Python calculation for heat pump SI-242

Parametric Heat Pump calculation

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Table 1: Fitted coefficients for the heat pump.

Coefficient	Description	
		$[kW]$
PQ_1	1^{st} *condenser polynomial coefficient*	8.6790e+01
PQ_2	2^{st} *condenser polynomial coefficient*	9.3917e+02
PQ_3	3^{st} *condenser polynomial coefficient*	-4.6678e+02
PQ_4	4^{st} *condenser polynomial coefficient*	-4.4486e+03
PQ_5	5^{st} *condenser polynomial coefficient*	3.3440e+03
PQ_6	6^{st} *condenser polynomial coefficient*	1.2445e+03
$PCOP_1$	1^{st} *COP polynomial coefficient*	2.3058e+00
$PCOP_2$	2^{st} *COP polynomial coefficient*	1.3236e+02
$PCOP_3$	3^{st} *COP polynomial coefficient*	5.9440e+01
$PCOP_4$	4^{st} *COP polynomial coefficient*	-6.7673e+02
$PCOP_5$	5^{st} *COP polynomial coefficient*	2.7135e+02
$PCOP_6$	6^{st} *COP polynomial coefficient*	-3.2856e+02
$\dot{m}_{cond}$	5400.00 $[kg/h]$	
$\dot{m}_{evap}$	5400.00 $[kg/h]$	
COP_{nom} (B0W35)	4.23	
$Q_{c,nom}$ (B0W35)	45.26 kW	
COP_{nom} (B2W35)	4.56	
$Q_{c,nom}$ (B2W35)	47.79 kW	
COP_{nom} (B10W35)	6.15	
$Q_{c,nom}$ (B10W35)	60.90 kW	

Table 2: Predicting results of the heat pump.

$T_{evap,in}$ ^oC	$T_{evap,out}$ ^oC	$T_{cond,in}$ ^oC	$T_{cond,out}$ ^oC	COP $[-]$	Q_{cond} $[kW]$	Q_{evap} $[kW]$	W_{comp} $[kW]$	$\dot{m}_{cond}$ kg/h	$\dot{m}_{evap}$ kg/h	ΔT_{evap} K	ΔT_{cond} K
-7.00	-11.65	23.68	30.00	3.04	39.69	26.64	13.05	5400	5400	4.7	6.3
-7.00	-11.70	32.59	38.75	3.28	38.71	26.90	11.81	5400	5400	4.7	6.2
-7.00	-11.57	41.09	47.50	2.85	40.28	26.14	14.14	5400	5400	4.6	6.4
-7.00	-10.28	49.27	56.25	1.75	43.88	18.78	25.10	5400	5400	3.3	7.0
-7.00	-1.35	57.83	65.00	0.58	45.06	-32.34	77.40	5400	5400	-5.6	7.2
-4.00	-9.35	23.19	30.00	3.52	42.77	30.61	12.16	5400	5400	5.3	6.8
-4.00	-9.08	32.32	38.75	3.57	40.41	29.10	11.31	5400	5400	5.1	6.4
-4.00	-8.67	41.05	47.50	2.93	40.57	26.71	13.85	5400	5400	4.7	6.5
-4.00	-6.76	49.44	56.25	1.58	42.82	15.80	27.02	5400	5400	2.8	6.8
-4.00	50.24	54.62	65.00	0.17	65.25	-310.46	375.72	5400	5400	-54.2	10.4
-1.00	-7.12	22.60	30.00	4.04	46.53	35.03	11.51	5400	5400	6.1	7.4
-1.00	-6.58	31.94	38.75	3.93	42.83	31.92	10.91	5400	5400	5.6	6.8
-1.00	-5.91	40.88	47.50	3.08	41.61	28.08	13.52	5400	5400	4.9	6.6
-1.00	-3.52	49.46	56.25	1.51	42.65	14.43	28.21	5400	5400	2.5	6.8
-1.00	47.41	54.59	65.00	0.19	65.44	-277.12	342.56	5400	5400	-48.4	10.4
2.00	-4.98	21.89	30.00	4.62	50.96	39.94	11.02	5400	5400	7.0	8.1
2.00	-4.18	31.44	38.75	4.34	45.95	35.37	10.58	5400	5400	6.2	7.3
2.00	-3.28	40.60	47.50	3.29	43.38	30.21	13.17	5400	5400	5.3	6.9
2.00	-0.60	49.36	56.25	1.52	43.29	14.86	28.42	5400	5400	2.6	6.9
2.00	44.62	54.55	65.00	0.21	65.66	-243.98	309.64	5400	5400	-42.6	10.4
5.00	-2.93	21.08	30.00	5.26	56.06	45.39	10.66	5400	5400	7.9	8.9
5.00	-1.89	30.83	38.75	4.82	49.76	39.43	10.33	5400	5400	6.9	7.9
5.00	-0.77	40.20	47.50	3.58	45.87	33.06	12.81	5400	5400	5.8	7.3
5.00	2.04	49.15	56.25	1.61	44.65	16.96	27.70	5400	5400	3.0	7.1
5.00	41.88	54.51	65.00	0.24	65.94	-211.10	277.05	5400	5400	-36.9	10.5
8.00	-0.98	20.17	30.00	5.94	61.79	51.39	10.40	5400	5400	9.0	9.8
8.00	0.29	30.12	38.75	5.35	54.24	44.11	10.13	5400	5400	7.7	8.6
8.00	1.61	39.69	47.50	3.93	49.06	36.59	12.47	5400	5400	6.4	7.8
8.00	4.44	48.82	56.25	1.77	46.69	20.38	26.31	5400	5400	3.6	7.4
8.00	39.20	54.45	65.00	0.27	66.29	-178.59	244.88	5400	5400	-31.2	10.5
11.00	0.88	19.16	30.00	6.68	68.16	57.95	10.21	5400	5400	10.1	10.8
11.00	2.37	29.30	38.75	5.95	59.38	49.40	9.98	5400	5400	8.6	9.4
11.00	3.88	39.08	47.50	4.36	52.93	40.78	12.14	5400	5400	7.1	8.4
11.00	6.67	48.40	56.25	2.01	49.35	24.77	24.58	5400	5400	4.3	7.9
11.00	36.61	54.38	65.00	0.31	66.74	-146.58	213.32	5400	5400	-25.6	10.6
14.00	2.63	18.04	30.00	7.46	75.15	65.07	10.07	5400	5400	11.4	12.0
14.00	4.34	28.38	38.75	6.61	65.17	55.30	9.86	5400	5400	9.7	10.4
14.00	6.03	38.36	47.50	4.85	57.47	45.62	11.85	5400	5400	8.0	9.1
14.00	8.78	47.87	56.25	2.31	52.65	29.88	22.77	5400	5400	5.2	8.4
14.00	34.14	54.29	65.00	0.37	67.33	-115.27	182.60	5400	5400	-20.1	10.7
17.00	4.29	16.84	30.00	8.30	82.73	72.76	9.97	5400	5400	12.7	13.2
17.00	6.20	27.36	38.75	7.32	71.58	61.80	9.78	5400	5400	10.8	11.4
17.00	8.08	37.53	47.50	5.41	62.66	51.08	11.58	5400	5400	8.9	10.0
17.00	10.79	47.25	56.25	2.69	56.58	35.53	21.05	5400	5400	6.2	9.0
17.00	31.85	54.16	65.00	0.44	68.13	-84.98	153.11	5400	5400	-14.8	10.8
20.00	5.85	15.54	30.00	9.18	90.91	81.00	9.90	5400	5400	14.2	14.5
20.00	7.96	26.24	38.75	8.09	78.62	68.90	9.72	5400	5400	12.0	12.5
20.00	10.02	36.60	47.50	6.04	68.49	57.15	11.35	5400	5400	10.0	10.9
20.00	12.72	46.52	56.25	3.14	61.15	41.65	19.50	5400	5400	7.3	9.7
20.00	29.81	53.98	65.00	0.55	69.25	-56.17	125.42	5400	5400	-9.8	11.0

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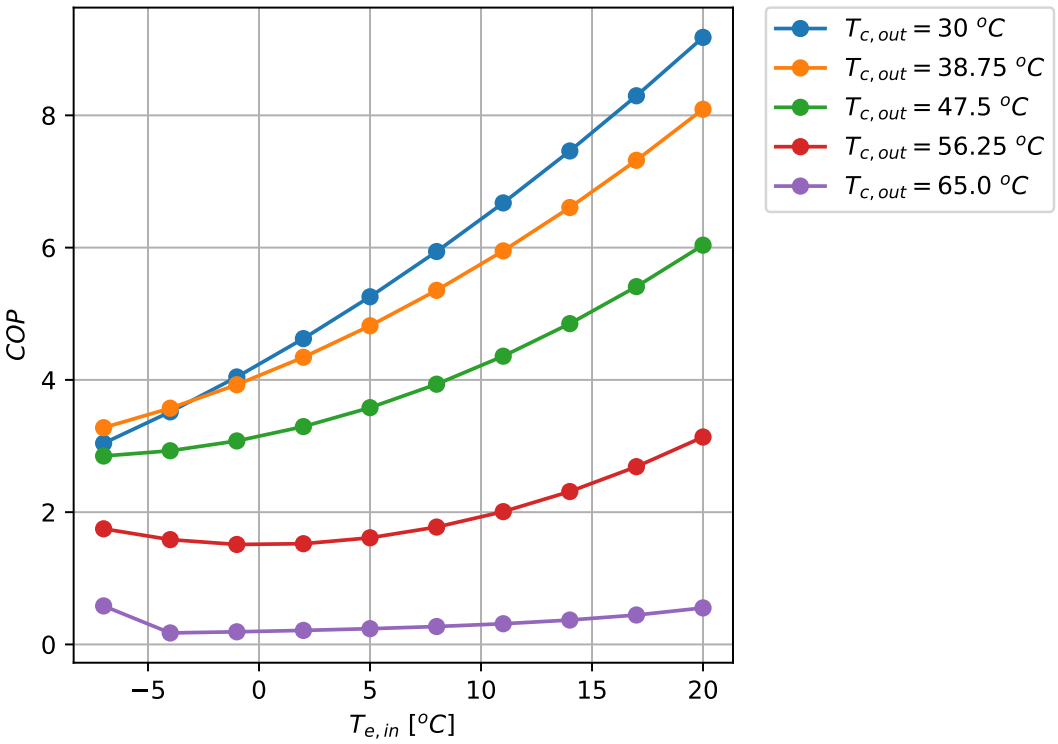

Figure 1: COP Results for the heat pump at the selected points

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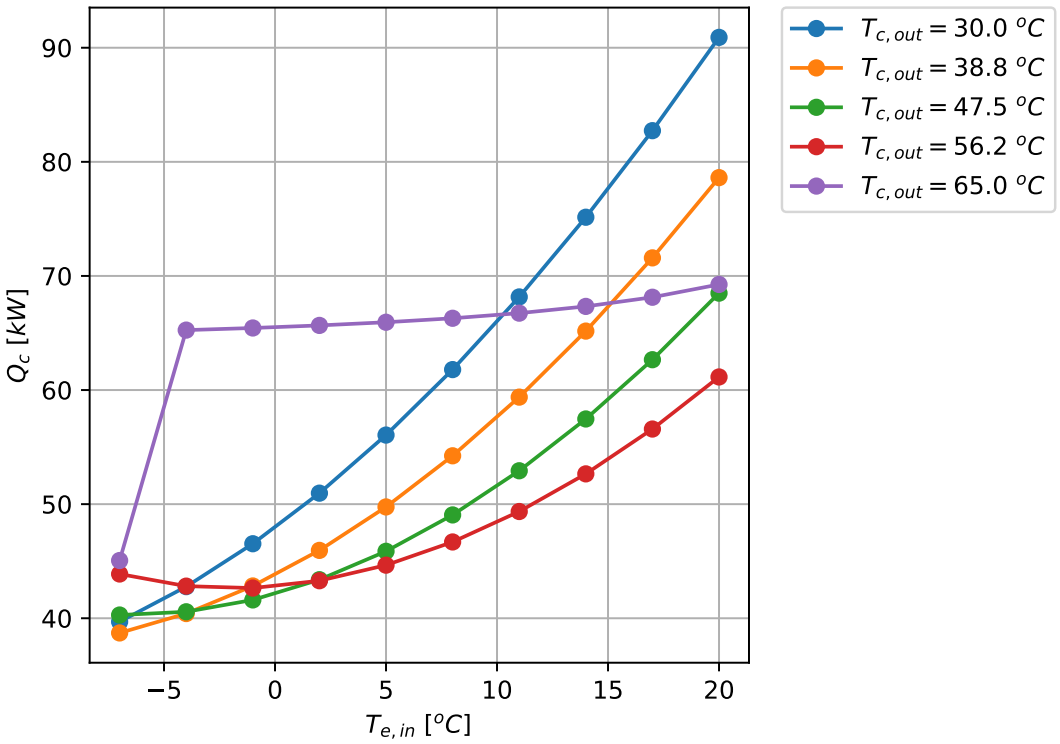

Figure 2: Q_c Results for the heat pump at the selected points