

```

print (' - Val MSE : ', round(mse, 2), ' || Val RMSE : ', round(np.sqrt(mse), 2))
plt.title('Prediction - Validation - Col:' + col + ' (RMSE:' + str(round(np.sqrt(mse), 2)) + ')')
plt.show()

det_anom_lit = model_val.resid[model_val.resid > threshold]
ind = []
TP = 0
FP = 0
for index, a in det_anom_lit.items():
    ind.append(index)
    if df_val['ATT_FLAG'][index] == 1 : TP += 1
    else : FP += 1

print (' -- TP : ', TP, ' || FP : ', FP)

return model_train_best, model_val
except:
    pass

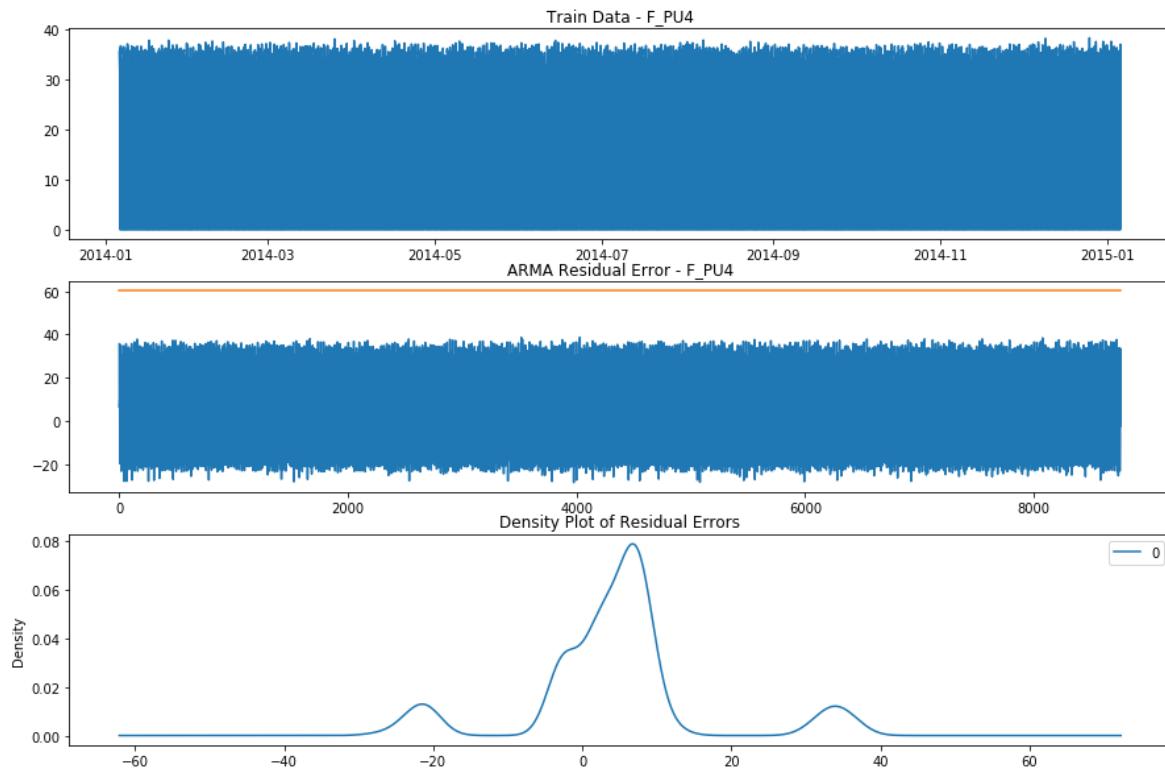
```

if __name__ == "__main__":
 for i,col in enumerate(df_train.columns):
 if i >= 11:
 doARIMA(df_train, df_val, col)

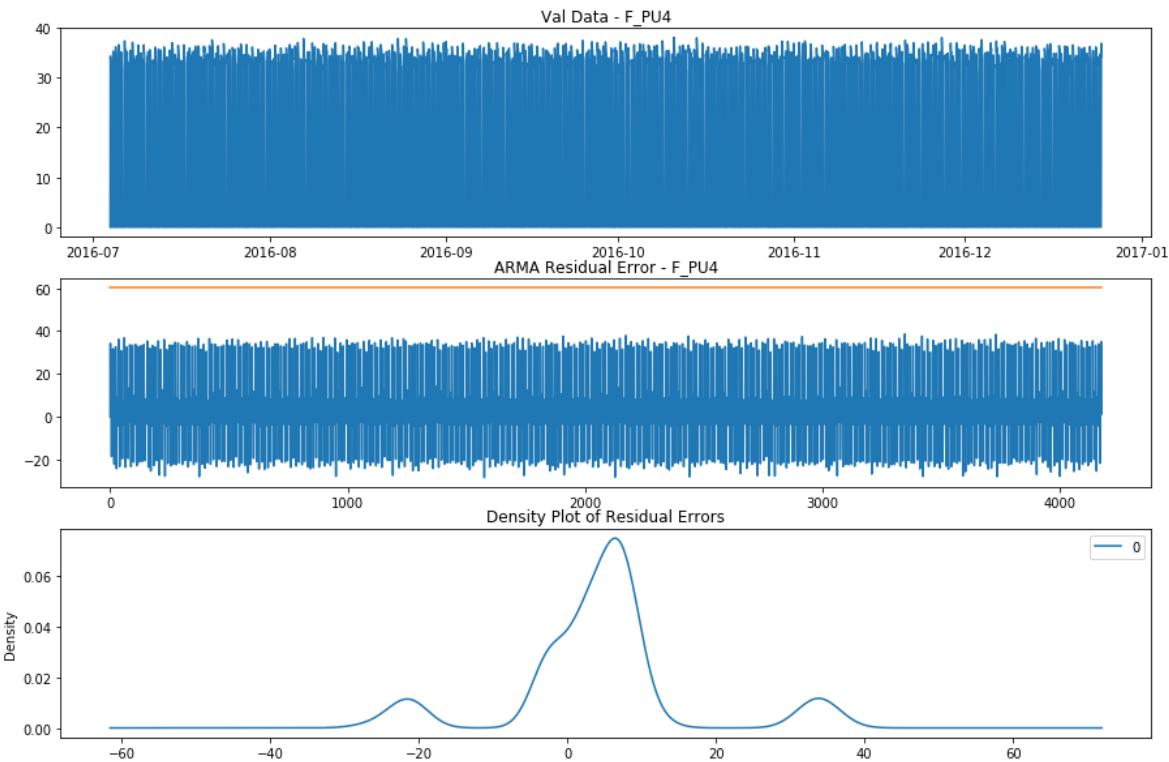
"""
- plot the ATT_FLAG=1 on the residual errors
- Add all values to a dataframe and print towards the end
"""

executed in 11m 54s, finished 00:38:54 2019-05-24

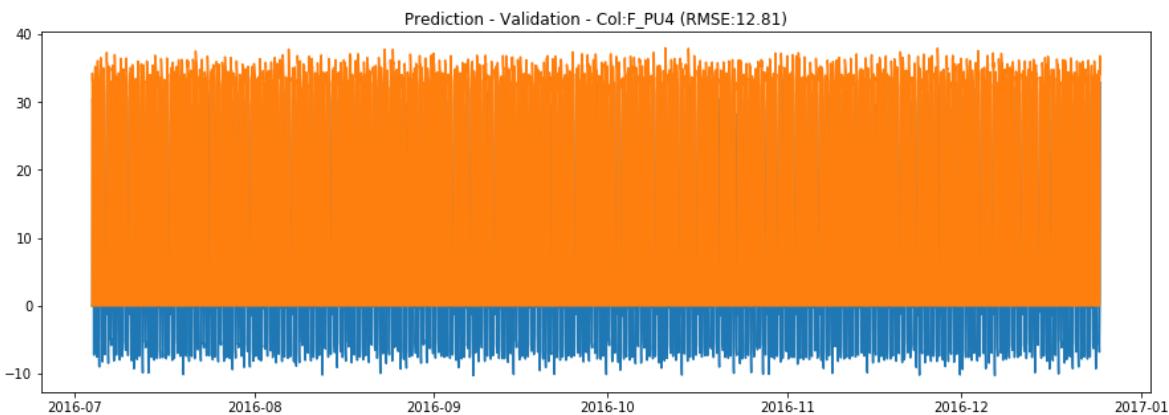
----- col : F_PU4 -----
- ARIMA Results : 2 3 || AIC : 69539.78979120243 (Time : 20.25 s)
-- Threshold Train : 60.107



-- Threshold Val: 60.112

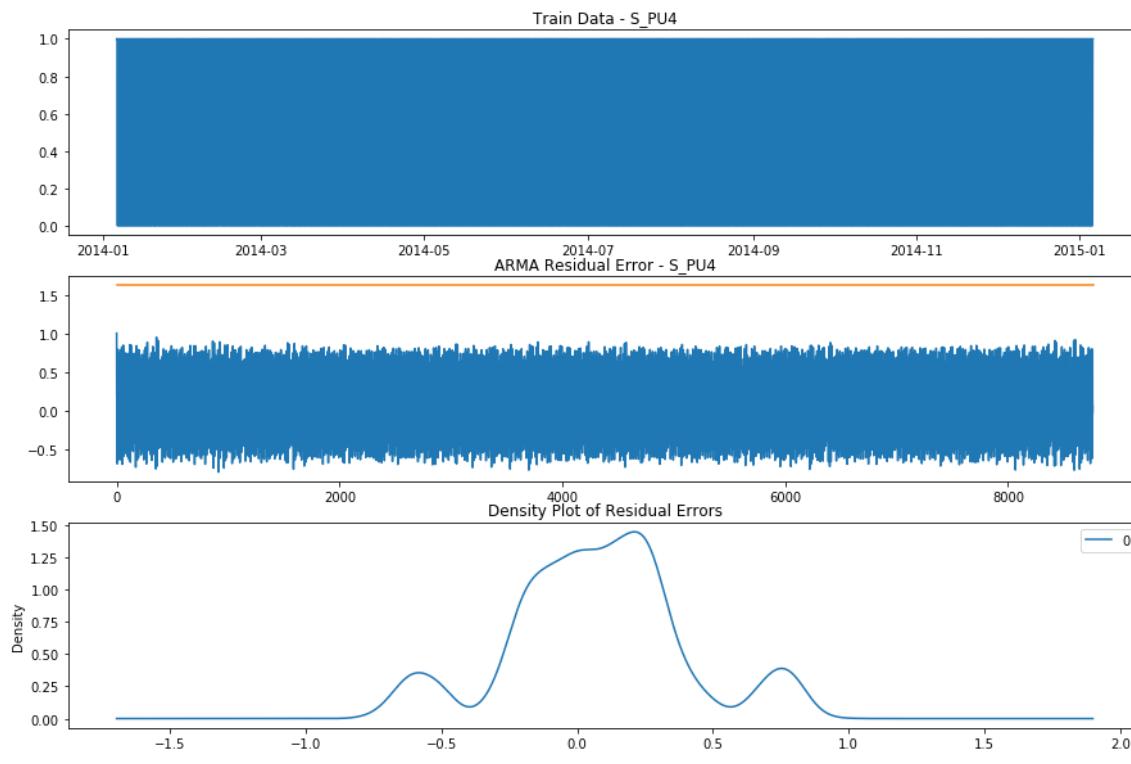


- Val MSE : 164.11 || Val RMSE : 12.81



-- TP : 17 || FP : 332

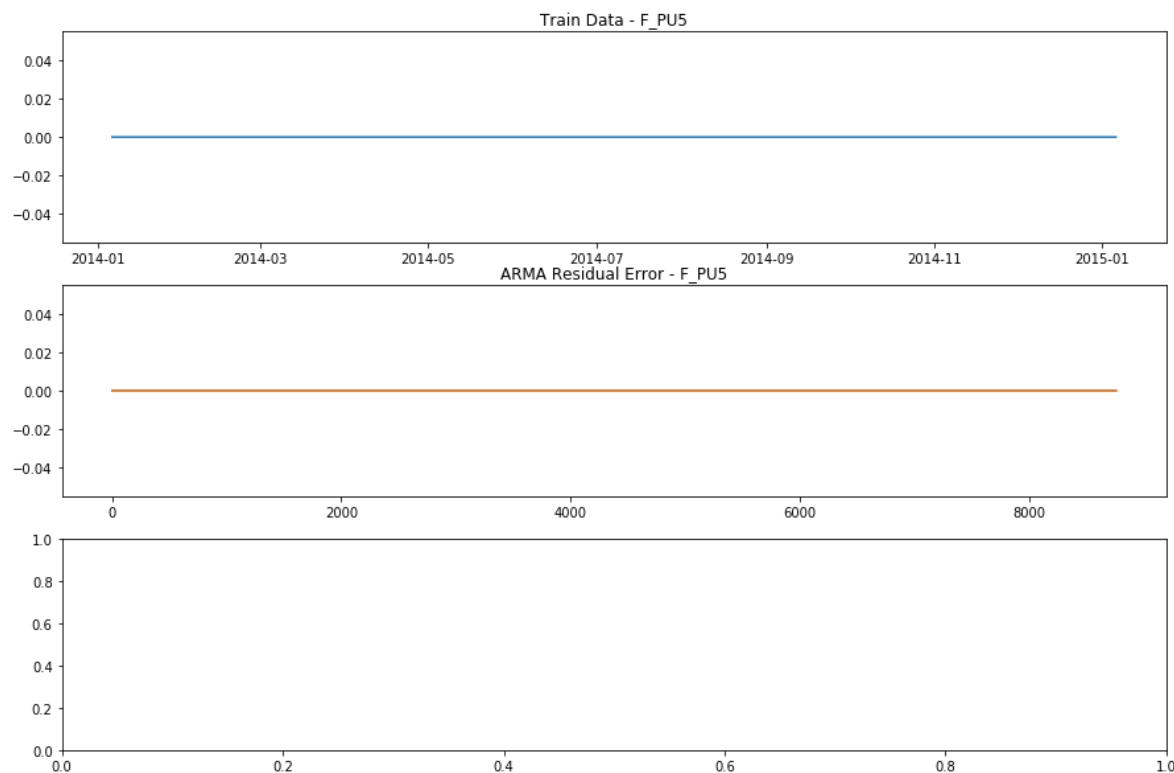
----- col : S_PU4 -----
- ARIMA Results : 3 2 || AIC : 5564.043785740148 (Time : 20.16 s)
-- Threshold Train : 1.619

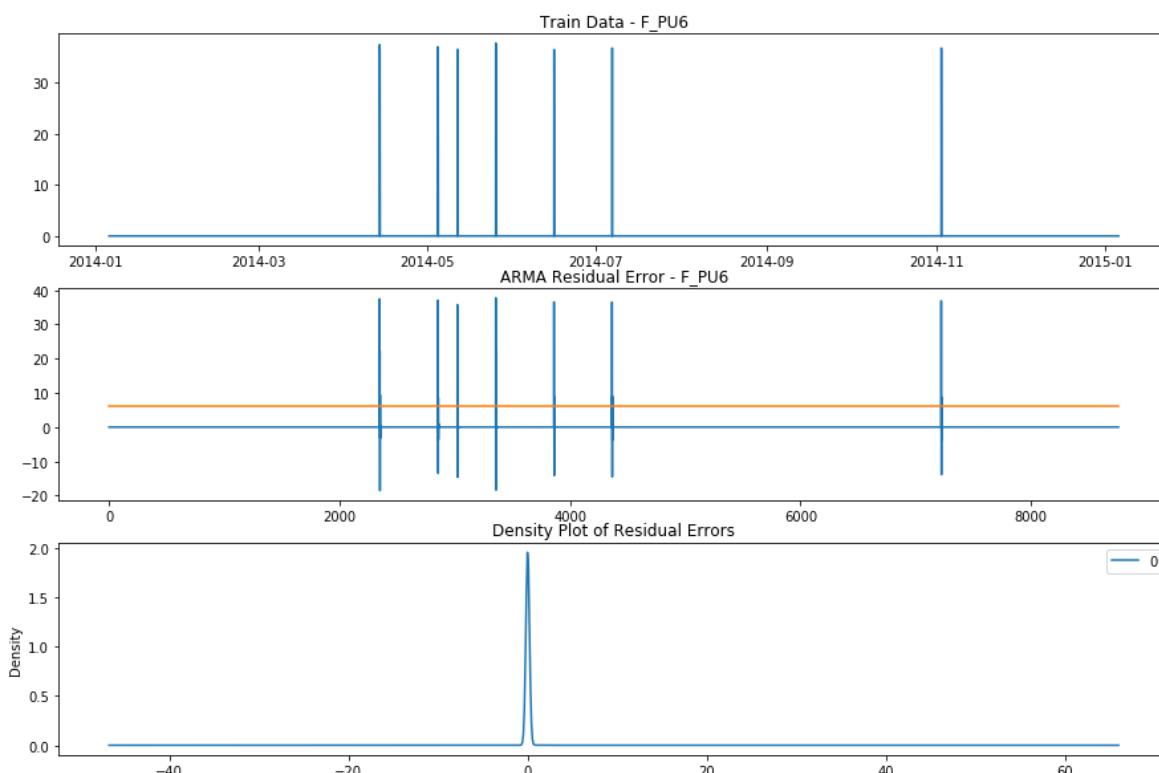
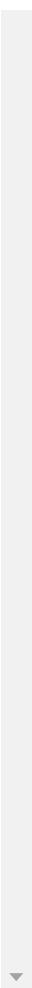
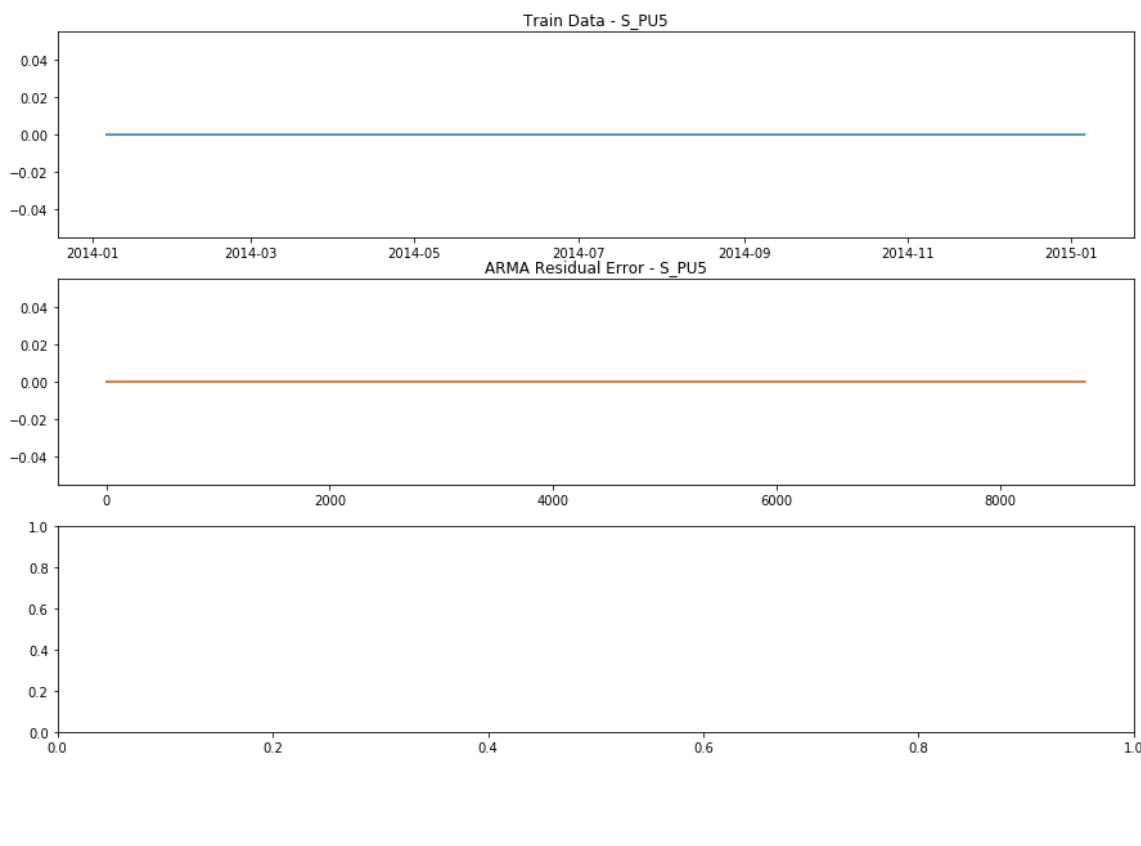


```
----- col : F_PU5 -----
- ARIMA Results : 1 1 || AIC : -inf (Time : 9.32 s)
-- Threshold Train : 0.0

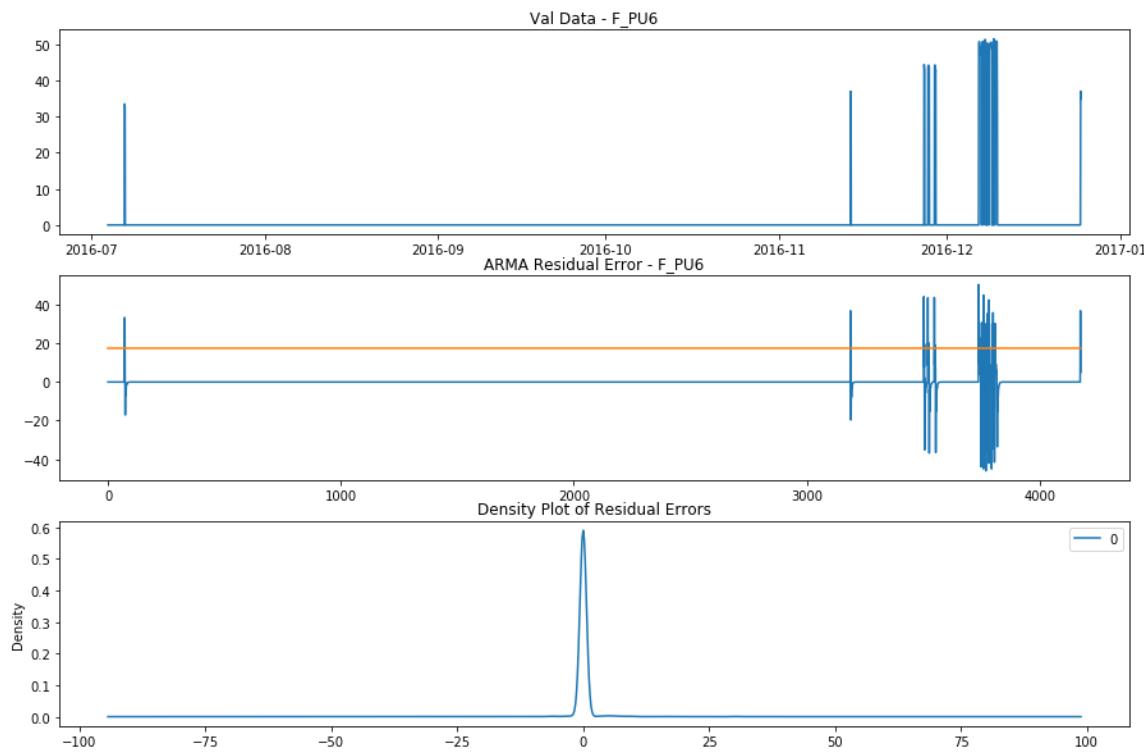
----- col : S_PU5 -----
- ARIMA Results : 1 1 || AIC : -inf (Time : 10.14 s)
-- Threshold Train : 0.0

----- col : F_PU6 -----
- ARIMA Results : 1 2 || AIC : 28590.579698764253 (Time : 16.45
s)
-- Threshold Train : 6.18
```

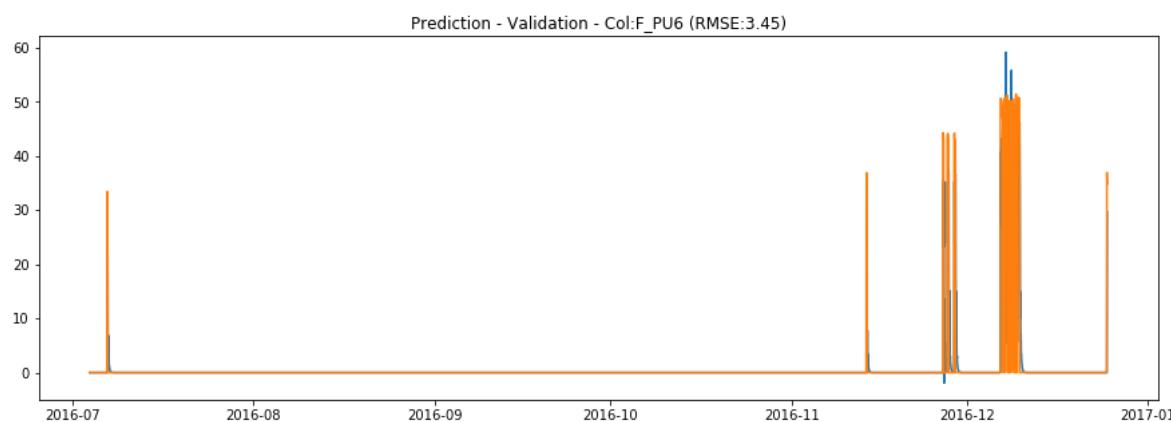




-- Threshold Val: 17.259

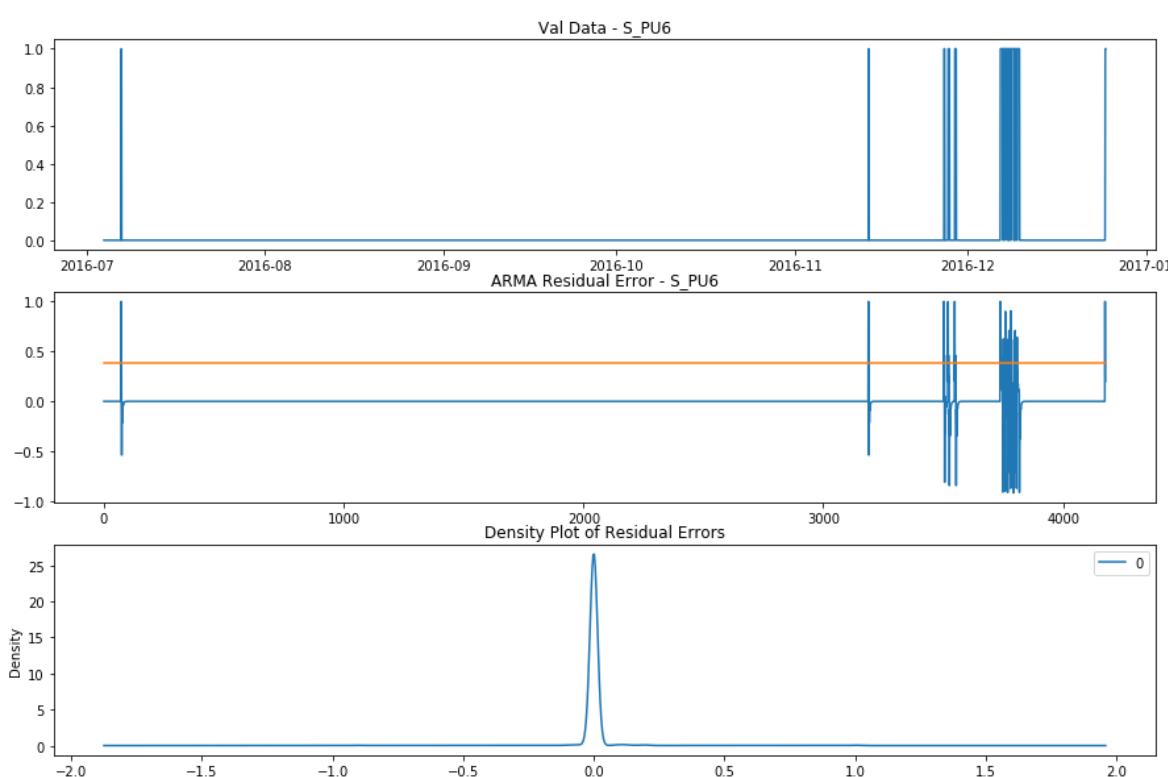
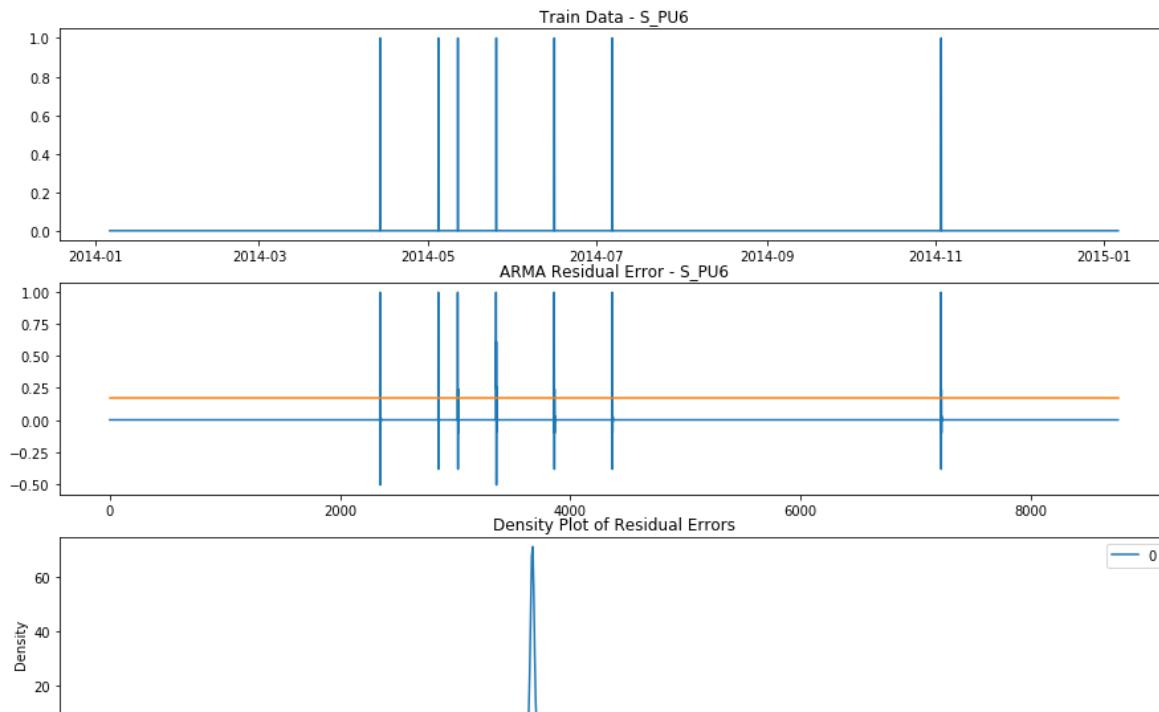


- Val MSE : 11.92 || Val RMSE : 3.45

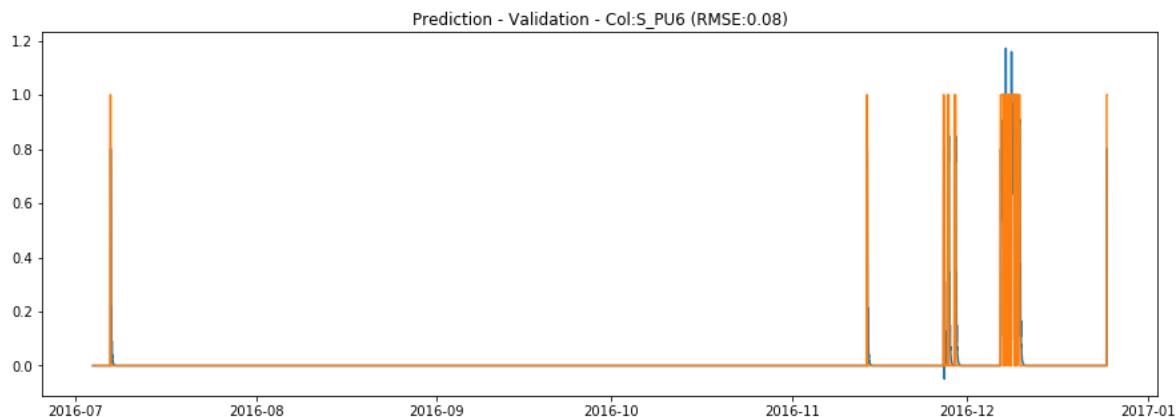


-- TP : 8 || FP : 7

----- col : S_PU6 -----
 - ARIMA Results : 1 2 || AIC : -34526.35637504015 (Time : 17.79 s)
 -- Threshold Train : 0.168

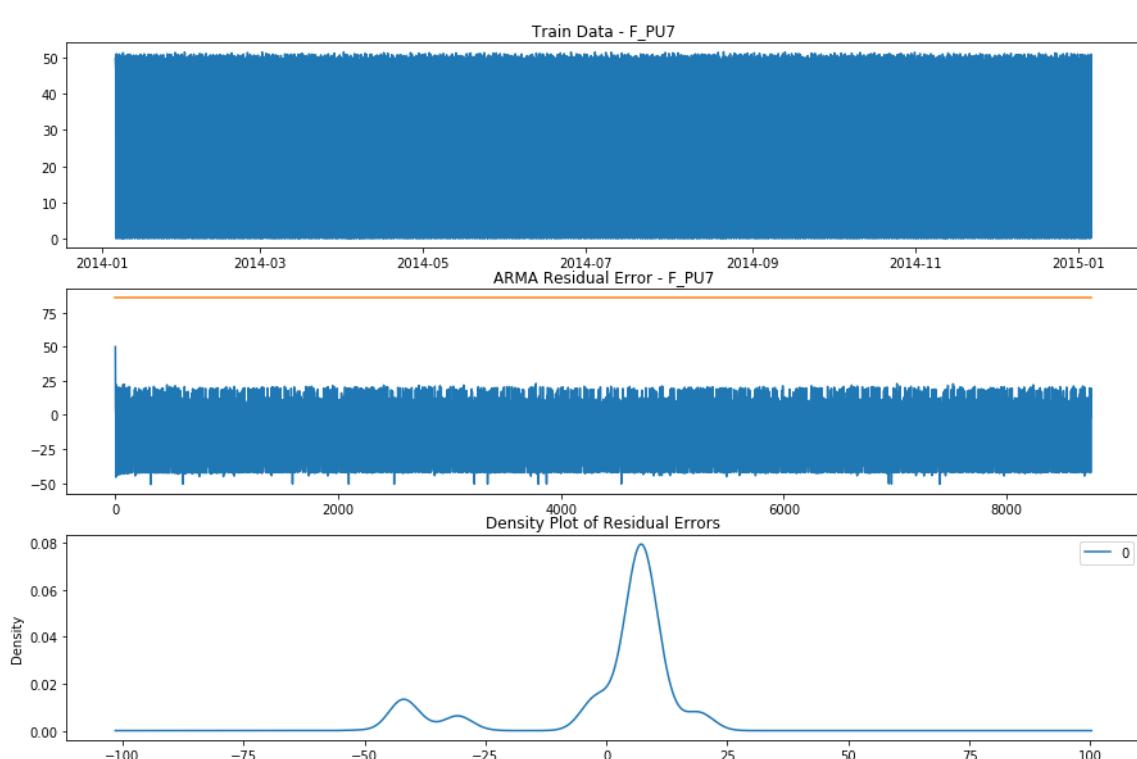


- Val MSE : 0.01 || Val RMSE : 0.08

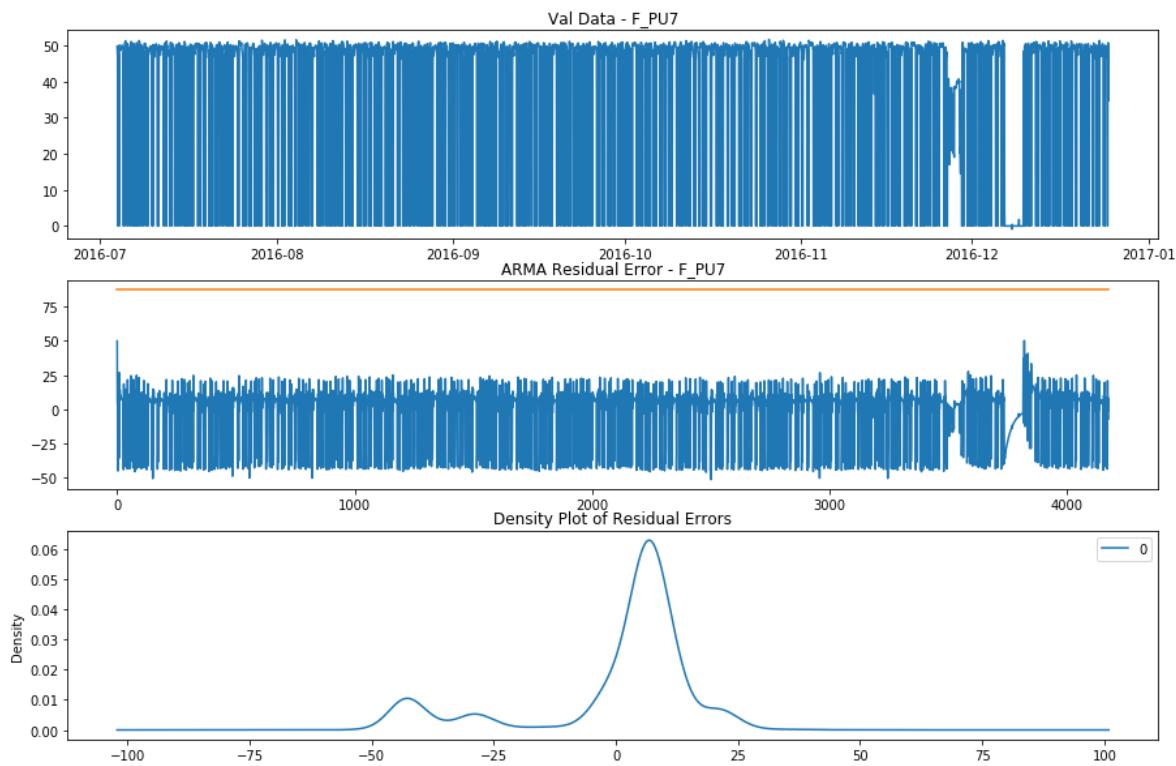


-- TP : 0 || FP : 0

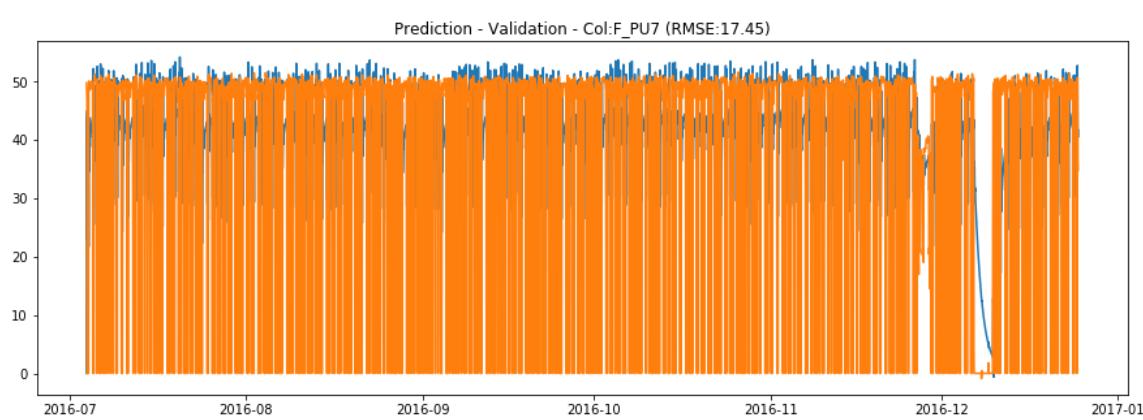
----- col : F_PU7 -----
- ARIMA Results : 3 3 || AIC : 74626.17124679718 (Time : 27.27 s)
-- Threshold Train : 85.541



-- Threshold Val: 87.247

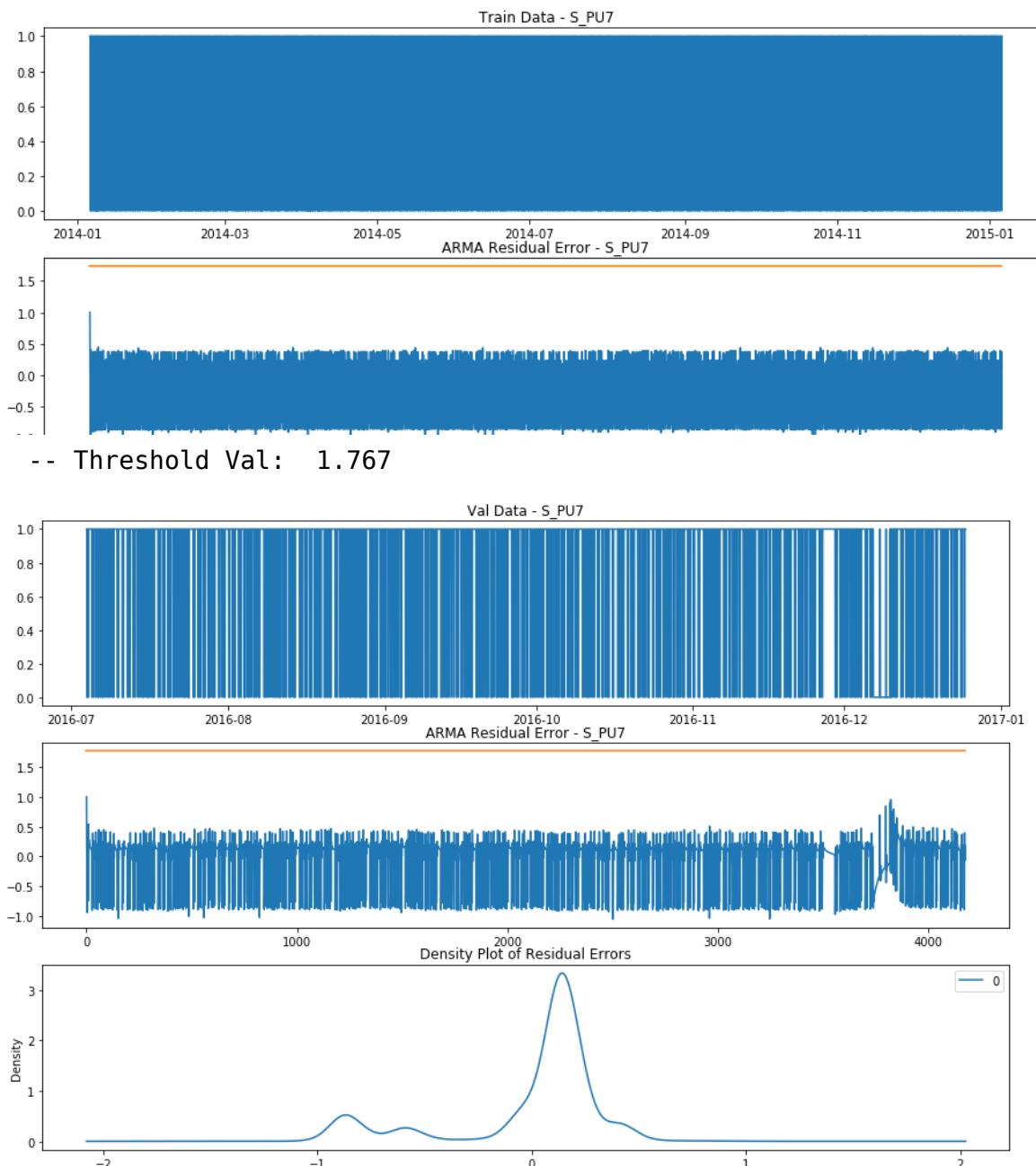


- Val MSE : 304.51 || Val RMSE : 17.45

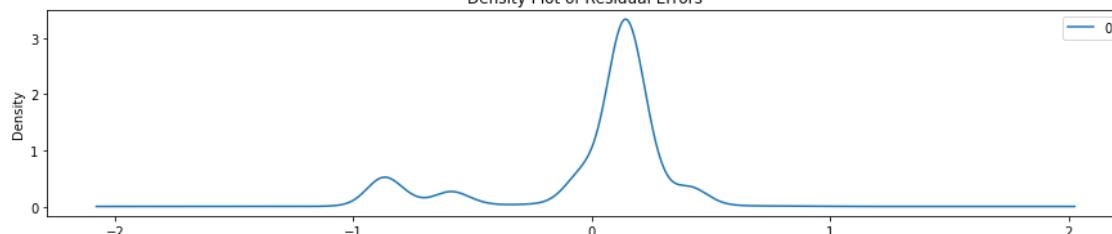


-- TP : 0 || FP : 31

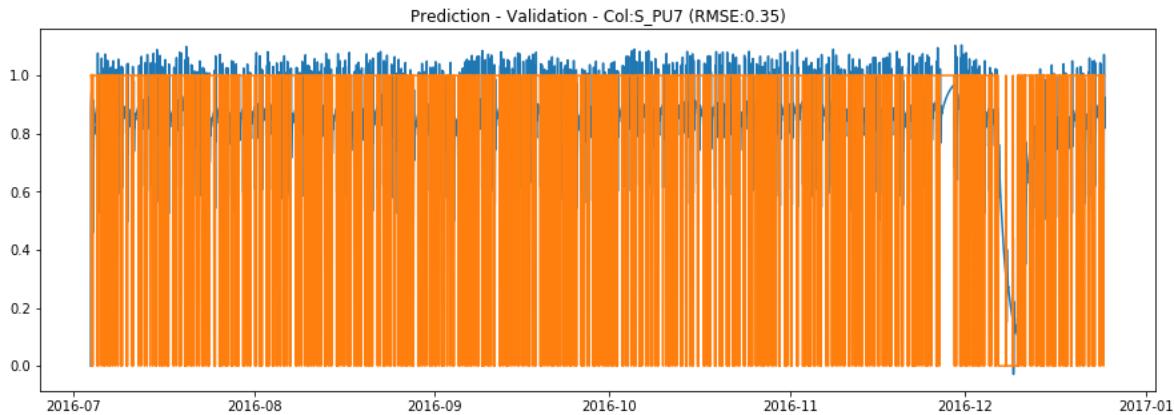
----- col : S_PU7 -----
- ARIMA Results : 3 3 || AIC : 6289.992701872678 (Time : 28.62 s)
-- Threshold Train : 1.731



Density Plot of Residual Errors

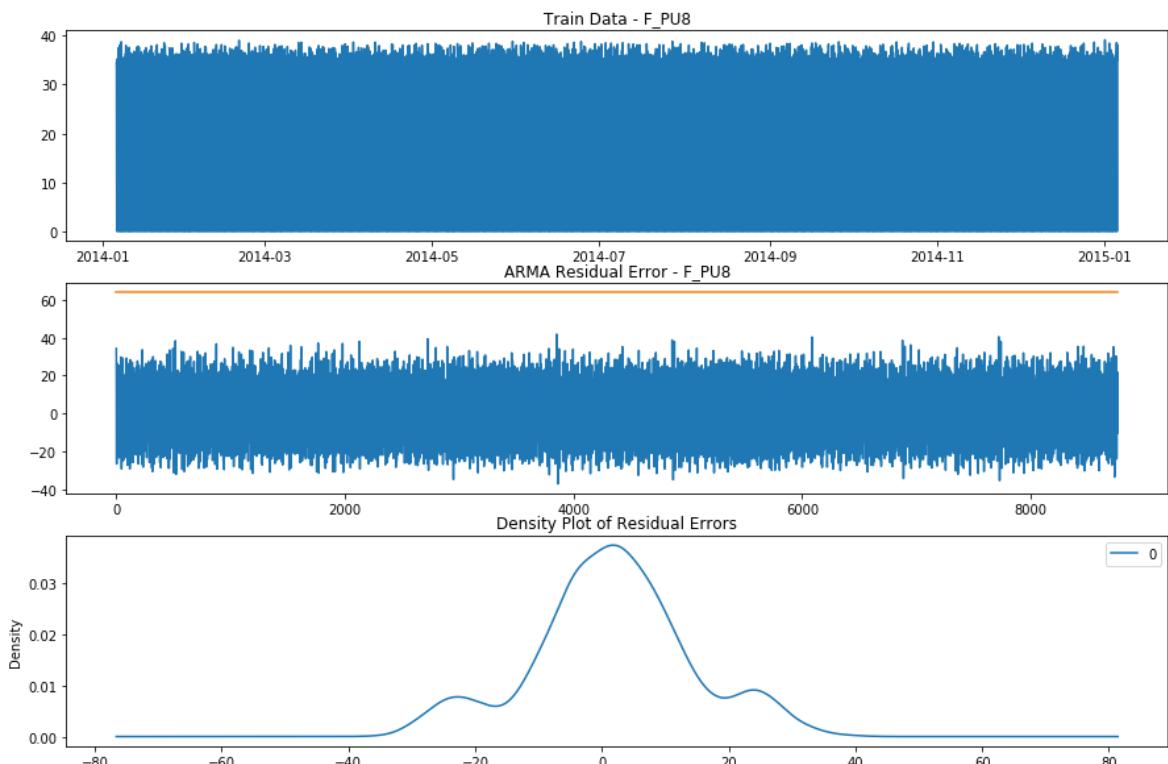


- Val MSE : 0.12 || Val RMSE : 0.35

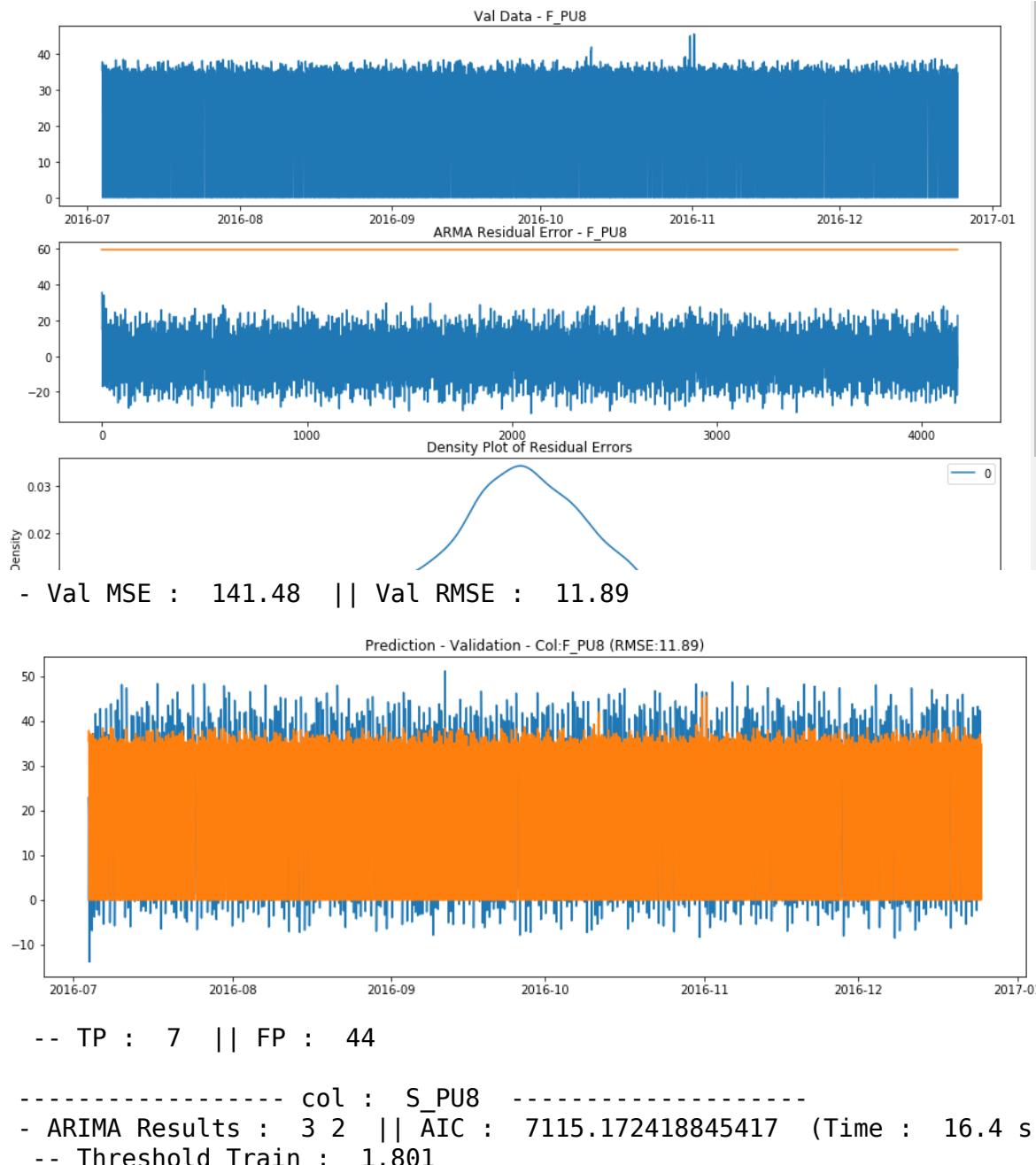


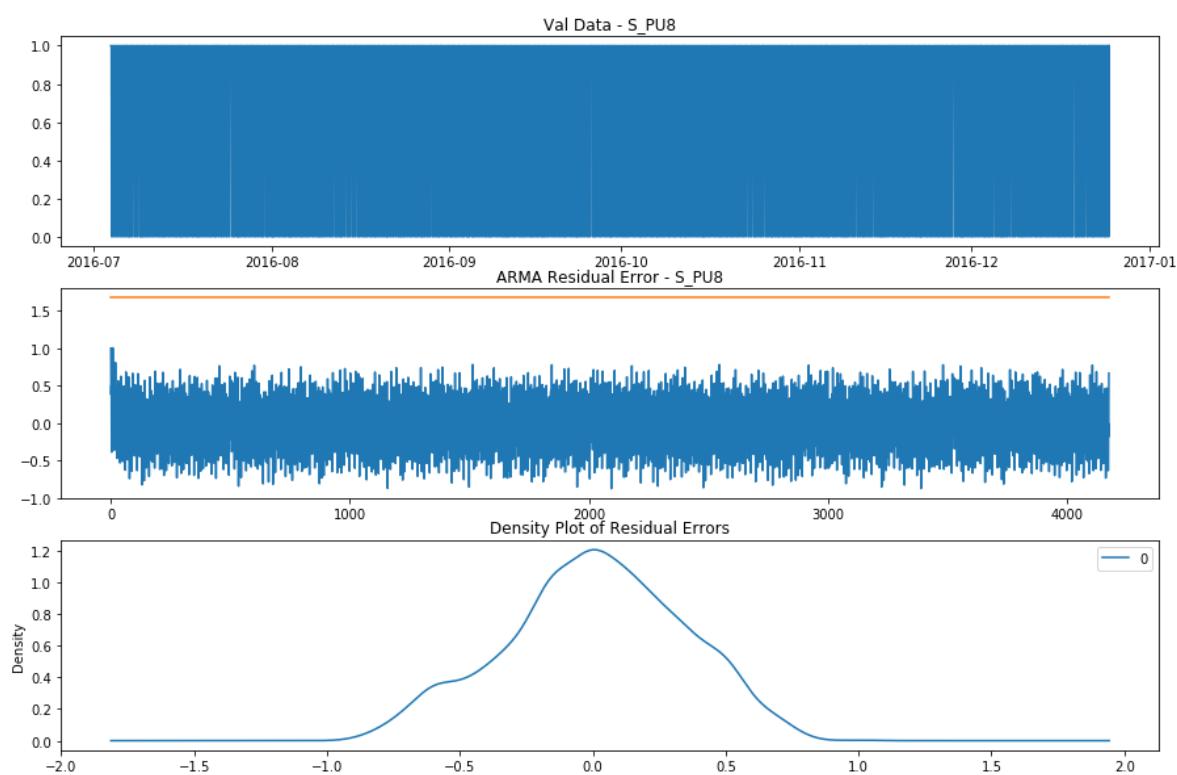
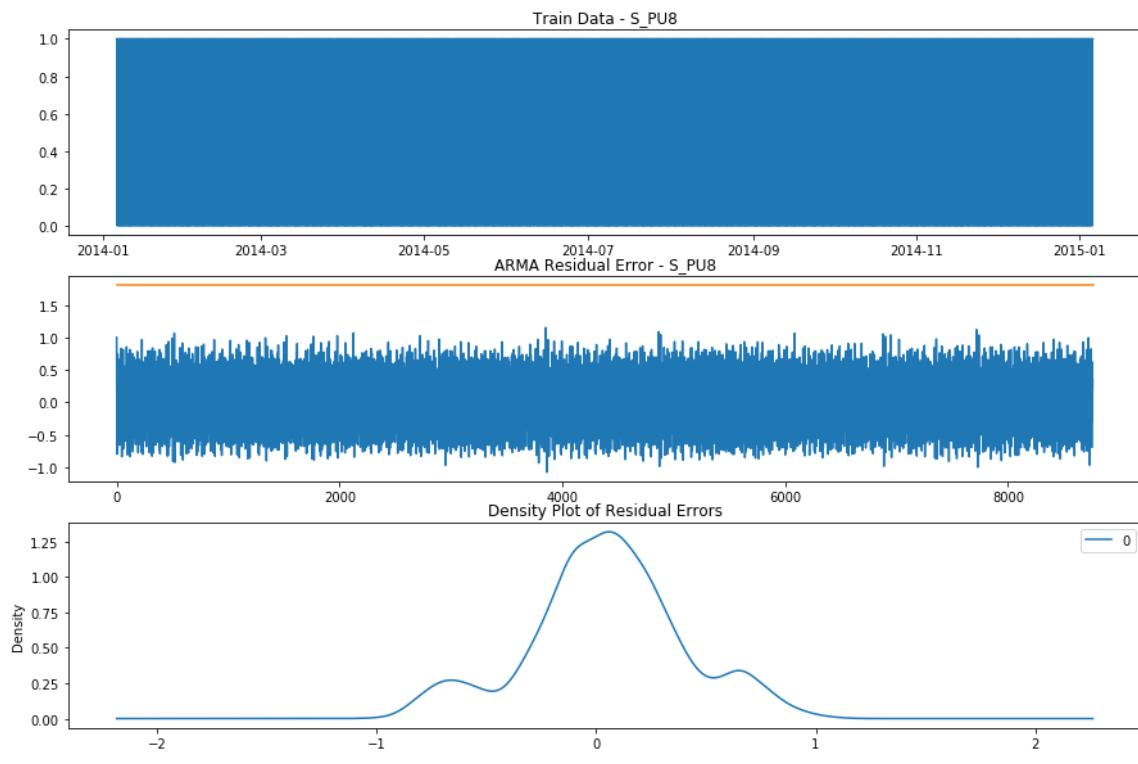
-- TP : 0 || FP : 0

----- col : F_PU8 -----
- ARIMA Results : 3 2 || AIC : 69651.72404123224 (Time : 15.9 s)
-- Threshold Train : 63.903



-- Threshold Val: 59.463





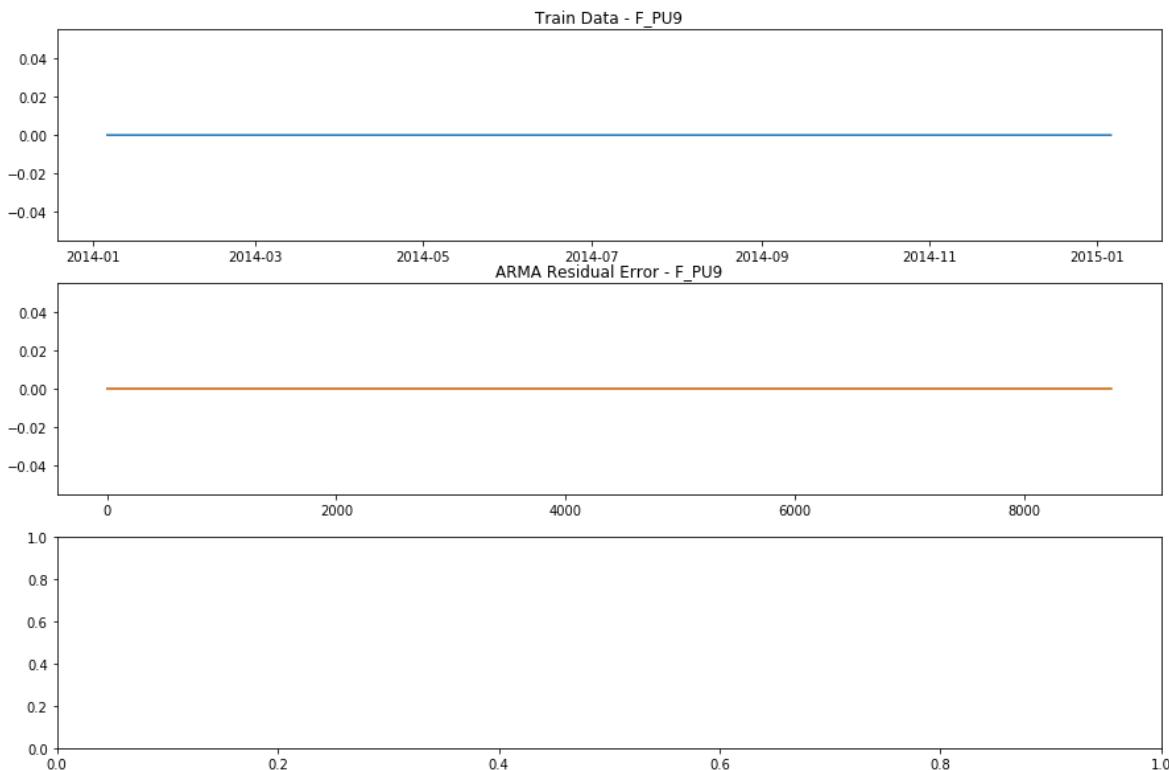
Prediction - Validation - Col:S_PU8 (RMSE:0.33)

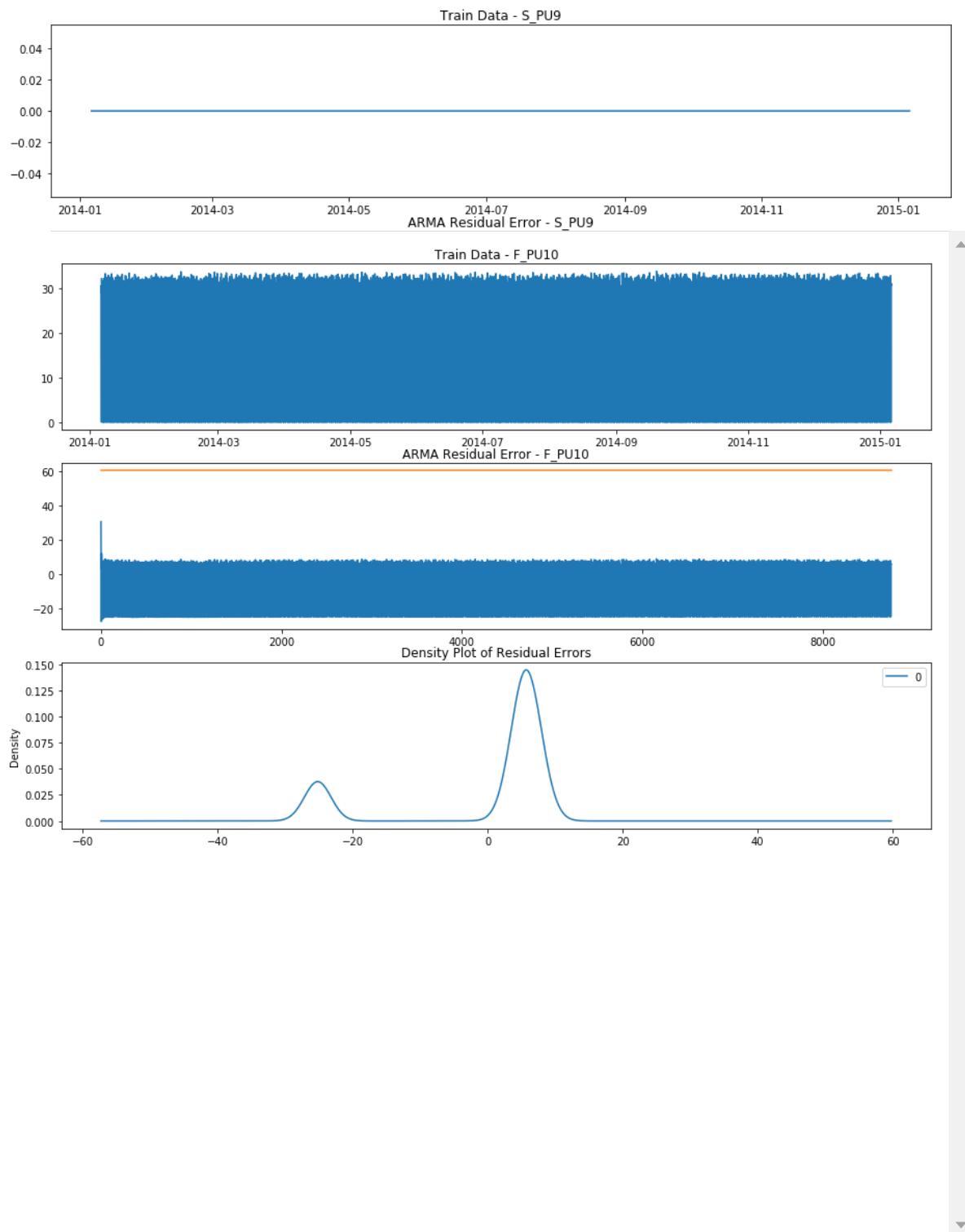
```
-- TP : 0 || FP : 0

----- col : F_PU9 -----
- ARIMA Results : 1 1 || AIC : -inf (Time : 9.65 s)
-- Threshold Train : 0.0

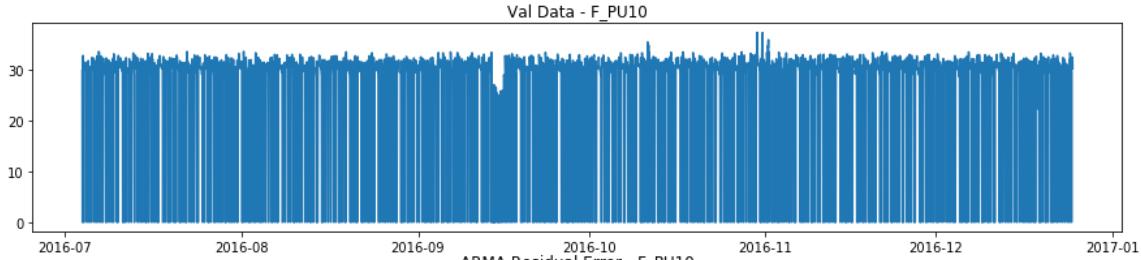
----- col : S_PU9 -----
- ARIMA Results : 1 1 || AIC : -inf (Time : 8.77 s)
-- Threshold Train : 0.0

----- col : F_PU10 -----
- ARIMA Results : 1 1 || AIC : 68538.46947413725 (Time : 13.46
s)
-- Threshold Train : 60.454
```

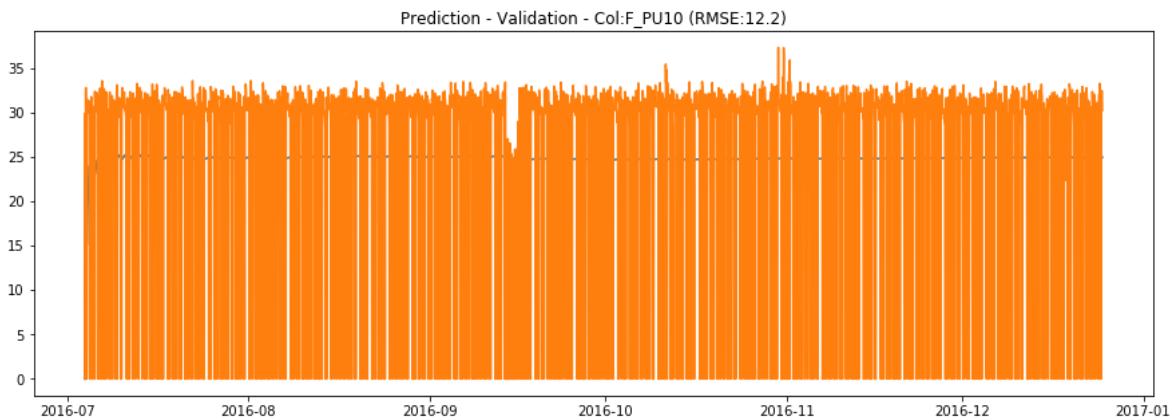




-- Threshold Val: 60.992



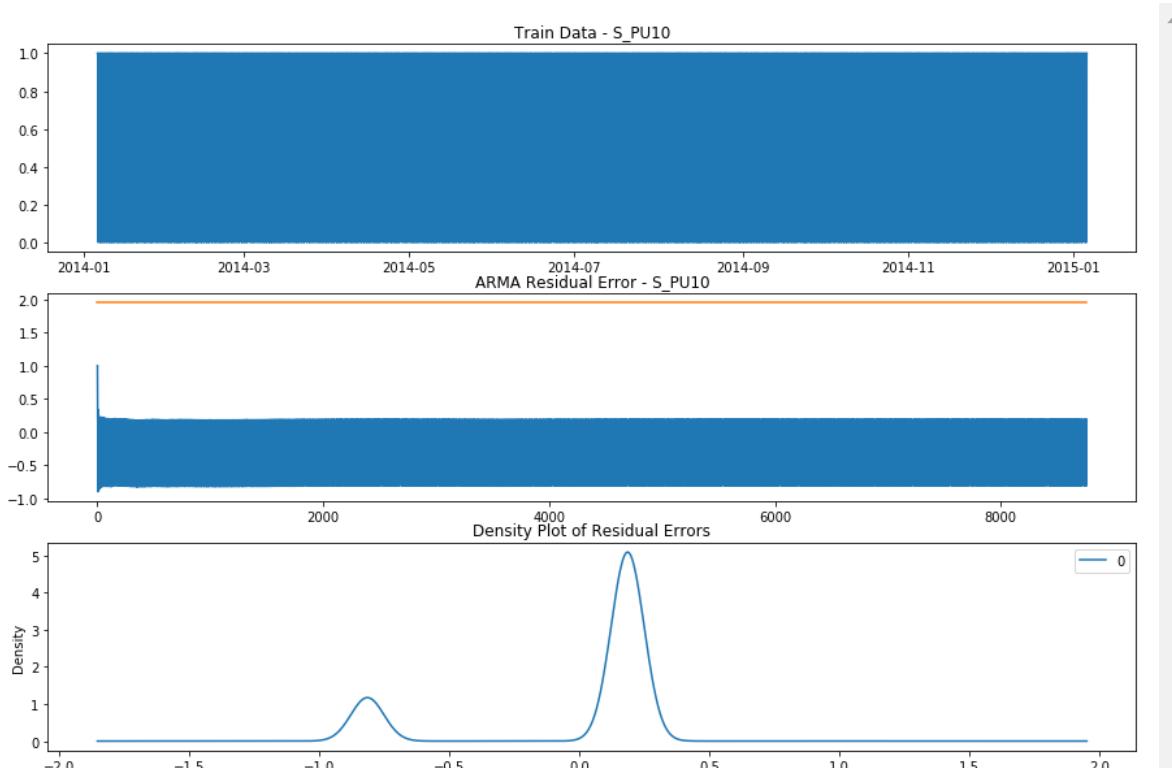
- Val MSE : 148.81 || Val RMSE : 12.2



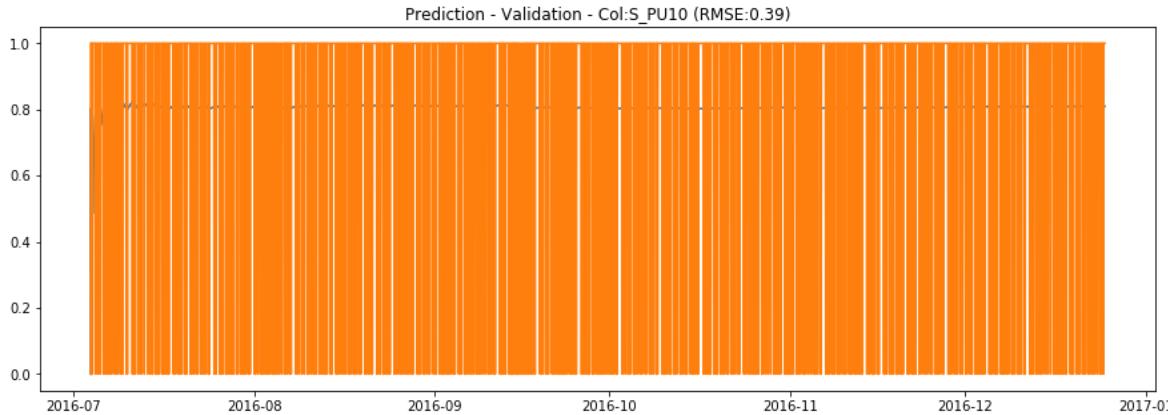
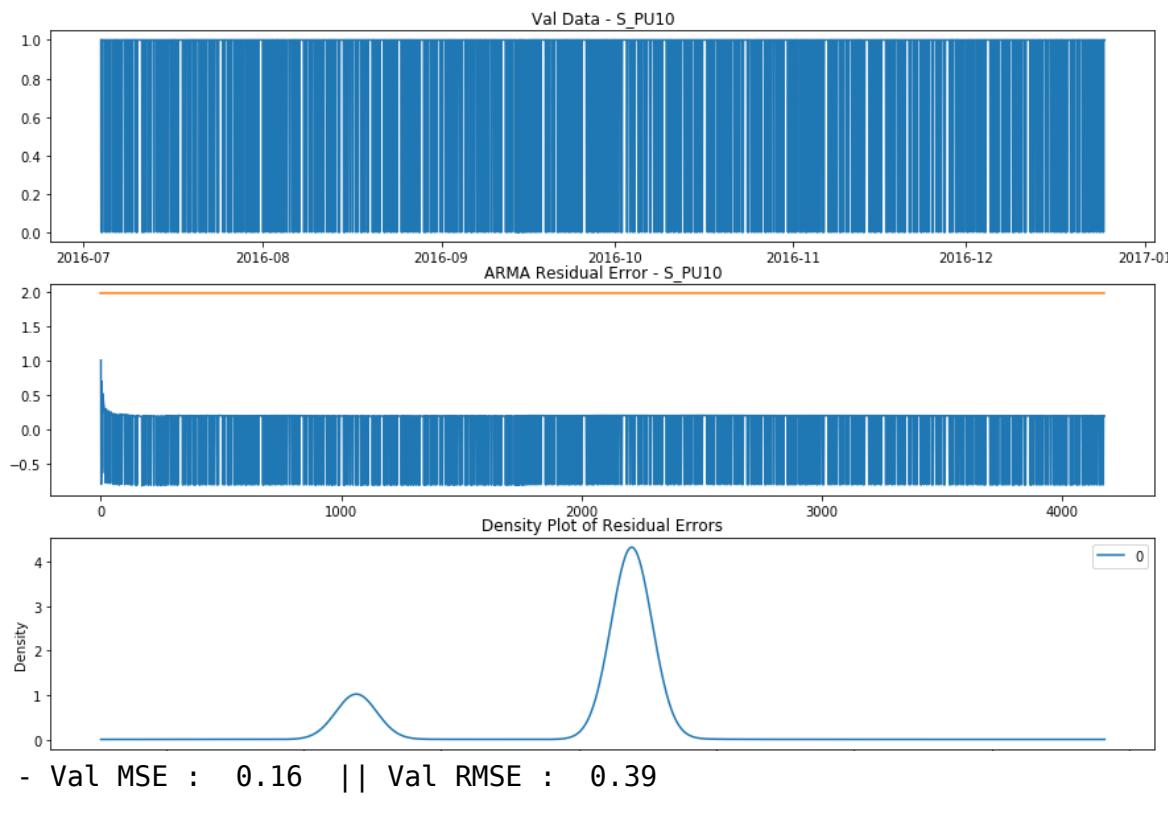
-- TP : 0 || FP : 1

----- col : S_PU10 -----

- ARIMA Results : 1 1 || AIC : 8376.83049898913 (Time : 14.62 s)
-- Threshold Train : 1.951

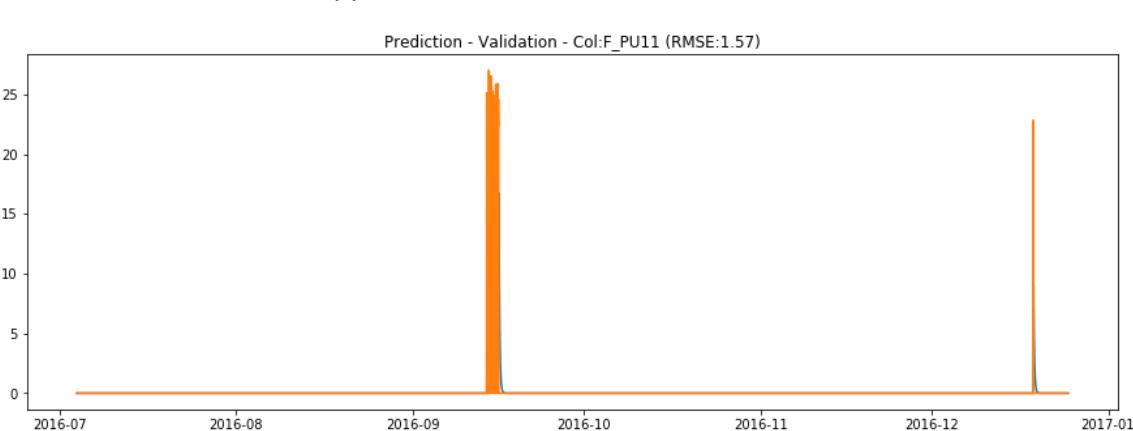
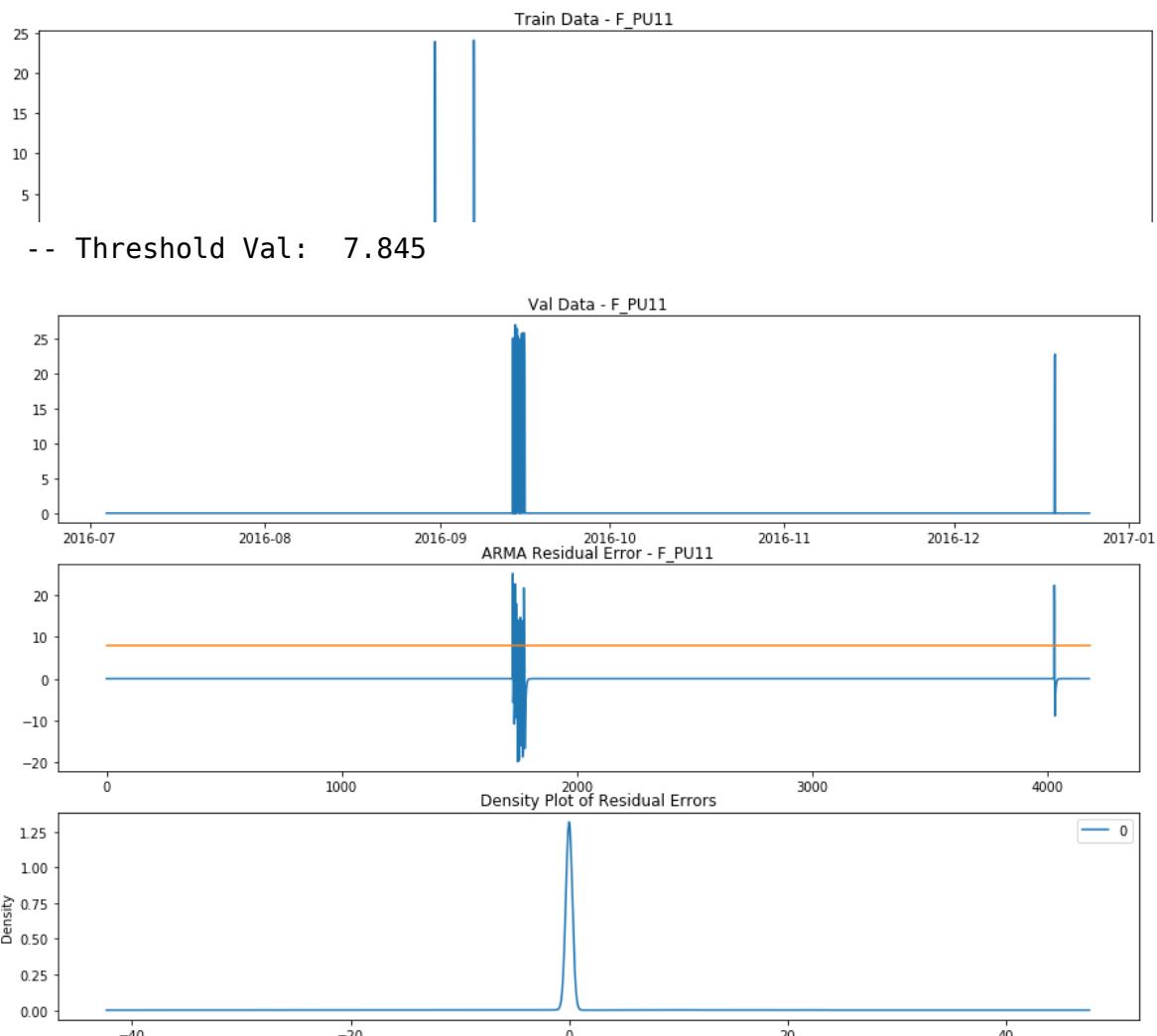


-- Threshold Val: 1.969



-- TP : 0 || FP : 0

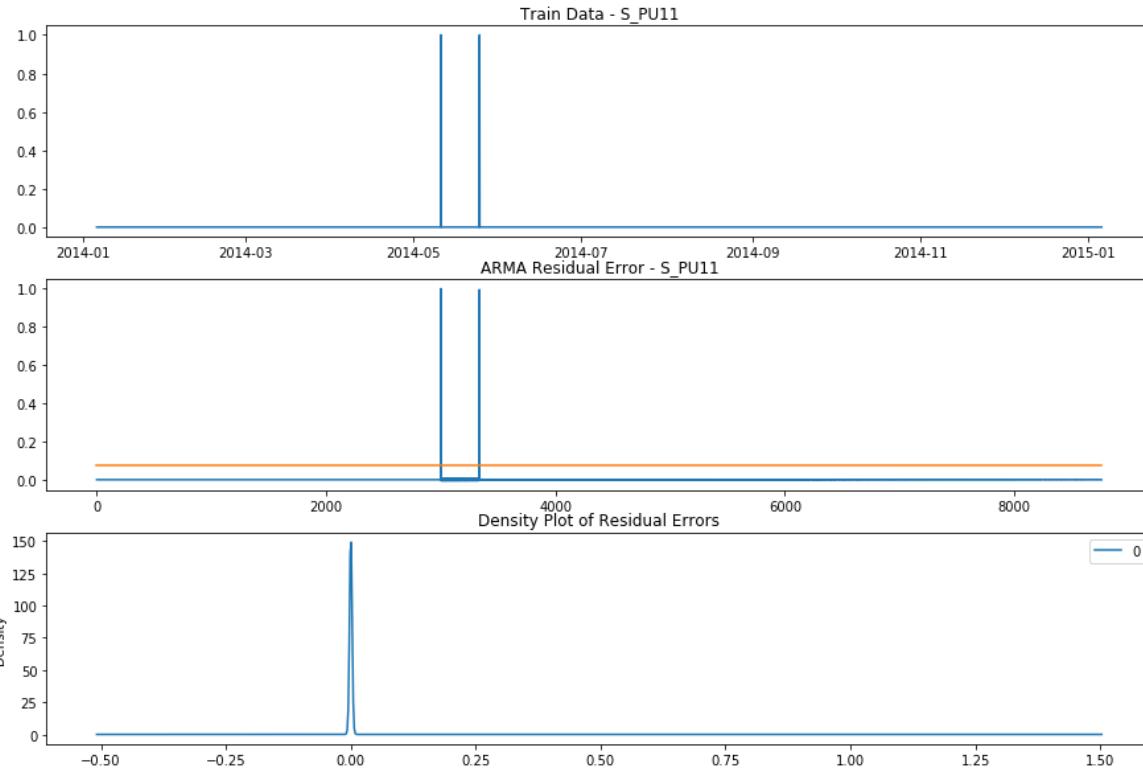
----- col : F_PU11 -----
 - ARIMA Results : 1 1 || AIC : 7081.514647902466 (Time : 20.35 s)
 -- Threshold Train : 1.811



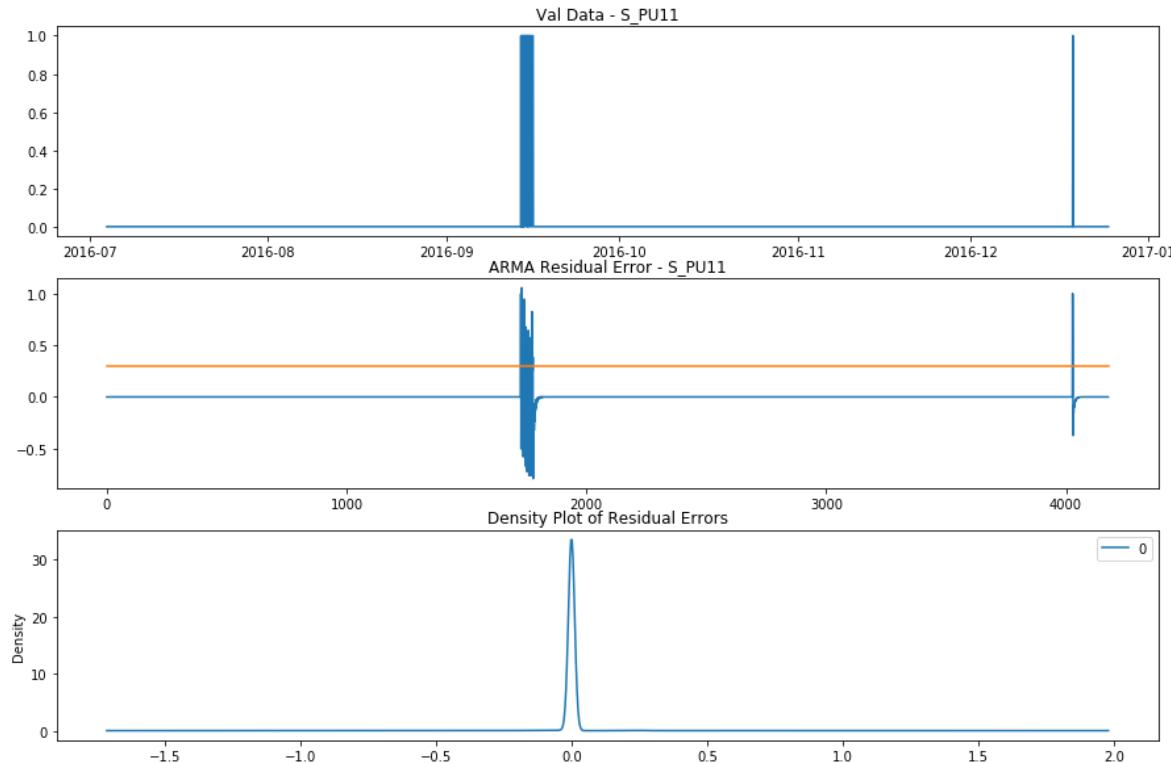
-- TP : 0 || FP : 1

----- col : S_PU11 -----
- ARIMA Results : 2 3 || AIC : -48600.18591531503 (Time : 38.05

s)

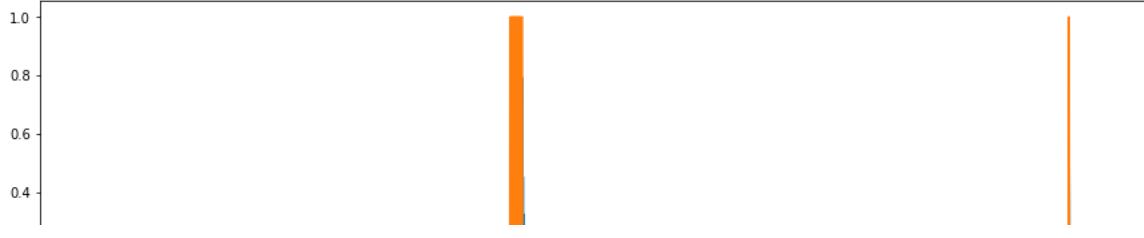


-- Threshold Val: 0.305



- Val MSE : 0.0 || Val RMSE : 0.06

Prediction - Validation - Col:S_PU11 (RMSE:0.06)

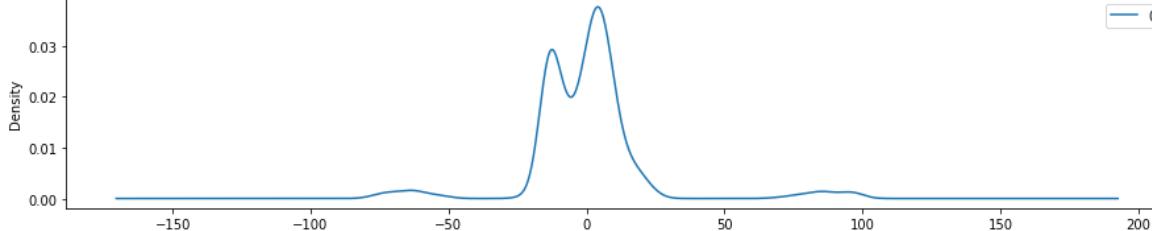
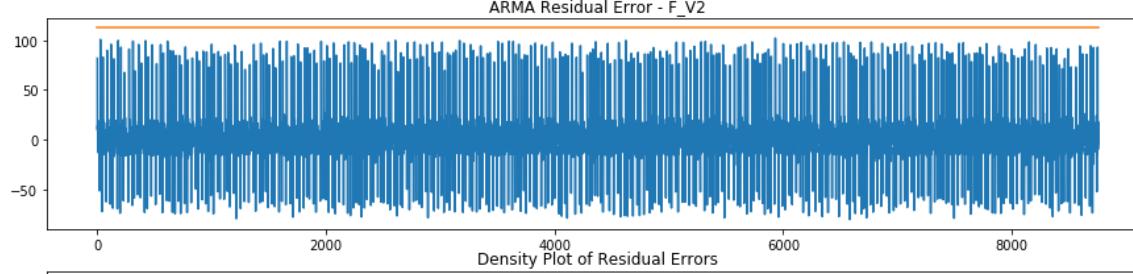
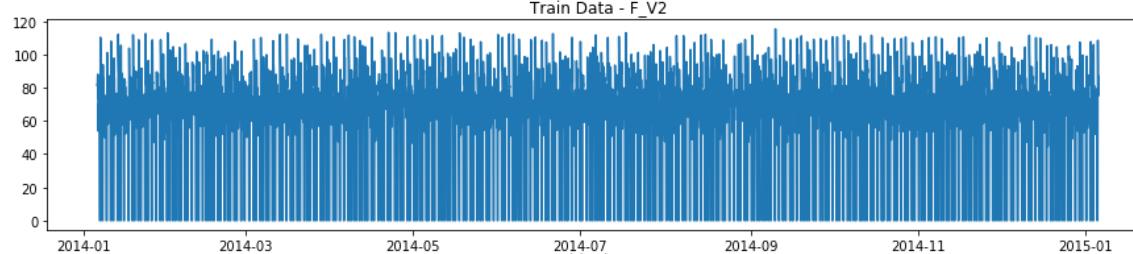


-- TP : 0 || FP : 0

----- col : F_V2 -----

- ARIMA Results : 2 3 || AIC : 79363.64230803952 (Time : 22.46 s)

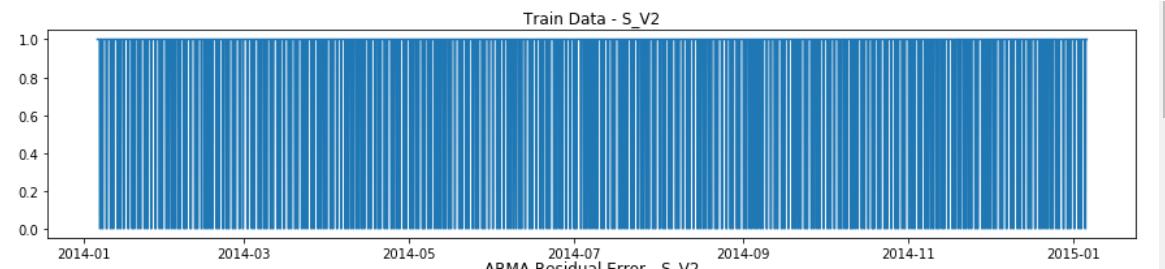
-- Threshold Train : 112.129



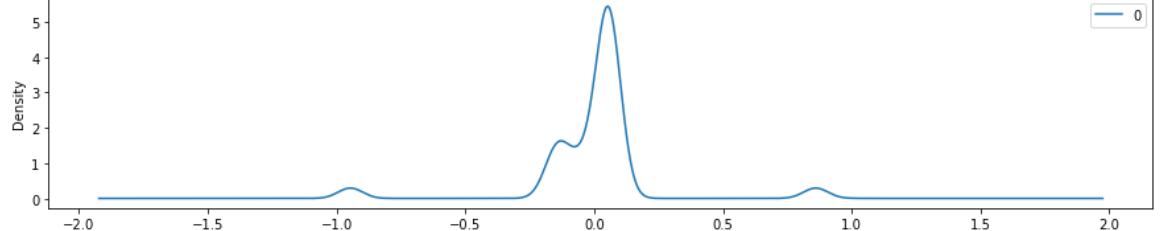
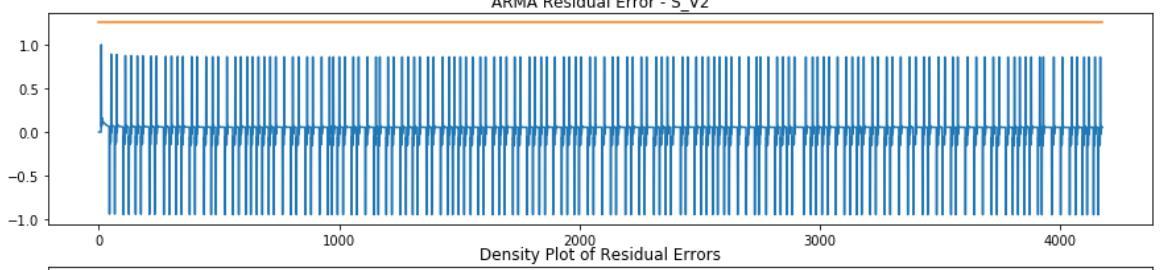
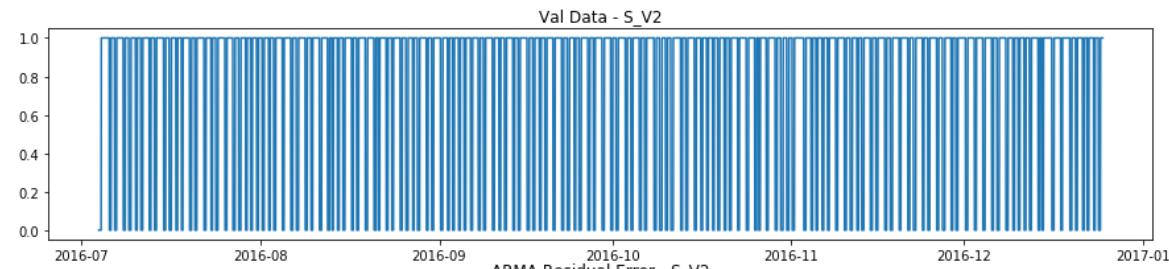
----- col : S_V2 -----

- ARIMA Results : 2 3 || AIC : 558.0192560257856 (Time : 38.08 s)

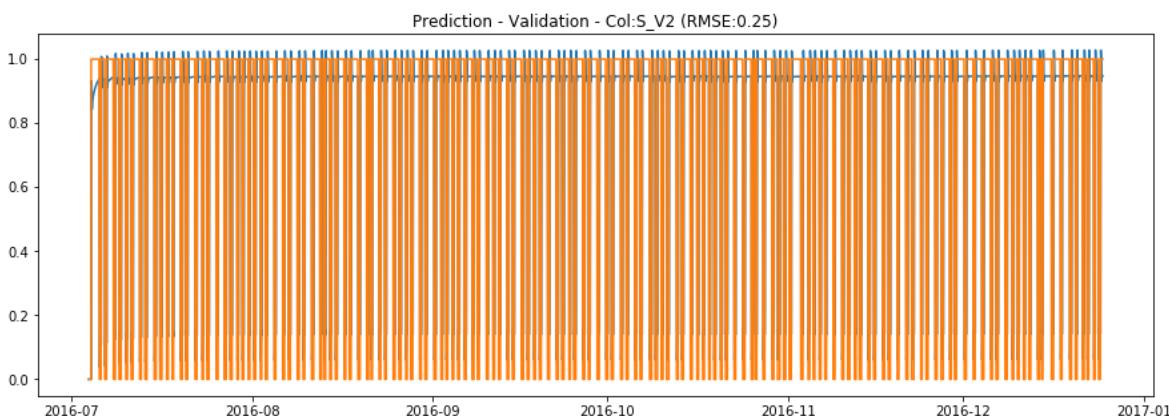
-- Threshold Train : 1.249



-- Threshold Val: 1.253

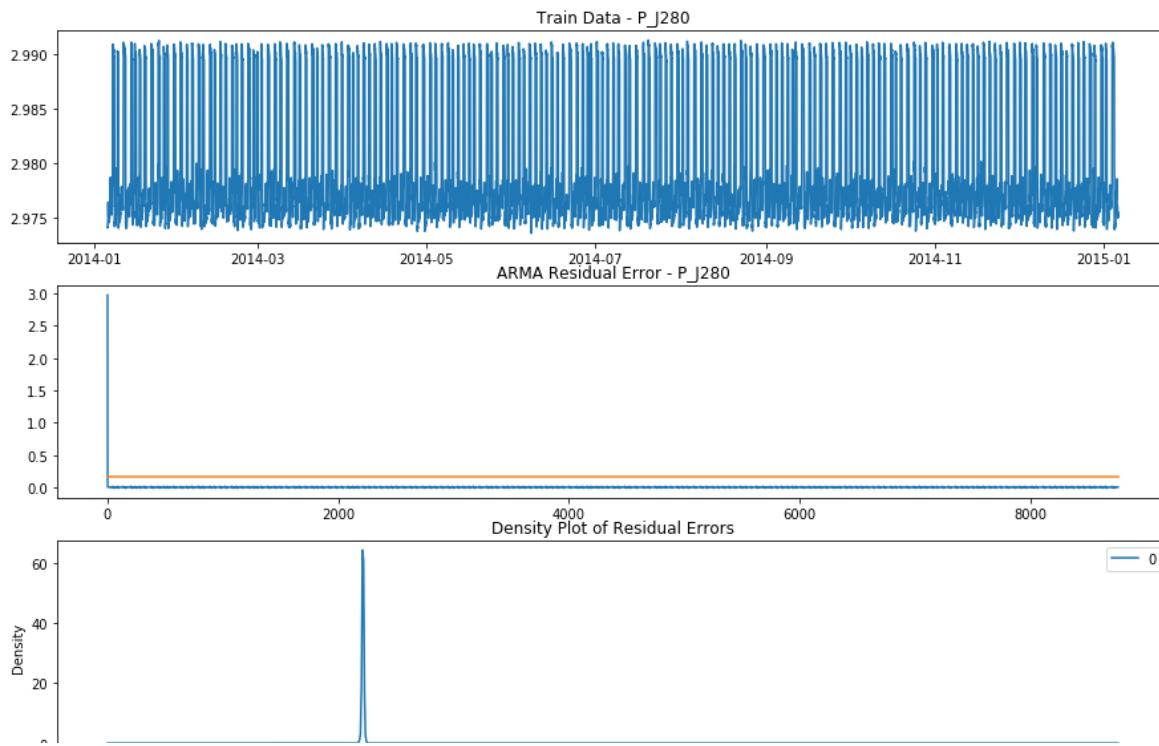


- Val MSE : 0.06 || Val RMSE : 0.25

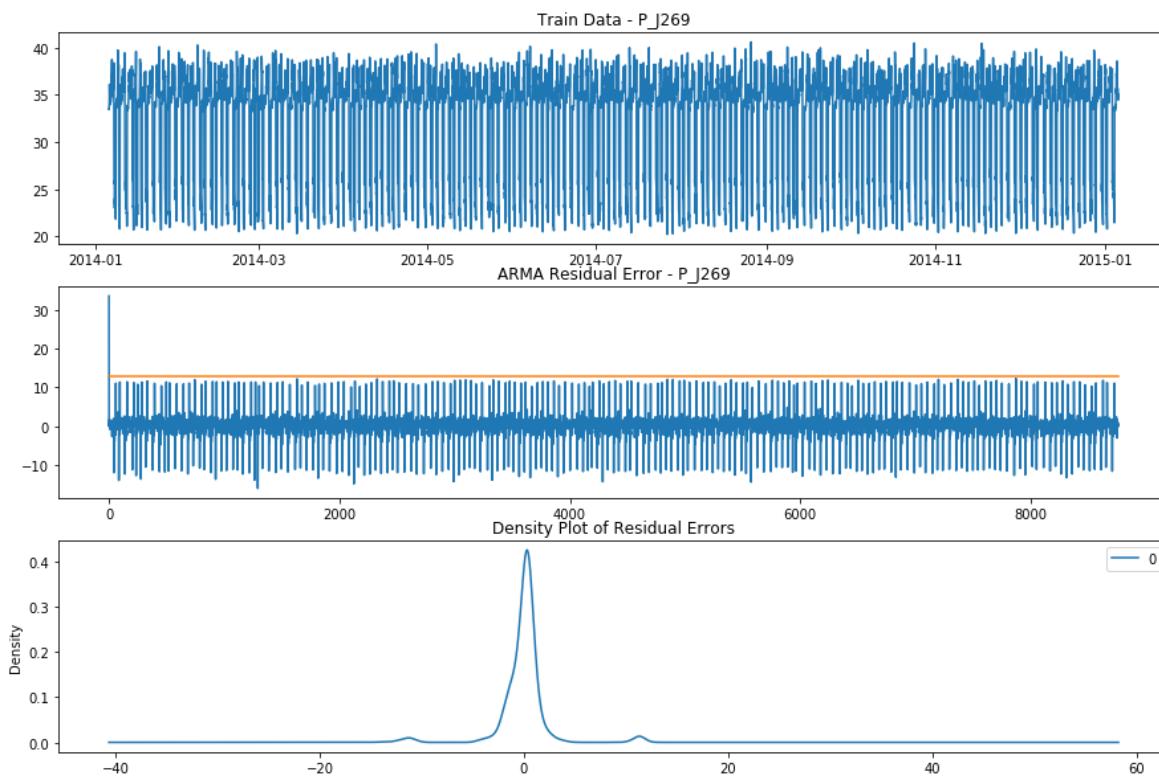


-- TP : 0 || FP : 0

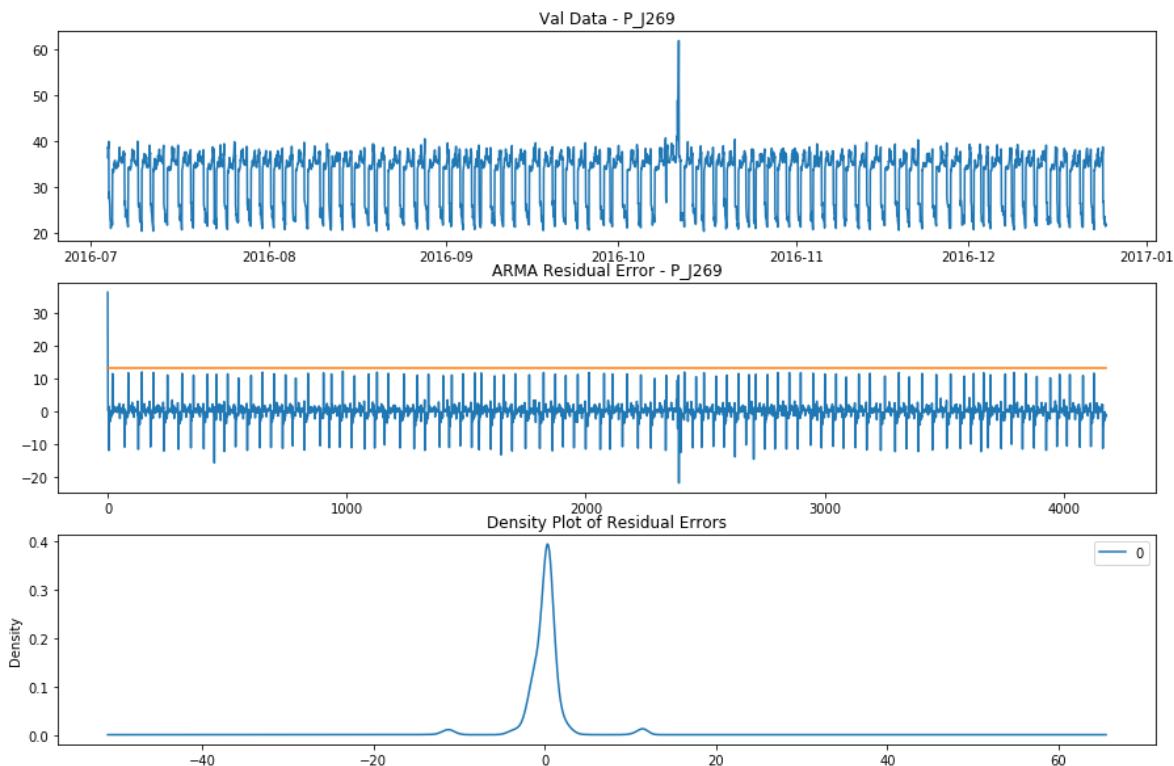
----- col : P_J280 -----
 - ARIMA Results : 1 1 || AIC : -77557.26245388955 (Time : 11.73
 s)
 -- Threshold Train : 0.16



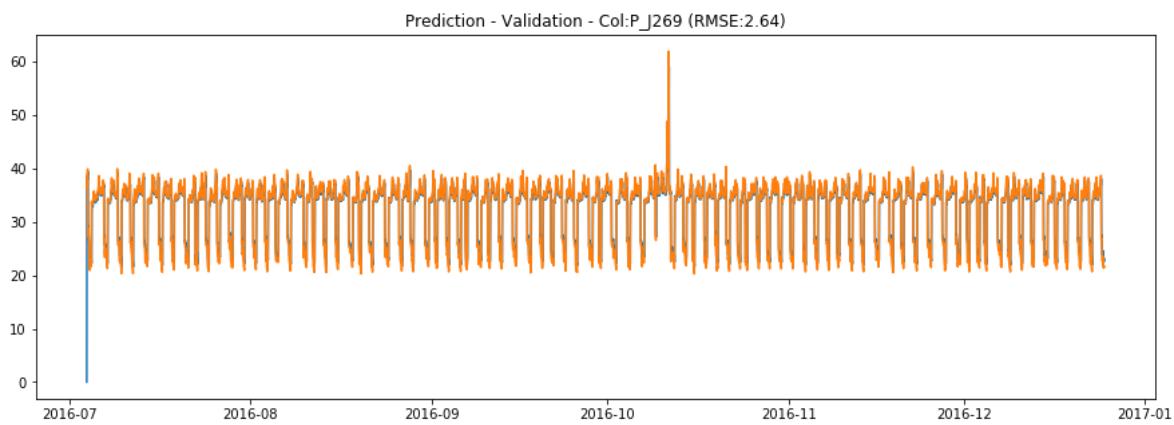
```
-- col : P_J269
- ARIMA Results : 3 3 || AIC : 41233.37173849765 (Time : 22.96
s)
-- Threshold Train : 12.837
```



-- Threshold Val: 13.203

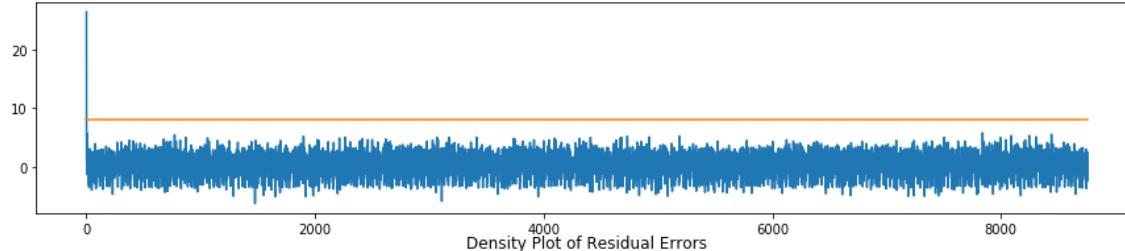
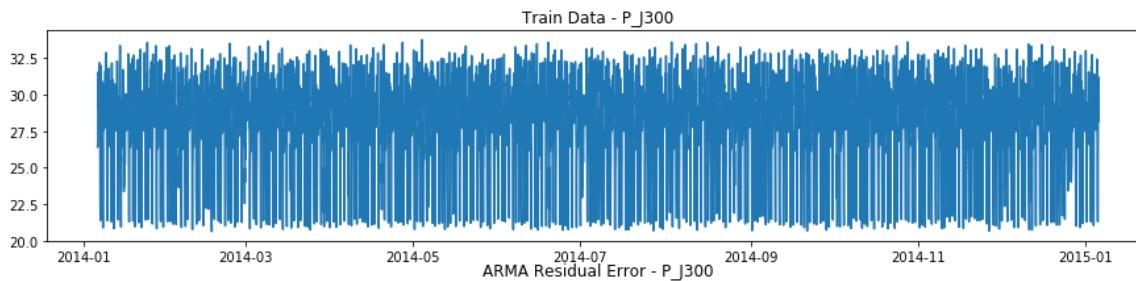


- Val MSE : 6.97 || Val RMSE : 2.64

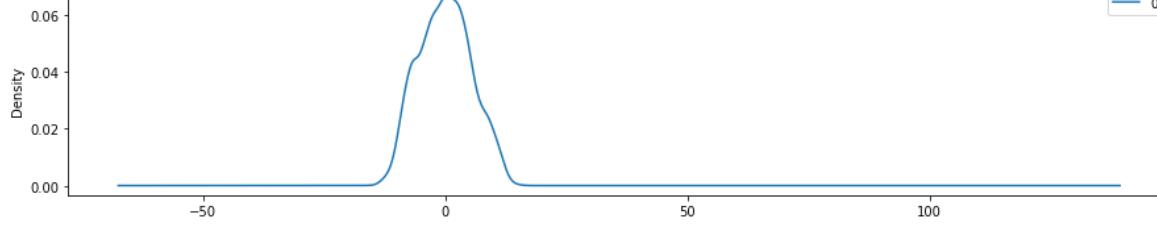
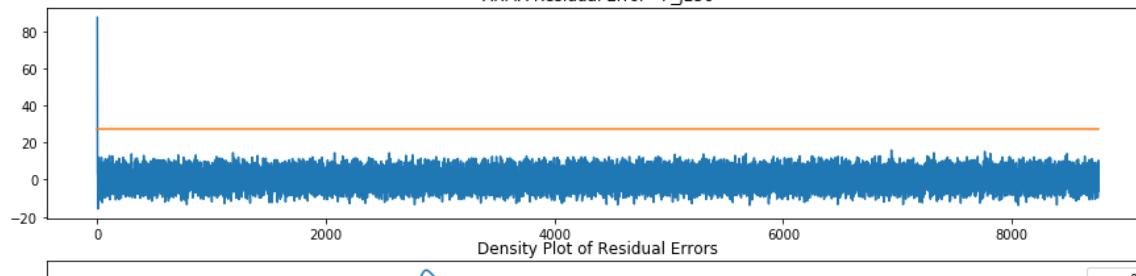
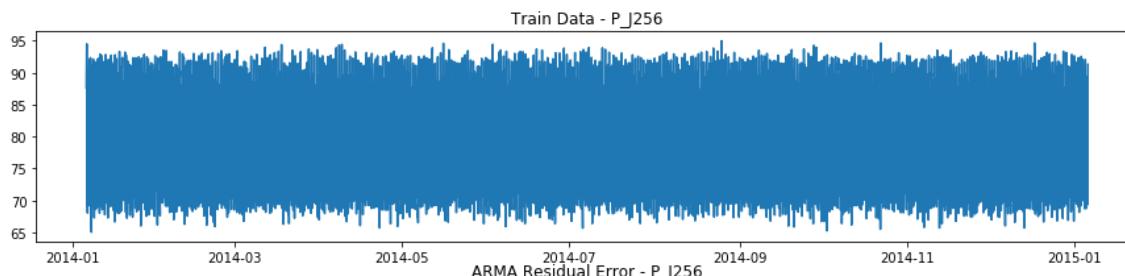


-- TP : 0 || FP : 1

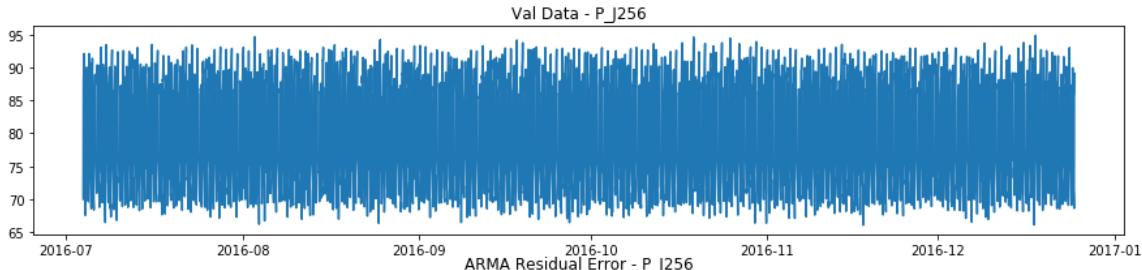
----- col : P_J300 -----
- ARIMA Results : 3 3 || AIC : 33068.103252975576 (Time : 36.6
1 s)
-- Threshold Train : 8.093



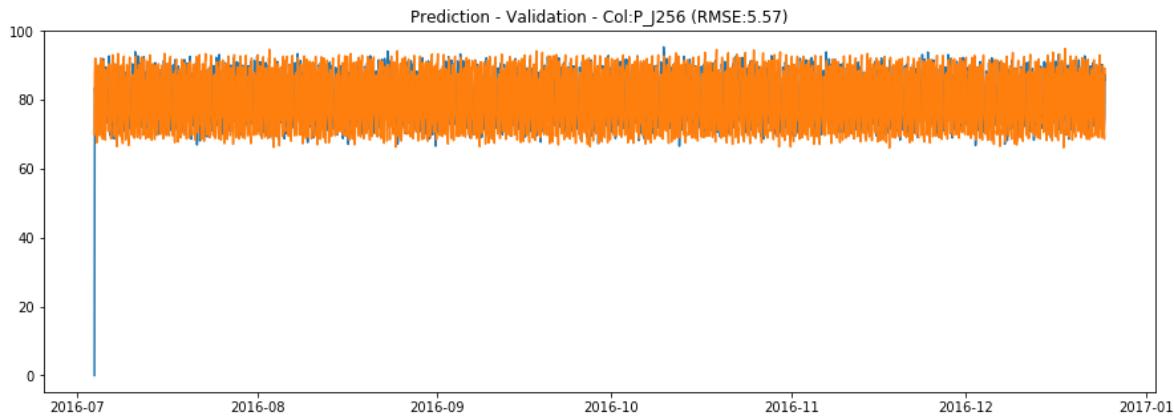
```
----- col : P_J256 -----
- ARIMA Results : 3 2 || AIC : 54562.55574623511 (Time : 27.27
s)
-- Threshold Train : 27.602
```



-- Threshold Val: 27.865



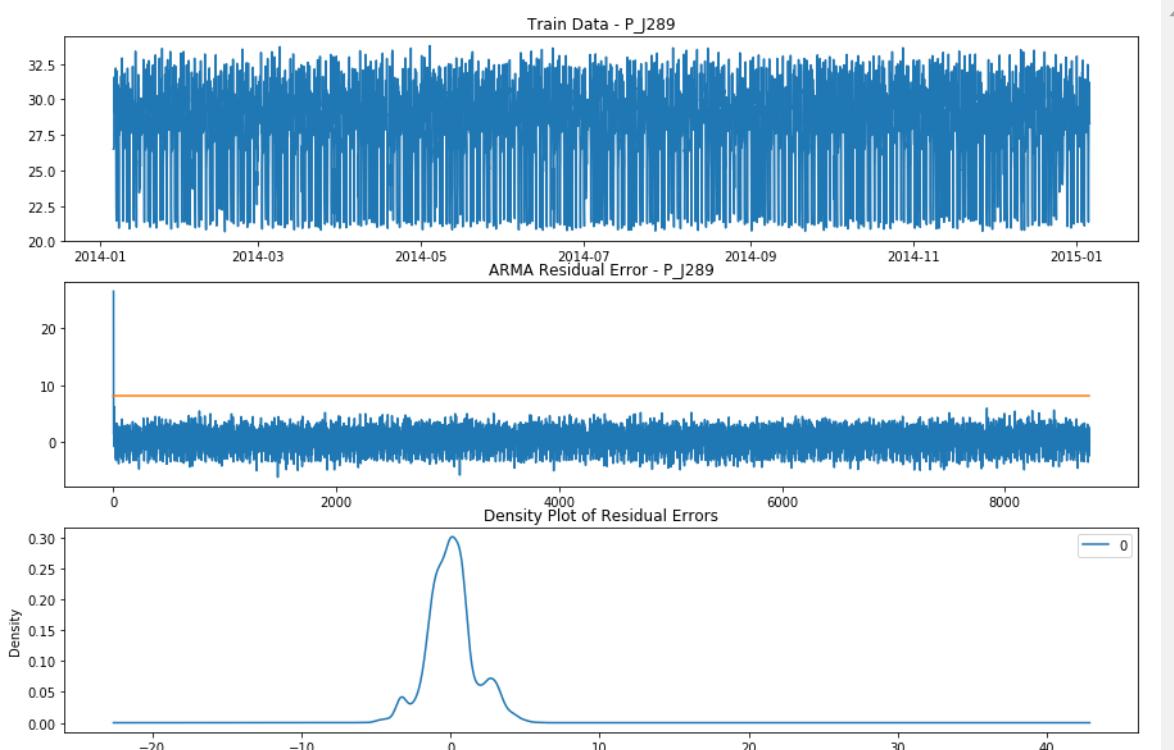
- Val MSE : 31.06 || Val RMSE : 5.57



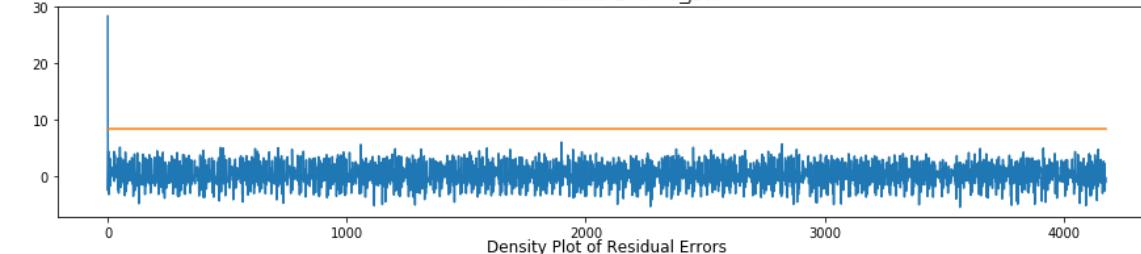
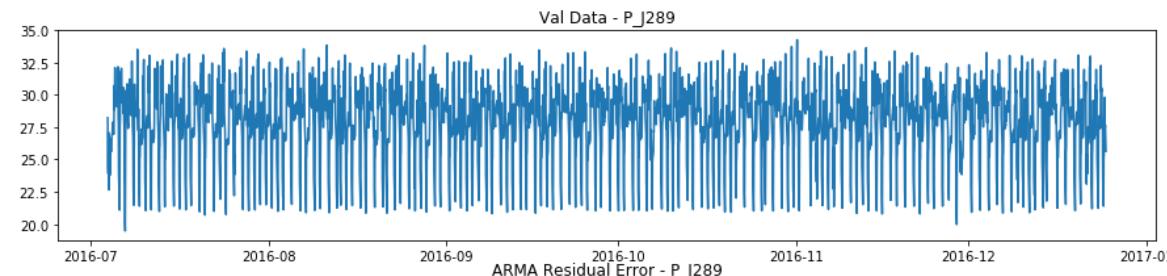
-- TP : 0 || FP : 1

----- col : P_J289 -----
- ARIMA Results : 3 3 || AIC : 33006.912736432285 (Time : 20.12 s)

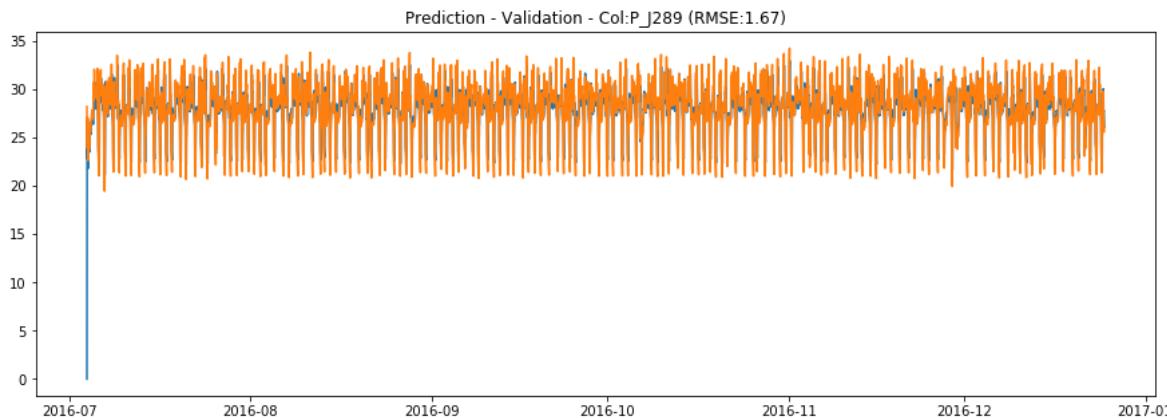
-- Threshold Train : 8.062



-- Threshold Val: 8.351



- Val MSE : 2.79 || Val RMSE : 1.67

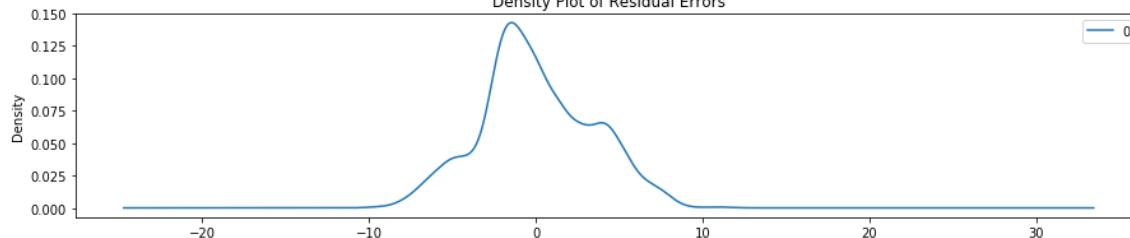
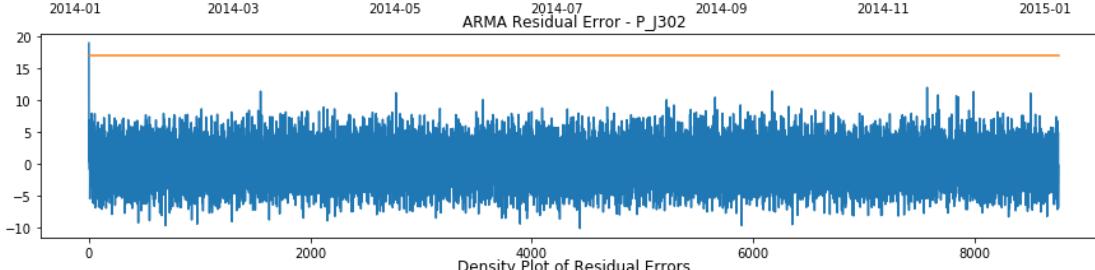
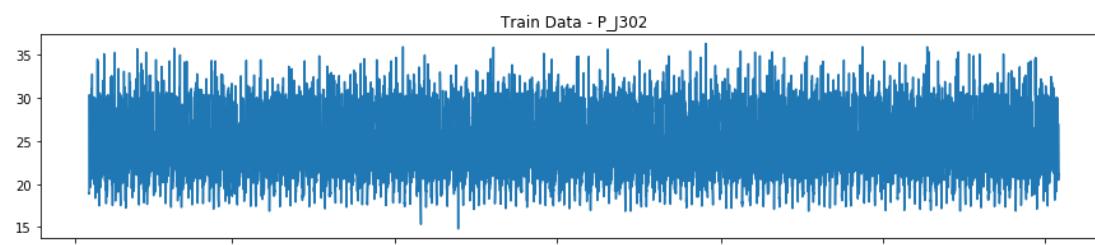


-- TP : 0 || FP : 1

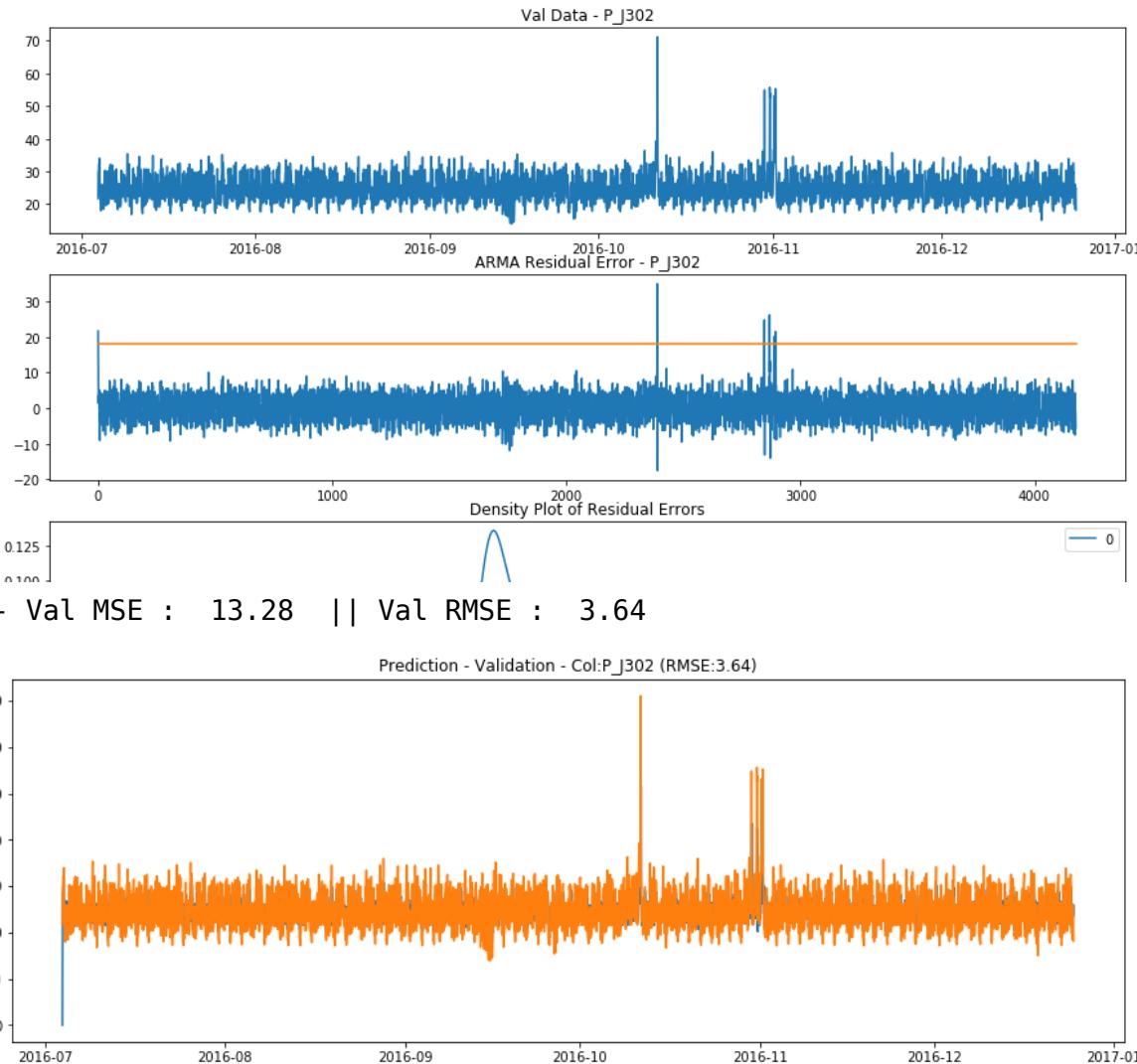
----- col : P_J415 -----
 - ARIMA Results : 3 2 || AIC : 59491.037824442115 (Time : 18.82
 s)
 -- Threshold Train : 36.321



```
-- col : P_J302
- ARIMA Results : 1 3 || AIC : 46153.619783432165 (Time : 17.6
s)
-- Threshold Train : 16.869
```



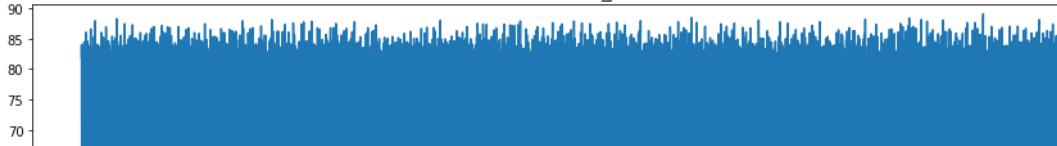
-- Threshold Val: 18.222



-- TP : 2 || FP : 1

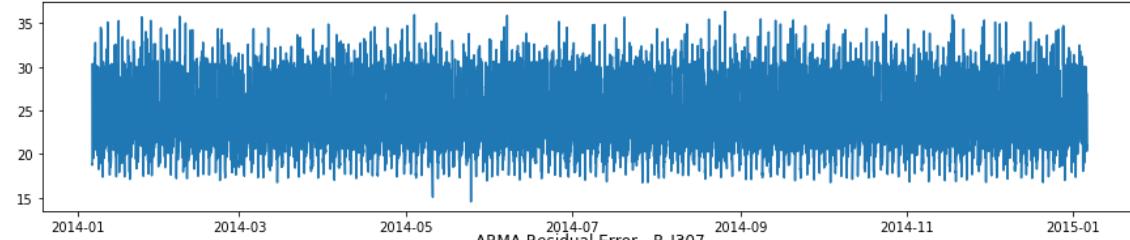
----- col : P_J306 -----
 - ARIMA Results : 3 2 || AIC : 58625.6053665347 (Time : 15.46 s)
 -- Threshold Train : 34.563

Train Data - P_J306

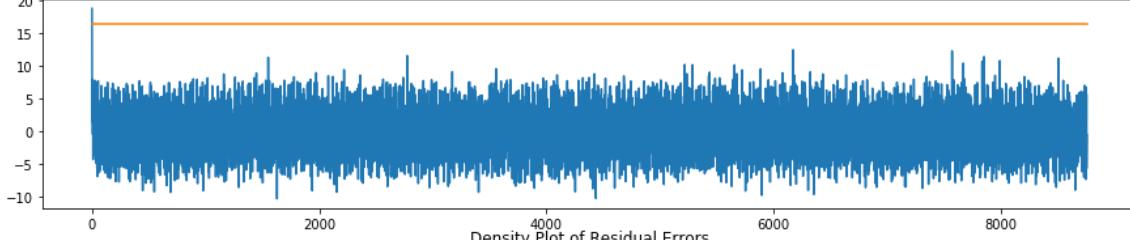


```
-- col : P_J307
- ARIMA Results : 3 2 || AIC : 45735.75300341871 (Time : 27.79
s)
-- Threshold Train : 16.47
```

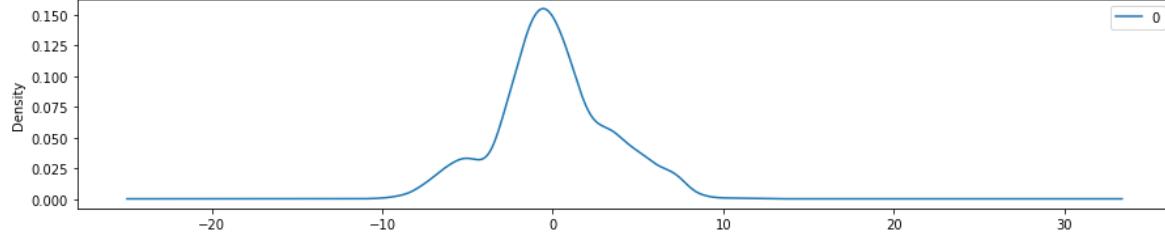
Train Data - P_J307



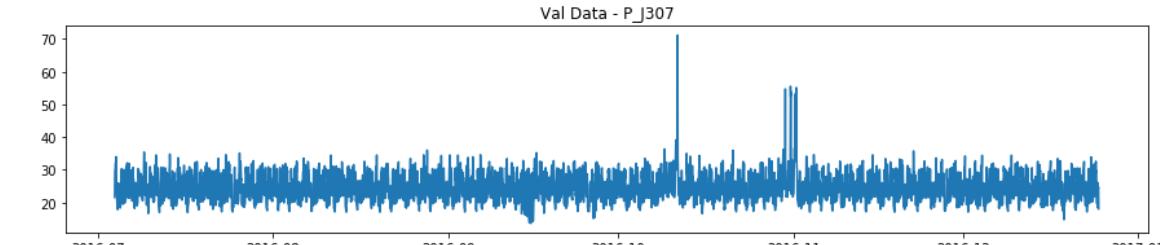
ARMA Residual Error - P_J307



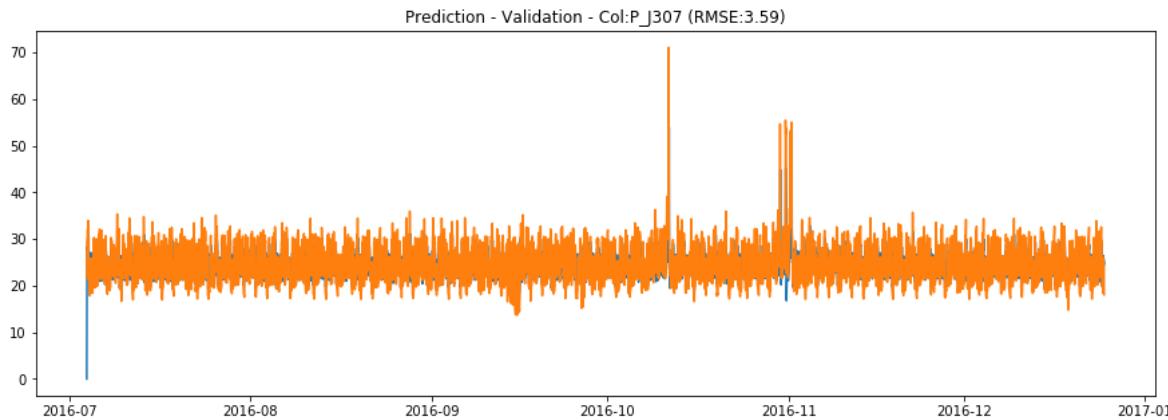
Density Plot of Residual Errors



```
-- Threshold Val: 17.927
```

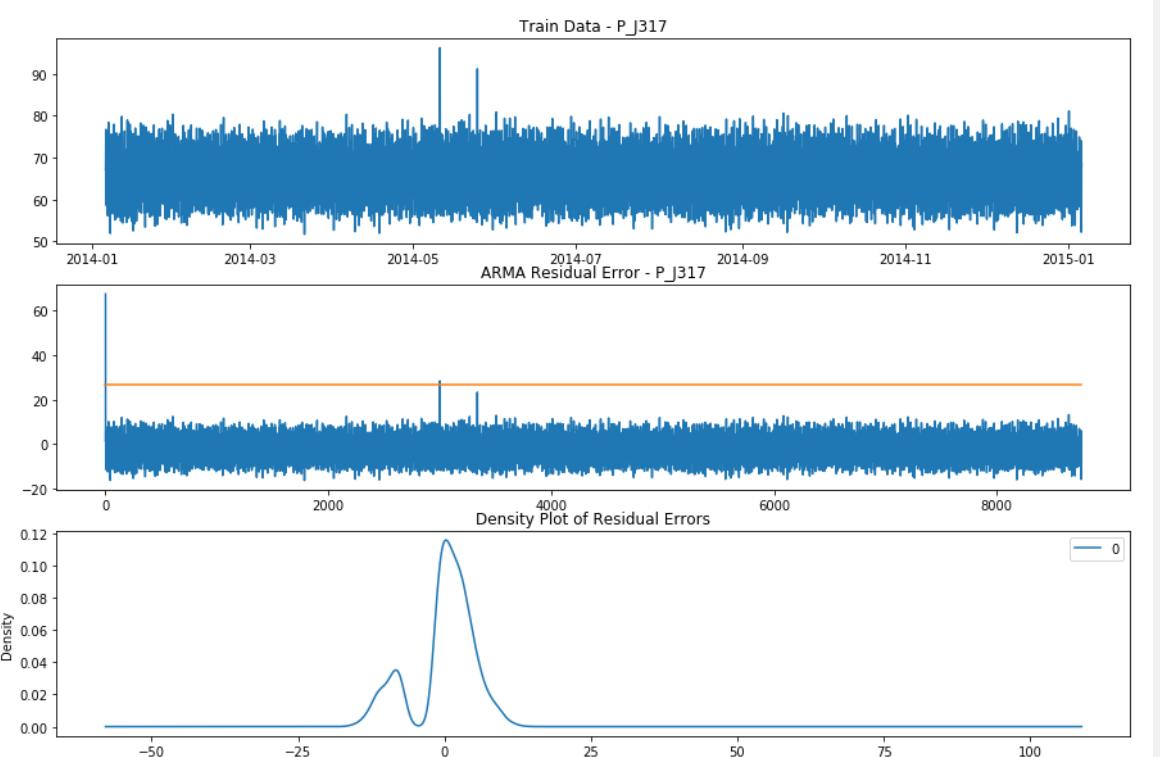


- Val MSE : 12.85 || Val RMSE : 3.59

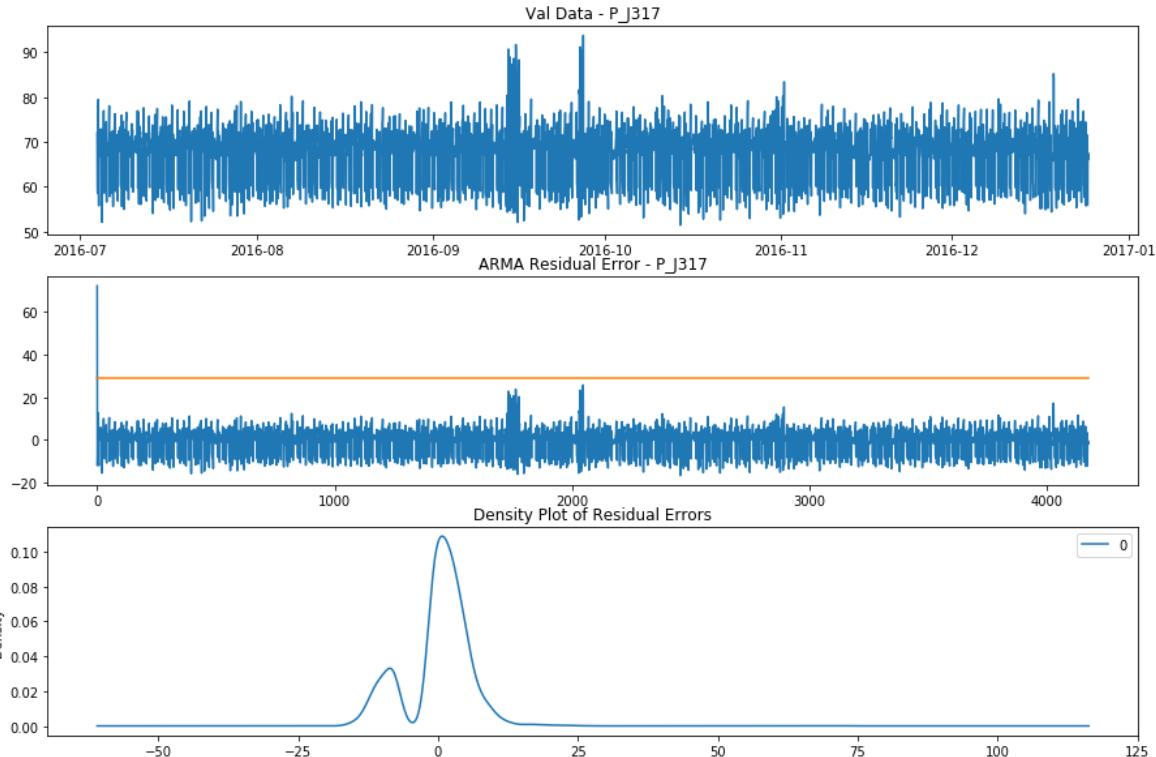


-- TP : 2 || FP : 1

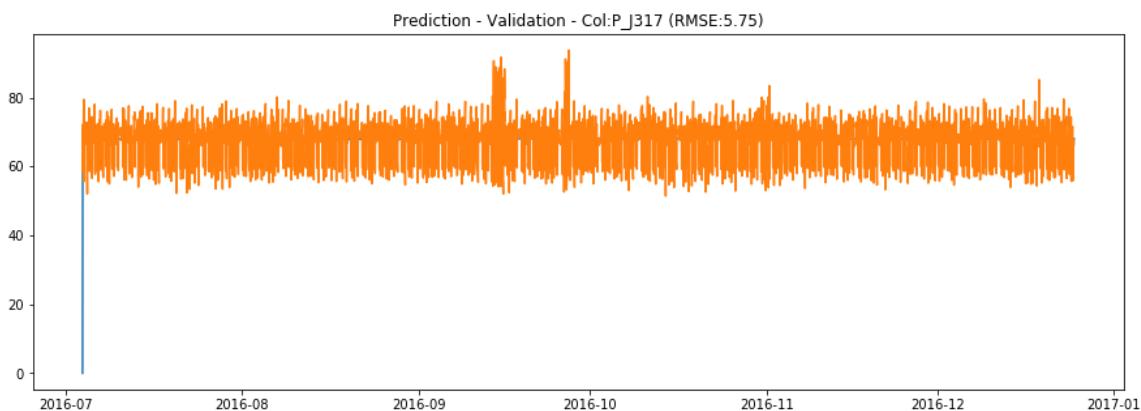
----- col : P_J317 -----
 - ARIMA Results : 1 1 || AIC : 54177.59082820872 (Time : 13.85 s)
 -- Threshold Train : 26.863



-- Threshold Val: 28.732



- Val MSE : 33.03 || Val RMSE : 5.75



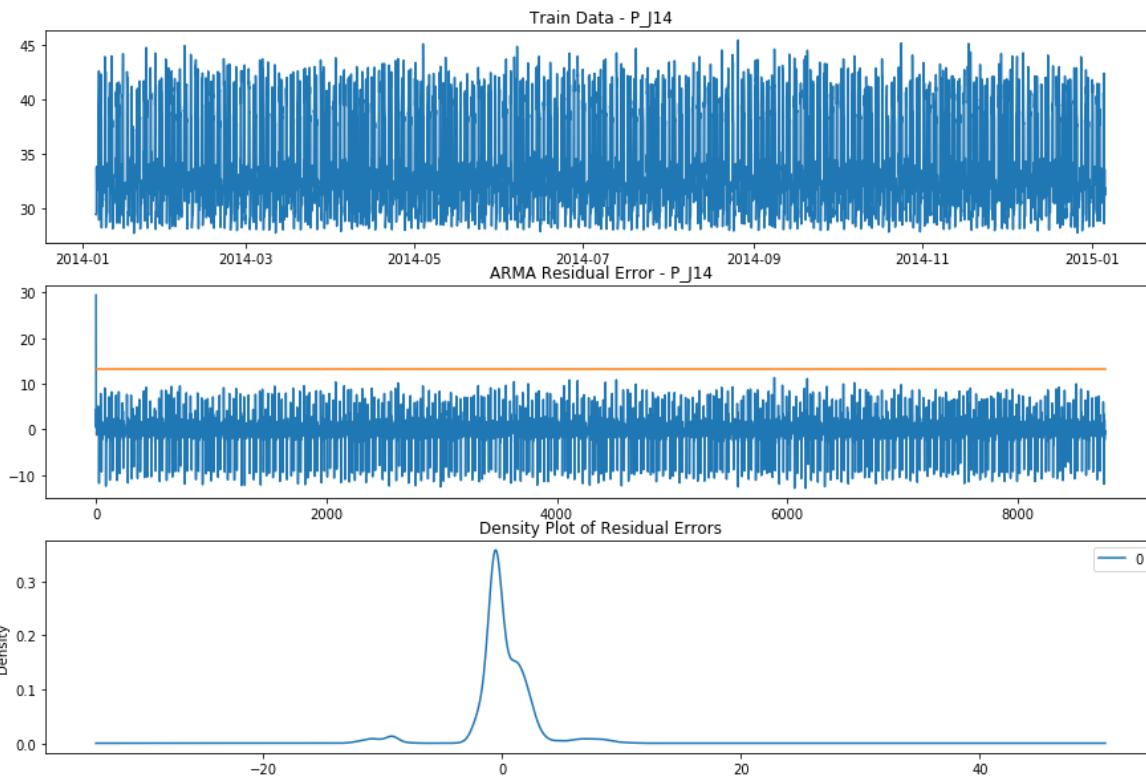
-- TP : 0 || FP : 2

----- col : P_J14 -----

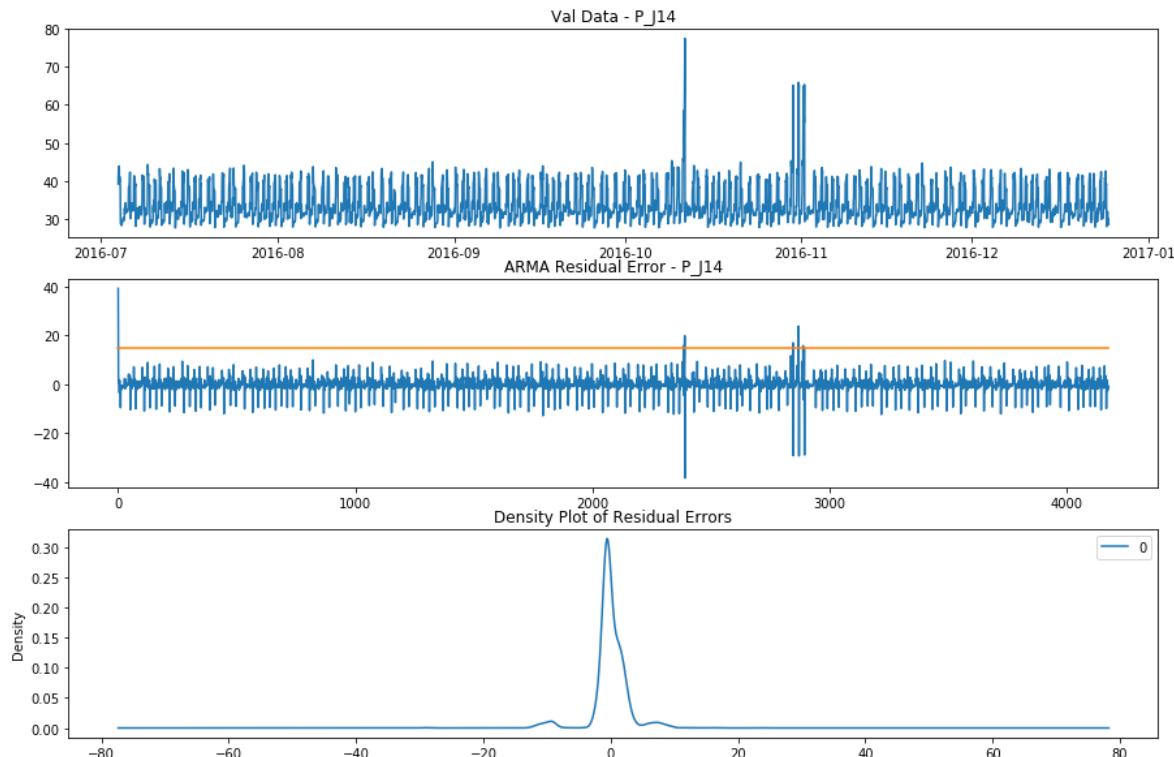
23/05/2019

02_ARIMA

- ARIMA Results : 2 2 || AIC : 41876.79206510154 (Time : 34.66 s)
-- Threshold Train : 13.283

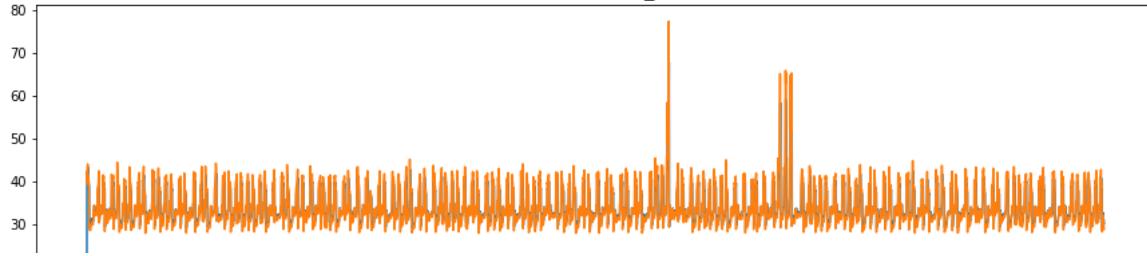


-- Threshold Val: 14.808



- Val MSE : 8.77 || Val RMSE : 2.96

Prediction - Validation - Col:P_J14 (RMSE:2.96)



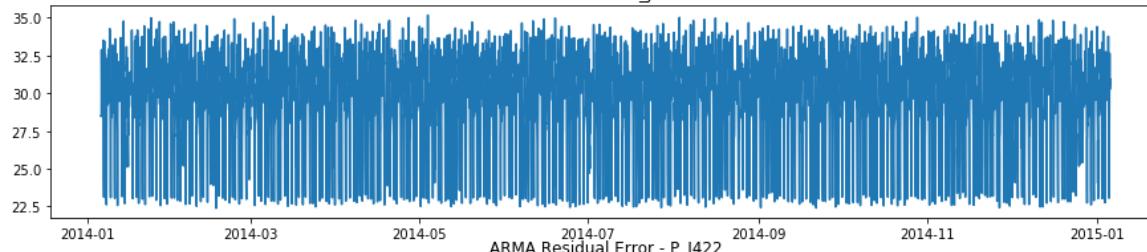
-- TP : 0 || FP : 1

----- col : P_J422 -----

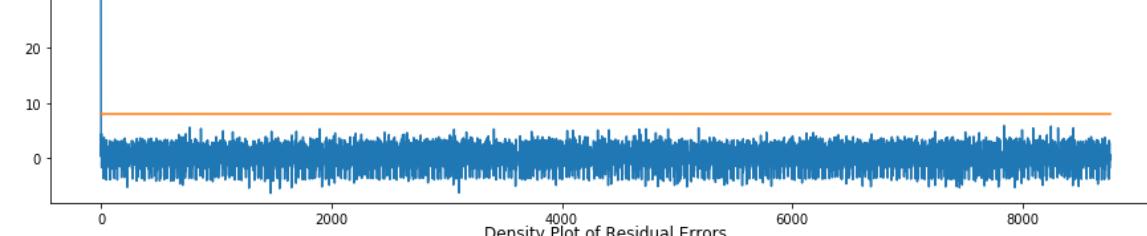
- ARIMA Results : 2 3 || AIC : 32627.656087558913 (Time : 20.79 s)

-- Threshold Train : 7.925

Train Data - P_J422



ARMA Residual Error - P_J422



Density Plot of Residual Errors

