```
predicted=12.681989, expected=12.600000
predicted=12.585085, expected=12.600000
predicted=12.600786, expected=12.500000
predicted=12.482109, expected=12.400000
predicted=12.385153, expected=12.300000
predicted=12.284685, expected=12.200000
predicted=12.184797, expected=12.100000
predicted=12.084819, expected=12.100000
predicted=12.101198, expected=12.000000
predicted=11.982238, expected=12.000000
predicted=12.001698, expected=11.900000
predicted=11.882285, expected=11.800000
predicted=11.785502, expected=11.800000
predicted=11.801351, expected=11.700000
predicted=11.682487, expected=11.700000
predicted=11.701934, expected=11.700000
predicted=11.698756, expected=11.600000
predicted=11.583016, expected=11.600000
predicted=11.601944, expected=11.600000
predicted=11.598853, expected=11.500000
predicted=11.483107, expected=11.500000
predicted=11.502028, expected=11.500000
predicted=11.498939, expected=11.400000
predicted=11.383202, expected=11.400000
predicted=11.402114, expected=11.400000
predicted=11.399027, expected=11.300000
predicted=11.283296, expected=11.300000
predicted=11.302200, expected=11.300000
predicted=11.299116, expected=11.200000
predicted=11.183392, expected=11.200000
predicted=11.202286, expected=11.200000
predicted=11.199205, expected=11.100000
predicted=11.083487, expected=11.100000
predicted=11.102372, expected=11.100000
predicted=11.099294, expected=11.100000
predicted=11.099796, expected=11.000000
predicted=10.983507, expected=11.000000
predicted=11.002470, expected=11.000000
predicted=10.999381, expected=11.000000
predicted=10.999884, expected=11.000000
predicted=10.999802, expected=10.900000
predicted=10.883620, expected=10.900000
predicted=10.902551, expected=10.900000
predicted=10.899470, expected=10.900000
predicted=10.899972, expected=10.900000
predicted=10.899890, expected=10.900000
predicted=10.899903, expected=10.900000
predicted=10.899901, expected=10.900000
predicted=10.899901, expected=10.900000
predicted=10.899901, expected=10.900000
predicted=10.899901, expected=10.900000
predicted=10.899901, expected=10.900000
predicted=10.899901, expected=10.900000
predicted=10.899901, expected=11.000000
predicted=11.016085, expected=11.000000
```

```
predicted=10.997168, expected=11.000000
predicted=11.000245, expected=11.000000
predicted=10.999744, expected=11.100000
predicted=11.115996, expected=11.100000
predicted=11.097083, expected=11.100000
predicted=11.100156, expected=11.200000
predicted=11.215819, expected=11.200000
predicted=11.197009, expected=11.300000
predicted=11.316191, expected=11.300000
predicted=11.296852, expected=11.400000
predicted=11.416075, expected=11.400000
predicted=11.396774, expected=11.500000
predicted=11.515947, expected=11.500000
predicted=11.496699, expected=11.600000
predicted=11.615820, expected=11.600000
predicted=11.596624, expected=11.600000
predicted=11.599714, expected=11.600000
predicted=11.599217, expected=11.700000
predicted=11.715303, expected=11.700000
predicted=11.696611, expected=11.800000
predicted=11.815589, expected=11.900000
predicted=11.912488, expected=11.900000
predicted=11.896866, expected=12.000000
predicted=12.015404, expected=12.000000
predicted=11.996311, expected=12.100000
predicted=12.115368, expected=12.100000
predicted=12.096236, expected=12.100000
predicted=12.099308, expected=12.200000
C:\Users\admin\Anaconda3\lib\site-packages\statsmodels\base\model.py:508:
ConvergenceWarning: Maximum Likelihood optimization failed to converge. Check mle_retvals
  "Check mle_retvals", ConvergenceWarning)
predicted=12.214798, expected=12.200000
predicted=12.196246, expected=12.200000
predicted=12.199224, expected=12.200000
predicted=12.198746, expected=12.200000
predicted=12.198824, expected=12.300000
predicted=12.314789, expected=12.300000
predicted=12.296173, expected=12.300000
predicted=12.299159, expected=12.300000
predicted=12.298681, expected=12.300000
predicted=12.298758, expected=12.300000
predicted=12.298747, expected=12.300000
predicted=12.298750, expected=12.300000
predicted=12.298750, expected=12.300000
predicted=12.298751, expected=12.200000
predicted=12.182783, expected=12.200000
predicted=12.201387, expected=12.100000
predicted=12.082480, expected=12.100000
predicted=12.101512, expected=12.000000
predicted=11.982585, expected=12.000000
predicted=12.001577, expected=11.900000
predicted=11.882703, expected=11.800000
predicted=11.785762, expected=11.800000
predicted=11.801261, expected=11.700000
predicted=11.682904, expected=11.700000
```

```
predicted=11.701809, expected=11.700000
predicted=11.698794, expected=11.600000
predicted=11.583406, expected=11.600000
predicted=11.601829, expected=11.500000
predicted=11.483059, expected=11.500000
predicted=11.501981, expected=11.500000
predicted=11.498970, expected=11.400000
predicted=11.383625, expected=11.400000
predicted=11.401994, expected=11.300000
predicted=11.283283, expected=11.300000
predicted=11.302146, expected=11.300000
predicted=11.299153, expected=11.200000
predicted=11.183846, expected=11.200000
predicted=11.202161, expected=11.200000
predicted=11.199256, expected=11.100000
predicted=11.083941, expected=11.100000
predicted=11.102250, expected=11.100000
predicted=11.099347, expected=11.100000
predicted=11.099807, expected=11.000000
predicted=10.983971, expected=11.000000
predicted=11.002348, expected=11.000000
predicted=10.999436, expected=10.900000
predicted=10.884140, expected=10.900000
predicted=10.902424, expected=10.900000
predicted=10.899527, expected=10.900000
predicted=10.899986, expected=10.900000
predicted=10.899914, expected=10.800000
predicted=10.784178, expected=10.800000
predicted=10.802518, expected=10.800000
predicted=10.799615, expected=10.800000
predicted=10.800074, expected=10.800000
predicted=10.800002, expected=10.700000
predicted=10.684276, expected=10.700000
predicted=10.702600, expected=10.700000
predicted=10.699702, expected=10.700000
predicted=10.700160, expected=10.700000
predicted=10.700088, expected=10.700000
predicted=10.700099, expected=10.700000
predicted=10.700097, expected=10.700000
predicted=10.700097, expected=10.700000
predicted=10.700097, expected=10.700000
predicted=10.700097, expected=10.700000
predicted=10.700097, expected=10.800000
predicted=10.815824, expected=10.800000
predicted=10.797512, expected=10.800000
predicted=10.800407, expected=10.900000
predicted=10.915668, expected=11.000000
predicted=11.013191, expected=11.000000
predicted=10.997716, expected=11.100000
predicted=11.115921, expected=11.200000
predicted=11.212971, expected=11.200000
predicted=11.197535, expected=11.300000
predicted=11.315779, expected=11.400000
predicted=11.412815, expected=11.500000
predicted=11.513223, expected=11.600000
```

```
predicted=11.613091, expected=11.700000
predicted=11.713048, expected=11.800000
predicted=11.812992, expected=11.800000
predicted=11.796878, expected=11.900000
predicted=11.915481, expected=12.000000
predicted=12.012431, expected=12.100000
predicted=12.112872, expected=12.100000
predicted=12.096602, expected=12.200000
predicted=12.215328, expected=12.200000
predicted=12.196123, expected=12.300000
predicted=12.315286, expected=12.300000
predicted=12.296054, expected=12.400000
predicted=12.415184, expected=12.400000
predicted=12.396000, expected=12.500000
predicted=12.515085, expected=12.500000
predicted=12.495951, expected=12.600000
predicted=12.614991, expected=12.600000
predicted=12.595907, expected=12.600000
predicted=12.598964, expected=12.700000
predicted=12.714444, expected=12.700000
predicted=12.695937, expected=12.700000
predicted=12.698902, expected=12.700000
predicted=12.698428, expected=12.700000
predicted=12.698505, expected=12.700000
predicted=12.698494, expected=12.700000
predicted=12.698497, expected=12.700000
predicted=12.698498, expected=12.700000
predicted=12.698499, expected=12.700000
predicted=12.698500, expected=12.600000
predicted=12.582539, expected=12.600000
predicted=12.601113, expected=12.500000
predicted=12.482221, expected=12.500000
predicted=12.501224, expected=12.400000
predicted=12.382311, expected=12.300000
predicted=12.285363, expected=12.200000
predicted=12.184916, expected=12.100000
predicted=12.085038, expected=12.100000
predicted=12.101106, expected=12.000000
predicted=11.982544, expected=11.900000
predicted=11.885582, expected=11.800000
predicted=11.785152, expected=11.800000
predicted=11.801384, expected=11.700000
predicted=11.682721, expected=11.600000
predicted=11.585799, expected=11.600000
predicted=11.601490, expected=11.500000
predicted=11.482878, expected=11.500000
predicted=11.502064, expected=11.400000
predicted=11.382929, expected=11.300000
predicted=11.286087, expected=11.300000
predicted=11.301767, expected=11.200000
predicted=11.183157, expected=11.200000
predicted=11.202345, expected=11.100000
predicted=11.083209, expected=11.100000
predicted=11.102440, expected=11.000000
predicted=10.983338, expected=11.000000
```

```
predicted=11.002521, expected=10.900000
predicted=10.883468, expected=10.900000
predicted=10.902602, expected=10.800000
predicted=10.783596, expected=10.800000
predicted=10.802681, expected=10.700000
predicted=10.683723, expected=10.700000
predicted=10.702758, expected=10.600000
predicted=10.583846, expected=10.600000
predicted=10.602833, expected=10.600000
predicted=10.599805, expected=10.500000
predicted=10.484422, expected=10.500000
predicted=10.502839, expected=10.400000
predicted=10.384066, expected=10.400000
predicted=10.402984, expected=10.400000
predicted=10.399974, expected=10.300000
predicted=10.284620, expected=10.300000
predicted=10.302986, expected=10.200000
predicted=10.184260, expected=10.200000
predicted=10.203124, expected=10.200000
predicted=10.200130, expected=10.200000
predicted=10.200605, expected=10.200000
predicted=10.200529, expected=10.100000
predicted=10.084744, expected=10.100000
predicted=10.103128, expected=10.100000
predicted=10.100211, expected=10.100000
predicted=10.100674, expected=10.100000
predicted=10.100600, expected=10.100000
predicted=10.100611, expected=10.100000
predicted=10.100609, expected=10.100000
predicted=10.100609, expected=10.100000
predicted=10.100608, expected=10.100000
predicted=10.100608, expected=10.100000
predicted=10.100607, expected=10.100000
predicted=10.100607, expected=10.200000
predicted=10.216396, expected=10.200000
predicted=10.198023, expected=10.200000
predicted=10.200935, expected=10.300000
predicted=10.316252, expected=10.400000
predicted=10.413770, expected=10.500000
predicted=10.514110, expected=10.600000
predicted=10.613994, expected=10.700000
predicted=10.713948, expected=10.800000
predicted=10.813888, expected=10.900000
predicted=10.913828, expected=11.000000
predicted=11.013766, expected=11.100000
predicted=11.113702, expected=11.200000
predicted=11.213637, expected=11.300000
predicted=11.313572, expected=11.400000
predicted=11.413506, expected=11.400000
predicted=11.397189, expected=11.500000
predicted=11.516051, expected=11.600000
predicted=11.612903, expected=11.700000
predicted=11.713347, expected=11.800000
predicted=11.813203, expected=11.800000
predicted=11.796787, expected=11.900000
```

```
predicted=11.915803, expected=11.900000
predicted=11.896261, expected=12.000000
predicted=12.015753, expected=12.100000
predicted=12.112500, expected=12.100000
predicted=12.096600, expected=12.100000
predicted=12.099214, expected=12.200000
predicted=12.215137, expected=12.200000
predicted=12.196077, expected=12.200000
predicted=12.199208, expected=12.200000
predicted=12.198694, expected=12.200000
predicted=12.198780, expected=12.200000
predicted=12.198766, expected=12.200000
predicted=12.198769, expected=12.100000
predicted=12.082426, expected=12.100000
predicted=12.101544, expected=12.000000
predicted=11.982101, expected=12.000000
predicted=12.001688, expected=11.900000
predicted=11.882213, expected=11.800000
predicted=11.785467, expected=11.800000
predicted=11.801347, expected=11.700000
predicted=11.682443, expected=11.600000
predicted=11.585617, expected=11.500000
predicted=11.485169, expected=11.400000
predicted=11.385323, expected=11.300000
predicted=11.285378, expected=11.300000
predicted=11.301938, expected=11.200000
predicted=11.182759, expected=11.100000
predicted=11.086011, expected=11.100000
predicted=11.102067, expected=11.000000
predicted=10.982931, expected=10.900000
predicted=10.886181, expected=10.900000
predicted=10.902270, expected=10.800000
predicted=10.783087, expected=10.700000
predicted=10.686348, expected=10.700000
predicted=10.702467, expected=10.600000
predicted=10.583237, expected=10.500000
predicted=10.486506, expected=10.500000
```

```
In [223]: error = mean_squared_error(diss_test, do_predictions)
     ...: print('Test MSE: %.3f' % error)
Traceback (most recent call last):

  File "<ipython-input-223-304c19d43e44>", line 1, in <module>
    error = mean_squared_error(diss_test, do_predictions)

  File "C:\Users\admin\Anaconda3\lib\site-packages\sklearn\metrics\regression.py", line
239, in mean_squared_error
    y_true, y_pred, multioutput)

  File "C:\Users\admin\Anaconda3\lib\site-packages\sklearn\metrics\regression.py", line
75, in _check_reg_targets
    check_consistent_length(y_true, y_pred)

  File "C:\Users\admin\Anaconda3\lib\site-packages\sklearn\utils\validation.py", line 235,
in check_consistent_length
```

```
    " samples: %r" % [int(l) for l in lengths])

ValueError: Found input variables with inconsistent numbers of samples: [1396, 1614]


In [224]:

In [224]: do_predictions = do_predictions[218:,:]
Traceback (most recent call last):

  File "<ipython-input-224-3ee3c45cfe82>", line 1, in <module>
    do_predictions = do_predictions[218:,:]

TypeError: list indices must be integers or slices, not tuple


In [225]:

In [225]: do_predictions = do_predictions[218:]

In [226]: plt.figure(figsize=(12,8))
    ...: pyplot.plot(diss_test, label = "Original")
    ...: pyplot.plot(do_predictions, color='red',label='Predicted')
    ...: plt.xlabel("Datatime Index ")
    ...: plt.ylabel("Dissolved Oxygen Values")
    ...: plt.title('Dissolved Oxygen Forecast')
    ...: plt.legend()
    ...: plt.show()
```
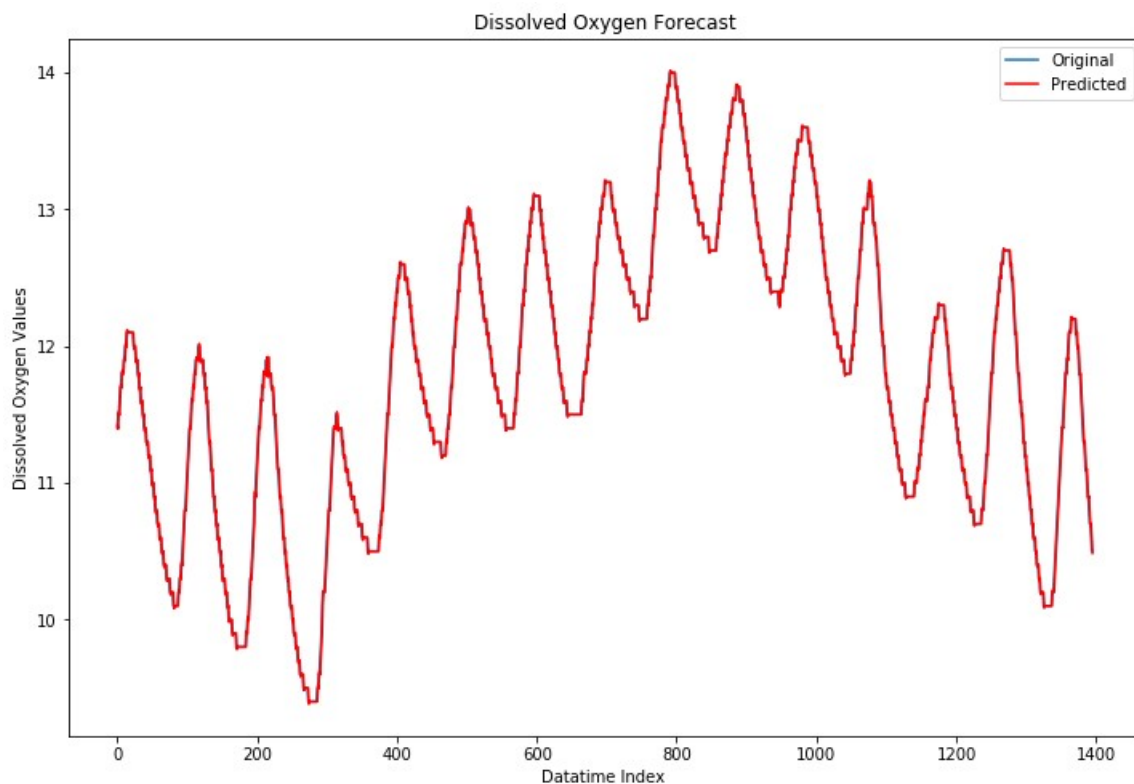
```
In [227]: dataset
    ...:
Out[227]:
                      SC(uS)  Turb(FNU)  DO(mg/L)
date_time
2017-02-25 00:00:00   487.0        1.5       8.9
2017-02-25 00:15:00   488.0        1.8       8.8
2017-02-25 00:30:00   489.0        2.0       8.7
2017-02-25 00:45:00   487.0        1.8       8.6
2017-02-25 01:00:00   488.0        1.4       8.6
2017-02-25 01:15:00   488.0        2.4       8.5
2017-02-25 01:30:00   488.0        1.4       8.4
2017-02-25 01:45:00   489.0        1.8       8.4
2017-02-25 02:00:00   492.0        1.6       8.3
2017-02-25 02:15:00   491.0        1.8       8.3
2017-02-25 02:30:00   491.0        1.7       8.2
2017-02-25 02:45:00   492.0        1.6       8.2
2017-02-25 03:00:00   492.0        4.1       8.1
2017-02-25 03:15:00   491.0        1.8       8.1
2017-02-25 03:30:00   492.0        1.8       8.1
2017-02-25 03:45:00   493.0        2.1       8.0
2017-02-25 04:00:00   490.0        1.6       8.0
2017-02-25 04:15:00   489.0        1.7       8.0
2017-02-25 04:30:00   490.0        2.2       8.0
2017-02-25 04:45:00   493.0        1.5       8.0
2017-02-25 05:00:00   494.0        2.1       7.9
2017-02-25 05:15:00   496.0        2.0       7.9
2017-02-25 05:30:00   495.0        1.9       7.9
2017-02-25 05:45:00   495.0        1.5       7.9
2017-02-25 06:00:00   495.0        2.0       7.9
2017-02-25 06:15:00   496.0        1.6       7.9
2017-02-25 06:30:00   495.0        1.5       7.9
2017-02-25 06:45:00   494.0        1.5       7.9
2017-02-25 07:00:00   495.0        1.7       7.9
2017-02-25 07:15:00   495.0        1.3       7.9
...                      ...        ...       ...
2017-03-21 16:30:00   457.0        1.8      12.2
2017-03-21 16:45:00   456.0        1.8      12.2
2017-03-21 17:00:00   456.0        2.0      12.2
2017-03-21 17:15:00   456.0        1.8      12.2
2017-03-21 17:30:00   456.0        1.4      12.2
2017-03-21 17:45:00   456.0        1.9      12.1
2017-03-21 18:00:00   456.0        1.8      12.1
2017-03-21 18:15:00   456.0        1.8      12.0
2017-03-21 18:30:00   458.0        1.7      12.0
2017-03-21 18:45:00   456.0        2.0      11.9
2017-03-21 19:00:00   456.0        2.0      11.8
2017-03-21 19:15:00   456.0        2.0      11.8
2017-03-21 19:30:00   457.0        1.9      11.7
2017-03-21 19:45:00   457.0        1.9      11.6
2017-03-21 20:00:00   457.0        2.4      11.5
2017-03-21 20:15:00   457.0        2.2      11.4
2017-03-21 20:30:00   454.0        2.2      11.3
2017-03-21 20:45:00   455.0        2.8      11.3
2017-03-21 21:00:00   455.0        3.0      11.2
```

```
2017-03-21 21:15:00    455.0       2.9        11.1
2017-03-21 21:30:00    455.0       3.3        11.1
2017-03-21 21:45:00    454.0       2.9        11.0
2017-03-21 22:00:00    455.0       3.1        10.9
2017-03-21 22:15:00    455.0       2.9        10.9
2017-03-21 22:30:00    455.0       2.8        10.8
2017-03-21 22:45:00    456.0       2.6        10.7
2017-03-21 23:00:00    456.0       2.6        10.7
2017-03-21 23:15:00    456.0       2.6        10.6
2017-03-21 23:30:00    457.0       3.0        10.5
2017-03-21 23:45:00    457.0       3.5        10.5

[2396 rows x 3 columns]

In [227]:

In [228]: dataset = pd.read_csv('Data7.csv',header=0, delimiter=',',index_col=0,
parse_dates=[0], date_parser=parser)
    ...:

In [229]: dataset
Out[229]:
                    SC(uS)   Turb(FNU)   DO(mg/L)
date_time
2017-01-27 00:00:00   467.0       8.3        10.4
2017-01-27 00:15:00   467.0       NaN        10.4
2017-01-27 00:30:00   467.0       7.8        10.4
2017-01-27 00:45:00   467.0       8.0        10.4
2017-01-27 01:00:00   468.0       7.5        10.4
2017-01-27 01:15:00   468.0       8.6        10.4
2017-01-27 01:30:00   469.0       8.7        10.4
2017-01-27 01:45:00   468.0       NaN        10.4
2017-01-27 02:00:00   469.0       7.8        10.4
2017-01-27 02:15:00   469.0       8.5        10.4
2017-01-27 02:30:00   469.0       NaN        10.4
2017-01-27 02:45:00   469.0      11.5        10.4
2017-01-27 03:00:00   470.0      11.2        10.4
2017-01-27 03:15:00   470.0       9.1        10.4
2017-01-27 03:30:00   470.0       6.9        10.4
2017-01-27 03:45:00   470.0       7.4        10.4
2017-01-27 04:00:00   470.0       7.6        10.4
2017-01-27 04:15:00   471.0       NaN        10.4
2017-01-27 04:30:00   471.0       NaN        10.4
2017-01-27 04:45:00   471.0       7.7        10.4
2017-01-27 05:00:00   471.0       9.8        10.4
2017-01-27 05:15:00   472.0       NaN        10.5
2017-01-27 05:30:00   472.0       6.3        10.5
2017-01-27 05:45:00   472.0       7.4        10.5
2017-01-27 06:00:00   473.0       NaN        10.5
2017-01-27 06:15:00   472.0       8.0        10.5
2017-01-27 06:30:00   473.0       8.8        10.5
2017-01-27 06:45:00   473.0       NaN        10.5
2017-01-27 07:00:00   473.0       6.3        10.5
2017-01-27 07:15:00   474.0       6.1        10.5
...                     ...        ...         ...
```

```
2017-03-21 16:30:00    457.0        1.8        12.2
2017-03-21 16:45:00    456.0        1.8        12.2
2017-03-21 17:00:00    456.0        2.0        12.2
2017-03-21 17:15:00    456.0        1.8        12.2
2017-03-21 17:30:00    456.0        1.4        12.2
2017-03-21 17:45:00    456.0        1.9        12.1
2017-03-21 18:00:00    456.0        1.8        12.1
2017-03-21 18:15:00    456.0        1.8        12.0
2017-03-21 18:30:00    458.0        1.7        12.0
2017-03-21 18:45:00    456.0        2.0        11.9
2017-03-21 19:00:00    456.0        2.0        11.8
2017-03-21 19:15:00    456.0        2.0        11.8
2017-03-21 19:30:00    457.0        1.9        11.7
2017-03-21 19:45:00    457.0        1.9        11.6
2017-03-21 20:00:00    457.0        2.4        11.5
2017-03-21 20:15:00    457.0        2.2        11.4
2017-03-21 20:30:00    454.0        2.2        11.3
2017-03-21 20:45:00    455.0        2.8        11.3
2017-03-21 21:00:00    455.0        3.0        11.2
2017-03-21 21:15:00    455.0        2.9        11.1
2017-03-21 21:30:00    455.0        3.3        11.1
2017-03-21 21:45:00    454.0        2.9        11.0
2017-03-21 22:00:00    455.0        3.1        10.9
2017-03-21 22:15:00    455.0        2.9        10.9
2017-03-21 22:30:00    455.0        2.8        10.8
2017-03-21 22:45:00    456.0        2.6        10.7
2017-03-21 23:00:00    456.0        2.6        10.7
2017-03-21 23:15:00    456.0        2.6        10.6
2017-03-21 23:30:00    457.0        3.0        10.5
2017-03-21 23:45:00    457.0        3.5        10.5

[5171 rows x 3 columns]
```

In [230]: