rTPCflowmeter

June 22, 2020

[1]:
```
import numpy as np
from scipy import interpolate
```

0.1 Setup for atmosphere Air and Stainless Steel ball

https://www.mathesongas.com/pdfs/flowchart/602%20(E300)/AIR%20602(E300)%20SS%200%20PSIG.pdf

[2]:
```
pathto="C:/Users/andre\Documents/"
ro,cal=np.loadtxt(pathto+'AIR_602(E300)_SS_0_PSIG.dat',unpack=True) # slpm
mnro,mxro=ro.min(),ro.max()
flowCal = interpolate.interp1d(ro, cal)
```

0.2 Calculate correction for different gas mixture

https://www.mathesongas.com/pdfs/flowchart/RotameterGasFactorChart.pdf

[3]:
```
Ar_factor=0.851
CO2_factor=0.808
```

[4]:
```
q_frac=0.3
mix_factor=((1.0-q_frac)*Ar_factor)+(q_frac*CO2_factor)
print(f'mix factor: {mix_factor:.5f}')
```

```
mix factor: 0.83810
```

0.3 Readout of the SS ball

Take the reading from the middle of the ball

[5]:
```
inSS=100
outSS=65
```

Determine input flow

[6]:
```
inFlow=flowCal(inSS)
print(f'Air inflow {inFlow:.3f} sccm')
inFlow*=mix_factor
print(f'Gas inflow {inFlow:.3f} sccm')
```

```
Air inflow 541.500 sccm
Gas inflow 453.831 sccm
```

Determine output flow

[7]:
```
outFlow=flowCal(outSS)
print(f'Air outflow {outFlow:.3f} sccm')
outFlow*=mix_factor
print(f'Gas outflow {outFlow:.3f} sccm')
```

```
Air outflow 305.860 sccm
Gas outflow 256.341 sccm
```

Determine retunr fraction

[8]:
```
print(f'Return fraction {outFlow/inFlow*100.0:.1f}%')
```

```
Return fraction 56.5%
```