

> operation manual

Pressure calibrator | Type DPC

intelligent electronics

FSM[®]

Hints

- > To avoid damage, please read the operating instructions carefully before using.
- > The permissible maximum pressure must not be exceeded: DPC 1/ DPC 10/ DPC 100 5-fold overload; DPC 1000 2x overload
- > The calibrator is able to exceed or fall below the target pressure specification by +/- 10%
- > The device may only be opened by qualified personnel from FSM AG.

Operating modes

The device has a total of four different operating modes.

operation mode	Application	function
CTRL (control)	Calibration of sensors and other test items	Pressure is built up and maintained. Specification can be percentage or absolute.
MESS (measure)	Measurement of differential and relative pressure.	Electronics evaluate the pressures present at the device.
AUTO (automatic)	Pressure profiles stored in the device are executed.	The pump builds up different pressures based on the stored pressure profiles.
MENU	Specific adaptation to the respective application.	Setup function for the different operating modes.

service

- > I/O: Button for switching the device on and off
- > MENU: This button takes you to the setup menu and allows you to make the settings for the respective operating mode. When using CTRL mode, the device is in VENT mode after exiting the setup menu.
- > LEAK: With the LEAK button, a test item connected to the calibrator can be checked for leaks.
- > ZERO: Button for manual zeroing of the integrated sensor
- > UP: In CTRL mode to set the absolute and percentage value. In MENU mode to switch to the various submenu items.
- > DOWN: In CTRL mode to set the absolute and percentage value. In MENU mode to switch to the various submenu items.
- > OK: The OK button can be used to switch between absolute and percentage value in CTRL mode. In MENU mode, the button is used to confirm the respective setting. The AUTO mode is started using the OK button.
- > %: In CTRL mode you can use the % key to change the value from -100% to 100%. In the submenu for setting the decimal places.
- > You can see the status of the integrated battery and power supply at any time in the display (bottom left)



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General Settings

Press the MENU button and the UP/DOWN button until you reach the desired menu item. Use the OK button to access the corresponding submenu. The following submenu items are available:

- > MODE: Selection of the operating mode
 - >CTRL (control): Calibration of pressure sensors and switches
 - >MESS (measure): Measurement of differential and relative pressure
 - >AUTO (automatic): Storing print profiles
- > UNIT: Selection of the pressure unit (Pa, hPa, kPa, mbar, bar, Torr, mmHG, inHG, psi, mmH2O, inH2O)
- > RANGE - (only with bipolar sensor, not in AUTO mode): Setting the negative pressure range (-100% – 0% value)
- > RANGE +: Setting the positive pressure range (0% – 100% value)
- > STEPS (only in CTRL mode): Setting the step size in %
- > AUTO CONFIG (only in auto mode): Setting the print area, the print unit and the steps into which the print area is divided. Different values can be assigned to the STEPS UP/ STEPS DOWN commands. Number of cycles and AUTO-Zero adjustable before each cycle. Start of the pressure range with bipolar sensor can be set at 0% or -100% pressure.
- > SETTINGS: see below

Settings submenu

- > ZEROING: Switching automatic zeroing on and off after exiting the menu. Setting at which time intervals the sensor should automatically zero.
- > RS232/USB: Selection of the respective interface
- > ADVERTISEMENT: see below
- > INFO: Basic information about the device (hardware version)

Display submenu

- > BRIGHTNESS: Brightness adjustment
- > LANGUAGE: Selection of the language displayed

Operating modes and operation

> CTRL (control)

CTRL mode is used for calibrating pressure sensors and switches or other pressure devices. In CTRL mode, the pump is active and regulates the target pressure accordingly. The internal sensor delivers the set value via the display.

> Connection

Differential pressure devices are connected to the + and - port of the device. Relative pressure devices are connected to the + connection

> Attitude

- > Press the MENU button. Confirm the MODE menu item with OK and press UP/DOWN until CTRL appears. Confirm with OK.
- > In the UNIT submenu, set the pressure unit (UP/DOWN) and confirm with OK.
- > In the RANGE + submenu, set the upper limit of the pressure range (UP/DOWN and 0%/100%) and confirm with OK

- > Bipolar sensor: In the RANGE submenu, set the lower limit of the pressure range (UP/DOWN and -100%/0%), confirm with OK
- > In the STEPS submenu, the step sequence is set in % (UP/DOWN and 0%/100%), confirm with OK.
- > Leave the submenu with the MENU button

> use

When you exit the menu, the device is in VENT mode, ie the pressure measuring cell of the calibrator is vented. The setpoint of the pressure range is shown in the upper center of the display. The percentage value can be read in the lower center of the display. When you exit the menu, this value is at 0%. With the OK button you can choose between Target pressure specification and the percentage value change.

- > The percentage value You can change using the UP/DOWN buttons (in the specified step sizes) and using the 0%/100% or -100%/100% buttons (bipolar sensor).

> The Target pressure specification can only be changed using the UP/DOWN buttons. With 0%/100% you can jump to the corresponding point in the target pressure specification.

> Example

Target pressure specification: By pressing the OK button you jump between the target pressure specification and the percentage specification in the display. Press the OK button until the value (top center of the display) is graphically highlighted. You can jump to the respective position using the 0% and 100% buttons. Use the UP and DOWN buttons to set the desired value. You can exit the target pressure specification by pressing the OK button. The border jumps back to the default percentage (bottom center of the display).

As soon as the calibrator display shows a stable value (thick frame appears around display value), the data can be recorded:

- > Default value: In the display at the bottom right
- > Pressure unit: In the top right of the display
- > Actual value: On the display of the connected device
- > Comparison value: center of display

In CTRL mode it is possible to manually zero the device and check the connected device for leaks.

- > Manual zeroing process: Press the ZERO button, the output signal (display) is zeroed.
- > Leak test: By pressing the LEAK button, the measuring cell is switched off and the pressure is maintained. You can check whether the value is stable via the display. Pressing the LEAK button again will exit the mode.

> MESS (measure)

The MEASURE mode is used to measure a differential or relative pressure. The pump is not active in this operating mode. The pressure is recorded directly by the built-in pressure measuring cell.

> Connection

Differential pressure devices are connected to the + and - port of the device. Relative pressure devices are connected to the + connection

> Attitude

- > Press the MENU button. Confirm the MODE menu item with OK and press UP/DOWN until MEASURE appears. Confirm with OK.
- > In the menu, go to UNIT using the UP/DOWN buttons, select the pressure unit and confirm with OK.
- > In MEASURING mode, the range limits RANGE + and RANGE - are displayed, but they cannot be set.
- > Press the MENU button to exit the menu
- > Submenu SETTINGS:
 - > Use the UP/DOWN buttons to jump to the SETTINGS menu item and confirm with OK:
 - > Jump to ZERO in the submenu and confirm with OK
 - > Under AUTO-ZERO you can deactivate or activate the automatic zeroing for the MEASURING mode

> use

After exiting the menu, the internal sensor is zeroed. The device begins measuring the existing pressure.



- > Top right: pressure unit
- > Middle top: maximum pressure or Minimum pressure
- > Top left: operating mode
- > Middle: current pressure

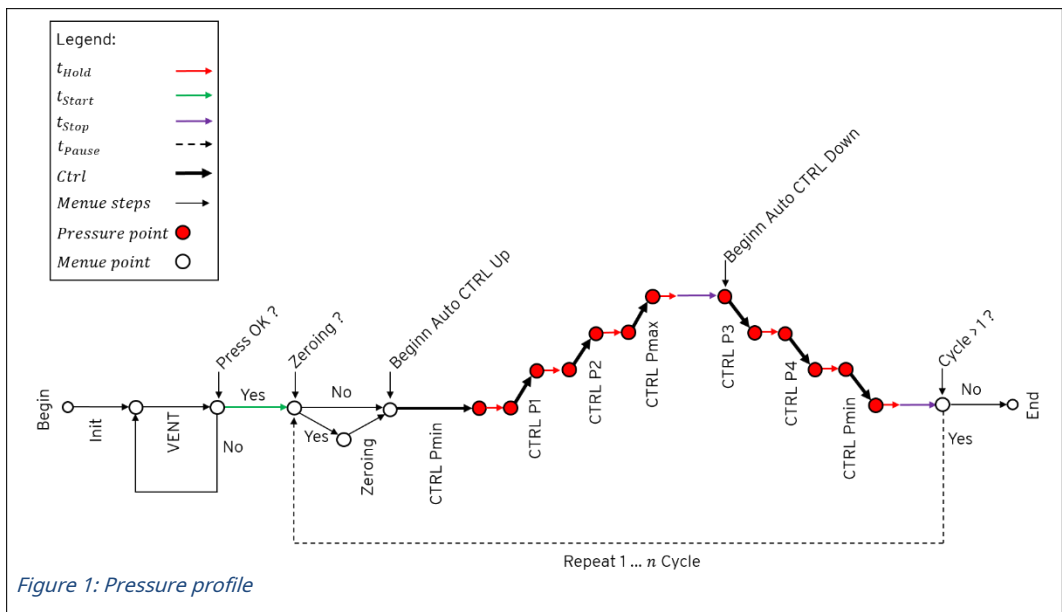
The device can be zeroed at any time in MEASURING mode using the ZERO button.

> Danger:

If the connected pressure exceeds the permissible maximum load (125% or -125% [bipolar]), the internal sensor is blocked by solenoid valves. ERROR appears in the display. You can unlock and release the device again using the OK button.

> CAR

In AUTO mode, a pressure profile as shown in Fig. 1 can be approached. Particularly when several pressure sensors or pressure switches need to be calibrated with an identical value. The mode also makes it possible to run through this defined profile several times in succession. Zeroing can always be carried out at the beginning of each cycle. The pressure stages are approached up to the maximum pressure range, then the negative minimum pressure is approached. The adjustment is carried out symmetrically around the zero point; an asymmetrical process is not possible. Note: the process is based on the DKD-R 6-1 guideline.



> Connection

Differential pressure devices are connected to the + and - port of the device. Relative pressure devices are connected to the + connection

> Attitude

- > Press the MENU button. Confirm the MODE menu item with OK and press UP/DOWN until AUTO appears. Confirm with OK.
- > For AUTO mode, only the submenu items RANGE + and UNIT are active.
- > Use the UP/DOWN buttons to go to the SETTINGS menu item and confirm with the OK button. The ZERO sub-item is not active.
- > In the submenu, go to AUTO MODE using the UP/Down buttons and confirm with OK.
- > RANGE: Pressure range that is approached (see "General Settings")
- > UNIT: Pressure unit (see "General Settings")

In the AUTO CONFIG submenu item you can specify further settings for the AUTO mode.

- > STEPS: Steps that are followed when building up (STEPS UP) and reducing (STEPS DOWN) the pressure.
- > Cycles: Here you specify the number of cycles that should be carried out in AUTO mode.
- > AUTO-ZERO: Automatic zeroing after each cycle has been completed
- > CTRL SYM: The pressure profile can either start symmetrically around the zero point (from -110% / ON) or only in the positive pressure range (from 0% / OFF).

In the TIME CONFIG submenu item you can specify further settings for the AUTO mode.

- > T Start: Waiting time for venting the sensor
- > T Stop: Waiting time after reaching the maximum or specified pressure

- > T stop: holding time of the current Pressure stage until the next pressure stage is started
- > T Pause: Waiting time between two cycles

Exit the submenu by pressing the MENU button

> use

VENT	+ 30.00	Pa
Zykl.	Zeit	s
1	Druck	+ 0.06
2		
	+ 0%	+ 0.00

After exiting the menu, the calibrator is in waiting status. All information about the AUTO mode is shown in the display.

- > Top right: pressure unit
- > Middle left: first of ten cycles
- > Bottom middle: percentage display of the current target pressure
- > Top middle: target pressure

Press the OK button to start AUTO mode.

> LEAK (leakage)

In CTRL mode, connected test items can be checked for leaks using the LEAK button.

> Connection

Differential pressure devices are connected to the + and - port of the device. Relative pressure devices are connected to the + connection

> Attitude

In order to check a test item for leaks, the device must be in CTRL mode.

- > Enter the desired pressure using the UP/DOWN or the 0%/100% or -100%/100% buttons.
- > As soon as the pressure is reached and the value is stable, press the LEAK button. The internal pump is switched off and the process starts.

> use

LEAK	+10.000	hPa
+10.099		
89s	+ 1.0%	+ 0.099

- > Top left: Current operating mode
- > Top middle: target pressure specification
- > Top right: pressure unit
- > Bottom middle: Percentage deviation from the target value
- > Bottom right: Actual deviation from target value
- > Bottom left: Elapsed time since the leak function was activated

Interfaces

You have the option of controlling and monitoring the calibrator via the PC using interfaces (USB or RS232). In rule, measurement and automatic mode, a cyclic output of the current device status can be switched on and off. Output interval is 1 second.

> USB

A virtual ComPort is provided to the PC via the USB interface. The control of the device therefore does not differ from the control via RS232.

> RS232

To connect, RxD, TxD and the GND line are required. The connection is made via a straight interface cable (1:1, male to female).

> Setting options

Press the MENU button and UP/DOWN until you reach the SETTINGS submenu item and confirm with OK. In the submenu, go to RS232/USB using the UP/DOWN buttons and confirm with OK. The following settings can be made:

- > ACTIVE: Selection whether an interface is used and which interface (USB, RS232 and -----)
- > BAUD: Selection of the baud rate (1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 56000, 57600)
- > DATA BITS: Default value (8)
- > STOP BITS: Specified value (1)
- > PARITY BITS: Specified value (N)

> driver

Future Technology Devices International Limited (FTDI) provides current interface drivers for download on its homepage for all common operating systems (Windows, Linux, Mac OS).

- > Homepage URL: <http://www.ftdichip.com>
- > Download URL: <http://www.ftdichip.com/Drivers/VCP.htm> (FTDI Homepage --> Drivers --> VCPDrivers)
- > Installation instructions for the different operating systems: <http://www.ftdichip.com/Documents/InstallGuides.htm> (FTDI Homepage --> Documents --> Installation Guides)

> Interface commands

All interface commands are introduced with a colon and concluded with the Carriage Return (CR). Command and parameter must be separated by a space. By appending a question mark to the respective command, the parameter that would otherwise be changed can be read out. Received commands are acknowledged with "OK", missing or incorrect commands are acknowledged with "ERROR".

You can request the interface protocol at the email address: info@fsm.ag .