

Profibus-Interface for HB-Therm (Protocol Profibus-DP)**Contents**

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1 General

This protocol is supported with Series 4 and Thermo-5 devices. The following settings must be made on the device:

Menu **Setting \ Remote**

- Set parameter **Address** to the desired value (corresponds to Profibus address).
- Set parameter **Protocol** to "15".

Only with Thermo-5

Menu **Setting \ Remote**

- Set parameter **Compatibility Profibus to S4** to "yes".

2 Interface concept

The control system of the production machine communicates via the standardized Profibus – interface with the temperature control units connected to it. Values are transmitted from the machine to the units and vice versa. The machine assumes the master function, the temperature control units are the slaves.

3 Description of hardware

The basic control system of the device is equipped with an additional board ZP, allowing communication via the Profibus. It is connected externally by a 9-pole Sub-D plug.

4 Safety concept

Transmission is ensured by the basic procedure of the Profibus. No additional protection is provided.

5 Communication protocol

Bussystem: Profibus DP

Interface: RS-485

Transmission rate: max. 12 MBit/s

Sequence of operation: normal DP-polling of all slaves

Format: user data consists of 2-byte words. All values are coded into 16-bit binary values.

Address setting: adjustable on unit (1–99)

Physical units: the Celsius scale is used for temperature units, flow rate is recorded in L/min.

There is a master message and a slave message. The message structure is basically identical for both directions. Normally data processing in the control system of the temperature control unit takes longer than the polling cycle (interrogation cycle) via the Profibus. The slave response therefore includes a counter variable which is incremented each time the data is reprocessed. This allows the master to check whether the data have already been 'collected'.

6 Example of use

As a help, an example to connect HB-Therm Temperature Control Units to a Siemens S7 environment is available and can be downloaded under www.hb-therm.ch.

Note:

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

- CPU 315-2 DP 6ES7 315-2AH14-0AB0
- CPU 315-2 DP 6ES7 315-2AG10-0AB0

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.

7 GSD-file

The GSD file is available for download at www.hb-therm.ch or is included in the application examples.

Note:

Problems with the GSD-file may occur with a few Profibus Masters of the SPS Mitsubishi due to optional application commands. In this case the problem can be solved by making following changes in the GSD-file (e.g. by using a text editor):

- Freeze_Mode_supp= 0
- Sync_Mode_supp = 0

For the availability of an already adapted GSD file, contact the HB-Therm representative (www.hb-therm.ch).

8 Master transmission (machine – temperature control unit)

Word	Bit	Description	Unit	Range	Comment
1		Reserve	-	-	
2		Nominal value 1	0,1 °C	0–4000	
3		Nominal value 2	0,1 °C	0–4000	
4		Valid upper deviation nominal / actual value	0,1 K	0–4000	1)
5		Valid lower deviation nominal / actual value	0,1 K	0 –4000	1)
6		Valid temperature difference main / return line	0,1 K	0–4000	1)
7		Valid minimum flow rate	L/min	0–1000	1)
8		Valid maximum flow rate	L/min	0–1000	1)
9	0	Operating mode Unit ON/OFF ²⁾	-	-	
	1	Cooling ON/OFF			
	2	Mould evacuation ON/OFF			
	3	Leak stopper ON/OFF			
	4	External sensor ON/OFF			
	5	2nd nominal value ON/OFF			
	6–7	Reserve			
	8	Alarm reset (for acknowledging P-/M-alarms)			
	9–14	Reserve			
	15	Watchdog			
10		Actual value external sensor *	0,1 °C	0–4000	3)
11		Reserve	-	-	
12		Reserve	-	-	

Table 1: Master transmission (machine – temperature control unit)

- 1) The value 0 means monitoring is switched off.
- 2) Must be set to 0 to shut down via Cooling and/or Mould evacuation.
- 3) Set parameter [Sensor type external sensosr](#) to "Profibus".

Note:

If transmitted values or functions are not available, then the status bit "illegal value" and/or "illegal function" and the bit "common alarm operation" are set until the appropriate value is reset correctly. An alarm reset is not necessary. Compare the nominal values and actual values to determine which function is incorrect (Word 2 to Word 9).

* Not implemented in software for Multi Zone Units

9 Slave transmission (temperature control unit - machine)

Word	Bit	Description	Unit	Range	Comment
1		Counter variable poll	-	0–ffffH	4)
2		Nominal value 1	0,1 °C	0–4000	
3		Nominal value 2	0,1 °C	0–4000	
4		Valid upper deviation nominal / actual value	0,1 K	0–4000	5)
5		Valid lower deviation nominal / actual value	0,1 K	0–4000	5)
6		Valid temperature difference main / return line	0,1 K	0–4000	5)
7		Valid minimum flow rate	L/min	0–1000	5)
8		Valid maximum flow rate	L/min	0–1000	5)
9		Operating mode (set)	-	-	6)
	0	Unit ON/OFF			
	1	Cooling ON/OFF ¹⁰⁾			
	2	Mould evacuation ON/OFF ¹⁰⁾			
	3	Leak stopper ON/OFF			
	4	External sensor ON/OFF			
	5	2nd nominal value ON/OFF			
	6–7	Reserve			
	8	Alarm reset (for acknowledging P-/M-alarms)			
	9–14	Reserve			
	15	Watchdog ⁷⁾			
10		Reserve	-	-	
11		Reserve	-	-	
12		Reserve	-	-	
13		Actual temperature main line	0,1 °C	0–4000	
14		Actual temperature return line	0,1 °C	0–4000	
15		Actual temperature external sensor	0,1 °C	0–4000	
16		Actual regulation ratio	%	-100 to +100	
17		Actual flow rate	L/min	0–1000	
18		Reserve	-	-	
19		Status operating mode	-	-	
	0	Unit ON/OFF ^{6), 8)}			
	1	Cooling ON/OFF ⁶⁾			
	2	Mould evacuation ON/OFF ⁶⁾			
	3	Leak stopper ON/OFF ⁶⁾			
	4	External sensor ON/OFF ⁶⁾			
	5	2nd nominal value ON/OFF ⁶⁾			
	6	Remote control operation ON/OFF			
	7	Reserve			
	8	Common alarm Process (P)			
	9	Common alarm Unit (M)			
	10	Common alarm Operation (B)			
	11–15	Reserve			

Word	Bit	Description	Unit	Range	Comment
20		Status alarms	-	-	
	0	Upper deviation exceeded (P)			
	1	Lower deviation exceeded (P)			
	2	Temperature difference exceeded (P)			
	3	Flow rate exceeded (P)			
	4	Flow rate not reached (P)			
	5	Process alarm: others (P)			
	6	Reserve			
	7	Malfunction level (M) ⁹⁾			
	8	Malfunction over temperature (M) ⁹⁾			
	9	Malfunction sensor break (M) ⁹⁾			
	10	Malfunction mains (M)			
	11	Malfunction: others (M) ⁹⁾			
	12	Reserve			
	13	Illegal value (set or limit) (B)			
	14	Illegal function (operating mode) (B)			
15	Reserve				

Table 2: Slave transmission (temperature control unit - machine)

- 4) Counter variable poll is incremented at each poll within the control system.
- 5) The value 0 means that monitoring is switched off.
- 6) Word 9 normally mirrors the master message (echo). If a function is not available in the unit, the message OFF (0) is transmitted and the bit "common alarm operation" is set. Word 17 reports the actual states. However, a time-lag can be applied to these if a function cannot be activated immediately due to temperature-related or time-related factors (e.g. mould evacuation after cooling).
- 7) The watchdog written by the master will be returned as it was sent by the master.
- 8) During the functions Cooling and Mould evacuation, bit 0 (unit ON/OFF) is not reset until the unit cuts out entirely after completing this sequence of operations.
- 9) As a rule, acknowledgement is required.
- 10) To activate the functions Cooling resp. Mould evacuation, bit 0 of word 9 (Unit ON/OFF) must be set to OFF (0) additionally.

Note:

If transmitted values or functions are not available the status bit "illegal value" and/or "illegal function" and the bit "common alarm operation" will be set until the appropriate value has been reset correctly. An alarm reset is not necessary. You can determine which value and/or function is wrong by comparing the set and actual data (Word 2 to Word 9).