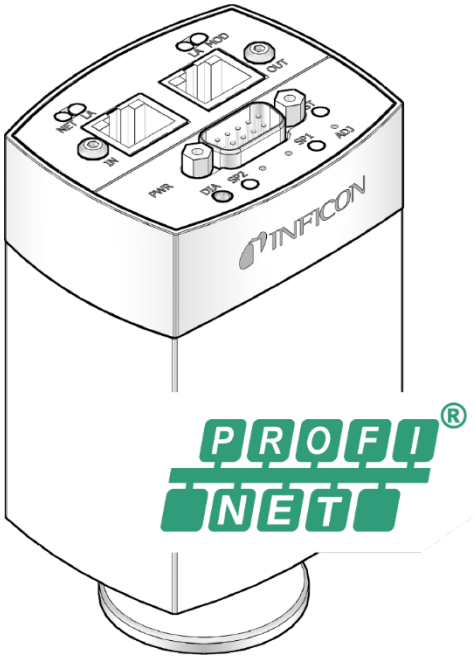
# Profinet®

for Pirani Capacitance Diaphragm and Pirani Standard Gauges

## PCG550, PCG552, PCG554,
## PSG550, PSG552, PSG554



## 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 the appropriate documents (→ 🕮 [1], [2]).

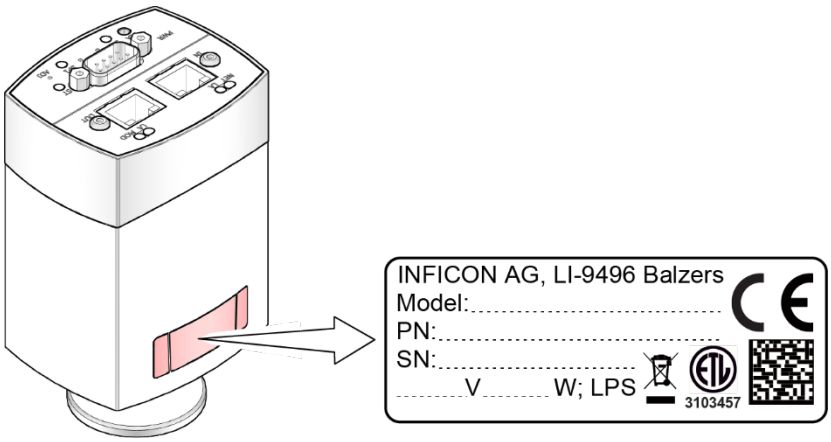
## Profinet Interface

This manual describes the functionality of a Profinet PCG55x and PSG55x gauge.

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 (PCG GSDML file, PSG GSDML file).

## 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.

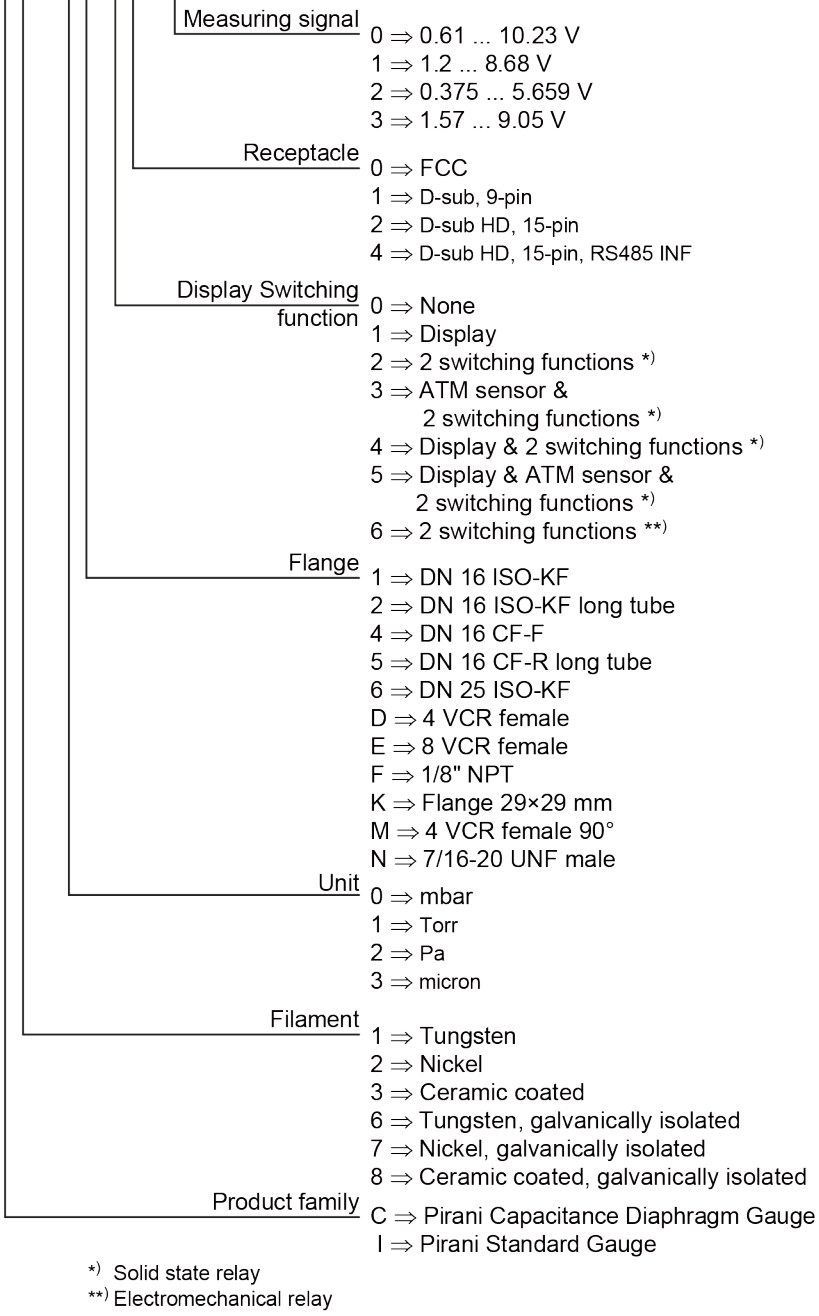



## Validity

This document applies to products of the Pirani Capacitance Diaphragm (PCG550, PCG552, PCG554) and Pirani Standard Gauges (PSG550, PSG552, PSG554) 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 set point) as defined in the corresponding ordering information.

**3Pxx-0xx-xxAx**




*) Solid state relay
**) Electromechanical relay

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 PCG550 gauges with DN 16 ISO-KF vacuum connection. They apply to other gauges by analogy.

## Trademark

Profinet® Profibus & Profinet International (PI), Germany

## Patents

EP 0689669 B1, 0689670 B1, 0658755 B1
US Patents 5608168, 4031997, 5583297

# Contents



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

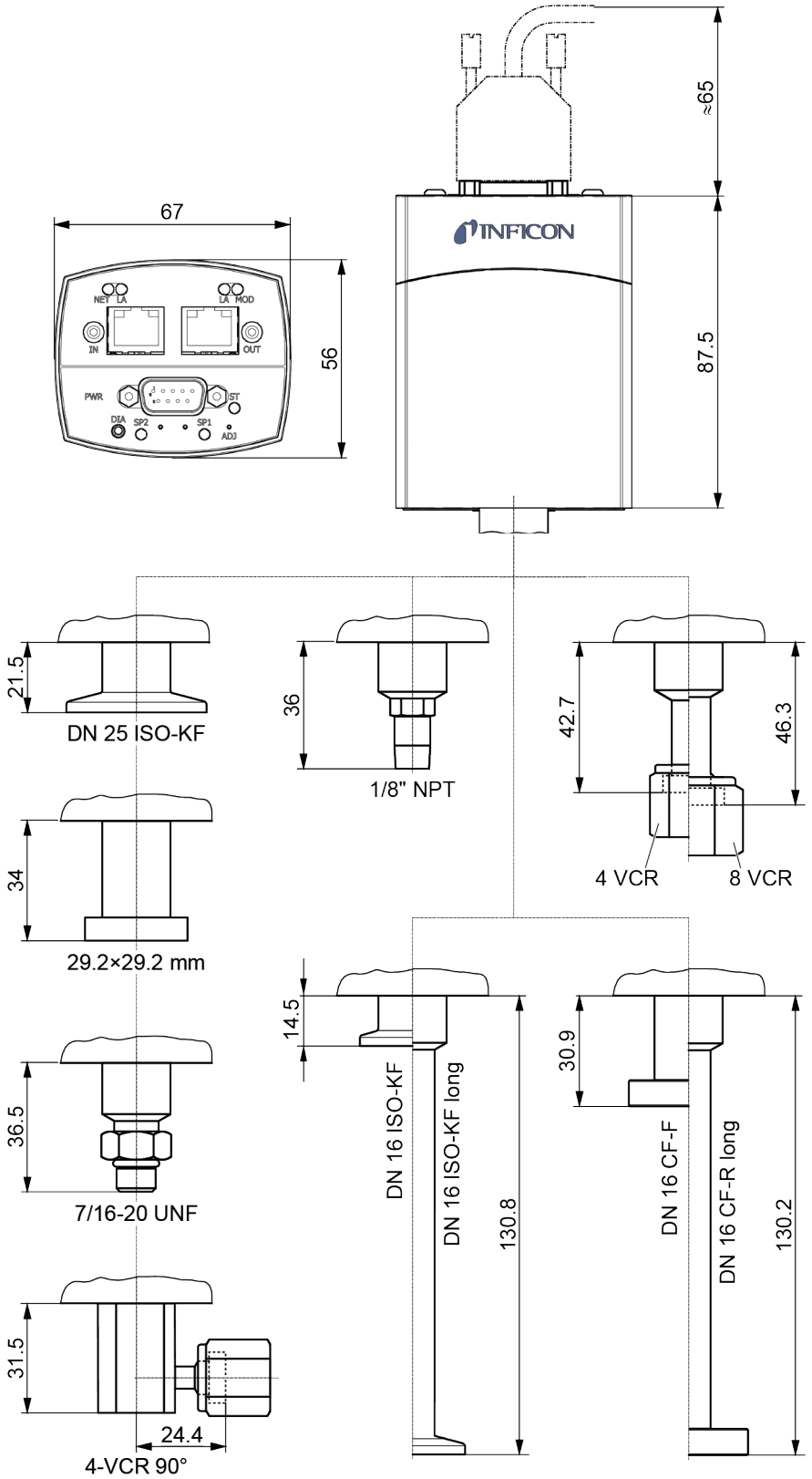
# 1 Technical Data

Further technical data → 🕮 [1], [2].

## Profinet interface

| | |
|---|---|
| Communication protocol | protocol specialized for Profinet IO |
| Data rate | 100 Mbp/s |
| Physical layer | 100BASE-Tx (IEEE 802.3) |
| Digital functions | read pressure, select units (mTorr, Torr, mbar, Pa), monitor gauge status, filament status |
| Analog functions | 0 … 10 V analog output pressure indication<br>two setpoint relays A + B |
| Setpoint relays | 2 |
| Range | $5.0\times10^{-5}$ … 1500 mbar |
| Relay contact | NO (normally open), potential free |
| Hysteresis | selectable |
| Contact rating | ≤30 V (ac) / ≤0.3 A (dc) |
| Profinet connector | 2 × RJ45, 8-pin (socket)<br><IN>: Profinet input<br><OUT>: Profinet output |
| Cable | shielded, special Ethernet Patch Cable (CAT5e quality or higher) |
| Cable length | ≤100 m |
| Data | Cyclic and Acyclic Data |

Dimensions [mm]



# 2 Interface Connection

## Making an Profinet interface cable

For operating the PxG55x gauge via Profinet, at least one cable conforming to the Profinet standard is required.

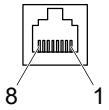
If no such cable is available, make it according to the following indications.

### Cable type

Ethernet Patch Cable (CAT5e quality) with FCC68 connector.

### Procedure

❶ Pin assignment:

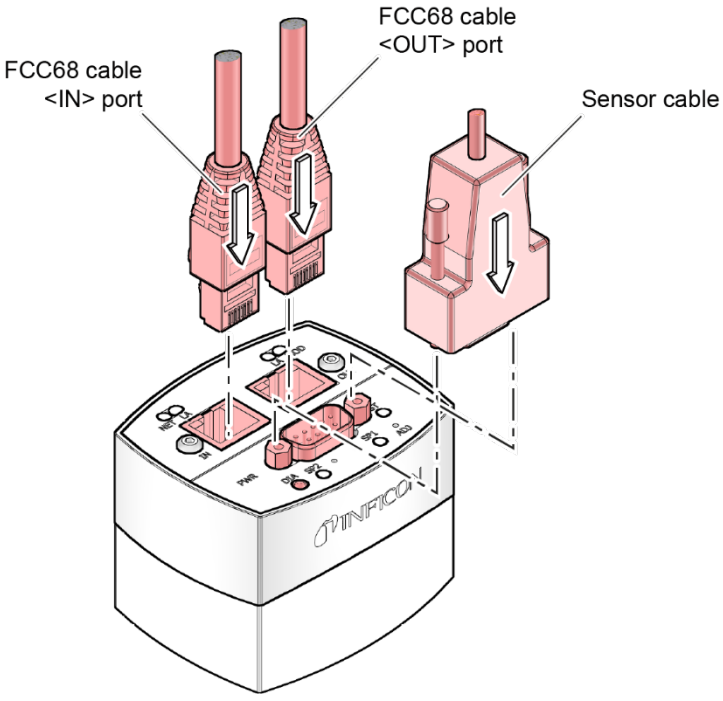



FCC68, 8-pin,
male, soldering side

| Pin | Signal | Description |
|---|---|---|
| 1 | TD+ | Transmission Data + |
| 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 |

Pin assignment of the D-sub 9-pin sensor connector according to the respective operating manual (→ 🕮 [1], [2]).

❷ 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 PxG55x <IN> port. And the cable from the PxG55x <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:

- Pressure reading
- Pressure unit (mTorr, Torr, mbar, Pa)
- Zero adjustment
- Status and error messages
- Status of the switching functions
- Set Trip Point for switching functions

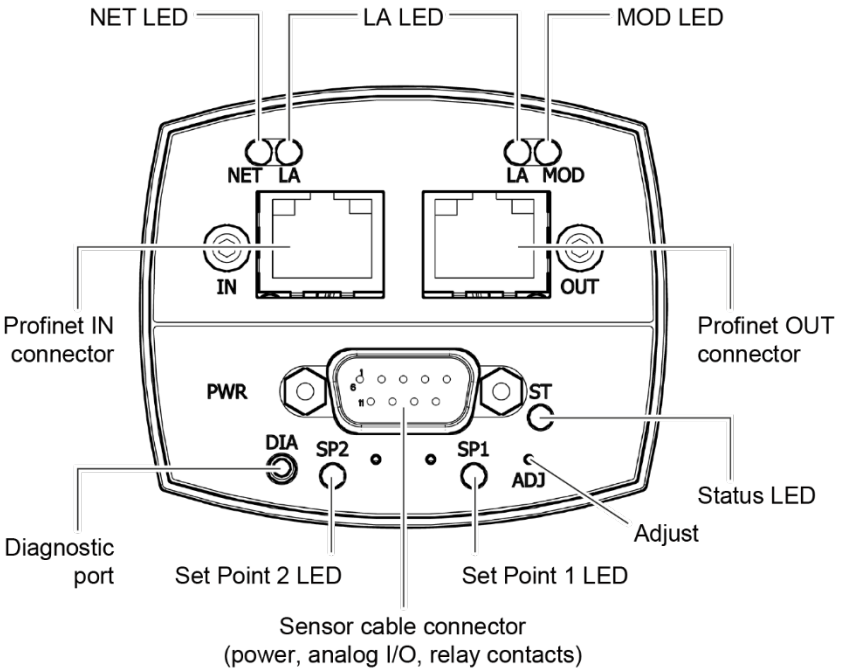
**Caution**

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




| Label | Function |
|---|---|
| NET | The NET LED indicates the network status of the PxG55x gauge |
| MOD | The MOD LED indicates the module status of the PxG55x gauge |
| IN | Profinet IN connector |
| LA | Link activity Profinet IN and OUT |
| OUT | Profinet OUT connector |
| PWR | Sensor cable connector<br>(Power, analog I/O and Relay contacts) |
| ST | Status of the gauge |
| SP1 | Status of Set Point 1 |
| SP2 | Status of Set Point 2 |
| DIA | Diagnosis port |
| ADJ | Adjust |

## 3.3 Indicators

For information on the <ST>, <SP1> and <SP2> indicators see respective operating manual (→ 🕮 [1], [2]).

### 3.3.1 <NET> LED


Displays the network status.

| Color | LED State | Description |
|---|---|---|
| | off | No power<br>No connection with IO Controller |
| green | 1 flash | Connection with IO Controller established<br>IO Controller in STOP state or IO data bad<br>IRT synchronization not finished |
| | blinking | Used by engineering tools to identify the node on the network |
| | on | Connection with IO Controller established<br>IO Controller in RUN state |
| red | on | Major internal error (the indication is combined with a red module status LED) |
| | 1 flash | Station name not set |
| | 2 flashes | IP address not set |
| | 3 flashes | Expected Identification differs from read identification |

### 3.3.2 <MOD> LED


Displays the module status.

| Color | LED State | Description |
|---|---|---|
| | off | No power OR Module in SETUP or NW_INIT state |
| green | on | Module has shifted from the NW_INIT state |
| | 1 flash | Diagnostic event(s) present |
| red | on | Device in state Exception<br>Major internal error (this indication is combined with a red network status LED) |
| red/ green | alternating (red/green) | Firmware update. Do NOT power off the module. Turning the module off during this phase could cause permanent damage. |

### 3.3.3 <LA> LED (<IN> Port)


Displays the input status.

| Color | LED State | Description |
|---|---|---|
| green | off | Port not connected or no power applied to device |
| | blinking | Port connected and communication active |
| | on | Port connected but no communication |

### 3.3.4 <LA> LED (<OUT> Port)


Displays the output status.

| Color | LED State | Description |
|---|---|---|
| green | off | Port not connected or no power applied to device |
| | blinking | Port connected and communication active |
| | on | Port connected but no communication |

# 4 Communication

Profinet provides cyclic and acyclic data. Cyclic data is automatically updated on a regular basis. Acyclic data needs to be requested by the user. In order to read or write a parameter Index, Slot and Subslot need to be correct.

This chapter gives an overview of the cyclic (4.2) and acyclic data (4.3). In 4.1 is a list of all the accessible parameters shown.

The Parameters contain naming abbreviations:

| | |
|---|---|
| CDG | Capacitive Diaphragm Sensor |
| Pir | Pirani / common heat transfer sensor |
| VPG | Vacuum Pressure Gauge |
| Fieldbus Unit | Unit, which translates Profinet commands into commands know to the vacuum pressure gauge and vice versa |

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

| Abbr. | Description |
|---|---|
| Access | parameter read/write access<br>• RO: object can only be read<br>• RW: object can be both read and written |
| Index | Index for the parameter |
| NV | Nonvolatile; attribute value is maintained through power cycles |
| Data Type | • Boolean = 1 bit. (0 = false, 1 = true)<br>• Unsigned8 = 8 bit. Unsigned Byte<br>• Unsigned16 = 16 bit. Unsigned integer value<br>• Unsigned32 = 32 bit. Unsigned integer value<br>• Unsigned64 = 64 bit. Unsigned integer value<br>• Float32 = 32 bit. Floating point<br>• VisibleString[n] = Visible string. Characters are based on 8 bit ASCII.<br>• OctetString[n]= ordered sequence of Bytes, numbered from 1 to n |

## 4.1 List of Parameters for a PCG with ATM

| Name | Description | Default | DataType | Index | Slot | Subslot |
|---|---|---|---|---|---|---|
| Gauge Reading Valid | Indicates whether both sensors are in underrange or overrange or any alarm is active. | n/a | Unsigned8 | 0x0001 | 1 | 1 |
| Gauge Overrange Exceeded | Indicates whether both sensors are in overrange. | n/a | Unsigned8 | 0x0002 | 1 | 1 |
| Gauge Underrange Exceeded | Indicates whether both sensors are in underrange. | n/a | Unsigned8 | 0x0003 | 1 | 1 |
| Gauge Active Value | The corrected, converted, calibrated final analog input value of the whole gauge. | n/a | Float32 | 0x0004 | 1 | 1 |
| Gauge Active Sensor Number | Shows which sensor is currently active. (PSG: 1 = Pirani, PCG: 1 = CDG, 2 = Pirani) | n/a | Unsigned16 | 0x0005 | 1 | 1 |
| Data Unit | Current data unit of the gauge (1 = Pa, 4 = mbar, 5 = Torr, 6 = mTorr) | check product key | Unsigned8 | 0x0021 | 0 | 10 |
| Mac Address | Mac Address of the vacuum pressure gauge | n/a | VisibleString[18] | 0x0023 | 0 | 10 |
| SW Version Complete Device | Software version of the complete device. | n/a | VisibleString[14] | 0x00B4 | 0 | 10 |
| SW Version VPG | Software version of the vacuum pressure. | n/a | VisibleString[14] | 0x00B5 | 0 | 10 |
| SW Version Fieldbus | Software version of the fieldbus unit. | n/a | VisibleString[14] | 0x00B6 | 0 | 10 |
| SW Version NP40 | Software version of the np40 chip. | n/a | VisibleString[14] | 0x00B7 | 0 | 10 |
| HW Version Fieldbus | Hardware version of the fieldbus unit. | n/a | VisibleString[9] | 0x00BB | 0 | 10 |
| Sensor Value CDG | The corrected, converted, calibrated final analog input value of the sensor. | n/a | Float32 | 0x0100 | 1 | 1 |
| Reading Valid CDG | Indicates whether the Value parameter contains a valid value within the specified accuracy or not. | n/a | Unsigned8 | 0x0101 | 1 | 1 |
| Overrange Exceeded CDG | Indicates whether the Value parameter contains a value in overrange. | n/a | Unsigned8 | 0x0102 | 1 | 1 |
| Underrange Exceeded CDG | Indicates whether the Value parameter contains a value in underrange. | n/a | Unsigned8 | 0x0103 | 1 | 1 |
| Sensor Warning CDG | Shows all warnings of the CDG sensor. | n/a | Unsigned16 | 0x0140 | 1 | 1 |
| Sensor Error CDG | Shows all errors of the CDG sensor. | n/a | Unsigned16 | 0x0141 | 1 | 1 |
| Sensor Value Piezo | The corrected, converted, calibrated final analog input value of the sensor. | n/a | Float32 | 0x0200 | 1 | 1 |
| Reading Valid Piezo | Indicates whether the Value parameter contains a valid value within the specified accuracy or not. | n/a | Unsigned8 | 0x0201 | 1 | 1 |
| Overrange Exceeded Piezo | Indicates whether the Value parameter contains a value in overrange. | n/a | Unsigned8 | 0x0202 | 1 | 1 |
| Underrange Exceeded Piezo | Indicates whether the Value parameter contains a value in underrange. | n/a | Unsigned8 | 0x0203 | 1 | 1 |
| Sensor Warning Piezo | Shows all warnings of the Piezo sensor. | n/a | Unsigned16 | 0x0240 | 1 | 1 |
| Sensor Error Piezo | Shows all errors of the Piezo sensor. | n/a | Unsigned16 | 0x0241 | 1 | 1 |
| Full Scale Adjust Command Piezo | Parameter to trigger a Full Scale / ATM adjustment. | n/a | OctetString[6] | 0x0274 | 0 | 10 |
| Full Scale Adjust Status Piezo | Status of a Full Scale / ATM adjustment of the piezo sensor. | n/a | OctetString[1] | 0x0275 | 0 | 10 |
| Full Scale Adjust Response Piezo | Response of a Full Scale / ATM adjustment of the piezo sensor. | n/a | OctetString[3] | 0x0276 | 0 | 10 |
| Sensor Value Pirani | The corrected, converted, calibrated final analog input value of the sensor. | n/a | Float32 | 0x0300 | 1 | 1 |
| Reading Valid Pirani | Indicates whether the Value parameter contains a valid value within the specified accuracy or not. | n/a | Unsigned8 | 0x0301 | 1 | 1 |
| Overrange Exceeded Pirani | Indicates whether the Value parameter contains a value in overrange. | n/a | Unsigned8 | 0x0302 | 1 | 1 |
| Underrange Exceeded Pirani | Indicates whether the Value parameter contains a value in underrange. | n/a | Unsigned8 | 0x0303 | 1 | 1 |
| Sensor Warning Pirani | Shows all warnings of the pirani sensor. | n/a | Unsigned16 | 0x0340 | 1 | 1 |
| Sensor Error Pirani | Shows all errors of the pirani sensor. | n/a | Unsigned16 | 0x0341 | 1 | 1 |

(continued)

(Table "List of Parameters for a PCG with ATM" continued)

| Name | Description | Default | DataType | Index | Slot | Subslot |
|---|---|---|---|---|---|---|
| Zero Adjust Command Pirani | Parameter to trigger a Zero Adjustment. | n/a | OctetString[6] | 0x0370 | 0 | 10 |
| Zero Adjust Status Pirani | Status of a Zero Adjustment of the pirani sensor. | n/a | OctetString[1] | 0x0371 | 0 | 10 |
| Zero Adjust Response Pirani | Response of a Zero Adjustment of the pirani sensor. | n/a | OctetString[3] | 0x0372 | 0 | 10 |
| Full Scale Adjust Command Pirani | Parameter to trigger a Full Scale / ATM adjustment. | n/a | OctetString[6] | 0x0374 | 0 | 10 |
| Full Scale Adjust Status Pirani | Status of the Full Scale / ATM adjustment of the pirani sensor. | n/a | OctetString[1] | 0x0375 | 0 | 10 |
| Full Scale Adjust Response Pirani | Response of the Full Scale / ATM adjustment of the pirani sensor. | n/a | OctetString[3] | 0x0376 | 0 | 10 |
| Trip Point Output All Instance | Status of the Trip Points (Bit 0: Status High Trip 1, 1: Low Trip 1, 2: High Trip 2, 3: Low Trip 2) | n/a | Unsigned8 | 0x0006 | 1 | 1 |
| Status High Trip 1 | Shows if High Trip Point 1 is asserted. | n/a | Unsigned8 | 0x0800 | 1 | 1 |
| Status Low Trip 1 | Shows if Low Trip Point 1 is asserted. | n/a | Unsigned8 | 0x0801 | 1 | 1 |
| High Trip Enable 1 | Indicates if High Trip Point 1 is enabled. | 0 | Unsigned8 | 0x0820 | 1 | 1 |
| Low Trip Enable 1 | Indicates if Low Trip Point 1 is enabled. | 1 | Unsigned8 | 0x0821 | 1 | 1 |
| High Trip Point Limit 1 | In Standard Mode (check: High Trip Source Index 1) the set point is set by this parameter. | 1501 | Float32 | 0x0826 | 1 | 1 |
| Low Trip Point Limit 1 | In Standard Mode (check: Low Trip Source Index 1) the set point is set by this parameter. | 0.00004 | Float32 | 0x0829 | 1 | 1 |
| High Trip Source Index 1 | This parameter shows if the threshold value is defined by the Standard Mode or the ATM Mode. | 0x0826 | Unsigned16 | 0x0812 | 1 | 1 |
| Low Trip Source Index 1 | This parameter shows if the threshold value is defined by the Standard Mode or the ATM Mode. | 0x0829 | Unsigned16 | 0x0815 | 1 | 1 |
| Percentage High Trip Source 1 | This defines how the set point is related to the Sensor Value Piezo in ATM Mode. | 1.01 | Float32 | 0x0813 | 1 | 1 |
| Percentage Low Trip Source 1 | This defines how the set point is related to the Sensor Value Piezo in ATM Mode. | 1.01 | Float32 | 0x0816 | 1 | 1 |
| High Trip Hysteresis 1 | This parameter defines the hysteresis value for the High Trip Point 1. | 150 | Float32 | 0x082C | 1 | 1 |
| Low Trip Hysteresis 1 | This parameter defines the hysteresis value for the Low Trip Point 1. | 0.000004 | Float32 | 0x082D | 1 | 1 |
| Status High Trip 2 | Shows if High Trip Point 2 is asserted. | n/a | Unsigned8 | 0x0900 | 1 | 1 |
| Status Low Trip 2 | Shows if Low Trip Point 2 is asserted. | n/a | Unsigned8 | 0x0901 | 1 | 1 |
| High Trip Enable 2 | Indicates if High Trip Point 2 is enabled. | 0 | Unsigned8 | 0x0920 | 1 | 1 |
| Low Trip Enable 2 | Indicates if Low Trip Point 2 is enabled. | 1 | Unsigned8 | 0x0921 | 1 | 1 |
| High Trip Point Limit 2 | In Standard Mode (check: High Trip Source Index 2) the set point is set by this parameter. | 1501 | Float32 | 0x0926 | 1 | 1 |
| Low Trip Point Limit 2 | In Standard Mode (check: Low Trip Source Index 2) the set point is set by this parameter. | 0.00004 | Float32 | 0x0929 | 1 | 1 |
| High Trip Source Index 2 | This parameter shows if the set point limit is defined by the Standard Mode or the ATM Mode. | 0x0826 | Unsigned16 | 0x0912 | 1 | 1 |
| Low Trip Source Index 2 | This parameter shows if the set point limit is defined by the Standard Mode or the ATM Mode. | 0x0829 | Unsigned16 | 0x0915 | 1 | 1 |
| Percentage High Trip Source 2 | This defines how the set point is related to the Sensor Value Piezo in ATM Mode. | 1.01 | Float32 | 0x0913 | 1 | 1 |
| Percentage Low Trip Source 2 | This defines how the set point is related to the Sensor Value Piezo in ATM Mode. | 1.01 | Float32 | 0x0916 | 1 | 1 |
| High Trip Hysteresis 2 | This parameter defines the hysteresis value for the High Trip Point 2. | 150 | Float32 | 0x092C | 1 | 1 |
| Low Trip Hysteresis 2 | This parameter defines the hysteresis value for the Low Trip Point 2. | 0.000004 | Float32 | 0x092D | 1 | 1 |
| Active Exception Status | Consolidated parameter to show all kind of warnings and errors at once. | 0 | Unsigned8 | 0x0040 | 0 | 10 |

(continued)

| (Table "List of Parameters for a PCG with ATM" concluded) | | | | | | |
|---|---|---|---|---|---|---|
| Active Global Device Warning Details | Shows Communication problem and EEPROM errors. | 0 | Unsigned32 | 0x0045 | 0 | 10 |
| Active Global Manufacturer Warning Details | Shows general warnings. | 0 | Unsigned32 | 0x0046 | 0 | 10 |
| Active Global Device Error Details | Shows Communication problem and EEPROM errors. | 0 | Unsigned32 | 0x0047 | 0 | 10 |
| Active Global Manufacturer Error Details | Shows general errors. | 0 | Unsigned32 | 0x0048 | 0 | 10 |
| Active Manufacturer Warning Details | Parameter is currently unused. | 0 | Unsigned32 | 0x0042 | 0 | 10 |
| Active Manufacturer Error Details | Parameter is currently unused. | 0 | Unsigned32 | 0x0044 | 0 | 10 |
| Device Reset Command | Parameter to trigger a Device Reset (standard reset or factory reset). | n/a | OctetString[6] | 0x0082 | 0 | 10 |
| Device Reset Status | Status of the Device Reset. | n/a | OctetString[1] | 0x0083 | 0 | 10 |
| Device Reset Response | Response of the Device Reset. | n/a | OctetString[2] | 0x0084 | 0 | 10 |

## 4.2 Cyclic Data

The following parameters are provided and updated regularly. Therefore, they are called process data or cyclic data.

| Index | Slot | Subslot | DataType | NV | Access | Name | Description |
|---|---|---|---|---|---|---|---|
| 0x0004 | 1 | 1 | Float32 | | RO | Gauge Active Value | The corrected, converted, calibrated final analog input value of the whole gauge. |
| 0x0005 | 1 | 1 | Unsigned16 | | | Gauge Active Sensor Number | Shows which sensor is currently active.<br>PSG: 1 = Pirani<br>PCG: 1 = CDG, 2 = Pirani |
| 0x0040 | | | Unsigned8 | | RO | Active Exception Status | Consolidated parameter to show all kind of warnings and errors at once.<br>For all Bits apply:<br>0 = error or warning is not active<br>1 = error or warning is active<br><br>Bit 0: Device Warning<br>Bit 1: Manufacturer Warning<br>Bit 2: Device Error<br>Bit 3: Manufacturer Error |
| 0x0006 | 1 | 1 | Unsigned32 | | RO | Trip Point Output All Instance | Bit 0: Status High Trip (0x0800)<br>Bit 1: Status Low Trip (0x0801)<br>Bit 2: Status High Trip (0x0900)<br>Bit 3: Status Low Trip (0x0901) |

If the internal communication of the gauge was interrupted the following values are shown for the cyclic parameters above:

- Gauge Active Value: 0
- Gauge Active Sensor Number: 0
- Active Exception Status: 5 (Device Warning and Device Error are active)
- Trip Point Output All: 0

## 4.3 Acyclic Data

The following chapter is structured in 4.3.1 General Parameters such as information about the general settings and the values of the combined gauge. In 4.3.2 to 4.3.4 are the sensor specific values described followed by the Errors and Warnings in 4.3.6. The chapter concludes with the Device Reset in 4.3.7.

### 4.3.1 General Parameters

| Index | Slot | Subslot | DataType | NV | Access | Name | Description |
|---|---|---|---|---|---|---|---|
| 0xAFF0 | 1 | 1 | VisibleString[60] | - | RO | I&M0 Data | Overview of general device parameters |

The I&M0 Data contains the following information in the given order:

| | |
|---|---|
| Block Type | WORD (16 Bit) |
| Block Length | WORD (16 Bit) |
| Block Version | WORD (16 Bit) |
| VendorID | WORD (16 Bit) |
| OrderID | STRING(21) |
| SerialNumber | STRING(17) |
| HW Revision | WORD (16 Bit) |
| SW Revision | 3 BYTE |
| Revision Count | WORD (16 Bit) |
| Profile ID | WORD (16 Bit) |
| Profile Spec Type | WORD (16 Bit) |
| IM_Version | ARRAY[0..1] OF BYTE |
| Support | WORD (16 Bit) |

#### 4.3.1.1 Gauge

| Index | Slot | Subslot | DataType | NV | Access | Name | Description |
|---|---|---|---|---|---|---|---|
| 0x0001 | 1 | 1 | Unsigned8 | - | RO | Gauge Reading Valid | Indicates whether both sensors are in underrange or overrange or any alarm is active.<br>Bit 0:<br>0 = invalid<br>1 = valid |
| 0x0002 | 1 | 1 | Unsigned8 | - | RO | Gauge Overrange Exceeded | Bit 0:<br>0 = No overrange for both sensors detected<br>1 = Pirani and CDG both are in overrange |
| 0x0003 | 1 | 1 | Unsigned8 | - | RO | Gauge Underrange Exceeded | Bit 0:<br>0 = No underrange for both sensors detected<br>1 = Pirani and CDG both are in underrange |
| 0x0004 | 1 | 1 | Float32 | - | RO | Gauge Active Value | The corrected, converted, calibrated final analog input value of the whole gauge. |
| 0x0005 | 1 | 1 | Unsigned16 | - | RO | Gauge Active Sensor Number | Shows which sensor is currently active.<br>PSG: 1 = Pirani<br>PCG: 1 = CDG, 2 = Pirani |

#### 4.3.1.2 Configurations

| Index | Slot | Subslot | DataType | NV | Access | Name | Description |
|---|---|---|---|---|---|---|---|
| 0x0021 | 0 | 10 | Unsigned8 | X | RW | Data Unit | 1 = Pa<br>4 = mbar<br>5 = Torr<br>6 = mTorr |
| 0x0022 | 0 | 10 | Unsigned32 | - | RO | Serial number VPG | Serial number of the vacuum pressure gauge |
| 0x0023 | 0 | 10 | VisibleString[18] | - | RO | Mac Address | Mac Address of the vacuum pressure gauge |
| 0x00B4 | 0 | 10 | VisibleString[14] | - | RO | SW Version Complete Device | Software version of the complete device<br>format: AA.BB.CC.DDDD<br>AA - Compatibility<br>BB - Release Version<br>CC - Development Version<br>DDDD - Build Version |
| 0x00B5 | 0 | 10 | VisibleString [14] | - | RO | SW Version VPG | Software version of the vacuum pressure gauge.<br>format: AA.BB.CC.DDDD<br>AA - Compatibility<br>BB - Release Version<br>CC - Development Version<br>DDDD - Build Version |
| 0x00B6 | 0 | 10 | VisibleString [14] | - | RO | SW Version Fieldbus | Software version of the fieldbus unit<br>format: AA.BB.CC.DDDD<br>AA - Compatibility<br>BB - Release Version<br>CC - Development Version<br>DDDD - Build Version |
| 0x00B7 | 0 | 10 | VisibleString [14] | - | RO | SW Version NP40 | Software version of the NP40 chip<br>format: AAA.BBB.CCC<br>AAA - Compatibility<br>BBB - Release Version<br>CCC - Development Version |
| 0x00BB | 0 | 10 | VisibleString [9] | - | RO | HW Version Fieldbus | Hardware version of the fieldbus unit<br>Format: AA.BB.CC<br>AA – Compatibility<br>BB – Release and Version<br>CC – Development and Version |

### 4.3.2 Heat Transfer (Pirani)

The common heat transfer sensor is abbreviated as Pir for Pirani.

At low pressures (below 1 mbar), only the signal of the Pirani sensor is used for pressure measurement; at high pressures (above 10 mbar) only the signal of the diaphragm capacitive sensor. To determine the output signal in the cross over area (1 … 10mbar), both signals are used proportionally to the pressure.

Sensor Value Pirani only shows the current sensor value within its measurement range ($5\times10^{-5}$ … 1 mbar).

#### 4.3.2.1 Parameters

| Index | Slot | Subslot | DataType | NV | Access | Name | |
|---|---|---|---|---|---|---|---|
| 0x0300 | 1 | 1 | Float32 | - | RO | Sensor Value Pirani | The corrected, converted, calibrated final analog input value of the sensor. |
| 0x0301 | 1 | 1 | Unsigned8 | - | RO | Reading Valid Pirani | Indicates whether the Value parameter contains a valid value within the specified accuracy or not<br>0 = Invalid<br>1 = Valid |
| 0x0302 | 1 | 1 | Unsigned8 | - | RO | Overrange Exceeded Pirani | Indicates whether the Value parameter contains a value in overrange.<br>0 = No Overrange Exceeded<br>1 = Overrange Exceeded |
| 0x0303 | 1 | 1 | Unsigned8 | - | RO | Underrange Exceeded Pirani | Indicates whether the Value parameter contains a value in underrange.<br>0 = No Underrange Exceeded<br>1 = Underrange Exceeded |

#### 4.3.2.2 Error and Warnings Heat Transfer (Pirani)

| Index | Slot | Subslot | DataType | NV | Access | Name | Description |
|---|---|---|---|---|---|---|---|
| 0x0340 | 1 | 1 | Unsigned16 | - | RO | Sensor Warning Pirani | Bit 1: Electronics Warning<br>0 = No Electronics Warning<br>1 = Electronics Warning |
| 0x0341 | 1 | 1 | Unsigned16 | - | RO | Sensor Error Pirani | Bit 0: Sensor Element Failure<br>0 = No Sensor Element Failure<br>1 = Sensor Element Failure<br>("Troubleshooting" → 🕮 [1], [2])<br><br>Bit 1: Electronics Failure<br>0 = No Electronics Failure<br>1 = Electronics Failure<br>("Troubleshooting" → 🕮 [1], [2]) |

#### 4.3.2.3 Adjusting the Gauge)

The gauge is factory calibrated. Due to mounting, long time operation or contamination, a zero drift can occur. Check the zero drift and adjust the gauge if necessary periodically. It is recommended to perform a zero and atm adjustment after any reinstallation.

For adjusting the zero point, operate the gauge under the same constant ambient conditions and in the same mounting orientation as normally. The gauge is adjusted to default values. However, it can also be adjusted to other pressure values (→ Zero Adjust with target offset), if the exact pressure value is known (reference measurement).

Procedure

❶ If you are using a seal with centering ring and filter, check that they are clean or replace them if necessary ("Deinstallation" → 🕮 [1], [2]).

❷ Put the gauge into operation and operate it at atmospheric pressure for at least 10 minutes.

❸ Perform an ATM adjustment described below "Full Scale Adjust Command Heat Transfer (Pirani)".

❹ Full Scale Adjust Status Pirani and Full Scale Adjust Response Pirani provide you with the information on the successful execution of the ATM adjustment. If it was not successful repeat step ❸.

❺ Evacuate the vacuum system to p << $10^{-5}$ mbar and wait at least 2 minutes (If your system can not evacuate to p << $10^{-5}$ mbar go to step ❽.

❻ Perform a Zero adjustment described below.

❼ Zero Adjust Status Pirani and Zero Adjust Response Pirani provide you with the information on the successful execution of the ATM adjustment. If it was not successful repeat step ❻.

✓ If the pressure value 4.99×$10^{-5}$ mbar is shown at Gauge Active Value, the adjustment has been successful. Otherwise, repeat the adjustment procedure.

If your system can not evacuate to p << $10^{-5}$ mbar:

❽ Evacuate the vacuum system to the lowest possible value and wait at least 2 minutes.

❾ Perform a Zero adjustment with target offset described below.

❿ Reading Zero Adjust Status Pirani and Zero Adjust Response Pirani provides you with the information if the zero adjustment was successful. If not repeat step ❾.

✓ If the target pressure value is shown at Gauge Active Value, the adjustment has been successful. Otherwise, repeat the adjustment procedure.

| Index | Slot | Subslot | DataType | NV | Access | Name | Description |
|---|---|---|---|---|---|---|---|
| 0x0374 | 0 | 10 | OctetString[6] | - | RW | Full Scale Adjust Command Pirani | Parameter to trigger a Full Scale Adjustment (see further information below). |
| 0x0375 | 0 | 10 | OctetString[1] | - | RO | Full Scale Adjust Status Pirani | 1 = Last command completed, no errors, reply available<br>3 = Last command completed, errors present, reply available<br>255 = Command is executing |
| 0x0376 | 0 | 10 | OctetString[3] | - | RO | Full Scale Adjust Response Pirani | Byte 0:<br>same as Full Scale Adjust Status Pirani<br>Byte 2:<br>0: Full Scale Adjust successful<br>1: Full Scale Adjust failed: out-of-range<br>254: No previous Zero Adjust command issued |

Full Scale Adjust Command Heat Transfer (Pirani)

**READ**

Shows the last command that has been written to this parameter.

**WRITE**

If you are using a seal with centering ring and filter, check that they are clean or replace them if necessary. Put the gauge into operation and operate it at atmospheric pressure for at least 10 minutes. Run the "Full Scale Adjust Command Pirani" with the correct bit stream. The Pirani sensor is adjusted to 1000 mbar by default.

For a PSG Pirani is the active instance 1, while for PSG Pirani is the active instance 2. The following algorithm allows both values.

Write: 0x00-01-00-00-00-00 or 0x00-02-00-00-00-00 to this parameter

The value 2 indicates that the chosen instance of this action is the Pirani sensor.

| Zero Adjust Command Pirani | |
|---|---|
| Byte 0 | 0: Full Scale Adjust |
| Byte 1 | Index of the Sub Sensor Instance => here Pirani = 1 or 2. |
| Byte 2-5 | Always 0 |

### 4.3.2.4 Zero Adjustment Heat Transfer (Pirani)

| Index | Slot | Subslot | DataType | NV | Access | Name | Description |
|---|---|---|---|---|---|---|---|
| 0x0370 | 0 | 10 | OctetString[6] | - | RW | Zero Adjust Command Pirani | Parameter to trigger a Zero adjustment (see further information below) |
| 0x0371 | 0 | 10 | OctetString[1] | - | RO | Zero Adjust Status Pirani | Parameter shows the Status of the previously triggered Zero adjustment (see further information below).<br>1 = Last command completed, no errors, reply available<br>3 = Last command completed, errors present, reply available<br>255 = Command is executing |
| 0x0372 | 0 | 10 | OctetString[3] | - | RO | Zero Adjust Response Pirani | Parameter shows the Response of the previously triggered Zero adjustment (see further information below). |

Zero Adjust Command Pirani

**READ**

Shows the last command that has been written to this parameter.

**WRITE**

The gauge is adjusted to default values (Zero Adjust with no offset). However, it can also be adjusted to other pressure values, if the exact pressure value is known (Zero Adjust with target offset).

Evacuate the vacuum system to p << $10^{-5}$ mbar or p = your target offset value and wait at least 2 minutes. Run the "Zero Adjust Command Pirani" with the correct bit stream. The gauge is adjusted either to $5\times10^{-5}$ mbar (default) or to your target offset value.

A Zero adjust can only be performed at a value <1e-1 mbar

1) Zero Adjust with no offset (STANDARD)

After "Zero Adjust" the output pressure value is set to 5e-5 mbar.

Write 0x00-01-00-00-00-00 or 0x00-02-00-00-00-00

Zero Adjustment is triggered (see: status or response for more information).

2) Zero Adjust with target offset

After "Zero Adjust" the output value is identical to the offset value sent by this command. You can make a zero adjustment at your current pressure level (e.g. if your pump is not able to reach $10^{-5}$ mbar). Internally, the gauge works with mbar, but you can set the parameter in your current data unit.

Write your current pressure level in data format REAL (0xAA BB CC DD)

-> Bit stream: x02-01-DD-CC-BB-AA and x02-02-DD-CC-BB-AA

Zero Adjustment at target offset is triggered (see: status or response for more information)

**Example:** Performing a Zero Adjust with Target Offset a 0.00289999996311963 mbar = 0x3B 3E 0D ED -> The Command is written as 0x02-02-ED-0D-3E-3B

| Zero Adjust Command Pirani | |
|---|---|
| Byte 0 | 0: Zero adjust with no offset<br>2: Zero adjust with target offset |
| Byte 1 | Index of the Sub Sensor Instance ==> here Pirani<br>For a PSC the Pirani is active instance 1 for a PCG active instance Pirani is 2, that's why both values are accepted. |
| Byte 2-5 | In case of “Zero adjust with target offset”:<br>Offset value (Data format: REAL)<br>Else:<br>0 |

### 4.3.3 Capacitance Diaphragm (CDG)

**Only PCG or PCG with ATM contain a capacitance diaphragm sensor.**

The capacitance diaphragm sensor is abbreviated as CDG.

At low pressures (below 1 mbar) only the signal of the Pirani sensor is used for pressure measurement; at high pressures (above 10 mbar) only the signal of the diaphragm capacitive sensor (CDG). To determine the output signal in the cross over area (1 … 10 mbar), both signals are used proportionally to the pressure.

Sensor Value CDG only shows the current sensor value within its measurement range (1 … 1500 mbar).

#### 4.3.3.1 Parameters

| Index | Slot | Subslot | DataType | NV | Access | Name | |
|---|---|---|---|---|---|---|---|
| 0x0100 | 1 | 1 | Float32 | - | RO | Sensor Value CDG | The corrected, converted, calibrated final analog input value of the sensor. |
| 0x0101 | 1 | 1 | Unsigned8 | - | RO | Reading Valid CDG | Indicates whether the Value parameter contains a valid value within the specified accuracy or not<br>0 = Invalid<br>1 = Valid |
| 0x0102 | 1 | 1 | Unsigned8 | - | RO | Overrange Exceeded CDG | Indicates whether the Value parameter contains a value in overrange.<br>0 = No overrange exceeded<br>1 = Overrange exceeded |
| 0x0103 | 1 | 1 | Unsigned8 | - | RO | Underrange Exceeded CDG | Indicates whether the Value parameter contains a value in underrange.<br>0 = No underrange exceeded<br>1 = Underrange exceeded |

#### 4.3.3.2 Error and Warnings

| Index | Slot | Subslot | DataType | NV | Access | Name | Description |
|---|---|---|---|---|---|---|---|
| 0x0140 | 1 | 1 | Unsigned16 | | RO | Sensor Warning CDG | Bit 1: Electronics Warning<br>0 = No Electronics Warning<br>1 = Electronics Warning |
| 0x0141 | 1 | 1 | Unsigned16 | | RO | Sensor Error CDG | Bit 0: Diaphragm Failure<br>0 = No Diaphragm Failure<br>1 = Diaphragm Failure ("Troubleshooting" → 🕮 [1]) |

### 4.3.4 Piezo

**Only PCG with ATM contain a piezo sensor.**

The common atmospheric sensor is abbreviated as Piezo.

The piezo sensor measures the ambient, atmospheric pressure and not the pressure within the vacuum chamber.

#### 4.3.4.1 Parameters

| Index | Slot | Subslot | DataType | NV | Access | Name | Description |
|---|---|---|---|---|---|---|---|
| 0x0200 | 1 | 1 | Float32 | - | RO | Sensor Value Piezo | The corrected, converted, calibrated final analog input value of the sensor. |
| 0x0201 | 1 | 1 | Unsigned8 | - | RO | Reading Valid Piezo | Indicates whether the Value parameter contains a valid value within the specified accuracy or not<br>0 = Invalid<br>1 = Valid |
| 0x0202 | 1 | 1 | Unsigned8 | - | RO | Overrange Exceeded Piezo | Indicates whether the Value parameter contains a value in overrange.<br>0 = No overrange exceeded<br>1 = Overrange exceeded |
| 0x0203 | 1 | 1 | Unsigned8 | - | RO | Underrange Exceeded Piezo | Indicates whether the Value parameter contains a value in underrange.<br>0 = No underrange exceeded<br>1 = Underrange exceeded |

#### 4.3.4.2 Error and Warnings

| Index | Slot | Subslot | DataType | NV | Access | Name | Description |
|---|---|---|---|---|---|---|---|
| 0x0240 | 1 | 1 | Unsigned16 | - | RO | Sensor Warning Piezo | Bit 1: Electronics Warning<br>0 = No Electronics Warning<br>1 = Electronics Warning |
| 0x0241 | 1 | 1 | Unsigned16 | - | RO | Sensor Error Piezo | Bit 0: Diaphragm Failure<br>0 = No Diaphragm Failure<br>1 = Diaphragm Failure ("Troubleshooting" → 🕮 [1])<br><br>Bit 1: Electronics Failure<br>0 = No Electronics Failure<br>1 = Electronics Failure ("Troubleshooting" → 🕮 [1]) |

#### 4.3.4.3 Adjusting the Piezo sensor

The gauge is factory calibrated. Due to long time operation or contamination, a zero drift could occur. Periodically check the zero and adjust it if necessary. For adjusting the zero, operate the gauge under the same constant ambient conditions and in the same mounting orientation as normally.

Procedure

❶ If you are using a seal with centering ring and filter, check that they are clean or replace them if necessary ("Deinstallation"→ 🕮 [1]).

❷ Put the gauge into operation and operate it at atmospheric pressure for at least 10 minutes.

❸ Perform an ATM adjustment of the piezo described below “Full Scale Adjust Piezo”.

❹ Full Scale Adjust Status Piezo and Full Scale Adjust Response Piezo provide you with the information on the successful execution of the ATM adjustment.

| Index | Slot | Subslot | DataType | NV | Access | Name | Description |
|---|---|---|---|---|---|---|---|
| 0x0274 | 0 | 10 | OctetString[6] | - | RW | Full Scale Adjust Command Piezo | Parameter to trigger a Full Scale adjustment of the piezo sensor (see further information below). |
| 0x0275 | 0 | 10 | OctetString[1] | - | RO | Full Scale Adjust Status Piezo | 1 = Last command completed, no errors, reply available<br>3 = Last command completed, errors present, reply available<br>255 = Command is executing |
| 0x0276 | 0 | 10 | OctetString[3] | - | RO | Full Scale Adjust Response Piezo | Byte 0: Same as Full Scale Adjust Status Piezo<br>Byte 2:<br>0: Full Scale Adjust successful<br>1: Full Scale Adjust failed: out-of-range<br>254: No previous Zero Adjust command issued |

Full Scale Adjust Command Piezo

**READ**

Shows the last command that has been written to this parameter.

**WRITE**

If you are using a seal with centering ring and filter, check that they are clean or replace them if necessary. Put the gauge into operation and operate it at atmospheric pressure for at least 10 minutes. Run the «Full Scale Adjust Command Piezo» with the correct bit stream. The atmospheric sensor is adjusted to 1000 mbar by default.

Write 0x00-03-00-00-00-00 to this parameter to start a full scale adjustment.

| Zero Adjust Command Piezo | |
|---|---|
| Byte 0 | 0: Full Scale Adjust |
| Byte 1 | Index of the Sub Sensor Instance => here Piezo = 3. |
| Byte 2-5 | Always 0 |

### 4.3.5 Trip Points / Set Points

The status of the set points / trip points determines if the gauge pressure is below or above a certain value. The status of the low trip point is on, if the pressure falls below a certain threshold value. Hence, the status of the high trip point is on, if the pressure surpasses a certain threshold value. To prevent a toggling behavior of the status at pressure close to the threshold value, a hysteresis is added to the threshold value. The threshold value can be set directly or indirectly (for PCG with ATM), which is called Standard mode or ATM mode. In Standard mode the set point value is defined by the parameter High Trip Point Limit/ Low Trip Point Limit. In ATM mode the set point results from the multiplication of the parameter "Percentage Trip Source" with the current value of the parameter "Sensor Value Piezo". The active mode is shown in parameter Source Index.

This calculation of the set points for the two modes is described below:

**Standard Mode:**

Low Set Point = Low Trip Point Limit

High Set Point = High Trip Point Limit

**ATM Mode:**

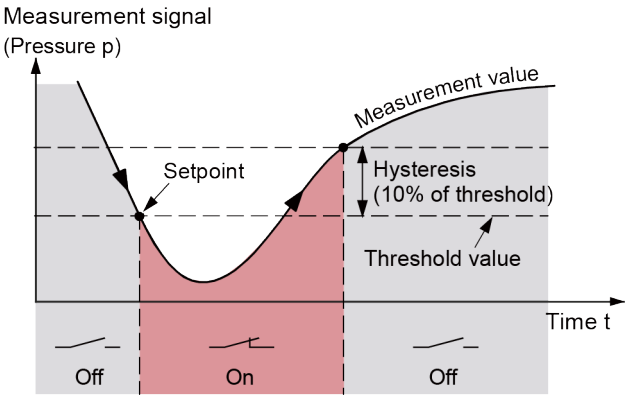
Low Set Point = Percentage Low Trip Source * Sensor Value Piezo

High Set Point = Percentage High Trip Source * Sensor Value Piezo

The functionality of the two set points and the set point mode is described below.

Low Trip Point (default)

If the pressure in the vacuum system is lower than the set point, the corresponding LED (<SP1> or <SP2>) 1 is lit solid and Status Low Trip Point 1/ 2 is set to 1. The corresponding relay is closed.




The set points SP1 and SP2 are factory set to the lower measurement range limit and therefore do not switch.

**Procedure to set a low trip at 0.05 mbar for the set point 1:**

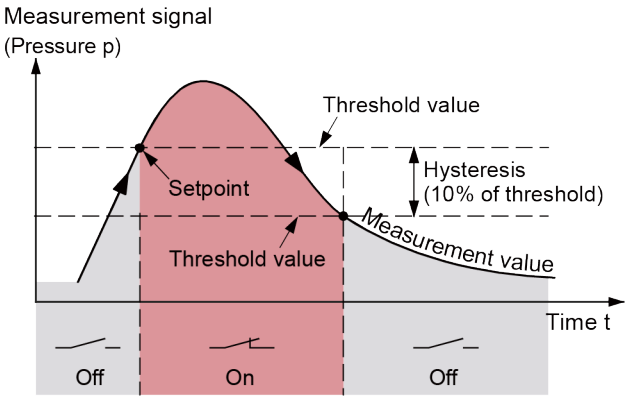
1. Make sure that parameter Low Trip Source Index 1 is set to 0x0829.
2. Write 0.05 to the parameter Low Trip Point Limit 1.
3. Enable the set point by writing 1 to parameter Low Trip Enable 1.

**Procedure to set a low trip at 0.3 of the ATM value for the set point 1:**

1. Make sure that parameter Low Trip Source Index 1 is set to 0x0200.
2. Write 0.3 to the parameter Percentage Low Trip Point 1.
3. Enable the set point by writing 1 to parameter Low Trip Enable 1.

## High Trip Point

If the pressure in the vacuum system is higher than the set point, the corresponding LED (<SP1> or <SP2>) is lit solid and Status High Trip Point 1 / 2 is set to 1. The corresponding relay is closed.




**Procedure to set at high trip at 5 [current pressure unit (e.g. Pa)] for the set point 2:**

1. Make sure that parameter High Trip Source Index 2 is set to 0x0926.
2. Write 5 to the parameter High Trip Point Limit 2.

❸ Enable the set point by writing 1 to parameter High Trip Enable 2.

**Procedure to set a high trip at 0.98 of the ATM value for the set point 2:**

❶ Make sure that parameter High Trip Source Index 2 is set to 0x0200.

❷ Write 0.98 to the parameter Percentage High Trip Point 2.

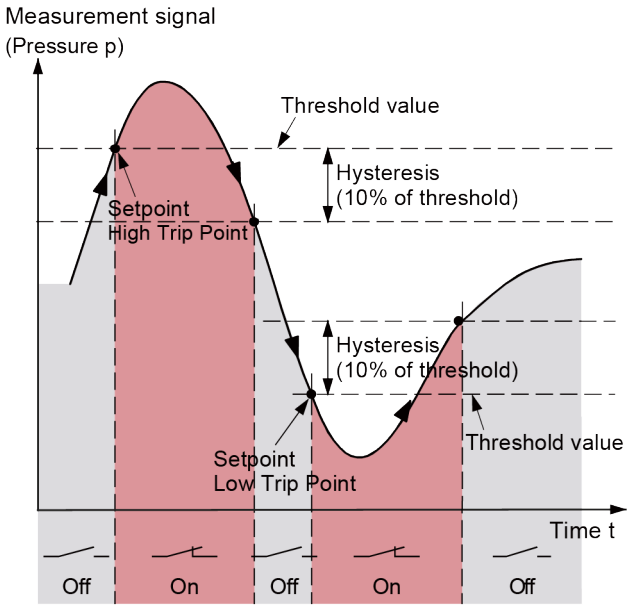
❸ Enable the set point by writing 1 to parameter High Trip Enable 2.
The current trip point value can be read at prameter High Trip Point Limit 2.

## High & Low Trip Point

Both a High Trip Point and a Low Trip Point are assigned to each set point.

If the pressure in the vacuum system is higher than the defined High Trip Point threshold, the corresponding LED (<SP1> or <SP2>) is lit and Status High Trip Point 1/ 2 is set to 1. The corresponding relay is closed.

If the pressure in the vacuum system is lower than the defined Low Trip Point threshold, the corresponding LED (<SP1> or <SP2>) is lit and Status Low Trip Point 1/ 2 is set to 1. The corresponding relay is closed.



### 4.3.5.1 Trip Point 1

| Index | Slot | Subslot | DataType | NV | Access | Name | Description |
|---|---|---|---|---|---|---|---|
| 0x0006 | 1 | 1 | Unsigned32 | - | RO | Trip Point Output All Instance | Bit 0: Status High Trip (0x0800)<br>Bit 1: Status Low Trip (0x0801)<br>Bit 2: Status High Trip (0x0900)<br>Bit 3: Status Low Trip (0x0901) |
| 0x0800 | 1 | 1 | Unsigned8 | x | RO | Status High Trip 1 | Bit 0<br>1 = High Trip Point 1 is asserted<br>0 = High Trip Point 1 is not asserted |
| 0x0801 | 1 | 1 | Unsigned8 | x | RO | Status Low Trip 1 | Bit 0<br>1 = Low Trip Point 1 is asserted<br>0 = Low Trip Point 1 is not asserted |
| 0x0820 | 1 | 1 | Unsigned8 | x | RW | High Trip Enable 1 | Bit 0:<br>0 = disable, High Trip Point is not active<br>1 = enable, High Trip Point is active |
| 0x0821 | 1 | 1 | Unsigned8 | x | RW | Low Trip Enable 1 | Bit 0:<br>0 = disable, Low Trip Point is not active<br>1 = enable, Low Trip Point is active |
| 0x0826 | 1 | 1 | Float32 | x | RW | High Trip Point Limit 1 | In Standard Mode (check: HighTripSourceIndex1) the set point is set by this parameter. Internally, the gauge works with mbar, but you can set the parameter in your current data unit. |
| 0x0829 | 1 | 1 | Float32 | x | RW | Low Trip Point Limit 1 | In ATM Mode (check: LowTripSourceIndex1) the set point is set by this parameter. Internally, the gauge works with mbar, but you can set the parameter in your current data unit. |
| 0x0812 | 1 | 1 | Unsigned16 | x | RW | High Trip Source Index 1 | This parameter shows if the set point limit is defined by the Standard Mode or the ATM Mode. In Standard Mode the set point equals the Trip Point Limit. In ATM Mode the set point equals the multiplication of Percentage Trip Source and the current Sensor Value Piezo.<br>0x0826 : Standard Mode is active → Set Point = High Trip Point Limit 1<br>0x0200 : ATM Mode is active → Set Point = PercentageHighTripPointSource1 * Sensor Value Piezo |
| 0x0815 | 1 | 1 | Unsigned16 | x | RW | Low Trip Source Index 1 | This parameter shows if the set point limit is defined by the Standard Mode or the ATM Mode.<br>In Standard Mode the set point equals the Trip Point Limit.<br>In ATM Mode the set point equals the multiplication of Percentage Trip Source and the current Sensor Value Piezo.<br>0x0829 : Standard Mode is active → Set Point = Low Trip Point Limit 1<br>0x0200 : ATM Mode is active → Set Point = PercentageLowTripPointSource1 * Sensor Value Piezo |
| 0x0813 | 1 | 1 | Float32 | x | RW | Percentage High Trip Source 1 | In ATM Mode (check: HighTripSourceIndex1) the set point is defined by Percentage High Trip Source 1 * Sensor Value Piezo.<br>This defines how the set point is related to the Sensor Value Piezo. |
| 0x0816 | 1 | 1 | Float32 | x | RW | Percentage Low Trip Source 1 | In ATM Mode (check: LowTripSourceIndex1) the set point is defined by PercentageLowTripSource1 * Sensor Value Piezo.<br>This defines how the set point is related to the Sensor Value Piezo. |

(continued)

(Table "Trip Point 1" concluded)

| Index | Slot | Subslot | DataType | NV | Access | Name | Description |
|---|---|---|---|---|---|---|---|
| 0x082C | 1 | 1 | Float32 | x | RW | High Trip Hysteresis 1 | This parameter defines the hysteresis value for the High Trip Point. Internally, the gauge works with mbar, but you can set the parameter in your current data unit.<br>This value defines how much (unit based in your data unit, e.g. 0.02 mbar) the pressure can fall below the set point until the set point relay is switched off (see: Image High Trip Point).<br>The relay is switched on, when the pressure overpassed the set point and switched off when it falls below the point (set point - hysteresis). |
| 0x082D | 1 | 1 | Float32 | x | RW | Low Trip Hysteresis 1 | This parameter defines the hysteresis value for the Low Trip Point. Internally, the gauge works with mbar, but you can set the parameter in your current data unit.<br>This value defines how much (unit based in your data unit, e.g. 0.02 mbar) the pressure is allowed to exceed the set point until the set point relay is switched off (see: Image Low Trip Point).<br>The relay is switched on, when the pressure falls below the set point and switched off when it exceeds the point (set point + hysteresis). |

### 4.3.5.2 Trip Point 2

| Index | Slot | Subslot | DataType | NV | Access | Name | Description |
|---|---|---|---|---|---|---|---|
| 0x0006 | 1 | 1 | Unsigned32 | - | RO | Trip Point Output All Instance | Bit 0: Status High Trip (0x0800)<br>Bit 1: Status Low Trip (0x0801)<br>Bit 2: Status High Trip (0x0900)<br>Bit 3: Status Low Trip (0x0901) |
| 0x0900 | 1 | 1 | Unsigned8 | - | RO | Status High Trip 2 | Bit 0<br>1 = High Trip Point 1 is asserted<br>0 = High Trip Point 1 is not asserted |
| 0x0901 | 1 | 1 | Unsigned8 | - | RO | Status Low Trip 2 | Bit 0<br>1 = Low Trip Point 1 is asserted<br>0 = Low Trip Point 1 is not asserted |
| 0x0920 | 1 | 1 | Unsigned8 | x | RW | High Trip Enable 2 | Bit 0:<br>0 = disable, High Trip Point is not active<br>1 = enable, High Trip Point is active |
| 0x0921 | 1 | 1 | Unsigned8 | x | RW | Low Trip Enable 2 | Bit 0:<br>0 = disable, Low Trip Point is not active<br>1 = enable, Low Trip Point is active |
| 0x0926 | 1 | 1 | Float32 | x | RW | High Trip Point Limit 2 | In Standard Mode (check: HighTripSourceIndex2) the set point is set by this parameter. Internally, the gauge works with mbar, but you can set the parameter in your current data unit. |
| 0x0929 | 1 | 1 | Float32 | x | RW | Low Trip Point Limit 2 | In Standard Mode (check: LowTripSourceIndex2) the set point is set by this parameter. Internally, the gauge works with mbar, but you can set the parameter in your current data unit. |

(continued)

(Table "Trip Point 2" concluded)

| Index | Slot | Subslot | DataType | NV | Access | Name | Description |
|---|---|---|---|---|---|---|---|
| 0x0912 | 1 | 1 | Unsigned16 | x | RW | High Trip Source Index 2 | This parameter shows if the set point limit is defined by the Standard Mode or the ATM Mode.<br>In Standard Mode the set point equals the Trip Point Limit.<br>In ATM Mode the set point equals the multiplication of Percentage Trip Source and the current Sensor Value Piezo.<br>0x0926 : Standard Mode is active -> Set Point = High Trip Point Limit 2<br>0x0200 : ATM Mode is active -> Set Point = PercentageHighTripPointSource2 * Sensor Value Piezo |
| 0x0915 | 1 | 1 | Unsigned16 | x | RW | Low Trip Source Index 2 | This parameter shows if the set point limit is defined by the Standard Mode or the ATM Mode.<br>In Standard Mode the set point equals the Trip Point Limit. In ATM Mode the set point equals the multiplication of Percentage Trip Source and the current Sensor Value Piezo.<br>0x0929 : Standard Mode is active -> Set Point = Low Trip Point Limit 2<br>0x0200 : ATM Mode is active -> Set Point = PercentageLowTripPointSource2 * Sensor Value Piezo |
| 0x0913 | 1 | 1 | Float32 | x | RW | Percentage High Trip Source 2 | In ATM Mode (check: HighTripSourceIndex2) the set point is defined by<br>PercentageHighTripSource2 * Sensor Value Piezo.<br>This defines how the set point is related to the Sensor Value Piezo. |
| 0x0916 | 1 | 1 | Float32 | x | RW | Percentage Low Trip Source 2 | In ATM Mode (check: LowTripSourceIndex2) the set point is defined by<br>PercentageLowTripSource2 * Sensor Value Piezo.<br>This defines how the set point is related to the Sensor Value Piezo. |
| 0x092C | 1 | 1 | Float32 | x | RW | High Trip Hysteresis 2 | This parameter defines the hysteresis value for the High Trip Point. Internally, the gauge works with mbar, but you can set the parameter in your current data unit. This values defines how much (unit based in your data unit, e.g. 0.02 mbar) the pressure can fall below the set point until the set point relay is switched off (see: Image High Trip Point).<br>The relay is switched on, when the pressure overpassed the set point and switched off when it falls below the point (set point - hysteresis). |
| 0x092D | 1 | 1 | Float32 | x | RW | Low Trip Hysteresis 2 | This parameter defines the hysteresis value for the Low Trip Point. Internally, the gauge works with mbar, but you can set the parameter in your current data unit. This values defines how much (unit based in your data unit, e.g. 0.02 mbar) the pressure is allowed to exceed the set point until the set point relay is switched off (see: Image Low Trip Point).<br>The relay is switched on, when the pressure falls below the set point and switched off when it exceeds the point (set point + hysteresis). |

### 4.3.6 Errors and Warnings

The following chapter explains all acyclic request to gather error or warning information ("Troubleshooting" → 🕮 [1], [2]).

#### 4.3.6.1 Overview

| Index | Slot | Subslot | DataType | NV | Access | Name | Description |
|---|---|---|---|---|---|---|---|
| 0x040 | 0 | 10 | Unsigned8 | - | RO | Active Exception Status | Consolidated parameter to show all kinds of warnings and errors at once collected from the parameters below.<br>For all Bits apply:<br>0 = error or warning is not active<br>1 = error or warning is active<br>Bit 0: Active Global Device Warning Details<br>Bit 1: Active Manufacturer Warning Details and Active Global Manufacturer Warning Details<br>Bit 2: Active Global Device Error Details and<br>Bit 3: Active Manufacturer Error Details and Active Global Manufacturer Error Details |
| 0x0045 | 0 | 10 | Unsigned32 | - | RO | Active Global Device Warning Details | Bit 1: Internal communication is disturbed or electronics and sensor do not fit together<br>Bit 3: EEPROM exception |
| 0x0047 | 0 | 10 | Unsigned32 | - | RO | Active Global Device Error Details | Bit 1: Internal communication is disturbed or electronics and sensor do not fit together<br>Bit 3: EEPROM exception |
| 0x0048 | 0 | 10 | Unsigned32 | - | RO | Active Global Manufacturer Error Details | Bit 1 : Time out EEPROM access<br>Bit 2 : CRC error<br>Bit 3 : EEPROM record error<br>Bit 5 : Wrong filament material<br>Bit 9 : Wrong ATM Configuration<br>Bit 10 : Wrong Insulation Configuration<br>Bit 11 : Configuration of sensor is different to Configuration of basis board |
| 0x0042 | 0 | 10 | Unsigned32 | - | RO | Active Manufacturer Warning Details | Bit 8: ATM sensor out of pressure spectrum |
| 0x0044 | 0 | 10 | Unsigned32 | - | RO | Active Manufacturer Error Details | Bit 4 : Pirani Filament is broken<br>Bit 6 : Cdg Diaphragm is broken |
| 0x0046 | 0 | 10 | Unsigned32 | - | RO | Active Global Manufacturer Warning Details | 0, reserved for future use. |

#### 4.3.6.2 Further Description

Active Exception Status

| Active Exception Status | |
|---|---|
| Bit 0 | Device Warning |
| Bit 1 | Manufacturer Warning |
| Bit 2 | Device Error |
| Bit 3 | Manufacturer Error |
| Bit 4…7 | 0 |

Active Global Device Warning Details

| Active Global Device Warning Details | |
|---|---|
| Bit 0 | Communication between fieldbus and vacuum pressure gauge is interrupted<br>OR<br>Electronics and sensor do not fit together |
| Bit 1-2 | 0 |
| Bit 3 | EEPROM exception |
| Bit 4…31 | 0 |

Active Global Manufacturer Error Details

| Active Global Manufacturer Error Details | |
|---|---|
| Bit 1 | Time out EEPROM access |
| Bit 2 | CRC error |
| Bit 3 | EEPROM record error |
| Bit 5 | Wrong filament material |
| Bit 9 | Wrong ATM Configuration |
| Bit 10 | Wrong Insulation Configuration |
| Bit 11 | Configuration of sensor is different to Configuration of Basic board |

Active Global Device Error Details

| c | |
|---|---|
| Bit 0 | Communication between fieldbus and vacuum pressure gauge is interrupted<br>OR<br>Electronics and sensor do not fit together |
| Bit 1-2 | 0 |
| Bit 3 | EEPROM exception → Turn the gauge off and on again after 5s (reset) →→Replace the gauge |
| Bit 4…31 | 0 |

Active Manufacturer Warning Details

| Active Manufacturer Warning Details | |
|---|---|
| Bit 8 | ATM sensor out of pressure spectrum |

Active Manufacturer Error Details

| Active Manufacturer Error Details | |
|---|---|
| Bit 4 | Pirani Filament is broken → Replace with the sensor |
| Bit 6 | Cdg Diaphragm is broken → Replace with the sensor |

### 4.3.7 Device Reset

Execution of this command causes the device to emulate a complete power cycle.

As consequence of a 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).

| Index | Slot | Subslot | DataType | NV | Access | Name | Description |
|---|---|---|---|---|---|---|---|
| 0x0082 | 0 | 10 | OctetString [6] | | RW | Device Reset Command | READ<br>Shows the last command that has been written to this parameter.<br><br>WRITE<br>1) Standard (Device) Reset<br>Write 0x74-65-73-65-72-00<br><br>2) Factory Reset<br>Write 0x74 65 73 65 72 66 |
| 0x0083 | 0 | 10 | OctetString [1] | | RO | Device Reset Status | 0 = Default value, if the command has not been initiated. Not a supported value otherwise.<br>2 = Last command completed, error, no response |
| 0x0084 | 0 | 10 | OctetString [3] | | RO | Device Reset Response | Byte 0:<br>same as in Device Reset Status<br>Byte 1<br>:-> Always 0 |

# Appendix

## A: Literature


[1] Operating Manual
PCG550, PCG552, PCG554
tina56d1 (German)
tina56e1 (English)
INFICON AG, LI–9496 Balzers, Liechtenstein

[2] Operating Manual
PSG550, PSG552, PSG554
tina60d1 (German)
tina60e1 (English)
INFICON AG, LI–9496 Balzers, Liechtenstein

[3] www.profibus.com
Profibus user organization

Notes

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