In [1]:

```
# from nilm_metadata import get_appliance_types
# appliance_types = get_appliance_types()
# print(appliance_types)

# import os
# os.getcwd()
```

Carregando bibliotecas...

In [2]:

```
!pip install seaborn

import seaborn as sns

from matplotlib import rcParams
import matplotlib.pyplot as plt
import pandas as pd
import nilmtk
from nilmtk import MeterGroup
from nilmtk.api import API
import warnings
warnings.filterwarnings("ignore")

plt.style.use('ggplot')
rcParams['figure.figsize'] = (13, 10)

# import pathlib
# pathlib.Path().resolve()
```

```
Requirement already satisfied: seaborn in ./miniconda3/envs/nilm_0.4.
3/lib/python3.7/site-packages (0.11.2)
Requirement already satisfied: numpy>=1.15 in ./miniconda3/envs/nilm_
0.4.3/lib/python3.7/site-packages (from seaborn) (1.19.5)
Requirement already satisfied: scipy>=1.0 in ./miniconda3/envs/nilm_0.
4.3/lib/python3.7/site-packages (from seaborn) (1.7.1)
Requirement already satisfied: pandas>=0.23 in ./miniconda3/envs/nilm_
0.4.3/lib/python3.7/site-packages (from seaborn) (0.25.3)
Requirement already satisfied: matplotlib>=2.2 in ./miniconda3/envs/ni
lm_0.4.3/lib/python3.7/site-packages (from seaborn) (3.1.3)
Requirement already satisfied: python-dateutil>=2.1 in ./miniconda3/en
vs/nilm_0.4.3/lib/python3.7/site-packages (from matplotlib>=2.2->seabo
rn) (2.8.2)
Requirement already satisfied: pyparsing!=2.0.4,!=2.1.2,!=2.1.6,>=2.0.
1 in ./miniconda3/envs/nilm_0.4.3/lib/python3.7/site-packages (from ma
tplotlib>=2.2->seaborn) (2.4.7)
Requirement already satisfied: kiwisolver>=1.0.1 in ./miniconda3/envs/
nilm_0.4.3/lib/python3.7/site-packages (from matplotlib>=2.2->seaborn)
(1.3.2)
Requirement already satisfied: cycler>=0.10 in ./miniconda3/envs/nilm_
0.4.3/lib/python3.7/site-packages (from matplotlib>=2.2->seaborn) (0.1
0.0)
Requirement already satisfied: six in ./miniconda3/envs/nilm_0.4.3/li
b/python3.7/site-packages (from cycler>=0.10->matplotlib>=2.2->seabor
n) (1.16.0)
Requirement already satisfied: pytz>=2017.2 in ./miniconda3/envs/nilm_
0.4.3/lib/python3.7/site-packages (from pandas>=0.23->seaborn) (2021.
1)
```

Converter

In [3]:

```
# from nilmtk.dataset_converters import convert_hb
# convert_hb('./BD/CASA/convert', './data/teste17.h5')
```

In [4]:

```
# st = pd.HDFStore("./data/teste17.h5")
# print (st.keys())

# print (st['/building1/elec/meter1'].head())
# print (st['/building1/elec/meter2'].head())
# print (st['/building1/elec/meter3'].head())

# st.close()
```

Carregando dataset

In [5]:

```
from nilmtk.api import API
import warnings
warnings.filterwarnings("ignore")

from nilmtk import DataSet
from nilmtk.utils import print_dict

hb = DataSet('teste17.h5')
#iawe = DataSet('/data/iawe.h5')

print_dict(hb.metadata)
print_dict(hb.buildings)
```

- **name**: HB
- **long_name**: The Reference Energy Disaggregation Data set
- **creators**:
  - Henrique
- **publication_date**: 2021
- **institution**: IFCE
- **contact**: henrique@ufc.br
- **description**: Several weeks of power data for 6 different homes.
- **subject**: Disaggregated power demand from domestic buildings.
- **number_of_buildings**: 1
- **timezone**: America/Fortaleza
- **geo_location**:
  - **locality**: Fortaleza
  - **country**: BR
  - **latitude**: -3.743443904897663
  - **longitude**: -38.526093995496886
- **related_documents**:
  - http://redd.csail.mit.edu (http://redd.csail.mit.edu)
  - J. Zico Kolter and Matthew J. Johnson. REDD: A public data set for energy disaggregation research. In proceedings of the SustKDD workshop on Data Mining Applications in Sustainability, 2011. http://redd.csail.mit.edu/kolter-kddsust11.pdf (http://redd.csail.mit.edu/kolter-kddsust11.pdf)
- **schema**: https://github.com/nilmtk/nilm_metadata/tree/v0.2 (https://github.com/nilmtk/nilm_metadata/tree/v0.2)
- **meter_devices**:
  - **eMonitor**:
    - **model**: sonoff
    - **manufacturer**: Powerhouse Dynamics
    - **manufacturer_url**: http://powerhousedynamics.com (http://powerhousedynamics.com)
    - **description**: ...
    - **sample_period**: 5
    - **max_sample_period**: 30
    - **measurements**:
      - {'physical_quantity': 'power', 'type': 'active', 'upper_limit': 1142, 'lower_limit': 0}
      - {'physical_quantity': 'power', 'type': 'apparent', 'upper_limit': 1215, 'lower_limit': 0}

        - {'physical_quantity': 'power', 'type': 'reactive', 'upper_limit': 901, 'lower_limit': 0}
        - {'physical_quantity': 'power factor', 'upper_limit': 1, 'lower_limit': 0}
        - {'physical_quantity': 'voltage', 'upper_limit': 232, 'lower_limit': 0}
        - {'physical_quantity': 'current', 'upper_limit': 6, 'lower_limit': 0}
      - **wireless**: True
  - **REDD_whole_house**:
      - **model**: pzem004t
      - **description**: ...
      - **sample_period**: 0.5
      - **max_sample_period**: 30
      - **measurements**:
        - {'physical_quantity': 'voltage', 'upper_limit': 230, 'lower_limit': 0}
        - {'physical_quantity': 'current', 'upper_limit': 15, 'lower_limit': 0}
        - {'physical_quantity': 'power', 'type': 'active', 'upper_limit': 3016, 'lower_limit': 0}
        - {'physical_quantity': 'frequency', 'upper_limit': 61, 'lower_limit': 0}
        - {'physical_quantity': 'power factor', 'upper_limit': 1, 'lower_limit': 0}
      - **wireless**: False

- **1**: Building(instance=1, dataset='HB')

Gráfico Geral

In [6]:

```
build = 1
elec = hb.buildings[build].elec
elec.mains().power_series_all_data().head()
```

Out[6]:

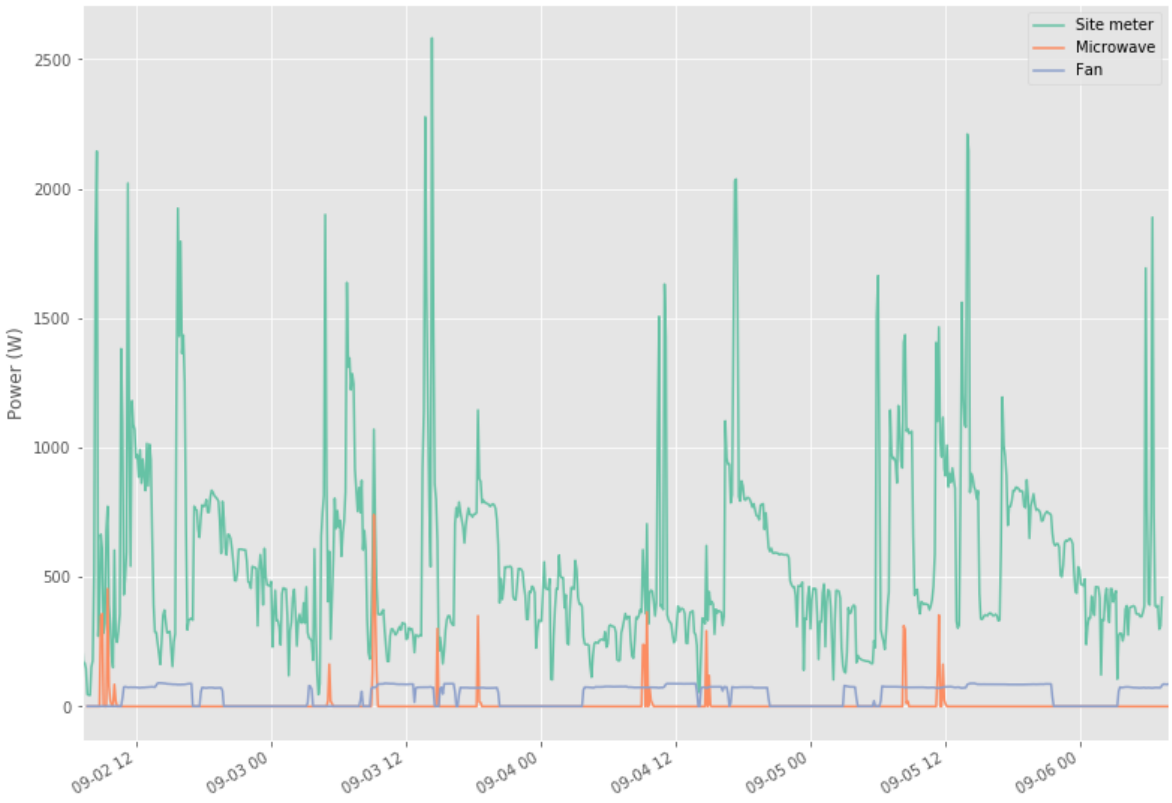
```
2021-09-02 07:14:34.515000-03:00    167.199997
2021-09-02 07:14:35.014000-03:00    167.199997
2021-09-02 07:14:35.513000-03:00    167.199997
2021-09-02 07:14:36.013000-03:00    167.199997
2021-09-02 07:14:36.527000-03:00    166.899994
Name: (power, active), dtype: float32
```

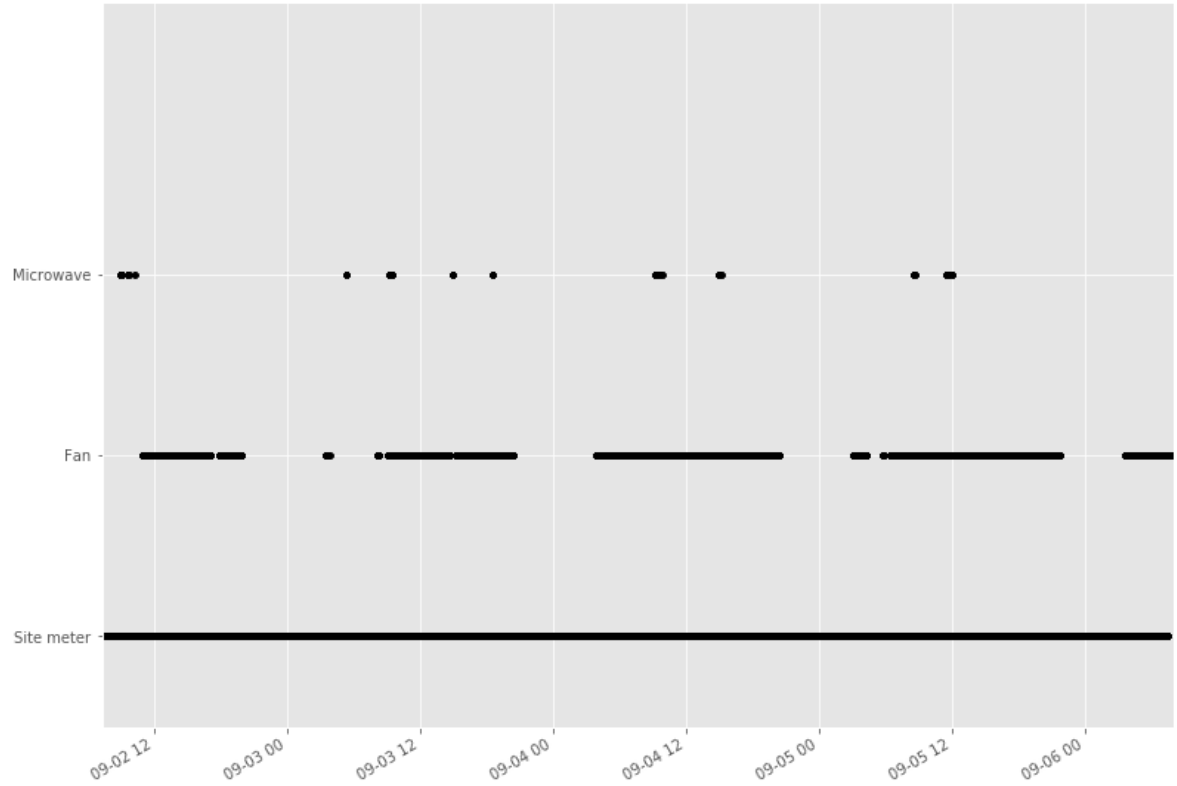
In [7]:

```
sns.set_palette("Set2", n_colors=5)
elec.mains().plot()
elec['microwave'].plot()
elec['fan'].plot()

# Set a threshold to remove residual power noise when devices are off
elec.plot_when_on(on_power_threshold = 40) # Plot appliances when they are in use¶

# elec.draw_wiring_graph()
```

Out[7]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f007e6d26d0>
```





Dados

Proporção de energia submedida

In [8]:

```
elec.proportion_of_energy_submetered()
```

```
Running MeterGroup.proportion_of_energy_submetered...
```

Out[8]:

```
0.09288249528613458
```

Total Energy

In [9]:

```
elec.mains().total_energy()
```

Out[9]:

```
active    53.946047
dtype: float64
```

Energy per submeter

In [10]:

```
energy_per_meter = elec.submeters().energy_per_meter() # kWh, again
energy_per_meter
```

```
2/2 ElecMeter(instance=3, building=1, dataset='HB', appliances=[Applia
nce(type='microwave', instance=1)])
```

Out[10]:

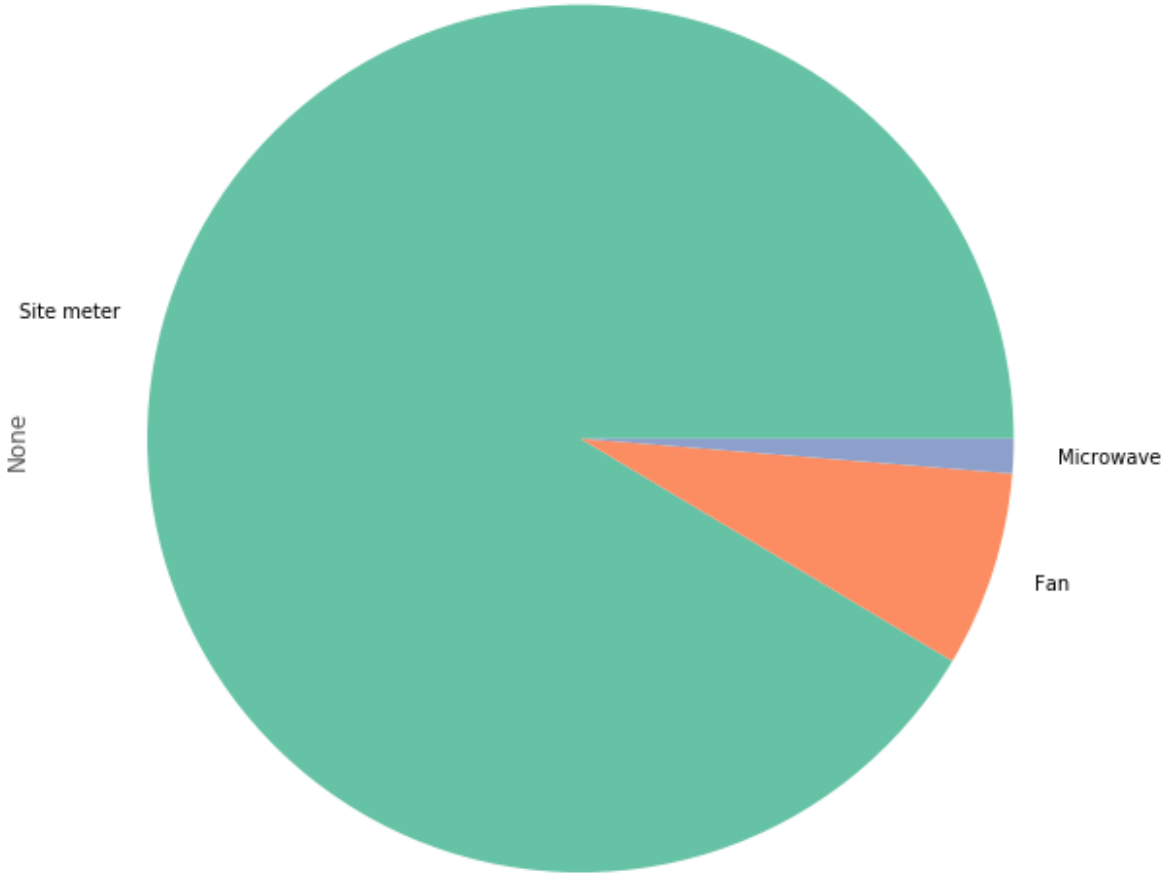
	(2, 1, HB)	(3, 1, HB)
active	4.298278	0.757815
apparent	NaN	NaN
reactive	NaN	NaN

Plot fraction of energy consumption of each appliance

In [11]:

```
# fraction = elec.submeters().fraction_per_meter().dropna()
fraction = elec.fraction_per_meter().dropna()
# Create convenient labels
labels = elec.get_labels(fraction.index)
plt.figure(figsize=(10,30))
fraction.plot(kind='pie', labels=labels);
```

```
3/3 ElecMeter(instance=3, building=1, dataset='HB', appliances=[Applia
nce(type='microwave', instance=1)])
```



Quadro Geral

In [12]:

```
print(elec)
elec.mains()
```

```
MeterGroup(meters=
  ElecMeter(instance=1, building=1, dataset='HB', site_meter, applianc
es=[])
  ElecMeter(instance=2, building=1, dataset='HB', appliances=[Applianc
e(type='fan', instance=1)])
  ElecMeter(instance=3, building=1, dataset='HB', appliances=[Applianc
e(type='microwave', instance=1)])
)
```

Out[12]:

```
ElecMeter(instance=1, building=1, dataset='HB', site_meter, appliances
=[])
```

In [13]:

```
from nilmtk.elecmeter import ElecMeterID##### Quadro Geral

meter1 = elec[ElecMeterID(instance=1, building=build, dataset='HB')]

next(meter1.load()).head()
```

Out[13]:

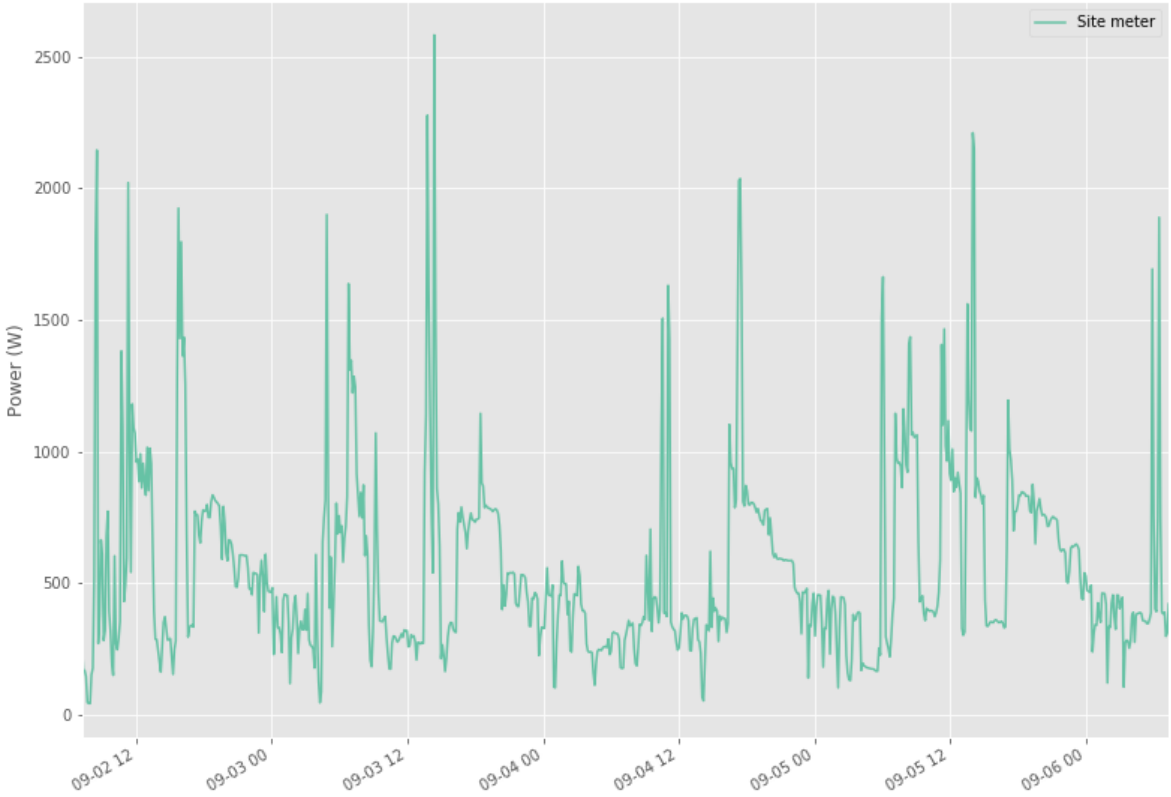
physical_quantity	power factor	power	current	frequency	voltage
type		active			
2021-09-02 07:14:34.515000-03:00	0.84	167.199997	0.896	60.0	221.600006
2021-09-02 07:14:35.014000-03:00	0.84	167.199997	0.896	60.0	221.600006
2021-09-02 07:14:35.513000-03:00	0.84	167.199997	0.896	60.0	221.600006
2021-09-02 07:14:36.013000-03:00	0.84	167.199997	0.896	60.0	221.600006
2021-09-02 07:14:36.527000-03:00	0.85	166.899994	0.890	60.0	221.500000

In [14]:

```
meter1.plot()
```

Out[14]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f0066537c50>
```



A taxa de abandono é um número entre 0 e 1 que especifica a proporção de amostras ausentes. Uma taxa de abandono de 0 significa que nenhuma amostra está faltando. Um valor de 1 significaria que todas as amostras estão faltando

In [15]:

```
meter1.dropout_rate()
```

Out[15]:

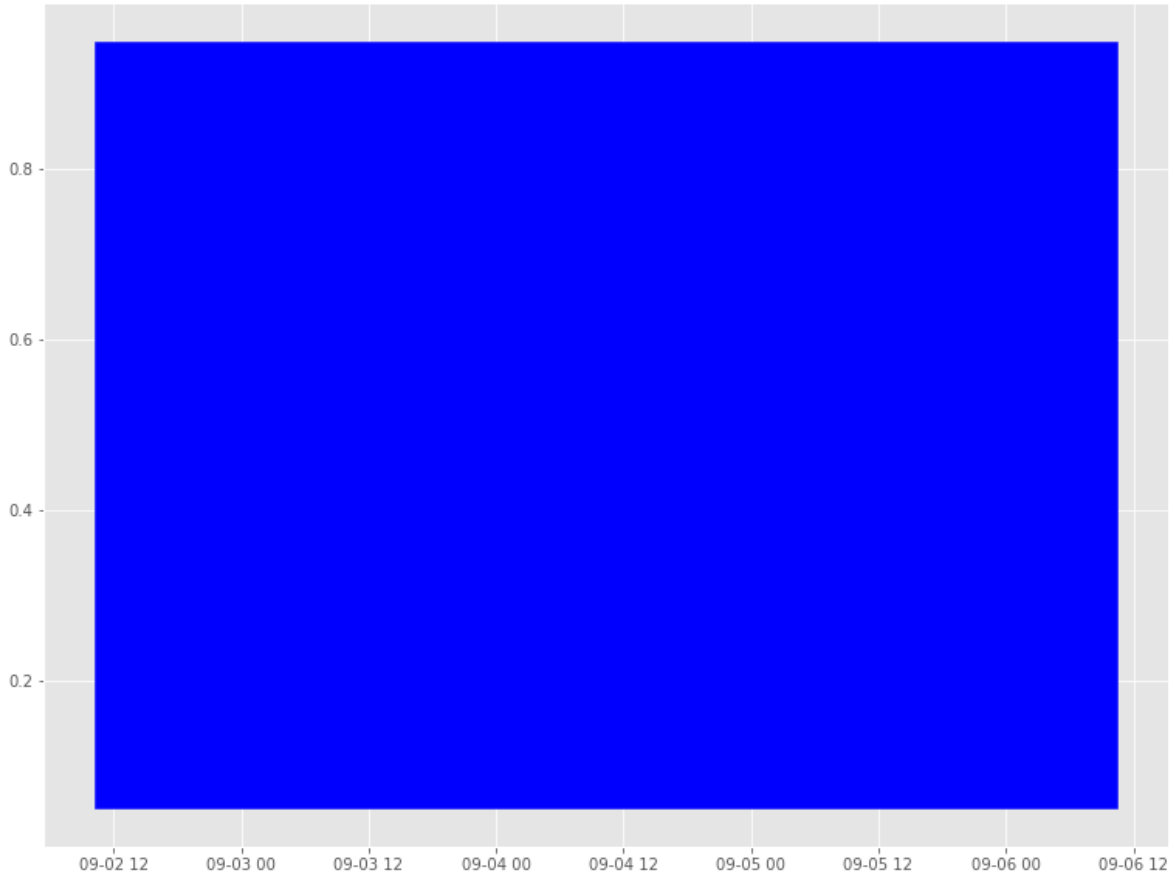
```
0.0002946431279545747
```

In [16]:

```
good_sections = meter1.good_sections(full_results=True)
good_sections.plot()
```

Out[16]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f0066412690>
```



In [17]:

```
good_sections.combined()
```

Out[17]:

```
[TimeFrame(start='2021-09-02 07:14:34.515000-03:00', end='2021-09-06 0
7:24:15.557000-03:00', empty=False)]
```

Microondas

In [18]:

```
microwave= elec['microwave']
#microwave.available_columns()
next(microwave.load()).head()
```

Out[18]:

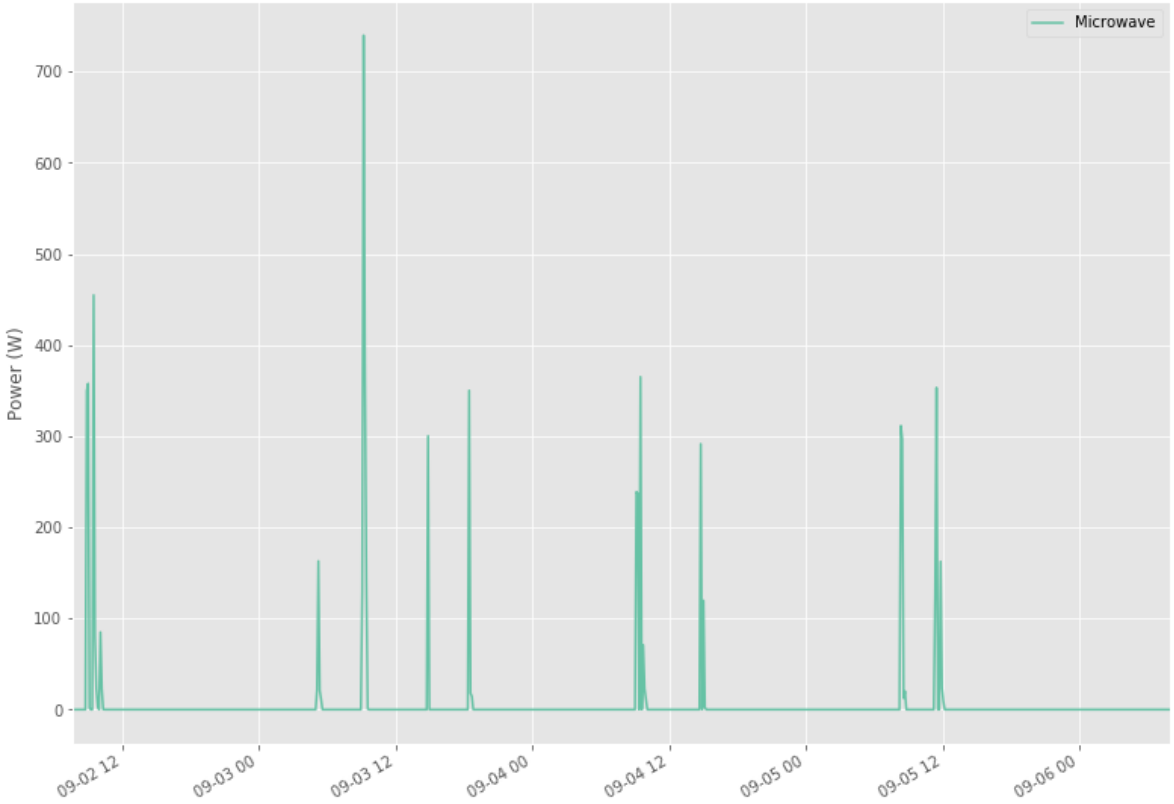
physical_quantity	power factor	power		current	voltage	power
type		apparent	active			reactive
2021-09-02 07:47:51-03:00	0.0	0.0	0.0	0.0	221.882004	0.0
2021-09-02 07:47:56-03:00	0.0	0.0	0.0	0.0	221.882004	0.0
2021-09-02 07:48:01-03:00	0.0	0.0	0.0	0.0	222.406006	0.0
2021-09-02 07:48:06-03:00	0.0	0.0	0.0	0.0	222.143997	0.0
2021-09-02 07:48:11-03:00	0.0	0.0	0.0	0.0	221.621994	0.0

In [19]:

```
microwave.plot()
```

Out[19]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f006648d250>
```



A taxa de abandono é um número entre 0 e 1 que especifica a proporção de amostras ausentes. Uma taxa de abandono de 0 significa que nenhuma amostra está faltando. Um valor de 1 significaria que todas as amostras estão faltando

In [20]:

```
microwave.dropout_rate()
```

Out[20]:

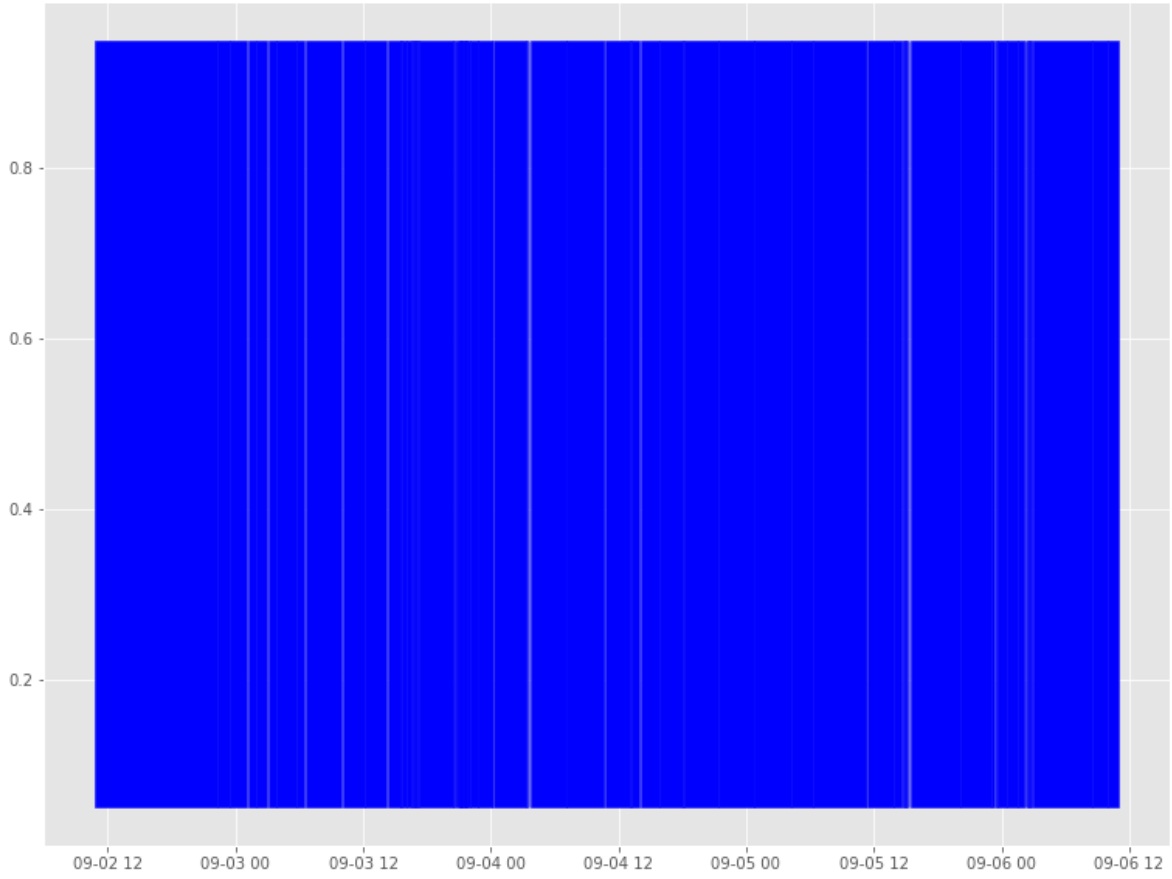
```
0.001913041828182637
```

In [21]:

```
good_sections = microwave.good_sections(full_results=True)
good_sections.plot()
```

Out[21]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f0066335a10>
```



In [22]:

```
good_sections.combined()
```

Out[22]:

```
[TimeFrame(start='2021-09-02 07:47:51-03:00', end='2021-09-02 19:17:21
-03:00', empty=False),
 TimeFrame(start='2021-09-02 19:20:01-03:00', end='2021-09-02 20:25:21
-03:00', empty=False),
 TimeFrame(start='2021-09-02 20:26:06-03:00', end='2021-09-02 22:07:21
-03:00', empty=False),
 TimeFrame(start='2021-09-02 22:07:56-03:00', end='2021-09-02 22:59:11
-03:00', empty=False),
 TimeFrame(start='2021-09-02 23:00:03-03:00', end='2021-09-03 00:01:28
-03:00', empty=False),
 TimeFrame(start='2021-09-03 00:05:58-03:00', end='2021-09-03 00:51:43
-03:00', empty=False),
 TimeFrame(start='2021-09-03 00:53:23-03:00', end='2021-09-03 02:39:33
-03:00', empty=False),
 TimeFrame(start='2021-09-03 02:40:18-03:00', end='2021-09-03 03:30:48
-03:00', empty=False),
 TimeFrame(start='2021-09-03 03:33:08-03:00', end='2021-09-03 07:00:39
-03:00', empty=False),
 TimeFrame(start='2021-09-03 07:02:10-03:00', end='2021-09-03 09:10:29
-03:00', empty=False),
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-03:00', empty=False),
 TimeFrame(start='2021-09-03 11:15:39-03:00', end='2021-09-03 12:31:03
-03:00', empty=False),
 TimeFrame(start='2021-09-03 12:31:49-03:00', end='2021-09-03 12:32:03
-03:00', empty=False),
 TimeFrame(start='2021-09-03 12:32:49-03:00', end='2021-09-03 12:39:04
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 TimeFrame(start='2021-09-03 12:40:29-03:00', end='2021-09-03 13:05:33
-03:00', empty=False),
 TimeFrame(start='2021-09-03 13:06:09-03:00', end='2021-09-03 13:28:08
-03:00', empty=False),
 TimeFrame(start='2021-09-03 13:28:53-03:00', end='2021-09-03 13:40:23
-03:00', empty=False),
 TimeFrame(start='2021-09-03 13:40:58-03:00', end='2021-09-03 13:49:08
-03:00', empty=False),
 TimeFrame(start='2021-09-03 13:50:28-03:00', end='2021-09-03 13:50:38
-03:00', empty=False),
 TimeFrame(start='2021-09-03 13:51:29-03:00', end='2021-09-03 13:55:33
-03:00', empty=False),
 TimeFrame(start='2021-09-03 13:56:54-03:00', end='2021-09-03 14:00:33
-03:00', empty=False),
 TimeFrame(start='2021-09-03 14:01:13-03:00', end='2021-09-03 14:05:53
-03:00', empty=False),
 TimeFrame(start='2021-09-03 14:07:48-03:00', end='2021-09-03 14:13:28
-03:00', empty=False),
 TimeFrame(start='2021-09-03 14:15:29-03:00', end='2021-09-03 17:29:05
-03:00', empty=False),
 TimeFrame(start='2021-09-03 17:30:14-03:00', end='2021-09-03 17:35:59
-03:00', empty=False),
 TimeFrame(start='2021-09-03 17:37:57-03:00', end='2021-09-03 17:39:02
-03:00', empty=False),
 TimeFrame(start='2021-09-03 17:40:12-03:00', end='2021-09-03 17:41:02
-03:00', empty=False),
 TimeFrame(start='2021-09-03 17:42:52-03:00', end='2021-09-03 17:43:02
-03:00', empty=False),
```

```
 TimeFrame(start='2021-09-03 17:44:12-03:00', end='2021-09-03 17:45:02
-03:00', empty=False),
 TimeFrame(start='2021-09-03 17:46:57-03:00', end='2021-09-03 17:47:07
-03:00', empty=False),
 TimeFrame(start='2021-09-03 17:49:02-03:00', end='2021-09-03 17:49:07
-03:00', empty=False),
 TimeFrame(start='2021-09-03 17:50:17-03:00', end='2021-09-03 17:51:07
-03:00', empty=False),
 TimeFrame(start='2021-09-03 17:52:17-03:00', end='2021-09-03 17:53:07
-03:00', empty=False),
 TimeFrame(start='2021-09-03 17:54:18-03:00', end='2021-09-03 17:55:07
-03:00', empty=False),
 TimeFrame(start='2021-09-03 17:55:47-03:00', end='2021-09-03 17:57:07
-03:00', empty=False),
 TimeFrame(start='2021-09-03 17:58:17-03:00', end='2021-09-03 17:59:07
-03:00', empty=False),
 TimeFrame(start='2021-09-03 18:00:17-03:00', end='2021-09-03 18:01:07
-03:00', empty=False),
 TimeFrame(start='2021-09-03 18:01:47-03:00', end='2021-09-03 18:03:07
-03:00', empty=False),
 TimeFrame(start='2021-09-03 18:03:47-03:00', end='2021-09-03 18:05:07
-03:00', empty=False),
 TimeFrame(start='2021-09-03 18:05:47-03:00', end='2021-09-03 18:06:52
-03:00', empty=False),
 TimeFrame(start='2021-09-03 18:08:22-03:00', end='2021-09-03 18:09:07
-03:00', empty=False),
 TimeFrame(start='2021-09-03 18:09:47-03:00', end='2021-09-03 18:10:12
-03:00', empty=False),
 TimeFrame(start='2021-09-03 18:10:52-03:00', end='2021-09-03 18:11:07
-03:00', empty=False),
 TimeFrame(start='2021-09-03 18:12:17-03:00', end='2021-09-03 18:13:07
-03:00', empty=False),
 TimeFrame(start='2021-09-03 18:14:17-03:00', end='2021-09-03 18:15:07
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 TimeFrame(start='2021-09-03 18:16:17-03:00', end='2021-09-03 18:17:08
-03:00', empty=False),
 TimeFrame(start='2021-09-03 18:18:17-03:00', end='2021-09-03 18:19:07
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 TimeFrame(start='2021-09-03 18:20:17-03:00', end='2021-09-03 18:21:07
-03:00', empty=False),
 TimeFrame(start='2021-09-03 18:22:17-03:00', end='2021-09-03 18:23:07
-03:00', empty=False),
 TimeFrame(start='2021-09-03 18:24:17-03:00', end='2021-09-03 18:25:07
-03:00', empty=False),
 TimeFrame(start='2021-09-03 18:26:17-03:00', end='2021-09-03 18:27:07
-03:00', empty=False),
 TimeFrame(start='2021-09-03 18:28:17-03:00', end='2021-09-03 18:29:07
-03:00', empty=False),
 TimeFrame(start='2021-09-03 18:30:17-03:00', end='2021-09-03 18:31:07
-03:00', empty=False),
 TimeFrame(start='2021-09-03 18:31:47-03:00', end='2021-09-03 18:33:07
-03:00', empty=False),
 TimeFrame(start='2021-09-03 18:33:47-03:00', end='2021-09-03 18:35:07
-03:00', empty=False),
 TimeFrame(start='2021-09-03 18:37:02-03:00', end='2021-09-03 18:37:07
-03:00', empty=False),
 TimeFrame(start='2021-09-03 18:37:47-03:00', end='2021-09-03 18:39:07
-03:00', empty=False),
 TimeFrame(start='2021-09-03 18:40:57-03:00', end='2021-09-03 18:44:08
-03:00', empty=False),
 TimeFrame(start='2021-09-03 18:44:48-03:00', end='2021-09-03 18:45:07
```

```
-03:00', empty=False),
 TimeFrame(start='2021-09-03 18:47:53-03:00', end='2021-09-03 19:05:41
-03:00', empty=False),
 TimeFrame(start='2021-09-03 19:06:21-03:00', end='2021-09-03 19:43:06
-03:00', empty=False),
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```

Ventilador

In [23]:

```
fan = elec['fan']
#microwave.available_columns()
next(fan.load()).head()
```

Out[23]:

physical_quantity	power factor	power		current	voltage	power
type		apparent	active			reactive
2021-09-02 07:47:51-03:00	0.04	18.454000	0.767	0.083	222.287003	18.400000
2021-09-02 07:47:56-03:00	0.03	31.761999	1.091	0.143	222.546997	31.700001
2021-09-02 07:48:01-03:00	0.05	20.479000	1.091	0.092	222.028000	20.400000
2021-09-02 07:48:06-03:00	0.03	31.187000	0.923	0.140	222.287003	31.200001
2021-09-02 07:48:11-03:00	0.04	23.195999	0.923	0.105	221.770004	23.200001

In [24]:

```
fan.plot()
```

Out[24]:

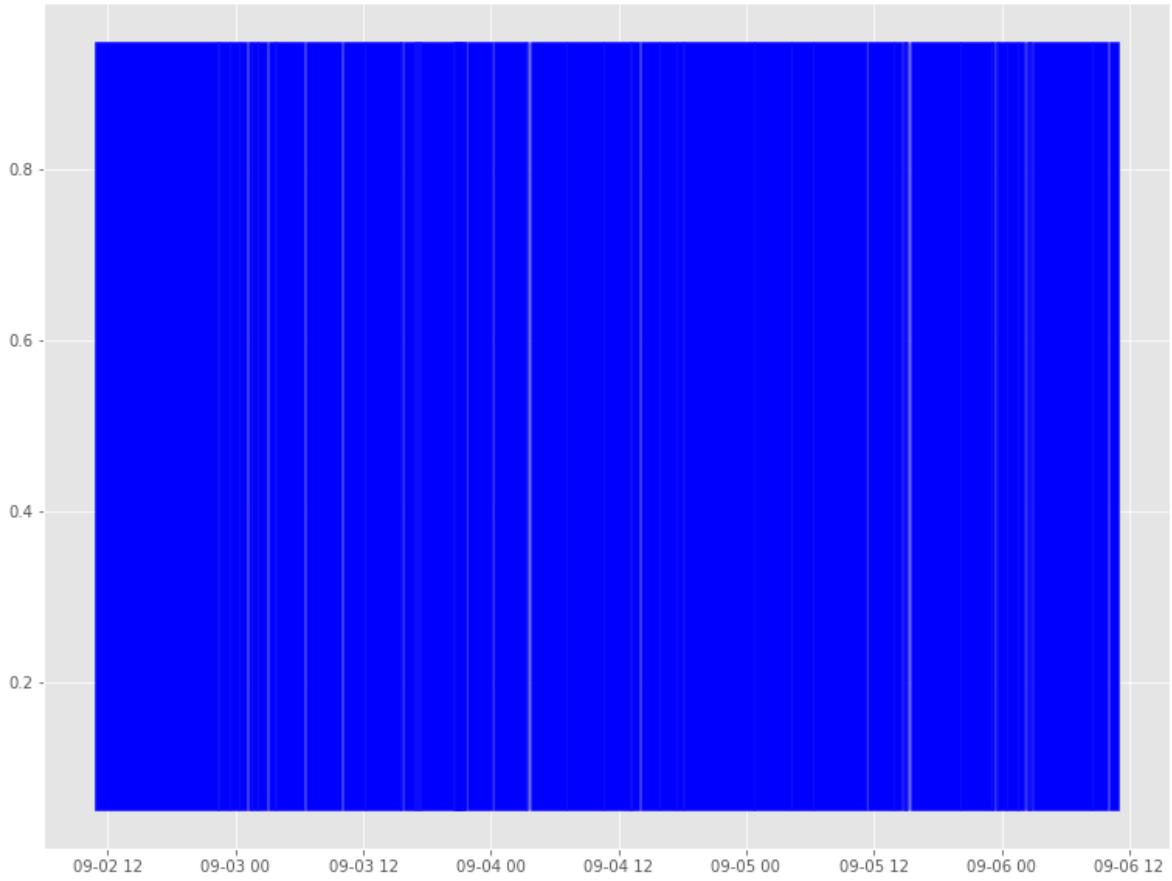
```
<matplotlib.axes._subplots.AxesSubplot at 0x7f00661e6110>
```

In [25]:

```
good_sections = fan.good_sections(full_results=True)
good_sections.plot()
```

Out[25]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f0083308b10>
```



A taxa de abandono é um número entre 0 e 1 que especifica a proporção de amostras ausentes. Uma taxa de abandono de 0 significa que nenhuma amostra está faltando. Um valor de 1 significaria que todas as amostras estão faltando

In [26]:

```
fan.dropout_rate()
```

Out[26]:

```
0.002014694526278486
```

In [27]:

```
good_sections.combined()
```

Out[27]:

```
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 TimeFrame(start='2021-09-06 05:33:59-03:00', end='2021-09-06 07:01:05
-03:00', empty=False),
 TimeFrame(start='2021-09-06 07:02:45-03:00', end='2021-09-06 07:56:00
-03:00', empty=False)]
```

Autocorrelation Plot

In [28]:

```
# from pandas.plotting import autocorrelation_plot
# elec.mains().plot autocorrelation();
```

Dataframe de correlação dos aparelhos

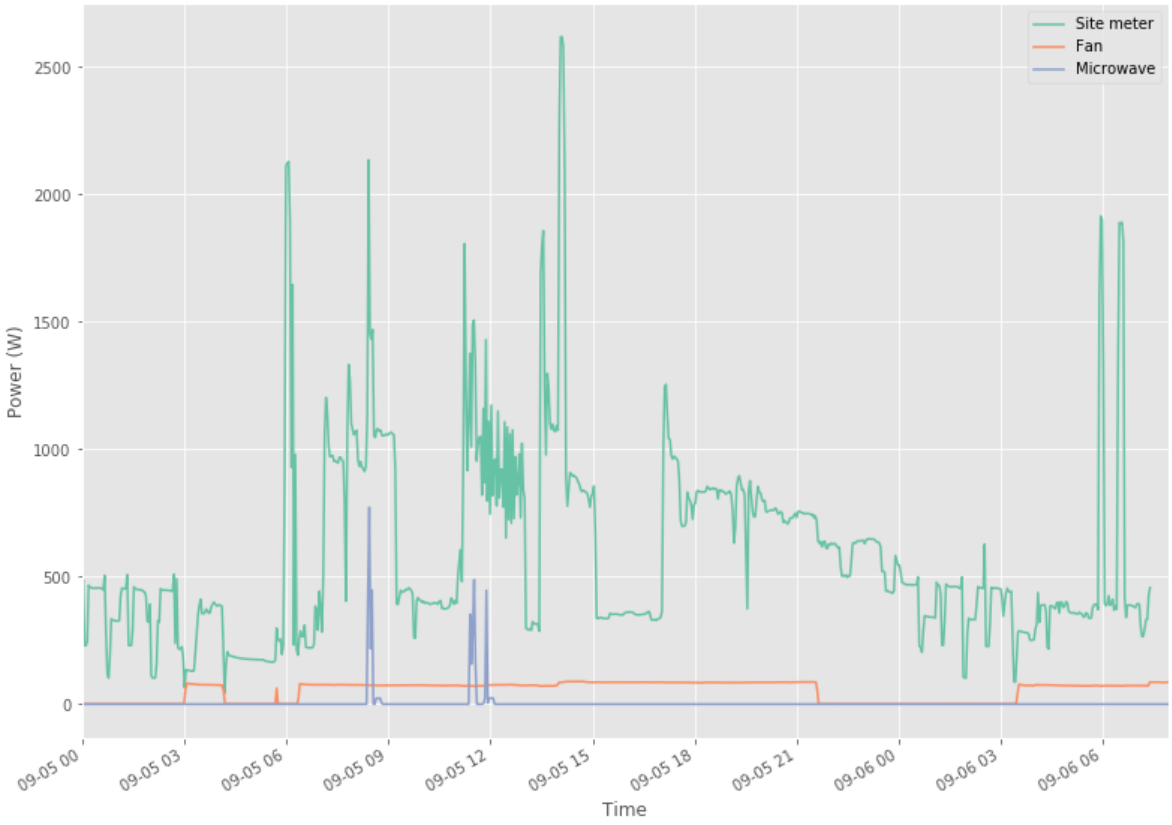
In [29]:

```
# correlation_df = elec.pairwise_correlation()
# correlation df
```

Traçar dados submedidos em um 1 dia

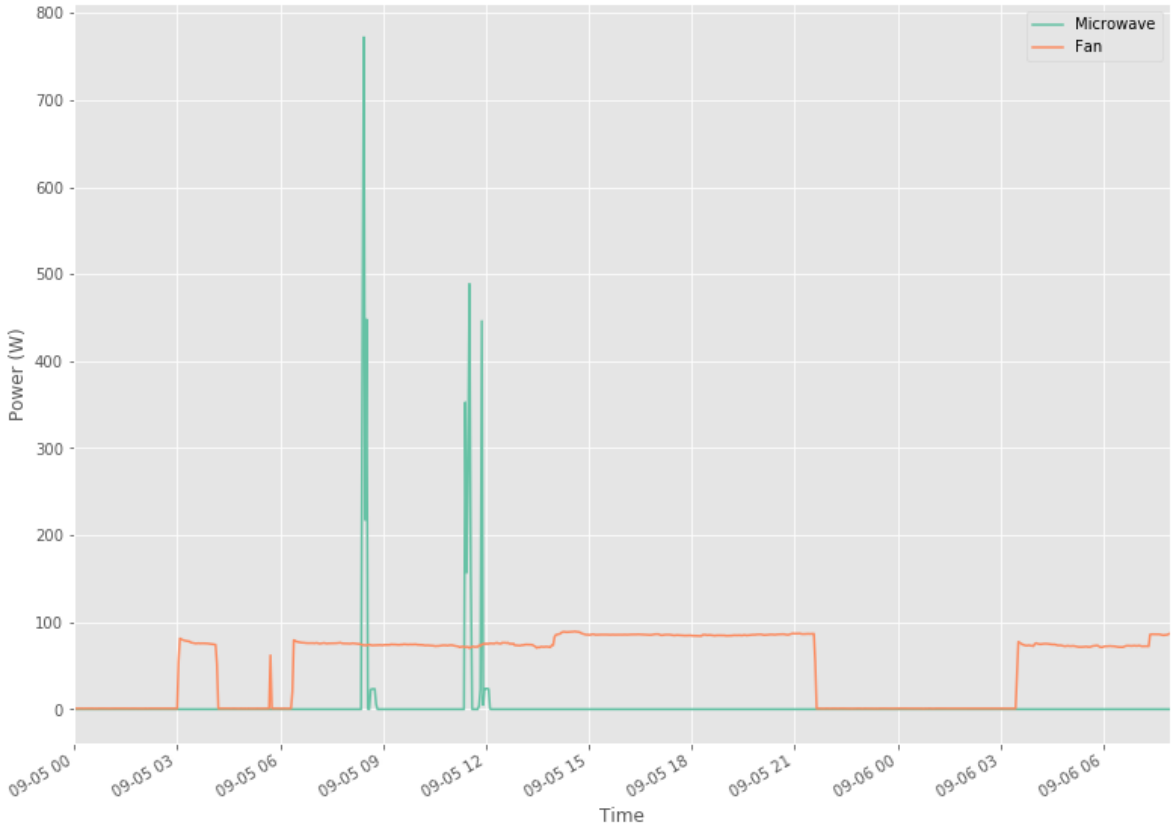
In [30]:

```
hb.set_window(start='2021-09-05', end='2021-09-07')
elec.plot();
plt.xlabel("Time");
```



In [31]:

```
hb.set_window(start='2021-09-05 00:00:00', end='2021-09-06 23:59:59')
elec['microwave'].plot()
elec['fan'].plot()
plt.xlabel("Time");
```



Importamos os algoritmos que desejamos executar os experimentos:

Mean: Mean Algorithm

Hart's Algorithm

CO: Combinatorial Optimization

Discriminative Sparse Coding

Additive Factorial Hidden Markov Model

Additive Factorial Hidden Markov Model with Signal Aggregate Constraints

DSC: Discriminative Sparse Coding

RNN: Long short-term memory - LSTM

DAE: Denoising Auto Encoder

Seq2Point*

Seq2Seq

WindowGRU/Online GRU: Similar a LSTM, mas usa Gated Recurrent Unit (GRU)

ELM

In [32]:

```
from nilmtk.disaggregate import Mean,CO,Hart85
# from nilmtk_contrib.disaggregate import AFHMM,AFHMM_SAC,DSC,RNN,Seq2Point,Seq2Seq
from nilmtk_contrib.disaggregate import RNN,Seq2Point,WindowGRU
```

```
Using TensorFlow backend.
```

Em seguida, inserimos os valores para os diferentes parâmetros no dicionário. Como precisamos de vários aparelhos, inserimos os nomes de todos os aparelhos necessários no parâmetro 'appliances'.

Métricas: https://github.com/nilmtk/nilmtk/blob/master/nilmtk/losses.py (https://github.com/nilmtk/nilmtk/blob/master/nilmtk/losses.py)

Error: https://github.com/nilmtk/nilmtk-contrib/issues/56 (https://github.com/nilmtk/nilmtk-contrib/issues/56)

In [33]:

```
d = {
  'power': {
    'mains': ['active'],
    'appliance': ['active']
#     'mains': ['active', 'frequency', 'power factor', 'current', 'voltage'],
#     'appliance': ['active', 'apparent', 'reactive', 'power factor', 'current', 'v
  },
  'sample_rate': 5,
  'display_predictions': True,
  'appliances': ['microwave', 'fan'],
  'methods': {
      'Mean':Mean({}),
#       "CO":CO({}),
      'Hart85':Hart85({}),
      'RNN':RNN({'n_epochs':50,'batch_size':1024}),
      'Seq2Point':Seq2Point({'n_epochs':50,'batch_size':1024})
      #'Seq2Seq':Seq2Seq({'n_epochs':50,'batch_size':1024}),
      #'WindowGRU':WindowGRU({'n_epochs':30,'batch_size':1024})
  },
 'train': {
    'datasets': {
      'hb': {
        'path': 'teste17.h5',
        'buildings': {
              1: {
                'start_time': '2021-09-02',
                'end_time': '2021-09-04'
              },

        }
      },

    }
  },

  'test': {
    'datasets': {
      'REDD': {
        'path': 'teste17.h5',
        'buildings': {
              1: {
                    'start_time': '2021-09-05',
                    'end_time': '2021-09-07'
            }
        }
      }
    },
    'metrics':['rmse', 'mae', 'relative_error', 'r2score', 'nde', 'nep', 'f1score']
  }
}
```

raiz do erro quadrático médio (RMSE) e o erro médio absoluto (MAE)

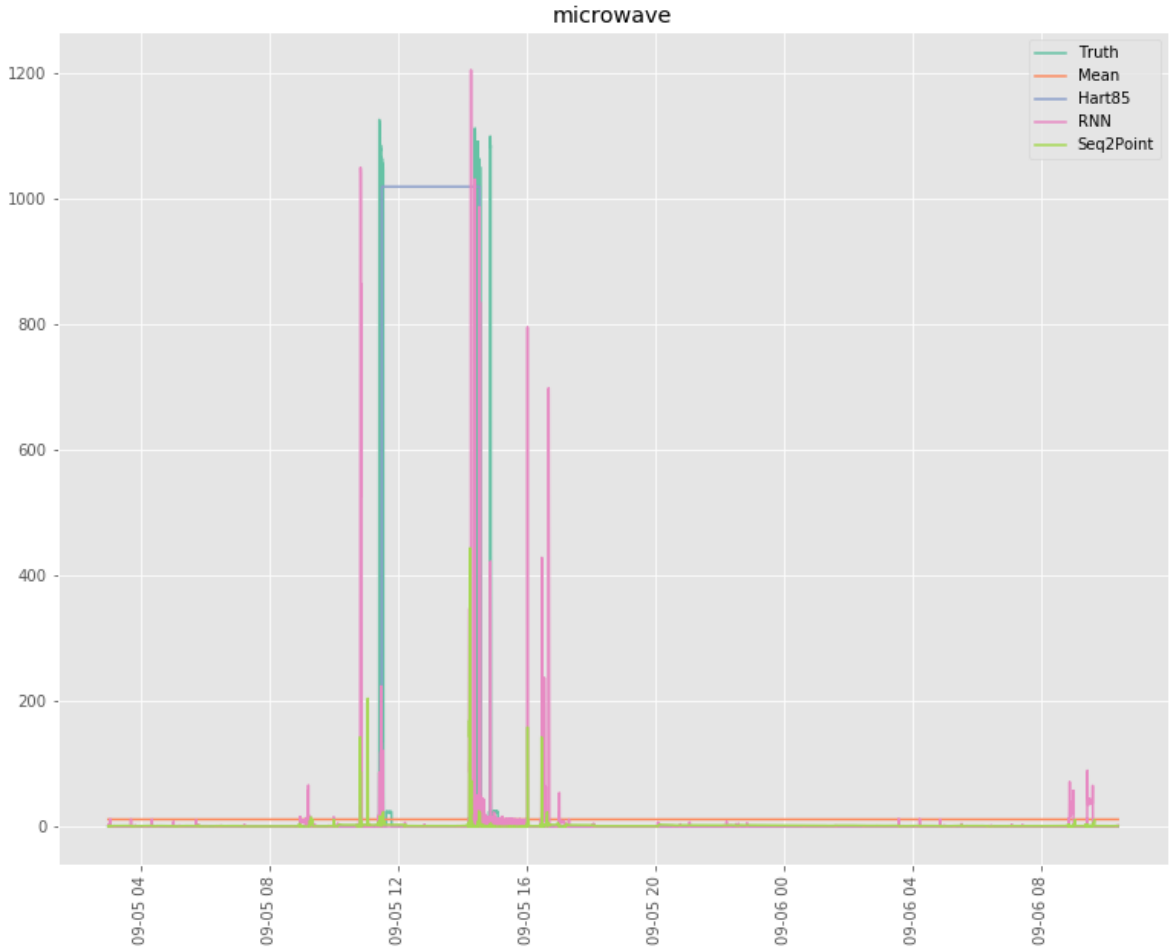
Quanto menor o seu valor, melhor é o modelo, já que a previsão se mostra mais próxima ao valor real. Comparando as duas métricas têm se que o RMSE penaliza desvios grandes, enquanto o MAE tem pesos iguais para todos os desvios.

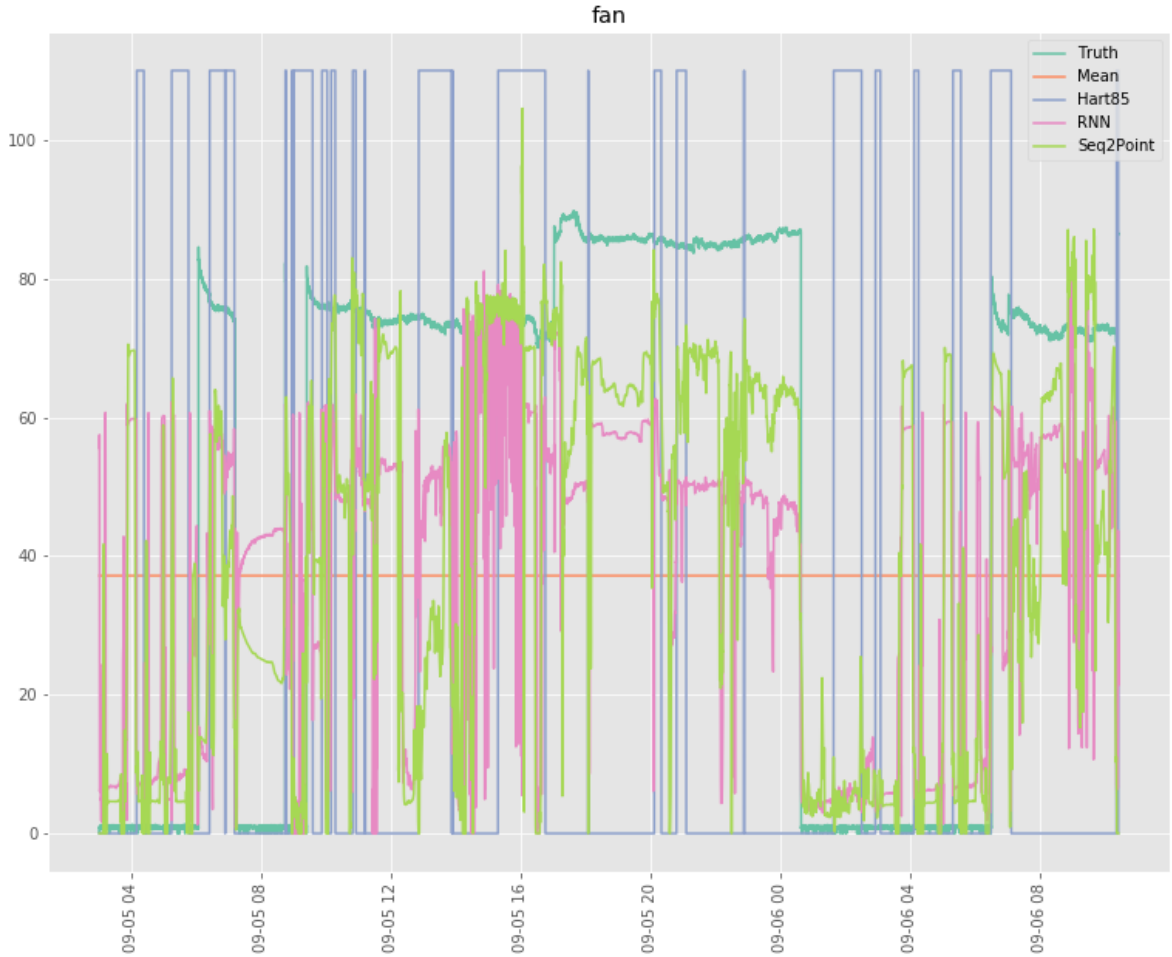
We can observe the prediction vs. truth graphs in the above cell. The accuracy metrics can be accessed using the following commands:

In [34]:

```
api_res = API(d)
```

```
Joint Testing for all algorithms
Loading data for  REDD  dataset
Dropping missing values
Generating predictions for : Mean
Generating predictions for : Hart85
Finding Edges, please wait ...
Edge detection complete.
Creating transition frame ...
Transition frame created.
Creating states frame ...
States frame created.
Finished.
Generating predictions for : RNN
Generating predictions for : Seq2Point
............  rmse  ............
                Mean      Hart85        RNN  Seq2Point
microwave  71.061497  319.886186  77.414819  71.616468
fan        39.949631   64.975333  31.322830  30.216249
............  mae  ............
                Mean      Hart85        RNN  Seq2Point
microwave  15.992266  100.814987   7.976542   6.868771
fan        39.587982   53.042061  25.582531  22.442392
............  relative_error  ............
                Mean     Hart85       RNN  Seq2Point
microwave  1.294125   2.599713  1.000965   2.048937
fan        1.037269  38.922932  1.367812   2.071282
............  r2score  ............
                Mean     Hart85       RNN  Seq2Point
microwave -0.007740 -19.420702 -0.195991  -0.023542
fan       -0.141613  -2.019884  0.298197   0.346908
............  nde  ............
                Mean    Hart85       RNN  Seq2Point
microwave  1.001237  4.507108  1.090753   1.009056
fan        0.629842  1.024394  0.493832   0.476386
............  nep  ............
                Mean     Hart85       RNN  Seq2Point
microwave  3.117446  19.652330  1.554904   1.338961
fan        0.772661   1.035251  0.499308   0.438021
............  f1score  ............
                Mean    Hart85       RNN  Seq2Point
microwave  0.041294  0.196907  0.222387   0.080645
fan        0.786794  0.366535  0.875124   0.876839
```


microwave
Truth
Mean
Hart85
RNN
Seq2Point
1200
1000
800
600
400
200
0
09-05 04
09-05 08
09-05 12
09-05 16
09-05 20
09-06 00
09-06 04
09-06 08


fan
Truth
Mean
Hart85
RNN
Seq2Point
100
80
60
40
20
0
09-05 04
09-05 08
09-05 12
09-05 16
09-05 20
09-06 00
09-06 04
09-06 08

In [35]:

```
import numpy as np
import pandas as pd

vals = np.concatenate([np.expand_dims(df.values,axis=2) for df in api_results_exper


cols = api_results_experiment_1.errors[0].columns
indexes = api_results_experiment_1.errors[0].index


mean = np.mean(vals,axis=2)
std = np.std(vals,axis=2)
print ('\n\n')
print ("Mean")
print (pd.DataFrame(mean,index=indexes,columns=cols))
print ('\n\n')
print ("Standard Deviation")
print (pd.DataFrame(std,index=indexes,columns=cols))
```

```
---------------------------------------------------------------------------
-----
NameError                                 Traceback (most recent call
 last)
/tmp/ipykernel_22651/2974443787.py in <module>
      2 import pandas as pd
      3
----> 4 vals = np.concatenate([np.expand_dims(df.values,axis=2) for df
in api_results_experiment_1.errors],axis=2)
      5
      6

NameError: name 'api_results_experiment_1' is not defined
```