

How to store data on Mindsphere cloud

We will use a Mindconnect Node-RED node to store data on Mindsphere

As documented here

[node-red-contrib-mindconnect \(node\) - Node-RED \(nodered.org\)](#)

First you have to create some data on mindsphere

Assets, aspects and variables

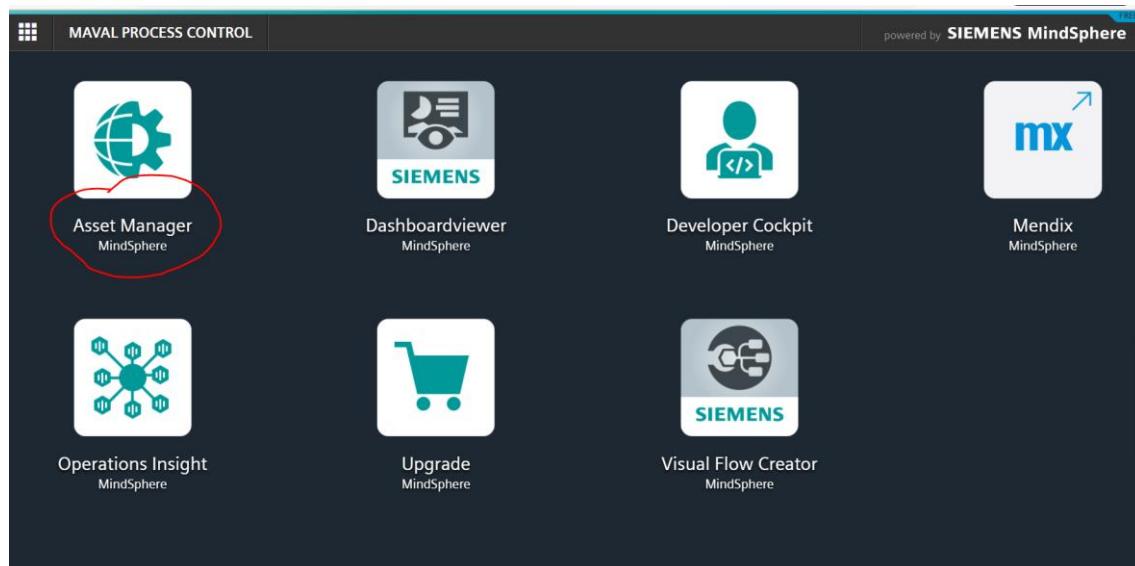
As explained here

[MindSphere – Como conectar um Raspberry PI ao MindSphere - YouTube](#)

And here you see how to inject to Mindsphere

[MindSphere – Como utilizar o Visual Flow Creator \(NODE-Red\) no MindSphere - YouTube](#)

So let's create an Asset from Asset Manager



Let's create an Aspect (A set of variables) so the Asset will be a type of Aspect, so you can have several assets (for instance Edge machines) of same type, so you do not have to create a new one each time.

Asset Model

- Assets**: An asset is a digital representation of a machine or an automation system with one or more automation units (e.g., PLC) connected to MindSphere.
- Types**: A type is a pre-configured template for an asset. Assets take on the properties of the type on which they are based. Within the type you can define which aspects are integrated into the template.
- Aspects**: Aspects are a data modeling mechanism for assets. Aspects group related data points based on their logical association and can consist of several variables.

Let's create an Aspect

Aspect Types

Create aspect

AgentOnlineStatus

Description: Online status of an agent typed asset.

Name	Unit	Data type	Max. length	Default value
onlineStatus	-	BOOLEAN	-	-

In this case called LoRaWAN_test

Aspect information

Type ID: iiotfbqv

Name: *

Description:

Choose category:

MAVAL PROCESS CONTROL Asset Manager powered by SIEMENS MindSphere

Library / Aspect Types / Create aspect

Create aspect

Aspect information

Type ID: iiotfbqv.LoRaWAN_test
Type ID cannot be changed after creation

Name: * LoRaWAN_test

Description: Description
255 characters left

Choose category:

Scroll down and add a variable

MAVAL PROCESS CONTROL Asset Manager powered by SIEMENS MindSphere

Library / Aspect Types / Create aspect

Dynamic The aspect is used for time-series data
 Static The aspect is used for static data

Variables

Please add at least one variable!

No variables entered yet
Add your first variable to your aspect

+ Add variable

MAVAL PROCESS CONTROL Asset Manager powered by SIEMENS MindSphere

Library / Aspect Types / Create aspect

The category of an aspect cannot be changed afterwards.

Dynamic The aspect is used for time-series data
 Static The aspect is used for static data

Variables

- Variable names must be unique inside an aspect.
- The data type BIG_STRING is only available for a dynamic aspect.

+ Add variable - Import variables ↴ Download template ↵ Export variables ⚡ Delete all new

Name	Unit	Data type	Max. length
Name	Unit	Select...	Max. length

Defined

Save Cancel

Fill in (add more variables like humidity, pressure, etc) and click save

The screenshot shows the 'Aspect Types' creation page. A note at the top states: 'The category of an aspect cannot be changed afterwards.' Below it, two radio button options are shown: 'Dynamic' (selected) and 'Static'. Under the 'Variables' section, there is a table with one row containing 'Temperatura_nevera' as the name, '°C' as the unit, 'DOUBLE' as the data type, and a 'Max. length' field set to 'Defined'. At the bottom left, a red circle highlights the 'Save' button.

If you scroll down you will see the just created Aspect type: LoRaWAN_test

The screenshot shows the 'Aspect Types' list page. On the left, a sidebar lists various asset types like 'core.sinumerikbasicmachinemodel', 'SinumerikBasicMachineStatus', etc. In the main area, a card for 'AgentOnlineStatus' is displayed with the title 'AgentOnlineStatus', status 'core.agentstatus', and 'Dynamic' type. It has a 'Description' section stating 'Online status of an agent typed asset' and a 'Variables' section with a table for 'onlineStatus' (BOOLEAN type). The 'LoRaWAN_test' item is also visible in the list on the left.

Now you need to create an Asset Type, it will be an instance of predefined Aspect type

Let's select Asset Types

The screenshot shows the 'Asset Types' selection page. On the left, a sidebar lists asset types like 'core.sinumerikbasicmachinemodel', 'SinumerikBasicMachineStatus', etc. In the main area, a card for 'AgentOnlineStatus' is displayed with the title 'AgentOnlineStatus', status 'core.agentstatus', and 'Dynamic' type. It has a 'Description' section stating 'Online status of an agent typed asset' and a 'Variables' section with a table for 'onlineStatus' (BOOLEAN type).

And create Type

The screenshot shows the 'BasicAsset' details page. On the left, there's a sidebar with icons for Home, Library, and Asset Types, followed by a 'Create type' button. Below these are sections for 'Core types' containing 'BasicAgent', 'BasicApplication', 'BasicDevice', 'BasicHierarchy', and 'Basic Edge Data Asset'. The main panel displays the 'BasicAsset' entity with the ID 'core.basicasset' and 0 aspects. It has tabs for 'General' and 'Usages' (which is selected). Below the tabs are sections for 'Variables' (empty) and 'Aspects' (empty).

The screenshot shows the 'Create type' form. It includes fields for 'Parent type' (set to 'core.basicasset'), 'Name' (set to 'Name'), 'Type ID' (set to 'iiotfbqv.'), and 'Description' (set to 'Description'). The form is divided into sections: 'Type information', 'Parent type', 'Name', 'Type ID', and 'Description'.

The screenshot shows the 'Create type' form again, but with a different name. The 'Name' field now contains 'farmacia'. The other fields ('Parent type', 'Type ID', and 'Description') remain the same as in the previous screenshot.

Then you have to scroll down and click on + aspect

MAVAL PROCESS CONTROL Asset Manager

Library / Asset Types / Details / Create type

No aspects entered yet

Add your first aspect to your type

+ Add aspect

Save Cancel

And select one of the created Aspects

MAVAL PROCESS CONTROL Asset Manager

Library / Asset Types / Details / Create type

+ Image

+ Variables

- Aspects

+ Add aspect Browse aspects

Name	Aspect	Category
Name	Select...	Defined

Save Cancel

Give a name and select an Aspect

MAVAL PROCESS CONTROL Asset Manager

Library / Asset Types / Details / Create type

+ Image

+ Variables

- Aspects

+ Add aspect Browse aspects

Name	Aspect	Category
Name	Select...	Defined

Save Cancel

The screenshot shows the 'Asset Manager' section of the Siemens MindSphere platform. A new asset type is being created with the name 'LoRaWAN_test'. The 'Aspects' section contains one entry: 'LoRaWAN_test' under 'Aspect' and 'Dynamic' under 'Category'. There are also sections for 'Image' and 'Variables'.

Once created you will see it on the list

The screenshot shows the list of asset types. One item, 'farmacia', is highlighted in yellow. The details for 'farmacia' are shown on the right, including its description as 'File to store data' and its aspect 'LoRaWAN_test'.

If you click on "farmacia" you will see this

The screenshot shows the detailed view for the asset type 'farmacia'. It includes sections for 'Description' (File to store data), 'Variables' (No variables entered yet), and 'Aspects' (List showing 'LoRaWAN_test' with 'Dynamic' category). The 'Usages' tab is currently selected.

Now we have to make two actions:

1 Talk to mindsphere (send data to mindsphere but this data will be lost) (we will name it as data_connection)

2 Store data to mindsphere (to make this data permanent) (we will name it as data_storage)

So click on Assets

The screenshot shows the Siemens MindSphere Asset Manager interface. On the left, there's a sidebar with navigation icons and a list of asset types: MindConnectIoTExtension, OPCUADataModel, OPCUADatatype, OPCUAHierarchydatatype, Own types, and farmacia. The 'farmacia' item is currently selected. The main panel displays the details for 'core.basicasset / iiotfbqv.farmacia'. The 'Description' field contains 'File to store data'. Below this are tabs for 'General' and 'Usages'. A 'Variables' section indicates 'No variables entered yet'. An 'Aspects' section lists a single entry: LoRaWAN_test under 'Name', iiotfbqv.LoRaWAN_test under 'Aspect', Dynamic under 'Category', and Defined under 'Defined'. There are edit and add icons at the top right of the main panel.

And create Asset

The screenshot shows the Siemens MindSphere Asset Manager interface. On the left, there's a sidebar with navigation icons and a list of assets: data_connection, data_storage, DemoPump, MobilePhone, and RPI Device. The 'data_connection' item is currently selected. The main panel displays the details for 'iiotfbqv'. The 'Description' field contains 'Root Asset for iiotfbqv tenant'. Below this are sections for 'Events' (Last updated: 2022-01-02 14:48:39) and 'Aspects'. The 'Events' section shows 'No events in the last 24 hours' and has a 'Refresh' button. The 'Aspects' section is collapsed. There are edit and add icons at the top right of the main panel.

Select type

Back

Filter

BasicArea core.basicarea	core type	Area type for creating asset hierarchy levels.
BasicSite core.basicsite	core type	Site type for creating asset hierarchy levels.
EdgeAnalyticsApplication core.edgeanalyticsapplica...	core type	Represents the Edge Analytics Application present on the Edge device
Industrial Edge Software A... core.industrialedgesoftw...	core type	Industrial Edge Software Agent unlocks the full potential of your existing edge hardware by c...

Industrial Edge

Create

And we select MindconnectLib

Select type

Back

Filter

MindConnectIntegration core.mcintegration	core type	MindConnect Integration Agent asset type
MindConnectIoT2040 core.mciot2040	core type	MindConnect IoT 2040 Agent asset type
MindConnectLib core.mcplib	core type	MindConnect Lib Agent asset type
MindConnectNano core.mcnano	core type	MindConnect Nano Agent asset type

MOTT Agent

Create

And give a name

Add asset

General

Type ID:
core.mcplib

Selected type of asset cannot be changed

Name: *
data_connection

Description:

Description

255 characters left

You will see this

The screenshot shows the Asset Manager interface for the 'MAVAL PROCESS CONTROL' system, powered by SIEMENS MindSphere. On the left, a sidebar lists assets under 'iiotfbqv': 'data_connection', 'data_storage', 'DemoPump', 'MobilePhone', and 'RPI Device'. The main panel displays the details for the 'data_connection' asset. It includes sections for 'Description' (No description available), 'Location' (No location available), 'Events' (Last updated: 2022-01-02 14:56:57, showing 'No events in the last 24 hours'), and 'Aspects' (Last updated: 2022-01-02 14:56:57). A 'Refresh' button is present in the Events section.

Now we create a storage asset same type than we have created before (farmacia)

We create new asset

The screenshot shows the 'Select type' dialog within the Asset Manager. It lists several asset types: 'VibrationSpectra' (core.vibrationspectra, core type, description: 'Represents the set of vibration frequency or order spectra'), 'Demo Pump Asset Type' (iiotfbqv.DemoPumpAsset..., description: 'Demo pump asset type'), 'farmacia' (iiotfbqv.farmacia, description: 'File to store data'), and 'MobilePhone' (iiotfbqv.mobilephone, description: 'Asset type for Mobile Phone example'). A 'Create' button is located at the bottom right of the dialog.

Select previously created asset (farmacia)

And click on create

The screenshot shows the 'Add asset' dialog. Under the 'General' tab, the 'Type ID:' field is set to 'iiotfbqv.farmacia' (Selected type of asset cannot be changed). The 'Name:' field contains 'data_storage'. The 'Description:' field is empty with the placeholder 'Description' and a note '255 characters left'.

Click on save and you will see this

The screenshot shows the Siemens MindSphere Asset Manager interface. On the left, there is a sidebar with a tree view of assets under the node 'iiotfbqv'. The selected asset is 'data_storage'. The main panel displays the asset's details, including its name 'data_storage', location 'No location available', and description 'No description available'. Below this, there are sections for 'Events' (last updated 2022-01-02 15:03:08) and 'Aspects' (last updated 2022-01-02 15:03:08). A 'Refresh' button is located in the events section.

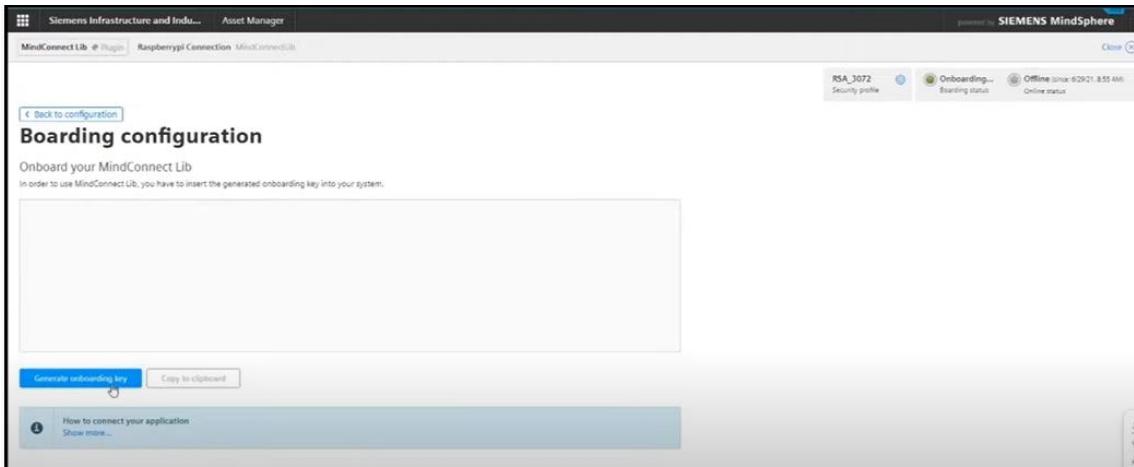
Now we have to go to data_connect asset created and click o the blue arrow close to MindConnect Lib to generate a security Key

The screenshot shows the Siemens MindSphere Asset Manager interface. On the left, there is a sidebar with a tree view of assets under the node 'iiotfbqv'. The selected asset is 'data_connection'. The main panel displays the asset's details, including its status (1 OFFLINE, 0 ONLINE, 0 STATIC). Below this, there are sections for 'Variables' (no variables entered yet) and 'Connectivity'. The 'Connectivity' section shows a connection to 'MindConnect Lib' (status: Offline, version: v3). A 'MindSphere Operator' icon is also present.

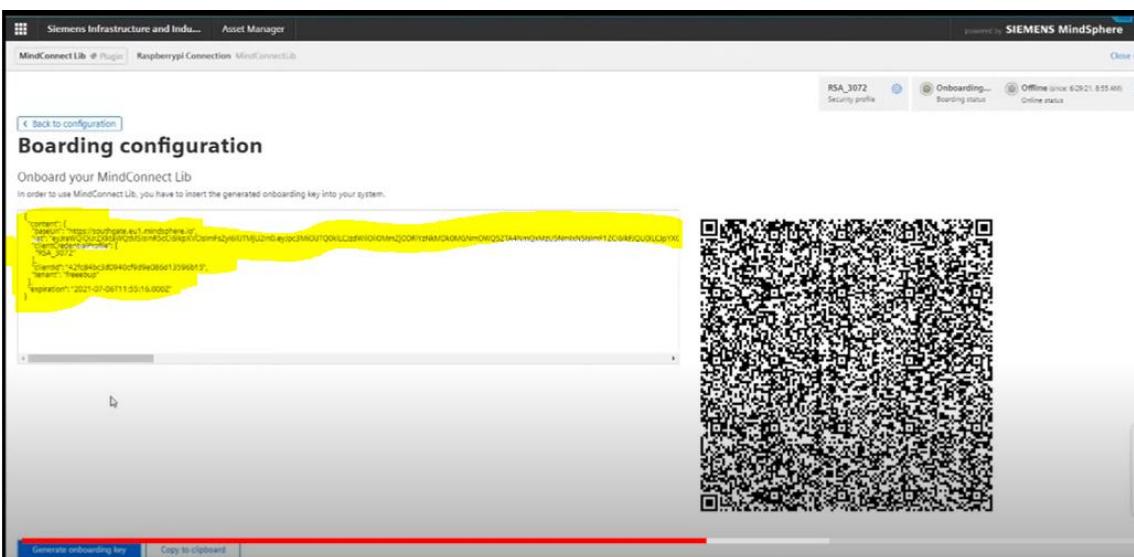
Let's select SHARED SECRET

The screenshot shows the 'Configure MindConnect Lib' dialog. It includes a header with 'Siemens Infrastructure and Industry Asset Manager' and 'powered by SIEMENS MindSphere'. Below the header, it says 'MindConnect Lib < Plugin RaspberryPi Connection MindConnectLib'. There is a 'Close' button. The main content area is titled 'Configure MindConnect Lib' and contains a note about secure connectivity. It asks the user to select a security profile. Two options are listed: 'RSA_3072' (selected) and 'SHARED_SECRET'. Both options mention the use of unique onboarding security tokens. At the bottom, there is a 'Save' button.

Ad click on save

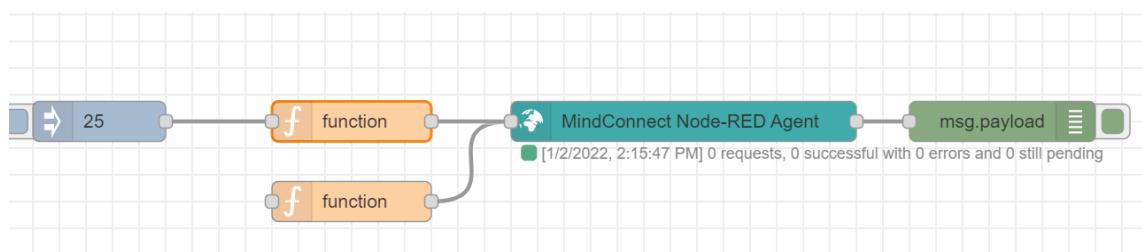


And click on “generate onboarding key”



You will see a key JSON text, copy it and save on a plain text file. You will need it later.

Now we can go to the IBM node RED or any Edge machine we will use



You must use a function like this one, with same name of variable you have created as Datapoint starting with DP-

Edit function node

Delete Cancel Done

Properties

Name Name

On Message

```

1 var newmsg = msg.payload;
2 const values =[{
3     "dataPointId": "DP-Temperatura_nevera",
4
5     "qualityCode": "0",
6     "value": `${newmsg}`
7     // "value": "25"
8 },
9 ]
10 msg.time=new Date();
11 msg.payload=values;
12 return msg;

```

And on the Mindconnect node, just copy the JSON credentials you have saved to a file before

Edit mindconnect node

Delete Cancel Done

Properties

Profile SHARED_SECRET

Retries 3

Async requests 1

Async duration 10 (in seconds)

Agent Configuration **Agent Information**

```
{
  "content": {
    "baseUrl": "https://southgate.eu1.mindsphere.io",
    "iat": "eyJraWQiOiJrZXktaWQtMSIsInR5cCI6IkpXVCIsImFsZyI6IlJTJmU2
    In0.eyJpc3MiOiJTQ0kiLCJzdWIiOiI2YzkwMGMxZWZmMDk0NGQ5
    OGExOGFmOTMzM2NiY2EzZilsImF1ZCI6IkFJQU0iLCJpYXQiOjE"
  }
}
```

Then you have to activate this connection by clicking on

Edit mindconnect node

Delete **Cancel** **Done**

Properties

Name	<input type="text" value="Name"/>
Profile	SHARED_SECRET
Retries	3
Async requests	1
Async duration	10 (in seconds)

Agent Configuration **Agent Information**

```
{
  "content": {
    "baseUrl": "https://southgate.eu1.mindsphere.io",
    "iat": ""
  }
}
```

You will see this

Agent Configuration

Automatic Data Source Configuration (Node Id: b52886e52bc45d23):

The data source configuration will automatically create the data source and data mappings for selected asset. If you want to use a more complex configuration (e.g. if you want to map the agent to multiple assets and/or aspects) please use the [MindSphere Configuration Dialog](#) instead.

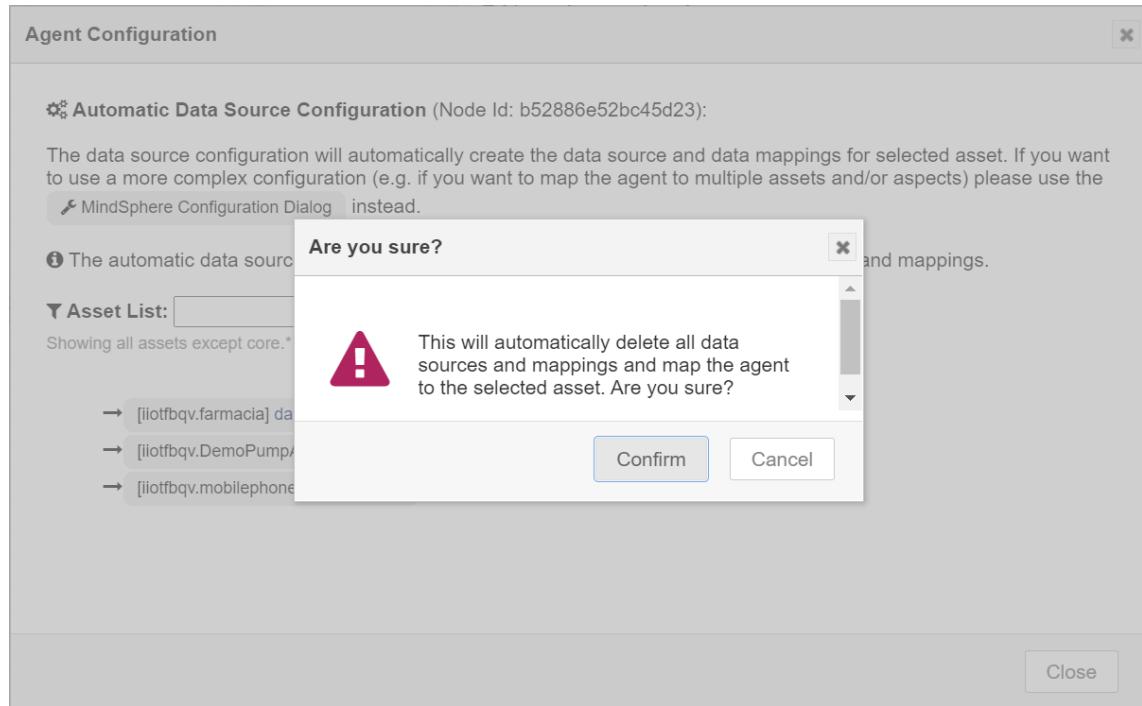
Asset List: **Filter Assets**

Showing all assets except core.* assets (like areas, sites, agents etc.)

- [iiotfbqv.farmacia] data_storage
- [iiotfbqv.DemoPumpAssetType] DemoPump
- [iiotfbqv.mobilephone] MobilePhone

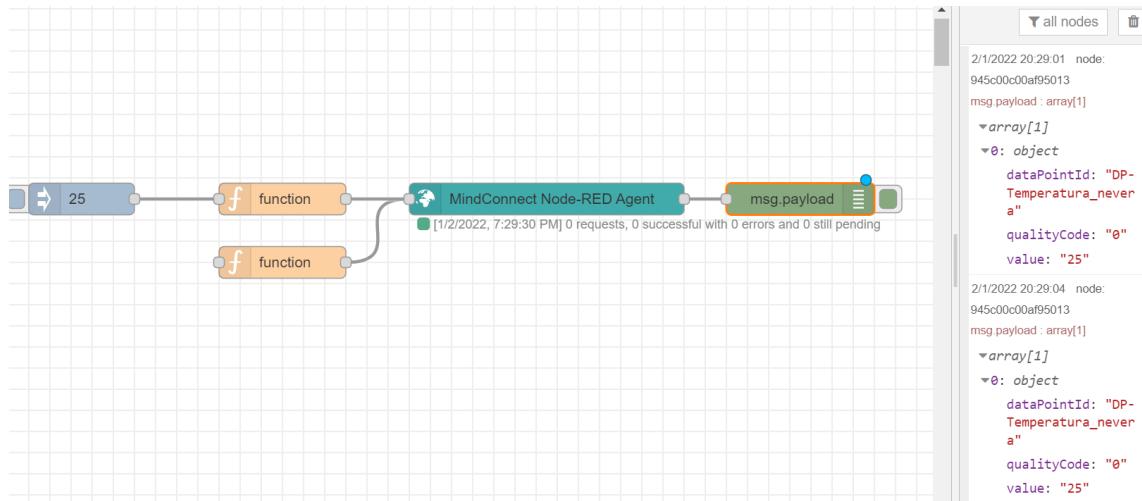
Close

Select our data_storage



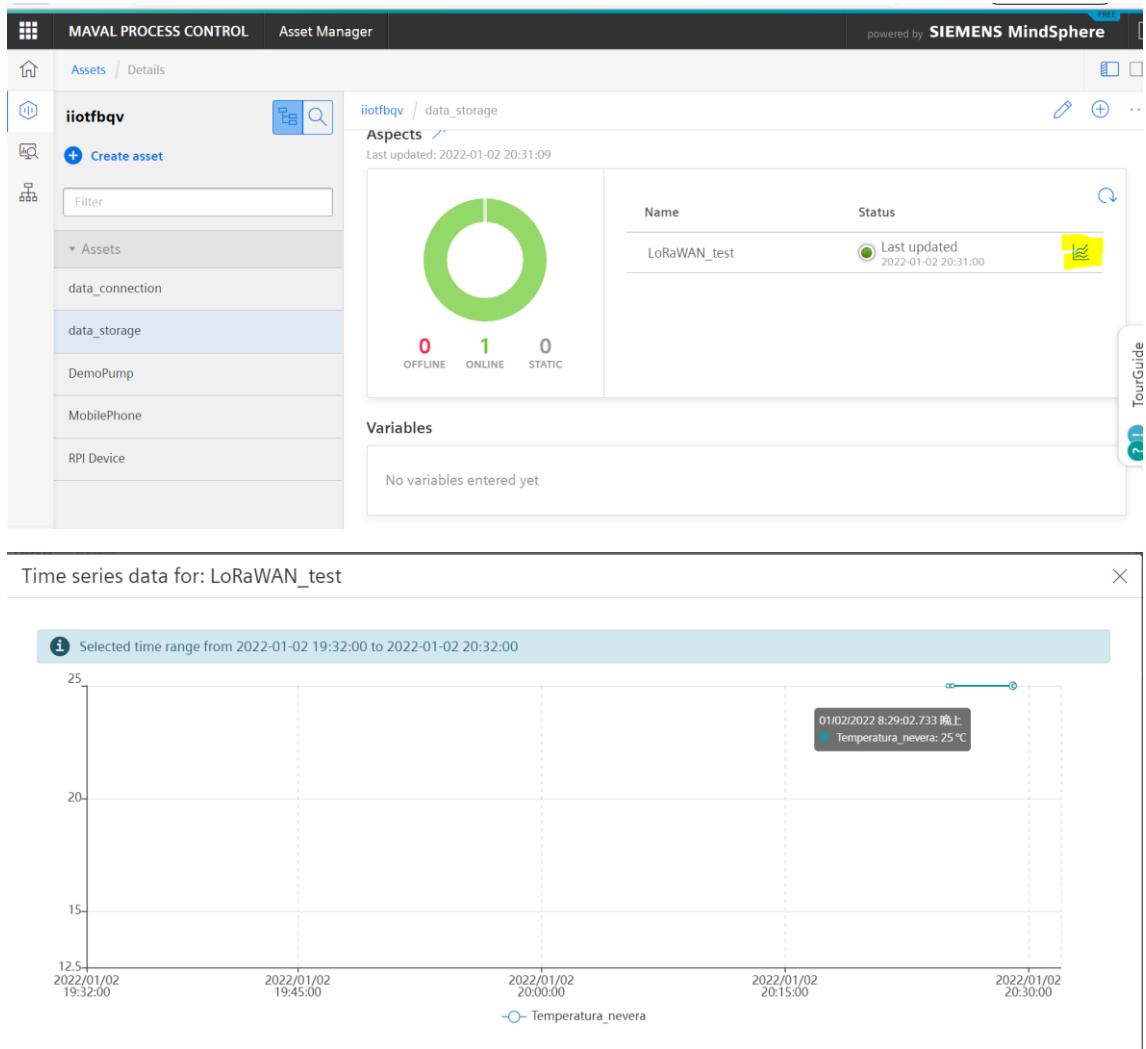
You will see data_connection in green color

We can test the IBM node-RED Flow

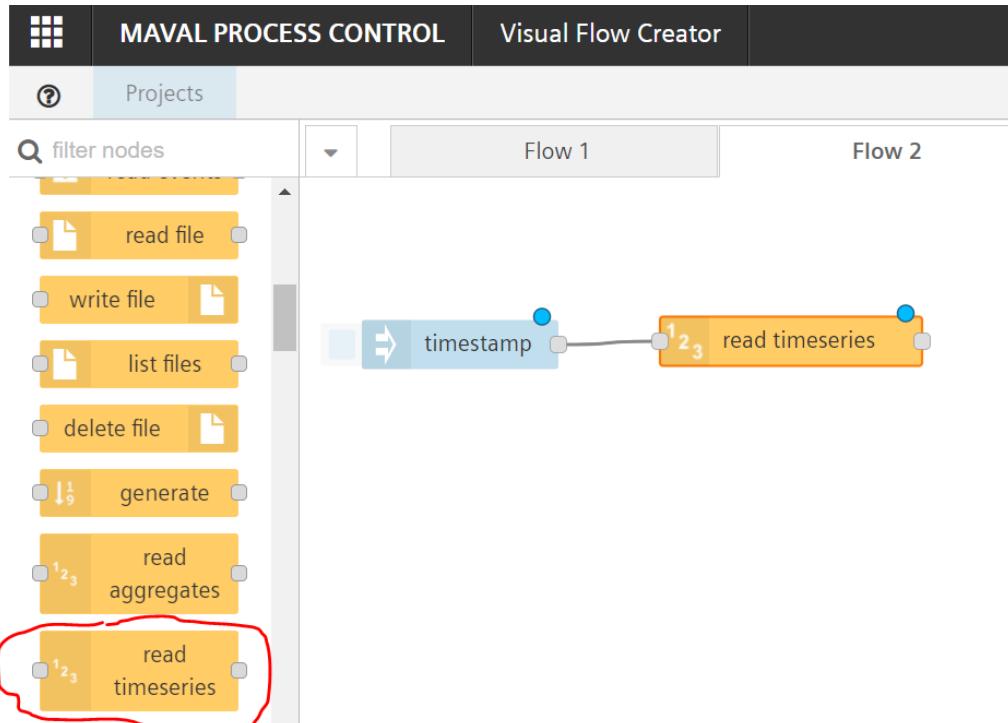


Now we can go to Asset Manager on MIndsphere

Assets / data_storage and click on the trend graph icon



Now we can go to the Visual Flow creator from Mindsphere and see whether there is data:



Edit read timeseries node

Delete Cancel Done

node properties

Name: Name

Topic: Topic ...

Topic Summary: No asset selected

Mode: Period

Period: 1 hour

Offset: no offset

TourGuide ? !

Assets Aspects Variables

Search ... 6 / 6 Search...

Icon	Name	Description
asset	data_connecti...	core.mclib
asset	data_storage	iiotfbqv.farmacia
asset	DemoPump	iiotfbqv.DemoPum... Please do not mo...
asset	iiotfbqv	core.basicenterprise Root Asset for iiot...

Ok Cancel

Assets

Search ... 6 / 6

- data_connecti...**
core.mclib
- data_storage**
iiotfbqv.farmacia
- DemoPump**
iiotfbqv.DemoPum...
Please do not mo...
- iiotfbqv**
core.basicenterprise
Root Asset for iiot...

Aspects

LoRaWAN_test

Variables

Search...

Ok Cancel

The screenshot shows the MAVL PROCESS CONTROL Visual Flow Creator interface. The top navigation bar includes 'MAVL PROCESS CONTROL', 'Visual Flow Creator', and 'powered by SI'. The main area is divided into three panels: 'Assets', 'Aspects', and 'Variables'. The 'Assets' panel lists several assets, including 'data_connecti...', 'data_storage', 'DemoPump', and 'iiotfbqv'. The 'Aspects' panel displays 'LoRaWAN_test'. The 'Variables' panel is currently empty. A red circle highlights the 'data_storage' asset in the 'Assets' panel. At the bottom right are 'Ok' and 'Cancel' buttons.

Projects

filter nodes

- read file
- write file
- list files
- delete file
- generate
- read aggregates
- read timeseries
- write timeseries
- subscribe timeseries
- asset type

Assets

Search ... 6 / 6

- data_connecti...**
core.mclib
- data_storage**
iiotfbqv.farmacia
- DemoPump**
iiotfbqv.DemoPum...
Please do not mo...
- iiotfbqv**
core.basicenterprise
Root Asset for iiot...

Aspects

LoRaWAN_test 1

Variables

Search...

Temperatura_nevera (°C)

Ok Cancel

This screenshot is identical to the one above, showing the MAVL PROCESS CONTROL Visual Flow Creator interface. The 'data_storage' asset is again highlighted with a red circle in the 'Assets' panel. The other assets listed are 'data_connecti...', 'DemoPump', and 'iiotfbqv'. The 'Aspects' panel shows 'LoRaWAN_test' with a count of 1. The 'Variables' panel contains a single variable entry: 'Temperatura_nevera (°C)'. The bottom right features 'Ok' and 'Cancel' buttons.

You will get these values

Edit read timeseries node

Delete

node properties

Name: Name

Topic: c81c03d0fcfb4606a9a5e034d1c957e3/47f54f6f6afa4f40ad4375ea44ce84e9/Temperatura_nevera

Topic Summary: c81c03d0fcfb4606a9a5e034d1c957e3 (data_storage)
47f54f6f6afa4f40ad4375ea44ce84e9 (LoRaWAN_test)
Temperatura_nevera

Mode: Period

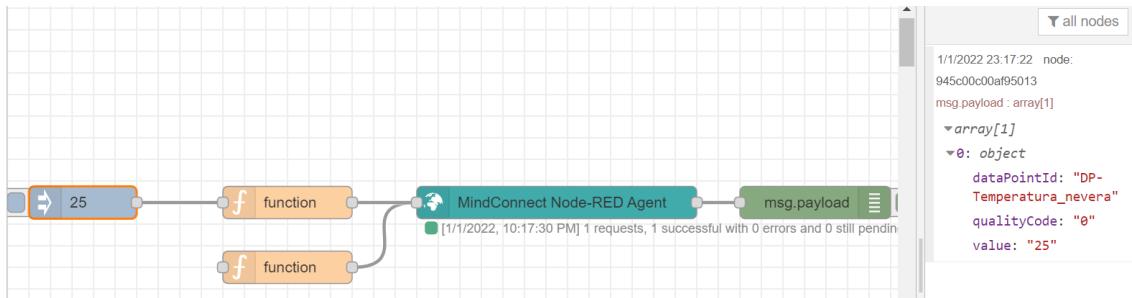
Period: 1 hour

```

graph LR
    timestamp[timestamp] --> read[read timeseries data_storage/LoRaWAN_test/Temperatura_nevera]
    read --> payload[msg.payload]
  
```

Let's test the flow

First let's inject data from IBM cloud to mindsphere



Attention, you have to insert DP- in front of your data name

Edit function node

Delete Cancel Done

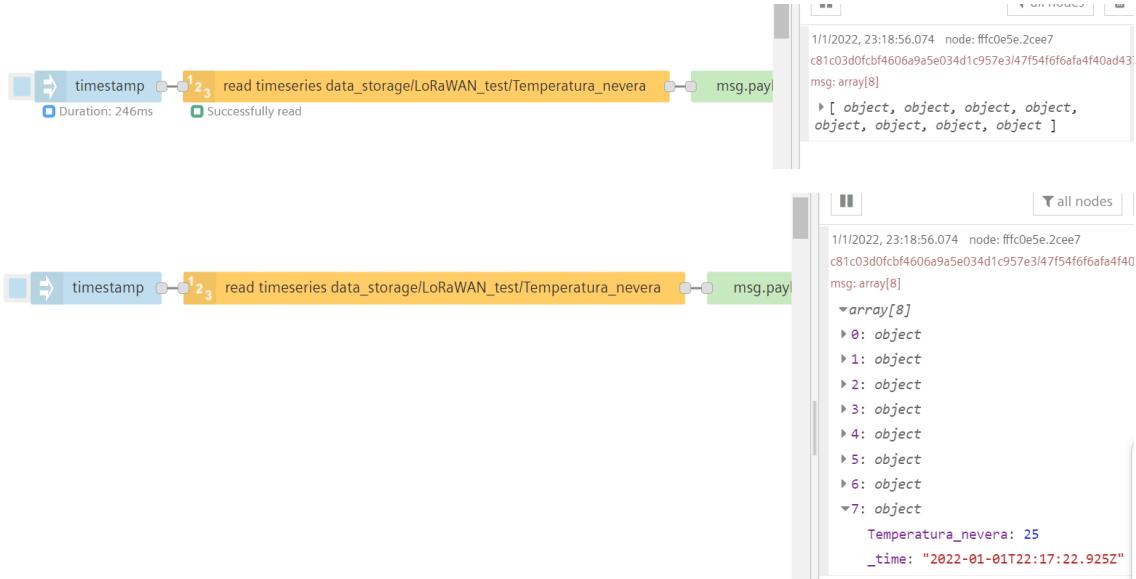
Properties

Name: Name

Setup On Start On Message On Stop

```

1 var newmsg = msg.payload;
2 const values =[{
3   "dataPointId": "DP-Temperatura_nevera",
4   "qualityCode": "0",
5   "value": `${newmsg}`,
6   // "value": "25"
7 },
8 ],
9 ]
10 msg.time=new Date();
11 msg.payload=values;
12 return msg;
  
```



So it works!

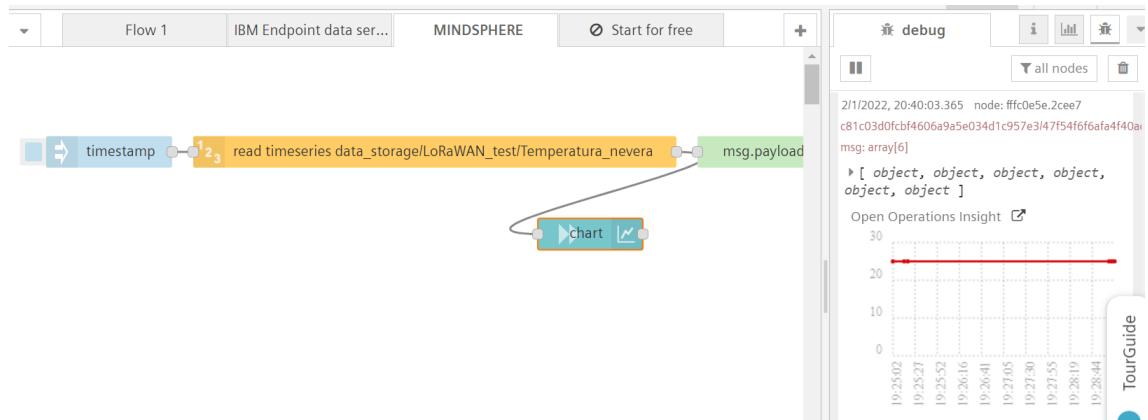
Let's add a chart

The screenshot shows a Node-RED flow with the following components:

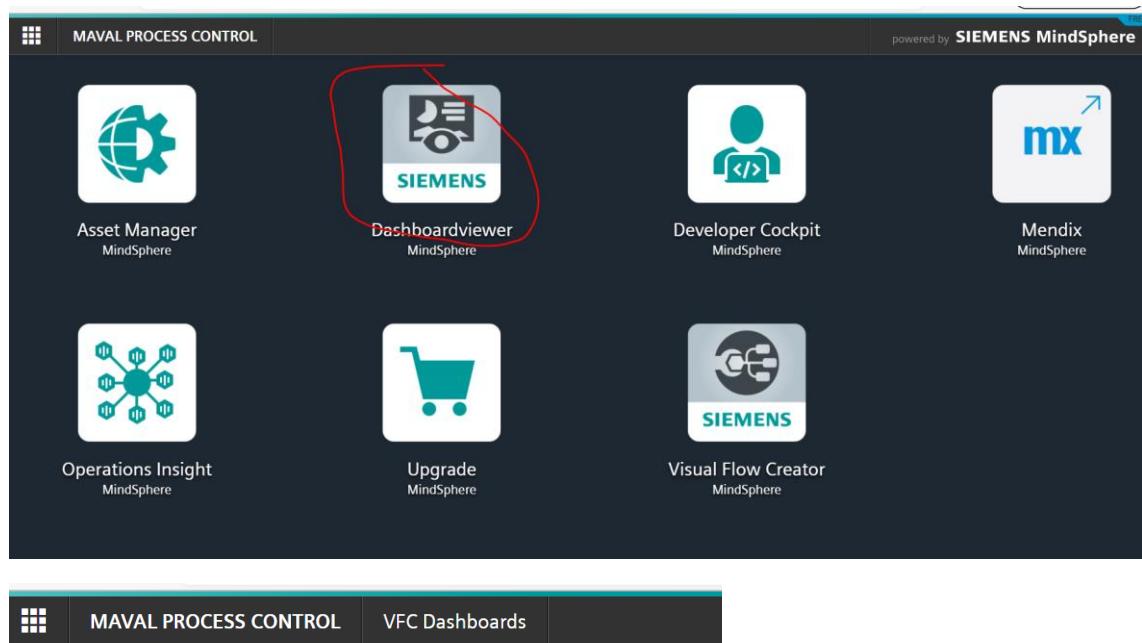
- A blue "timestamp" node.
- An orange "read timeseries" node with the path "data_storage/LoRaWAN_test/Temperatura_nevera".
- A green "msg.payload" output port from the read node.
- A red "chart" node connected to the msg.payload port.
- An "Edit chart node" dialog box is open, showing the following configuration:

 - Group:** Temperatura_nevera [Temperatura ne]
 - Size:** auto
 - Label:** chart
 - Type:** Line chart (selected)
 - X-axis:** last 1 hours OR 1000 points
 - X-axis Label:** HH:mm:ss
 - Y-axis:** min 0 max 1641075307

And let's inject again



Now let's see the dashboard



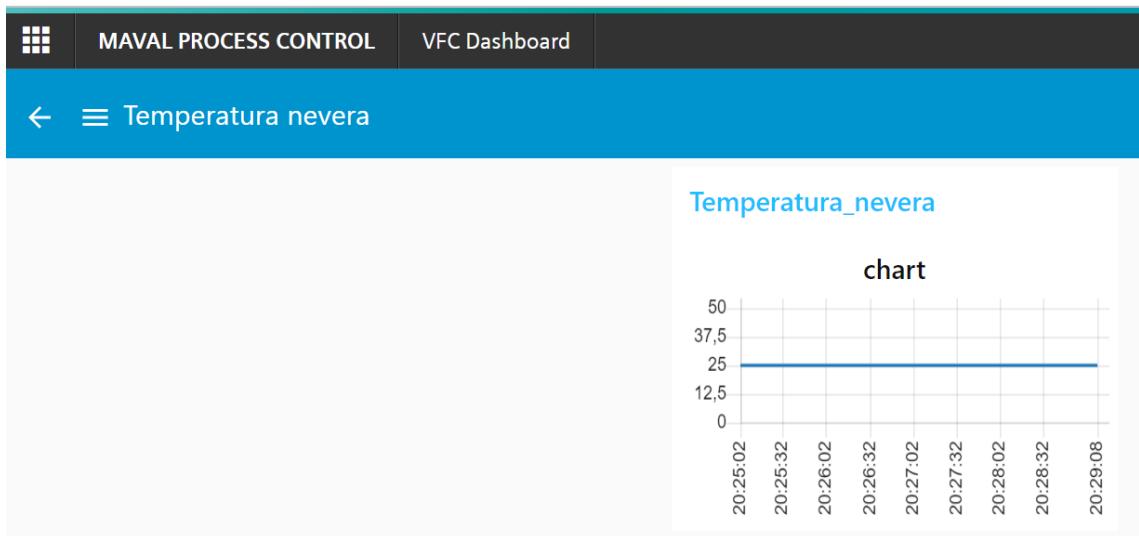
Dashboards Overview

Here you can view all of the Dashboards available to you.

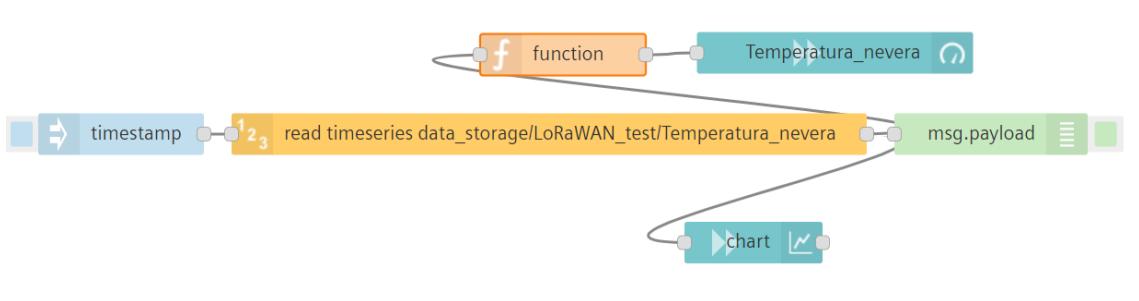
Search for a Dashboard:

The screenshot shows two dashboards listed on the "VFC Dashboards" page:

- Temperat...** by xflorensa. It features a large circular icon with a network or gear-like pattern.
- Start for free** by xflorensa. It also features a large circular icon with a network or gear-like pattern.



We may add a Gauge to see last value



Edit function node

Delete
Cancel
Done

node properties

Name: Name Save

Code

```

1 msg.payload=msg.payload[msg.payload.length-1].Temperatura_nevera;
2 return msg;
  
```

Outputs: 1

See the Info tab for help writing functions.

port labels

Edit gauge node

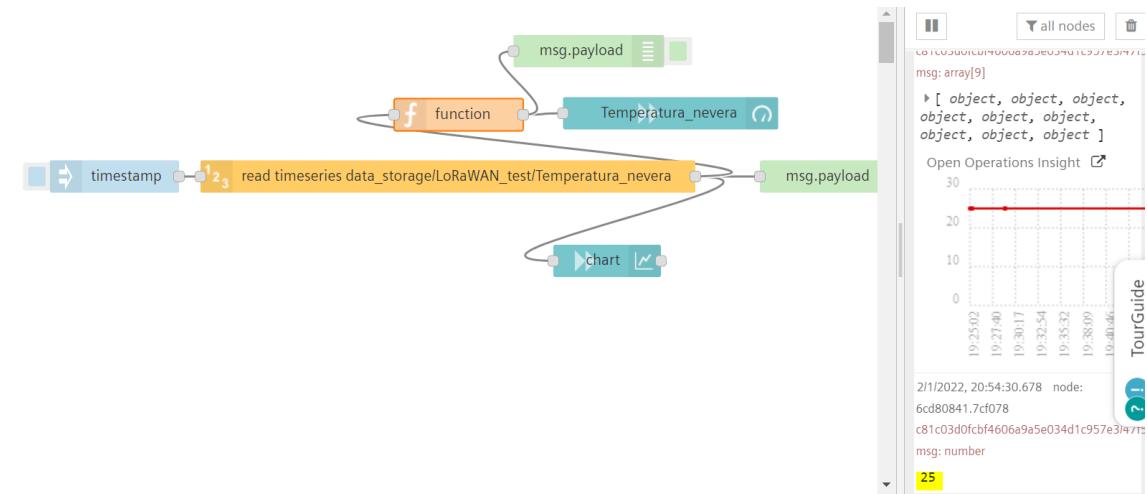
[Delete](#) [Cancel](#) [Done](#)

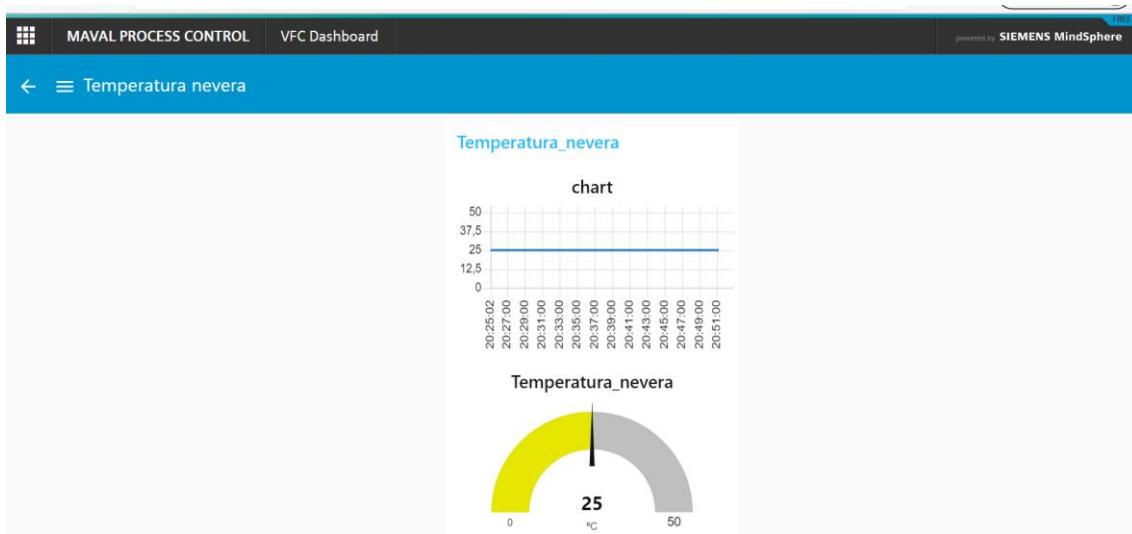
node properties

Group	Temperatura_nevera [Temperatura ne edit]
Size	auto
Type	Gauge
Label	Temperatura_nevera
Value format	<code>{{value}}</code>
Units	°C
Range	min <input type="text" value="0"/> max <input type="text" value="50"/>

[port labels](#)

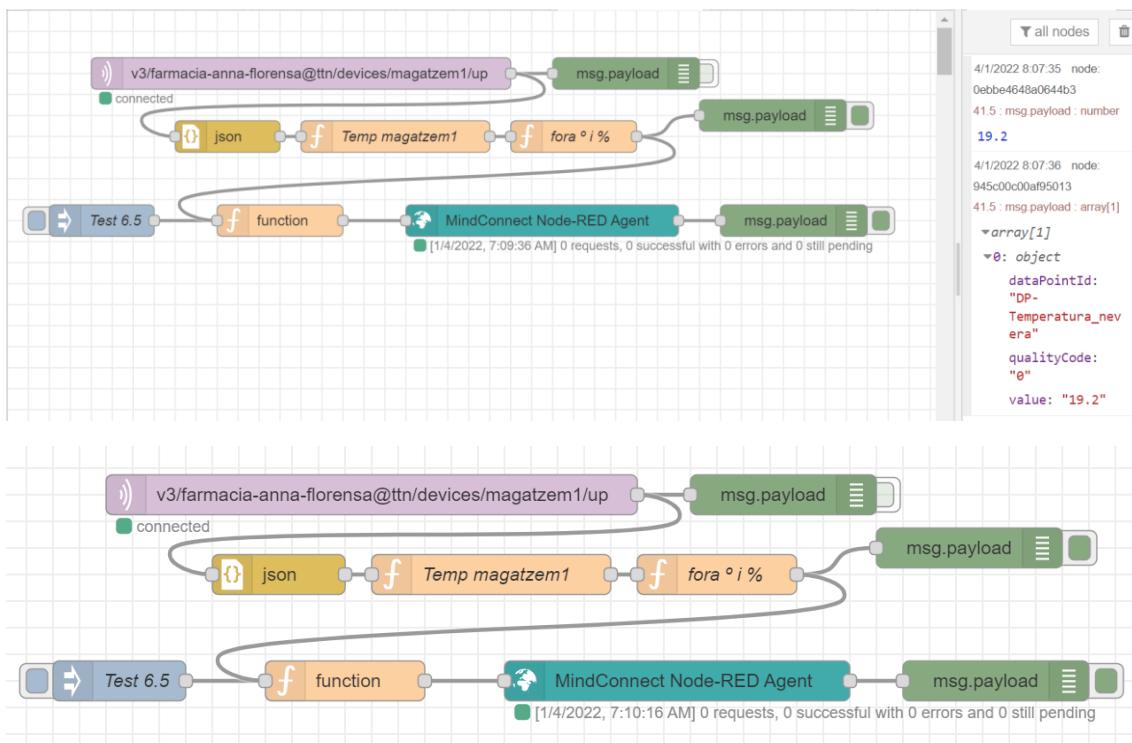
Let's inject again on both IBM and Mindsphere Node-RED





Next step is to inject real LoRaWAN data

Let's prepare the MQTTin node on IBM cloud



Yes, as soon as the data arrives to TTN console it is sent to Mindsphere

debug

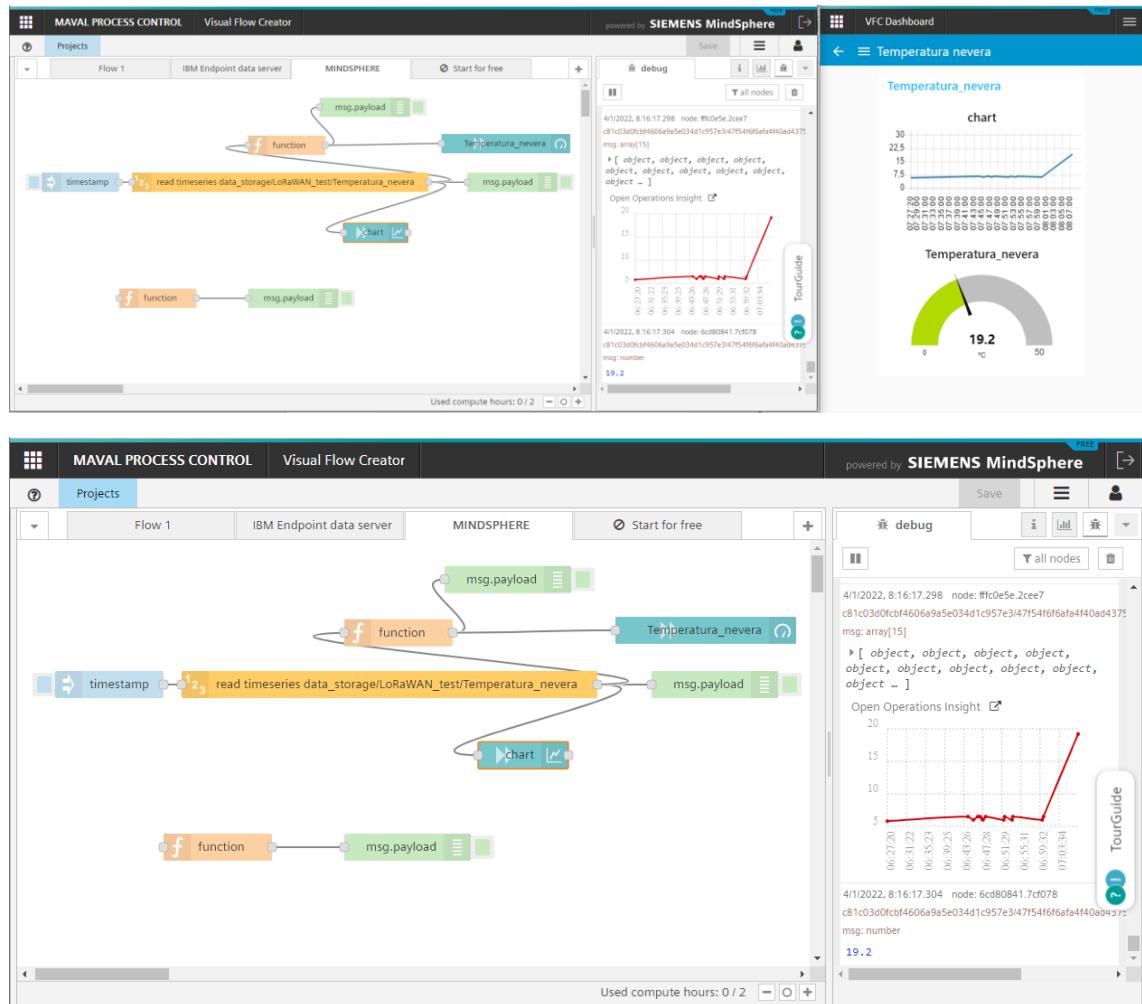
all nodes X

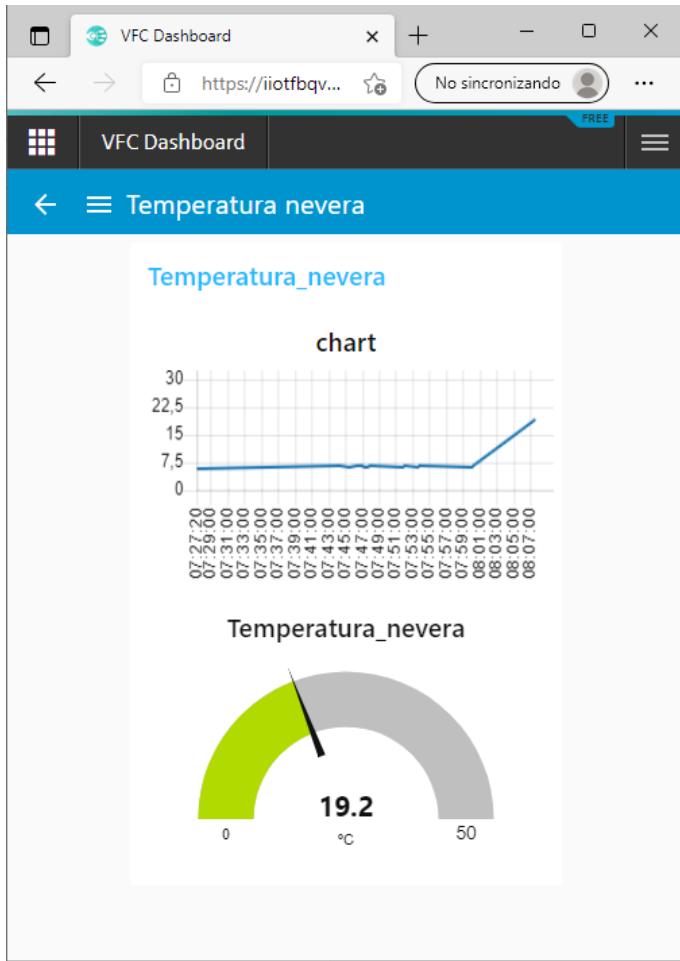
4/1/2022 8:07:35 node:
0ebbe4648a0644b3
41.5 : msg.payload : number
19.2

4/1/2022 8:07:36 node:
945c00c00af95013
41.5 : msg.payload : array[1]

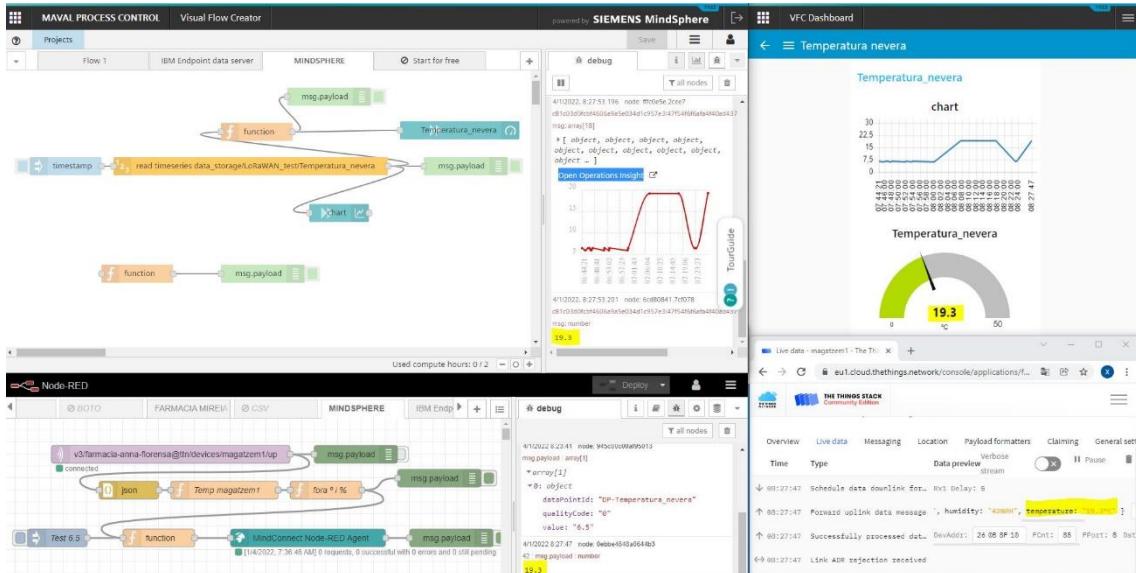
- ▼array[1]
- ▼0: object
 - dataPointId:**
"DP-
Temperatura_nova"
 - qualityCode:**
"0"
 - value:** "19.2"

If we take a look on MIndsphere Visual Flow editor, we see the transmitted data





Here is the complete figure



You can find the code here:

<https://github.com/xavierflorensa/LoRaWAN-to-SIEMENS-Mindsphere-cloud>