INSTITUT FÜR SOLARTECHNIK

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Python calculation for heat pump SIN-50TU

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*	4.5713e+01
PQ_2	2^{st} *condenser polynomial coefficient*	5.3253e+02
PQ_3	3^{st} *condenser polynomial coefficient*	2.1462e+02
PQ_4	4^{st} *condenser polynomial coefficient*	-6.8035e+02
PQ_5	5^{st} *condenser polynomial coefficient*	7.1420e+02
PQ_6	6^{st} *condenser polynomial coefficient*	-1.0875e+03
$PCOP_1$	1^{st} *COP polynomial coefficient*	6.5443e+00
$PCOP_2$	2^{st} *COP polynomial coefficient*	6.2672e+01
$PCOP_3$	3^{st} *COP polynomial coefficient*	3.1491e+00
$PCOP_4$	4^{st} *COP polynomial coefficient*	-1.6528e+02
$PCOP_5$	5^{st} *COP polynomial coefficient*	1.7388e+02
$PCOP_6$	6^{st} *COP polynomial coefficient*	-1.1522e+02
$\dot{m}_{cond}$	8800.00 $[kg/h]$	
$\dot{m}_{evap}$	8800.00 $[kg/h]$	
COP_{nom} (B0W35)	4.95	
$Q_{c,nom}$ (B0W35)	52.22 kW	
COP_{nom} (B2W35)	5.24	
$Q_{c,nom}$ (B2W35)	55.23 kW	
COP_{nom} (B10W35)	6.57	
$Q_{c,nom}$ (B10W35)	67.91 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	-10.49	25.88	30.00	4.37	42.20	32.55	9.65	8800	8800	3.5	4.1
-7.00	-10.29	34.68	38.75	3.78	41.67	30.65	11.02	8800	8800	3.3	4.1
-7.00	-9.77	43.69	47.50	2.95	39.05	25.80	13.25	8800	8800	2.8	3.8
-7.00	-8.71	52.89	56.25	1.87	34.37	15.95	18.42	8800	8800	1.7	3.4
-7.00	-4.85	62.17	65.00	0.59	28.96	-20.06	49.03	8800	8800	-2.2	2.8
-4.00	-7.94	25.46	30.00	4.76	46.51	36.73	9.78	8800	8800	3.9	4.5
-4.00	-7.72	34.28	38.75	4.12	45.83	34.69	11.13	8800	8800	3.7	4.5
-4.00	-7.19	43.30	47.50	3.24	43.05	29.75	13.30	8800	8800	3.2	4.2
-4.00	-6.15	52.52	56.25	2.11	38.20	20.10	18.10	8800	8800	2.2	3.7
-4.00	-3.02	61.85	65.00	0.78	32.21	-9.11	41.33	8800	8800	-1.0	3.1
-1.00	-5.41	25.03	30.00	5.18	50.95	41.11	9.84	8800	8800	4.4	5.0
-1.00	-5.18	33.86	38.75	4.49	50.12	38.96	11.16	8800	8800	4.2	4.9
-1.00	-4.64	42.89	47.50	3.56	47.19	33.95	13.24	8800	8800	3.6	4.6
-1.00	-3.63	52.13	56.25	2.39	42.17	24.55	17.62	8800	8800	2.6	4.1
-1.00	-1.02	61.51	65.00	1.01	35.71	0.23	35.48	8800	8800	0.0	3.5
2.00	-2.90	24.58	30.00	5.63	55.54	45.68	9.86	8800	8800	4.9	5.4
2.00	-2.66	33.42	38.75	4.90	54.56	43.42	11.13	8800	8800	4.7	5.3
2.00	-2.11	42.47	47.50	3.93	51.47	38.38	13.10	8800	8800	4.1	5.0
2.00	-1.13	51.73	56.25	2.71	46.28	29.22	17.06	8800	8800	3.1	4.5
2.00	1.10	61.15	65.00	1.27	39.43	8.44	30.99	8800	8800	0.9	3.9
5.00	-0.41	24.12	30.00	6.13	60.26	50.43	9.84	8800	8800	5.4	5.9
5.00	-0.15	32.98	38.75	5.35	59.13	48.08	11.06	8800	8800	5.2	5.8
5.00	0.39	42.04	47.50	4.33	55.90	43.00	12.90	8800	8800	4.6	5.5
5.00	1.35	51.32	56.25	3.07	50.54	34.08	16.46	8800	8800	3.7	4.9
5.00	3.30	60.77	65.00	1.58	43.36	15.87	27.49	8800	8800	1.7	4.2
8.00	2.07	23.64	30.00	6.66	65.13	55.34	9.78	8800	8800	5.9	6.4
8.00	2.33	32.52	38.75	5.83	63.85	52.90	10.94	8800	8800	5.7	6.2
8.00	2.88	41.60	47.50	4.77	60.46	47.80	12.67	8800	8800	5.1	5.9
8.00	3.81	50.89	56.25	3.47	54.94	39.09	15.85	8800	8800	4.2	5.4
8.00	5.56	60.36	65.00	1.92	47.48	22.76	24.72	8800	8800	2.4	4.6
11.00	4.52	23.15	30.00	7.22	70.13	60.42	9.71	8800	8800	6.5	6.8
11.00	4.79	32.04	38.75	6.36	68.71	57.90	10.81	8800	8800	6.2	6.7
11.00	5.34	41.14	47.50	5.25	65.17	52.76	12.41	8800	8800	5.7	6.4
11.00	6.26	50.44	56.25	3.90	59.49	44.23	15.26	8800	8800	4.7	5.8
11.00	7.86	59.94	65.00	2.30	51.77	29.30	22.48	8800	8800	3.1	5.1
14.00	6.96	22.65	30.00	7.83	75.27	65.65	9.62	8800	8800	7.0	7.3
14.00	7.24	31.55	38.75	6.91	73.70	63.04	10.66	8800	8800	6.8	7.2
14.00	7.80	40.66	47.50	5.76	70.03	57.88	12.15	8800	8800	6.2	6.8
14.00	8.69	49.98	56.25	4.37	64.18	49.49	14.69	8800	8800	5.3	6.3
14.00	10.18	59.51	65.00	2.72	56.25	35.60	20.64	8800	8800	3.8	5.5
17.00	9.39	22.14	30.00	8.47	80.54	71.03	9.51	8800	8800	7.6	7.9
17.00	9.67	31.05	38.75	7.51	78.84	68.34	10.50	8800	8800	7.3	7.7
17.00	10.23	40.18	47.50	6.32	75.02	63.14	11.88	8800	8800	6.8	7.3
17.00	11.12	49.51	56.25	4.88	69.03	54.87	14.16	8800	8800	5.9	6.7
17.00	12.52	59.06	65.00	3.18	60.88	41.77	19.12	8800	8800	4.5	5.9
20.00	11.79	21.61	30.00	9.14	85.95	76.55	9.40	8800	8800	8.2	8.4
20.00	12.09	30.54	38.75	8.14	84.12	73.78	10.33	8800	8800	7.9	8.2
20.00	12.65	39.67	47.50	6.90	80.16	68.55	11.61	8800	8800	7.3	7.8
20.00	13.53	49.02	56.25	5.42	74.01	60.36	13.66	8800	8800	6.5	7.2
20.00	14.87	58.59	65.00	3.68	65.69	47.85	17.84	8800	8800	5.1	6.4

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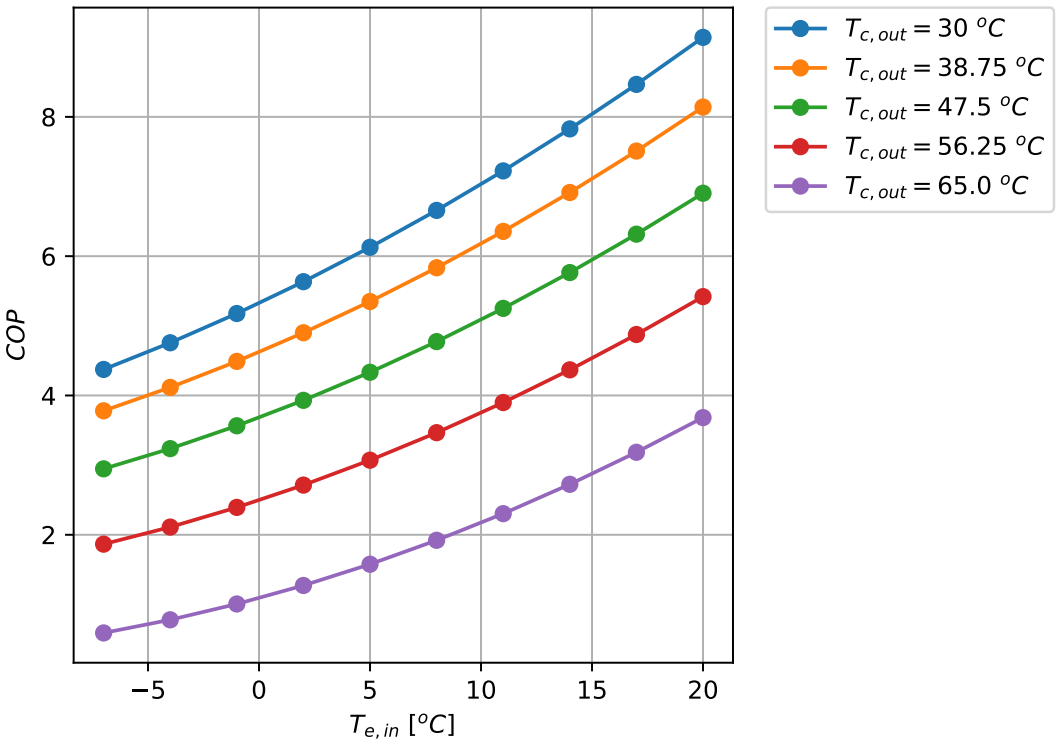

Figure 1: COP Results for the heat pump at the selected points

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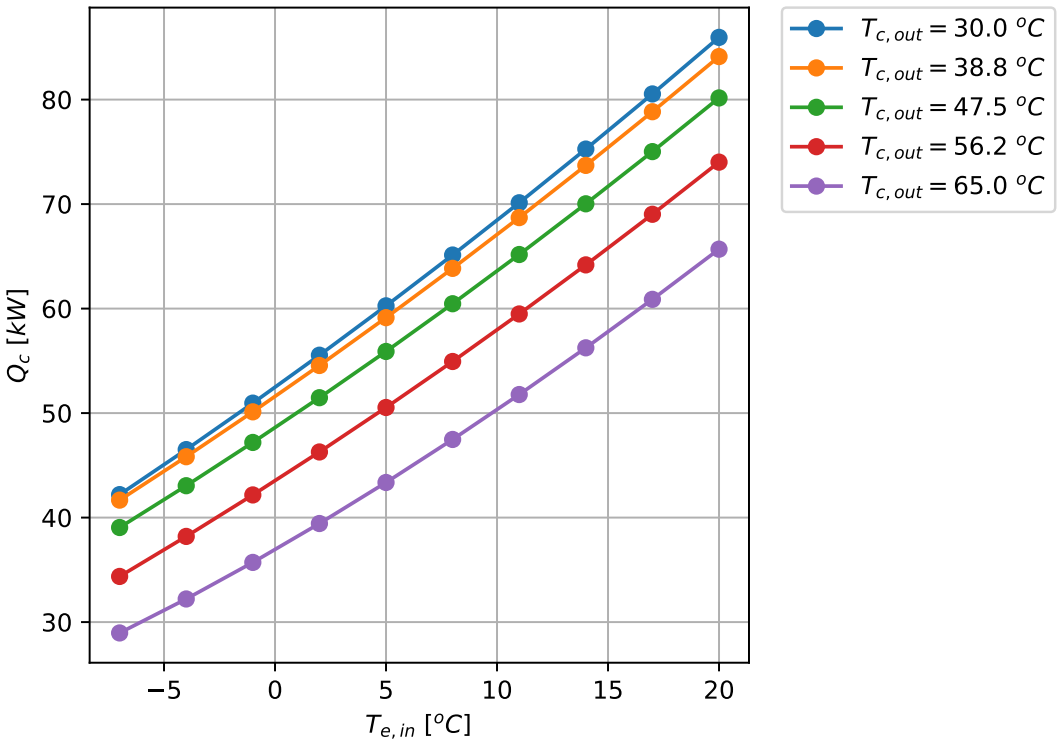

Figure 2: Q_c Results for the heat pump at the selected points