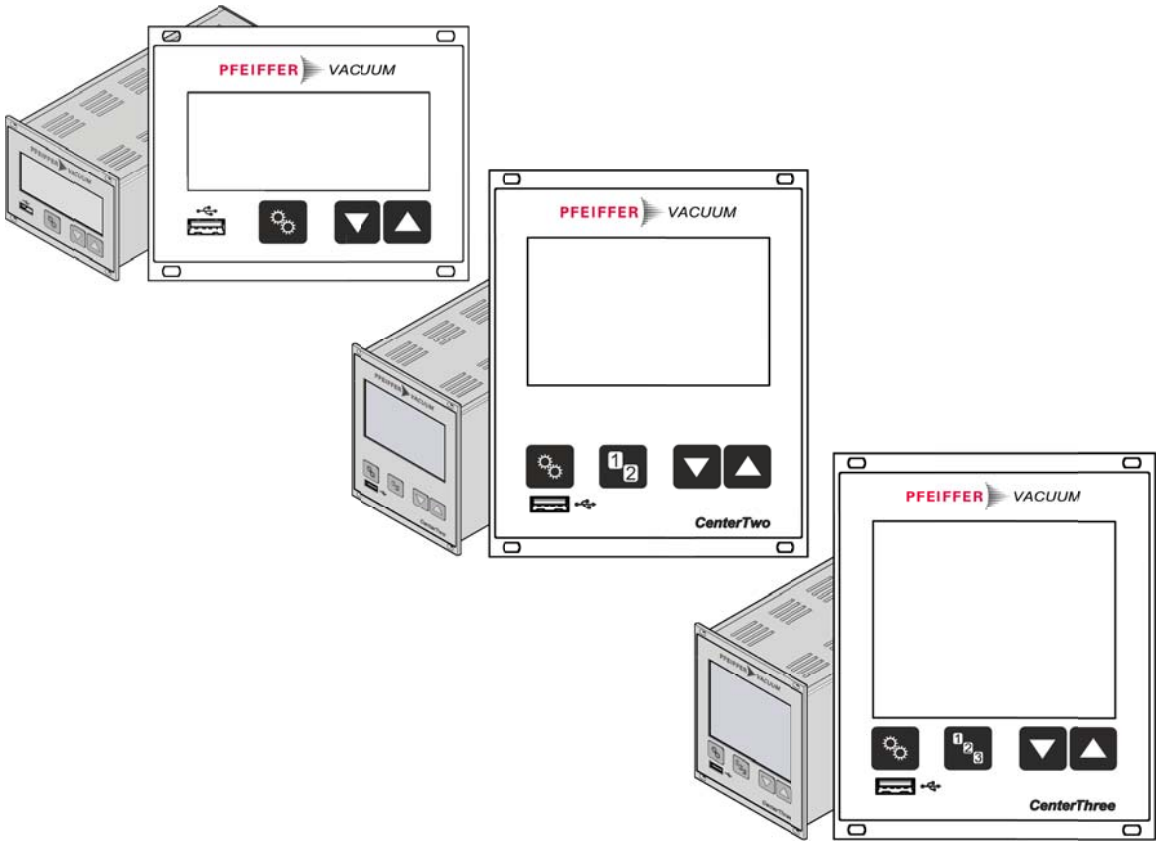



# COMMUNICATION PROTOCOL

EN

Translation of the original instructions

# CenterOne, CenterTwo, CenterThree

**Mnemonics Protocol for Single-, Dual- and Three Channel Measurement and Control Units for CenterLine Gauges**

BG 5045 BEN / A (2018-03)

PFEIFFER VACUUM

## Product Identification

CenterOne, CenterTwo and CenterThree → Operating Instructions BG 5044 BEN

## Validity

This document applies to products with part numbers:

| | |
|---|---|
| PT G28 310 | (CenterOne, Single-Channel control unit) |
| PT G28 320 | (CernterTwo, Two-Channel control unit) |
| PT G28 330 | (CenterThree, Three-Channel control unit) |

The part number (Mod.-No.) can be found on the product nameplate.

This manual is based on firmware version V1.06.

If your unit does not work as described in this document, please check that it is equipped with the above firmware version (→ 🗎 33).

If not indicated otherwise in the legends, the illustrations in this document correspond to the CenterThree (Three-Channel control unit). They apply to the CenterOne (Single-Channel control unit) and CenterTwo (Two-Channel control unit) by analogy.

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

## Intended Use

The serial interface is used for communication between the CenterOne, CenterTwo and CenterThree and a computer or a terminal.

## Trademark

FullRange® Pfeiffer Vacuum GmbH

# Contents



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

# 1 Mnemonics Protocol

The Center unit communicates with a computer via virtual serial interfaces (COM ports). Thus the user software can access the Center unit via USB Type B or via Ethernet interface.

## Communication via USB Type B interface

The corresponding driver for the virtual COM port is installed automatically, when the Center unit is connected to a computer via the USB Type B interface. If the driver is not installed automatically, it can be downloaded from the FTDI website (www.ftdichip.com/Drivers/VCP.htm).

The installed virtual COM port appears as additional serial interface in the device manager of the computer.

## Communication via Ethernet interface

With the Ethernet Configuration Tool a virtual serial interface (COM) can be assigned to an IP address. In addition, it allows configuration of the Ethernet interface via a computer (→ 🗎 33).

The installed virtual COM port appears as additional serial interface in the device manager of the computer.

When the Center unit is put into operation, it starts transmitting measured values in intervals of 1 s. As soon as the first character is transferred to the Center unit, the automatic transmission of measured values stops. After the necessary inquiries or parameter modifications have been made, the transmission of measured values can be started again with the **COM** command (→ 🗎 9).

Communication structure and procedures are identical for the three controllers CenterOne, CenterTwo and CenterThree. Therefore the term Center unit is used in this chapter.

It should be noted that mnemonics with channel specific parameters must be issued with the number of values corresponding to the number of channels of the respective device.

| | | |
|---|---|---|
| Example: | CenterOne | Transmit: **OFC** [,a] |
| | CenterTwo | Transmit: **OFC** [,a,b] |
| | ThenterThree | Transmit: **OFC** [,a,b,c] |

## 1.1 Data Transmission

The data transmission is bi-directional, i.e. data and control commands can be transmitted in either direction.

### 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 | Dez | Hex |
|---|---|---|---|
| HOST | Computer or terminal | | |
| [...] | Optional elements | | |
| ASCII | American Standard Code for Information Interchange | | |
| | | Dez | Hex |
| <ETX> | END OF TEXT (CTRL C)<br>Reset the interface | 3 | 03 |
| <CR> | CARRIAGE RETURN<br>Go to beginning of line | 13 | 0D |
| <LF> | LINE FEED<br>Advance by one line | 10 | 0A |
| <ENQ> | ENQUIRY (CTRL E)<br>Request for data transmission | 5 | 05 |
| <ACK> | ACKNOWLEDGE<br>Positive report signal | 6 | 06 |
| <NAK> | NEGATIVE ACKNOWLEDGE<br>Negative report signal | 21 | 15 |

"Transmit": Data transfer from HOST to Center unit
"Receive": Data transfer from Center unit to HOST

### Flow Control

After each ASCII string, the HOST must wait for a report signal (<ACK><CR><LF> or <NAK> <CR><LF>).

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

## 1.2 Communication Protocol

### Transmission format

Messages are transmitted to the Center unit as ASCII strings in the form of mnemonic operating codes and parameters. All mnemonics comprise three ASCII characters.

Spaces are ignored. <ETX> (CTRL C) clears the input buffer in the Center unit.

### Transmission protocol

| HOST — Center unit | Explanation |
|---|---|
| Mnemonics [and parameters] ——————> <CR>[<LF>] ——————————> | Receives message with "end of message" |
| <—————————— <ACK><CR><LF> | Positive acknowledgment of a received message |

### Reception format

When requested with a mnemonic instruction, the Center unit transmits the measurement data or parameters as ASCII strings to the HOST.

<ENQ> (CTRL E) must be transmitted to request the transmission of an ASCII string. Additional strings, according to the last selected mnemonic, are read out by repetitive transmission of <ENQ>.

If <ENQ> is received without a valid request, the ERROR word is transmitted.

### Reception protocol

| HOST — Center unit | Explanation |
|---|---|
| Mnemonics [and parameters] ——————> <CR>[<LF>] ——————————> | Receives message with "end of message" |
| <—————————— <ACK><CR><LF> | Positive acknowledgment of a received message |
| <ENQ> ——————————> | Requests to transmit data |
| <—————— Measurement values or parameters <—————————— <CR><LF> | Transmits data with "end of message" |
| : | : |
| <ENQ> ——————————> | Requests to transmit data |
| <—————— Measurement values or parameters <—————————— <CR><LF> | Transmits data with "end of message" |

### Error processing

The strings received are verified in the Center unit. If an error is detected, a negative acknowledgment <NAK> is output.

### Error recognition protocol

| HOST — Center unit | Explanation |
|---|---|
| Mnemonics [and parameters] ——————> <CR>[<LF>] ——————————> | Receives message with "end of message" |
| ***** Transmission or programming error ***** | |
| <—— <NAK><CR><LF> | Negative acknowledgment of a received message |
| Mnemonics [and parameters] ——————> <CR>[<LF>] ——————————> | Receives message with "end of message" |
| <—————————— <ACK><CR><LF> | Positive acknowledgment of a received message |

## 1.3 Mnemonics

## 1.4 Measurement Mode

COM - Continuous output of measurement values

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

| | Description |
|---|---|
| a | Time interval, a =<br>0 –> 100 ms<br>1 –> 1 s (default)<br>2 –> 1 minute |

Receive: <ACK><CR><LF>

<ACK> is immediately followed by the continuous output of the measurement value in the desired interval.

Receive: b,sx.xxxxEsxx,c,sy.yyyyEsyy,d,sz.zzzzEszz <CR><LF>

| | Description |
|---|---|
| b | Status gauge 1, b =<br>0 –> Measurement data okay<br>1 –> Underrange<br>2 –> Overrange<br>3 –> Measurement value error (sensor error)<br>4 –> Sensor off (PTR 225, PTR 225 S, PTR 237)<br>5 –> No sensor<br>6 –> Identification error<br>7 –> Error ITR |
| sx.xxxxEsxx | Measurement value gauge 1 [1)] [in current pressure unit] (s = sign) |
| c | Status gauge 2 |
| sy.yyyyEsyy | Measurement value gauge 2 [1)] [in current pressure unit] (s = sign) |
| d | Status gauge 3 |
| sz.zzzzEszz | Measurement value gauge 3 [1)] [in current pressure unit] (s = sign) |

1) Values always in exponential format.
For logarithmic gauges, the 3rd and 4th decimal are always 0.

## CPR - Combined pressure range (linear gauges) (CenterTwo/Three only)

This parameter combines different pressure ranges to one combined pressure range, if several linear gauges with different full scales (F.S.) are connected to the CenterTwo and CenterThree. Thus the pressure for this combined pressure range can be read out with best accuracy.

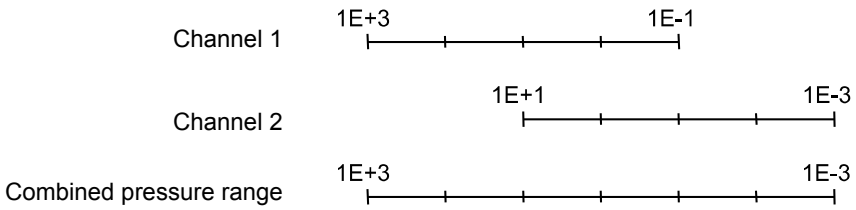
The pressure is higher than the full scale of the gauge with lower full scale: The CenterTwo/Three switches to the gauge with higher full scale.

Only one linear gauge is connected: The measurement value of this gauge is output.

No linear gauge is connected: 1000 mbar is output as measurement value and the parameters a, b and c are set to "0".

Example

Channel 1: linear gauge, 1000 mbar F.S.
Channel 2: linear gauge, 10 mbar F.S.




**Transmit command:** CPR,1,2,0 or
CPR,1,2 or
CPR,2,1

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

| | Description |
|---|---|
| a | Measurement channel of the selected gauge, a = |
| | 0 –> No linear gauge connected |
| | 1 –> Measurement channel 1 |
| | 2 –> Measurement channel 2 |
| | 3 –> Measurement channel 3 |
| b | Measurement channel of the selected gauge |
| c | Measurement channel of the selected gauge |

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

Receive: a,b,c,sx.xxxxEsxx

| | Description |
|---|---|
| a | Measurement channel of the selected gauge |
| b | Measurement channel of the selected gauge |
| c | Measurement channel of the selected gauge |
| sx.xxxxEsxx | Combined measurement value [1] [in current pressure unit] |
| | (s = sign) |

1) Values always in exponential format.

## ERR - Error status

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

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

Receive: aaaa <CR><LF>

| | Description |
|---|---|
| aaaa | Error status, aaaa =<br>0000 –> No error<br>1000 –> ERROR (controller error (see display on front panel)<br>0100 –> NO HWR (no hardware)<br>0010 –> PAR (inadmissible parameter)<br>0001 –> SYN (Syntax error) |

The ERROR word is cancelled when read out. If the error persists, it is immediately set again.

## PR1, PR2, PR3 - Measurement data gauge 1, 2 or 3

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

| | Description |
|---|---|
| n | Measurement value, n =<br>1 –> Gauge 1<br>2 –> Gauge 2<br>3 –> Gauge 3 |

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

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

| | Description |
|---|---|
| a | Status, a =<br>0 –> Measurement data okay<br>1 –> Underrange<br>2 –> Overrange<br>3 –> Sensor error<br>4 –> Sensor off (PTR 225, PTR 225 S, PTR 237)<br>5 –> No sensor<br>6 –> Identification error<br>7 –> Error ITR |
| sx.xxxxEsxx | Measurement value [1] [in current pressure unit]<br>(s = sign) |

[1] Values always in exponential format.
For logarithmic gauges, the 3rd and 4th decimal are always 0.

## PRX - Measurement data gauge 1, 2 and 3

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

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

Receive: a,sx.xxxxEsxx,b,sy.yyyyEsyy,c,sz.zzzzEszz <CR><LF>

| | Description |
|---|---|
| a | Status gauge 1, a =<br>0 –> Measurement data okay<br>1 –> Underrange<br>2 –> Overrange<br>3 –> Sensor error<br>4 –> Sensor off (PTR 225, PTR 225 S, PTR 237)<br>5 –> No Sensor<br>6 –> Identification error<br>7 –> Error ITR |
| sx.xxxxEsxx | Measurement value gauge 1 [1)] [in current pressure unit] (s = sign) |
| b | Status gauge 2 |
| sy.yyyyEsyy | Measurement value gauge 2 [1)] [in current pressure unit] (s = sign) |
| c | Status gauge 3 |
| sz.zzzzEszz | Measurement value gauge 3 [1)] [in current pressure unit] (s = sign) |

1) Values always in exponential format.
For logarithmic gauges, the 3rd and 4th decimal are always 0.

## RES - Reset

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

| | Description |
|---|---|
| a | a =<br>1 –> Restarts the unit and returns to measurement mode |

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

Receive: b[,b][,b][…] <CR><LF>

| | Description |
|---|---|
| b | List of all present error messages, b =<br>0 –> No error<br>1 –> Watchdog has responded<br>2 –> Task fail error<br>3 –> FLASH error<br>4 –> RAM error<br>5 –> EEPROM error<br>6 –> DISPLAY error<br>7 –> A/D converter error<br>8 –> UART error<br>9 –> Gauge 1 general error<br>10 –> Gauge 1 ID error<br>11 –> Gauge 2 general error<br>12 –> Gauge 2 ID error<br>13 –> Gauge 3 general error<br>14 –> Gauge 3 ID error |

## TID - Gauge identification

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

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

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

| | Description | |
|---|---|---|
| a | Identification gauge 1, a = | |
| | TTR | (Pirani Gauge) |
| | TTR100 | (Pirani / Capacitance Gauge) |
| | PTR | (Cold Cathode) |
| | PTR90 | (Cold Cathode / Pirani Gauge) |
| | CTR | (Capacitance Gauge) |
| | DI20x | (Capacitance Gauge) |
| | DI200x | (Capacitance Gauge) |
| | DI200xR | (Capacitance Gauge) |
| | DU20x | (Capacitance Gauge) |
| | DU200x | (Capacitance Gauge) |
| | DU200xR | (Capacitance Gauge) |
| | ITR | (Hot Ionization / Pirani Gauge) |
| | ITR200 | (Hot Ionization / Pirani Gauge) |
| | noSENSOR | (No sensor) |
| | noIDENT | (No identifier) |
| b | Identification gauge 2 | |
| c | Identification gauge 3 | |

## 1.5 Switching Function Parameters

### SPS - Switching function status

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

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

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

| | Description |
|---|---|
| a | Status switching function 1, a =<br>0 –> Off<br>1 –> On |
| b | Status switching function 2 |
| c | Status switching function 3 |
| d | Status switching function 4 |
| e | Status switching function 5 |
| f | Status switching function 6 |

### SP1 … SP6 - Switching function 1 … 6

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

| | Description |
|---|---|
| x | Switching function, x =<br>1 –> Switching function 1<br>2 –> Switching function 2<br>3 –> Switching function 3<br>4 –> Switching function 4<br>5 –> Switching function 5<br>6 –> Switching function 6 |
| a | Switching function assignment, a =<br>0 –> Turned off<br>1 –> Turned on<br>2 –> Measurement channel 1<br>3 –> Measurement channel 2<br>4 –> Measurement channel 3 |
| x.xxxxEsxx | Lower threshold [1)] [in current pressure unit]<br>(default = depending on gauge) (s = sign) |
| y.yyyyEsyy | Upper threshold [1)] [in current pressure unit]<br>(default = depending on gauge) (s = sign) |

1) Values can be entered in any format.
They are internally converted into the floating point format.

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

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

| | Description |
|---|---|
| a | Switching function assignment |
| x.xxxxEsxx | Lower threshold [in current pressure unit]<br>(s = sign) |
| y.yyyyEsyy | Upper threshold [in current pressure unit]<br>(s = sign) |

## 1.6 Gauge Parameters

### CF1, CF2, CF3 - Calibration factor gauge 1, 2 or 3

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

| | Description |
|---|---|
| x | Calibration factor gauge x =<br>1 –> Gauge 1<br>2 –> Gauge 2<br>3 –> Gauge 3 |
| a.aaa | Calibration factor gauge x, 0.100 … 10.000<br>(default = 1.000) |

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

Receive: a.aaa <CR><LF>

| | Description |
|---|---|
| a.aaa | Calibration factor gauge x |

### COR - Calibration factor

Precondition: Parameter "GAS" is set to "7" (other gases) (→ 🗎 20). Except CTR, CCR and DI/DU.

This parameter is effective in the entire measurement range of the gauge.

Transmit: **COR** [,a.aaa,b.bbb,c.ccc] <CR>[<LF>]

| | Description |
|---|---|
| a.aaa | Calibration factor gauge 1, 0.100 … 10.000<br>(default = 1.000) |
| b.bbb | Calibration factor gauge 2 |
| c.ccc | Calibration factor gauge 3 |

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

Receive: a.aaa,b.bbb,c.ccc <CR><LF>

| | Description |
|---|---|
| a.aaa | Calibration factor gauge 1 |
| b.bbb | Calibration factor gauge 2 |
| c.ccc | Calibration factor gauge 3 |

## DCD - Display resolution

Transmit: **DCD** [,a,a,a] <CR>[<LF>]

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

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

| | Description |
|---|---|
| a | Resolution a =<br>0 –> AUTO (default)<br>1 –> One digit<br>2 –> Two digits<br>3 –> Three digits<br>4 –> Four digits |

When the PrE (→ 🗎 29) is ON and the pressure is in the range p<1.0E-4 mbar the display resolution of the TTR gauges is reduced by one decimal digit.

## DGS - Degas

Transmit: **DGS** [,a,b,c] <CR>[<LF>]

| | Description |
|---|---|
| a | Degas gauge 1, a =<br>0 –> Degas off (default)<br>1 –> Degas on (3 minutes) |
| b | Degas gauge 2 |
| c | Degas gauge 3 |

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

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

| | Description |
|---|---|
| a | Degas status gauge 1 |
| b | Degas status gauge 2 |
| c | Degas status gauge 3 |

## EUM - Emission user mode

Transmit: **EUM** [,a,b,c] <CR>[<LF>]

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

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

| | Description |
|---|---|
| a | Emission for measurement channel 1, a =<br>0 –> Manually<br>1 –> Automatic (default) |
| b | Emission for measurement channel 2 |
| c | Emission for measurement channel 3 |

## FIL - Measurement value filter

Transmit: **FIL** [,a,b,c] <CR>[<LF>]

| | Description |
|---|---|
| a | Filter gauge 1, a = |
| | 0 –> Filter off |
| | 1 –> Fast |
| | 2 –> Normal |
| | 3 –> Slow |
| | 4 –> CTR |
| b | Filter gauge 2 |
| c | Filter gauge 3 |

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

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

| | Description |
|---|---|
| a | Filter time constant gauge 1 |
| b | Filter time constant gauge 2 |
| c | Filter time constant gauge 3 |

## FUM - Filament user mode ITR200

Transmit: **FUM** [,a,b,c] <CR>[<LF>]

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

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

| | Description |
|---|---|
| a | Filament for measurement channel 1, a = |
| | 0 –> Automatic (default) |
| | 1 –> Filament 1 |
| | 2 –> Filament 2 |
| b | Filament for measurement channel 2 |
| c | Filament for measurement channel 3 |

## FSR - Measurement range (linear gauges)

The full scale value of the measurement range (Full Scale) of linear analog gauges has to be defined by the user. The full scale value of linear digital gauges and logarithmic gauges is automatically recognized.

Transmit: **FSR** [,a,b,c] <CR>[<LF>]

| | Description |
|---|---|
| a | Full scale value gauge 1, a =<br>0 –> 0.01 mbar<br>1 –> 0.01 Torr<br>2 –> 0.02 mbar<br>3 –> 0.02 Torr<br>4 –> 0.05 mbar<br>5 –> 0.05 Torr<br>6 –> 0.10 mbar<br>7 –> 0.10 Torr<br>8 –> 0.25 mbar<br>9 –> 0.25 Torr<br>10 –>0.50 mbar<br>11 –>0.50 Torr<br>12 –>1 mbar<br>13 –>1 Torr<br>14 –>2 mbar<br>15 –>2 Torr<br>16 –>5 mbar<br>17 –>5 Torr<br>18 –>10 mbar<br>19 –>10 Torr<br>20 –>20 mbar<br>21 –>20 Torr<br>22 –>50 mbar<br>23 –>50 Torr<br>24 –>100 Torr<br>25 –>100 mbar<br>26 –>200 mbar<br>27 –>200 Torr<br>28 –>500 mbar<br>29 –>500 Torr<br>30 –>1000 mbar<br>31 –>1100 mbar<br>32 –>1000 Torr (default)<br>33 –>2 bar<br>34 –>5 bar<br>35 –>10 bar<br>36 –>50 bar<br>37 –>DI20x<br>38 –>DI200x<br>39 –>DI2001rel |
| b | Full scale value gauge 2 |
| c | Full scale value gauge 3 |

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

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

| | Description |
|---|---|
| a | Full scale value gauge 1 |
| b | Full scale value gauge 2 |
| c | Full scale value gauge 3 |

## GAS - Gas type correction

Transmit: **GAS** [,a,b,c] <CR>[<LF>]

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

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

| | Description |
|---|---|
| a | Gas type correction measurement channel 1, a =<br>0 –> nitrogen / air (default)<br>1 –> Argon<br>2 –> Hydrogen<br>3 –> Helium<br>4 –> Neon<br>5 –> Krypton<br>6 –> Xenon<br>7 –> Other gases<br>Calibration factor for other gases by entering command "COR" (→ 16). |
| b | Gas type correction measurement channel 2 |
| c | Gas type correction measurement channel 3 |

## HVC - HV control, EMI on / off

Transmit: **HVC** [,a,b,c] <CR>[<LF>]

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

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

| | Description |
|---|---|
| a | Gauge 1, a =<br>0 –> Off<br>1 –> On |
| b | Gauge 2 |
| c | Gauge 3 |

## ITR - Data output ITR, CTR 100, CTR 101, CCR 36x, CCR 37x

Transmit: **ITR** <CR>[<LF>]

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

Receive: aa,aa,aa,aa,aa,aa,aa,aa bb,bb,bb,bb,bb,bb,bb,bb cc,cc,cc,cc,cc,cc,cc,cc <CR><LF>

| | Description |
|---|---|
| aa,aa,aa,aa,aa,aa,aa,aa | Data string gauge 1<br>(byte 0 … 7 in hex format) |
| bb,bb,bb,bb,bb,bb,bb,bb | Data string gauge 2<br>(byte 0 … 7 in hex format) |
| cc,cc,cc,cc,cc,cc,cc,cc | Data string gauge 3<br>(byte 0 … 7 in hex format) |

## OFC - Offset correction (linear gauges)

Transmit: **OFC** [,a,b,c] <CR>[<LF>]

| | Description |
|---|---|
| a | Offset correction gauge 1, a = |
| | 0 –> Off (default) |
| | 1 –> On |
| | 2 –> Determine offset value and activate offset correction |
| | 3 –> Adjust the zero of linear gauges |
| b | Offset correction gauge 2 |
| c | Offset correction gauge 3 |

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

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

| | Description |
|---|---|
| a | Offset correction gauge 1 |
| b | Offset correction gauge 2 |
| | Offset correction gauge 3 |

## OFD - Offset display (linear gauges)

Transmit: **OFD** [,sa.aaaaEsaa,sb.bbbbEsbb,sc.ccccEscc] <CR>[<LF>]

| | Description |
|---|---|
| sa.aaaaEsaa | Gauge 1 Offset [1)], [in current pressure unit] (default = 0.0000E+00) (s = sign) |
| sb.bbbbEsbb | Gauge 2 Offset [1)] (s = sign) |
| sc.ccccEscc | Gauge 3 Offset [1)] (s = sign) |

[1)] Values can be entered in any format. They are internally converted into the floating point format.

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

Receive: sa.aaaaEsaa,sb.bbbbEsbb,sc.ccccEscc <CR><LF>

| | Description |
|---|---|
| sa.aaaaEsaa | Gauge 1 Offset [1)] (s = sign) |
| sb.bbbbEsbb | Gauge 2 Offset [1)] (s = sign) |
| sc.ccccEscc | Gauge 3 Offset [1)] (s = sign) |

## OFS - Offset correction (linear gauges, CenterOne only)

Transmit: **OFS** [,a,sx.xxxxEsxx] <CR>[<LF>]

| | Description |
|---|---|
| a | Mode, a =<br>0 –> Off (default)<br>No offset value needs to be entered<br>1 –> On<br>If no offset value has been entered, the previously defined offset value is taken over<br>2 –> Auto (offset measurement)<br>No offset value needs to be entered<br>3 –> Zero adjustment CTR 100, CTR 101, CCR 36x, CCR 37x<br>No offset value needs to be entered |
| sx.xxxxEsxx | Offset [1], [in current pressure unit]<br>(default = 0.0000E+00)<br>s = sign |

[1] Values can be entered in any format. They are internally converted into the floating point format.

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

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

| | Description |
|---|---|
| a | Mode |
| sx.xxxxEsxx | Offset [1], [in current pressure unit]<br>s = sign |

## 1.7 Gauge Control

SC1, SC2, SC3 - Gauge 1, 2 or 3 control

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

| | Description |
|---|---|
| x | Controlled gauge, x = |
| | 1 –> Gauge 1 |
| | 2 –> Gauge 2 |
| | 3 –> Gauge 3 |
| a | Gauge activation, a = |
| | 0 –> Manual (default) |
| | 1 –> Hot start |
| | 2 –> External |
| | 3 –> Via measurement channel 1 |
| | 4 –> Via measurement channel 2 |
| | 5 –> Via measurement channel 3 |
| b | Gauge deactivation, b = |
| | 0 –> Manual (default) |
| | 1 –> Self control |
| | 2 –> External |
| | 3 –> Via measurement channel 1 |
| | 4 –> Via measurement channel 2 |
| | 5 –> Via measurement channel 3 |
| c.ccEscc | ON threshold (s = sign) |
| d.ddEsdd | OFF threshold (s = sign) |

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

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

| | Description |
|---|---|
| a | Gauge activation |
| b | Gauge deactivation |
| c.ccEscc | ON threshold (s = sign) |
| d.ddEsdd | OFF threshold (s = sign) |

## 1.8 General Parameters

AOM - Analog output mode (CenterTwo/Three only)

Characteristic curve of the recorder output

Transmit: **AOM** [,a,b] <CR>[<LF>]

| | Description |
|---|---|
| a | Measurement channel, a = |
| | 0 –> Measurement channel 1 |
| | 1 –> Measurement channel 2 |
| | 2 –> Measurement channel 3 |
| b | Output characteristic, b = |
| | 0 –> Logarithmic LOG |
| | 1 –> Logarithmic LOG A |
| | 2 –> Logarithmic LOG -6 |
| | 3 –> Logarithmic LOG -3 |
| | 4 –> Logarithmic LOG +0 |
| | 5 –> Logarithmic LOG +3 |
| | 6 –> Logarithmic LOG C1 |
| | 7 –> Logarithmic LOG C2 |
| | 8 –> Logarithmic LOG C3 |
| | 9 –> Linear LIN -10 |
| | 10 –> Linear LIN -9 |
| | 11 –> Linear LIN -8 |
| | 12 –> Linear LIN -7 |
| | 13 –> Linear LIN -6 |
| | 14 –> Linear LIN -5 |
| | 15 –> Linear LIN -4 |
| | 16 –> Linear LIN -3 |
| | 17 –> Linear LIN -2 |
| | 18 –> Linear LIN -1 |
| | 19 –> Linear LIN +0 |
| | 20 –> Linear LIN +1 |
| | 21 –> Linear LIN +2 |
| | 22 –> Linear LIN +3 |
| | 23 –> IM221 |
| | 24 –> Logarithmic LOG C4 |
| | 25 –> PM411 |
| | 26 –> CH x |
| | 27 –> PRM10K |
| | 28 –> IMR110 |
| | 29 –> IMR120 |
| | 30 –> IMR310 |
| | 31 –> IMR320 |
| | 32 –> PRL10K |
| | 33 –> PRL1Q |

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

Receive: a,b <CR><LF>

| | Description |
|---|---|
| a | Measurement channel |
| b | Voltage (measurement value) |

## BAL - Backlight

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

| | Description |
|---|---|
| a | Backlight in percent, a = 0 … 100<br>100% is full brightness |

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

Receive: a <CR><LF>

| | Description |
|---|---|
| a | Backlight |

## BAU - Transmission rate (USB)

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

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

As soon as the new baud rate has been entered, the report signal is transmitted at the new transmission rate.

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

Receive: x <CR><LF>

| | Description |
|---|---|
| a | Transmission rate |

## DCB - Display control bar graph

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

| | Description |
|---|---|
| a | Measurement channel, a = |
| | 0 –> Measurement channel 1 |
| | 1 –> Measurement channel 2 |
| | 2 –> Measurement channel 3 |
| b | Bar graph display, b = |
| | 0 –> Off (default) |
| | 1 –> Bar graph covering full scale range |
| | 2 –> Bar graph covering full scale range, high-level presentation |
| | 3 –> Bar graph covering full scale range and setpoint threshold |
| | 4 –> Bar graph covering a decade according to current measurement value |
| | 5 –> Bar graph covering a decade according to current measurement value, high-level presentation |
| | 6 –> Bar graph covering a decade according to current measurement value and setpoint threshold |
| | 7 –> p = $f_{(t)}$, autoscaled, 0.2 seconds / pixel<br>For each measurement every 200 ms a measurement value is saved in tabular form and the last 100 measurement values (=100 pixel) are shown autoscaled.<br>The represented data string corresponds to a logging duration of 20 seconds. |
| | 8 –> p = $f_{(t)}$, autoscaled, 1 second / pixel<br>For each measurement every second a measurement value is saved in tabular form and the last 100 measurement values (=100 pixel) are shown autoscaled.<br>The represented data string corresponds to a logging duration of 100 seconds. |
| | 9 –> p = $f_{(t)}$, autoscaled, 6 seconds / pixel<br>For each measurement every 6 seconds a measurement value is saved in tabular form and the last 100 measurement values (=100 pixel) are shown autoscaled.<br>The represented data string corresponds to a logging duration of 10 minutes. |
| | 10 –> p = $f_{(t)}$, autoscaled, 1 minute / pixel<br>For each measurement every minute a measurement value is saved in tabular form and the last 100 measurement values (=100 pixel) are shown autoscaled.<br>The represented data string corresponds to a logging duration of 100 minutes. |
| | 11 –> p = $f_{(t)}$, autoscaled, 30 minutes / pixel<br>For each measurement every 30 minutes a measurement value is saved in tabular form and the last 100 measurement values (=100 pixel) are shown autoscaled.<br>The represented data string corresponds to a logging duration of 50 hours. |
| | 12 –> The sensor type is displayed for the selected measuring channel. |

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

Receive: a,b <CR><LF>

| | Description |
|---|---|
| a | Measurement channel |
| b | Bar graph display |

## DCC - Display control contrast

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

| | Description |
|---|---|
| a | Contrast in percent, a = 0 … 100<br>100% = full contrast |

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

Receive: a <CR><LF>

| | Description |
|---|---|
| a | Contrast |

## DCS - Display control screensaver

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

| | Description |
|---|---|
| a | Screensaver, a =<br>0 –> Off (default)<br>1 –> After 10 minutes<br>2 –> After 30 minutes<br>3 –> After 1 hour<br>4 –> After 2 hours<br>5 –> After 8 hours<br>6 –> The backlight is switched off completely after 1 minute |

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

Receive: a <CR><LF>

| | Description |
|---|---|
| a | Screensaver |

## ERA - Error relay allocation

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

| | Description |
|---|---|
| a | Switching behaviour error relay, a =<br>0 –> Switches for all errors (default)<br>1 –> Only unit errors<br>2 –> Error sensor 1 and unit error<br>3 –> Error sensor 2 and unit error<br>4 –> Error sensor 3 and unit error |

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

Receive: a <CR><LF>

| | Description |
|---|---|
| a | Switching behaviour error relay |

## EVA - Measurement range end value

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

| | Description |
|---|---|
| a | Measurement range end value, a =<br>0 –> UR or OR is displayed (default) when an underrange or overrange occurs<br>1 –> Measurement range end value<br>2 –> <or> measurement range end value |

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

Receive: a <CR><LF>

| | Description |
|---|---|
| a | Measurement range end value |

## FMT - Number format (measurement value)

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

| | Description |
|---|---|
| a | Number format (measurement value), a =<br>0 –> Floating point format, if possible (default)<br>1 –> Exponential format |

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

Receive: a <CR><LF>

| | Description |
|---|---|
| a | Number format |

## LNG - Language (display)

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

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

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

Receive: a <CR><LF>

| | Description |
|---|---|
| a | Language |

## PRE - Pirani range extension

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

| | Description |
|---|---|
| a | Pirani range extension for gauge 1, a =<br>0 –> Disabled (default)<br>1 –> Enabled |

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

Receive: a <CR><LF>

| | Description |
|---|---|
| a | Pirani range extension status |

TTR gauges only, measurement range up to $5 \times 10^{-5}$ mbar.

## SAV - Save parameters (EEPROM)

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

| | Description |
|---|---|
| a | Save parameters to EEPROM, a =<br>0 –> Save default parameters (default)<br>1 –> Save user parameters |

Receive: <ACK><CR><LF>

### UNI - Pressure unit

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

| | Description |
|---|---|
| a | Pressure unit, a =<br>0 –> mbar/bar<br>1 –> Torr<br>2 –> Pascal<br>3 –> Micron<br>4 –> hPascal (default)<br>5 –> Volt |

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

Receive: a <CR><LF>

| | Description |
|---|---|
| a | Pressure unit |

## 1.9 Data Logger Parameters

The group is only available when a USB memory stick formatted for the the FAT file system (FAT32) is plugged in. Use a max. 32 GB memory stick.

### DAT - Date

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

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

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

| | Description |
|---|---|
| yyyy-mm-dd | Current date in the format yyyy-mm-dd |

## LCM - Start / stop data logger

Further processing of recorded data (e.g. with Excel): Pay attention to the corresponding decimal separator (comma or dot).

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

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

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

| | Description |
|---|---|
| a | Data logger command, a = |
| | 0 –> Stop / data logging stopped |
| | 1 –> Start / data logging started |
| | 2 –> Clear / deletion of measurement data file (ending CSV) from USB memory stick |
| b | Data logging interval, b = |
| | 0 –> Logging interval 1/s |
| | 1 –> Logging interval 1/10 s |
| | 2 –> Logging interval 1/30 s |
| | 3 –> Logging interval 1/60 s |
| | 4 –> Logging interval in the event of measurement value changes ≥1% |
| | 5 –> Logging interval in the event of measurement value changes ≥5% |
| c | Decimal separator, c = |
| | 0 –> , (decimal comma) |
| | 1 –> . (decimal point) |
| ddddddd | File name (max. 7 digits) |

## TIM - Time

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

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

Receive: hh:mm <CR><LF>

| | Description |
|---|---|
| hh:mm | Current time in the format hh:mm [24 h] |

## 1.10 Parameter Transfer

The group is only available when a USB memory stick formatted for the the FAT file system (FAT32) is plugged in. Use a max. 32 GB memory stick.

### SCM - Save / load parameters (USB)

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

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

Receive: a <CR><LF>

| | Description |
|---|---|
| a | Setup parameters, a =<br>0 –> Saving completed (read only)<br>1 –> CSV file is being saved (read only)<br>2 –> Loading all parameters from the USB memory stick onto the Center unit<br>3 –> Formatting USB memory stick (FAT32)<br>4 –> Deleting parameter files (ending CSV) from the USB memory stick |
| bb | Number in the file name (0 … 99) |

## 1.11 Test Parameters

(For service personnel)

### CDA - Re-calibration

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

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

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

| | Description |
|---|---|
| yyyy-mm-dd | Date of the next re-calibration.<br>A warning is displayed when the date is reached. |

### HDW - Hardware version

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

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

Receive: a.a <CR><LF>

| | Description |
|---|---|
| a.a | Hardware version, e.g. 1.0 |

## LOC - Keylock

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

| | Description |
|---|---|
| a | Keylock, a =<br>0 –> Off (default)<br>1 –> On |

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

Receive: a <CR><LF>

| | Description |
|---|---|
| a | Keylock status |

## MAC - Ethernet MAC address

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

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

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

| | Description |
|---|---|
| aa-aa-aa-aa-aa-aa | Ethernet MAC address of the unit:<br>00-A0-41-0A-00-00 … 00-A0-41-0B-FF-FF |

## PNR - Firmware version

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

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

Receive: a.aa <CR><LF>

| | Description |
|---|---|
| a.aa | Firmware version, e.g. 1.00 |

## RHR - Operating hours

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

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

Receive: a <CR><LF>

| | Description |
|---|---|
| a | Run (operating) hours, e.g. 24 [hours] |

## TAD - A/D converter test

Transmit: **TAD** <CR>[<LF>]

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

Receive: aa.aaaa,bb.bbbb,cc.cccc <CR><LF>

| | Description |
|---|---|
| aa.aaaa | A/D converter channel 1<br>Measurement signal [0.0000 … 11.0000 V] |
| bb.bbbb | A/D converter channel 2<br>Measurement signal [0.0000 … 11.0000 V] |
| cc.cccc | A/D converter channel 3<br>Measurement signal [0.0000 … 11.0000 V] |

## TAI – ID resistance test

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

Receive: <ACK><CR><LF>
Transmit: <ENQ> starts the test (very brief)

Receive: a.aa,b.bb,c.cc <CR><LF>

| | Description |
|---|---|
| a.aa | Identification gauge 1 [kOhm] |
| b.bb | Identification gauge 2 [kOhm] |
| c.cc | Identification gauge 3 [kOhm] |

## TDI - Display test

Transmit: **TDI** [,a] <CR>[<LF>]

| | Description |
|---|---|
| a | Display test, a =<br>0 –> Stops the test - display according to current operating mode (default)<br>1 –> Starts the test - all segments on |

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

Receive: x <CR><LF>

| | Description |
|---|---|
| x | Display test status |

## TEE - EEPROM test

Test of the parameter memory.

Transmit: **TEE** <CR>[<LF>]

Receive: <ACK><CR><LF>
Transmit: <ENQ> Starts the test (duration <1 s)

Do not keep repeating the test (EEPROM life).

Receive: aaaa <CR><LF>

| | Description |
|---|---|
| aaaa | Error word |

## TEP - FLASH test

Test of the program memory.

Transmit: **TEP** <CR>[<LF>]

Receive: <ACK><CR><LF>
Transmit: <ENQ> Starts the test (very brief)

Receive: aaaa,bbbbbbbb <CR><LF>

| | Description |
|---|---|
| aaaa | Error word |
| bbbbbbbbbb | Check sum (hex) |

## TIO - I/O test

**Caution**

The relays switch irrespective of the pressure.

Starting a test program may cause unwanted effects in connected control systems.

Disconnect all sensor cables and control system lines to ensure that no control commands or messages are triggered by mistake.

Transmit: **TIO** [,a,b] <CR>[<LF>]

| | Description |
|---|---|
| a | Test status, a =<br>0 –> Off<br>1 –> On |
| b | Relay status (in hex format), bb =<br>00 –> All relays deactivated<br>01 –> Switching function relay 1 activated<br>02 –> Switching function relay 2 activated<br>04 –> Switching function relay 3 activated<br>08 –> Switching function relay 4 activated<br>10 –> Switching function relay 5 activated<br>20 –> Switching function relay 6 activated<br>40 –> Error relay activated<br>7F –> All relays activated |

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

Receive: a,b <CR><LF>

| | Description |
|---|---|
| a | I/O test status |
| b | Relay status |

## TKB - Operator key test

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

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

Receive: abcd <CR><LF>

| | Description |
|---|---|
| a | Key 1, a =<br>0 –> Not pushed<br>1 –> Pushed |
| b | Key 2, b =<br>0 –> Not pushed<br>1 –> Pushed |
| c | Key 3, c =<br>0 –> Not pushed<br>1 –> Pushed |
| d | Key 4, d =<br>0 –> Not pushed<br>1 –> Pushed |

## TLC - Torr lock

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

| | Description |
|---|---|
| a | Torr lock, a =<br>0 –> Off (default)<br>1 –> On |

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

Receive: a <CR><LF>

| | Description |
|---|---|
| a | Torr lock status |

## TMP - Inner Temperature of the Unit

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

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

Receive: aa <CR><LF>

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

## TRS - Serial interface test

Transmit: **TRS** <CR>[<LF>]

Receive: <ACK><CR><LF>
Transmit: <ENQ> Starts the test (repeats each character, test is interrupted with <CTRL> C).

### WDT - Watchdog control

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

| | Description |
|---|---|
| a | Watchdog control, a =<br>0 –> Manual error acknowledgement<br>1 –> Automatic error acknowledgement [1] (default) |

[1] If the watchdog has responded, the error is automatically acknowledged and cancelled after 2 s.

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

Receive: a <CR><LF>

| | Description |
|---|---|
| a | Watchdog control |

## 1.12 Further

### AYT - Are you there?

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

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

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

| | Description |
|---|---|
| a | Type of the unit, e.g. CPG103 |
| b | Model No. of the unit, e.g. PTG28330 |
| c | Serial No. of the unit, e.g. 44990000 |
| d | Firmware version of the unit, e.g. 1.00 |
| e | Hardware version of the unit, e.g. 1.0 |

### ETH - Ethernet configuration

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

Receive: <ACK><CR><LF>
Transmit: <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 =<br>0 –> Statically<br>1 –> Dynamically |
| bbb.bbb.bbb.bbb | IP address |
| ccc.ccc.ccc.ccc | Subnet address |
| ddd.ddd.ddd.ddd | Gateway address |

## 1.13 Example

"Transmit (T)" and "Receive (R)" are related to host.

| | |
|---|---|
| T: **TID** <CR> [<LF>] | Request for gauge identification |
| R: <ACK> <CR> <LF> | Positive acknowledgement |
| T: <ENQ> | Request for data transmission |
| R: TTR <CR> <LF> | Gauge identification |
| T: **SP1** <CR> [<LF>] | Request for parameters of switching function 1 (setpoint 1) |
| R: <ACK> <CR> <LF> | Positive acknowledgement |
| T: <ENQ> | Request for data transmission |
| R: 1,1.0000E-09,9.0000E-07 <CR> <LF> | Thresholds |
| T: **SP1**,1,6.80E-3,9.80E-3 <CR> [<LF>] | Modification of parameters of switching function 1 (setpoint 1) |
| R: <ACK> <CR> <LF> | Positive acknowledgement |
| T: **FOL**,2 <CR> [<LF>] | Modification of filter time constant (syntax error) |
| R: <NAK> <CR> <LF> | Negative acknowledgement |
| T: <ENQ> | Request for data transmission |
| R: 0001 <CR> <LF> | ERROR word |
| T: **FIL**,2 <CR> [<LF>] | Modification of filter time constant |
| R: <ACK> <CR> <LF> | Positive acknowledgement |
| T: <ENQ> | Request for data transmission |
| R: 2 <CR> <LF> | Filter time constants |
| T: **PR1** <CR> [<LF>] | Request for measurement data |
| R: <ACK> <CR> <LF> | Positive acknowledgement |
| T: <ENQ> | Request for data transmission |
| R: 0,8.3400E-03 <CR> <LF> | Status and pressure |
| T: <ENQ> | Request for data transmission |
| R: 1,8.0000E-04 <CR> <LF> | Status and pressure |

# 2 Appendix

## A: Literature


[1] www.pfeiffer-vacuum.com
Operating Instructions
Pirani Gauge TTR 91, TTR 91 S, TTR 96 S
BG 5037 BEN
Pfeiffer Vacuum GmbH, D–35614 Asslar, Deutschland

[2] www.pfeiffer-vacuum.com
Operating Instructions
Pirani/Capacitance Gauge TTR 101, TTR 101 S2
BG 5038 BEN
Pfeiffer Vacuum GmbH, D–35614 Asslar, Deutschland

[3] www.pfeiffer-vacuum.com
Instruction Sheet
FullRange® Bayard-Alpert Gauge ITR 90
BG 5039 BEN
Pfeiffer Vacuum GmbH, D–35614 Asslar, Deutschland

[4] www.pfeiffer-vacuum.com
Operating Instructions
FullRange® Gauge PTR 91
BG 5041 BEN
Pfeiffer Vacuum GmbH, D–35614 Asslar, Deutschland

[5] www.pfeiffer-vacuum.com
Operating Instructions
Penning Gauge PTR 225, PTR 225 S, PTR 237
BG 5043 BEN
Pfeiffer Vacuum GmbH, D–35614 Asslar, Deutschland

[6] www.pfeiffer-vacuum.com
Operating Instructions
Ceramic Capacitance Gauge CCR 361 … CCR 365
BG 5035 BEN
Pfeiffer Vacuum GmbH, D–35614 Asslar, Deutschland

[7] www.pfeiffer-vacuum.com
Operating Instructions
Ceramic Capacitance Gauge CCR 371 … CCR 375
BG 5039 BEN
Pfeiffer Vacuum GmbH, D–35614 Asslar, Deutschland

[8] www.pfeiffer-vacuum.com
Operating Instructions
Control Units CenterOne, CenterTwo, CenterThree
BG 5044 BEN
Pfeiffer Vacuum GmbH, D–35614 Asslar, Deutschland

## VACUUM SOLUTIONS FROM A SINGLE SOURCE

**Pfeiffer Vacuum stands for innovative and custom vacuum solutions worldwide, technological perfection, competent advice and reliable service.**

## COMPLETE RANGE OF PRODUCTS

**From a single component to complex systems:**
**We are the only supplier of vacuum technology that provides a complete product portfolio.**

## COMPETENCE IN THEORY AND PRACTICE

**Benefit from our know-how and our portfolio of training opportunities!**
**We can support you with your plant layout and provide first-class on-site-service worldwide.**

**Are you looking for a perfect vacuum solution? Please contact us:**

**Pfeiffer Vacuum GmbH**
**Headquarters ● Germany**
**T +49 6441 802-0**
**info@pfeiffer-vacuum.de**

**www.pfeiffer-vacuum.com**

PFEIFFER VACUUM

bg5045ben/ a