

**HART® Field Device Specification:**  
**Polytron 8000 Revision 4**

**Document “FDS Polytron 8000.docx”, revision 4**

Initial release: 16 April 2010

Release Date: 18 December 2024

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## 1 INTRODUCTION

### 1.1 Scope

The Dräger Safety gas transmitter, model Polytron 8000, revision 1 complies with HART Protocol Revision 7.0. This document specifies all the device specific features and documents HART Protocol implementation details (e.g., the Engineering Unit Codes supported). The functionality of this Field Device is described sufficiently to allow its proper application in a process and its complete support in HART capable Host Applications.

### 1.2 Purpose

This specification is designed to complement other documentation (Polytron 8000 manual) by providing an unambiguous description of this Field Device from a HART Communication perspective.

### 1.3 Who should use this document?

The specification is designed to be a technical reference for HART capable Host Application Developers, System Integrators, and knowledgeable End Users. It also provides functional specifications (e.g., commands, enumerations, and performance requirements) used during Field Device development, maintenance and testing. This document assumes the reader is familiar with HART Protocol requirements and terminology.

### 1.4 Abbreviations and definitions

<b>ADC</b>	Analogue to Digital Converter
<b>CPU</b>	Central Processing Unit (of microprocessor)
<b>DAC</b>	Digital to Analogue Converter
<b>EEPROM</b>	Electrically Erasable Read-Only Memory
<b>ROM</b>	Read-Only Memory
<b>DSA</b>	Draeger Sensor Alive

### 1.5 References

*HART Smart Communications Protocol Specification*. HCF\_SPEC-12. Available from the HCF.

## 2 DEVICE IDENTIFICATION

<b>Manufacturer Name:</b>	Dräger Safety AG & Co. KGaA	<b>Model Name(s):</b>	Polytron 8000
<b>Manufacture ID Code:</b>	82 (52 Hex)	<b>Device Type Code:</b>	232 (E8 Hex)
<b>HART Protocol Revision</b>	7.0	<b>Device Revision:</b>	4
<b>Number of Device Variables</b>	None		
<b>Physical Layers Supported</b>	FSK		
<b>Physical Device Category</b>	Transmitter, Non-DC-isolated Bus Device		

The Polytron 8000 is a designed to mount on a wall. The name plate indicates the model name.

## 3 PRODUCT OVERVIEW

The Polytron 8000 family is a gas transmitter three-wire loop-powered with a 4-to-20mA output. There are different versions for electrochemical, catalytic, and infrared sensors. There are Polytron 8000 versions with or without relays.

The analogue output of this device is linear with the gas concentration. The user can make a lot of settings. For example, the gas name, the unit and the range.

Further information can be found in the different manuals for Polytron 8000.

## 4 PRODUCT INTERFACES

### 4.1 Process Interface

The Polytron 8000 has a

- sensor for gas measurement
- 3 connectors for the power supply and the 4-20mA interface
- optional 3 relays for switching external devices
- a graphical display
- 3 buttons
- 3 LEDs
- Infrared communication

Further information see manuals for Polytron 8000.

#### 4.1.1 Sensor Input Channel

There is no sensor input channel.

### 4.1.2 Actuator Output Channels

Optional the Polytron 8000 provides 3 relays. During normal use the relays are only controlled from the Polytron 8000 and cannot controlled from a master.

## 4.2 Host interface

### 4.2.1 Analogue Output 1: Gas concentration

The three-wire 4-to-20mA current loop is connected on two terminals. Refer to the Installation Manual of the Polytron 8000 for connection details.

This is the only output from this transmitter, representing the gas concentration measurement, linearized and scaled according to the configured range of the instrument. This output corresponds to the Primary Variable. HART Communication is supported on this loop. This device has a CN number of 1.

A guaranteed linear over-range is provided. Device malfunction can be indicated by down-scale current. Current values are shown in the manual.

	Direction	Values (percent of range)	Values (mA or V)
<b>Linear over-range</b>	Down	-1.25% ± 0.2%	3.77 to 3.83 mA
	Up	+103.125% ± 1.0%	20.34 to 20.66 mA
<b>Device malfunction indication</b>	Down: less than	-2.5%	3.6 mA
	Up: greater than	+106.25%	21.0 mA
<b>Maximum current</b>		+112.5%	22.0 mA
<b>Multi-Drop current draw</b>			1.0 mA
<b>Lift-off voltage</b>			10.5 V

## 4.3 Local Interfaces, Jumpers and Switches

### 4.3.1 Local Controls and Displays

This device has a display and three buttons.

### 4.3.2 Internal Jumpers and Switches

#### *Lithium Battery*

The Polytron 8000 has a switch for connecting the lithium battery with the real time clock.

## 5 DEVICE VARIABLES

This Field Device does not expose any Device Variables.

## 6 DYNAMIC VARIABLES

Two Dynamic Variables are implemented.

	Meaning	Units
PV	Gas concentration	Vol%, %UEG, %LIE, %LEL, ppb, ppb, hPa, kPa, L/m <sup>3</sup> , mbar, mg/L, mg/m <sup>3</sup> , μbar, μg/L, μg/m <sup>3</sup> , mL/L, mL/m <sup>3</sup> , Pa
SV	Temperature	°C

The PV is a temperature compensated and linearized gas concentration.

The SV is the temperature of the Polytron 8000.

Both PV and SV values are smoothed. (See Section 12.1.)

## 7 STATUS INFORMATION

### 7.1 Device Status

Bit 4 ("More Status Available") is set whenever any failures or warnings are detected. Command #48 gives further detail. (See Section 7.2.)

Bit 1 ("Non-Primary Variable Out of Limits") refers to the internal gas sensor. (This event does *not* set bit 7 ("Field Device Malfunction").)

### 7.2 Extended Device Status

The Field Device cannot predict, in advance, when the maintenance will be required. This bit is set if any errors are detected.

### 7.3 Additional Device Status (Command #48)

Command #48 returns 25 bytes of data, with the following status information:

#### Version P7000

Byte	Bit	Meaning	Class	Device Status Bits Set
0	0	Device error	Error	4,7
	1	Checksum error instrument data	Error	4,7
	2	Checksum error user data	Error	4,7
	3	Error I2C	Error	4,7
	4	Communication error	Error	4,7

	5	Voltage error	Error	4,7
	6	Not used	Error	4,7
	7	Not used	Error	4,7
1	0	Not used		
	1	Not used		
	2	Not used		
	3	Not used		
	4	Not used		
	5	Not used		
	6	Not used		
	7	Not used		
2	0	Answer "not Acknowledged" from the subsystem	Error	4,7
	1	Measurement value in valid due to subsystem error	Error	4,7
	2	Invalid subsystem state	Error	4,7
	3	Configured gas index invalid	Error	4,7
	4	Not used	Error	4,7
	5	Not used	Error	4,7
	6	The external ADC is not valid	Error	4,7
	7	Data are not valid for the filter	Error	4,7
3	0	Error in subsystem	Error	4,7
	1	The measurement unit cannot be converted	Error	4,7
	2	Number of gases > 20	Error	4,7
	3	Error in sensor data set	Error	4,7
	4	Communication error with the subsystem	Error	4,7

	5	Sensor cannot be used with the Polytron 8000	Error	4,7
	6	The subsystem communication driver is not ready	Error	4,7
	7	The subsystem cannot execute the command "configuration of the hardware"	Error	4,7
4	0	Unknown unit	Error	4,7
	1	Measurement value is lower than the negative limit	Error	4,7
	2	Corrupted data	Error	4,7
	3	Not used	Error	4,7
	4	No valid zero calibration	Error	4,7
	5	No valid span calibration	Error	4,7
	6	Read or write block are corrupted	Error	4,7
	7	Exponential calculation is not implemented but necessary	Error	4,7
5	0	Error (summary)	Error	4,7
	1	Check sum error instrument data	Error	4,7
	2	Check sum error user data	Error	4,7
	3	Check sum error instrument sensor data	Error	4,7
	4	Check sum error user sensor data	Error	4,7
	5	No sensor connected	Error	4,7
	6	Bad sensor version is connected	Error	4,7
	7	Bad sensor type is connected	Error	4,7
6	0	Maintenance required		
	1	Not used		
	2	Not used		
	3	Not used		

	4	Not used		
	5	Not used		
	6	Not used		
	7	Not used		
7		Byte not used		
8	0	Not used		
	1	Not used		
	2	Not used		
	3	Not used		
	4	Not used		
	5	Not used		
	6	Not used		
	7	Write protected		
9		Byte not used		
10		Byte not used		
11		Byte not used		
12		Byte not used		
13		Byte not used		
14	0	Warning Device (summary)	Warning	4
	1	Data logger is full	Warning	4
	2	Datalogger >= 90 % full	Warning	4
	3	Internal error in the data logger	Warning	4

	4	Date and time are not valid	Warning	4
	5	System write error	Warning	4
	6	Dongle data are corrupted	Warning	4
	7	Lithium battery is nearly empty	Warning	4
15	0	Predictive maintenance dongle is corrupted or removed without acknowledgement	Warning	4
	1	Sensor test dongle is corrupted or removed without acknowledgement	Warning	4
	2	Data logger dongle is corrupted or removed without acknowledgement	Warning	4
	3	Alarms deactivated	Warning	4
	4	Subsystem information cannot be read	Warning	4
	5	Not used	Warning	4
	6	Not used	Warning	4
	7	Not used	Warning	4
16	0	Bad sensor part number (Sensor lock is active)	Error	4,7
	1	Not used	Error	
	2	Not used	Error	
	3	Not used	Error	
	4	P8000 cannot control the set point of the PIR7x00	Error	4,7
	5	Value is not equal to string	Error	4,7
	6	SIL password of PIR7x00 has not the default value	Error	4,7
	7	Not used	Error	
17	0	Calibration interval span expired	Warning	4

	1	Measurement value is lower than the negative warning limit	Warning	4
	2	Beam Block warning at PIR7X00 or PIR3000	Warning	4
	3	Span calibration not possible because zero calibration is older than 24h	Warning	4
	4	Not used		
	5	Not used		
	6	Not used		
	7	Not used		
18	0	Measurement warning (summary)	Warning	4
	1	Temperature is too low	Warning	4
	2	Temperature is too high	Warning	4
	3	Calibration value is very low, sensor is near end of life	Warning	4
	4	Sensor is warming up, no measurement values	Warning	4
	5	Sensor is warming up, measurement values are valid, error < 4 x data sheet	Warning	4
	6	Not used	Warning	4
	7	Calibration interval zero expired	Warning	4
19	0	Bad sensor part number (Sensor lock is activated)	Error	4,7
	1	Sensor test after reset fail	Error	4,7
	2	Reference electrode test fail	Error	4,7
	3	Error during copying data to sensor buffer	Error	4,7
	4	Communication error or time out during sensor test	Error	4,7
	5	error in sensor data base	Error	4,7
	6	EC_ERR_SQR_NEG_VALUE	Error	4,7

	7	EC_ERR_RNTC	Error	4,7
20	0	There is no extension block in the sensor	Error	4,7
	1	Sensor test is failed	Error	4,7
	2	Potentiostat voltage cannot be read	Error	4,7
	3	Internal potentiostat voltage cannot be read	Error	4,7
	4	Too many lookup values in the sensor	Error	4,7
	5	Sensor EEPROM is not supported	Error	4,7
	6	Subsystem cannot execute sensor test values	Error	4,7
	7	Sensor test is failed, sensor can be refilled	Error	4,7
21	0	Explicit sensor error	Error	4,7
	1	Error signal supervision	Error	4,7
	2	Error current supervision	Error	4,7
	3	Pellistor out of range	Error	4,7
	4	Error sum pellistor	Error	4,7
	5	Not used	Error	4,7
	6	Not used	Error	4,7
	7	Not used	Error	4,7
22	0	Life integral is full, sensor is nearly end of life	Warning	W8
	1	Calibration necessary because too high exposition	Warning	4
	2	Calibration necessary because too high concentration	Warning	4
	3	Calibration necessary because too high temperature	Warning	4
	4	Voltage of counter electrode not within the expected range	Warning	4
	5	Concentration is too high	Warning	4
	6	Sensor test warning	Warning	4

	7	Sensor test warning, sensor could be refilled	Warning	4
23	0	4-20mA wire is not connected	Error	4,7
	1	4-20mA readback error	Error	4,7
	2	Error during initializing the external ADC	Error	4,7
	3	Internal error of the external ADC	Error	4,7
	4	External ADC has no reference voltage	Error	4,7
	5	Not used	Error	4,7
	6	Not used	Error	4,7
	7	Not used	Error	4,7
24	0	Not used	Error	4,7
	1	Sensor initialization required	Error	4,7
	2	Not use	Error	4,7
	3	Clean mirror	Error	4,7
	4	Not used	Error	4,7
	5	Error gas configuration	Error	4,7
	6	Sensor voltage is not in range	Error	4,7
	7	Difference between ICom and 4-20mA	Error	4,7

"Not used" bits are always set to 0.

All bits used in this transmitter indicate device or sensor warnings or failure, and therefore also set bit 4 and bit 7 (only for an error) of the Device Status byte.

These bits are set or cleared by the self-test executed at power up, or following a reset or self-test command. They are also set and cleared by any failure detected during continuous background self-testing.

## 8 UNIVERSAL COMMANDS

Command #3 returns PV and SV for a total of 14 bytes of response data. See Section 6.

Command #14: Units for sensor limits and minimum span are as ppm (unit code 139 decimal) or %LEL (unit code 161 decimal). Sensor serial number is not used and returns 0.

## **9 COMMON-PRACTICE COMMANDS**

### **9.1 Supported Commands**

The following common-practice commands are implemented:

- 38     Reset "Configuration Changed" Flag
- 42     Perform Master Reset
- 48     Read Additional Device Status
- 59     Write Number of Response Preambles

Command #48 returns 25 bytes of data. (See Section 7.2.)

### **9.2 Burst Mode**

This Field Device does not support Burst Mode.

### **9.3 Catch Device Variable**

This Field Device does not support Catch Device Variable.

## **10 DEVICE-SPECIFIC COMMANDS**

The following device-specific commands are implemented:

### 10.1 Command 128 Read Measurement Value and Alarm Condition

Reads the gas concentration in measurement gas unit and decimal adjustment. Reads Alarm condition if an Alarm Module is installed.

If no Alarm Module is present, Alarm condition 0x00 is provided.

#### Request Data Bytes

Byte	Format	Description
none		

#### Response Data Bytes

Byte	Format	Description
0 ... 3	Float	Gas Concentration Value, in configured measurement unit
4	uint	Decimal Adjustment
5	Bitfield	Alarm condition  0x80: Not used  0x40: reserved (overflow)  0x20: Alarm 2 condition tripped  0x10: Alarm 1 condition tripped  0x08: Not used  0x04: Error Activated  0x02: Alarm 2 activated  0x01: Alarm 1 activated

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.2 Command 129 Configure LEL

Write LEL in volume percent for the measurement gas

SIL Activation Level < 2 required

### Request Data Bytes

Byte	Format	Description
0...3	Float	LEL in Vol% for measurement gas

### Response Data Bytes

Byte	Format	Description
0...3	Float	LEL in Vol%

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
7	Error	In Write Protect Mode
3	Error	Passed Parameter Too Large
4	Error	Passed Parameter Too Small
80	Error	No Sensor

### 10.3 Command 130 Read Device and Module Information

Reads the part number and the serial number of the hardware, the part number of the software and the software version.

Depending on module parameter, some data may not be relevant for requested module

#### Request Data Bytes

Byte	Format	Description
0	uint	Module  0x00 Transmitter  0x02 Subsystem (SIOS)

#### Response Data Bytes

Byte	Format	Description
0	uint	echo Module or  0xFF: requested Module not present, following data not valid
1...7	ASCII	Module Part Number
8...15	ASCII	Module Serial Number
16...22	ASCII	Module Software Part Number
23	uint	Module Software Version
24	uint	Module Software Revision
25	uint	Module Software Sub Revision

#### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

5	misc	Too few bytes received
---	------	------------------------

## 10.4 Command 131 Read Sensor Information

Reads sensor part No. and sensor serial number, sensor manufacturing date, sensor EEPROM type, sensor EEPROM version and sensor install date. For some sensors the data is not available and "XXX" will be returned for part- und serial number.

Date Format: Day: U\_BYTE, Month: U\_BYTE, Year U\_WORD

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0...6	ASCII	Sensor Part Number
7...14	ASCII	Sensor Serial Number
15	uint	Sensor EEPROM Type
16	uint	Sensor EEPROM Version
17...20	Date	Fabrication Date
21...24	Date	Install Date

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

### 10.5 Command 132 Read Measurement Gas and Unit Information

Reads measurement gas and unit name, unit compensation type and unit factor.

Only ppm exists as a HART unit for use with cmd1 and cmd3. If any other unit is selected, the measurement value must be converted into the selected unit:

$$value(Unit) = value(ppm) * Unit\ Factor * \prod_{bit(i)} Compensation$$

Depending on the unit compensation type there are none, one or two compensations to be considered.

Unit Comp. Type: Compensation Factor(s): Remark:

Bit 0 (T[°C] + 273.15) / 293.15 Temperature Compensation

Bit 1 293.15 / (T[°C] + 273.15) Temperature Compensation

Bit 2 p[Pa] / 101300 Pressure Compensation

Bit 3 101300 / p[Pa] Pressure Compensation

#### Request Data Bytes

Byte	Format	Description
none		

#### Response Data Bytes

Byte	Format	Description
0...9	ASCII	Gas Name
10...14	ASCII	Unit Name
15	uint	Unit Compensation Type
16...19	Float	Unit Factor

20	uint	Allowed units
		0xFF: all units
		BIT0: UEG ORIENTIERT
		BIT1: VOLUMENORIENTIERT

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.6 Command 133 Read Sensor Analytical Data

Reads remaining sensor warmup time 1, last and next calibration date and warmup time 2. Read maximum sensor temperature.

Date format: Day: U\_BYTE, Month: U\_BYTE, Year U\_WORD

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0...1	uint	Sensor warmup time 1 in minutes
2...3	uint	Sensor warmup time 2 in minutes
4...7	Date	Last calibration
8...11	Date	Next calibration
12	uint	Sensor Present Information  0x01 Sensor Present  0x00 Sensor Not Present
13...16	Float	maximum sensor temperature

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.7 Command 134 Read Date and Time

Reads date and time.

Date Format: Day: U\_BYTE, Month: U\_BYTE, Year U\_WORD

### Request Data Bytes

Byte	Format	Description
		none

### Response Data Bytes

Byte	Format	Description
0	uint	Day
1	uint	Month
2...3	uint	Year
4	uint	Hour
5	uint	Minute
6	uint	Second

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
8	Warning	Update Failure (if Date and Time not valid)

## 10.8 Command 135 Read Transmitter Temperature

Reads Device Temperature

### Request Data Bytes

Byte	Format	Description
	none	

### Response Data Bytes

Byte	Format	Description
0	sint	Temperature

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.9 Command 136 Read Analogue Output Configuration

Reads analogue warning signal on/off flag, analogue warning current level, analogue warning signal period time, analogue warning current time and analogue maintenance current level.

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0	uint	analogue warning signal on/off flag  0x00: off  0x01: on
1...4	Float	analogue warning current level in mA
5	uint	analogue warning signal period time in seconds
6	uint	analogue warning current time in seconds
7...10	Float	analogue maintenance current level in mA
11...14	Float	minimum analogue maintenance current level in mA
15	uint	Bit0  0x00: static maintenance signal selected  0x01: dynamic maintenance signal selected
16..19	Float	analogue fault level in mA
20..23	Float	analogue beamblock level / DSA warning level in mA
24	uint	beamblock on/off
25	ASCII	analogue warning signal on off

26..33	ASCII	analogue warning current level in mA
34..36	ASCII	analogue warning signal period time in seconds
37..39	ASCII	analogue warning current time in seconds
40..47	ASCII	analogue maintenance current level in mA
48..55	ASCII	minimum analogue maintenance current level in mA
56	ASCII	static/dynamic maintenance signal selected
57..64	ASCII	analogue fault level in mA
65..72	ASCII	analogue beamblock level / DSA warning level in mA
73	ASCII	beamblock on/off

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.10 Command 137 Read Calibration Interval and other Data

Reads the configured calibration interval and the maximum calibration interval for this sensor. Reads autocal on/off. Reads display capture information (service only).

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0...1	uint	Calibration Interval in Days
2...3	uint	Calibration Maximum Interval
4	uint	autocal on/off  0x00 off  0x01 on
5...8	Float	Display Capture Offset
9...12	Float	Display Capture Low
13...16	Float	Display Capture High
17..24	ASCII	Display Capture Offset
25..32	ASCII	Display Capture Low
33..40	ASCII	Display Capture High
41..44	Float	Display Capture Min
45..48	Float	Display Capture Max

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
16	Error	Try again, this moment no valid data

## 10.11 Command 138 Read Alarm Module Configuration

Reads alarm module information, alarm module active, alarm acknowledgement by enter key enabled / disabled, hysteresis thresholds and configured relay logic.

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0	Uint	Alarm Module Information  0x01: Alarm Module present  0x00: No Alarm Module present
1	Uint	Alarm Module active  0x01: Alarm Module activated  0x00: Alarm Module deactivated
2	Bitfield	reserved
3...6	F32	Hysteresis 1 Value in configured unit
7..10	F32	Hysteresis 2 Value in configured unit
11	Uint	Relay logic A1  0x01: relay normally energized  0x00: relay energized on alarm
12	Uint	Relay logic A2  0x01: relay normally energized  0x00: relay energized on alarm

13	ASCII	Alarm Module Information
14	ASCII	Alarm Module active
15	ASCII	reserved
16..23	ASCII	Hysteresis 1 Value in configured unit
24..31	ASCII	Hysteresis 2 Value in configured unit
32	ASCII	Relay logic A1
33	ASCII	Relay logic A2

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
16	Error	Try again, this moment no valid data

## 10.12 Command 139 Read Measurement Gas Configuration

Reads measurement gas index, unit index and names of gas and unit. Reads maximum measurement gas index (a maximum index of i means that there are i+1 measurement gases available.)

Reads analogue setpoint (concentration corresponding to 20 mA, only relevant if a HART-Card is installed and device is not in multidrop mode).

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0	uint	Measurement Gas Index
1	uint	Measurement Unit Index
2...5	F32	Analogue Setpoint in configured Unit
6...15	ASCII	Gas Name
16...20	ASCII	Unit Name
21	uint	Maximum Measurement Gas Index
22..29	ASCII	Analogue Setpoint in configured Unit
30...41	ASCII	CAS

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
16	Error	Try again, this moment no valid data

### 10.13 Command 140 Read Test Gas Configuration

Reads test gas index, unit index, gas concentration and names of test gas and unit. Reads maximum test gas index (a maximum index of i means that there are i+1 test gases available.)

#### Request Data Bytes

Byte	Format	Description
none		

#### Response Data Bytes

Byte	Format	Description
0	uint	Test Gas Index
1	uint	Test Unit Index
2...11	ASCII	Gas Name
12...16	ASCII	Unit Name
17...20	Float	Test Gas Concentration
21	uint	Maximum Test Gas Index
22..29	ASCII	Test Gas Concentration
30...41	ASCII	CAS

#### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
16	Error	Try again, this moment no valid data

## 10.14 Command 141 Read Measurement Gas Name

Read names of measurement gases. Calibration only gases are not shown.

Reads gas lower explosion level (LEL) in Vol% (not configured unit) and gas molecular weight.

If the requested index is not valid, the string „Not Used“ is returned and gas LEL and molecular weight are zero.

### Request Data Bytes

Byte	Format	Description
0	uint	Gas Index

### Response Data Bytes

Byte	Format	Description
0...9	ASCII	Gas Name
10...13	Float	gas LEL in Vol%
14...17	Float	gas molecular weight in g/mol
18...25	ASCII	gas LEL in Vol%
26...33	ASCII	gas molecular weight in g/mol
34	U8	Constant "Fl" (for PIR7X00)
35	U8	Constant "Gl" (for PIR7X00)
36	U8	Flags "flags" (for PIR7X00)
37	U8	free (Version) (for PIR7X00)
38...40	ASCII	gas number (for PIR7X00)
41...52	ASCII	CAS
53	uint	Gas Index

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
16	Error	Try again, this moment no valid data

## 10.15 Command 142 Read Analogue Setpoint Information

### Reads

1. configured analogue setpoint  
equals the maximum gas concentration the device can display. Higher concentrations will result in an overflow. This limit is also relevant for alarm configuration
2. minimum and maximum limits for 1.
3. Negative error limit  
Below this measurement value the device will produce an error

All values in configured unit.

### Request Data Bytes

Byte	Format	Description
None		

### Response Data Bytes

Byte	Format	Description
0...3	F32	Minimum setpoint
4...7	F32	Analogue setpoint in unit
8...11	F32	Maximum setpoint
12...15	F32	Negative Error Limit
16..23	ASCII	Analogue setpoint in unit ASCII

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
16	Error	Try again, this moment no valid data

## 10.16 Command 143 Read Unit Name

Reads name, unit type and factor of selectable units. Selectable unit index ranges from 0 to 22. Units 1 to 22 are the same for every gas, unit 0 is depending on the configured gas.

### Request Data Bytes

Byte	Format	Description
0	uint	Unit Index

### Response Data Bytes

Byte	Format	Description
0...4	ASCII	Unit Name
5	uint	Unit type 0x00 VOLUME ORIENTED 0x01 LEL ORIENTED 0x02 PRESSURE ORIENTED 0x03 WEIGHT ORIENTED 0x04 UGLD ORIENTED
6...9	Float	Unit factor
10	uint	Unit Index

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received

## 10.17 Command 144 Read Sensor Lock On / Off

Reads the sensor lock information and (only if locked) part number.

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0	Bitfield	Sensor Lock Information  0x00: Locking inactive – Part Number <b>invalid</b>  0x01: Locking active – Part Number <b>valid</b>
1...7	ASCII (unpacked)	Locked Sensor Part Number
8-10	ASCII	Sensor Lock Information in ASCII

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.18 Command 145 Read Beam Block Limit

Reads the beamblock / DSA warning limit in float and ASCII and the min and max values.

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0..3	Float	limit
4..7	Float	limit max
8..15	ASCII	limit ASCII
16..19	Float	limit min

## 10.19 Command 146 Read Sensor Self-Test Configuration

Reads sensor self-test configuration and sensor self-test function status.

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0	uint	Sensor self-test function status  0x01: Sensor self-test function available  0x00: Sensor self-test function not available
1	uint	Sensor self-test on/off  0x01 on  0x00 off
2-4	ASCII	Function status in ASCII
5-7	ASCII	Self-test on/off in ASCII

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.20 Command 147 Read Status

This command is for reading the device status every second. It is mainly for the Draeger IR HHT and for the digital bus interface cards (LON, Fieldbus, Profibus).

Information in Bytes 10...13 corresponds mainly to icons in the device and HHT display. Some of this information is redundant with other data like Error Information and HART Device Status.

Each of the Bits in Bytes 5 to 8 corresponds to status bytes (words) in command #48.

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0...3	Float	Measurement value in configured Unit (as in #128)
4	uint	Decimal Adjustment (as in #128)
5...6	uint	Device Specific Status ERROR DEVICE (BIT0) ERROR MB (BIT2) ERROR SENS (BIT3)
7...8	uint	Device Specific Status WARNING DEVICE (BIT0) WARNING MB/SENS (BIT2)
9	uint	Alarm Condition (as in #128)
10...13	uint	Device Specific Status Icon Maintenance (BIT0)

Icon Error	(BIT1)
Icon Warning	(BIT2)
Icon SIL Active	(BIT3)
unused	
Icon DL Stack	(BIT5)
Icon DL Roll	(BIT6)
Icon Analogue Fixed	(BIT7)
Icon Analogue Overflow	(BIT8)
Icon Analogue Underflow	(BIT9)
Icon Sensor Status: „Good“	(BIT10)
Icon Sensor Status: „Ok“	(BIT11)
Icon Sensor Status: „Change soon“	(BIT12)
Warmup1	(BIT13)
Warmup2	(BIT14)
Display Overflow („↑↑↑↑“)	(BIT15)
Display Underflow („↓↓↓↓“)	(BIT16)
Icon Lifetest	(BIT17)
Icon Proofest	(BIT18)

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.21 Command 148 Read Transmitter Specific Options

Reads Hardware Configuration of Device (TSO, Transmitter Specific Options).

### Request Data Bytes

Byte	Format	Description
	none	

### Response Data Bytes

Byte	Format	Description
0...3	uint	TSO, Transmitter Specific Options  BIT0: Relays present  BIT1: unused  BIT2: Donglefunction Datalogger present  BIT3: Donglefunction Selftest Present  BIT4: Donglefunction Diag Present  BIT5: unused  BIT6: unused  BIT7: unused  BIT8: HART Modul present  BIT9: 4-20mA Modul present  BIT10: unused  BIT11: Modbus present  BIT12: Profibus present  BIT13: Foundation Fieldbus  BIT14: Alarmmodul present

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.22 Command 149 Read Calibration Data

Reads gas reading during calibration.

If device is not in calibration mode, the normal measurement value is provided.

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0...3	Float	Test Gas Reading or Measurement Gas Reading (if gas reading was switched during cross calibration)
4...13	ASCII	Calibration Gas Name
14...18	ASCII	Calibration Unit Name
19	uint	Calibration Status  0x00 zero cal possible  0x02 test gas reading (and span cal possible)  0x03 measurement gas reading (and span cal possible)  0x04 warmup  0x05 impossible  0x06 date/time invalid  0x07 cal not ok  0x0A not in calibration mode
20	uint	decimal adjustment for cal reading

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
16	Error	Try again, this moment no valid data

## 10.23 Command 150 Read sensor ID

### Request Data Bytes

Byte	Format	Description
	none	

### Response Data Bytes

Byte	Format	Description
0	unit	0x00: HPP SENSOR 0x01: DSIR SENSOR 0x02: DD SENSOR 0x03: LC SENSOR 0x04: EC SENSOR 0x05: PID SENSOR 0x06: PIR3000 SENSOR 0x07: PIR7X00 SENSOR
1..2		Wavelength (only valid for PIR7X00)

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.24 Command 151 Read Logger Configuration

The command reads configuration of data and event logger.

The command reads logger dongle module information.

Reads Logger Function Status, Buffer Mode, DL Sample Time, DL Trigger Threshold, DL Trigger Active Status and DL Evaluate Mode.

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0	uint	Logger Function Status  0x01: Logger Function available  0x00: Logger Function not available
1	uint	Logger active  0x01 Active  0x00 Not Active
2	uint	Buffer Mode  0x01 Ring  0x00 Stack
3...4	uint	DL Sample Time in [1, 10, 30, 60, 600] sec
5...6	uint	DL Trigger threshold (0-200)  The range of the internal value is 0...100% of the maximum range.

Internal value = DL Trigger threshold * 0.5%		
7	uint	DL Trigger Active Status  0x01 On  0x00 Off
8	uint	DL Evaluate Mode  0x01 Average  0x00 Peak

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.25 Command 152 – Read Sensor Temperature

Reads Sensor Temperature

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0-3	Float	Temperature of Sensor

## 10.26 Command 153 Read Change Sensor Information

Reads status of change sensor mode.

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0	Bitfield	Change Sensor Status  0x00: "Sensor present, data loaded"  0x01: "Plug-in sensor!" (no sensor lock)  0x02: "Plug-in sensor!" (with part number)  0x03: "Loading sensor data"  0x04: "Sensor not accepted" (other reasons)  0x05: "Sensor not accepted" (due to sensor lock, instead part number)  0x06: "Sensor defect or sensor data corrupted"  0x07: "Not possible" (other reasons)  0x08: "Device not in change sensor mode"
1...7	ASCII	Sensor part number

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.27 Command 154 Read Set Analogue Limits

Reads concentration limits for setting of fixed analogue value corresponding to a concentration (#181). Minimum limit corresponds to analogue underflow (3.8 mA), maximum limit corresponds to analogue overflow (20.5 mA).

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0...3	Float	minimum set analogue limit (configured gas & unit)
4...7	Float	maximum set analogue limit (configured gas & unit)

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
16	Error	Try again, this moment no valid data

## 10.28 Command 155 Read Alarm Levels

reduced information for HART compatibility. Description see Cmd 156

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0	uint	Alarm Mode  0x80 : A2 is a latching Alarm  0x40 : A2 is an acknowledgeable Alarm  0x20 : A1 is a latching Alarm  0x10 : A1 is an acknowledgeable Alarm  0x08 : A2 is Mainalarm  0x04 : A2 is a rising Alarm  0x02 : A1 is Mainalarm  0x01 : A1 is a rising Alarm
1..4	F32	A1-Alarm, Level in configured unit
5...8	F32	A2-Alarm, Level in configured unit

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
16	Error	Try again, this moment no valid data

## 10.29 Command 156 Read Alarm Levels

Reads Alarm Module Information, the Alarm Mode, the A1- and the A2-Alarm Threshold.

A rising alarm is tripped as the gas level increases; a falling alarm is tripped as the gas level decreases. An acknowledgeable alarm may be reset while the Measurement Value is still above the alarm level, a non – acknowledgeable alarm may be reset only if the alarm condition is no longer met. A latched alarm must be reset manually, a non – latched will reset automatically. If no other values have been configured, the alarm configuration is derived from the sensor Database.

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0	uint	Alarm Mode  0x80 : A2 is a latching Alarm  0x40 : A2 is an acknowledgeable Alarm  0x20 : A1 is a latching Alarm  0x10 : A1 is an acknowledgeable Alarm  0x08 : A2 is Mainalarm  0x04 : A2 is a rising Alarm  0x02 : A1 is Mainalarm  0x01 : A1 is a rising Alarm
1	uint	Alarm Mode 2  0x02: A2 pre-acknowledge  0x01: A1 pre-acknowledge

2..5	F32	A1-Alarm, Level in configured unit
6..9	F32	A2-Alarm, Level in configured unit
10	ASCII	A1 is rising in ASCII
11	ASCII	A1 is Mainalarm in ASCII
12	ASCII	A2 is rising in ASCII
13	ASCII	A2 is Mainalarm in ASCII
14	ASCII	A1 is acknowledgeble
15	ASCII	A1 is latching
16	ASCII	A2 is acknowledgeable
17	ASCII	A2 is latching
18	ASCII	A1 is pre-acknowledgeable
19	ASCII	A2 is pre-acknowledgeable
20..27	ASCII	A1 Alarm ASCII
28..35	ASCII I	A1 Alarm ASCII

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
16	Error	Try again, this moment no valid data

### 10.30 Command 157 Read Test Gas Name

Read names of test gases. Only gases that are possible test gases for the configured measurement gas are shown.

Reads gas lower explosion level (LEL) in Vol% (!, not configured unit) and gas molecular weight.

If the requested index is not valid, the string „Not Used“ is returned and gas LEL and molecular weight are zero.

#### Request Data Bytes

Byte	Format	Description
0	uint	Gas Index

#### Response Data Bytes

Byte	Format	Description
0...9	ASCII	Gas Name
10...13	Float	gas LEL in Vol%
14...17	Float	gas molecular weight in g/mol
18...29	ASCII	CAS
30		Not defined
31	uint	Gas Index

#### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
16	Error	Try again, this moment no valid data

## 10.31 Command 158 Read Calibration Unit Name

Reads default unit name of configured calibration gas.

### Request Data Bytes

Byte	Format	Description
		none

### Response Data Bytes

Byte	Format	Description
0...4	ASCII	Unit Name

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

### 10.32 Command 159 Read Analogue Setpoint Information Temporary

Reads default analogue setpoint and minimum and maximum limits for given gas and unit index.

Maximum setpoint equals the maximum gas concentration the device can display. Higher concentrations will result in an overflow. This limit is also relevant for alarm configuration.

Reads resolution of measurement (config values in #164 and #165 are checked versus resolution).  
Only valid for EC

#### Request Data Bytes

Byte	Format	Description
0	uint	Gas Index
1	uint	Unit Index

#### Response Data Bytes

Byte	Format	Description
0...3	F32	Minimum analogue setpoint
4..7	F32	Default analogue setpoint
8...11	F32	Maximum analogue setpoint
12...15	F32	Resolution
16	uint	Gas Index
17	uint	Unit Index

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
16	Error	Try again, this moment no valid data

### 10.33[deprecated] Command 160 Write Date and Time

Writes date and time. [deprecated, replaced by command 166]

The date and time returned by this command are the date and time in the request. To read the actual date and time after setting, use command 134.

#### Request Data Bytes

Byte	Format	Description
0	uint	Day
1	uint	Month
2...3	uint	Year
4	uint	Hour
5	uint	Minute
6	uint	Second

#### Response Data Bytes

Byte	Format	Description
0	uint	Day
1	uint	Month
2...3	uint	Year
4	uint	Hour
5	uint	Minute
6	uint	Second
7	uint	Plausibility Information  0x00: no error  0x01: wrong year  0x02: wrong month

0x04: wrong day
0x08: wrong hour
0x10: wrong minute
0x20: wrong second

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received

### 10.34 Command 161 Read Test Gas LEL in Vol% SILName

Reads gas lower explosion level (LEL) in Vol%

#### Request Data Bytes

Byte	Format	Description
0	uint	Gas Index

#### Response Data Bytes

Byte	Format	Description
0...7	ASCII	gas LEL in Vol% ASCII
8	uint	Gas Index

#### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
16	Error	Try again, this moment no valid data

## **10.35[deprecated] Command 162 Configure Analogue Output** [deprecated, replaced by command 170]

Writes analogue warning signal on/off flag, analogue warning current level, analogue warning signal period time, analogue warning current time and analogue maintenance current level.

### **Request Data Bytes**

<b>Byte</b>	<b>Format</b>	<b>Description</b>
0	uint	analogue warning signal on/off flag
1...4	Float	analogue warning current level in mA
5	uint	analogue warning signal period time in seconds (t1)
6	uint	analogue warning current time in seconds (t2)
7...10	Float	analogue maintenance current level in mA
11	uint	Bit0  0x00: select static maintenance signal  0x01: select dynamic maintenance signal
12..15	Float	analogue fault current level in mA
16..19	Float	analogue beamblock current level in mA (only relevant for PIR7x00) or DSA warning level (only for EC)
20	uint	beamblock on/off (only relevant for PIR7x00)

### **Response Data Bytes**

<b>Byte</b>	<b>Format</b>	<b>Description</b>
0	uint	Analogue warning signal on/off flag
1...4	Float	Analogue warning current level in mA
5	uint	Analogue warning signal period time (t1) in seconds

6	uint	analogue warning current time (t2) in seconds (1s < t2 < t1 < 60s)
7...10	Float	analogue maintenance current level in mA
11	uint	Plausibility Information: 0x00: no error 0x01: t2 greater than t1 0x02: t1 too long 0x04: time (t1 or t2) too short 0x08: warning current too high 0x10: warning current too low 0x20: maintenance current too high 0x40: maintenance current too low
12	uint	Maintenance signal Bit 0 0x00: static maintenance signal selected 0x01: dynamic maintenance signal selected
13..16	Float	analogue fault current level in mA
17..20	Float	analogue beamblock current level in mA
21	uint	beamblock on/off (only relevant for PIR7x00)
22	uint	additional Plausibility Information: 0x00: no error 0x01: error current too high

0x02: error current too low  
0x04: beamblock current too high  
0x08: beamblock current too low

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
6	Error	Sil locked

## 10.36[deprecated] Command 163 Configure Calibration Interval [deprecated, replaced by command 182]

Configure the Calibration Interval.

Note:  $1 \leq \text{Calibration Interval} \leq \text{Maximum Calibration Interval (cmd137)}$

Configures autocal on/off and display capture information (for service only).

Configures gas lower explosion level (LEL) for configured measurement gas

SIL Activation Level < 2 required

### Request Data Bytes

Byte	Format	Description
0...1	uint	Calibration Interval in Days
2	uint	autocal on/off 0x00 off 0x01 on

### Response Data Bytes

Byte	Format	Description
0...1	uint	Calibration Interval in Days
2	uint	autocal on/off 0x00 off 0x01 on
3	uint	Plausibility Information: 0x01: no sensor 0x02: cal interval too large

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
6	Error	Sil locked

### **10.37[deprecated] Command 164 Configure Additional Alarm Parameters** [deprecated, replaced by command 188]

Configures Alarm Configuration, Hysteresis Values and relay logic.

The Hysteresis Threshold of a rising / falling Alarm must be set below / above the Alarm Level.

To reset any Relay, the Measurement must fall below / exceed the Hysteresis Threshold.

The Hysteresis Value is the gap between Alarm - and Hysteresis Level.

Note:

Rising Alarm 1: Resolution  $\leq$  Hysteresis Level 1  $\leq$  Alarm 1

Falling Alarm 1: Alarm 1  $\leq$  Hysteresis Level 1  $\leq$  Maximum Analogue Setpoint

Rising Alarm 2: Resolution  $\leq$  Hysteresis Level 2  $\leq$  Alarm 2

Falling Alarm 2: Alarm 2  $\leq$  Hysteresis Level 2  $\leq$  Maximum Analogue Setpoint

And:

Hysteresis 1 Value = 0 Hysteresis 1 disabled

Hysteresis 2 Value = 0 Hysteresis 2 disabled

SIL Activation Level < 2 required

#### **Request Data Bytes**

Byte	Format	Description
0	uint	Alarm Module active
		0x01: Alarm Module activated

		0x00: Alarm Module deactivated
1	uint	reserved
2...5	Float	Hysteresis 1 Value in configured unit
6...9	Float	Hysteresis 2 Value in configured unit
10	uint	Relay logic A1  0x01: relays normally energized  0x00: relays energized on alarm
11	uint	Relay logic A2  0x01: relays normally energized  0x00: relays energized on alarm

### Response Data Bytes

Byte	Format	Description
0	uint	Alarm Module active  0x01: Alarm Module activated  0x00: Alarm Module deactivated
1	uint	reserved
2...5	Float	Hysteresis 1 Value in configured unit
6...9	Float	Hysteresis 2 Value in configured unit
10	uint	Plausibility Information:  0x00: no error  0x01: hysteresis1 too small (and not zero)  0x02: hysteresis1 too large  0x04: hysteresis2 too small (and not zero)

		0x08: hysteresis2 too large 0x10: no sensor
12	uint	Relay logic A1 0x01: relays normally energized 0x00: relays energized on alarm
13	uint	Relay logic A2 0x01: relays normally energized 0x00: relays energized on alarm

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
6	Error	Sil locked

## **10.38[deprecated] Command 165 Configure Alarm Levels** [deprecated, replaced by command 194]

Configure the Alarm Mode, the A1- and the A2-Alarm Threshold.

A rising alarm is tripped as the gas level increases; a falling alarm is tripped as the gas level decreases. An acknowledgeable alarm may be reset while the Measurement Value above the alarm level, a non - acknowledgeable alarm may be reset only if the alarm is no longer met.

A latched alarm must be reset manually, a non - latched will reset automatically.

Pre-Acknowledge has a impact on the alarm behavior for non-acknowledgeable and latching alarms – a pre acknowledge during alarm removes the latching condition temporary for the actual alarm. The alarm will be automatically reset if the alarm condition is not valid anymore, but the alarm will be signalized as long as the alarm condition is valid.

If no other values have been configured, the alarm configuration is derived from the Database.

Note:

Resolution <= A 1 <= Maximum Analogue Setpoint

Resolution <= A 2 <= Maximum Analogue Setpoint

SIL Activation Level < 2 required

### **Request Data Bytes**

<b>Byte</b>	<b>Format</b>	<b>Description</b>
0	uint	Alarm Mode
		0x80 : A2 is a latching Alarm
		0x40 : A2 is an acknowledgeable Alarm
		0x20 : A1 is a latching Alarm

		0x10 : A1 is an acknowledgeable Alarm
		0x08 : reserved
		0x04 : A2 is a rising Alarm
		0x02 : reserved
		0x01 : A1 is a rising Alarm
1	uint	Alarm Mode 2
		0x02: A2 pre-acknowledge (0x80=1, 0x40=0)
		0x01: A1 pre-acknowledge (0x20=1, 0x10=0)
2...5	Float	A1-Alarm, Level in configured unit
6...9	Float	A2-Alarm, Level in configured unit

**Response Data Bytes**

Byte	Format	Description
0	uint	Alarm Mode
		0x80 : A2 is a latching Alarm
		0x40 : A2 is an acknowledgeable Alarm
		0x20 : A1 is a latching Alarm
		0x10 : A1 is an acknowledgeable Alarm
		0x08 : reserved
		0x04 : A2 is a rising Alarm
		0x02 : reserved
		0x01 : A1 is a rising Alarm
1	uint	Alarm Mode 2

2...5	Float	A1-Alarm, Level in configured unit
6...9	Float	A2-Alarm, Level in configured unit
10	uint	Plausibility Information  0x00: no error  0x01: a1 too small  0x02: a1 too large  0x04: a2 too small  0x08: a2 too large  0x10: no sensor

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
6	Error	Sil locked

## 10.39 Command 166 Write Date and Time

Writes date and time.

The date and time returned by this command are the date and time in the request. To read the actual date and time after setting, use command 134.

### Request Data Bytes

Byte	Format	Description
0	uint	Day
1	uint	Month
2...3	uint	Year
4	uint	Hour
5	uint	Minute
6	uint	Second

### Response Data Bytes

Byte	Format	Description
0	uint	Day
1	uint	Month
2...3	uint	Year
4	uint	Hour
5	uint	Minute
6	uint	Second

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
65	Error	First Value Is Wrong
66	Error	Second Value Is Wrong
67	Error	Third Value Is Wrong
68	Error	Fourth Value Is Wrong
69	Error	Fifth Value Is Wrong
70	Error	Sixth Value Is Wrong

## 10.40 Command 167 – Read Name of Categories

PIR7000 supports several categories:

Here are the number of categories and the text.

1: NIOSH

2: IEC

3: PTB

4: custom specific

5: Category 5

6: Category 6

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0	uint	Number of Categories – 1  For example: 4 = NIOSH until category 5 are supported.
1...5	ASCII	Category 5
6...10	ASCII	Category 6
11...15	ASCII	Category 7
16...20	ASCII	Category 8
21...25	ASCII	Category 9
26...30	ASCII	Category 10

31...35 ASCII Category 11
---------------------------

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
16	Error	Try again, this moment no valid data

## **10.41 [deprecated] Command 168 Configure Beamblock limit** [deprecated, replaced by command 199]

Writes analogue beamblock limit / DSA warning limit.

### **Request Data Bytes**

<b>Byte</b>	<b>Format</b>	<b>Description</b>
0..3	Float	limit

### **Response Data Bytes**

<b>Byte</b>	<b>Format</b>	<b>Description</b>
0..3	Float	limit
4	uint	Plausibility Information:  0x00: no error  0x01: limit is too high  0x02: limit not supported  0x03: limit is too low

## 10.42[deprecated] Command 169 Configure Logger [deprecated, replaced by command 209]

Configure Data und Event Logger. Write Logger active, Buffer Mode, DL Sample Time, DL Trigger Threshold, DL Trigger Active Status and DL Evaluate Mode.

### Request Data Bytes

Byte	Format	Description
0	uint	Logger active  0x01 Active  0x00 Not Active
1	uint	Buffer Mode  0x01 Ring  0x00 Stack
2...3	uint	DL Sample Time in [1, 10, 30, 60, 600] sec
4...5	uint	DL Trigger Threshold (0-200)  The range of the internal value is 0..100% of the maximum range.  Internal value = DL Trigger threshold * 0.5%
6	uint	DL Trigger Active Status  0x01 On  0x00 Off
7	uint	DL Evaluate Mode  0x01 Average  0x00 Peak

## Response Data Bytes

Byte	Format	Description
0	uint	Logger active  0x01 Active  0x00 Not Active
1	uint	Buffer Mode  0x01 Ring  0x00 Stack
2...3	uint	DL Sample Time in [1, 10, 30, 60, 600] sec
4...5	uint	DL Trigger Threshold (0-200)  The range of the internal value is 0..100% of the maximum range.  Internal value = DL Trigger threshold * 0.5%
6	uint	DL Trigger Active Status  0x01 On  0x00 Off
7	uint	DL Evaluate Mode  0x01 Average  0x00 Peak
8	uint	Plausibility Information  0x00: no error  0x01: trigger threshold too large  0x02: sample time too small  0x04: sample time too large

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received

## 10.43 Command 170 Configure Analogue Output

Writes analogue warning signal on/off flag, analogue warning current level, analogue warning signal period time, analogue warning current time and analogue maintenance current level.

### Request Data Bytes

Byte	Format	Description
0	uint	analogue warning signal on/off flag
1...4	Float	analogue warning current level in mA
5	uint	analogue warning signal period time in seconds (t1)
6	uint	analogue warning current time in seconds (t2)
7...10	Float	analogue maintenance current level in mA
11	uint	Bit0  0x00: select static maintenance signal  0x01: select dynamic maintenance signal
12..15	Float	analogue fault current level in mA
16..19	Float	analogue beamblock current level in mA (only relevant for PIR7x00) or DSA warning level (only for EC)
20	uint	beamblock on/off (only relevant for PIR7x00)

### Response Data Bytes

Byte	Format	Description
0	uint	Analogue warning signal on/off flag
1...4	Float	Analogue warning current level in mA
5	uint	Analogue warning signal period time (t1) in seconds
6	uint	analogue warning current time (t2) in seconds (1s < t2 < t1 < 60s)

7...10	Float	analogue maintenance current level in mA
11	uint	Maintenance signal  Bit 0  0x00: static maintenance signal selected  0x01: dynamic maintenance signal selected
12..15	Float	analogue fault current level in mA
16..19	Float	analogue beamblock current level in mA
20	uint	beamblock on/off (only relevant for PIR7x00)

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
7	Error	In Write Protect Mode
83	Error	Second Value Is too Small
84	Error	Second Value Is too Large
67	Error	Third Value Is Wrong
85	Error	Third Value Is too Small
68	Error	Fourth Value Is Wrong
87	Error	Fourth Value Is too Small

88	Error	Fourth Value Is too Large
89	Error	Fifth Value Is too Small
90	Error	Fifth Value Is too Large
93	Error	Seventh Value Is too Small
94	Error	Seventh Value Is too Large
95	Error	Eighth Value Is too Small
29	Error	Eighth Value Is too Large

## 10.44 Command 171 Configure Sensor Self-Test

Writes sensor self-test on/off.

SIL Activation Level < 2 required

### Request Data Bytes

Byte	Format	Description
0	uint	Sensor self-test on/off

### Response Data Bytes

Byte	Format	Description
0	uint	Sensor self-test on/off

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
6	Error	Sil locked

## 10.45 Command 172 Write Measurement Gas Index

Write Measurement Gas Index. If index in request and response differ, the chosen index was wrong (too large).

SIL Activation Level < 2 required

### Request Data Bytes

Byte	Format	Description
0	uint	Measurement Gas Index

### Response Data Bytes

Byte	Format	Description
0	uint	Measurement Gas Index

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
6	Error	Sil locked

## **10.46[deprecated] Command 173 Write Measurement Unit Index** [deprecated, replaced by command 215]

Write Measurement Unit Index. If index in request and response differ, the chosen index was wrong (too large).

SIL Activation Level < 2 required

### **Request Data Bytes**

<b>Byte</b>	<b>Format</b>	<b>Description</b>
0	uint	Unit Index

### **Response Data Bytes**

<b>Byte</b>	<b>Format</b>	<b>Description</b>
0	uint	Unit Index
1	uint	Plausibility Information  0x00: no error  0x01: no sensor  0x02: unit index out of range
8	uint	

### **Command Specific Response Codes**

<b>Code</b>	<b>Class</b>	<b>Description</b>
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
6	Error	Sil locked

## 10.47 [deprecated] Command 174 Configure Analogue Setpoint [deprecated, replaced by command 254]

Write Analogue Setpoint in configured Unit.

SIL Activation Level < 2 required

### Request Data Bytes

Byte	Format	Description
0...3	Float	Analogue Setpoint in configured Unit

### Response Data Bytes

Byte	Format	Description
0...3	Float	Analogue Setpoint
4	uint	Plausibility Information  0x00: No error  0x04: Analogue Setpoint too small  0x08: Analogue Setpoint too large  0x10: No sensor

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
6	Error	Sil locked

## 10.48 Command 175 Write Test Gas Index

Write Test Gas Index. If index in request and response differ, the chosen index was wrong (too large).

SIL Activation Level < 2 required

### Request Data Bytes

Byte	Format	Description
0	uint	Test Gas Index

### Response Data Bytes

Byte	Format	Description
0	uint	Test Gas Index

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
6	Error	Sil locked

### 10.49 Command 176 Write Test Unit Index

Writes Test Unit Index. If index in request and response differ, the chosen index was wrong (too large).

SIL Activation Level < 2 required

#### Request Data Bytes

Byte	Format	Description
0	uint	(Calibration) Unit Index

#### Response Data Bytes

Byte	Format	Description
0	uint	(Calibration) Unit Index

#### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
6	Error	Sil locked

## **10.50[deprecated] Command 177 Write Test Gas Concentration** [deprecated, replaced by command 255]

Write Test Gas Concentration.

SIL Activation Level < 2 required

### **Request Data Bytes**

<b>Byte</b>	<b>Format</b>	<b>Description</b>
0...3	Float	Test Gas Concentration

### **Response Data Bytes**

<b>Byte</b>	<b>Format</b>	<b>Description</b>
0...3	Float	Test Gas Concentration
4	uint	Plausibility Information  0x00: No error  0x04: cal concentration too small  0x08: cal concentration too large  0x10: No sensor

### **Command Specific Response Codes**

<b>Code</b>	<b>Class</b>	<b>Description</b>
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
6	Error	Sil locked

## 10.51 Command 178: Read Modbus baudrate

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0	U8	Baudrate
1	U8	Valid owner:  0x00 Address invalid  0x01 Last edit by Menu  0x02 Last edit by Remote System

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## **10.52[deprecated] Command 179: Set Modbus baudrate** [deprecated, replaced by command 64796]

### **Request Data Bytes**

<b>Byte</b>	<b>Format</b>	<b>Description</b>
0	U8	Baudrate

### **Response Data Bytes**

<b>Byte</b>	<b>Format</b>	<b>Description</b>
0	U8	Address
1	U8	Valid owner:  0x00 Adress invalid  0x01 Last edit by Menu  0x02 Last edit by Remote System
2	U8	Plausi:  0x01 Adress request out of range

### **Command Specific Response Codes**

<b>Code</b>	<b>Class</b>	<b>Description</b>
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received

## 10.53 Command 180 Acknowledge Alarms and Overflow

Acknowledges alarms.

### Request Data Bytes

Byte	Format	Description
	none	

### Response Data Bytes

Byte	Format	Description
0	Bitfield	Alarm result  0x80: Not used  0x40: Overflow acknowledged  0x20: Alarm 2 condition tripped  0x10: Alarm 1 condition tripped  0x08: Not used  0x04: Error activated  0x02: Alarm 2 acknowledged  0x01: Alarm 1 acknowledged

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.54 Command 181 Set Analogue Output

Sets the analogue output temporarily to maintenance, warning, fault signal, or to give values of current or gas concentration.

Notice: Setting current to values larger than 22.0 mA will result in an output current of 22.0 mA. Setting gas concentration to values that would lead to currents larger than 20.5 mA will result in an output current of 20.5 mA (overflow).

Setting current to values smaller than 3.0 mA (1.0 mA in three wire mode) will result in an output current of 3.0 mA (1.0 mA). Setting gas concentration to values that would lead to currents smaller than 3.8 mA will result in an output current of 3.8 mA (underflow).

SIL Activation Level < 2 required

There is a timeout for 15 minutes. After that the P8000 leaves the test mode.

### Request Data Bytes

Byte	Format	Description
0	Bitfield	Temporary Analogue Output  0x06: Beamblock signal  0x05: Fixed Current  0x04: Current corresponding to Gas Concentration  0x03: Maintenance Signal  0x02: Error Signal  0x01: Warning Signal  0x00: Analogue Signal back to normal
1...4	Float	Gas Concentration in configured Unit (valid only if Temporary Analogue Output 0x04)
5...8	Float	Fixed Current in mA (valid only if Temporary Analogue Output 0x05)

## Response Data Bytes

Byte	Format	Description
0	Bitfield	Temporary Analogue Output  0x07: invalid  0x06: Beamblock signal  0x05: Fixed Current  0x04: Current corresponding to Gas Concentration  0x03: Maintenance Signal  0x02: Error Signal  0x01: Warning Signal  0x00: Analogue Signal back to normal
1...4	Float	Gas Concentration in configured Unit (valid only if Temporary Analogue Output 0x04)
5...8	Float	Fixed Current in mA (valid only if Temporary Analogue Output 0x05)

## Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
6	Error	Sil locked

## 10.55 Command 182 Configure Calibration Interval

Configure the Calibration Interval.

Note:  $1 \leq \text{Calibration Interval} \leq \text{Maximum Calibration Interval (cmd137)}$

Configures autocal on/off and display capture information (for service only).

Configures gas lower explosion level (LEL) for configured measurement gas

SIL Activation Level < 2 required

### Request Data Bytes

Byte	Format	Description
0...1	uint	Calibration Interval in Days
2	uint	autocal on/off 0x00 off 0x01 on

### Response Data Bytes

Byte	Format	Description
0...1	uint	Calibration Interval in Days
2	uint	autocal on/off 0x00 off 0x01 on

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
7	Error	In Write Protect Mode
3	Error	Passed Parameter too Large
80	Error	No sensor

## **10.56[deprecated] Command 183 Set Fault and Alarm Test** [deprecated, replaced by command 64793]

Controls Test Fault and Alarm Mode.

There is a timeout for 15 minutes. After that the P8000 leaves the test mode.

### **Request Data Bytes**

<b>Byte</b>	<b>Format</b>	<b>Description</b>
0	Bitfield	Control Alarm and Fault Settings
		0x20: Enter Mode
		0x10: Exit Mode
		0x04: Set Error State active
		0x02: Set Alarm 2 State active
		0x01: Set Alarm 1 State active
		0x00: Reset all Error and Alarm States

### **Response Data Bytes**

<b>Byte</b>	<b>Format</b>	<b>Description</b>
0	Bitfield	Control Alarm and Fault Settings
		0x40: Access Denied
		0x20: Mode entered
		0x10: Mode exited
		0x04: Error State active
		0x02: Alarm 2 State active
		0x01: Alarm 1 State active

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
6	Error	Sil locked

## **10.57 [deprecated] Command 184 Change Sensor** [deprecated, replaced by command 64794]

Controls Change Sensor Mode.

### **Request Data Bytes**

<b>Byte</b>	<b>Format</b>	<b>Description</b>
0	Bitfield	0x01: Start Change Sensor 0x00: Stop Change Sensor

### **Response Data Bytes**

<b>Byte</b>	<b>Format</b>	<b>Description</b>
0	Bitfield	0x02: Access Denied 0x01: Start Change Sensor 0x00: Stop Change Sensor

### **Command Specific Response Codes**

<b>Code</b>	<b>Class</b>	<b>Description</b>
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
6	Error	Sil locked

## 10.58 Command 185 Sensor Init

Sensor and gas specific channel data is reset, default values are used.

SIL Activation Level < 2 required

### Request Data Bytes

Byte	Format	Description
		none

### Response Data Bytes

Byte	Format	Description
		none

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
6	Error	Sil locked

## 10.59 Command 186 Device Init

Device configuration data is reset, default values are used. Sensor Init is implicit in this command.

SIL Activation Level < 2 required

### Request Data Bytes

Byte	Format	Description
		none

### Response Data Bytes

Byte	Format	Description
		none

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
6	Error	Sil locked

## 10.60[deprecated] Command 187 Write Sensor Lock On / Off [deprecated, replaced by command 64791]

Configure the Sensor Lock On/Off.

### Request Data Bytes

Byte	Format	Description
0	Bitfield	Sensor Lock Information  0x00: Locking inactive  0x01: Locking active

### Response Data Bytes

Byte	Format	Description
0	Bitfield	Sensor Lock Information  0x00: Locking inactive  0x01: Locking active
1...7	ASCII (unpacked)	Locked Sensor Part Number, valid if locking active

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
6	Error	Sil locked

## 10.61 Command 188 Configure Additional Alarm Parameters

Configures Alarm Configuration, Hysteresis Values and relay logic.

The Hysteresis Threshold of a rising / falling Alarm must be set below / above the Alarm Level.

To reset any Relay, the Measurement must fall below / exceed the Hysteresis Threshold.

The Hysteresis Value is the gap between Alarm - and Hysteresis Level.

Note:

Rising Alarm 1: Resolution  $\leq$  Hysteresis Level 1  $\leq$  Alarm 1

Falling Alarm 1: Alarm 1  $\leq$  Hysteresis Level 1  $\leq$  Maximum Analogue Setpoint

Rising Alarm 2: Resolution  $\leq$  Hysteresis Level 2  $\leq$  Alarm 2

Falling Alarm 2: Alarm 2  $\leq$  Hysteresis Level 2  $\leq$  Maximum Analogue Setpoint

And:

Hysteresis 1 Value = 0 Hysteresis 1 disabled

Hysteresis 2 Value = 0 Hysteresis 2 disabled

SIL Activation Level < 2 required

### Request Data Bytes

Byte	Format	Description
0	uint	Alarm Module active  0x01: Alarm Module activated  0x00: Alarm Module deactivated
1	uint	reserved

2...5	Float	Hysteresis 1 Value in configured unit
6...9	Float	Hysteresis 2 Value in configured unit
10	uint	Relay logic A1  0x01: relays normally energized  0x00: relays energized on alarm
11	uint	Relay logic A2  0x01: relays normally energized  0x00: relays energized on alarm

**Response Data Bytes**

Byte	Format	Description
0	uint	Alarm Module active  0x01: Alarm Module activated  0x00: Alarm Module deactivated
1	uint	reserved
2...5	Float	Hysteresis 1 Value in configured unit
6...9	Float	Hysteresis 2 Value in configured unit
10	uint	Relay logic A1  0x01: relays normally energized  0x00: relays energized on alarm
11	uint	Relay logic A2  0x01: relays normally energized  0x00: relays energized on alarm

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
7	Error	In Write Protect Mode
80	Error	No Sensor
85	Error	Third Value Is too Small
86	Error	Third Value Is too Large
87	Error	Fourth Value Is to Small
88	Error	Fourth Value Is to Large

## 10.62 Command 189 Start Sensor Self-Test

Start sensor self-test. Status and result of Sensor self-test are read using command 212.

### Request Data Bytes

Byte	Format	Description
		none

### Response Data Bytes

Byte	Format	Description
		none

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.63 Command 190 Read UGLD Measurement Filter Settings

This command returns the current configured settings.

### Request Data Bytes

Byte	Format	Description
0	uint	Measurement Channel Index (= 0 if only one channel)

### Response Data Bytes

Byte	Format	Description
0	uint	Measurement Channel Index (echo)
1..2	unit	Analyze Time in seconds
3..4	uint	Selection Value (e.g., Delay)
5	Bits	Filter Activation Bit 0 - Display: Shown on display Bit 1 - Alarm: Use result for alarms Bit 2 - Analogue: Put result on 4-20mA interface
6	enum	Filter Activation: Analogue Interface Alarm Behaviour 0x00 Normal: 4-20mA signal follows the value 0x01 Enhanced: signals follow value as long as it's below the first alarm level, else use fixed alarm signals 0x02 Fixed Alarms Only: Use 4mA when no alarm, use fixed current values for the alarms
7..11	ASCII 5	Analyze Time in seconds [seconds in ASCII]
12..16	ASCII 5	Selection Value in ASCII
17..19	ASCII 3	Filter Result Usage Number as ASCII

20 ASCII 1 Filter Result Analogue Interface Alarm Behaviour as ASCII:

Normal -> 'N', Enhanced -> 'E' , Fixed -> 'F'

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
2	Error	Invalid Selection
5	Error	Too Few Data Bytes Received

## 10.64 Command 191 Set Analyze Time

This command allows to change the time sample values are analyzed.

### Request Data Bytes

Byte	Format	Description
0	uint	Measurement Channel Index (= 0 if only one channel)
1..2	uint	Filter Sample Duration in seconds

### Response Data Bytes

Byte	Format	Description
0	uint	Measurement Channel Index (echo)
1..2	uint	Filter Sample Duration in seconds (echo)

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
2	Error	Invalid Selection
3	Error	Passed Parameter Too Large
4	Error	Passed Parameter Too Small
5	Error	Too Few Data Bytes Received
7	Error	In Write Protect Mode

## **10.65[deprecated] Command 192 Start/Stop Calibration** [deprecated, replaced by command 64795]

Starts and exits calibration mode. Save calibration in device. Switches between Measurement gas and Cal gas for cross calibration (0x02/0x03).

Cmd 192: Start calibration

Cmd 128: Read values

Cmd 193: Perform calibration

Cmd 192: Save calibration

You may start span cal mode without exiting zero cal mode beforehand.

SIL Activation Level < 3 required

### **Request Data Bytes**

<b>Byte</b>	<b>Format</b>	<b>Description</b>
0	uint	Operation Request
		0x00 start zero cal
		0x01 start span cal
		0x02 test gas reading (for cross calibration, without function else)
		0x03 measurement gas reading
		0x04 save cal
		0x05 exit cal without saving

## Response Data Bytes

Byte	Format	Description
0	uint	echo Operation Request  0x00 start zero cal  0x01 start span cal  0x02 test gas reading (for cross calibration, without function else)  0x03 measurement gas reading  0x04 save cal  0x05 exit cal  or  0x06 access denied
1	uint	Calibration Status  0x00 zero cal possible  0x02 test gas reading (and span cal possible)  0x03 measurement gas reading (and span cal possible)  0x04 warmup  0x05 impossible  0x06 date/time invalid  0x07 cal not ok  0x0A not in cal mode

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
6	Error	Sil locked

## 10.66 Command 193 Perform Calibration

Perform a calibration without saving in EEPROM. After Performing save with Cmd 192.

SIL Activation Level < 3 required

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0	uint	Calibration Status  0x00 possible  0x02 test gas reading (and span cal possible)  0x03 measurement gas reading (and span cal possible)  0x04 warmup  0x05 impossible  0x06 date/time invalid  0x07 cal not ok  0x0A not in calibration mode
1	uint	Rest Span after Calibration (in Percent)

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
6	Error	Sil locked

## 10.67 Command 194 Configure Alarm Levels

Configure the Alarm Mode, the A1- and the A2-Alarm Threshold.

A rising alarm is tripped as the gas level increases; a falling alarm is tripped as the gas level decreases. An acknowledgeable alarm may be reset while the Measurement Value above the alarm level, a non - acknowledgeable alarm may be reset only if the alarm is no longer met.

A latched alarm must be reset manually, a non - latched will reset automatically.

Pre-Acknowledge has a impact on the alarm behaviour for non-acknowledgeable and latching alarms – a pre acknowledge during alarm removes the latching condition temporary for the actual alarm. The alarm will be automatically reset if the alarm condition is not valid anymore, but the alarm will be signaled if the alarm condition is valid.

If no other values have been configured, the alarm configuration is derived from the Database.

Note:

Resolution <= A 1 <= Maximum Analogue Setpoint

Resolution <= A 2 <= Maximum Analogue Setpoint

SIL Activation Level < 2 required

### Request Data Bytes

Byte	Format	Description
0	uint	Alarm Mode
		0x80 : A2 is a latching Alarm
		0x40 : A2 is an acknowledgeable Alarm
		0x20 : A1 is a latching Alarm
		0x10 : A1 is an acknowledgeable Alarm
		0x08 : reserved
		0x04 : A2 is a rising Alarm

		0x02 : reserved
		0x01 : A1 is a rising Alarm
1	uint	Alarm Mode 2  0x02: A2 pre-acknowledge (0x80=1, 0x40=0)  0x01: A1 pre-acknowledge (0x20=1, 0x10=0)
2...5	Float	A1-Alarm, Level in configured unit
6...9	Float	A2-Alarm, Level in configured unit

**Response Data Bytes**

Byte	Format	Description
0	uint	Alarm Mode  0x80 : A2 is a latching Alarm  0x40 : A2 is an acknowledgeable Alarm  0x20 : A1 is a latching Alarm  0x10 : A1 is an acknowledgeable Alarm  0x08 : reserved  0x04 : A2 is a rising Alarm  0x02 : reserved  0x01 : A1 is a rising Alarm
1	uint	Alarm Mode 2
2...5	Float	A1-Alarm, Level in configured unit

6...9	Float	A2-Alarm, Level in configured unit
-------	-------	------------------------------------

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
7	Error	In Write Protect Mode
80	Error	No Sensor
85	Error	Third Value Is too Small
86	Error	Third Value Is too Large
87	Error	Fourth Value Is to Small
88	Error	Fourth Value Is to Large

## 10.68 Command 195 Service Init

Resets whole configuration and non-configurable data of the device (service function). It will go through a reset afterwards.

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
none		

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
6	Error	Sil locked

## 10.69 Command 196 Clear Logger

Clears Data or Event Logger of the Device.

### Request Data Bytes

Byte	Format	Description
0	uint	Clear Logger
		0x00 Clear Data Logger
		0x01 Clear Event Logger

### Response Data Bytes

Byte	Format	Description
0	uint	Clear Logger

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.70 Command 197 Deactivate Dongles

Command deactivates the different dongles. This command is to be used if a dongle is defect or is to be removed.

After reset the plugged dongles are active again.

### Request Data Bytes

Byte	Format	Description
None		

### Response Data Bytes

Byte	Format	Description
None		

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
6	Error	Sil locked

## 10.71 Command 198 Write Fieldbus Information

Command writes the following data to the P8000

- Identification of Module
- Firmware version

### Request Data Bytes

Byte	Format	Description
0	uint	Fieldbus Identification: <ul style="list-style-type: none"><li>• 0x01 Foundation Fieldbus Module</li><li>• 0x02 Profibus Module</li><li>• 0x03 Profisafe Module</li><li>• 0x04 Modbus</li></ul>
1-11	ASCII	Firmware version string  (unused characters = 0x00)

### Response Data Bytes

Byte	Format	Description
0	uint	Fieldbus Identification
1-11	ASCII	Firmware version string  (unused characters = 0x00)

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received

## 10.72 Command 199 Configure Beamblock limit

Writes analogue beamblock limit / DSA warning limit.

### Request Data Bytes

Byte	Format	Description
0..3	Float	limit

### Response Data Bytes

Byte	Format	Description
0..3	Float	limit

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
7	Error	In Write Protect Mode
4	Error	The Passed parameter is too small
3	Error	The Passed parameter is too large
30	Error	Truncated: Limit not supported

## 10.73 Command 200 Read Measurement Gas Unit Name Temporary

Reads Unit Name of a measurement gas (not necessarily the configured gas).

gas index only valid for EC, always configured gas for ANA and PIR7x000

### Request Data Bytes

Byte	Format	Description
0	uint	Gas Index
1	uint	Unit Index

### Response Data Bytes

Byte	Format	Description
0...4	ASCII	Unit Name
5	uint	Gas Index
6	uint	Unit Index

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received

## 10.74 Command 201 Read Alarm Level Limits

Read minimum and maximum limits of alarm levels in configured unit.

### Request Data Bytes

Byte	Format	Description
None		

### Response Data Bytes

Byte	Format	Description
0...3	Float	A1 Level Min
4...7	Float	A1 Level Max
8...11	Float	A2 Level Min
12...15	Float	A2 Level Max
16...23	ASCII	A1 Level Min
24...31	ASCII	A1 Level Max
32...39	ASCII	A2 Level Min
40...47	ASCII	A2 Level Max

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
16	Error	Try again, this moment no valid data

## 10.75 Command 202 Read Alarm Hysteresis Limits

Read minimum and maximum limits of alarm hysteresis levels in configured unit.

### Request Data Bytes

Byte	Format	Description
None		

### Response Data Bytes

Byte	Format	Description
0...3	Float	A1 Hysteresis Min
4...7	Float	A1 Hysteresis Max
8...11	Float	A2 Hysteresis Min
12...15	Float	A2 Hysteresis Max
16...23	ASCII	A1 Hysteresis Min
24...31	ASCII	A1 Hysteresis Max
32...39	ASCII	A2 Hysteresis Min
40...47	ASCII	A2 Hysteresis Max

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
16	Error	Try again, this moment no valid data

## 10.76 Command 203 Read Predictive Maintenance Info

Reads Sensor Vitality, Sensor Health Status, Sensor Diagnostics Function Status and most important DSA Subsystem states

### Request Data Bytes

Byte	Format	Description
None		

### Response Data Bytes

Byte	Format	Description
0	uint	Sensor Diagnostics Function Status  0x01: Sensor Diagnostics Function available  0x00: Sensor Diagnostics Function not available
1	uint	Sensor Health Status, valid only if Function available  0x00: „No dongle“  0x01: „Not calculated“, e.g. no sensor  0x02: „Sensor good“  0x03: „Sensor ok“  0x04: „Change Sensor soon“
2	uint	Sensor Vitality in Percent, valid only if Function available  0xFD „Not supported“  0xFE „No dongle“  0xFF „Not calculated“
3	uint	Subsystem DSA Error E12 0x01 :Sensor clogged 0x02: Sensor sensitivity error 0x04: Sensor too high charge 0x08: Sensor below sensitivity threshold

4	uint	Subsystem DSA Error E13
5	uint	Subsystem DSA Warning W12  0x01: No communication  0x02: No diag possible  0x04: Corrupted DSA data  0x08: Invalid DSA version 0x10 Sensitivity below 50%  0x20: Sensitivity below 40%  0x40: No calibration possible 0x80: Integral nozzle 1 not plausible
6	uint	Subsystem DSA Warning W13 0x01: Integral nozzle 2 not plausible  0x02: Nozzle 1 not working  0x04: Nozzle 2 not working  0x08: Wrong RTC 0x10 Synchronization not done  0x20: Current out of range  0x40: Safety fail check active 0x80: Invalid firmware
7	uint	LifeTest Status 0x00 normal operation 0x01 Lifetest running  0x02 Proof Test active

### Command Specific Response Codes

<b>Code</b>	<b>Class</b>	<b>Description</b>
0	Success	No Command-Specific Errors

## 10.77 Command 204 Read Error Status

Reads all error bytes of the device.

### Request Data Bytes

Byte	Format	Description
None		

### Response Data Bytes

Byte	Format	Description	
0..3	uint	E3..E0	ERROR DEVICE
4..7	uint	E7..E4	ERROR MB
8..9	uint	E9..E8	ERROR SENS
10..13	uint	W3..W0	WARNING DEVICE
14..15		always 0	reserved
16..17	uint	W7..W6	WARNING MB
18..19	uint	W9..W8	WARNING SENS
20..23	uint	E15..E12	DSA ERROR
24..27	uint	E19..E16	DSA ERROR
28..31	uint	W15..W12	DSA WARN
32..35	uint	W19..W16	DSA WARN

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.78 Command 205 Read Error History

Read all error bytes of the device that occurred since Power On. General errors excluded.

### Request Data Bytes

Byte	Format	Description
None		

### Response Data Bytes

Byte	Format	Description
0..3	uint	E3..E0 ERROR DEVICE
4..7	uint	E7..E4 ERROR MB
8..9	uint	E9..E8 ERROR SENS
10..13	uint	W3..W0 WARNING DEVICE
14..15		always 0 reserved
16..17	uint	W7..W6 WARNING MB
18..19	uint	W9..W8 WARNING SENS
20..23	uint	E15..E12 DSA ERROR
24..27	uint	E19..E16 DSA ERROR
28..31	uint	W15..W12 DSA WARN
32..36	uint	W19..W16 DSA WARN

## Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.79 Command 206 Set Selection Value

This command allows to change the filter selection value.

### Request Data Bytes

Byte	Format	Description
0	uint	Measurement Channel Index (= 0 if only one channel)
1..2	uint	Selection Value

### Response Data Bytes

Byte	Format	Description
0	uint	Measurement Channel Index (echo)
1..2	uint	Selection Value

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
2	Error	Invalid Selection
3	Error	Passed Parameter Too Large
4	Error	Passed Parameter Too Small
5	Error	Too Few Data Bytes Received
7	Error	In Write Protect Mode

## 10.80 Command 207 Set Filter Activation

This command allows to change the result usage.

### Request Data Bytes

Byte	Format	Description
0	uint	Measurement Channel Index (= 0 if only one channel)
1	bits	Filter Activation (see UGLD_FILTER+0)

### Response Data Bytes

Byte	Format	Description
0	uint	Measurement Channel Index (echo)
1	bits	Filter Activation (echo)

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
2	Error	Invalid Selection
5	Error	Too Few Data Bytes Received
7	Error	In Write Protect Mode

## 10.81 Command 208 Set Filter Activation: Analogue Interface Alarm Behaviour

This command allows to change the interface alarm behaviour of the result.

### Request Data Bytes

Byte	Format	Description
0	uint	Measurement Channel Index (= 0 if only one channel)
1	enum	Filter Activation: Alarm Interface Alarm Behaviour (see UGLD_FILTER+0)

### Response Data Bytes

Byte	Format	Description
0	uint	Measurement Channel Index (echo)
1	enum	Filter Activation: Alarm Interface Alarm Behaviour (echo)

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
2	Error	Invalid Selection
5	Error	Too Few Data Bytes Received
7	Error	In Write Protect Mode

## 10.82 Command 209 Configure Logger

Configure Data und Event Logger. Write Logger active, Buffer Mode, DL Sample Time, DL Trigger Threshold, DL Trigger Active Status and DL Evaluate Mode.

### Request Data Bytes

Byte	Format	Description
0	uint	Logger active  0x01 Active  0x00 Not Active
1	uint	Buffer Mode  0x01 Ring  0x00 Stack
2...3	uint	DL Sample Time in [1, 10, 30, 60, 600] sec
4...5	uint	DL Trigger Threshold (0-200)  The range of the internal value is 0..100% of the maximum range.  Internal value = DL Trigger threshold * 0.5%
6	uint	DL Trigger Active Status  0x01 On  0x00 Off
7	uint	DL Evaluate Mode  0x01 Average  0x00 Peak

## Response Data Bytes

Byte	Format	Description
0	uint	Logger active  0x01 Active  0x00 Not Active
1	uint	Buffer Mode  0x01 Ring  0x00 Stack
2...3	uint	DL Sample Time in [1, 10, 30, 60, 600] sec
4...5	uint	DL Trigger Threshold (0-200)  The range of the internal value is 0..100% of the maximum range.  Internal value = DL Trigger threshold * 0.5%
6	uint	DL Trigger Active Status  0x01 On  0x00 Off
7	uint	DL Evaluate Mode  0x01 Average  0x00 Peak

## Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
85	Error	Third Value Is too Small

86	Error	Third Value Is too Large
88	Error	Fourth Value Is too Large

## 10.83 Command 210 Read temporary Testgas Concentration Info

Read Testgas Concentration Info of a test gas (not necessarily the configured test gas).

gas index only valid for EC, always configured gas for ANA and PIR7x000

### Request Data Bytes

Byte	Format	Description
0	uint	testgas index
1	uint	unit index

### Response Data Bytes

Byte	Format	Description
0...3	Float	testgas concentration
4...7	Float	testgas concentration min
8...11	Float	testgas concentration max
12	uint	testgas index
13	uint	unit index

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
16	Error	Try again, this moment no valid data

### 10.84 Command 211 Read configured Testgas Concentration Info

Reads Testgas Concentration Info of the configured test gas.

#### Request Data Bytes

Byte	Format	Description
None		

#### Response Data Bytes

Byte	Format	Description
0...3	Float	testgas concentration
4...7	Float	testgas concentration min
8...11	Float	testgas concentration max

#### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
16	Error	Try again, this moment no valid data

### 10.85 Command 212 Read Sensor Self-Test Status

Read status and last result of sensor self-test. New result is cleared if a new test could be started.

only valid if Sensortest is available

#### Request Data Bytes

Byte	Format	Description
None		

## Response Data Bytes

Byte	Format	Description
0	uint	<p><b>status</b></p> <p>0x00 SENSTEST_STATUS_IDLE</p> <p>0x01 SENSTEST_NO_DONGLE („No Sorentest available“)</p> <p>0x02 SENSTEST_NOT_SUPPORTED („Sensor does not support Sorentest“)</p> <p>0x03 SENSTEST_SENSOR_ERROR („No Sensor plugged“)</p> <p>0x04 SENSTEST_WARMUP („Test not possible: Warming Up active, please wait“)</p> <p>0x05 SENSTEST_CALIBRATION („Test not possible: Calibration active, retry“)</p> <p>0x06 SENSTEST_TEMPERATURE_OUT_OF_RANGE („Test not possible: Temp too high/low, retry“)</p> <p>0x07 SENSTEST_TEMPORARILY_NOT_POSSIBLE (“Test not possible: Instrument busy, retry“)</p> <p>0x08 SENSTEST_DELAY_TIME („Test not possible: Minimum waittime, please wait“)</p> <p>0x09 SENSTEST_STATUS_RUNNING</p> <p>0x0A SENSTEST_STATUS_OTHER</p>
1	uint	<p><b>result</b></p> <p>SENSTEST_NO_RESULT 0x00</p> <p>SENSTEST_RESULT_PASSED 0x01</p> <p>SENSTEST_RESULT_WARNING 0x02</p> <p>SENSTEST_RESULT_NOT_PASSED 0x03</p>

## Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.86 Command 213 Read Test Gas Unit Name Temporary

Read Unit Name of a test gas (not necessarily the configured test gas).

gas index only valid for EC, always configured gas for ANA and PIR7x000

### Request Data Bytes

Byte	Format	Description
0	uint	Gas Index
1	uint	Unit Index

### Response Data Bytes

Byte	Format	Description
0...4	ASCII	Unit Name
5	Uint	Gas Index
6	Uint	Unit Index

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received

## 10.87 Command 214 Read raw values of sensor-subsystem

Reads raw values of sensor

### Remark:

The Debug status of the subsystem is read by request. At the first call of this function the validity of the debug status can be

- invalid (if it was not read before)  
or
- valid, but outdated

Each processing of this command will start a new internal request of the debug-status. The latest after one second the status will be valid and up to date, provided that the internal read was processed without error.

### Request Data Bytes

Byte	Format	Description
None		

### Response Data Bytes

Byte	Format	Description
0...3	Float	EC: NTC resistor in k $\Omega$  Analogue: Voltage Detector in mA  PIR7X00: A11
4...7	Float	EC: Sensorcurrent in $\mu$ A  Analogue sensors: Voltage Comperator in mA  PIR7X00: A12
8...11	Float	EC: Electrode voltage in mV  Analogue sensors: Bridge Voltage in mA  PIR7X00: A21

12...15	Float	Analogue sensors: sensor current in mA  PIR7X00: A22	
16...19	Float	EC, PIR7X00: Measurement value in ppm  Analogue: Measurement value in LEL	
20	uint	EC  Validity of Main status words  0x01 Valid	0x00 Not valid
21...22	uint	EC: Main status Word 1	Float: Abfangelektrode
23...24	uint	EC: Main status Word 2	EC: Sensorcurrent in µA
25...26	uint	EC: Main status Word 3	not defined
27	uint	EC: Validity of Debug status words  0x01 Valid	0x00 Not valid
28...29	uint	EC: Debug status Word 1	Float: Abfangelektrode
30...31	uint	EC: Debug status Word 2	EC: Electrode voltage in mV

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
32	Busy	During loading sensor data, there is no time for an answer.

## 10.88 Command 215 Write Measurement Unit Index

Write Measurement Unit Index. If index in request and response differ, the chosen index was wrong (too large).

SIL Activation Level < 2 required

### Request Data Bytes

Byte	Format	Description
0	uint	Unit Index

### Response Data Bytes

Byte	Format	Description
0	uint	Unit Index

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
7	Error	In Write Protect Mode
65	Error	First Value Is Wrong
80	Error	No Sensor

## 10.89 Command 216 Read Gas LEL Limits

Read limits of LEL configuration of configured measurement and test gas in Vol%.

### Request Data Bytes

Byte	Format	Description
None		

### Response Data Bytes

Byte	Format	Description
0...3	Float	Lower Measurement Gas LEL Limit
4...7	Float	Upper Measurement Gas LEL Limit
8...11	Float	Lower Test Gas LEL Limit
12...15	Float	Upper Test Gas LEL Limit

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.90 Command 217 Read Fieldbus Information

Command reads the following data from the P8000

- Fieldbus Identification
- Firmware version

### Request Data Bytes

Byte	Format	Description
		none

### Response Data Bytes

Byte	Format	Description
0	uint	Fieldbus Identification: <ul style="list-style-type: none"><li>• 0x00 Module unknown</li><li>• 0x01 Foundation Fieldbus Module</li><li>• 0x02 Profibus Module</li><li>• 0x03 PB-PS</li><li>• 0x04 Modbus</li></ul>
1-11	ASCII	Firmware version string  (unused characters = 0x00)

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received

## 10.91 Command 218: Read Fast Response

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0	U8	Response 0: standard 1: fast 0xFF: not supported
1-3	ASCII	Response in ASCII
4	U8	DD Sensor Latching
5	ASCII	DD Sensor Latching in ASCII
6	U8	Fault relay flashing 0: no flashing 1: flashing
7	ASCII	Fault relay flashing in ASCII

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.92 Command 219: Set Fast Response

### Request Data Bytes

Byte	Format	Description
0	U8	Response 0: standard 1: fast
1	U8	DD Sensor Latching 0: no Latching 1: Latching
2	U8	Fault relay flashing 0: no flashing 1: flashing

### Response Data Bytes

Byte	Format	Description
0	U8	Response 0: standard 1: fast 0xFF not supported
1	U8	DD Sensor Latching 0: no Latching 1: Latching

2	U8	Fault relay flashing
		0: no flashing
		1: flashing

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
2	Error	Invalid Selection
5	Error	Too Few Data Bytes Received
6	Error	SIL Locked

## 10.93 Command 220: Read Profibus address

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0	U8	Address
1	U8	Valid owner: 0x00 Adress invalid 0x01 Last edit by Menu 0x02 Last edit by Remote System

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.94 [deprecated] Command 221: Set Profibus address

[deprecated, replaced by command 64792]

### Request Data Bytes

Byte	Format	Description
0	U8	Address

### Response Data Bytes

Byte	Format	Description
0	U8	Address
1	U8	Valid owner:  0x00 Address invalid  0x01 Last edit by Menu  0x02 Last edit by Remote System
2	U8	Plausi:  0x01 Address request out of range

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received

## 10.95[deprecated] Command 222 Configure Display Capture [deprecated, replaced by command 64789]

display capture information

SIL Activation Level < 2 required

### Request Data Bytes

Byte	Format	Description
0...3	Float	Display Capture Offset (must be $\geq 0.0$ )
4...7	Float	Display Capture Low (must be $\leq 0.0$ )
8..11	Float	Display Capture High (must be $\geq 0.0$ )

### Response Data Bytes

Byte	Format	Description
0...3	Float	Display Capture Offset
4...7	Float	Display Capture Low
8..11	Float	Display Capture High
12	uint	Plausibility Information: 0x00: no error 0x01: no sensor 0x02: check neg value 0x04: check pos value 0x08: 0x10: 0x20: 0x40:

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
6	Error	Sil locked

## 10.96[deprecated] Command 223 Configure LEL [deprecated, replaced by command 129]

LEL

SIL Activation Level < 2 required

### Request Data Bytes

Byte	Format	Description
0...3	Float	LEL in Vol% for measurement gas

### Response Data Bytes

Byte	Format	Description
0...3	Float	LEL in Vol%
4	uint	Plausibility Information:  0x00: no error  0x01: no sensor  0x02: LEL too low  0x04: LEL too high

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
6	Error	Sil locked

## 10.97 Command 224: Write Display Settings

### Request Data Bytes

Byte	Format	Description
0	Uint	Display contrast
1	Uint	Display mode  0x00 : Non Display  0x01 : Standard

### Response Data Bytes

Byte	Format	Description
0	Uint	Display contrast: actual value
1	Uint	Display mode  0x00 : Non Display  0x01 : Standard

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
12	Error	Invalid Mode Selection (dsp contrast failure)

## 10.98 Command 225 Set Profisafe F-Parameter

Write the 14 bytes Profisafe F-Parameter to the Profisafe Stack-Interface from Profisafe Profile Specification Version 2.4

### Request Data Bytes

Byte	Format	Description
0...13	uint	Profibus data

### Response Data Bytes

Byte	Format	Description
0...13	uint	Profibus data

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received

## 10.99 Command 226 Profisafe Data-Exchange

receive and return Profisafe Processdata via Profisafe Stackinterface.

Only valid if device is in Profisafe Cyclic Dataexchange mode

### Request Data Bytes

Byte	Format	Description
0	uint	reserved

### Response Data Bytes

Byte	Format	Description
0..3	Float	Measurement Value
4	uint	DezPkt
5..7	uint	reserved

## 10.100 Command 227 Switch on / off the data logger

This command switches on or off the logging of data.

### Request Data Bytes

Byte	Format	Description
0	Byte	0 Shutdown 1 Restart

### Response Data Bytes

Byte	Format	Description
0	Byte	0 Shutdown 1 Restart

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received

## 10.101 Command 228 Read the number of pages from data logger

This command reads the number of pages from the data logger. The size of a page must be sent.

### Request Data Bytes

Byte	Format	Description
0 - 1	uint	Page size (best value 0x20)

### Response Data Bytes

Byte	Format	Description
0 - 1	uint	Page size (best value 0x20)
2 - 3	uint	Number of pages

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received

## 10.102 Command 229 Read Datalogger Page

The data logger can be read out with this command.

### Request Data Bytes

Byte	Format	Description
0 – 1	uint	Page size (0x20)
2 - 3	uint	Page Number

### Response Data Bytes

Byte	Format	Description
0 – 1	uint	Page size
2 - 3	uint	Page Number
4 - 35	uint	Data of the data logger

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received

### 10.103 Command 230 Switch on / off the event logger

This command switches on or off the logging of events.

#### Request Data Bytes

Byte	Format	Description
0	Byte	0 Shutdown 1 Restart

#### Response Data Bytes

Byte	Format	Description
0	Byte	0 Shutdown 1 Restart

#### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received

### **10.104 Command 231 Read the number of pages from the event logger**

This command reads the number of pages from the event logger. The size of a page must be sent.

#### **Request Data Bytes**

Byte	Format	Description
0 - 1	uint	Page size (best value 0x20)

#### **Response Data Bytes**

Byte	Format	Description
0 - 1	uint	Page size (best value 0x20)
2 - 3	uint	Number of pages

#### **Command Specific Response Codes**

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received

## 10.105 Command 232 Read Event Logger Page

The event logger can be read out with this command.

### Request Data Bytes

Byte	Format	Description
0 – 1	uint	Page size (0x20)
2 - 3	uint	Page Number

### Response Data Bytes

Byte	Format	Description
0 – 1	uint	Page size
2 - 3	uint	Page Number
4 - 35	uint	Data of the data logger

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received

## 10.106 Command 233: Read Last Calibration Params + Unit+ Gasname

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0..3	Float	Measured value at last calibration
4..7	Float	Configured Cal Concentration at last calibration
8	U8	Caldate: Day
9	U8	Month
10..11	U16	Year
12..17	U8	Unit
18..28	U8	Gasname

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.107 Command 234 Command to SIOS or PIR7X00

Command is for communication with a subsystem (SIOS or PIR7X00).

### Request Data Bytes

Byte	Format	Description
x	u8	data, which are sent to SIOS or PIR7X00

### Response Data Bytes

Byte	Format	Description
x	u8	data, which was received from SIOS or PIR7X00

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received (maybe the subsystem do not support the command).
32	Error	Instrument is busy (repeat the command immediately).

## 10.108 Command 235: Read Category

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0	U8	Index of category 1: NIOSH 2: IEC 3: PTB 4: custom specific 0xFF Function not available
1-5	ASCII	category in ASCII

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.109 Command 236: Set Category

### Request Data Bytes

Byte	Format	Description
0	U8	Index der Category  1: NIOSH  2: IEC  3: PTB  4: custom specific

### Response Data Bytes

Byte	Format	Description
0	U8	Index der category  1: NIOSH  2: IEC  3: PTB  4: custom specific  0xFF: Function not available

### Command Specific Response Codes

Code	Description
0	No Command-Specific Errors
2	Invalid Selection
5	Too few Data Bytes
6	Sil locked

## 10.110 Command 237: Read SILlock

see cmd239

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0...1	U16	SIL id
2...5	ASCII	reserved
6	U8	SIL Activation Level  3: SILlock: Parameter & calibration locked  2: SILlock: Parameter locked  1: kein SILlock, check of parameters for SIL  0: kein SILlock

### Command Specific Response Codes

Code	Description
0	No Command-Specific Errors

## 10.111 Command 238: decimal point settings

Information about decimal point position for alarm values.

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0	Uint	decimal point settings 0: for example, display 1 1: for example, display 1.1 2: for example, display 1.12 3: for example, display 1.123

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

**10.112 [deprecated] Command 239: Set SIL lock**  
 [deprecated, replaced by command 64797]

P8000 can be protected against changing of SIL relevant parameter.

The SIL ID is a check word from all SIL data.

**Request Data Bytes**

Byte	Format	Description
0...3	ASCII	Password (password) Cfg/Cal
4	U8	SIL Activation Level  0xFF: Sil Lock  1: no SILlock, check of parameters for SIL (only Cfg)  0: no SILlock

**Response Data Bytes**

Byte	Format	Description
0...1	U16	SIL id
2...5	ASCII	reserviert
6	U8	SIL Activation Level  3: SILlock: Parameter & Kalibration locked  2: SILlock: Parameter locked  1: no SILlock, check of parameters for SIL  0: no SILlock
7	U8	plausi

0x00 no error

0x01 no Sensortest

0x02 Aneg invalid

0x04 4-20 zeropoint adjustment invalid

0x08  
HARTAL\_RESPONSE\_TOO\_FEW\_DATA\_BYTES

0x10 HARTAL\_RESPONSE\_INVALID\_SELECTION

0x20 not supported

0x40 reserved

0x80 invalid transition

### Command Specific Response Codes

Code	Description
0	No Command-Specific Errors
2	Invalid Selection wrong PIN/ invalid Level
5	Too few Data Bytes

## 10.113 Command 240: Set CFG PW

### Request Data Bytes

Byte	Format	Description
0...3	ASCII	Cfg PW old
4...7	ASCII	Cfg PW new

### Response Data Bytes

Byte	Format	Description
0...3	ASCII	Cfg PW old
4...7	ASCII	Cfg PW new

### Command Specific Response Codes

Code	Description
0	No Command-Specific Errors
2	Invalid Selection
5	Too few Data Bytes

## 10.114 Command 241: Set Cal PW

### Request Data Bytes

Byte	Format	Description
0...3	ASCII	Cal PW old
4...7	ASCII	Cal PW new

### Response Data Bytes

Byte	Format	Description
0...3	ASCII	Cal PW old
4...7	ASCII	Cal PW new

### Command Specific Response Codes

Code	Description
0	No Command-Specific Errors
2	Invalid Selection
5	Too few Data Bytes

## 10.115 [deprecated] Command 242: Set Language [deprecated, replaced by command 64788]

Configures the Language Index

### Request Data Bytes

Byte	Format	Description
0	uint	Language Index
		0x00: german
		0x01: english
		0x02: spanish
		0x03: french
		0x04: Russian
		0x05: chinese
		0x06: user

### Response Data Bytes

Byte	Format	Description
0	uint	Language Index
1	uint	plausi:
		0x00 no error
		0x01 index too large

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received

## 10.116 Command 243: Read Language

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0	uint	Language Index
1..9	ASCII	User Language Name
10	Bitfield	Language valid  0x01 : language 0 valid  0x02: language 1 valid  0x04: language 2 valid  0x08: language 3 valid  0x10 language 4 valid  0x20 language 5 valid  0x40 language 6 valid

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.117 [deprecated] Command 244: Set Function Key [deprecated, replaced by command 64790]

Configures the Function Key

### Request Data Bytes

Byte	Format	Description
0	Uint	Function key index  0x00: FCT_KEY_OFF,  0x01: FCT_KEY_GRAPH,  0x02: FCT_KEY_FAULT,  0x03: FCT_KEY_NOTICE,  0x04: FCT_KEY_FAULT_CODES  0x05: FCT_KEY_VITALITY

### Response Data Bytes

Byte	Format	Description
0	Uint	Function key index
1	uint	plausi:  0x00 no error  0x01 not used  0x02 key too large

(\*) reduced ASCII char set: ['A'..'Z'], ['0'..'9'], ['/', '-', ';', '\_']

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received

## 10.118 Command 245: Read Function Key

### Request Data Bytes

Byte	Format	Description
	none	

### Response Data Bytes

Byte	Format	Description
0	Uint	Function key index
		0x01 FCT_KEY_OFF
		0x02 FCT_KEY_GRAPH,
		0x03 FCT_KEY_FAULT,
		0x04 FCT_KEY_NOTICE,
		0x05 FCT_KEY_FAULT_CODES,
		0x06 FCT_KEY_VITALITY

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.119 [deprecated] Command 246: Set Display Settings

### Request Data Bytes

Byte	Format	Description
0	Uint	Display contrast
1	Uint	Display mode 0x00 : Non Display 0x01 : Standard

### Response Data Bytes

Byte	Format	Description
0	Uint	Display contrast: Allowed min value
1	Uint	Display contrast: Allowed max value
2	Uint	Display contrast: actual value
3	Uint	Display mode 0x00 : Non Display 0x01 : Standard
4	Uint	plausi 0x00 no error 0x01 not used 0x02 not used 0x04 dsp contrast failure

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received

## 10.120 Command 247: Read Display Settings

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0	Uint	Display contrast: Allowed min value
1	Uint	Display contrast: Allowed max value
2	Uint	Display contrast: actual value
3	Uint	Display mode 0x00 : Non Display 0x01 : Standard

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.121 [deprecated] Command 248: Set Analogue Offset

Configures the Analogue Offset [deprecated, replaced by command 64800]

### Request Data Bytes

Byte	Format	Description
0..3	Float	Offset
4	int	Free
5..8	Float	Span

### Response Data Bytes

Byte	Format	Description
0..3	Float	Offset
4	Uint	plausi 0x02 current to high 0x04 current to low
5..8	Float	Span
9	Uint	plausi 0x02 current to high 0x04 current to low

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
6	Error	Sil locked

## 10.122 Command 249: Read Analogue Offset

### Request Data Bytes

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0..3	Float	Analogue Offset
4..11	ASCII	Analogue Offset ASCII
12..15	Float	Analogue Span
16..23	ASCII	Analogue Span ASCII

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.123 Command 250: Set Gasname

Configures a gas name for the analogue sensors

### Request Data Bytes

Byte	Format	Description
0 - 11	ASCII	Gasname (Zero-terminated)  The name starts with the 2 <sup>nd</sup> byte!!!!!!

### Response Data Bytes

Byte	Format	Description
0 - 11	ASCII	Gasname (Zero-terminated)

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
6	Error	Sil locked

## 10.124 Command 251: Read Last Calibration Params

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0..3	Float	Measured value at last calibration
4..7	Float	Configured Cal Concentration at last calibration
8	U8	Caldate: Day
9	U8	Month
10...11	U16	Year

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.125 Command 252: Read Error 48 from PIR7X00

Byte	Format	Description
none		

### Response Data Bytes

Byte	Format	Description
0..24	U8	Data from PIR7X00 cmd 48

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

## 10.126 Command 254 Configure Analogue Setpoint

Write Analogue Setpoint in configured unit.

SIL Activation Level < 2 required

### Request Data Bytes

Byte	Format	Description
0...3	Float	Analogue Setpoint in configured unit

### Response Data Bytes

Byte	Format	Description
0...3	Float	Analogue Setpoint

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
7	Error	In Write Protect Mode
3	Error	Passed Parameter Too Large
4	Error	Passed Parameter Too Small
80	Error	No Sensor

## 10.127 Command 255 Write Test Gas Concentration

Write Test Gas Concentration.

SIL Activation Level < 2 required

### Request Data Bytes

Byte	Format	Description
0...3	Float	Test Gas Concentration

### Response Data Bytes

Byte	Format	Description
0...3	Float	Test Gas Concentration

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
7	Error	In Write Protect Mode
3	Error	Passed Parameter Too Large
4	Error	Passed Parameter Too Small
80	Error	No Sensor

## 10.128 Command 31 – Extension commands

### 10.128.1 Command 64768: Read Measurement Gas Configuration

This command reads the configuration data for sensor alive.

#### Request Data Bytes

Byte	Format	Description
0	UInt	Measurement Channel Index (0 for first or only channel/sensor)

#### Response Data Bytes

Byte	Format	Description
0	UInt	Echo Measurement Channel Index
1	UInt	Supported features <ul style="list-style-type: none"><li>• Sensor alive is supported (Bit 0)</li><li>• Time monitoring (Bit 1)</li><li>• Smart calibration (Bit 2)</li><li>• System proof test (Bit 3)</li></ul>
2	UInt	Enabled features <ul style="list-style-type: none"><li>Bit 0: Sensor Alive</li><li>Bit 1: Sensitivity Monitoring</li><li>Bit 2: Smart Calibration</li><li>Bit 3: Fault Detection</li><li>Bit 4: Smart Proof Test</li><li>Bit 5: Clogging Detection</li></ul>

Bit 6: Response Time Monitoring Activation		
3	UInt	Schedule hour
4	UInt	Schedule minute
5	UInt	Life Test Repetition Mode
6	UInt	Life Test Status Out
7	UInt	Smart Cal Time Trigger
8	UInt	Smart Cal Deviation Trigger
9	UInt	Response Time Cfg Factor
10	UInt	Response Time Behavior
11 ... 14	Float	threshold gas override life test in measurement unit
15	Int	Temperature range minimum
16	Int	Temperature range maximum
17	Int	Bit 0: Alert 40 DSA Warning Bit 1: Alert 40 Fault Bit 2: Alert 50 Warning
18...20	ASCII 3	Echo Measurement Channel Index
21..28	ASCII 8	Enabled Features (1 char per feature, e.g. AM-FS---)
29...30	ASCII 2	Schedule hour
31...32	ASCII 2	Schedule minute
33	ASCII 1	Life Test Repetition Mode
34	ASCII 1	Life Test Status Out
35...36	ASCII 2	Smart Cal Time Trigger
37...38	ASCII 2	Smart Cal Device Trigger
39...40	ASCII 2	Response Time Cfg Factor

41	ASCII 1	Response Time Behavior
42...49	ASCII 8	threshold gas override life test in measurement unit
50...52	ASCII 3	Temperature range minimum
53...56	ASCII 3	Temperature range maximum
57	ASCII 1	Alert 40
58	ASCII 1	Alert 50

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
2	Error	Invalid Selection
5	Error	Too few bytes received

### 10.128.2 Command 64769: Read DSA Information

This command reads diverse status bits of DSA, its version, number of executed life tests and smart information.

#### Request Data Bytes

Byte	Format	Description
0	UInt	Measurement index

#### Response Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1	UInt	Status 1
2	UInt	Status 2
3	UInt	Status 3
4	UInt	Status 4
5	UInt	Status 5
6	UInt	Status 6
7	UInt	Major version
8	UInt	Minor version
9	UInt	Patch version
10...11	UInt	No of LT Nozzle 1.
12...13	UInt	No of LT Nozzle 2.
14...15	UInt	End of life minimum
16...17	UInt	End of life maximum
18	UInt	Sensitivity loss since last calibration [%]

19	UInt	Last smart calibration day
20	UInt	Last smart calibration month
21...22	UInt	Last smart calibration year
23	UInt	Next electrolysis test day
24	UInt	Next electrolysis test month
25...26	UInt	Next electrolysis test year
27	UInt	Next electrolysis test hour
28	UInt	Next electrolysis test minute
29	UInt	Next electrolysis test second
30	UInt	Next electrolysis test nozzle
31	UInt	Last valid LifeTest day
32	UInt	Last valid LifeTest month
33..34	UInt	Last valid LifeTest year
35	UInt	Last valid LifeTest hour
36	UInt	Last valid LifeTest minute
37	UInt	Last valid LifeTest sec

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors

2	Error	Invalid Selection
5	Error	Too Few Data Bytes Received

### 10.128.3 Command 64770: Reset DSA

This command reset DSA.

#### Request Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1	UInt	Reset Version  0 only reset  1 reset with status reset (Service reset)

#### Response Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1	UInt	Reset Version  0: only reset  1: reset with status reset (Service reset)

#### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
2	Error	Invalid Selection
5	Error	Too Few Data Bytes Received
7	Error	In write protect mode

#### 10.128.4 Command 64771: Read Min and Max for Configuration

This command reads minimum and maximum values of the gas override threshold range for configuration.

##### Request Data Bytes

Byte	Format	Description
0	UInt	Measurement index

##### Response Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1...4	Float	Gas Override Threshold Range min
5...8	Float	Gas Override Threshold Range max

##### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
2	Error	Invalid Selection
5	Error	Too Few Data Bytes Received

**10.128.5 Command 64772: Write Features Enabled**

This command configures the sensor alive activation:

**Request Data Bytes**

Byte	Format	Description
0	UInt	Measurement index
1	UInt	Enabled features Bit 0: Sensor Alive Bit 1: Sensitivity Monitoring Bit 2: Smart Calibration Bit 3: Fault Detection Bit 4: Smart Proof Test Bit 5: Clogging Detection Bit 6: Response Time Monitor Activation

**Response Data Bytes**

Byte	Format	Description
0	UInt	Measurement index
1	UInt	Enabled Features

**Command Specific Response Codes**

Code	Class	Description
0	Success	No Command-Specific Errors
2	Error	Invalid Selection
5	Error	Too Few Data Bytes Received

7	Error	In write protect mode
12	Error	Invalid mode: selected features not available

### 10.128.6 Command 64773: Write Schedule

This command configures the sensor alive schedule:

Hour and minutes must be a valid time (hour lower than 24 and minutes lower than 60).

#### Request Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1	UInt	Hour
2	UInt	Minutes

#### Response Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1	UInt	Hour
2	UInt	Minutes

#### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
2	Error	Invalid Selection
3	Error	Passed Parameter Too Large
4	Error	Passed Parameter Too Small
5	Error	Too Few Data Bytes Received
7	Error	In write protect mode

### 10.128.7 Command 64774: Write Threshold in measurement unit

This command configures threshold gas override life test in measurement unit. The limits could read with command 3.

#### Request Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1...4	float	threshold gas override life test in measurement unit

#### Response Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1...4	float	threshold gas override life test in measurement unit

#### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
2	Error	Invalid Selection
3	Error	Passed Parameter Too Large
4	Error	Passed Parameter Too Small
5	Error	Too Few Data Bytes Received
7	Error	In write protect mode

### 10.128.8 Command 64775: Write Repetition Mode

This command configures the sensor repetition mode. Valid data are 0 (LTREPTMODE\_STATIC) and 1 (LTREPTMODE\_FLEX)

#### Request Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1	UInt	Repetition Mode

#### Response Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1	UInt	Repetition Mode

#### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
2	Error	Invalid Selection
3	Error	Passed Parameter Too Large
4	Error	Passed Parameter Too Small
5	Error	Too Few Data Bytes Received
7	Error	In write protect mode

### 10.128.9 Command 64776: Write Smart Calibration Configuration

This command configures the smart calibration time trigger and deviation trigger.

Valid data are 0 to 12 for Smart Calibration Time Trigger in the unit month.

Valid data are 0, 10, 20 and 30 for Smart Calibration Deviation Trigger in the unit %.

#### Request Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1	UInt	Smart Calibration Time Trigger
2	UInt	Smart Calibration Deviation Trigger

#### Response Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1	UInt	Smart Calibration Time Trigger
2	UInt	Smart Calibration Deviation Trigger

#### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
2	Error	Invalid Selection
3	Error	Passed Parameter Too Large
4	Error	Passed Parameter Too Small
5	Error	Too Few Data Bytes Received
7	Error	In write protect mode

### 10.128.10 Command 64777: Write LifeTest status output

This command configures the life test status output.

Valid data are 0 (LTSTATUS\_FROZEN), 1 (LTSTATUS\_MAIN) and 2 (LTSTATUS\_MEASURE)

#### Request Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1	UInt	LifeTest status output

#### Response Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1	UInt	LifeTest status output

#### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
2	Error	Invalid Selection
3	Error	Passed Parameter Too Large
4	Error	Passed Parameter Too Small
5	Error	Too Few Data Bytes Received
7	Error	In write protect mode

### 10.128.11 Command 64778: Write Response Time Configuration

This command configures the Response Time Configuration.

Valid data are 2, 3, 4, and 5 for the response time configuration factor.

Valid data are 0 (RTHIGH\_DISABLED) 1 (RTHIGH\_DSA\_WARNING) and 2 (RTHIGH\_FAULT) for the response time behavior.

#### Request Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1	UInt	Response Time Factor
2	UInt	Response time behavior

#### Response Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1	UInt	Response Time Configuration Factor
2	UInt	Response time behavior

#### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
2	Error	Invalid Selection
3	Error	Passed Parameter Too Large
4	Error	Passed Parameter Too Small
5	Error	Too Few Data Bytes Received

7	Error	In write protect mode
---	-------	-----------------------

### 10.128.12 Command 64779: Write Temperature Range

This command configures the temperature range.

Valid data are -40, -30, -20, -10 and 0 for the minimum temperature in the unit °C.

Valid data are 20, 30, 40, 50 and 60 for the maximum temperature in the unit °C.

#### Request Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1	Int	Temperature minimum
2	Int	Temperature maximum

#### Response Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1	Int	Temperature minimum
2	Int	Temperature maximum

#### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
2	Error	Invalid Selection
3	Error	Passed Parameter Too Large
5	Error	Too Few Data Bytes Received
7	Error	In write protect mode

### 10.128.13 Command 64780: Set Inhibit Mode

This command set / reset the inhibit mode.

#### Request Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1	Int	Inhibit Mode (0 is inactive, 1 is active)

#### Response Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1	Int	Inhibit Mode (0 is inactive, 1 is active)

#### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
2	Error	Invalid Selection
3	Error	Passed Parameter Too Large
5	Error	Too Few Data Bytes Received

### 10.128.14 Command 64781: Sensitivity Alerts

This command sets sensitivity alerts 40 and 50.

#### Request Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1	Int	Bit 0: Alert 40 DSA Warning Bit 1: Alert 40 Fault Bit 2: Alert 50 Warning

#### Response Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1	Int	Bit 0: Alert 40 DSA Warning Bit 1: Alert 40 Fault Bit 2: Alert 50 Warning

#### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
2	Error	Invalid Selection
5	Error	Too Few Data Bytes Received
7	Error	In write protect mode

**10.128.15 Command 64782: Acknowledge Fault**  
This command acknowledges acknowledgeable faults.

**Request Data Bytes**

Byte	Format	Description
0	UInt	Measurement index

**Response Data Bytes**

Byte	Format	Description
0	UInt	Measurement index

**Command Specific Response Codes**

Code	Class	Description
0	Success	No Command-Specific Errors
2	Error	Invalid Selection
5	Error	Too Few Data Bytes Received

### 10.128.16 Command 64788: Set Language

Configures the Language Index

#### Request Data Bytes

Byte	Format	Description
0	uint	Language Index
		0x00: german
		0x01: english
		0x02: spanish
		0x03: french
		0x04: Russian
		0x05: chinese
		0x06: user

#### Response Data Bytes

Byte	Format	Description
0	uint	Language Index

#### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
3	Error	Passed Parameter Too Large

**10.128.17 Command 64789: Configure Display Capture**  
 display capture information

SIL Activation Level < 2 required

**Request Data Bytes**

Byte	Format	Description
0...3	Float	Display Capture Offset (must be $\geq 0.0$ )
4...7	Float	Display Capture Low (must be $\leq 0.0$ )
8..11	Float	Display Capture High (must be $\geq 0.0$ )

**Response Data Bytes**

Byte	Format	Description
0...3	Float	Display Capture Offset
4...7	Float	Display Capture Low
8..11	Float	Display Capture High

**Command Specific Response Codes**

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
7	Error	In Write Protect Mode
80	Error	No Sensor
81	Error	First Value Is too Small
83	Error	Second Value Is too Small
84	Error	Second Value Is too Large

85	Error	Third Value Is too Small
86	Error	Third Value Is too Large

### 10.128.18 Command 64790: Set Function Key

Configures the Function Key

#### Request Data Bytes

Byte	Format	Description
0	Uint	Function key index  0x00: FCT_KEY_OFF,  0x01: FCT_KEY_GRAPH,  0x02: FCT_KEY_FAULT,  0x03: FCT_KEY_NOTICE,  0x04: FCT_KEY_FAULT_CODES  0x05: FCT_KEY_VITALITY

#### Response Data Bytes

Byte	Format	Description
0	Uint	Function key index

(\*) reduced ASCII char set: ['A'..'Z'], ['0'..'9'], [',', '-', '\_', '']

#### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
3	Error	Passed Parameter Too Large

**10.128.19 Command 64791: Write Sensor Lock On / Off**  
Configure the Sensor Lock On/Off.

**Request Data Bytes**

Byte	Format	Description
0	Bitfield	Sensor Lock Information  0x00: Locking inactive  0x01: Locking active

**Response Data Bytes**

Byte	Format	Description
0	Bitfield	Sensor Lock Information  0x00: Locking inactive  0x01: Locking active

**Command Specific Response Codes**

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
7	Error	In Write Protect Mode

## 10.128.20 Command 64792: Set Profibus address

### Request Data Bytes

Byte	Format	Description
0	U8	Address

### Response Data Bytes

Byte	Format	Description
0	U8	Address

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
65	Error	First Value Is Wrong

### 10.128.21 Command 64793: Set Fault and Alarm Test Controls Test Fault and Alarm Mode.

There is a timeout for 15 minutes. After that the P8000 leaves the test mode.

#### Request Data Bytes

Byte	Format	Description
0	Bitfield	Control Alarm and Fault Settings  0x20: Enter Mode  0x10: Exit Mode  0x04: Set Error State active  0x02: Set Alarm 2 State active  0x01: Set Alarm 1 State active  0x00: Reset all Error and Alarm States

#### Response Data Bytes

Byte	Format	Description
0	Bitfield	Control Alarm and Fault Settings  0x20: Mode entered  0x10: Mode exited  0x04: Error State active  0x02: Alarm 2 State active  0x01: Alarm 1 State active  0x00: Reset all Error and Alarm States

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
7	Error	In Write Protect Mode
16	Error	Access Restricted
65	Error	First Value Is Wrong

### 10.128.22 Command 64794: Change Sensor

Controls Change Sensor Mode.

#### Request Data Bytes

Byte	Format	Description
0	Bitfield	0x01: Start Change Sensor 0x00: Stop Change Sensor

#### Response Data Bytes

Byte	Format	Description
0	Bitfield	0x01: Start Change Sensor 0x00: Stop Change Sensor

#### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
7	Error	In Write Protect Mode
16	Error	Access Restricted
65	Error	First Value Is Wrong

### 10.128.23 Command 64795: Start/Stop Calibration

Starts and exits calibration mode. Save calibration in device. Switches between Measurement gas and Cal gas for cross calibration (0x02/0x03).

Cmd 192: Start calibration

Cmd 128: Read values

Cmd 193: Perform calibration

Cmd 192: Save calibration

You may start span cal mode without exiting zero cal mode beforehand.

SIL Activation Level < 3 required

The Calibration Status can be reached by the command 149.

#### Request Data Bytes

Byte	Format	Description
0	uint	Operation Request
		0x00 start zero cal
		0x01 start span cal
		0x02 test gas reading (for cross calibration, without function else)
		0x03 measurement gas reading
		0x04 save cal
		0x05 exit cal without saving

## Response Data Bytes

Byte	Format	Description
0	uint	echo Operation Request
		0x00 start zero cal
		0x01 start span cal
		0x02 test gas reading (for cross calibration, without function else)
		0x03 measurement gas reading
		0x04 save cal
		0x05 exit cal

## Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
7	Error	In Write Protect Mode
16	Error	Access Restricted
65	Error	First Value Is Wrong

## 10.128.24 Command 64796: Set Modbus baudrate

### Request Data Bytes

Byte	Format	Description
0	U8	Baudrate

### Response Data Bytes

Byte	Format	Description
0	U8	Baudrate

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
2	Error	Invalid Selection

### 10.128.25 Command 64797: Set SIL lock

P8000 can be protected against changing of SIL relevant parameter.

The SIL ID is a check word from all SIL data.

#### Request Data Bytes

Byte	Format	Description
0...3	ASCII	Password (password) Cfg/Cal
4	U8	SIL Activation Level  0xFF: Sil Lock  1: no SILlock, check of parameters for SIL (only Cfg)  0: no SILlock

#### Response Data Bytes

Byte	Format	Description
0...3	ASCII	Password
4	U8	SIL Activation Level  3: SILlock: Parameter & Kalibration locked  2: SILlock: Parameter locked  1: no SILlock, check of parameters for SIL  0: no SILlock

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
2	Error	Invalid Selection wrong PIN/ invalid Level
5	Error	Too Few Data Bytes Received
30	Error	Truncated: SIL status has an error
16	Error	Access Restricted

### 10.128.26 Command 64798: Configure Analogue Setpoint

Write Analogue Setpoint in configured Unit.

SIL Activation Level < 2 required

#### Request Data Bytes

Byte	Format	Description
0...3	Float	Analogue Setpoint in configured Unit

#### Response Data Bytes

Byte	Format	Description
0...3	Float	Analogue Setpoint

#### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
7	Error	In Write Protect Mode
3	Error	Passed Parameter Too Large
4	Error	Passed Parameter Too Small
80	Error	No Sensor

### 10.128.27 Command 64799: Write Test Gas Concentration

Write Test Gas Concentration.

SIL Activation Level < 2 required

#### Request Data Bytes

Byte	Format	Description
0...3	Float	Test Gas Concentration

#### Response Data Bytes

Byte	Format	Description
0...3	Float	Test Gas Concentration

#### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
7	Error	In Write Protect Mode
3	Error	Passed Parameter Too Large
4	Error	Passed Parameter Too Small
80	Error	No Sensor

### 10.128.28 Command 64800: Set Analogue Offset

Configures the Analogue Offset

#### Request Data Bytes

Byte	Format	Description
0..3	Float	Offset
4..7	Float	Span

#### Response Data Bytes

Byte	Format	Description
0..3	Float	Offset
4..7	Float	Span

#### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
6	Error	Sil locked
81	Error	First value is too small
82	Error	First value too large
83	Error	Second value is too small
84	Error	Second value is too large

### 10.128.29 Command 64801: Set Autozero Configuration

Sets the autozero configuration enable / disable

#### Request Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1	Int	Autozero Mode (0 is inactive, 1 is active)

#### Response Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1	Int	Autozero Mode (0 is inactive, 1 is active)

#### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
2	Error	Invalid Selection
3	Error	Passed Parameter Too Large (autozero mode > 1)
5	Error	Too Few Data Bytes Received

### 10.128.30 Command 64802: Read Autozero Configuration

This command reads the autozero configuration

#### Request Data Bytes

Byte	Format	Description
0	UInt	Measurement index

#### Response Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1	UInt	Autozero mode (0 is inactive, 1 is active)
2	UInt	Reserved
3	UInt	Reserved
4..7	float	Autozero 1 value
8..11	float	Autozero 2 value

#### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
2	Error	Invalid Selection

5	Error	Too Few Data Bytes Received

### 10.128.31 Command 64803: Trigger Get Lifetest History

This command triggers sensor alive: GetLifetestHistory, when response is received it's stored in local buffer and can be read using command 64804 (Get Lifetest History).

#### Request Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1-2	UInt	Offset

#### Response Data Bytes

Byte	Format	Description
0	UInt	Measurement index
1-2	UInt	Offset

#### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
12	Error	Invalid Selection (Feature not supported/enabled)

### 10.128.32 Command 64804: Get Lifetest History

Read lifetest history log from sensor alive. Please keep in mind it requires to call command 64803 first to get the log buffer.

Command returns always 126B of data, but 'Number of entries' value determines how many entries is valid in log, rest should be skipped.

Returns status busy if didn't receive lifetest history from sensor alive yet.

#### Request Data Bytes

Byte	Form at	Description
0	UInt	Measurement index

#### Response Data Bytes

Byte	Form at	Description
0	UInt	Measurement index
1	UInt	Log status: <b>0 – Log valid.</b> <b>1 – Log invalid</b> , rest of payload should be skipped and GetLifetestHistory command should be triggered once again
2...3	UInt	Offset
4...5	UInt	Number of entries (0-40)
6...126	UInt	Entries, from 0, up to 40 entries, 3B each. Number of entries specifies how many of them are valid.

### Response Data Bytes – detailed.

Byte	Format	Description
0	UInt	Measurement index
1	UInt	Log status
2...3	UInt	Offset
4...5	UInt	Number of entries = N (max 40)
		Repeat up to N times...
6...7	UInt	Lifetest Date
8	UInt	Lifetest Status
9...10	UInt	Lifetest Data
11	UInt	Lifetest Status
		...
(N*3-2)...(N*3-1)	UInt	Lifetest Data
N*3	UInt	Lifetest Status

### Command Specific Response Codes

Code	Class	Description
0	Success	No Command-Specific Errors
5	Error	Too Few Data Bytes Received
12	Error	Invalid Selection (Feature not supported/enabled)
32	Error	Busy



## 11 TABLES

### 11.1 Used Device Variable Codes

subset of Common Table 34, HART 7

244	Percent Range
245	Loop Current
246	Primary Variable
247	Secondary Variable

### 11.2 Used Unit Codes

subset of Common Table 2, HART 7

139	ppm
32	degrees Celsius
39	milliamperes
57	percent
161	LEL

## 12 PERFORMANCE

### 12.1 Sampling Rates

Typical sampling rates are shown in the following table.

PV digital value calculation	1 per second
SV digital value calculation	1 per second
Analogue output update	1 per second

### 12.2 Power-Up

On power up, the transmitter goes through a self-test procedure (see section 12.4) and load data from the sensor, which takes approximately 10 seconds. The first 5 seconds the device will not respond to HART commands. The analogue output is set at 0mA. After power up the Polytron 8000 is in the state warm up for several minutes depend of the sensor. The maintenance current (default 3.4mA) is set to the 4-20mA interface.

If the self-test fails, all live measurement data (PV, SV, current and percent of range) are set to "Not A Number", and the analogue output is set to the configured malfunction-indicating current. The device will attempt to respond to HART commands.

Fixed-current mode is cancelled by power loss.

### 12.3 Reset

Command 42 ("Device Reset") causes the device to reset its microprocessor. The resulting restart is identical to the normal power up sequence. (See Section 12.2.)

## 12.4 Self-Test

The self-test procedure is executed at power up, following Command 42 ("Device Reset"). The self-test includes:

- Microprocessor
- RAM
- Program ROM
- Configuration storage EEPROM
- POWER SUPPLY

This self-test takes about 5 seconds.

Continuous self-testing is also part of the normal device operation. The same checks are made, but over a longer period, between measurement function cycles.

## 12.5 Command Response Times

Minimum	7ms
Typical	10ms
Maximum	125ms

## **12.6 Busy and Delayed-Response**

The transmitter may respond with "busy" status for the special commands 214 and 234.

Delayed-response is used for the following commands: 42, 185,186 and 195.

## **12.7 Long Messages**

The largest data field used is in the response to Command 136: 76 bytes including the two status bytes.

## **12.8 Non-Volatile Memory**

EEPROM is used to hold the device's configuration parameters. New data is written to this memory immediately on execution of a write command.

## **12.9 Modes**

Fixed current mode is implemented.

## **12.10 Write Protection**

Write-protection is not provided.

## **12.11 Damping**

Damping is standard, affecting only the PV and the loop current signal.

## ANNEX A. CAPABILITY CHECKLIST

Manufacturer, model and revision	Polytron 8000, rev. 1
Device type	Transmitter
HART revision	7.0
Device Description available	Yes
Number and type of sensors	1
Number and type of actuators	0
Number and type of host side signals	1: 4 - 20mA analogue
Number of Device Variables	0
Number of Dynamic Variables	2
Mappable Dynamic Variables?	No
Number of common-practice commands	4
Number of device-specific commands	159
Bits of additional device status	8
Alternative operating modes?	No
Burst mode?	No
Write-protection?	No

## **ANNEX B.     DEFAULT CONFIGURATION**

<b>Parameter</b>	<b>Default value</b>
Lower Range Value	0
Upper Range Value	Sensor specific
PV Units	Sensor specific
Sensor type	Gas sensor
Number of wires	3
Damping time constant	Sensor specific
Fault-indication jumper	-
Write-protect jumper	-
Number of response preambles	5

## **ANNEX C. REVISION HISTORY**

### **A1. Changes from Rev 1.0 to Rev 1.1**

Complete rework, first public version.

### **A2. Changes from Rev 1.1 to Rev 2.1**

Command 139, 140, 141, 157, 218, 219: Parameters added.

New 145, 167, 168

Command 48 changed.

### **A3. Changes from Rev 2.1 to Rev 3.0**

Added commands to support the Draeger SensorAlive sensor.

Deprecated non-compliant commands and replaced them by compliant versions.

Command 48 changed.

### **A4. Changes from Rev 3.0 to Rev 4.0**

Added commands Autozero Config and Lifetest History