MODEL DA

Pressure Alarm Controller

Low Differential Pressure

The Model DA is a controller designed for the monitoring of low differential pressures. It combines in one enclosure a low pressure transducer, a digital display, and up to two alarms (see Fig.1).
A 4-20 mA output is also available as an option.
The Model DA controller is typically used for the monitoring of clean room pressures, duct static and velocity pressures; as well as filter differential, draft, fume hood and other low pressure applications.

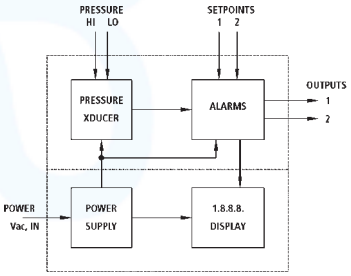


Fig.1 - Block diagram.

DESCRIPTION

The pressure sensing element is a differential capacitance cell for pressure measurements ranging from 0.1 to 5.0 inches of water (25 Pa to 1.0 kPa), or a piezoresistive (silicon) sensor for pressures from 5 inches of water to 30 PSI (1.0 kPa to 200 kPa).

The display section has 3 1/2 digits with bright, easy to read LEDs. The display is factory-calibrated to read in engineering units.

The alarm section is offered with 1 or 2 alarms. Each alarm may be ordered with a relay or transistor output. Each setpoint is displayed by pressing a button on the front panel and its setting is changed by means of a multiturn potentiometer also accessible on the front panel.

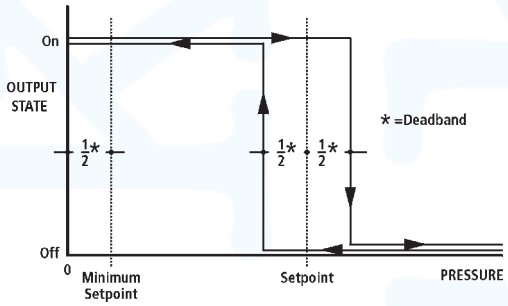
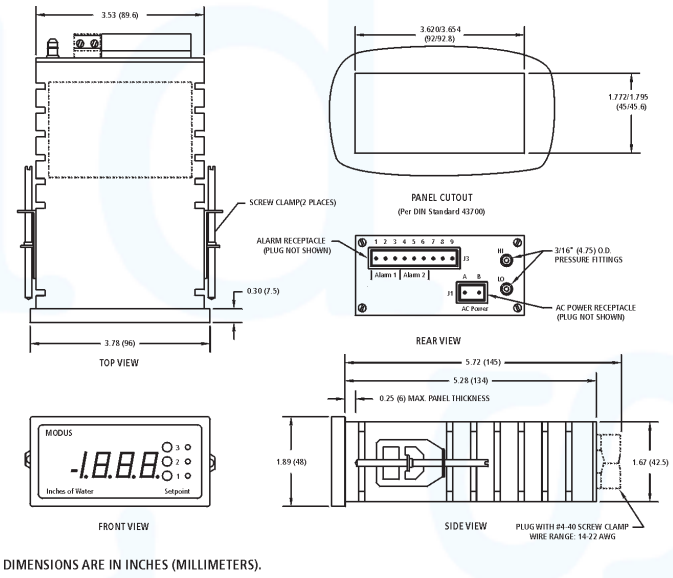


Fig.2 - Deadband diagram.

Figure 2 shows a typical deadband diagram for an alarm energizing on falling pressure. When the momentary pushbutton is pressed, the reading on the display is the position of the midpoint of the deadband.

When the potentiometer is turned all the way counterclockwise, the lowest reading appearing on the display is half the deadband.
Barb fittings and pluggable terminals with screw clamps are provided at the rear for quick and simple field connections.



DIMENSIONS ARE IN INCHES (MILLIMETERS).

SPECIFICATIONS

General

Accuracy of reading: standard ±1% of span + 1 digit (including non-linearity & hysteresis)
Setpoint accuracy: ±0.2% of span + 1 digit (including repeatability)
Power requirements: 21 - 32 Vac, 50/60 Hz, 105-135 Vac, 50/60 Hz or 210-265 Vac, 50/60 Hz
Power consumption: 2.5 VA
Electrical connections: Non-interchangeable power and alarm plugs with #4-40 screw clamps; wire range is 14-22 AWG
Warmup time: 5 minutes to rated accuracy

Pressure Transmitter

Measures differential, gage pressure or vacuum
Medium: Air or inert gases
Standard pressure ranges: See table D for English units and metric units
Maximum safe momentary overpressure: See table D
Zero & span adjustments: 15-turn potentiometers accessible behind red front filter
Port connections: 3/16" (4.75 mm) Dia. suitable for 1/8" or 5/32" I.D. Tygon™ or polyurethane tubing; 1/4"O.D. polyethylene tubing
Air filter at both ports

Display

Display: 3 1/2 digits, 7 segments, orange-red LEDs, 0.56"(14.2 mm) high, decimal point factory-programmable to 4 positions (1.8.8.8.)
Conversion rate: 3 readings/sec
Polarity: Automatic, no positive sign, "–" negative sign
Overrange indication: Beyond 1999 display shows "1"
Zero & span adjustments: 15-turn potentiometers accessible behind red front filter

Alarms

Number of alarms: 1 or 2 alarms
Setpoint adjustment: 15-turn potentiometer accessible through hole in front filter
Setpoint display: By pressing momentary pushbutton in front of controller
Deadband: Factory set at 5% of range to prevent output chatter in most applications
Output: Each alarm is available with either:

A. • SPDT (1 form C) electromechanical relay; contacts rated at 5A 30V DC 120V AC, or 4A at 240V AC resistive
   • Contact material is gold overlay
   • Isolation between contacts and coil is 2000 Vac 1 minute

B. • Transistor (NPN with open collector) rated at: 40 Vdc off-state voltage
   • 120 mAdc on-state current when using an external power supply
   • 40 mA per alarm when using the internal 5 Vdc supply (consult factory for higher currents)
   • 0.4 V saturation voltage at 100 mA
   • Internal diode to absorb transients when the internal 5 Vdc supply is connected to inductive loads

Environmental

Operating temperature: 0°C to 52°C (32°F to 125°F)
Storage temperature: -40°C to 85°C (-40°F to 185°F)
Relative humidity: 0 to 90% non-condensing
Effect of temperature: ±0.05%/°C reading, ±0.01%/°C setpoint

Physical

Dimensions: 1/8 DIN case (see drawing)
Case material: Glass-reinforced NORYL® rated UL94V-1
Weight: 1.0 lb (465 g)

ORDERING INFORMATION

Order Number (See Table below and Reference Table D on page 27)

DA - PS - IP - O - AO - E - OPTION
EXAMPLE: DA - 1 - 13P - 0 - R - F

PS = Power Supply	IP= Input Pressure	O = Offset (See Notes)	Alarm Outputs (See Notes)	E = Energize	OPTION
1 = 120 Vac 2 = 240 Vac 3 = 24 Vac	See Table D	0 = No offset A = 1/4 offset B = 1/2 offset	R = Electro Mechanical T = Transistor	F = Falling pressure R = Rising Pressure	(420) = 4 to 20 mA output

NOTES

Offset

If the controller must operate when a reversal of pressure occurs, then an offset must be specified. To order a controller with offset zero, estimate the maximum positive pressure excursion needed and select the appropriate pressure range from Table D. Then estimate the maximum negative pressure excursion. If it is about equal to the positive excursion, specify "B" offset. If the negative excursion is less than half of the positive excursion, specify an "A" offset.

WIRING DIAGRAMS

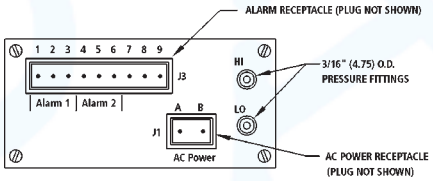


Fig.3. Rear panel connections.

Fig.3 is a view of the rear panel of the controller with the high and low pressure ports, the power receptacle J1 (with terminals labeled A & B) and the alarm output receptacle J3 (with terminals labeled 1 through 9).

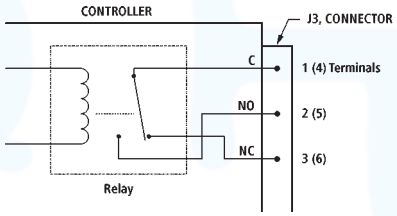


Fig.4 Relay output.

Fig. 4 shows the internal wiring of the electromechanical relay. This type of output will switch small loads such as pilot lights or audible alarms. Also, the gold contacts offer a reliable output when a contact closure must be sensed and the current is very low.

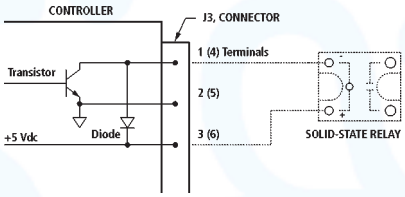


Fig.5 Transistor output, internal power supply.

Fig. 5 is a wiring diagram of the transistor output connected to a solid-state relay. The input voltage range of the relay is 3 to 32 Vdc. Power is supplied by the internal 5 Vdc supply of the controller. If an inductive load is connected, the internal diode will protect the transistor against transients.

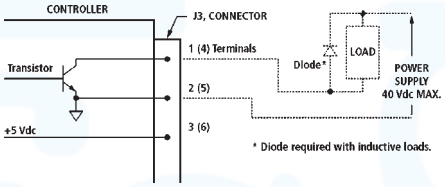


Fig.6 Transistor output, external power supply.

Fig. 6 shows the transistor controlling a load powered by an external 12 or 24 Vdc supply.
An external diode or other means of limiting transients to 40 Volts must be added if the load is inductive. The current must not exceed 120 mA.

Alarm Outputs

R Electromechanical relay.
T Transistor, NPN with open collector (specify if external power supply is used). The above alarms can be configured at the factory to energize on rising or falling pressure. To specify the logic, add the following letter after the alarm type:

R Energizing on rising pressure
F Energizing on falling pressure

For example: Alarm 1 is selected with a transistor energized on falling pressure, the ordering code is "TF." Alarm 2 is a relay energized on rising pressure, the code would be "TR"

TABLE A—STANDARD PRESSURE RANGES

ENGLISH			METRIC UNITS					
Pressure Code	Pressure Range English	Max. Safe Momentary Overpressure	Pressure Code	Pressure Range Pascals	Max. Safe Momentary Overpressure	Pressure Code	Pressure Range Pascals	Max. Safe Momentary Overpressure
01E	0-0.100 in. H_2O		01P	0-25.0 Pa		01M	0-2.50 mm H_2O	
02E	0-0.200 in. H_2O	5 in. H_2O	02P	0-50.0 Pa	1.25 kPa	02M	0-5.00 mm H_2O	125 mm
03E	0-0.300 in. H_2O		03P	0-75.0 Pa		03M	0-7.50 mm H_2O	
04E	0-0.500 in. H_2O		04P	0-100.0 Pa		04M	0-10.00 mm H_2O	
05E	0-1.00 in. H_2O		05P	0-250 Pa		05M	0-25.0 mm H_2O	
06E	0-2.00 in. H_2O	20 in. H_2O	06P	0-500 Pa	5 kPa	06M	0-50.0 mm H_2O	500 mm
07E	0-3.00 in. H_2O		07P	0-750 Pa		07M	0-75.0 mm H_2O	
08E	0-5.00 in. H_2O		08P	0-1.00 kPa		08M	0-100 mm H_2O	
09E	0-10.0 in. H_2O	5 psid	09P	0-2.50 kPa	35 kPa	09M	0-250 mm H_2O	3.5 m
11E	0-20.0 in. H_2O		11P	0-5.00 kPa		11M	0-500 mm H_2O	
12E	0-30.0 in. H_2O		12P	0-7.50 kPa		12M	0-750 mm H_2O	
13E	0-50.0 in. H_2O		13P	0-10.0 kPa		13M	0-1.00 m H_2O	
14E	0-100 in. H_2O	15 psid	14P	0-25.0 kPa	100 kPa	14M	0-2.5 m H_2O	10 m
15E	0-1.00 psid		15P	0-50.0 kPa		15M	0-5.0 m H_2O	
16E	0-2.00 psid		-	-		-	-	
17E	0-3.00 psid		-	-		-	-	
18E	0-5.00 psid		-	-		-	-	
19E	0-15.0 psid	30 psid	16P	0-100 kPa	200 kPa	16M	0-10.0 m H_2O	20 m
20E	0-30.0 psid	60 psid	17P	0-200 kPa	400 kPa	17M	0-20.0 m H_2O	40 m

TABLE B—STANDARD PRESSURE RANGES FOR W SERIES

ENGLISH UNITS			METRIC UNITS					
Pressure Code	Differential Pressure Range, psid	Operating Static Pressure, psi	Pressure Code	Differential Pressure Range, kPA	Operating Static Pressure, psi	Pressure Code	Differential Pressure Range, k mm H_2O	Operating Static Pressure k mm H_2O
31E	0-6 psid		31P	0-50 kPa		31M	0-5.0 k mm H_2O	
32E	0-10 psid	0-100 psi*	32P	0-75 kPa	0 - 700 kPa*	32M	0-7.5 k mm H_2O	0-70 k mm H_2O
33E	0-15 psid		33P	0-100 kPa		33M	0-10 k mm H_2O	
34E	0-30 psid		34P	0-200 kPa		34M	0-20 k mm H_2O	
35E	0-60 psid		35P	0-500 kPa		35M	0-50 k mm H_2O	
36E	0-100 psid	0 - 300 psi*	36P	0-750 kPa	0 - 2000 kPa*	36M	0-75 k mm H_2O	0-200 k mm H_2O
37E	0-150 psid		37P	0-1000 kPa		37M	0-100 k mm H_2O	
38E	0-200 psid		38P	0-1500 kPa		38M	0-150 k mm H_2O	

* Maximum safe momentary overpressure at any port is 2X the maximum operating static pressure

TABLE C—STANDARD PRESSURE RANGES FOR MANOMETER

ENGLISH				METRIC UNITS							
Pressure Code	Pressure Range	Displayed Units	Max. Safe Momentary Overpass	Pressure Code	Pressure Range Pascals	Displayed Units	Max. Safe Momentary Overpass	Pressure Code	Pressure Range mm of H_2O	Displayed Units	Max. Safe Momentary Overpass
01E	0-0.100 in. H_2O	.100		01P	0-25.0 Pa	25.0		01M	0-2.50 mm	2.50	
02E	0-0.200 in. H_2O	.200	5 in H_2O	02P	0-50.0 Pa	50.0	1.25 kPa	02M	0-5.00 mm	5.00	125 mm
03E	0-0.300 in. H_2O	.300		03P	0-75.0 Pa	75.0		03M	0-7.50 mm	7.50	
04E	0-0.500 in. H_2O	.500		04P	0-100 Pa	100.0		04M	0-10.0 mm	10.0	
05E	0-1.00 in. H_2O	1.000		05P	0-250 Pa	250		05M	0-25.0 mm	25.0	
06E	0-2.00 in. H_2O	1.999	$2H_20$	06P	0-500 Pa	500	5 kPa	06M	0-50.0 mm	50.0	500 mm
07E	0-3.00 in. H_2O	3.00		07P	0-750 Pa	750		07M	0-75.0 mm	75.0	
08E	0-5.00 in. H_2O	5.00		08P	0-1.00 kPa	1.000		08M	0-100 mm	100.0	
09E	0-10.0 in. H_2O	10.00		09P	0-2.50 kPa	2.50		09M	0-250 mm	250	
11E	0-20.0 in. H_2O	19.99	5 psid	11P	0-5.00 kPa	5.00	35 kPa	11M	0-500 mm	500	3.5 m
12E	0-30.0 in. H_2O	30.0		12P	0-7.50 kPa	7.50		12M	0-750 mm	750	
13E	0-50.0 in. H_2O	50.0		13P	0-10.0 kPa	10.00		13M	0-1.00 m	1.000	
14E	0-100 in. H_2O	100.0		14P	0-25.0 kPa	25.0		14M	0-2.50 m	2.50	
15E	0-1.00 psid	1.000	5 psid	15P	0-50.0 kPa	50.0	100 kPa	15M	0-5.00 m	5.00	10 m
16E	0-2.00 psid	1.999		16P	0-100 kPa	100.0		16M	0-10.0 m	10.00	
17E	0-3.00 psid	3.00		17P	0-200 kPa	199.9		17M	0-20.0 m	19.99	
18E	0-5.00 psid	5.00									

TABLE D—STANDARD PRESSURE RANGES

English Units

Pressure Code (1)	Pressure Range	Displayed Units (2)	Resolution	Maximum Overpressure
01E	0-0.1 in. H_2O	.100	0.001"	5.0"
02E	0-0.2 in. H_2O	.200	0.001"	5.0"
04E	0-0.5 in. H_2O	.500	0.001"	5.0"
05E	0-1.0 in. H_2O	1.000	0.001"	20.0"
06E	0-2.0 in. H_2O	1.999	0.001"	20.0"
08E	0-5.0 in. H_2O	5.00	0.01"	5 psid
09E	0-10.0 in. H_2O	10.00	0.01"	5 psid
11E	0-20.0in. H_2O	19.99	0.01"	5 psid
15E	0-1 psid	1.000	0.001"psid	15 psid
16E	0-2 psid	1.999	0.001"psid	15 psid
17E	0-3 psid	3.00	0.01"psid	15 psid
18E	0-5 psid	5.00	0.01"psid	15 psid
19E	0-15 psid	15.00	0.01"psid	30 psid
20E	0-30 psid	30.0	0.1"psid	60 psid
**E	Contact factory for other pressure ranges, displayed units and resolution			

Metric Units, millimeters of water

Pressure Code (1)	Pressure Range	Displayed Units (2)	Resolution	Maximum Overpressure
01M	0-2.50 mm H_2O	2.50	0.01 mm	125 mm
02M	0-5.00	5.00	0.01 mm	125 mm
04M	0-10.0	10.00	0.01 mm	125 mm
05M	0-25.0	25.0	0.1 mm	500 mm
06M	0-50.0	50.0	0.1 mm	500 mm
08M	0-100	100.0	0.1 mm	3.5 m
09M	0-250	250	1.0 mm	3.5 m
11M	0-500	500	1.0 mm	3.5 m
13M	0-1.00 meter	1.000	.001 meter	10 m
14M	0-2.50 meter	2.50	.01 meter	10 m
15M	0-5.00 meter	5.00	.01 meter	10 m
16M	0-10.0 meter	10.00	.01 meter	20 m
17M	0-20.0 meter	19.99	.01 meter	40 m
**M	Contact factory for other pressure ranges, displayed units and resolution			

Metric Units, pascals

Pressure Code (1)	Pressure Range	Displayed Units (2)	Resolution	Maximum Overpressure
01P	0-25 Pa	25.0	0.1 Pa	1.25 kPa
02P	0-50 Pa	50.0	0.1 Pa	1.25 kPa
04P	0-100 Pa	100.0	0.1 Pa	1.25 kPa
05P	0-250 Pa	250	1 Pa	5.0 kPa
06P	0-500 Pa	500	1 Pa	5.0 kPa
08P	0-1.0 kPa	1.000	1 Pa	35 kPa
09P	0-2.5 kPa	2.50	10 Pa	35 kPa
11P	0-5.0 kPa	5.00	10 Pa	35 kPa
13P	0-10 kPa	10.00	10 Pa	100 kPa
14P	0-25 kPa	25.0	100 Pa	100 kPa
15P	0-50 kPa	50.0	100 Pa	100 kPa
16P	0-100 kPa	100.0	100 Pa	200 kPa
17P	0-200 kPa	199.9	100 Pa	400 kPa
**P	Contact factory for other pressure ranges, displayed units and resolution			

(1) Use this code when ordering.
(2) This column shows the number of digits that are displayed and the position of the decimal point.

TABLE E

Velocity Ranges, feet per minute

Pressure Code (1)	Pressure Range	Velocity Range	Displayed Units (2)	Resolution	Maximum Overpressure
capacitance cell					
01F	0-0.1 in. H_20	90 - 1266 fpm	1.27	10 fpm	5.0 in. H_20
02F	0-0.2 in. H_20	125 - 1791 fpm	1.80	10 fpm	5.0 in. H_20
04F	0-0.5 in. H_20	200 - 2832 fpm	2.83	10 fpm	5.0 in. H_20
05F	0-1.0 in. H_20	280 - 4005 fpm	4.00	10 fpm	20.0 in. H_20
06F	0-2.0 in. H_20	400 - 5664 fpm	5.66	10 fpm	20.0 in. H_20
08F	0-5.0 in. H_20	4625 - 8955 fpm	8.96	10 fpm	50.0 in. H_20
09F	0-10.0 in. H_20	885 - 12665 fpm	12.7	100 fpm	50.0 in. H_20
**F	Contact factory for other pressure or velocity ranges, displayed units and resolution				

1. Use this code when ordering.
2. The velocities are accurate for dry air at standard conditions (air density of 0.075 lb/ft^3, barometric pressure of 29.92 inches of mercury and temperature of 70°F). It is also assumed that standard pitot tubes similar to those described in the accessory bulletin are used. The velocities are derived from the following formula:

$V = 4005 \sqrt{H_v}$ Where: V is air velocity in feet per minute

H_v is velocity pressure in inches of water

Velocity Ranges, meters per second

Pressure Code (1)	Pressure Range	Velocity Range	Displayed Units (2)	Resolution	Maximum Overpressure
capacitance cell					
01V	0-2.5 mm H_20	0.45 - 6.4 m/s	6.50	0.01 m/s	125 mm
02V	0-5.0 mm H_20	0.63-9 m/s	9.00	0.01 m/s	125 mm
04V	0-10.0 mm H_20	0.90 - 13 m/s	13.0	0.1 m/s	125 mm
05V	0-25.0 mm H_20	1.4 - 20 m/s	20.0	0.1 m/s	500 mm
06V	0-50.0 mm H_20	2.0 - 29 m/s	29.0	0.1 m/s	500 mm
08V	0-100 mm H_20	2.8 - 40 m/s	40.0	0.1 m/s	1250 mm
09V	0-250 mm H_20	4.5 - 64 m/s	64.0	0.1 m/s	1250 mm
**V	Contact factory for other pressure or velocity ranges, displayed units and resolution				

1. Use this code when ordering.
2. The velocities are accurate for dry air at standard conditions (air density of 1.201 kg/m^3, barometric pressure of 760 mm of mercury and temperature of 21°C). It is also assumed that standard pitot tubes similar to those described in the accessory bulletin are used. The velocities are derived from the following formula:

$V = 4.037 \sqrt{H_v}$ Where: V is air velocity in meters per second

H_v is velocity pressure in millimeters of water