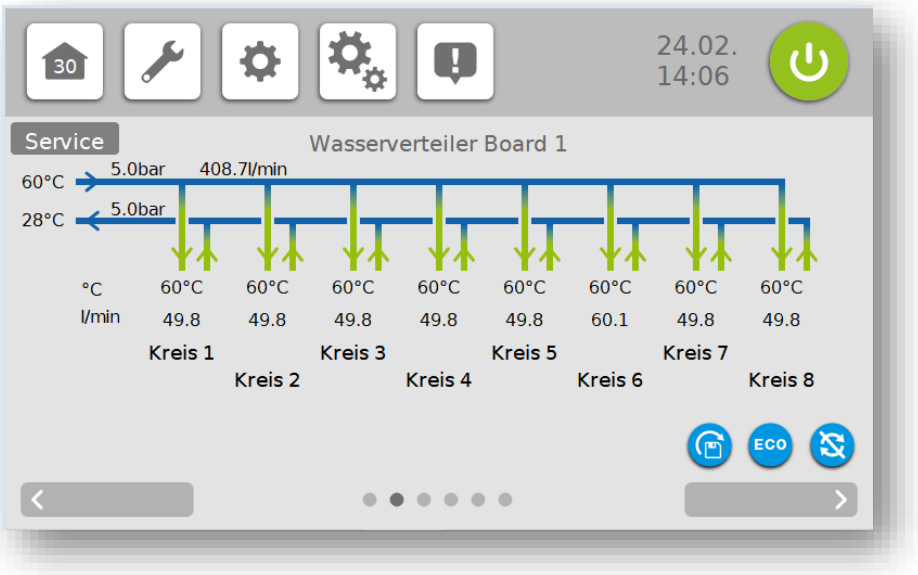
Description
Data transmission:

Profinet

Single Smart Control
SSC water manifold type: R8500



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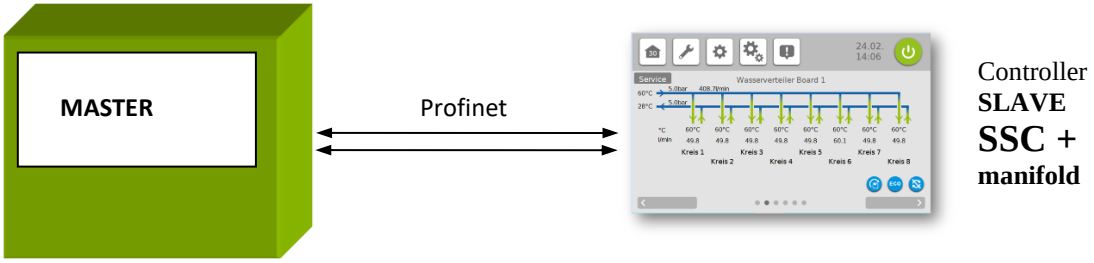
Preface

Content

1 Interface, general description

The ‘Single Smart Control’ **SSC + water manifold** (the controller) is suitable for connection to the Profinet bus system.



This allows the controller to be monitored and controlled via Profinet by a master (e.g. an industrial or personal computer or a PLC).

The communication process is always controlled by the master. The controller functions as slave. Each controller has its own device address.

If the controller discovers transmission errors or plausibility errors (e.g. values out of range),
it does not accept these data. The previous, already existing valid data are maintained.

Controller settings:

Device address: The controller’s IP address is assigned by the master. By default, the device comes with IP address 0.0.0.0. Protocols NetIdent or DCP can be used to find the device in the network.

Strictly observe the operating manual for the controller.

GSDML file:
Please obtain via: SINGLE Temperiertechnik GmbH, Ostring 17-19, D-73269 Hochdorf.
Internet: www.single-temp.de

1.1 Putting into operation

Note
The controller with Profinet connection may only be put into operation by trained personnel in compliance with the safety regulations.
Solid experience in working with Profinet is essential.
Please also observe our FAQ list.

The following components are required for putting the unit into operation:
- Ethernet cable
- GSDML file
- Any configuration tool for Profinet

To ensure that the controller will work properly, the following steps must be performed when putting it into operation:

Profinet connection: Connect the controller to the Ethernet cable.

Set the following parameters on the controller:
Set parameter 'Protocol' to 'Profinet'

Set parameter 'WV - Schnittstelle aktiv' (WM interface active) to 'ON'.
To be able to access the parameters of the water manifold, this parameter must be set to ON.

Diagnostic displays:
The following diagnostic displays are shown in the "Status" parameter:

Data Exchange:	The device is in the Data Exchange mode. The communication is OK. Data are exchanged with the master.
Warte Parameter (Wait for parameters):	The bus connection is detected. The controller waits for the parameter configuration from the master. This is performed automatically.
Keine Verb. (No connection):	The controller is not properly connected to the bus. e.g. - There may be a wiring error - The master is not active - The protocol was not set correctly

2 Transmission of parameters

Communication:
The master sends data to the controller. The controller sends a response to the Profibus master in the opposite direction. This process is carried out cyclically and is controlled by the master. The controller is configured using the GSDML file.

Process image and configuration channel

In the process image, certain parameters are transmitted according to a predefined pattern. The complete process image include 124 bytes of output data (master to slave); depending on device configuration and application, only a small portion of the bytes are used. 119 bytes are for the input data (slave to master), but the SSC

only uses 17 bytes. The remaining data bytes are only needed if a water manifold is connected or if an external sensor via Profinet is used.

The configuration channel (length: 8 bytes) follows the last data bytes of the input data and the output data, respectively. The configuration channel can be used to read or write individual device parameters. For detailed information and examples of how to use the configuration channel, refer to Section 2.1.2.

Any bytes that are not needed can be set to 0 or ignored.

2.1 Process image

Depending on the configuration, 0 must be entered for certain values.

SSC values (temperature control unit)	External actual value	Water manifold values, 8+16 zones	Water manifold values, 16 zones	Configuration channel

SSC temperature control unit only:

Master to controller: uses only bytes 1–3 and, if applicable, the configuration channel (bytes 125–132).

Master to controller: uses only bytes 1–17 and, if applicable, the configuration channel (bytes 120–127).

SSC temperature control unit and 1 water manifold:
Master to controller: uses only bytes 1–3, 9–18 and 29–124 and, if applicable, the configuration channel (bytes 125–132).

Master to controller: uses only bytes 1–17, 24–37, 46–109 and, if applicable, the configuration channel (bytes 120–127).

SSC temperature control unit and 2 water manifold:
Master to controller: uses all bytes (except reserve bytes) and, if applicable, the configuration channel (bytes 125–132).

Master to controller: uses all bytes (except reserve bytes) and, if applicable, the configuration channel (bytes 120–127).

External sensor via Profinet
If the control loop will use the value from an external sensor, this value must be transmitted on bytes 4+5. Using an external sensor requires additional configuration steps (refer to the controller manual).

2.1.1 Process image: From master to controller

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
Setpoint High Byte	**Setpoint** Low Byte	**Control byte**	**External actual value** High Byte	**ext. Actual value** Low Byte

Byte 6	Bytes 7+8	Bytes 9+10	Bytes 11+12	Bytes 13+14	Bytes 15+16	Bytes 17+18
Reserve	**Reserve**	**Flow limit, overall WM board 1**	**Shared supply temp. limit, min. WM board 1**	**Shared supply temp. limit, max. WM board 1**	**Pressure limit, min. WM board 1**	**Limit value pressure, max. WM board 1**

Bytes 19+20	Bytes 21+22	Bytes 23+24	Bytes 25+26	Bytes 27+28	Bytes 29…60	Bytes 61…92	Bytes 93…124
Flow limit, over-all WV Board 2	**Shared supply temp. limit, min. WV Board 2**	**Shared supply temp. limit, max. WV Board 2**	**Pressure limit, min. WV Board 2**	**Limit value pressure, max. WV Board 2**	**Limit value Flow Circuit 1…16**	**Limit value Min. temp. circuit 1...16**	**Limit value Max. temp. circuit 1... 16**

Byte 125	Byte 126	Byte 127	Byte 128	Byte 129	Byte 130	Byte 131	Byte132
Sequential number	**always:** 0x01	**Command code** **BC**	**always:** 0x00	**Parameter code** **PC**	**Parameter value** **PWH** High Byte	**Parameter value** **PWL** Low Byte	**Decimal place** **PWK**

Setpoint
The parameter value consists of two data bytes:

Example:	Dec.	Hex.	High Byte	Low Byte
Setpoint:	230	00E6	00	E6

Corresponds e.g. to 230 °C or 230 °F or 23.0 °C depending on parameter CF
(see parameter list of the controller)

The numeric value is processed as shown in the display.
150 -> 15.0 with decimal point
150 -> 150 without decimal point

Control byte

Bit 0:	Device ‘on’ / ‘off’	1 = on
Bit 1:	Device ‘cool down’ and ‘off’	1 = on
Bit 2:	Internal/external sensor	1 = external
Bit 3:	Leak stop mode	1 = on
Bit 4*:	Mould evacuation	1 = on
Bit 5:	Setback setpoint (2nd setpoint)	1 = on
Bit 6*:	Optimisation	1 = on
Bit 7:	Actual value via Profinet	1 = on / 0 = actual value selection via bit 2

*For bit 4 "Mould evacuation":
The change from "0" to "1" causes a one-time mould evacuation.
To trigger another evacuation, the bit must
be set to ‘0’ once in-between.
The current device status can be read in the status of the process data. When mould evacuation is finished, status ‘Device off and mould evacuation off’ is returned.

*For bit 6 "Optimisation":
The change from “0” to “1” causes a one-time optimisation.
To trigger another optimisation, the bit must
be set to ‘0’ once in-between.
If bit 6 is set to ‘0’, any running optimisation will be aborted.
The current optimisation status can be read in the status of the process data.

The control byte (byte 3) is used to select the ‘external sensor’ parameter as follows:

Internal/external sensor Bit 2 =	Actual value via Profinet Bit 7 =	Parameter “external sensor”
0	0	Off: Control loop uses internal sensor
1	0	On: Control loop uses external sensor
0	1	Profinet sensor: The actual value from bytes 4 and 5 is used for the control loop.
1	1	

If ‘Profinet sensor’ is selected as actual value, there is an automatic switch-over to the internal actual value in the following cases.

1. The value transmitted is outside the measuring range. (-30°C / 400°C)
2. The Profinet connection is faulty.
3. Remote operation is not activated.

2.1.2 Process image: From controller to master

Depending on the configuration, certain values are transmitted with 0.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Status specification	**Act. value, current control sensor** High Byte	**Act. value, current control sensor** Low Byte	**Actual value, from-process** High Byte	**Actual value, from-process** Low Byte	**Flow** High Byte	**Flow** Low Byte

Byte 8	Byte 9	Byte 10	Byte 11	Byte 12	Byte 13	Byte 14
Pressure High Byte	**Pressure** Low Byte	**Output** High Byte	**Output** Low Byte	**Film temperature** High Byte	**Film temperature** Low Byte	**Output level** 0x9C…0x64

Byte 15	Byte 16	Byte 17	**Byte 18**	**Byte 19**	**Byte 20**	**Byte 21**	**Byte 22**	**Byte 23**
Alarms 1	**Alarms 2**	**SSC status**	**Reserve**	**Reserve**	**Reserve**	**Reserve**	**Reserve**	**Reserve**

Byte 24	Byte 25	Bytes 26+27	Bytes 28+29	Bytes 30+31	Bytes 32 + 33	Bytes 34 + 35	Bytes 36 + 37
Configuration Water manifold	**Reserve**	**Sensor error WM flow rate 1 … 16**	**Sensor error WM temperature 1 … 16**	**Reserve**	**Temperature To-process WM board 1**	**Pressure To-process WM board 1**	**Pressure from-process WM board 1**

Bytes 38+39	Bytes 40+41	Bytes 42+43	Bytes 44+45	Bytes 46-77	Bytes 78-109	Bytes 110+111
Temperature To-process WV Board 2	**Pressure To-process WV Board 2**	**Pressure from-process WV Board 2**	**Reserve**	**Actual value, flow rate 1 … 16**	**Actual value, temperature of circuit 1… 16**	**Reserve**

Bytes 112+113	Bytes 114+115	Bytes 116+117	Bytes 118+119
Reserve	**Reserve**	**Reserve**	**Reserve**

Byte 120	Byte 121	Byte 122	Byte 123	Byte 124	Byte 125	Byte 126	Byte 127
Sequential number	**always:** 0x01	**Command code BC**	**always:** 0x00	**Parameter code PC**	**Parameter value PWH** High Byte	**Parameter value PWL** Low Byte	**Decimal place PWK**

Definition of 'Status specification':

Indicates whether a range error occurred when writing the setpoint.

0 = Setpoint OK
1 = Setpoint specification incorrect

Definition of "Alarms 1":

Bit 0 = collective alarm (alarms marked with * are not included in the collective alarm)
Bit 1 = Alarm 1 *
Bit 2 = ---
Bit 3 = Pump alarm (motor circuit breaker tripped,
phase fault or rotational direction fault)
Bit 4 = Fill level alarm
Bit 5 = Flow / flow monitor alarm
Bit 6 = System error
Bit 7 = Optimisation error *

Definition of "Alarms 2":

Bit 0 = To-process temperature alarm
Bit 1 = From-process temperature alarm
Bit 2 = Film temperature alarm
Bit 3 = Sensor break alarm (current control sensor)
Bit 4 = Pressure alarm
Bit 5 = Delta T alarm (monitoring of difference between to-process and from-process)
Bit 6 = Almost empty *
Bit 7 = ---

Definition of 'Status':

Bit 0 = Device on / off	1 = on
Bit 1 = Device cool down and off	1 = on
Bit 2 = Internal/external sensor	1 = external
Bit 3 = Leak stop mode	1 = on
Bit 4 = Mould evacuation	1 = on
Bit 5 = Setback setpoint (setpoint 2)	1 = on
Bit 6 = Optimisation	1 = on
Bit 7 = Manual / remote operation	1 = manual

Definition of 'Water manifold configuration':

Bit 0 = 8-circuit water manifold	1 = present
Bit 1 = 16-circuit water manifold	1 = present

Definition of 'sensor error in flow, WM1 ... 16':

Bit 0 = Flow rate in circuit 1	1 = sensor error
Bit 1 = Flow rate in circuit 2	1 = sensor error
Bit 2… 15 = Flow in circuit 3… 16	1 = sensor error

Definition of 'sensor error in temperature rate, WM1 ... 16':

Bit 0 = Temperature in circuit 1	1 = sensor error
Bit 1 = Temperature in circuit 2	1 = sensor error
Bit 2…15 = Temperature in circuit 3…16	1 = sensor error

2.1.3 Process image table with limit values, slave -> master

Byte	Process image
1	Temperature setpoint of temperature control unit
2	
3	Control byte of temperature control unit
4	Actual value specified via Profinet
5	
6	Reserve
7	Reserve
8	
9	Limit value for flow warning, total flow, board 1
10	
11	Temperature limit for shared supply, min., water manifold board 1
12	
13	Temperature limit for shared supply, max., water manifold board 1
14	
15	Pressure limit for shared supply, min., water manifold board 1
16	
17	Pressure limit for shared supply, max., water manifold board 1
18	
19	Limit value for flow warning, total flow, board 2
20	
21	Temperature limit for shared supply, min., water manifold board 2
22	
23	Temperature limit for shared supply, max., water manifold board 2
24	
25	Pressure limit for shared supply, min., water manifold board 2
26	
27	Pressure limit for shared supply, max., water manifold board 2
28	
29	Limit value for flow rate, circuit 1
30	
31	Limit value for flow rate, circuit 2
32	
33	Limit value for flow rate, circuit 3
34	
35	Limit value for flow rate, circuit 4
36	
37	Limit value for flow rate, circuit 5
38	
39	Limit value for flow rate, circuit 6
40	
41	Limit value for flow rate, circuit 7
42	
43	Limit value for flow rate, circuit 8
44	
45	Limit value for flow rate, circuit 9
46	
47	Limit value for flow rate, circuit 10

48	
49	Limit value for flow rate, circuit 11
50	
51	Limit value for flow rate, circuit 12
52	
53	Limit value for flow rate, circuit 13
54	
55	Limit value for flow rate, circuit 14
56	
57	Limit value for flow rate, circuit 15
58	
59	Limit value for flow rate, circuit 16
60	
61	Temperature limit, min. 1
62	
63	Temperature limit, min. 2
64	
65	Temperature limit, min. 3
66	
67	Temperature limit, min. 4
68	
69	Temperature limit, min. 5
70	
71	Temperature limit, min. 6
72	
73	Temperature limit, min. 7
74	
75	Temperature limit, min. 8
76	
77	Temperature limit, min. 9
78	
79	Temperature limit, min. 10
80	
81	Temperature limit, min. 11
82	
83	Temperature limit, min. 12
84	
85	Temperature limit, min. 13
86	
87	Temperature limit, min. 14
88	
89	Temperature limit, min. 15
90	
91	Temperature limit, min. 16
92	
93	Temperature limit, max. 1
94	
95	Temperature limit, max. 2
96	
97	Temperature limit, max. 3

98	
99	Temperature limit, max. 4
100	
101	Temperature limit, max. 5
102	
103	Temperature limit, max. 6
104	
105	Temperature limit, max. 7
106	
107	Temperature limit, max. 8
108	
109	Temperature limit, max. 9
110	
111	Temperature limit, max. 10
112	
113	Temperature limit, max. 11
114	
115	Temperature limit, max. 12
116	
117	Temperature limit, max. 13
118	
119	Temperature limit, max. 14
120	
121	Temperature limit, max. 15
122	
123	Temperature limit, max. 16

2.1.4 Process image table with limit values, slave -> master

Depending on the configuration of the control system, individual data are not available and will be set to 0.

Byte	Process image
1	Status specification: Value out of range, setpoint, temperature control unit
2	Act. value, current control sensor, temperature control unit
3	
4	Act. value, from-process, temperature control unit
5	
6	Flow rate, temperature control unit
7	
8	Pressure, temperature control unit
9	
10	Output, temperature control unit
11	
12	Film temperature, temperature control unit
13	
14	Heating-cooling output level
15	Alarms 1 + 2, temperature control unit
16	
17	Status, temperature control unit SSC
18	Reserve
19	Reserve
20	Reserve
21	Reserve
22	Reserve
23	Reserve
24	Water manifold configuration
25	Reserve
26	Sensor error, WM flow 1... 16
27	
28	Sensor error, WM temperature 1... 16
29	
30	Reserve
31	
32	To-process temperature, WM board 1
33	
34	To-process pressure, WM board 1
35	
36	From-process pressure, WM board 1
37	
38	To-process temperature, WM board 2
39	
40	To-process pressure, WM board 2
41	
42	From-process pressure, WM board 2
43	
44	Reserve
45	

46	Actual value, flow rate of circuit 1
47	
48	Actual value, flow rate of circuit 2
49	
50	Actual value, flow rate of circuit 3
51	
52	Actual value, flow rate of circuit 4
53	
54	Actual value, flow rate of circuit 5
55	
56	Actual value, flow rate of circuit 6
57	
58	Actual value, flow rate of circuit 7
59	
60	Actual value, flow rate of circuit 8
61	
62	Actual value, flow rate of circuit 9
63	
64	Actual value, flow rate of circuit 10
65	
66	Actual value, flow rate of circuit 11
67	
68	Actual value, flow rate of circuit 12
69	
70	Actual value, flow rate of circuit 13
71	
72	Actual value, flow rate of circuit 14
73	
74	Actual value, flow rate of circuit 15
75	
76	Actual value, flow rate of circuit 16
77	
78	Actual value, temperature of circuit 1
79	
80	Actual value, temperature of circuit 2
81	
82	Actual value, temperature of circuit 3
83	
84	Actual value, temperature of circuit 4
85	
86	Actual value, temperature of circuit 5
87	
88	Actual value, temperature of circuit 6
89	
90	Actual value, temperature of circuit 7
91	
92	Actual value, temperature of circuit 8
93	
94	Actual value, temperature of circuit 9
95	

96	Actual value, temperature of circuit 10
97	
98	Actual value, temperature of circuit 11
99	
100	Actual value, temperature of circuit 12
101	
102	Actual value, temperature of circuit 13
103	
104	Actual value, temperature of circuit 14
105	
106	Actual value, temperature of circuit 15
107	
108	Actual value, temperature of circuit 16
109	
110	Reserve
111	
112	Reserve
113	
114	Reserve
115	
116	Reserve
117	
118	Reserve
119	

2.1.5 Transmission example: Master to controller

Example for the transmission of setpoint 1, control word

Prerequisite: Unit parameter = °C (not °F or 0.1°C)

Bytes 1 + 2: A setpoint of 50 °C should be transmitted to the controller.
Setpoint: 50 decimal = 0 x 0032 hexadecimal as a 16 bit integer value

Byte 3: The controller should be switched on (bit 0 = 1).

Bytes 4–124 unused

Bytes 125–130 configuration channel (see 2.2)

Byte 1	Byte 2	Byte 3
Setpoint High Byte 0x00	**Setpoint Low Byte** 0x32	**Control word** 0x01

For separate transmission examples for the configuration channel, refer to Section 2.2.3.

Byte 125	Byte 126	Byte 127	Byte 128	Byte 129	Byte 130	Byte 131	Byte 132
Sequential number	**always:** 0x01	**Command code BC**	always: 0x00	**Parameter code PC**	**Parameter value PWH** High Byte	**Parameter value PWL** Low Byte	**Decimal place PWK**

2.1.6 Transmission example: Response from controller to master

The controller displays the following parameter values (parameter "Unit" = °C):

Byte 1:	Status specification:	The last specification was OK
Bytes 2 + 3:	Actual value:	55 (decimal) = 0 x 0037 (hexadecimal as a 16 bit integer value)
Bytes 4 + 5:	Actual value, return:	50 (dec.) = 0x0032 (hex.)
Bytes 6 + 7:	Actual value, flow:	(only if available) 0 (dec.) = 0x0000 (hex.)
Bytes 8 + 9:	Actual value, pressure:	(only if available) 0 (dec.) = 0x0000 (hex.)
Bytes 10 + 11:	Output:	(only if available) 0 (dec.) = 0x0000 (hex.)
Bytes 12 + 13:	Actual value, film temperature:	100 (dec.) = 0x0064 (hex.)
Byte 14:	Output level:	-33 (dec.) = 0xDF (hex. as 8-bit integer value)
Byte 15:	Alarms 1	The collective alarm has tripped.
Byte 16:	Alarms 2	The film temperature alarm has tripped.
Byte 17:	Status	The controller is switched on.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
Status specification 0x00	**Actual value, current control sensor** High Byte 0x00	**Actual value, current con-trol sensor** Low Byte 0x37	**Actual value, from-process** High Byte 0x00	**Actual value, from-process** Low Byte 0x32

Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11
Flow High Byte 0x00	**Flow** Low Byte 0x00	**Pressure** High Byte 0x00	**Pressure** Low Byte 0x00	**Output** High Byte 0x00	**Output** Low Byte 0x00

Byte 12	Byte 13	Byte 14	Byte 15	Byte 16	Byte 17
Film temperature High Byte 0x00	**Film temperature** Low Byte 0x64	**Output level** -100…+100 0xDF	**Alarms 1** 0x01	**Alarms 2** 0x04	**Status (read)** 0x01

For separate transmission examples for the configuration channel, refer to Section 2.2.3.

Byte 120	Byte 121	Byte 122	Byte 123	Byte 124	Byte 125	Byte 126	Byte 127
Sequential number	**always:** 0x01	**Command code** **BC**	**always:** 0x00	**Parameter code** **PC**	**Parameter value** **PWH** High Byte	**Parameter value** **PWL** Low Byte	**Decimal place** **PWK**

2.2 Configuration channel

Each parameter can be addressed individually via the configuration channel. The Profinet master is able to read out all available data from the controllers and, if permitted, to change them. The transmission of commands or parameters is performed in both directions via defined data blocks.

Terms

Command code	[**BC**]:	tells the device what to do (1 byte)
Parameter code	[**PC**]:	identifies each individual parameter that can be called up in the device (1 byte)
Parameter value	[**PW**]:	specifies the value of a parameter (3 bytes)

Number ranges

Command code	[**BC**]:	0x10, 0x20, 0x21
Parameter code	[**PC**]:	0x00...0xFF
Parameter value	[**PW**]:	the parameter value (16-bit integer) is composed of the plain numeric value **PWH** and **PWL** and the decimal place **PWK**

Parameter value high byte	[**PWH**]
Parameter value low byte	[**PWL**]
Decimal place	[**PWK**]

2.2.1 Configuration of the parameters via the configuration channel

The configuration channel always follows the last byte of the process image.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Sequential number 0x00 ... 0xFF	**always:** 0x01	**Command code** **BC** 0x10, 0x20 or 0x21	**always:** 0x00	**Parameter code** **PC** 0x00 ... 0xFF	**Parameter value** **PWH** High Byte	**Parameter value** **PWL** Low Byte	**Decimal place** **PWK** 0x00 ... 0xFF

Byte 1

Sequential number: The master should prefix each new request with a new sequential number. The controller repeats this number in its response. This makes it possible to match each request with the corresponding response.

Byte 2: Always 0x01

Byte 3

Command code, BC:

0x10:	Read parameter
0x20:	Write parameter
0x21:	Write and save parameter (powerfail-proof) The powerfail-proof semiconductor memory (EAROM, EEPROM) supports max. 1,000,000 write cycles.

Byte 4: Always 0x00

Byte 5

Parameter code, PC: **Request:** Addresses the parameter to be configured (see table).
Response: If the reading process from the controller was error-free, byte 5 in the response from the controller contains the parameter code PC. If the writing process to the controller was error-free, byte 5 contains the value 00H (acknowledge).

In case of a communication fault, the following error messages can occur in byte 5:

03 H	- Procedure error (invalid command code). Device is not in remote mode
04 H	- Value out of range (too high or too low)
05 H	- Byte 2 ≠ 0
06 H	- Addressed parameter is read-only
08 H	- Invalid parameter code
09 H	- Command execution not possible (e.g. optimisation cannot be triggered)
FEH	- Error while writing to powerfail-safe memory
FFH	- General error

Bytes 6, 7 and 8

Parameter value: Bytes 6, 7 and 8 contain parameter values **PWH** and **PWL** and decimal place **PWK**.

The parameter value consists of three data bytes:
2 data bytes (numeric value), 1 data byte (decimal place).

Examples:	Dec.	Hex.	PWH	PWL	Decimal place
Actual value (°C or °F):	215	00D7	00	D7	00
Setpoint (°C or °F):	230	00E6	00	E6	00
Output level, cooling (%)	-16	FFF0	FF	F0	00
Setpoint ramp (°C/min):	2.2	0016	00	16	01

The parameter value is calculated as follows:
Dec.: 2.2 = 22 with one decimal place
Hex.: = 0016 (PWH PWL)
= 01 (1 decimal place)

Negative values:
Formation by the binary 2's complement.

2.2.2 Parameter codes (Table 1)

Parameter		Para Code	Read Write	Other
Cockpit				
1. Setpoint		0x21	RW	
Expert				
Actual value, temperature		0x10	RO	
From-process temperature		0x12	RO	
To-process temperature		0x13	RO	
Film temperature		0x14	RO	
Current output level		0x60	RO	
Flow		0x15	RO	
To-process pressure		0x16	RO	
Flow rate		0x17	RO	
Device functions				
Alarm value		0x38	RW	
Leak stop mode On/Off		0xA7	RW	
Remote On/Off		-		
Mould evacuation active		-		
Pump overrun		0xD4	RW	Cooling down before switching off
Pump control On/Off		0xB3	RW	On=1
Basic settings				
Language		0xD9	RW	
Unit		0x1B	RW	
Keyboard lock		0x85	RW	
Lock code		-		
Single service access		-		
Pressure unit		0xE5	RW	Option
Flow unit		0xE6	RW	Option
Device control				
Filling		0xD0	RW	
Direct cooling		0x94	RW	
Switch-off temperature		0x93	RW	
Draining time		0xA1	RW	
Setpoint source		0xD6	RW	Option
Aquatimer start time		0xA9	RW	
Aquatimer		0xA0	RW	
Filling time monitoring		0xB0	RW	
Restart lockout		0x90	RW	Emergency Off
External sensor		0xD7	RW	Option On=1 Off=0
Actual value output upper value		0x87	RW	
Actual value output lower value		0x89	RW	

Temperature control				
2. Setpoint		0x22	RW	
Output level limitation, heating		0x64	RW	
Output level limitation, cooling		0x69	RW	
XP - heating		0x40	RW	
TV - heating		0x41	RW	
TN - heating		0x42	RW	
XP - cooling		0x50	RW	
TV - cooling		0x51	RW	
TN - cooling		0x52	RW	
Switching hysteresis heating / cooling		0x46	RW	
Switching cycle time heating		0x43	RW	
Switching cycle time cooling		0x53	RW	
Upper setpoint limit		0x2C	RW	
Lower setpoint limit		0x2B	RW	
System closing temperature		0xA2	RW	
Setpoint ramp, rising		0x2F	RW	
Setpoint ramp, falling		0x2E	RW	
Switching hysteresis for cooling switch-on		0x5A	RW	only for 2-point cooling
Switching hysteresis for cooling switch-off		0x59	RW	only for 2-point cooling
Cascade control		0x33	RW	
Offset values				
Internal temperature sensor off-set		0xAB	RW	
External temperature sensor offset		0xAC	RW	
Film temperature sensor offset		0xAF	RW	
From-process sensor offset		0xAD	RW	
To-process sensor offset		0xAE	RW	
Analogue values 4..20 mA/0..10 V		0x84	RW	
Flow offset		0x8E	RW	Option
Alarms and limits				
Configuration Alarm1		0x34	RW	
Film temperature limit		0x39	RW	
To-process alarm		0x3A	RW	
Alarm Flow		0x3B	RW	
From-process limit value		0x3C	RW	
Alarm ΔT		0xA3	RW	
Alarm - Pressure too high		0x3E	RW	
Alarm - Low pressure		0x3F	RW	
Communication				
Protocol		-		
Address		-		
Baud rate		-		Only serial
Data format		-		
Status		-		

Pump control				
Pump control selection		0xB1	RW	
Fixed control variable		0xB2	RW	
Desired flow value		0xE7	RW	
Pressure limit		0xB8	RW	
Difference dT		0xB4	RW	
XP flow		0xB5	RW	
TV flow		0xB6	RW	
TN flow		0xB7	RW	

Parameter codes (Table 2)

Other parameters				
Parameter		**Para Code**	**Read Write**	**Other**
Current actual temperature		0x10	RO	
Current setpoint		0x20	RO	
Device on/off		0x8F	RW	
Device type		0x01	RO	
SW version		0x02	RO	

2.2.3 Transmission example to the configuration channel, command code 10 H

The controller should send the parameter (actual value, 10 H) to the master.
The actual value has the value of 225 degrees C. 225 (decimal) = 0xE1 (hex)

Master to controller: Dec.	**Hex.**	
Sequential number:	1	0x01
always:	1	0x01
Send parameter:	16	0x10
always:	0	0x00
Parameter code (actual value):	16	0x10
Parameter value (High Byte)	0	0x00
Parameter value (Low Byte)	0	0x00
Decimal place:	0	0x00

Transmission to controller: 0x01, 0x01 0x10, 0x00, 0x10, 0x00, 0x00, 0x00

Controller to master: Dec.	**Hex.**	
Sequential number of the request:	1	0x01
always:	1	0x01
Send parameter:	16	0x10
always:	0	0x00
Parameter code (actual value):	16 *)	0x10
Parameter value (High Byte)	0	0x00
Parameter value (Low Byte)	225	0xE1
Decimal place:	0	0x00

Transmission to the master: 0x01, 0x01 0x10, 0x00, 0x10, 0x00, 0xE1, 0x00

*) Repeat of PC = 16 because reading process was error-free.

2.2.4 Transmission example to the configuration channel, command code 20 H

The controller receives the command:
'Apply parameter XP heating (parameter code: 40H, parameter value: 5.0 %)
to data memory (RAM)'.

Master to controller: Dec.	**Hex.**	
Sequential number:	2	0x02
always:	1	0x01
Command code:	32	0x20
always:	0	0x00
Parameter code (XP heating):	64	0x40
Parameter value (High Byte)	0	0x00
Parameter value (Low Byte)	50	0x32
Decimal place:	1	0x01

Transmission to controller: 0x02, 0x01, 0x20, 0x00, 0x40, 0x00, 0x32, 0xFF

Controller to master:	**Dec.**	**Hex.**
Sequential number of the request:	2	0x02
always:	1	0x01
Command code:	32	0x20
always:	0	0x00
Parameter code:	0 *)	0x00
Parameter value (High Byte)	0	0x00
Parameter value (Low Byte)	0	0x00
Decimal place:	0	0x00

Transmission to the master: 0x02, 0x01, 0x20, 0x00, 0x00, 0x00, 0x00, 0x00

*) If the controller has "understood" the command of the master, it responds with the parameter code PC = 00 because the write process was error-free. In the event of transmission or other (e.g. formal) errors, the controller responds at this point with a corresponding error code.

2.2.5 Transmission example to the configuration channel, command code 21 H

The controller receives the command:
'Apply parameter SP1 = 200 °C (setpoint1, parameter code: 0x21) and save powerfail-safe'.

Master to controller:	**Dec.**	**Hex.**
Sequential number:	3	0x03
always:	1	0x01
Command code:	33	0x21
always:	0	0x00
Parameter code (SP1):	33	0x21
Parameter value (High Byte)	0	0x00
Parameter value (Low Byte)	200	0xC8
Decimal place:	0	0x00

Transmission to controller: 0x03, 0x01, 0x21, 0x00, 0x21, 0x00, 0xC8, 0x00

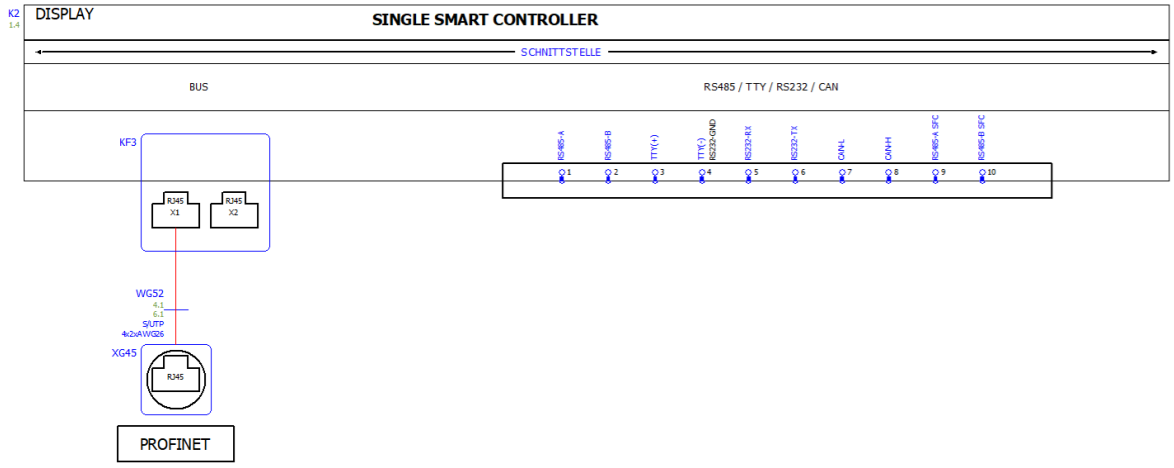
Controller to master:	**Dec.**	**Hex.**
Sequential number of the request:	3	0x03
always:	1	0x01
Command code:	33	0x21
always:	0	0x00
Parameter code:	0 *)	0x00
Parameter value (High Byte)	0	0x00
Parameter value (Low Byte)	0	0x00
Decimal place:	0	0x00

Transmission to the master: 0x03, 0x01, 0x21, 0x00, 0x00, 0x00, 0x00, 0x00

*) If the controller has "understood" the command of the master, it responds with the parameter code PC = 00 because the write process was error-free. In the event of transmission or other (e.g. formal) errors, the controller responds at this point with a corresponding error code.

3 Connection example

3.1 Profinet module



3.2 Application example