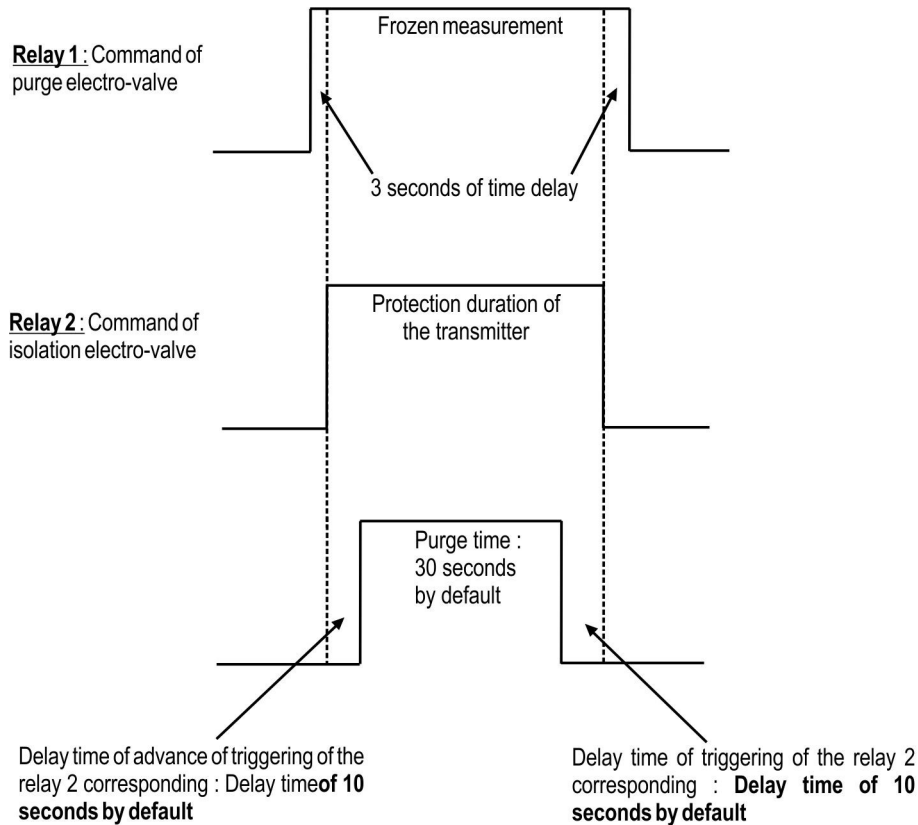
 - The autozero duration must be between 0 and 60 minutes.
 - The default autozero duration is 10 minutes.

Set the purge time : The purge mode enables to freeze the measurement when being displayed, enables to lock the analogue outputs, and to activate the relay 1, in order to actuate a de-dust system of an air movement conditions system and to activate the relay 2 in order to isolate the transmitter.

Here is the detailed process of the purge mode :

- 1 – Measurement is frozen.
- 2 – Wait for 3 seconds.
- 3 – Activation of the relay 2 (isolation of the transmitter).
- 4 – Wait for time-delay (e.g : 10 seconds).
- 5 – Activation of the relay 1 (sending compressed air into the network to clean the installation).
- 6 – Purge duration (e.g : 30 seconds).
- 7 – Deactivation of the relay 1 (stop sending compressed air).
- 8 – Wait for time-delay (e.g : 10 seconds).
- 9 – Deactivation of the relay 2.

- 10 – Wait for 3 seconds.
- 11 – Recovery of the measurement.



- Press OK.
- Enter the security code then press OK.
- Go to the **“Parameters”** line then press OK.
- Go to **“Board”** line then press OK.
- Go to **“Purge”** line then press OK.
- Go to **“Mode”** line then press OK.
- Select **“Run”** with Down arrow then press OK.
- Go to **“Purge duration”** line then press OK.
- Enter the purge duration with Up/Down/Left/Right arrows then press OK to validate.
- Go to **“Delay between two purges”** then press OK.
- Enter the delay between 2 purges with Up/Down/Left/Right arrows then press OK to validate.
- Go to **“Delay”** line then press OK.
- Enter the delay with Up/Down/Left/Right arrows then press OK to validate.



- The purge duration must be between **1 and 60 seconds**.
- The duration between 2 purges must be between **1 and 9999 minutes**.
- The delay duration must be between **1 and 60 seconds**.

3.7. Activate an option

It is possible to buy one or several options. The firm will supply a code allowing to activate the required option.
To activate an option :

- Turn on the transmitter.
- Press OK.
- Enter the security code then press OK.
- Go to the **“Options”** line then press OK.
- Go to the line of the requested option then press OK.

The transmitter displays asking if you want to activate the option.

➤ Go to **“Continue”** then press OK.

The transmitter asks for an activation code.

➤ Enter the supplied activation code then press OK.

4. Description of function and Modbus connections

4.1. Device

Modbus	Register type	Description	Possibilities
1000	-	Serial number of the transmitter	
1010	-	Firmware version	
1400	-	Keypad locking	0 : deactivated 1 : activated
1410	U16	Security code	
1500	U8	Modbus slave number	From 1 to 255
1510	Enumeration	Modbus speed communication	2400 / 4800 / 9600/ 19200 / 38400 / 115200 bds
1700	-	Activation of the high resolution in pressure option	1 : activated / 0 : deactivated
1710	-	Activation of the Modbus option	1 : activated / 0 : deactivated
1900	-	Back to factory configuration	

4.2. Channels

Modbus	Register type	Description	Possibilities
2000	Enumeration	Unit selection of the channel 1	Probe Board Deactivated
2100	Enumeration	Unit selection of the channel 2	Probe Board Deactivated
2200	Enumeration	Unit selection of the channel 3	Probe Board Deactivated
2300	Enumeration	Unit selection of the channel 4	Probe Board Deactivated
2010	Enumeration	Activation/deactivation of the channel 1	According to probe and board
2110	Enumeration	Activation/deactivation of the channel 2	According to probe and board
2210	Enumeration	Activation/deactivation of the channel 3	According to probe and board
2310	Enumeration	Activation/deactivation of the channel 4	According to probe and board

4.3. Outputs

Modbus	Register type	Description	Possibilities			
3000	Enumeration	Analogue output selection of the channel 1	4-20 mA / 0-20 mA / 0-10 V / 0-5 V			
3100	Enumeration	Analogue output selection of the channel 2	4-20 mA / 0-20 mA / 0-10 V / 0-5 V			
3200	Enumeration	Analogue output selection of the channel 3	4-20 mA / 0-20 mA / 0-10 V / 0-5 V			
3010	Real	Channel 1 minimum range	From -1999 to 9999			
3020	Real	Channel 1 maximum range	From -1999 to 9999			
3110	Real	Channel 2 minimum range	From -1999 to 9999			
3120	Real	Channel 2 maximum range	From -1999 to 9999			
3210	Real	Channel 3 minimum range	From -1999 to 9999			
3220	Real	Channel 3 maximum range	From -1999 to 9999			
3030	Enumeration	Channel 1 diagnostic : generation of a current or a voltage	Generation according the output signal			
			0-10 V	0-5 V	0-20 mA	4-20 mA
			0 V	0 V	0 mA	4 mA
			5 V	2.5 V	10 mA	12 mA
			10 V	5 V	20 mA	20 mA
3130	Enumeration	Channel 2 diagnostic : generation of a current or a voltage	Generation according the output signal			
			0-10 V	0-5 V	0-20 mA	4-20 mA
			0 V	0 V	0 mA	4 mA
			5 V	2.5 V	10 mA	12 mA
			10 V	5 V	20 mA	20 mA
3230	Enumeration	Channel 3 diagnostic : generation of a current or a voltage	Generation according the output signal			
			0-10 V	0-5 V	0-20 mA	4-20 mA
			0 V	0 V	0 mA	4 mA
			5 V	2.5 V	10 mA	12 mA
			10 V	5 V	20 mA	20 mA

4.4. Alarms

Modbus	Register type	Description	Possibilities
4000 – 4100 – 4200	Enumeration	Alarm mode	Rising edge Falling edge Monitoring
4010 – 4110 – 4210	U8	Channel selection	Channel 1 Channel 2 Channel 3
4020 – 4120 – 4220	Real	Threshold 1 setting	According to connected probe
4030 – 4130 – 4230	Real	Threshold 2 or hysteresis setting	According to connected probe
4040 – 4140 – 4240	U16	Delay time 1 setting	From 0 to 600 s
4050 – 4150 – 4250	U16	Delay time 2 setting	From 0 to 600 s
4060 – 4160 - 4260	Boolean	Audible alarm	1 : activated / 0 : deactivated

4.5. Measurement parameters

Modbus	Register type	Description	Possibilities
5000	U8	Measurement integration in pressure (board)	From 0 to 9
5010	U8	Measurement integration in air velocity (probe 1)	From 0 to 9
5020	U8	Measurement integration in air velocity (probe 2)	From 0 to 9
5100	U8	Delay time between 2 autozeros	From 0 to 60 min
5200	Real	Channel 1 coefficient	From 0.01 to 5
5300	Real	Channel 2 coefficient	From 0.01 to 5
5400	Real	Channel 3 coefficient	From 0.01 to 5
5210	Real	Channel 1 offset	According to probe
5310	Real	Channel 2 offset	According to probe
5410	Real	Channel 3 offset	According to probe

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