

User Manual

CAIRCLOUD

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TRACABILITY – REVIEW OF THE DOCUMENT

DATES	VERSIONS	AUTHORS	MODIFICATIONS
10/06/2020	3.9.0	PRI	Creation of the document
19/06/2020	3.9.0	PRI	Correct the default emission period or Cairnet 3.0
30/06/2020	3.9.0	PRI	Explicit export format ; add Physical code
13/07/2020	3.9.0	PRI	Correction sur Physical Array
19/11/2020	3.10.0	MDR	Add feature ComputeO3

INTRODUCTION

Caircloud is a cloud portal that allows you to track and analyse the measures of air quality monitored by "Cairsens" sensors of Envea Cairpol Microsensors.

Recommended web explorers: Google Chrome, Mozilla Firefox.

The connection to the portal is established by an ID and password provided by Envea Cairpol Microsensors.

Proposed principal functionalities:

- *Check of the data history (Graphical visualisation)*
- *Alerts on thresholds for primary data level*
- *Computation of second level data
quarter-hourly, hourly and daily (in the sensor local timezone)*
- *Data export to your own FTP/SFTP server*
- *Data export to an iséo XR Server (on request)*

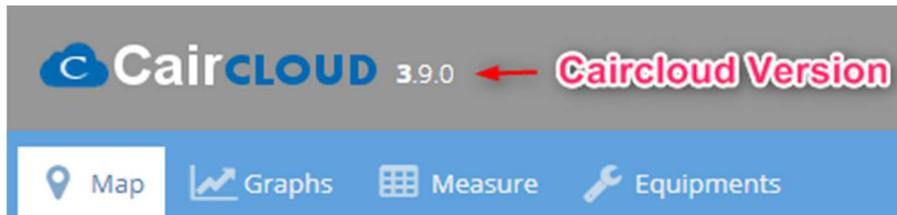
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1. Homepage

The homepage proposes four thematic tabs.

In the header you can find the current version of the caircloud.



The dropdown list which appears by clicking on the “User Button” allows to open the User setting panel (see §2.1) or the Technical configuration panel (see §2.2).



The bell is red flashing is at least, one threshold alert is running.

2. Settings

Some settings are user level only (the User settings ones) and others are customer level scoped (Technical configuration and alert thresholds)

2.1 User settings

The window allows you to modify following settings :

 **Language & Display timezone** : Select the language and the time zone in which to display the data date. (The daily aggregation will remain computed according to the timezone of the installation of sensors). When changing language you must disconnect and reconnect in order to apply this new setting..

 **Login** : Customize the user account information

First Use:

The account email address should be set. This email address will be used to inform our customers about site maintenance and update forecasts.

2.2 Technical configuration

The window allows you to modify following settings:

 **Alerts** : Activate or deactivate the alert functionality on the threshold overrun.

When this functionality is activated, you will be able to set up custom thresholds upon channel primary level measurement data from the UI.

If you are using Cairnet 2.0 (sending data to a FTP server), you can set an “accelerated” period emission of data applied to the Cairnet which have at least one measurement in overrun.

 **Exports** : Set the periodic export of the data (channel primary level measurement data) in CSV format to a side FTP server.

You have to make sure that the connectivity and the credential are well specified. If the export emission module of the Caircloud doesn't succeed to connect with such specification for 3 continuous days then the export will be automatically toggled off.

Refer to §4.1 concerning the format of the exported file.

 **XR Server Synchronization** : Caircloud is also able to transfer measurement data to an iséo XR model Server. This menu just indicates if the XR Server Synchronization is active or not. To activate the XR Server Synchronization please contact Cairpol customer service.

Add/Associate an equipment : If you bought an equipment (Cairnet 3.0) with an association code supplied, you need to enter here the association code once this equipment have started to send data to the Caircloud. Otherwise you won't see the measurements on your customer account. Association code can be found on a sticker like the following :



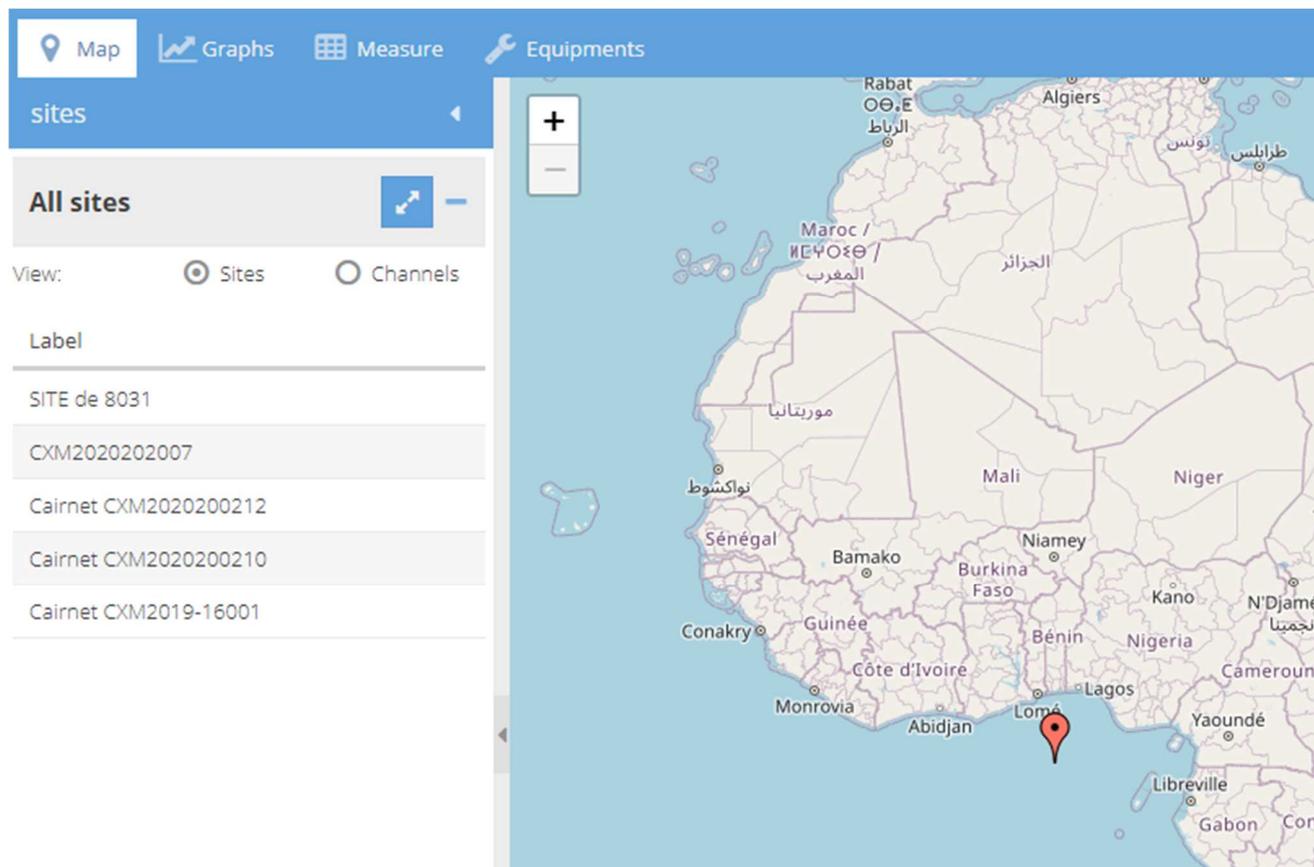
Association codes are one-use only, after being used the root equipment and all sub equipments are bind to your customer account.

Cairnet 3.0 Communication Period : Cairnet 3.0 start working with a factory default emission period in order that the Cairnet will decide by itself the suitable emission period considering his battery load context. This can be changed but for all the customer account cairnets at the same time.

Note : the modification of the emission period is not immediate, you will have to wait up to two times the current emission period in order that the Cairnets works with the new emission period..

3. Thematic tabs and auxiliary panels

3.1 Map tab



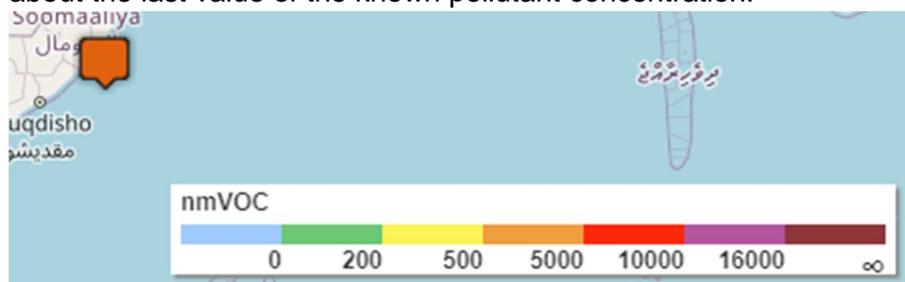
The map tab is displayed by default. It represents the list of the sites and their position on the map.

To visualize a small graph about the latest measured values or the site details, click on its position identified by the icon  on the map.

On the first reception of data of any Cairnet's Sensors a measurement site is created to group all sensors sharing the same location (the coordinates are set to the default coordinates ie Latitude = 0, Longitude = 0. During the first use you should set the appropriate coordinates of the measurement site (see §3.5).

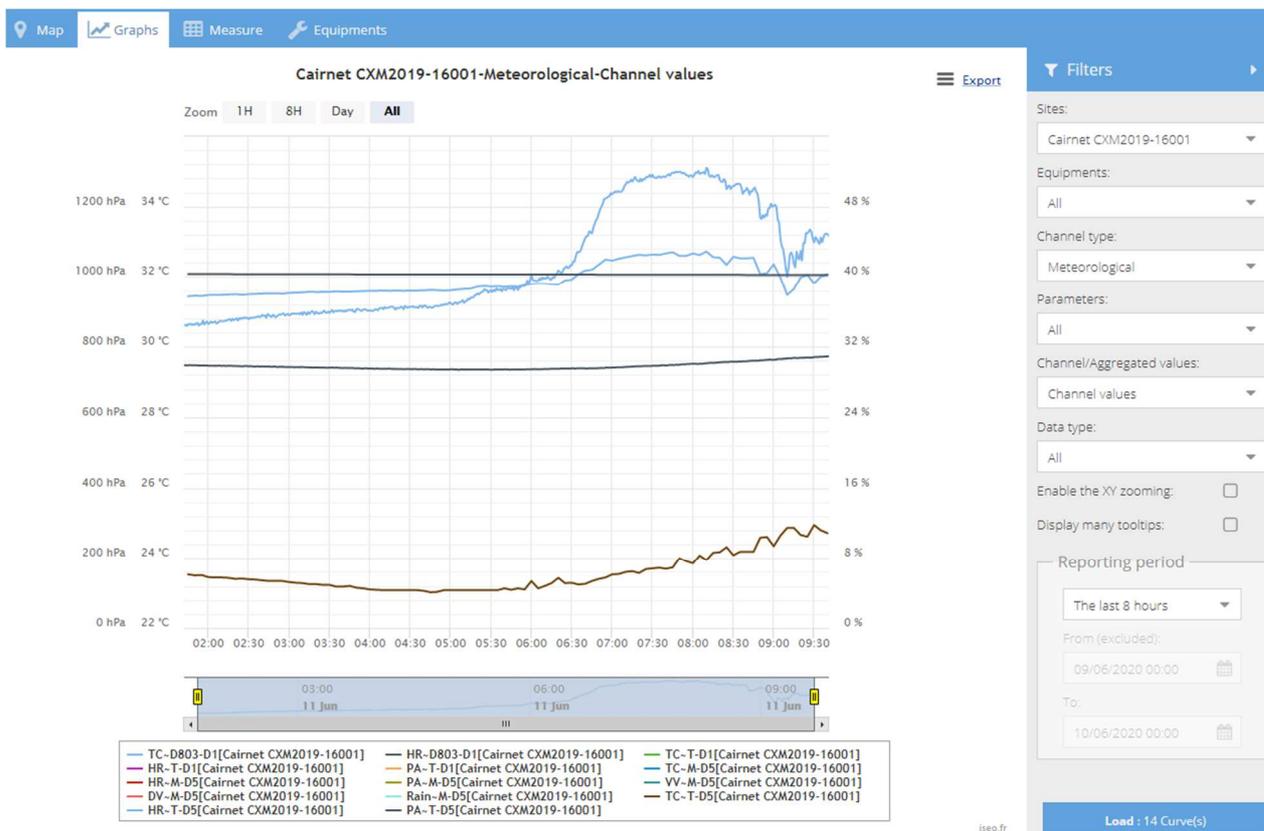
To visualize the latest values of the whole sensors for a single parameter, activate the button « Channels » and chose the parameter in the proposed list.

For some pollutants, a scale of colour appears at the bottom right of the map, giving a quick indication about the last value of the known pollutant concentration.



If a small graph is displayed you can jump to the Graph tab by clicking on the icon .

3.2 Graph tab



This tab allows you to view data history in the form of graphs.

First select the scope using the drop down filters, the button “Load” mention the curve number expected on any filter change.

Select the reporting period, considering that, you are not allowed to display more than 100 000 values among all the curves.

Then click on the “Load” button, the data will be then retrieved from the server database (which could take a while), then next will be drawn on graph.

Once drawn,

- You can zoom the view (a X zoom or a XY zoom view)
- You can export “what you see” as an image or the data as CSV file by clicking **Export**
- If you are in zoom view, the export will just concern “what you see”.
- You can hide or display a curve on the graph by clicking on its name in the legend.
- The name of the curves in the legend follows many rules

<Chemical code>~<short reference to the sensor serial number, usually the last 4 digits>-<data type code> [Label of the Site]

Usual data type are :

D1 : 1 minute data (from sensor)

D5 : 5 minutes data (from sensor)

QM : Quarter-hourly mean (aggregation of the sensor data)

3.3 Measure tab

Site label ↑	Serial number	Parameter	Value	Quality	Date	Alert threshold	Alert state
CXM2020202007	 CIV0119102504	COV-NM	6699.00 ppb	Drift [P]	09:47	500000 ppb over 13 minutes	
CXM2020202007	 MET2020202007	TC	50.00 °C	Correct [A]	14 May 2020 06:50	-	
CXM2020202007	 MET2020202007	HR	80.00 %	Correct [A]	14 May 2020 06:50	-	
CXM2020202007	 MET2020202007	PA	1050.00 hPa	Correct [A]	14 May 2020 06:50	-	
CXM2020202007	 MET2020202007	WV	60.00 m/s	Correct [A]	14 May 2020 06:50	-	

- The icon  in the Site label column will open the Site configuration panel (see §3.5)
- The icon  in the Alert threshold will open the Threshold configuration panel (see §3.7)
Note : this column is only shown if the alerts are enabled (see §2.2)
- If Data are less than 24 hours aged, the column Data will only display the clock time of the data.

3.4 Equipment tab

Type	Serial Number	Last communication	Life %	Site	Alarm
▶ Cairnet 3.0	CXM202018031	08:59	*80%	SITE de 8031	
▶ Cairnet 3.0	CXM2020202007	09:17	*0%	CXM2020202007	
▶ Cairnet 3.0	CXM2020200210	09:44	*0%	Cairnet CXM2020200210	
▼ Cairnet 3.0	CXM2020200212			Cairnet CXM2020200212	
■ Cairsens NCL3 0-1000 ppb	CCM0220123456	11 Jun 2020 09:29	71%	-	
☁ Weather Station	MET2020200212	14 May 2020 04:50	-	-	🔔
📡 Internal THP Probe	THP2020200212	11 Jun 2020 09:28	-	-	
▶ Cairnet 3.0	CXM2019-16001	09:42	*63%	Cairnet CXM2019-16001	

This tab displays all the related information about the equipments. It also allows to access to the Equipment data panel.

About equipment hierarchy : the main/root equipment (usually a Cairnet) could have many sub equipments (usually many Cairsens). All such equipments, will share the same physical localization, and therefore the same measurement site entity.

In the Serial Number column :

- The icon will open the Equipment data panel (see §3.6)
- The icons or will switch the view to the Graph tab selecting the equipment channels

In the Site column :

- The icon will open the Site configuration panel (see §3.5)
- The icons or will switch the view to the Graph tab selecting the site channels
- The Last communication column works like the Date column of the Measure tab: if the last communication is less than 24 hours aged, the column Last Communication will only display the clock time of the data.

The Search pattern item allows you to find a specific equipment from all of your linked equipment. It only works by serial number requests (either Cairnet, either sensors or probe). For instance, if you search the pattern '8031', all the sites with an equipment whose the serial number contains the pattern '8031' will be displayed.

The Expand all button allows you to display all the sub-equipments all over your sites. Collapse all allows you to hide all the sub-equipments.

3.5 Site configuration panel

Edit site

Label: Site near Paris

Site location: near Paris

Timezone: Europe/Paris

Address: paris

Latitude: 48.8566969

Longitude: 2.3514616

Cancel Apply

You can edit site Label and Site Location Tag as you wish.

The Site time zone cannot be modified, the daily aggregation will use this time zone to know the local scope to compute.

To define the position of the measurement site (latitude & longitude) do one of the following:

- Enter the coordinates Latitude and Longitude of the measuring point, and finalize by clicking on « Apply ».
- Enter an address and click on the search icon , the mini map will show a position mark. You can now adjust the exact position of the mark by moving it. Finalize by clicking on « Apply ».

3.6 Equipement data panel

⚙ Equipement data panel
✕

Serial number : MET2020200212

Model : [] Weather Station

Last communication date : 14 May 2020 04:50

Channels :

Parameter ↑	Data t...	Date	Value	Quality code	Threshold setting	Alarm state
Atmospheric pressure	D5	14 May 2020 04:50	1050.00 hPa	Correct [A]	-	
Rain fall	D5	14 May 2020 04:50	25.00 mm/h	Correct [A]	-	
Relative humidity	D5	14 May 2020 04:50	80.00 %	Correct [A]	1 % over 3 mn	
Temperature	D5	14 May 2020 04:50	50.00 °C	Correct [A]	-	
Wind direction	D5	14 May 2020 04:50	230.00 degre	Correct [A]	-	

States :

Parameter	Date	Value
Firmware	14 May 2020 02:49	Simulateur

This panel displays

- All equipment primary measurement channels last values, if any.
- All equipment states last values, if any.

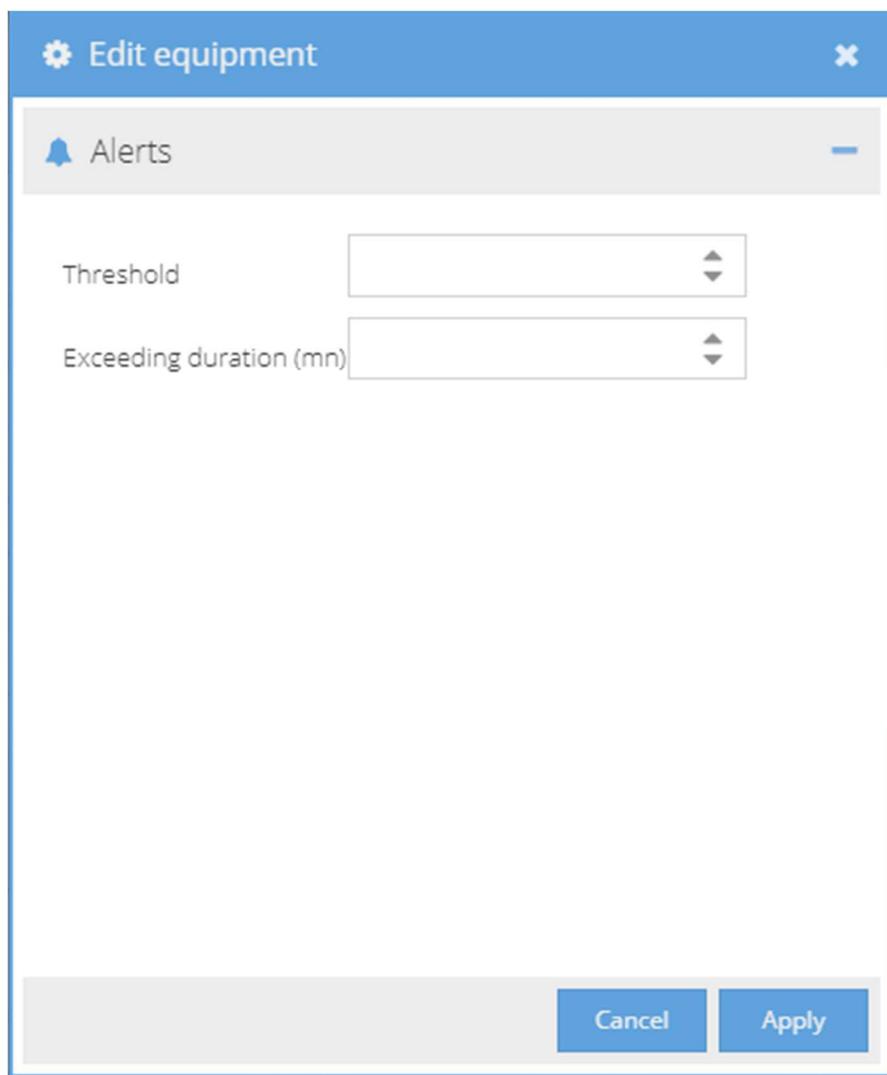
Equipment states are not stored by history way, so only the last value can be known.

In the Threshold setting column :

- The icon will open the Threshold setting panel (see §3.7)

The Date column works like the Date column of the Measure tab: if the data date is less than 24 hours aged, the column Date will only display the clock time of the data.

3.7 Threshold setting panel



The screenshot shows a dialog box titled "Edit equipment" with a close button (X) in the top right corner. Below the title bar, there is a section for "Alerts" with a bell icon and a minus sign. The "Alerts" section is expanded, showing two input fields: "Threshold" and "Exceeding duration (mn)". Both fields are currently empty. At the bottom of the dialog, there are "Cancel" and "Apply" buttons.

To configure an alert on a channel, do the following:

Enter the alert threshold and the desired overrun time

Finalize by « Apply ».

3.8 O3 computation from two cairsens

Actually, we have NO2 cairsens and O3-NO2 cairsens, but the O3 cairsens does not exist. However, if you have both NO2 and O3-NO2 cairsens plugged to the same cairnet or data acquisition system, then caircloud will create an O3 virtual measure which will be assigned to the cairnet.

This is done automatically without any need for configurations.

4. Appendice

4.1 FTP Export File Format

From the technical settings screen (see §2.2), an automatic transfer of the data can be activated. In this case, the data are transferred immediately after their integration in the Caircloud database. One file per Cairnet (Site) and per data step (1 minute, 5 minutes,...) are transmitted. The files have the format CSV (separator « ; »).

The first three header lines provide information on the content of the file, the following lines are the data.

- Description of the header lines:

The 1st line, is about the site : `Label of the site;Longitude;Latitude;Alert State`

Where :

- Label of the site is customizable by the customer.
- Longitude & Latitude are in Decimal degrees.
- Alert State [0-1], is a flag which =1 if there is at least one measure within the site in alert condition.

The 2nd line, is about the channels : `Label of the measure #1 (Example: H2S); ... measure #2;`

...

Where :

- Label of the measure depend of many rules applicables at the historical time of creation of the measurement channel, current applicable rules are :
- For Cairnet 2.0 measure, that the label of the measure is builded using the physical nickname (see §0)
- For Cairnet 3.0 measures, that the label of the measure is builded using the physical nickname (see §0) + '-' + the caircloud measure internal unique ID.

The 3rd line, is about the units : `Measure #1 unit 1 (Example: ppb); Measure #2 unit; ...`

Description of the data lines (from the 4th line till the end of the file) :

`Timestamp of the data; Measure #1 value; Measure #2 value;...`

Where :

- Timestamp of the data are in the ISO 8601 format « yyyy-mm-ddThh:mm:ss » (always in UTC timezone)
- Measure value with a decimal separator « . » (depending the precision of the measure).

- CSV file naming:

`<Ref client>_<Ref site>_<Data step>_<Date><Time>_<ID>.CSV`

Where :

- <Ref client>: is the unique customer ID in Caircloud (Example : 000005 for ID=5)
- <Ref site>: is the unique serial number of the site' main equipment that is usually a Cairnet (Example: 3552780582157922)

- <Data step>: Step in minutes (1, 5, 10, 15 minutes ...), generally 1 or 5 minutes for pollutant
- <Date>: Date of the last data, shown in the file in the format yyyyymmdd (in UTC timezone)
- <Time>: Time of the last data, shown in the file in the format hhmmss (in UTC timezone)
- <ID>: Unique file generation number.

File example : (name = 000043_CXM2020200210_1_20200518060300_350813.csv)

Content :

```
Cairnet CXM2020200210;48;2.8;0
BC-3356;HR-3317;NH3-3225;PA-3318;TC-3316
%;%;ppb;hPa;°C
2020-05-18T05:13:00;99;33;13600;1023;23
2020-05-18T05:14:00;99;33;13700;1023;23
2020-05-18T05:15:00;99;33;13800;1023;23
2020-05-18T05:16:00;99;33;13898;1023;23
2020-05-18T05:17:00;99;33;13998;1023;23
2020-05-18T05:18:00;99;33;14098;1023;23
2020-05-18T05:19:00;99;33;14200;1023;23
2020-05-18T05:20:00;99;33;14298;1023;23
2020-05-18T05:21:00;99;33;14398;1023;23
2020-05-18T05:22:00;100;33;14498;1023;23
2020-05-18T05:23:00;99;33;14598;1023;23
2020-05-18T05:24:00;99;33;14700;1023;23
2020-05-18T05:25:00;99;33;14800;1023;23
2020-05-18T05:26:00;99;33;14900;1023;23
2020-05-18T05:27:00;99;33;14998;1023;23
2020-05-18T05:28:00;99;33;15098;1023;23
2020-05-18T05:29:00;99;33;15198;1023;23
2020-05-18T05:30:00;99;33;15298;1023;23
2020-05-18T05:31:00;99;33;15400;1023;23
2020-05-18T05:32:00;100;33;15500;1023;23
2020-05-18T05:33:00;99;;;15600;;
2020-05-18T05:34:00;;;15700;;
2020-05-18T05:35:00;;;15798;;
2020-05-18T05:36:00;;;15898;;
2020-05-18T05:37:00;;;15998;;
```

4.2 Quality codes

Quality code is an information state of the data, it is affected by the acquisition system based on information related to the state of the sensor or the channel, but it can be changed by the server regarding the context. This code is a character (example: A => Correct)

Existing quality codes are the following :

Letter	Label	Meaning
A	Correct	Data is usable
R	Estimated *	
O	Corrected	The data have been corrected
P	Drift	The sensor provide bad measurement
D	Failure	The data is not usable
I	Invalidated *	
M	Maintenance *	
Z	Zero *	
C	Span *	
N	Non-obtained	There is no data for this timestamp
W	Warning	The sensor start loosing precision
B	Anomaly *	
X	Stopped *	
S	Substitute *	
G	Out of range *	
H	Out of field *	
g	Out of range but still valid*	
V	Stand-by *	

(*) these codes are not used yet into the Caircloud

4.3 Physical codes

Nickname (related on chemical code is applicable)	Label	Physical Type label	Caircloud internal ID	ISO code
Alt	Altitude	Technical	35	#a
ANA1	Analog channel 1	Technical	27	a1
ANA2	Analog channel 2	Technical	28	a2
ANA3	Analog channel 3	Technical	29	a3
BC	Battery level	Technical	1	BC
C2Cl4	Tetrachloroethylene	Pollutant	2	St
C6H6	Benzene	Pollutant	10	V4
C7H8	Toluene	Pollutant	9	VQ
CH2O	CH2O	Pollutant	8	VB
CH4	Methane	Pollutant	15	16
CL2	Dichlorine	Pollutant	7	S9
CO	CO	Pollutant	13	4
CO2	CO2	Pollutant	16	17
COV-NM	nmVOC	Pollutant	6	S8
DV	Wind direction	Meteorological	42	52
E13W	Solar Power 13W	Technical	26	WT
E3W	Solar Power 3W	Technical	25	W3
Fan	Fan speed	Technical	44	fs
Firm	Firmware	Technical	45	fw
H2S	Hydrogen sulfide	Pollutant	3	S5
H2S-CH4S	H2S & CH4S	Pollutant	5	S7
HR	Relative humidity	Meteorological	20	58
Iin	I input	Technical	36	li
Iout	I output	Technical	37	lo
Lat	Latitude	Technical	33	#I
Long	Longitude	Technical	34	#L
NCL3	Trichloramine	Pollutant	32	c3
NH3	NH3	Pollutant	17	21
NO2	NO2	Pollutant	12	3
O3	Ozone	Pollutant	14	8
O3-NO2	O3 & NO2	Pollutant	4	S6
PA	Atmospheric pressure	Meteorological	24	53
PM1	PM1	Pollutant	30	68
PM10	PM10	Pollutant	22	24
PM2.5	PM2.5	Pollutant	23	39
P.S	Dust	Pollutant	18	23
Rain	Rain fall	Meteorological	43	60
SO2	SO2	Pollutant	11	1

TC	Temperature	Meteorological	19	54
TCPU	CPU Temperature	Technical	40	Tp
TSP	Total Suspended Particles	Pollutant	31	ts
Uin	U input	Technical	38	Ui
Uout	U output	Technical	39	Uo
Usure	Wear	Technical	21	UX
VV	Wind speed	Meteorological	41	51