INSTITUT FÜR SOLARTECHNIK

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Python calculation for heat pump SI-108-HT

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*	1.1592e+01
PQ_2	2^{st} *condenser polynomial coefficient*	1.4291e+02
PQ_3	3^{st} *condenser polynomial coefficient*	-2.9978e+01
PQ_4	4^{st} *condenser polynomial coefficient*	-5.0425e+02
PQ_5	5^{st} *condenser polynomial coefficient*	5.0221e+02
PQ_6	6^{st} *condenser polynomial coefficient*	6.3589e+01
$PCOP_1$	1^{st} *COP polynomial coefficient*	1.0349e+01
$PCOP_2$	2^{st} *COP polynomial coefficient*	1.1188e+02
$PCOP_3$	3^{st} *COP polynomial coefficient*	-5.9716e+01
$PCOP_4$	4^{st} *COP polynomial coefficient*	-4.9672e+02
$PCOP_5$	5^{st} *COP polynomial coefficient*	5.0264e+02
$PCOP_6$	6^{st} *COP polynomial coefficient*	1.0878e+02
$\dot{m}_{cond}$	900.00 $[kg/h]$	
$\dot{m}_{evap}$	900.00 $[kg/h]$	
COP_{nom} (B0W35)	4.37	
$Q_{c,nom}$ (B0W35)	8.05 kW	
COP_{nom} (B2W35)	4.69	
$Q_{c,nom}$ (B2W35)	8.55 kW	
COP_{nom} (B10W35)	6.40	
$Q_{c,nom}$ (B10W35)	10.92 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	-12.16	23.70	30.00	3.94	6.60	4.93	1.68	900	900	5.2	6.3
-7.00	-11.94	32.36	38.75	3.39	6.69	4.72	1.98	900	900	4.9	6.4
-7.00	-11.85	40.92	47.50	3.05	6.89	4.63	2.26	900	900	4.8	6.6
-7.00	-11.97	49.38	56.25	2.93	7.20	4.74	2.46	900	900	5.0	6.9
-7.00	-12.38	57.70	65.00	3.05	7.65	5.14	2.51	900	900	5.4	7.3
-4.00	-9.81	23.10	30.00	4.29	7.23	5.54	1.69	900	900	5.8	6.9
-4.00	-9.42	31.90	38.75	3.58	7.17	5.17	2.00	900	900	5.4	6.8
-4.00	-9.11	40.61	47.50	3.07	7.22	4.87	2.35	900	900	5.1	6.9
-4.00	-8.95	49.21	56.25	2.78	7.38	4.72	2.66	900	900	4.9	7.0
-4.00	-9.05	57.70	65.00	2.70	7.64	4.82	2.83	900	900	5.0	7.3
-1.00	-7.57	22.42	30.00	4.74	7.94	6.27	1.68	900	900	6.6	7.6
-1.00	-7.03	31.35	38.75	3.88	7.75	5.75	2.00	900	900	6.0	7.4
-1.00	-6.53	40.19	47.50	3.22	7.66	5.28	2.38	900	900	5.5	7.3
-1.00	-6.12	48.93	56.25	2.76	7.67	4.89	2.78	900	900	5.1	7.3
-1.00	-5.89	57.58	65.00	2.50	7.77	4.66	3.11	900	900	4.9	7.4
2.00	-5.43	21.65	30.00	5.29	8.75	7.09	1.65	900	900	7.4	8.4
2.00	-4.77	30.71	38.75	4.28	8.42	6.45	1.97	900	900	6.8	8.0
2.00	-4.11	39.68	47.50	3.47	8.19	5.83	2.36	900	900	6.1	7.8
2.00	-3.49	48.56	56.25	2.85	8.06	5.24	2.82	900	900	5.5	7.7
2.00	-2.95	57.35	65.00	2.43	8.02	4.72	3.30	900	900	4.9	7.7
5.00	-3.40	20.80	30.00	5.93	9.64	8.01	1.62	900	900	8.4	9.2
5.00	-2.61	29.98	38.75	4.78	9.18	7.26	1.92	900	900	7.6	8.8
5.00	-1.83	39.08	47.50	3.83	8.82	6.52	2.31	900	900	6.8	8.4
5.00	-1.04	48.09	56.25	3.06	8.55	5.76	2.79	900	900	6.0	8.2
5.00	-0.24	57.01	65.00	2.48	8.37	5.00	3.37	900	900	5.2	8.0
8.00	-1.46	19.86	30.00	6.67	10.62	9.03	1.59	900	900	9.5	10.1
8.00	-0.56	29.17	38.75	5.38	10.03	8.17	1.86	900	900	8.6	9.6
8.00	0.34	38.39	47.50	4.28	9.54	7.31	2.23	900	900	7.7	9.1
8.00	1.26	47.53	56.25	3.37	9.14	6.43	2.71	900	900	6.7	8.7
8.00	2.24	56.58	65.00	2.65	8.82	5.49	3.33	900	900	5.8	8.4
11.00	0.39	18.85	30.00	7.50	11.68	10.12	1.56	900	900	10.6	11.1
11.00	1.40	28.28	38.75	6.07	10.97	9.16	1.81	900	900	9.6	10.5
11.00	2.40	37.62	47.50	4.83	10.34	8.20	2.14	900	900	8.6	9.9
11.00	3.44	46.88	56.25	3.78	9.81	7.22	2.59	900	900	7.6	9.4
11.00	4.55	56.06	65.00	2.92	9.37	6.15	3.21	900	900	6.5	8.9
14.00	2.16	17.76	30.00	8.42	12.82	11.30	1.52	900	900	11.8	12.2
14.00	3.27	27.31	38.75	6.86	11.99	10.24	1.75	900	900	10.7	11.4
14.00	4.37	36.77	47.50	5.48	11.24	9.19	2.05	900	900	9.6	10.7
14.00	5.50	46.16	56.25	4.29	10.57	8.11	2.47	900	900	8.5	10.1
14.00	6.71	55.46	65.00	3.28	10.00	6.95	3.05	900	900	7.3	9.5
17.00	3.84	16.60	30.00	9.43	14.04	12.55	1.49	900	900	13.2	13.4
17.00	5.05	26.25	38.75	7.73	13.09	11.40	1.69	900	900	11.9	12.5
17.00	6.25	35.84	47.50	6.22	12.22	10.25	1.96	900	900	10.7	11.7
17.00	7.47	45.34	56.25	4.89	11.43	9.09	2.34	900	900	9.5	10.9
17.00	8.77	54.77	65.00	3.74	10.72	7.86	2.86	900	900	8.2	10.2
20.00	5.45	15.36	30.00	10.52	15.34	13.88	1.46	900	900	14.5	14.6
20.00	6.76	25.12	38.75	8.69	14.27	12.63	1.64	900	900	13.2	13.6
20.00	8.06	34.82	47.50	7.05	13.28	11.40	1.88	900	900	11.9	12.7
20.00	9.36	44.45	56.25	5.58	12.36	10.15	2.21	900	900	10.6	11.8
20.00	10.73	53.99	65.00	4.30	11.53	8.85	2.68	900	900	9.3	11.0

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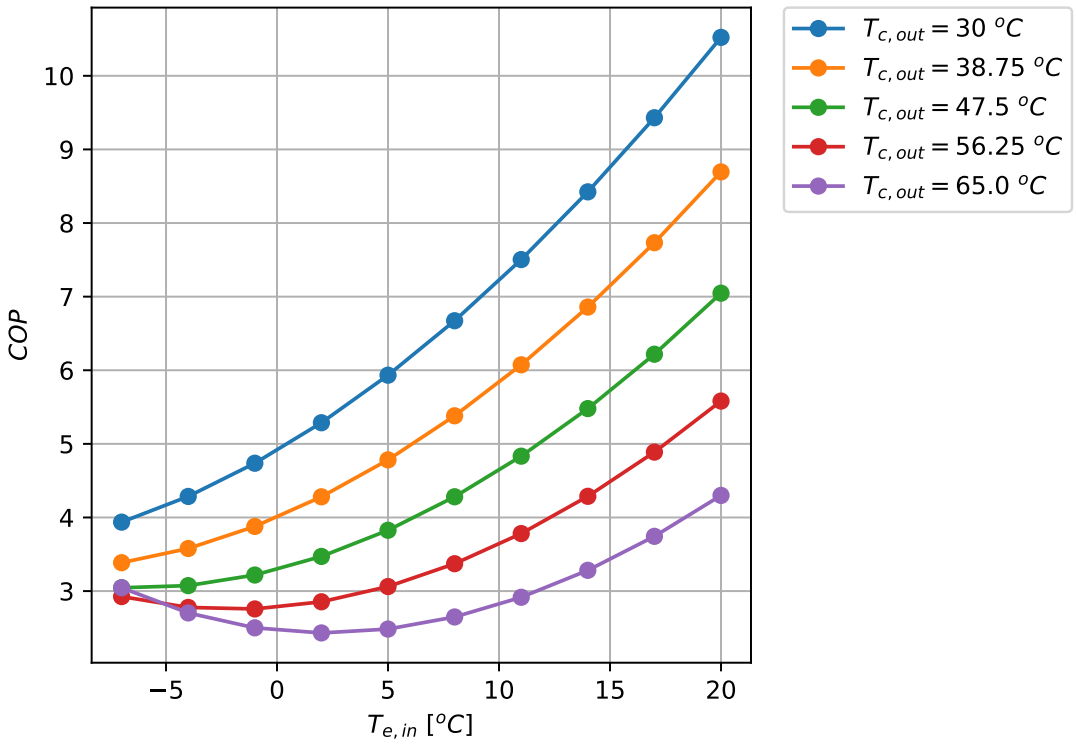

Figure 1: COP Results for the heat pump at the selected points

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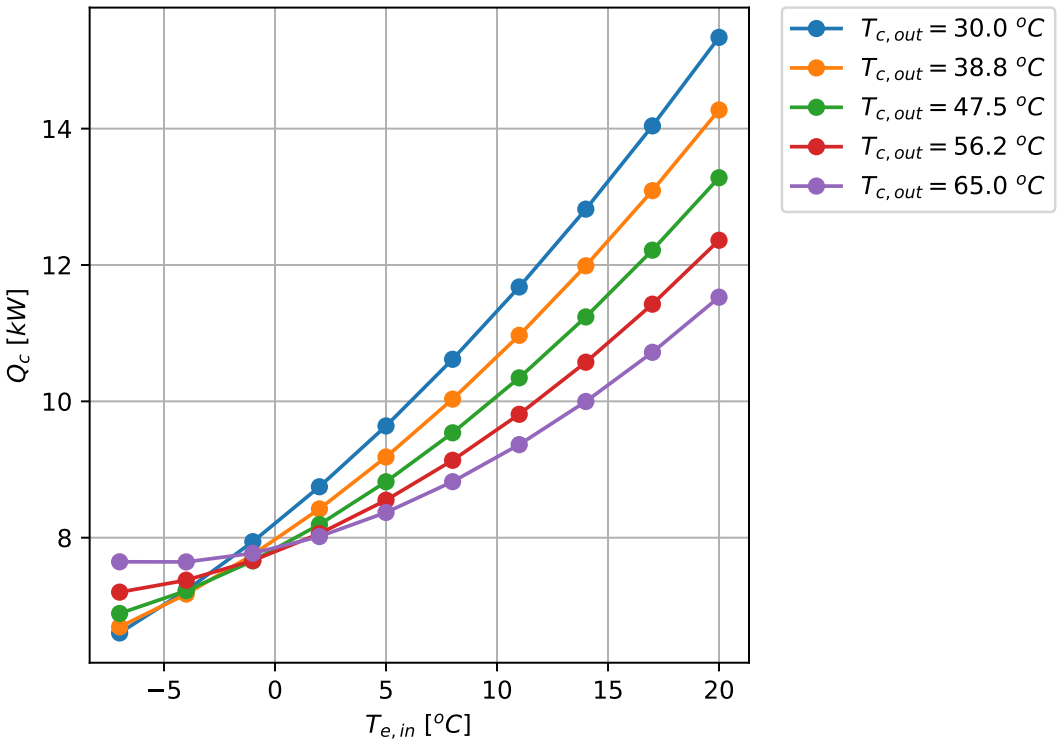

Figure 2: Q_c Results for the heat pump at the selected points