DPC

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BULLETIN EM20180308 DPC

DPC

PRECISION DIGITAL MASS FLOW CONTROLLER WITH MULTI GAS FUNCTIONALITY

Design Features

- Simultaneously displays Mass Flow, Volumetric Flow, Pressure and Temperature.
- Multi-Gas functionality: support for 90 different gases and gas mixes.
- "User Defined Mixture" functionality allows to create and store up 20 custom gas mixes with up to 5 different gases each.
- Quick (100-150 ms) response time.[1]
- Standard accuracy ± (0.5% RD + 0.2% FS).
- 200 to 1 turn-down ratio.
- Two programmable mass flow rate totalizers.
- High, Low or In Range Alarms with preset action delay for Mass Flow, Temperature and Pressure.
- User programmable mass flow rate Pulse Output (via SSR).
- Extensive Self Diagnostics with status LED or OLED indication.
- All 3 user selectable analog input and output interfaces are standard: 0-5Vdc, 0-10Vdc, 4-20mA.
- Two user selectable digital communication interfaces (RS-232 and RS-485) are standard.
- Optional Modbus RTU network interface with isolated RS485 transceiver.
- User programmable solid state relay with latch option.
- Universal 12-26 Vdc power supply input.
- Local high contrast OLED (optional) graphic display with joystick control.
- Free, easy-to-use configuration and calibration software (RS-232/RS-485).
- Programmable set point table with ramping up/down capability up to 16 steps.

General Description

Aalborg Instruments' DPC series precision digital mass flow controller provides accurate and stable control of mass flow rate, of process gases. With simultaneous display of Mass Flow, Volumetric Flow, Pressure and Temperature parameters it can be used in a variety of industries: scientific and analytical applications, bioreactors and surface depositions, gas sampling, manufacturing and metrology activities.

DPC series precision digital mass flow controller incorporate multi-gas functionality which allows users on site to select up to 30 different gases locally via optional OLED/Joystick interface, remotely via the RS232/RS485 interface or optional Modbus RTU interface.

DPC flow controllers support various functions including: user selectable local, analog, digital or program set point control, two programmable flow totalizers, low, high or range flow, temperature and pressure alarms, automatic zero adjustment (activated via local or communication interface), programmable SSR relay, programmable 0-5 Vdc, 0-10 Vdc or 4-20 mA analog inputs and outputs, user-programmable pulse output (via SSR), and extensive self-diagnostics functionality.

AALBORG DPC series mass flow controllers Totalizers with batch processing mode, high ±(0.5% RD + 0.2%FS) standard accuracy, 200:1 turn-down ratio and less than 150 ms response time allow users to save considerable costs of owning and installation discreet application specific instruments required to perform similar control and measurement.

Principles of Operation

DPC flow controllers are based on the measurement of the differential pressure across specially designed restrictor flow elements. The restrictor flow element is designed to establish laminar flow across the entire range of the instrument's operation from 0 to 133% of full scale range. A high accuracy and high resolution differential pressure sensor is utilized to measure pressure drop across laminar flow channel, which is linearly proportional to volumetric flow rate. To convert volumetric flow in to the mass flow, high accuracy and high resolution absolute pressure and temperature sensors are utilized. Based on data from the sensors and Gas Properties from the built-in data base of the instrument, the micro-controller calculates Volumetric and Mass Flow, which along with Pressure and Temperature parameters are available on the instrument display or via digital interfaces. In addition, the Mass Flow reading is accessible via the instrument Analog interface which can be set by user to 0-5, 0-10 Vdc or 4-20mA mode.

DPC FLOW RANGES

MODEL NO.	FULL SCALE MASS FLOW RATE	PRESSURE DROP AT FULL SCALE FLOW (PSID)	PROCESS CONNECTION
DPC07	0.5 to 50 sml/min	1.0	10-32 Female Thread
DPC17	51 sml/min to 20 sl/min	1.0 - 20.0	1/8" NPT Female
DPC37	21 sl/min to 50 sl/min	5.0 - 8.5	1/8" NPT Female
DPC47	51 sl/min to 100 sl/min	10.0 - 20.0	1/4" NPT Female

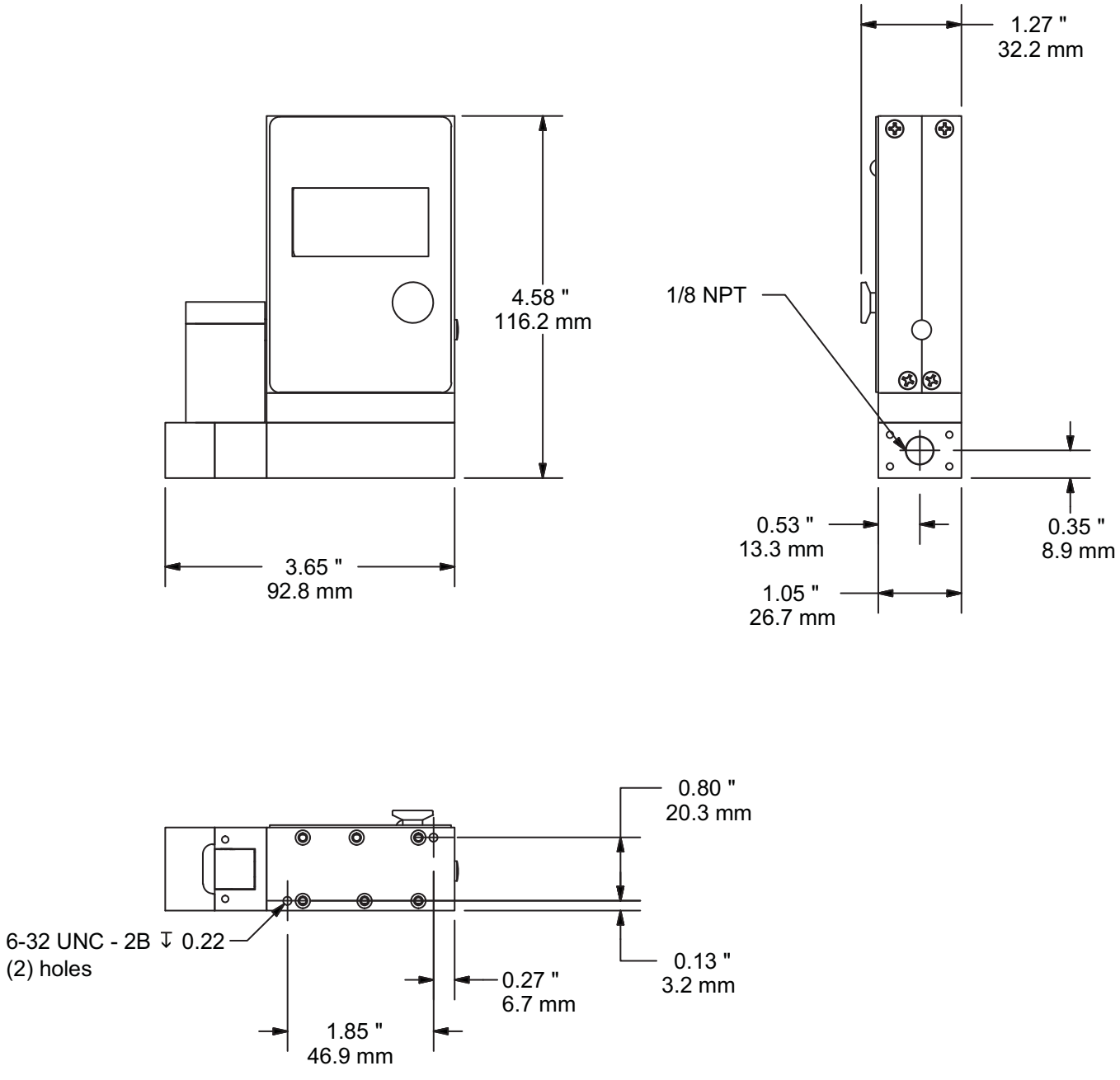
DPC ACCESSORY'S

FITTINGS

MODEL NO.	FITTING CODE	DESCRIPTION
DPC07	F0C2	10-32 Thread, Face Seal, 316 ss
DPC17	F2C2	1/8 NPT thread, 1/8 tubing, 316 ss
DPC17	F2C4	1/8 NPT thread, 1/4 tubing, 316 ss
DPC37	F4C4	1/4 NPT thread, 1/4 tubing, 316 ss
DPC47	F4C6	1/4 NPT thread, 3/8 tubing, 316 ss

POWER SUPPLIES	
PS-GFM-110NA-2	Power Supply, 110 V / 12 Vdc /North America
PS-GFM-110NA-4	Power Supply, 110 V / 24 Vdc /North America
PS-GFM-230EU-2	Power Supply, 220 V / 12 Vdc /Europe
PS-GFM-230EU-4	Power Supply, 220 V / 24Vdc /Europe
PS-GFM-240UK-2	Power Supply 240 V / 12 Vdc /United Kingdom
CABLES	
CBL-A232	Communication Cable for DPC with RS-232 Interface 6 FT 3.5mm stereo audio con. with 3-wire to 9 pins female D-connector (included with each DPC).
CBL-A485	Communication Cable for DPC with RS-485 Interface 6 FT 3.5mm stereo audio con. with 3-wire to stripped ends.
CBL-8MINIDIN-3	Shielded cable 8 pins MinDin with stripped ends 3 feet long
CBL-8MINIDIN-12	Shielded cable 8 pins MinDin with stripped ends 12 feet long
COMMUNICATION PORT ACCESSORIES	
USB-RS232	USB to RS232 converter
USB-RS485	USB to RS485 converter
MODBUS INTERFACE ACCESSORIES	
ECS803-1	RJ45 shielded Y-adapter (Passive TAP).
TDG1026-8C	RJ45 Modular Coupler.
MOD27T	RJ45 Line Terminator (100 Ohm 0.25 W).
JMOD4S-1	RJ45 Splitter fully shielded (5xRJ45, 1 input 4 outputs).
TRD815BL-2	Category 5E Patch Twisted Pair Cable, RJ45 / RJ45, Blue 2.0 feet.
TRD815BL-10	Category 5E Patch Twisted Pair Cable, RJ45 / RJ45, Blue 10.0 feet.
TRD815BL-25	Category 5E Patch Twisted Pair Cable, RJ45 / RJ45, Blue 25.0 feet.

DPC 17 Dimensional Drawing



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DPC SPECIFICATIONS	
FLOW MEDIUM:	Please note that DPC Mass Flow Controllers are designed to work only with clean, non-corrosive gases. Never try to control flow rates of liquids with any DPC.
CALIBRATIONS:	Performed at standard conditions [14.7 psia (101.4 kPa) and 70 °F (21.1 °C)] unless otherwise requested or stated.
ENVIRONMENTAL (PER IEC 664):	Installation Level II; Pollution Degree II.
FLOW ACCURACY (INCLUDING LINEARITY):	±(0.5% RD + 0.2% FS) at calibration temperature and pressure conditions after tare.
REPEATABILITY:	±0.2% of full scale.
FLOW TEMPERATURE COEFFICIENT:	0.05% of full scale/ °C or better.
FLOW PRESSURE COEFFICIENT:	0.01% of full scale/psi (6.895 kPa) or better.
TYPICAL FLOW RESPONSE TIME:	Default 150 ms (adjustable).[1]
INSTRUMENT WARM-UP TIME:	< 5 seconds.
MAXIMUM CONTROLLABLE FLOW RANGE:	133% Full Scale.
OPERATING RANGE / TURNDOWN RATIO:	0.5% to 100% Full Scale / 200:1.
MASS REFERENCE CONDITIONS STP):	70 °F & 14.696 PSIA (other available on request).
MAXIMUM INTERNAL GAS PRESSURE (STATIC):	120 PSIG.
MAXIMUM INSTANTANEOUS DIFFERENTIAL PRESSURE ACROSS DIFFERENTIAL SENSOR:	12 PSID for DPC07/17, 20.5 PSID for DPC37/47.
PROOF PRESSURE:	145 PSIG.
VALVE TYPE:	Normally Closed.
OPERATING TEMPERATURE:	-10 to +60 ˚C (14 to 140 ˚F).
MOUNTING ATTITUDE SENSITIVITY:	None.
RELATIVE GAS HUMIDITY RANGE:	0 to 100% (Non -Condensing).
INGRESS PROTECTION:	IP40.
ANALOG OUTPUT SIGNALS:	Linear 0-5 Vdc (3000 ohms min. load impedance);
	Linear 0-10 Vdc (5000 ohms min. load impedance);
	Linear 4-20 mA (550 ohms maximum loop resistance) with power supply >= 14Vdc.
	Maximum noise 10mV peak to peak (for 0-5/0-10 Vdc output).
ANALOG SET POINT INPUT SIGNALS	Linear 0-5 Vdc, 0-10Vdc (100K input impedance).
	Linear 4-20mA (250 Ohm input impedance).
TRANSDUCER INPUT POWER:	12 to 26 Vdc, 150 mV maximum peak to peak output noise. Power consumption: 250 mA maximum for DPC07/17, 300mA maximum for DPC37/47. Circuit board have built-in polarity reversal protection, 300mA resettable fuse provide power input protection.
DIGITAL OUTPUT SIGNALS [2]:	Standard RS-232 or RS-485 (user selectable). Optional Modbus over isolated RS-485 transceiver.
WETTED MATERIALS:	316 stainless steel, 416 stainless steel, high temperature polyamide, alumina ceramic, poxy, silicone, glass, gold. Viton® O-rings; Buna-N®, Neoprene® or Kalrez® O-rings are optional.

1. For DPC with full scale 20 sml/min and lower the response time may be slightly longer.
2. Digital Signal provide access to Mass Flow, Volumetric Flow, Pressure, Temperature, Totalizers, Alarms.

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ORDERING INFORMATION PRECISION DIGITAL MASS FLOW CONTROLLER WITH MULTI GAS FUNCTIONALITY

DPC	MODEL

MAX FLOW (N2)	
07	0.5 sml/min to 50 sml/min
17	51 sml/min to 20 sl/min
37	21 sl/min to 50 sl/min
47	51 sl/min to 100 sl/min

MATERIAL	
S	Stainless Steel
T	PTFE

SEALS	
V	Viton®
B	Buna®
E	EPR
T	PTFE/ Kalrez®

CONNECTIONS	
0	Not Included (Optional Accessory)

OLED READOUT	
N	NO Display
L	OLED Readout

POWER	
6	Universal 12 to 26 VDC

SET POINT ANALOG INPUT SIGNAL	
A	0-5 VDC
B	4-20 mA
M	0-10 VDC

OUTPUT SIGNAL	
A	0-5 VDC
B	4-20 mA
M	0-10 VDC

DIGITAL INTERFACE	
2	RS232
5	RS485
3	RS232 with Modbus
4	RS485 with Modbus

DPC	17	S	—	V	0	L	6	—	A	A	3

EXAMPLE: DPC17S-V0L6-AA3

SPECIFY: FLOW RANGE, GAS, and PRESSURE

**n.a. = not applicable.*

DPC17, 316 stainless steel, Viton® seals, with OLED readout 12-26 VDC, 0-5 Vdc input signal ,0-5 Vdc output signal,RS 232 with Modbus

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