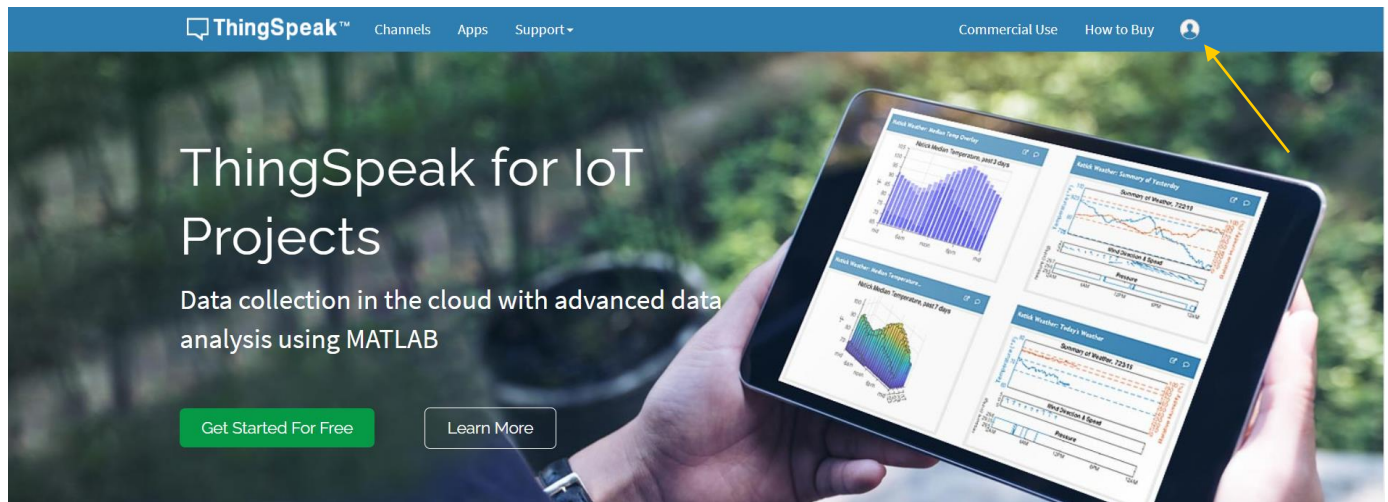
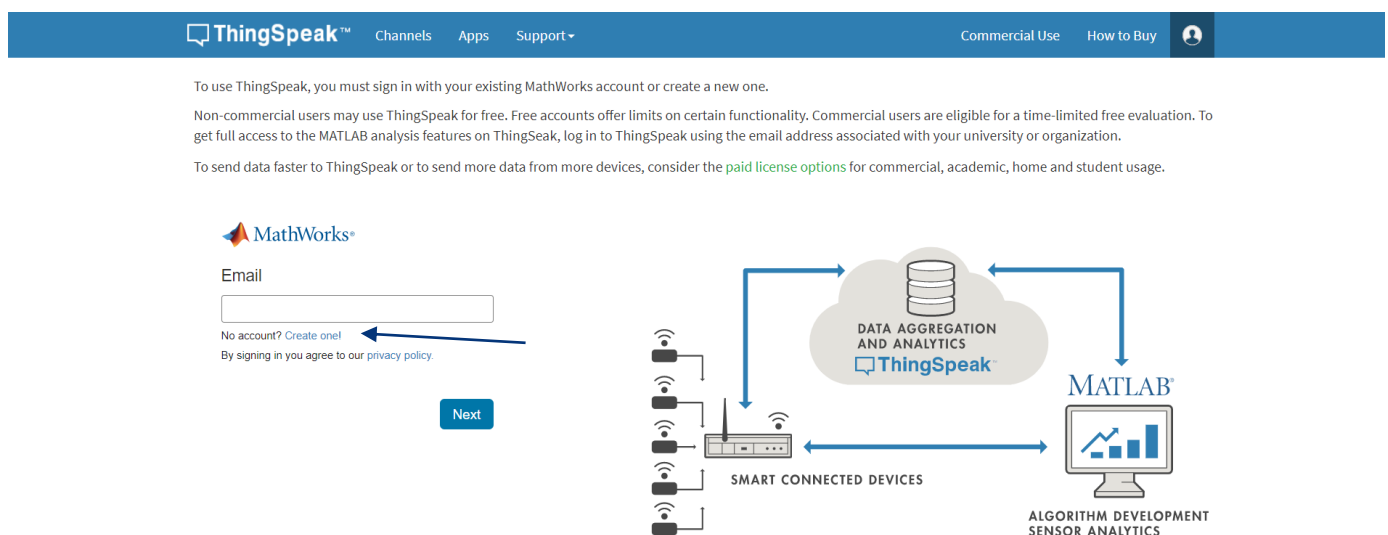


Aprire un canale su ThingSpeak™

Andare sul sito <https://thingspeak.com/> e cliccare sull'avatar in alto a destra



Se non si possiede un account MathWorks, crearne uno cliccando su **Create one!**



Inserire tutte le informazioni richieste (mail, nazione, nome, cognome) e cliccare su **Continue**

ThingSpeak™ChannelsAppsSupport

Commercial UseHow to Buy

To use ThingSpeak, you must sign in with your existing MathWorks account or create a new one.

Non-commercial users may use ThingSpeak for free. Free accounts offer limits on certain functionality. Commercial users are eligible for a time-limited free evaluation. To get full access to the MATLAB analysis features on ThingSpeak, log in to ThingSpeak using the email address associated with your university or organization.

To send data faster to ThingSpeak or to send more data from more devices, consider the [paid license options](#) for commercial, academic, home and student usage.

Create MathWorks Account

Email Address

Missing required information

Location

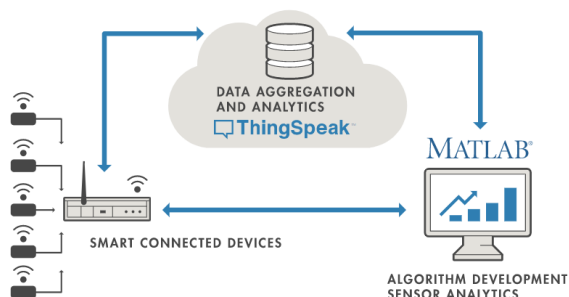
Italy

First Name

Last Name

Continue

Cancel



Verrà inviata una mail all'indirizzo inserito, che chiederà di verificare l'account. Cliccare sul link di conferma. Tornare alla pagina rimasta aperta su ThingSpeak™ e cliccare su **Continue**

ThingSpeak™ChannelsAppsSupport

Commercial UseHow to Buy

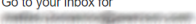
To use ThingSpeak, you must sign in with your existing MathWorks account or create a new one.

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To send data faster to ThingSpeak or to send more data from more devices, consider the [paid license options](#) for commercial, academic, home and student usage.

Verify Your MathWorks Account

To finish creating your account, complete the following steps:

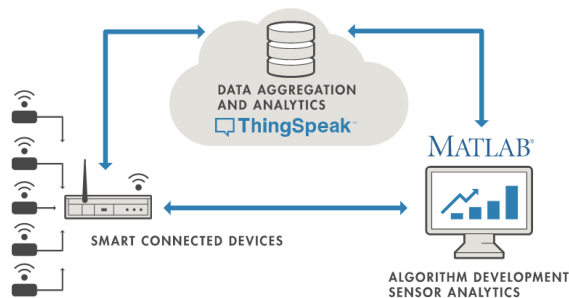
1. Go to your inbox for 
2. Click the link in the email we sent you.
3. Click **Continue**.

Didn't receive the email?

- Check your spam folder.
- [Send me the email again.](#)
- If you still have not received the email, Contact [Customer Support](#)

Continue

Cancel



Inserire una password a propria scelta rispettando i requisiti richiesti. Mettere la spunta indicata e cliccare su **Continua**

The screenshot shows the registration page of the ThingSpeak website. At the top is a blue navigation bar with the ThingSpeak logo, links for Channels, Apps, and Support, and buttons for Commercial Use, How to Buy, and a user profile icon. The main content area contains the following text: "To use ThingSpeak, you must sign in with your existing MathWorks account or create a new one.", "Non-commercial users may use ThingSpeak for free. Free accounts offer limits on certain functionality. Commercial users are eligible for a time-limited free evaluation. To get full access to the MATLAB analysis features on ThingSpeak, log in to ThingSpeak using the email address associated with your university or organization.", and "To send data faster to ThingSpeak or to send more data from more devices, consider the [paid license options](#) for commercial, academic, home and student usage." Below this is the heading "Terminare il proprio Profilo" followed by a "Password" input field with a toggle for visibility. Below the password field is a checkbox labeled "Accetto il Accordo sui servizi online" and a link "Per maggiori informazioni vedere quanto riportato in [policy sulla privacy](#)". At the bottom are two buttons: "Continua" (highlighted with a blue arrow) and "Annulla". To the right of the form is a diagram showing "SMART CONNECTED DEVICES" connected to a cloud labeled "DATA AGGREGATION AND ANALYTICS ThingSpeak", which in turn connects to a "MATLAB" logo and a monitor displaying a bar chart labeled "ALGORITHM DEVELOPMENT SENSOR ANALYTICS".

La procedura di registrazione è completata, e si è ora in possesso di un account ThingSpeak™
È ora possibile creare un proprio canale. Andare su **My Channels** e cliccare su **New Channel**

The screenshot shows the "My Channels" page on the ThingSpeak website. The navigation bar is identical to the previous page. The main content area has a heading "My Channels" and a green "New Channel" button (highlighted with a blue arrow). To the right of the button is a search bar labeled "Search by tag" with a magnifying glass icon. On the right side of the page is a "Help" section with the text: "Collect data in a ThingSpeak channel from a device, from another channel, or from the web.", "Click **New Channel** to create a new ThingSpeak channel.", "Click on the column headers of the table to sort by the entries in that column or click on a tag to show channels with that tag.", "Learn to [create channels](#), explore and transform data.", and "Learn more about [ThingSpeak Channels](#)." Below the help section is an "Examples" section with a list of links: "Arduino", "Arduino MKR1000", "ESP8266", "Raspberry Pi", and "Netduino Plus". At the bottom is an "Upgrade" section with the text "Need to send more data faster?" and "Need to use ThingSpeak for a commercial project?", followed by a green "Upgrade" button.

Nel campo **Name** inserire il nome del canale (nel nostro caso CO2) e nel campo **Field 1** la quantità di cui si riceveranno dati (nel nostro caso CO2 in PPM). Il numero del Field (in questo caso 1) in cui abbiamo indicato la quantità da rilevare sarà importante ai fini della compilazione del programma.

Sarà possibile inserire altre informazioni a piacimento nei corrispondenti campi, e alla fine sarà necessario cliccare su **Save Channel** scorrendo in fondo alla pagina

ThingSpeak™ Channels Apps Support Commercial Use How to Buy

New Channel

Name: CO2

Description:

Field 1: CO2 (PPM) ☒

Field 2: ☐

Field 3: ☐

Field 4: ☐

Field 5: ☐

Field 6: ☐

Field 7: ☐

Field 8: ☐

Metadata:

Scorri in fondo per trovare Save Channel

Help

Channels store all the data that a ThingSpeak application collects. Each channel includes eight fields that can hold any type of data, plus three fields for location data and one for status data. Once you collect data in a channel, you can use ThingSpeak apps to analyze and visualize it.

Channel Settings

- Percentage complete:** Calculated based on data entered into the various fields of a channel. Enter the name, description, location, URL, video, and tags to complete your channel.
- Channel Name:** Enter a unique name for the ThingSpeak channel.
- Description:** Enter a description of the ThingSpeak channel.
- Field#:** Check the box to enable the field, and enter a field name. Each ThingSpeak channel can have up to 8 fields.
- Metadata:** Enter information about channel data, including JSON, XML, or CSV data.
- Tags:** Enter keywords that identify the channel. Separate tags with commas.
- Link to External Site:** If you have a website that contains information about your ThingSpeak channel, specify the URL.
- Show Channel Location:**
 - Latitude:** Specify the latitude position in decimal degrees. For example, the latitude of the city of London is 51.5072.
 - Longitude:** Specify the longitude position in decimal degrees. For example, the longitude of the city of London is -0.1275.
 - Elevation:** Specify the elevation position meters. For example, the elevation of the city of London is 35.000.

Ora il canale è creato. È già disponibile il **Channel ID**, che sarà una delle informazioni che ci servirà nel programma. Notiamo anche che il canale risulta privato (**Private**) ovvero non sarà accessibile da chiunque.

La seconda informazione che ci servirà nel programma sarà la chiave API. Clicchiamo su **API Keys** per reperirla

ThingSpeak™ Channels Apps Support Commercial Use How to Buy

CO2

Channel ID: **123456789**
Author: **username**
Access: Private

Private View Public View Channel Settings Sharing API Keys Data Import / Export

+ Add Visualizations + Add Widgets Export recent data

MATLAB Analysis MATLAB Visualization

Channel Stats

Created: less than a minute ago
Entries: 0

Field 1 Chart

CO2 (PPM)

CO2

L'informazione che ci serve reperire nella schermata delle API Keys è la **Write API Key**, che ci permetterà di far scrivere dati sul canale. Annotiamola e clicchiamo su **Private View** per aggiungere una nuova visualizzazione di tipo Gauge (Manometro) dei nostri dati

The screenshot shows the ThingSpeak interface for a channel named "CO2". The top navigation bar includes "Channels", "Apps", and "Support". The channel information shows "Channel ID: 123456789", "Author: [redacted]", and "Access: Private". The "API Keys" tab is selected, displaying the "Write API Key" section with a key field and a "Generate New Write API Key" button. Below it is the "Read API Keys" section with a key field and a "Note" field. The right sidebar contains "Help" text, "API Keys Settings" with instructions for write and read keys, and "API Requests" with a "Write a Channel Feed" button.

CO2

Channel ID: 123456789
Author: [redacted]
Access: Private

Private View Public View Channel Settings Sharing API Keys Data Import / Export

Write API Key

Key [redacted]

Generate New Write API Key

Read API Keys

Key [redacted]

Note

Help

API keys enable you to write data to a channel or read data from a private channel. API keys are auto-generated when you create a new channel.

API Keys Settings

- **Write API Key:** Use this key to write data to a channel. If you feel your key has been compromised, click **Generate New Write API Key**.
- **Read API Keys:** Use this key to allow other people to view your private channel feeds and charts. Click **Generate New Read API Key** to generate an additional read key for the channel.
- **Note:** Use this field to enter information about channel read keys. For example, add notes to keep track of users with access to your channel.

API Requests

Write a Channel Feed

Clicchiamo sul tasto **Add Widgets**

The screenshot shows the ThingSpeak interface for the same "CO2" channel. The top navigation bar is the same. The "Channel Stats" section shows "Created: 13 minutes ago" and "Entries: 0". The "Add Widgets" button is highlighted with a blue arrow. Below the stats is a "Field 1 Chart" widget showing a graph of "CO2 (ppm)" vs "Date". The right sidebar contains "MATLAB Analysis" and "MATLAB Visualization" buttons.

Private View Public View Channel Settings Sharing API Keys Data Import / Export

+ Add Visualizations + Add Widgets Export recent data

Channel Stats

Created: 13 minutes ago
Entries: 0

Field 1 Chart

CO2

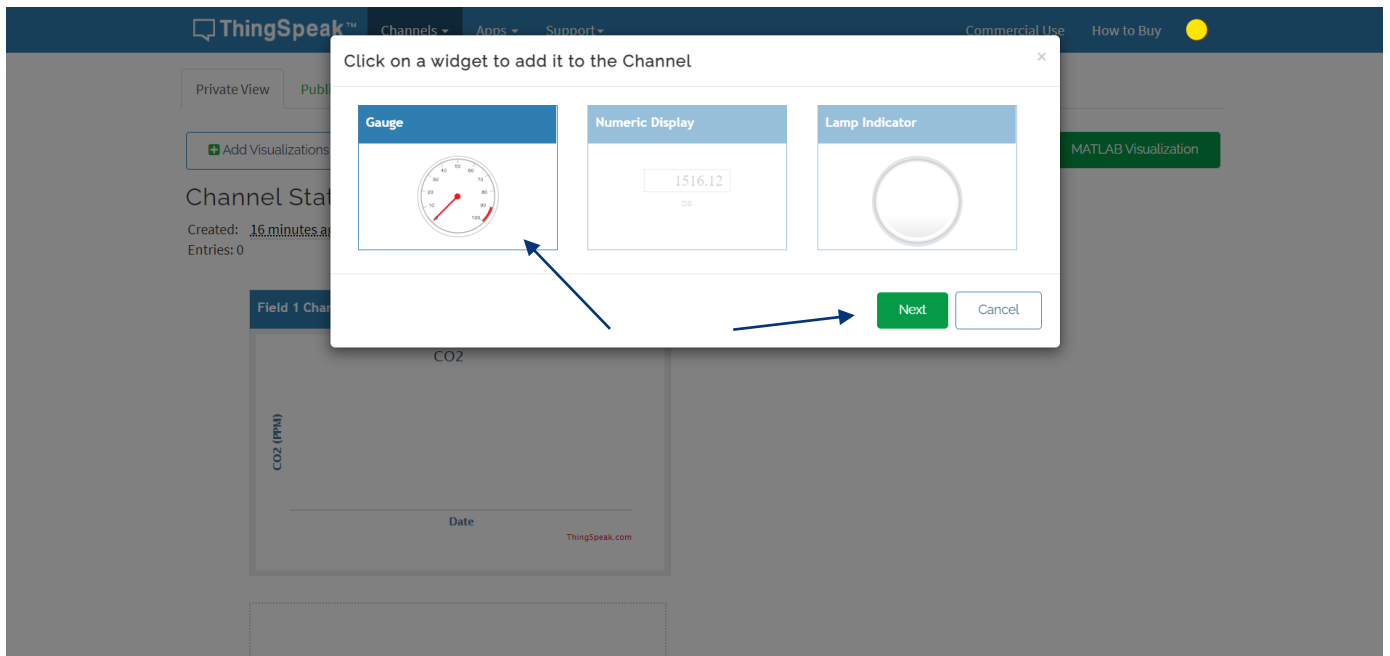
CO2 (ppm)

Date

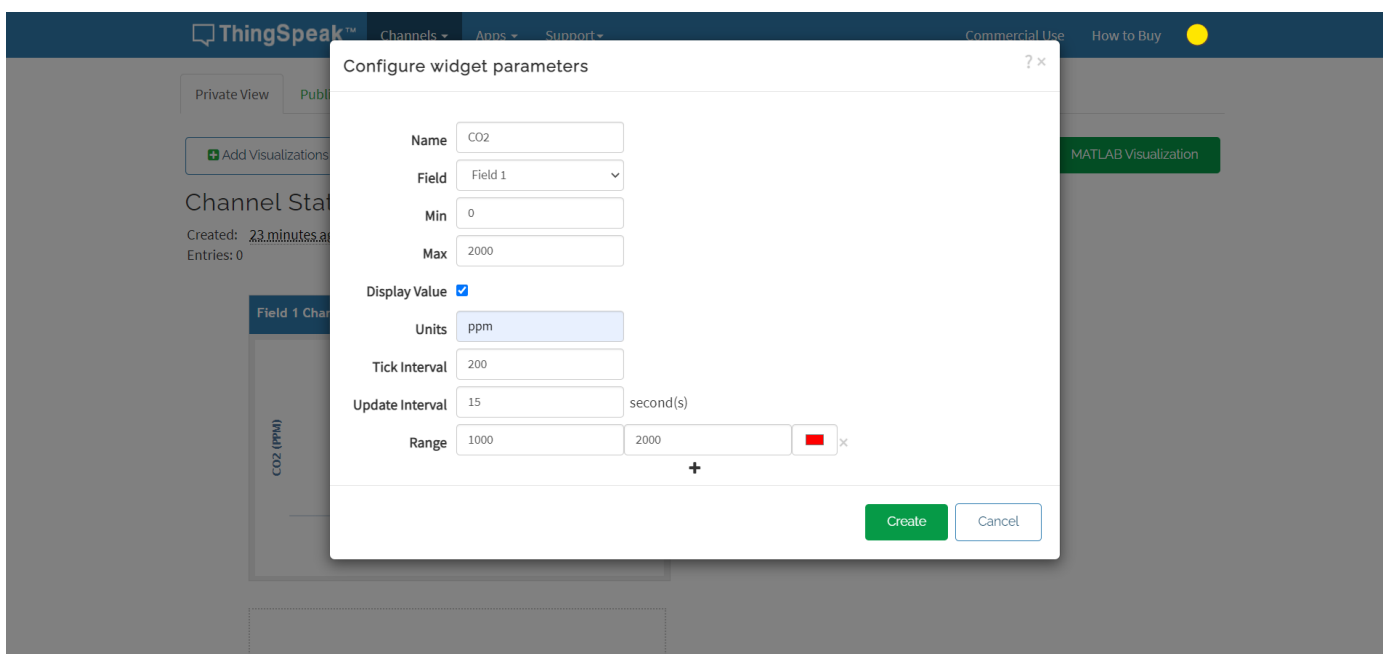
ThingSpeak.com

MATLAB Analysis MATLAB Visualization

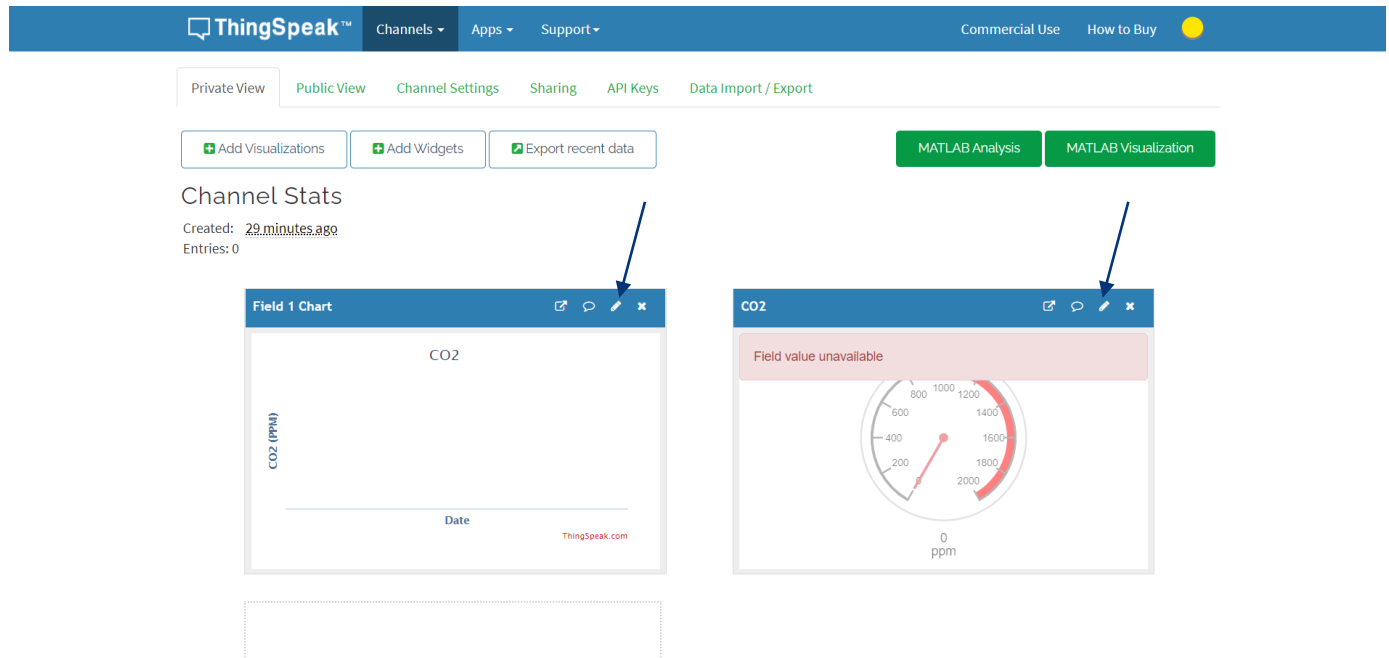
Successivamente selezioniamo **Gauge** e poi clicchiamo sul tasto **Next**. A questo punto apparirà una schermata di configurazione che permetterà di settare alcuni parametri



Possiamo indicare il nome da visualizzare nel campo **Name**, il **Field** da cui prendere i dati (fondamentale indicare lo stesso che abbiamo dichiarato nei Channel Settings, nel nostro caso 1), il range **Min** e **Max** in cui visualizzare i dati (il sensore è in grado di rilevare da 0 a 40.000 ppm di CO₂, ma per i nostri scopi andrà bene indicare da 0 a 2000. Possiamo inoltre indicare le **Units** (ovvero l'unità di misura dei dati che rileviamo), il **Tick Interval** (ovvero l'intervallo di visualizzazione delle tacche intermedie sul manometro, 200 sarà più che sufficiente), e un eventuale **Range** da segnalare (nel nostro caso potrebbe essere l'intervallo fra il valore che decideremo essere critico di CO₂ e il fondo scala del manometro). Questo range sarà visualizzato come una banda rossa sul display

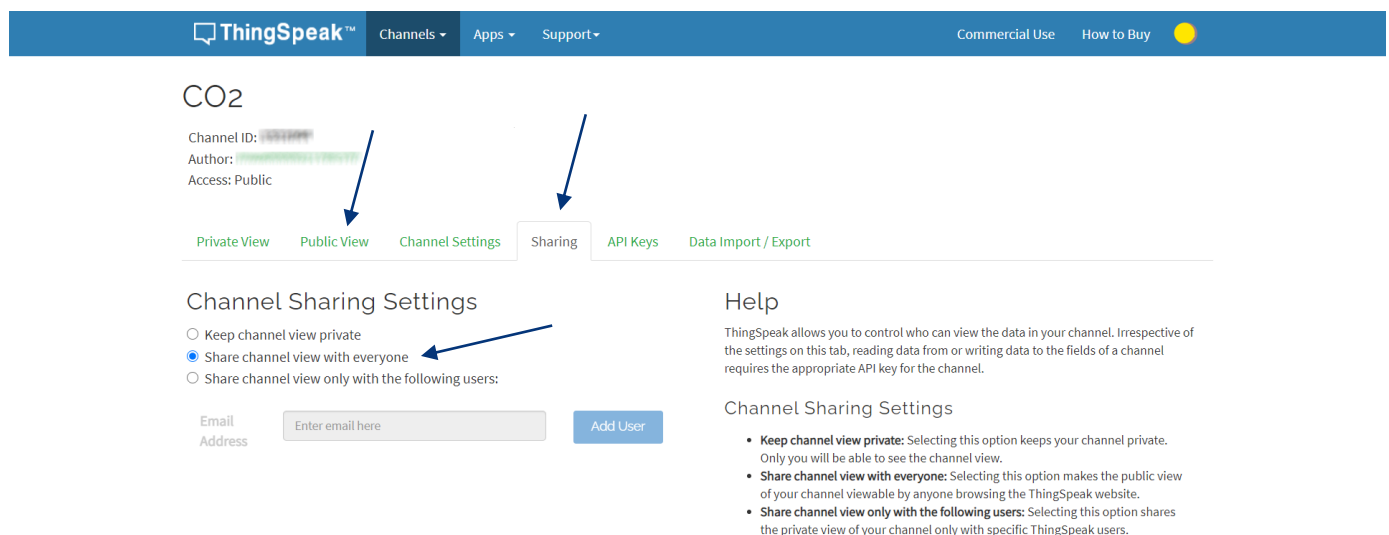


Il nostro Gauge è ora visibile, ma non ha dati da visualizzare (ovviamente). Finchè non imposteremo il programma per inviare dati a ThingSpeak™, nulla sarà visualizzato. Sarà sempre possibile modificare le impostazioni dei grafici cliccando sul simbolo della matita



The screenshot shows the ThingSpeak interface. At the top is a blue navigation bar with the ThingSpeak logo, 'Channels', 'Apps', and 'Support' dropdowns, and links for 'Commercial Use', 'How to Buy', and a yellow profile icon. Below this is a sub-navigation bar with 'Private View', 'Public View', 'Channel Settings', 'Sharing', 'API Keys', and 'Data Import / Export'. A row of buttons includes 'Add Visualizations', 'Add Widgets', 'Export recent data', 'MATLAB Analysis', and 'MATLAB Visualization'. The main content area is titled 'Channel Stats' with 'Created: 29 minutes ago' and 'Entries: 0'. Below this are two channel visualizations. The first, 'Field 1 Chart', is a line graph for 'CO2' with a y-axis labeled 'CO2 (ppm)' and an x-axis labeled 'Date'. The second, 'CO2', is a gauge chart with a red needle and a scale from 0 to 2000 ppm, displaying the message 'Field value unavailable'. Both charts have a blue header bar with icons for share, comment, edit (highlighted by a blue arrow), and close.

Prima di concludere, diamo qualche altra indicazione utile sul funzionamento di ThingSpeak™. Innanzitutto è possibile rendere il canale pubblico, ovvero visibile da tutti, e addirittura includerlo nel proprio sito web (come ad esempio quello della scuola). Per fare ciò cliccare sul tasto **Sharing** e mettere la spunta su **Share channel view with everyone**. A questo punto il canale sarà visibile anche nel menu **Public View**, in cui sarà possibile effettuare le modifiche della visualizzazione pubblica. Clicchiamo proprio su Public View per vedere come verrà visualizzato all'esterno. Dando al pubblico l'indirizzo web presente nella barra degli indirizzi (<https://www.thingspeak.com/channels/xxxxxxx>) chiunque potrà visualizzare il grafico direttamente su internet

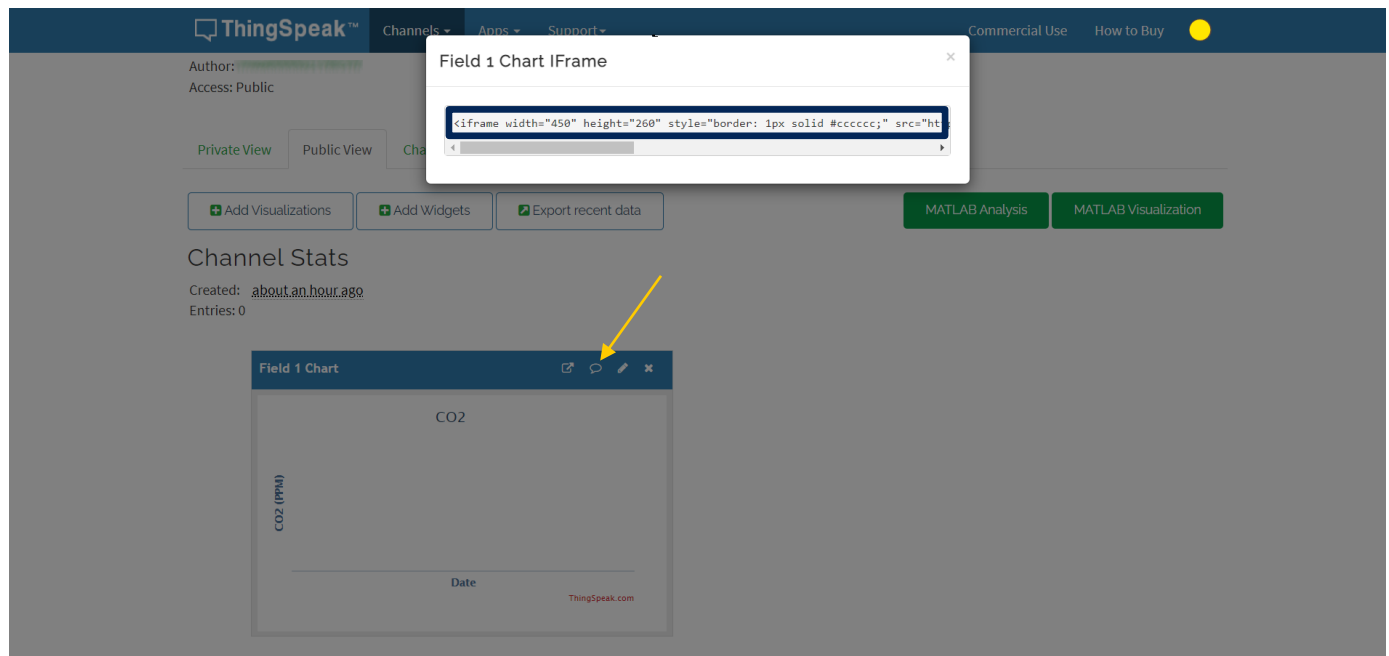


The screenshot shows the 'Channel Sharing Settings' page for a channel named 'CO2'. The top navigation bar is the same as the previous screenshot. Below it, the sub-navigation bar highlights 'Channel Settings', 'Sharing', 'API Keys', and 'Data Import / Export'. The 'Channel Stats' section shows 'Channel ID: 1031891', 'Author: [redacted]', and 'Access: Public'. The 'Channel Sharing Settings' section has three radio button options: 'Keep channel view private', 'Share channel view with everyone' (selected and highlighted by a blue arrow), and 'Share channel view only with the following users:'. Below these is a form with 'Email Address' and 'Enter email here' fields, and an 'Add User' button. To the right, a 'Help' section explains the settings, and a 'Channel Sharing Settings' section lists the three options with their effects.

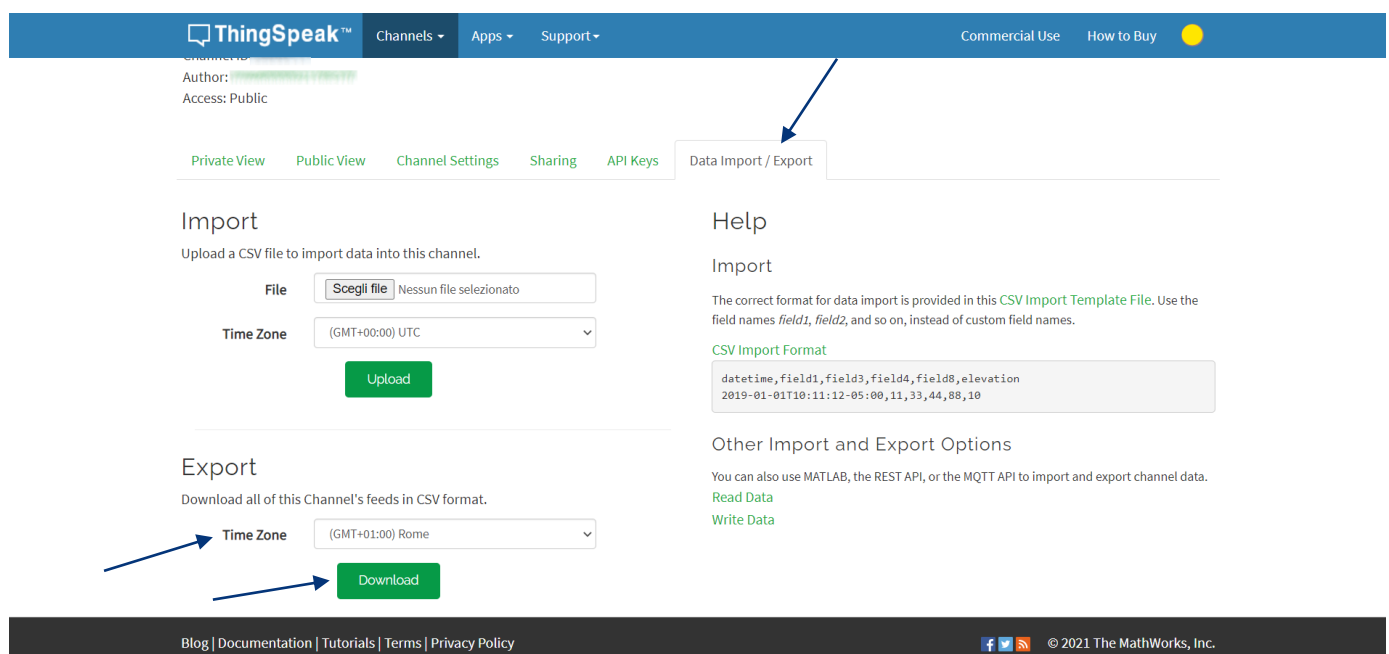
Channel Sharing Settings

- **Keep channel view private:** Selecting this option keeps your channel private. Only you will be able to see the channel view.
- **Share channel view with everyone:** Selecting this option makes the public view of your channel viewable by anyone browsing the ThingSpeak website.
- **Share channel view only with the following users:** Selecting this option shares the private view of your channel only with specific ThingSpeak users.

Invece per poter inglobare il grafico sul proprio sito sarà necessario andare sempre su Public View, cliccare sul simbolo della nuvoletta presente sul grafico, e copiare l'intero codice **iframe** per inserirlo nel codice HTML della propria pagina web



Come ultima indicazione mostriamo come è possibile esportare i dati. Per fare ciò si clicca sul menu **Data Import/Export**, dove successivamente sarà necessario indicare la corretta **Time Zone** per evitare dati scorretti, e cliccare su **Download** per scaricare un file in formato **.csv** da poter elaborare con **Excel** o simili



Ora siamo pronti per poter inserire i parametri del nostro canale ThingSpeak™ nel programma. A questo proposito, ricordiamoci di prendere nota dei seguenti parametri:

- Channel ID
- Write API Key
- Numero del Field