ELOTECH
INDUSTRIEELEKTRONIK GMBH

Manual
Data Transfer:

Profibus DP

Single Electronic Controller SC
Type: R8200

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Content:

Disclaimer of liability

We have checked the contents of the document for conformity with the hardware and software described. Nevertheless, we are unable to preclude the possibility of deviations so that we are unable to assume warranty for full compliance. The information given in the publication is, however, reviewed regularly. Necessary amendments are incorporated in the following editions. We would be pleased to receive any improvement proposals which you may have.
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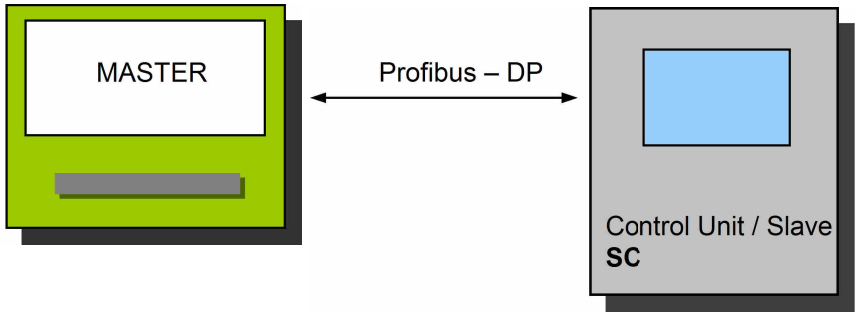
1. Interface, general

The control unit **SC** (slave) is equipped with a PROFIBUS DP interface.



The PROFIBUS -interface allows the slave to be monitored and controlled by a PROFIBUS master.
The data transfer between the slave and master takes place with the aid of the PROFIBUS-DP-protocol acc. to EN 50170.

The communication is always controlled by the PROFIBUS-DP master.
Each slave has it's own PROFIBUS- address.

If there are transmission or other errors detected by the slave, it doesn't accept this data.
The old parameter values are still valid.

Please take attention to the manual of the slave (SC).

GDS - data file:
Will be delivered by Single Temperiertechnik, Hochdorf (Germany).
See: www.single-temp.de

1.1 Line routing, screening and measures to combat interference voltage

This chapter deals with line routing in the case of bus, signal and power supply lines, with the aim of ensuring an EMC- compliant design of your system.

General information on line routing

- Inside and outside of cabinets

  In order to achieve EMC- compliant routing of the lines, it is advisable to split the lines into the following line groups and to lay these groups separately.

Group A:
- shielded bus and data lines (e.g. for PROFIBUS-DP, RS232C and printers etc.)
- shielded analogue lines
- unshielded lines for DC voltages ≥ 60 V
- unshielded lines for AC voltage ≥ 25 V
- coaxial lines for monitors

Group B:
- unshielded lines for DC voltages ≥ 60 V and ≥ 400 V
- unshielded lines for AC voltage ≥ 24 V and ≥ 400 V

Group C:
- unshielded lines for DC voltages > 400 V

The table below allows you to read off the conditions for laying the line groups on the basis of the combination of the individual groups.

Line laying instructions as a function of the combination of line groups:

	Group A	**Group B**	**Group C**
Group A	1	2	3
Group B	2	1	3
Group C	3	3	1

1) Lines may be laid in common bunches or cable ducts.
2) Lines must be laid in separate bunches or cable ducts (without minimum clearance).
3) Lines must be laid in separate bunches or cable ducts inside cabinets but on separate cable racks with at least 10 cm clearance outside of cabinets but inside buildings .

1.2 Shielding of lines

Shielding is intended to weaken (attenuate) magnetic, electrical or electromagnetic interference fields.

Interference currents on cable shields are discharged to earth via the shielding bus which is connected conductively to the chassis or housing. A low-impedance connection to the PE wire is particularly important in order to prevent these interference currents themselves becoming an interference source.

Wherever possible, use only lines with braided shield. The coverage density of the shield should exceed 80 %. Avoid lines with foil shield since the foil can be damaged very easily as the result of tensile and compressive stress on attachment. The consequence is a reduction in the shielding effect.

In general, you should always connect the shields of cables at both ends. The only way of achieving good interference suppression in the higher frequency band is by connecting the shields at both ends.
The shield may also be connected at one end only in exceptional cases. However, this then achieves only an attenuation of the lower frequencies. Connecting the shield at one end may be more favourable if

- it is not possible to lay an equipotential bonding line
- analogue signals (a few mV resp. mA) are to be transmitted
- foil shields (static shields) are used.

In the case of data lines for serial couplings, always use metallic or metallised plugs and connectors. Attach the shield of the data line to the plug or connector housing. Do not connect the shield to a pin of the multi pole connector!

If there are potential differences between the earthing points, a compensating current may flow via the shield connected at both ends. In this case, you should lay an additional equipotential bonding line.

Please note the following points when shielding:

- Use metal cable clips to secure the shield braiding. The clips must surround the shield over a large area and must have good contact.
- Downstream of the entry point of the line into the cabinet, connect the shield to a shielding bus. Continue the shield as far as the module, but do not connect it again at this point!

1.3 Connection guide

Note: Only in PROFIBUS- technology trained personnel following the safety regulations may do the PROFIBUS - connections.

It is essential, that one has well experience in installing a profibus device.

Please look to the FAQ-list.

You will require the following components to connect the slave:

- Connector for Profibus connection to the slave
- PROFIBUS cable (this cable is generally already installed on site!)
- GSD file and User Manual
- Project planning tool for the PROFIBUS-DP

It is essential, that you perform the following during connecting in order to ensure that the slave operates correctly:

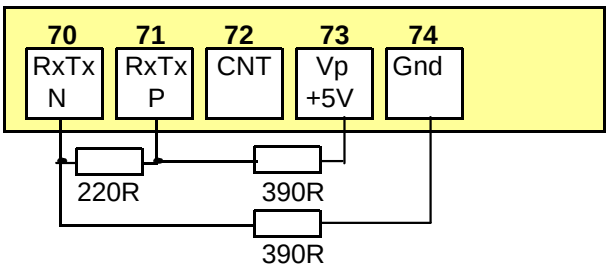
PROFIBUS- Connections:

Connect the slave with the PROFIBUS. Take care to the terminals.

Terminals (SC):

Terminating-Resistors (Tol. +/-2%)

The terminals Vp and GND have to be used to connect the terminating-resistors.
There is no further load allowed.



PROFIBUS – Adjustments:

Adjust the following parameters (slave):
See menu: ”setup interface”

Parameter „Protocol“:	Profibus-DP The slave has to be equipped with a PROFIBUS-modul Type: M8200-ProfibusDP, Single Art.No.: 18152 Otherwise the warning “Module not available” will be displayed.
Parameter „interface address“:	Profibus- address
Parameter „baudrate“,	No adjustment possible. The baud rate will detected and monitored automatically. Warning: „no baud rate is detected” Line “State”: Profibus- status is displayed

PROFIBUS - Status:

Data Exchange:	The slave is in the data-exchange-modus. The communication is OK. The data-exchange with the master takes place.
Wait_Prm:	The bus is detected. The slave is waiting until the master has programmed the slave. This happens automatically.
Wait Cfg:	The slave expects it`s configuration taken through the master. This takes place automatically.
?:	The slave is not connected to the bus correctly. E.g.:- Maybe there is a wiring error. - The master is not active. - The protocol isn't selected in the right way.
Error xxx:	Slave: Hardware error. No communication possible. Please return the slave. The controller-function of the slave itself is further possible.

2. Parameter Transmission

The Communication:

The master sends it´s data to the slave.
After this the slave sends an answer to the PROFIBUS DP - master.
This takes place cyclic and will be controlled by the master.
The configuration of the slave takes place with the help of the GSD-file.

The following standard- modules are available for the slave (type: SC):

- Process Reflection (Standard): Module: „SvL/SC Process Data“

- Configuration Channel: Module: „Parameter Channel“

- Process reflection (Standard)
and Configuration Channel: Module: „SvL/SC Process Data + Parameter“

Software version V34/08 and higher includes the following extended moduls:

- Process Reflection (Extended): Module: „SvL/SC Process Data Extended“

- Process reflection (Extended)
and Configuration Channel: Module:
„SvL/SC Process Data Extended + Param“

2.1 Process Reflection (Standard)

Parameter transfer according to the process reflection modul

2.1.1 From master to slave: Transfer of Setpoint 1 and Control word

Byte 1	Byte 2	Byte 3
Setpoint High Byte	**Setpoint** Low Byte	**Control word**

Setpoint: The parameter value consists out of 2 data bytes.

Example:	Dec.	Hex.	High-Byte	Low-Byte
Setpoint (°C):	230	00E6	00	E6

Means 230°C or 230°F or 23,0°C, depending of the selected measuring range.

Control word:

Bit 0:	slave „on“ or „off“	1 = on
Bit 1:	slave „cool down“ and „off“	1 = on
Bit 2:	sensor internal or external	1 = external
Bit 3:	suction mode	1 = on
Bit 4:	evacuating mode	1 = on
Bit 5:	2nd. setpoint	1 = on
Bit 6:	auto tuning *)	1 = on
Bit 7:	---	

*) Bit 6 „Auto tuning“:
The changing from „0“ to „1“ forces one auto tuning action.
Before starting another auto tuning function, set bit 6 first to „0“ again.
If Bit 6 is set on „0“ the running auto tuning circle stops.
You can read the actual state of auto tuning in the process data state.

2.1.2 From slave to master: Transfer of the process data

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
Status-Instruction	**Actual Process temperature, Pre-flow** High Byte	**Actual Process temperature, Pre-flow** Low Byte	**Process temperature, Back-flow** High Byte	**Process temperature, Back-flow** Low Byte

Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11
flow High Byte	**flow** Low Byte	**Pressure** High Byte	**Pressure** Low Byte	**Power** High Byte	**Power** Low Byte

Byte 12	Byte 13	Byte 14	Byte 15	Byte 16	Byte 17
Film-temperature High Byte	**Film-temperature** Low Byte	**Controller output** 0x9C...0x64	**Alarms 1**	**Alarms 2**	**Status**

Definition
„Status instruction“ : Indicates, if a range error has been detected, when writing the setpoint.
0 = setpoint value OK.
1 = setpoint value faulty

Definition „Flow-Through“ : The sending value is to be interpreted without or with a decimal place.
This depends on the system configuration.
For example: Send: 50 -→ Display Flow-Through = 50 l/min.
For example: Send: 50 -→ Display Flow-Through = 5.0 l/min.
For example: Send: 504 -→ Display Flow-Through = 50,4 l/min.

Definition „Pressure“ : The sending value has to be interpreted with or without a decimal point.
Definition „Work“ : For example: Send: 50 -→ Display Preasure = 5.0 bar
For example: Send: 70 -→ Display Work = 7.0 kW

Definition
„Alarms 1“ :
Bit 0 = collecting alarm
Bit 1 = alarm 1
Bit 2 = ---
Bit 3 = alarm pump (phase, rotation direction)
Bit 4 = alarm filling level
Bit 5 = alarm flow transducer and through-flow
Bit 6 = system error
Bit 7 = auto tune error

Definition
„Alarms 2“ :
Bit 0 = alarm pre-flow
Bit 1 = alarm back-flow
Bit 2 = alarm film-temperature
Bit 3 = alarm sensor breakage (act. sensor)
Bit 4 = alarm pressure
Bit 5 = alarm delta T (monitoring the difference between pre- and backflow)
Bit 6 = ---
Bit 7 = ---

Definition
„Status“ :

Bit 0 = slave on / off	1 = on
Bit 1 = slave „cool down“ and „out“	1 = on
Bit 2 = sensor internal or external	1 = external
Bit 3 = suction mode	1 = on
Bit 4 = evacuating mode	1 = on
Bit 5 = 2nd. setpoint	1 = on
Bit 6 = auto tuning	1 = on
Bit 7 = hand- or remote-operation	1 = hand

2.1.3 From master to slave: Example; transfer of setpoint 1 and control word

Byte 1 + 2: The setpoint 50°C should be send to the slave.
Setpoint: 50 decimal = 0x0032 hexadecimal as a 16 Bit integer-value

Byte 3: The slave should be switched „on“ (Bit 0 = 1).

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

Answer from slave to master: Transmission of the process reflection

The slave sends the following parameter-values:

Byte 1:	status instruction	the last instruction was ok.	
Byte 2 + 3:	pre-flow temperature	55	decimal = 0x0037 hexadecimal as a 16 Bit integer-value
Byte 4 + 5:	back-flow temperature	50	decimal = 0x0032 hexadecimal as a 16 Bit integer-value
Byte 6 + 7:	through-flow	280	decimal = 0x0118 hexadecimal as a 16 Bit integer-value
Byte 8 + 9:	pressure	11,4	decimal = 0x0072 hexadecimal as a 16 Bit integer-value
Byte 10 + 11:	through-flow power	232,0	decimal = 0x0910 hexadecimal as a 16 Bit integer-value
Byte 12 + 13:	film-temp.	46	decimal = 0x002E hexadecimal as a 16 Bit integer-value
Byte 14:	output ratio	-33	decimal = 0xDF hexadecimal as a 8 Bit integer-value
Byte 15:	alarms 1	no alarm	
Byte 16:	alarms 2	film-alarm is active	
Byte 17:	status	slave is switched „on“	

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
Status-Instruction 0x00	**Actual Process temperature, Pre-flow** High Byte 0x00	**Actual Process temperature, Pre-flow** Low Byte 0x37	**Process temperature, Back-flow** High Byte 0x00	**Process temperature, Back-flow** Low Byte 0x32

Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11
Trough-flow High Byte 0x01	**Trough-flow** Low Byte 0x18	**Pressure** High Byte 0x00	**Pressure** Low Byte 0x72	**Trough-flow Power** High Byte 0x09	**Trough-flow Power** Low Byte 0x10

Byte 12	Byte 13	Byte 14	Byte 15	Byte 16	Byte 17
Film-temperature High Byte 0x00	**Film-temperature** Low Byte 0x2F	**Controller output** 0xDF	**Alarms 1** 0x00	**Alarms 2** 0x04	**Status (read)** 0x01

2.2 Configuration Channel

With the help of the configuration channel each parameter can be addressed individually.
The master is allowed to read and to change all allowed parameters.
The instruction- or parameter transfer is executed in both directions by means of defined data blocks.
The communication is always controlled by the master.

Terms

Instruction-code [**BC**]: "tells" the device, what to do (1 Byte)
Parameter-code [**PC**]: designates each individual parameter of the slave (1 Byte)
Parameter-value [**PW**]:shows the value of a parameter (3 Byte)

Parameter ranges

Instruction-code [**BC**]: 0x10, 0x20, 0x21
Parameter-code [**PC**]: 0x00...0xFF
Parameter-value [**PW**]: 16 bit integer, real numerical value **PWH** and **PWL** and dec.point **PWK**

Parameter-value High-Byte [**PWH**]
Parameter-value Low- Byte [**PWL**]
Dec. point [**PWK**]

2.2.1 Configuring of the parameters via the configuration channel.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Current number 0x00 ... 0xFF	**always:** 0x01	**Instruction code** **BC** 0x10, 0x20 or 0x21	**always:** 0x00	**Parameter-code** **PC** 0x00 ... 0xFF	**Parameter-value** **PWH** High-Byte	**Parameter-value** **PWL** Low-Byte	**Dec. point** **PWK** 0x00 ... 0xFF

Byte 1
Current Number: For every new task the master should preset a current number.
This number will be repeated from the slave with every answer.
So it is possible, to find out which instruction and which answer belong together.

Byte 2: Always 0x01

Byte 3
Instruction code, BC: 0x10 : Read parameter
0x20 : Write parameter
0x21 : Write parameter and store with power fail protection
Take care: The EAROM or EEPROM of the slave permits max. 1.000.000 write cycles.

Byte 4: Always 0x00

Byte 5
Parameter code, PC: **Enquiry:**
Addresses the parameter which should be configured.

Answer:
If the read-proceeding to the slave was OK., then, in the answer of the slave, byte 5 shows the parameter-code PC.
If the write-proceeding to the slave was OK., then, in the answer of the slave, byte 5 shows the value 00H (acknowledge).
If the communication was not OK., the following error-warnings are shown in byte 5:

03 H - Procedure error (instruction code not valid)
04 H - Non-compliance with specified range (value to low or to high)
05 H - Byte 2 ≠ 1
06 H - The addressed parameter is a read-only parameter
08 H - Parameter-code not valid
09 H - It is not possible, to execute the instruction
(e.g., the auto tuning can´t be started)
FEH - Error during writing into the power fail storage
FFH - General error

Byte 6, 7 und 8
Parameter value: The parameter value comprises three data bytes:
2 data byte (PWH and PWL), 1 data byte (dec.point).

Byte 6: Parameter value **PWH**
Byte 7: Parameter value **PWL**
Byte 8: Comma (dec. point) **PWK**

Examples:	Dec.	Hex.	PWH	PWL	PWK
Process value (°C):	215	00D7	00	D7	00
Setpoint (°C):	230	00E6	00	E6	00
Output ratio, cooling (%)	-16	FFF0	FF	F0	00
Setpoint ramp (°C/min):	2,2	0016	00	16	FF

The parameter value is calculated as follows:
Dec.: 2,2 = 22 with 1 dec. point
Hex.: = 0016 (PWH PWL)
= 01 (comma / dec. point)

Negative data values:
Built binary two´s complement.

2.2.2 Parametercodes (1)

Parameter	Param.-code	Attri-bute	Others
1st setpoint	0x21	RW	
alarm limit	0x38	RW	
2nd setpoint	0x22	RW	
alarm to process	0x3a	RW	
aqua timer	0xa0	RW	
draining time	0xa1	RW	
alarm flow	0x3b	RW	
alarm pressure high	0x3e	RW	
alarm pressure low	0x3f	RW	
leak stop	0xa7	RW	
testing time flow capacity	0xaa	RW	
regulation ratio	0x60	RO	
regulation ratio heating	0x64	RW	
regulation ratio 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	
hyst. switch heating/cooling	0x46	RW	
switch cycle time heating	0x43	RW	
switch cycle time cooling	0x53	RW	
upper setpoint limit	0x2c	RW	
lower setpoint limit	0x2b	RW	
alarm film temperature	0x39	RW	
system closing temperature	0xa2	RW	
alarm ΔT	0xa3	RW	
temperature unit	0x1b	RW	
external sensor logic	0x1c	RW	
self-optimization	0x88	RW	
from process limit	0x3c	RW	
setpoint ramp increasing	0x2f	RW	
setpoint ramp decreasing	0x2e	RW	
alarm 2	0x3d	RW	*)
switch on hyst. cooling	0x5a	RW	*)
switch off hyst. cooling	0x59	RW	*)

*) if cooling–off function (only) has been selected.

Parametercodes (2a)

Parameter	Param.-code	Attri-bute	Others
parameter lock	0x85	RW	
cascade control	0x33	RW	
shut down temperature	0x93	RW	
act. value output: upper value	0x87	RW	
act. value output: lower value	0x89	RW	
config. change logic	0xa8	RW	
aqua timer start time	0xa9	RW	
record. function: sample time	0xd8	RW	
reclosing lockout	0x90	RW	
recipe selection	0X91	RW	
profile controller	0x92	RW	
actual value offset int. sens.	0xab	RW	
actual value offset ext. sens.	0xac	RW	
act. value offset from process	0xad	RW	
act. value offset sens. to proc.	0xae	RW	
act. value offset film sensor	0xaf	RW	

Parameter-codes (2b)

Additional Parameters	Param.-code	Attri-bute	Others
process temperature	0x10	RO	
from process temperature	0x12	RO	
to process temperature	0x13	RO	
film temperature	0x14	RO	
flow	0x15	RO	
to process pressure	0x16	RO	
power	0x17	RO	
setpoint	0x20	RO	
device on/off	0x8f	RW	

RW = Read/Write
RO = Read Only

2.2.3 Transmission example: Configuration channel, Instruction code: 10 H

The slave is asked to send the parameter „Process value, 10 H“ to the master.
The process value is 225 °C. 225 (Decimal) = 0xE1 (Hex)

Master to slave:	**Dec.**	**Hex**
Current number:	1	0x01
Always:	1	0x01
Send parameter:	16	0x10
Always:	0	0x00
Parameter code (process value):	16	0x10
Parameter value (High-Byte):	0	0x00
Parameter value (Low -Byte):	0	0x00
Dec.point:	0	0x00

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

Slave to master:	**Dec.**	**Hex**
Current number of instruction:	1	0x01
Always:	1	0x01
Send parameter:	16	0x10
Always:	0	0x00
Parameter code (process value):	16 *)	0x10
Parameter value (High-Byte):	0	0x00
Parameter value (Low -Byte):	225	0xE1
Dec. point:	0	0x00

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

*) Repetition of the parameter code (PC = 16), because the read-process was ok.

2.2.4 Transmission example: Configuration channel, Instruction code: 20 H

The slave gets the instruction:
"Overtake parameter „prop.-band heating“ (parameter code: 40H, parameter value: 5,0 %)
and store into the RAM".

Master to slave:	**Dec.**	**Hex**
Current number:	2	0x02
Always:	1	0x01
Instruction code:	32	0x20
Always:	0	0x00
Parameter code:	64	0x40
Parameter value (High-Byte):	0	0x00
Parameter value (Low -Byte):	50	0x32
Dec.point:	1	0x01

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

Slave to master:	**Dec.**	**Hex**
Current number of instruction:	2	0x02
Always:	1	0x01
Instruction code:	32	0x20
Always:	0	0x00
Parameter code (Prop-band, heating):	0 *)	0x00
Parameter value (High-Byte):	0	0x00
Parameter value (Low -Byte):	0	0x00
Dec. point:	0	0x00

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

*) If the slave has understood the instruction of the master, it answers always with the parameter code (PC) = 00, because the writing-process was OK.
If there are transmission or other errors the slave answers with the corresponding error code.

2.2.5 Transmission example: Configuration channel, Instruction code: 21 H

The slave gets the instruction:
"Overtake parameter setpoint 1 / SP1 = 200°C (parameter code: 21H) and store power fail safe into the EEPROM".

Master to slave:	**Dec.**	**Hex**
Current number:	3	0x03
Always:	1	0x01
Instruction code:	33	0x21
Always:	0	0x00
Parameter code (SP1):	33	0x21
Parameter value (High-Byte):	0	0x00
Parameter value (Low -Byte):	200	0xC8
Dec.point:	0	0x00

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

Slave to master:	**Dec.**	**Hex**
Current number of instruction:	3	0x03
Always:	1	0x01
Instruction code:	33	0x21
Always:	0	0x00
Parameter code:	0 *)	0x00
Parameter value (High-Byte):	0	0x00
Parameter value (Low -Byte):	0	0x00
Dec. point:	0	0x00

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

*) If the slave has understood the instruction of the master, it answers always with the parameter code (PC) = 00, because the writing-process was ok.
If there are transmission or other errors the slave answers with the corresponding error code.

2.3 Process Reflection (Standard) and Configuration Channel

It is possible, to transmit process reflection and configuration channel simultaneously.
In this case the bytes of the configuration channel have to be fit together with the process reflection.

Master to slave:

Byte 1	Byte 2	Byte 3
Setpoint High Byte	**Setpoint** Low Byte	**Control word**

Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11
Current number	always: 0x01	**Instruction code BC**	always: 0x00	**Parameter-code PC**	**Parameter-value PWH** High Byte	**Parameter-value PWL** Low Byte	**Dec.point: PWK**

Slave to master:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
Status-Instruction	**Process temperature, Pre-flow** High Byte	**Process temperature, Pre-flow** Low Byte	**Process temperature, Back-flow** High Byte	**Process temperature, Back-flow** Low Byte

Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11
flow High Byte	**flow** Low Byte	**Pressure** High Byte	**Pressure** Low Byte	**Power** High Byte	**Power** Low Byte

Byte 12	Byte 13	Byte 14	Byte 15	Byte 16	Byte 17
Film-temperature High Byte	**Film-temperature** Low Byte	**Controller output**	**Alarms 1**	**Alarms 2**	**Status (read)**

Byte 18	Byte 19	Byte 20	Byte 21	Byte 22	Byte 23	Byte 24	Byte 25
Current number	always: 0x01	**Instruction code BC**	always: 0x00	**Parameter-code PC**	**Parameter-value PWH** High Byte	**Parameter-value PWL** Low Byte	**Dec. point: PWK**

2.4 Process Reflection (Extended)

Software Version 34/08 and higher
profile controller from SW-Version 04/13

2.4.1 Process Value Transmission

The slave gets it's actual temperature value (controller value) via PROFIBUS from the master.

Transfer of the process data SC, extended:

From master to slave: Transmission of setpoint, control word recipe selection and act. process temperature value

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Setpoint High Byte	**Setpoint** Low Byte	**Control word**	**Process value via Profibus** High Byte	**Process value via Profibus** Low Byte	**start profile controller** 0 = Stop 1= Start	**Recipe selection** 1..10

Setpoint: The parameter value consists out of 2 data bytes.

Example:	Dec.	Hex.	High-Byte	Low-Byte	
Setpoint (°C):	230	00E6	00	E6	
Means 230°C or 230°F or 23,0°C, depending of the selected measuring range.					
Control word:	129	81		81	Slave on, process value via Profibus
Act. temp. value	110	006E	00	6E	
in reserve	0	0000	00	00	
profile controller starting:	0	00		00	profile controller stopped
recipe selection:	4	04		04	recipe 4 selected.

Adjustment of recipe selection is only possible when profile controller is stopped, otherwise error message "setpoint value faulty" in status byte „Status instruction".

Control word, Byte 3:	Bit 0:	slave „on" or „off"	1 = on
	Bit 1:	slave „cool down" and „off"	1 = on
	Bit 2:	sensor internal or external	1 = external
	Bit 3:	suction mode	1 = on
	Bit 4:	evacuating mode	1 = on
	Bit 5:	2nd. setpoint	1 = on
	Bit 6:	autotuning	1 = on
	Bit 7:	Actual process temperature via PROFIBUS	1 = on 0 = process value selection acc. to bit 2

Select Parameter „external sensor" with the help of the control word (Byte 3):

Sensor, internally / externally Bit 2 =	Act. Process value via Profibus Bit 7 =	Parameter: external sensor
0	0	Off: Controlling: int. sensor
1	0	On: Controlling: ext. sensor
0	1	Sensor Profibus: Act. process temp. value (Byte 4 and 5) will be used for temp. controlling
1	1	Sensor Profibus: Act. process temp. value (Byte 4 and 5) will be used for temp. controlling

If „Sensor Profibus“ is selected as the actual process temperature value, it will be switched over to „internal process value“ automatically, if:

1. The act. process value is lower or higher than the selected range (-30°C / 400°C).
2. The Profibus- connection is disturbed.
3. The Remote-operation is not active.

Type „SC – Professional“: The selection of an external sensor is not possible via external contact S1, if the parameter „External Sensor“ is set to „Sensor Profibus“.

2.4.2 Output: Act. Temperature Process Value

The following act. temperature process values can be send to PROFIBUS and to the analogue output (Terminals 40-42).

Go to menu: “setup: Device functions”.
The selection takes place with parameter „Temp. output / PB”

Select:

„Actual controller sensor“ → The actual controller process value (either int. or ext. sensor) will be send to the analogue output and the PROFIBUS.

„External Sensor“ → The value of the external sensor will be send to the analogue output and to the PROFIBUS. If the external sensor has a sensor breakage, the value of the internal sensor will be send to the output automatically.

„Internal Sensor“ → The value of the internal sensor will be send to the analogue output and to the PROFIBUS.

Transmission of the Process Data SC, extended:

Slave to Master:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
Status-Instruction	**Process value = act. controller sensor** or **ext./int. sensor** High Byte	**Process value = act. controller sensor** or **ext./int. sensor** Low Byte	**Process temperature, Back-flow** High Byte	**Process temperature, Back-flow** Low Byte

Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11
flow High Byte	**flow** Low Byte	**Pressure** High Byte	**Pressure** Low Byte	**Power** High Byte	**Power** Low Byte

Byte 12	Byte 13	Byte 14	Byte 15	Byte 16	Byte 17
Film-temperature High Byte	**Film-temperature** Low Byte	**Controller output**	**Alarms 1**	**Alarms 2**	**Status (read)**

Byte 18	Byte 19	Byte 20	Byte 21	Byte 22	Byte 23
in reserve 1	in reserve 2	in reserve 3	in reserve 4	in reserve 5	in reserve 6

In reserve: not used.

2.5 Process Reflection (Extended) and Configuration Channel

Software Version 34/08 and higher
profile controller from SW-Version 04/13

Process reflection and Configuration Channel can be transmitted simultaneously.
The bytes of the configuration channel will be added to the process reflection.

Master to Slave:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
Setpoint High Byte	**Setpoint** Low Byte	**Control word**	**Process value via Profibus** High Byte	**Process value via Profibus** Low Byte	**start profile controller** 0 = Stop 1= Start	**Recipe selection** 1..10

Byte 8	Byte 9	Byte 10	Byte 11	Byte 12	Byte 13	Byte 14	Byte 15
Current number	always: 0x01	**Instruction-code BC**	always: 0x00	**Parameter-code PC**	**Parameter-value PWH** High-Byte	**Parameter-value PWL** Low-Byte	**Dec. point PWK**

Slave to Master:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
Status-Instruction	**Process value = act. controller sensor** or **ext./int. sensor** High Byte	**Process value = act. controller sensor** or **ext./int. sensor** Low Byte	**Process temperature, Back-flow** High Byte	**Process temperature, Back-flow** Low Byte

Byte 6	Byte 7	Byte 8	Byte 9	Byte 10	Byte 11
flow High Byte	**flow** Low Byte	**Pressure** High Byte	**Pressure** Low Byte	**Power** High Byte	**Power** Low Byte

Byte 12	Byte 13	Byte 14	Byte 15	Byte 16	Byte 17
Film-temperature High Byte	**Film-temperature** Low Byte	**Controller output**	**Alarms 1**	**Alarms 2**	**Status (read)**

Byte 18	Byte 19	Byte 20	Byte 21	Byte 22	Byte 23
in reserve 1	in reserve 2	in reserve 3	in reserve 4	in reserve 5	in reserve 6

Byte 24	Byte 25	Byte 26	Byte 27	Byte 28	Byte 29	Byte 30	Byte 31
Current number	always: 0x01	**Instruction-code BC**	always: 0x00	**Parameter-code PC**	**Parameter-value PWH** High-Byte	**Parameter-value PWL** Low-Byte	**Dec. point PWK**