



# Operation manual Pneumator – Pressure calibra- tor and measuring instrument

<b>Order number</b>	<b>Measuring range</b>
0519.0816	1 hPa
0519.0817	10 hPa
0519.0818	100 hPa
0519.0819	1000 hPa

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## 1. Introduction and safety instructions

Dear Sir or Madam,

Thank you for buying a Pneumator from Testo industrial services GmbH.  
We are sure, that this instrument will be of benefit to you and your work for a long time.

Please read the operation manual carefully and get acquainted with the handling of the Pneumator before you start operating.

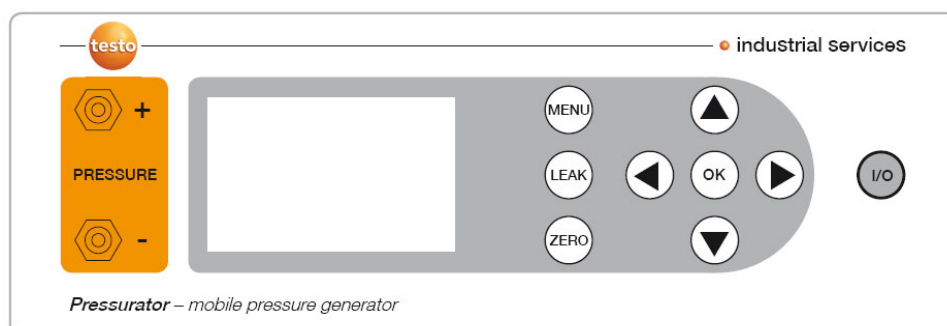
Should a problem occur, which you are not able to solve yourself, please contact our service department or your salesman. We will make every effort to help you as fast and competent as possible.

### Attention:

- The Pneumator is supplied via a power supply with 20 to 26 VDC at an amperage of 1 A. **Never touch parts under Voltage!**
- The inserted reference sensor has an overload protection. However, please note that the max. application of pressure is never exceeded, as otherwise lasting destruction could occur:
  - Pneumators 1 / 10 / 100 hPa → 5-times overload stability
  - Pneumators 1000 hPa → 2-times overload stability
- Please note that a negative pressure at the minus connection may never exceed 10% of the measuring range
- The Pneumator contains an accumulator (lithium manganese cells). This should be unloaded occasionally, in order to optimize the performance.
- Concerning transport, the Pneumator must be packed shockproof in order to avoid damages!
- Please leave the device closed. **When opening the device the warranty expires.**

## 2. Overview operation elements

The Pneumator has two pressure connections, one display as well as 9 control buttons:



Pressure „+“ With differential pressure, the higher pressure must be attached here  
With relative pressure, please attach only to this connector

Pressure „-“ With differential pressure, the lower pressure must be attached here

Display Depending upon selected mode of operation all relevant information is shown here.

The operating keys are described in the section „general instruction information“

### Interfaces:

On the back of the Pneumator, you will find the following interfaces:

- Voltage supply (20..26 VDC, 1 A, min. 30 W, by provided power supply)
- RS232
- USB

## 3. Operating modes

Operating mode	Page	Application	Pressure connection	Function
CTRL	8	Calibration (step-by-step)	Test device (Differential-/relative pressure measuring instrument)	Pump builds up selected pressure, display indicates the reference sensor value
AUTO	11	Calibration (programmed)	Test device (Differential/Relative pressure instrument)	As CTRL, with pre-programmed steps
MESS	15	Pressure measurement  Differential pressure  Relative pressure	Process pressure...  ...connect to „Plus“ and „Minus“  ...connect to „Plus“	Pump deactivated, Display indicates the pressure value of the reference sensor
VELO	17	Velocity measurement	Pitot tube (air duct)	As MESS, however velocity display
FLOW	20	Volumetric flow-measurement	Pitot tube (air duct)	As MESS, however Volume flow display

## 4. General operation

Each mode of operation is programmed at first (in the menu and/or in its submenus), before it is used. Programming is done as follows:

- Usually by operating buttons (in this description always written in capital letters). Their function is described below.
- By the RS232 or USB interface (see the chapter „computer programming“)
- 

### Overview control-buttons:

I/O	On-off switch. Function of the off switch: In the mains operation it is switched to battery charge. In battery operation the instrument is switched off.
MENU	During operation: Start menu programming In the menu: Leave menu, start application In the submenu: not applied
OK	During operation: see description of the individual operation mode In the menu: Choose submenu In the submenu: leave submenu, store set values
UP	During operation: see description of the individual operation mode In the menu: next line In the submenu: value +1
DOWN	During operation: see description of the individual operation mode In the menu: previous line In the submenu: value -1
0%	During operation: see description of the individual operation mode In the menu: without function

100%	In the submenu: one decimal to the left During operation: see description of the individual operation mode In the menu: without function
LEAK	In the submenu: one decimal to the right Tightness test (between the test device and the reference sensor), at CTRL and AUTO without function
ZERO	Manual zero setting of the reference sensor

## 5. Menu settings for all operating modes

In this section the settings are described, which are relevant for all modes of operation. All further settings, you will find described in the respective chapters.

- Press MENU
- **Submenu „Language“:** Change menu language (buttons UP, DOWN, confirming with OK).
- **Submenu settings:** At OK a further menu overview is being opened.
  - **Submenu zero:** At zeroing the reference pressure sensor is being pressurized with the differential pressure = 0 Pa, by opening internal electromagnetic valves. This can be done manually (ZERO) or in automatic cycles (each duration approx. 5 s). The setting is done in the following submenus.
    - **Submenu Auto-Zero:** Activated = „ON“ / deactivated = „OFF“ (buttons UP, DOWN, confirm with OK)
    - **Submenu interval:** Value range 1 .. 60 minutes selectable (buttons UP, DOWN, 0%, 100%, confirm with OK)
    - Leave submenu by pressing MENU
  - **Submenu RS232/USB:** compare with „programming via PC“
  - **Submenu display:** The brightness is defined in another submenu.
    - **Submenu „brightness“:** Adjustment of the display brightness . Range of value 0% to 100% (buttons UP, DOWN, 0%, 100%, confirm with OK).
  - **Submenu info:** Equipment specification about the measuring range, firmware and hardware

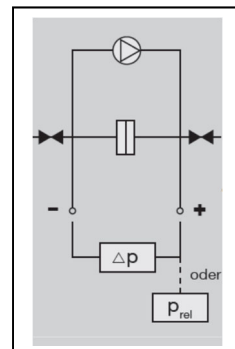
## 6. Operating mode CTRL – calibration (step-by-step)

### Purpose:

The operation mode CTRL (Control / regulation) is selected for the calibration of a test device in individual steps. In case the calibration takes place at the same pressure ranges frequently, we recommend the operation mode AUTO.

### Device function and schematic diagram:

In the operation mode CTRL the pump is turned on and regulates in each case the requested pressure set point value. Thereby the internal reference pressure sensor, whose measured value is shown in the display in each case, supplies the actual pressure value.



### Connection of the test device:

Differential pressure test device: Connect to „Plus“ and „Minus“.

Relative pressure test device: Connect to „Plus“.

### Programming:

- Press MENU
- **Submenu „Mode“:** press UP or DOWN until CTRL appears. Selecting with OK.
- **Submenu „Range“:** Define maximal calibration pressure (buttons UP, DOWN, 0%, 100%, confirming with OK). Possible value ranges compare chart.

Pneumator type	Minimal value	Maximal value
0519.0816	-0,1 hPa	1,1 hPa
0519.0817	-1 hPa	11 hPa
0519.0818	-10 hPa	110 hPa
0519.0819	-100 hPa	1100 hPa

- **Submenu „Unit“:** Define requested pressure unit (buttons UP and DOWN, confirm with OK). The maximal calibration pressure (Submenu „Range“) is being calculated automatically.
- **Submenu „Steps“:** Define requested (percental) step rate (buttons UP, DOWN, 0%, 100%, confirm with OK).
- *Example:* at range/unit = +1.000 hPa and steps = the following pressure sequence is provided: 0 hPa, then 250 hPa, then 500 hPa, then 750 hPa, and finally 1.000 hPa pressure.
- **Submenu „Setting → Zero“:** Definition of automatic zero procedure
  - Auto zero = ON: right after leaving the menu, and then on a regular basis the zero points gets adjusted
  - Interval: Time Distance in minutes between two zero adjustments
- Leave the menu by pressing the MENU button



### Operation / application:

After selecting the operation mode CTRL and leaving the menu (MENU button) a zero adjustment is automatically conducted, in case AUTO ZERO = ON. Subsequently, the reference sensor is venting („VENT “).

The respective pressure set point value now results now from the nominal pressure value (see upper display middle, initial value = full measuring range), multiplied by a percentage value (see lower display middle, initial value = 0%). The respective set point value is indicated in the lower right display, the unit in the upper right. Note: The new set point value is activated immediately after the change of the absolute value or of the percental value.

#### Example (compare illustration):

- Nominal value: 100.00 Pa
- Percental value: 0%
- Current set point value = 100 Pa \* 0% = 0 Pa



You can switch between the absolute value and the percental value by pressing OK.

#### **Change of the percental value (lower display middle - framed bold):**

For the gradual up - and down regulation of the pressure value, e.g. 0 / 25 / 50 / 75 / 100 % of the absolute value. The step size x is defined in the submenu „range“ .

- UP: Pressure rise of x % of the measuring range
- DOWN: Pressure reduction of x % of the measuring range
- 0%: Pressure = 0 Pa
- 100%: Pressure = 100% of the measuring range

#### **Change of the absolute value (upper display center - framed bold):**

For the start-up of a given pressure value, e.g. 610 hPa. In most cases it is advisable to leave this value on 100% of the measuring range.

- UP: Digit +1
- DOWN: Digit -1
- 0%: one digit position to the left
- 100%: one digit position to the right

#### **Retrieval of the calibration data:**

As soon as the central display figure indicates a stable value, the respective calibration data can be retrieved:

- physical unit: Display value upper right
- pressure set value: Display value in the lower right
- actual value of test device: Display of the test device
- Reference value: Display middle

#### **Manual zero balance (ZERO)**

In case the reference measuring cell is to be set to zero during the calibration, please use the ZERO button. After approximately 3-5 seconds, the previous status is started up again.

### **Leakage test (LEAK)**

In case the test device has to be checked whether it is connected pressure-tight, you can start a leakage test with the LEAK button at each pressure step, upon reaching a stabilized value. The pump is now switched off; the middle display value shows whether a stable value is being held or whether the pressure value sinks. Pressing the LEAK button again, you return to the CTRL operating mode.

**Example** (see display photo):

- Lower left: time since pressing LEAK in s, here 89 s
- Lower middle: Pressure change in % since pressing LEAK, here increase by approx. 1%
- Lower right: Absolute Pressure change, here by +0,099 hPa

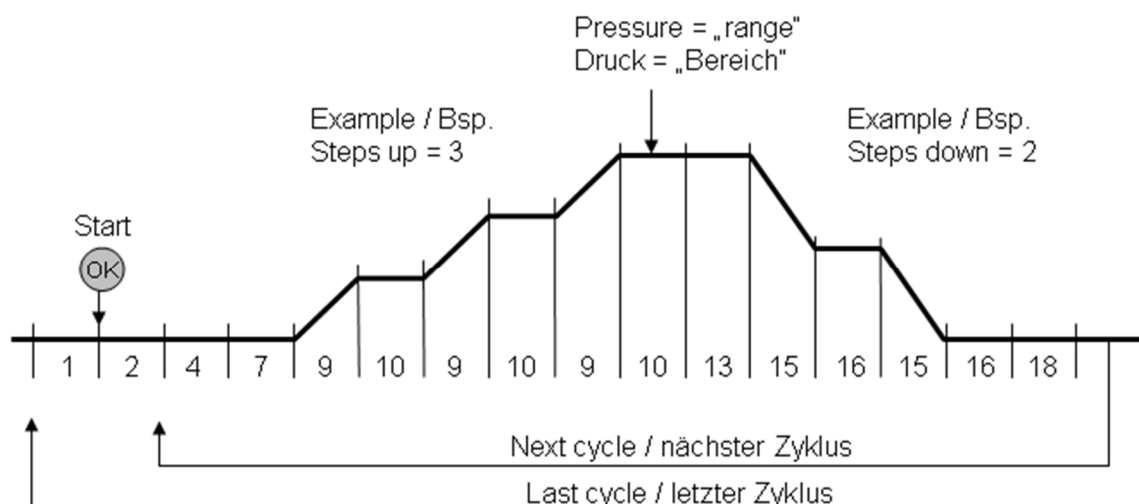


### **Leaving the operation mode CTRL**

When pressing the MENU button, the Pneumator is first driven into the VENT mode (venting) in order to reduce the internal pump pressure. By pressing the MENU button again, the operation menu is shown. In the submenu “Modus” another mode of operation can be selected.



- **Submenu „Steps down“:** Define requested number of descending pressure steps (buttons UP, DOWN, 0%, 100%, confirm with OK).
  - **Submenu „Configuration 1“:** By pressing OK, a further menu overview is being opened. The meaning of the variables is also clarified in the following illustration.
    - **Submenu „Cycles“:** Here is being defined how often the pressure sequence shall be repeated (buttons UP, DOWN, 0%, 100%, confirm with OK).
    - **Submenu „T Start“:** Initial waiting time for the venting (buttons UP, DOWN, 0%, 100%, confirm with OK), compare illustration and chart
    - **Submenu „T Stop“:** Waiting time at maximum pressure (buttons UP, DOWN, 0%, 100%, confirm with OK), compare illustration and chart
    - **Submenu „T Hold“:** Holding time of each adjusted pressure stage (buttons UP, DOWN, 0%, 100%, confirm with OK), compare illustration and chart
    - **Submenu „T Pause“:** Pause time between 2 cycles (buttons UP, DOWN, 0%, 100%, confirm with OK), compare illustration and chart
    - **Submenu „Auto Zero“:** Selection (buttons UP / DOWN, confirm with OK), whether an automatically zero-ing shall be driven as phase 4. ON = yes, OFF = no.
- Leave the menu by pressing the MENU button several times



Phase number	Indication in menu	Signification
1		Wait for start (activate with OK), equipment is venting (display shows VENT)
2	T START	Waiting time (in seconds) for venting (display shows VENT)
4		Zeroing phase (if AUTO ZERO = ON), about. 3-5 seconds. At AUTO ZERO = OFF → phase is dropped
7	T HOLD	Holding time (in seconds) at point zero
9		Adjustment of the next higher pressure stage
10	T HOLD	Holding time (in seconds) for adjusted pressure (equivalent to the duration of phase 7)
13	T STOP	Waiting time (in seconds) at maximum pressure („range“)
15		Adjustment of the next lower pressure stage
16	T HOLD	Holding time (in seconds) at “pressure down” steps and when reaching the zero point again (equivalent to the duration of phase 7)
18	T PAUSE	Pause time between 2 cycles

### Operation / application (AUTO):

After selecting the operation mode AUTO and leaving the menu (MENU button) the AUTO display appears which supplies all relevant information for the automated calibration procedure. The device is now in phase 1 (Waiting for OK = start).

### The meaning of the display elements (AUTO):

- Top left: Indication of the current operation mode
  - VENT = venting
  - ZERO = zeroing
  - CTRL = Adjustment and holding of the programmed pressure stages

- Upper middle and right: Indication of the maximum pressure and unit
- Middle left: Number of past and future cycles
- Middle: Phase number (compare chart above), phase-duration, reference pressure value
- Bottom to the left: Battery load indicator (at mains operation: plug symbol)
- Bottom in the middle: percental indication of the current set pressure stage (in percent of the maximum pressure)
- Bottom right: Absolute value of the current set pressure stage.

**Example** (see illustration):

- Maximum pressure = 10 mbar
- Currently phase 1 (waiting for OK), venting
- Currently pressure = 0,002 mbar,
- first of ten cycles
- power supply operation (lower left)

VENT	+10.000	mbar
Cycl.	Phase	1
1	Time	s
/100	Press	- 0.013
	+ 0%	+ 0.000

**Retrieval of calibration data:**

The programmed calibration cycles will be started by the OK button. As soon as the display (middle) indicates a stable value in the phases 10 or 16, the adequate calibration data can be registered (please note: the values will not be stored):

- Physical unit: Value in the upper right of the display
- Set value: value in the lower right of the display
- Actual value of the test device: Display of the test device
- Reference value: Middle of display

**Leakage test (LEAK)**

The leakage test is not available in the AUTO-Modus.

**Leaving the operating mode AUTO**

Pressing the MENU button, the AUTO-Modus will be canceled and left at any time. While the menu is shown, the equipment is venting (VENT) in order to reduce the internal pressure of the pump. If desired, you can switch to another mode (CTRL, MESS).

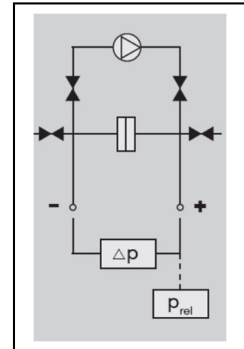
## 8. Operating mode MESS – Pressure measurement

### Purpose:

The operating mode MESS (pressure measurement) is used for measurement of process pressure (differential pressure or relative pressure).

### Device function and schematic diagram:

In the operating mode MESS the pump is turned off. The internal reference pressure sensor immediately measures the pressure value of the process.



### Connection to the process:

- Differential pressure process: Connection to „plus“ and „minus“.
- Relative pressure process: Connection to „plus“.

### Programming:

- Press the button MENU.
- **Submenu „Mode“:** Press UP or DOWN, until MESS appears. Selecting with OK.
- **Submenu „Unit“:** Define the favored pressure unit (buttons UP and DOWN, confirm with OK). The maximum measurement range is automatically converted (in the upper middle of the MESS display).
- **Submenu „Setting → Zero“:** Definition of automatic zero procedure
  - Auto zero = ON: right after leaving the menu, and then on a regular basis the zero points gets adjusted
  - Interval: Time Distance in minutes between two zero adjustments
- Remark: The submenus which are contained in the menu „Range“ and „Steps“ are not relevant in MESS, they can remain unchanged.

### Operation / Application (MESS):

After selecting the operating mode MESS and leaving the menu (MENU button) a zero adjustment is automatically conducted, in case AUTO ZERO = ON. Thereafter the MESS display indication appears which provides all relevant information of the measurement.

### Meaning of the display elements (MESS):

- Top left: Display of current operating mode (ZERO = zeroing, MESS = measurement operation, ERR = overload error)
- In the upper middle: maximum measurement range (cannot be changed, size according to model)
- Top right: physical unit
- In the middle: current pressure measurement value (of the internal pressure sensor).
- Bottom left: Rechargeable battery charger display (at mains operation: plug symbol)

**Example** (see illustration):

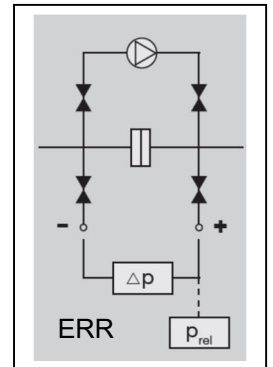
- Operating mode pressure measurement (MESS)
- Maximum pressure = 10 mbar
- Current measurement value = 0 mbar
- Current pressure = 0,002 mbar,
- Mains operation (bottom left)



**Protection against overload:**

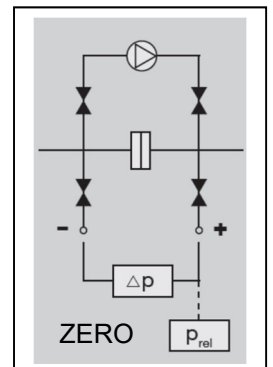
**IMPORTANT:** Please bear in mind that the connected pressure does not exceed 125% of the measurement range of the Pneumator. If this happens slowly, the internal magnetic valve will lock at this value and ERR appears in the display. Make sure that the high pressure is no longer present and unlock the equipment by pushing the button OK.

**ATTENTION:** If an overload occurs too quickly (approx. <math><1\text{ms}</math>), the pressure sensor can be destroyed.



**Manual zero balance (ZERO)**

In case the reference measurement element has to be set to zero during the measuring procedure, please press the ZERO button. After approx. 3-5 seconds the measurement operation will proceed again.





## 9. Operating mode VELO – Velocity measurement

### Purpose:

The operating mode VELO (velocity measurement) is used for the measurement of process velocity (e.g. in an air duct) with the help of a pitot tube.

### Device function and schematic diagram:

In the operating mode VELO the pump is turned off. The internal reference pressure sensor immediately measures the differential pressure value of the process. This value directly relates to the velocity value, which is indicated on the display:

$$v = s * \text{sqrt} ( 2 * \text{DeltaP} / \rho )$$

with

v = Velocity [m/s]

s = Pitot tube factor (without unit)

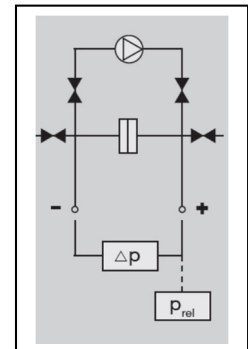
= 0.67 if a straight pitot tube

= 1.0 if Prandtl pitot tubes

$\rho$  = density [kg/m<sup>3</sup>]

DeltaP = Differential pressure [Pa]

sqrt = Square root



### Programming:

- Press MENU
- **Submenu „Mode“:** Press UP or DOWN, until VELO appears. Selecting with OK.
- **Submenu „Unit“:** Define the favored velocity unit (button UP and DOWN, confirm with OK). The maximum measurement range (is indicated in the VELO display upper middle) is automatically converted.
- **Submenu „Settings“:** Here the submenu „VELO-FLOW“ is relevant, selecting with OK
  - **Submenu „Density“:** Enter the media density (e.g.. air at 20°C: 1.20 kg/m<sup>3</sup>)
  - **Submenu „Pitot tube“:** Enter the pitot tube factor
    - = 1.0 if straight pitot tube
    - = 0.67, if Prandtl pitot tube
- **Submenu „Setting → Zero“:** Definition of automatic zero procedure
  - Auto zero = ON: right after leaving the menu, and then on a regular basis the zero points gets adjusted
  - Interval: Time Distance in minutes between two zero adjustments
- Remark: The submenus “range” and “steps” in the main are not relevant in VELO, therefore they can remain unchanged.

### Operation / application (VELO):

Connect the pitot tube pressure-tight to the equipment. The end of the pitot tube is connected with the „Plus“- junction, the other pitot tube-junction with „Minus“.

After selecting the operating mode VELO and leaving the menu (MENU button), a zero adjustment is automatically conducted, in case AUTO ZERO = ON. Thereafter

the VELO display indication appears, which provides all relevant information of the measurement, appears.

**Meaning of the display elements (VELO):**

- Top left: Display of current operating mode (ZERO = zero setting, VELO = velocity measurement operation, ERR = overload error)
- In the upper middle: maximum measurement range (cannot be changed, value according to model)
- Top right: physical unit
- In the middle: current velocity measurement value (calculated from the measurement value of the internal pressure sensor).
- Bottom left: Rechargeable battery charger display (at mains operation: plug symbol)

**Example** (compare illustration):

- Operating mode velocity (VELO)
- Maximum velocity = 40,825 m/s
- Current measurement value = 0 m/s
- Density = 1,2 kg/m<sup>3</sup>,
- mains operation (bottom left)



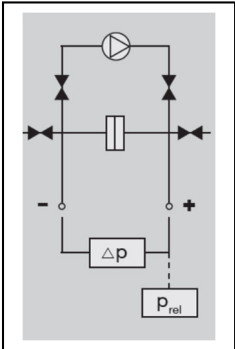
**Protection against overload:**

IMPORTANT: Please bear in mind that the connected pressure does not exceed 125% of the measurement range of the Pneumator. If this happens slowly, the internal magnetic valve will lock at this value and ERR appears in the display. Make sure that the high pressure is no longer present and unlock the equipment by pushing the button OK.

ATTENTION: If an overload occurs too quickly (approx. <1ms), the pressure sensor can be destroyed.

**Manual zero balance (ZERO)**

In case the reference measurement element has to be set to zero during the measuring procedure, please press the ZERO button. After approx. 3-5 seconds the measurement operation will proceed again.



## 10. Operating mode FLOW – volume flow measurement

### Purpose:

The operating mode FLOW (volume flow measurement) is used for measurement of process-volume flow (e.g. in an air duct) with the help of a pitot tube.

### Device function and schematic diagram:

In the operating mode FLOW the pump is turned off. The internal reference pressure sensor immediately measures the differential pressure value of the process. This value directly relates to the volume flow value, which is indicated on the display:

$$V = s * A * \text{sqrt} ( 2 * \text{DeltaP} / \text{rho} )$$

with

V = volume flow [m<sup>3</sup>/s]

s = pitot tube pressure factor (without unit)

= 0.67 if a straight pitot tube

= 1.0 if Prandtl-pitot tube

A = cross sectional area [m<sup>2</sup>]

rho = density [kg/m<sup>3</sup>]

DeltaP = differential pressure [Pa]

sqrt = square root

### Programming:

- Press MENU
- **Submenu „Mode“:** Press UP or DOWN, until FLOW appears. Selecting with OK.
- **Submenu „Unit“:** Define the favored volume flow unit (button UP and DOWN, confirm with OK). The maximum measurement range (is indicated in the FLOW display upper middle) is automatically converted.
- **Submenu „settings“:** Here the submenu „VELO-FLOW“ is relevant, selecting with OK.
  - **Submenu „density“:** Enter the density media (e.g.. air at 20°C: 1.20 kg/m<sup>3</sup>)
  - **Submenu „pitot tube“:** Enter the pitot tube factor
    - = 1.0 if a straight pitot tube
    - = 0.67, if Prandtl-pitot tube
  - **Submenu „Area“:** Enter the cross sectional area in the air duct [m<sup>2</sup>].
- **Submenu „Setting → Zero“:** Definition of automatic zero procedure
  - Auto zero = ON: right after leaving the menu, and then on a regular basis the zero points gets adjusted
  - Interval: Time Distance in minutes between two zero adjustments
- Remark: The submenus „range“ and „steps“ in the main menu are not relevant in FLOW, therefore they can remain unchanged.

### Operation / application (FLOW):

Connect the pitot tube pressure-tight to the equipment. The end of the pitot tube is connected with the „Plus“-junction, the other pitot tube-junction with „Minus“.

After selecting the operating mode FLOW und leaving the Menu (MENU button), a zero adjustment is automatically conducted, in case AUTO ZERO = ON. Thereafter

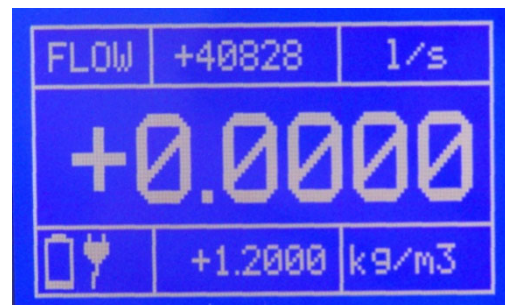
the FLOW display indication appears, which provides all relevant information of the measurement.

**Meaning of the display elements (FLOW):**

- Top left: Display of current operating mode (ZERO = zero setting, FLOW = volume flow measurement operation, ERR = overload error)
- In the upper middle: maximum measurement range (cannot be changed, size according to model) For some units the value 99.999 can be indicated, in case the maximal possible pressure value exceeds an volume flow value  $\geq 100.000$ .
- Top right: physical unit
- In the middle: current volume flow measurement value (calculated from measurement value of the internal pressure sensor).
- Bottom left: Rechargeable battery charger display (at mains operation: plug symbol)

**Example** (compare illustration):

- Operating mode volume flow (FLOW)
- Maximal volume flow = 40828 l/s
- Current measurement value = 0 m/s
- Tightness = 1,2 kg/m<sup>3</sup>,
- mains operation (bottom left)



**Protection against overload:**

IMPORTANT: Please bear in mind that the connected pressure does not exceed 125% of the measurement range of the Pneumator. If this happens slowly, the internal magnetic valve will lock at this value and ERR appears in the display. Make sure that the high pressure is no longer present and unlock the equipment by pushing the button OK.

ATTENTION: If an overload occurs too quickly (approx. <1ms), the pressure sensor can be destroyed.

**Manual zero balance (ZERO)**

In case the reference measurement element has to be set to zero during the measuring procedure, please press the button ZERO. After approx. 3-5 seconds the measurement operation will proceed again.

## 11. Computer programming

The Pneumator can be controlled by PC-interfaces (RS232 or USB). The communication interval in each case is 1 second.

### RS232:

RxD, TxD and the GND cable is needed for the connection. The connection is made with a straight interface cable (1:1, male x female).

### USB:

A virtual ComPort is provided for the PC via the USB interface. The operation of the equipment does therefore not differ from the operation via RS232.

### Interface programming:

- Press MENU
- **Submenu „settings“:** With OK another menu overview opens.
  - **Submenu „RS232/USB“:** With OK a menu overview opens again. Setting of the values: compare the following chart.

Parameter	Possible values
Active	----- (= no use of interfaces ) USB RS232
BAUD	1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 56000, 57600 (only selectable, if „active“ = USB or RS232)
Data-Bits	8 (not changeable)
Stop-Bits	1 (not changeable)
Parity-Bit	N (not changeable)

- Press MENU several times in order to leave the menu.

### Driver for the activation via PC:

Future Technology Devices International Limited (FTDI) provides the current interface driver for download on their homepage for all common system software (Windows, Linux, Mac OS).

- Homepage: <http://www.ftdichip.com>
- Download: <http://www.ftdichip.com/Drivers/VCP.htm>
- Installation manual of the different operating systems:  
<http://www.ftdichip.com/Documents/InstallGuides.htm>

### Interface instruction:

All interface instructions are started with a colon and closed with the Carriage Return (CR). Command and parameter are to be separated with a blank. By attaching an

interrogation mark on the respective command, a parameter can be read out. Received commands are acknowledged with „OK“, not available or wrong commands /instructions with „ERROR“.

### Auto mode:

:saaz <01> <CR>	Auto Zero before each cycle (phase 4) 0 – off 1 - on
:acy <1...100><CR>	Cycles to go 1...100 → number of cycles
:asd <1...100><CR>	Steps Down 1...100 → number of steps for reaching the endpoint
:asu <1...100><CR>	Steps Up 1...100 → number of steps for reaching the endpoint
:ate <0...10000><CR>	Waiting time at the endpoint (period 13) 1...10000 → time in seconds
:ath <1...10000><CR>	Hold time (period 10 and 16) 1...10000 → Zeit in Sekunden
:atp <1...10000><CR>	Pause time (phase 18) 1...10000 → time in seconds
:atr <1...10000><CR>	Tolerance band 1...10000 → tolerance as factor 0,01% of the measurement range of the equipment. As soon as the pressure value finds itself for one second within this range of tolerance , the hold time starts.
:ats <1...10000><CR>	Delay of start (phase 2) 1...10000 → time in seconds

### Interfaces Output:

:o <0,1><CR>	Output status information about interface 0 → off 1 → on
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### Measurement mode:

:smm m<CR>	Switch on the measurement mode
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Remark: Single measurement values cannot be read out (please use the display indication)

### Regulation mode:

:pa <-110...110><CR>	Increase set pressure to x percent -110...110 → Chance of set pressure requirement in %
:pd <CR>	Decrease set pressure to current set step range in % (Step DOWN)
:pr <-1100...11000><CR>	Define the current operating and measurement range -1100...11000 → new measurement range in 0,01% FS

:ps <-10...110><CR>	Percentual set pressure requirement -10...110 → set pressure requirement in %
:pu <CR>	Set pressure requirements to raise the actual set step size in % (Step UP)

**Menu settings:**

:saz<0,1>	Set auto zero (in measuring and control mode) 0 off 1 on
:sbr<0...1>	Set baud rate RS232 0 → 1200 1 → 2400 2 → 4800 3 → 9600 4 → 14400 5 → 19200 6 → 28800 7 → 38400 8 → 56000 9 → 57600
:sbu<0...1>	Set baud rate USB 0 → 1200 1 → 2400 2 → 4800 3 → 9600 4 → 14400 5 → 19200 6 → 28800 7 → 38400 8 → 56000 9 → 57600
:sci<n,u,r>	Select active interface Set Communication Interface n → Interfaces off u → USB active r → RS232 active
:sdb <0...100><CR>	Display brightness 0...100 → brightness in %



## 12. Technical data

Measuring range/Pressure range	4 types (1, 10, 100, 1000 hPa)	Usable pressure and measurement range	-10...110%
Measurement principle	inductive differential pressure measurement	Specified pressure and measurement range	0...100%
Operating modes	Calibration (manually or with programmed sequences), Measuring (Pressure, velocity, volume flow), Zeroing, Venting, Pressure-Tightness test	Overpressure protection	When exposed to overpressures higher than 125% of range, the internal reference sensor is separated from pressure and vented
Measurement Accuracy	0,3% of scale ± 1 Digit (Measurement range 1 hPa) 0,1% of scale ± 1 Digit (Measurement range 10, 100, 1000 hPa)	Pressure units	Pa, kPa, hPa, bar, mbar, psi, inH2O, inHg, mmHg, Torr
Linearity	0,2% of scale ± 1 Digit (Measurement range 1 hPa) 0,1% of scale ± 1 Digit (Measurement range 10, 100, 1000 hPa)	Velocity/volume flow units	m/s, km/h, fpm, mph, m3/h, l/s, lpm, cfm
Hysteresis	0,1% v. E. max.	Media	Air, non-aggressive, non-corrosive gases
Temperature drift int. reference sensor	Zero point: 0,03% of scale/K (0% by zero point adjustment) Span: 0,03% of scale/K	Pressure connection	6,6x11 mm (hoses D=6 mm)
Zero point adjustment	automatic (at settable intervals), manual (ZERO button)	Supply	20...26 VDC/1A internal accumulator, charges automatically upon net supply · Type: Lithium-Manganese · minimum use: 8h
Long-term stability	0,5% of scale per year (max.)	Interface	USB/RS232
Working temperature range	+10°...+40°C	Measures	Dimensions without handle : (HxWxD) 102,6 mm x 257 mm x 271 mm
Storage temperature range	-10°...+70°C	Weight	4,6 kg

### The resolution of the 4 Pneumator models is as follows::

Model 1hPa: 100,01 Pa -> Resolution 0,01  
 Model 10 hPa: 10,001 hPa -> Resolution 0,001  
 Model 100hPa: 100,01 hPa -> Resolution 0,01  
 Model 1000hPa 1000,1 hPa-> Resolution 0,1

## 13. Trouble-shooting

Interference	Reason	Procedure
Device does not function, display is dark	no supply voltage	<div style="border: 1px solid black; padding: 2px; display: inline-block;">20..26 VDC</div> the plug is connected in the power socket → Switch on the device with the main switch on the rear side → Check the fuse and if necessary, replace the fuse with a new one <b>Attention! Pull the power plug</b>
Set pressure is not being reached, pump runs permanently	leak source in the system, too big hose diameter	→ Slide on the hoses correctly, eliminate possible leaks → hose diameter max 5mm

## 14. Service

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