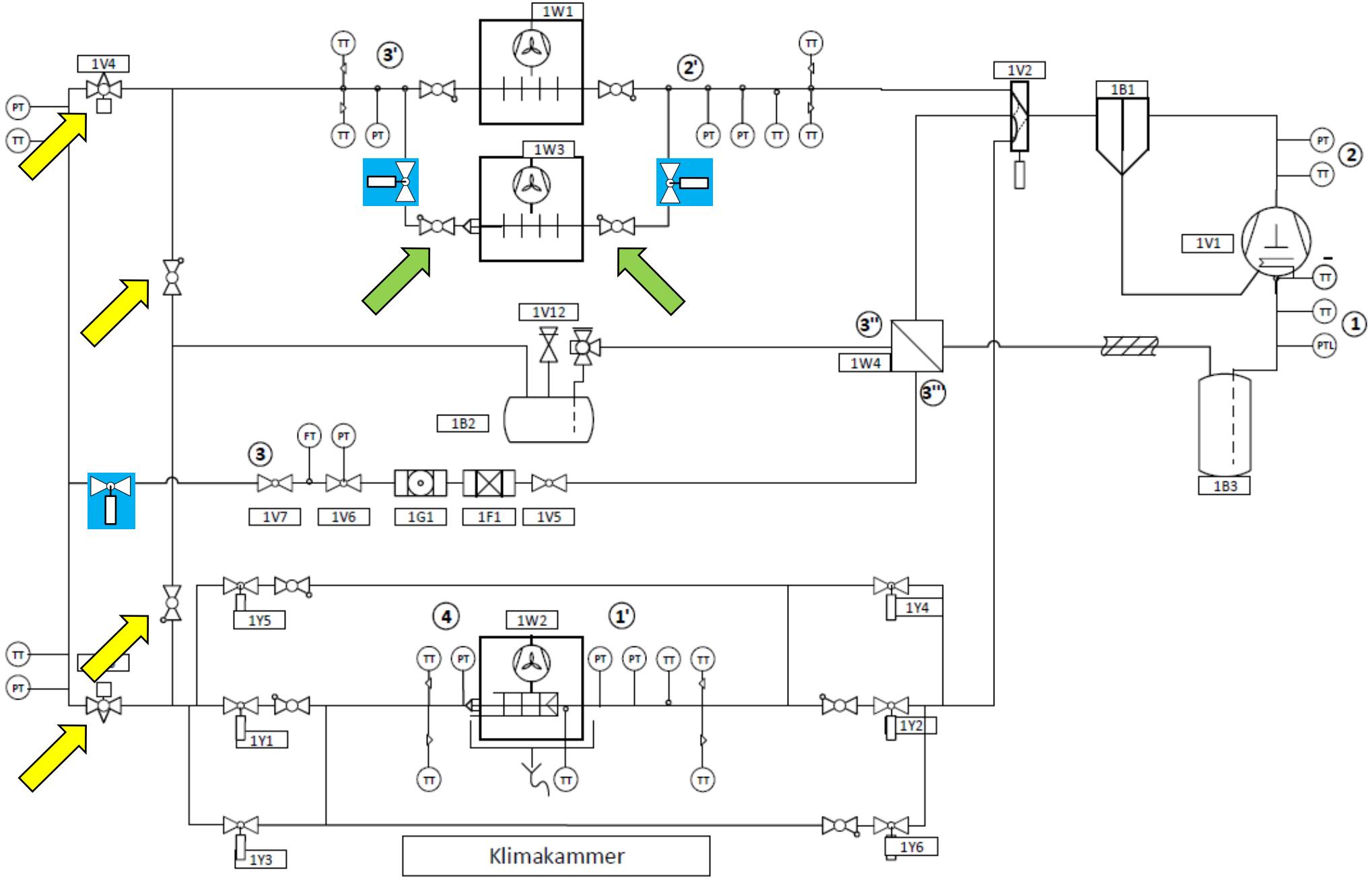
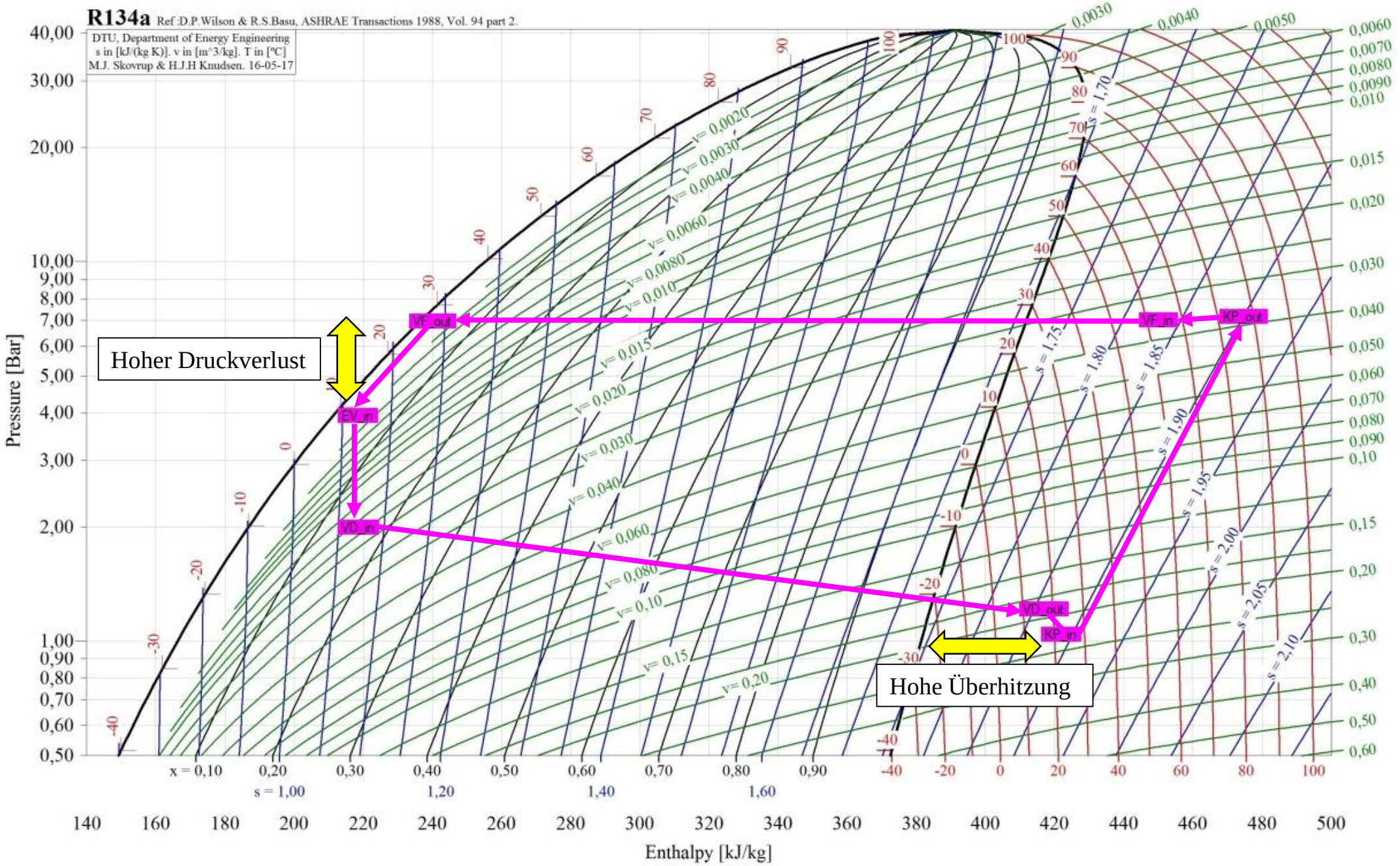
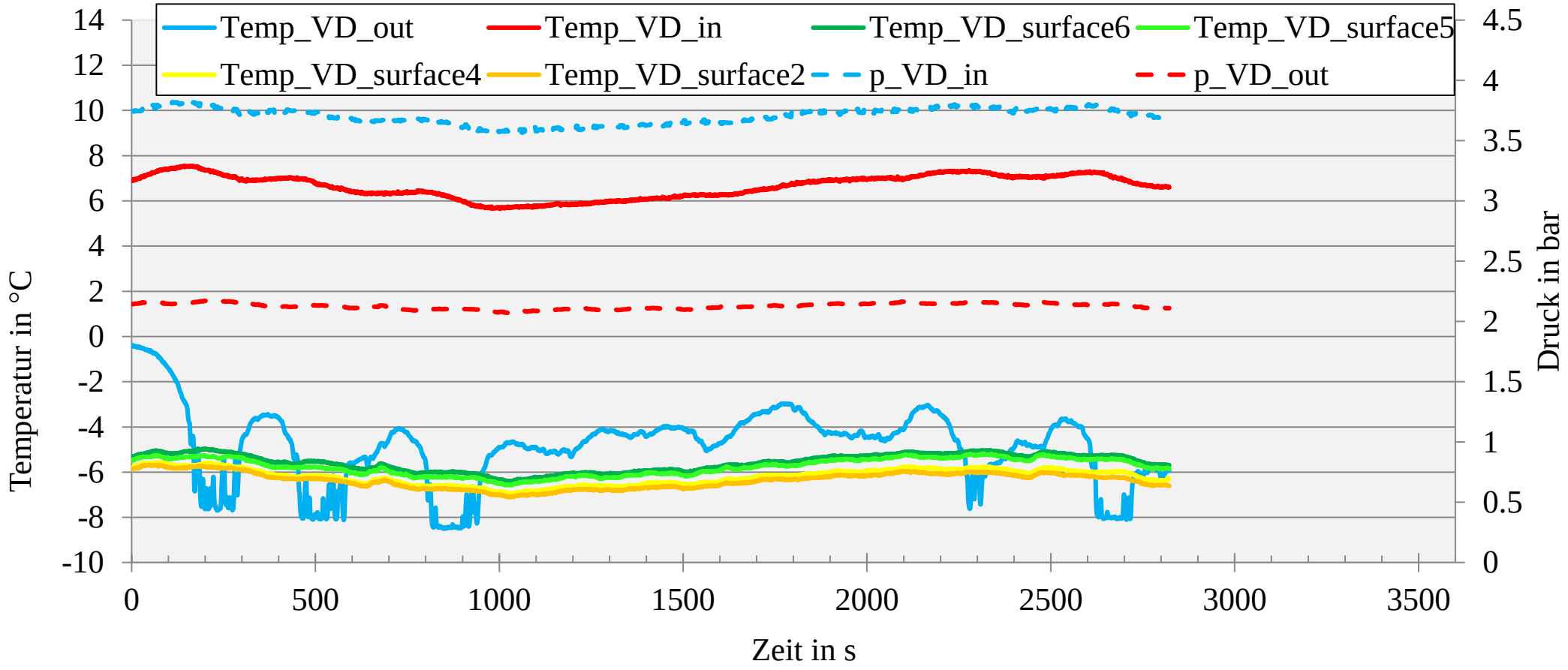

1W1
1V4
3'
2'
1V2
1B1
1W3
1V1
1V12
3''
1W4
1B2
3
1V7
1V6
1G1
1F1
1V5
1B3
1Y5
4
1W2
1'
1Y4
1Y1
1Y2
1Y3
1Y6
Klimakammer

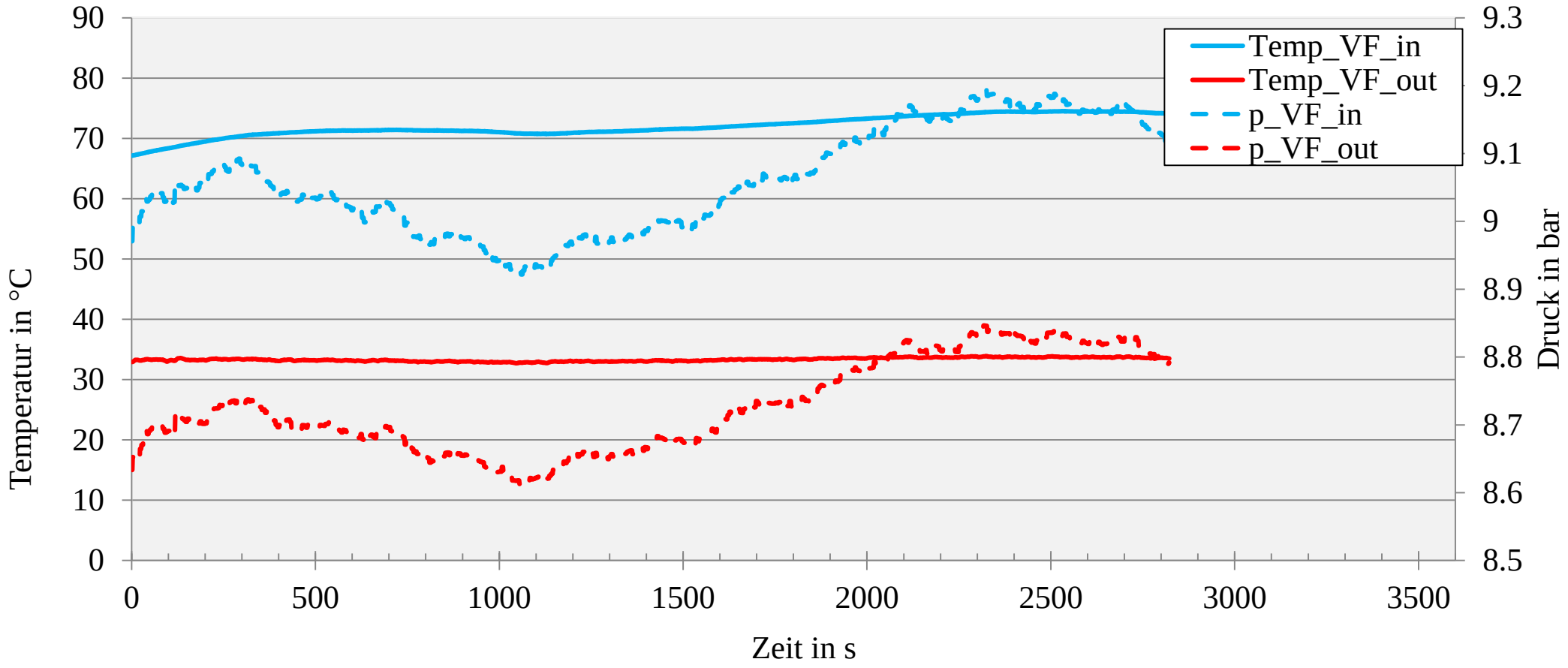

R134a Ref :D.P.Wilson & R.S.Basu, ASHRAE Transactions 1988, Vol. 94 part 2.
DTU, Department of Energy Engineering
s in [kJ/(kg K)]. v in [m^3/kg]. T in [°C]
M.J. Skovrup & H.J.H Knudsen. 16-05-17
Pressure [Bar]
Enthalpy [kJ/kg]
Hoher Druckverlust
Hohe Überhitzung
VF_out
VF_in
KP_out
EV_in
VD_in
VD_out
KP_in

Heißgas_Oben mit TT auf Stackeingang Vereisen

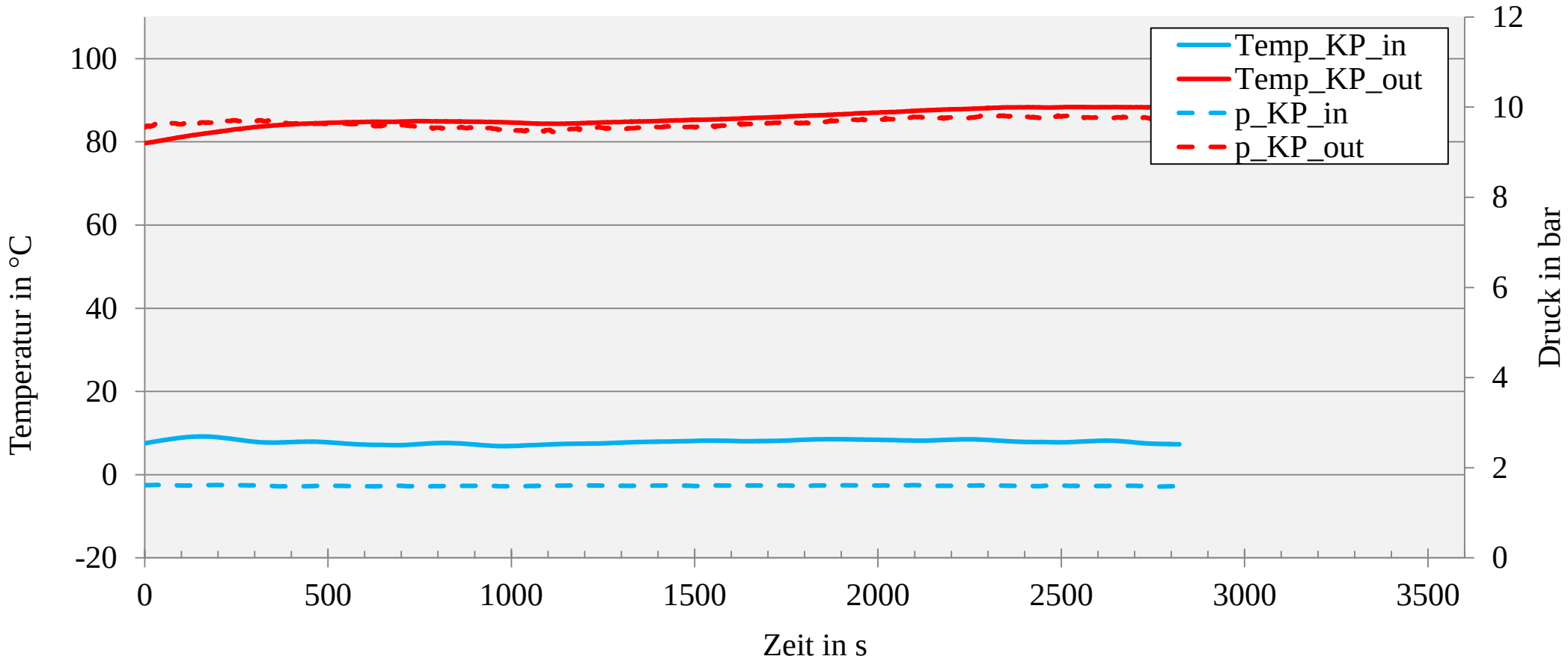
Verdampfer


Temp_VD_out
Temp_VD_in
Temp_VD_surface6
Temp_VD_surface5
Temp_VD_surface4
Temp_VD_surface2
p_VD_in
p_VD_out
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
0
500
1000
1500
2000
2500
3000
3500
Temperatur in °C
Druck in bar
Zeit in s

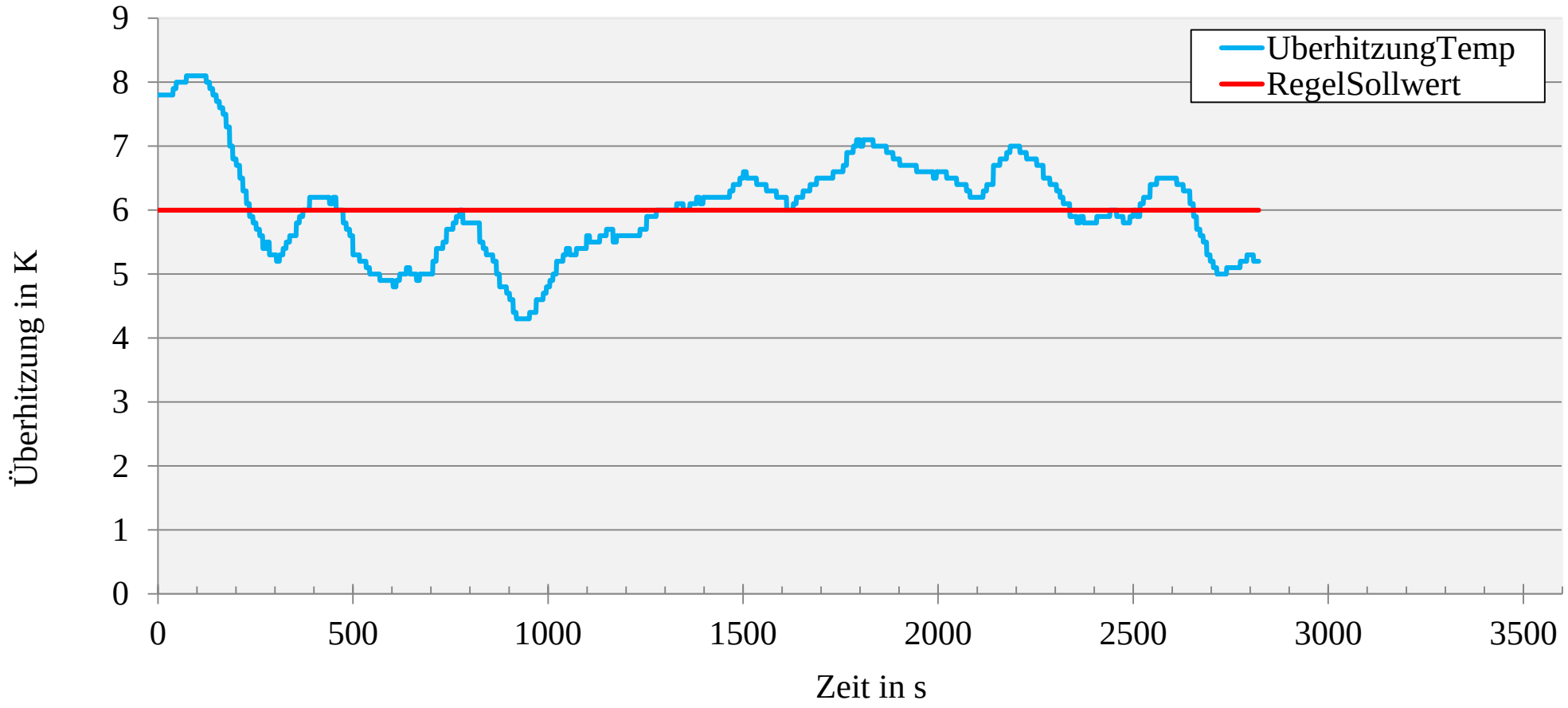
Verdfüssiger



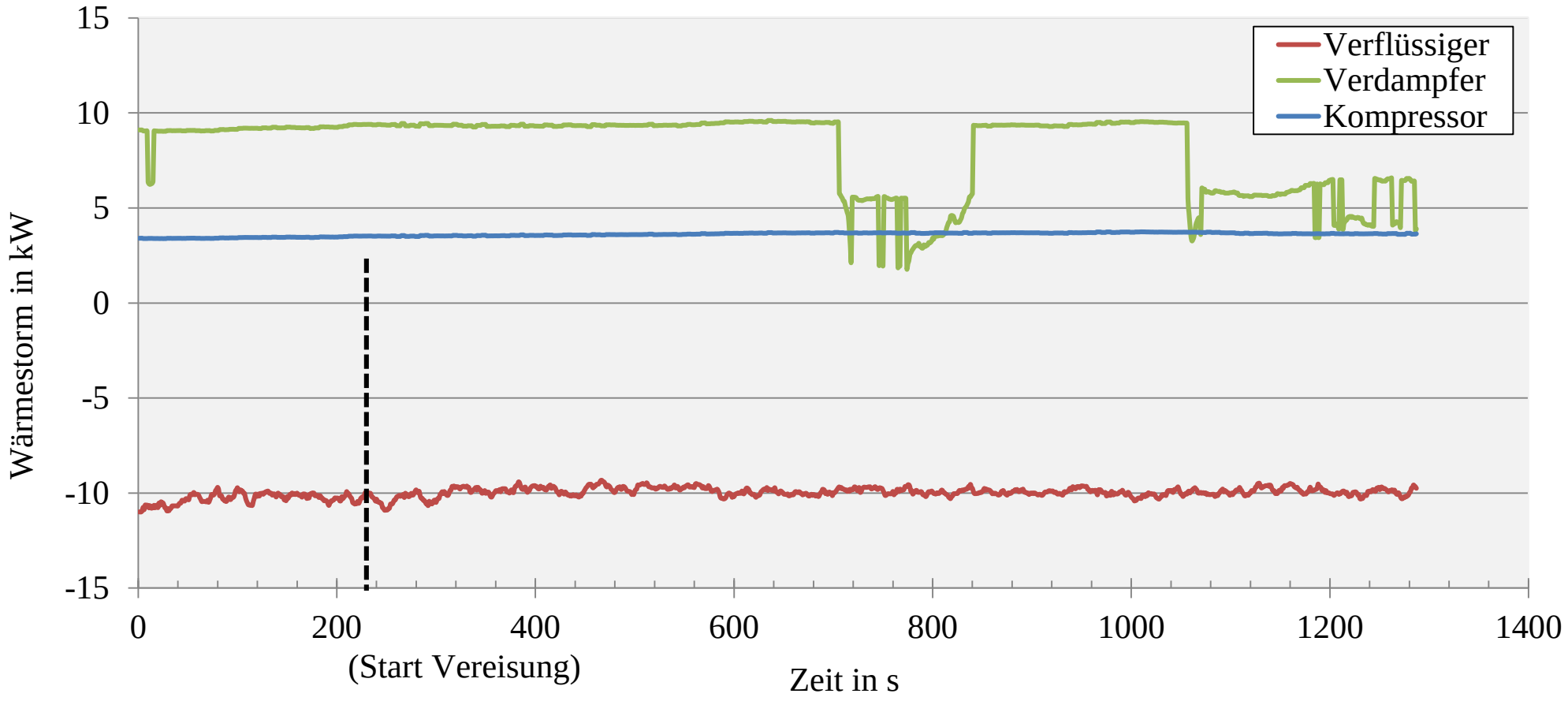
Kompressor


Temp_KP_in
Temp_KP_out
p_KP_in
p_KP_out
Temperatur in °C
Druck in bar
Zeit in s
100
80
60
40
20
0
-20
12
10
8
6
4
2
0
0
500
1000
1500
2000
2500
3000
3500

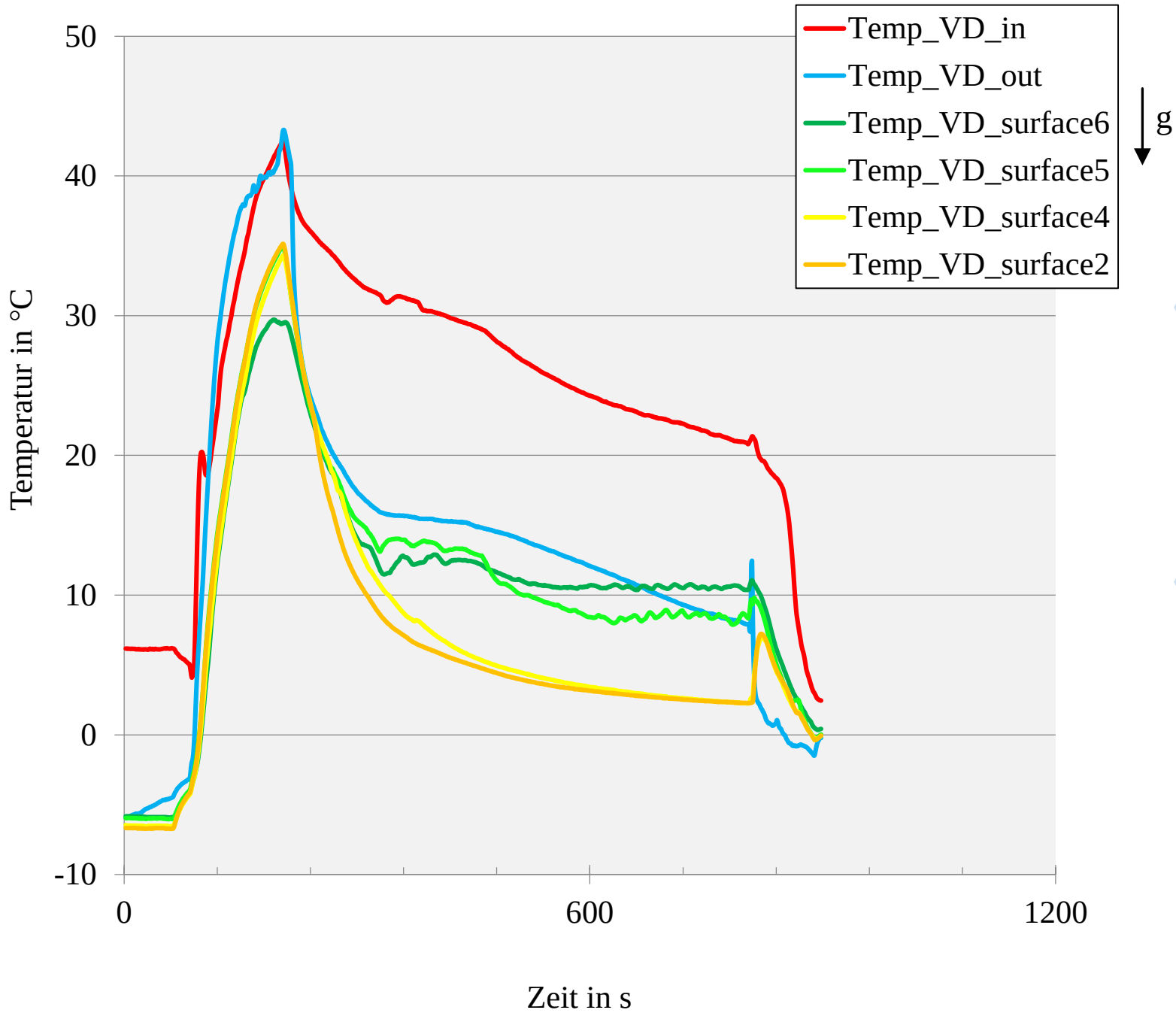
Expansionsventil

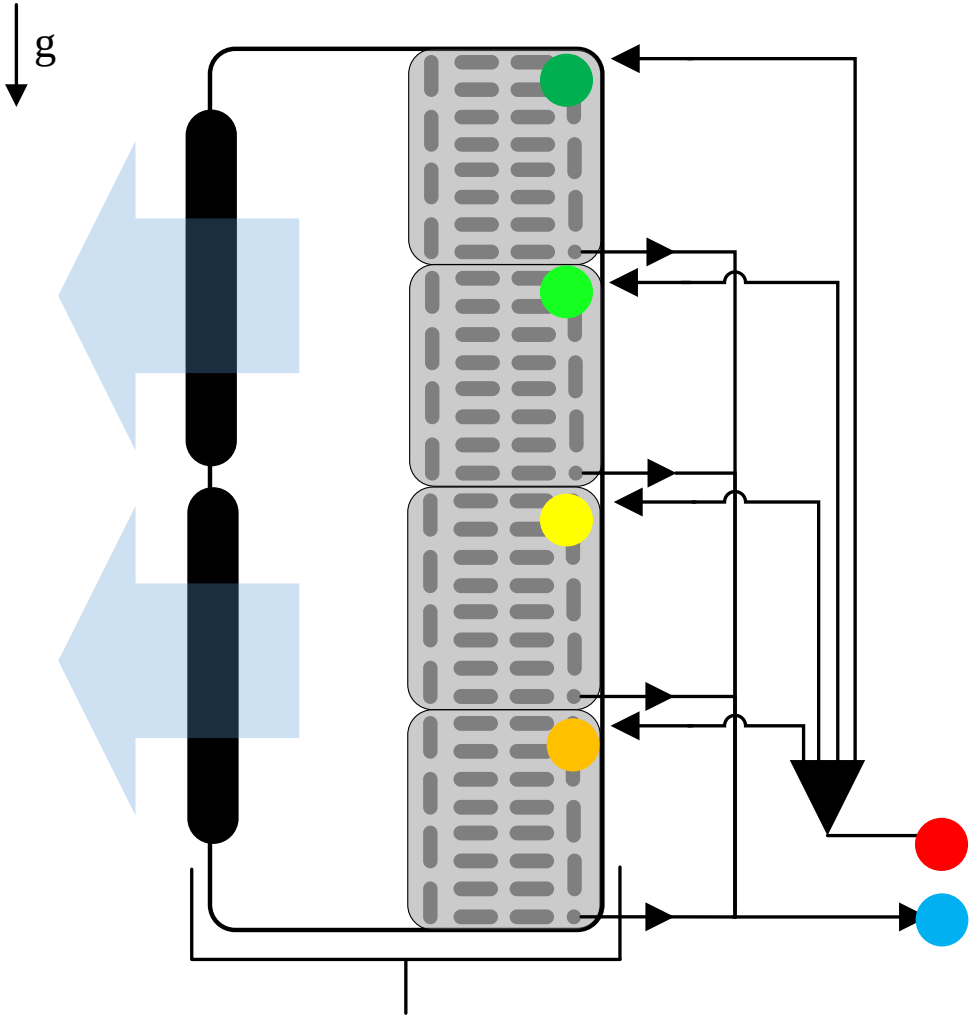


Wärmeströme

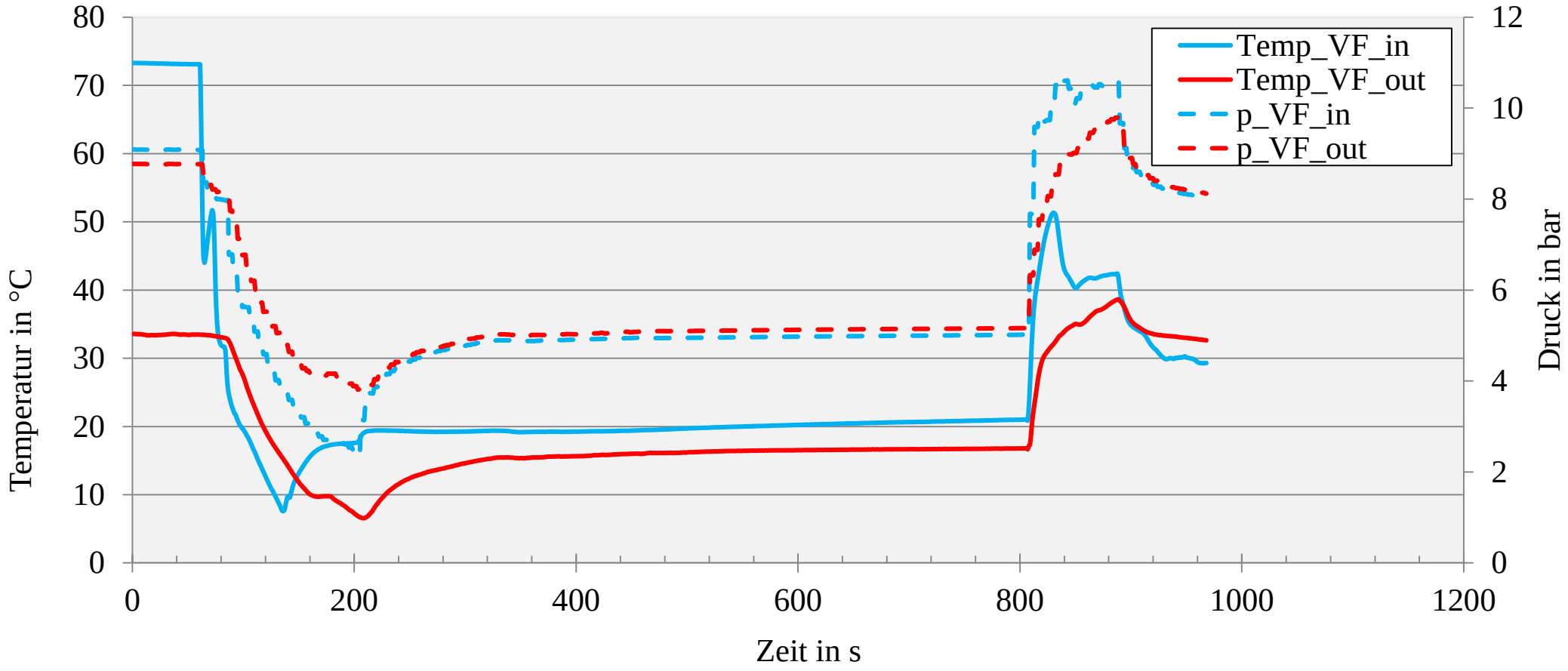


Heißgas_Oben mit TT auf Stackeingang Abtauen

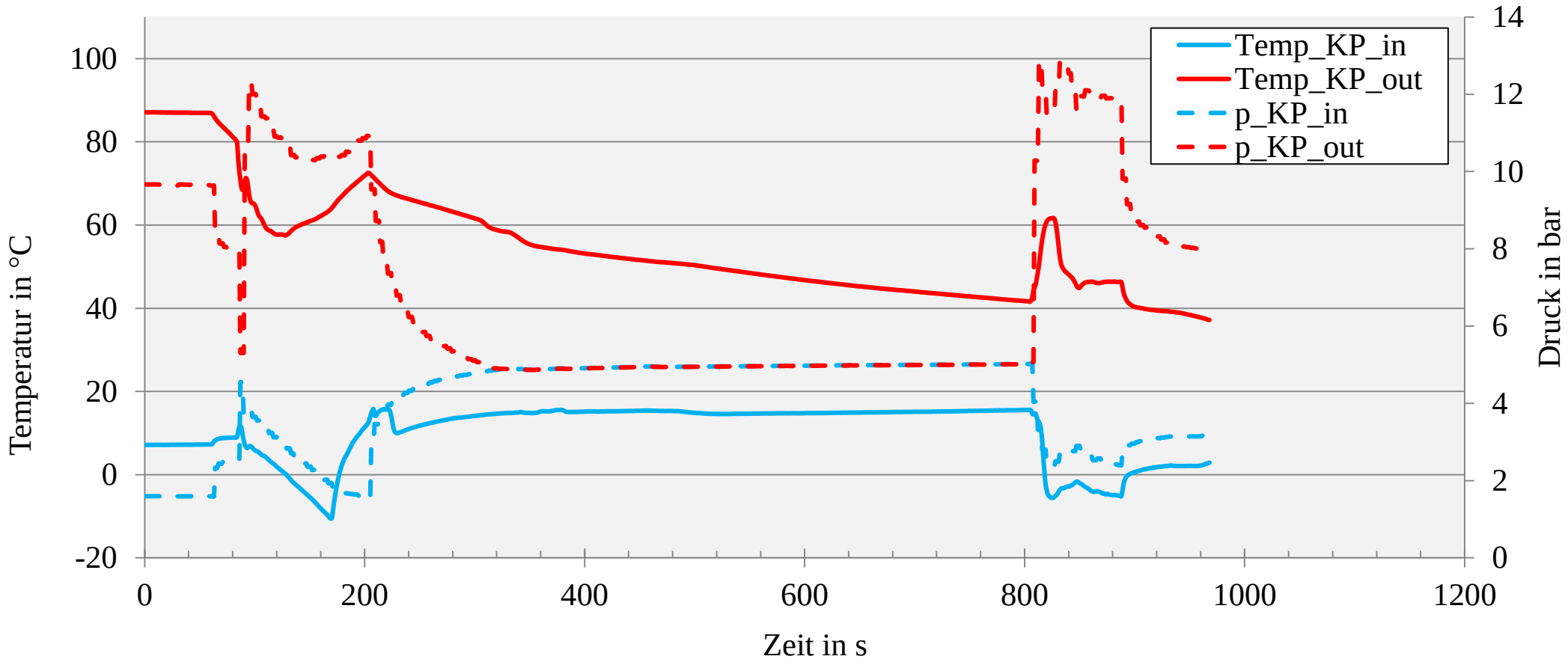

Temp_VD_in
Temp_VD_out
Temp_VD_surface6
Temp_VD_surface5
Temp_VD_surface4
Temp_VD_surface2
50
40
30
20
10
0
-10
Temperatur in °C
0
600
1200
Zeit in s


g

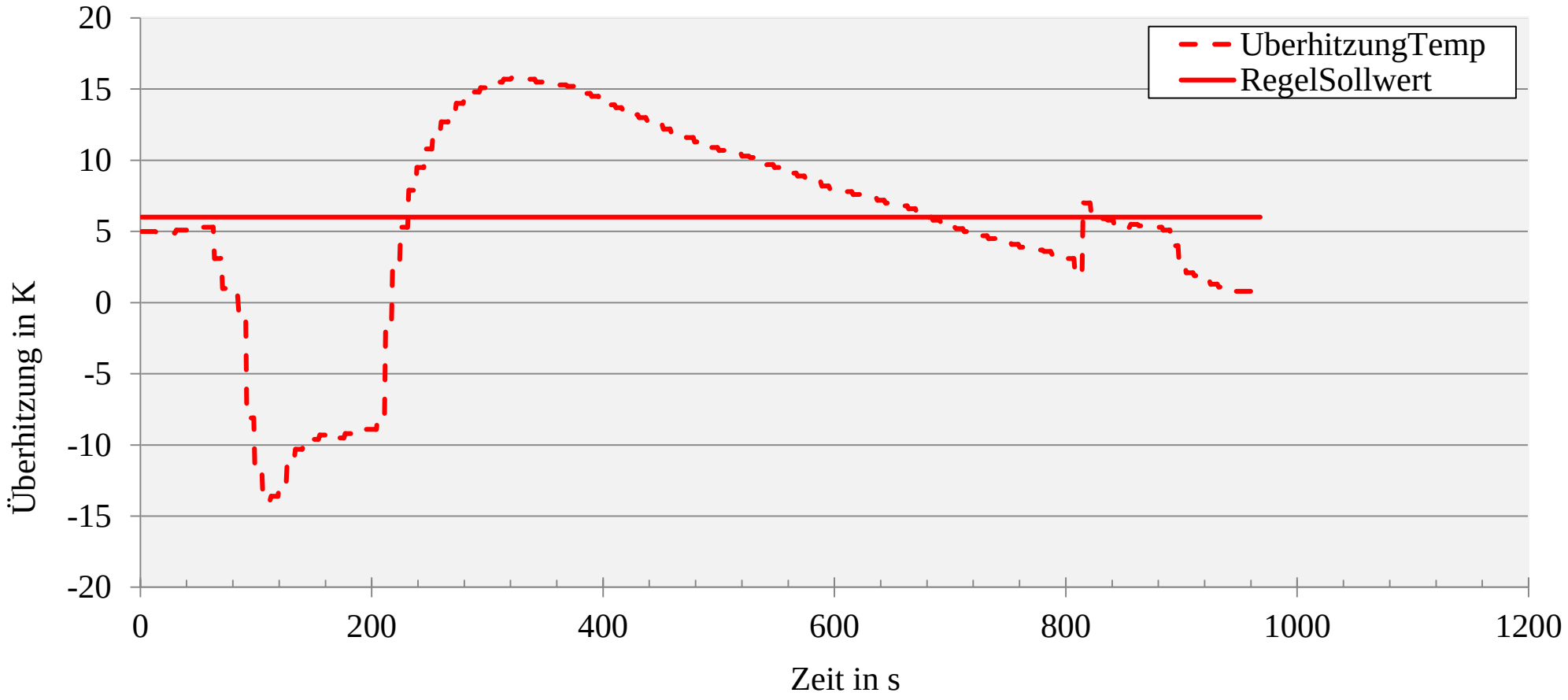
Verfüssiger



Kompressor

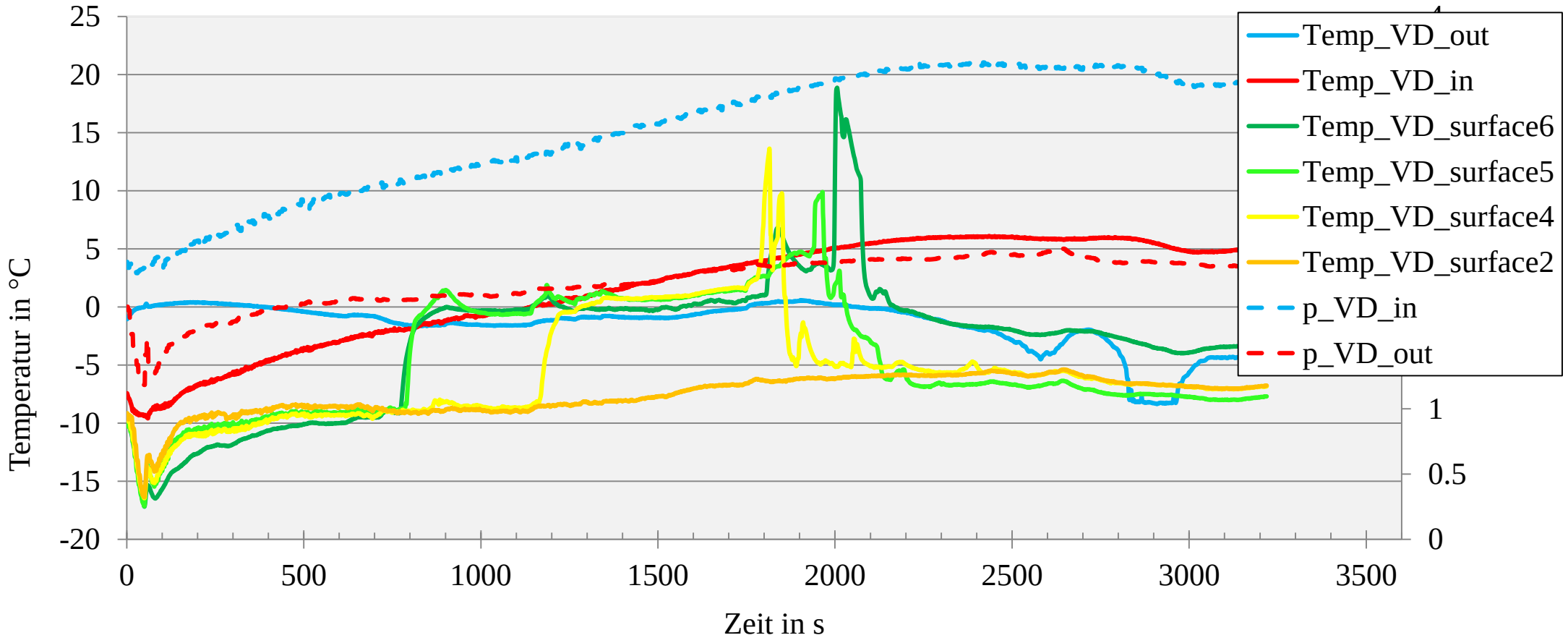

Temp_KP_in
Temp_KP_out
p_KP_in
p_KP_out
Temperatur in °C
Druck in bar
Zeit in s
100
80
60
40
20
0
-20
14
12
10
8
6
4
2
0
0
200
400
600
800
1000
1200

Expansionsventil

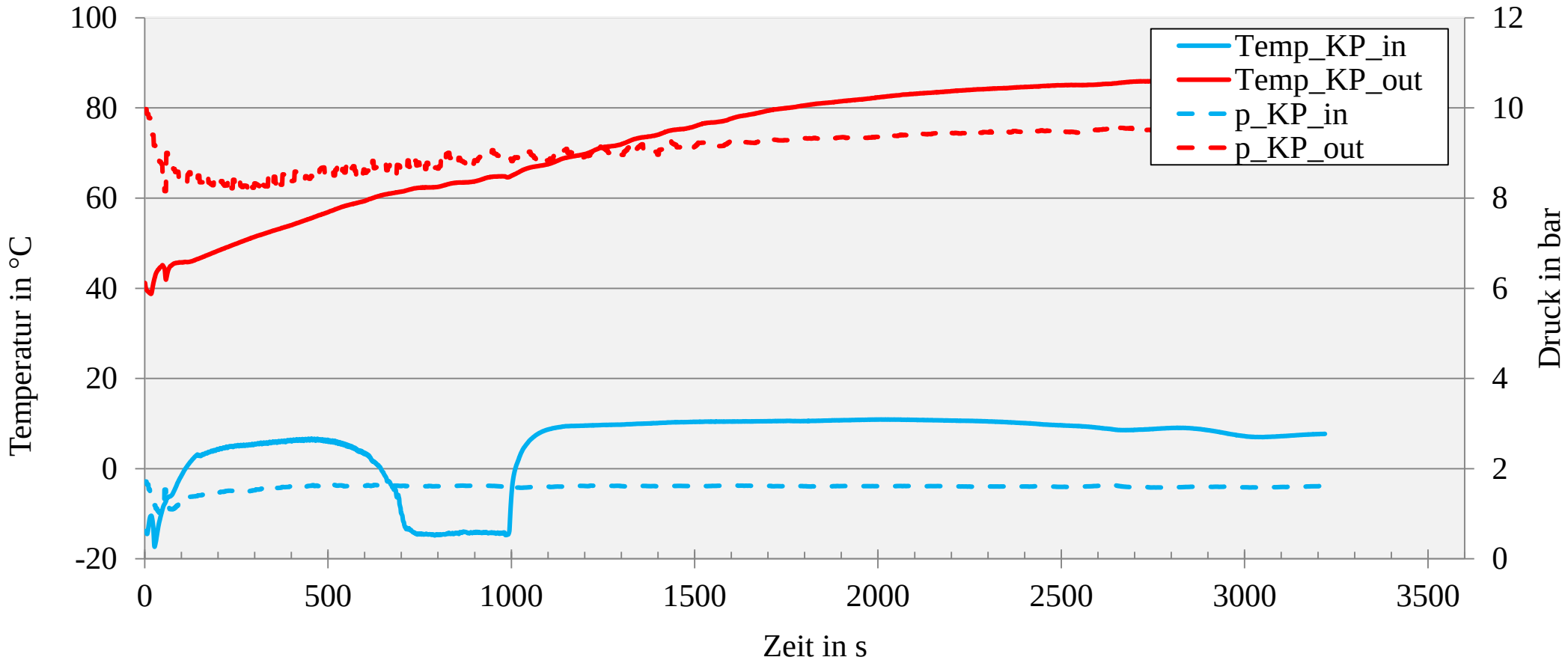


Heißgas_oben Über einen Stack Vereisung

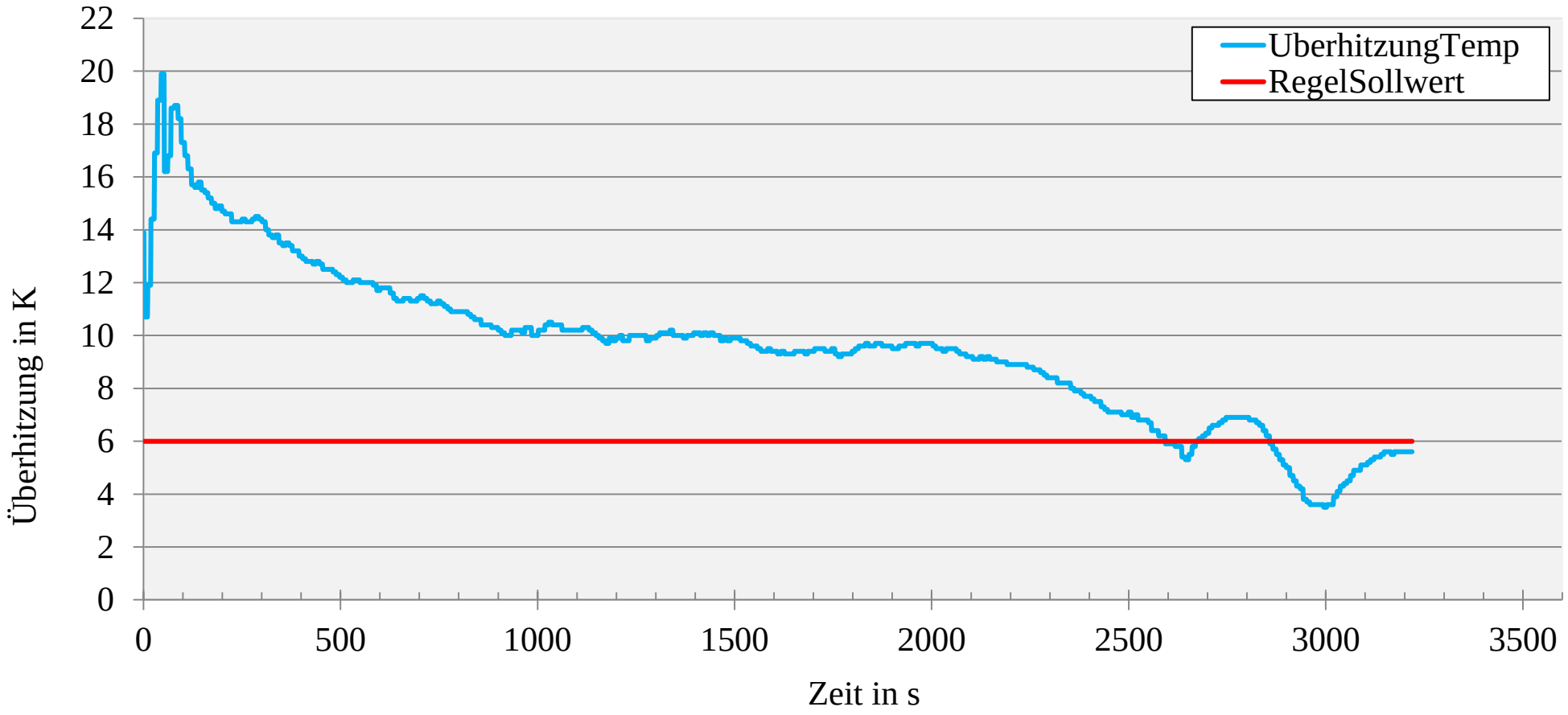
Verdampfer


Temperatur in °C
25
20
15
10
5
0
-5
-10
-15
-20
0
500
1000
1500
2000
2500
3000
3500
Zeit in s
1
0.5
0
Temp_VD_out
Temp_VD_in
Temp_VD_surface6
Temp_VD_surface5
Temp_VD_surface4
Temp_VD_surface2
p_VD_in
p_VD_out

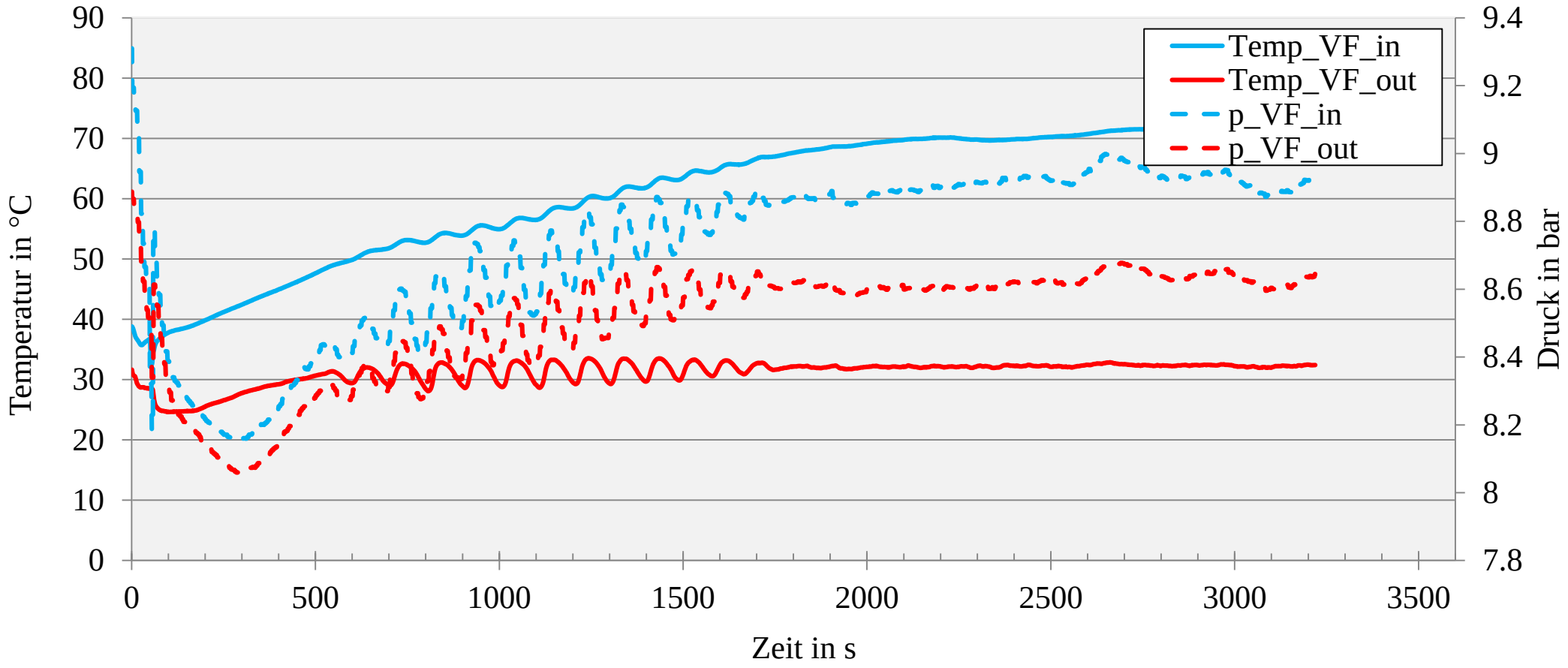
Kompressor


Temp_KP_in
Temp_KP_out
p_KP_in
p_KP_out
Temperatur in °C
Druck in bar
Zeit in s
100
80
60
40
20
0
-20
12
10
8
6
4
2
0
0
500
1000
1500
2000
2500
3000
3500

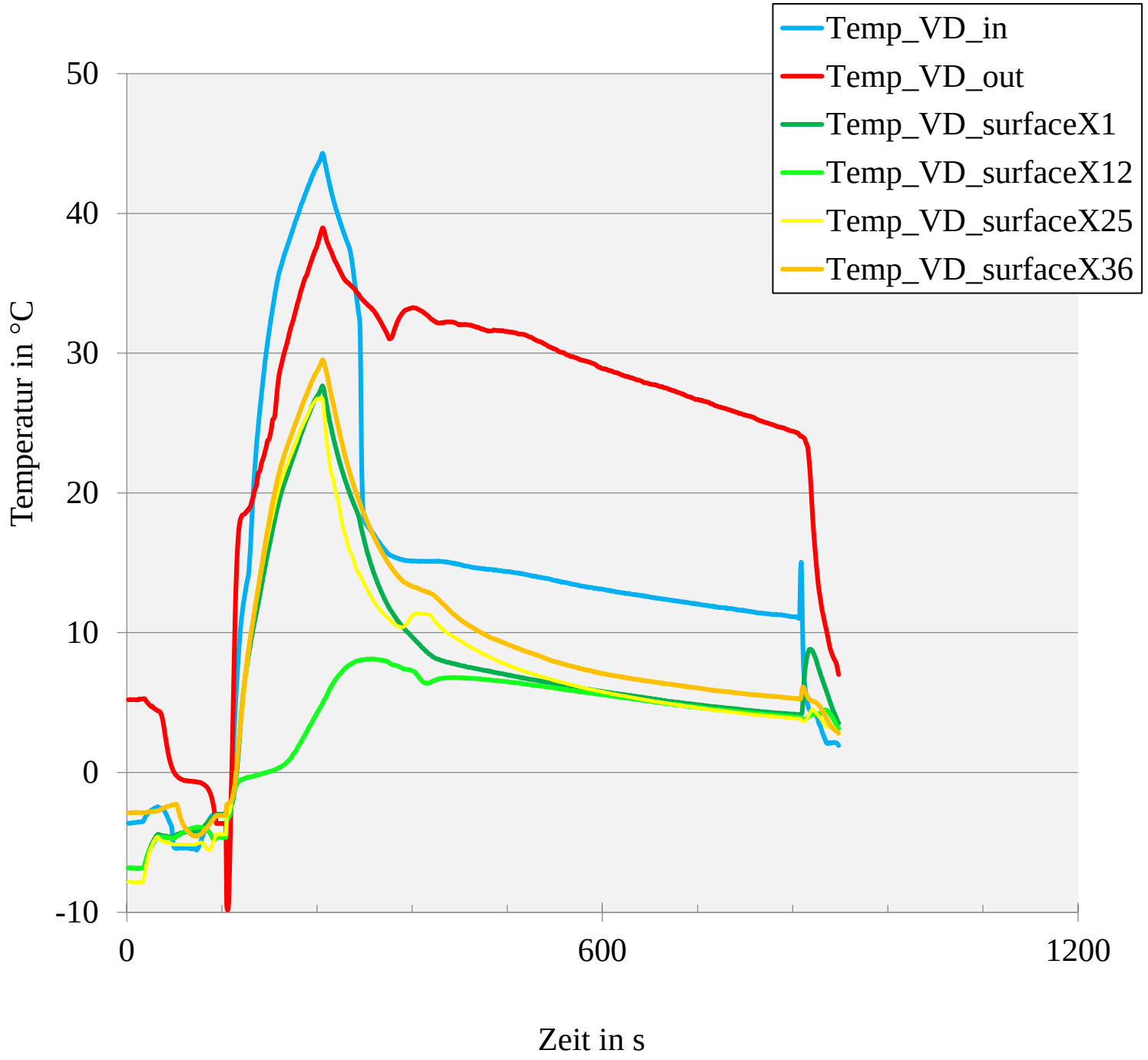
Expansionsventil

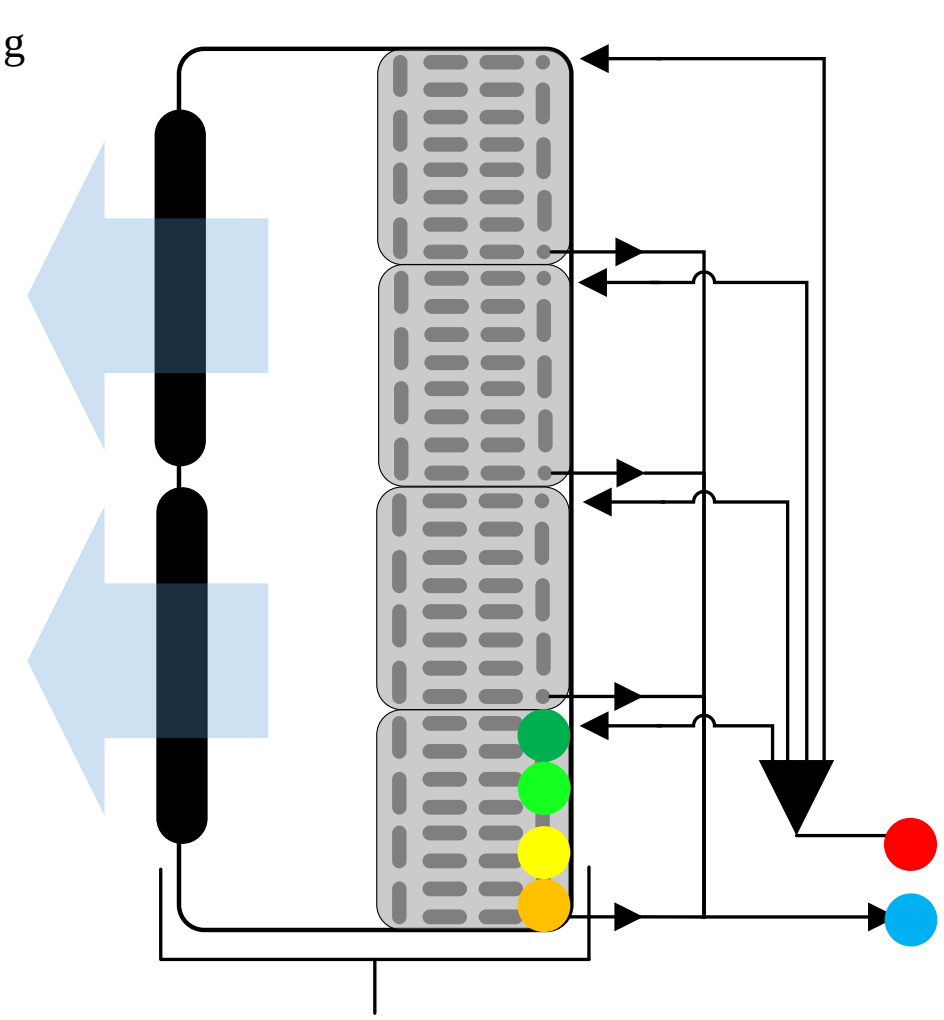


Verflüssiger



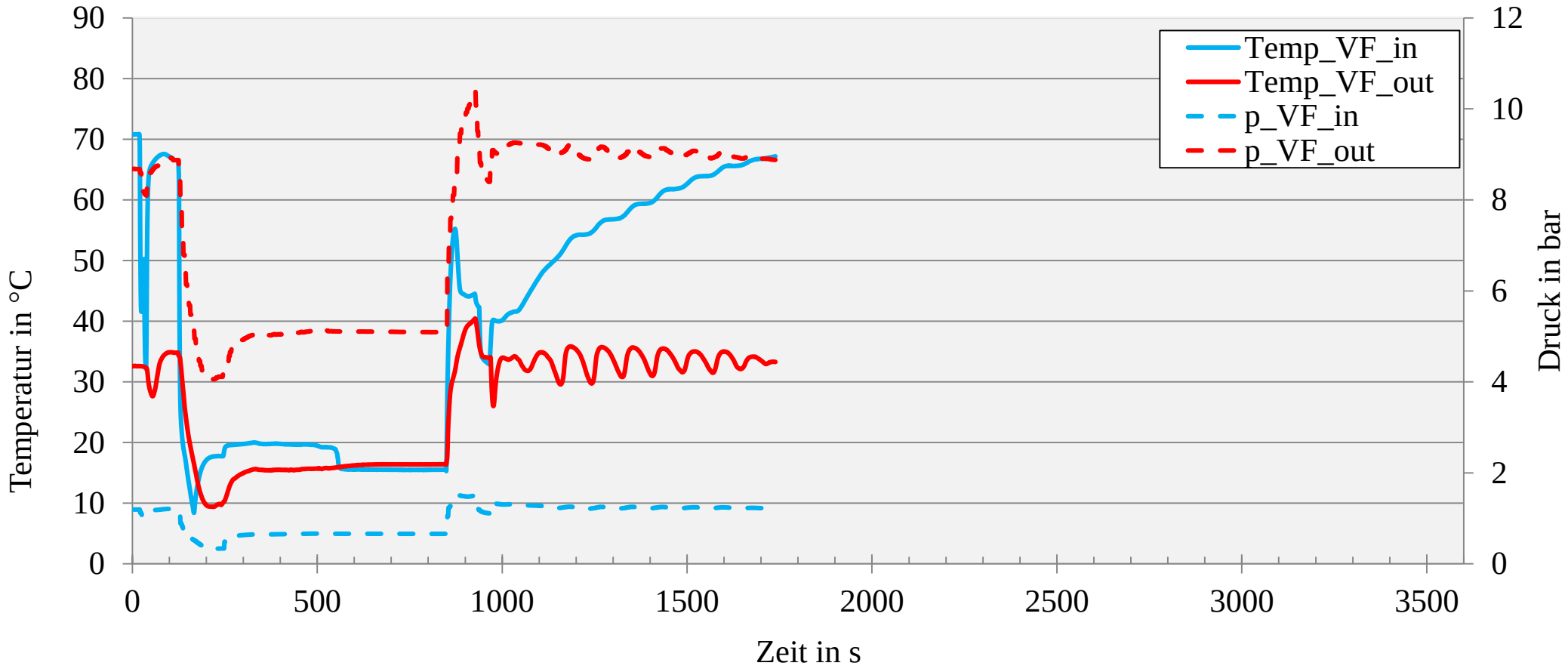
Heißgas_oben Über einen Stack Abtauen


Temp_VD_in
Temp_VD_out
Temp_VD_surfaceX1
Temp_VD_surfaceX12
Temp_VD_surfaceX25
Temp_VD_surfaceX36
50
40
30
20
10
0
-10
Temperatur in °C
0
600
1200
Zeit in s

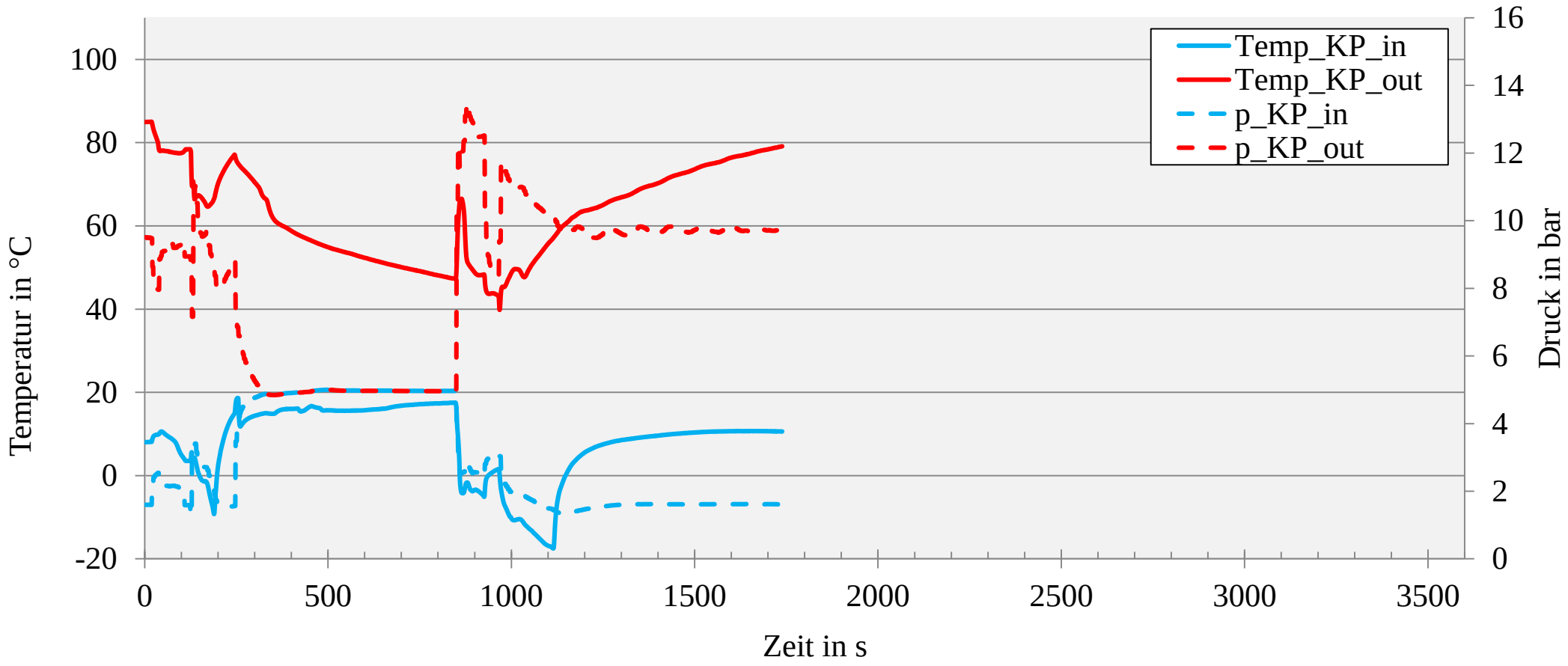

g


PumpDown
Start Kühlen
Verdampfermasse
Abtropfmasse
Öffnung E-Ventil
Abtaudauer
Gewichtsänderung in g
Ventilöffnung in %
Zeit in s
4000
3000
2000
1000
0
-1000
-2000
60
50
40
30
20
10
0
0
600
1200
1800

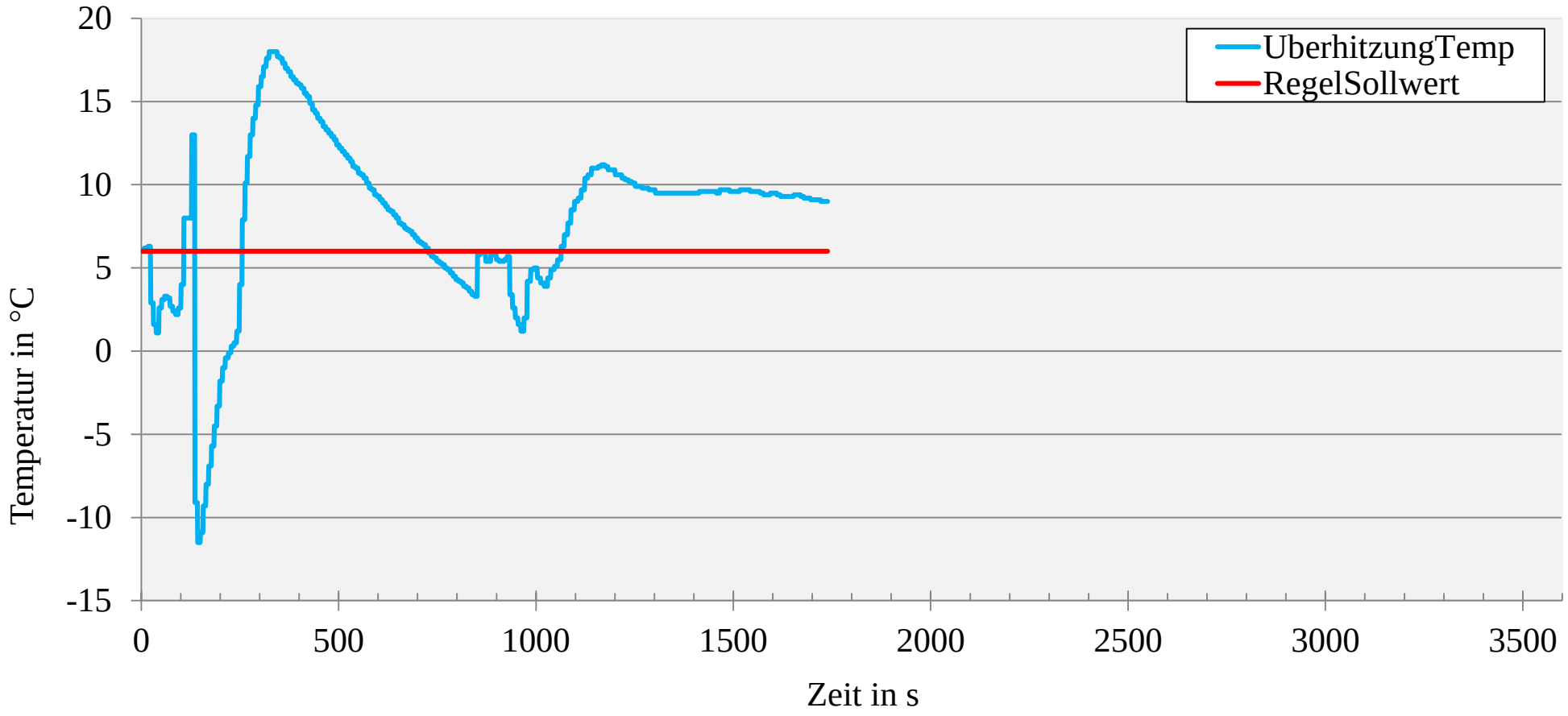
Verflüssiger



Kompressor

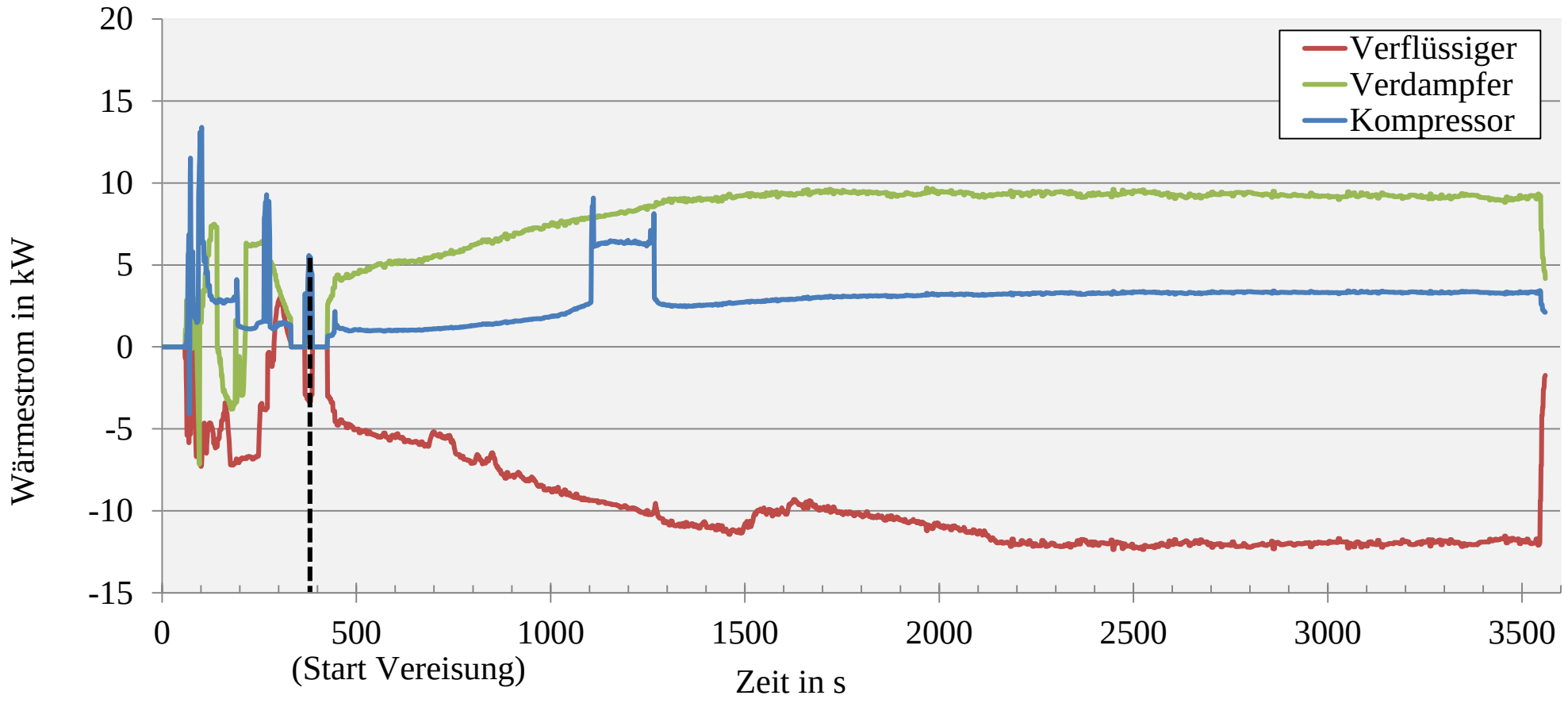

Temperatur in °C
Druck in bar
Zeit in s
Temp_KP_in
Temp_KP_out
p_KP_in
p_KP_out
100
80
60
40
20
0
-20
16
14
12
10
8
6
4
2
0
0
500
1000
1500
2000
2500
3000
3500

Expansionsventil

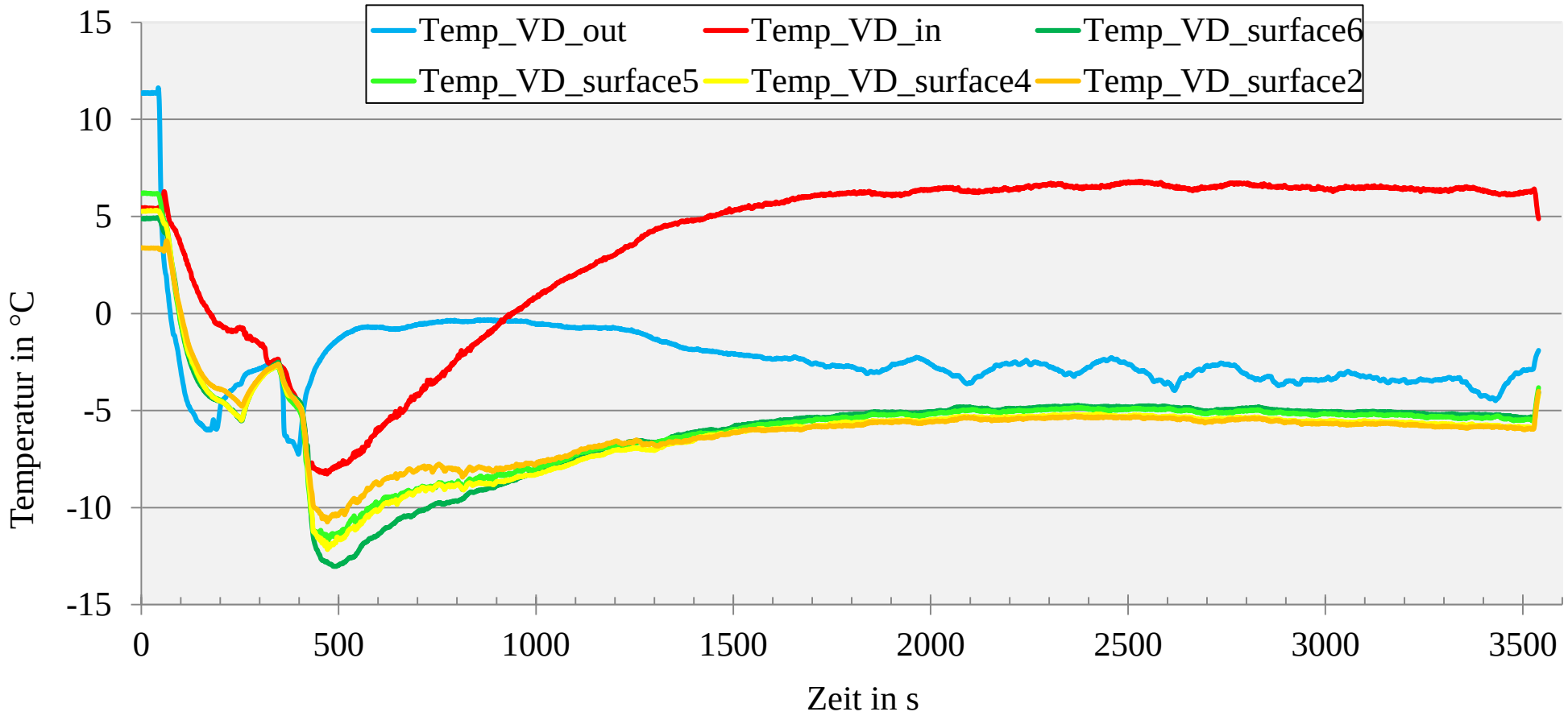


Elektrisch Vereisung

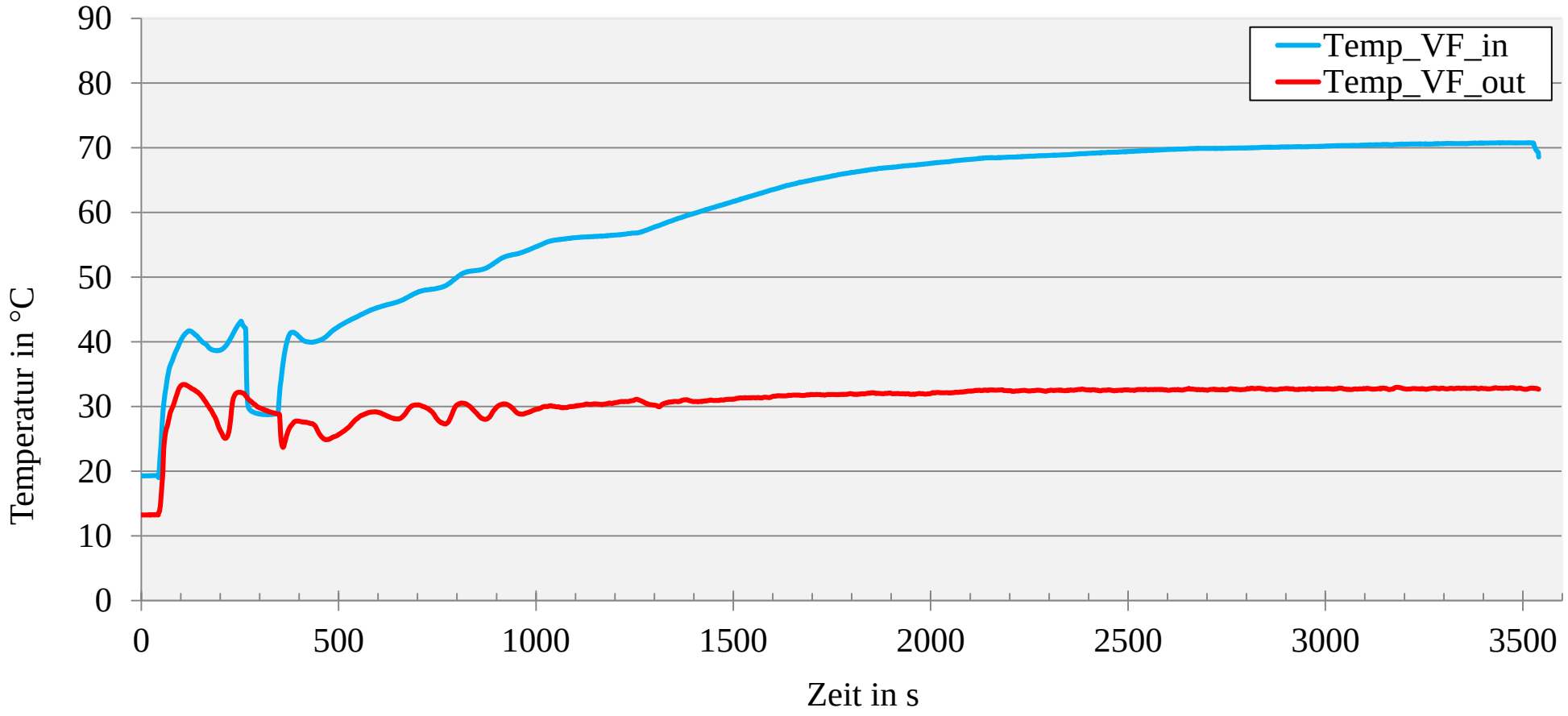
Enthalpie


Verflüssiger
Verdampfer
Kompressor
Wärmestrom in kW
20
15
10
5
0
-5
-10
-15
0
500
1000
1500
2000
2500
3000
3500
(Start Vereisung)
Zeit in s

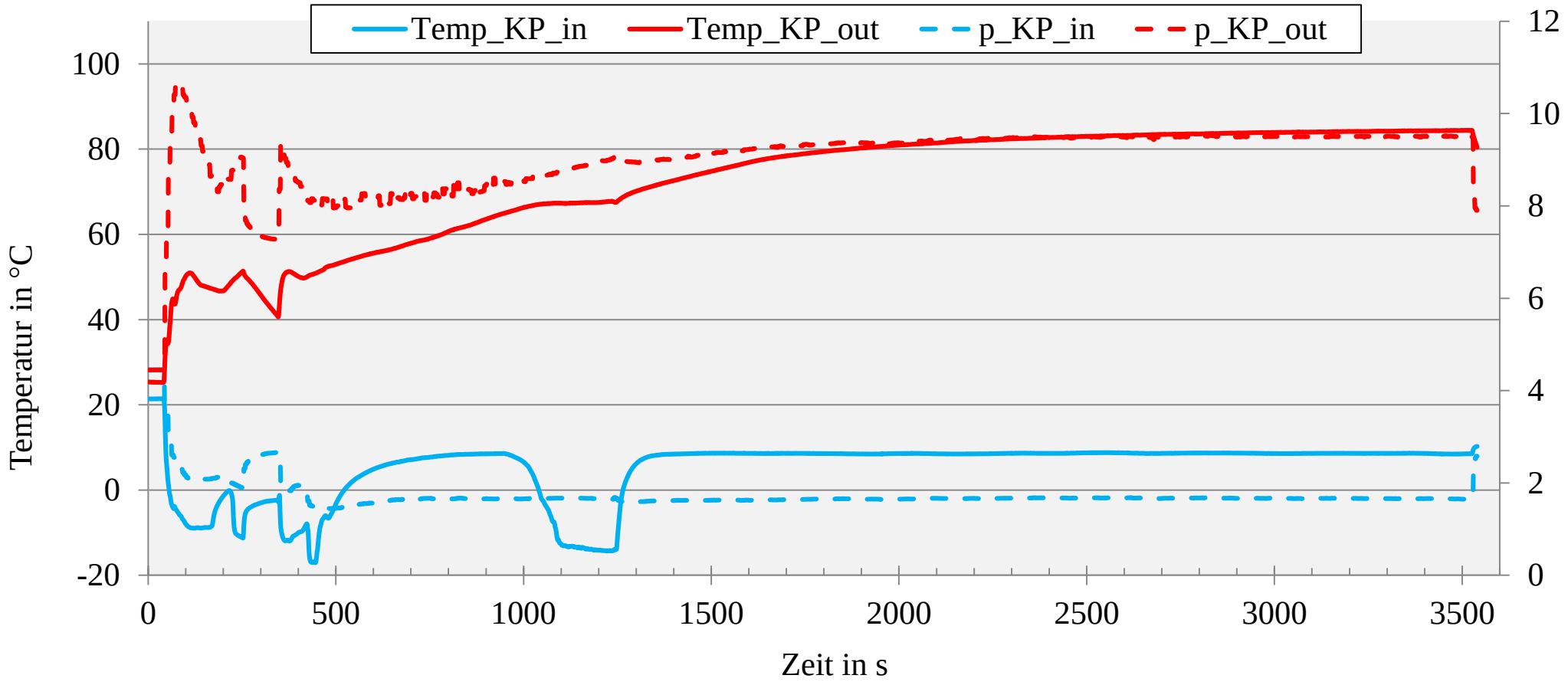
Verdampfer


Temp_VD_out
Temp_VD_in
Temp_VD_surface6
Temp_VD_surface5
Temp_VD_surface4
Temp_VD_surface2
15
10
5
0
-5
-10
-15
Temperatur in °C
0
500
1000
1500
2000
2500
3000
3500
Zeit in s

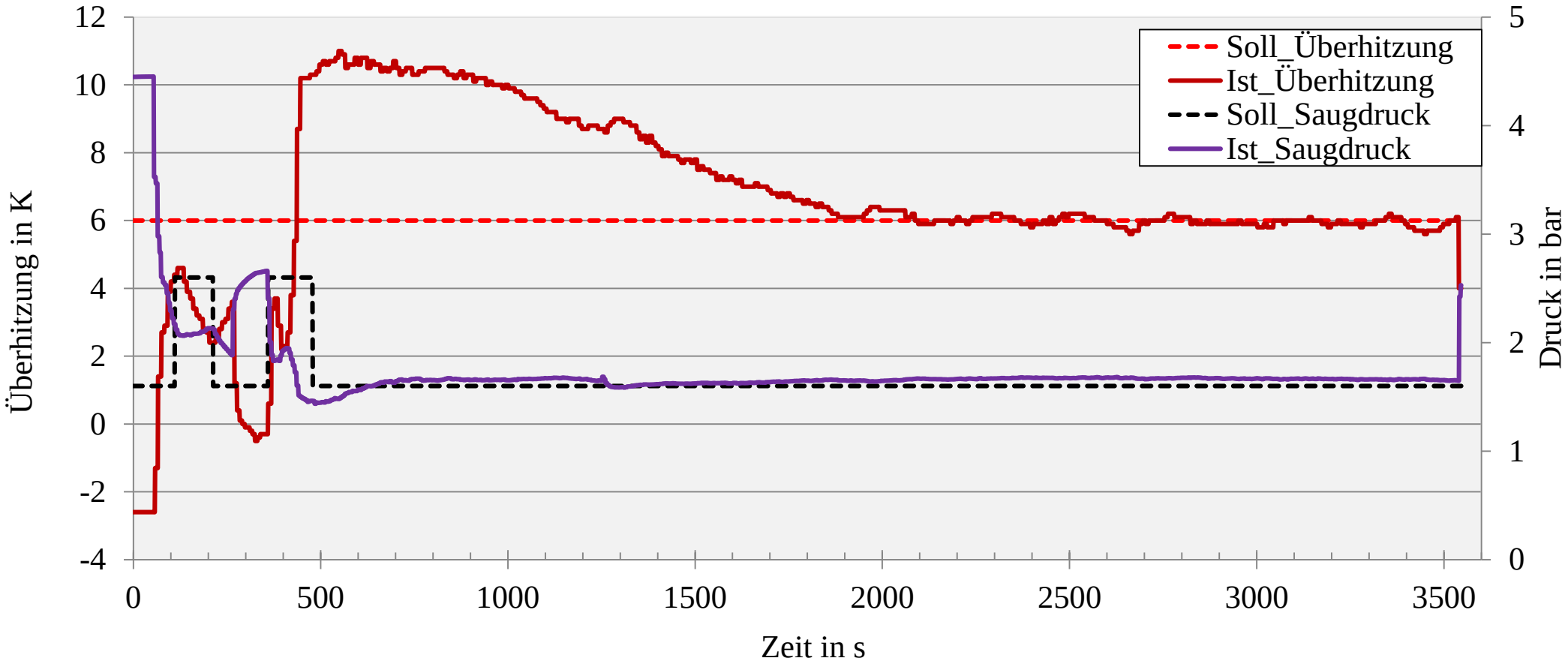
Verflüssiger



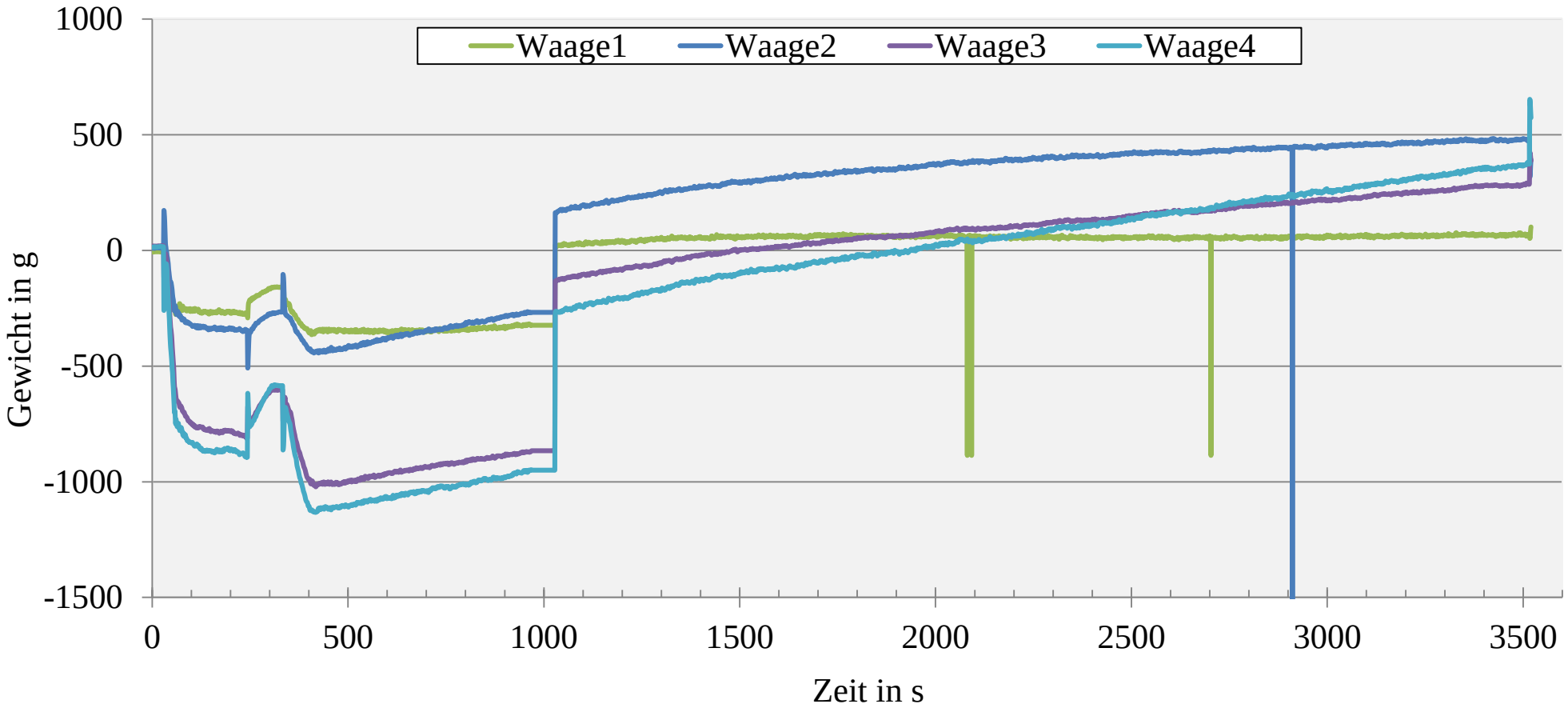
Kompressor

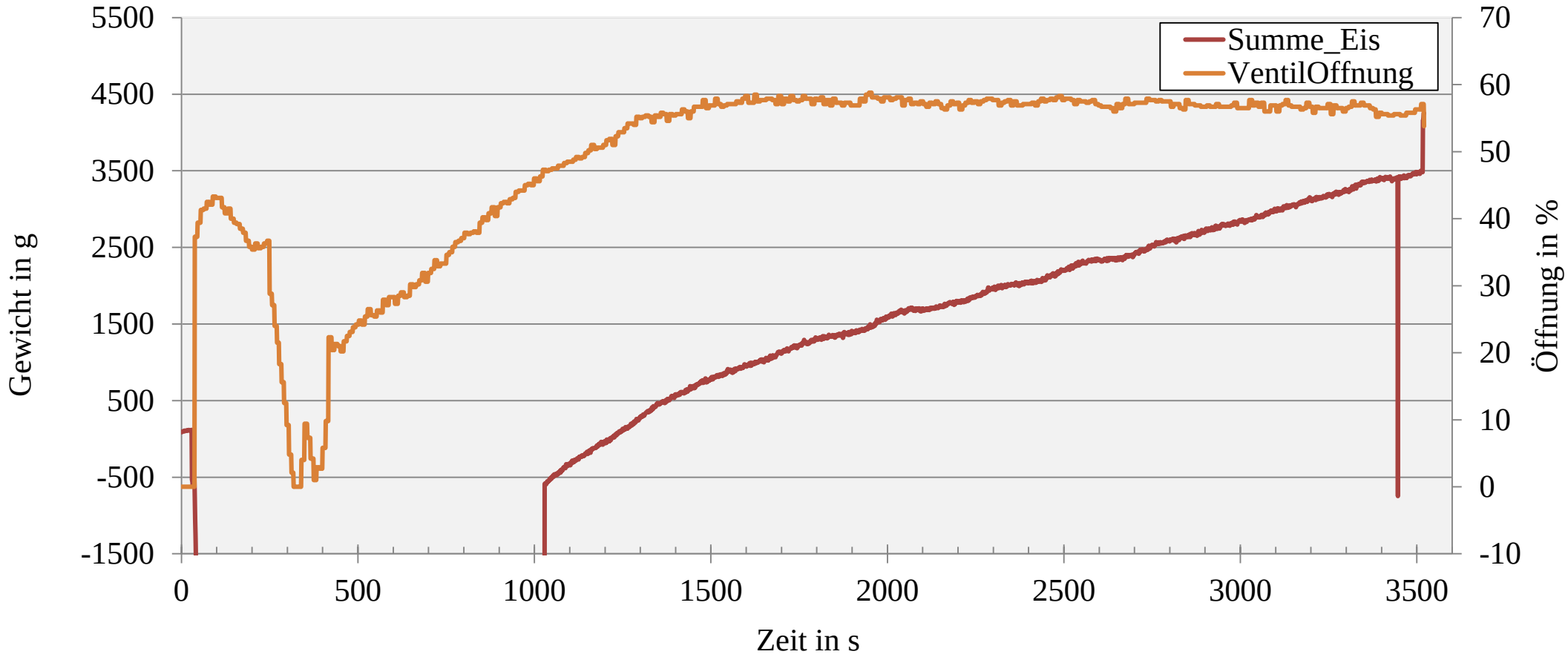

Temp_KP_in
Temp_KP_out
p_KP_in
p_KP_out
Temperatur in °C
Zeit in s
100
80
60
40
20
0
-20
0
500
1000
1500
2000
2500
3000
3500
12
10
8
6
4
2
0

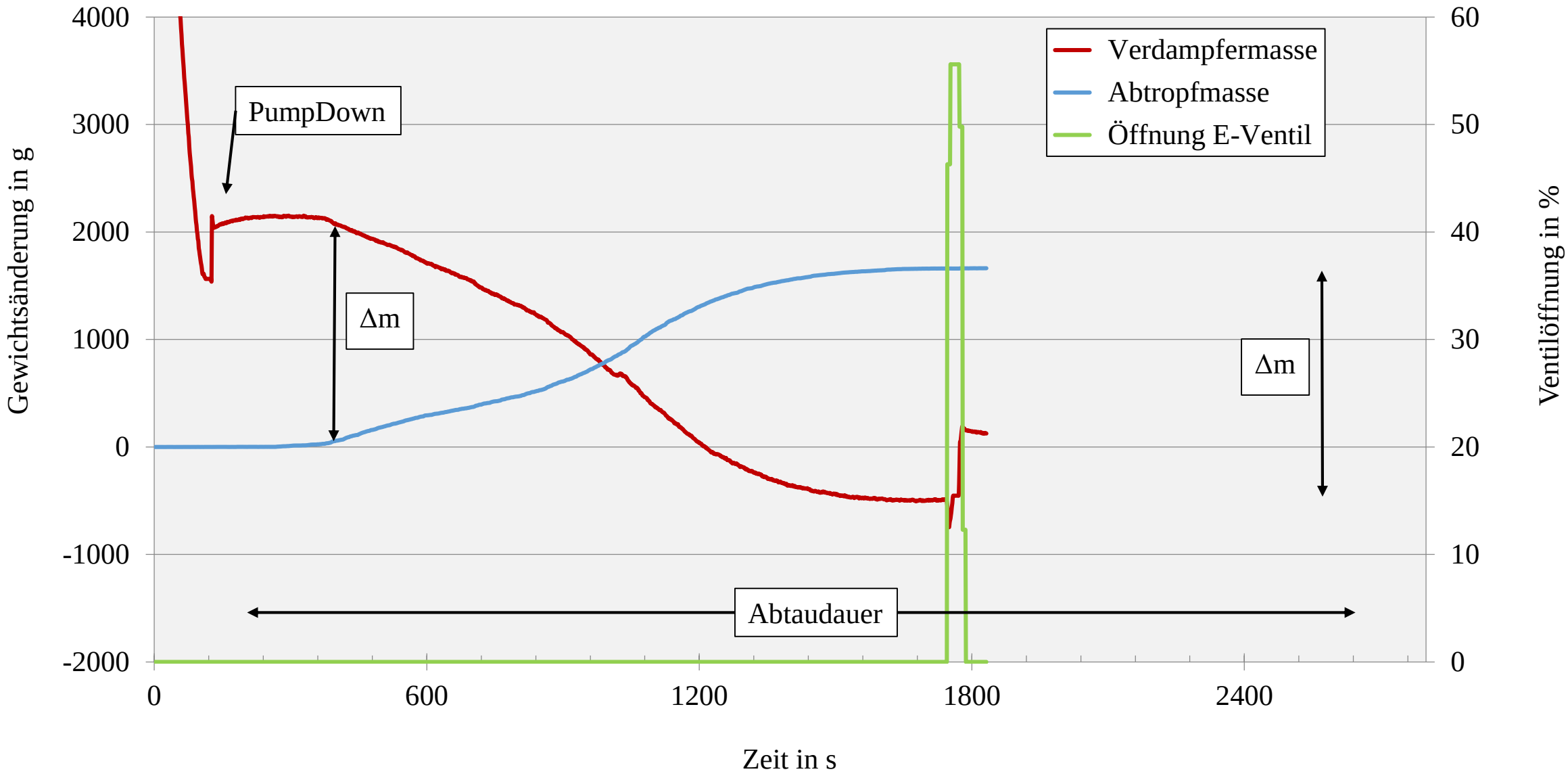
Regelung


Soll_Überhitzung
Ist_Überhitzung
Soll_Saugdruck
Ist_Saugdruck
Überhitzung in K
Druck in bar
Zeit in s
12
10
8
6
4
2
0
-2
-4
5
4
3
2
1
0
0
500
1000
1500
2000
2500
3000
3500

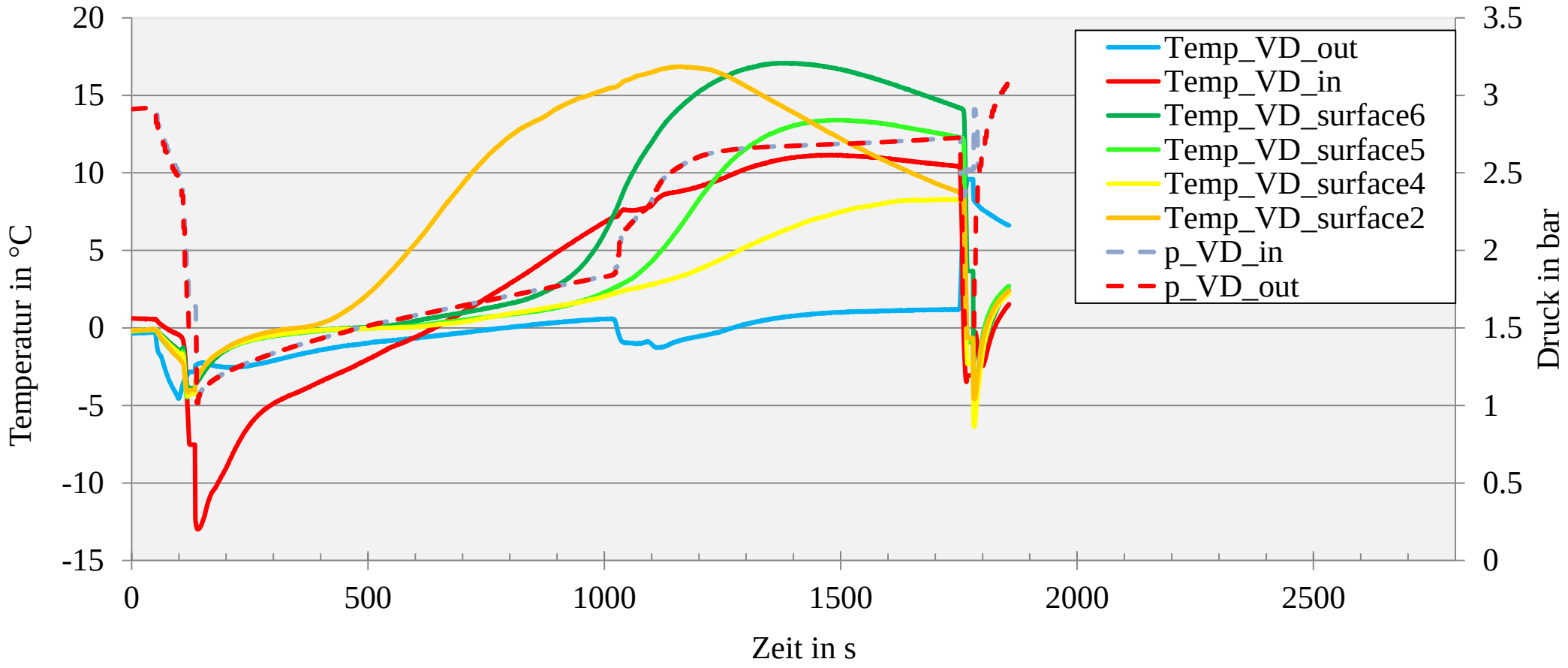
Waagen


Waage1
Waage2
Waage3
Waage4
1000
500
0
-500
-1000
-1500
Gewicht in g
0
500
1000
1500
2000
2500
3000
3500
Zeit in s


Summe_Eis
VentilOffnung
Gewicht in g
Öffnung in %
Zeit in s
5500
4500
3500
2500
1500
500
-500
-1500
70
60
50
40
30
20
10
0
-10
0
500
1000
1500
2000
2500
3000
3500


Verdampfermasse
Abtropfmasse
Öffnung E-Ventil
PumpDown
Δm
Δm
Abtaudauer
Gewichtsänderung in g
Ventilöffnung in %
Zeit in s
4000
3000
2000
1000
0
-1000
-2000
60
50
40
30
20
10
0
0
600
1200
1800
2400

Elektrisch Abtauen


Temperatur in °C
Druck in bar
Zeit in s
20
15
10
5
0
-5
-10
-15
3.5
3
2.5
2
1.5
1
0.5
0
0
500
1000
1500
2000
2500
Temp_VD_out
Temp_VD_in
Temp_VD_surface6
Temp_VD_surface5
Temp_VD_surface4
Temp_VD_surface2
p_VD_in
p_VD_out