

PORTABLE DIFFERENTIAL PRESSURE GAUGE

ESA DPG-E SERIES



INTRODUCTION

ESA DPG-E is a pressure gauge with liquid crystal display managed by a microprocessor. The ergonomic design of the instrument has been developed in order to allow the operation of the pressure measurement "on field" in industrial plants.

APPLICATIONS

- Measurement of relative and differential pressures.
- Measurement of flow through calibrated orifices with temperature compensation.
- Measurement of chimney draft.
- Measurement of flow speed for Pitot tubes in pipes

FEATURES

- Type of gas: all not aggressive gases
- Nominal differential pressure range: $-100 \text{ mbar} \div +200 \text{ mbar}$
- Accuracy: see sensor features
- Maximum pressure: 500 mbar
- Pressure input connection: flexible rubber pipes 11x9
- Supply voltage: 3Vdc from batteries 1.5 V (LR6 AA)
- Low battery signal: present
- Working temperature: $0 \div 50 \text{ }^\circ\text{C}$
- Storage temperature: $-10 \div 60 \text{ }^\circ\text{C}$
- Input gas temperature: $5 \div 45 \text{ }^\circ\text{C}$
- Protection degree: IP40
- Atmospheres: not suitable for explosive and corrosive environment
- Dimensions: 155X122X29 mm
- Weight: 350 g

DESCRIPTION

ESA DPG-E is a pressure gauge with double liquid crystal display and four key buttons for functions selection. The pressure measurement is made in continuous way and the device displays the values read with different measure scale. ESA DPG-E allows to set up to four calibrated orifices' data, in order to calculate the flow rates related to four different flanges of measurement. For one of those flow rate calculation, the temperature compensation also is available. ESA DPG-E, being programmable, it can be shaped according the users' requirements. The instrument can operate in two different modes: "Automatic" and "Programming". In the Automatic mode or Automode, the device displays the measured pressure and the four calculated flows; while in the Programming mode or Program, the operator can set the operation parameters.



Headquarters
Esa S.r.l.
Via E. Fermi 40 I-24035 Curno (BG) - Italy
Tel. +39.035.6227411 - Fax +39.035.6227499
esa@esacombustion.it - www.esapyronics.com

International Sales
Pyronics International S.A./N.V.
Zoning Ind., 4ème rue B-6040 Jumet - Belgium
Tel +32.71.256970 - Fax +32.71.256979
marketing@pyronics.be

SENSOR FEATURES

ESA DPG-E uses a differential pressure sensor with the features listed below:

Nominal span	-100 ÷ 200 mbar
Inlet maximum relative pressure to the atmospheric pressure	500 mbar
Maximum differential pressure between the two inlets (+ and -)	500 mbar
Accuracy of measure: range 0 ÷ 30 mbar range 30 ÷ 100 mbar range 100 ÷ 200 mbar range 0 ÷ - 30 mbar range -30 ÷ -100 mbar	<1% F.S. ± 0,1 mbar ± 1 digit ± 0,2 mbar ± 1 digit ± 0,3 mbar ± 1 digit ± 0,2 mbar ± 1 digit ± 0,4 mbar ± 1 digit

KEYBOARD DESCRIPTION

DPG-E have the following buttons:

- 1) Up button (↑)
- 2) Down button (↓)

- 3) Enter or function button (F)
- 4) Power-on and power-off button (ON/OFF)

The main functions of these buttons are shown in the following table:

OPERATION	MODE	DESCRIPTION
↑ ○ ↓	Automode	Displays scanning the pressure and the four calculated flows
F	Automode	Activates the zero pressure function during the pressure displaying
↑ + F	Automode	Switch to programming mode
↑ ○ ↓	Program.	Displays scanning of available menus and the parameters to be set inside each menu. When the values of the parameters are being changed, changes the values displayed on the upper display.
F	Program.	Gives access to the menu displayed. Enables the change of the parameter displayed and then stores the current value.
↑ + F	Program.	Switch to Automode when the values of the parameters are being changed, exits from programming mode without storing.

DISPLAY DESCRIPTION

ESA DPG-E have a double liquid crystals display:

- Upper display (4 digit 7 segment): in Automode, it displays the value measured (pressure) or calculated (flow) by the instrument; whereas in programming mode, it displays either the name of the selected menu or the value of the current parameter.
- Lower display (8 digit alphanumeric): in Automode, it displays the name of the parameter shown on the upper display; in programming mode it displays the name of the current parameter.

The position adopted for the decimal point is variable according the value shown and the unit of measurement. For flow indication the decimal fractions are hidden for values higher than 999.9 Nm³/h (or cfm).

For pressure indication the number of decimal fraction varies according the unit as per the following: two decimal fraction (kPA), one decimal fraction (mbar and incWC) or none decimal fraction (mmH₂O)

POWER-ON AND POWER-OFF

To switch on ESA DPG-E keep the "ON/OFF" button pressed for at least 1 second. At the beginning of this phase the words "ESA DPG-E" will be displayed, followed by the software release number. At the end of the initializing phase, the device will switch to the Automatic mode.

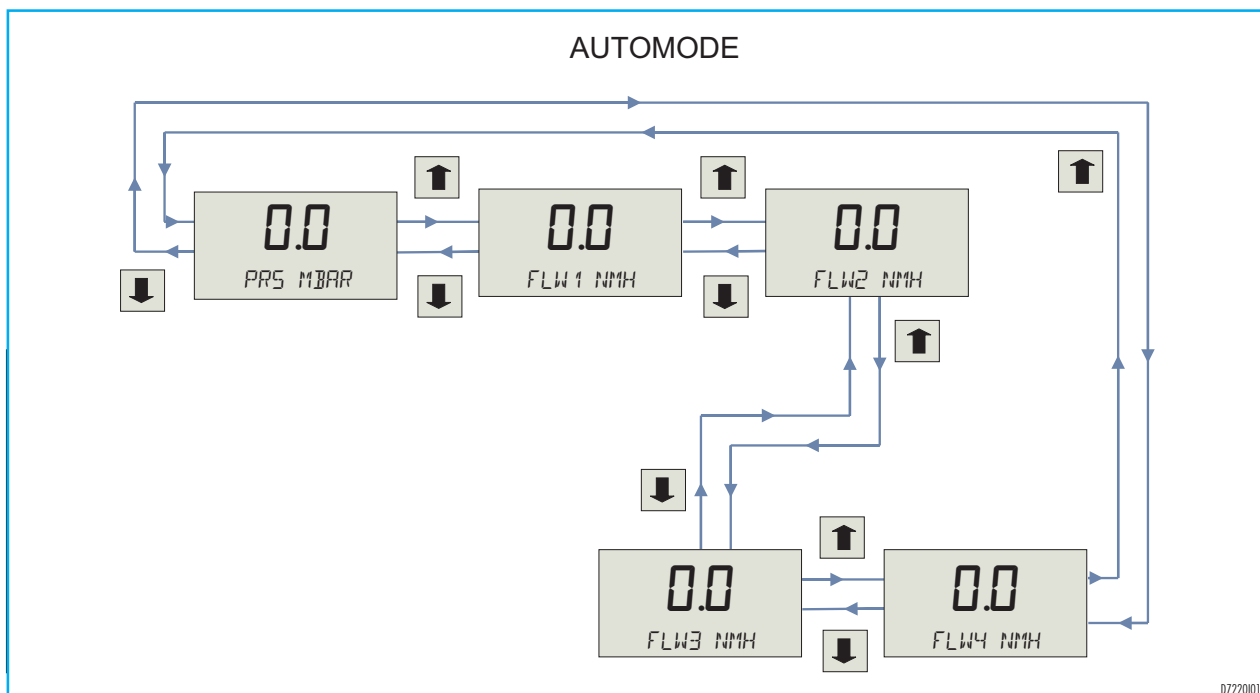
To switch off the device keep the "ON/OFF" button pressed for at least 3 seconds: the indication "PWR OFF" is displayed, and then the device switch off itself.

The Automatic switching off function allows the device to turn off after a predefined time (see "Auto OFF" parameter).

AUTOMATIC MODE (AUTOMODE)

The Automatic mode start at power on after the initializing phase or after the exit from Programming mode. In the Automatic mode the device displays the differential pressure measured or the values of the four flows calculated, moreover it allows to reset the "zero" pressure conditions (see "reset zero pressure").

After the initializing phase, ESA DPG-E displays the last measured/calculated value shown before the switch off, while at the exiting from Programming mode the device indicate always the pressure value. Pressing the button \uparrow or \downarrow all the physical quantity are displayed in sequence.

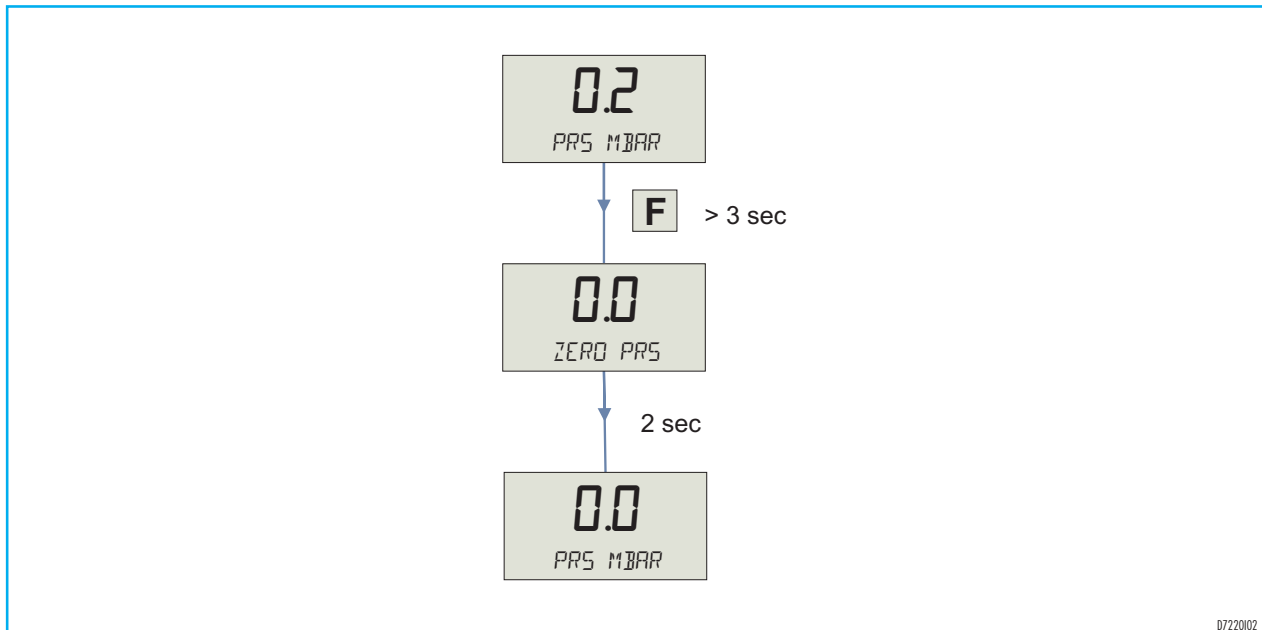


OPERATION	UPPER DISPLAY	LOWER DISPLAY	DESCRIPTION
Power on	8888	ESA-DPGE	Initial indication
None	8.88	Rel . se	Software device version
None	8888	PRS MBAR	Displays differential pressure value
↑ o ↓	8888	FLW1 NMh	Displays flow 1 value
↑ o ↓	8888	FLW2 NMh	Displays flow 2 value
↑ o ↓	8888	FLW3 NMh	Displays flow 3 value
↑ o ↓	8888	FLW4 NMh	Displays flow 4 value

RESET ZERO PRESSURE

The reset of "zero" pressure is necessary to compensate possible sensor drifts (time or temperature). The correction of "zero" pressure measurement is obtained keeping pressed the function "F" button for at least 3 seconds while the pressure value is shown.

Before starting with the "zero" pressure correction it is recommended that ESA DPG-E is powered at least from one minute, and it is necessary that the pipes are both at atmospheric pressure (disconnected by any flange, pressure tap,..).



0722002

PROGRAMMING MODE (PROGRAM.)

To access the programming mode of the configurable parameters, press the \uparrow and **F** buttons simultaneously while in Automatic mode. The instrument will show the current functioning mode displaying "Program." on the lower display and the name of the menu on the upper one.

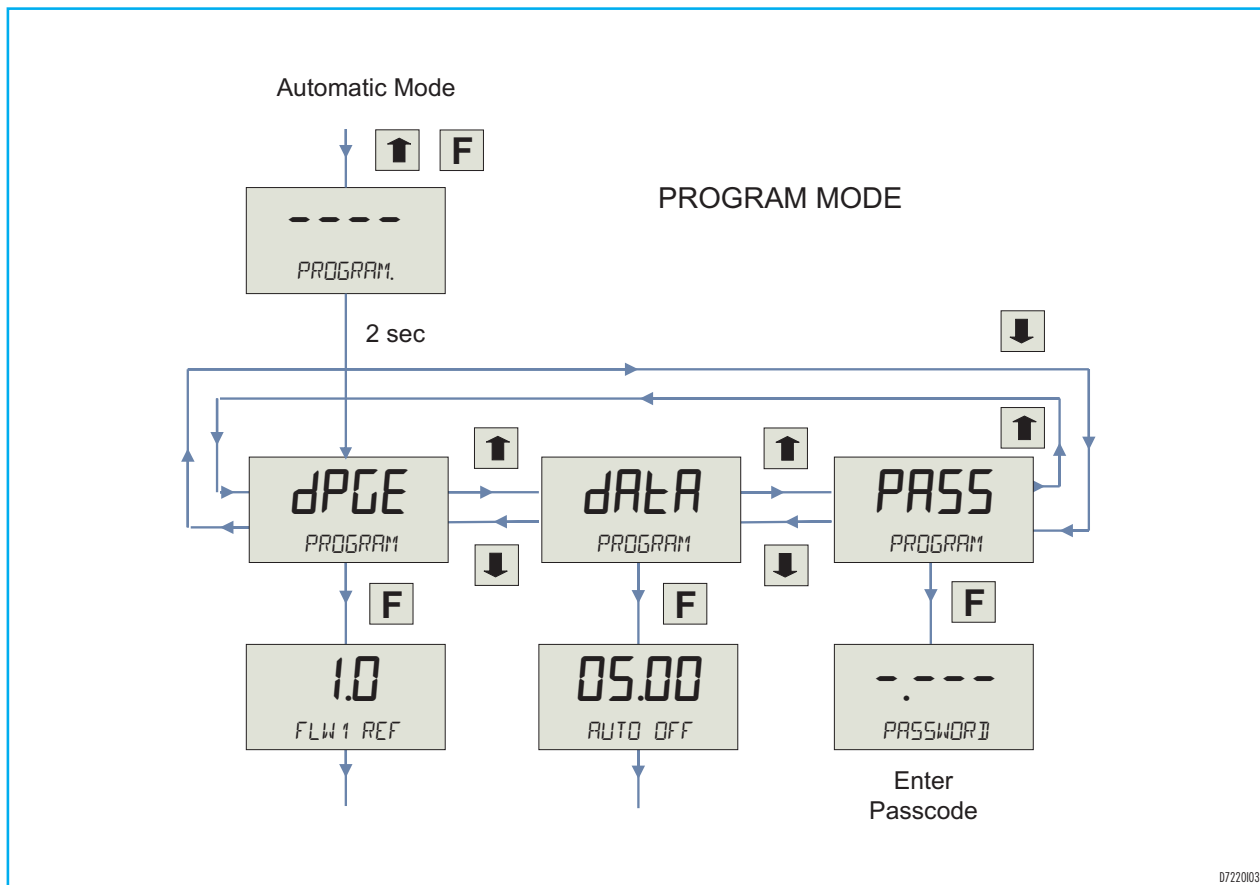
To leave the Programming mode and return to the Automatic mode press \uparrow and **F** simultaneously again; the message "Automode" will be displayed for few seconds to indicate you are leaving the Programming mode.

The following menus are available in Programming mode:

- **DPGE Menu:** contains all the parameters concerning the calculation of flows.
- **DATA Menu:** contains the parameters related to the device operating conditions and the unit of measurement.
- **PASS Menu:** calibration menu with access enabled by password. In case of erroneous access at password entering, press \uparrow and **F** simultaneously to switch to Automatic mode.

Use the \uparrow or \downarrow button to choose the requested menu and confirm with the **F** button.

To exit from the menu and come back to Programming mode, select the proper parameter and confirm with the **F** button.

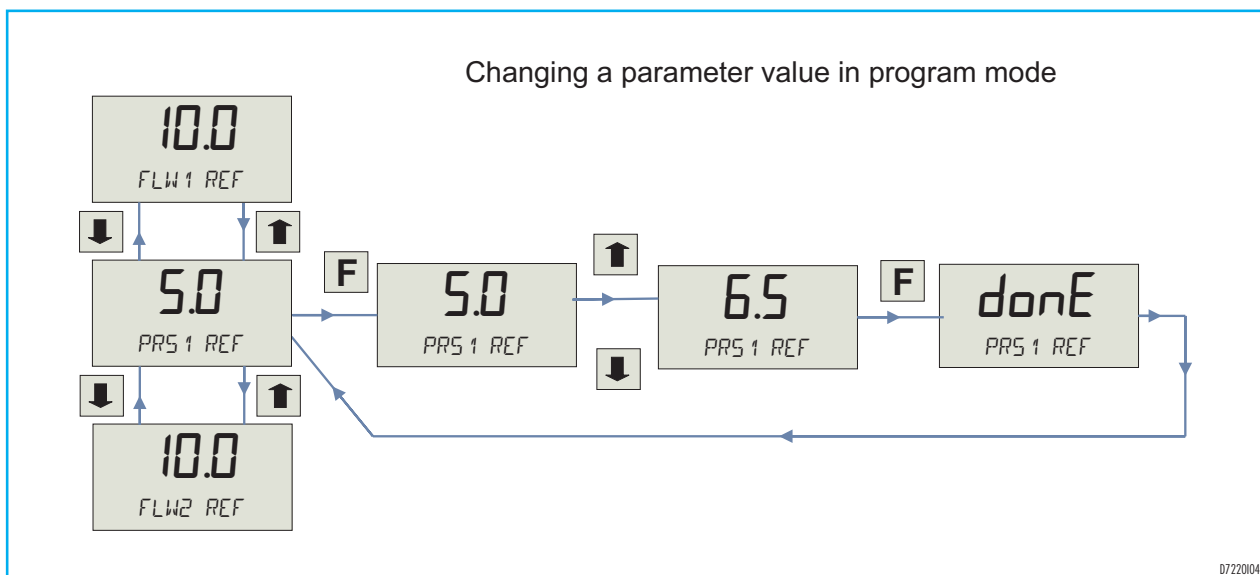


0722003

TO CHANGE PARAMETER:

To change parameter values, follow these instructions:

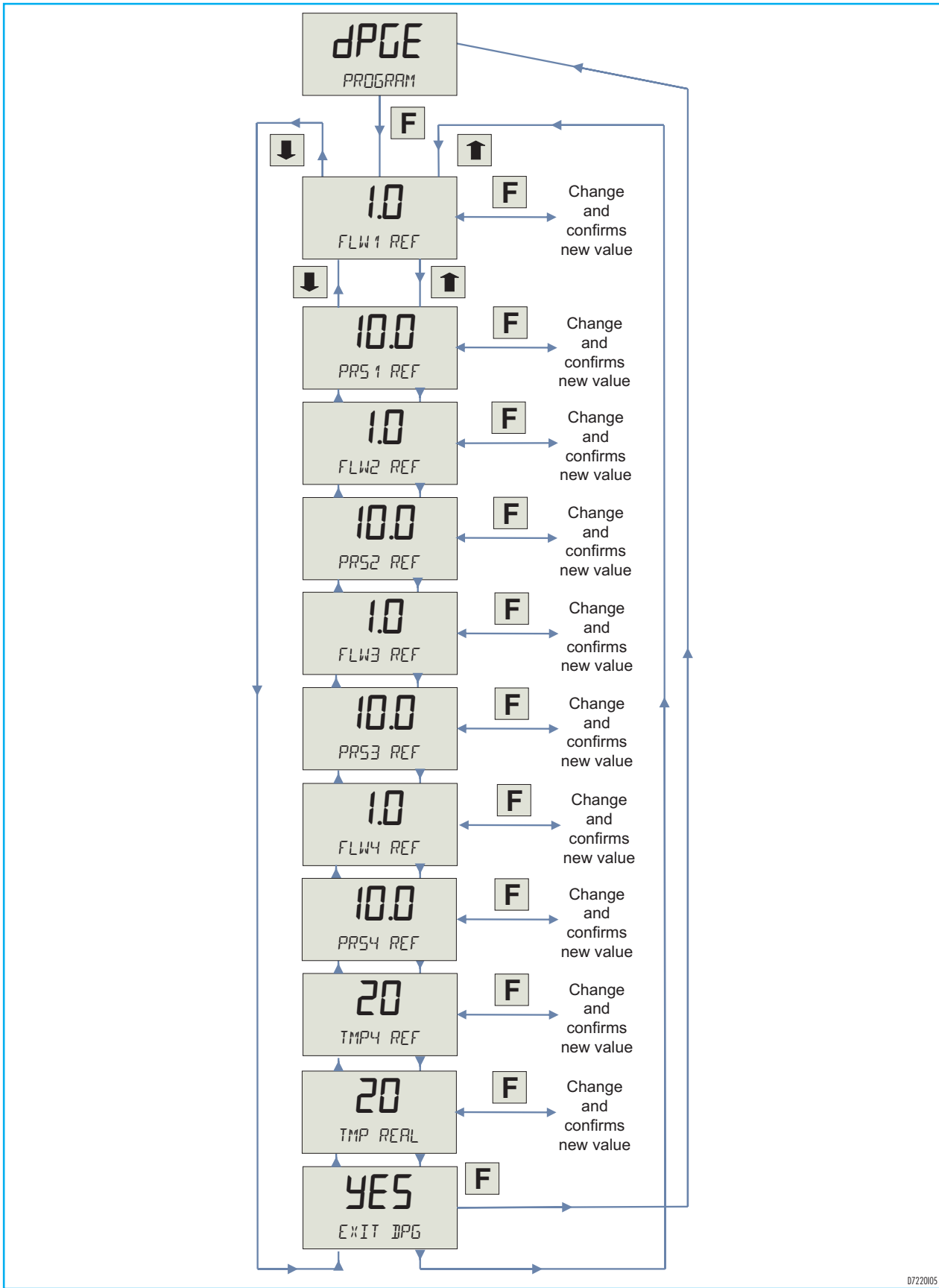
- Select the required parameter in the menus, pressing the \uparrow and \downarrow buttons. In this phase the parameter's name is shown in the lower display, while its value is shown in the upper display.
- Press **F** to allow the parameter change: the word on the lower display starts blinking.
- Press the \uparrow and \downarrow buttons to either increase or decrease the value. At this stage of procedure, the new value is not yet stored, so if some additional change/correction is needed (i.e. because of an operation mistake) the operator can avoid to modify the previously existing value by pressing **F** and \uparrow simultaneously (exit from Programming mode without storing)
- Press **F** button to store the new value of the parameter in the memory; the message "done" will appear on the upper display for a couple of seconds if the new value has been correctly stored.
- Once the value has been stored, the word on the upper display stops blinking.
- Use the \uparrow and \downarrow buttons to select the parameter you now want to change or leave the menu of the programming mode.



ESA DPG-E MENU

PARAMETER	LOWER DISPLAY	DEFAULT VALUE	MINIMUM VALUE	MAXIMUM VALUE
Flow rate of reference (Nm ³ /h) of the orifice 1 calculation	FLW1 REF	1.0	0.0	6553
Pressure of reference (mbar) of the orifice 1 calculation	PRS1 REF	10.0	0.0	200
Flow rate of reference (Nm ³ /h) of the orifice 2 calculation	FLW2 REF	1.0	0.0	6553
Pressure of reference (mbar) of the orifice 2 calculation	PRS2 REF	10.0	0.0	200
Flow rate of reference (Nm ³ /h) of the orifice 3 calculation	FLW3 REF	1.0	0.0	6553
Pressure of reference (mbar) of the orifice 3 calculation	PRS3 REF	10.0	0.0	200
Flow rate of reference (Nm ³ /h) of the orifice 4 calculation	FLW4 REF	1.0	0.0	6553
Pressure of reference (mbar) of the orifice 4 calculation	PRS4 REF	10.0	0.0	200
Temperature of reference (°C) of the orifice 4 calculation	TMP4 REF	20	-100	1000
Real temperature of the gas during the measurement	TMP REAL	20	-100	1000
Exit from DPGE menu	Exit DPGE	YES	YES	YES

- FLW1 REF: set up of calculation flow rate of the measuring element 1; together with "PRS1 REF" parameter allows the device to calculate the instant flow rate "FLW1".
 - PRS1 REF: set up of calculation differential (or relative) pressure of the measuring element 1; together with "FLW1 REF" parameter allows the device to calculate the instant flow rate "FLW1".
 - FLW2 REF: set up of calculation flow rate of the measuring element 2; together with "PRS2 REF" parameter allows the device to calculate the instant flow rate "FLW2".
 - PRS2 REF: set up of calculation differential (or relative) pressure of the measuring element 2; together with "FLW2 REF" parameter allows the device to calculate the instant flow rate "FLW2".
 - FLW3 REF: set up of calculation flow rate of the measuring element 3; together with "PRS3 REF" parameter allows the device to calculate the instant flow rate "FLW3".
 - PRS3 REF: set up of calculation differential (or relative) pressure of the measuring element 3; together with "FLW3 REF" parameter allows the device to calculate the instant flow rate "FLW3".
 - FLW4 REF: set up of calculation flow rate of the measuring element 4; together with "PRS4 REF", "TMP4 REF" and "TMP REAL" parameters allows the device to calculate the instant flow rate "FLW4".
 - set up of calculation differential (or relative) pressure of the measuring element 4; together with "FLW4 REF", "TMP4 REF" and "TMP REAL" parameter allows the device to calculate the instant flow rate "FLW4".
 - TMP4 REF: set up of calculation temperature of the measuring element 4; together with "FLW4 REF", "PRS4 REF" and "TMP REAL" parameters allows the device to calculate the instant flow rate "FLW4".
 - TMP REAL: set up of real gas temperature during the measurement; together with "FLW4 REF", "PRS4 REF" and "TMP4 REF" parameters allows the device to calculate the instant flow rate "FLW4" setting the temperature compensation.
 - EXIT DPG: exit command from the DPGE menu, when displayed, pressing F button the instrument displays the programming mode again.
- PS: The calculation values of the measuring element must be set in the " FLW REF" parameters in normalized cubic meters per hour (Nm³/h); in the " PRS REF" parameters in millibar (mbar), and in the " TMP4 REF" and "TMP REAL" parameters in celsius degrees (°C).

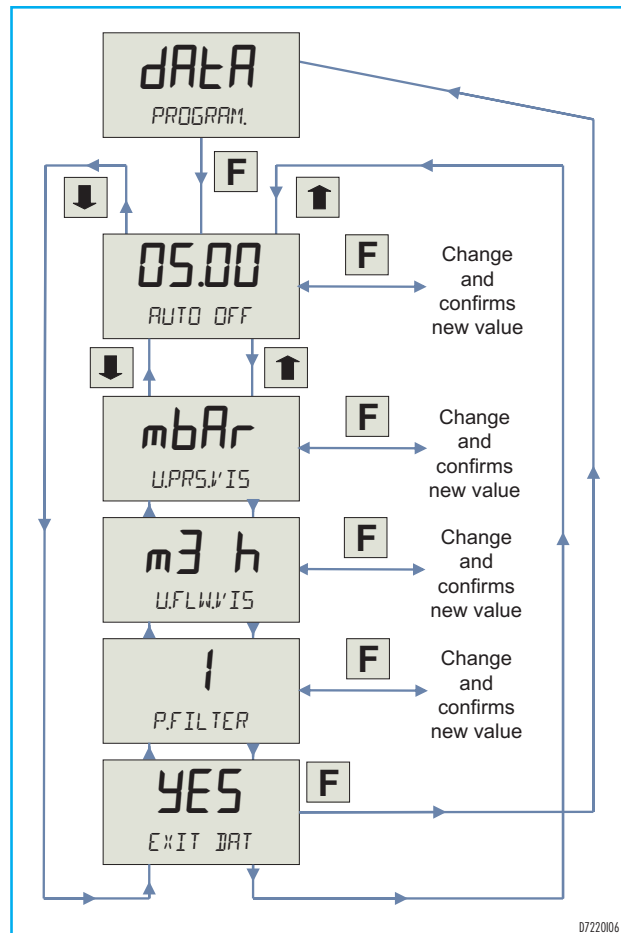


0722005

DATA MENU

PARAMETER	LOWER DISPLAY	DEFAULT VALUE	MINIMUM VALUE	MAXIMUM VALUE
Automatic power off timeout (seconds)	AUTO OFF	5.00	0.00	20.00
Measuring unit for pressure displaying	U.PRS.VIS	mbar	mbar	incW
Measuring unit for flow rate displaying	U.FLW.VIS	M3_h	M3_h	CFM
Filtering on pressure measure	P.FILTER	1	0	3
Exit from DATA menu	EXIT DAT	YES	YES	YES

- **AUTO OFF:** sets timeout (in seconds) after that period of time the automatic switch off is performed. The automatic switch off function is active only in Automatic mode, while in Program mode (or if timeout is set to 0 seconds) it is deactivated.
- **U.PRS.VIS:** selection of the measuring unit for the pressure displaying in Automatic mode. The choice may be done among the following units: millibars (mbar), kilopascal (KPa), millimeters of water column (mmH₂O) or inches of water column (incWC).
- **U.FLW.VIS:** selection of the measuring unit for the instant flow in Automatic mode, it is possible to choose between normalised cubic meters per hour (Nm³/h) or cubic feet per minute (cfm).
- **P filter:** sets the software filtering function of pressure signal. The higher this parameter, the smaller the influence of slight, instant changes on the value displayed of differential pressure. Setting this parameter to 0, the filter is disabled.
- **EXIT DAT:** exit command from the DATA menu, when displayed, pressing F button the instrument displays the programming mode again.

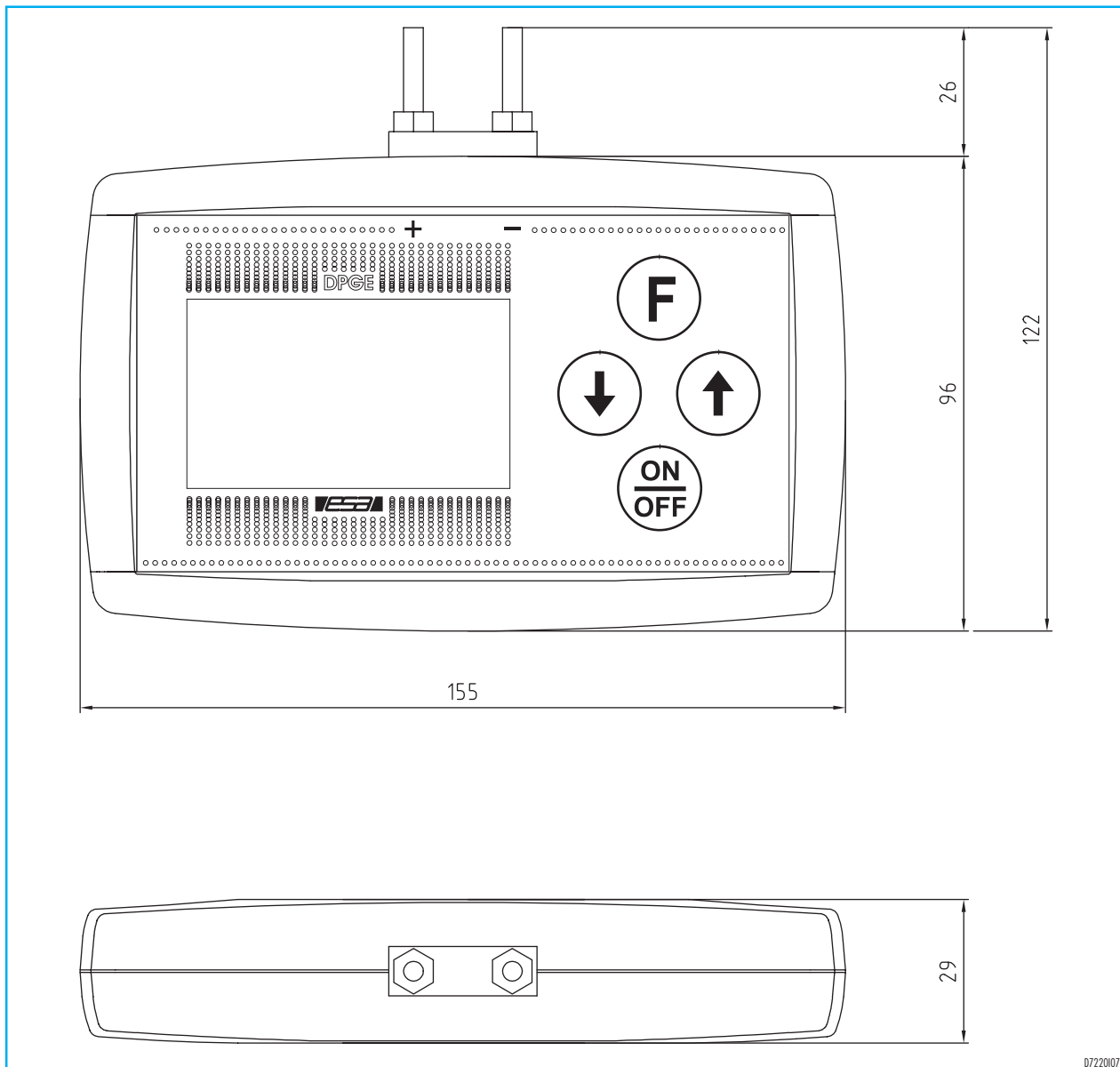


WARNINGS

- Use ESA DPG-E in environment where thermal excursions are within the allowed limits, avoid exposure to intense electrical and/or magnetic fields, avoid exposure to vibration or conditions where it might be exposed to radiative fluxes heat, or get in contact with fumes, liquids, solvents, or corrosive gases.
- The pneumatic connections for the pressure inlet signals (+ / -) can be accomplished with the supplied rubber pipes. It is advisable to maintain the device in a higher position respect to pressure intakes (calibrated flange, anubar, etc.) to avoid that dust and condensate can damage the sensor.
- Before take in place any measure, check the "zero" pressure holding the input pipes disconnected from measure element and at atmospheric pressure
- If the instrument is used to measure relative pressure, the signal must be connected to the positive inlet, and the negative inlet must remain open (atmospheric pressure).
- The batteries must be replaced only with specified type, when the "Lo b" indication occurs.

- If the ESA DPG-E fails to work properly, it must be sent back to the manufacturer for repair. Modifications or repairs carried out by third parties are not permitted and can compromise the proper operation of the device. In that case the warranty terms expire.
- ESA DPG-E is a measuring device for the combustion plant regulation an control. The scope of this device is not intended to warranty the safe operation of the plant: for this purpose others equipments are availables.

OVERALL DIMENSIONS



07220107

CONFORMITY

 The device is conform to the European Community standard 89/336/CEE with reference at : EN 61000-4-2 (EMC immunity) - EN5008-1 (EMC source) - EN50082-1 (EMC)