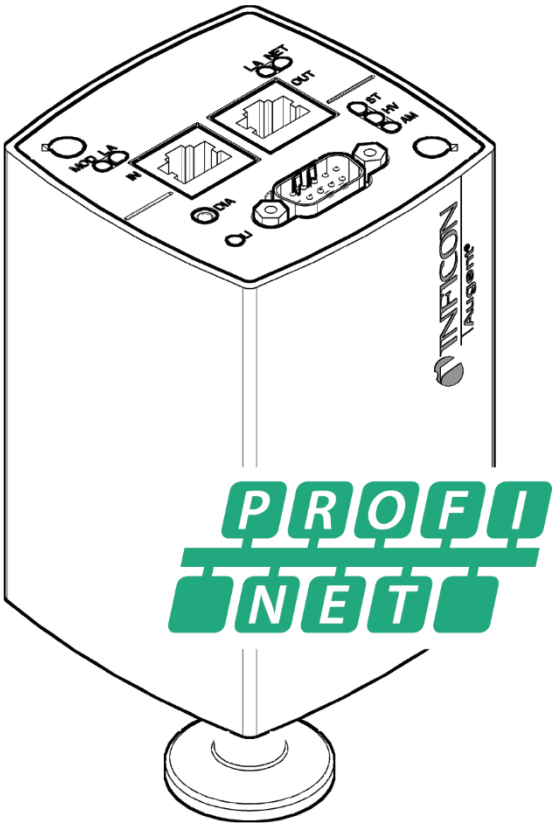


Communication Protocol

PROFINET

for the Optical Plasma Gauges

Augent® OPG550

Table of Contents

For cross-references within this document, the symbol (→ 🗎 XY) is used, for cross-references to further documents, listed under literature, the symbol (→ 🕮 [Z]).

General Information

Caution

Data transmission errors

Any attempt to simultaneously operate the gauge via the RS232C Serial Interface and PROFINET interface or the diagnostic port may result in incorrect data and data transmission errors.

Therefore, it is inadmissible to simultaneously operate the gauge via the RS232C Serial Interface and PROFINET interface, or the diagnostic port.

Intended Use

This Communication Protocol contains instructions for operating PROFINET interfaces (slaves) together with a master.

For safety information, specifications and operation instructions of the vacuum gauges refer to Operating Manual tinb84d1 (German) or tinb84e1 (English). Both can be downloaded from our website (www.inficon.com).

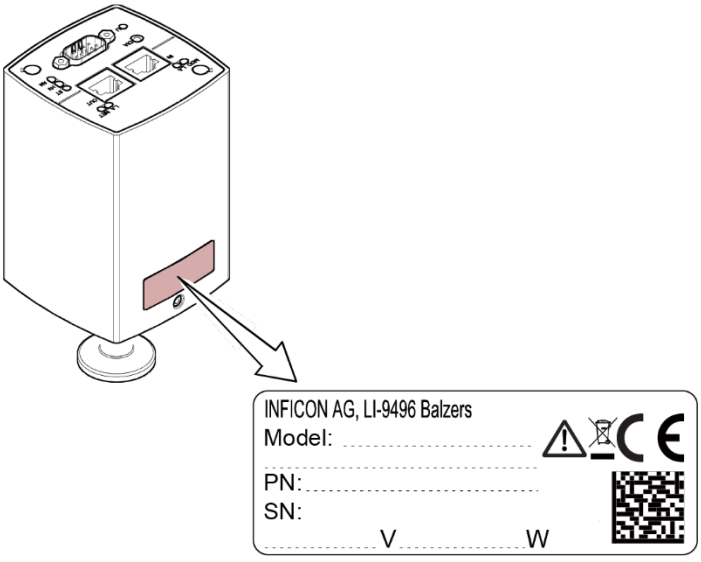
PROFINET–Interface

This manual describes the functionality of a PROFINET device.

For operating the gauge via PROFINET, prior installation of the device specific GSDML file is required on the bus master side. This file can be downloaded from our website (www.inficon.com).

Product Identification

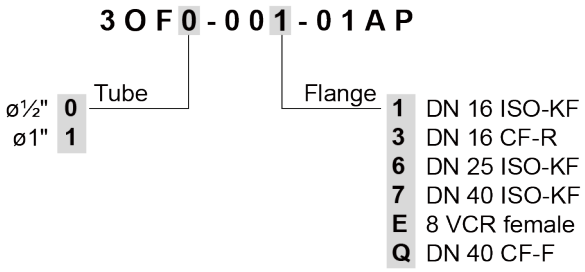
In all communications with INFICON, please specify the information on the product nameplate. For convenient reference copy that information into the space provided below.



Validity

This document applies to products of the Augent® OPG550 series with PROFINET interface.

Part numbers of standard products are indicated below. OEM products have other part numbers and different parameter settings (e.g. factory setting of setpoint) as defined in the corresponding ordering information.



The part number (PN) can be taken from the product nameplate.

If not indicated otherwise in the legends, the illustrations in this document correspond to OPG550 gauges with the DN 25 ISO-KF vacuum connection. They apply to the other gauges by analogy.

We reserve the right to make technical changes without prior notice.

Trademarks

PROFINET	PROFIBUS Nutzerorganisation e.V., 76131 Karlsruhe, DE
Augent®	INFICON Holding AG

1 Technical Data

Further technical data → 🕮 [1]

Power supply

DANGER

The gauge may only be connected to power supplies, instruments, or control devices that conform to the requirements of a grounded protective extra-low voltage (PELV) and limited power source (LPS), Class 2. The connection to the gauge has to be fused.

Supply voltage at the gauge	+14.5 … +30 V (dc) Class 2 / LPS
Ripple	≤1 V_{pp}
Power consumption	≤5 W
Fuse to be connected	1 AT

The minimum voltage of the power supply unit must be increased proportionally to the length of the sensor cable.

Electrical connection	D-sub, 9-pin, male
Sensor cable	7-pin, shielded

PROFINET interface

Communication protocol	protocol specialized for PROFINET
Data rate	100 Mbps
Node address	Explicit Device Identification
Physical layer	100BASE-Tx (IEEE 802.3)
PROFINET connector	2 × RJ45, 8-pin (socket) <IN>: PROFINET input <OUT>: PROFINET output
Cable	shielded, special Ethernet Patch Cable (CAT5e quality or higher)
Cable length	≤100 m
Cyclic data	IO-data
Acyclic data	configuration, responses and information

2 Power Connection

Make sure the vacuum connection is properly made (→ Operating Manual).

DANGER

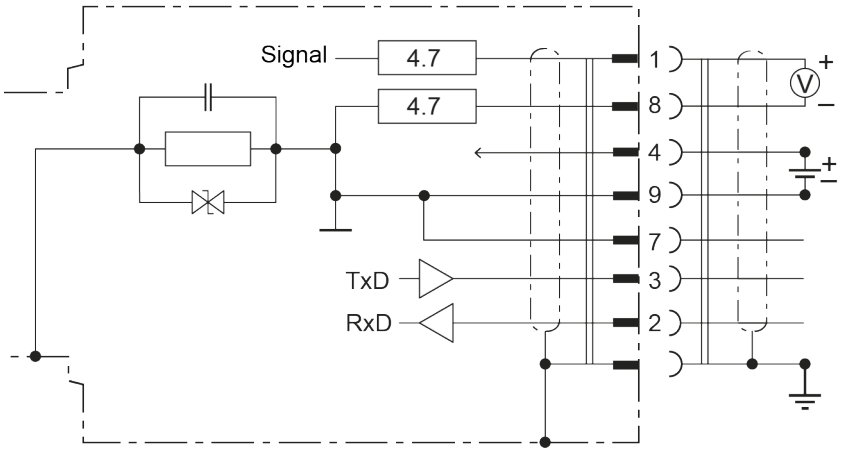
The gauge may only be connected to power supplies, instruments, or control devices that conform to the requirements of a grounded protective extra-low voltage (PELV) and limited power source (LPS), Class 2. The connection to the gauge has to be fused.

Ground loops, differences of potential, or EMC problems may affect the measurement signal. For optimum signal quality, please do observe the following notes:

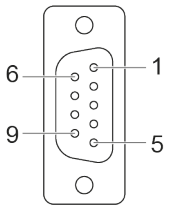
- Use an overall metal braided shielded cable. The connector must have a metal case.
- Connect the supply common with protective ground directly at the power.
- Use differential measurement input (signal common and supply common conducted separately).
- Potential difference between supply common and housing ≤6 V (overvoltage protection).

2.1 D-sub, 9-pin Connector

If no sensor cable is available, make one according to the following diagram.



Pin 1 Signal output (measuring signal)
Pin 2 RS232, RxD
Pin 3 RS232, TxD
Pin 4 Supply (+14.5 … +30 V dc))
Pin 5 n.c.
Pin 6 n.c.
Pin 7 RS232, GND
Pin 8 Signal common
Pin 8 Supply common



D-sub, 9-pin
female
soldering side

2.2 RJ45, 8-pin Connector

For operating the OPG550 gauges via PROFINET, two interface cables conforming to the PROFINET standard are required.

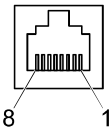
If no sensor cable is available, make one according to the following diagram.

Cable type

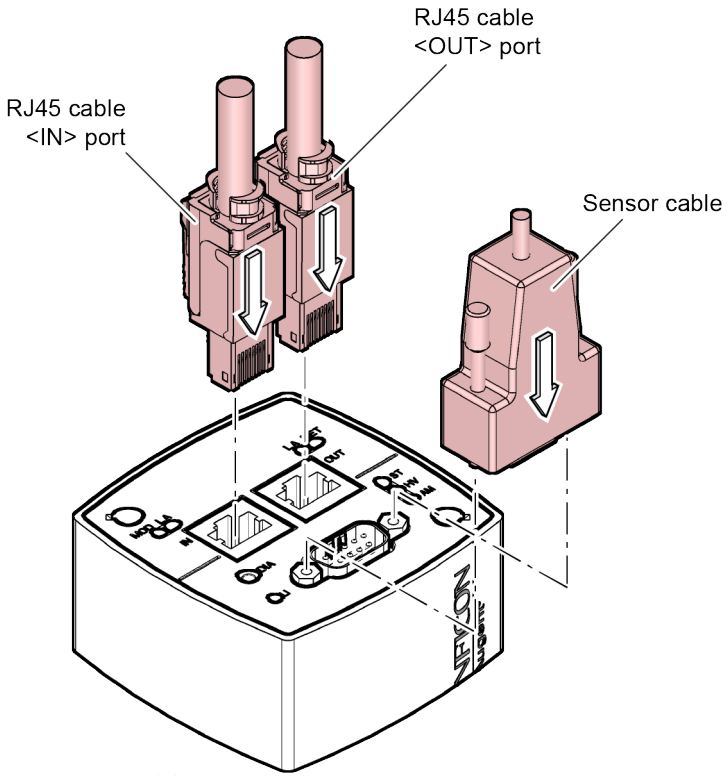
Ethernet Patch Cable Cable (CAT5e quality) with RJ45 connector.

Procedure

1 Pin assignment:

Pin	Signal	Description	
1	TD+	Transmission Data +	 RJ45, 8-pin male soldering side
2	TD-	Transmission Data -	
3	RD+	Receive Data +	
4	nu	not used	
5	nu	not used	
6	RD-	Receive Data -	
7	nu	not used	
8	nu	not used	

2 Plug the PROFINET (and sensor) cables connector into the gauge: From the previous device the cable connected to OUT port has to be connected to the OPG550 <IN> port. And the cable from the OPG550 <OUT> port has to be connected to the next device's <IN> port.



3 Operation

3.1 Introduction

Via the PROFINET interface, the following and further data are exchanged in the standardized PROFINET protocol:

- SPEC, ROR or RGA values
- Pressure reading
- Pressure unit (Torr, mbar, Pa)
- Status and error messages
- Device control commands

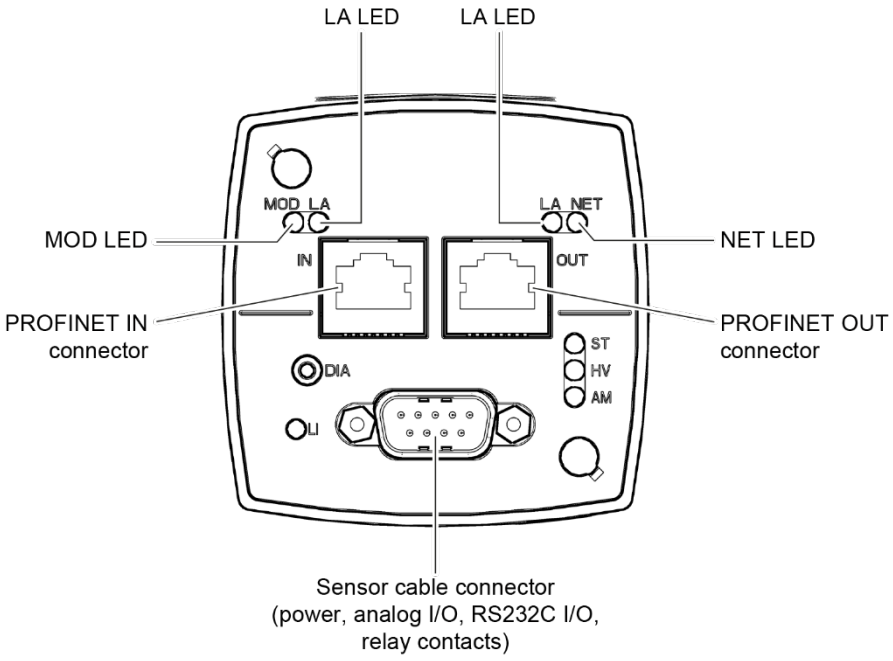
Caution

Data transmission errors

Any attempt to simultaneously operate the gauge via the RS232C Serial Interface and PROFINET interface or the diagnostic port may result in incorrect data and data transmission errors.

Therefore, it is inadmissible to simultaneously operate the gauge via the RS232C Serial Interface and PROFINET interface or the diagnostic port.

3.2 Front View



3.3 Indicators and Switches

3.3.1 Life Information LED <LI>

Displays the main status of the sensor.

Color	LED State	Description
green	on	Operational.
orange	on	Warning: scheduled maintenance soon.
red	on	Device failure.
	blinking	The device is in error status (no communication possible).
	Double flash (200 ms on 200 ms off 200 ms on 1000 ms off)	Application firmware is not valid or firmware update failed.
	Triple flash (200 ms on 200 ms off 200 ms on 200 ms off 200 ms on 1000 ms off)	The device is in error status (communication possible).

During firmware update, the lifetime LED shows up the current progress.

Color	LED State	Description
green/ red	alternating	FW upgrade in progress. Do NOT power off the module. Turning the module off during this phase could cause permanent damage.
green	on	FW upgrade without version change – nothing done.
	double flash (200 ms on 200 ms off 200 ms on 1000 ms off)	FW upgrade done – reboot required.
red	double flash (200 ms on 200 ms off 200 ms on 1000 ms off)	Application firmware is not valid or firmware update failed.

3.3.2 Status LED <ST>

Displays the status of the device.

Color	LED State	Description
green	off	No power applied to device.
	blinking (200 ms on 200 ms off)	The device is starting up.
	double flash (200 ms on 200 ms off 200 ms on 1000 ms off)	The device is in bootloader status.
	on	Application firmware is running.

3.3.3 High Voltage LED <HV>

Displays the Cold Cathode high voltage status.

Color	LED State	Description
green	off	High voltage is off.
	blinking	High voltage is on, but no plasma ignited.
	on	High voltage is on and plasma ignited.

3.3.4 Augent Measurement LED <AM>

Displays the gas measurement status.

Color	LED State	Description
blue	off	No spectrum measurement active.
	on	Spectrum measurement active (SPEC, ROR or RGD)

3.3.5 Firmware Update

The firmware update can be done via FTP interface via PROFINET connection.
Please ensure to

- user: fwupdate
- password: (empty)

The firmware update progress is indicated at the <LI> LED (chapter 3.3.1).

4 Object Structure OPG550

This chapter describes the PROFINET communication.

4.1 Object Dictionary structure

The objects in the PROFINET can either be accessed via cyclic process data or acyclic record data.

Device Description

A device description is available on our website (www.inficon.com).

The GSDML file provides the available process data as well as all relevant device specific fieldbus settings.

Modular device concept

The device is structured according to the modular device concept into modules. The modules are mapped to slots:

Slot	Name
0	Device Access Point
1	Pressure Gauge
2	SPEC Algorithm
3	ROR Algorithm
4	RGD Algorithm
5	Exceptions

The modules can be configured via device configuration in PROFINET. It is recommended to remove the not used Algorithms and to remove the “Exception” module if not used.

The modules provide cyclic process data and acyclic record data for configuring the modules.

Common acyclic record data are available in the Device Access Point in Slot 0.

Layout Object Dictionary

The following table presents the overall layout of the PROFINET Indexes.

Index (hex.)	Object dictionary area
0x0000 – 0x02FF	Command area
0x0800 – 0x08FF	Exception area
0x2000 – 0x2FFF	Input area
0x3000 – 0x3FFF	Output area
0x4000 – 0x4FFF	Configuration area
0x5000 – 0x5FFF	Information area

Abbreviations

Explanations for the abbreviations in the columns of the tables are given below:

Abbr.	Description
Access	parameter read/write access RO: object can only be read RW: object can be both read and written WO: object can only be written
DAP	Device Access Point (Slot 0 providing device specific data)
Index	Index for the parameter (Slot = 0, Subslot = 1)
NV	Nonvolatile; attribute value is maintained through power cycles
Object	Abstract representation of a particular component within a device, which consists of data, parameters, and methods.
PAP	Parameter Access Point (SubSlot 1, record interface)
Type	Data Type BOOL, BIT = 1 bit. Boolean (0 = false, 1 = true) USINT, BYTE = 8 bit. Unsigned byte UINT, WORD = 16 bit. Unsigned integer value UDINT = 32 bit. Unsigned integer value ULINT = 64 bit. Unsigned integer value REAL = 32 bit. Floating point V_STRING = 8×n bit. Visible string (1 byte for character) BYTE_ARR(n) = Array of bytes with n bytes

4.2 Device Access Point (DAP)

4.2.1 OPG550 Specific Commands

HV On/Off

Execution of this command will start a high voltage on / off operation.

SubSlot	Index	DataType	Access	Name
ParamAP (10)	0x0021	BYTE[2]	RW	Command
	0x0022	BYTE	RO	Status
	0x0023	BYTE[3]	RO	Response

Index 0x0021

Command	
Byte 0	0: HV OFF 1: HV ON
Byte 1	2: Index of the Sub Sensor (always 5 for Cold Cathode Sensor)

Index 0x0022

Status (supported values)	
0	Last command completed, no errors, no reply available
1	Last command completed, no errors, reply available
2	Last command completed, errors present, no reply available
3	Last command completed, errors present, reply available
255	Command is executing

Index 0x0023

Response	
Byte 0	See Index 0x0022
Byte 1	not used = 0x00
Byte 2	0: HV ON/OFF successful 1: HV ON/OFF failed (unspecific reason) 2: HV ON failed because pressure to high 254: No previous HV ON/OFF command issued

4.2.2 SEMI Specific Commands

Device Reset Command

Execution of this command causes the device to emulate a complete power cycle. This includes an ESC reset. An SDP may limit some behavior of the power cycle emulation, but shall not exclude the PROFINET interface.

As consequence of an ESC reset all following devices are disconnected from the network.

There are two versions of this command:

- Standard reset (as described above)
- Factory reset (as described above, but additionally, all parameters are restored to as-shipped defaults).

SubSlot	Index	DataType	Access	Name
ParamAP (10)	0x0101	BYTE[6]	RW	Command
	0x0102	BYTE	RO	Status
	0x0103	BYTE[2]	RO	Response

Index 0x0101

A device reset is initiated when the following byte sequence is sent.

Command	
Byte 0	0x74
Byte 1	0x65
Byte 2	0x73
Byte 3	0x65
Byte 4	0x72
Byte 5	0x00 = Standard reset

Index 0x0102

Status (supported values)	
0	Reserved
1	Reserved
2	Last command completed, error, no response
3	Reserved
255	Command is executing

Index 0x0103

Response	
Byte 0	See Index 0x0102
Byte 1	not used = 0x00

Store Parameters Command

SubSlot	Index	DataType	Access	Name
ParamAP (10)	0x0121	BYTE[4]	RW	Command
	0x0122	BYTE	RO	Status
	0x0123	BYTE[2]	RO	Response

Index 0x0121

All nonvolatile parameters are stored when the following byte sequence is sent.

Read:

Command: Read	
Byte 0	0x65
Byte 1	0x76
Byte 2	0x61
Byte 3	0x73

Write:

Command: Write	
Byte 0	0x73
Byte 1	0x61
Byte 2	0x76
Byte 3	0x65

Index 0x0122

Status (supported values)	
0	Last command completed, no error, no response
1	Reserved
2	Last command completed, error, no response
3	Reserved
255	Command is executing

Index 0x0123

Response	
Byte 0	See Index 0x0122
Byte 1	not used = 0x00

Calculate Checksum Command

SubSlot	Index	DataType	Access	Name
ParamAP (10)	0x0131	BYTE[4]	RW	Command
	0x0132	BYTE	RO	Status
	0x0133	BYTE[6]	RO	Response

Index 0x0131

The calculation of the checksum is initiated when the following byte sequence is sent.

Read

Command: Read	
Byte 0	Bit 0 = 1: non-volatile parameters supported Bit 1 = 1: CRC-32 Bit 2..7 = 0: not used
Byte 1	not used = 0x00
Byte 2	not used = 0x00
Byte 3	not used = 0x00

Write

Command: Write	
Byte 0	Bit 0 = 1: use default checksum algorithm of the slave Bit 1 = 1: CRC-32 Bit 2..7 = 0: not used
Byte 1	not used = 0x00
Byte 2	not used = 0x00
Byte 3	not used = 0x00

Index 0x0132

Status (supported values)	
0	Last command completed, no error, no response
1	Reserved
2	Last command completed, error, no response
3	Reserved
255	Command is executing

Index 0x0133

Response	
Byte 0	See Subindex 0x02
Byte 1	not used = 0
Byte 2	Checksum return value, Byte 0
Byte 3	Checksum return value, Byte 1
Byte 4	Checksum return value, Byte 2
Byte 5	Checksum return value, Byte 3

Load Parameters Command

Execution of this command will load all parameters from non-volatile memory.

SubSlot	Index	DataType	Access	Name
ParamAP (10)	0x0141	BYTE[4]	RW	Command
	0x0142	BYTE	RO	Status
	0x0143	BYTE[2]	RO	Response

Index 0x0141

The loading is initiated when the following byte sequence is sent.

Read:

Command: Read	
Byte 0	0x64
Byte 1	0x61
Byte 2	0x6F
Byte 3	0x6C

Write:

Command: Write	
Byte 0	0x6C
Byte 1	0x6F
Byte 2	0x61
Byte 3	0x64

Index 0x0142

Status (supported values)	
0	Last command completed, no error, no response
1	Reserved
2	Last command completed, error, no response
3	Reserved
255	Command is executing

Index 0x0143

Response	
Byte 0	See Subindex 0x02
Byte 1	not used = 0x00

4.2.3 Record Data - Exceptions

The exceptions can either be read as records in the specific module or by using the Exception module (chapter 4.7) as process data.

Global Exceptions

The active global exceptions detail the warning and error state of the device itself.

SubSlot	Index	DataType	Access	Name
ParamAP (10)	0x0800	WORD	RO	Global Active Errors
	0x0801	WORD	RO	Global Active Warnings

Index 0x0800

Active Global Error Details	
Bit 0...2	Reserved: always 0
Bit 3	EEPROM exception
Bit 4…9	Reserved: always 0
Bit 10	Internal Power supply output voltage error (3.3, 5.0 or 12.0V)
Bit 11	External Power supply output voltage error (24V)
Bit 12	Scheduled maintenance due
Bit 13	Notify vendor
Bit 14…31	Reserved: always 0

Index 0x0801

Active Global Warning Details	
Bit 0	Reserved: always 0
Bit 1	uP High Temp.
Bit 2...11	Reserved: always 0
Bit 12	Scheduled maintenance soon
Bit 13…31	Reserved: always 0

Global Exception Masks

SubSlot	Index	DataType	Access	Name
ParamAP (10)	0x0810	WORD	RW	Global Device Error Mask
	0x0811	WORD	RW	Global Device Warning Mask

Index 0x0810

Global Device Error Mask: Mask Bits for 0x0800.

Index 0x0811

Global Device Warning Mask: Mask Bits for 0x0810.

Exception Status

SubSlot	Index	DataType	Access	Name
ParamAP (10)	0x0820	BYTE	RO	Exception Status

Index 0x0820

Active Exception Status	
Bit 0	Device Warning
Bit 1	Reserved, always 0
Bit 2	Device Error
Bit 3…7	Reserved, always 0

4.2.4 Record Data - Configuration

Pixel Information

SubSlot	Index	DataType	Access	Name
ParamAP (10)	0x4000	USINT	RW	Operation Mode
	0x4001	REAL	RW	Pressure trip point limit
	0x4002	REAL	RW	Pressure trip point hysteresis

Index 0x4000

Operation Mode: This configuration selects if the algorithms start automatically when a given pressure is reached or manually by executing the Algorithm On/Off command (chapter 4.4).

Mode	
0	Manual
1	Automatic SPEC
2	Automatic ROR
3	Automatic RGA

Index 0x4001

Pressure trip point limit: Configuration for the automatic modes. In automatic mode, the algorithm automatically starts when the pressure is below this configurated pressure value.

Index 0x4002

Pressure trip point hysteresis: In automatic mode, the algorithm switches off if the pressure value is above the pressure this point limit plus this hysteresis.

The trip pint hysteresis is defined in percent of the Trip Point Limit.

4.2.5 Record Data - Information

Pixel Information

SubSlot	Index	DataType	Access	Name
ParamAP (10)	0x5000	UINT	RO	Number of pixels
	0x5001	UINT	RW	Start pixel number
	0x5002	REAL[10]	RO	Wavelength [nm]

Index 0x5000

Number of pixels: Number of pixels of the spectrometer (288).

Index 0x5001

Start pixel number: Changing this number will change the information output on 0x5002 and 0x5003.
There is a slot of 10 returned wavelengths with the start index defined in 0x5001.

Index 0x5002

Wavelength of the related spectrometer pixels in [nm].

4.3 Module Pressure Gauge

The gauge consists of two separate measuring systems (the Pirani and the Cold Cathode system according to the inverted magnetron principle).

The Pirani and Cold Cathode sensor are internally combined as combined pressure gauge. These combined values are directly available as process data whereas the single values are available as record data.

The PROFINET module is fix in slot 1.

4.3.1 Process Data

Pressure Measurement

SubSlot	Index	DataType	Access	Name
20		STRUCT		Pressure Measurement
	1	BYTE	RO	Status
	2	REAL	RO	Active Value
	3	UINT	RO	Active Sensor Number

Status

Pressure Status	
Bit 0	Value Valid
Bit 1	Overrange
Bit 2	Underrange
Bit 3	High Voltage ON
Bit 4	Plasma Ignited
Bit 5…7	Reserved: always 0

Active Value

Combined active pressure value.

The unit can be configured on record data with index 0x4010.

The range is indicated by multiple record data on range 0x5000 to 5013.

Active Sensor Number

Identifies the module that is providing the measurement value, the latter of which is copied into the Active Value parameter for the Combo Pressure Value.

Active Sensor Number	
0	No module has a valid value
4	Heat Transfer sensor is providing the Active Value
5	Cold Cathode sensor is providing the Active Value

4.3.2 Record Data - Exceptions

The exceptions can either be read as records in the specific module or by using the Exception module (chapter 4.7) as process data.

Pressure Gauge Exceptions

SubSlot	Index	DataType	Access	Name
ParamAP (1)	0x0800	WORD	RO	Pressure Gauge Active Errors
	0x0801	WORD	RO	Pressure Gauge Active Warnings

Index 0x0800

Pressure Gauge Sensor Errors	
Bit 0	Sensor Element Failure
Bit 1	Electronics Failure
Bit 2	Sensor High Temp
Bit 3…15	Reserved: always 0

Index 0x0801

Pressure Gauge Sensor Warnings	
Bit 0	Sensor Element Warning
Bit 1	Electronics Warning
Bit 2	Sensor High Temp
Bit 3…15	Reserved: always 0

Pressure Gauge Exception Masks

SubSlot	Index	DataType	Access	Name
ParamAP (1)	0x0810	WORD	RW	Pressure Gauge Error Mask
	0x0811	WORD	RW	Pressure Gauge Warning Mask

Index 0x0810

Pressure Gauge Error Mask: Mask Bits for 0x0800.

Index 0x0811

Pressure Gauge Warning Mask: Mask Bits for 0x0801.

Record Data – Input Pirani

SubSlot	Index	DataType	Access	Name
ParamAP (1)	0x2000	BYTE	RO	Status
	0x2001	REAL	RO	Active Value

Index 0x2000

Pirani Status	
Bit 0	Value Valid
Bit 1	Overrange
Bit 2	Underrange
Bit 3…7	Reserved: always 0

Index 0x2001

The corrected, converted, calibrated final pressure value of the Pirani sensor.

Cold Cathode

SubSlot	Index	DataType	Access	Name
ParamAP (1)	0x2010	BYTE	RO	Status
	0x2011	REAL	RO	Active Value

Index 0x2010

Cold Cathode Status	
Bit 0	Value Valid
Bit 1	Overrange
Bit 2	Underrange
Bit 3	High Voltage ON
Bit 4	Plasma Ignited
Bit 5…7	Reserved: always 0

Index 0x2011

The corrected, converted, calibrated final pressure value of the Cold Cathode sensor.

4.3.3 Record Data - Configuration

Plasma Interlock

SubSlot	Index	DataType	Access	Name
ParamAP (1)	0x4000	USINT	RW	Plasma Interlock

Index 0x4000

Plasma Interlock: Command to switch off the plasma interlock of the Cold Cathode.

If enabled, the sensor automatically switches the plasma off if the vacuum pressure is too high. It is not recommended to switch off the plasma interlock due to lifetime considerations.

Plasma interlock	
0	No plasma interlock
1	Plasma is switched off at too high pressure (default)

Pressure Data Unit

SubSlot	Index	DataType	Access	Name
ParamAP (1)	0x4010	USINT	RW	Pressure Data Unit

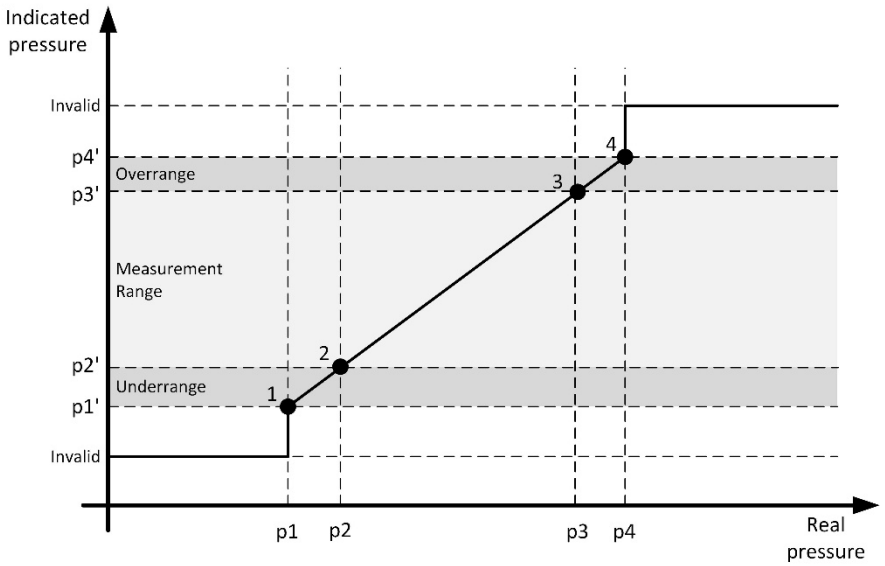
Index 0x4010

Data Unit for Input Sensor with following possible values.

Data Units	
0x01	Pascal
0x04	mbar
0x05	Torr

4.3.4 Record Data - Information

Pirani Measurement Range



The "measurement range" is the range between minimum and maximum pressure, where the reading of the gauge is within the specified measurement uncertainty limits.

The display range is the complete pressure range where the gauge gives an indication (measurement signal). The display range consists of underrange, measurement range and overrange.

According to these definitions, 4 points are defined:

1 Lowest informational measurement value
2 Lowest precision measurement value
3 Highest precision measurement value
4 Highest informational measurement value

SubSlot	Index	DataType	Access	Name
ParamAP (1)	0x5001	REAL	RO	Highest Informational Measurement Value
	0x5002	REAL	RO	Highest Precision Measurement Value
	0x5003	REAL	RO	Lowest Precision Measurement Value

Index 0x5001

Highest Informational Measurement Value: Highest value that the gauge can measure without a specified accuracy.

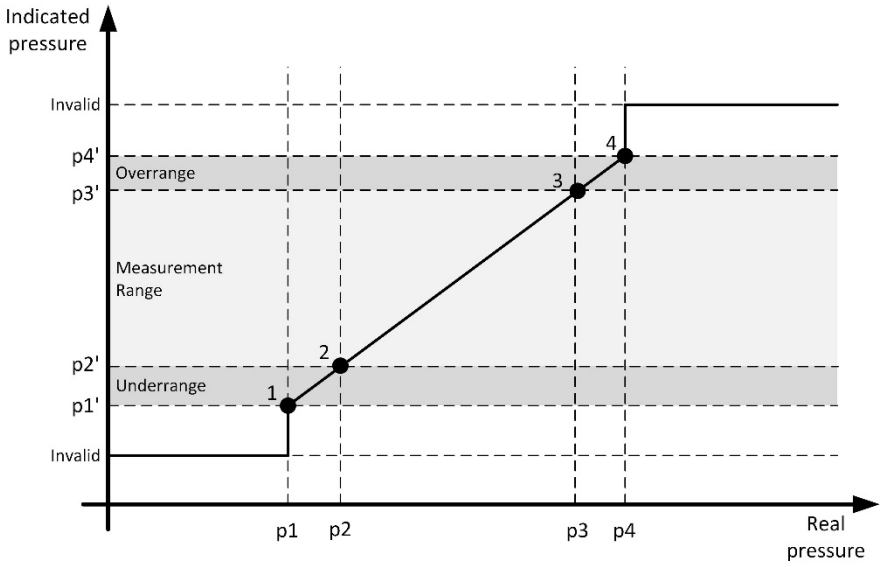
Index 0x5002

Highest Precision Measurement Value: Highest valid value at which the gauge is specified with an accuracy value. Above that value, the parameter Reading Valid is set to invalid.

Index 0x5003

Lowest Precision Measurement Value: Lowest valid value at which the gauge is specified with an accuracy value. Below that value, the parameter Reading Valid is set to invalid.

Cold Cathode



The "measurement range" is the range between minimum and maximum pressure, where the reading of the gauge is within the specified measurement uncertainty limits.

The display range is the complete pressure range where the gauge gives an indication (measurement signal). The display range consists of underrange, measurement range and overrange.

According to these definitions, 4 points are defined:

1 Lowest informational measurement value
2 Lowest precision measurement value
3 Highest precision measurement value
4 Highest informational measurement value

SubSlot	Index	DataType	Access	Name
ParamAP (1)	0x5011	REAL	RO	Highest Informational Measurement Value
	0x5012	REAL	RO	Highest Precision Measurement Value
	0x5013	REAL	RO	Lowest Precision Measurement Value

Index 0x5011

Highest Informational Measurement Value: Highest value that the gauge can measure without a specified accuracy.

Index 0x5012

Highest Precision Measurement Value: Highest valid value at which the gauge is specified with an accuracy value. Above that value, the parameter Reading Valid is set to invalid.

Index 0x5013

Lowest Precision Measurement Value: Lowest valid value at which the gauge is specified with an accuracy value. Below that value, the parameter Reading Valid is set to invalid.

4.4 Module SPEC Algorithm

The SPEC algorithm measures the gas emission spectrum with a manually set integration time.

Further information → 🕮 [1]

The PROFINET module is fix in slot 2.

4.4.1 Process Data

The device allows to output the spectrum power of up to 10 user defined wavelengths on PROFINET. These wavelengths can be configured by record elements 0x4010.

SPEC Measurement

SubSlot	Index	DataType	Access	Name
20		STRUCT		SPEC Measurement
	1	BYTE	RO	Status
	2	UDINT	RO	Timestamp
	3	USINT	RO	Algorithm Status
	4	UDINT	RO	Integration Time
	5	BYTE	WO	Command

Status

SPEC Status	
Bit 0	Value Valid
Bit 1…7	Reserved: always 0

Timestamp

The relative time from start of the measurement in [ms].

Algorithm Status

SPEC Algorithm Status	
0	Not selected
1	Idle
2	Setup
3	Background capture
4	Spectrum capture
5	Cleanup
255	Error

Integration Time

Integration Time: Optical integration time in [µs].

Command

SPEC Command	
Bit 0	Algorithm on
Bit 1…7	Reserved: not used

Spectrum Power

SubSlot	Index	DataType	Access	Name
21		STRUCT		Spectrum Power
	1	REAL	RO	Spectrum Power of Wavelength 01
	2	REAL	RO	Spectrum Power of Wavelength 02
	3	REAL	RO	Spectrum Power of Wavelength 03
	4	REAL	RO	Spectrum Power of Wavelength 04
	5	REAL	RO	Spectrum Power of Wavelength 05
	6	REAL	RO	Spectrum Power of Wavelength 06
	7	REAL	RO	Spectrum Power of Wavelength 07
	8	REAL	RO	Spectrum Power of Wavelength 08
	9	REAL	RO	Spectrum Power of Wavelength 09
	10	REAL	RO	Spectrum Power of Wavelength 10

Spectrum Power of Wavelength N

Measured value by the SPEC algorithm.

The related wavelength can be configured by elements 0x4010.

4.4.2 Record Data - Exceptions

The exceptions can either be read as records in the specific module or by using the Exception module (chapter 4.7) as process data.

SPEC Exceptions

SubSlot	Index	DataType	Access	Name
ParamAP (1)	0x0800	WORD	RO	SPEC Active Errors
	0x0801	WORD	RO	SPEC Active Warnings

Index 0x0800

SPEC Algorithm Errors	
Bit 0	FSM State Error
Bit 1…31	Reserved: always 0

Index 0x0801

SPEC Algorithm Warnings	
Bit 0…31	Reserved: always 0

SPEC Exception Mask

SubSlot	Index	DataType	Access	Name
ParamAP (1)	0x0810	WORD	RW	SPEC Error Mask
	0x0811	WORD	RW	SPEC Warning Mask

Index 0x0810

SPEC Error Mask: Mask Bits for 0x0800.

Index 0x0811

SPEC Warning Mask: Mask Bits for 0x0801.

4.4.3 Record Data - Configuration

Configuration MANUAL mode

In MANUAL mode, the operation starts when the user successfully executes the Algo On/Off command.

SubSlot	Index	DataType	Access	Name
ParamAP (1)	0x4000	UDINT	RW	Number of spectra to capture
	0x4001	UDINT	RW	Integration time

Index 0x4000

Number of spectra to capture in MANUAL mode: defines that the measurement ends after a specific number of spectra.

Value of 0: Endless mode. Algorithm runs till stopped via process data.

Index 0x4001

Integration time for MANUAL mode: manually set optical integration time for SPEC algorithm in [µs].

Configuration AUTOMATIC mode

In AUTO mode, the operation starts under a defined pressure.

SubSlot	Index	DataType	Access	Name
ParamAP (1)	0x4011	UDINT	RW	Integration time

Index 0x4011

Integration time for AUTO mode: manually set optical integration time for SPEC algorithm in [µs].

Configuration Process Data

SubSlot	Index	DataType	Access	Name
ParamAP (1)	0x4020	REAL[10]	RW	Wavelength n

Index 0x4010

Configuration wavelength 1 to 10: configuration of the wavelength output from the SPEC algorithm.

4.5 Module ROR Algorithm

The ROR measurement type measures the effective gas emission spectrum and characterizes the outgassing behavior of a vacuum chamber during a pressure rise measurement.

 Further information → 🕮 [1]

The PROFINET module is fix in slot 3.

4.5.1 Process Data

The device allows to output the spectrum intensity of up to 10 user defined wavelengths on PROFINET. These wavelengths can be configured by record elements 0x4010.

The device allows to output the ROR leak rate numbers (formerly named Leak Rates) of up to 10 user defined gases on PROFINET. These gases can be configured by record elements 0x4011.

ROR Measurement

SubSlot	Index	DataType	Access	Name
20		STRUCT		ROR Measurement
	1	BYTE	RO	Status
	2	UDINT	RO	Timestamp
	3	USINT	RO	Algorithm Status
	4	UDINT	RO	Integration Time
	5	BYTE	WO	Command

Status

ROR Status	
Bit 0	Value Valid
Bit 1…7	Reserved: always 0

Timestamp

The relative time from start of the measurement in [ms].

Algorithm Status

ROR Algorithm Status	
0	Not selected
1	Idle
2	Setup
3	Spectrum capture
4	Cleanup
255	Error

Integration Time

Optical integration time in [µs].

Command

ROR Command	
Bit 0	Algorithm on
Bit 1…7	Reserved: not used

Spectrum Intensity

SubSlot	Index	DataType	Access	Name
21		STRUCT		Spectrum Intensity
	1	UINT	RO	Spectrum Intensity of Wavelength 01
	2	UINT	RO	Spectrum Intensity of Wavelength 02
	3	UINT	RO	Spectrum Intensity of Wavelength 03
	4	UINT	RO	Spectrum Intensity of Wavelength 04
	5	UINT	RO	Spectrum Intensity of Wavelength 05
	6	UINT	RO	Spectrum Intensity of Wavelength 06
	7	UINT	RO	Spectrum Intensity of Wavelength 07
	8	UINT	RO	Spectrum Intensity of Wavelength 08
	9	UINT	RO	Spectrum Intensity of Wavelength 09
	10	UINT	RO	Spectrum Intensity of Wavelength 10

Spectrum Intensity of Wavelength N

Spectrum Intensity of Wavelength 1 to 10: Measured value by the ROR algorithm.

The related wavelengths can be configured by record elements 0x4010.

Leak Rate Number

SubSlot	Index	DataType	Access	Name
22		STRUCT		Leak Rate Number
	1	REAL	RO	Leak Rate Number of Gas Number 01
	2	REAL	RO	Leak Rate Number of Gas Number 02
	3	REAL	RO	Leak Rate Number of Gas Number 03
	4	REAL	RO	Leak Rate Number of Gas Number 04
	5	REAL	RO	Leak Rate Number of Gas Number 05
	6	REAL	RO	Leak Rate Number of Gas Number 06
	7	REAL	RO	Leak Rate Number of Gas Number 07
	8	REAL	RO	Leak Rate Number of Gas Number 08
	9	REAL	RO	Leak Rate Number of Gas Number 09
	10	REAL	RO	Leak Rate Number of Gas Number 10

Leak Rate Number of Gas Number N

Leak Rate Number of Gas Number 1 to 10: Output by the ROR algorithm.

The related gas indexes can be configured by Record elements 0x4011.

4.5.2 Record Data - Exceptions

The exceptions can either be read as records in the specific module or by using the Exception module (chapter 4.7) as process data.

ROR Exceptions

SubSlot	Index	DataType	Access	Name
ParamAP (1)	0x0800	WORD	RO	ROR Active Errors
	0x0801	WORD	RO	ROR Active Warnings

Index 0x0800

ROR Algorithm Errors	
Bit 0	FSM State Error
Bit 1…31	Reserved: always 0

Index 0x0801

ROR Algorithm Warnings	
Bit 0…31	Reserved: always 0

ROR Exception Masks

SubSlot	Index	DataType	Access	Name
ParamAP (1)	0x0810	WORD	RW	ROR Error Mask
	0x0811	WORD	RW	ROR Warning Mask

Index 0x0810

ROR Error Mask: Mask Bits for 0x0800.

Index 0x0811

ROR Warning Mask: Mask Bits for 0x0801.

4.5.3 Record Data - Configuration

Configuration MANUAL Mode

SubSlot	Index	DataType	Access	Name
ParamAP (1)	0x4000	UDINT	RW	Number of spectra to capture
	0x4002	UINT	RW	Gas number sensitivity

Index 0x4000

Number of spectra to capture in MANUAL mode: defines that the measurement ends after a specific number of spectra.

Value of 0: Endless mode. Algorithm runs till stopped via process data command.

Index 0x4002

Sensitivity gas number for MANUAL mode: The ROR algorithm detects the integration time for optimizing the measurement for a specific gas information. This index sets the focus to a specific gas.

ROR Sensitivity Gas Number	
0	Whole Spectrum
1	Oxygen 777 nm
2	Argon 812 nm
3	Nitrogen 822 nm
4	Nitrogen 870 nm
5	Nitrogen 337 nm
6	Hydrogen 656 nm

Configuration AUTO Mode

SubSlot	Index	DataType	Access	Name
ParamAP (1)	0x4012	UINT	RW	Gas number sensitivity

Index 0x4012

Sensitivity gas number for AUTO mode: The ROR algorithm detects the integration time for optimizing the measurement for a specific gas information. This index sets the focus to a specific gas.

ROR Sensitivity Gas Number	
0	Whole Spectrum
1	Oxygen 777 nm
2	Argon 812 nm
3	Nitrogen 822 nm
4	Nitrogen 870 nm
5	Nitrogen 337 nm
6	Hydrogen 656 nm

Configuration Process Data

SubSlot	Index	DataType	Access	Name
ParamAP (1)	0x4020	REAL[10]	RW	Wavelength n
	0x4021	UINT[10]	RW	Gas number n

Index 0x4010

Configuration wavelength 1 to 10: configuration of the wavelength output from the ROR algorithm.

Index 0x4011

Configuration gas number 1 to 10: configuration of the gas output from the ROR algorithm.

ROR Configuration Gas Number	
0	Whole Spectrum
1	Oxygen 777 nm
2	Argon 812 nm
3	Nitrogen 822 nm
4	Nitrogen 870 nm
5	Nitrogen 337 nm
6	Hydrogen 656 nm

4.5.4 Record Data - Information

Gas Information

The ROR algorithm got an enumeration of gases used to configure the sensor.

This enumeration can be programmatically accessed via following elements.

SubSlot	Index	DataType	Access	Name
ParamAP (1)	0x5000	UINT	RO	Number of gases
	0x5010	UINT	RW	Gas number
	0x5020	STRING[32]	RO	Description
	0x5021	REAL	RO	Wavelength

The enumeration will result in following table. The definition might be extended in future SW versions.

ROR Sensitivity Gas Number	
0	Whole Spectrum
1	Oxygen 777 nm
2	Argon 812 nm
3	Nitrogen 822 nm
4	Nitrogen 870 nm
5	Nitrogen 337 nm
6	Hydrogen 656 nm

The index 0 means that the sensor is sensitive to the whole spectrum, this is reserved for element “Sensitivity Gas Number”.

Index 0x5000

Number of gases: highest index of enumeration (6).

Index 0x5010

Gas number: Changing this number will change the information output on 0x5020 and 0x5021.

Index 0x5020

Description: Description of the gas.

Index 0x5021

Wavelength: Informative wavelength in [nm].

4.6 Module RGD Algorithm

The RGD algorithm measures a signal-to-noise optimized gas emission spectrum and detects gas types, detects gas types and measures gas partial pressures.

Further information → 🕮 [1]

The PROFINET module is fix in slot 4.

4.6.1 Process Data

The device allows to output the spectrum powers of up to 10 user defined wavelengths on PROFINET. These wavelengths can be configured by record elements 0x4010.

The device allows to output the gas intensities and the gas partial pressures of up to 10 user defined gases on PROFINET. These gases can be configured by record elements 0x4011.

The device allows to output the ratio information of up to 10 user defined ratio indexes on PROFINET. These ratios can be configured by record elements 0x4012.

RGD Measurement

SubSlot	Index	DataType	Access	Name
20		STRUCT		RGD Measurement
	1	BYTE	RO	Status
	2	UDINT	RO	Timestamp
	3	USINT	RO	Algorithm Status
	4	UDINT	RO	Integration Time
	5	BYTE	WO	Command

Status

RGD Status	
Bit 0	Value Valid
Bit 1…7	Reserved: always 0

Timestamp

The relative time from start of the measurement in [ms].

Algorithm Status

RGD Algorithm Status	
0	Not selected
1	Idle
2	Setup
3	Background capture
4	Spectrum capture
5	Cleanup
255	Error

Integration Time

Optical integration time in [µs].

Command

RGD Command	
Bit 0	Algorithm on
Bit 1…7	Reserved: not used

Spectrum Power

SubSlot	Index	DataType	Access	Name
21		STRUCT		Spectrum Power
	1	REAL	RO	Spectrum Power of Wavelength 01
	2	REAL	RO	Spectrum Power of Wavelength 02
	3	REAL	RO	Spectrum Power of Wavelength 03
	4	REAL	RO	Spectrum Power of Wavelength 04
	5	REAL	RO	Spectrum Power of Wavelength 05
	6	REAL	RO	Spectrum Power of Wavelength 06
	7	REAL	RO	Spectrum Power of Wavelength 07
	8	REAL	RO	Spectrum Power of Wavelength 08
	9	REAL	RO	Spectrum Power of Wavelength 09
	10	REAL	RO	Spectrum Power of Wavelength 10

Spectrum Power of Wavelength 1 to 10

Measured value by the RGD algorithm.

The related wavelengths can be configured by record elements 0x4010.

Gas Intensity

SubSlot	Index	DataType	Access	Name
22		STRUCT		Gas Intensity
	1	REAL	RO	Gas Intensity of Gas Number 01
	2	REAL	RO	Gas Intensity of Gas Number 02
	3	REAL	RO	Gas Intensity of Gas Number 03
	4	REAL	RO	Gas Intensity of Gas Number 04
	5	REAL	RO	Gas Intensity of Gas Number 05
	6	REAL	RO	Gas Intensity of Gas Number 06
	7	REAL	RO	Gas Intensity of Gas Number 07
	8	REAL	RO	Gas Intensity of Gas Number 08
	9	REAL	RO	Gas Intensity of Gas Number 09
	10	REAL	RO	Gas Intensity of Gas Number 10

Gas Intensity of Gas Number 1 to 10

Output of the RGD algorithm. The whole spectrum is taken into account to get the residual gas intensities.

The related gas indexes can be configured by record elements 0x4011.

Gas Partitial Pressure

SubSlot	Index	DataType	Access	Name
23		STRUCT		Gas Partitial Pressure
	1	REAL	RO	Gas Partitial Pressure of Gas Number 01
	2	REAL	RO	Gas Partitial Pressure of Gas Number 02
	3	REAL	RO	Gas Partitial Pressure of Gas Number 03
	4	REAL	RO	Gas Partitial Pressure of Gas Number 04
	5	REAL	RO	Gas Partitial Pressure of Gas Number 05
	6	REAL	RO	Gas Partitial Pressure of Gas Number 06
	7	REAL	RO	Gas Partitial Pressure of Gas Number 07
	8	REAL	RO	Gas Partitial Pressure of Gas Number 08
	9	REAL	RO	Gas Partitial Pressure of Gas Number 09
	10	REAL	RO	Gas Partitial Pressure of Gas Number 10

Gas Partitial Pressure of Gas Number 1 to 10

Output of the RGD algorithm. The gas intensities are recalculated as partial pressures.

The related gas indexes can be configured by record elements 0x4011.

Ratio

SubSlot	Index	DataType	Access	Name
24		STRUCT		Ratio
	1	REAL	RO	Ratio Number 01
	2	REAL	RO	Ratio Number 02
	3	REAL	RO	Ratio Number 03
	4	REAL	RO	Ratio Number 04
	5	REAL	RO	Ratio Number 05
	6	REAL	RO	Ratio Number 06
	7	REAL	RO	Ratio Number 07
	8	REAL	RO	Ratio Number 08
	9	REAL	RO	Ratio Number 09
	10	REAL	RO	Ratio Number 10

Ratio Number 1 to 10

Output of the RGD algorithm. The gas intensities are put into ratios.

The related ratio indexes can be configured by record elements 0x4012.

4.6.2 Record Data - Exceptions

The exceptions can either be read as records in the specific module or by using the Exception module (chapter 4.7) as process data.

RGD Exceptions

SubSlot	Index	DataType	Access	Name
ParamAP (1)	0x0800	WORD	RO	RGD Active Errors
	0x0801	WORD	RO	RGD Active Warnings

Index 0x0800

RGD Algorithm Errors	
Bit 0	FSM State Error
Bit 1…31	Reserved: always 0

Index 0x0801

RGD Algorithm Warnings	
Bit 0…31	Reserved: always 0

RGD Exception Masks

SubSlot	Index	DataType	Access	Name
ParamAP (1)	0x0810	WORD	RW	RGD Error Mask
	0x0811	WORD	RW	RGD Warning Mask

Index 0x0810

RGD Error Mask: Mask Bits for 0x0800.

Index 0x0811

RGD Warning Mask: Mask Bits for 0x0801.

4.6.3 Record Data - Configuration

Configuration MANUAL mode

SubSlot	Index	DataType	Access	Name
ParamAP (1)	0x4000	UDINT	RW	Number of spectra to capture
	0x4002	UINT	RW	Gas number sensitivity

Index 0x4000

Number of spectra to capture in MANUAL mode: defines that the measurement ends after a specific number of spectra.

Value of 0: Endless mode. Algorithm runs till stopped via process data command.

Index 0x4002

Sensitivity gas number for MANUAL mode: The RGA algorithm detects the integration time for optimizing the measurement for a specific gas information. This index sets the focus to a specific gas.

RGA Sensitivity Gas Number	
0	Whole Spectrum
1	Hydrogen 656 nm
2	Helium 501 nm
3	Nitrogen 337 nm
4	Oxygen 775 nm
5	Argon 809 nm
6	Ammonia 335 nm
7	OH 314 nm
8	CH 431 nm
9	CO 452 nm
10	Fluor 687 nm

Configuration AUTO mode

SubSlot	Index	DataType	Access	Name
ParamAP (1)	0x4012	UINT	RW	Gas number sensitivity

Index 0x4012

Sensitivity gas number for AUTO mode: The RGA algorithm detects the integration time for optimizing the measurement for a specific gas information. This index sets the focus to a specific gas.

RGA Sensitivity Gas Number	
0	Whole Spectrum
1	Hydrogen 656 nm
2	Helium 501 nm
3	Nitrogen 337 nm
4	Oxygen 775 nm
5	Argon 809 nm
6	Ammonia 335 nm
7	OH 314 nm
8	CH 431 nm
9	CO 452 nm
10	Fluor 687 nm

Configuration Process Data

SubSlot	Index	DataType	Access	Name
ParamAP (1)	0x4020	REAL[10]	RW	Wavelength n
	0x4021	UINT[10]	RW	Gas number n
	0x4022	UINT[10]	RW	Ratio number n

Index 0x4010

Configuration wavelength 1 to 10: configuration of the wavelength output from the RGA algorithm.

Index 0x4011

Configuration gas number 1 to 10: configuration of the gas output from the RGA algorithm.

RGA Configuration Gas Number	
1	Hydrogen 656 nm
2	Helium 501 nm
3	Nitrogen 337 nm
4	Oxygen 775 nm
5	Argon 809 nm
6	Ammonia 335 nm
7	OH 314 nm
8	CH 431 nm
9	CO 452 nm
10	Fluor 687 nm

Index 0x4012

Configuration Ratio number 1 to 10: configuration of the ratio output from the RGA algorithm.

RGA Configuration Ratio Number	
1	391nm N2+ vs 311nm OH
2	336nm N2 vs 311nm OH
3	391nm N2+ vs 656nm H
4	336nm N2 vs 656nm H
5	391nm N2+ vs 810nm Ar
6	777nm O vs 810nm Ar
7	502nm He vs 336nm N2
8	777nm O vs 336nm N2
9	656nm H vs 777nm O
10	656nm H vs 810nm Ar

4.6.4 Record Data - Information

Gas Information

The RGD algorithm got an enumeration of gases used to configure the sensor.

This enumeration can be programmatically accessed via following elements.

SubSlot	Index	DataType	Access	Name
ParamAP (1)	0x5000	UINT	RO	Number of gases
	0x5010	UINT	RW	Gas number
	0x5020	STRING[32]	RO	Description
	0x5021	REAL	RO	Wavelength

The enumeration will result in following table. The definition might be extended in future SW versions.

RGD Gas Number	
0	Whole Spectrum
1	Hydrogen 656 nm
2	Helium 501 nm
3	Nitrogen 337 nm
4	Oxygen 775 nm
5	Argon 809 nm
6	Ammonia 335 nm
7	OH 314 nm
8	CH 431 nm
9	CO 452 nm
10	Fluor 687 nm

The index 0 means that the sensor is sensitive to the whole spectrum, this is reserved for element “Sensitivity Gas Number”.

Index 0x5000

Number of gases: highest index of enumeration (10).

Index 0x5010

Gas number: Changing this number will change the information output on 0x5020 and 0x5021.

Index 0x5020

Description: Informative description of the gas.

Index 0x5021

Wavelength: Informative wavelength in [nm].

Ratio Information

The RGD algorithm got an enumeration of ratios used to configure the sensor.

This enumeration can be programmatically accessed via following elements.

SubSlot	Index	DataType	Access	Name
ParamAP (1)	0x5030	UINT	RO	Number of ratios
	0x5040	UINT	RW	Ratio number
	0x5050	STRING[32]	RO	Description

The enumeration will result in following table. The definition might be extended in future SW versions.

RGD Ratio Number	
1	391nm N2+ vs 311nm OH
2	336nm N2 vs 311nm OH
3	391nm N2+ vs 656nm H
4	336nm N2 vs 656nm H
5	391nm N2+ vs 810nm Ar
6	777nm O vs 810nm Ar
7	502nm He vs 336nm N2
8	777nm O vs 336nm N2
9	656nm H vs 777nm O
10	656nm H vs 810nm Ar

Index 0x5030

Number of ratios: highest index of enumeration (10).

Index 0x5040

Ratio number: Changing this number will change the information output on 0x5050.

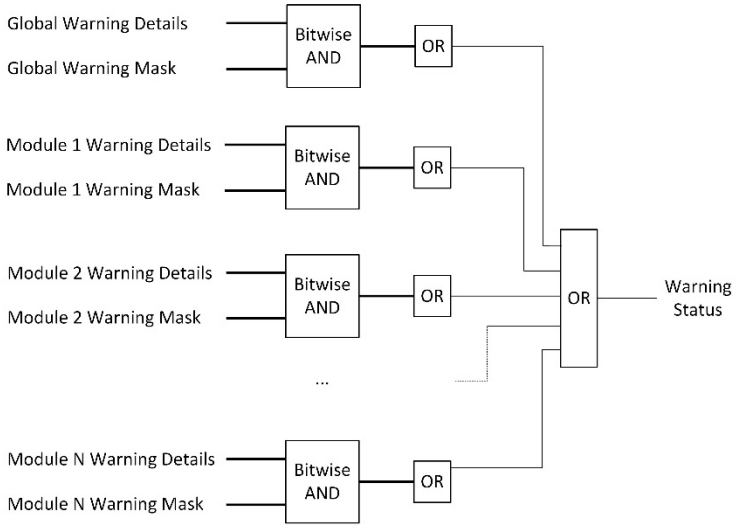
Index 0x5050

Description: Informative description of the ratio.

4.7 Module EXC

The device exceptions are split into warnings where the device is still operational and errors where the device switches off.

The warnings and errors are detailed in registers providing specific errors and warnings.



To simplify, the exception module also provides status bits indicating that any bit of these registers is active. The exception masks can be used to mask the detailed registers to be influencing the status bits.

The PROFINET module is fix in slot 5.

4.7.1 Process Data

Exception Status

SubSlot	Index	DataType	Access	Name
20		STRUCT		Exception Status
	1	BYTE	RO	Exception Status

Exception Status	
Bit 0	Device Warning
Bit 1	Reserved: always 0
Bit 2	Device Error
Bit 3…7	Reserved: always 0

Global Exceptions

SubSlot	Index	DataType	Access	Name
21		STRUCT		Global Exceptions
	1	WORD	RO	Global Active Errors
	2	WORD	RO	Global Active Warnings

Global Active Errors

Active Global Error Details	
Bit 0...2	Reserved: always 0
Bit 3	EEPROM exception
Bit 4…9	Reserved: always 0
Bit 10	Internal Power supply output voltage error (3.3, 5.0 or 12.0V)
Bit 11	External Power supply output voltage error (24V)
Bit 12	Scheduled maintenance due
Bit 13	Notify vendor
Bit 14…31	Reserved: always 0

Global Active Warnings

Active Global Warning Details	
Bit 0	Reserved: always 0
Bit 1	uP High Temp.
Bit 2...11	Reserved: always 0
Bit 12	Scheduled maintenance soon
Bit 13…31	Reserved: always 0

Module Exceptions

SubSlot	Index	DataType	Access	Name
22		STRUCT		Module Exceptions
	1	WORD	RO	Pressure Gauge Active Errors
	2	WORD	RO	Pressure Gauge Active Warnings
	3	WORD	RO	SPEC Active Errors
	4	WORD	RO	SPEC Active Warnings
	5	WORD	RO	ROR Active Errors
	6	WORD	RO	ROR Active Warnings
	7	WORD	RO	RGD Active Errors
	8	WORD	RO	RGD Active Warnings

Pressure Gauge Active Errors

Pressure Gauge Sensor Errors	
Bit 0	Sensor Element Failure
Bit 1	Electronics Failure
Bit 2	Sensor High Temp
Bit 3…15	Reserved: always 0

Pressure Gauge Active Warnings

Pressure Gauge Sensor Warnings	
Bit 0	Sensor Element Warning
Bit 1	Electronics Warning
Bit 2	Sensor High Temp
Bit 3…15	Reserved: always 0

SPEC Active Errors

SPEC Sensor Errors	
Bit 0	FSM State Error
Bit 1…15	Reserved: always 0

SPEC Active Warnings

SPEC Sensor Warnings	
Bit 0…15	Reserved: always 0

ROR Active Errors

ROR Algorithm Errors	
Bit 0	FSM State Error
Bit 1…15	Reserved: always 0

ROR Active Warnings

ROR Warnings	
Bit 0…15	Reserved: always 0

RGD Active Errors

RGD Algorithm Errors	
Bit 0	FSM State Error
Bit 1…31	Reserved: always 0

RGD Active Warnings

RGD Algorithm Warnings	
Bit 0…31	Reserved: always 0

Appendix

A: Literature

🕮 [1] Operating Manual OPG550
tinb84d1 (German)
tinb84e1 (English)
INFICON AG, LI–9496 Balzers, Liechtenstein

🕮 [2] IEC 61158-x-12 (all parts for type 12): Industrial communication networks – Fieldbus specifications

🕮 [3] IEC 61784-2: Industrial communication networks – Profiles – Part 2: Additional fieldbus profiles for real-time networks based on ISO/IEC 8802-3

🕮 [4] SEMI E54 / Draft 5102A: SPECIFICATION FOR SENSOR/ACTUATOR NETWORK SPECIFIC DEVICE MODEL FOR VACUUM PRESSURE GAUGES

🕮 [5] SEMI E52: Practice for referencing gases, gas mixtures and vaporizable materials used in digital mass flow controllers

Notes

Original: English
TIRB92E1

INFICON
LI–9496 Balzers
Liechtenstein
Tel +423 / 388 3111
Fax +423 / 388 3700
reachus@inficon.com

www.inficon.com