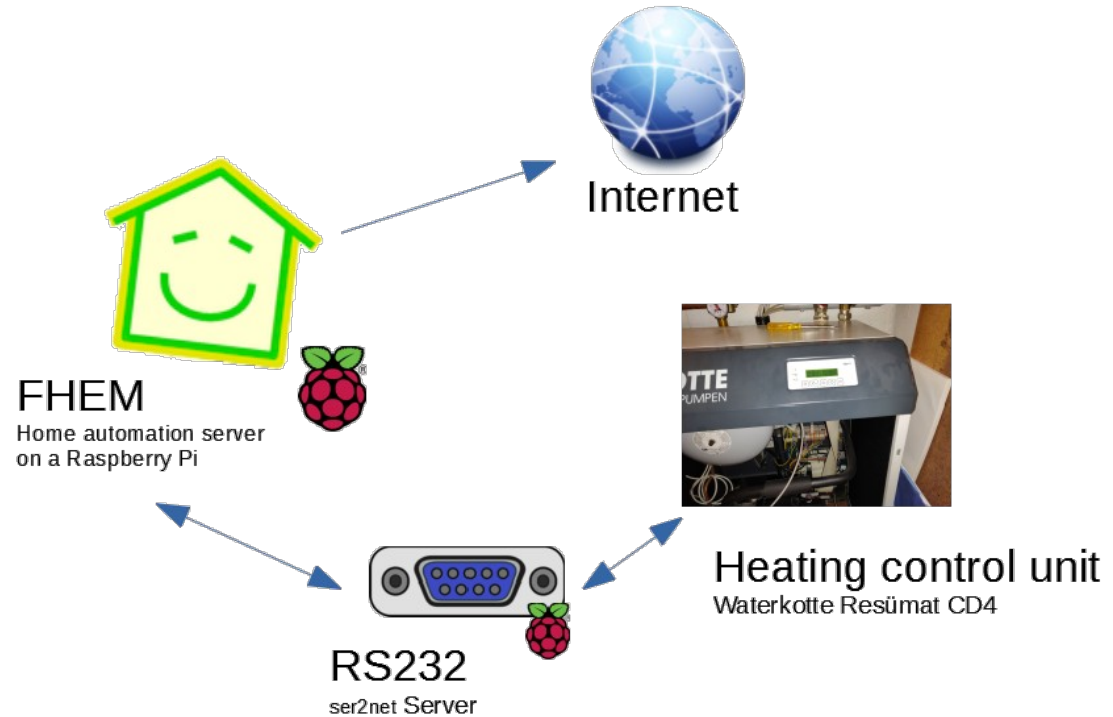


- Waterkotte „Resümat CD4“ (2002) as control unit
- RS232 serial port available
- Serial protocol uses hexadecimal data
- Already reverse engineered by people in online forums
- Protocol has read and write options
- Protocol uses a CRC-16 (checksum) with special parameters



10 02 01 15 0000 00FF 10 03 7C1A
START MODE OFFSET BYTES END CRC

Read 255 bytes starting from 0x00

Available modes:

- 01 15 Read
- 01 14 Set clock (time + date)
- 01 13 Write

CRC-16 (Hex)
CRC-16/BUYPASS

Poly: 0x8005
Init: 0x0000
LSB: 0x0000
Inp. rev: no
Res. rev: no
<https://crccalc.com>

Internet of Things

Manual analysis

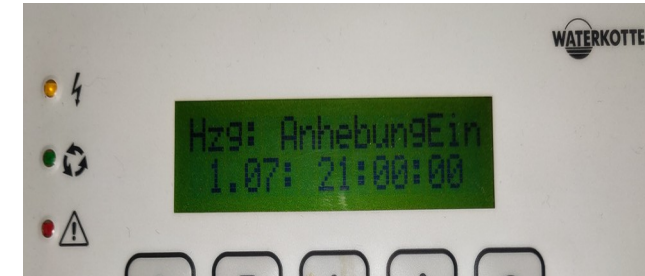
Cond: Read mem Start address Read x bytes after start DLE ETX CRC16, POL 8005 MTO USB0

Kennwort 99 → Mehr Infos
WATERKOTTE RESUMAT CD4

00000000	16	10	02	00	17	52	6C	83	3F	20	5C	3E	3F	7F	3C	84	3F	5F	EF	D5	41	E8	21	E4	41	71	2E	09	42	00	00	00	00	00	00	00	00	E0	B8	D4	
00000028	3E	16	55	22	C8	B5	08	39	C0	21	9E	F4	41	72	72	42	42	22	26	0F	1E	0C	12	1C	1E	08	07	09	01	2B	A1	EE	46	93	1F	C0	45	00	01	01	
00000050	01	01	01	01	5F	97	0F	47	00	00	00	00	00	00	00	00	26	D5	00	00	00	00	35	38	12	1C	02	10	10	40	2C	24	00	00	E1	C5	2E	41	70	B4	
00000078	12	3F	FE	67	C6	BF	57	C4	2B	40	EC	85	AD	41	2A	92	65	42	D0	CF	3F	42	30	BC	D7	41	00	00	00	00	00	00	00	00	01	00	00	02	A3	20	00
000000A0	20	00	00	00	02	00	00	00	00	00	03	01	04	1C	04	00	0C	0A	08	1E	0C	12	A6	23	00	00	D4	FF	7F	41	5A	00	B8	41	F2	FF	C7	41	00	00	
000000C8	00	00	00	00	18	00	00	15	00	00	05	5A	00	B8	41	00	02	00	00	C0	00	20	42	00	00	20	42	00	00	00	40	02	00	00	00	05	00	00	17		
000000F0	18	00	44	42	00	00	00	41	F5	FF	BF	40	00	00	00	3F	1F	3F	00	02	04	10	03	86	C6	16	1														

Handwritten analysis notes:

- Uhrzeit:** 23:02:56 (Offsets: 0x3b, 0x3a, 0x39)
- Datum:** 31.12.18 (Offsets: 0x3c, 0x3d, 0x3e)
- Versions-Datum:** 28.04.2000 (Offsets: 0x1c, 0x1d, 0x1e)
- Messbeginn-Zeit:** HH:MM:SS (Offsets: 0x41, 0x40, 0x3f)
- Messbeginn-Datum:** DD.MM.YY (Offsets: 0x42, 0x43, 0x44)
- Ausfall-Zeit:** HH:MM:SS (Offsets: 0x67, 0x66, 0x65)
- Ausfall-Datum:** DD.MM.YY (Offsets: 0x6a, 0x6b, 0x6c)
- 1.07 Anhebung Ein** (Highlighted in red box, Offsets: 0xcf, 0xce, 0xcd)
- 1.07 Anhebung Aus** (Offsets: 0x42, 0x41, 0x40)
- 1.06 Zeit Aus** (Offsets: 0x6e, 0x6b, 0x6d)
- 1.07 Zeit Ein** (Offsets: 0xc9, 0xc8, 0xc7)
- 2.07 Ww Zeit Ein** (Offsets: 0xec, 0xeb, 0xea)
- 2.02 Ww Zeit Aus** (Offsets: 0xef, 0xee, 0xed)
- 3.07 Kompr Beginn-Zeit** (Offsets: 0x5b, 0x4f, 0x4e)
- 3.08 Kompr Beginn Datum** (Offsets: 0x51, 0x52, 0x53)
- 6.00 Kennwort** 0x99 01



- Finding out offsets/addresses by comparing hex data with values on the display
- Floats: IEEE 754 (little endian)
- Used hex editor: Bless

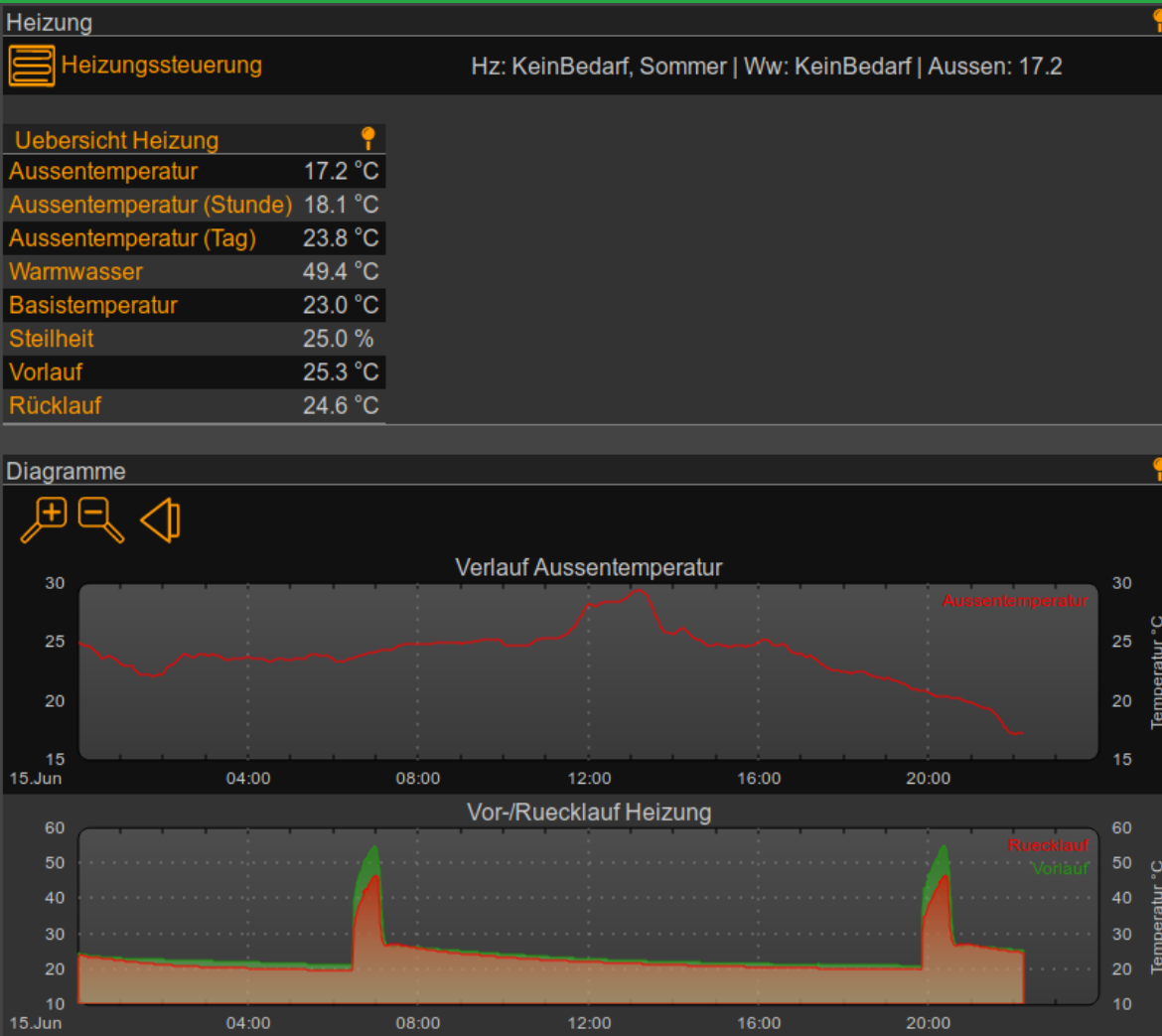
Feldname	Menünummer	Adresse	Länge	Typ
Temp-Aussen	0.00	0	4	f
Temp-Aussen-24h	0.01	4	4	f
Temp-Aussen-1h	0.02	8	4	f
Temp-Ruecklauf-Soll	0.03	0C	4	f
Temp-Ruecklauf	0.04	10	4	f
Temp-Vorlauf	0.05	14	4	f
Temp-Raum	0.06	18	4	f
Temp-Raum-1h	0.07	1C	4	f
Temp-WQuelle-Ein	0.08	20	4	f
Temp-WQuelle-Aus	0.09	24	4	f
Temp-Verdampfer	0.10	28	4	f
Temp-Kondensator	0.11	2C	4	f
Ww-Temp	2.03	30	4	f
Uhrzeit	3.00	34	3	t
Datum	3.01	37	3	d
Messbeginn-Zeit	3.02	3A	3	t
Messbeginn-Datum	3.03	3D	3	d
Hz-Messergebnis	3.04	41	4	f
Ww-Messergebnis	3.05	44	4	f
Mess-Reset	3.06	48	1	c
KomprBeginn-Zeit	3.07	49	3	t
KomprBeginn-Datum	3.08	4C	3	d
KomprBetrStunden	3.09	4F	4	f
Kompr-Mess-Reset	3.10	53	1	c
Unterbrechungen	4.00	54	1	b
Warnung-Eingang	4.01	55	1	b
Warnung-Ausgang	4.02	56	1	b
Warnung-Sonstige	4.03	57	1	b
Ausfaelle	4.04	58	1	b
Fuehler-Ausfall	4.05	59	1	b
Fuehler-KurzSchl	4.06	5A	1	b
FuehlerZaehler0	4.07	5B	2	n
FuehlRaum-Ausfall	4.08	5D	1	b
FuehlRaum-KurzSchl	4.09	5E	1	b
FuehlRaum-Zaehler0	4.10	5F	2	n
Ausfall-Zeit	5.00	61	3	t
Ausfall-Datum	5.01	64	3	d
Ausfall-Betriebszust.	5.02	67	1	b
Ausfall-Do-Buffer	5.03	68	1	b
Ausfall-Di-Buffer	5.04	69	1	b
Ausfall-Fuehl/Ausfall	5.05	6A	1	b

- Inserting the new addresses into the FHEM plugin (Perl)
- Add some own improvements (writing special fields)

```
my %frameReadings = (  
  'Temp-Aussen'          => { addr => 0x000, bytes => 0x004,  
                               menu => '0.00', fmat => '%0.1f', unp => 'f<' },  
  
  'Temp-Ruecklauf-Soll'  => { addr => 0x00C, bytes => 0x004,  
                               menu => '0.03', fmat => '%0.1f', unp => 'f<' },  
  
  'Temp-Ruecklauf'       => { addr => 0x010, bytes => 0x004,  
                               menu => '0.04', fmat => '%0.1f', unp => 'f<' },  
  
  'Temp-Vorlauf'         => { addr => 0x014, bytes => 0x004,  
                               menu => '0.05', fmat => '%0.1f', unp => 'f<' }  
);
```

- FHEM plugin requests and processes heating data every minute

{ JavaScript source code
for refreshing the chart/slider. }



Thanks for your
attention!

Further questions?

Sources:

- Private knowledge
- <https://www.iotforall.com>
- <https://www.wired.co.uk>
- <https://www.pocket-lint.com>
- <https://digibusters.com>
- <https://www.sap.com>