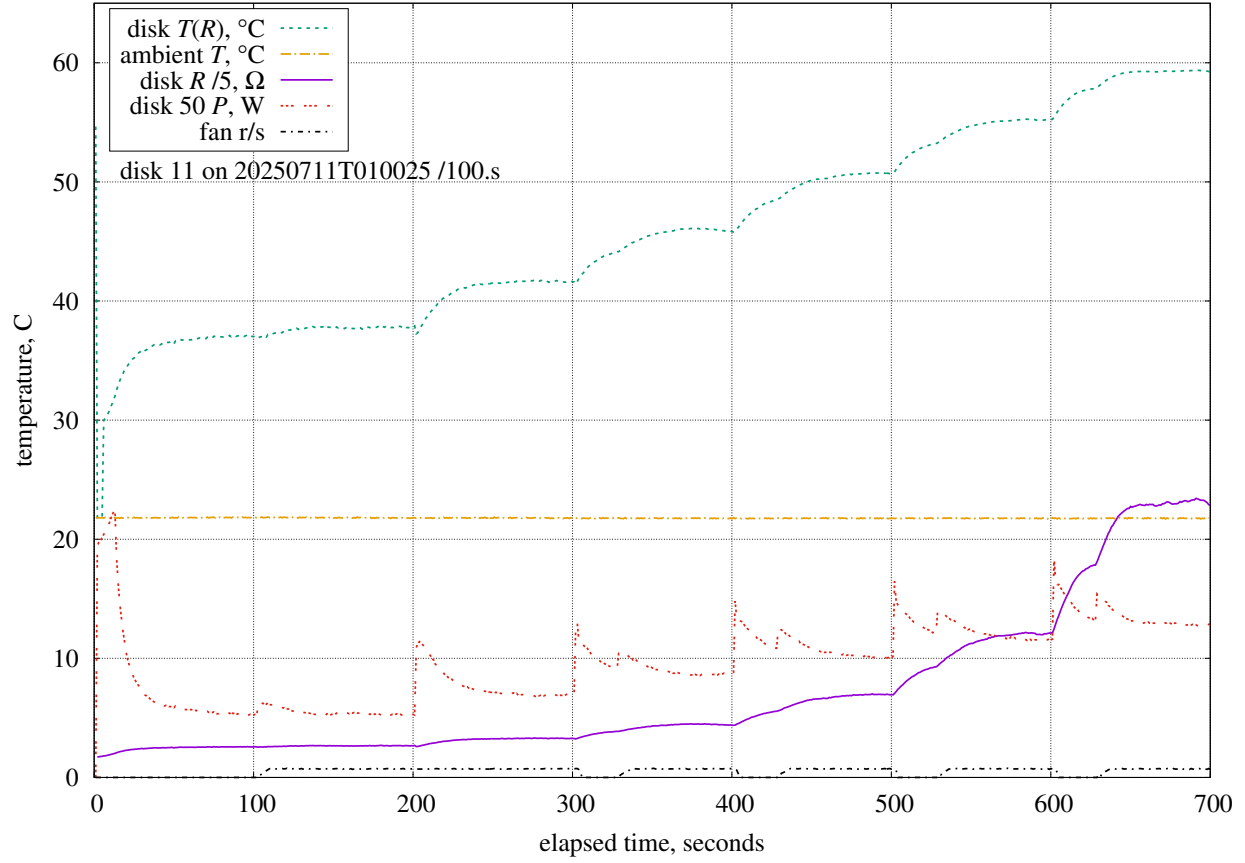


$\theta = 6.6^\circ$; $\psi = 173.3^\circ$; $V = 0.000$ m/s (0 r/min)

Estimated measurement uncertainties of natural convection at $\theta = 6.7$.

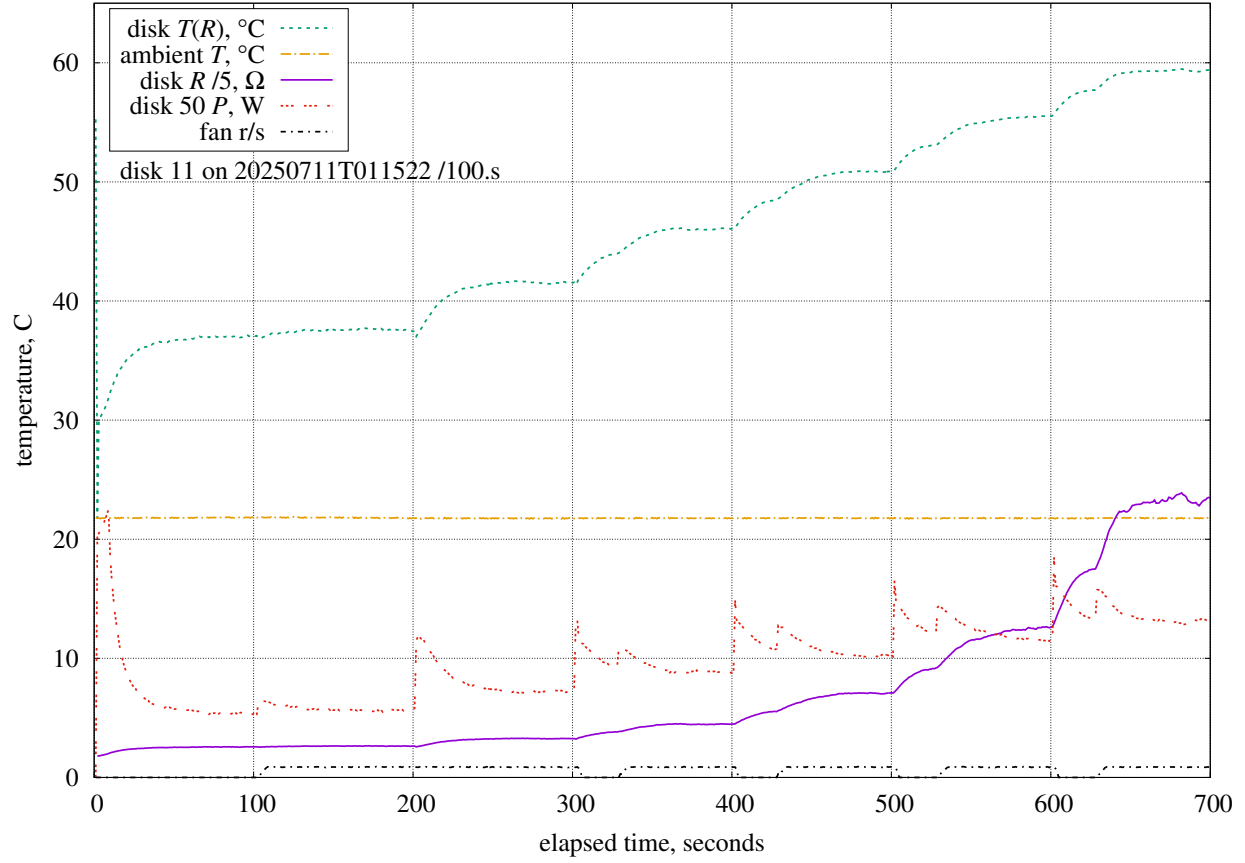
Symbol	Nominal	Sensitivity	Bias	Uncertainty	Component
ΔT	25.0.K	+4.26%/K	0.10.K	0.43%	LM35C differential
P	101.kPa	+0.0002%/Pa	1.5.kPa	0.24%	MPXH6115A6U air pressure
D_o	2.81.mm	+2475%/m	500.um	1.24%	tube outer diameter
D_i	1.11.mm	+8223%/m	200.um	1.64%	tube inner diameter
D_g	166.um	-310%/m	750.um	0.23%	tube air gap
L_{wire}	38.0.mm	+1293%/m	500.um	0.65%	wire length
k_{ABS}	179. $\frac{\text{mW}}{\text{K}\cdot\text{m}}$	+0.156%/ $\frac{\text{mW}}{\text{K}\cdot\text{m}}$	9.0. $\frac{\text{mW}}{\text{K}\cdot\text{m}}$	1.40%	ABS thermal conductivity
d	12.0.mm	+3485%/m	100.um	0.35%	disk diameter
				2.65%	combined bias uncertainty



$\theta = 6.6^\circ$; $\psi = 173.3^\circ$; $V = 0.131$ m/s (43 r/min)

Estimated measurement uncertainties at $Re = 95$.

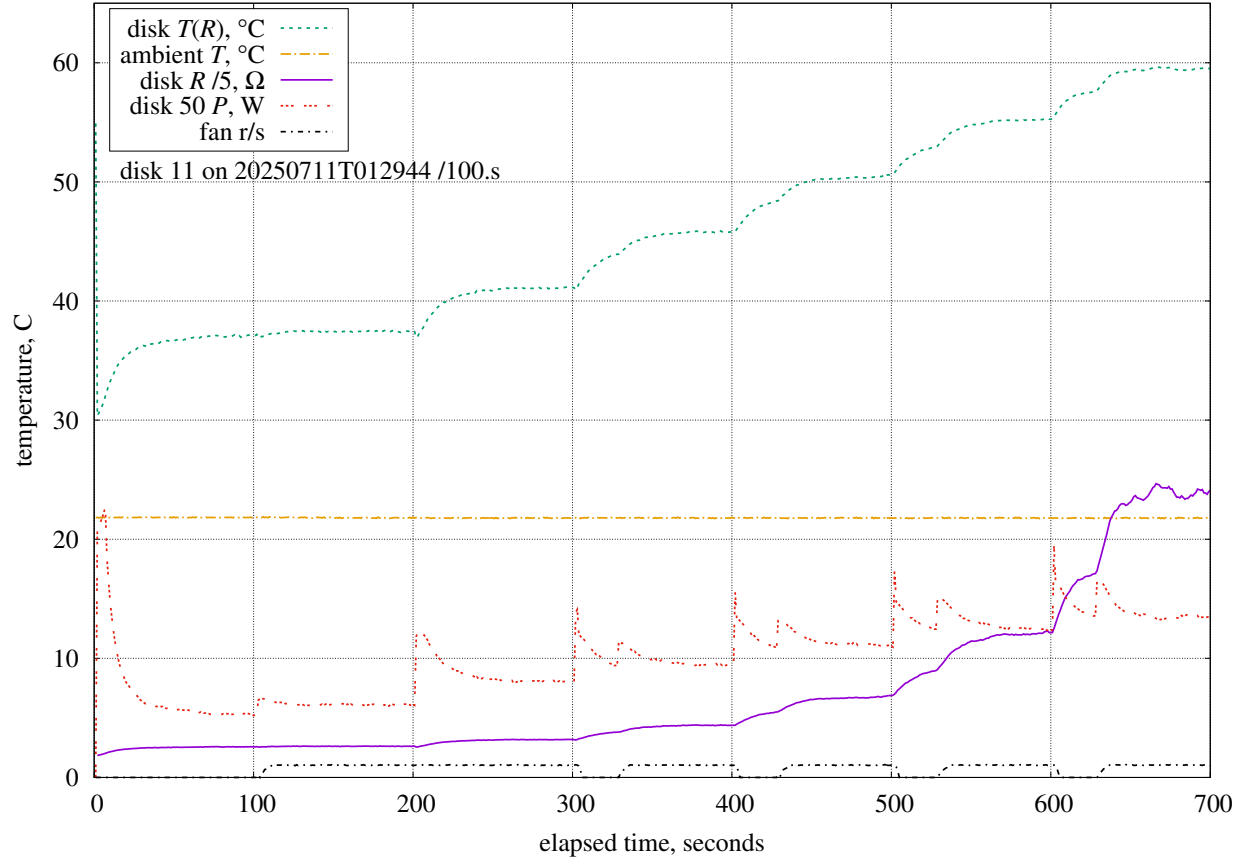
Symbol	Nominal	Sensitivity	Bias	Uncertainty	Component
T	307.K	$-0.406\%/K$	0.50.K	0.20%	LM35C temperature sensor
ΔT	25.0.K	$+4.27\%/K$	0.10.K	0.43%	LM35C differential
P	101.kPa	$+0.0004\%/Pa$	1.5.kPa	0.62%	MPXH6115A6U air pressure
η	0.340	$+72.7\%$	0.007	0.49%	anemometer calibration
Re_0	600	$+0.0098\%$	60	0.59%	integration lower-bound
D_o	2.81.mm	$-6826\%/m$	500.um	3.41%	tube outer diameter
D_i	1.11.mm	$+8060\%/m$	200.um	1.61%	tube inner diameter
L_{wire}	38.0.mm	$+720\%/m$	500.um	0.36%	wire length
k_{ABS}	$179. \frac{mW}{K \cdot m}$	$+0.147\% / \frac{mW}{K \cdot m}$	$9.0. \frac{mW}{K \cdot m}$	1.32%	ABS thermal conductivity
d	12.0.mm	$+4655\%/m$	100.um	0.47%	disk diameter
ϵ_{ABS}	0.920	-45.6%	0.010	0.46%	ABS emissivity
ϵ_{wt}	0.900	-45.8%	0.025	1.14%	wind-tunnel emissivity
				4.37%	combined bias uncertainty
Symbol	Nominal	Sensitivity	Variability	Uncertainty	Component
ω	43.4.r/min	$+0.570\%/(r/min)$	1.4.r/min	0.79%	fan rotation rate
				4.65%	RSS combined uncertainty



$\theta = 6.6^\circ$; $\psi = 173.3^\circ$; $V = 0.157$ m/s (52 r/min)

Estimated measurement uncertainties at $Re = 114$.

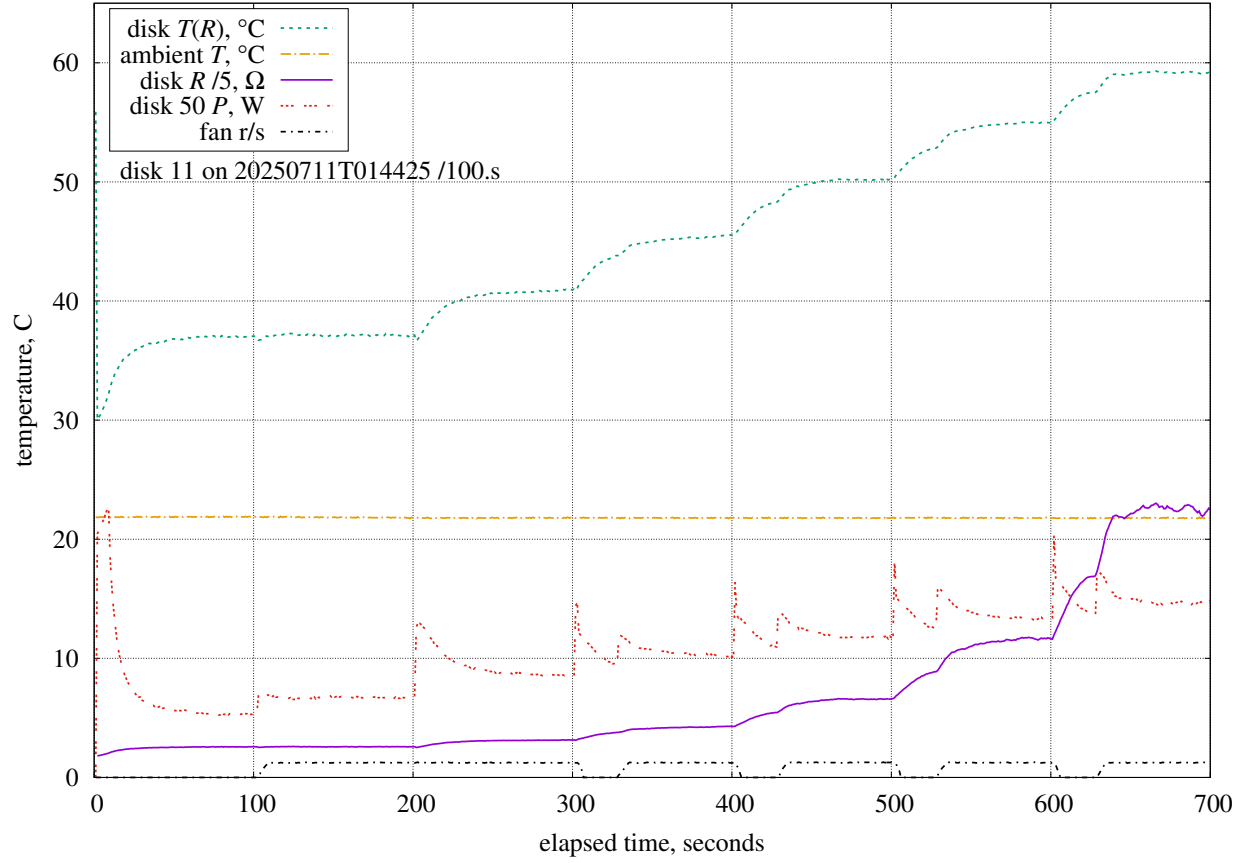
Symbol	Nominal	Sensitivity	Bias	Uncertainty	Component
T	307.K	$-0.441\%/K$	0.50.K	0.22%	LM35C temperature sensor
ΔT	25.0.K	$+4.18\%/K$	0.10.K	0.42%	LM35C differential
P	101.kPa	$+0.0004\%/Pa$	1.5.kPa	0.67%	MPXH6115A6U air pressure
η	0.340	$+95.3\%$	0.007	0.65%	anemometer calibration
Re_0	600	$+0.0055\%$	60	0.33%	integration lower-bound
D_o	2.81.mm	$-7670\%/m$	500.um	3.84%	tube outer diameter
D_i	1.11.mm	$+9446\%/m$	200.um	1.89%	tube inner diameter
L_{wire}	38.0.mm	$+846\%/m$	500.um	0.42%	wire length
k_{ABS}	$179. \frac{mW}{K \cdot m}$	$+0.160\% / \frac{mW}{K \cdot m}$	$9.0. \frac{mW}{K \cdot m}$	1.44%	ABS thermal conductivity
d	12.0.mm	$+4374\%/m$	100.um	0.44%	disk diameter
ϵ_{ABS}	0.920	-47.8%	0.010	0.48%	ABS emissivity
ϵ_{wt}	0.900	-48.0%	0.025	1.20%	wind-tunnel emissivity
				4.86%	combined bias uncertainty
Symbol	Nominal	Sensitivity	Variability	Uncertainty	Component
ω	52.2.r/min	$+0.621\%/(r/min)$	0.82.r/min	0.51%	fan rotation rate
				4.97%	RSS combined uncertainty



$\theta = 6.6^\circ$; $\psi = 173.3^\circ$; $V = 0.188$ m/s (62 r/min)

Estimated measurement uncertainties at $Re = 137$.

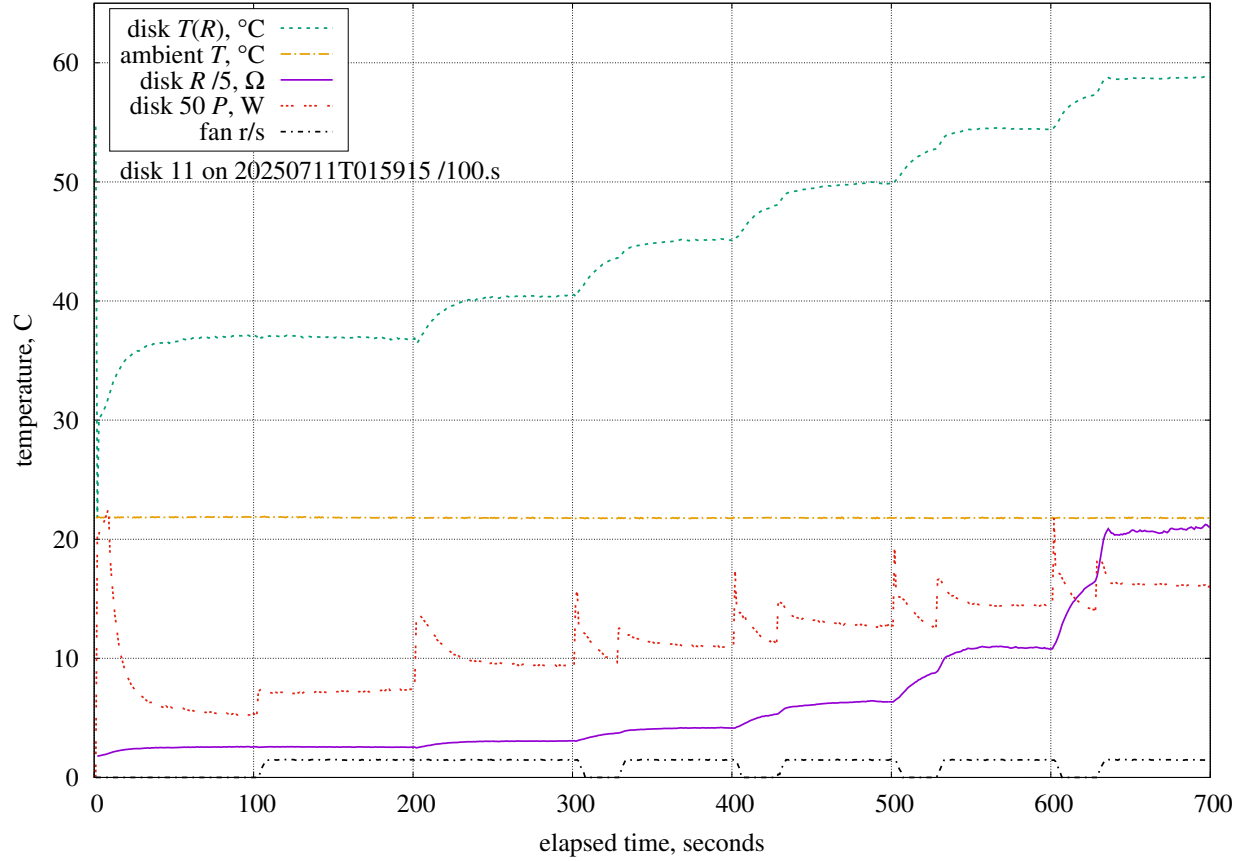
Symbol	Nominal	Sensitivity	Bias	Uncertainty	Component
T	307.K	$-0.502\%/K$	0.50.K	0.25%	LM35C temperature sensor
ΔT	25.0.K	$+3.96\%/K$	0.10.K	0.40%	LM35C differential
P	101.kPa	$+0.0006\%/Pa$	1.5.kPa	0.84%	MPXH6115A6U air pressure
η	0.340	$+159\%$	0.007	1.08%	anemometer calibration
Re_0	600	-0.0095%	60	0.57%	integration lower-bound
D_o	2.81.mm	$-8349\%/m$	500.um	4.17%	tube outer diameter
D_i	1.11.mm	$+10608\%/m$	200.um	2.12%	tube inner diameter
L_{wire}	38.0.mm	$+954\%/m$	500.um	0.48%	wire length
k_{ABS}	$179. \frac{mW}{K \cdot m}$	$+0.169\% / \frac{mW}{K \cdot m}$	$9.0. \frac{mW}{K \cdot m}$	1.51%	ABS thermal conductivity
d	12.0.mm	$+4829\%/m$	100.um	0.48%	disk diameter
ϵ_{ABS}	0.920	-48.4%	0.010	0.48%	ABS emissivity
ϵ_{wt}	0.900	-48.7%	0.025	1.22%	wind-tunnel emissivity
				5.37%	combined bias uncertainty
Symbol	Nominal	Sensitivity	Variability	Uncertainty	Component
ω	62.3.r/min	$+0.868\%/(r/min)$	1.1.r/min	0.93%	fan rotation rate
				5.69%	RSS combined uncertainty



$\theta = 6.6^\circ$; $\psi = 173.3^\circ$; $V = 0.224$ m/s (74 r/min)

Estimated measurement uncertainties at $Re = 163$.

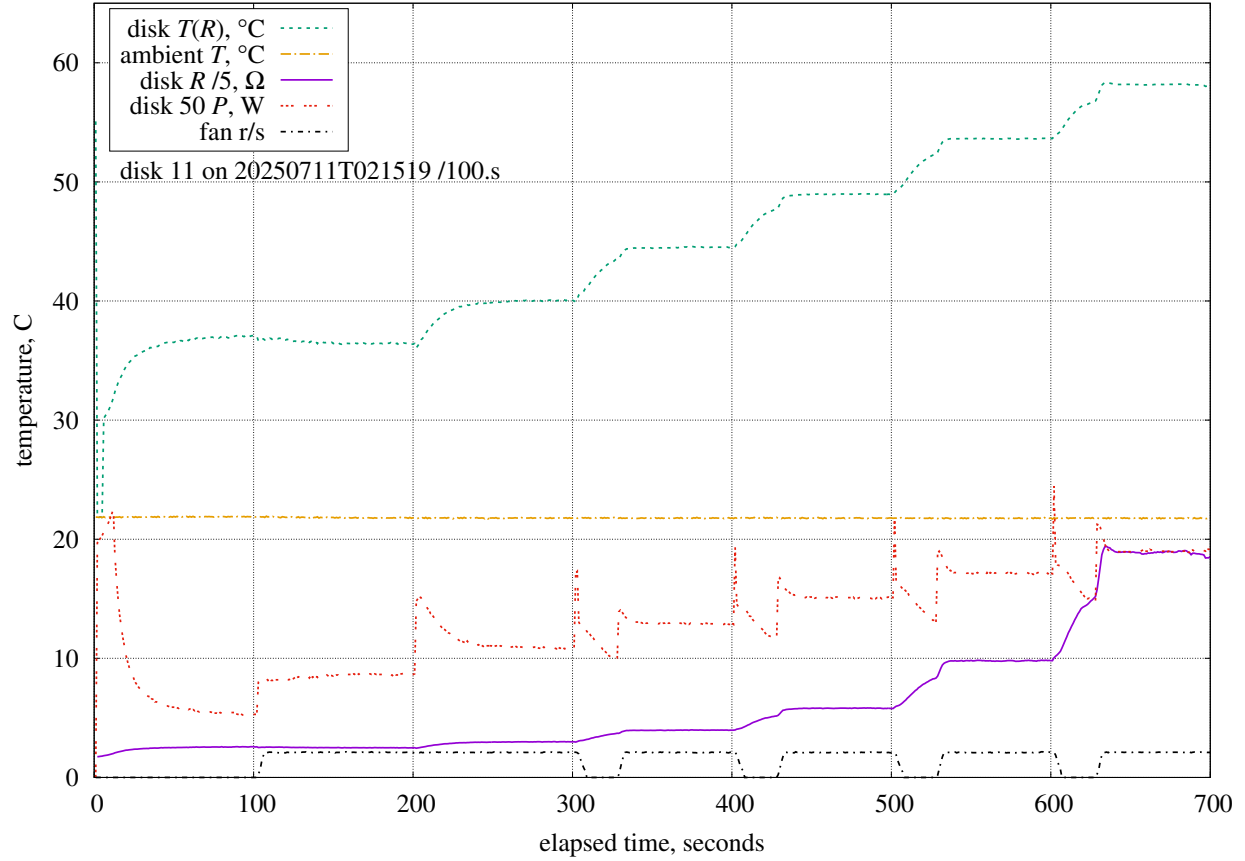
Symbol	Nominal	Sensitivity	Bias	Uncertainty	Component
T	307.K	$-0.508\%/K$	0.50.K	0.25%	LM35C temperature sensor
ΔT	25.0.K	$+3.92\%/K$	0.10.K	0.39%	LM35C differential
P	101.kPa	$+0.0006\%/Pa$	1.5.kPa	0.87%	MPXH6115A6U air pressure
η	0.340	$+169\%$	0.007	1.15%	anemometer calibration
Re_0	600	-0.013%	60	0.76%	integration lower-bound
D_o	2.81.mm	$-8868\%/m$	500.um	4.43%	tube outer diameter
D_i	1.11.mm	$+11570\%/m$	200.um	2.31%	tube inner diameter
L_{wire}	38.0.mm	$+1049\%/m$	500.um	0.52%	wire length
k_{ABS}	179. $\frac{mW}{K \cdot m}$	$+0.174\%/ \frac{mW}{K \cdot m}$	9.0. $\frac{mW}{K \cdot m}$	1.55%	ABS thermal conductivity
d	12.0.mm	$+4983\%/m$	100.um	0.50%	disk diameter
ϵ_{ABS}	0.920	-47.9%	0.010	0.48%	ABS emissivity
ϵ_{wt}	0.900	-48.3%	0.025	1.21%	wind-tunnel emissivity
				5.70%	combined bias uncertainty
Symbol	Nominal	Sensitivity	Variability	Uncertainty	Component
ω	74.4.r/min	$+0.770\%/(r/min)$	1.0.r/min	0.78%	fan rotation rate
				5.92%	RSS combined uncertainty



$\theta = 6.6^\circ$; $\psi = 173.3^\circ$; $V = 0.267$ m/s (88 r/min)

Estimated measurement uncertainties at $Re = 194$.

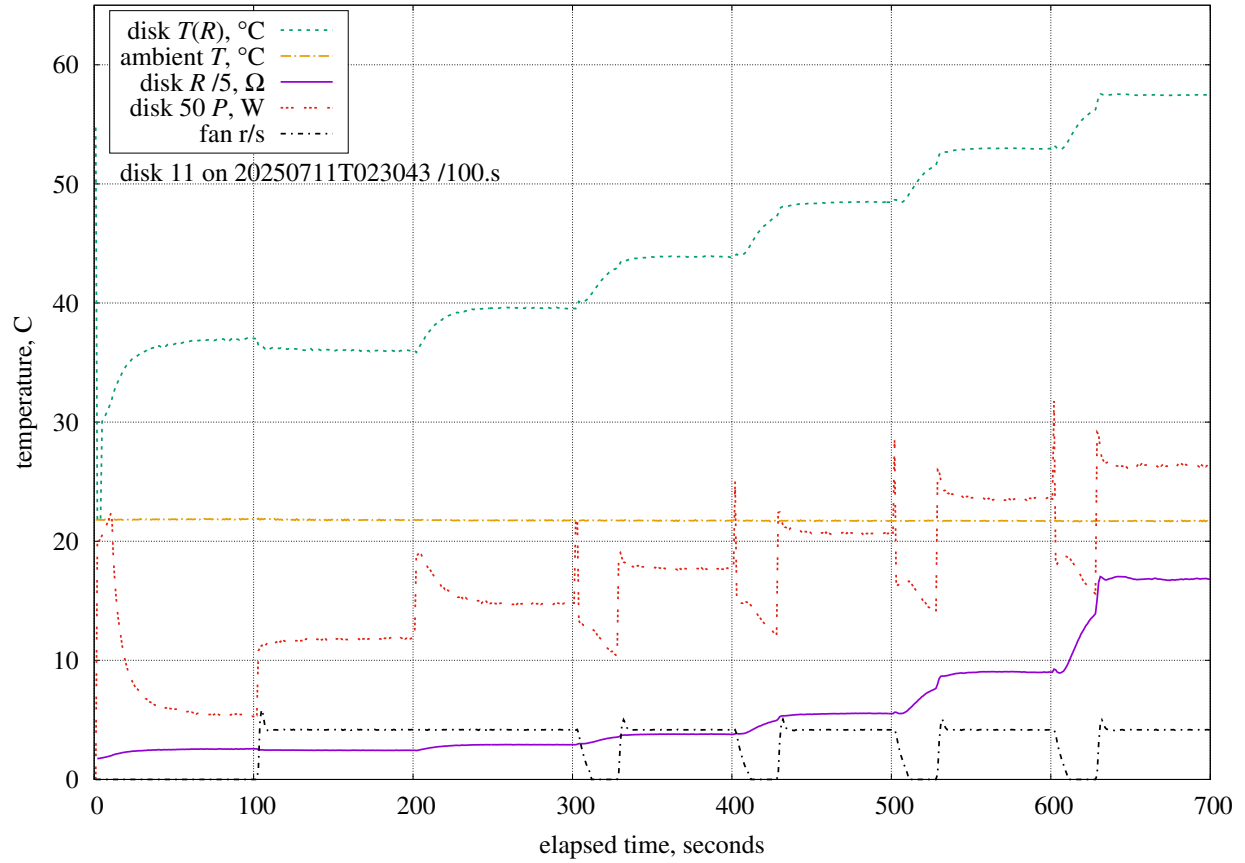
Symbol	Nominal	Sensitivity	Bias	Uncertainty	Component
T	307.K	$-0.501\%/K$	0.50.K	0.25%	LM35C temperature sensor
ΔT	25.0.K	$+3.91\%/K$	0.10.K	0.39%	LM35C differential
P	101.kPa	$+0.0006\%/Pa$	1.5.kPa	0.85%	MPXH6115A6U air pressure
η	0.340	$+165\%$	0.007	1.12%	anemometer calibration
Re_0	600	-0.013%	60	0.75%	integration lower-bound
D_o	2.81.mm	$-9360\%/m$	500.um	4.68%	tube outer diameter
D_i	1.11.mm	$+12495\%/m$	200.um	2.50%	tube inner diameter
D_g	166.um	$-274\%/m$	750.um	0.21%	tube air gap
L_{wire}	38.0.mm	$+1143\%/m$	500.um	0.57%	wire length
k_{ABS}	179. $\frac{mW}{K \cdot m}$	$+0.178\%/ \frac{mW}{K \cdot m}$	9.0. $\frac{mW}{K \cdot m}$	1.59%	ABS thermal conductivity
d	12.0.mm	$+5023\%/m$	100.um	0.50%	disk diameter
ϵ_{ABS}	0.920	-47.3%	0.010	0.47%	ABS emissivity
ϵ_{wt}	0.900	-47.7%	0.025	1.19%	wind-tunnel emissivity
				5.98%	combined bias uncertainty
Symbol	Nominal	Sensitivity	Variability	Uncertainty	Component
ω	88.5.r/min	$+0.633\%/(r/min)$	0.84.r/min	0.53%	fan rotation rate
				6.07%	RSS combined uncertainty



$\theta = 6.6^\circ$; $\psi = 173.3^\circ$; $V = 0.379$ m/s (126 r/min)

Estimated measurement uncertainties at $Re = 276$.

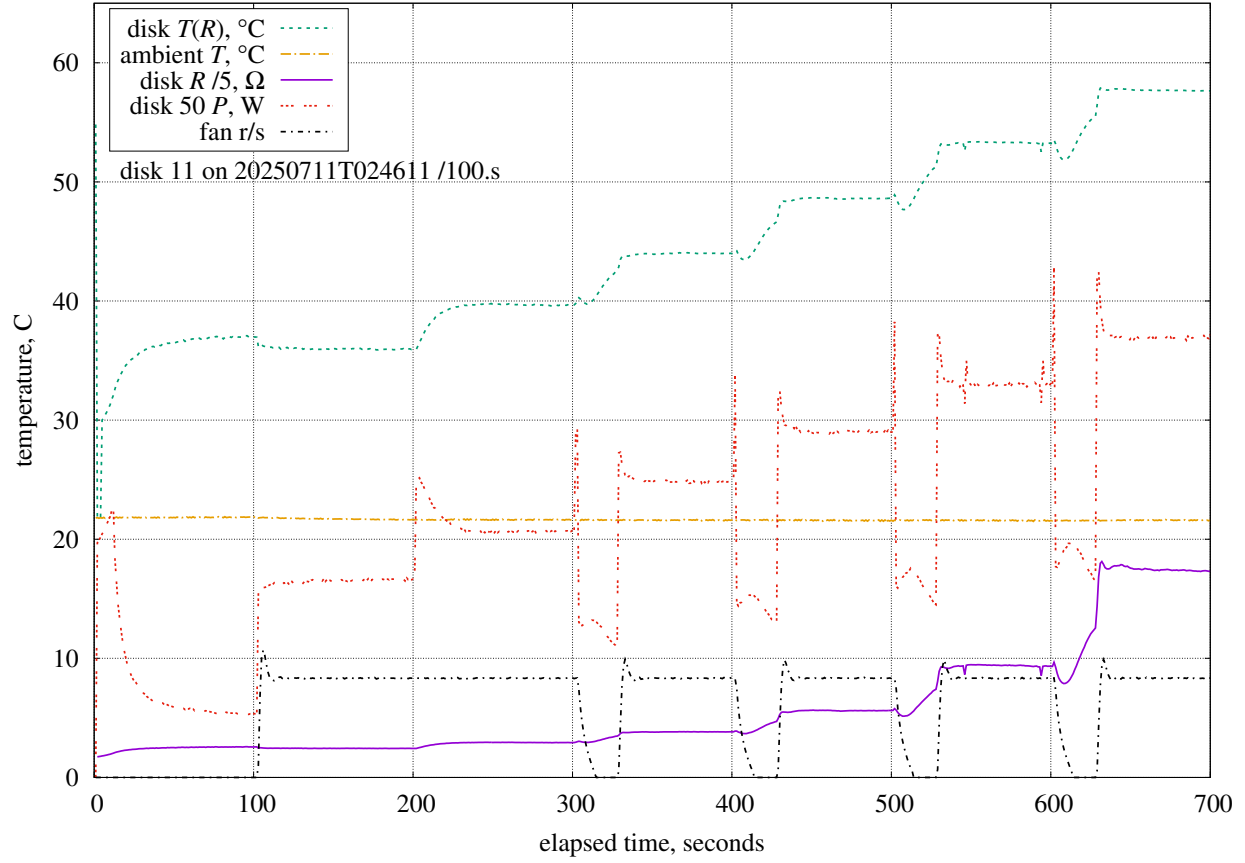
Symbol	Nominal	Sensitivity	Bias	Uncertainty	Component
T	307.K	$-0.485\%/K$	0.50.K	0.24%	LM35C temperature sensor
ΔT	25.0.K	$+3.91\%/K$	0.10.K	0.39%	LM35C differential
P	101.kPa	$+0.0005\%/Pa$	1.5.kPa	0.81%	MPXH6115A6U air pressure
η	0.340	$+153\%$	0.007	1.04%	anemometer calibration
Re_0	600	-0.011%	60	0.69%	integration lower-bound
D_o	2.81.mm	$-10433\%/m$	500.um	5.22%	tube outer diameter
D_i	1.11.mm	$+14452\%/m$	200.um	2.89%	tube inner diameter
D_g	166.um	$-325\%/m$	750.um	0.24%	tube air gap
L_{wire}	38.0.mm	$+1355\%/m$	500.um	0.68%	wire length
k_{ABS}	179. $\frac{mW}{K \cdot m}$	$+0.187\%/ \frac{mW}{K \cdot m}$	9.0. $\frac{mW}{K \cdot m}$	1.67%	ABS thermal conductivity
d	12.0.mm	$+5062\%/m$	100.um	0.51%	disk diameter
ϵ_{ABS}	0.920	-46.0%	0.010	0.46%	ABS emissivity
ϵ_{wt}	0.900	-46.5%	0.025	1.16%	wind-tunnel emissivity
				6.57%	combined bias uncertainty
Symbol	Nominal	Sensitivity	Variability	Uncertainty	Component
ω	126.r/min	$+0.414\%/(r/min)$	0.68.r/min	0.28%	fan rotation rate
				6.59%	RSS combined uncertainty



$\theta = 6.6^\circ$; $\psi = 173.3^\circ$; $V = 0.748$ m/s (250 r/min)

Estimated measurement uncertainties at $Re = 545$.

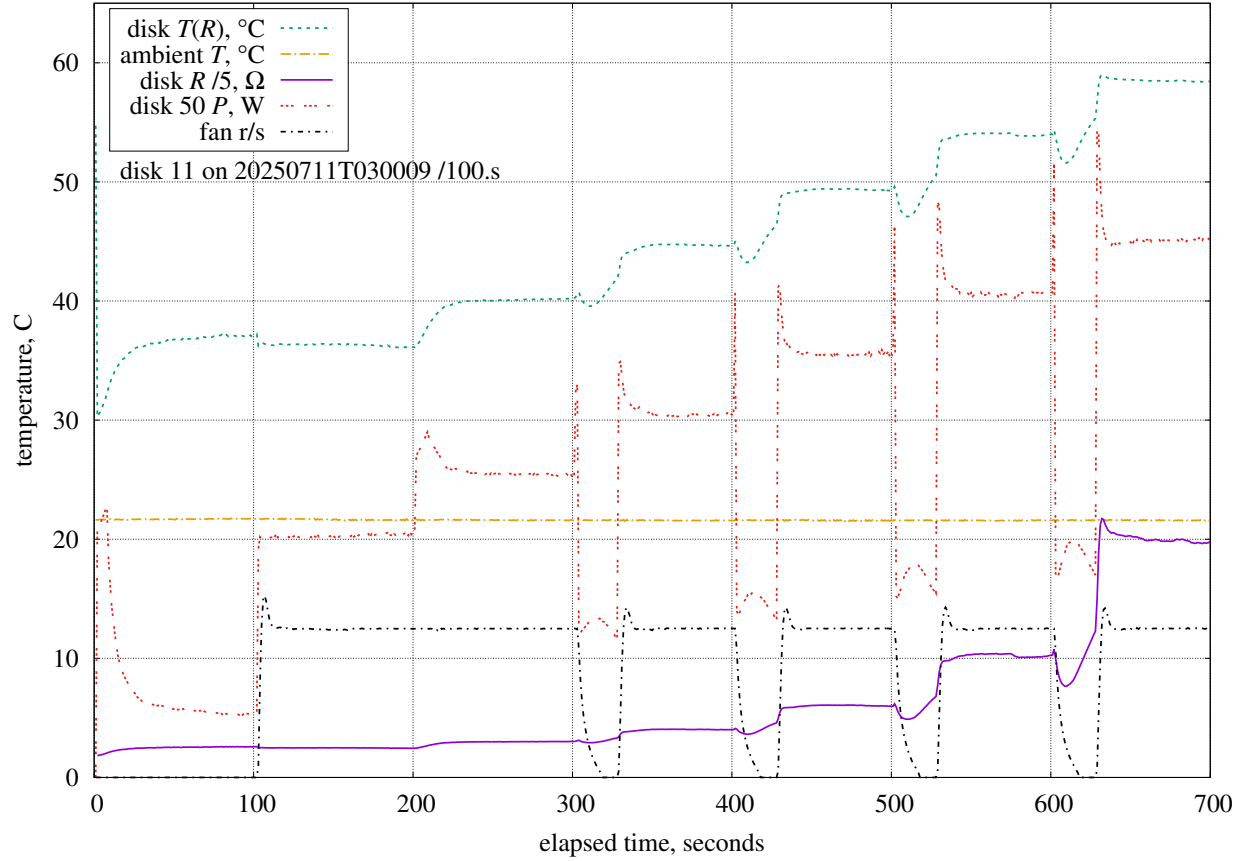
Symbol	Nominal	Sensitivity	Bias	Uncertainty	Component
ΔT	25.0.K	+4.01%/K	0.10.K	0.40%	LM35C differential
P	101.kPa	+0.0004%/Pa	1.5.kPa	0.58%	MPXH6115A6U air pressure
η	0.340	+93.1%	0.007	0.63%	anemometer calibration
Re_0	600	-0.0087%	60	0.52%	integration lower-bound
D_o	2.81.mm	-9729%/m	500.um	4.86%	tube outer diameter
D_i	1.11.mm	+17113%/m	200.um	3.42%	tube inner diameter
D_g	166.um	-402%/m	750.um	0.30%	tube air gap
L_{wire}	38.0.mm	+1676%/m	500.um	0.84%	wire length
k_{ABS}	179. $\frac{\text{mW}}{\text{K}\cdot\text{m}}$	+0.190%/ $\frac{\text{mW}}{\text{K}\cdot\text{m}}$	9.0. $\frac{\text{mW}}{\text{K}\cdot\text{m}}$	1.70%	ABS thermal conductivity
d	12.0.mm	+5635%/m	100.um	0.56%	disk diameter
ϵ_{ABS}	0.920	-27.9%	0.010	0.28%	ABS emissivity
ϵ_{wt}	0.900	-28.1%	0.025	0.70%	wind-tunnel emissivity
				6.42%	combined bias uncertainty
Symbol	Nominal	Sensitivity	Variability	Uncertainty	Component
ω	250.r/min	+0.127%/(r/min)	0.88.r/min	0.11%	fan rotation rate
				6.42%	RSS combined uncertainty



$\theta = 6.6^\circ$; $\psi = 173.3^\circ$; $V = 1.467 \text{ m/s}$ (500 r/min)

Estimated measurement uncertainties at $Re = 1070$.

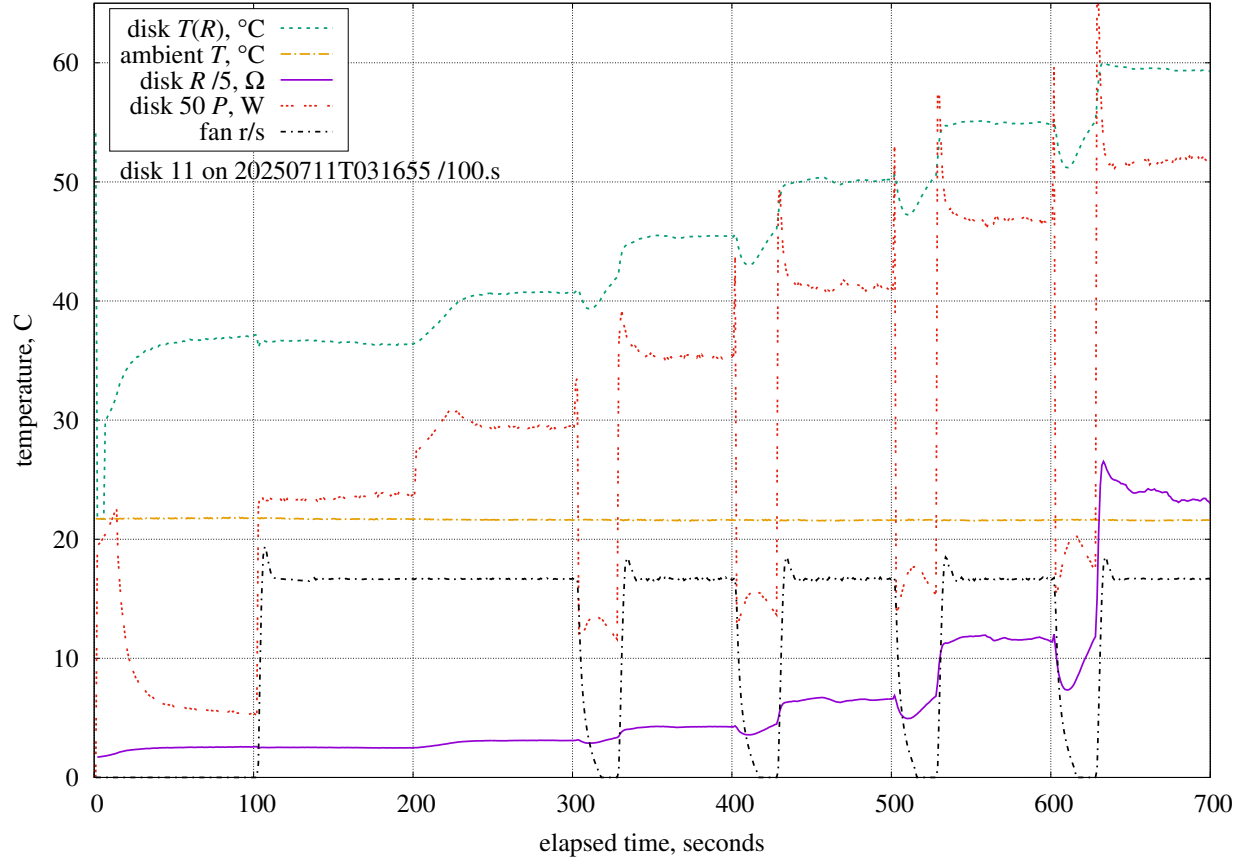
Symbol	Nominal	Sensitivity	Bias	Uncertainty	Component
T	307.K	$-0.490\%/K$	0.50.K	0.25%	LM35C temperature sensor
ΔT	25.0.K	$+3.68\%/K$	0.10.K	0.37%	LM35C differential
P	101.kPa	$+0.0005\%/Pa$	1.5.kPa	0.74%	MPXH6115A6U air pressure
η	0.340	$+141\%$	0.007	0.96%	anemometer calibration
Re_0	600	-0.013%	60	0.80%	integration lower-bound
D_o	2.81.mm	$-16306\%/m$	500.um	8.15%	tube outer diameter
D_i	1.11.mm	$+23073\%/m$	200.um	4.61%	tube inner diameter
D_g	166.um	$-598\%/m$	750.um	0.45%	tube air gap
L_{wire}	38.0.mm	$+2491\%/m$	500.um	1.25%	wire length
k_{ABS}	$179. \frac{\text{mW}}{\text{K}\cdot\text{m}}$	$+0.231\%/ \frac{\text{mW}}{\text{K}\cdot\text{m}}$	$9.0. \frac{\text{mW}}{\text{K}\cdot\text{m}}$	2.06%	ABS thermal conductivity
d	12.0.mm	$+5230\%/m$	100.um	0.52%	disk diameter
ϵ_{ABS}	0.920	-46.1%	0.010	0.46%	ABS emissivity
ϵ_{wt}	0.900	-46.9%	0.025	1.17%	wind-tunnel emissivity
				9.90%	combined bias uncertainty
Symbol	Nominal	Sensitivity	Variability	Uncertainty	Component
ω	500.r/min	$+0.096\%/(r/min)$	1.8.r/min	0.18%	fan rotation rate
				9.90%	RSS combined uncertainty



$\theta = 6.6^\circ$; $\psi = 173.3^\circ$; $V = 2.131$ m/s (750 r/min)

Estimated measurement uncertainties at $Re = 1554$.

Symbol	Nominal	Sensitivity	Bias	Uncertainty	Component
T	307.K	$-0.482\%/K$	0.50.K	0.24%	LM35C temperature sensor
ΔT	25.0.K	$+3.61\%/K$	0.10.K	0.36%	LM35C differential
P	101.kPa	$+0.0005\%/Pa$	1.5.kPa	0.71%	MPXH6115A6U air pressure
η	0.340	$+128\%$	0.007	0.87%	anemometer calibration
Re_0	600	-0.013%	60	0.79%	integration lower-bound
D_o	2.81.mm	$-17605\%/m$	500.um	8.80%	tube outer diameter
D_i	1.11.mm	$+24475\%/m$	200.um	4.89%	tube inner diameter
D_g	166.um	$-667\%/m$	750.um	0.50%	tube air gap
L_{wire}	38.0.mm	$+2778\%/m$	500.um	1.39%	wire length
k_{ABS}	179. $\frac{mW}{K \cdot m}$	$+0.233\%/ \frac{mW}{K \cdot m}$	9.0. $\frac{mW}{K \cdot m}$	2.09%	ABS thermal conductivity
d	12.0.mm	$+5573\%/m$	100.um	0.56%	disk diameter
ϵ_{ABS}	0.920	-45.3%	0.010	0.45%	ABS emissivity
ϵ_{wt}	0.900	-46.1%	0.025	1.15%	wind-tunnel emissivity
				10.58%	combined bias uncertainty
Symbol	Nominal	Sensitivity	Variability	Uncertainty	Component
ω	750.r/min	$+0.058\%/(r/min)$	2.1.r/min	0.12%	fan rotation rate
				10.58%	RSS combined uncertainty



$\theta = 6.6^\circ$; $\psi = 173.3^\circ$; $V = 2.726$ m/s (1000 r/min)

Estimated measurement uncertainties at $Re = 1988$.

Symbol	Nominal	Sensitivity	Bias	Uncertainty	Component
T	307.K	$-0.482\%/K$	0.50.K	0.24%	LM35C temperature sensor
ΔT	25.0.K	$+3.55\%/K$	0.10.K	0.35%	LM35C differential
P	101.kPa	$+0.0005\%/Pa$	1.5.kPa	0.70%	MPXH6115A6U air pressure
η	0.340	$+114\%$	0.007	0.78%	anemometer calibration
Re_0	600	-0.013%	60	0.77%	integration lower-bound
D_o	2.81.mm	$-18588\%/m$	500.um	9.29%	tube outer diameter
D_i	1.11.mm	$+25263\%/m$	200.um	5.05%	tube inner diameter
D_g	166.um	$-715\%/m$	750.um	0.54%	tube air gap
L_{wire}	38.0.mm	$+2980\%/m$	500.um	1.49%	wire length
k_{ABS}	179. $\frac{mW}{K \cdot m}$	$+0.234\%/ \frac{mW}{K \cdot m}$	9.0. $\frac{mW}{K \cdot m}$	2.09%	ABS thermal conductivity
d	12.0.mm	$+5783\%/m$	100.um	0.58%	disk diameter
ϵ_{ABS}	0.920	-45.5%	0.010	0.45%	ABS emissivity
ϵ_{wt}	0.900	-46.3%	0.025	1.16%	wind-tunnel emissivity
				11.07%	combined bias uncertainty
Symbol	Nominal	Sensitivity	Variability	Uncertainty	Component
ω	1.00.kr/min	$+0.039\%/(r/min)$	1.6.r/min	0.06%	fan rotation rate
				11.07%	RSS combined uncertainty