Configuration of C310 multifunction transmitters by keypad
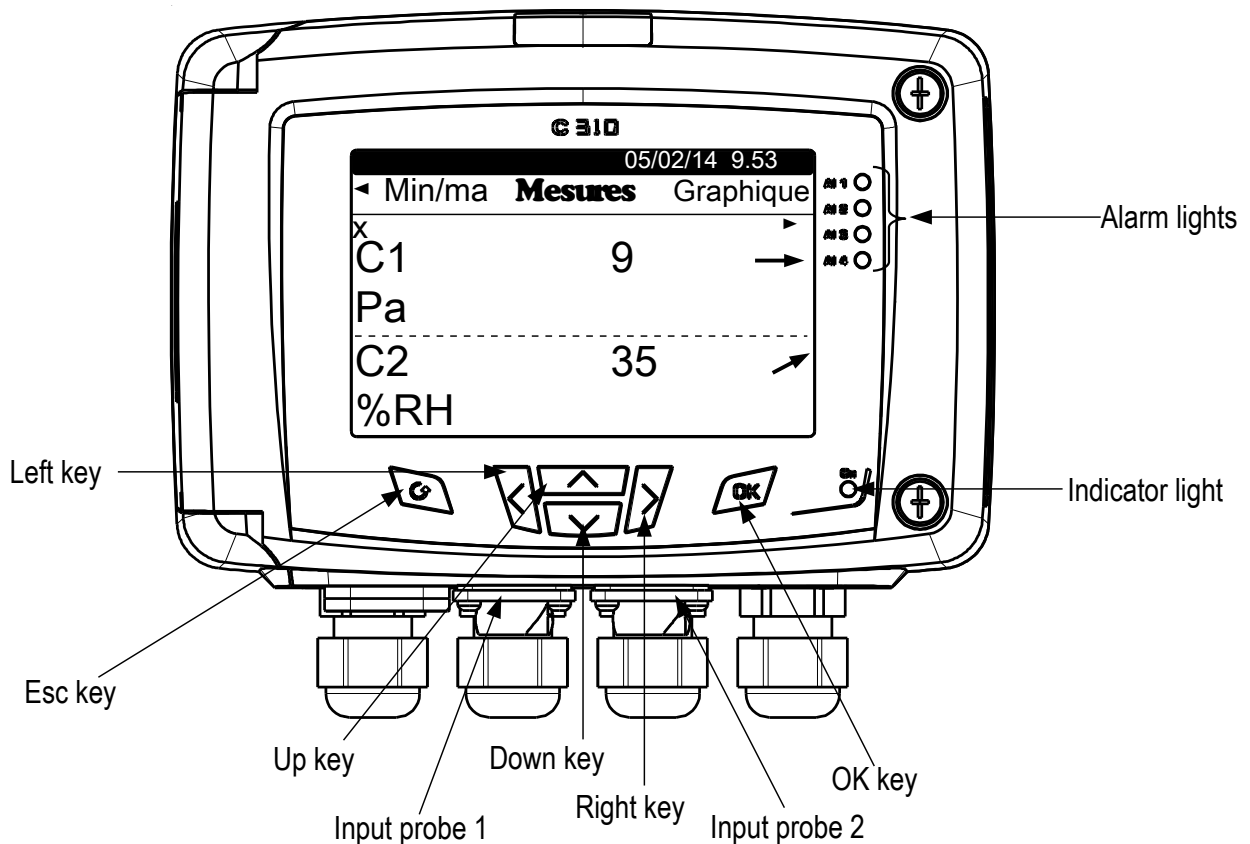
Table of contents

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 if 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.

Protection tip to unscrew — Sensitive element

Protection tip to unscrew — Sensitive element
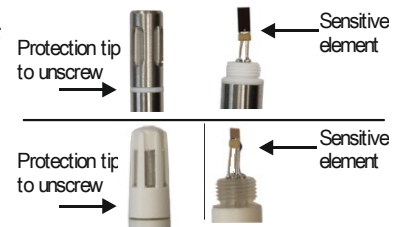
2.1. Configuration of parameters

- **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)
- **Data sending :** made by words of 2 bytes, in the following order : most-significant then least-significant byte

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	Description	Format
U8	1 byte	Unsigned integer 8 bits	Byte 1
Example with a value of **24 (0x18)**			**0x18**

Type	Size	Description	Format	
U16	2 bytes	Unsigned integer 16 bits	Byte 2	Byte 1
Example with a value of **300 (0x012C)**			**0x01**	**0x2C**

Type	Size	Description	Format			
U32	4 bytes	Unsigned integer 32 bits	Byte 2	Byte 1	Byte 4	Byte 3
Example with a value of **1 096 861 217 (0x4160C621)**			**0xC6**	**0x21**	**0x41**	**0x60**

Type	Size	Description	Format			
Real	4 bytes	Real 32 bits	Byte 2	Byte 1	Byte 4	Byte 3
Example with a value of **153.5 (0x43198000)**			**0x80**	**0x00**	**0x43**	**0x19**

Type	Size	Description	Format
Enumeration	1 byte	See Enumeration table page 9	Same as U8
Boolean	1 byte	True = 1 ; False = 0	Same as U8

Type	Size	Description	Format			
Date	4 bytes	Year (2 bytes) Month (1 byte) Day (1 byte)	Byte 2 (month)	Byte 1 (day)	Byte 4 (year most-significant byte)	Byte 3 (year least-significant byte)
Example with **31/03/2014 (0x07DE031F)**			0x03	0x1F	0x07	0xDE

Type	Size	Description	Format			
Hours	5 bytes	Hour (1 byte, digital) Minute (1 byte, digital) Second (1 byte, digital) Unused (1 byte, indifferent)	Byte 2 (minute)	Byte 1 (hour)	Byte 4 (unused)	Byte 3 (second)
Example with **22h 35 min 06sec (0xXX062316)**			0x23	0x16	0xXX	0x06

Type	Size	Description	Example
Serial number	8 bytes	Class (1 byte) Range (1 byte) Year (2 bytes) Month (1 byte) Number (3 bytes)	'3' (0x33) 'F' (0x46) 13 (0x000D) 8 (0x08) 98765 (0x0181CD)

Format							
Byte 2 (range)	Byte1 (class)	Byte 4 (year)	Byte 3 (year)	Byte 6 (number)	Byte 5 (month)	Byte 8 (number)	Byte 7 (number)
0x46	0x33	0x00	0x0D	0xCD	0x08	0x01	0x81
Example with 3F13898765 : 0x0181CD08000D4633							

Alarms and relays status – Modbus code : 7000
Encoded on 4 bytes (U32)

Byte 2		Byte 1				
b8 – b15	b7 – b4	b3	b2	b1	b0
Unused	Unused	Channel 4	Channel 3	Channel 2	Channel 1
		Alarm state[*]			

[*]**1 :** the channel is in alarm state / **0 :** the channel is not in alarm state

Byte 4					Byte 3				
b31 – b28	b27	b26	b25	b24	b23 – b20	b19	b18	b17	b16
Unused	Relay 4[**]	Relay 3[**]	Relay 2[**]	Relay 1[**]	Unused	Alarm 4[***]	Alarm 3[***]	Alarm 2[***]	Alarm 1[***]

[**]**1 :** the alarm is activated / **0 :** the alarm is deactivated
[***]**1 :** the relay is triggered / **0 :** the relay is not triggered

- **Values** (real) – 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**	m^3/h	80
	Kj/KG	34		l/s	81
	°C td	35		cfm	82
	°F td	36		m^3/s	83
	°C Tw	37	**Combustion**	ppm	112
	°F Tw	38			
Pressure	kPa	50			
	inWg	51			
	hPa	52			
	mbar	53			
	mmHg	54			
	mmH2O	55			
	daPa	56			
	Pa	57			

"Enumerations" table :

Corresponding values		0	1	2	3	4	5	6	7
Backlight duration		Off	10s	30s	60s	Permanent	Unused		
Graphical period		3 mn	15 mn	30 mn	1 hour	3 hours	6 hours	12 hours	24 hours
Language		French	English	Third language	Unused				
Date Format		dd-mm-yyyy	mm-dd-yyyy	yyyy-mm-dd	Unused				
Time Format		24H	12H	Unused					
Modbus	**Com speed**	2400	4800	9600	19200	38400	115200	Unused	
Channel x	**Unit**	See list of unit							
Channel x	**Transmitter**	none	probe 1	probe 2	module	Unused			
Output x	**Type**	4 - 20 mA	0 - 20 mA	0 - 10 V	0 - 5 V	0 - 1 V	Unused		
Output x	**Diagnostic**	Deactivate	0%	50%	100%		Unused		
Input x	**Type**	4 - 20 mA	0 - 20 mA	0 - 10 V	0 - 5 V	0 - 1 V	Unused		
Alarm x	**Mode**	Deactivate	Rising edge	Falling edge	Monitoring	Transmitter state	Unused		

Alarm x	Security	Negative	Positive	Unused				
Relay x	Selection	OFF	ON	Alarm 1	Alarm 2	Alarm 3	Alarm 4	Unused
Compensation	Temperature : Unit	°C	°F	Unused				
Compensation	Temperature : Mode	Value	Thermocouple	Probe N°1	Unused			
Compensation	Pressure : Unite	hPa	mbar	mmHg	m (alt)	Unused		
Compensation	Normative value	None	DIN1343	ISO2533		Unused		
Airflow	Pressure unit for airflow	Pa	mmH2O	inWg	mbar	Unused		
Measurement means	Differential pressure device	Pitot L	Pitot S	Debimo blades	Factor	Unused		
Section	Type	Rectangular	Circular	Coefficient	Unused			
Section	Unit	mm	inch	Unused				

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.*

Code ?
0101

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 : Frencjh 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.

ℹ️ 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.

ℹ️ 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 (probe1, 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.

ℹ️ 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.
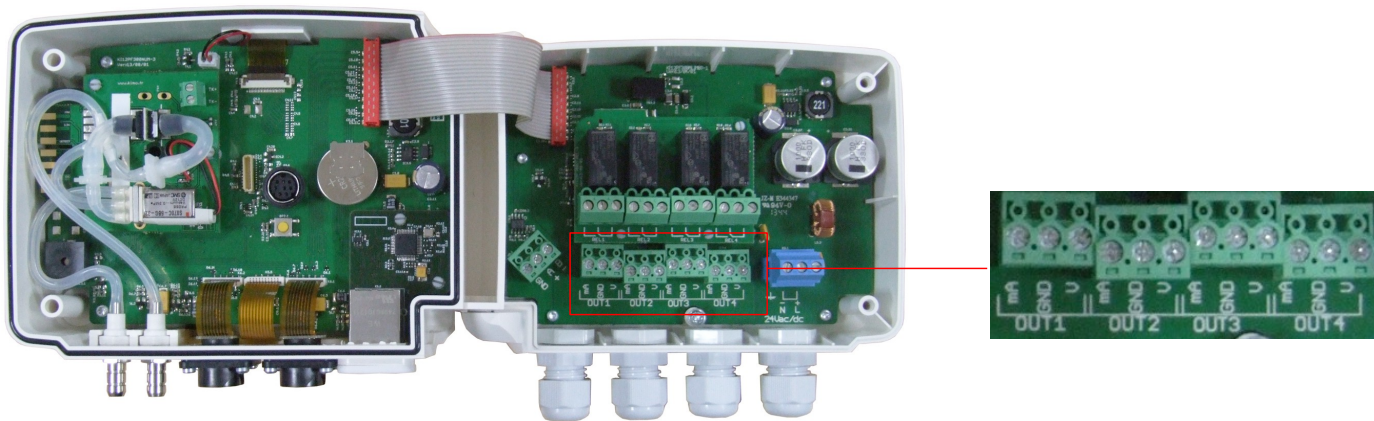
3.4.3 Perform an output diagnostic

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...)

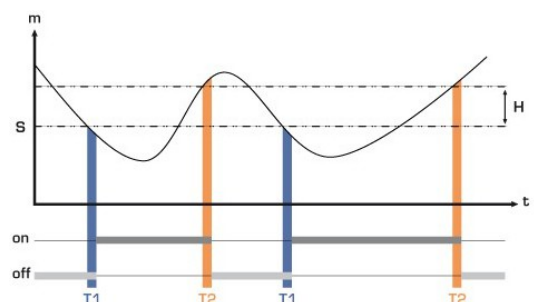*only with the pressure board

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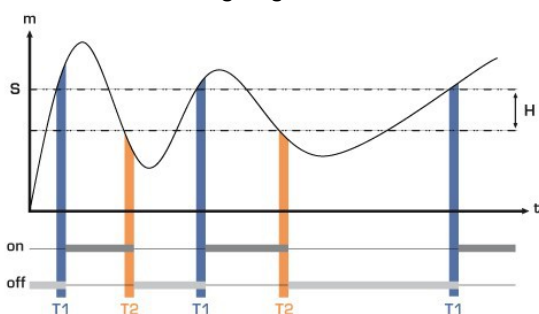
Measurement (m) > Threshold (S) during the time-delay T1 → Alarm activation
Measurement (m) < Threshold (S) - Hysteresis (H) during the time-delay T2 → Alarm deactivation

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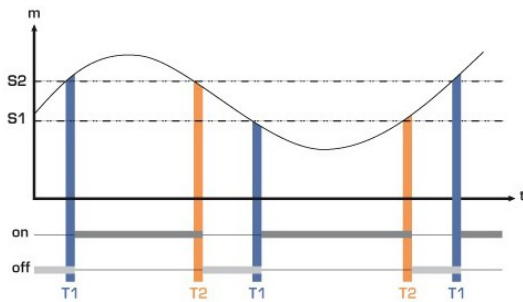
The alarm goes off when the measurement is outside the low and high thresholds.

ℹ️ When an alarm goes off, it is possible to acknowledge it pressing OK key on the transmitter : the audible alarm, if it is activated, turns off and the displayed value blinks during the acknowledgement duration (from 0 to 60 minutes). At the end of the acknowledgement duration, if the transmitter is still in alarm state, the audible alarm is reactivated.

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 line **"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.
➢ Go to the line **"Acknowledgement duration"** then press OK.
➢ Use Up/Down/Left/Right arrows to enter the value of the alarm acknowledgement in minute then press OK (this value is between 0 and 60 minutes).

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 time-delay of the alarm activation 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 time-delay to return to a normal state 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.
- ➢ Go to the line **"Acknowledgement duration"** then press OK.
- ➢ Use Up/Down/Left/Right arrows to enter the value of the alarm acknowledgement in minute then press OK (this value is between 0 and 60 minutes).

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.
- ➢ Go to the line **"Acknowledgement duration"** then press OK.
- ➢ Use Up/Down/Left/Right arrows to enter the value of the alarm acknowledgement in minute then press OK (this value is between 0 and 60 minutes).

*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 integration 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"** whith 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 - Coef.) x New Value) + (Coef. x 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 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 CO_2 probe or a temperature/hygrometry probe

A CO_2 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 CO_2 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)
    - • 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 x $\sqrt{\Delta pressure}$

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.

Normative values:
In airflow mode, it is possible to convert the measurement in normative values (ex: Nm³/h)
The conversion can be done according to two standards:
- – DIN 1343: 1013,325 hPa, 273,15 K (0°C)
- – ISO 2533: 1013,325 hPa, 288,15 K (15 °C)

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 thermocuple 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".

In automatic mode, if no temperature probe is connected to the sensor, the temperature used for the compensation will be the one manually entered.

- ➢ 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.
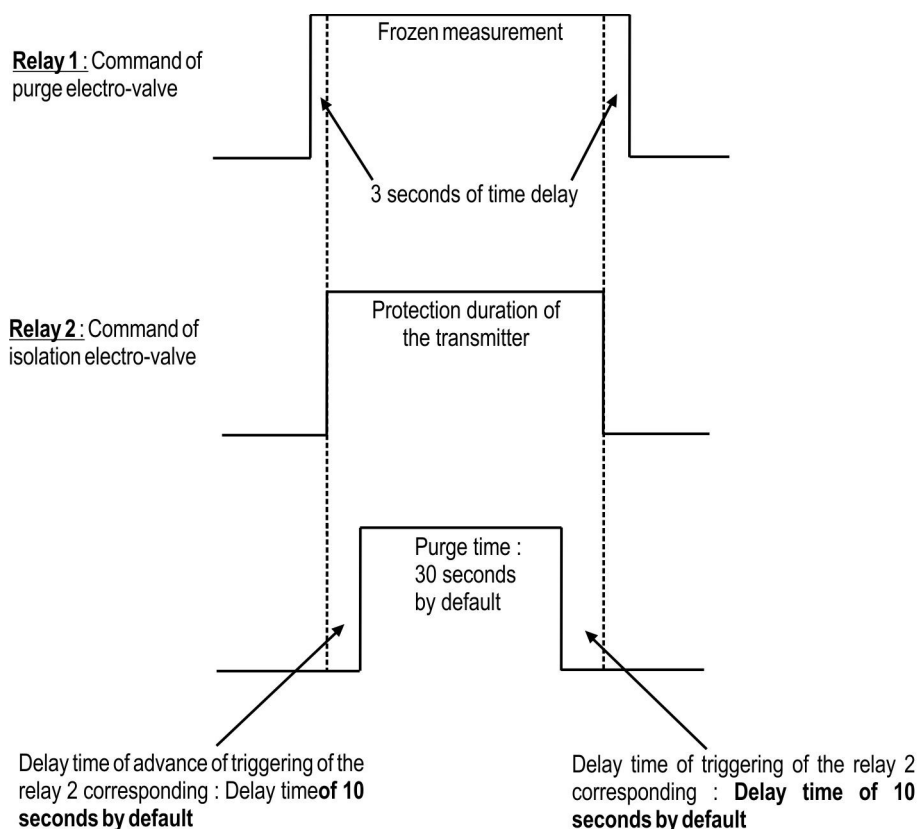
Relay 1 : Command of purge electro-valve

Frozen measurement

3 seconds of time delay

Relay 2 : Command of isolation electro-valve

Protection duration of the transmitter

Purge time :
30 seconds
by default

Delay time of advance of triggering of the relay 2 corresponding : Delay time**of 10 seconds by default**

Delay time of triggering of the relay 2 corresponding : **Delay time of 10 seconds by default**

- ➢ 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	Serial number of the transmitter	
1010	Real	Firmware version	
1020	U32	Device identification	
1030	U32	Probe 1 identification	
1040	U32	Probe 2 identification	
1050	U32	Board identification	
1100	U8	Contrast	
1110	Enumeration	Backlight duration	0 : Off 1 : 10 s 2 : 30 s 3 : 60 s 4 : Permanent
1120	U8	Backlight value	
1150	Enumeration	Graph period	
1200	Enumeration	Language	0 : French 1 : English 3 : 3rd language
1300	Date	Date	
1310	Hour	Hour	
1320	Enumeration	Date format	
1330	Enumeration	Hour format	
1350	Boolean	Sound	
1400	Boolean	Keypad locking	0 : deactivated 1 : activated
1410	U16	Safety code	
1500	U8	Modbus slave number	From 1 to 255
1510	Enumeration	Modbus speed communication	2400 / 4800 / 9600/ 19200 / 38400 / 115200 bds
1600	Boolean	DHCP	
1610	-	IP address	
1620	-	Mask	
1630	-	Gateway	
1640	-	DNS	
1650	U16	Port	
1660	-	Mac address	
1670	-	Base address	

1700	U32	Activation of the high resolution in pressure option	1 : activated / 0 : deactivated
1710	U32	Activation of the Modbus option	1 : activated / 0 : deactivated
1800		Digital input	
1900	Boolean	Back to factory configuration	

4.2. Channels

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

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			
3300	Enumeration	Analogue output selection of the channel 4	4-20 mA / 0-20 mA / 0-10 V / 0-5 V			
3010	Enumeration	Channel 1 diagnostic : generation of a current or a voltage	Generation according to 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
3110	Enumeration	Channel 2 diagnostic : generation of a current or a voltage	Generation according to 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
3210	Enumeration	Channel 3 diagnostic : generation of a current or a voltage	Generation according to 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

3310	Enumeration	Channel 4 diagnostic : generation of a current or a voltage	Generation according to 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
3020	Real	Channel 1 minimum range	From -1999 to +9999 (according to probe)			
3030	Real	Channel 1 maximum range	From -1999 to +9999 (according to probe)			
3120	Real	Channel 2 minimum range	From -1999 to +9999 (according to probe)			
3130	Real	Channel 2 maximum range	From -1999 to +9999 (according to probe)			
3220	Real	Channel 3 minimum range	From -1999 to +9999 (according to probe)			
3230	Real	Channel 3 maximum range	From -1999 to +9999 (according to probe)			
3320	Real	Channel 4 minimum range	From -1999 to +9999 (according to probe)			
3330	Real	Channel 4 maximum range	From -1999 to +9999 (according to probe)			
3900	Boolean	Purge mode				
3910	U16	Purge duration	From 1 to 60 s			
3920	U16	interval	From 1 to 9999 min			
3930	U8	Delay-time	From 1 to 60 s			

4.4. Alarms and relays

4.4.1 Alarms

Modbus				Register type	Description	Possibilities
Alarm 1	Alarm 2	Alarm 3	Alarm4			
4000	4100	4200	4300	Enumeration	Alarm mode	None Rising edge Falling edge Monitoring Transmitter state
4010	4110	4210	4310	U8	Channel selection	Channel 1 Channel 2 Channel 3
4020	4120	4220	4320	Real	Threshold 1 setting	According to the connected probe
4030	4130	4230	4330	Real	Threshold 2 setting or hysteresis	According to the connected probe
4040	4140	4240	4340	U16	Delay-time 1 setting	From 0 to 600 s
4050	4150	4250	4350	U16	Delay-time 2 setting	From 0 to 600 s
4060	4160	4260	4360	U32	Condition (for transmitter state)	Ambient temperature too high Ambient temperature too low Memory error Pressure board error Probe 1 error Probe 2 error Pressure value too high

4080	4180	4280	4380	Boolean	Audible alarm	1 : activated / 0 : deactivated
4090	4190	4290	4390	U8	Acknowledgement duration	From 0 to 60 minutes

4.4.2 Relays

Modbus	Register type	Description	Possibilities
4400	Enumeration	Relay 1 selection	0 : Off 1 : On 2 : Alarm 1 3 : Alarm 2 4 : Alarm 3 5 : Alarm 4
4410	Enumeration	Relay 1 safety	0 : Negative 1 : Positive
4500	Enumeration	Relay 2 selection	0 : Off 1 : On 2 : Alarm 1 3 : Alarm 2 4 : Alarm 3 5 : Alarm 4
4510	Enumeration	Relay 2 safety	0 : Negative 1 : Positive
4600	Enumeration	Relay 3 selection	0 : Off 1 : On 2 : Alarm 1 3 : Alarm 2 4 : Alarm 3 5 : Alarm 4
4610	Enumeration	Relay 3 safety	0 : Negative 1 : Positive
4700	Enumeration	Relay 4 selection	0 : Off 1 : On 2 : Alarm 1 3 : Alarm 2 4 : Alarm 3 5 : Alarm 4
4710	Enumeration	Relay 4 safety	0 : Negative 1 : Positive

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 pressure (probe 1)	From 0 to 9
5030	U8	Measurement integration in air velocity (probe 2)	From 0 to 9
5050	U8	Measurement integration in pressure (probe 2)	From 0 to 9
5100	U8	Delay time between 2 autozeros	From 0 to 60 min

5110	Boolean	Instantaneous autozero	
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
5500	Real	Channel 4 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
5510	Real	Channel 4 offset	According to probe

4.6. Pressure board and probes 1 and 2 parameters

4.6.1 Pressure board parameters

Modbus	Register type	Description	Possibilities
6000	Enumeration	Temperature compensation unit	0 : °C / 1 : °F
6010	Enumeration	Temperature mode	0 : Value 1 : Thermocouple 2 : Probe n°1
6020	Real	Temperature value in manual mode	Between -50 and +50 °C
6030	Enumeration	Atmospheric pressure compensation unit	0 : hPa 1 : mbar 2 : mmHg 3 : m (altitude)
6040	Real	Atmospheric pressure compensation value	From 0 tot 4000 hPa From 0 to 4000 mbar From 0 to 3000.24 mmHg
6050	Real	Altitude compensation value	From 0 to 10 000 m
6100	Enumeration	Differential pressure device	0 : Pitot L 1 : Pitot S 2 : Debimo blade 3 : Factor
6110	Real	Differential pressure coefficient value	
6120	Real	Correction factor in air velocity	From 0.2 to 2
6200	Enumeration	Type of section	0 : Rectangular 1 : Circular 2 : Coefficient
6210	Enumeration	Section unit	0 : mm 1 : inch
6220	Real	Length	From 1 to 3000 mm
6230	Real	Width	From 1 to 3000 mm
6240	Real	Diameter	From 1 to 3000 mm
6250	Real	Airflow coefficient	From 0.1 to 9999.9
6260	Enumeration	Pressure unit / Airflow coefficient	0 : Pa 1 : mmH2O

			2 : inWg 3 : mbar

4.6.2   Probe 1 parameters

Modbus	Register type	Description	Possibilities
6330	Enumeration	Compensation unit in atmospheric pressure	0 : hPa 1 : mbar 2 : mmHg 3 : m (altitude)
6340	Real	Compensation value in atmospheric pressure	From 0 to 4000 hPa From 0 to 4000 mbar From 0 to 3000.24 mmHg
6350	Real	Compensation value in altitude	From 0 to 10 000 m
6420	Real	Correction factor in air velocity	From 0.2 to 2
6500	Enumeration	Type of section	0 : Rectangular 1 : Circular 2 : Coefficient
6510	Enumeration	Section unit	0 : mm 1 : inch
6520	Real	Length	From 1 to 3000 mm
6530	Real	Width	From 1 to 3000 mm
6540	Real	Diameter	From 1 to 3000 mm

4.6.3   Probe 2 parameters

Modbus	Register type	Description	Possibilities
6630	Enumeration	Compensation unit in atmospheric pressure	0 : hPa 1 : mbar 2 : mmHg 3 : m (altitude)
6640	Real	Compensation value in atmospheric pressure	From 0 to 4000 hPa From 0 to 4000 mbar From 0 to 3000.24 mmHg
6650	Real	Compensation value in altitude	From 0 to 10 000 m
6720	Real	Correction factor in air velocity	From 0.2 to 2
6800	Enumeration	Type of section	0 : Rectangular 1 : Circular 2 : Coefficient
6810	Enumeration	Section unit	0 : mm 1 : inch
6820	Real	Length	From 1 to 3000 mm
6830	Real	Width	From 1 to 3000 mm
6840	Real	Diameter	From 1 to 3000 mm

4.6.4 Normative values

Modbus	Register type	Description	Possibilities
6900	Enumeration	Normative values	0 : None 1 : Din 1343 2 : ISO2533

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