

Test Program for a Profibus connection Thermo-6 / Thermo-5 to Siemens S7-300**Contents**

| | | |
|----------|--|----------|
| 1 | Introduction | 2 |
| 2 | Content | 2 |
| 3 | STEP-7 Projects | 2 |
| 3.1 | Insert a CPU 315-2 DP | 2 |
| 3.2 | GSD-File installed..... | 3 |
| 3.3 | Insert the station HB-Therm USR-51 as DP-Slave | 3 |
| 3.4 | Configure station..... | 4 |
| 3.5 | Read the input ports | 5 |
| 3.5.1 | Device DB11 | 6 |
| 3.6 | Output to the temperature control unit | 7 |
| 3.6.1 | Device DB10 | 8 |
| 3.7 | Panel | 9 |
| 3.8 | Settings on the temperature control unit | 9 |
| 3.8.1 | Thermo-6 / Gate-6 | 9 |
| 3.9 | Thermo-5 | 9 |

1 Introduction

This example of use assumes knowledge in the programming language STEP 7 with Profibus and in the operation of a Thermo-5 temperature control unit. This test program can be used for only a Thermo-6 and Thermo-5 temperature control unit.

The following instruction manuals provide further details:

- Instruction Manual for temperature control units
- Description Profibus interface (O8316-X, X=language)

2 Content

STEP 7 projects include a S7-300 with one CPU 315-2 DP and Thermo-5 temperature control unit. The communication is implemented via Profibus-DP (Master-Slave).

There exist the following examples:

- 1 Thermo-5 Unit: HB-THERM_K1M1_jjmm.ZIP ¹⁾
- 4 Thermo-5 Units: HB-THERM_K4M1_jjmm.ZIP ^{1) 2)}
- 16 Thermo-5 Units: HB-THERM_K4M4_jjmm.ZIP ^{1) 3)}

The projects must be unzipped in the SIMATIC Manager.

Note:

The test program was initially checked on the following Siemens S7 hardware versions:

- CPU 315-2 DP 6ES7 315-2AH14-0AB0

There is no guarantee for proper function of the test program in case of other Siemens S7 hardware versions. If there are problems by using hardware versions not listed above, please contact the Siemens Support Office directly.

3 STEP-7 Projects

3.1 Insert a CPU 315-2 DP

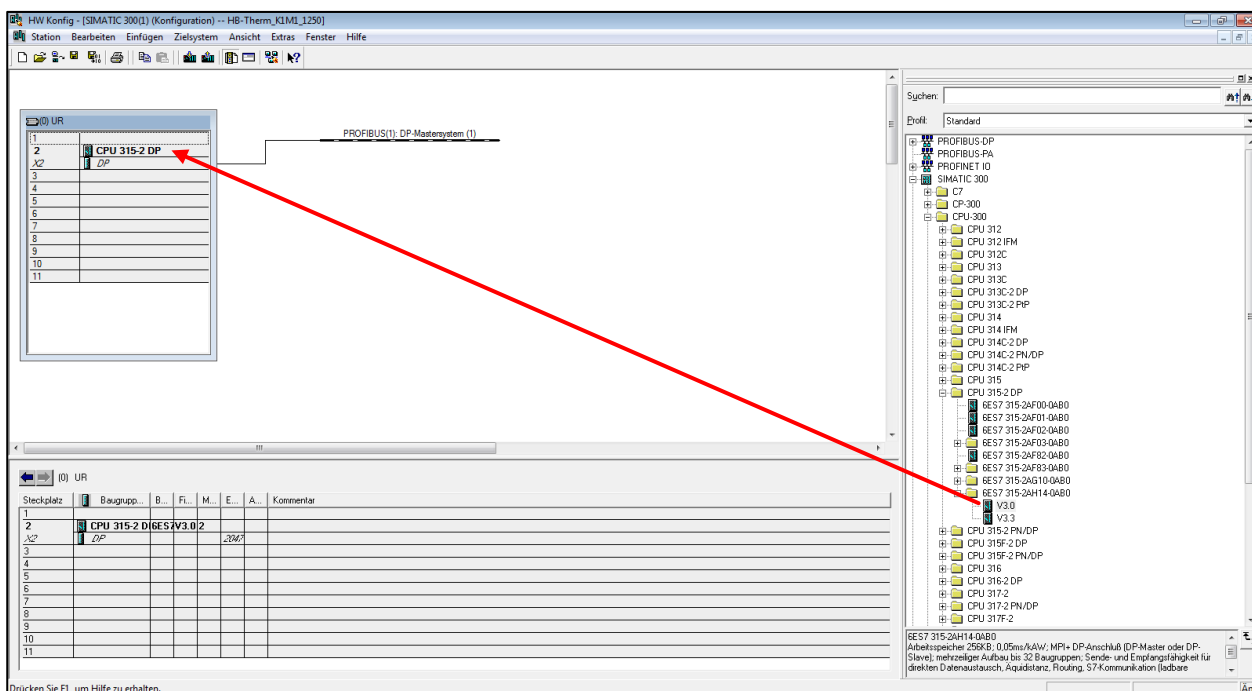


Figure 1: Insert CPU 315-2DP

¹ K_ = Number of Profibus node, M_ = Number of units per module Profibus node, jjmm = version

² 1 Single unit with 3 Modular units

³ 1 Single unit with 15 Modular units

3.2 GSD-File installed

If you already work with an existing GSD-file, please check under <https://knowledge.hb-therm.eu> if the version matches with the actual one.

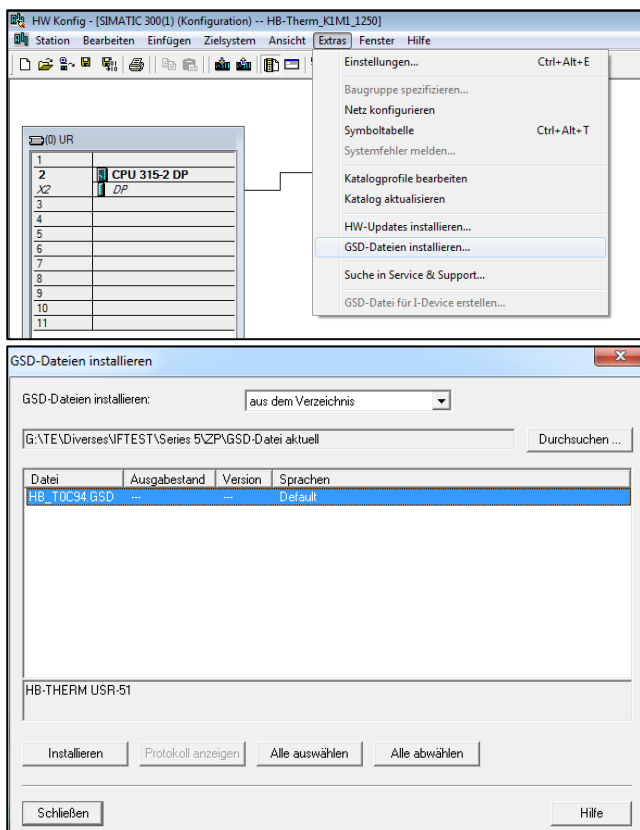


Figure 2: Install GSD-file

3.3 Insert the station HB-Therm USR-51 as DP-Slave

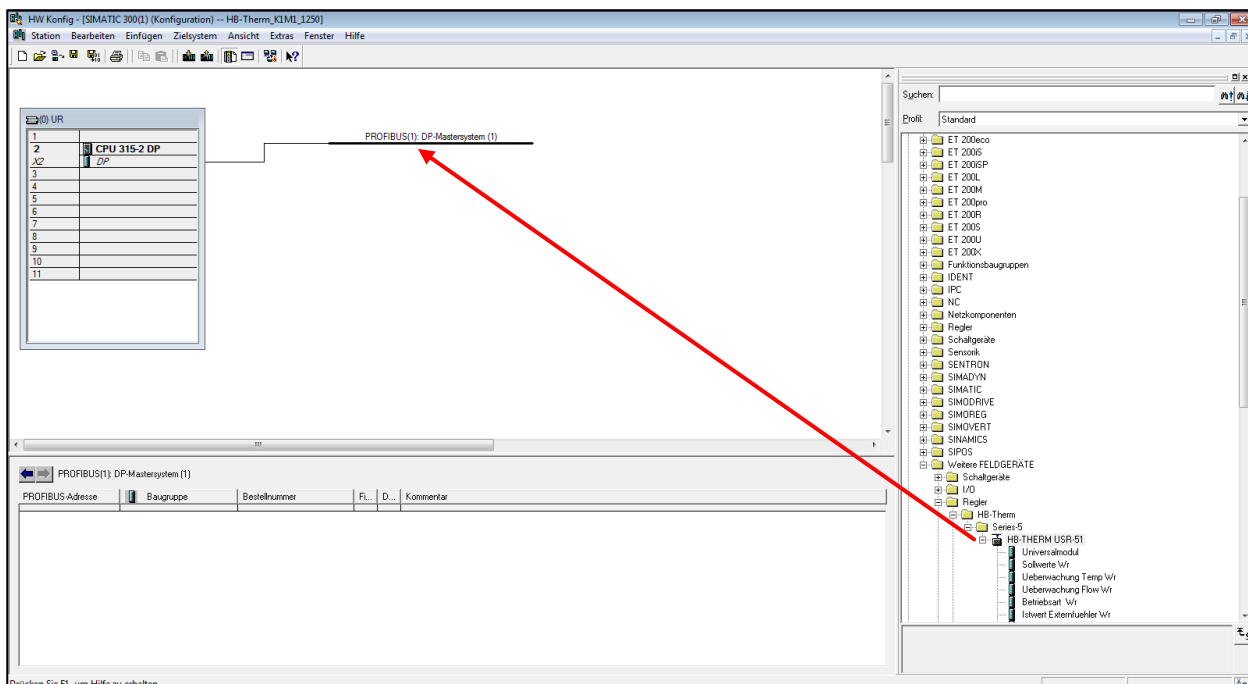


Figure 3: Insert station

3.4 Configure station

- Set the address of the slave (in this case no 5)
- Insert the object HB-THERM USR 51 and set the I/O address (in this case I/O after 256)

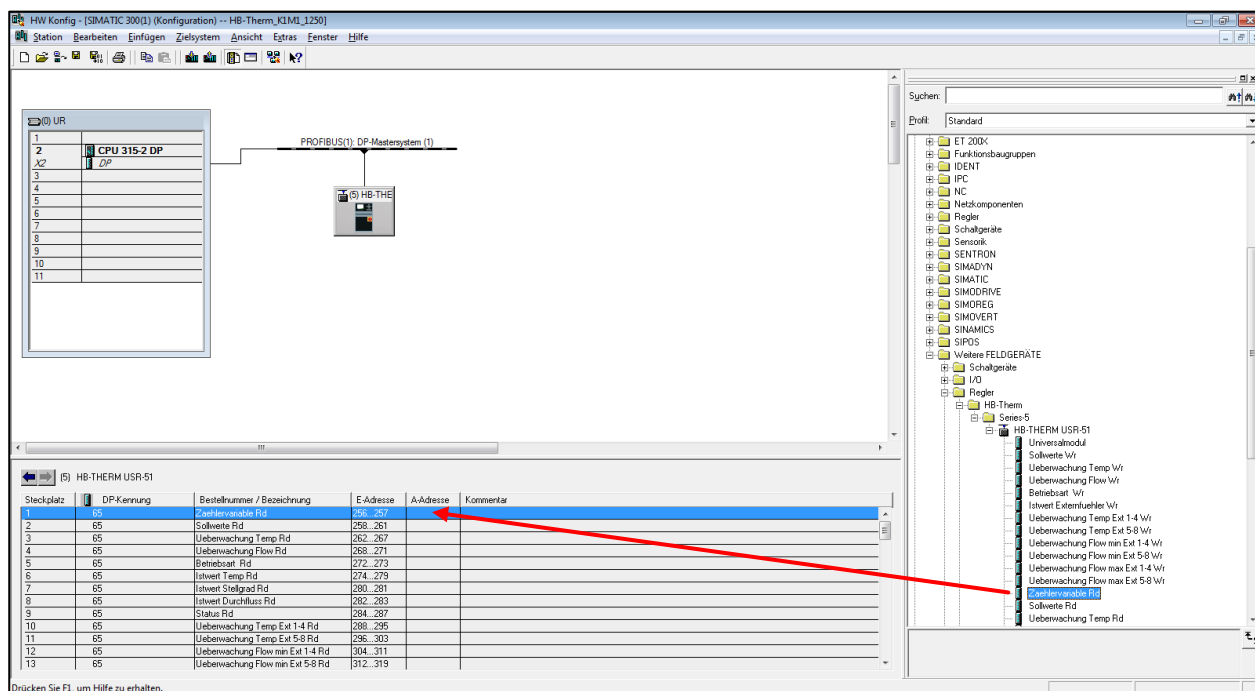


Figure 4: Settings

- The value of ModuleNumber must correspond to the remote control address (address) of the temperature control unit you want to communicate with.
- For communication with multiple units over one Profibus Node the modules of the GSD-file are to implement several times.

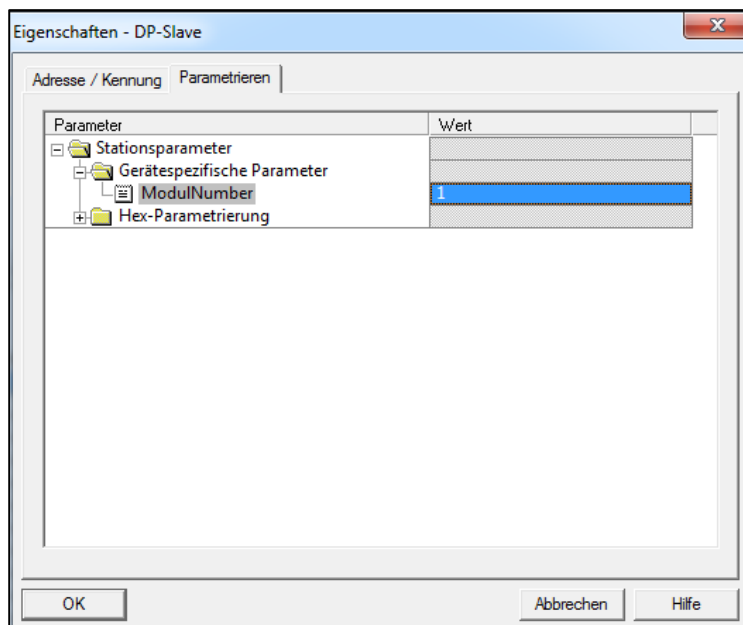


Figure 5: Configure station

3.5 Read the input ports

The data is read from the input ports and saved to the device DB11 for further processing.

```

OBI : "Main Program Sweep (Cycle)"
Kommentar:
*****: Reading inputs from HS-THERM
Kommentar:

// Counter variable poll
L FEW 256
T "DB11".Zaehlervariable          DB11.DBW0      -- Counter variable poll, Range 0 - ffffH

// Nominal value 1
L FEW 258
T "DB11".Sollwert_1              DB11.DBW2      -- Nominal value 1, Unit 0,1°C, Range 0-4000

// Nominal value 2
L FEW 260
T "DB11".Sollwert_2              DB11.DBW4      -- Nominal value 2, Unit 0,1°C, Range 0-4000

// Valid upper deviation nominal / actual value
L FEW 262
T "DB11".Abweichung_oben         DB11.DBW6      -- Valid upper deviation nominal / actual value, Unit 0,1K, Range 0-4000

// Valid lower deviation nominal / actual value
L FEW 264
T "DB11".Abweichung_unten        DB11.DBW8      -- Valid lower deviation nominal / actual value, Unit 0,1K, Range 0-4000

// Valid temperature difference main / return line
L FEW 266
T "DB11".Temp_Diff_Vor_Ruecklauf DB11.DBW10     -- Valid temperature difference main / return line, Unit 0,1K, Range 0-4000

// Valid minimum flow rate
L FEW 268
T "DB11".Durchfluss_minimum     DB11.DBW12     -- Valid minimum flow rate, Unit L/min, Range 0 - 1000

// Valid maximum flow rate
L FEW 270
T "DB11".Durchfluss_maximum     DB11.DBW14     -- Valid maximum flow rate, Unit L/min, Range 0 - 1000

// Operating mode set (Bit-Values)
L FEW 272
T DB11.DBW 16

// Actual temperature main line
L FEW 274
T "DB11".Istwert_Vorlauf         DB11.DBW18     -- Actual temperature main line, Unit 0,1°C, Range 0-4000

// Actual temperature return line
L FEW 276
T "DB11".Istwert_Ruecklauf       DB11.DBW20     -- Actual temperature return line, Unit 0,1°C, Range 0-4000

// Actual temperature external sensor
L FEW 278
T "DB11".Istwert_extern          DB11.DBW22     -- Actual temperature external sensor, Unit 0,1°C, Range 0-4000

// Actual regulation ratio
L FEW 280
T "DB11".Stellgrad               DB11.DBW24     -- Actual regulation ratio, Unit %, Range -100 - +100

// Actual flow rate
L FEW 282
T "DB11".Durchfluss              DB11.DBW26     -- Actual flow rate, Unit L/min, Range 0 - 1000

// Status Operating mode (Bit-Values)
L FEW 284
T DB11.DBW 28

// Status alarms (Bit-Values)
L FEW 286
T DB11.DBW 30

// Temperatur Differenz Vorlauf Ruecklauf Ext. 1-8
L FEW 288
T "DB11".Temp_Diff_VL_RL_Ext1    DB11.DBW32     -- Zulässige TempDiff Vor/Rücklauf ext.1, Unit 0,1 K, Range 0-4000
L FEW 290
T "DB11".Temp_Diff_VL_RL_Ext2    DB11.DBW34     -- Zulässige TempDiff Vor/Rücklauf ext.2, Unit 0,1 K, Range 0-4000
L FEW 292
T "DB11".Temp_Diff_VL_RL_Ext3    DB11.DBW36     -- Zulässige TempDiff Vor/Rücklauf ext.3, Unit 0,1 K, Range 0-4000
L FEW 294
T "DB11".Temp_Diff_VL_RL_Ext4    DB11.DBW38     -- Zulässige TempDiff Vor/Rücklauf ext.4, Unit 0,1 K, Range 0-4000

// Durchfluss minimum ext. 1-8
L FEW 304
T "DB11".Durchfluss_minimum_Ext1 DB11.DBW48     -- Durchfluss minimum ext. 1, Unit 0,1 L/min, Range 0-4000
L FEW 306
T "DB11".Durchfluss_minimum_Ext2 DB11.DBW50     -- Durchfluss minimum ext. 2, Unit 0,1 L/min, Range 0-4000
L FEW 308
T "DB11".Durchfluss_minimum_Ext3 DB11.DBW52     -- Durchfluss minimum ext. 3, Unit 0,1 L/min, Range 0-4000
L FEW 310
T "DB11".Durchfluss_minimum_Ext4 DB11.DBW54     -- Durchfluss minimum ext. 4, Unit 0,1 L/min, Range 0-4000

// Durchfluss maximum ext. 1-8
L FEW 320
T "DB11".Durchfluss_maximum_Ext1 DB11.DBW64     -- Durchfluss maximum ext. 1, Unit 0,1 L/min, Range 0-4000
L FEW 322
T "DB11".Durchfluss_maximum_Ext2 DB11.DBW66     -- Durchfluss maximum ext. 2, Unit 0,1 L/min, Range 0-4000
L FEW 324
T "DB11".Durchfluss_maximum_Ext3 DB11.DBW68     -- Durchfluss maximum ext. 3, Unit 0,1 L/min, Range 0-4000
L FEW 326
T "DB11".Durchfluss_maximum_Ext4 DB11.DBW70     -- Durchfluss maximum ext. 4, Unit 0,1 L/min, Range 0-4000

// Istwert Ruecklauf Temperatur ext. 1-8
L FEW 336
T "DB11".Istwert_Ruecklauf_Ext1  DB11.DBW80     -- Istwert Rücklauf ext. 1, Unit 0,1 °C, Range 0-4000
L FEW 338
T "DB11".Istwert_Ruecklauf_Ext2  DB11.DBW82     -- Istwert Rücklauf ext. 2, Unit 0,1 °C, Range 0-4000
L FEW 340
T "DB11".Istwert_Ruecklauf_Ext3  DB11.DBW84     -- Istwert Rücklauf ext. 3, Unit 0,1 °C, Range 0-4000
L FEW 342
T "DB11".Istwert_Ruecklauf_Ext4  DB11.DBW86     -- Istwert Rücklauf ext. 4, Unit 0,1 °C, Range 0-4000

// Durchfluss ext. 1-8
L FEW 352
T "DB11".Durchfluss_Ext1         DB11.DBW96     -- Durchfluss ext. 1, Unit 0,1 L/min, Range 0-4000
L FEW 354
T "DB11".Durchfluss_Ext2         DB11.DBW98     -- Durchfluss ext. 2, Unit 0,1 L/min, Range 0-4000
L FEW 356
T "DB11".Durchfluss_Ext3         DB11.DBW100     -- Durchfluss ext. 3, Unit 0,1 L/min, Range 0-4000
L FEW 358
T "DB11".Durchfluss_Ext4         DB11.DBW102     -- Durchfluss ext. 4, Unit 0,1 L/min, Range 0-4000
L FEW 360
T "DB11".Durchfluss_Ext5         DB11.DBW104     -- Durchfluss ext. 5, Unit 0,1 L/min, Range 0-4000
L FEW 362
T "DB11".Durchfluss_Ext6         DB11.DBW106     -- Durchfluss ext. 6, Unit 0,1 L/min, Range 0-4000
L FEW 364
T "DB11".Durchfluss_Ext7         DB11.DBW108     -- Durchfluss ext. 7, Unit 0,1 L/min, Range 0-4000
L FEW 366
T "DB11".Durchfluss_Ext8         DB11.DBW110     -- Durchfluss ext. 8, Unit 0,1 L/min, Range 0-4000

```

Figure 6: Read the input ports

3.5.1 Device DB11

Address space assignment of the input ports

| Adresse | Name | Typ | Anfangswert | Kommentar |
|---------|--------------------------|------------|-------------|--|
| 0x0 | | STRUCT | | |
| +0.0 | Zaehlervariable | WORD | #16#0 | Counter variable poll, Range 0 - ffffh |
| +2.0 | Sollwert_1 | INT | 0 | Nominal value 1, Unit 0,1°C, Range 0-4000 |
| +4.0 | Sollwert_2 | INT | 0 | Nominal value 2, Unit 0,1°C, Range 0-4000 |
| +6.0 | Abweichung_oben | INT | 0 | Valid upper deviation nominal / actual value, Unit 0,1K, Range 0-4000 |
| +8.0 | Abweichung_unten | INT | 0 | Valid lower deviation nominal / actual value, Unit 0,1K, Range 0-4000 |
| +10.0 | Temp_Diff_Vor_Ruecklauf | INT | 0 | Valid temperature difference main / return line, Unit 0,1K, Range 0-4000 |
| +12.0 | Durchfluss_minimum | INT | 0 | Valid minimum flow rate, Unit L/min, Range 0 - 1000 |
| +14.0 | Durchfluss_maximum | INT | 0 | Valid maximum flow rate, Unit L/min, Range 0 - 1000 |
| +16.0 | BA_Alarm_Reset | BOOL | FALSE | Operating mode: Alarm reset (for acknowledging P- / M-alarms) |
| +16.1 | BA_Bit_9_Reserve | BOOL | FALSE | Operating mode: Bit 9 Reserve |
| +16.2 | BA_Bit_10_Reserve | BOOL | FALSE | Operating mode: Bit 10 Reserve |
| +16.3 | BA_Bit_11_Reserve | BOOL | FALSE | Operating mode: Bit 11 Reserve |
| +16.4 | BA_Bit_12_Reserve | BOOL | FALSE | Operating mode: Bit 12 Reserve |
| +16.5 | BA_Bit_13_Reserve | BOOL | FALSE | Operating mode: Bit 13 Reserve |
| +16.6 | BA_Bit_14_Reserve | BOOL | FALSE | Operating mode: Bit 14 Reserve |
| +16.7 | BA_Watchdog | BOOL | FALSE | Operating mode: Watchdog |
| +17.0 | BA_Geraet_Ein_Aus | BOOL | FALSE | Operating mode: Unit ON/OFF |
| +17.1 | BA_Abkuehlen_Ein_Aus | BOOL | FALSE | Operating mode: Cooling ON/OFF |
| +17.2 | BA_Foermentierung_Ein_A | BOOL | FALSE | Operating mode: Mould evacuation ON/OFF |
| +17.3 | BA_Leckstopbetrieb_Ein_A | BOOL | FALSE | Operating mode: Leak stopper ON/OFF |
| +17.4 | BA_Externfuehler_Ein_Aus | BOOL | FALSE | Operating mode: External sensor ON/OFF |
| +17.5 | BA_2_Sollwert_Ein_Aus | BOOL | FALSE | Operating mode: 2nd nominal value ON/OFF |
| +17.6 | BA_Bit_6_Reserve | BOOL | FALSE | Operating mode: Bit 6 Reserve |
| +17.7 | BA_Bit_7_Reserve | BOOL | FALSE | Operating mode: Bit 7 Reserve |
| +18.0 | Istwert_Vorlauf | INT | 0 | Actual temperature main line, Unit 0,1°C, Range 0-4000 |
| +20.0 | Istwert_Ruecklauf | INT | 0 | Actual temperature return line, Unit 0,1°C, Range 0-4000 |
| +22.0 | Istwert_extern | INT | 0 | Actual temperature external sensor, Unit 0,1°C, Range 0-4000 |
| +24.0 | Stellgrad | INT | 0 | Actual regulation ratio, Unit %, Range -100 - +100 |
| +26.0 | Durchfluss | INT | 0 | Actual flow rate, Unit L/min, Range 0 - 1000 |
| +28.0 | SBA_Sammelalarm_Prozess | BOOL | FALSE | Status operating mode: Common alarm Process (P) |
| +28.1 | SBA_Sammelalarm_Geraet | BOOL | FALSE | Status operating mode: Common alarm Unit (M) |
| +28.2 | SBA_Sammelalarm_Bedien | BOOL | FALSE | Status operating mode: Common alarm Operation (B) |
| +28.3 | SBA_Bit_11_Reserve | BOOL | FALSE | Status operating mode: Bit 11 Reserve |
| +28.4 | SBA_Bit_12_Reserve | BOOL | FALSE | Status operating mode: Bit 12 Reserve |
| +28.5 | SBA_Bit_13_Reserve | BOOL | FALSE | Status operating mode: Bit 13 Reserve |
| +28.6 | SBA_Bit_14_Reserve | BOOL | FALSE | Status operating mode: Bit 14 Reserve |
| +28.7 | SBA_Bit_15_Reserve | BOOL | FALSE | Status operating mode: Bit 15 Reserve |
| +29.0 | SBA_Geraet_Ein_Aus | BOOL | FALSE | Status operating mode: Unit ON/OFF |
| +29.1 | SBA_Abkuehlen_Ein_Aus | BOOL | FALSE | Status operating mode: Cooling ON/OFF |
| +29.2 | SBA_Foermentierung_Ein_A | BOOL | FALSE | Status operating mode: Mould evacuation ON/OFF |
| +29.3 | SBA_Leckstopbetrieb_E_A | BOOL | FALSE | Status operating mode: Leak stopper ON/OFF |
| +29.4 | SBA_Externfuehler_Ein_A | BOOL | FALSE | Status operating mode: External sensor ON/OFF |
| +29.5 | SBA_2_Sollwert_Ein_Aus | BOOL | FALSE | Status operating mode: 2nd nominal value ON/OFF |
| +29.6 | SBA_Fernsteuerbetrieb_EA | BOOL | FALSE | Status operating mode: Remote control operation ON/OFF |
| +29.7 | SBA_Bit_6_Reserve | BOOL | FALSE | Status operating mode: Bit 6 Reserve |
| +30.0 | SA_Uebertemperatur | BOOL | FALSE | Status alarms: Malfunction overtemperature (M) |
| +30.1 | SA_Fuehlerbruch | BOOL | FALSE | Status alarms: Malfunction sensor break (M) |
| +30.2 | SA_Nets | BOOL | FALSE | Status alarms: Malfunction mains (M) |
| +30.3 | SA_Andere | BOOL | FALSE | Status alarms: Malfunction others |
| +30.4 | SA_Bit_12_Reserve | BOOL | FALSE | Status alarms: Bit 12 Reserve |
| +30.5 | SA_unsuesessiger_Wert | BOOL | FALSE | Status alarms: Illegal value (set or limit) (B) |
| +30.6 | SA_unsuesessiger_Funkt | BOOL | FALSE | Status alarms: Illegal function (operating mode) (B) |
| +30.7 | SA_Bit_15_Reserve | BOOL | FALSE | Status alarms: Bit 15 Reserve |
| +31.0 | SA_obere_Abweichung | BOOL | FALSE | Status alarms: Upper deviation exceeded (P) |
| +31.1 | SA_untere_Abweichung | BOOL | FALSE | Status alarms: Lower deviation exceeded (P) |
| +31.2 | SA_Temp_Differenz | BOOL | FALSE | Status alarms: Temperature difference exceeded (P) |
| +31.3 | SA_Durchfluss_ueberschr | BOOL | FALSE | Status alarms: Flow rate exceeded (P) |
| +31.4 | SA_Durchfluss_unterschr | BOOL | FALSE | Status alarms: Flow rate not reached (P) |
| +31.5 | SA_Prozessalarm_andere | BOOL | FALSE | Status alarms: Process alarm: others (P) |
| +31.6 | SA_Bit_6_Reserve | BOOL | FALSE | Status alarms: Bit 6 Reserve |
| +31.7 | SA_Fuelistand | BOOL | FALSE | Status alarms: Malfunction level (M) |
| +32.0 | Temp_Diff_VL_RL_Ext1 | INT | 0 | Zulaessige TempDiff Vor/Ruecklauf ext.1, Unit 0,1 K, Range 0-4000 |
| +34.0 | Temp_Diff_VL_RL_Ext2 | INT | 0 | Zulaessige TempDiff Vor/Ruecklauf ext.2, Unit 0,1 K, Range 0-4000 |
| +36.0 | Temp_Diff_VL_RL_Ext3 | INT | 0 | Zulaessige TempDiff Vor/Ruecklauf ext.3, Unit 0,1 K, Range 0-4000 |
| +38.0 | Temp_Diff_VL_RL_Ext4 | INT | 0 | Zulaessige TempDiff Vor/Ruecklauf ext.4, Unit 0,1 K, Range 0-4000 |
| +40.0 | Temp_Diff_VL_RL_Ext5 | INT | 0 | Zulaessige TempDiff Vor/Ruecklauf ext.5, Unit 0,1 K, Range 0-4000 |
| +42.0 | Temp_Diff_VL_RL_Ext6 | INT | 0 | Zulaessige TempDiff Vor/Ruecklauf ext.6, Unit 0,1 K, Range 0-4000 |
| +44.0 | Temp_Diff_VL_RL_Ext7 | INT | 0 | Zulaessige TempDiff Vor/Ruecklauf ext.7, Unit 0,1 K, Range 0-4000 |
| +46.0 | Temp_Diff_VL_RL_Ext8 | INT | 0 | Zulaessige TempDiff Vor/Ruecklauf ext.8, Unit 0,1 K, Range 0-4000 |
| +48.0 | Durchfluss_minimum_Ext1 | INT | 0 | Durchfluss minimum ext. 1, Unit 0,1 L/min, Range 0-4000 |
| +50.0 | Durchfluss_minimum_Ext2 | INT | 0 | Durchfluss minimum ext. 2, Unit 0,1 L/min, Range 0-4000 |
| +52.0 | Durchfluss_minimum_Ext3 | INT | 0 | Durchfluss minimum ext. 3, Unit 0,1 L/min, Range 0-4000 |
| +54.0 | Durchfluss_minimum_Ext4 | INT | 0 | Durchfluss minimum ext. 4, Unit 0,1 L/min, Range 0-4000 |
| +56.0 | Durchfluss_minimum_Ext5 | INT | 0 | Durchfluss minimum ext. 5, Unit 0,1 L/min, Range 0-4000 |
| +58.0 | Durchfluss_minimum_Ext6 | INT | 0 | Durchfluss minimum ext. 6, Unit 0,1 L/min, Range 0-4000 |
| +60.0 | Durchfluss_minimum_Ext7 | INT | 0 | Durchfluss minimum ext. 7, Unit 0,1 L/min, Range 0-4000 |
| +62.0 | Durchfluss_minimum_Ext8 | INT | 0 | Durchfluss minimum ext. 8, Unit 0,1 L/min, Range 0-4000 |
| +64.0 | Durchfluss_maximum_Ext1 | INT | 0 | Durchfluss maximum ext. 1, Unit 0,1 L/min, Range 0-4000 |
| +66.0 | Durchfluss_maximum_Ext2 | INT | 0 | Durchfluss maximum ext. 2, Unit 0,1 L/min, Range 0-4000 |
| +68.0 | Durchfluss_maximum_Ext3 | INT | 0 | Durchfluss maximum ext. 3, Unit 0,1 L/min, Range 0-4000 |
| +70.0 | Durchfluss_maximum_Ext4 | INT | 0 | Durchfluss maximum ext. 4, Unit 0,1 L/min, Range 0-4000 |
| +72.0 | Durchfluss_maximum_Ext5 | INT | 0 | Durchfluss maximum ext. 5, Unit 0,1 L/min, Range 0-4000 |
| +74.0 | Durchfluss_maximum_Ext6 | INT | 0 | Durchfluss maximum ext. 6, Unit 0,1 L/min, Range 0-4000 |
| +76.0 | Durchfluss_maximum_Ext7 | INT | 0 | Durchfluss maximum ext. 7, Unit 0,1 L/min, Range 0-4000 |
| +78.0 | Durchfluss_maximum_Ext8 | INT | 0 | Durchfluss maximum ext. 8, Unit 0,1 L/min, Range 0-4000 |
| +80.0 | Istwert_Ruecklauf_Ext1 | INT | 0 | Istwert Ruecklauf ext. 1, Unit 0,1 °C, Range 0-4000 |
| +82.0 | Istwert_Ruecklauf_Ext2 | INT | 0 | Istwert Ruecklauf ext. 2, Unit 0,1 °C, Range 0-4000 |
| +84.0 | Istwert_Ruecklauf_Ext3 | INT | 0 | Istwert Ruecklauf ext. 3, Unit 0,1 °C, Range 0-4000 |
| +86.0 | Istwert_Ruecklauf_Ext4 | INT | 0 | Istwert Ruecklauf ext. 4, Unit 0,1 °C, Range 0-4000 |
| +88.0 | Istwert_Ruecklauf_Ext5 | INT | 0 | Istwert Ruecklauf ext. 5, Unit 0,1 °C, Range 0-4000 |
| +90.0 | Istwert_Ruecklauf_Ext6 | INT | 0 | Istwert Ruecklauf ext. 6, Unit 0,1 °C, Range 0-4000 |
| +92.0 | Istwert_Ruecklauf_Ext7 | INT | 0 | Istwert Ruecklauf ext. 7, Unit 0,1 °C, Range 0-4000 |
| +94.0 | Istwert_Ruecklauf_Ext8 | INT | 0 | Istwert Ruecklauf ext. 8, Unit 0,1 °C, Range 0-4000 |
| +96.0 | Durchfluss_Ext1 | INT | 0 | Durchfluss ext. 1, Unit 0,1 L/min, Range 0-4000 |
| +98.0 | Durchfluss_Ext2 | INT | 0 | Durchfluss ext. 2, Unit 0,1 L/min, Range 0-4000 |
| +100.0 | Durchfluss_Ext3 | INT | 0 | Durchfluss ext. 3, Unit 0,1 L/min, Range 0-4000 |
| +102.0 | Durchfluss_Ext4 | INT | 0 | Durchfluss ext. 4, Unit 0,1 L/min, Range 0-4000 |
| +104.0 | Durchfluss_Ext5 | INT | 0 | Durchfluss ext. 5, Unit 0,1 L/min, Range 0-4000 |
| +106.0 | Durchfluss_Ext6 | INT | 0 | Durchfluss ext. 6, Unit 0,1 L/min, Range 0-4000 |
| +108.0 | Durchfluss_Ext7 | INT | 0 | Durchfluss ext. 7, Unit 0,1 L/min, Range 0-4000 |
| +110.0 | Durchfluss_Ext8 | INT | 0 | Durchfluss ext. 8, Unit 0,1 L/min, Range 0-4000 |
| +112.0 | | END_STRUCT | | |

Figure 7: Device DB11

3.6 Output to the temperature control unit

The output is triggered on the chip DB10. The data is written on the output ports.

```

Netzwerk 2 : Output to HB-THERM
Kommentar:

// Nominal value 1
L "DB10".Sollwert_1          DB10.DBW0    -- Nominal value 1, Unit 0,1°C, Range 0-4000
T PAM 256

// Nominal value 2
L "DB10".Sollwert_2          DB10.DBW2    -- Nominal value 2, Unit 0,1°C, Range 0-4000
T PAM 258

// Valid upper deviation nominal / actual value
L "DB10".Abweichung_oben     DB10.DBW4    -- Valid upper deviation nominal / actual value, Unit 0,1K, Range 0-4000
T PAM 260

// Valid lower deviation nominal / actual value
L "DB10".Abweichung_unten     DB10.DBW6    -- Valid lower deviation nominal / actual value, Unit 0,1K, Range 0-4000
T PAM 262

// Valid temperature difference main / return line
L "DB10".Temp_Diff_Vor_Ruecklauf DB10.DBW8    -- Valid temperature difference main / return line, Unit 0,1K, Range 0-4000
T PAM 264

// Valid minimum flow rate
L "DB10".Durchfluss_minimum DB10.DBW10   -- Valid minimum flow rate, Unit L/min, Range 0 - 1000
T PAM 266

// Valid maximum flow rate
L "DB10".Durchfluss_maximum DB10.DBW12   -- Valid maximum flow rate, Unit L/min, Range 0 - 1000
T PAM 268

// Operating mode (Bit-Values)
L DB10.DBW 14
T PAM 270

//Actual value external sensor)
L "DB10".Istwert_Externfuehler DB10.DBW16 -- Actual value external sensor
T PAM 272

// max. zulässige TempDiff Vor-Rück ext. 1-8
L "DB10".Temp_Diff_VL_RL_Ext1 DB10.DBW18   -- Zulässige Temp-Diff Vor/Rücklauf ext. 1, Unit 0,1 K, Range 0-4000
T PAM 274

L "DB10".Temp_Diff_VL_RL_Ext2 DB10.DBW20   -- Zulässige Temp-Diff Vor/Rücklauf ext. 2, Unit 0,1 K, Range 0-4000
T PAM 276

L "DB10".Temp_Diff_VL_RL_Ext3 DB10.DBW22   -- Zulässige Temp-Diff Vor/Rücklauf ext. 3, Unit 0,1 K, Range 0-4000
T PAM 278

L "DB10".Temp_Diff_VL_RL_Ext4 DB10.DBW24   -- Zulässige Temp-Diff Vor/Rücklauf ext. 4, Unit 0,1 K, Range 0-4000
T PAM 280

L "DB10".Temp_Diff_VL_RL_Ext5 DB10.DBW26   -- Zulässige Temp-Diff Vor/Rücklauf ext. 5, Unit 0,1 K, Range 0-4000
T PAM 282

L "DB10".Temp_Diff_VL_RL_Ext6 DB10.DBW28   -- Zulässige Temp-Diff Vor/Rücklauf ext. 6, Unit 0,1 K, Range 0-4000
T PAM 284

L "DB10".Temp_Diff_VL_RL_Ext7 DB10.DBW30   -- Zulässige Temp-Diff Vor/Rücklauf ext. 7, Unit 0,1 K, Range 0-4000
T PAM 286

L "DB10".Temp_Diff_VL_RL_Ext8 DB10.DBW32   -- Zulässige Temp-Diff Vor/Rücklauf ext. 8, Unit 0,1 K, Range 0-4000
T PAM 288

// zulässiger Durchfluss min ext. 1-8
L "DB10".Durchfluss_minimum_Ext1 DB10.DBW34 -- Durchfluss minimum ext. 1, Unit 0,1 L/min, Range 0-4000
T PAM 290

L "DB10".Durchfluss_minimum_Ext2 DB10.DBW36 -- Durchfluss minimum ext. 2, Unit 0,1 L/min, Range 0-4000
T PAM 292

L "DB10".Durchfluss_minimum_Ext3 DB10.DBW38 -- Durchfluss minimum ext. 3, Unit 0,1 L/min, Range 0-4000
T PAM 294

L "DB10".Durchfluss_minimum_Ext4 DB10.DBW40 -- Durchfluss minimum ext. 4, Unit 0,1 L/min, Range 0-4000
T PAM 296

L "DB10".Durchfluss_minimum_Ext5 DB10.DBW42 -- Durchfluss minimum ext. 5, Unit 0,1 L/min, Range 0-4000
T PAM 298

L "DB10".Durchfluss_minimum_Ext6 DB10.DBW44 -- Durchfluss minimum ext. 6, Unit 0,1 L/min, Range 0-4000
T PAM 300

L "DB10".Durchfluss_minimum_Ext7 DB10.DBW46 -- Durchfluss minimum ext. 7, Unit 0,1 L/min, Range 0-4000
T PAM 302

L "DB10".Durchfluss_minimum_Ext8 DB10.DBW48 -- Durchfluss minimum ext. 8, Unit 0,1 L/min, Range 0-4000
T PAM 304

// zulässiger Durchfluss max ext. 1-8
L "DB10".Durchfluss_maximum_Ext1 DB10.DBW50 -- Durchfluss maximum ext. 1, Unit 0,1 L/min, Range 0-4000
T PAM 306

L "DB10".Durchfluss_maximum_Ext2 DB10.DBW52 -- Durchfluss maximum ext. 2, Unit 0,1 L/min, Range 0-4000
T PAM 308

L "DB10".Durchfluss_maximum_Ext3 DB10.DBW54 -- Durchfluss maximum ext. 3, Unit 0,1 L/min, Range 0-4000
T PAM 310

L "DB10".Durchfluss_maximum_Ext4 DB10.DBW56 -- Durchfluss maximum ext. 4, Unit 0,1 L/min, Range 0-4000
T PAM 312

L "DB10".Durchfluss_maximum_Ext5 DB10.DBW58 -- Durchfluss maximum ext. 5, Unit 0,1 L/min, Range 0-4000
T PAM 314

L "DB10".Durchfluss_maximum_Ext6 DB10.DBW60 -- Durchfluss maximum ext. 6, Unit 0,1 L/min, Range 0-4000
T PAM 316

L "DB10".Durchfluss_maximum_Ext7 DB10.DBW62 -- Durchfluss maximum ext. 7, Unit 0,1 L/min, Range 0-4000
T PAM 318

L "DB10".Durchfluss_maximum_Ext8 DB10.DBW64 -- Durchfluss maximum ext. 8, Unit 0,1 L/min, Range 0-4000
T PAM 320
DB10.DBW60 / "DB10".Durchfluss_maximum_Ext6 / Durchfluss maximum ext.6, Unit 0,1 L/min, Range 0-4000

```

Figure 8: Output to the temperature control unit

3.6.1 Device DB10

Data source for control

| Adresse | Name | Typ | Anfangswert | Kommentar |
|---------|--------------------------|------------|-------------|--|
| 0.0 | | STRUCT | | |
| +0.0 | Sollwert_1 | INT | 567 | Nominal value 1, Unit 0,1°C, Range 0-4000 |
| +2.0 | Sollwert_2 | INT | 345 | Nominal value 2, Unit 0,1°C, Range 0-4000 |
| +4.0 | Abweichung_oben | INT | 24 | Valid upper deviation nominal / actual value, Unit 0,1K, Range 0-4000 |
| +6.0 | Abweichung_unten | INT | 12 | Valid lower deviation nominal / actual value, Unit 0,1K, Range 0-4000 |
| +8.0 | Temp_Diff_Vor_Ruecklauf | INT | 67 | Valid temperature difference main / return line, Unit 0,1K, Range 0-4000 |
| +10.0 | Durchfluss_minimum | INT | 1 | Valid minimum flow rate, Unit L/min, Range 0 - 1000 |
| +12.0 | Durchfluss_maximum | INT | 50 | Valid maximum flow rate, Unit L/min, Range 0 - 1000 |
| +14.0 | BA_Alarm_Reset | BOOL | FALSE | Operating mode: Alarm reset (for acknowledging P- / M-alarms) |
| +14.1 | BA_Bit_9_Reserve | BOOL | FALSE | Operating mode: Bit 9 Reserve |
| +14.2 | BA_Bit_10_Reserve | BOOL | FALSE | Operating mode: Bit 10 Reserve |
| +14.3 | BA_Bit_11_Reserve | BOOL | FALSE | Operating mode: Bit 11 Reserve |
| +14.4 | BA_Bit_12_Reserve | BOOL | FALSE | Operating mode: Bit 12 Reserve |
| +14.5 | BA_Bit_13_Reserve | BOOL | FALSE | Operating mode: Bit 13 Reserve |
| +14.6 | BA_Bit_14_Reserve | BOOL | FALSE | Operating mode: Bit 14 Reserve |
| +14.7 | BA_Watchdog | BOOL | TRUE | Operating mode: Watchdog |
| +15.0 | BA_Geraet_Ein_Aus | BOOL | TRUE | Operating mode: Unit ON/OFF |
| +15.1 | BA_Abkuehlen_Ein_Aus | BOOL | FALSE | Operating mode: Cooling ON/OFF |
| +15.2 | BA_Foermentierung_Ein_A | BOOL | FALSE | Operating mode: Mould evacuation ON/OFF |
| +15.3 | BA_Lackstopbetrieb_Ein_A | BOOL | FALSE | Operating mode: Leak stopper ON/OFF |
| +15.4 | BA_Externfuehler_Ein_Aus | BOOL | FALSE | Operating mode: External sensor ON/OFF |
| +15.5 | BA_2_Sollwert_Ein_Aus | BOOL | FALSE | Operating mode: 2nd nominal value ON/OFF |
| +15.6 | BA_Bit_6_Reserve | BOOL | FALSE | Operating mode: Bit 6 Reserve |
| +15.7 | BA_Bit_7_Reserve | BOOL | FALSE | Operating mode: Bit 7 Reserve |
| +16.0 | Istwert_Externfuehler | INT | 0 | Actual value external sensor |
| +18.0 | Temp_Diff_VL_RL_Ext1 | INT | 0 | Zulässige Temp-Diff Vor/Rücklauf ext. 1, Unit 0,1 K, Range 0-4000 |
| +20.0 | Temp_Diff_VL_RL_Ext2 | INT | 0 | Zulässige Temp-Diff Vor/Rücklauf ext. 2, Unit 0,1 K, Range 0-4000 |
| +22.0 | Temp_Diff_VL_RL_Ext3 | INT | 0 | Zulässige Temp-Diff Vor/Rücklauf ext. 3, Unit 0,1 K, Range 0-4000 |
| +24.0 | Temp_Diff_VL_RL_Ext4 | INT | 0 | Zulässige Temp-Diff Vor/Rücklauf ext. 4, Unit 0,1 K, Range 0-4000 |
| +26.0 | Temp_Diff_VL_RL_Ext5 | INT | 0 | Zulässige Temp-Diff Vor/Rücklauf ext. 5, Unit 0,1 K, Range 0-4000 |
| +28.0 | Temp_Diff_VL_RL_Ext6 | INT | 0 | Zulässige Temp-Diff Vor/Rücklauf ext. 6, Unit 0,1 K, Range 0-4000 |
| +30.0 | Temp_Diff_VL_RL_Ext7 | INT | 0 | Zulässige Temp-Diff Vor/Rücklauf ext. 7, Unit 0,1 K, Range 0-4000 |
| +32.0 | Temp_Diff_VL_RL_Ext8 | INT | 0 | Zulässige Temp-Diff Vor/Rücklauf ext. 8, Unit 0,1 K, Range 0-4000 |
| +34.0 | Durchfluss_minimum_Ext1 | INT | 0 | Durchfluss minimum ext. 1, Unit 0,1 L/min, Range 0-4000 |
| +36.0 | Durchfluss_minimum_Ext2 | INT | 0 | Durchfluss minimum ext. 2, Unit 0,1 L/min, Range 0-4000 |
| +38.0 | Durchfluss_minimum_Ext3 | INT | 0 | Durchfluss minimum ext. 3, Unit 0,1 L/min, Range 0-4000 |
| +40.0 | Durchfluss_minimum_Ext4 | INT | 0 | Durchfluss minimum ext. 4, Unit 0,1 L/min, Range 0-4000 |
| +42.0 | Durchfluss_minimum_Ext5 | INT | 0 | Durchfluss minimum ext. 5, Unit 0,1 L/min, Range 0-4000 |
| +44.0 | Durchfluss_minimum_Ext6 | INT | 0 | Durchfluss minimum ext. 6, Unit 0,1 L/min, Range 0-4000 |
| +46.0 | Durchfluss_minimum_Ext7 | INT | 0 | Durchfluss minimum ext. 7, Unit 0,1 L/min, Range 0-4000 |
| +48.0 | Durchfluss_minimum_Ext8 | INT | 0 | Durchfluss minimum ext. 8, Unit 0,1 L/min, Range 0-4000 |
| +50.0 | Durchfluss_maximum_Ext1 | INT | 0 | Durchfluss maximum ext. 1, Unit 0,1 L/min, Range 0-4000 |
| +52.0 | Durchfluss_maximum_Ext2 | INT | 0 | Durchfluss maximum ext. 2, Unit 0,1 L/min, Range 0-4000 |
| +54.0 | Durchfluss_maximum_Ext3 | INT | 0 | Durchfluss maximum ext. 3, Unit 0,1 L/min, Range 0-4000 |
| +56.0 | Durchfluss_maximum_Ext4 | INT | 0 | Durchfluss maximum ext. 4, Unit 0,1 L/min, Range 0-4000 |
| +58.0 | Durchfluss_maximum_Ext5 | INT | 0 | Durchfluss maximum ext. 5, Unit 0,1 L/min, Range 0-4000 |
| +60.0 | Durchfluss_maximum_Ext6 | INT | 0 | Durchfluss maximum ext. 6, Unit 0,1 L/min, Range 0-4000 |
| +62.0 | Durchfluss_maximum_Ext7 | INT | 0 | Durchfluss maximum ext. 7, Unit 0,1 L/min, Range 0-4000 |
| +64.0 | Durchfluss_maximum_Ext8 | INT | 0 | Durchfluss maximum ext. 8, Unit 0,1 L/min, Range 0-4000 |
| +66.0 | | END_STRUCT | | |

Figure 9: Device DB10

3.7 Panel

The STEP 7 project includes a panel for simulation. It is run with the software WinCC-flexible-Runtime 2008.

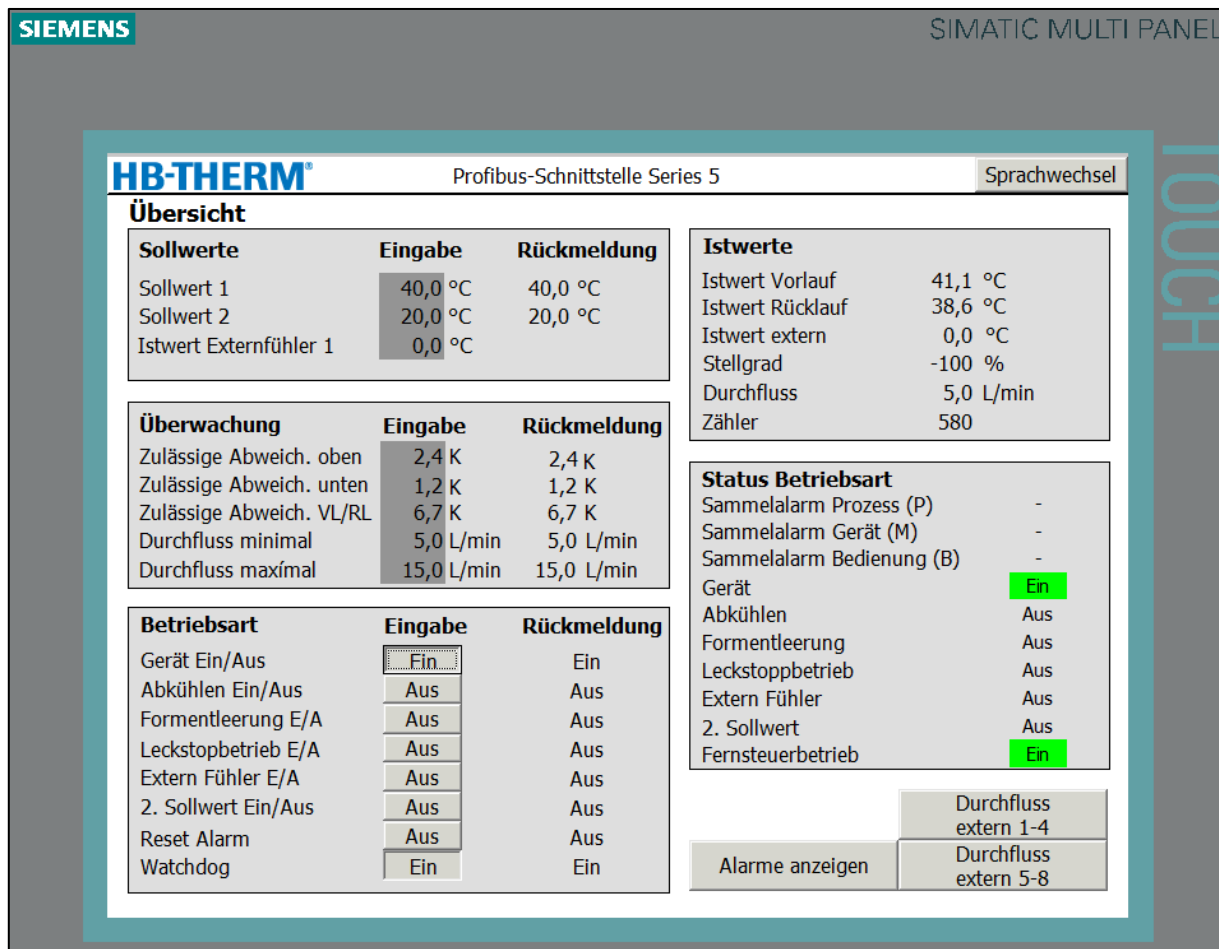


Figure 10: Example single unit

3.8 Settings on the temperature control unit

3.8.1 Thermo-6 / Gate-6

The following settings must be made on the temperature control unit Thermo-6 or interface server Gate-6.

| Parameter | Profile | Menu level | Value | Remarks |
|------------------------|----------|---------------------------|--------|------------------|
| Protocol | Standard | Gate \ Protocol converter | 15 | Profibus-DP |
| Profibus-DP address | Extended | Gate \ Protocol converter | 5 | in this case "5" |
| Remote control address | Standard | Setting \ Remote control | 1 | in this case "1" |
| Remote control | Standard | Functions | active | |

Table 1: Settings on Thermo-6 / Gate-6

3.9 Thermo-5

The following settings must be made on the temperature control unit Thermo-5.

| Parameter | Profile | Menu level | Value | Remarks |
|------------------------------|----------|------------------|--------|------------------|
| Protocol | Standard | Setting \ Remote | 15 | Profibus-DP |
| Compatibility Profibus to S4 | Standard | Setting \ Remote | no | |
| Profibus node 1 | Standard | Setting \ Remote | 5 | in this case "5" |
| Address | Standard | Setting \ Remote | 1 | in this case "1" |
| Remote | Standard | Functions | active | |

Table 2: Settings on Thermo-5