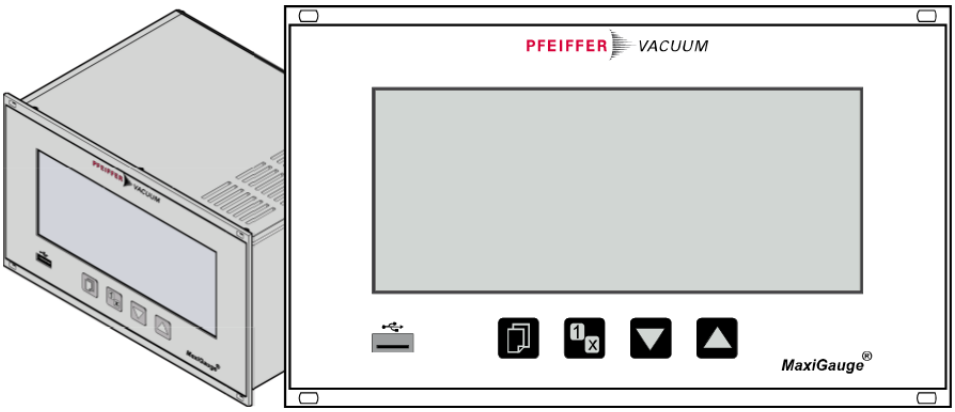


COMMUNICATION PROTOCOL

EN

Translation of the Original

TPG 366

MaxiGauge®, Total pressure measurement and control unit for ActiveLine gauges

BG 5511 BEN (2018-08)

PFEIFFER VACUUM

Product identification

→ Operating manual for MaxiGauge TPG 366, BG 5501 BEN

Validity

This document is valid for products with the article numbers

PT G28 770 (TPG 366, MaxiGauge)

The article numbers (P/N) can be found on the rating plate.

This document is based on firmware version V010100.

If the device is not functioning as described, check that your device is equipped with this firmware version (→ 32).

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

Proper use

The serial interface permits the operation of the TPG 366 via a computer or a terminal.

Brand

MaxiGauge® Pfeiffer Vacuum GmbH
FullRange® Pfeiffer Vacuum GmbH

Contents

The symbol (→ 🗎 XY) is used for page references in the text, and the symbol (→ 🕮 [Z]) is used for references to other documents given in the list of references.

1 Mnemonics protocol

The serial interface permits communication of the TPG 366 with a computer. A terminal can also be connected for test purposes.

When switched on, the device begins continuous transmission of the measured value at an intervals 1 second. When the first character is sent to the device, the automatic measured value transmission stops, but can be re-started using the command **COM** after any parameter changes have been made (→ 🗎 8).

It should be noted that for commands containing channel-specific parameters, the number of values must match the number of channels.

Example: Send: **OFC** [,a,b,c,d,e,f]

1.1 Installation

→ Operating manual for MaxiGauge TPG 366, BG 5501 BEN

1.2Data transmission

The exchange of information is carried out bidirectionally, i.e. data and control commands can be exchanged in both directions.

Configuration of the interface

→ Operating manual for MaxiGauge TPG 366, BG 5501 BEN

Data format

1 start bit, 8 data bits, no parity bit, 1 stop bit, no hardware handshake

Definitions

The following abbreviations and symbols are used:

Symbol	Meaning	Dec	Hex
HOST	Computer or terminal		
[...]	Elements not compulsorily specified		
ASCII	American Standard Code for Information Interchange		
<ETX>	END OF TEXT (CTRL C) Reset of the interface	3	03
<CR>	CARRIAGE RETURN Return	13	0D
<LF>	LINE FEED Line feed	10	0A
<ENQ>	ENQUIRY Request for data transmission	5	05
<ACK>	ACKNOWLEDGE Positive feedback	6	06
<NAK>	NEGATIVE ACKNOWLEDGE Negative feedback	21	15

"Send": Transfer from the HOST to the TPG 366.
"Receive": Transfer from the TPG 366 to the HOST.

Flow control

The HOST must wait for receipt of acknowledgment (<ACK><CR><LF> oder <NAK><CR><LF>) after each ASCII string.

The input buffer of the HOST must have a capacity of at least 32 bytes.

1.3 Communication protocol

Send format

The messages are sent in the form of mnemonics (command codes) and parameters as ASCII strings to the TPG 366. All mnemonics comprise three ASCII characters.

Spaces are ignored. <ETX> (CTRL C) clears the input buffer in the TPG 36x.

Do not transmit any LINE FEEDS (<LF>) via the RS-485 half duplex line for fear they could cause data collisions on the bus.

The use of LINE FEED is generally allowed for other interfaces (USB, Ethernet), but should be avoided for reasons of time.

Send protocol

HOST	TPG 366	Explanation
Mnemonics [and parameters] <CR>[<LF>]	——————> ——————————>	Receives message with "End message"
<——————————	<ACK><CR><LF>	Positive confirmation of a received message

Receive format

On request via mnemonics, the TPG 366 transmits the measurement data or parameters in the form of ASCII strings to the HOST.

<ENQ> must be sent as a request for transmission of an ASCII string. Repeated sending of <ENQ> exports other strings, in accordance with the last selected mnemonic.

<ENQ> without a valid request sends the ERROR word.

Receive protocol

HOST	TPG 366	Explanation
Mnemonics [and parameters] <CR>[<LF>]	——————> ——————————>	Receives message with "End message"
<——————————	<ACK><CR><LF>	Positive confirmation of a received message
<ENQ>	——————————>	Request for data transmission
<—————— Measured values or parameters <————————————	<CR><LF>	Sends data with "End message"
:		:
<ENQ>	——————————>	Request for data transmission
<—————— Measured values or parameters <————————————	<CR><LF>	Sends data with "End message"

Error handling

Entered strings are checked on the TPG 366. In the event of an error, negative confirmation <NAK> is issued.

Error detection protocol

HOST	TPG 366	Explanation
Mnemonics [and parameters] <CR>[<LF>]	——————> ——————————>	Receives message with "End message"
***** Transmission or programming error *****		
<——	<NAK><CR><LF>	Negative confirmation of a received message
Mnemonics [and parameters] <CR>[<LF>]	——————> ——————————>	Receives message with "End message"
<——————————	<ACK><CR><LF>	Positive confirmation of a received message

1.4 Mnemonics Table

			→
ADC	A/D Converter test	A/D converter test	29
AYT	Are you there?	Device identification	34
BAL	Backlight	Backlighting	21
BAU	Transmission rate (USB)	Transmission rate for serial interface (USB)	21
CAL	Calibration factor	Calibration factor	15
CDA	Calibration date	Re-calibration date	29
CID	Channel identifier	Sensor name	15
CFx	Calibration factor gauge 1 … 6	Calibration factor of gauge 1 … 6	16
COM	Continuous mode of measurement values	Continuous output of measured values	8
CPR	Combined pressure (linear gauges)	Combined measuring range (linear gauges)	9
DAT	Date	Date	28
DCB	Display control bar graph	Bar graph display	22
DCC	Display control contrast	Display contrast	23
DCD	Display resolution	Display resolution	16
DCS	Display control screensaver	Screensaver	23
DGS	Degas	Degas	17
DIS	Display test	Display test	30
EEP	EEPROM test	EEPROM test	30
EPR	FLASH test	FLASH test	30
ERA	Error relay allocation	Error relay allocation	24
ERR	Error status	Error status	10
ETH	Ethernet configuration	Ethernet configuration	34
EVA	Measurement range end value	Measuring range end value	24
FIL	Measurement value filter	Measured value filter	17
FMT	Number format (measurement value)	Number format (measurement output)	24
FSR	Measurement range (linear gauges)	Measuring range (linear gauges)	18
GAS	Gas type correction	Gas type correction	18
HDW	Hardware version	Hardware version	30
IOT	I/O test	I/O test	31
LCM	Start/stop data logger	Start/stop data logger	28
LNG	Language (display)	Language (user interface)	25
LOC	Keylock	Input lock	31
MAC	Ethernet MAC address	Ethernet MAC address	32
NAD	Node (device) address for RS485	Node address (device address for RS485	25
OFC	Offset correction (linear gauges)	Offset correction (linear gauges)	19
OFD	Offset display (linear gauges)	Offset display (linear gauges)	19
PNR	Firmware version	Firmware version	32
PRn	Measurement data and status for gauges 1 … 6	Pressure and status for gauges 1 … 6	10
PRE	Pirani range extension	Pirani range extension	25
PRO	Protocol serial interface	Protocol for serial interface	26
PRX	Measurement data and status for all gauges	Pressure and status for all gauges	11
PUC	Penning underrange control	Measuring underrange control	26
RES	Reset	Device re-start	12
RHR	Operating hours	Operating hours	32
SAV	Save parameters (EEPROM)	Save default values (EEPROM)	26
SCx	Gauge 1 … 6 control	Control for gauge 1 … 6	20
SCM	Save/load parameters (USB)	Save/read parameters (USB)	29

SEN	Gauge on/off	Switch gauge on/off	13
SPx	Switching function 1 … 6	Switching function 1 … 6	14
PLC	Switching function status	Switching function status	14
TAI	Test A/D converter, ID resistance	Test A/D converter, ID resistance	32
TAS	Test A/D sensor	Test A/D converter measured value inputs	32
TID	Gauge identification	Gauge identification	13
TIM	Time	Time	28
TKB	Operator key test	Operator key test	33
TLC	Torr lock	Torr lock	33
TMP	Inner temperature of the unit	Inner device temperature	33
UNI	Pressure unit	Pressure unit	27
WDT	Watchdog control	Watchdog malfunction	34

1.5 Measuringmode

1.5.1 COM - Continuous measured value output

Send: **COM** [,a] <CR>[<LF>]

	Description
a	Mode, a = 0 –> 100 ms 1 –> 1 s (default) 2 –> 1 minute

Receive: <ACK><CR><LF>

The continuous measured value output directly follows <ACK> at the required time interval

Receive: b,sx.xxxxEsxx,b,sx.xxxxEsxx,b,sx.xxxxEsxx,
b,sx.xxxxEsxx,b,sx.xxxxEsxx,b,sx.xxxxEsxx <CR><LF>

	Description
b	Status of the gauge, b = 0 –> Measuring data OK 1 –> Measuring range underrange 2 –> Measuring range overrange) 3 –> Sensor error 4 –> Sensor switched off (IKR, PKR, IMR, PBR) 5 –> No gauge (output: 5,2.0000E-2 [hPa]) 6 –> Identification error
sx.xxxxEsxx	Measured value gauge [1] [current unit of measurement] (s = algebraic sign)

[1] Values always in exponential form.

The third and fourth decimal places is always 0 for logarithmic gauges.

1.5.2 CPR - Combined measuring range (linear gauges)

If multiple linear gauges with different fullscales (F.S.) are connected to the TPG 366, this command is used to combine the various measuring ranges into one measuring range. This means that the pressure in this combined measuring range can be determined with the best possible accuracy.

If the pressure is greater than the fullscale of the guage with smaller fullscale, there is a switchover to the gauge with larger fullscale.

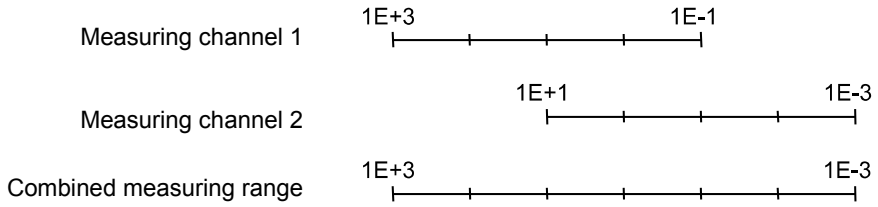
If only one linear gauge is connected, the measured value from that gauge is output.

If no linear gauge is connected, 1000 hPa is output as the measured value and the parameters a and b are on "0"

Example

Measuring channel 1: linear gauge, 1000 hPa F.S.

Measuring channel 2: linear gauge, 10 hPa F.S.



Send command: CPR,1,2,0 or
CPR,1,2 or
CPR,2,1

Send: **CPR** [,a,b,c] <CR>[<LF>]

	Description
a	Measuring channel of the selected gauge, a =
	0 –> no linear gauge connected
	1 –> Measuring channel 1
	2 –> Measuring channel 2
	3 –> Measuring channel 3
	4 –> Measuring channel 4
	5 –> Measuring channel 5
	6 –> Measuring channel 6
b	Measuring channel of the selected gauge
c	Measuring channel of the selected gauge

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a,b,c,sx.xxxxEsxx

	Description
a	Measuring channel of the selected gauge
b	Measuring channel of the selected gauge
c	Measuring channel of the selected gauge
sx.xxxxEsxx	Combined measured value [1] [current unit of measurement]
	(s = algebraic sign)

[1] Values always in exponential form.

1.5.3 ERR - Error status

Send: **ERR** <CR>[<LF>] Error status

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: aaaa <CR><LF>

	Description
aaaa	error status, aaaa = 0000 –> no error 1000 –> ERROR (see display on front panel) 0100 –> NO HWR (hardware not installed) 0010 –> PAR (non-permitted parameters) 0001 –> SYN (wrong syntax)

The error status is cleared on export, but is issued again if the error remains or if there is a further error.

1.5.4 PRn - Pressure of gauge 1 … 6

Send: **PRn** <CR>[<LF>]

	Description
n	Measured value, n = 1 –> Gauge 1 2 –> Gauge 2 3 –> Gauge 3 4 –> Gauge 4 5 –> Gauge 5 6 –> Gauge 6

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a,sx.xxxxEsxx <CR><LF>

	Description
a	Status, a = 0 –> Measuring data OK 1 –> Measuring range underrange 2 –> Measuring range overrange) 3 –> Sensor error 4 –> Sensor switched off (IKR, PKR, IMR, PBR) 5 –> No gauge (output: 5,2.0000E-2 [hPa]) 6 –> Identification error
sx.xxxxEsxx	Measured value [1] [current unit of measurement] (s = algebraic sign)

[1] Values always in exponential form.
The third and fourth decimal places is always 0 for logarithmic gauges.

1.5.5 PRX - Pressure of gauges 1 … 6

Send: **PRX** <CR>[<LF>]

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a,sx.xxxxEsxx,a,sx.xxxxEsyy,a,sx.xxxxEsyy
a,sx.xxxxEsyy,a,sx.xxxxEsyy,a,sx.xxxxEsyy <CR><LF>

	Description
a	Gauge status, a = 0 –> Measuring data OK 1 –> Measuring range underrange 2 –> Measuring range overrange) 3 –> Sensor error 4 –> Sensor switched off (IKR, PKR, IMR, PBR) 5 –> No gauge (output: 5,2.0000E-2 [hPa]) 6 –> Identification error
sx.xxxxEsxx	Measured value gauge [1] [current unit of measurement] (s = algebraic sign)

[1] Values always in exponential form.

The third and fourth decimal places is always 0 for logarithmic gauges.

1.5.6 RES - Device restart

Send: **RES** [,a] <CR>[<LF>]

	Description
a	a = 1 –> Re-start of the device and return to measuring mode

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: b[,b][,b][…] <CR><LF>

	Description
b	List of current error messages, b = 0 –> no error 1 –> Watchdog has triggered 2 –> One or more tasks not completed 3 –> FLASH error 4 –> RAM error 5 –> EEPROM error 6 –> DISPLAY error 7 –> A/D converter error 8 –> UART error 9 –> Gauge 1 error (e.g. wire break, no supply) 10 –> Gauge 1 identification error 11 –> Gauge 2 error (e.g. wire break, no supply) 12 –> Gauge 2 identification error 13 –> Gauge 3 error (e.g. wire break, no supply) 14 –> Gauge 3 identification error 15 –> Gauge 4 error (e.g. wire break, no supply) 16 –> Gauge 4 identification error 17 –> Gauge 5 error (e.g. wire break, no supply) 18 –> Gauge 5 identification error 19 –> Gauge 6 error (e.g. wire break, no supply) 20 –> Gauge 6 identification error

1.5.7 SEN - Switching gauges on/off

Send: **SEN** [,a,b,c,d,e,f] <CR>[<LF>]

	Description
a	Gauge 1, a =
	0 –> no change
	1 –> switch off gauge
	2 –> switch on gauge
b	Gauge 2
⋮	⋮
f	Gauge 6

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a,b,c,d,e,f <CR><LF>

	Description
a	Gauge 1 status, a =
	0 –> Gauge cannot be switched on/off
	1 –> Gauge is switched off
	2 –> Gauge is switched on
b	Gauge 2 status
⋮	⋮
f	Gauge 6 status

1.5.8 TID - Gauge identification

Send: **TID** <CR>[<LF>] Gauge identification

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a,b,c,d,e,f <CR><LF>

	Description
a	Identification Gauge 1, a =
	TPR/PCR (Pirani Gauge or Pirani Capacitance Gauge)
	IKR (Cold Cathode Gauge 10^{-9} and 10^{-11})
	PKR (FullRange® CC Gauge)
	PBR (FullRange® BA Gauge)
	IMR (Pirani / High Pressure Gauge)
	CMR/APR (linear gauge)
	noSENSOR (no gauge)
	noIDENT (no identification)
b	Identification Gauge 2
⋮	⋮
f	Identification Gauge 6

1.6 Switching function-parameter group

1.6.1 PLC - Switching function status

Send: **SPS** <CR>[<LF>]

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a,b,c,d,e,f <CR><LF>

	Description
a	Switching function status 1, a = 0 –> off 1 –> on
b	Switching function 2 status
⋮	⋮
f	Switching function 6 status

1.6.2 SP1 … SP6 - Switching - function 1 … 6

Send: **SPx** [,a,x.xxxxEsxx,y.yyyyEsyy] <CR>[<LF>]

	Description
x	Switching function, x = 1 –> Switching function 1 2 –> Switching function 2 3 –> Switching function 3 4 –> Switching function 4 5 –> Switching function 5 6 –> Switching function 6
a	Switching function allocation, a = 0 –> Switched off 1 –> Switched on 2 –> Measuring channel 1 3 –> Measuring channel 2 4 –> Measuring channel 3 5 –> Measuring channel 4 6 –> Measuring channel 5 7 –> Measuring channel 6
x.xxxxEsxx	lower threshold value [1)] [current unit of measurement] (default = gauge-dependent) (s = algebraic sign)
y.yyyyEsyy	upper threshold value [1)] [current unit of measurement] (default = gauge-dependent) (s = algebraic sign)

[1)] The entered number format is not relevant. This is always converted internally into a floating point format.

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a,x.xxxxEsxx,y.yyyyEsyy <CR><LF>

	Description
a	Switching function allocation
x.xxxxEsxx	lower threshold value [current unit of measurement] (s = algebraic sign)
y.yyyyEsyy	upper threshold value [current unit of measurement] (s = algebraic sign)

1.7 Gauges controlgroup

1.7.1 CAL - calibration factor

Prerequisite: The "GAS" parameter is set to "7" (other gases) (→ 🗎 18). Except for linear gauges.

The calibration factor is effective in the entire measuring range of the gauge.

Send: **CAL** [,a.aaa,b.bbb,c.ccc,d.ddd,e.eee,f.fff] <CR>[<LF>]

	Description
a.aaa	Calibration factor for gauge 1, 0.100 … 10.000 (default = 1.000)
b.bbb	Calibration factor for gauge 2
⋮	⋮
f.fff	Calibration factor for gauge 6

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a.aaa,b.bbb,c.ccc,d.ddd,e.eee,f.fff <CR><LF>

	Description
a.aaa	Calibration factor for gauge 1
⋮	⋮
f.fff	Calibration factor for gauge 6

1.7.2 CID - Sensor name

Name of the sensor (max. 8 characters). Only capital letters, numbers and underlines permitted.

Send: **CID** [,aaaaaaaa,bbbbbbbb,cccccccc,dddddddd,eeeeeeee,ffffffff] <CR>[<LF>]

	Description
aaaaaaaa	Name of sensor 1
⋮	⋮
ffffffff	Name of sensor 6

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: aaaaaaaa,bbbbbbbb,cccccccc,dddddddd,eeeeeeee,ffffffff <CR><LF>

	Description
aaaaaaaa	Name of sensor 1
⋮	⋮
ffffffff	Name of sensor 6

1.7.3 CF1 … CF6 - Calibration factor for gauges 1 to 6

Send: **CFx** [,a.aaa] <CR>[<LF>]

	Description
x	Calibration factor for gauge x = 1 –> Gauge 1 2 –> Gauge 2 3 –> Gauge 3 4 –> Gauge 4 5 –> Gauge 5 6 –> Gauge 6
a.aaa	Calibration factor for gauge x, 0.100 … 10.000 (default = 1.000)

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a.aaa <CR><LF>

	Description
a.aaa	Calibration factor for gauge x

1.7.4 DCD - Display resolution

Send: **DCD** [,a,b,c,d,e,f] <CR>[<LF>]

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a,b,c,d,e,f <CR><LF>

	Description
a	Number of points on measuring channel 1, a = 0 –> AUTO (default) 1 –> One point 2 –> Two points 3 –> Three points 4 –> Four points
b	Number of points on measuring channel 2
⋮	⋮
f	Number of points on measuring channel 6

The display is reduced by one decimal place for PCR gauges in the pressure range p<1.0E-4 hPa and activated PrE (→ 🗎 25).

1.7.5 DGS - Degas

Send: **DGS** [,a,b,c,d,e,f] <CR>[<LF>]

	Description
a	Degas gauge 1, a =
	0 –> Degas off (default)
	1 –> Degas on (3 minutes)
b	Degas gauge 2
⋮	⋮
f	Degas gauge 6

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a,b,c,d,e,f <CR><LF>

	Description
a	Degas status of gauge 1
⋮	⋮
f	Degas status of gauge 6

1.7.6 FIL - Measured value filter

Send: **FIL** [,a,b,c,d,e,f] <CR>[<LF>]

	Description
a	Filter for gauge 1, a =
	0 –> Filter switched off
	1 –> fast
	2 –> normal
	3 –> slow
b	Filter for gauge 2
⋮	⋮
f	Filter for gauge 6

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a,b,c,d,e,f <CR><LF>

	Description
a	Filter time constant for gauge 1
⋮	⋮
f	Filter time constant for gauge 6

1.7.7 FSR - Measuring range (linear gauges)

Send: **FSR** [,a,b,c,d,e,f] <CR>[<LF>]

	Description
a	Measuring range end value for gauge 1, a =
	0 –> 0.01 hPa
	1 –> 0.1 hPa
	2 –> 1 hPa
	3 –> 10 hPa
	4 –> 100 hPa
	5 –> 1000 hPa (default)
	6 –> 2000 hPa
	7 –> 5000 hPa
	8 –> 10000 hPa
	9 –> 50000 hPa
b	Measuring range end value for gauge 2
⋮	⋮
f	Measuring range end value for gauge 6

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a,b,c,d,e,f <CR><LF>

	Description
a	Measuring range end value for gauge 1
⋮	⋮
f	Measuring range end value for gauge 6

1.7.8 GAS - Gas correction

Send: **GAS** [,a,b,c,d,e,f] <CR>[<LF>]

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a,b,c,d,e,f <CR><LF>

	Description
a	Gas correction for gauge 1, a =
	0 –> Nitrogen / air (default)
	1 –> Argon
	2 –> Hydrogen
	3 –> Helium
	4 –> Neon
	5 –> Krypton
	6 –> Xenon
	7 –> Other gas Enter calibration factor for other gases via command "CAL" (→ 🖹 15)
b	Gas correction for gauge 2
⋮	⋮
f	Gas correction for gauge 6

1.7.9 OFC - Offset correction (linear gauges)

Send: **OFC** [,a,b,c,d,e,f] <CR>[<LF>]

	Description
a	Offset correction gauge 1, a =
	0 –> Off (default)
	1 –> On
	2 –> Determine offset value and switch on offset correction
b	Offset correction gauge 2
⋮	⋮
f	Offset correction gauge 6

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a,b,c,d,e,f <CR><LF>

	Description
a	Offset correction gauge 1
⋮	⋮
f	Offset correction gauge 6

1.7.10 OFD - Offset display (linear gauges)

Send: **OFD** [,sa.aaaaEsaa,sa.aaaEsaa,sa.aaaaEsaa,
sa.aaaaEsaa,sa.aaaaEsaa,sa.aaaaEsaa] <CR>[<LF>]

	Description
sa.aaaaEsaa	Offset gauge [1)], [current unit of measurement] (default = 0.0000E+00)
	s = algebraic sign

[1)] The entered number format is not relevant. This is always converted internally into a floating point format.

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: sa.aaaaEsaa,sa.aaaaEsaa,sa.aaaaEsaa,
sa.aaaaEsaa,sa.aaaaEsaa,sa.aaaaEsaa <CR><LF>

	Description
sa.aaaaEsaa	Offset gauge [1)] (s = algebraic sign)

1.8 Gauges controlgroup

1.8.1 SC1 ... SC6 - Control for gauges 1 to 6

Send: **SCx** [,a,b,c.ccEscc,d.ddEsdd] <CR>[<LF>]

	Description
x	Controlled gauge, x =
	1 –> Gauge 1
	2 –> Gauge 2
	3 –> Gauge 3
	4 –> Gauge 4
	5 –> Gauge 5
	6 –> Gauge 6
a	Gauge switch-on type, a =
	0 –> Manual (default)
	1 –> Warm start
	2 –> External
	3 –> Via measuring channel 1
	4 –> Via measuring channel 2
	5 –> Via measuring channel 3
	6 –> Via measuring channel 4
	7 –> Via measuring channel 5
	8 –> Via measuring channel 6
b	Gauge switch-off type, b =
	0 –> Manual (default)
	1 –> Self-monitoring
	2 –> External
	3 –> Via measuring channel 1
	4 –> Via measuring channel 2
	5 –> Via measuring channel 3
	6 –> Via measuring channel 4
	7 –> Via measuring channel 5
	8 –> Via measuring channel 6
c.ccEscc	Switch-on value (s = algebraic sign)
d.ddEsdd	Switch-off value (s = algebraic sign)

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a,b,c.ccEscc,d.ddEsdd <CR><LF>

	Description
a	Gauge switch-on type
b	Gauge switch-off type
c.ccEscc	Switch-on value (s = algebraic sign)
d.ddEsdd	Switch-off value (s = algebraic sign)

1.9 General parameters-group

1.9.1 BAL - Backlighting

Send: **BAL** [,a] <CR>[<LF>]

	Description
a	Backlighting in percent, a = 0 … 100 100% is full brightness

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a <CR><LF>

	Description
a	Backlighting

1.9.2 BAU - Transmission rate for serial interface (USB)

Send: **BAU** [,a] <CR>[<LF>]

	Description
a	Transmission rate, a = 0 –> 9600 Baud (default) 1 –> 19200 Baud 2 –> 38400 Baud 3 –> 57600 Baud 4 –> 115200 Baud

The transmission rate of the RS485 interface is 9600 Baud and cannot be changed.

When changing over, the response is sent with the changed Baud rate already.

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: x <CR><LF>

	Description
a	Transmission rate

1.9.3 DCB - Bar graph display

Send: **DCB** [,a,b] <CR>[<LF>]

	Description
a	Measuring channel, a =
	0 –> Measuring channel 1
	1 –> Measuring channel 2
	2 –> Measuring channel 3
	3 –> Measuring channel 4
	4 –> Measuring channel 5
	5 –> Measuring channel 6
b	Bar graph display, b =
	0 –> Off (default)
	1 –> Bar graph across entire measuring range of the gauge
	2 –> Bar graph across entire measuring range of the gauge, high display
	3 –> Bar graph across entire measuring range of the gauge and switch point threshold value
	4 –> Bar graph over a decade according to current measured value
	5 –> Bar graph over a decade according to current measured value, high display
	6 –> Bar graph over a decade according to current measured value and switch point threshold value
	7 –> p = $f_{(t)}$, auto-scaled, 0.2 second/pixel For each measuring channel, a measured value is stored in the table every 200 ms and the last 100 measured values (=100 pixels) are displayed auto-scaled. The data range displayed corresponds to a recording duration of 20 seconds.
	8 –> p = $f_{(t)}$, auto-scaled, 1 second/pixel For each measuring channel, a measured value is stored in the table every second and the last 100 measured values (=100 pixels) are displayed auto-scaled. The data range displayed corresponds to a recording duration of 100 seconds.
	9 –> p = $f_{(t)}$, auto-scaled, 6 seconds/pixel For each measuring channel, a measured value is stored in the table every 6 seconds and the last 100 measured values (=100 pixels) are displayed auto-scaled. The data range displayed corresponds to a recording duration of 10 minutes.
	10 –> p = $f_{(t)}$, auto-scaled, 1 minute/pixel For each measuring channel, a measured value is stored in the table every minute and the last 100 measured values (=100 pixels) are displayed auto-scaled. The data range displayed corresponds to a recording duration of 100 minutes.
	11 –> p = $f_{(t)}$, auto-scaled, 30 minutes/pixel For each measuring channel, a measured value is stored in the table every 30 minutes and the last 100 measured values (=100 pixels) are displayed auto-scaled. The data range displayed corresponds to a recording duration of 50 hours.
	12 –> For the selected measuring channel the sensor type and the sensor name are displayed.
	13 –> For the selected measuring channel the sensor type and the assigned switch points are displayed.

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a,b <CR><LF>

	Description
a	Measuring channel
b	Bar graph display

1.9.4 DCC - Display contrast

Send: **DCC** [,a] <CR>[<LF>]

	Description
a	Contrast in percent, a = 0 … 100 100% is full contrast

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a <CR><LF>

	Description
a	Contrast

1.9.5 DCS - Screensaver

Send: **DCS** [,a] <CR>[<LF>]

	Description
a	Screensaver, a = 0 –> Off (default) 1 –> After 10 minutes 2 –> After 30 minutes 3 –> After 1 hour 4 –> After 2 hours 5 –> After 8 hours 6 –> Switches the backlighting off completely after 1 minute

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a <CR><LF>

	Description
a	Screensaver

1.9.6 ERA - Error relay allocation

Send: **ERA** [,a] <CR>[<LF>]

	Description
a	Error relay switch response, a = 0 –> Switches with all errors (default) 1 –> Device errors only 2 –> Sensor 1 error and device error 3 –> Sensor 2 error and device error ⋮ 7 –> Sensor 6 error and device error

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a <CR><LF>

	Description
a	Error relay switch response

1.9.7 EVA - Measuring range end value

Send: **EVA** [,a] <CR>[<LF>]

	Description
a	Measuring range end value display, a = 0 –> With a measuring range underrun- or -overrun, UR or OR is displayed (default) 1 –> With a measuring range underrun- or -overrun, the corresponding measuring range end value is displayed

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a <CR><LF>

	Description
a	Measuring range end value

1.9.8 FMT - Number format (measured value output)

Send: **FMT** [,a] <CR>[<LF>]

	Description
a	Number format (measurement output), a = 0 –> Floating point number, if displayable (default) 1 –> Exponential display x.xEsy 2 –> Exponential display x.xsy

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a <CR><LF>

	Description
a	Number format

1.9.9 LNG - Language (user interface)

Send: **LNG** [,a] <CR>[<LF>]

	Description
a	Language, a = 0 –> English (default) 1 –> German 2 –> French

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a <CR><LF>

	Description
a	Language

1.9.10 NAD - Node address (device address) for RS485

Send: **NAD** [,a] <CR>[<LF>]

	Description
a	Device address, a = 1 … 24 (1 = default)

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a <CR><LF>

	Description
a	Device address

1.9.11 PRE - Pirani-range expansion

Send: **PRE** [,a] <CR>[<LF>]

	Description
a	Pirani-range expansion, a = 0 –> Off (default) 1 –> On

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a <CR><LF>

	Description
a	Pirani-range extension

Only TPR/PCR gauges, measuring range up to 5×10^{-5} hPa.

1.9.12 PRO - Protocol for serial interface

Send: **PRO** [,a] <CR>[<LF>]

	Description
a	Protocol for serial interfaces, a = 0 –> Automatic detection (default) 1 –> Pfeiffer Vacuum protocol 2 –> Mnemonics protocol

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a <CR><LF>

	Description
a	Protocol for serial interfaces

1.9.13 PUC - Measuring underrange control

Send: **PUC** [,a] <CR>[<LF>]

	Description
a	Measuring underrange control, a = 0 –> Off (default) 1 –> On

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a <CR><LF>

	Description
a	Measuring underrange control

1.9.14 SAV - Save default values (EEPROM)

Send: **SAV** [,a] <CR>[<LF>]

	Description
a	Save the parameters on the EEPROM, a = 0 –> Save default parameters (default) 1 –> Save user parameters (user)

Receive: <ACK><CR><LF>

1.9.15 UNI - Unit of measurement

Send: **UNI** [,a] <CR>[<LF>]

	Description
a	Unit of measurement, a = 0 –> mbar/bar 1 –> Torr 2 –> Pascal 3 –> Micron 4 –> hPascal (default) 5 –> Volt

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a <CR><LF>

	Description
a	Pressure unit

1.10 Data logger parameters group

This group is only available when a USB memory stick with FAT file system (FAT32) is plugged in. Use memory sticks with ≤32 GB.

1.10.1 DAT - Date

Send: **DAT** [,yyyy-mm-dd] <CR>[<LF>]

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: yyyy-mm-dd <CR><LF>

	Description
yyyy-mm-dd	Date in the format yyyy-mm-dd

1.10.2 LCM - Start/stop data logger

For further processing of the recorded measurement data (eg with Excel), pay attention to the corresponding decimal separator (comma or dot).

Send: **LCM** [,a,b,c,ddddddd] <CR>[<LF>]

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a,b,c,ddddddd <CR><LF>

	Description
a	Data logger command, a = 0 –> Stop / recording stopped 1 –> Start / recording running 2 –> Delete / delete measuring data file from USB memory stick
b	Save interval, b = 0 –> Recording interval 1/s 1 –> Recording interval 1/10 s 2 –> Recording interval 1/30 s 3 –> Recording interval 1/60 s 4 –> Recording interval: For measured value changes ≥1% 5 –> Recording interval: For measured value changes ≥5%
c	Decimal separator, c = 0 –> , (comma) 1 –> . (point)
ddddddd	File name (max. 7 characters)

1.10.3 TIM - Time

Send: **TIM** [,hh:mm] <CR>[<LF>]

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: hh:mm <CR><LF>

	Description
hh:mm	Time in the format hh:mm [24 hours]

1.11 Setup group

This group is only available when a USB memory stick with FAT file system (FAT32) is plugged in. Use memory sticks with ≤32 GB.

1.11.1 SCM - Save/reset parameters (USB)

Send: **SCM** [,a,bb] <CR>[<LF>]

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a <CR><LF>

	Description
a	Setup parameters, a = 0 –> Save process complete (read only) 1 –> Save process running (read only) 2 –> Save parameters from USB memory stick to the device 3 –> USB memory stick is formatted 4 –> Parameter files (extension .CSV) are deleted from the USB memory stick
bb	Number in file name (0 … 99)

1.12 Test parameters group

(for service technicians)

1.12.1 ADC - A/D converter test

Send: **ADC** <CR>[<LF>]

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: aa.aaaa,bb.bbbb,cc.cccc,dd.dddd,ee.eeee,ff.ffff <CR><LF>

	Description
aa.aaaa	A/D converter channel 1 measuring signal [0.0000 … 11.0000 V]
⋮	⋮
ff.ffff	A/D converter channel 6 measuring signal [0.0000 … 11.0000 V]

CDA – Re-calibration

Send: **CDA** [,yyyy-mm-dd] <CR>[<LF>]

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: yyyy-mm-dd <CR><LF>

	Description
yyyy-mm-dd	Date of the next re-calibration. When the date is reached, a warning is displayed.

1.12.2 DIS - Display test

Send: **DIS** [,a] <CR>[<LF>]

	Description
a	Display test, a = 0 –> Stop test - display matches operating mode (default) 1 –> Start test - all LEDs on

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: x <CR><LF>

	Description
a	Display test status

1.12.3 EEP - EEPROM test

Test of the parameter memory.

Send: **EEP** <CR>[<LF>]

Receive: <ACK><CR><LF>
Send: <ENQ> starts the test (duration <1 s)

Do not repeat the test continuously (EEPROM service life).

Receive: aaaa <CR><LF>

	Description
aaaa	Error word

1.12.4 EPR - FLASH test

Test of the program memory.

Send: **EPR** <CR>[<LF>]

Receive: <ACK><CR><LF>
Send: <ENQ> starts the test (very short)

Receive: aaaa,bbbbbbbb <CR><LF>

	Description
aaaa	Error word
bbbbbbbb	Checksum (Hex)

1.12.5 HDW - Hardware version

Send: **HDW** <CR>[<LF>]

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: aaaaaa <CR><LF>

	Description
aaaaaa	Hardware version, e.g. 010100

1.12.6 IOT - I/O test

Vorsicht

Caution: Relays switch independently of pressure

Starting the test program can result in unintended results on connected control units.

Prevent the triggering of incorrect control commands or messages. Unplug the connected measurement and control cables.

Send: **IOT** [,a,bb] <CR>[<LF>]

	Description
a	Status test, a = 0 –> Test stopped 1 –> Test running
bb	Status of relay (in hex format), bb = 00 –> All relays off 01 –> Switch function relay 1 on 02 –> Switch function relay 2 on 04 –> Switch function relay 3 on 08 –> Switch function relay 4 on 10 –> Switch function relay 5 on 20 –> Switch function relay 6 on 40 –> Error relay on 7F –> All relays on

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a,bb <CR><LF>

	Description
a	Status I/O test
bb	Status of relay

Example: 24 = relay switch functions 3 and 6 on

1.12.7 LOC - Input lock

Send: **LOC** [,a] <CR>[<LF>]

	Description
a	Input lock, a = 0 –> Off (default) 1 –> On

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a <CR><LF>

	Description
a	Input lock status

1.12.8 MAC - Ethernet MAC address

Send: **MAC** <CR>[<LF>]

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: aa-aa-aa-aa-aa-aa <CR><LF>

	Description
aa-aa-aa-aa-aa-aa	Ethernet MAC address of the device: 00-A0-41-xx-xx-xx

1.12.9 PNR - Firmware version

Send: **PNR** <CR>[<LF>]

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: aaaaaa <CR><LF>

	Description
aaaaaa	Firmware version, e.g. 010100

1.12.10 RHR - Operating hours

Send: **RHR** <CR>[<LF>]

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a <CR><LF>

	Description
a	Operating hours, e.g. 24 [hours]

1.12.11 TAI - Test A/D converter, ID resistance

Send: **TAI** <CR>[<LF>]

Receive: <ACK><CR><LF>
Send: <ENQ> starts the test (very short)

Receive: a.aa,b.bb,c.cc,d.dd,e.ee,f.ff <CR><LF>

	Description
a.aa	Identification resistance of gauge 1 [kOhm]
⋮	⋮
f.ff	Identification resistance of gauge 6 [kOhm]

1.12.12 TAS - Test A/D converter measured value inputs

Send: **TAS** <CR>[<LF>]

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a.aaa,a.aaa,a.aaa,a.aaa,a.aaa,a.aaa <CR><LF>

	Description
a.aaa	Measurement voltages for gauges 1 … 6

1.12.13 TKB - Operator keys test

Send: **TKB** <CR>[<LF>]

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: abcd <CR><LF>

	Description
a	Key 1, a = 0 –> Not pressed 1 –> Pressed
b	Key 2, b = 0 –> Not pressed 1 –> Pressed
c	Key 3, c = 0 –> Not pressed 1 –> Pressed
d	Key 4, d = 0 –> Not pressed 1 –> Pressed

1.12.14 TLC - Torr lock

Send: **TLC** [,a] <CR>[<LF>]

	Description
a	Torr lock, a = 0 –> Off (default) 1 –> On

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a <CR><LF>

	Description
a	Torr lock status

1.12.15 TMP - Inner temperature of device

Inner temperature of the TPG 36x.

Send: **TMP** <CR>[<LF>]

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: aa <CR><LF>

	Description
aa	Temperature (±2 °C) [°C]

1.12.16 WDT - Watchdog malfunction

Send: **WDT** [,a] <CR>[<LF>]

	Description
a	Watchdog malfunction, a = 0 –> Manual error acknowledgment 1 –> Automatic error acknowledgment [1] (default)

[1] If the watchdog has tripped, the error is automatically acknowledged and cleared after 2 seconds.

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a <CR><LF>

	Description
a	Watchdog malfunction

1.13 Other

1.13.1 AYT - Device identification

Send: **AYT** <CR>[<LF>]

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a,b,c,d,e <CR><LF>

	Description
a	Designation of the measuring device, e.g. TPG366
b	Article number of the measuring device, e.g. PTG28770
c	Serial number of the measuring device, e.g. 44990000
d	Firmware version of the measuring device, e.g. 010100
e	Hardware version of the measuring device, e.g. 010100

1.13.2 ETH - Ethernet configuration

Send: **ETH** [,a,bbb.bbb.bbb.bbb,ccc.ccc.ccc.ccc,ddd.ddd.ddd.ddd] <CR>[<LF>]

Receive: <ACK><CR><LF>
Send: <ENQ>

Receive: a,bbb.bbb.bbb.bbb,ccc.ccc.ccc.ccc,ddd.ddd.ddd.ddd <CR><LF>

	Description
a	DHCP (dynamic host configuration protocol), a = 0 –> Static 1 –> Dynamic
bbb.bbb.bbb.bbb	IP address
ccc.ccc.ccc.ccc	Subnet address
ddd.ddd.ddd.ddd	Gateway address

1.14 Example Mnemonics

"Send (S)" and "Receive (E)" relate to the host.

S: **TID** <CR> [<LF>]	Call of the gauge identification
E: <ACK> <CR> <LF>	Positive feedback
S: <ENQ>	Query
E: TPR/PCR,CMR <CR> <LF>	Output of the gauge types
S: **SEN** <CR> [<LF>]	Call of the gauge status conditions
E: <ACK> <CR> <LF>	Positive feedback
S: <ENQ>	Query
E: 0.0 <CR> <LF>	Output of the gauge status conditions
S: **SP1** <CR> [<LF>]	Call of the parameters of the switching function 1
E: <ACK> <CR> <LF>	Positive feedback
S: <ENQ>	Query
E: 2,1.0000E-09,9.0000E-07 <CR> <LF>	Output of the threshold values
S: **SP1**,2,6.80E-3,9.80E-3 <CR> [<LF>]	Change in the threshold values of switching function 1
E: <ACK> <CR> <LF>	Positive feedback
S: **FOL**,1,2 <CR> [<LF>]	Change in the filtering (syntax error)
E: <NAK> <CR> <LF>	Negative feedback
S: <ENQ>	Query
E: 0001 <CR> <LF>	Output of the ERROR word
S: **FIL**,1,2 <CR> [<LF>]	Change in the filtering
E: <ACK> <CR> <LF>	Positive feedback
S: <ENQ>	Query
E: 1.2 <CR> <LF>	Output of the filter stages

2 Pfeiffer Vacuum protocol

2.1 Telegram frame

The Pfeiffer Vacuum protocol uses ASCII format. In other words, all data bytes are displayable characters with an ASCII code between 32 and 127 with the exception of the telegram end character carriage return (CR, ASCII 13).

The transmitted telegrams are located in a frame designed as follows, without exceptions:

Address			Action		Parameter number			Data length		…… data ……		Checksum			CR
a1	a2	a3			n1	n2	n3	d1	d2			c1	c2	c3	

Address

Address of the triggered device or responding device (slave), e.g. "042".

A separate address is assigned to the controller and to each measuring channel ("aab"):

- aa: Address of the controller [1 … 24] (factory setting: 01)
- b: Channel number {1, 2, 3, 4, 5, 6}

Ranges for measuring channel addresses: 011 … 246 (factory setting: 011 for channel 1, 012 for channel 2, 013 for channel 3, etc.).

Parameters independent of the measuring channel (e.g. device address, operating hours) are triggered via the channel number b = 0 (e.g. "200" for controller 20).

Action

"00" = Read parameters (from master to slave).

"10" = Write parameters (from master to slave), or
transmit queried parameter value (from slave to master), or
confirm written parameter value (from slave to master).

Parameter number

Number of the affected parameter, e.g. "303".

Data length

E.g. "06" for 6 characters, corresponds to the length of the "Data" field.

Data

Data in the corresponding data type (→ 🗎 38).

Checksum

Total of all ASCII characters up to before checksum modulo 256 (decimal). E.g. total = 786, 786 modulo 256 = 18. I.e. checksum = "018" (converted into ASCII string).

CR

carriage return (ASCII character 13) = telegram end.

Due to the master/slave response, data exchange always runs according to the schema: master sends (either control command or query), slave answers (acknowledgment or sending of data/error messages).

2.2 Telegrams

2.2.1 master telegrams

The device undertaking the communication (master, e.g. PC) can send three different telegrams.

Read parameters:

a1	a2	a3	0	0	n1	n2	n3	0	2	=	?	c1	c2	c3	CR

Write parameters:

a1	a2	a3	1	0	n1	n2	n3	d1	d2	……data……	c1	c2	c3	CR

2.2.2 slave telegrams

The slave device cannot start any communication itself, and only answers when it is triggered with a valid individual address. The following telegrams are possible:

Data response / control command understood:

a1	a2	a3	1	0	n1	n2	n3	d1	d2	……data……	c1	c2	c3	CR

The control command is valid and is processed by the slave. The sent data is used, and the telegram therefore looks exactly the the same as the control command.

Error message:

a1	a2	a3	1	0	n1	n2	n3	0	6	N _ _	O R L	_ A O	D N G	E G I	F E C	c1	c2	c3	CR

"NO_DEF" Parameter number does not exist

"_RANGE" Data outside the permitted range

"_LOGIC" Logical access error, e.g. writing of a read-only parameter

2.3 Data types

Depending on the content of the parameters, the data field can have different formats. The following data types are possible:

Data type	Description	Length	Example
0 – boolean_old	False / true in the form of six zeros (ASCII 48) or ones (ASCII 49)	6	000000 = false 111111 = true
1 – u_integer	Six-digit integer without algebraic sign (leading zeros)	6	000042 123456 001200
2 – u_real	Fixed number of decimal points with four digits before the point and two after the point, normalized to 0.01 (leading zeros)	6	001570 = 15.70 000020 = 0.2
4 – string	Any character string with ASCII characters ≥32 (decimal)	6	Hallo! TC_600
6 – boolean_new	False / true in the form of one zero (ASCII 48) or ones (ASCII 49)	1	0 = false 1 = true
7 – u_short_int	Three-digit integer without algebraic sign (leading zeros)	3	123 042 007
10 – u_expo_new	Positive exponential number. The first four digits contain the mantissa multiplied by 1000, and the last two contain the exponents with an offset of 20	6	100023 = 1.000E3 456711 = 4.567E-9

2.4 Parameters

Sub-address xx0 = measuring channel of independent parameters
xx1 = measuring channel 1 parameter
xx2 = measuring channel 2 parameter
⋮
xx6 = measuring channel 6 parameter

Display Display on Pfeiffer Vacuum control unit

Access type R = read, W = write

corresponds to ASCII 32 ~ corresponds to ASCII 127

Parameter no.	Sub-address	Display	Designation	Description	Data type	Access type	Unit	Min. value	Max. value
008	xx0	KeysLocked	Keys locked	0: Keys enabled 1: Keys locked	0	RW	####	000000	111111
040	xx1	DeGas#####	Degas Sensor 1	W0/1: Deactivate/activate DeGas R:0/1: Status (0: not active, 1: active) DeGas deactivates automatically after the relevant time elapses	6	RW	####	0	1
	xx2	DeGas#####	Degas Sensor 2						
	xx3	DeGas#####	Degas Sensor 3						
	xx4	DeGas#####	Degas Sensor 4						
	xx5	DeGas#####	Degas Sensor 5						
	xx6	DeGas#####	Degas Sensor 6						
041	xx1	SensEnable	Gauge 1 on/off	0: off 1: on 3: switch on/off via gauge on subsequent channel: Gauge on channel 1 via gauge on channel 2 Gauge on channel 2 via gauge on channel 3 Gauge on channel 3 via gauge on channel 4 Gauge on channel 4 via gauge on channel 5 Gauge on channel 5 via gauge on channel 6 Gauge on channel 6 via gauge on channel 1	7	RW	####	000	003
	xx2	SensEnable	Gauge 2 on/off						003
	xx3	SensEnable	Gauge 3 on/off						003
	xx4	SensEnable	Gauge 4 on/off						003
	xx5	SensEnable	Gauge 5 on/off						003
	Xx6	SensEnable	Gauge 6 on/off						003
045	xx0	Cfg#Rel#R1	Configuration of relay 1	9: always passive 10: always active 19: Sensor 1 threshold value underrun 20: Sensor 2 threshold value underrun 21: Sensor 3 threshold value underrun 22: Sensor 4 threshold value underrun 23: Sensor 5 threshold value underrun 24: Sensor 6 threshold value underrun The sensor 1/2/3/4/5/6 threshold value is only accessible via the display, or MNE protocol (SPx)	7	RW	####	009	24
046	xx0	Cfg#Rel#R2	Configuration of relay 2						
047	xx0	Cfg#Rel#R3	Configuration of relay 3						
048	xx0	Cfg#Rel#R4	Configuration of relay 4						
066	xx0	Cfg#Rel#R5	Configuration of relay 5						
067	xx0	Cfg#Rel#R6	Configuration of relay 6						
303	xx0	Error#Code	TPG error	"000000", "WrnXXX", "ErrXXX" XXX stands for the error or warning number (e.g. "Err042") "Wrn036" = device not calibrated "Err107" = sensor error /hardware faulty	4	R	####	######	~~~~~~
	xx1	Error#Code	Sensor 1 error						
	xx2	Error#Code	Sensor 2 error						
	xx3	Error#Code	Sensor 3 error						
	xx4	Error#Code	Sensor 4 error						
	xx5	Error#Code	Sensor 5 error						
	xx6	Error#Code	Sensor 6 error						
312	xx0	FW#Version	Firmware version TPG366	E.g. "010100": first firmware version	4	R	####	######	~~~~~~
314	xx0	Operat.Hrs	TPG366 operating hours	Remains the same when the max. value is reached (where applicable <999999)	1	R	h###	000000	999999
349	xx0	DeviceName	TPG366 device name	"TPG366"	4	R	####	######	~~~~~~
	xx1	DeviceName	Sensor 1 device name	"TPR###" or "IKR###" or "PKR###" or "PBR###" or "IMR###" or "CMR###" or '"PCR" or "APR" or "noSENS" or "noID##"					
	xx2	DeviceName	Sensor 2 device name						
	xx3	DeviceName	Sensor 3 device name						
	xx4	DeviceName	Sensor 4 device name						
	xx5	DeviceName	Sensor 5 device name						
	xx6	DeviceName	Sensor 6 device name						
354	xx0	HW#Version	TPG hardware version	E.g. "010100": first hardware version	4	R	####	######	~~~~~~
730	xx1	SwOn#Thrs#	Sensor 1 switch-on threshold	Range 1E-5 … 1 hPa Pressure always in hPa, regardless of the unit used on the display	10	RW	hPa#	100015	100020
	xx2	SwOn#Thrs#	Sensor 2 switch-on threshold						
	xx3	SwOn#Thrs#	Sensor 3 switch-on threshold						
	xx4	SwOn#Thrs#	Sensor 4 switch-on threshold						
	xx5	SwOn#Thrs#	Sensor 5 switch-on threshold						
	xx6	SwOn#Thrs#	Sensor 6 switch-on threshold						

Parameter no.	Sub-address	Display	Designation	Description	Data type	Access type	Unit	Min. value	Max. value
732	xx1	SwOff#Thrs	Sensor 1 switch-off threshold	Range 1E-5 … 1 hPa Pressure always in hPa, regardless of the unit used on the display	10	RW	hPa#	100015	100020
	xx2	SwOff#Thrs	Sensor 2 switch-off threshold						
	xx3	SwOff#Thrs	Sensor 3 switch-off threshold						
	xx4	SwOff#Thrs	Sensor 4 switch-off threshold						
	xx5	SwOff#Thrs	Sensor 5 switch-off threshold						
	xx6	SwOff#Thrs	Sensor 6 switch-off threshold						
740	xx1	Pressure##	Sensor 1 actual pressure value	R supplies current pressure value (000000: underrange, 999999: overrange) W writes the offset value (this is taken from the current pressurevalue) Pressure always in hPa, regardless of the unit used on the display	10	RW	hPa#	000000	999999
	xx2	Pressure##	Sensor 2 actual pressure value						
	xx3	Pressure##	Sensor 3 actual pressure value						
	xx4	Pressure##	Sensor 4 actual pressure value						
	xx5	Pressure##	Sensor 5 actual pressure value						
	xx6	Pressure##	Sensor 6 actual pressure value						
742	xx1	Press#Corr	Sensor 1 correction value	0.10 … 10.00, or analogue display	2	RW	####	000010	001000
	xx2	Press#Corr	Sensor 2 correction value						
	xx3	Press#Corr	Sensor 3 correction value						
	xx4	Press#Corr	Sensor 4 correction value						
	xx5	Press#Corr	Sensor 5 correction value						
	xx6	Press#Corr	Sensor 6 correction value						
797	xx0	RS485#Adr#	TPG device address	{010, 020, 030, … 240}	1	RW	####	000010	000240

Appendix

A: Literature

[1] www.pfeiffer-vacuum.de
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Pirani gauges TPR 261
BG 5105 BEN
Pfeiffer Vacuum GmbH, D–35614 Asslar, Germany

[2] www.pfeiffer-vacuum.de
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Pirani gauges TPR 265
BG 5177 BEN
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[3] www.pfeiffer-vacuum.de
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Pirani gauges TPR 280, TPR 281
BG 5178 BEN
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[4] www.pfeiffer-vacuum.de
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Compact Pirani Capacitance Gauge PCR 260
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[7] www.pfeiffer-vacuum.de
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BG 5115 BEN
Pfeiffer Vacuum GmbH, D–35614 Asslar, Germany

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🕮 [13] www.pfeiffer-vacuum.de
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BG 5131 BEN
Pfeiffer Vacuum GmbH, D–35614 Asslar, Germany

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Pfeiffer Vacuum GmbH, D–35614 Asslar, Germany

🕮 [15] www.pfeiffer-vacuum.de
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Compact Capacitance Gauge CMR 361 … CMR 365
BG 5136 BEN
Pfeiffer Vacuum GmbH, D–35614 Asslar, Germany

🕮 [16] www.pfeiffer-vacuum.de
Instruction manual
Compact Capacitance Gauge CMR 371 … CMR 375
BG 5138 BEN
Pfeiffer Vacuum GmbH, D–35614 Asslar, Germany

🕮 [17] www.pfeiffer-vacuum.de
Quick guide
Compact Piezo Gauge APR 250 … APR 267
BG 5127 BN
Pfeiffer Vacuum GmbH, D–35614 Asslar, Germany

🕮 [18] www.pfeiffer-vacuum.de
Installation manual
TPG 366
BG 5512 BXX
Pfeiffer Vacuum GmbH, D–35614 Asslar, Germany

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