In [ ]:

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

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

Carregando bibliotecas...

In [1]:

```
!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: pandas>=0.23 in ./miniconda3/envs/nilm_
0.4.3/lib/python3.7/site-packages (from seaborn) (0.25.3)
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: matplotlib>=2.2 in ./miniconda3/envs/ni
lm_0.4.3/lib/python3.7/site-packages (from seaborn) (3.1.3)
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: 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: 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: 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: 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 [ ]:

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

In [ ]:

```
# 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')
redd = DataSet('redd.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 [3]:

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

```
---------------------------------------------------------------------------
NameError                                 Traceback (most recent call last)
/tmp/ipykernel_13826/717090891.py in <module>
      1 build = 1
----> 2 elec = hb.buildings[build].elec
      3 elec.mains().power_series_all_data().head()

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

In [ ]:

```
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()
```

Dados

Proporção de energia submedida

In [5]:

```
elec.proportion_of_energy_submetered()
```

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

Out[5]:

```
0.09288249528613458
```

Total Energy

In [6]:

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

Out[6]:

```
active    53.946047
dtype: float64
```

Energy per submeter

In [7]:

```
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[7]:

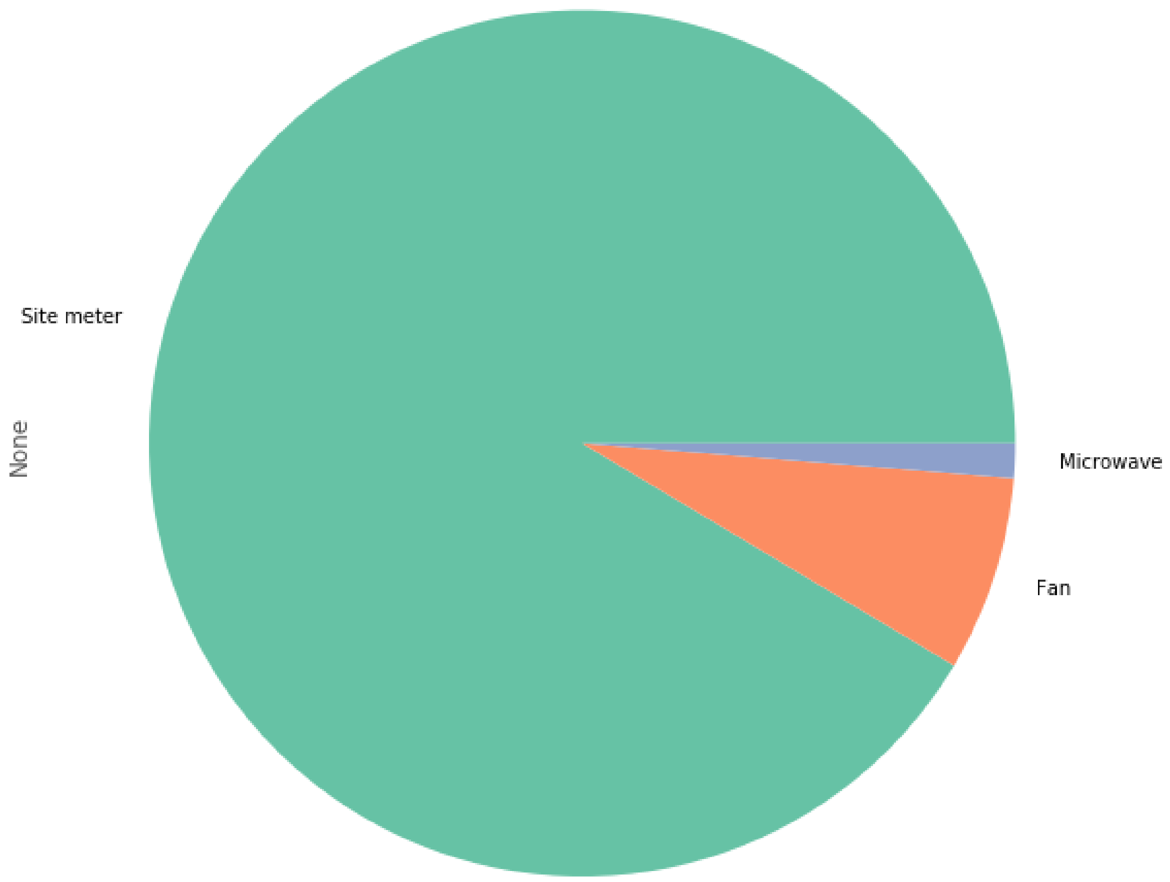
	(2, 1, HB)	(3, 1, HB)
active	4.298278	0.757815
apparent	NaN	NaN
reactive	NaN	NaN

Plot fraction of energy consumption of each appliance

In [5]:

```
# 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 [6]:

```
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[6]:

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

In [11]:

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

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

next(meter1.load()).tail()
```

Out[11]:

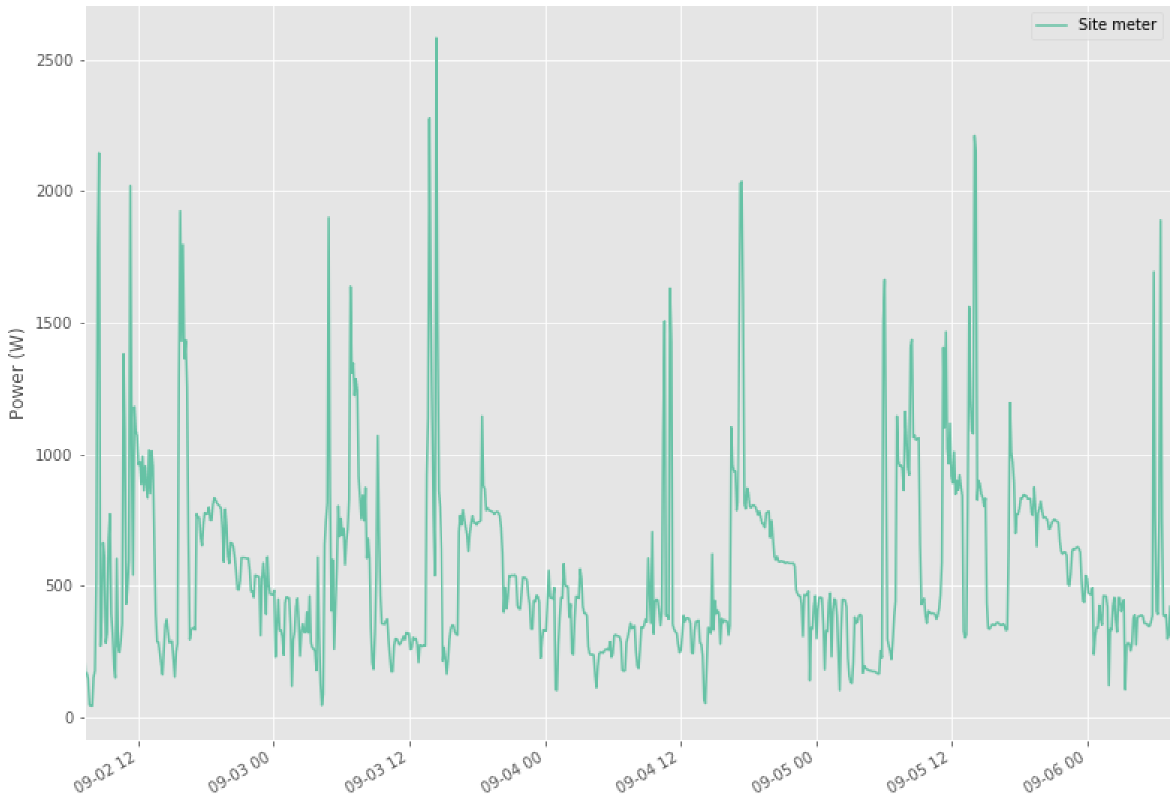
physical_quantity	voltage	frequency	power	power factor	current
type			active		
2021-09-06 07:24:13.545000-03:00	221.300003	60.0	458.399994	0.91	2.286
2021-09-06 07:24:14.060000-03:00	221.300003	60.0	458.399994	0.91	2.286
2021-09-06 07:24:14.559000-03:00	221.500000	60.0	458.299988	0.91	2.282
2021-09-06 07:24:15.042000-03:00	221.500000	60.0	458.299988	0.91	2.282
2021-09-06 07:24:15.557000-03:00	221.600006	60.0	459.000000	0.91	2.286

In [12]:

```
meter1.plot()
```

Out[12]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f667a0fdd90>
```



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 [13]:

```
meter1.dropout_rate()
```

Out[13]:

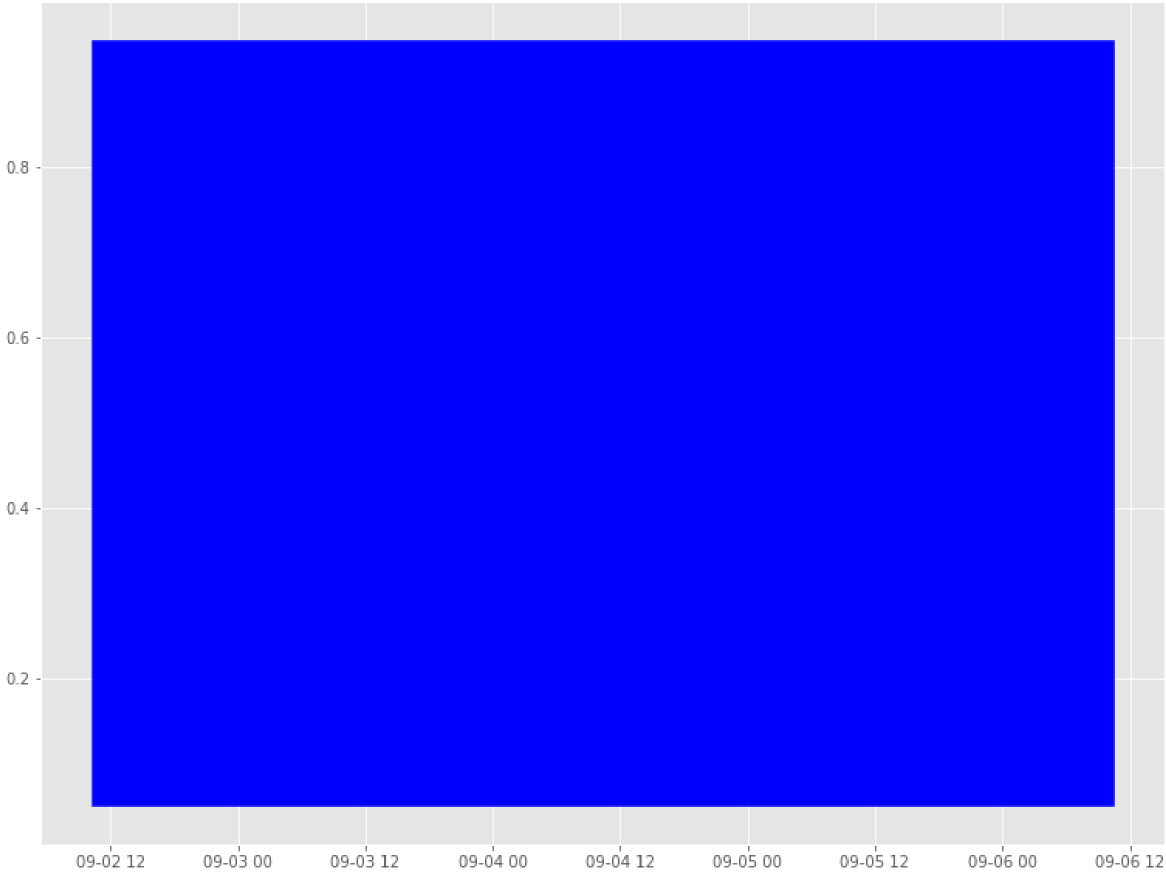
```
0.0002946431279545747
```

In [14]:

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

Out[14]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f667b21ed10>
```



In [15]:

```
good_sections.combined()
```

Out[15]:

```
[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 [16]:

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

Out[16]:

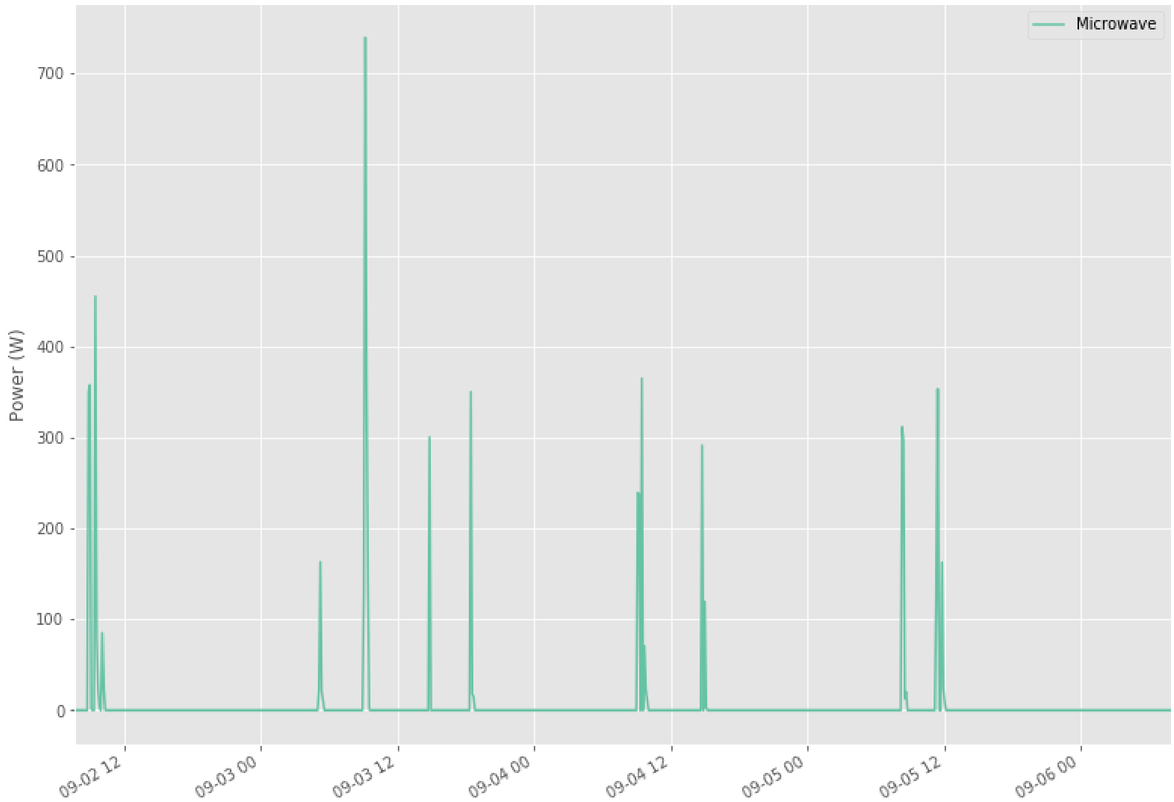
physical_quantity	voltage	power		power factor	power	current
type		apparent	active		reactive	
2021-09-02 07:47:51-03:00	221.882004	0.0	0.0	0.0	0.0	0.0
2021-09-02 07:47:56-03:00	221.882004	0.0	0.0	0.0	0.0	0.0
2021-09-02 07:48:01-03:00	222.406006	0.0	0.0	0.0	0.0	0.0
2021-09-02 07:48:06-03:00	222.143997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

In [17]:

```
microwave.plot()
```

Out[17]:

<matplotlib.axes._subplots.AxesSubplot at 0x7f667a10a910>



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 [18]:

```
microwave.dropout_rate()
```

Out[18]:

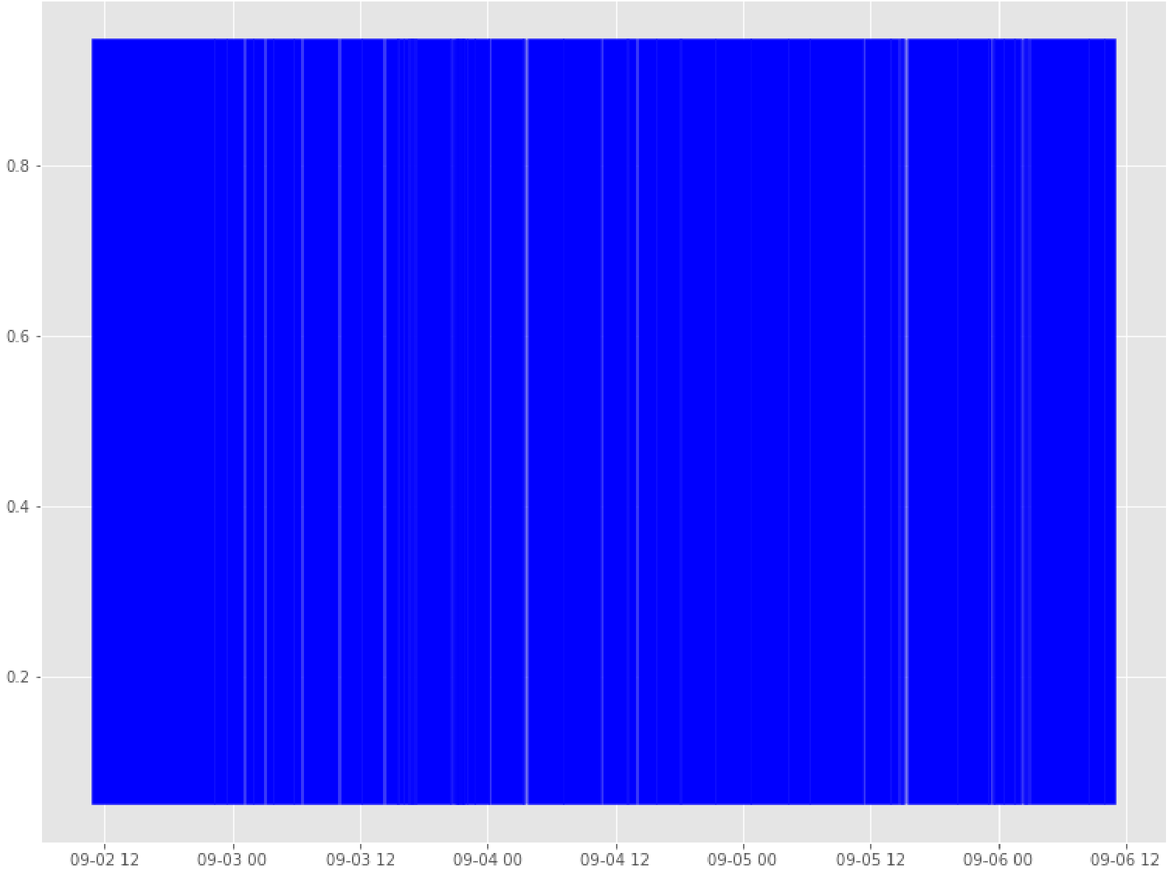
0.001913041828182637

In [19]:

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

Out[19]:

<matplotlib.axes._subplots.AxesSubplot at 0x7f66785fc890>



In [20]:

```
good_sections.combined()
```

Out[20]:

```
[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),
 TimeFrame(start='2021-09-03 09:11:09-03:00', end='2021-09-03 11:13:15
-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
-03:00', empty=False),
 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
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 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
-03:00', empty=False),
 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
-03:00', empty=False),
 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
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 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),
 TimeFrame(start='2021-09-03 19:43:52-03:00', end='2021-09-03 19:47:36
-03:00', empty=False),
 TimeFrame(start='2021-09-03 19:48:41-03:00', end='2021-09-03 21:04:57
-03:00', empty=False),
 TimeFrame(start='2021-09-03 21:05:42-03:00', end='2021-09-03 21:07:08
-03:00', empty=False),
 TimeFrame(start='2021-09-03 21:07:47-03:00', end='2021-09-03 21:07:52
-03:00', empty=False),
 TimeFrame(start='2021-09-03 21:08:47-03:00', end='2021-09-03 21:09:47
-03:00', empty=False),
 TimeFrame(start='2021-09-03 21:12:07-03:00', end='2021-09-04 00:19:02
-03:00', empty=False),
 TimeFrame(start='2021-09-04 00:19:57-03:00', end='2021-09-04 00:30:42
-03:00', empty=False),
 TimeFrame(start='2021-09-04 00:31:22-03:00', end='2021-09-04 00:38:07
-03:00', empty=False),
 TimeFrame(start='2021-09-04 00:41:17-03:00', end='2021-09-04 04:06:02
-03:00', empty=False),
 TimeFrame(start='2021-09-04 04:06:42-03:00', end='2021-09-04 04:07:47
-03:00', empty=False),
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```
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-03:00', empty=False),
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-03:00', empty=False),
 TimeFrame(start='2021-09-06 07:02:09-03:00', end='2021-09-06 07:55:59
-03:00', empty=False)]
```

Ventilador

In [21]:

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

Out[21]:

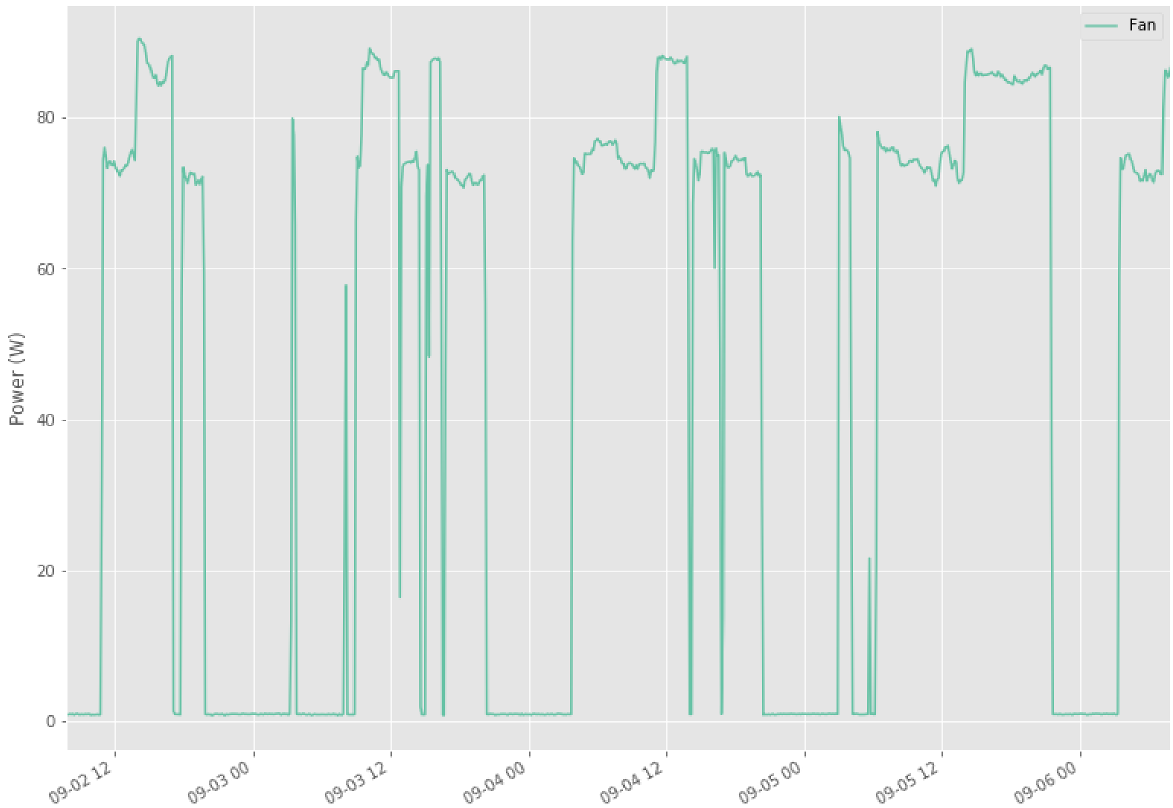
physical_quantity	voltage	power		power factor	power	current
type		apparent	active		reactive	
2021-09-02 07:47:51-03:00	222.287003	18.454000	0.767	0.04	18.400000	0.083
2021-09-02 07:47:56-03:00	222.546997	31.761999	1.091	0.03	31.700001	0.143
2021-09-02 07:48:01-03:00	222.028000	20.479000	1.091	0.05	20.400000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

In [22]:

```
fan.plot()
```

Out[22]:

<matplotlib.axes._subplots.AxesSubplot at 0x7f667845a050>

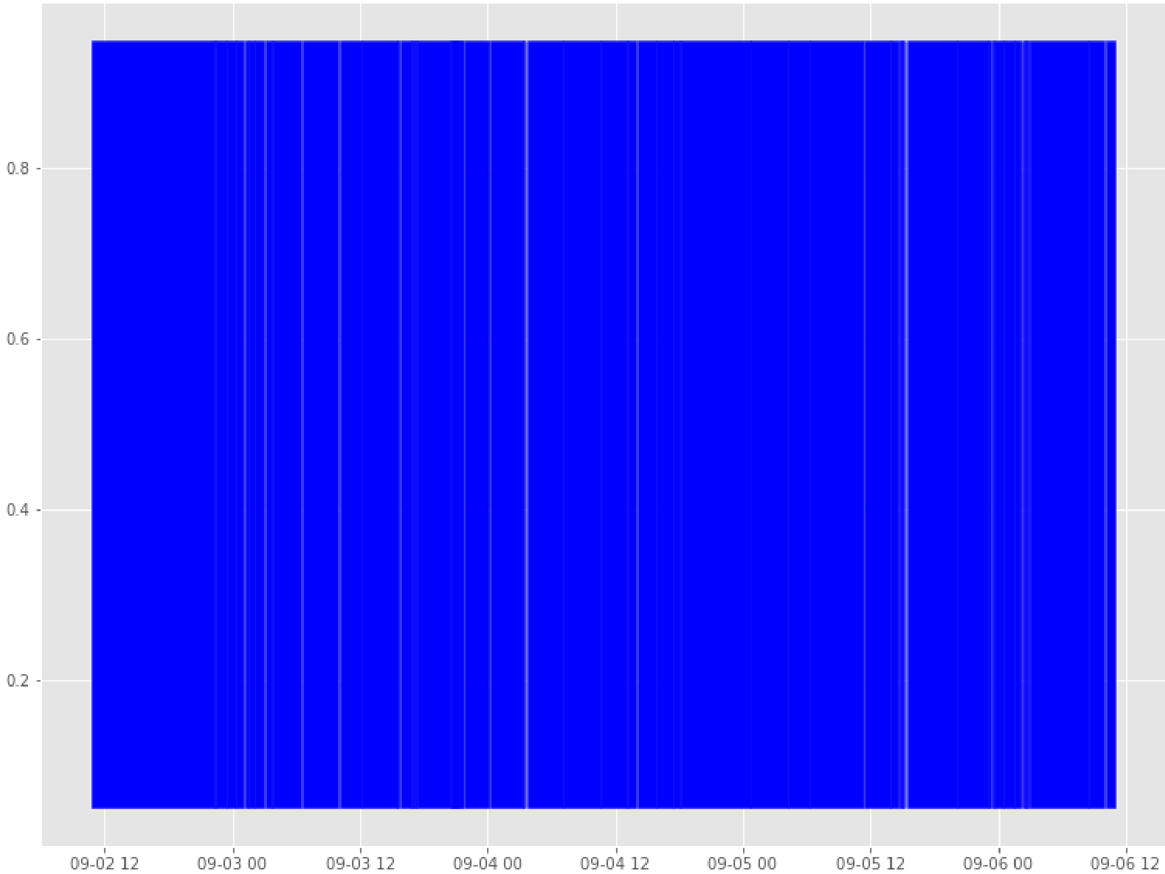


In [23]:

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

Out[23]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f66783d2910>
```



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 [24]:

```
fan.dropout_rate()
```

Out[24]:

```
0.002014694526278486
```

In [25]:

```
good_sections.combined()
```

Out[25]:

```
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-03:00', empty=False),
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```

```
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-03:00', empty=False),
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-03:00', empty=False),
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-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 [26]:

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

Dataframe de correlação dos aparelhos

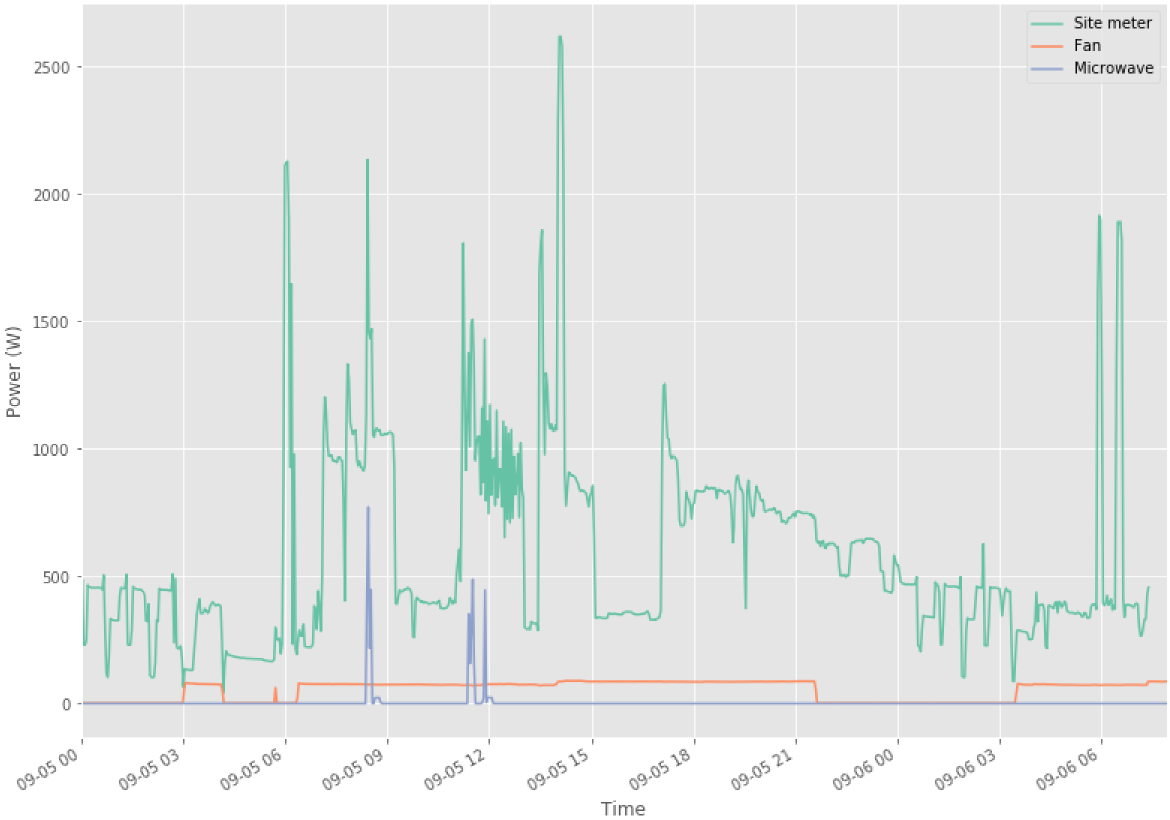
In [27]:

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

Traçar dados submedidos em um 1 dia

In [28]:

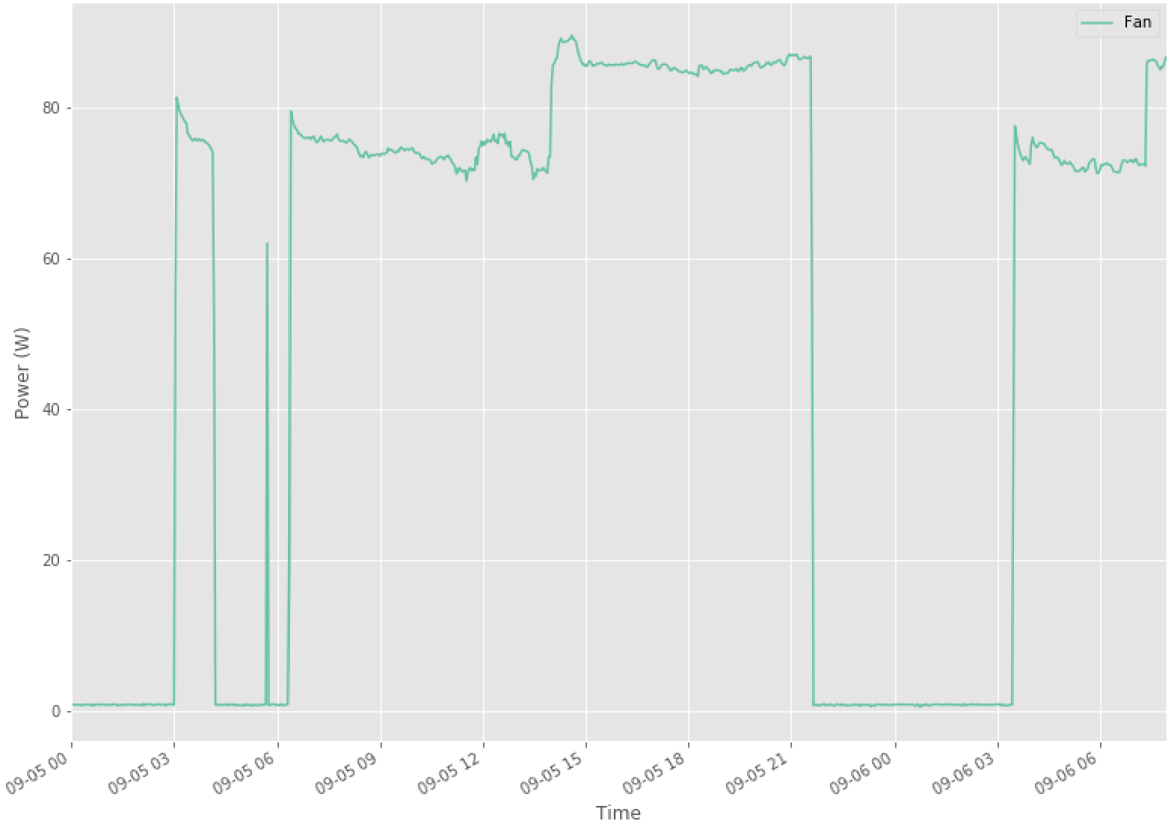
```
hb.set_window(start='2021-09-05', end='2021-09-07')
elec.plot();
plt.xlabel("Time");
```



In [29]:

```
# hb.set_window(start='2021-09-05 00:00:00', end='2021-09-06 23:59:59')
hb.set_window(start='2021-09-05', end='2021-09-07')

# 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 [2]:

```
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,Seq2Seq,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 [3]:

```
d = {
  'power': {
    'mains': ['active'],
    'appliance': ['reactive']
#     'mains': ['active', 'frequency', 'power factor', 'current', 'voltage'],
#     'appliance': ['active', 'apparent', 'reactive', 'power factor', 'current', 'v
  },
  'artificial_aggregate': False,
  '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': {
      'hb': {
        '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)

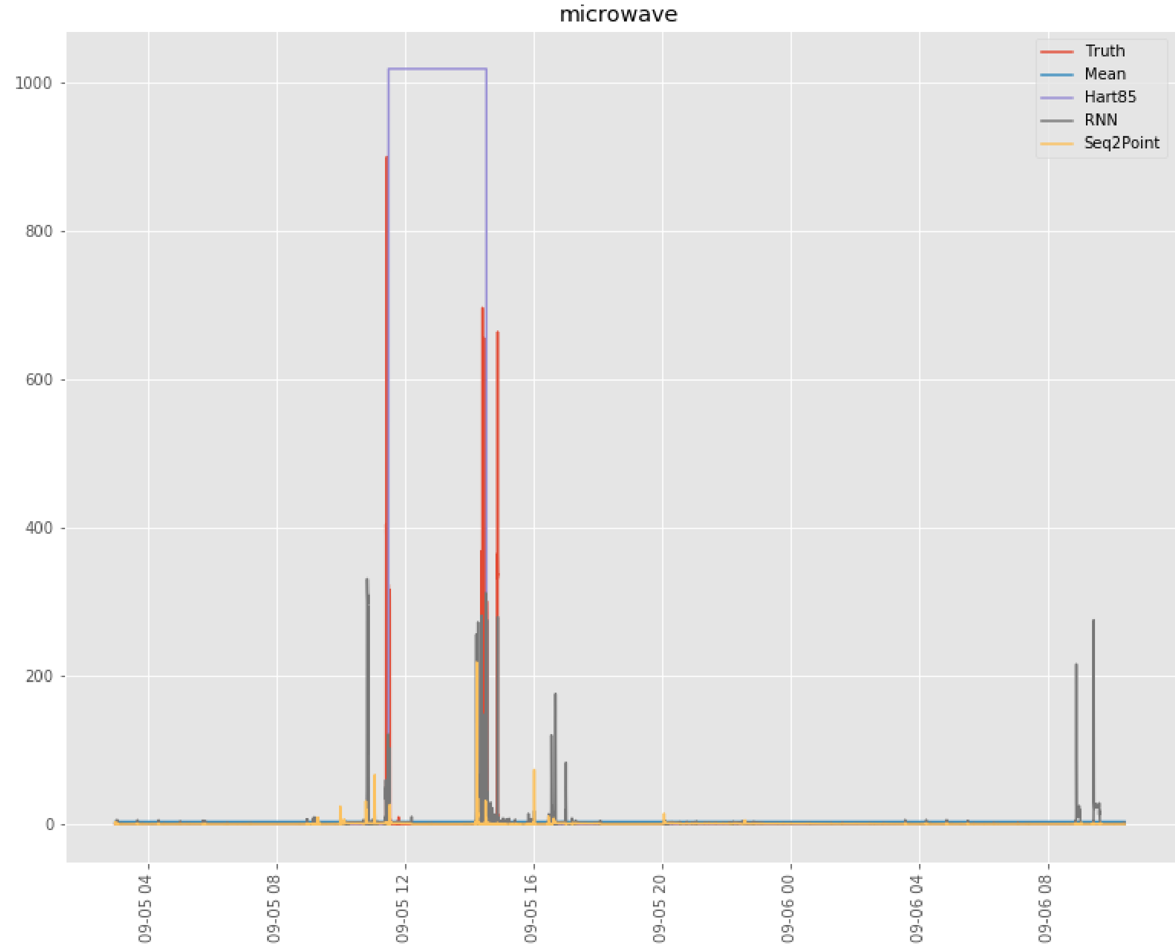
Quanto menor o seu valor, melhor é o modelo, já que a previsão se mostra mais próxima ao valor real. Comparando as duas métricas têm se que o RMSE penaliza desvios grandes, enquanto o MAE tem pesos iguais para todos os desvios.

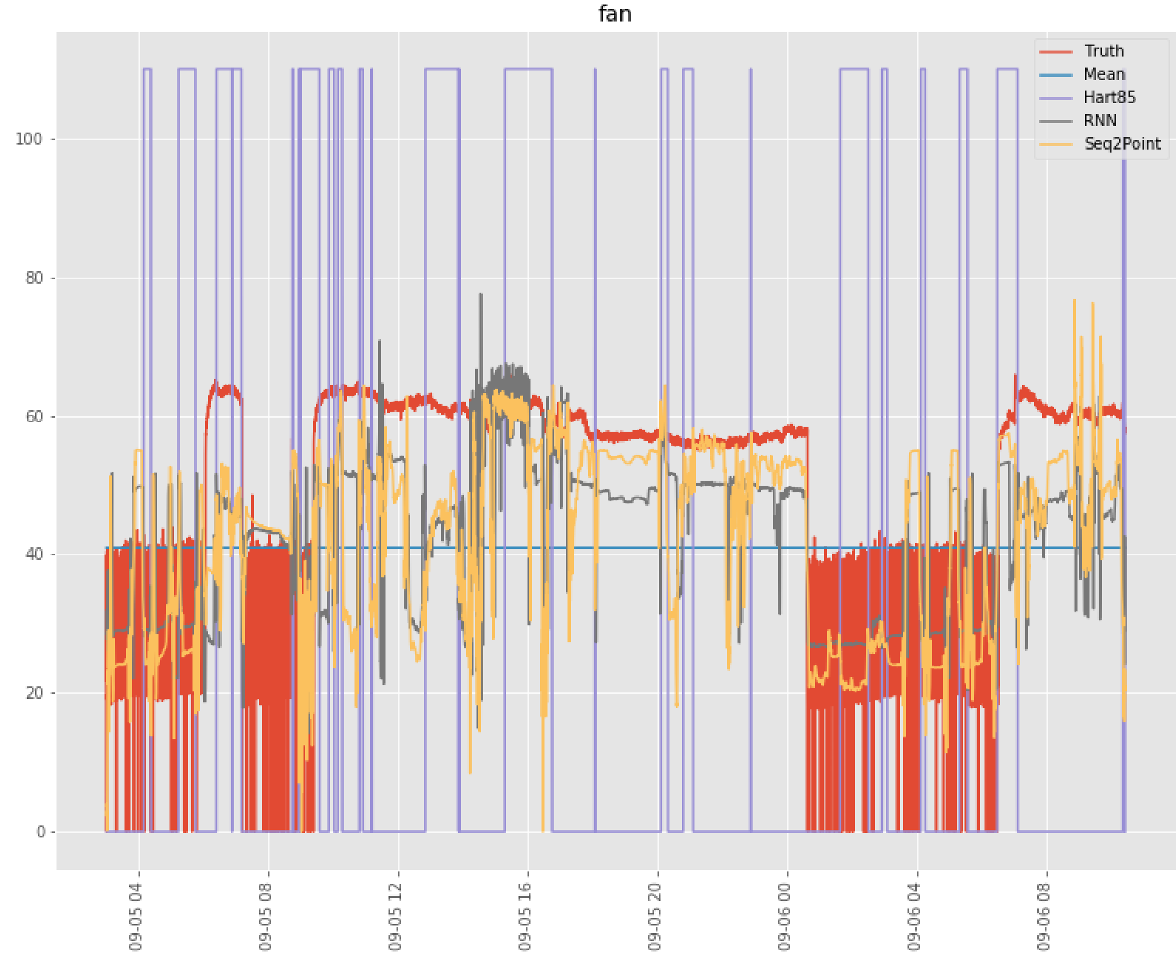
We can observe the prediction vs. truth graphs in the above cell. The accuracy metrics can be accessed using the following commands:

In [4]:

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

```
Joint Testing for all algorithms
Loading data for  hb  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  24.359955  318.755907  25.996061  24.751624
fan        18.427816   53.662934  14.322017  15.212287
............  mae  ..............
                Mean      Hart85        RNN  Seq2Point
microwave   4.947622  100.694908   3.551025   2.098739
fan        17.445124   50.592281  11.505986  11.362168
............  relative_error  ..............
               Mean     Hart85       RNN  Seq2Point
microwave  1.119764   0.863632  0.988220   0.985183
fan        0.416089  36.065834  0.292169   0.321175
............  r2score  ..............
               Mean      Hart85       RNN  Seq2Point
microwave -0.005820 -171.220043 -0.145466  -0.038424
fan       -0.170755   -8.928121  0.292825   0.202176
............  nde  ..............
               Mean     Hart85       RNN  Seq2Point
microwave  1.000829  13.096092  1.068049   1.016921
fan        0.362053   1.054322  0.281386   0.298878
............  nep  ..............
               Mean     Hart85       RNN  Seq2Point
microwave  3.160475  64.322563  2.268348   1.340646
fan        0.363712   1.054795  0.239887   0.236889
............  f1score  ..............
               Mean    Hart85       RNN  Seq2Point
microwave  0.000000  0.046410  0.177258   0.035503
fan        0.992732  0.388611  0.992732   0.992042
```


microwave
Truth
Mean
Hart85
RNN
Seq2Point
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
0
20
40
60
80
100
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 [5]:

```
import numpy as np
import pandas as pd

vals = np.concatenate([np.expand_dims(df.values,axis=2) for df in api_res.errors],a


cols = api_res.errors[0].columns
indexes = api_res.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))
```

```
Mean
               Mean     Hart85       RNN  Seq2Point
microwave  4.940404  46.651353  4.843356   4.312885
fan        5.405253  19.127236  3.989572   4.089374



Standard Deviation
               Mean      Hart85       RNN  Seq2Point
microwave  8.100065  136.348452  8.713811   8.372110
fan        7.935909   24.672605  5.699429   5.912763
```

In [ ]: