Python calculation for heat pump SIN-35TU

Parametric Heat Pump calculation

Dani Carbonell

dani.carbonell@solarenergy.ch

2019/03/12 at: 16:08:42 h

HSR

HOCHSCHULE FÜR TECHNIK
RAPPERSWIL

FHO Fachhochschule Ostschweiz

INSTITUT FÜR
SPF SOLARTECHNIK

Table 1: Fitted coefficients for the heat pump.

Coefficient	Description	$[kW]$
PQ_1	1st condenser polynomial coefficient	3.5066e+01
PQ_2	2st condenser polynomial coefficient	3.8459e+02
PQ_3	3st condenser polynomial coefficient	6.5501e+01
PQ_4	4st condenser polynomial coefficient	-6.2781e+02
PQ_5	5st condenser polynomial coefficient	3.8715e+02
PQ_6	6st condenser polynomial coefficient	-3.7043e+02
$PCOP_1$	1st COP polynomial coefficient	7.5227e+01
$PCOP_2$	2st COP polynomial coefficient	1.8270e+02
$PCOP_3$	3st COP polynomial coefficient	-9.8056e+02
$PCOP_4$	4st COP polynomial coefficient	-7.3151e+02
$PCOP_5$	5st COP polynomial coefficient	-2.9248e+03
$PCOP_6$	6st COP polynomial coefficient	3.3858e+03
$\dot{m}_{cond}$	6100.00 $[kg/h]$	
$\dot{m}_{evap}$	6100.00 $[kg/h]$	
COP_{nom} (B0W35)	5.50	
$Q_{c,nom}$ (B0W35)	35.12 kW	
COP_{nom} (B2W35)	6.41	
$Q_{c,nom}$ (B2W35)	37.14 kW	
COP_{nom} (B10W35)	7.57	
$Q_{c,nom}$ (B10W35)	45.82 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	-10.25	26.03	30.00	3.95	28.16	21.04	7.12	6100	6100	3.3	4.0
-7.00	-12.88	34.98	38.75	-2.37	26.76	38.04	-11.28	6100	6100	5.9	3.8
-7.00	-14.67	43.95	47.50	-1.03	25.17	49.60	-24.42	6100	6100	7.7	3.5
-7.00	-29.20	53.74	56.25	-0.14	17.83	143.57	-125.74	6100	6100	22.2	2.5
-7.00	-10.44	61.75	65.00	26.59	23.09	22.22	0.87	6100	6100	3.4	3.3
-4.00	-8.07	25.63	30.00	6.66	31.00	26.34	4.65	6100	6100	4.1	4.4
-4.00	-6.41	34.30	38.75	1.97	31.61	15.56	16.05	6100	6100	2.4	4.5
-4.00	-7.24	43.26	47.50	3.28	30.12	20.93	9.20	6100	6100	3.2	4.2
-4.00	-7.96	52.31	56.25	11.86	27.95	25.59	2.36	6100	6100	4.0	3.9
-4.00	-7.79	61.42	65.00	27.98	25.40	24.49	0.91	6100	6100	3.8	3.6
-1.00	-5.68	25.21	30.00	8.95	34.04	30.23	3.80	6100	6100	4.7	4.8
-1.00	-4.75	33.95	38.75	3.47	34.09	24.28	9.81	6100	6100	3.8	4.8
-1.00	-4.97	42.89	47.50	4.65	32.74	25.70	7.04	6100	6100	4.0	4.6
-1.00	-5.36	51.95	56.25	13.00	30.53	28.18	2.35	6100	6100	4.4	4.3
-1.00	-5.15	61.08	65.00	28.74	27.80	26.84	0.97	6100	6100	4.2	3.9
2.00	-3.21	24.76	30.00	10.70	37.20	33.72	3.48	6100	6100	5.2	5.2
2.00	-2.50	33.54	38.75	4.68	36.97	29.07	7.90	6100	6100	4.5	5.2
2.00	-2.50	42.49	47.50	5.52	35.55	29.10	6.44	6100	6100	4.5	5.0
2.00	-2.76	51.57	56.25	13.53	33.20	30.75	2.45	6100	6100	4.8	4.7
2.00	-2.52	60.73	65.00	28.88	30.29	29.24	1.05	6100	6100	4.5	4.3
5.00	-0.73	24.30	30.00	11.89	40.46	37.06	3.40	6100	6100	5.7	5.7
5.00	-0.04	33.11	38.75	5.37	40.05	32.59	7.46	6100	6100	5.0	5.6
5.00	0.07	42.08	47.50	5.81	38.50	31.86	6.63	6100	6100	4.9	5.4
5.00	-0.15	51.18	56.25	13.45	35.97	33.30	2.67	6100	6100	5.1	5.1
5.00	0.10	60.37	65.00	28.40	32.87	31.71	1.16	6100	6100	4.9	4.6
8.00	1.76	23.83	30.00	12.52	43.82	40.32	3.50	6100	6100	6.2	6.2
8.00	2.53	32.66	38.75	5.50	43.27	35.40	7.87	6100	6100	5.5	6.1
8.00	2.74	41.64	47.50	5.49	41.59	34.01	7.58	6100	6100	5.3	5.9
8.00	2.46	50.78	56.25	12.76	38.83	35.79	3.04	6100	6100	5.5	5.5
8.00	2.71	60.00	65.00	27.30	35.53	34.23	1.30	6100	6100	5.3	5.0
11.00	4.27	23.34	30.00	12.59	47.27	43.51	3.76	6100	6100	6.7	6.7
11.00	5.22	32.18	38.75	5.02	46.67	37.37	9.30	6100	6100	5.8	6.6
11.00	5.60	41.18	47.50	4.51	44.88	34.94	9.94	6100	6100	5.4	6.3
11.00	5.10	50.36	56.25	11.45	41.80	38.15	3.65	6100	6100	5.9	5.9
11.00	5.31	59.61	65.00	25.58	38.29	36.79	1.50	6100	6100	5.7	5.4
14.00	6.79	22.84	30.00	12.08	50.82	46.62	4.21	6100	6100	7.2	7.2
14.00	8.24	31.66	38.75	3.84	50.36	37.26	13.10	6100	6100	5.8	7.1
14.00	9.40	40.62	47.50	2.56	48.84	29.76	19.08	6100	6100	4.6	6.9
14.00	7.79	49.93	56.25	9.51	44.89	40.17	4.72	6100	6100	6.2	6.3
14.00	7.91	59.21	65.00	23.26	41.13	39.37	1.77	6100	6100	6.1	5.8
17.00	9.34	22.33	30.00	11.00	54.49	49.53	4.95	6100	6100	7.7	7.7
17.00	13.31	31.00	38.75	1.77	54.99	23.89	31.10	6100	6100	3.7	7.7
17.00	13.61	40.42	47.50	1.77	50.25	21.93	28.32	6100	6100	3.4	7.1
17.00	10.64	49.47	56.25	6.86	48.17	41.15	7.02	6100	6100	6.4	6.8
17.00	10.52	58.79	65.00	20.32	44.08	41.91	2.17	6100	6100	6.5	6.2
20.00	11.95	21.79	30.00	9.32	58.28	52.03	6.25	6100	6100	8.0	8.2
20.00	15.85	30.75	38.75	1.90	56.76	26.83	29.93	6100	6100	4.1	8.0
20.00	16.46	40.38	47.50	1.83	50.57	22.87	27.70	6100	6100	3.5	7.1
20.00	15.84	48.79	56.25	2.03	52.94	26.88	26.06	6100	6100	4.2	7.5
20.00	13.15	58.36	65.00	16.75	47.13	44.31	2.81	6100	6100	6.9	6.6

Meier/SIN-35TU/SIN-35TU-Cop.pdf
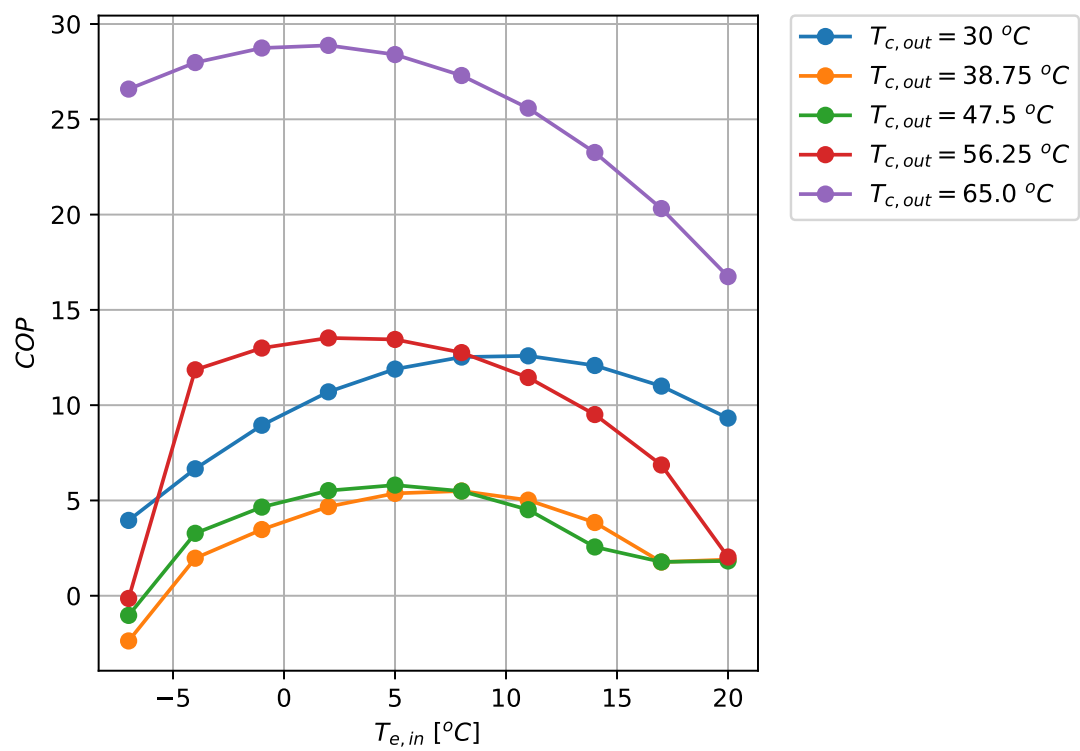
Figure 1: COP Results for the heat pump at the selected points

INSTITUT FÜR
SOLARTECHNIK

HSR
HOCHSCHULE FÜR TECHNIK
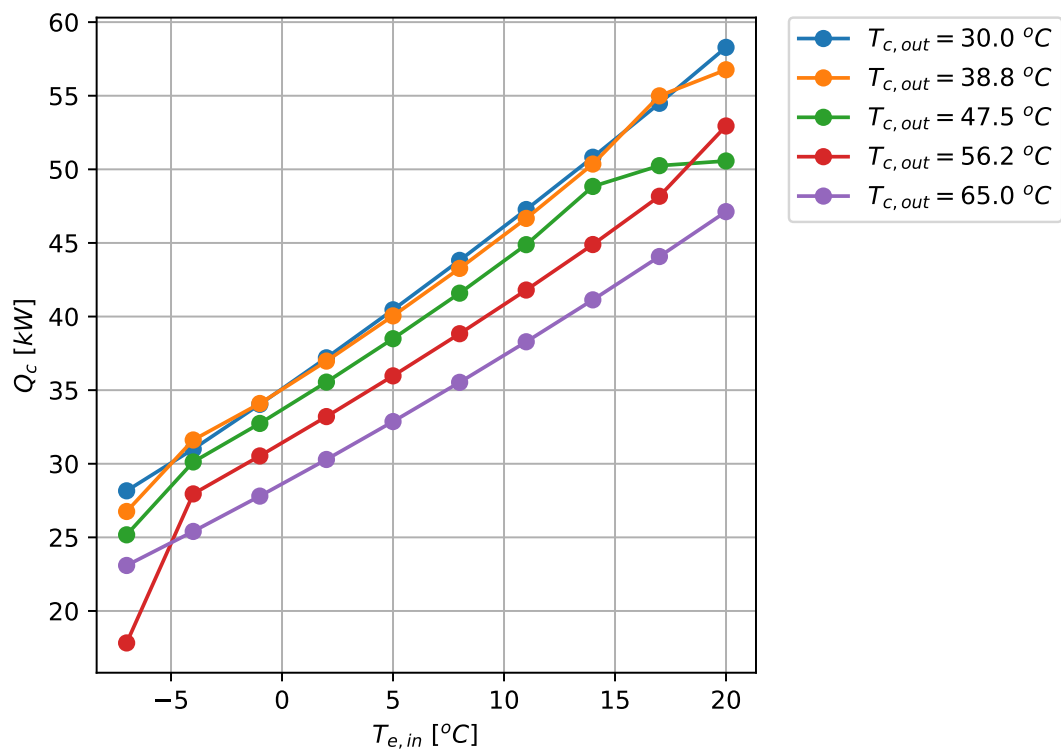RAPPERSWIL

FHO Fachhochschule Ostschweiz

Meier/SIN-35TU/SIN-35TU-Qc.pdf

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