

Configuration of CA 310 transmitters by keypad



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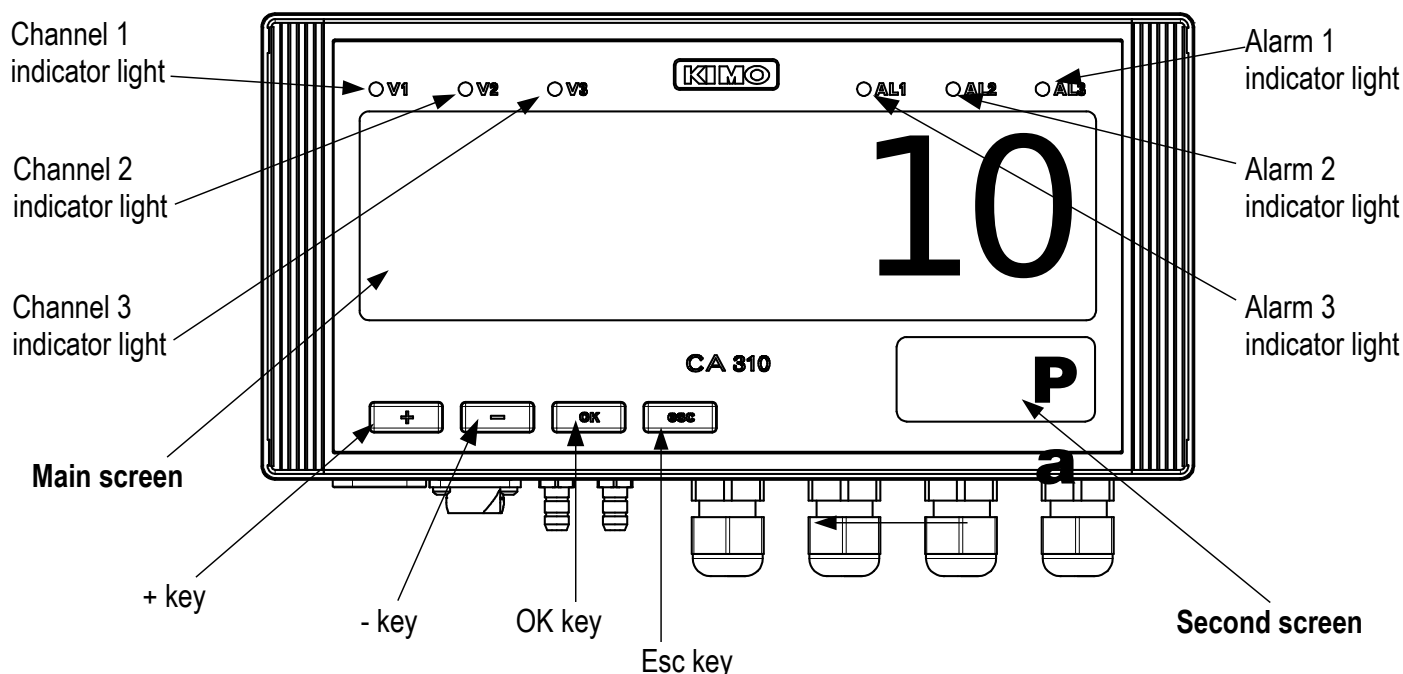
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1. Introduction

1.1. Description of the transmitter

CA310 transmitter can be configured via the keypad. It is possible to set the measurement units, to activate or not a channel...

Principle: the different settings are in the form of folders and sub-folders numbers. The digital codes are fully detailed in this manual.



Main screen displays the measured values and the folders numbers.
Second screen displays the measurement units and the sub-folders numbers.

1.2. Description of the keys

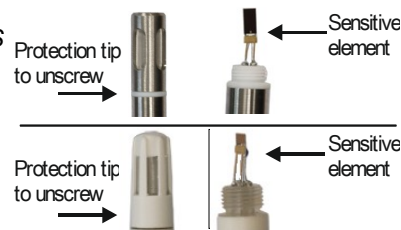
- **+ key:** increments a value or a level
- **- key:** decrements a value or a level
- **OK key:** validates an input
- **Esc key:** cancels an input or goes back to previous step

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.



2.1. 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 7	Same as U8
Boolean	1 byte	True = 1 ; False = 0	Same as U8

Type	Size	Description	Example				
Serial number	8 octets	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 octets (U32)

Byte 2	Byte 1				
b8 – b15	b7 – b4	b3	b2	b1	b0
Unused	Unused	Unused	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	Unused	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** – Modbus code: 7010 (channel 1)
7040 (channel 2)
7070 (channel 3)
- **Number of digits after the decimal point** – Modbus code: 7020 (channel 1)
7050 (channel 2)
7080 (channel 3)
- **Unit** – Modbus code: 7030 (channel 1)
7060 (channel 2)
7090 (channel 3)

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	Combustion	ppm	112
	°F Tw	38	Electricity	mV	160
Pressure	kPa	50		V	161
	inWg	51		µA	162
	hPa	52		mA	163
	mbar	53		A	164
	mmHg	54			
	mmH ₂ O	55			
	daPa	56			
	Pa	57			

“Enumerations” table:

Corresponding values		0	1	2	3	4	5	6	7					
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	Deactivated	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	Unused							
Compensation	Temperature: Unit	°C	°F											
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 mean	Differential pressure device	Pitot L	Pitot S	Debimo blades	Factor	Unused								
Section	Type	Rectangular	Circular	Coefficient	Unused									
Section	Unit	mm	inch	Unused										

3. Access to the different functions



This step is compulsory for each configuration.

First, to access to the transmitter functions, and for safety, a safety code must be entered. The default safety code is **0101**.

- The transmitter must be energized.
- Connect the transmitter.
- Wait until the initializing period is over.
- Press **OK**.
The main screen displays "0000" and the second screen displays "Code". The 1st zero blinks.
- Press OK to go to the 2nd zero.
It blinks.
- Press + key to display 1 then press OK.
The 3rd zero blinks.
- Press OK to go to the 4th zero.
- Press + key then press OK.
The following display appears:

Code
0101

F 100

"F 100" is for the number of the configuration folder. There are 6:

- **F 100**: folder of the transmitter configuration. See page 9.
- **F 200**: folder of the channels and measurement units. See page 12.
- **F 300**: folder of the analogue outputs. See page 14.
- **F 400**: folder of the alarms. See page 19.
- **F 500**: folder of the channels, integration and autozero configuration. See page 21.
- **F 600**: folder of the probes and boards configuration, See page 23.

To select the required folder:

***"F 100"** is displayed and 1 is blinking.*

- Press + key until the required folder number is displayed (F 100, F 200, F 300, F 400, F 500 or F 600).
- Press OK.

4. F 100: Configure the transmitter

This folder allows to configure the following parameters of the transmitter: safety code, modbus, options and factory configuration.

It also indicates the serial number and the firmware version of the transmitter.

4.1. Access to the serial number: F100

The serial number allows to get activation codes for the options.

F 100 is displayed (see previous page).

- Press OK.

"F 100" is displayed on the second screen and the serial number scrolls on the main screen.

4.2. Access to the firmware version: F101

F100 folder is displayed

- Press + key.

"F 101" is displayed on the second screen and the firmware version is displayed on the main screen (e.g: 1.01)

4.3. Lock the keypad: F 140

For more safety and to avoid any handling mistake, it is possible to lock the keys.

F101 sub-folder is displayed.

- Press + key.

"F 140" is displayed on the second screen and "0" is displayed on the main screen meaning the locking is off.

- Press OK.

"0" blinks.

- Press + or - key, "1" blinks, then press OK.

"LOCK" is displayed for a few seconds then the transmitter backs to the displaying of measured values.

All the keys are inactive.

To activate them again:

- Press OK for 10 seconds.

"LOCK" is displayed for a few seconds then the transmitter goes back to the displaying of measured values and keys are active again.

4.4. Modify the safety code: F141

It is possible to modify the safety code.

F140 sub-folder is displayed.

- Press + key.

"F 141" blinks and the safety code is displayed on the main screen.

- Press OK.

The 1st zero blinks.

- Press + or – key to modify the digit then press OK.

The 2nd digit blinks.

- Press + or – key to modify the digit then press OK.

The 3rd digit blinks.

- Press + or – key to modify the digit then press OK.

The 4th digit blinks.

- Press + or – key to modify the digit then press OK.

"OK"» is displayed on the secondary screen.

- Press OK to validate the modification of the code or Esc to cancel.

The transmitter goes back to the displaying of the F141 folder with the new code indicated.

4.5. Configure the Modbus communication (optional)



Modbus option must be activated (see chapter 4.6).

4.5.1 Set the slave number: F150

F141 sub-folder is displayed.

- Press + key.
“F 150” is displayed on the main screen.
- Press OK.
“F150” blinks on the second screen and the slave number is displayed on the main screen (ex: 255).
- Press OK.
The 1st digit of the slave number blinks.
- Press + or - keys to modify it then press OK.
The 2nd digit of the slave number blinks.
- Press + or - keys to modify it then press OK.
The 3rd digit of the slave number blinks.
- Press + or - keys to modify it then press OK.
“F150” blinks and the selected slave number is displayed on the main screen.

4.5.2 Set the speed communication: F151

- Press + or – key to go to F151 sub-folder.
Speed communication in bits per second is displayed (e.g: 9600).
- Press OK.
The speed communication blinks.
- Press + or – key to select the required speed communication between the following values:
 - 2400 bds
 - 4800 bds
 - 9600 bds
 - 19.2 Kbps
 - 38.4 Kbps
 - 115.2 Kbps
- Press OK.
“F151” blinks and the selected speed communication is displayed on the main screen.

 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.

4.6. Activate the options



To activate an option, an activation code is necessary. This code is provided by the manufacturer. Options concerned by the activations codes are the high resolution in pressure (sub-folder F170), the modbus (sub-folder F171) and air velocity and airflow (sub-folder F172). Ethernet option is factory built.

- High resolution in pressure option: F170

- *“F150” sub-folder is displayed.*
- Press + key.
“F170” blinks on the second screen and “0” is displayed on the main screen, meaning the option is not activated.
- Press OK.
“0” blinks.
- Press + key.
The transmitter asks for an activation code.
- Enter the activation code (same procedure as for the safety code) then press OK.

"F170" blinks and "1" is displayed on the main screen, meaning the option is activated.

- Modbus option: F171

- Go to the F171 sub-folder and perform the same procedure as for high resolution option.

- Air velocity and air flow option: F172 (this option is only available with a pressure board type SPI-2)

- Go to the F172 sub-folder and perform the same procedure as for high resolution option.

- Ethernet option: F173

- Ethernet option can not be activated after the manufacturing of the product. This option must be asked when ordered the transmitter.

4.7. *Activate the digital inputs: F180*

"F170" folder is displayed on the main screen.

- Press + key.
"F180" blinks on the second screen and "OFF" is displayed on the main screen, meaning the digital inputs are not activated.
- Press OK.
"OFF" blinks.
- Press + key.
"ON" blinks on the main screen.
- Press OK.



"ON": displaying of values transmitted by Modbus or Ethernet is activated

"OFF": displaying of values transmitted by probes and boards is activated.

4.8. *Back to factory settings: F190*

"F180" sub-folder is displayed.

- Press + key to display F190 folder.
"F190" blinks on the second screen and "RAZ" is displayed on the main screen.
- Press OK.
"OK?" is displayed.
- Press OK to confirm the factory settings or Esc to cancel.



All the performed configurations will be erased.

5. F 200: Configuration of the channels and measurement units

This folder allows to activate the channels and to set measurement unit for each channel.

5.1. Activate a channel

The transmitter is powered on.

- Press OK.
- Enter the activation code (see page 8).
- Press OK.
- Press + key to go to F200 folder.
- Press twice OK.
“MOD”, “OFF” or “SDE” is displayed on the main screen.
- Press OK.
“MOD”, “OFF” or “SDE” blinks.
- Press + and – keys to select:
 - « SDE »: channel is activated with a measurement probe
 - « PRES »: channel is activated with a pressure board
 - « OFF »: channel is deactivated
- Press OK.
The last zero of F200 blinks.

“F200” folder allows to activate the channel 1 of the transmitter.

To activate channels 2 and 3 go to the following folders:

- F210 for channel 2
- F220 for channel 3
- Perform the same procedure as for the channel 1.

5.2. Assign a measurement unit to a channel

The transmitter is powered on and a channel is activated.

“F200” folder is displayed on the second screen and the last zero blinks.

- Press + key.
- Press OK.
“F201” sub-folder is displayed on the second screen with the unit corresponding to the channel 1 on the main screen.
- Press OK.
- Press + and – keys to select the required unit.
- Press OK.

 “---” sign means that the channel is deactivated.

“F201” sub-folder allows to select the unit for the channel 1.

To select the unit for channels 2 and 3, go to the following folders:

- F211 for channel 2
- F221 for channel 3
- Perform the same procedure as for the unit selection for the channel 1.

If a current/voltage board is connected to the transmitter, it is possible to create a **free unit**.

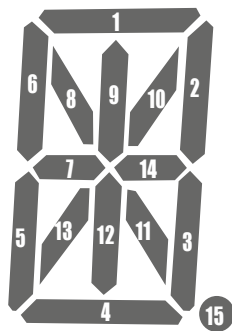
Always on F 201 sub-folder:

- Scroll the units until “UNITE LIBRE” (free unit) is displayed on the main screen.
- Press OK.
The up segment of the 1st digit blinks.
- Press OK to validate the segment or + and – keys to not taking it into account and go to the following digit.

- Press + and – keys to go to the 1st segment of the following digit once the 1st digit is configured.

 The new measurement unit can have a maximum of 4 typefaces.

Order of turn of the digits segments:



List of available units:

1	°C	18	ppm
2	°F	19	km/h
3	%RH	20	m ³ /h
4	kJ/kg	21	l/s
5	°C td	22	cfm
6	°F td	23	m ³ /s
7	°C tw	24	lux
8	°F tw	25	fc
9	kPa	26	W/m ²
10	inWg	27	mV
11	hPa	28	V
12	mbar	29	μA
13	mmHg	30	mA
14	mmH ₂	31	A
15	daPa	32	ohms
16	Pa	33	UNITE LIBRE (free unit)
17	m/s		

6. F 300: Manage analogue inputs and outputs

CA310 transmitters have 3 analogue outputs, 2 digital inputs/outputs as option and 3 analogue inputs as option with the MVA board.



With MVA board: analogue inputs are activated and analogue outputs are deactivated, so this is the inputs that have to be configured.

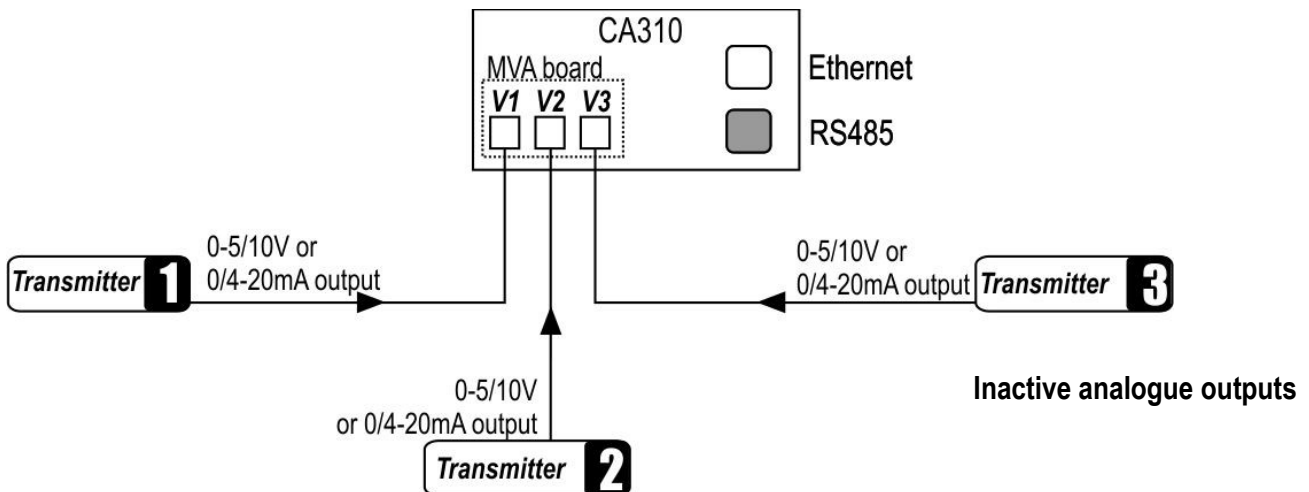
Without MVA board: analogue outputs are activated and analogue inputs are deactivated, so this is the outputs that have to be configured.

So 5 types of configuration are possible:

1 – Displaying of values from a measurement device via analogue inputs

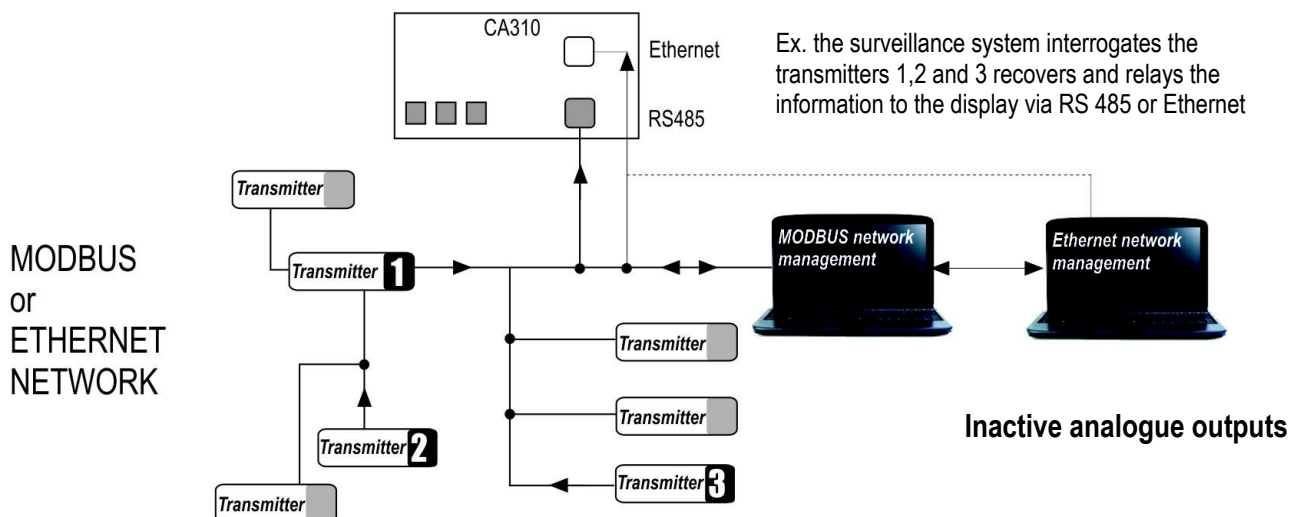
- Disable the digital inputs: “F180” on “OFF”.

☒ Analogue output ☐ 0-5/10V / 0/4-20mA analogue input ☒ RS485 digital input ☐ Ethernet digital input



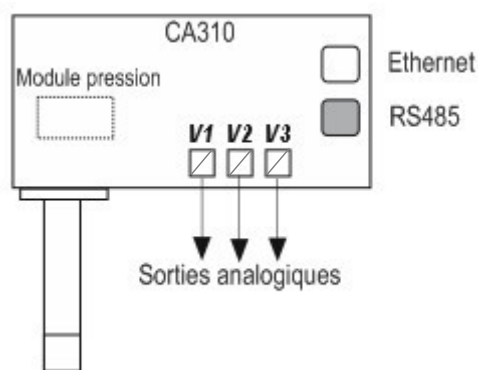
2 – Displaying of values from a measurement device via digital inputs

- Enable the digital inputs: “F180” on “ON”



3 – Displaying of measured values via pressure boards or probes via the analogue outputs

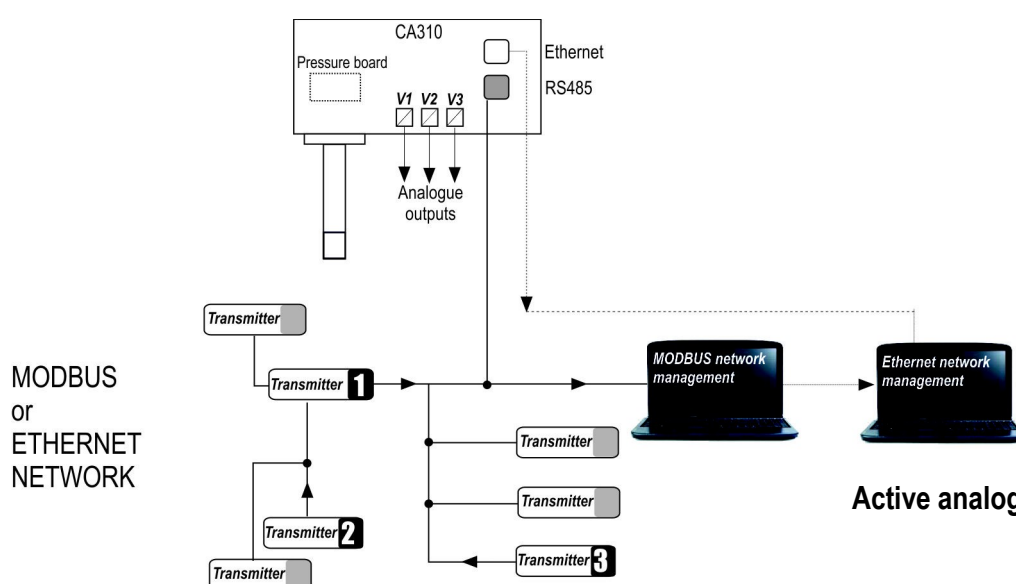
- Disable the digital inputs: “F180” on “OFF”



Active analogue outputs

4 – Displaying of measured values via pressure boards or probes and transmission of the value via digital outputs, Ethernet or Modbus

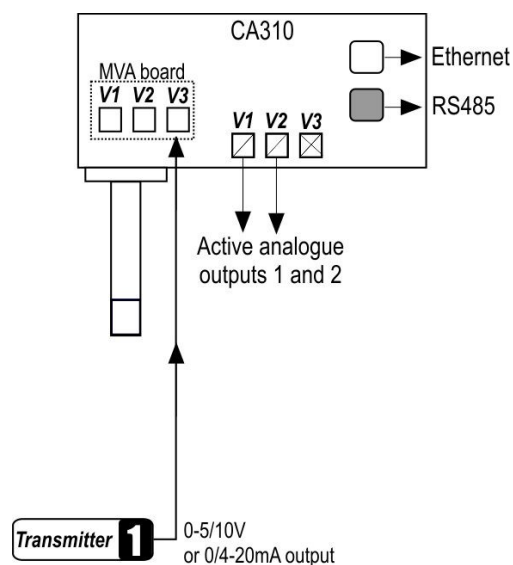
- Disable the digital inputs: “F180” on “OFF”



Active analogue outputs

5 – Displaying of the measured value via a probe and via the analogue outputs and transmission of values via analogue outputs

- Disable the digital inputs: “F180” on “OFF”



When a channel of the MVA board is enabled, the corresponding channel in output est disabled (e.g: channel n°3 of the MVA board enabled, channel n°3 in output disabled).

6.1. Set the analogue inputs and outputs

The transmitter is powered on.

- Press OK.
- Enter the safety code (see page 8).
- Press OK.
- Press + key to go to F300 folder corresponding to the analogue output of the channel 1 then press twice OK.
"F300" is displayed on the second screen and the analogue output of the channel 1 is displayed on the main screen.
- Press OK.
The analogue output blinks.
- Press + or – key to select the required output signal.
 - 4-20 mA
 - 0-20 mA
 - 0-10 V
 - 0-5 V
- Press OK.



"F300" folder is for the analogue output of the channel 1.

For the channels 2 and 3, go to the following folders:

- F310 for the channel 2
- F320 for the channel 3
- Perform the same procedure as for the channel 1.

6.2. Set the ranges of the analogue inputs and outputs

This function allows to modify the ranges of the of the analogue outputs.



Values to enter depend on the unit of measurement and not on the measurement range of the transmitter.

Ex: on a CA310 pressure transmitter (0 to ± 100 Pa) with a reading in mmH₂O, the minimum and maximum ranges must be configured on a measuring range from 0 to ± 10 mmH₂O. See conversion chart page 18).

The transmitter is powered on.

- Press OK.
- Enter the activation code (see page 8).
- Press OK.
- Press + key to go to F300 folder.
- Press OK twice.
"F300" blinks on the second screen.
- Press + key then OK to enter in the folder F301 corresponding to the low range of the channel 1..
- Enter with + and – keys the figure value or the negative sign of the value then press OK.
The 2nd digit blinks.
- Enter with + and – keys its value then press OK.
- Perform the same procedure for the following figures.
- Press OK when the last figure is configured.
F 301 blinks, the low range is configured.
- Press + key then press OK to enter in the folder F 302 corresponding to the high range of the channel 1.
The 1st digit of the high range blinks.
- Enter with + and – keys the figure value or the negative sign of the value then press OK.
The 2nd digit blinks.
- Enter its value with + and – keys then press OK.
- Perform the same procedure for the following figures.

- Press OK when the last figure is configured.
F 302 blinks, the high range is configured.

-  To set the low and high ranges of the channel 2, go to the folder F311 (low range) and F 312 (high range) and follow the setting procedure of the channel 1.
-  To set the low and high ranges of the channel 3, go to the folder F 321 (low range) and F 322 (high range) and follow the setting procedure of the channel 1.

6.3. **Position of the decimal point**

This function allows to set the position of the decimal point (one, two or three digit(s) after the decimal point) on channel 1, 2 or 3.

The transmitter is powered on.

- Press OK.
- Enter the activation code (see page 8).
- Press OK.
- Press + key to go to F300 folder.
- Press twice OK.
F300 blinks on the second screen.
- Press + key then OK key to enter in the folder F304 in order to set the decimal point position for channel 1.
- With + and – keys, choose the value from 0 to 3 to set the number of digits after the decimal point: 0 for an integer, 1 for one digit after the decimal point, 2 for two digits after the decimal point and 3 for three digits after the decimal point.
- Press OK to validate.
F304 blinks, the decimal point position is configured for channel 1.

-  To set the decimal point position of the channel 2, go to the folder F314 and follow the setting procedure of the channel 1.
- To set the decimal point position of the channel 3, go to the folder F 324 and follow the setting procedure of the channel 1.

6.4. **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.

6.4.1 **Connection configuration**

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 multimeter !

- Select an output for the output diagnostic.
- Connect a measurement device on the channel 1, 2 or 3.

6.4.2 **Perform the output diagnostic**

Once the connection to the measurement device is performed, you can carry out the analogue output diagnostics on several check points.

The transmitter is powered on.

- Press OK.
- Enter the activation code (see page 8).
- Press OK.

- Press + key to go to F303 folder.
- Press OK.
F 303 blinks, corresponding to the folder of the **channel 1 diagnostic**.
- Press OK.
- Press + and – keys to select the signal the transmitter must generate.

Display	Generated output	Example
1/3	Simulates 0% of the output range	On the range 0-10V, the transmitter will generate 0 V.
2/3	Simulates 50% of the output range	On the range 0-10V, the transmitter will generate 5 V.
3/3	Simulates 100% of the output range	On the range 0-10V, the transmitter will generate 10 V.



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.



For the diagnostic of the **channel 2**, go to **F 313** folder and perform the same procedure as for the channel 1.
For the diagnostic of the **channel 3**, go to **F 323** folder and perform the same procedure as for the channel 1.

Measurement conversion charts:

- **Pressure**

Pa	mmH ₂ O	InWG	mbar	mmHG	kPa	daPa	hPa
±100	±10.2	±0.40	±1.00	±0.75	±0.100	±10.0	±1.00
±1000	±102.0	±4.01	±10.00	±7.50	±1.000	±100.0	±10.00

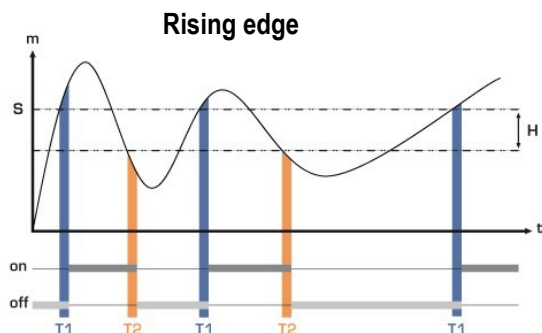
- **Temperature**

°C	°F
From 0.0 to +50.0	From +32.0 to +122.0
From -20.0 to +80.0	From -4.0 to +176.0
From -40.0 to +180.0	From -40.0 to +356.0
From -100.0 to +400.0	From -148.0 to +752.0

7. F 400: Manage the alarms

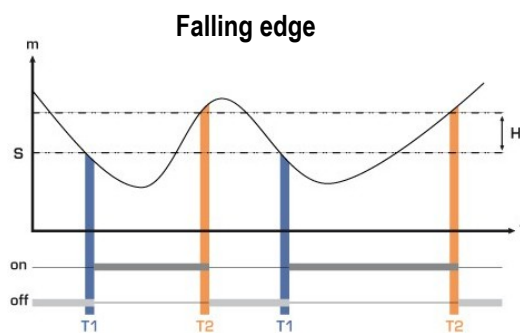
Three alarm modes are available:

- **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.



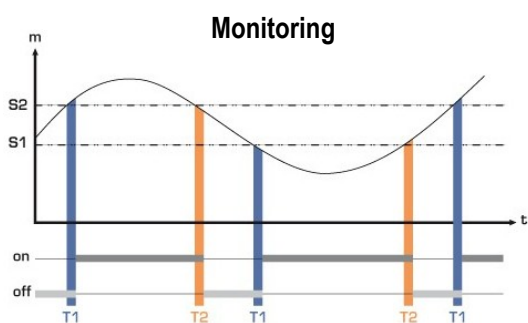
Measurement (m) > Threshold (S) during the time-delay $T1 \rightarrow$ Alarm activation

Measurement (m) < Threshold (S) - Hysteresis (H) during the time-delay $T2 \rightarrow$ Alarm deactivation



Measurement (m) < Threshold (S) during time-delay $T1 \rightarrow$ Alarm activation.

Measurement (m) > Threshold (S) + Hysteresis (H) during time-delay $T2 \rightarrow$ Alarm deactivation



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

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.



It is possible to set 3 different alarms:

- **F400** folder corresponds to the **alarm 1** setting
- **F410** folder corresponds to the **alarm 2** setting
- **F420** folder corresponds to the **alarm 3** setting

The alarm setting procedure explained below corresponds to the alarm 1 setting. For the alarms 2 and 3 settings, go to the corresponding folder and perform the same procedure as for the alarm 1.

The transmitter is powered on.

- Press OK.
- Enter the activation code (see page 8).
- Press OK.
- Press + to go to F 400 folder then press twice OK.
This folder is about the alarm mode.
- Press + or – key to select the required alarm mode.

- **OFF:OFF:** alarm is deactivated
 - **1/3:** rising edge mode
 - **2/3:** falling edge mode
 - **3/3:** monitoring mode
- Press OK.
"F400" blinks.
- Press + key to the **"F401"** folder of the alarm 1 (**F411** for alarm 2 and F421 for alarm 3) then press OK.
- Press + or – key then select the channel where the alarm will be activated.
- Press OK.
"F401" blinks.
- Press + key to go to **F402** folder (**F412** for alarm 2 and **F422** for alarm 3) then press OK.
*This folder is about the **threshold 1** setting.*
- Set the threshold 1 with + and – keys.
- Press OK when the last digit is set.
"F402" blinks.
- Press + key to go **F403** folder (**F413** for alarm 2 and **F423** for alarm 3) then press OK.
This folder is about:
- For a rising or falling edge: **hysteresis setting**
 - For a monitoring: **threshold 2 setting.**
- Set the hysteresis or the threshold 2 with + and – keys.
- Press OK when the last digit has been set.
"F403" blinks.
- Press + key to go to **F404** folder (**F414** for alarm 2 and **F424** for alarm 3) then press OK.
*This folder is about the **delay time 1** setting.*
- Set the delay time 1 with + and – keys.
- Press OK when the last digit has been set.
"F404" blinks.
- Press + key to go to F405 folder (F415 for alarm 2 and F425 for alarm 3) then press OK..
*This folder is about the **delay time 2** setting.*
- Set the delay time 2 with + and – keys.
- Press OK when the last digit has been set.
"F405" blinks.
- Press Up key to go to F406 folder (F416 for alarm 2 and F426 for alarm 3) then press OK..
*This folder allows to activate or not the **audible alarm.***
- Set the activation of the audible alarm with + and – keys:
- **1:** audible alarm is activated
 - **2:** audible alarm is deactivated
- Press OK to validate the alarm..
"F406" blinks.
- Press Up key to to th F407 folder (F417 for alarm 2 and F427 for alarm 3) then press OK.
*This folder is about the **acknowledgement of the alarm.***
- Set the acknowledgement duration of the alarm with + and - keys.
- Press OK when the last digit has been set.

8. F 500: Set the measurements

This part allows to set an integration coefficient, to perform an autozero, to set a delay time between two autozeros. In order to compensate a possible drift of the sensor, it is possible to add an offset and/or a coefficient to the value displayed by the transmitter.

8.1. Perform an autozero



This setting is only available if the CA310 has a SPI-2 pressure board.

CA10 transmitters have a manual autozero which guarantees a good reliability of the measurement in high and low ranges. The autozero compensates for any long-term drift of the sensitive element, with the manual adjusting of the zero.

To perform a self-calibration:

- Press Esc during 8 seconds.
The transmitter beeps that indicates the autozero has been well performed.

8.2. Integration of the pressure measurement



This setting is only available if the CA310 has a pressure board.

The pressure measurement element is very sensitive and reacts to pressure changes. When making measurements in unstable air movement conditions, the pressure measurement may fluctuate. The integration coefficient (from 0 to 9) makes an average of the measurements ; 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: CA 310 (0-1000 Pa) – Current measurement: 120 Pa – New measurement: 125 Pa

The pressure source being stable, the user selects a low integration. Integration: 1, maximum admitted variation ± 10 Pa.

The variation is lower than 10 Pa, it is possible to apply the integration calculation formula.

Next displayed value: $((9 \times 125) + (1 \times 120)) / 10 = 124.5$ i.e, 124 Pa. If the new measurement had been de 131 Pa, the next displayed value would have been 100% of the new value i.e, 131 Pa.

The transmitter is powered on.

- Press OK.
- Enter the activation code (see page 8).
- Press OK.
- Press + key to go to F500 folder.
- Press OK.
- Set the integration value with + and – keys.

This value is between 0 and 9 with:

- **Coefficient 0:** no integration, important fluctuation of the displayed value
- **Coefficient 9:** maximum integration, more stable measurement display.

8.3. Delay times between 2 auto-zeros



This setting is only available if the CA310 has a pressure board.

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.

The transmitter is powered on.

- Press OK.
- Enter the activation code (see page 8).

- Press OK.
- Press + key to go to F500 folder.
- Press OK.
- Press + key to go to F510 folder.
- Press OK.
- The duration between 2 self-calibrations is displayed.*
- Set the duration with + and – keys.
- This delay time must be between OFF (no self-calibration) and 60 minutes.*
- Press OK to validate the duration.

8.4. Add a coefficient

The correction coefficient allows to apply a correction to a measurement.

The transmitter is powered on.

- Press OK.
- Enter the activation code (see page 8).
- Press OK.
- Press + key to go to F500 folder.
- Press OK.
- Press + key to go to F520 folder then press OK.
- “F 520” blinks, corresponding to the folder of the gain setting for the channel 1.*
- Press OK.
- The 1st digit of the gain blinks.*
- Enter with + and – keys the figure value or the negative sign of the value then press OK.
- The 2nd digit blinks.*
- Enter with + and – keys its value then press OK.
- Perform the same procedure for the following figures.
- Press OK when the last digit has been set.
- F 520 blinks, the coefficient for the channel 1 is set.*



To add a gain to the **channel 2**, go to **F 530** folder and perform the same procedure as for the channel 1.
To add a gain to the **channel 3**, go to **F 540** folder and perform the same procedure as for the channel 1.

8.5. Add an offset

In order to compensate any possible drift of the sensor, it is possible to add an offset to the value displayed by the transmitter entering a digital value via the keypad.

The transmitter is powered on.

- Press OK.
- Enter the activation code (see page 8).
- Press OK.
- Press + key to go to F500 folder.
- Press OK.
- Press + key to go to F 521 folder then press OK.
- “F 521” blinks, corresponding to the folder of the offset setting for the channel 1.*
- Press OK.
- The 1st digit of the offset blinks.*
- Enter with + and – keys the figure value or the negative sign of the value then press OK.
- The 2nd digit blinks.*
- Enter with + and – keys its value then press OK.
- Perform the same procedure for the following figures.
- Press OK when the last digit has been set.
- F 521 blinks, the offset for the channel 1 is set.*



To add an offset to the **channel 2**, go to **F 531** folder and perform the same procedure as for the channel 1.
To add an offset to the **channel 3**, go to **F 541** folder and perform the same procedure as for the channel 1.

9. F 600: Configure the boards and probes

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.
- **For a CO₂ probe:** the compensation in atmospheric pressure
- **For an hygro/temperature probe:** the compensation in atmospheric pressure for the psychrometry calculations.

You can **modify the temperature compensation value**. The air velocity and airflow measured with a differential probe (such as Pitot tube, Debimo blade, orifice plate...) depends on the working temperature. Then, it is required to enter the **operating temperature** to get more accurate results. You can enter the value either manually or using a thermocouple K probe which offers the automatic temperature compensation.

9.1. Configure a pressure board

9.1.1 Set the temperature

The transmitter is powered on.

- Press OK.
- Enter the activation code (see page 8).
- Press OK.
- Press + key to go to F600 folder.
- Press twice OK.
- F600 blinks and the temperature mode is displayed.*
- Press OK.
- Select the temperature mode with + and – keys.
 - **1/3:** manual input of the temperature
 - **2/3:** automatic temperature (thermocouple)
 - **3/3:** automatic temperature (probe)
- Press OK.

If the manual input of the temperature has been selected:

- Press + key to go to F601 folder that allows to set the temperature unit then press OK.
- Select the temperature unit with + and – keys then press OK.
- Press + key to go to F602 folder that allows to set the temperature then press OK.
- Set the temperature with + and – keys then press OK.

If an automatic temperature has been selected:

- Press + key to go to F603 folder.

9.1.2 Set the atmospheric pressure or the altitude

The temperature has been selected.

- Press + key to go to F603 folder then press OK.
- Select the atmospheric pressure unit between hPa, mbar and mmHg or select “m” for the altitude.
- Press OK.
- Press + key to go to F604 folder then press OK.
- Set the atmospheric pressure.
- Or
- Press + key to go to F605 folder then press OK.
- Set the altitude.
- Press OK.

9.1.3 Select the measuring device

The atmospheric pressure or the altitude has been configured.

- Press + key to go to F610 folder then press OK.
- Select the type of measuring device:
 - **1/4:** Pitot tube L (coefficient: 1.0015)
 - **2/4:** Pitot tube S (coefficient: 0.84)
 - **3/4:** Debimo blades (coefficient: 0.8165)
 - **4/4:** Coefficient of the element (free coefficient)
- Press OK.

If the coefficient of the element has been selected:

- Press + key to go to F611 folder then press OK.
- Set the coefficient value with + and – keys then press OK.

9.1.4 Enter a correction factor in air velocity

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 + key to go to F612 folder then press OK.
- Set the correction value with + and – keys then press OK.



The correction factor must be between 0.2 and 2.

9.1.5 Configure the section

- Press + key to go to F620 folder then press OK.
- Press + key to select the type of section between:
 - **1/3:** rectangular section
 - **2/3:** circular section
 - **3/3:** airflow coefficient
- Press OK.
- Press + key to go to F621 folder then press OK.
- Select the unit of the section (mm or inch) with + key for a rectangular or circular section.
- Press OK.
- Press + key to go to F622 folder then press OK.
- Set the length of the rectangular section if the type of selected section is rectangular then press OK.
- Press + key to go to F623 folder then press OK.
- Set the width of the rectangular section if the type of selected section is rectangular then press OK.
- Press + key to go to F624 folder then press OK.
- Set the diameter of the circular section if the type of selected section is circular then press OK.
- Press + key to go to F625 folder then press OK.
- Set the airflow coefficient if the type of selected section is airflow coefficient then press OK.
- Press + key to go to F626 folder then press OK.
- Select the airflow unit if the type of selected section is airflow coefficient.

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. $\text{Airflow} = C_D \times \sqrt{\Delta \text{Pressure}}$



The coefficient must be between 0.1 and 9999.9.

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

9.2. Configure a probe

9.2.1 Set the atmospheric pressure or the altitude

The transmitter is powered on.

- Press OK.
- Enter the activation code (see page 8).
- Press OK.
- Press + key to go to F600 folder.
- Press OK then + key to go to F630 folder.
- Select the unit the atmospheric pressure between hPa, mbar and mmHg or select "m" for the altitude then press OK.
- Press + key to go to F631 folder then press OK.
- Set the atmospheric pressure.
- Or
- Press + key to go to F632 folder then press OK.
- Set the altitude.
- Press OK.

9.2.2 Set the section

- Go to F650 folder then press OK.
- Press + key to select the type of section between:
 - 1/3: rectangular section
 - 2/3: circular section
- Press OK.
- Go to F651 folder then press OK.
- Select the unit of the section (mm or inch) with + key for a rectangular or circular section.
- Press OK.
- Press + key to go to F652 folder then press OK.
- Set the length of the rectangular section if the type of selected section is rectangular then press OK.
- Press + key to go to F653 folder then press OK.
- Set the width of the rectangular section if the type of selected section is rectangular then press OK.
- Press + key to go to F654 folder then press OK.
- Set the diameter of the circular section if the type of selected section is circular then press OK.

9.2.3 Select a normative value

It is possible to select a standard allowing to bring the measured values to measured values in normal environmental conditions.

- Go to F690 folder then press OK.
- Press + key to select the standard:
 - OFF: no standard
 - DIN1343
 - ISO2533

10. Functions recap and Modbus connections

10.1. F 100: configure the transmitter

Code	Register type	Modbus	Description	Possibilities
F 100	-	1000	Serial number of the transmitter	
F 101	Real	1010	Firmware version	
-	U32	1020	Device identification	
-	U32	1030	Probe identification	
F 135	Boolean	1350	Sound	
F 140	Boolean	1400	Keypad locking	0: deactivated 1: activated
F 141	U16	1410	Safety code	
F 150		1500	Modbus slave number	From 1 to 255
F 151		1510	Modbus speed communication	2400 / 4800 / 9600/ 19200 / 38400 / 115200 bds
F 160	Boolean	1600	DHCP	
F 161	-	1610	IP address	
F 162	-	1620	Mask	
F 163	-	1630	Gateway	
F 164	-	1640	DNS	
F 165	U16	1650	Port	
F 166	-	1660	MAC address	
F 167	-	1670	Base address	
F 170	U32	1700	Activation of the high resolution in pressure option	0: deactivated 1: activated
F 171	U32	1710	Activation of the Modbus option	0: deactivated 1: activated
F 180		1800	Activation of digital inputs	ON / OFF
F 190		1900	Back to factory configuration	

10.2. F 200: configure the channels and measurement units

Code	Register type	Modbus	Description	Possibilities
F 200	Enumeration	2010	Probe or board selection	Probe / board / deactivated
F 201	Enumeration	2000	Unit selection of the channel 1	According to probe and board
F 210	Enumeration	2110	Probe or board selection	Probe / board / deactivated
F 211	Enumeration	2100	Unit selection of the channel 2	According to probe and module
F 220	Enumeration	2210	Probe or board selection	Probe / board / deactivated
F 221	Enumeration	2200	Unit selection of the channel 3	According to probe and module

10.3. F 300: manage analogue inputs and outputs

Code	Register type	Modbus	Description	Possibilities			
F 300	Enumeration	3000	Analogue output of the channel 1	4-20 mA / 0-20 mA / 0-10 V / 0-5 V			
F 310	Enumeration	3100	Analogue output of the channel 2	4-20 mA / 0-20 mA / 0-10 V / 0-5 V			
F 320	Enumeration	3200	Analogue output of the channel 3	4-20 mA / 0-20 mA / 0-10 V / 0-5 V			
F 301	Real	3010	Low range of the channel 1	From -19999 to 99999			
F 302	Real	3020	High range of the channel 1	From -19999 to 99999			
F 311	Real	3110	Low range of the channel 2	From -19999 to 99999			
F 312	Real	3120	High range of the channel 2	From -19999 to 99999			
F 321	Real	3210	Low range of the channel 3	From -19999 to 99999			
F 322	Real	3220	High range of the channel 3	From -19999 to 99999			
F 303	Enumeration	3010	Channel 1 diagnostic: generation of a voltage or a current	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
F 313	Enumeration	3110	Channel 2 diagnostic: generation of a voltage or a current	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
F 323	Enumeration	3210	Channel 3 diagnostic: generation of a voltage or a current	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

10.4. F 400: manage the alarms and relays

10.4.1 Alarm

Code	Register type	Modbus	Description	Possibilities
F 400	Enumeration	4000	Alarm mode of the alarm 1	OFF 1: Rising edge 2: Falling edge 3: Monitoring
F 401	U8	4010	Channel selection of the alarm 1	Channel 1 Channel 2 Channel 3
F 402	Real	4020	Threshold 1 setting of the alarm 1	According to connected probe

F 403	Real	4030	Threshold 2 or hysteresis setting of the alarm 1	According to connected probe
F 404	U16	4040	Delay-time 1 setting of the alarm 1	From 0 to 600 s
F 405	U16	4050	Delay-time 2 setting of the alarm 1	From 0 to 600 s
F 406	Boolean	4080	Audible alarm 1	1: activated / 0: deactivated
F 407	U8	4070	Alarm 1 acknowledgement duration	From 0 to 60 minutes
F 410	Enumeration	4100	Alarm mode of the alarm 2	OFF 1: Rising edge 2: Falling edge 3: Monitoring
F 411	U8	4110	Channel selection of the alarm 2	Channel 1 Channel 2 Channel 3
F 412	Real	4120	Threshold 1 setting of the alarm 2	According to connected probe
F 413	Real	4130	Threshold 2 or hysteresis setting of the alarm 2	According to connected probe
F 414	U16	4140	Delay-time 1 setting of the alarm 2	From 0 to 600 s
F 415	U16	4150	Delay-time 2 setting of the alarm 2	From 0 to 600 s
F 416	Boolean	4180	Audible alarm 2	1: activated / 0: deactivated
F 417	U8	4070	Alarm 1 acknowledgement duration	From 0 to 60 minutes
F 420	Enumeration	4200	Alarm mode of the alarm 3	OFF 1: Rising edge 2: Falling edge 3: Monitoring
F 421	U8	4210	Channel selection of the alarm 3	Channel 1 Channel 2 Channel 3
F 422	Real	4220	Threshold 1 setting of the alarm 3	According to connected probe
F 423	Real	4230	Threshold 2 or hysteresis setting of the alarm 3	According to connected probe
F 424	U16	4240	Delay-time 1 setting of the alarm 3	From 0 to 600 s
F 425	U16	4250	Delay-time 2 setting of the alarm 3	From 0 to 600 s
F 426	Boolean	4280	Audible alarm 3	1: activated / 0: deactivated
F 427	U8	4070	Alarm 1 acknowledgement duration	From 0 to 60 minutes

10.4.2 Relays

Code	Register type	Modbus	Description	Possibilities
F 440	Enumeration	4400	Relay 1 selection	0: Off 1: On 2: Alarm 1 3: Alarm 2 4: Alarm 4
F 441	Enumeration	4410	Relay 1 security	0: Negative 1: Positive
F 450	Enumeration	4500	Relay 2 selection	0: Off 1: On 2: Alarm 1 3: Alarm 2 4: Alarm 4
F 451	Enumeration	4510	Relay 2 security	0: Negative 1: Positive
F 460	Enumeration	4600	Relay 3 selection	0: Off 1: On 2: Alarm 1 3: Alarm 2 4: Alarm 4
F 461	Enumeration	4610	Relay 3 security	0: Negative 1: Positive

10.5. *F 500: set the measurements*

Code	Register type	Modbus	Description	Possibilities
F 500	U8	5000	Measurement integration in pressure (board)	From 0 to 9
F 501	U8	5010	Measurement integration in air velocity (probe)	From 0 to 9
F 502	U8	5020	Measurement integration in pressure (probe)	From 0 to 9
F 510	U8	5100	Delay-time between two autozeros	From 0 to 60 min
F 511	Boolean	5110	Instantaneous autozero	
F 520	Real	5200	Channel 1 coefficient	From 0.01 to 5
F 530	Real	5300	Channel 2 coefficient	From 0.01 to 5
F 540	Real	5400	Channel 3 coefficient	From 0.01 to 5
F 521	Real	5210	Channel 1 offset	According to probe
F 531	Real	5310	Channel 2 offset	According to probe
F 541	Real	5410	Channel 3 offset	According to probe

10.6. F 600: configure the board and probe

10.6.1 Pressure board parameters

Code	Register type	Modbus	Description	Possibilities
F 600	Enumeration	6000	Temperature mode	0: Value 1: Thermocouple 2: Probe n°1
F 601	Enumeration	6010	Temperature compensation unit	0: °C / 1: °F
F 602	Real	6020	Temperature value in manual mode	From -50 to +50°C
F 603	Enumeration	6030	Unit of the atmospheric pressure compensation	0: hPa 1: mbar 2: mmHg 3: m (altitude)
F 604	Real	6040	Value of the atmospheric pressure compensation	From 0 to 4000 hPa From 0 to 4000 mbar From 0 to 3000.24 mmHg
F 605	Real	6050	Altitude compensation value	From 0 to 10 000 m
F 610	Enumeration	6100	Differential pressure mean	0: Pitot L 1: Pitot S 2: Debimo blades 3: Factor
F 611	Real	6110	Differential pressure coefficient value	
F 612	Real	6120	Air velocity correction factor	From 0.2 to 2
F 620	Enumeration	6200	Type of section	0: Rectangular 1: Circular 2: Coefficient
F 621	Enumeration	6210	Unit of the section	0: mm 1: inch
F 622	Real	6220	Length	From 1 to 3000 mm
F 623	Real	6230	Width	From 1 to 3000 mm
F 624	Real	6240	Diameter	From 1 to 3000 mm
F 625	Real	6250	Airflow coefficient	From 0.1 to 9999.9
F 626	Enumeration	6260	Pressure unit / airflow coefficient	0: Pa 1: mmH ₂ O 2: inWg 3: mbar

10.6.2 Probe parameters

Code	Register type	Modbus	Description	Possibilities
F 633	Enumeration	6330	Unit of the atmospheric pressure compensation	0: hPa 1: mbar 2: mmHg 3: m (altitude)
F 634	Real	6340	Value of the atmospheric pressure compensation	From 0 to 4000 hPa From 0 to 4000 mbar

				From 0 to 3000.24 mmHg
F 635	Real	6350	Altitude compensation value	From 0 to 10 000 m
F 642	Real	6420	Air velocity factor correction	From 0.2 to 2
F 650	Enumeration	6500	Type of section	0: Rectangular 1: Circular 2: Coefficient
F 651	Enumeration	6510	Section unit	0: mm 1: inch
F 652	Real	6520	Length	From 1 to 3000 mm
F 653	Real	6530	Width	From 1 to 3000 mm
F 654	Real	6540	Diameter	From 1 to 3000 mm

10.6.3 Select a standard

Code	Register type	Modbus	Description	Possibilities
F 690	Enumeration	6900	Selection of a standard	0: OFF – no standard 1: DIN 1343 2: ISO 2533

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