
Type977 fitting for heat pump R410A

Parametric Heat Pump calculation

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2017/09/19 at: 21:34:09 h

Table 1: Fitted coefficients for the heat pump.

Coefficient	Description	[kW]
P_{Q_1}	1 st condenser polynomial coefficient	1.4868e+01
P_{Q_2}	2 st condenser polynomial coefficient	1.2747e+02
P_{Q_3}	3 st condenser polynomial coefficient	-1.3745e+01
P_{Q_4}	4 st condenser polynomial coefficient	-2.1650e+02
P_{Q_5}	5 st condenser polynomial coefficient	3.9254e+02
P_{Q_6}	6 st condenser polynomial coefficient	-7.9875e+00
P_{COP_1}	1 st COP polynomial coefficient	1.2411e+01
P_{COP_2}	2 st COP polynomial coefficient	6.1891e+01
P_{COP_3}	3 st COP polynomial coefficient	-8.3490e+01
P_{COP_4}	4 st COP polynomial coefficient	-2.3331e+02
P_{COP_5}	5 st COP polynomial coefficient	1.0307e+02
P_{COP_6}	6 st COP polynomial coefficient	1.7703e+02
\dot{m}_{cond}	3055.36 [kg/h]	
\dot{m}_{evap}	2865.59 [kg/h]	
Fit model	Average Temperature	

Table 2: Differences between experiments and fitted data for the heat pump. $error = 100 \cdot \left| \frac{Q_{exp} - Q_{num}}{Q_{exp}} \right|$ and $RMS = \sqrt{\sum \frac{(Q_{exp} - Q_{num})^2}{n_p}}$ where n_p is the number of data points.

$T_{cond,out}$ °C	$T_{evap,in}$ °C	COP [-]	COP_{exp} [-]	error [%]	Q_{cond} [kW]	$Q_{cond,exp}$ [kW]	error [%]	W_{comp} [kW]	$W_{comp,exp}$ [kW]	error [%]
55.00	-4.00	2.58	2.53	2.1	10.43	10.40	0.3	4.04	4.11	1.82
50.00	-4.00	2.82	2.85	1.1	10.64	10.60	0.4	3.77	3.72	1.50
45.00	-4.00	3.17	3.21	1.2	10.84	10.82	0.2	3.42	3.37	1.45
40.00	-4.00	3.64	3.65	0.3	11.04	11.02	0.1	3.03	3.02	0.43
35.00	-4.00	4.23	4.20	0.6	11.22	11.24	0.2	2.65	2.68	0.80
30.00	-4.00	4.93	4.91	0.4	11.40	11.45	0.4	2.31	2.33	0.86
55.00	-2.00	2.68	2.67	0.3	10.95	10.93	0.2	4.09	4.09	0.17
50.00	-2.00	2.95	3.00	1.8	11.18	11.15	0.3	3.80	3.72	2.18
45.00	-2.00	3.33	3.37	1.2	11.41	11.39	0.2	3.43	3.38	1.43
40.00	-2.00	3.83	3.82	0.2	11.63	11.63	0.0	3.04	3.04	0.25
35.00	-2.00	4.45	4.41	0.8	11.84	11.87	0.3	2.66	2.69	1.10
30.00	-2.00	5.18	5.19	0.1	12.04	12.09	0.4	2.32	2.33	0.26
60.00	0.00	2.60	2.52	3.3	11.23	11.26	0.3	4.31	4.47	3.48
55.00	0.00	2.79	2.80	0.5	11.51	11.50	0.0	4.13	4.11	0.58
50.00	0.00	3.08	3.14	1.8	11.77	11.76	0.1	3.82	3.75	1.90
45.00	0.00	3.50	3.52	0.6	12.02	12.01	0.1	3.44	3.41	0.70
40.00	0.00	4.04	4.03	0.2	12.26	12.51	2.0	3.04	3.10	2.16
35.00	0.00	4.69	4.64	1.0	12.50	12.74	1.9	2.67	2.75	2.91
30.00	0.00	5.42	5.46	0.7	12.71	12.26	3.7	2.34	2.25	4.42
60.00	2.00	2.69	2.62	2.7	11.80	11.83	0.2	4.39	4.52	2.83
55.00	2.00	2.90	2.92	0.6	12.10	12.10	0.0	4.17	4.14	0.61
50.00	2.00	3.23	3.26	0.9	12.39	12.37	0.1	3.83	3.79	1.02
45.00	2.00	3.68	3.70	0.6	12.66	12.64	0.1	3.44	3.42	0.79
40.00	2.00	4.24	4.22	0.5	12.92	12.92	0.0	3.05	3.06	0.43
35.00	2.00	4.92	4.88	0.8	13.18	13.19	0.1	2.68	2.70	0.87
30.00	2.00	5.72	5.73	0.2	13.44	13.46	0.2	2.35	2.35	0.02
60.00	4.00	2.79	2.76	1.0	12.41	12.45	0.3	4.45	4.51	1.27
55.00	4.00	3.03	3.06	1.0	12.73	12.73	0.0	4.20	4.16	1.00
50.00	4.00	3.39	3.44	1.4	13.04	13.02	0.2	3.85	3.78	1.63
45.00	4.00	3.87	3.87	0.1	13.34	13.33	0.1	3.45	3.44	0.13
40.00	4.00	4.46	4.43	0.7	13.63	13.61	0.1	3.05	3.07	0.57
35.00	4.00	5.17	5.12	1.0	13.91	13.91	0.0	2.69	2.72	1.03
30.00	4.00	6.00	6.04	0.6	14.19	14.20	0.1	2.36	2.35	0.52
60.00	6.00	2.89	2.88	0.5	13.06	13.10	0.3	4.51	4.55	0.82
55.00	6.00	3.17	3.21	1.3	13.40	13.39	0.1	4.23	4.17	1.38
50.00	6.00	3.56	3.61	1.4	13.73	13.70	0.2	3.86	3.80	1.65
45.00	6.00	4.07	4.06	0.2	14.05	14.03	0.2	3.45	3.46	0.03
40.00	6.00	4.69	4.64	1.2	14.37	14.34	0.2	3.06	3.09	0.95
35.00	6.00	5.44	5.40	0.7	14.67	14.67	0.0	2.70	2.72	0.66
30.00	6.00	6.30	6.35	0.8	14.98	14.98	0.0	2.38	2.36	0.78
60.00	8.00	3.01	3.02	0.2	13.74	13.75	0.1	4.56	4.55	0.17
55.00	8.00	3.32	3.35	0.9	14.11	14.10	0.1	4.25	4.21	0.99
50.00	8.00	3.74	3.78	1.0	14.46	14.45	0.1	3.87	3.82	1.11
45.00	8.00	4.28	4.25	0.7	14.81	14.78	0.2	3.46	3.48	0.54
40.00	8.00	4.94	4.88	1.2	15.14	15.13	0.1	3.07	3.10	1.09
35.00	8.00	5.71	5.66	1.0	15.47	15.48	0.0	2.71	2.73	0.98
30.00	8.00	6.61	6.68	1.1	15.80	15.82	0.1	2.39	2.37	0.97
60.00	10.00	3.14	3.14	0.1	14.46	14.47	0.1	4.60	4.61	0.14
55.00	10.00	3.48	3.51	0.9	14.85	14.83	0.1	4.27	4.23	1.01
50.00	10.00	3.93	3.94	0.2	15.23	15.21	0.1	3.87	3.86	0.28
45.00	10.00	4.50	4.48	0.6	15.59	15.59	0.0	3.46	3.48	0.52
40.00	10.00	5.19	5.12	1.4	15.96	15.95	0.0	3.07	3.12	1.38
35.00	10.00	6.00	5.95	0.9	16.31	16.35	0.2	2.72	2.75	1.10
30.00	10.00	6.93	7.03	1.5	16.66	16.70	0.2	2.40	2.38	1.24
Sum				48.2			15.0			58.89
RMS_{COP}	4.13e - 02									
$RMS_{Q_{cond}}$	8.11e - 02									
$RMS_{W_{comp}}$	4.82e - 02									

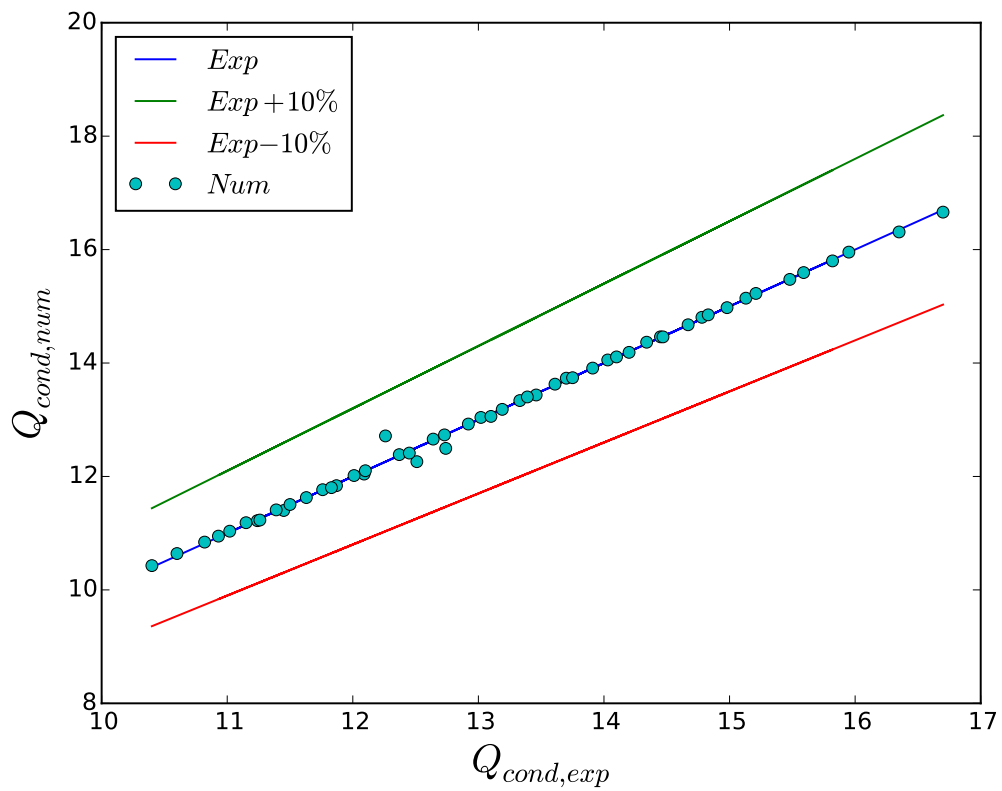


Figure 1: Q_{cond} differences between experiments and fitted data

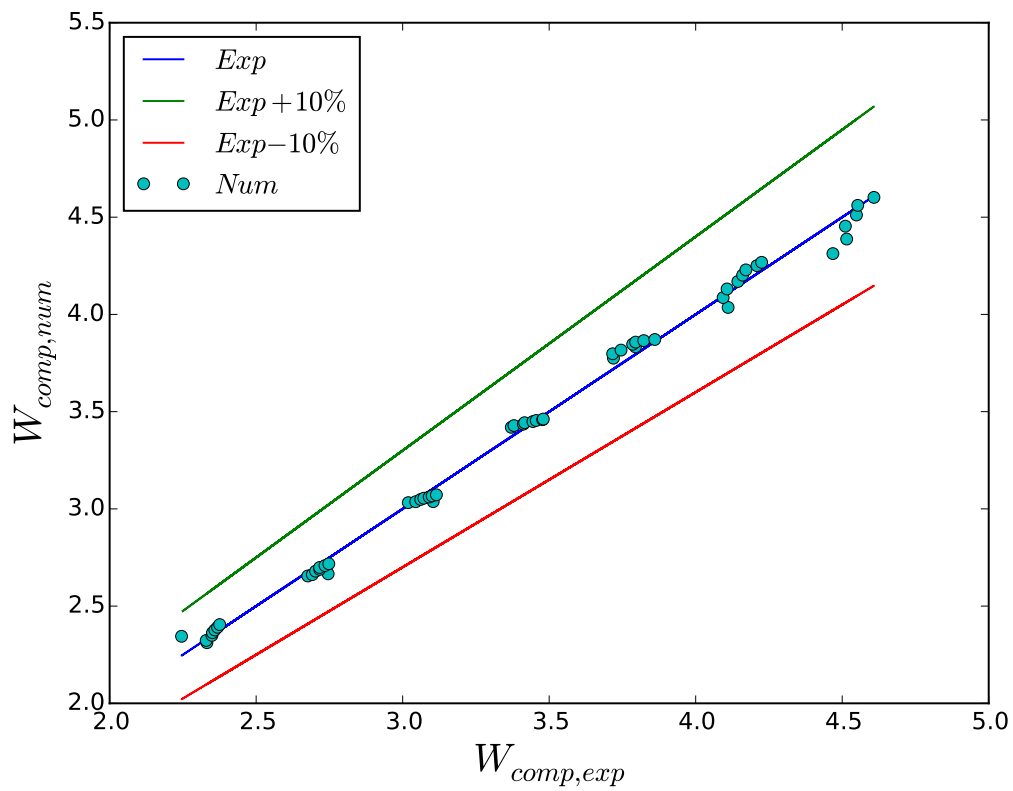


Figure 2: W_{comp} differences between experiments and fitted data

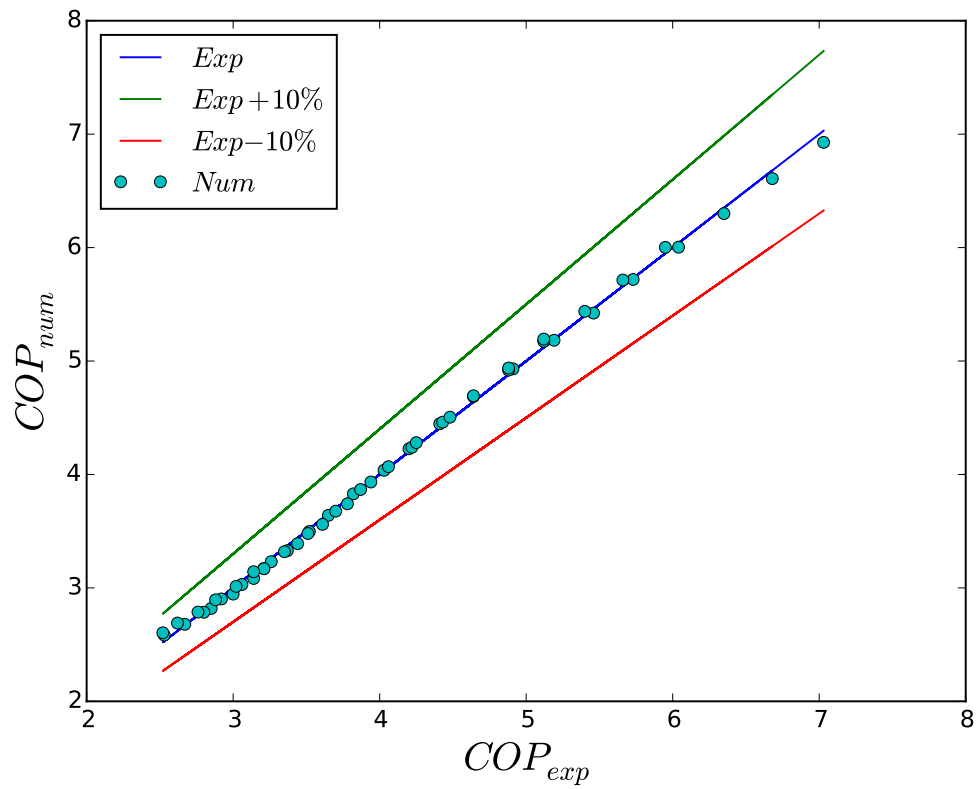


Figure 3: COP differences between experiments and fitted data