

MODEL DW

Pressure Display Controller

Low Differential Pressure



The Model DW pressure controller accurately monitors and controls very low pressures. It combines in one enclosure a low pressure transducer, a digital display and two alarms (see Fig. 1). This pressure controller has a three-state output: a high pressure alarm when the pressure exceeds a high limit, a low pressure alarm when the pressure falls below a low limit, and no output when the pressure is within these limits.

It is typically used for the monitoring and control of pressure in closed areas such as rooms and buildings.

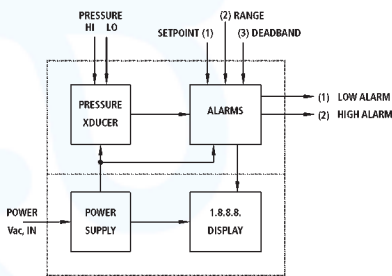


Fig. 1 Block Diagram

DESCRIPTION

The pressure sensing element is a differential capacitance cell for pressure measurements ranging from 0.1 to 5.00 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 2 alarms. Each alarm may be ordered with a relay, or transistor output. On the front panel are three multiturn potentiometers and three pushbuttons. Momentarily pressing a pushbutton displays the corresponding potentiometer setting (see Fig. 2).

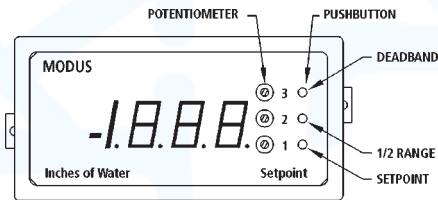
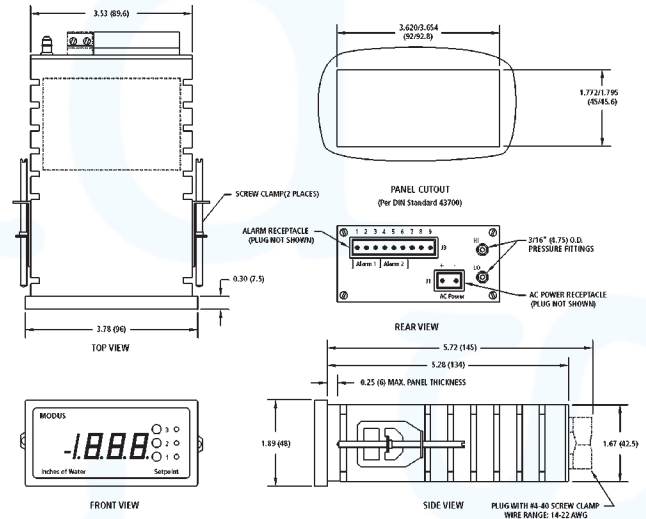


Fig. 2 Front panel of controller

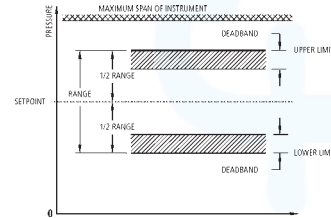
Potentiometer 1 sets the desired control pressure (setpoint).

Potentiometer 2 controls the range (or the \pm deviation from the setpoint). Displayed value is 1/2 the range.

Potentiometer 3 controls the deadband. This is the pressure change required to turn the high or low alarm OFF when the controlled pressure is moving toward the setpoint after reaching the upper or lower limit (see fig. 3). 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

Accuracy of reading: Standard $\pm 1\%$ of span + 1 digit (including non-linearity & hysteresis)

Setpoint accuracy: $\pm 0.2\%$ 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 reference table D

Maximum safe momentary overpressure: See reference 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 9999 display shows "1"

Zero & span adjustments: 15-turn potentiometers accessible behind red front filter

WIRING DIAGRAMS

Alarms

Number of alarms: 2 alarms

Setpoint range & deadband adjustments: 15-turn potentiometers accessible through holes in front filter (see fig.2)

Setpoint range or deadband display: by pressing momentary push-button in front of controller (see fig.2)

Setpoint adjustment: from 0 to 100% of span

1/2 range adjustment: from 1% to 33% of span

Deadband adjustment: from 0 to 33% of span

Output: each alarm is available with either:

A. SPDT (1 form C) electromechanical relay; contacts rated at 3A 30V DC or 120V AC, or 4A at 240V AC resistive

- Contact material is gold overlay
- Isolation between contacts and coil is 2000 Vrms minimum.

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: 10% to 90% R.H. non-condensing

Effect of temperature: $\pm 0.05\%/^{\circ}\text{C}$ reading $\pm 0.01\%/^{\circ}\text{C}$ 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)

DW - PS - IP - O - AO

EXAMPLE: DW - 1 - 13P - 0 - TFTR00

PS = Power Supply	IP = Input Pressure	O = Offset	AO = Alarm Output (See Notes)
1 = 120 Vac 2 = 240 Vac 3 = 24 Vac	See Table D for English or metric, or Table E for English or metric velocity (square root outputs)	Offsets are not available. Enter "0", no offset.	RFRR00 = Electro mechanical relay TFTR00 = Transistor, NPN with open collector

NOTES

Alarm Outputs

RFRR00 Electromechanical relay

TFTR00 Transistor, NPN with open collector (specify if external power supplied is used). Alarm 1 is configured to energize on falling pressure and alarm 2 on rising pressure (alarm 3 is not used).

When ordering a Model DW controller, supply the following three fields: power supply, input pressure and alarm outputs. A typical part number may look as follows: DW-1-13P-0-TFTR00

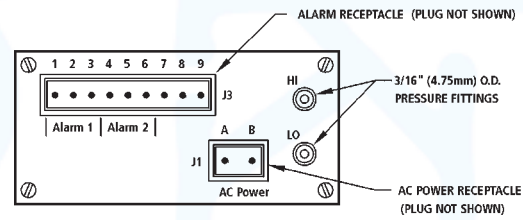


Fig.5 Rear panel connections.

Figure 5 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).

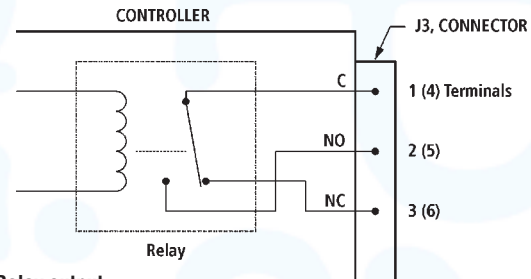


Fig.6 Relay output.

Figure 6 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.

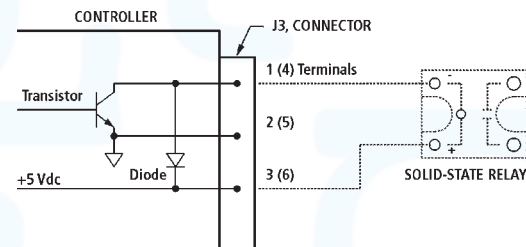


Fig.7 Transistor output, internal power supply.

Figure 7 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.

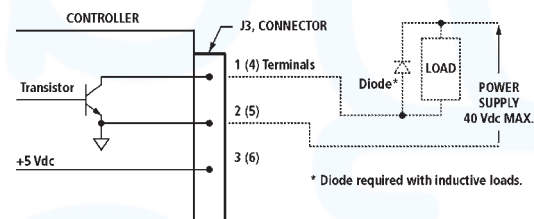


Fig.8 Transistor output, external power supply.

Figure 8 shows the transistor controlling a load powered by an external 12 or 24 Vdc supply. The internal diode has been removed and 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.

TABLE D—STANDARD PRESSURE RANGES**English Units**

Pressure Code (1)	Pressure Range	Displayed Units (2)	Resolution	Maximum Overpressure
01E	0-0.1 in. H ₂ O	.100	0.001"	5.0"
02E	0-0.2 in. H ₂ O	.200	0.001"	5.0"
04E	0-0.5 in. H ₂ O	.500	0.001"	5.0"
05E	0-1.0 in. H ₂ O	1.000	0.001"	20.0"
06E	0-2.0 in. H ₂ O	1.999	0.001"	20.0"
08E	0-5.0 in. H ₂ O	5.00	0.01"	5 psid
09E	0-10.0 in. H ₂ O	10.00	0.01"	5 psid
11E	0-20.0 in. H ₂ O	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 ₂ O	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 ₂ O	90 - 1266 fpm	1.27	10 fpm	5.0 in. H ₂ O
02F	0-0.2 in. H ₂ O	125 - 1791 fpm	1.80	10 fpm	5.0 in. H ₂ O
04F	0-0.5 in. H ₂ O	200 - 2832 fpm	2.83	10 fpm	5.0 in. H ₂ O
05F	0-1.0 in. H ₂ O	280 - 4005 fpm	4.00	10 fpm	20.0 in. H ₂ O
06F	0-2.0 in. H ₂ O	400 - 5664 fpm	5.66	10 fpm	20.0 in. H ₂ O
08F	0-5.0 in. H ₂ O	4625 - 8955 fpm	8.96	10 fpm	50.0 in. H ₂ O
09F	0-10.0 in. H ₂ O	885 - 12665 fpm	12.7	100 fpm	50.0 in. H ₂ O
**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/ft³; 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:

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

$$H_v \text{ is velocity pressure in inches of water}$$

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 ₂ O	0.45 - 6.4 m/s	6.50	0.01 m/s	125 mm
02V	0-5.0 mm H ₂ O	0.63-9 m/s	9.00	0.01 m/s	125 mm
04V	0-10.0 mm H ₂ O	0.90 - 13 m/s	13.0	0.1 m/s	125 mm
05V	0-25.0 mm H ₂ O	1.4 - 20 m/s	20.0	0.1 m/s	500 mm
06V	0-50.0 mm H ₂ O	2.0 - 29 m/s	29.0	0.1 m/s	500 mm
08V	0-100 mm H ₂ O	2.8 - 40 m/s	40.0	0.1 m/s	1250 mm
09V	0-250 mm H ₂ O	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/m³; 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:

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

$$H_v \text{ is velocity pressure in millimeters of water}$$