



PGC202 PASSIVE GAUGE CONTROLLER INSTRUCTION MANUAL

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Issue: A

Original Instructions



Declaration of Conformity

We, Edwards,
Innovation Drive,
Burgess Hill,
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RH15 9TW, UK

declare under our sole responsibility, as manufacturer and person within the EU authorised to assemble the technical file, that the product(s)

- Pirani (PRG) and Ion (IG 40) gauges connected to controllers (PGC).

D03000200	PRG20K - NW16 AI	D03000300	IG40 BA DN40CF +
D03000210	PRG20K - DN16CF SS	D03000310	IG40 EX DN40CF +
D03000220	PRG20KCR - NW16 SS	D03000410	PGC202 Pirani/Ion Contr +*
D03000201	PRG cable 5 m	D03000301	IG40 BA/EX cable 5 m bakeable +
D03000202	PRG cable 10 m	D03000302	IG40 BA/EX cable 10 m bakeable +
D03000203	PRG cable 20 m	D03000305	IG40 BA/EX cable 50 m bakeable +
D03000204	PRG cable 30 m		
D03000205	PRG cable 50 m		

to which this declaration relates is in conformity with the following standard(s) or other normative document(s)

EN61010-1:2010	Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use. General Requirements
EN61326-1:2013 Class B, Industrial	Electrical equipment for measurement, control and laboratory Use. EMC requirements. General requirements

and fulfils all the relevant provisions of

(+) 2014/35/EU	Low Voltage Directive
(*) 2014/30/EU	Electromagnetic Compatibility (EMC) Directive
2011/65/EU	Restriction of Certain Hazardous Substances (RoHS) Directive
2012/19/EU	Waste from Electrical and Electronic Equipment (WEEE) Directive

Note: This declaration covers all product serial numbers from the date this Declaration was signed onwards.

Larry Marini, Senior Technical


07.06.2017, Eastbourne

Date and Place

This product has been manufactured under a quality management system certified to ISO 9001:2008

Material Declaration

In accordance with the requirements of the Chinese regulatory requirement on the Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products Order No. 32 (also known as 'China RoHS2') and SJ/T 11364 Marking for the Restricted Use of Hazardous Substances in Electronic and Electrical Products:

Product	Product Label	Meaning
PGC202 vacuum gauge controller		This product contains hazardous substances in at least one of the homogeneous materials used which are above the limit requirement in GB/T 26572 as detailed in the declaration table below. These parts can safely be used for the environmental protection use period as indicated.

材料成分声明 Materials Content Declaration

部件名称 Part name	有害物质 Hazardous Substances					
	铅 Lead (Pb)	汞 Mercury (Hg)	镉 Cadmium (Cd)	六价铬 Hexavalent Chromium (Cr VI)	多溴联苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
印刷电路组件 (PCA) Printed Circuit Assembly (PCA)	X	O	X	O	O	O
电缆/电线/连接器 Cable/Wire/Connector	X	O	O	O	O	O
机械部件 Mechanical Components	X	O	O	O	O	O

O: 表示该有害物质在该部件的所有均质材料中的含量低于 GB/T 26572 标准规定的限量要求
O: Indicates that the hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in GB/T 26572.
X: 表示该有害物质在该部件的至少一种均质材料中的含量超出 GB/T26572 标准规定的限量要求
X: Indicates that the hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement of GB/T26572.

These products are EU RoHS complaint, the following Exemptions apply:

6(b) Lead as an alloying element in aluminium containing up to 0.4% by weight

6(c) Copper alloy containing up to 4% lead by weight

7(a) Lead in in high melting temperature type solder (i.e lead based alloys containing 85% by weight or more lead)

(c) I Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectronic devices, or in a glass or ceramic matrix compound

7(c) II Lead in dielectric ceramic in capacitors for a rated voltage of 125 V AC or 250 V DC or higher

8(b) Cadmium and its compounds in electrical contacts

15 Lead in solders to complete a viable electrical connection between semiconductor die and carrier within integrated circuit flip chip packages

34 Lead in cermet-based trimmer potentiometer elements

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Contents

Description	1
Validity	1
Part number	1
Nameplate	1
Intended use	1
Responsibility and warranty	1
Shipping damage	2
Safety	3
General information	3
Key to the symbols	3
Basic safety information	3
General equipment description	5
PGC202	5
PRG (Pirani) method of measurement	5
Principle of measurement for IG (Extractor or Bayard-Alpert)	5
Connectable gauge heads	5
Gauge head cables	6
Accessories	6
Technical data	7
General data	7
Mechanical data	7
Standard parameters (factory defaults)	8
Sensor dependent parameters	8
General parameters	8
Environment	8
Standards	9
Mains connection	9
Measurement channels	9
PRG measurement channels	9
IG measurement channel	10
Measurement	10
Switching functions / relay outputs	11
Switching function relay	11
Ready signal relay	11
Outputs and inputs	11
Analog output	11
External control	12
Serial interfaces	12
RS232	12
RS485	12
Installation	13
Supplied equipment	13

Mechanical installation	13
Rack installation	13
Front panel installation	14
Benchtop instrument	15
Connections	15
Rear side of the instrument	15
Mains connection	16
Earthing	17
PRG measurement channels (PRG 1 and PRG 2)	17
IG measurement channel (IG)	17
Control signals	18
Measurement signal	18
Connecting:	18
Analog output and external control (analog output / extern control)	18
Connecting:	19
RS232 / RS485 Interface (Interface RS232 / RS485)	19
Relay output	20
Operation	21
Front panel	21
Display	21
Control pushbuttons	22
(CH)	22
(PARA)	22
Arrow pushbuttons (◀ 'DOWN' / ▶ 'UP')	22
Switching on and off	22
Switching on	22
Switching off	22
Operating modes	23
Measurement mode	23
Parameter mode	23
Measurement mode	23
Selection	23
Description	23
Pushbutton functions	23
Measurement channel selection	24
Parameter mode selection	24
Switching the IG on	24
Function Degas	24
Switching the IG off	24
PRG adjustment	25
Parameter mode	26
Selection	26
Parameter groups	26
Switching function parameters (PArA SP)	26
Sensor parameters (PArA SEn)	27
General parameters (PArA GEn)	27
Operating concept	27

Parameters	29
Switching function parameters (PArA SP)	29
Basic terms	29
Switching functions	29
Threshold values	29
Lower threshold value (SP1 Lo, SP2 Lo)	29
Upper threshold value (SP1 Hi, SP2 Hi)	29
Hysteresis	29
Configuring the switching functions	30
Adjustment range	30
Sensor parameters (PArA SEn)	31
Filament material PRG (FIL)	31
Measured Value Filter (FiLt)	31
Type of gas correction PRG (GASTM)	31
Type of gas correction IG (GASiE)	32
Sensor switch-on type (S-on)	32
Sensor switch-on value (t-on)	33
Switch-on Delay for Extractor Gauge Head (dELAy)	33
Sensor switch-off type (S-off)	33
Sensor switch-off value (t-off)	33
Sensitivity Setting for IG Gauge Head (SEnS)	34
General parameters (PArA GEn)	34
Unit of measurement (unit)	34
Analog output (AnALoG)	34
Display format (diGit)	35
Display brightness (bri)	35
Baud rate (bAud)	35
Interface (rS)	35
Computer interface	37
Basics	37
Connection	37
Nomenclature	37
Communication	38
Protocol	38
General string structure	38
Command set (mnemonics)	39
Command overview	39
RPV (Read Pressure Value)	40
RVN (Read Version Number)	41
RSS (Read Setpoint Status)	41
SHV (Set HV on/off)	41
SDG (Set Degas on/off)	42
SKL (Set Key Lock on/off)	42
SAC (Save Actual Configuration)	42
RSA (Read Serial Address)	42
SSA (Set Serial Address)	43
RGP (Read General Parameter)	43
SGP (Set General Parameter)	44
RGC (Read Gas Correction)	45

SGC (Set Gas Correction)	45
RSC (Read Sensor Control)	45
SSC (Set Sensor Control)	46
RSP (Read Set Point)	47
SSP (Set Set Point)	47
Maintenance and service	49
Maintenance	49
General maintenance information	49
Troubleshooting	49
Fault finding	49
Error messages	49
Help the case of faults	50
Fuse replacement	50
Repair	50
Storing and waste disposal	51
Storing	51
Disposal	51

List of Figures

Dimensions (mm)	7
Rack installation	14
Front panel cut-out dimensions (mm)	14
Preparing the instrument for utilisation as a benchtop unit	15
Rear panel of the instrument	16
Connection for the IG gauge head (Metalock Bantam UTG0187SVDEU)	18
Connection plug for analog output and external control (SUB-D, 15-way)	19
Interface connection socket (SUB-D, 9-way)	19
Connection plug for relay output (SUB-D, 25-way)	20
Front panel	21
Operating the pushbuttons	23
Full-scale adjustment for the PRG gauge head	25
Zero adjustment for the PRG gauge head	25
Behaviour of a switching function in response to pressure changes	30

List of Tables

Part numbers	1
Connectable gauge heads	5
Gauge head cables	6
Accessories	6
Switching parameters, factory defaults	8
Sensor parameters, factory defaults	8
General parameters, factory defaults	8

Supplied equipment	13
Display components	21
Display in the measurement mode	23
Parameter groups and corresponding parameters	26
Available sensor parameters	31
Values for the parameter FIL	31
Values for the parameter unit	34
Values for the parameter AnALoG	34
Values for the parameter diGit	35
Values for the parameter bri	35
Values for the parameter bAud	35
Values for the parameter rS	35
Terms computer interface	37
Control characters computer interface	37
Mnemonics for read commands	39
Mnemonics for write commands	39
Mnemonics for read and write commands	39
Error messages	49

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Description

Validity

Part number

This document applies to the following products:

Table 1 Part numbers

Item number	Product description
D03000410	PGC202 Three-channel measuring instrument for passive vacuum sensors

Nameplate

A nameplate is located on the side of the instrument. When communicating with Edwards, stating the information on the nameplate is necessary.

Intended use

The PGC202 is a universal vacuum gauge controller instrument which, by combining two principles of measurement, Pirani (PRG) and ionisation gauge (IG), provides full coverage and control over vacuum pressures ranging between 1×10^{-12} mbar and atmospheric pressure. One IG sensor (Extractor or Bayard-Alpert) and a maximum of 2 PRG sensors can be connected.

The built-in RS232/RS485 interface permits computer controlled operation as well as the exchange of the measurement data between the PGC202 and a computer.

Operate all connected sensors in agreement with the information given in the corresponding Operating Instructions.



Note:

Based on the technical data please ensure the measuring instrument is suited for the application.

Responsibility and warranty

Edwards will not assume any responsibility or warranty in cases where the operator or third persons:

- Do not observe the information given in this document.
- Do not use the product as intended.
- Modify the product in any way (conversions, repair work etc).
- Operate the product with accessories not listed in the corresponding product documentation.

Subject to technical alterations without prior notice. The figures are not binding.

Shipping damage

- Examine the shipping package for any external damage.
- Remove all of the packaging material and check the instrument. If the instrument is damaged, follow the Edwards return of equipment procedures that are laid out in the back of this manual. Do not use the instrument if it is damaged.

Safety

General information

The Edwards PGC202 controller is delivered ready for operation. This manual provides installation, operation and maintenance instructions for the PGC202. The instrument must be used as specified in this manual.

Key to the symbols

Important instructions relating to technical safety and safe operation are emphasised by symbols.



WARNING:

Warnings are given where failure to observe the instruction could result in injury or death to people.



CAUTION:

Cautions are given where failure to observe the instruction could result in damage to the equipment, associated equipment and process.



WARNING:

Risk of electric shock.



Note:

General information pointing to further information, respectively reference sections.

Basic safety information

During all installation, maintenance and repair activities, comply with the pertinent safety regulations.



WARNING:

Do not allow objects or liquids to enter the instrument. Coming into contact with components at mains voltage level can be dangerous to life.



CAUTION:

Improper usage can damage the instrument. Use the instrument only in agreement with the specifications issued by the manufacturer.



CAUTION:

Wrong connection and operating data can damage the instrument. Comply with all specified connection and operating data.

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General equipment description

PGC202

This combination instrument offers three measurement channels, two PRG and one IG. Thus measurement of vacuum pressures over 15 full decades from 1×10^{-12} mbar to atmospheric pressure is possible. Six switching thresholds permit the integration of the PGC202 within complex vacuum control facilities. The two PRG channels are immediately active upon powering up. The IG channel may be switched on and off by one of the two PRG channels or externally or manually. The operating status of the switching thresholds and the measurement systems is displayed and signalled correspondingly through the outputs.

PRG (Pirani) method of measurement

This method of measurement covering the range of 5×10^{-4} to 1×10^3 mbar utilises the heat conductance of the gas for the purpose of measuring pressure. In order to attain a response time which is as short as possible, all PRG instruments rely exclusively on the principle of the controlled Pirani where the measurement filament is part of a Wheatstone Bridge. When the temperature of the filament changes due to pressure changes, the bridge becomes unbalanced. The quickly responding control circuitry adapts the heating power for the filament so that the filament temperature reaches its nominal level thereby balancing the measurement bridge again. The displayed pressure is dependent on the type of gas. By default the display of the instrument has been calibrated for nitrogen or dry air.

Principle of measurement for IG (Extractor or Bayard-Alpert)

This principle of measurement relies on the ionisation of gases which is used for measuring pressures. The ion current produced during ionisation is proportional to the pressure. The Bayard-Alpert gauge head (IG40 BA) is suited for pressure measurements in the high vacuum and ultra high vacuum ranges. The Extractor gauge head (IG40 EX) has been specially designed for measurements in the UHV and XHV ranges.

Connectable gauge heads

The following gauge heads can be operated by the PGC202:

Table 2 Connectable gauge heads

Gauge heads	Product description	Item number
PRG	PRG20K - NW16 Al	D03000200
	PRG20K - DN16CF SS	D03000210
	PRG20KCR - NW16 SS	D03000220
IG	IG40 BA DN40CF	D03000300
	IG40 EX DN40CF	D03000310

Gauge head cables

Table 3 Gauge head cables

Gauge head type	Product description	Item number
Gauge head cables PRG	5 m	D03000201
	10 m	D03000202
	20 m	D03000203
	30 m	D03000204
	50 m	D03000205
Bakeable (up to 200 °C) gauge head cables to IG	5 m	D03000301
	10 m	D03000302
	50 m	D03000305

Accessories

Table 4 Accessories

Gauge head type	Product description	Item number
Pirani (PRG) spares	Replacement sensing cell K	D03000209
	Replacement sensing cell KCR	D03000229
Ion (IG) spares	Spare Cathode IG40 BA	D03000309
	Spare Cathode IG40 EX	D03000319

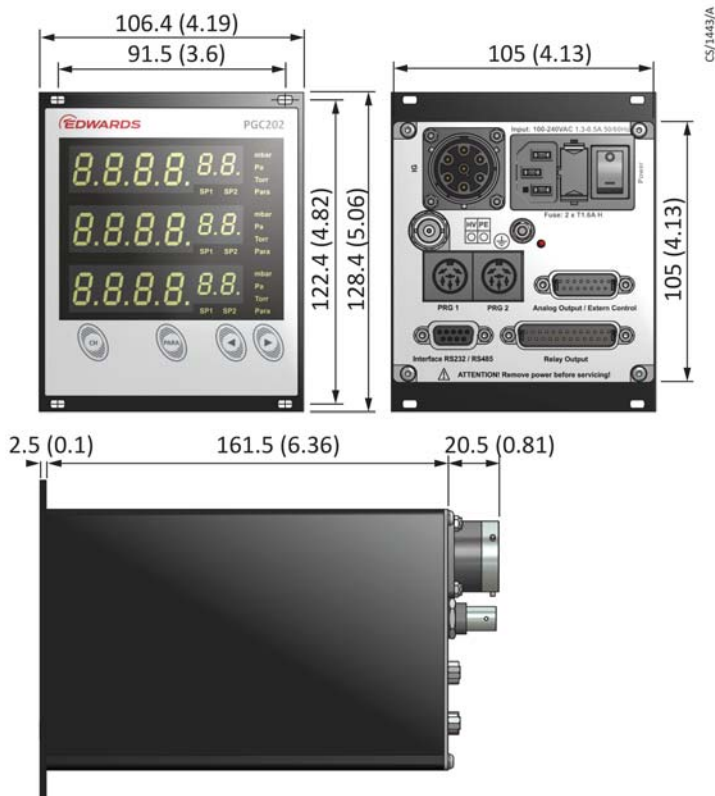
Technical data

General data

Mechanical data

Dimensions:	Width: 106.4 mm Height: 128.4 mm Depth: 185.0 mm
Weight:	≤ 1.4 kg
Installation depth:	≤ 280 mm approximately (including connected plugs)
Usage:	Rack installation Front panel installation Benchtop instrument

Figure 1 Dimensions (mm)



Standard parameters (factory defaults)

Sensor dependent parameters

Table 5 Switching parameters, factory defaults

Parameter	Parameter description	PRG setting (mbar)	IG setting (mbar)
SP1Lo	Switching threshold 1 - lower threshold	5.0 ⁻³	1.0 ⁻⁸
SP1Hi	Switching threshold 1 - upper threshold	5.5 ⁻³	1.1 ⁻⁸
SP2Lo	Switching threshold 2 - lower threshold	5.0 ⁻³	1.0 ⁻⁸
SP2Hi	Switching threshold 2 - upper threshold	5.5 ⁻³	1.1 ⁻⁸

Table 6 Sensor parameters, factory defaults

Parameter	Parameter description	PRG setting	IG setting
FIL	PRG filament material	tungsten	-
FILT	Filter factor	-	15
PRG	PRG gas type correction characteristic	N ₂ (nitrogen)	-
IG	IG gas type correction factor	-	1.00
SON	Switch-on type for sensor	-	CH ₂
SOFF	Switch-off type for sensor	-	HRnd (IG40 EX) CH ₂ (IG40 BA)
SENS	Sensitivity for IG gauge head	-	6.25 (IG40 EX) 1.7 (IG40 BA)

General parameters

Table 7 General parameters, factory defaults

Parameter	Parameter description	Setting
UNIT	Displayed unit of measurement	mbar
ANALOG	Analog output	2
DIGIT	Number of displayed digits	3
BRI	Display brightness	Hi
BAUD	Baud rate	19.2
RS	Serial interface	232

Environment

Temperature:	Storage: -20 to +60 °C Operating: +5 to +50 °C (sea level) +5 to +30 °C (2000 metres above sea level)
Relative atmospheric humidity:	80% maximum (up to 30 °C) decreasing to 50% maximum (from 40 °C)
Use:	Indoors (altitude 2000 m maximum above sea level)
Ingress protection type:	IP40

Standards

- Conformity with respect to Low Voltage Directive 2014/35/EU
- Conformity with respect to EMC Directive 2014/30/EU
- Conformity with respect to RoHS Directive 2011/65/EU
- Conformity with respect to WEEE Directive 2012/19/EU

International/national standards as well as specifications:

- DIN EN 61010-1 (2011) (Safety requirements for electrical equipment for measurement, control and laboratory use).
- DIN EN 61326-1 (2013) (Electrical equipment for measurement, control and laboratory use - EMC requirements. Industrial immunity; domestic emissions, Class B).

Mains connection

Voltage:	100 to 240 V a.c.
Frequency:	50/60 Hz
Fuses:	2 x T1.6 A H
Power consumption:	< 60 W
Current consumption:	1.3 to 0.5 Amp approximately
Oversvoltage category:	II
Protection category:	1
Connection:	Cold device plug IEC 60320 C14

Measurement channels

Number:	2 PRG measurement channels 1 IG measurement channel
Connection:	6-way DIN socket for PRG Metalock Bantam UTG0187SVDEU, BNC for IG

PRG measurement channels

Measurement range:	5×10^{-4} to 1000 mbar
Measurement accuracy:	$\pm 20\%$ of measured value (10^{-3} to 10^{-2} mbar) $\pm 15\%$ of measured value (10^{-2} to 10^2 mbar)
Cable length:	Up to 50 m
Cable length compensation:	Automatic

IG measurement channel

		Extractor (IG40 EX)	Bayard-Alpert (IG40 BA)
Measurement range:		2×10^{-12} to 1×10^{-4} mbar	2×10^{-11} to 1×10^{-2} mbar
Measurement accuracy:		$\pm 2\%$ of measured value, $\pm 5 \times 10^{-13}$ mbar	$\pm 2\%$ of measured value, $\pm 3 \times 10^{-13}$ mbar
Filter time constant:		15 ... 7 ... 3 ... 1 (slow ... fast)	
Anode voltage:	Operation:	220 V	220 V
	Degassing:	480 V	480 V
Reflector voltage:	Operation:	205 V	
Cathode voltage:	Operation:	100 V	80 V
	Degassing:	10 V	20 V
Emission current:	Operation:	1.6 mA	100 μ A / 10 mA
	Degassing:	45 mA	90 mA
Switching point of emission current:			100 μ A \rightarrow 10 mA: 1×10^{-6} mbar 10 mA \rightarrow 100 μ A: 1×10^{-5} mbar
Cable length:	up to 50 meters		

Measurement

Display rate:	4 s^{-1}
Unit of measurement:	mbar, Pa, Torr

Switching functions / relay outputs

Switching function relay

Number:	6
Assignment:	2 per channel
Response time:	< 50 ms
Adjustment range:	IG40 EX 1×10^{-11} to 1×10^{-4} mbar IG40 BA 1×10^{-8} to 5×10^{-3} mbar PRG 5×10^{-3} to 5×10^2 mbar
Hysteresis:	Adjustable $\geq 10\%$ of measured value
Contact type:	Changeover contact, floating
Load (resistive):	Switched current: 1 Amp maximum Switched voltage: maximum 30 V a.c./30 V d.c.
Service life:	Mechanical: 5×10^6 switching cycles Electrical: 10^5 switching cycles at maximum load
Connection:	SUB-D, 25-way, plug

Ready signal relay

Number:	3
Assignment:	1 per channel
Response time:	< 50 ms
Contact type:	Normally open contact, floating
Load (resistive):	Switched current: 1 Amp maximum
switched voltage:	Maximum 30 V a.c./30 V d.c.
Service life:	Mechanical: 5×10^6 switching cycles
Electrical:	10^5 switching cycles at maximum load
Connection:	SUB-D, 25-way, plug

Outputs and inputs

Analog output

Number:	1 per measurement channel
Voltage range:	0 to 10 V d.c. (limit values 0 to 10.5 V d.c.)
Output voltage for fault:	10.2 to 10.5 V d.c.
Deviation of display value:	$\pm 0.2\%$
Internal resistance:	100 Ohm
Characteristic:	Logarithmic

Measurement channel	Аналог 1	Аналог 2
IG	1.0 V d.c./decade ($0 \text{ V} \pm 1 \times 10^{-12} \text{ mbar}$) $\rho = 10^{-12} \text{ mbar} \cdot 10^{U[V]}$ $\rho = 10^{-10} \text{ Pa} \cdot 10^{U[V]}$ $\rho = 0.75 \times 10^{-13} \text{ Torr} \cdot 10^{U[V]}$	1.0 V d.c./decade ($0 \text{ V} \pm 1 \times 10^{-12} \text{ mbar}$) $\rho = 10^{-12} \text{ mbar} \cdot 10^{U[V]}$ $\rho = 10^{-10} \text{ Pa} \cdot 10^{U[V]}$ $\rho = 0.75 \times 10^{-13} \text{ Torr} \cdot 10^{U[V]}$
PRG	1.67 VDC/decade ($0 \text{ V} \pm 1 \times 10^{-3} \text{ mbar}$) $\rho = 10^{-3} \text{ mbar} \cdot 10^{(U[V]/1.67V)}$ $\rho = 10^{-1} \text{ Pa} \cdot 10^{(U[V]/1.67V)}$ $\rho = 0.75 \times 10^{-3} \text{ Torr} \cdot 10^{(U[V]/1.67V)}$	1.286 VDC/decade ($1.9 \text{ V} \pm 5 \times 10^{-4} \text{ mbar}$) $\rho = 5 \times 10^{-4} \text{ mbar} \cdot 10^{((U[V]-1.9V)/1.286V)}$ $\rho = 5 \times 10^{-2} \text{ Pa} \cdot 10^{((U[V]-1.9V)/1.286V)}$ $\rho = 3.75 \times 10^{-4} \text{ Torr} \cdot 10^{((U[V]-1.9V)/1.286V)}$

Response time:	100 ms approximately
Resolution:	10-bit
Connection:	SUB-D, 15-way, plug (jointly used with connection for external control)

External control

PLC compatible logic level:	(Low) < 7 V d.c.; 0 Amp (High) > 13 V d.c.; 7 mA (at 24 V d.c.)
Contact via relay:	24 V d.c. approximately, is provided by the instrument via a self-resetting fuse (100 mA)
Connection:	SUB-D, 15-way, plug (jointly used with analog output connection)

Serial interfaces

RS232

Standard:	RS232
Parameters:	8 data bits, 1 stop bit, no parity, no protocol
Signals:	RXD and TXD
Baud rate:	9600, 19200, 38400 baud
Connection:	SUB-D, 9-way, socket (jointly used with RS485)

RS485

Standard:	RS485 (half duplex)
Parameters:	8 data bits, 1 stop bit, no parity, no protocol
Signals:	A and B
Baud rate:	9600, 19200, 38400 baud
Connection:	SUB-D, 9-way, socket (jointly used with RS232)

Installation

Supplied equipment

Table 8 Supplied equipment

Description	Quantity
PGC202	1
Mains cord with shockproof plug (EU)	1
Mains cord with shockproof plug (US)	1
Operating Instructions	1
Spare fuses	2
Neck collar screws	4
Plastic sleeves	4
Edge protection	2
Adhesive feet	2

Mechanical installation

The PGC202 can be used as follows:

- Rack installation
- Front panel installation
- Benchtop instrument



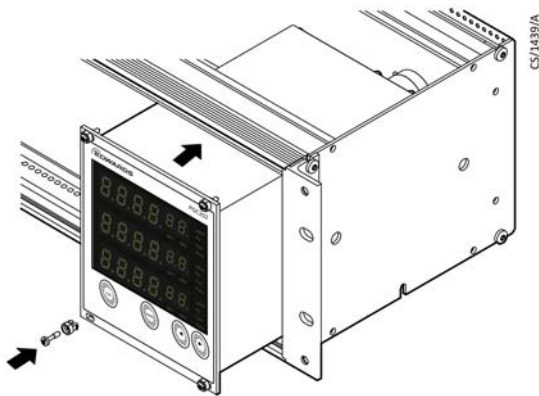
WARNING:

Install the instrument or locate it so the operator is in a position to operate the mains power switch or ensure that the instrument can be de-energised at any time.

Rack installation

The PGC202 has been designed for installation within a sub-rack (19", 3 U) in accordance with DIN EN 60297 (IEC 60297) (see [Figure 2](#)). The equipment supplied includes four neck collar screws and plastic sleeves for this purpose.

Figure 2 Rack installation

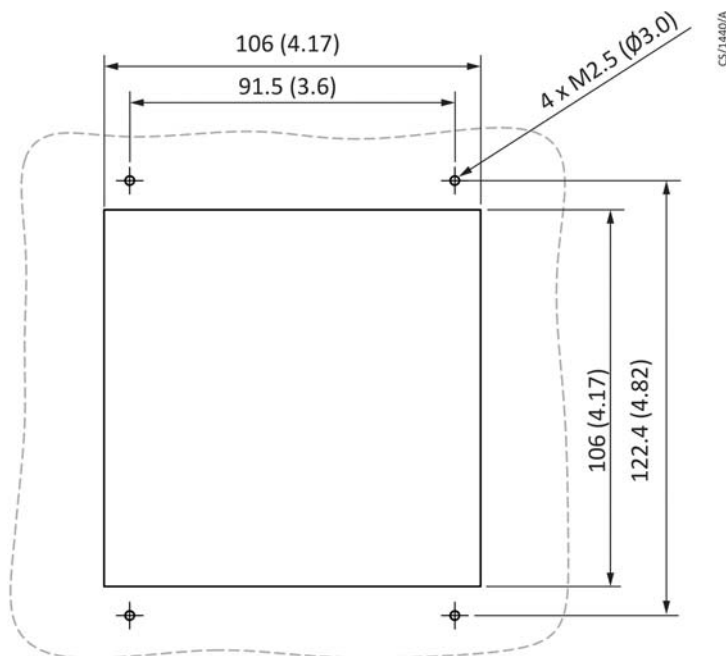


- Attach the sub-rack within the rack.
- Push the PGC202 into the sub-rack.
- Affix the instrument to the sub-rack with the neck collar screws and the plastic sleeves supplied with the product.

Front panel installation

For panel mounting of the instrument, the following cut-out (see Figure 3) is required:

Figure 3 Front panel cut-out dimensions (mm)



- Guide the PGC202 into the cut-out.
- Affix the instrument with the neck collar screws and the plastic sleeves supplied with the product.

Benchtop instrument



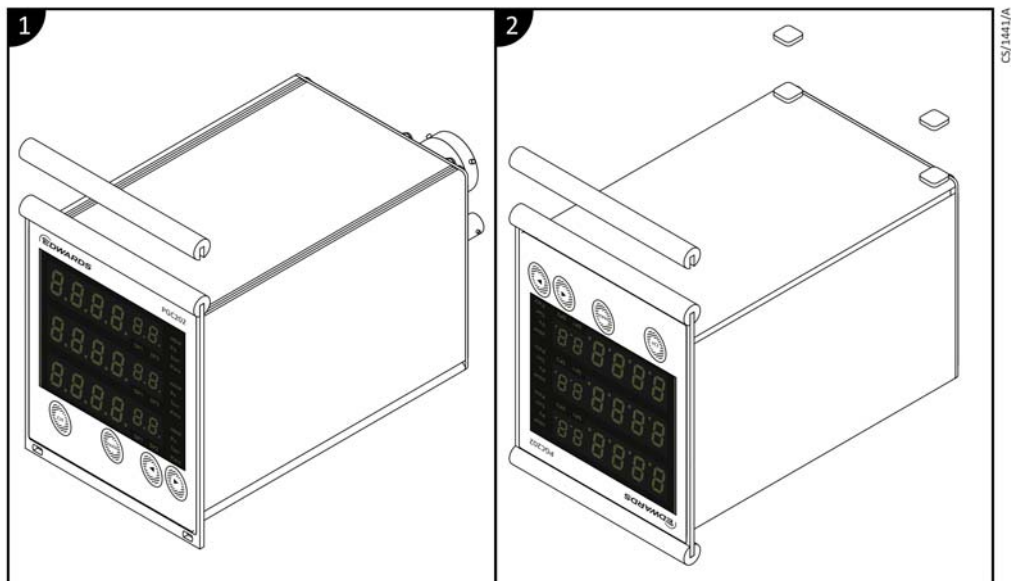
WARNING:

When using the PGC202 as a benchtop instrument fit the two edge protection rubber pieces onto the top and bottom edge of the front panel to avoid injury by sharp edges.

When intending to use the PGC202 as a benchtop instrument, then proceed as follows:

- Push one of the two edge protection rubber pieces supplied with the product over the top edge of the front panel (see Figure 4 item 1).
- Place the PGC202 on its back (see Figure 4 item 2).
- Push the second edge protection rubber piece supplied with the product onto the bottom edge of the front panel.
- Stick the two rubber feet supplied with the product onto the bottom of the housing.
- Turn the PGC202 over again and move it to the desired place.

Figure 4 Preparing the instrument for utilisation as a benchtop unit



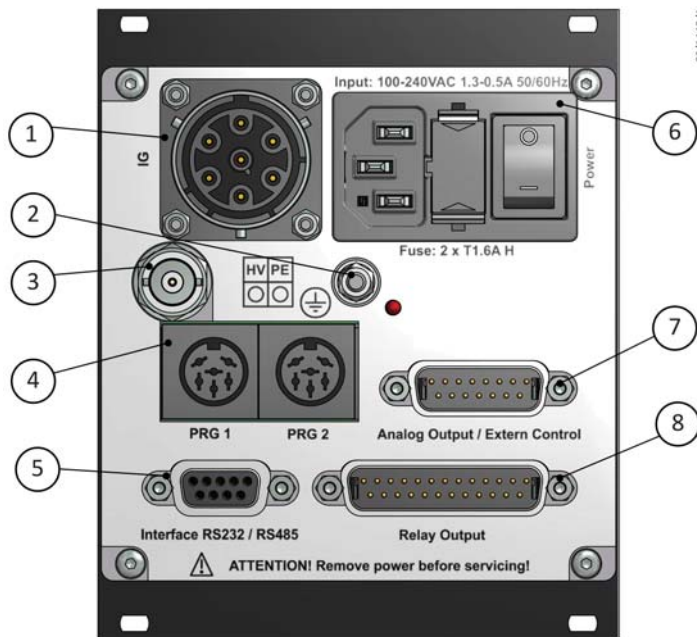
1. Top side
2. Bottom side

Connections

Rear side of the instrument

Figure 5 shows the rear panel of the PGC202. The way in which the individual connections have been wired is described in the following sections.

Figure 5 Rear panel of the instrument



- 1 Control signal connection for IG gauge head (IG)
- 2 Ground connection (protective earth) and shield of the PRG measurement cables
- 3 Measurement signal connection for IG gauge head (IG)
- 4 Connections for the PRG gauge heads (PRG 1, PRG 2)
- 5 Connection for the RS232 or RS485 interface
- 6 Mains connection with mains switch and fuses
- 7 Connection for analog output and external control
- 8 Connection for relay output

Mains connection



WARNING:

Appliances, which have not been professionally connected to Earth, can be life-threatening in the event of a malfunction. For this reason use 3-wire mains cords and extension cords with protective earthing only. Insert the mains plug into a mains power socket which provides an Earth contact.



Note:

A mains power cord is supplied with the product. If the plug on the mains power side is not compatible with the mains power outlets, provide a mains cord which meets the following specifications:

- 3-wire cable with protective earthing.
- Conductor cross-section: 3 x 0.75 mm² or greater.
- Cable length 2.5 m maximum.

The mains connection on the rear panel (see [Figure 5](#)) is not intended for use with a mains cord designed for use with heating apparatus.

- Insert the plug of the mains cord into the mains socket provided on the instrument.
- Insert the mains plug of the mains cord into the mains outlet.

Earthing



WARNING:

The vacuum chamber earth should be connected to the PGC202 protective earth terminal on the rear of the instrument.

With the aid of the earthing screw (see [Figure 5](#) item 2) the PGC202 can be connected to the protective ground of the vacuum chamber.

PRG measurement channels (PRG 1 and PRG 2)



WARNING:

A special cable from Edwards is required for connection to PRG1 and PRG2. The ground connection (see [Figure 5](#)) of the special cable must be connected to the ground connection on the rear of the instrument.



CAUTION:

Gauge heads which have not been designed to be operated in connection with the PGC202 or which do not comply with current EMC guidelines can impair operation of the instrument or even damage it. Always operate the PGC202 with approved gauge heads, see [Connectable gauge heads](#).

The connections PRG 1 and PRG 2 (see [Figure 5](#)) allow the connection of up to two PRG gauge heads (See [Connectable gauge heads](#)).

Connecting:

- PRG 1: connect the gauge head using the corresponding connecting cable to connection PRG 1 on the rear of the PGC202.
- PRG 2: connect the gauge head using the corresponding connecting cable to connection PRG 2 on the rear of the PGC202.

IG measurement channel (IG)



WARNING:

For utilising the connection IG, a special cable from Edwards must be used.



CAUTION:

Gauge heads which have not been designed to be operated in connection with the PGC202 or which do not comply with current EMC guidelines can impair operation of the instrument or even damage it. Always operate the PGC202 with approved gauge heads, see [Connectable gauge heads](#).

The connection IG (Figure 5) allows the connection of an Extractor or Bayard-Alpert gauge head (See Connectable gauge heads).

Control signals

The control signals are supplied through a 7-way Metalock Bantam connector (Figure 5 and 6).

Figure 6 Connection for the IG gauge head (Metalock Bantam UTG0187SVDEU)



Measurement signal



WARNING:

If during operation the IG suffers a malfunction then a live voltage may be present at the gauge head measurement signal connection (Figure 5, item 3).

Affix the touch protection component to the BNC plug on the IG cable after it is connected to the PGC202 and before the PGC202 is switched on.

The touch protection component is supplied together with the gauge head cable.

The measurement signal (ion current) is transferred via a coaxial cable to a BNC connector on the rear of the PGC202 (see Figure 5 item 3).

Pin assignment: Inside conductor: Ion current
 Outside conductor: Shield

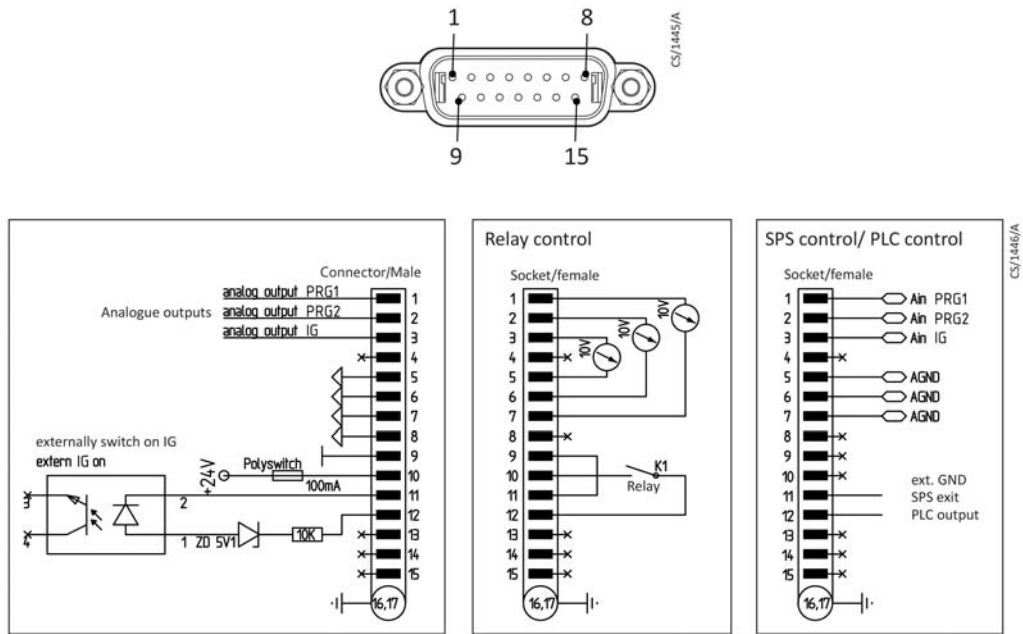
Connecting:

- Connect the IG gauge head through the corresponding connecting cable to the connection IG on the rear of the PGC202.

Analog output and external control (analog output / extern control)

The Analog Output / Extern Control connection (Figures 5 and 7) provides the connections of the analog outputs for the signals of the individual measurement channels as well as the inputs for externally controlling the IG gauge.

Figure 7 Connection plug for analog output and external control (SUB-D, 15-way)



Connecting:

- Connect the peripheral components using a shielded connecting cable to the connection Analog Output/Extern Control on the rear of the PGC202.

RS232 / RS485 Interface (Interface RS232 / RS485)

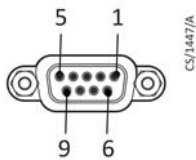


CAUTION:

When using the RS232 serial interface, use a serial extension cable with a 9-way plug and a 9-way socket. The wires in the cable must not be crossed. Utilisation of the RS485 requires a special cable.

The connection Interface RS232 / RS485 (Figures 5 and 8) permits operation of the instrument via a computer or a terminal.

Figure 8 Interface connection socket (SUB-D, 9-way)



- | | | | |
|---|-------------|---|-------------|
| 1 | B (RS485) | 6 | Link with 4 |
| 2 | TxD (RS232) | 7 | Link with 8 |
| 3 | RxD (RS232) | 8 | Link with 7 |
| 4 | Link with 6 | 9 | A (RS485) |
| 5 | Ground | | |

Connecting:

- Connect the serial interface of the computer using a shielded cable to the connection RS232/RS485 on the rear of the PGC202.

Relay output

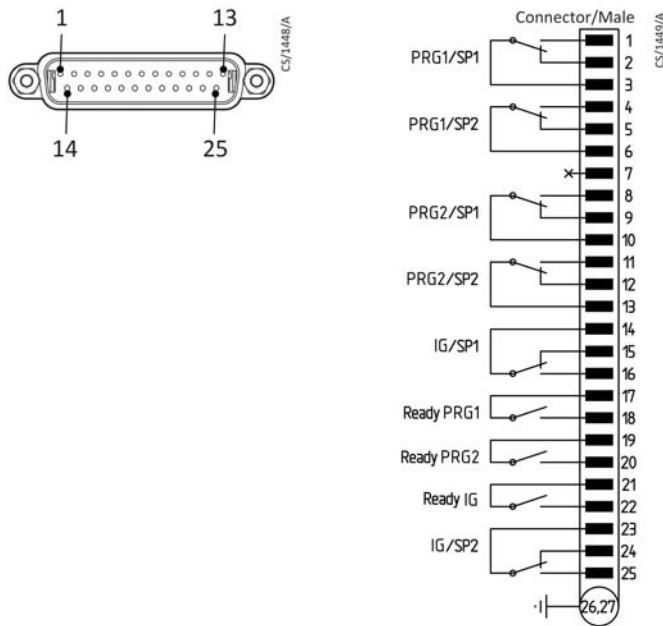


WARNING:

Voltages exceeding 60 V d.c. or 30 V a.c. are dangerous when touched. The operator may only switch output voltages of up to 30 V d.c. or 30 V a.c. with a maximum current of 1 Amp at the connector marked Relay Output. The voltage must comply with the requirements of a safety extra low voltage (SELV-E in accordance with EN 61010).


Through the connection Relay Output (Figures 5 and 9) the operator can utilise the floating relay contacts for switching purposes and ready signals.

Figure 9 Connection plug for relay output (SUB-D, 25-way)



Operation

WARNING:

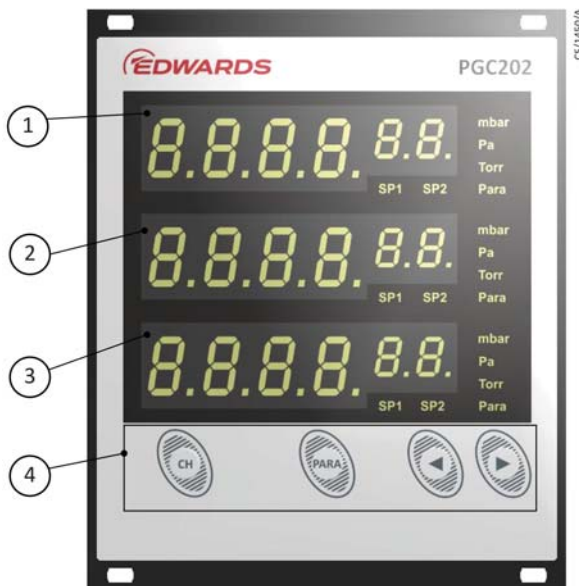


Do not use the PGC for safety critical applications. The PGC is not intended to be fail safe.

Front panel

Figure 10 shows the front panel of the PGC202.

Figure 10 Front panel



- 1 Display of channel 1 with two corresponding switching thresholds
- 2 Display of channel 2 with two corresponding switching thresholds
- 3 Display of channel 3 with two corresponding switching thresholds
- 4 Operating pushbuttons

Display

Table 9 Display components

Display	Description
8.8.8.8.8.8	Measured value or status message When the measured value readout for measurement channel 3 flashes, then the degassing function for the IG gauge head is active
SP1, SP2	Switching function status. When the symbol is lit, the pressure is then below the lower threshold. When the symbol is not lit, then the pressure is above the upper threshold.
mbar, Pa, Torr	Pressure unit (applies to all channels)
Para	Channel selection, configuration mode for channel

Control pushbuttons

(CH)

With the pushbutton (CH) the operator can select a measurement channel. This is necessary, for example, when wanting to switch the IG gauge head on or off, or when wanting to change the sensor parameters. The number of the selected measurement channel is displayed flashing for 10 seconds.

(PARA)

Through the pushbutton (PARA) the operator can invoke the parameter mode for switching threshold, sensor and general parameters. The indicator Para for the selected measurement channel comes on. The operator can set up different parameters.

Arrow pushbuttons (◀ 'DOWN' / ▶ 'UP')

The arrow pushbuttons are needed to be able to enter data in the parameter mode or switch the IG gauge head on or off (see [Switching on](#) and [Switching off](#)). By operating the pushbuttons, a default value can be reduced or increased. The corresponding pushbuttons are designated in the following as 'DOWN' (◀) and 'UP' (▶).

Switching on and off

Switching on

- Switch the instrument on at the mains switch.

After switching on, the PGC202 runs the following:

- Self test
- Display test
- Display of the software version used
- Re-establishing the parameters set up last
- Identification of the connected measuring equipment
- Activation of the measurement mode

Switching off



CAUTION:

Wait for at least 5 seconds before switching the instrument on again.

Switch the instrument off at the mains switch.

Operating modes

The PGC202 may be operated in one of the following operating modes:

Measurement mode

The measurement mode is the standard operating mode. Here the measured values or status messages are displayed (see [Measurement mode](#)).

Parameter mode

In the parameter mode, the operator has access to different parameters. The operator can simply view the parameters or change them with the aid of the arrow keys. In this way the operator can configure the PGC202 (see [Parameter mode](#)).

Measurement mode

Selection

After switching on the PGC202 it will automatically run the measurement mode.

If running the parameter mode and when not operating a key for 10 seconds the instrument will then automatically revert back to the measurement mode.

Description

In the measurement mode the measured values of the gauge heads are displayed. When the pressure is outside the permissible range, then a status message is displayed.

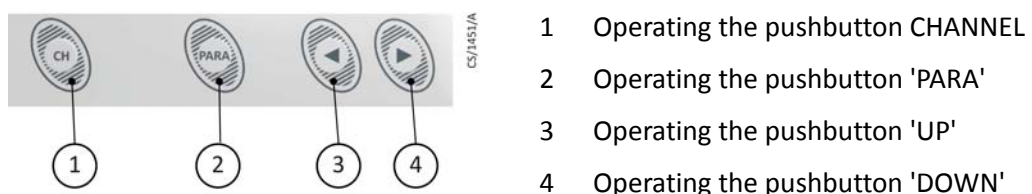
Measurement channels to which no gauge head has been connected will indicate *noSEN*. This status message is erased after 30 seconds and 4 dots are displayed.

Table 10 Display in the measurement mode

Display	Description
<i>1000 nn</i>	Above the permissible range (overrange)
<i>B.BBB^{-B}</i>	Within the permissible range
<i>cB.BB^{-B}</i>	Below the permissible range (underrange)
<i>S OFF</i>	Gauge head has been switched off
<i>HU on</i>	IG is on

Pushbutton functions

Figure 11 Operating the pushbuttons



Measurement channel selection

- Press the pushbutton (CH).
 - The instrument selects the next measurement channel. The Para indicator for the selected measurement channel will flash for 10 seconds.

Parameter mode selection

- Press the pushbutton (PARA) and keep it depressed for approximately 2 seconds.
 - The instrument will change to the parameter mode (see [Parameter mode](#)).
 - If no pushbuttons are pressed within 10 seconds, the instrument will then automatically return to the measurement mode.

Switching the IG on

The IG gauge head can be switched on manually. For this, sensor control must be set to *HRnd* (see [Sensor switch-on type \(S-on\)](#)).

- Press the pushbutton (CH) to select measurement channel 3.
- Keep the key marked (UP) pressed for approximately two seconds.
 - The IG gauge head at measurement channel 3 is switched on. Either the measured value or a status message will be displayed ([Table 10](#)).

Function Degas

The IG gauge head can be cleaned by running the function Degas. For this the gauge head must be switched on (see [Switching on](#)) and the measured pressure must be below 5×10^{-5} mbar.

- Press the pushbutton (CH) to select measurement channel 3.
- Keep the key marked (UP) pressed for approximately two seconds.
 - The function Degas at measurement channel 3 is switched on. The measured value readout for measurement channel 3 flashes ([Table 9](#)).
 - The process ends automatically after 2 minutes or can be terminated prematurely by pressing the pushbutton (DOWN). Afterwards the gauge head will return to measurement mode.

Switching the IG off

The IG gauge head can be switched off manually. For this, sensor control must be set to *HRnd* (see [Sensor switch-off type \(S-off\)](#)).

- Press the pushbutton (CH) to select measurement channel 3.
- Keep the key marked (DOWN) pressed for approximately two seconds.
 - The IG gauge head at measurement channel 3 is switched off. The display will indicate the status *oFF*.

PRG adjustment

Ageing and contamination of the sensor filament will impair the accuracy of the pressure readout. For this it is recommended that the PRG gauge head is adjusted as required. For this, the gauge head must be orientated in the same way in which it is subsequently operated. The adjustment process is performed as follows:

- Vent the vacuum system and adjust the 100% potentiometer on the PRG gauge head so that the following readout is obtained:

Figure 12 Full-scale adjustment for the PRG gauge head



- In order to ensure a stable but also precise adjustment of the 100% point, the adjustment potentiometer (100%) should be turned further by 90° in the clockwise direction after the indication of 1000 mbar has been displayed. Here the over-range indicator should just come on.
- Evacuate the vacuum system to a pressure $< 5 \times 10^{-4}$ mbar and adjust the "0" potentiometer on the PRG gauge head so that the following reading is obtained:

Figure 13 Zero adjustment for the PRG gauge head



- Vent the vacuum system and check the 100% setting once more. Correct any deviation with the 100% potentiometer.
- If a correction of the 100% setting was necessary, then repeat the Zero adjustment.

Parameter mode

Selection

By pressing the (PARA) pushbutton for approximately 2 seconds the instrument changes from the measurement mode to the parameter mode. The Para indicator comes on for the channel selected in each case. When the instrument is running in the parameter mode and if no pushbutton is operated for 10 seconds, then the instrument will automatically return back to the measurement mode. The Para indicator for the channel which was selected in each case is turned off.

Parameter groups

In the parameter mode the operator has access to different parameters. The operator may view these parameters or change these with the aid of the arrow pushbuttons. In this way the instrument can be configured. [Table 11](#) shows all available parameters.

Table 11 Parameter groups and corresponding parameters

Parameter groups	Parameter
PARA SP	SP I-Lo SP I-H, SP2-Lo SP2-H,
PARA SEn	F iL BAS ^{ti} BAS ^{Pi} S-on S-off SEnS
PARA SEn	un it AnALoG d iG it br i Adr Pb bAud rS

The available parameters have been divided into the following parameter sets:

Switching function parameters (PARA SP)

These parameters affect only the sensor of the selected measurement channel. Two switching functions are available per measuring channel.

See [Switching function parameters \(PARA SP\)](#).

Sensor parameters (PARA SEn)

These parameters affect only the selected measurement channel. Two switching functions are available per measuring channel.

See [Sensor parameters \(PARA SEn\)](#).

General parameters (PARA GEN)

With the aid of these parameters the instrument can generally be configured. The parameters apply to all measurement channels.

See [General parameters \(PARA GEN\)](#).

Operating concept

From the measurement mode, the operator can select and change a certain parameter as follows:

- Press the pushbutton (CH) to select the desired measurement channel (only necessary when wanting to change a sensor parameter)
 - The Para indicator flashes for the selected channel.
- Press the (PARA) pushbutton for about 2 seconds.
 - The parameter menu has now been invoked.
- Use the arrow pushbuttons to select the desired parameter group.
 - The name of the parameter group is displayed.
- Press the (PARA) pushbutton to select the desired parameter.
 - The name and the value of the parameter are displayed.
- Use the arrow pushbuttons to change the value of the parameter.
 - The value of the parameter is changed.
- Repeat the last 2 steps to change further parameters from the same parameter group.

After having accessed the last parameter of a parameter group, the instrument will switch back to the measurement mode. Changes to the parameters become effective immediately and are automatically saved to the EEPROM.

When the instrument is running in the parameter mode and if for a period of 10 seconds no changes are made to the parameters, then the instrument will automatically return to the measurement mode. Any parameter changes made up to this point are automatically saved to the EEPROM.

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Parameters

Switching function parameters (PARA SP)

Switching functions can be configured in this parameter group. The PGC202 provides the following switching function parameters:

SP1 ^{Lo}	Switching function 1	low switching threshold
SP1 ^{Hi}	Switching function 1	high switching threshold
SP2 ^{Lo}	Switching function 2	low switching threshold
SP2 ^{Hi}	Switching function 2	high switching threshold

Basic terms

Switching functions

The PGC202 contains 6 switching function relays, that is, the switching functions 1 and 2 are available for each measurement channel. These switch depending on the measured pressure. The contacts of the relays are floating and may be used for switching purposes through the connection marked Relay Output (see [Relay output](#)).

Threshold values

The switching behaviour of individual relays is defined in each case through two parameters: the lower threshold and the upper threshold value of the switching function.

Lower threshold value (SP1^{Lo}, SP2^{Lo})

The lower threshold value governs switching on of the assigned switching function. When the pressure drops below the lower threshold value, then the relay is energised. The common contact of the relay is then connected to the normally open contact.

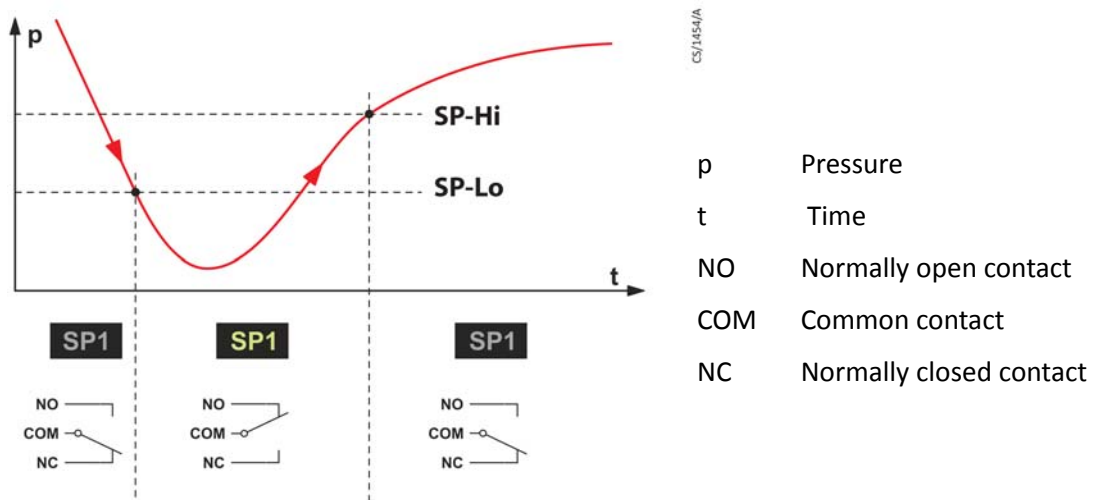
Upper threshold value (SP1^{Hi}, SP2^{Hi})

The upper threshold value governs switching off of the assigned switching function. When the pressure exceeds the upper switching threshold, then the relay is de-energised. The common contact of the relay is then connected to the normally closed contact.

Hysteresis

In the pressure range between the two thresholds, the current relay status is maintained. Within this range the relay will not switch over and the relay status depends on the history (see [Figure 14](#)).

Figure 14 Behaviour of a switching function in response to pressure changes



The range between the lower and the upper threshold value produces a certain amount of hysteresis between switching on and switching off of the relay. The hysteresis prevents rapid switching on and off of the switching function when the pressure is close to a switching threshold.

Configuring the switching functions

- Select the desired measurement channel by operating the pushbutton (CH) several times.
- Keep the pushbutton (PARA) depressed for approximately 2 seconds.
 - The instrument is now running the parameter mode in the parameter group *SP*.
- Press the pushbutton (PARA) to select the desired parameter.
 - The name and the value of the parameter are displayed.
- Use the arrow pushbuttons to change the threshold value.
 - The value of the parameter is changed.
- Repeat the steps to change further parameters of the parameter group.

Adjustment range



CAUTION:

Select the thresholds for the Extractor gauge head in the range of 1×10^{-11} to 1×10^{-4} mbar, for the Bayard-Alpert gauge head in the range of 1×10^{-8} to 5×10^{-3} mbar and for the PRG gauge head in the range of 5×10^{-3} to 5×10^{-2} mbar.

The upper and the lower threshold value can be changed depending on the type of sensor in the range between 5×10^2 and 1×10^{-11} mbar.

Hysteresis amounts to at least 10% of the lower threshold value.

Sensor parameters (PARA SEN)

A separate set of sensor parameters exists for each measurement channel. Depending on which transmitter is connected to the respective measurement channel, different parameters are available (see Table 12).

Table 12 Available sensor parameters

Gauge heads	FIL	FILT	GAS ^{nit}	GAS ^{IE}	S-on	S-off	SENS
IG		✓		✓	✓	✓	✓
PRG	✓		✓				

- Select the desired measurement channel by operating the pushbutton (CH) several times.
- Keep the pushbutton (PARA) depressed for approximately 2 seconds
 - The instrument is now running the parameter mode.
- Use the arrow keys to access the parameter group SEN.
- Press the pushbutton (PARA) to select the desired parameter.
 - The name and the value of the parameter are displayed.
- Use the arrow keys to change the parameter setting.
- Repeat the steps to change further parameters of the parameter group.

Filament material PRG (FIL)

Filament material of the connected PRG gauge head.

Table 13 Values for the parameter FIL

Display	Description
TU	Tungsten PRG20K - NW16 Al, PRG20K - DN16CF SS
PL	Platinum PRG20KCR - NW16 SS

Measured Value Filter (FILT)

The measured value filter allows for improved evaluation of noisy signals or signals suffering interference. This filter is applied to the readout on the display and to the switching functions. However, the analogue outputs are not influenced by this filter.

The measured value filter can be set to values of 1, 3, 7 or 15 where 1 represents a fast filter and 15 represents a slow filter.

In the case of a two-digit readout, we recommend a filter factor of 3, for a three digit readout, a filter factor of 15.

Type of gas correction PRG (GAS^{nit})

The PRG gauge heads are normally calibrated for measurements in nitrogen or air. With the aid of the parameter GAS^{nit} the operator can set up the measurement channel to the other

type of gas in each case. The characteristic may be selected for a gauge head between nitrogen (N_2) or argon (Ar).

For this proceed as follows:

- Select the parameter $GR5^{L1}$.
- Press the pushbutton (PARA).
 - The setup characteristic is displayed.
- Use the arrow pushbuttons to change the characteristic.
 - The value of the parameter is changed.

Type of gas correction IG ($GR5^{IE}$)

The IG gauge heads are normally calibrated for measurements in nitrogen or air. With the aid of the parameter $GR5^{IE}$ the operator can set up the measurement channel to other types of gas.

- For this proceed as follows:
- Select the parameter $GR5^{IE}$.
 - Press the pushbutton (PARA).
- The setup characteristic is displayed.
 - Use the arrow pushbuttons to change the characteristic.
- The value of the parameter is changed.

The correction factor for a gauge head can be set up in the range of 0.2 - 1.0 - 8.0. A setting of 1.0 returns the uncorrected value.

Sensor switch-on type ($S-on$)

This parameter defines how the IG gauge head is switched on.

The switch-on time can be set to the following values:

$HRnd$	Manual. The gauge head can be switched on by pressing the pushbutton (UP) (see Switching on).
Ect	Externally through optocoupler (PLC compatible high-level > 13 V d.c.; 7 mA at 24 V d.c.).
Hob	Warm start. The sensor is switched on automatically upon switching on the instrument. After a power failure the measurement is started automatically.
$CH 1$	Through measurement channel PRG 1. With the aid of the next parameter $t-on$ the operator can define a switch-on value. When the pressure in the measurement channel PRG 1 drops below the switch-on value, the sensor is switched on.
$CH 2$	Through measurement channel PRG 2. With the aid of the next parameter $t-on$ the operator can define a switch-on value. When the pressure in the measurement channel PRG 2 drops below the switch-on value, the sensor is switched on.

Sensor switch-on value (t-on)

This parameter will only appear when the sensor switch-on time has been set to CH 1 or CH 2 (see Sensor switch-on type (S-on)).

Through the parameter t-on the operator can define a switch-on value. When the pressure in the respective measurement channel drops below the switch-on value, the gauge head is switched on.

Switch-on Delay for Extractor Gauge Head (dELAY)

This parameter will only be displayed provided an Extractor gauge head has been connected and provided the sensor switch-on type has been set to CH 1 or CH 2 (see Sensor switch-on type (S-on)).

Through the parameter dELAY the switch-on Delay for the Extractor gauge head is defined. Switch-on delays may be set up within a range of 60 to 600 seconds. Resolution is one second. The default is 60 seconds.

The switch-on delay becomes effective from the point onwards when the switch-on value set according to, Sensor switch-on value (t-on), is enabled.

Sensor switch-off type (S-off)

This parameter defines how the IG gauge head is switched off.

The switch-off type can be set up to the following values:

MANd	Manual. The gauge head can be switched off by pressing the pushbutton (DOWN) (see Switching off).
ECLt	Externally through an optocoupler (PLC compatible low level < 7 V d.c.; 0 A at 24 V d.c.).
SELF	Self-monitoring. With the aid of the next parameter t-off, a switch-off value can be defined. When the pressure at the gauge head exceeds the switch-off value then the gauge head is switched off.
CH 1	Through measurement channel PRG 1. With the aid of the next parameter t-off, a switch-off value can be defined. When the pressure in the measurement channel PRG 1 exceeds the switch-off value then the sensor is switched off.
CH 2	Through measurement channel PRG 2. With the aid of the next parameter t-off, a switch-off value can be defined. When the pressure in the measurement channel PRG 2 exceeds the switch-off value then the sensor is switched off.

Sensor switch-off value (t-off)

This parameter will only appear when the sensor switch-off type has been set to CH 1 or CH 2 (see Sensor switch-off type (S-off)).

Through the parameter t-off, a switch-off value can be defined. When the pressure in the respective measurement channel exceeds the switch-off value, the gauge head is switched off.

Sensitivity Setting for IG Gauge Head (SEN5)

Through this menu, the sensitivity of the IG gauge head can be adjusted.

The sensitivity is adjusted through the respective sensor constant.

The sensor constant can be set up in the range 1.00 to 30.0 mbar⁻¹. Resolution is 0.01 mbar⁻¹ in the range between 1.00 to 9.99 and 0.1 mbar⁻¹ in the range 10.0 to 30.0. The default for the Extractor gauge head is 6.25 mbar⁻¹ and for the Bayard-Alpert gauge head it is 17 mbar⁻¹.

General parameters (PARA GEN)

With the aid of these parameters the instrument can generally be configured. The parameters apply to all measurement channels.

- Keep the pushbutton (PARA) depressed for approximately 2 seconds.
 - The instrument is now in the parameter mode.
- Use the arrow pushbuttons to access the parameter group GEN.
- Press the pushbutton (PARA) to select the desired parameter.
 - The name and the value of the parameter are displayed.
- Use the arrow pushbuttons to change the parameter setting.
- Repeat the steps to change further parameters of the parameter group.

Unit of measurement (Unit)

Unit of measurement for pressure values. This unit of measurement affects the displayed pressure values, threshold values etc.

Table 14 Values for the parameter unit

Display	Description
mBar	Unit of measurement mbar
Torr	Unit of measurement Torr
PA	Unit of measurement Pascal

The unit of measurement is indicated on the display (Figure 10).

Analog output (ANALOG)

Analog output for the gauge heads.

Table 15 Values for the parameter ANALOG

Display	Description
1	Alternate mode (see Analog output)
2	PGC202 mode (see Analog output)

Display format (*d 9 t*)

Number of digits on the display.

Table 16 Values for the parameter *d 9 t*

Display	Description
2	2 digits, for example 2.5^{-1}
3	2 digits, for example 2.47^{-1}

Display brightness (*br i*)

Display brightness.

Table 17 Values for the parameter *br i*

Display	Description
H i	High brightness
L o	Low brightness

Baud rate (*bAUd*)

Baud rate of the interface

Table 18 Values for the parameter *bAUd*

Display	Description
9.6	Baud rate 9600 baud
19.2	Baud rate 19200 baud
38.4	Baud rate 38400 baud



Note:

Changing the baud rate will only become effective after having restarted the instrument.

Interface (*r 5*)

Selection of the interface.

Table 19 Values for the parameter *r 5*

Display	Description
232	RS232 Interface
485	RS485 Interface

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Computer interface

Basics

Connection

The PGC202 can communicate with the computer through a serial interface. RS232 and RS485 interfaces are available. The selection is made through the parameter group $PARA\ GEN$ in the parameter mode (see [General parameters \(PARA GEN\)](#)).

The respective connecting socket and the necessary connecting cable are described in, [RS232 / RS485 Interface \(Interface RS232 / RS485\)](#).

Nomenclature

The following terms and symbolical spellings are used in order to describe the computer interface:

Table 20 Terms computer interface

Terms	Description
Send	Data transfer from the host to the instrument
receive	Data transfer from the instrument to the host
Host	Terminal (Computer)
ASCII	American Standard Code for Information Interchange

Square brackets [...]

Square brackets mark parameters.

Sharp brackets <...>

Abbreviations in sharp brackets mark control characters. The complete term including the sharp brackets is replaced by a numerical value.

Table 21 Control characters computer interface

Terms	Value	Description
<,>	0x2C	Separator
<CR>	0x0D	Terminator

Communication

Protocol

The following log is used for communication:

- 8 data bits
- no parity bit
- 1 stop bit

The baud rate is selectable.

- 9600
- 19200
- 38400

No hardware handshake is used. The messages are transferred by way of ASCII strings. A comma (0x2C) in the string is taken as a separating character. Space characters (0x20) or tabs (0x09) may be contained in the string. As to the communication, the computer is always the master. The input buffer of the computer must have a capacity of at least 50 bytes.

General string structure

The Address is necessary for RS485 only

The response includes the Address for RS485 only

Write command

Example: **Address Command <,> [Parameter] <CR>**

Response: **OK**

Reading command

Example: **Address Command <CR>**

Response: **Address <,> <TAB> [Parameter] <CR>**

Error code

Response: **? <TAB> X**

Incorrect command

Response: **? <TAB> P <,> <TAB> z**

Incorrect parameter,
Parameter number of the
transmitted command

Response: **? <TAB> C <,> <TAB> x**

Channel x on device not available

Response: **? <TAB> S <,> <TAB> x**

No sensor on Channel x connected

Response: **? <TAB> K**

No divider in the command available

Command set (mnemonics)

Command overview

Table 22 Mnemonics for read commands

Read commands	Description
RPV	Read Pressure Value.
	Read the pressure value for a measurement channel.
RVN	Read Version Number
	Read the instrument software version number.
RSS	Read Setpoint Status
	Read the status of the switching thresholds for a channel.

Table 23 Mnemonics for write commands

Write commands	Description
SHV	Set HV on/off
	Switch the high voltage on or off for a channel.
SKL	Set Key Lock on/off
	Switch the keylock on or off.
SAC	Save Actual Configuration
	Save the current configuration for switching threshold, sensor and general parameters.

Table 24 Mnemonics for read and write commands

Read and write commands	Description
RSA	Read Serial Address
	Read address for RS485.
SSA	Set Serial Address
	Set address for RS485.
RGP	Read General Parameter
	Read instrument settings.
SGP	Set General Parameter
	Set instrument settings.
RGC	Read Gas Correction
	Read type of gas correction factor for a measurement channel.
SGC	Set Gas Correction
	Set type of gas correction factor for a measurement channel.
RSC	Read Sensor Control
	Read type of sensor control for a measurement channel.

Table 24 Mnemonics for read and write commands (continued)

Read and write commands	Description
SSC	Set Sensor Control
	Set type of sensor control for a measurement channel.
RSP	Read Setpoint
	Read switching thresholds for a channel.
SSP	Set Setpoint
	Set switching thresholds for a channel.



Note:

All changes to values are only permanently saved to the EEPROM after having issued the write command SAC. For this reason, after having set all values, save the current configuration through the SAC write command before restarting the instrument.

RPV (Read Pressure Value)

Reading a pressure value for a measurement channel.

Example: **RPV[a]<CR>**

Response: **b[,] [TAB]x.xxxxE±xx**

Parameter	Description
a	Channel number
	1 = Channel 1 (PRG 1)
	2 = Channel 2 (PRG 2)
	3 = Channel 3 (IG)
b	Status
	0 = Measured value OK
	1 = Measured value < measurement range
	2 = Measured value > measurement range
	3 = Measured values << measurement range (Err L0)
	4 = Measured values >> measurement range (Err H1)
	5 = Sensor off (5 OFF)
	6 = HV on (HV ON)
	7 = Sensor error (Err 5)
	9 = No sensor (no SEN)
	10 = No switch-on or switch-off threshold (no tr 9)
12 = Pirani error (Err P1)	
16 = Measured value OK degas function	
x.xxxxE±xx	Pressure value of the selected channel in the current unit of measurement

RVN (Read Version Number)

Reading the version number of the instrument software.

Example: **RVN<CR>**

Response: **x.xx<CR>**

Parameter	Description
x.xx	Version number

RSS (Read Setpoint Status)

Reading the status of the switching thresholds for a channel.

Example: **RSS[a]<CR>**

Response: **b[,][TAB]c<CR>**

Parameter	Description
a	Channel number
	1 = Channel 1 (PRG 1)
	2 = Channel 2 (PRG 2)
	3 = Channel 3 (IG)
b	Status SP1
	0 = low
	1 = high
c	Status SP2
	0 = low
	1 = high

SHV (Set HV on/off)

Setting HV on/off for IG, if switch-on and switch-off type have been set to manual.

Example: **SHV[a, b]<CR>**

Response: **OK<CR>**

Parameter	Description
a	Channel number
	3 = Channel 3 (IG)
b	HV on/off
	0 = off
	1 = on

SDG (Set Degas on/off)

Start or terminate degas function.

Example: **SDG[a, b]<CR>**

Response: **OK<CR>**

Parameter	Description
a	Channel number
	1 = Channel 3 (IG)
b	Degas on/off
	0 = off
	1 = on

SKL (Set Key Lock on/off)

Switching the key lock on or off.

Example: **SKL[a]<CR>**

Response: **OK<CR>**

Parameter	Description
a	Key lock
	0 = off
	1 = on

SAC (Save Actual Configuration)

Saving current configuration for switching threshold, sensor and general parameters.

Example: **SAC<CR>**

Response: **OK<CR>**

RSA (Read Serial Address)

Read address for RS485.

Example: **RSA<CR>**

Response: **a<CR>**

Parameter	Description
a	Address 1 - 126 (01 - 7E) (output in the HEX format)

SSA (Set Serial Address)

Setting address for RS485.

Example: **SSA[a]<CR>**

Response: **OK<CR>**

Parameter	Description
a	Address 1 - 126 (01 - 7E) (entry must be in the HEX format)

RGP (Read General Parameter)

Reading instrument settings.

Example: **RGp<CR>**

Response: **a[,][TAB]b[,][TAB]c[,][TAB]d[,][TAB]e[,][TAB]f[,][TAB]g <CR>**

Parameter	Description
a	Unit
	0 = mbar
	1 = Pa
	2 = Torr
b	Analog output
	0 = Legacy controller mode
	1 = PGC202 default
c	Number of displayed digits
	0 = 2
	1 = 3
d	Brightness
	0 = high
	1 = low
f	Baud rate
	0 = 9600
	1 = 19200
	2 = 38400
g	Serial interface
	0 = RS232
	1 = RS485

SGP (Set General Parameter)

Setting instrument settings.

Example: **SGP[a, b, c, d, e, f, g]<CR>**

Response: **OK <CR>**

Parameter	Description
a	Unit
	0 = mbar
	1 = Pa
	2 = Torr
	X = Parameter remains unchanged
b	Analog output
	0 = Legacy controller mode
	1 = PGC202 default
	X = Parameter remains unchanged
c	Number of displayed digits
	0 = 2
	1 = 3
	X = Parameter remains unchanged
d	Brightness
	0 = high
	1 = low
	X = Parameter remains unchanged
f	Baud rate
	0 = 9600
	1 = 19200
	2 = 38400
	X = Parameter remains unchanged
g	Serial interface
	0 = RS232
	1 = RS485
	X = Parameter remains unchanged



CAUTION:

Changes to the baud rate address only become effective after having restarted the instrument. Before restarting, save the current configuration using the SAC write command.

RGC (Read Gas Correction)

Reading the type of gas correction factor for a measurement channel.

Example: **RGC[a]<CR>**

Response: **b<CR>**

Parameter	Description
a	Channel number
	3 = Channel 3 (IG)
b	Gas type correction factor channel
	Format X.XX with a range from 0.20 to 8.00

SGC (Set Gas Correction)

Setting the type of gas correction factor for a measurement channel.

Example: **SGC[a, b]<CR>**

Response: **OK<CR>**

Parameter	Description
a	Channel number
	3 = Channel 3 (IG)
b	Gas type correction factor channel
	Format X.XX with a range from 0.20 to 8.00

RSC (Read Sensor Control)

Reading the type of sensor control for IG.

Example: **RSC[a]<CR>**

Response: **b[,][TAB]c[,][TAB]x.xxxxE±xx[,][TAB]x.xxxxE±xx<CR>**

Parameter	Description
a	Channel number
	3 = Channel 3 (IG)
b	Sensor switch-on type channel
	0 = Manual
	1 = External
	2 = n.a.
	3 = Through channel 1
4 = Through channel 2	

Parameter	Description
c	Sensor switch-off type channel
	0 = Manual
	1 = External
	2 = Self-monitoring
	3 = Through channel 1
	4 = Through channel 2
x.xxxxE±xx	Switch-on value in the current unit of measurement
x.xxxxE±xx	Switch-off value in the current unit of measurement

SSC (Set Sensor Control)

Setting the type of sensor control for IG.

Example: **SSC[a, b, c, x.xxxxE±xx, x.xxxxE±xx]<CR>**

Response: **OK<CR>**

Parameter	Description
a	Channel number
	3 = Channel 3 (IG)
b	Sensor switch-on type channel
	0 = Manual
	1 = External
	2 = n.a.
	3 = Through channel 1 (PRG 1)
	4 = Through channel 2 (PRG 2)
c	Sensor switch-off type channel
	0 = Manual
	1 = External
	2 = Self-monitoring
	3 = Through channel 1 (PRG 1)
	4 = Through channel 2 (PRG 2)
x.xxxxE±xx	Switch-on value in the current unit of measurement
x.xxxxE±xx	Switch-off value in the current unit of measurement

RSP (Read Set Point)

Reading the switching thresholds for a channel.

Example: **RSP[a]<CR>**

Response: **b[,][TAB]c[,][TAB]d[,][TAB]e<CR>**

Parameter	Description
a	Channel number
	1 = Channel 1 (PRG 1)
	2 = Channel 2 (PRG 2)
	3 = Channel 3 (IG)
b	SP_1^{L0} (pressure value of the switching threshold in the current unit of measurement in the form of x.xxxxE±xx)
c	SP_1^{H1} (pressure value of the switching threshold in the current unit of measurement in the form of x.xxxxE±xx)
d	SP_2^{L0} (pressure value of the switching threshold in the current unit of measurement in the form of x.xxxxE±xx)
e	SP_2^{H1} (pressure value of the switching threshold in the current unit of measurement in the form of x.xxxxE±xx)

SSP (Set Set Point)

Setting the switching thresholds for a channel.

Example: **SSP[a, b, c, d, e]<CR>**

Response: **OK<CR>**

Parameter	Description
a	Channel number
	1 = Channel 1 (PRG 1)
	2 = Channel 2 (PRG 2)
	3 = Channel 3 (IG)
b	SP_1^{L0} (pressure value of the switching threshold in the current unit of measurement in the form of x.xxxxE±xx)
c	SP_1^{H1} (pressure value of the switching threshold in the current unit of measurement in the form of x.xxxxE±xx)
d	SP_2^{L0} (pressure value of the switching threshold in the current unit of measurement in the form of x.xxxxE±xx)
e	SP_2^{H1} (pressure value of the switching threshold in the current unit of measurement in the form of x.xxxxE±xx)

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Maintenance and service

Maintenance

General maintenance information



WARNING:

Do not allow objects or liquids to enter the instrument. Coming into contact with components at mains voltage level can be dangerous to life.

For external cleaning please use a piece of dry cotton cloth. Do not use any aggressive or abrasive detergents.

Troubleshooting

Fault finding

A malfunction of the PGC202 is indicated by an error message on the display (see Error messages).

Error messages

Table 25 Error messages

Error (display)	Fault cause and remedy
<i>Err Lo</i>	Measurement signal from the gauge head significantly below the permissible range.
<i>Err Hi</i>	Measurement signal from the gauge head significantly above the permissible range.
<i>Err 5</i>	Sensor error. Malfunction affecting the connection to the gauge head. The message will only be displayed in the display field for the affected measurement channel. Acknowledge by pressing any key.
<i>Err P</i>	Pressure Error. Shutdown of the IG gauge head by a pressure value which is much too high. Acknowledge by pressing any key.
<i>Err 01</i>	Anode voltage error. Anode voltage under minimum. Acknowledge by pressing any key.
<i>Err 02</i>	Anode voltage error. Anode voltage over maximum. Acknowledge by pressing any key.
<i>Err 04</i>	Bias voltage error. Bias voltage under minimum. Acknowledge by pressing any key.
<i>Err 08</i>	Bias voltage error. Bias voltage over maximum. Acknowledge by pressing any key.
<i>Err 10</i>	Emission current error. Emission current under minimum. Acknowledge by pressing any key.

Table 25 Error messages (continued)

Error (display)	Fault cause and remedy
<i>Err 20</i>	Emission current error. Emission current over maximum. Acknowledge by pressing any key.
<i>Err 40</i>	Filament current error. Emission current under minimum or filament of the IG vacuum gauge head is defective. Acknowledge by pressing any key.
<i>Err 80</i>	Filament current error. Filament current over maximum. Acknowledge by pressing any key.
<i>no 5En</i>	No gauge head connected to the measurement channel. The status message disappears after 30 seconds.
<i>notr 16</i>	Error affecting the switch-on or switch-off channel. No switch-on or switch-off threshold has been defined for the IG gauge head (malfunction of the PRG gauge head, for example).
<i>FIL br</i>	Filament broken. Filament of the PRG vacuum gauge head is defective. The error message persists until the sensor is replaced.

Help the case of faults

If the malfunction persists even after having replaced the gauge heads, please contact the nearest Edwards service office.

Fuse replacement

Fuses should only be replaced with fuses of the correct type, as specified on the rear of the instrument. The two fuses are located in the fuse insert at the mains connector (Figure 5), and may be levered out using a small screwdriver.

Repair

Send defective products for repair to the nearest Edwards service office. Edwards will not assume any responsibility or honour a warranty if the operator or third persons have attempted repair work on the PGC202.

Storing and waste disposal

Storing

Return the PGC202 to its protective packaging and store in clean dry conditions until required for use. Do not exceed the storage temperature conditions specified in [Environment](#).

Disposal

Dispose of the PGC202 and any components safely and in accordance with all local and national safety and environmental requirements.

Alternatively, the PGC202 and /or cables may be able to be recycled; contact Edwards or supplier for advice (also see below).

The PGC202 and associated cables are within the scope of the European Directive on Waste and Electronic Equipment, 2012/19/EU. Edwards offers customers a recycling service for the product / cables / associated gauge heads at the end of the product's life. Contact Edwards for advice on how to return the PGC202 and/or cables for recycling

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Return of Edwards Equipment - Procedure

INTRODUCTION

Before returning your equipment, you must warn Edwards if substances you used (and produced) in the equipment can be hazardous. This information is fundamental to the safety of our Service Centre employees and will determine the procedures employed to service your equipment.

Complete the Declaration (HS2) and send it to Edwards before you dispatch the equipment. It is important to note that this declaration is for Edwards internal use only, and has no relationship to local, national or international transportation safety or environmental requirements. As the person offering the equipment for shipment, it is your responsibility to ensure compliance with applicable laws.

GUIDELINES

- Equipment is 'uncontaminated' if it has not been used, or if it has only been used with substances that are not hazardous. Your equipment is 'contaminated' if it has been used with any substances classified as hazardous under the UN Globally Harmonised System on the classification and labelling of chemicals (GHS), EU Regulation No 1272/2008 on classification, labelling and packaging (CLP) or US Occupational Safety and Health regulations (29CFR1910.1200, Hazard Communication).
- If your equipment has been used with radioactive substances, biological or infectious agents, mercury, polychlorinated biphenyls (PCB's), dioxins or sodium azide, you must decontaminate it before you return it to Edwards. You must send independent proof of decontamination (for example a certificate of analysis) to Edwards with the Declaration (HS2). Phone Edwards for advice.
- If your equipment is contaminated, you must either:
 - Remove all traces of contamination (to the satisfaction of laws governing the transportation of dangerous/hazardous substances).
 - Or, properly classify the hazard, mark, manifest and ship the equipment in accordance with applicable laws governing the shipment of hazardous materials.

Note: Some contaminated equipment may not be suitable for airfreight.

PROCEDURE

1. Contact Edwards and obtain a Return Authorisation Number* for your equipment.
2. Complete the Return of Edwards Equipment - Declaration (HS2).
3. If the equipment is contaminated, you must contact your transporter to ensure that you properly classify the hazard, mark, manifest and ship the equipment, in accordance with applicable laws governing the shipment of contaminated/hazardous materials. As the person offering the equipment for shipment, it is your responsibility to ensure compliance with applicable law. **Note: Equipment contaminated with some hazardous materials, such as semiconductor by-products, may not be suitable for airfreight - contact your transporter for advice.**
4. Remove all traces of hazardous gases: pass an inert gas through the equipment and any accessories that will be returned to Edwards. Where possible, drain all fluids and lubricants from the equipment and its accessories.
5. Seal up all of the equipment's inlets and outlets (including those where accessories were attached) with blanking flanges or, for uncontaminated product, with heavy gauge tape.
6. Seal equipment in a thick polythene/polyethylene bag or sheet.
7. If the equipment is large, strap the equipment and its accessories to a wooden pallet. If the equipment is too small to be strapped to a pallet, pack it in a suitable strong box.
8. E-mail via scan, fax or post a copy of the original with signature of the Declaration (HS2) to Edwards. The Declaration must arrive before the equipment.
9. Give a copy of the Declaration (HS2) to the transporter. You must tell your transporter if the equipment is contaminated.
10. Seal the original Declaration in a suitable envelope: attach the envelope securely to the outside of the equipment package, in a clear weatherproof bag.

WRITE YOUR RETURN AUTHORISATION NUMBER* CLEARLY ON THE OUTSIDE OF THE ENVELOPE OR ON THE OUTSIDE OF THE EQUIPMENT PACKAGE.

** not applicable in Japan*

Return of Edwards Equipment - Declaration

Return Authorisation Number: _____

You must:

- Know about all of the substances which have been used and produced in the equipment before you complete this Declaration
- Read the Return of Edwards Equipment - Procedure (HS1) before you complete this Declaration
- Contact Edwards to obtain a Return Authorisation Number and to obtain advice if you have any questions
- Send this form to Edwards before you return your equipment as per the procedure in HS1

SECTION 1: EQUIPMENT

Manufacturer's Product Name _____
 Manufacturer's Part Number _____
 Manufacturer's Serial Number _____

Has the equipment been used, tested or operated?
 YES, Used or operated Go to Section 2
 YES, Tested, but not connected to any process or
 production equipment, and only exposed to Nitrogen,
 Helium or Air Go to Section 4
 NO Go to Section 4

IF APPLICABLE:

Tool Identification Number _____
 Tool Manufacturer/OEM _____
 Tool Model _____
 Process _____
 Installed Date _____ De-installed Date _____
 Part Number of Replacement Equipment _____
 Serial Number of Replacement Equipment _____
 Pump datalog attached? YES NO
 (Edwards Internal Use Only)

SECTION 2: SUBSTANCES IN CONTACT WITH THE EQUIPMENT

Are any substances used or produced in the equipment:

- Radioactive, biological or infectious agents, mercury, poly chlorinated biphenyls (PCBs), dioxins or sodium azide? (if YES, see Note 1) YES NO
- Hazardous to human health and safety? YES NO

Note 1: Edwards will not accept delivery of any equipment that is contaminated with radioactive substances, biological/infectious agents, mercury, PCB's, dioxins or sodium azide, unless you:

- Decontaminate the equipment
- Provide proof of decontamination

YOU MUST CONTACT EDWARDS FOR ADVICE BEFORE YOU RETURN SUCH EQUIPMENT

SECTION 3: LIST OF SUBSTANCES IN CONTACT WITH THE EQUIPMENT

Substance name	Chemical Symbol	Precautions required (for example, use protective gloves, etc.)	Action required after a spill, leak or exposure

SECTION 4: RETURN INFORMATION

Reason for return and symptoms of malfunction: _____

For how many hours has the product run? _____ Do you wish to purchase a full Failure Analysis report? YES NO

If you have a warranty claim:

- who did you buy the equipment from? _____
- give the supplier's invoice number _____

SECTION 5: DECLARATION

Print your name: _____ Print your job title: _____

Print your organisation: _____

Print your address: _____

Telephone number: _____ Date of equipment delivery: _____

I have made reasonable enquiry and I have supplied accurate information in this Declaration. I have not withheld any information, and I have followed the Return of Edwards Equipment - Procedure (HS1).

Signed: _____ Date: _____

Note: Please print out this form, sign it and return the signed form as hard copy.

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